# Effectiveness of a medical polyvalent Day Care Hospital: evaluation of the reduction of hospitalizations and days of hospitable stay

A before-and-after study

**Final Degree Project**

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# 1. ABSTRACT

**BACKGROUND:** Day Care Hospitals (DCH) are medical healthcare units where are attended patients that need diagnostic methods or treatments that last a few hours of attention, but that do not need to be hospitalized. "Hospital Universitari de Vic" has recently initiated a new project to improve the medical attention of the patients and to clear up the contact between professionals. One of the pillars of the project is the opening of a medic DCH. There are few studies that evaluate the medical care and the profitability of DCH in Spain, but they have generally concluded that DCHs provide a reduction of pressure on the Emergency Room and on the Hospitalization Floor.

**JUSTIFICATION:** This study is realized to evaluate the effectiveness of the opening of the DCH in Vic with the reduction of hospitalizations and the reduction of the time that patients are hospitalized. A lower number of hospitalizations implies a lower number of complications related to the hospitalizations, a lower sanitary expense and an improvement on the optimizations of the resources. This study will also provide data that could be interesting for the sanitary centers that want to open a DCH.

**AIMS:** To describe the characteristics of the chronic patients (HF, chronic pneumopathies and LC) that are attended at the DCH. To determine the effect on the number of hospitalizations and hospitable stays of the patients with chronic advanced diseases (HF, CP, LC) with the functioning of the Day Care Hospital. To determine the real impact in the general number of medical hospitalizations in the HUV.

**METHODS:** This study has been realized with a before-and-after study, with the opening of the DCH in Vic as the main intervention. It has been realized in the medical DCH of the HUV with a sample of 78 subjects, which have been collected with a consecutive no-probabilistic sampling of the patients that have been attended in the DCH of the HUV. Demographic, clinical, diagnostic and treatment data of the patients have been collected. The number of hospitalizations, hospitable stays and attentions to the Emergency Room has also been collected during a period of time that has been equal between the after and the before period of the DCH opening. The hospitalizations and the hospitable stays during the months of DCH functioning have been compared with the same period of the 2 previous years (2013 and 2014). The statistical analysis has been realized with the SPSS statistical package v21.0.

**RESULTS:** The most frequent attended disease was heart failure, with the 50% of prevalence in the DCH. It has been detected a borderline statistical significance of the reduction of medical hospitalizations compared to the previous two years, when the DCH wasn't working.

**CONCLUSION:** The medical Day Care Hospital in Vic has reduced the number of hospitalizations and hospitable stays of the attended patients during the six months that has been working.

**KEYWORDS:** Day Care Hospital; Hospitalization reduction; Hospitable stay reduction.

## 2. ABBREVIATIONS

| | |
|---|---|
| **ACEI** | Angiotensin converting enzyme inhibitor |
| **ACS** | Acute coronary syndrome |
| **ARA-II** | Angiotensin II receptor antagonists |
| **CAFO** | Chronical Airflow Obstruction |
| **CAP** | Continued Attention Programs |
| **COPD** | Chronic obstructive pulmonary disease |
| **CP** | Chronic pneumopathies |
| **DCH** | Day Care Hospitals |
| **DM** | Diabetes mellitus |
| **ER** | Emergency Room |
| **HBP** | High Blood Pressure |
| **HE** | Hepatic encephalopathy |
| **HF** | Heart failure |
| **HUV** | Hospital Universitari de Vic |
| **ICD** | Implantable cardioverter-defibrillator |
| **IPE-4** | Phosphodiesterase type 4 inhibitor |
| **LABA** | Long-acting beta-adrenoceptor agonists |
| **LAMA** | Long-acting muscarinic antagonists |
| **LC** | Liver cirrhosis |
| **MELD** | Model for end-stage Liver Disease |
| **MRC** | Medical Research Council |
| **NYHA** | New York Heart Association |
| **PHT** | Portal Hypertension |
| **RDU** | Rapid Diagnose Unit |
| **RenI** | Renal insufficiency |
| **RespI** | Respiratory insufficiency |
| **SABA** | Short-acting beta-adrenoceptor agonists |
| **SAMA** | Short-acting muscarinic antagonists |
| **SBP** | Spontaneous Bacterial Peritonitis |
| **SD** | Standard Deviation |
| **UGIB** | Upper gastrointestinal bleeding |

# 3. INTRODUCTION

## 3.1. Medical day care hospitals

Day Care Hospitals (DCH) are medical healthcare units where are attended patients who need diagnostic methods or treatments that last a few hours of attention, but that do not need to join the hospital (1,2).

DCHs are an alternative to the conventional hospitalization that allow attending the patients with major comfort and the disadvantages of the hospitalization are avoided.

Typically they are closed during the night and the weekends, so that means that there is a saving resource very important.

A great coordination is needed between the multiple services of the hospital, but DCHs allow that the medical assistance should be more agile and more comfortable for the patient.

DCHs can contribute to provide multiple advantages that favor multiple agents: the patient, the sanitary personnel and the medical center (4):

- The patient can reconcile his/her labor or domestic life with the treatment and follow-up of his/her disease because medical appointments can be scheduled according to the patient's calendar.
- The medical staff knows the patient situation and the characteristics of the disease with more details, since the patient is visited frequently.
- The sessions in the DCH are programmed independently of hospitalization, so it is less likely that they are cancelled or delayed.
- The patients perceive it as less aggressive than hospitalization.
- DCHs reduce potential adverse effects inherent to hospitalization, as nosocomial infections.
- DCHs allow us to program treatments most directly and with flexibility, so that facilitates the work of the medical staff.
- DCHs reduce waiting lists and waiting time for certain procedures.

DCHs have arisen to cover the needs of the patients throughout the years. For example, the oncologic DCHs have been opened to accompany the patient in the moments that receives the oncologic therapy. They have also been opened to treat reactions of intolerance to the antineoplastic therapy.

Another example is the psychiatric DCH, which have also been developed to control the psychiatric diseases that need a closer view, but that are not tributaries of hospitalization (6).

### 3.2. The Day care hospital in Hospital Universitari de Vic

Hospital Universitari de Vic has recently started a project called PANORAMA (Projecte d'Adequació als Nous Reptes en l'Atenció Mèdica), coordinated by the Service of Internal Medicine of Consorci Hospitalari de Vic, which has as the principal engine the medical Day Care Hospital.

This medical Day Care Hospital is aimed to patients with prevalent chronic pathologies that have a high risk of suffering exacerbations of their disease: chronic pneumopathies (CP), heart failure (HF) and liver cirrhosis (LC). These patients normally have to be attended in the Emergency Room (ER) and they usually finish hospitalized in the Internal Medicine Service.

The opening of the DCH in Vic has as aims:

- To provide an important saving of the hospitalization of these patients
- To improve the indexes of inadequate hospitalization
- To reduce the medical hospitalizations
- To provide a better life's quality to the attended patients
- To liberate beds in the Internal Medicine Service
- To provide a better personal attention to the patients
- To reduce the hospital complications, as the nosocomial infection
- To reach an economic saving for the HUV

The DCH is a device that requires a high coordination with other health services in the territory. For that reason, the professionals who work at the DCH go to the ER every day to drift the patients that are candidates to be attended at the DCH. The professionals also hold weekly meetings with the Basic Health Areas in the region of Osona to inform the Family Doctors of the evolution of their respective patients.

The DCH has also created a Rapid Diagnose Unit (RDU), which allows speeding up the diagnoses of the diseases that require quick action. Patients are treated in a less expensive system of assistance, with the same availability of diagnostic resources than the patients that are hospitalized, but with more agility in the diagnostic process and without a reduction of the quality of the assistance.

The most frequent reasons of consultation in the RDU are toxic syndrome, anemia, feverish syndrome, systemic autoimmune diseases, dyspnea and adenopathies.

In the RDU, intravenous medical treatments can also be provided by the nursing personnel (programmed blood transfusions, intravenous iron, intravenous immunoglobulin infusions,

immunosuppressants or biological treatments), which allows a major therapeutic comfort for the patient.

The medical DCH of the HUV is formed by nine separated spaces of medical attention: six armchairs with chairs for the accompanists, two beds in two separated rooms and a medical consultation that provides major intimacy to the patient when it is interrogated and explored.
The personnel that works in the medical DCH is formed by two nurses, that work in two different work shifts (morning and afternoon), that administer the prescribed treatments and attend the telephonic calls that are directed to the DCH; and a doctor, who carries out the diagnostic labors and the follow-up of the patients. In spite on the fact that the personnel is limited, the aim is to increase the medical personnel in a few months.

### *3. 2. 1. Patients of Day care hospital in Vic*

The medical DCH in HUV is managed by the Internal Medicine Service, so the pathologies that are attended there are medical diseases, not surgical.

The attended patients have advanced chronic diseases that have exacerbated or have a high risk of suffering an exacerbation. The characteristics of each type of patient are:

- Patients with heart failure with functional class I-IV according to the NYHA (12) that are suffering a moderate or severe exacerbation. An exacerbation of the HF is defined by the rapid onset of the signs and symptoms of the IC or the appearance of changes on these signs and symptoms, and these clinical symptoms require urgent attention and treatment (7).

  This exacerbation can occur in different clinical forms:

  - Pulmonary edema
  - Peripheral edema or congestion
  - Dyspnea
  - Orthopnea
  - Paroxysmal nocturnal dyspnea
  - Appearance of cough or changes in cough characteristics
  - Nocturia
  - Fatigue

- Patients with Chronic Pneumopathies (CP), which the most frequent type is the COPD, with functional class I-IV according to the BODE index (11) that are suffering a moderate or severe exacerbation of their basal dyspnea, with a sudden or a progressive onset.

- Patients with liver cirrhosis with functional class A-C according to the Child-Pugh classification (13), which are suffering or are in risk of suffering an exacerbation. An exacerbation of the LC is defined with the appearance of (9):

  - Dropsical decompensation: ascites or hydrothorax
  - Spontaneous bacterial peritonitis, for which we can only provide the diagnose, because the treatment has to be done in the Hospitalization Floor
  - Hepatorenal syndrome
  - Hepatic encephalopathy
  - Hepatopulmonary syndrome

These patients are attended in the DCH in Vic during the course of their exacerbation. Once the patient gets the baseline of its illness or reaches a stable phase of the disease, is derived to his/her Family doctor or to the specialist doctor to continue the medical monitoring.

If a new exacerbation appears and the Family doctor has not the appropriate resources to treat the disease, the Family doctor can led the patient back to the DCH to prevent the progression of the exacerbation and to avoid a hospitalization.

### 3.3. Current data of Day care hospitals

There are few studies that evaluate the medical care and the profitability of DCH in Spain. Most published studies refer to cancer or psychiatric DCH because they are a very prevalent type of DCH (1).

Throughout the years a doubt has arisen from DCHs: general DCHs are more profitable than specialized DCHs?

General DCHs are medical or medical-surgical DCHs, which are designed to attend multiples pathologies of different services, while specialized DCHs take charge of specific procedures, as oncologic, psychiatric or hematologic DCH.

Although the debate was opened, there has not been realized any study that has compared the efficiency or the effectiveness between both types of DCH (5). Nevertheless, different studies have been realized separately of DCHs, with the evaluation of avoided hospital admissions and the life's quality of the patients in each type of DCH.

The studies realized in polyvalent DCHs have demonstrated that the DCH is profitable, since it generates a saving in comparison to the conventional hospitalization. A study realized in the "Hospital Universitario de Valladolid" demonstrated that the cost of the DCH is equivalent to the 8,6% of the costs generated by the conventional hospitalization (1). Then, the saving is really important.

Polyvalent DCHs also bring benefits in terms of quality care, since they improve the quality indicators of the service (they reduce the rate of cancellation of meetings, the rate of transfusions reactions and the ambulatory index). The surveys that have been past to the patients also demonstrate a good quality of the service, since the 93% of the patients refer a global satisfaction with the service (1,18).

The success of general DCHs on reducing the hospitalizations has been assumed to two factors: firstly, that the DCH is capable to reduce the inadequate hospital admissions (for example, the hospitalizations that are done to expedite studies, procedures and treatments) and secondly, that DCH allows diminishing the readmissions (18).

Regarding to the DCHs of concrete specializations, there has been demonstrated that DCHs are cost-effective because they reduce the sanitary expenses in comparison to the classic hospitalization. This is possible due to the reduction of the number of hospitalizations (2,3).

Despite the fact that some hospitals had to increase the number of physicians to open the DCH, the

reduction of the number of hospitalizations has compensated this expense (3). In addition, while the DCH was opened, there were more available beds because they were fewer hospitalizations, so in some cases it was possible to reduce the personnel that was working at conventional hospitalization.

In the studies realized in Pulmonologist DCHs, the authors attributed the success of the DCH to a Specialized Attention Program (SAP) that allows to know better each patient (2,3,17). Thereby, DCHs reduce in the first year of the follow-up of the patient to less than 50% the attendances to the Emergency Room (2). They also diminish the number of hospitalizations and they reduce to 10 days the average hospitable stay, with a reduction of the sanitary expenses of 50% in comparison to the classic hospitalization (2).

There have also been evaluated the indexes of quality of the assistance, and the results have shown that they have not been deteriorated. The rate of readmissions and the mortality rate have been kept stable from the opening of the DCH (3).
If we consider the impact on the family life as a quality indicator, we obtain a great improvement in the quality of life, since the patients can adapt their schedules to the visits to the DCH and they do not need to be admitted to the hospital so much often (3).

In conclusion, DCHs provide a reduction of pressure on the Emergency Room and on the Hospitalization Floor (3). That supposes a great economic advantage to the hospital and an improvement on the optimization of the resources.

### 3.4. Evaluation methodology

To value the effectiveness of Vic's DCH, we have used two parameters that have helped us: the hospitalizations that have been avoided since the DCH is opened and the reduction of hospitable stay.

To evaluate whether there has been a reduction of the hospitalizations, we have quantified the number of hospitalizations and hospitable stays of the patients between the moment when they were attended in the DCH and the moment when we have collected the data (post-DCH hospitalizations and hospitable stays). We also have quantified the same data in the same quantity of time for each patient, but during the previous period of the DCH attention (pre-DCH hospitalizations and hospitable stays). The range of time could be from 1 to 6 months of time (pre and post-attention to the DCH), that is the time that the DCH has been working.

In order to objectify if there has been a reduction of the days of hospitable stay we have had to quantify the duration of each hospitalization. The duration of each hospitalization has been quantified during 6 months before the opening of the DCH (using the same temporary space that we have used with the number of hospitalizations) and during the first 6 months of the DCH service with the same patients. We have compared the results to detect if there has been a reduction on the hospitable stay.

There have also been collected the attentions to the Emergency Room of the patients that have been treated in the DCH. We have collected the number of attentions to the ER during the period of DCH attention and the same number of months before the patient was attended in the DCH. With this data collection, we have observed the difference of the attentions to the ER between the before and after periods of DCH functioning.

We have collected some demographic data of the patients to see which is the profile of the patients that we treat in our DCH. The collected data is:

- The diagnose of the basal disease of the patient
- The age and sex of the patient
- The comorbidities that the patient presents
- The service that refers the patient to the DCH
- The main characteristics of the principal disease: the etiology, the basal state and the base treatment that the patient receives
- The main characteristics of the exacerbation: the diagnosis, the clinic and the treatment that

has received the patient during the exacerbation

- The number of visits to the DCH
- The number of attendances to the Emergency Room before and after the opening of the DCH

We have also used Google Flu Trens and Qlick View data applications to evaluate our obtained results and to get a better idea of the complete situation of the DCH.

### 3.5. Study justification

It is known that there are multiple benefits with the opening of a medical DCH, for the patient and for the sanitary center. The "Hospital Universitari de Vic" has recently opened its medical DCH, directed by the Internal Medicine Service, to cope with the needs that have arisen throughout the years from the chronic patients with a high risk of exacerbation.

This study wants to measure the effectiveness of the medical DCH of Vic in terms of benefits for the patient and for the institution. It also wants to contribute relevant information about the benefits of the DCH functioning, to make able that other sanitary centers that are interested in opening a medical DCH can have more information to create their own DCH.

The importance of the DCH is that, in the studies realized till now, it has demonstrated that reduces the hospitable admissions (1-3,5,6,17,18), which brings benefits to the patient and to the sanitary center:

- It improves the quality of life, since the patient can be in his/her domicile, can have his/her own schedules and can be more comfortable and nearest to his/her family (4,18).
- The reduction of the hospitalizations supposes also a reduction of the medical complications associated with the hospitable stay (infections, increase of mortality, etc.).
- The DCH allows the professional to be closer to the patient and to know him/her better. The medical staff knows better the state of the disease, so it facilitates the sanitary work (4).
- With the reduction on hospitalizations, the sanitary center gets benefits, because there is a saving of economic resources and there is more availability of beds for other patients (1,3).

The analysis of the information obtained here is important for multiple reasons. The first reason is that we want to know whether the functioning of the DCH in Vic has brought benefits to the HUV, because one of the most important aims of the project has been to achieve the justification in terms of cost-efficacy for the hospital. The DCH in Vic was opened with a main objective: to reduce the number of hospitalizations in order to reduce sanitary expenses and to have more bed availability in the hospitalization service. So now we are interested in knowing if there has been a reduction of the hospitalizations and a reduction of the duration of the hospitable stays.

The second reason is that we are interested in knowing whether the hospitalizations have diminished, because this implies that we have avoided the complications of the hospitalization and provides better quality of life to the patient.

Finally, this study is important because there are few data of the DCH in Spain and, especially, there are few data of polyvalent DCHs. The DCH in Vic is a polyvalent one, so the data obtained from this study may be applied to the same type of DCHs.

## 4. HYPOTHESIS

1) The medical attention of the patients with chronic advanced diseases (HF, CP and LC) in the Day Care Hospital reduces the number of hospitalizations of these patients.

2) The medical attention of the patients with chronic advanced diseases (HF, CP and LC) in the Day Care Hospital reduces the hospitable stays of these patients.

3) The medical attention of the patients with chronic advanced diseases (HF, CP and LC) in the Day Care Hospital reduces the number of attentions to the Emergency Room.

4) The medical attention of the patients with chronic advanced diseases (HF, CP and LC) in the Day Care Hospital reduces the global number of medical hospitalizations.

## 5. OBJECTIVES

1) To determine whether the number of hospitalizations diminishes in patients with chronic advanced diseases (HF, CP and LC) with the opening of the Day Care Hospital.

2) To determine whether the duration of the hospitable stays diminishes in patients with chronic advanced diseases (HF, CP and LC) with the opening of the Day Care Hospital.

3) To determine whether the number of attentions in the Emergency Room diminishes in patients with chronic advanced diseases (HF, CP and LC) with the opening of the Day Care Hospital.

4) To determine whether the global number of medical hospitalizations diminishes with the opening of the medical Day Care Hospital.

# 6. METHODOLOGY

## 6.1. Study design

This study is a retrospective observational study of before-and-after intervention.

To value our objectives, we have collected data of the hospitalizations and the ER attentions from patients that have been attended in the DCH. Data has been collected during two temporary periods:

- Post-DCH opening: during the six months that the DCH has been working, from May 4th, 2015 to October 30th, 2015.
- Pre-DCH opening: during the same quantity of months that the patient has been followed by the DCH, but in the months before the DCH was opened.

Data obtained from the hospitalizations and ER attentions allow us to compare:

- The number of hospitalizations between the period before the opening of the DCH and the period after the opening of the DCH.
- The average duration of the hospitalizations between the period before the opening of the DCH and the period after the opening of the DCH.
- The number of attentions in the Emergency Room between the period before the opening of the DCH and the period after the opening of the DCH.

## 6.2. Reference population

The reference population is the polyvalent Day Care Hospitals.

## 6.3. Study population

The study population is the polyvalent Day Care Hospital of the “Hospital Universitari de Vic”.

## 6.4. Sample

**Sample selection**

The method of sample selection has been consecutive non probabilistic. The sampling has consisted in collecting the patients who have been attended in Vic's Medical DCH since the day of its opening.

**Sample size**

GRANMO application (23) has been used to calculate the sample size of the study. Since we divide the study in two parts, we have calculated two different samples.

To calculate the sample to evaluate if the hospitalizations have diminished since the opening of the DCH, we have used the hospitalization rate per person to compare the groups of before and after the DCH opening.

We have assumed that the standard deviation of the hospitalization rate will be of 2,5 hospitalizations/person.

We were interested to know if there is a difference between the reduction of hospitalizations per person, so we have accepted as the minimal difference to detect a value of 1 hospitalizations/person between before and after the opening of the DCH.

Accepting an alpha risk of 0,05 and a beta risk of 0,2 in a two-sided test, 50 subjects are necessary to recognize as statistically significant a difference greater than or equal to 0,05 units. The standard deviation is assumed to be 2,5. It has been anticipated a drop-out rate of 1%.

To calculate the sample to evaluate whether there has been a reduction of the hospitable stay since the opening of the DCH, we have assumed that the standard deviation of the differences between before and after the opening of DCH will be of 3 days of hospitalization.

We want to know if there is at least 1 day of reduction of hospitalizations, so we have accepted that the minimal difference to detect will be of a day of hospitalization.

Accepting an alpha risk of 0,05 and a beta risk of 0,2 in a two-sided test, 72 subjects are necessary to recognize as statistically significant a difference greater than or equal to 0,05 units. The standard deviation is assumed to be 3. It has been anticipated a drop-out rate of 1%.

With both sample sizes, we have concluded that 72 subjects are necessary to value both dependent variables.

## 6.5. Variables

**Independent variable**

The opening of the Day Care Hospital in the "Hospital Universitari de Vic"

It is a dichotomous categorical variable (pre-opening of the DCH/post-opening of the DCH).

Data of the hospitalizations of the patients that have been attended in the DCH has been collected in two temporary periods: in the six months before the opening of the DCH and in the six first months after the opening of the DCH.

**Dependent variable**

The dependent variables are:

1. The hospitalizations of the patients, which has been compared between the periods of before and after the opening of the DCH.
   It is a discrete quantitative variable.
   It has been measured by collecting the number of hospitalizations that the patients of the DCH have done and the number of hospitalizations that the patients did during the same period of time, but previously to be attended to the DCH. We have divided the hospitalizations by the number of total attended patients in the DCH (78 subjects) and we have obtained the hospitalization rate per patient.
   It has been expressed as an arithmetic mean and the standard deviation.

2. The days of hospitable stay, which have been compared between the periods of before and after the opening of the DCH to see if there has been a reduction of the stay.
   It is a discrete quantitative variable.
   It has been measured by dividing the total number of days of hospitalizations with the number of hospitalizations. This procedure has been done twice: first, the days of stay have been calculated from the period of time that the DCH has been working. Then, the days of stay have been calculated from the same period of time, but in the previous months of the opening of the DCH.
   It has been expressed as an arithmetic mean and the standard deviation.

**Covariates**

1. Age: it is a discrete quantitative variable, measured in years.

   The age of the patient is collected at the time of the opening of the DCH and it is measured with one year intervals, taking as the reference the date of birth. It has been collected from the database of the HUV, which have been introduced previously from identificative legally document.

   The age is important because the study population is generally formed by elderly people. It is also relevant because the treated diseases in the DCH are chronic and progressive, so as the patient gets older, the disease progresses. This fact can affect directly to the number of hospitalizations.

   It has been expressed as an arithmetic mean and the standard deviation.

2. Sex: it is a dichotomous qualitative variable (male/female).

   It has been collected from the database of the HUV, which have been introduced previously from identificative legally document.

   It is important because the cardiovascular risk factors are usually more present in men than in women (smoking, central obesity, hypertension, poor diet, etc.) (7). Also alcoholism, which is a major etiological agent for liver cirrhosis, is usually more prevalent in males (9).

   It has been expressed in percentages.

3. Basal diagnosis: it is a nominal qualitative variable (HF, CP, LC).

   The diagnosis has been collected from the database of the HUV, which have been introduced previously by the doctor responsible for the patient at the time of the debut of the disease. The doctor have introduced the diagnosis by using clinical criteria and/or radiological criteria specified in the cardiology, pulmonology and hepatology guidelines (7,8,9).

   It has been expressed in percentages.

4. Comorbidities: it is a nominal qualitative variable.

   The comorbidities that are being evaluated are the major comorbidities of patients with HF, CP and LC and the comorbidities that are used to calculate the Charlson Index (22).

   It has been collected from the database of HUV, which have been introduced previously by the doctor responsible for the patient at the time of the debut of the disease.

   It has been expressed in percentages.

5. The referring sanitary service: it is a nominal qualitative variable (Primary Care/ Emergency Service/ Internal Medicine/other specializations).
   It has been collected from the database of the HUV, which have been introduced by the DCH doctor.
   It has been expressed in percentages.

6. Etiology of the basal disease: it is a nominal qualitative variable.
   It has been collected from the database of the HUV, which have been introduced by the DCH doctor.
   It has been expressed in percentages.

7. Basal treatments administered: it is a nominal qualitative variable.
   It has been collected from the database of the HUV, which have been introduced by the DCH doctor.
   It has been expressed in percentages.

8. Current status of the basal disease, that has been quantified according to the indexes of each guidelines. It is an ordinal qualitative variable that has been measured according to each disease.
   In the HF patients, the functional class has been calculated. In the LC patients, the Child-Pugh (13) and the MELD (20) indexes has been quantified. In CP patients, the MRC index (21) has been measured.
   It has been calculated from the database of the HUV and from the laboratory data, which have been introduced by the DCH doctor. The indexes have been calculated in the moment of the exacerbation.
   It has been expressed in percentages.

9. Exacerbation symptoms: it is a nominal qualitative variable.
   It has been collected from the database of the HUV, which have been introduced by the DCH doctor.
   It has been expressed in percentages.

10. Exacerbation diagnose: it is a nominal qualitative variable.

    It has been collected from the database of the HUV, which have been introduced by the DCH doctor at the moment of the exacerbation, using the clinical and/or radiological criteria of the guidelines of each disease: HF, CP, LC (7,8,9).

    It has been expressed in percentages.

11. Administered treatment at the exacerbation: it is a qualitative nominal variable.

    It has been collected from the database of the HUV, which will have been introduced by the DCH doctor at the moment of the exacerbation.

    It has been expressed in percentages.

12. Number of visits at the DCH: it is a discrete quantitative variable.

    It has been collected from the database of the HUV.

    It has been expressed with the arithmetic mean and the standard deviation.

13. Number of visits at the Emergency Room: it is a discrete quantitative variable.

    It has been collected from the database of the HUV.

    It has been expressed with the arithmetic mean and the standard deviation.

### 6.6. Measure instruments

**A) Difference between the rate of hospitalizations per patient before and after the opening of the DCH:** three steps have been followed to calculate it:

1. **Calculation of the rate of hospitalizations per patient in the period of post-opening of the DCH:** the number of hospitalizations of the patients that have been attended in the DCH has been collected during the period of functioning of the DCH. The number of hospitalizations has been firstly added, and secondly has been divided by the total evaluated patients (78 subjects). The rate of hospitalizations per patient has been obtained during the period of DCH post-opening.

2. **Calculation of the rate of hospitalizations per patient in the period of pre-opening of the DCH:** the number of hospitalizations of the same patients of step A.1 during the same period of time than step a.1, but in the previous months of the DCH opening, has been collected. The number of hospitalizations has been firstly added, and secondly has been divided by the total evaluated patients. The rate of hospitalizations per patient has been obtained during the period of DCH pre-opening.

3. **Calculation of the difference between the hospitalization rates before and after the opening of DCH:** the result of step A.1 (hospitalization rate of post-opening DCH period) has been subtracted of the result of step A.2 (hospitalization rate of pre-opening DCH period). The obtained number informs us if there has been a reduction of the hospitalizations or not:
    - If the obtained number of the subtraction is positive (the rate of hospitalizations before the DCH opening is higher than the rate of hospitalizations after the DCH opening), we can say that there has been a reduction of the hospitalizations since the DCH opening. Then, the alternative hypothesis can be accepted.
    - If the obtained number of the subtraction is negative or zero (the rate of hospitalizations before the DCH opening is lower or is the same as the rate of hospitalizations after the DCH opening), we can say that there has not been a reduction of the hospitalizations since the DCH opening. Then, the null hypothesis will be accepted.

**B) Difference between the days of hospitalizations before and after the opening of the DCH:** three steps have been followed to calculate it:

1. **Calculation of the arithmetic mean of the days of hospitalization after the opening of the DCH:** the days of hospitalization of the patients that have been attended in the DCH have been collected in the period of functioning of the DCH. Then, the number of hospitalization days has been added and has been divided by the total number of hospitalizations after the DCH opening. The obtained number is the arithmetic mean of hospitalization days during the period of DCH post-opening.

2. **Calculation of the arithmetic mean of the days of hospitalization before the opening of the DCH:** the days of hospitalization of the same patients of step B.1 have been collected in the same period of time than step B.1, but during the previous months of the DCH opening. Then, the number of hospitalization days has been added and has been divided by the total number of hospitalizations before the opening of DCH. The obtained number is the arithmetic mean of hospitalization days during the period of DCH pre-opening.

3. **Calculation of the difference between the arithmetic means of the days of hospitalization:** a subtraction has been realized between the mean of hospitalization days before DCH opening (using the number of step B.2) and the mean of hospitalization days after DCH opening (using the number of step B.1). The obtained value informs us if there is a difference between the duration of the hospitable stays since the DCH has been opened:
    - If the obtained number of the subtraction is positive (the days of hospitalizations before the DCH opening are higher than the days of hospitalizations after the DCH opening), we can say that there has been a reduction of the hospitable days since the DCH opening. Then, the alternative hypothesis can be accepted.
    - If the obtained number of the subtraction is negative or zero (the days of hospitalizations before the DCH opening are lower or are the same as the days of hospitalizations after the DCH opening), we can say that there has not been a reduction of the hospitable days since the DCH opening. Then, the null hypothesis can be accepted.

### 6.7. Data collection and visits chronogram

We have been working with the clinical history of the patient, which is computerized in the informatic system of HUV, to obtain the clinical items that we wanted to analyze.

The clinical history of the patients gets up-to-date in every medical visit in which the patient is attended. The sanitary staff who attends the patients collect the information and update it in the clinical history of the patient.

The clinical history fulfills the safety and privacy requirements of the "Ley Orgánica de Protección de Datos" (LOPD 15/1999).

It has been created a DCH database from the clinical histories of the patients, in which the following items have been collected:

| Collected data | Basal | DCH pre-opening | DCH post-opening |
|---|---|---|---|
| Clinical history number | X | | |
| Age | X | | |
| Sex | X | | |
| Toxic habits (smoking, alcoholism) | X | | |
| Comorbidities | X | | |
| Derivation service | | | X |
| Basal disease diagnose | X | | |
| Basal disease etiology | X | | |
| Previous complications of the disease | X | | |
| Basal treatment | X | | |
| Basal disease state | X | | |
| Clinical of the exacerbation | | X | X |
| Exacerbation diagnose | | X | X |
| Exacerbation treatment | | X | X |
| Death | X | | |
| Follow-up time e of the patient | | | X |
| Number of hospitable stay | | X | X |
| Days of hospitable stay | | X | X |
| Number of DCH visits | | | X |
| Emergency care attentions | | X | X |

The obtained data has been collected with the DCH Registration Form (Annex 1) and has been included to the DCH Database. Later they has been evaluated.

# 7. STATISTICAL ANALYSIS

The statistical analysis has been conducted using Statistical Package for Social Sciences (SPSS) for Windows®.

## 7.1. Univariate descriptive analysis

The opening of the DCH has been considered a dichotomous categorical variable (DCH pre-opening/ DCH post-opening) and has been expressed by absolute values.

The hospitalization rate per patient and the days of hospitable stay has been considered quantitative variables. Bots variables have been expressed with the mean and the standard deviation.

The covariates that have been considerate categorical are: sex, the basal disease diagnose, the exacerbation diagnose, comorbidities, the basal treatment, the etiology of the basal disease, the derivation service, the basal disease state and the clinical of the exacerbation.

The covariates that have been considered quantitative are: age, the follow-up time of the patient, the number of DCH visits and the Emergency room attentions. The categorical covariates have been expressed as relative frequencies and percentages. The quantitative covariates have been expressed with the mean and standard deviation.

## 7.2. Bivariate analysis

The variables of hospitalizations pre and post-DCH functioning and the hospitable stays pre and post-DCH functioning were following a normal distribution with K-S test.

The variables that have not followed a normal distribution have been compared with a non parametric test for paired data (Wilcoxon test).

The variables that have followed a normal distribution for independent data have been compared with the T-student test.

## 7.3. Multivariate analysis

Two Lineal Models have been realized to the patients to evaluate:

1. The difference between the number of hospitalizations before and after the DCH opening.
2. The difference between the days of hospitable stay before and after the DCH opening.

The models included as covariates: age, sex, the basal disease diagnose, the exacerbation diagnose, comorbidities, the derivation service, the basal disease etiology, the basal treatment, the state of the basal disease, the clinical of the exacerbation, the follow-up time of the patient, the number of DCH visits and the Emergency room attentions.

Results have been expressed as absolute numbers and percentages, arithmetic means and standard deviations. Statistical tests have been considered significant with p value <0,05.

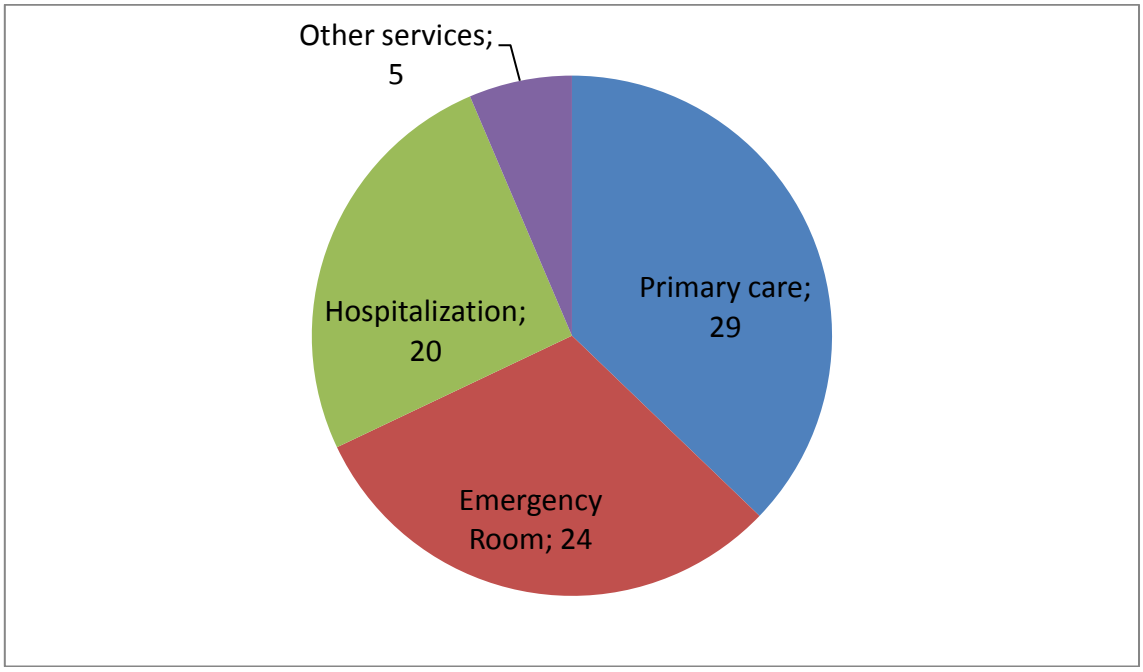
## 8. RESULTS

During the months between May to October, 2015, 78 patients were attended in the DCH, with a mean of age of 71,8 years, and a SD of 12,18, with ages between 42 to 94 years. Men were the 64,1% of the total subjects (50 patients were men).

The majority of the patients came to the DCH derived from Primary care (29 patients, corresponding to 37,2%), from the Emergency department (24 patients, corresponding to 30,8%) and from hospitalization (20 patients, corresponding to 25,6%). The five remaining patients came derived from other specialties (6,4%), as it is shown in Chart 1.

***Chart 1***

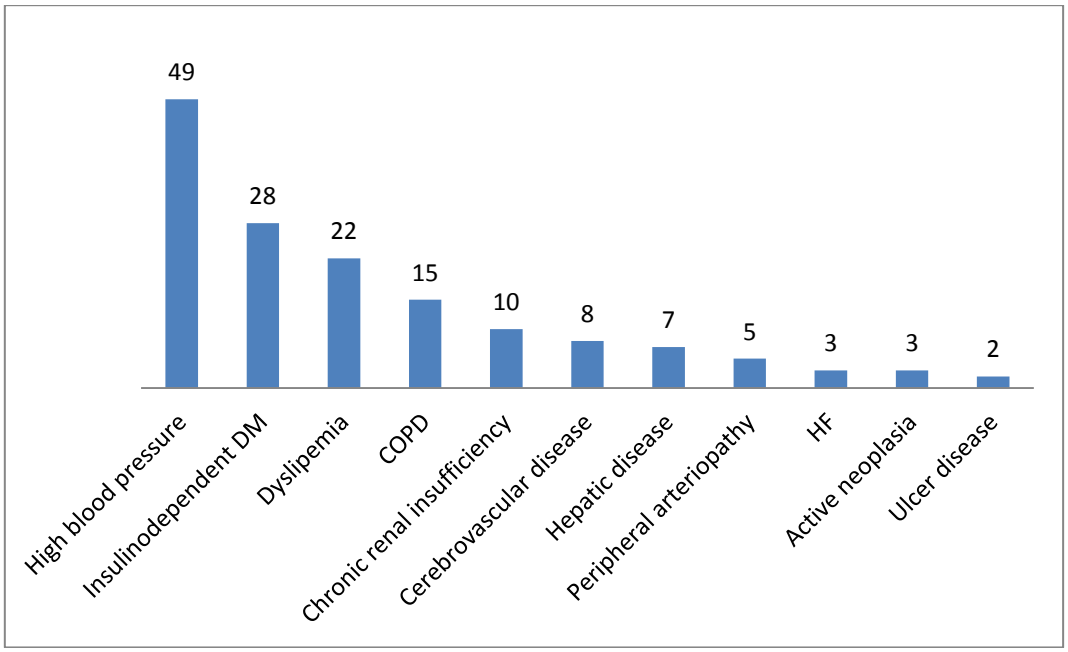
Medical specialty that derivates the patient to the DCH




The comorbidities that patients presented have been collected in Chart 2, where stand out the hypertension (62,8%), the insulin-dependent diabetes mellitus (35,9%) and the dyslipidemia (28,2%).

***Chart 2***

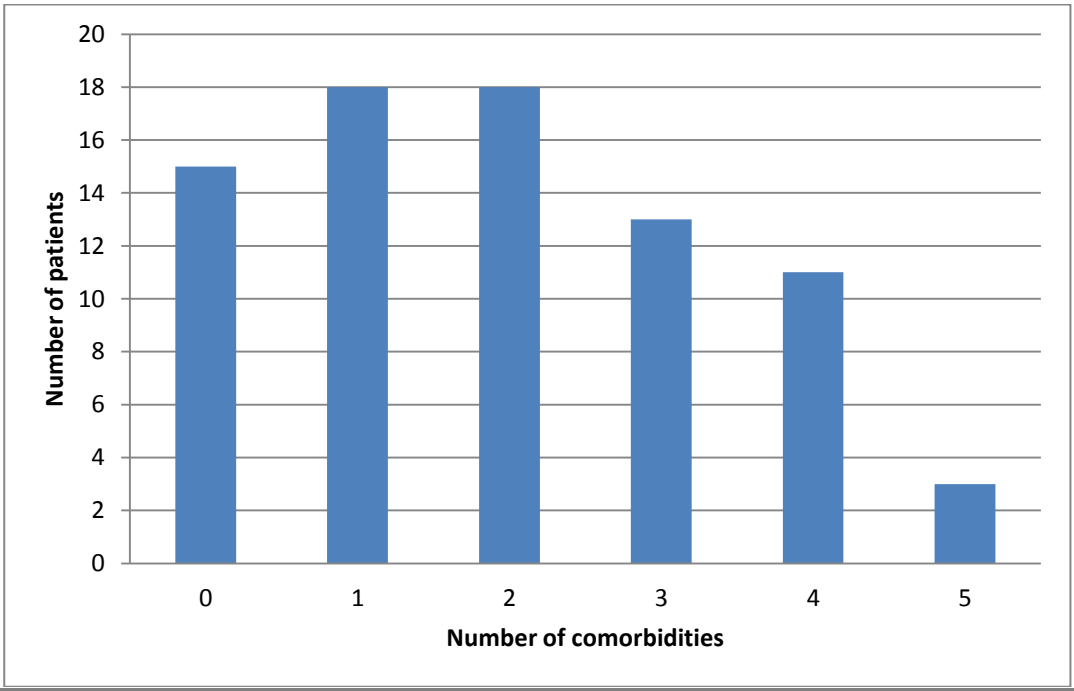
Comorbidities of the patient




The mean of comorbidities per patient was 1,95, with a SD of 1,45. 27 patients have been attended with 3 or more comorbidities (Chart 3). The mean of the Charlson index of our patients was 2,67, with a SD of 1,52 .The Charlson Index of the patients has exceeded 3 points (indicative of high comorbidity) in 9 patients (11,4%).

***Chart 3***

Comorbidities of the patient

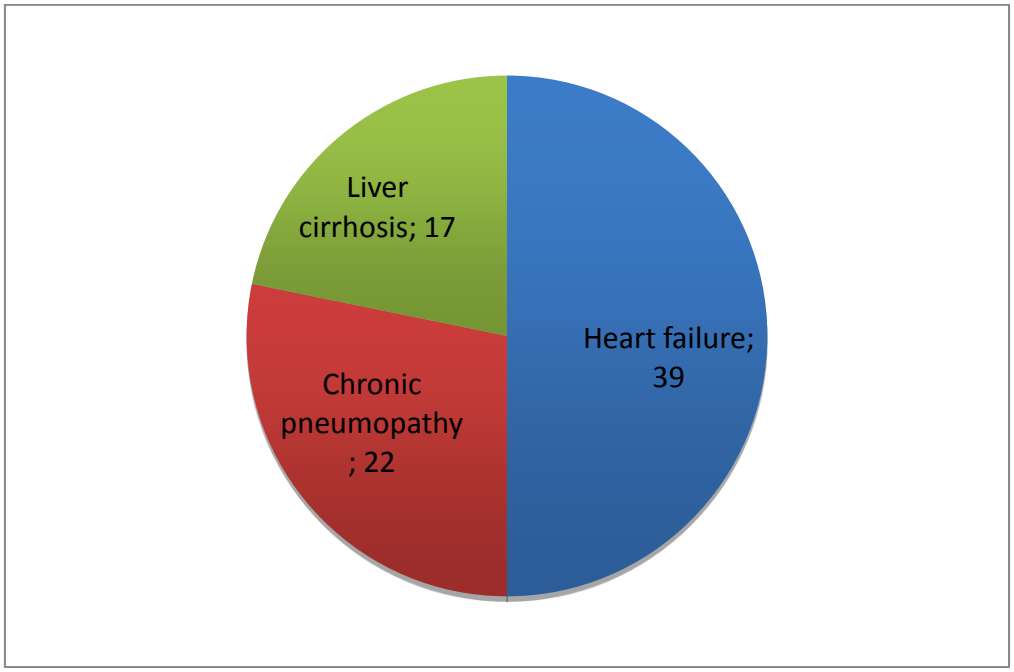


Toxic habits of the patients have been collected and we have obtained the following results: 6 patients were active smokers (7,7%) and 16 patients were ex-smokers (20,5%). The remaining patients have never smoked before. Regarding to the alcoholism, 6 patients were active drinkers (7,7%) and 17 patients were ex-drinkers (21,8%). The remaining patients had never consumed a quantity of alcohol of risk chronically (70,5%).

The predominant attended pathology in the DCH (Chart 4) was HF, with 39 attended patients (50,9%), followed by CP, with 22 attended patients (28,2%), and LC, with 17 attended patients (21,8%).

***Chart 4***

Diseases of the attended patients in the DCH of Vic




**PATIENTS WITH PULMONARY DISEASE**

Patients with pulmonary disease that have been attended in the DCH have diagnosed of three types of pulmonary diseases: Chronic Obstructive Pulmonary Disease (COPD), Chronic Ariflow Obstruction (CAFO) and restrictive pneumopathy.

COPD is characterized by different phenotypes. In our DCH, 7 patients (31,8%) were diagnosed of COPD chronic bronchitis exacerbator, 5 patients (22,7%) were diagnosed of COPD emphysema exacerbator

and 2 patients (9,1%) were diagnosed of mixed phenotype COPD-asthma. 4 patients were diagnosed of restrictive pneumopathy (18,2%) and 4 patients were diagnosed of COFA (18,2%).

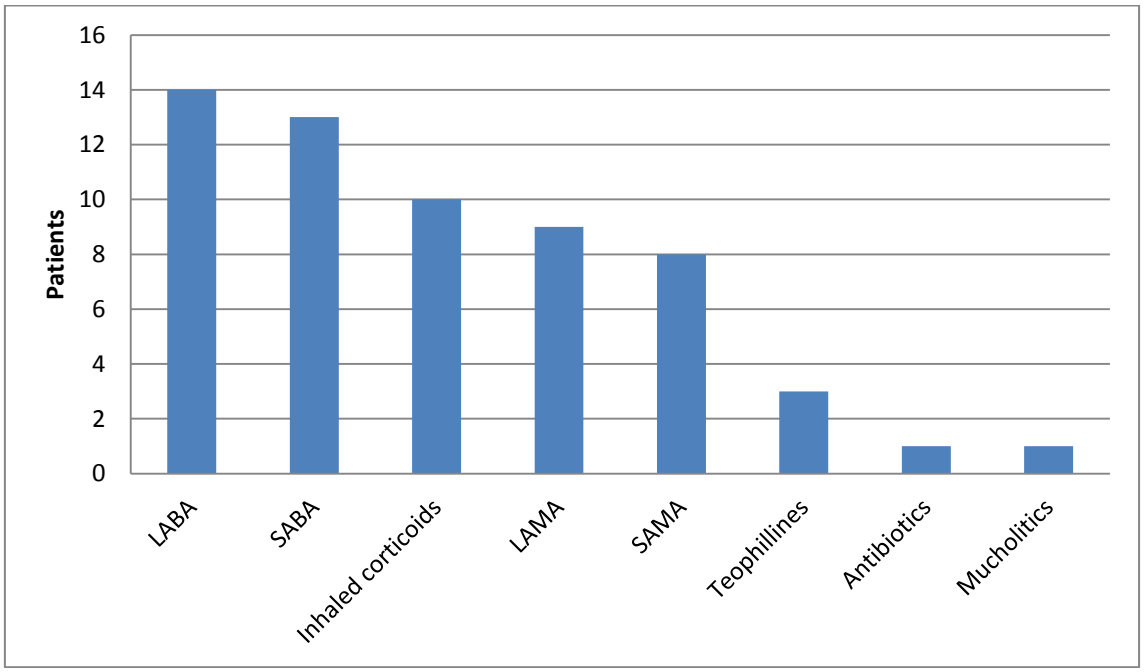
The dyspnea degree of the patients has been quantified with the modified MRC scale, and we have noticed that the majority of patients had a 2 degree during the exacerbation (10 patients, corresponding to 45,5%).

The characteristics of the patients have been collected: 4 patients require domiciliary continued oxygen therapy (18,2%), 3 patients are dependent for corticoids (13,6%) and 8 patients are chronic exacerbators (36,4%). Only 4 patients had more than one comorbidity (18,2%).

All patients with COPD of CAFO were treated with bronchodilators. 14 patients with COPD were treated with LABA (63,6%), while 9 were treated with LAMA (40,9%), as it is shown in Chart 5.

***Chart 5***

Basal treatment of patients with pulmonary disease in the DCH




The recommended therapeutic combinations by the Clinical practical guide of GesEPOC (8) have been also collected (Table 1). We have collected the previous diagnose of the patients and we have evaluated if the treatments were correctly applied to the patients by the recommendations of the Clinical guide of GesEPOC. We have obtained that 17 patients with COPD diagnose were correctly treated (94,4%).

The mean of medication that received the patients was 3,41, with a SD of 1,71. The maximum number of medication received was 6 drugs, that has been found in 1 patient.

***Table 1***

Therapeutic combinations according to the GesEPOC Clinical Guide

| Therapeutic combinations | N patients (%) |
|---|---|
| **LABA + IC** | 6 (27,3) |
| **LABA + LAMA** | 3 (13,6) |
| **LABA + LAMA + IC** | 1 (4,5) |
| **LABA + LAMA + Teophylline** | 1 (4,5) |
| **LABA + LAMA + IC + Teophylline** | 1 (4,5) |

The diagnoses of the exacerbation were acute respiratory infections in 9 patients (40,9%) and acute respiratory insufficiency in 11 patients (50,0%).

The administrated treatment of the exacerbation has varied in patients (Table 2). The nebulized bronchodilators have been the most received treatment (17 patients, corresponding to 77,3%). Also intravenous corticoids have been given in 14 patients (63,6%).

The mean of received treatment during the DCH attention was 2,32, with a SD of 0,78. Only in one patient was only given an antibiotic, while the remaining 21 patients has received 2 or more medications (95,5%).

***Table 2***

Administrated treatment of the exacerbation

| Administrated treatment | N patients (%) |
|---|---|
| **Nebulized bronchodilators** | 17 (77,3) |
| **Intravenous corticoids** | 14 (63,6) |
| **Antibiotic** | 10 (45,5) |
| **Other treatments** | 8 (36,4) |
| **Oxygen** | 2 (9,1) |

**PATIENTS WITH LIVER CIRRHOSIS**

From the total 17 patients attended in the DCH with a diagnose of LC, 15 had as etiology the alcohol (88,2%). Only one patient had LC secondary to an autoimmune disease and only one patient was catalogued of cryptogenetic LC.

The mean of previous complications of the LC in our DCH was 2,28, with a SD of 1,84. The previous complications maximum was collected from one patient, who had 6 previous complications. The minimum of previous complications was 0, that has been found in 4 patients (23,5%).

The two most frequent previous complications were edemato-ascitic decompensation (12 patients, 70,6%) and esophageal varicose (12 patients, 70,6%). The others complications are collected in Table 3.

***Table 3***

Previous complications of the LC, before the attention to the DCH

| Previous complications | N patients (%) |
|---|---|
| **Edemato-ascitic decompensation** | 12 (70,6) |
| **Esophageal varicose** | 12 (70,6) |
| **Hepatic encephalopathy** | 6 (35,3) |
| **High digestive hemorrhage** | 5 (29,4) |
| **Spontaneous bacterial peritonitis (SBP)** | 3 (17,6) |
| **Hepatorenal syndrome** | 2 (11,8) |
| **Others** | 1 (5,9) |

The attended patients in the DCH with a diagnose of LC were receiving a combination of basal treatment: 15 patients received diuretics (88,2%), 6 patients received laxatives (35,3%) and 4 patients received prophylactic antibiotic for the peritonitis (23,5%). Other received treatments were Rifaximina in 3 patients (17,6%) and thiamine in 3 patients (17,6%).

The mean of received treatments of patients with LC was 1,82 medications per patient, with a SD of 0,95. In 9 patients the number of medications that they were taking was >1 medication (52,9%).

To determine the severity of the basal state of the disease, the Child-Pugh index has been calculated. Only 4 patients have obtained a Child A score (23,5%), while 8 patients have obtained a Child B score (47,1%) and 5 patients have obtained a Child C score (29,4%).

It has also been calculated the MELD prognostic index, that was 14,18, with a SD of 6,11, a minimum value of 6 points and a maximum of 31 points. Only 2 patients (11,8%) have exceeded the 19 points that increases the mortality significantly.

The most frequent diagnose of exacerbation has been edemato-ascitic decompensation, with 13 patients diagnosed during the exacerbation (76,5%), while other diagnoses have been less frequent: there was 1 patient with spontaneous bacterial peritonitis, 1 patient with hepatic encephalopathy, 1 patient with upper gastrointestinal bleeding (UGIB) and 1 patient with comorbitidy decompensation.

The therapeutic measures that have been carried out in the DCH during the exacerbation have been collected in Table 4. The most prevalent measures have been the evacuative paracentesis in 13 patients (76,5%), the intravenous albumins in 12 patients (70,6%) and the oral diuretics in 12 patients (70,6%). The mean of therapeutic measures carried out in the DCH was 2,71, with a SD of 1,16. The maximum number of received treatments was 5. In 14 patients the treatments that they received was of more than 1 treatment (82,4%).

***Table 4***

Therapeutic measures realized during the exacerbation of the LC

| Therapeutic measure | N patients (%) |
|---|---|
| **Evacuative paracentesis** | 13 (76,5) |
| **Intravenous albumins** | 12 (70,6) |
| **Oral diuretics** | 12 (70,6) |
| **Laxatives** | 3 (17,6) |
| **Treatment retired** | 3 (17,6) |
| **Antibiotic** | 2 (11,8) |
| **Others** | 2 (11,8) |

**PATIENTS WITH HEART FAILURE**

A total of 39 patients with HF have been attended at the DCH. The etiologies of their HF are collected on Table 5.

***Table 5***

Etiology of the cardiac insufficiency

| Etiology | N patients (%) |
|---|---|
| **Ischemic cardiopathy** | 12 (30,8) |
| **Severe valvulopathy** | 12 (30,8) |
| **Hypertensive miocardiopathy** | 9 (23,1) |
| **Dilated miocardiopathy** | 4 (10,3) |
| **Obstructive hypertrophic miocardiopathy** | 1 (2,5) |
| **Mixed (severe valvulopathy + ischemic cardiopathy)** | 1 (2,5) |

Basal received treatments in these patients are collected in Table 6. The most frequent treatments are diuretics, that have been given in 32 patients (82,1%); beta-blockers, that have been administrated to 22 patients (56,4%); antiaggregants, that have been given to 20 patients (51,3%) and oral anticoagulants, administrated to 20 patients (51,3%).

The patients received a mean of 4,10 medications, with a SD of 1,65. The maximum medications received has been 7 treatment per patient, that has been found in 5 patients with HF (12,8%), while the minimum of treatments was one medications, that has been found in 2 patients (5,1%).

***Table 6***

Basal treatment of HF

| Medication | N patients (%) |
|---|---|
| **Diuretics** | 32 (82,1) |
| **Beta-blockers** | 22 (56,4) |
| **Antiaggregants** | 20 (51,3) |
| **Anticoagulants** | 20 (51,3) |
| **Hypolipemiants** | 14 (35,9) |
| **Digoxina** | 10 (25,6) |
| **ACEI** | 10 (25,6) |
| **ARA-II** | 7 (17,9) |
| **Ivabradina** | 2 (5,1) |
| **Calcium antagonists** | 1 (2,6) |
| **Mineralcorticoids receptors antagonists** | 1 (2,6) |
| **Ranolazina** | 1 (2,6) |

The mean of the ejection fraction of the left ventricle in the patients attended in our DCH was 51%, with a maximum of 80% and a minimum of 16%. 15 patients had an ejection fraction lower than 50% (38,5% of the patients attended with HF).

25 patients had a Functional Class by the NYHA of II (64,1%), while 10 had a Functional Class of I (25,6%) and 4 patients a Functional Class of III (10,3%). There hasn't been any patient with Functional Class of IV.

During the exacerbation, patients have suffered a combination of symptoms that have been collected in Table 7. The most frequent symptom was dyspnea, with 35 patients suffering it (89,7%). Other frequent symptoms were edema and orthopnea.

Patients at the DCH had a mean of 2,54 symptoms per patient, with a SD of 1,32. The maximum number of collected symptoms was 5, collected in 5 patients.

***Table 7***

Symptoms of the exacerbation

| Symptom | N patients (%) |
|---|---|
| **Dyspnea** | 35 (89,7) |
| **Edema** | 20 (51,3) |
| **Orthopnea** | 15 (38,5) |
| **Cough** | 9 (23,1) |
| **Nocturnal paroxística dyspnea** | 6 (15,4) |
| **Acute pulmonary edema** | 1 (2,6) |
| **Wheezes** | 1 (2,6) |

The diagnoses of the exacerbation were very diverse (Table 8). The most frequent is the HF decompensation, with 35 patients diagnosed of it (89,7%). It is followed by anemia, collected in 8 patients (20,5%).

***Table 8***

Exacerbation diagnoses

| Diagnose of the exacerbation | N patients (%) |
|---|---|
| **HF decompensation** | 27 (69,2) |
| **HF decompensation + anemia** | 5 (12,8) |
| **Anemia** | 3 (7,7) |
| **HF decompensation + Another diagnose (different from anemia)** | 3 (7,7) |
| **Respiratory insufficiency** | 1 (2,6) |

The received treatment of the patients during the exacerbation was a combination of medications, with a mean of 2,54 medications per patient, with a SD of 1,25. The maximum medications that a patient received was 5 (Table 9), that has been found in 4 patients (10,3%). The administrated medications are collected in Table 10.

***Table 9***

Therapeutic combination during the exacerbation of the patient with HF

| Number of medications | N patients (%) |
|---|---|
| **1** | 9 (23,1) |
| **2** | 12 (30,8) |
| **3** | 10 (25,6) |
| **4** | 4 (10,2) |
| **5** | 4 (10,2) |

***Table 10***

Medications received during the exacerbation of the patient with HF

| Therapeutic measure | N patients (%) |
|---|---|
| **Oral diuretic** | 37 (94,9) |
| **Intravenous diuretic** | 14 (35,9) |
| **Others** | 11 (28,2) |
| **Intravenous iron** | 10 (25,6) |
| **Beta-blockers** | 6 (15,4) |
| **ACEI** | 4 (10,3) |
| **Oral anticoagulant** | 3 (7,7) |
| **Oral iron** | 3 (7,7) |
| **Oxygen** | 1 (2,6) |

**EXITUS:**

We have collected 4 exitus of the patients that have been attended in the DCH:

1. A patient with COPD chronic bronchitis exacerbator, with a severe intensity of the dyspnea, which was cortico-dependent and required chronic domiciliary therapy with oxygen. The patient did not die for his/her pulmonary disease, but for a cardiorespiratory arrest secondary to the use of opiates for the pain control of a fracture. In the moment of the death, the patient was compensated of his/her pulmonary disease.
2. A patient with LC that was derived to the "Hospital de la Santa Creu" because the patient was suffering of hepatic encephalopathy and progressive worsening of the renal function, secondary to an hepatorenal syndrome.
3. A patient with pulmonary interstitial disease that progressed rapidly during the first days of DCH opening.
4. A patient with LC and an hepatocellular carcinoma that suffered a UGIB and died because of an hemorrhagic shock.

From the total collected exitus, three of them have been due to the basal disease that the DCH was treating.

**HOSPITALIZATIONS AND HOSPITABLE STAYS**

During the six months of the DCH opening, 270 visits have been done. That supposes a mean of 3,46 visits per patient and a SD of 2,87. The maximum number of visits in one patient was 17, while the minimum was 1. The following time of the patients by the DCH was 2,27 months, with a SD of 1,73.

Data of hospitalizations, hospitable stays and attentions to the ER pre and post-DCH opening have been collected from every patient included in the study, during the period of previous following by the DCH and the period of DCH following. These periods have oscillated between 1 to 6 months pre and post-DCH opening.

There were 64 hospitalizations before the DCH opening, while after the opening 31 hospitalizations were collected. The mean of hospitalizations per patient was 0,82 before the DCH opening, with a SD of 1,03, while the mean of hospitalizations per patient after the DCH opening was 0,40, with a SD of 0,74. These values inform that there has been a reduction of 51,2% of the hospitalizations since the opening of the DCH with statistical significance (p value 0,001).

The hospitable stay before the DCH opening was of 247 days, while after the opening were 99 days of stay. The mean of days of hospitable stay per patient before the DCH opening was 3,17, with a SD of 6,70, while the mean after the DCH opening was 1,27, with a SD of 2,87. With this data, we can see that there has been a reduction of 59,9% of the days of hospitable stay with statistical significance (p value 0,015).

7 hospitalizations have been realized directly from the DCH to the Hospitalization floor. That means that 9,0% of the patients attended at the DCH have been hospitalized at the moment that they attended to the DCH for being treated of their exacerbation.

There have been 99 attentions to the Emergency Room before the DCH opening, while after the DCH opening 47 attentions were realized to the ER. That supposes a mean of 1,27 attentions to the ER per patient before the DCH opening, with a SD of 1,17, while after the DCH opening the mean of ER attentions was 0,60, with a SD of 0,94. There has been a reduction of 52,8% of attentions at the Emergency Room with statistical significance (p value 0,002).

Although we have found a reduction in the number of hospitalizations, hospitable stays and attentions to the ER significantly, we cannot say that it is due to the DCH, because we have not compared with a control group of patients with chronic HF, PC and LC that have not been attended to the DCH.

**QLICK VIEW DATA**

To value our obtained results in this study, we have acceded to the Qlick View Application (27) to obtain the data of hospitalizations and hospitable stay of the last three years in our sanitary center.
First, we have acceded to the data of the first four-month period of the last three years (from 2013 to 2015) to see the trend of these months in terms of hospitalizations and hospitable stay. The obtained data is collected in Table 11.

***Table 11***

Hospitalizations and hospitable stay of the first four months (January to April) of the last 3 years

| Year | Hospitalizations | Hospitable stays |
|---|---|---|
| **2015** | 1354 | 10200 |
| **2014** | 1279 | 8861 |
| **2013** | 1318 | 9293 |

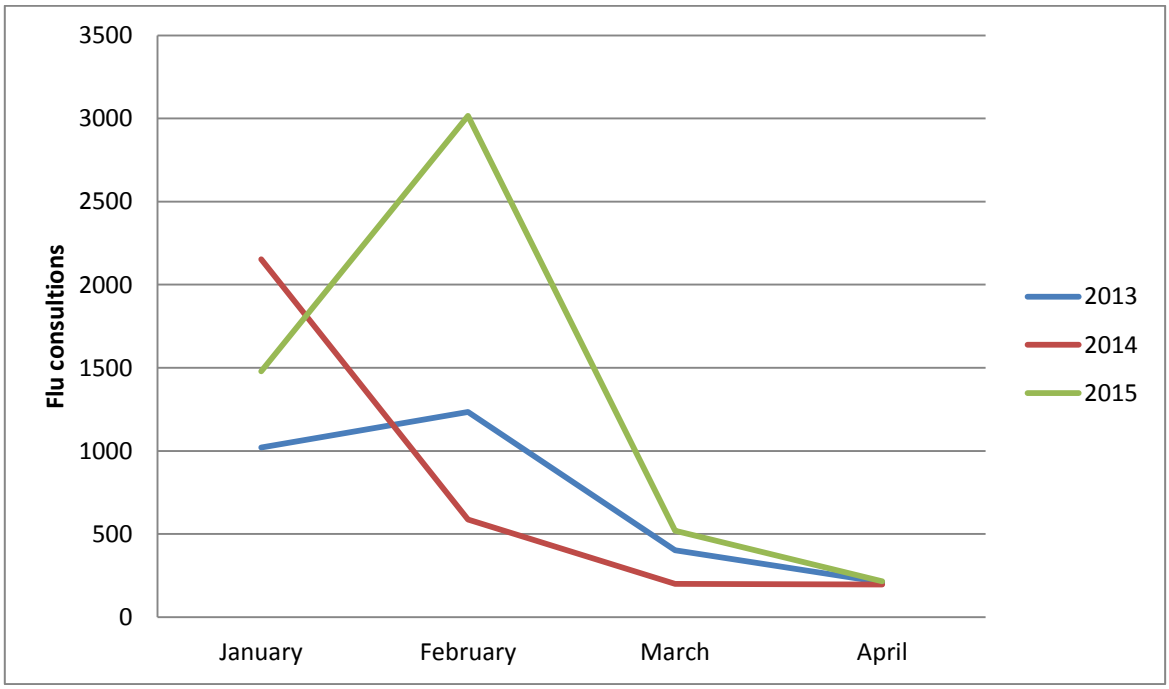
With this obtained data we can see that during the first four months of 2015 there was an increase of the hospitalizations and the hospitable stays in comparison to the other 2 last years. For that reason, with these unfavorable data, the obtained values of our study (the reduction of hospitalizations and hospitable stays) can be influenced by this trend to increase the number of hospitalizations and hospitable stays.

We have also searched the flu trend at Google Flu Trends application (26) of the last three years, because we have thought that the increment trend of the hospitalizations and hospitable stays of the first four months of the year could be caused by the flu.

Data obtained from Google Flu Trends show the trend of medical visits that people from different regions of the world has done during the year. In the region of Catalunya we can see that 2015 has been the worst year of flu medical visits, with an increase of medical visits for flu, in comparison to the last two years (Chart 6), so the trend to increase the number of hospitalizations and hospitable stays in the first four-months of the year in HUV could be justified for that reason.

**Chart 6**

Flu trend in Catalunya during the first four months of the last three years (data from Google Flu Trends)



With the data obtained from the Google Flu Trends we can say that there was a flu epidemic in 2015 that has been the most incident from the last three years. We have to take into account these data because it could influence our study results.

On the other hand, we have valued the number of total hospitalizations, hospitable stays, re-hospitalizations and rehospitalization stays of the Hospital Universitari de Vic of the last 3 years during the period that we have been attending the patients in the DCH (from May to October). We have collected the data from the Qlick View and we have obtained the following results (Charts 7-10).

***Chart 7***

Hospitalizations of the last three years of the HUV during the period from May to October

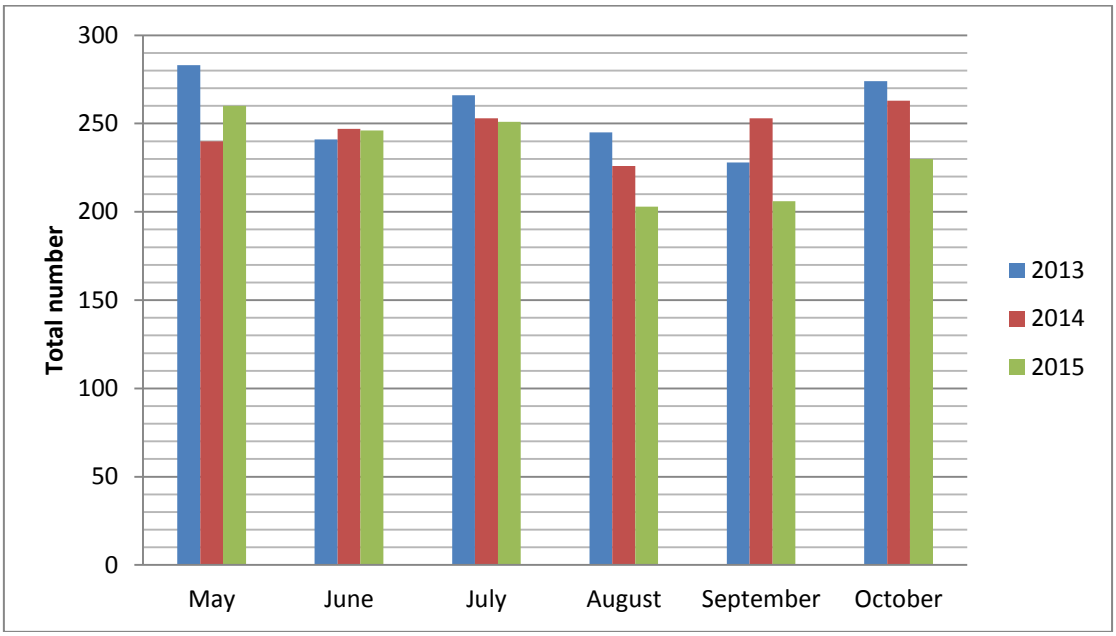


***Chart 8***

Hospitable stays of the last three years in the HUV, during the period from May to October

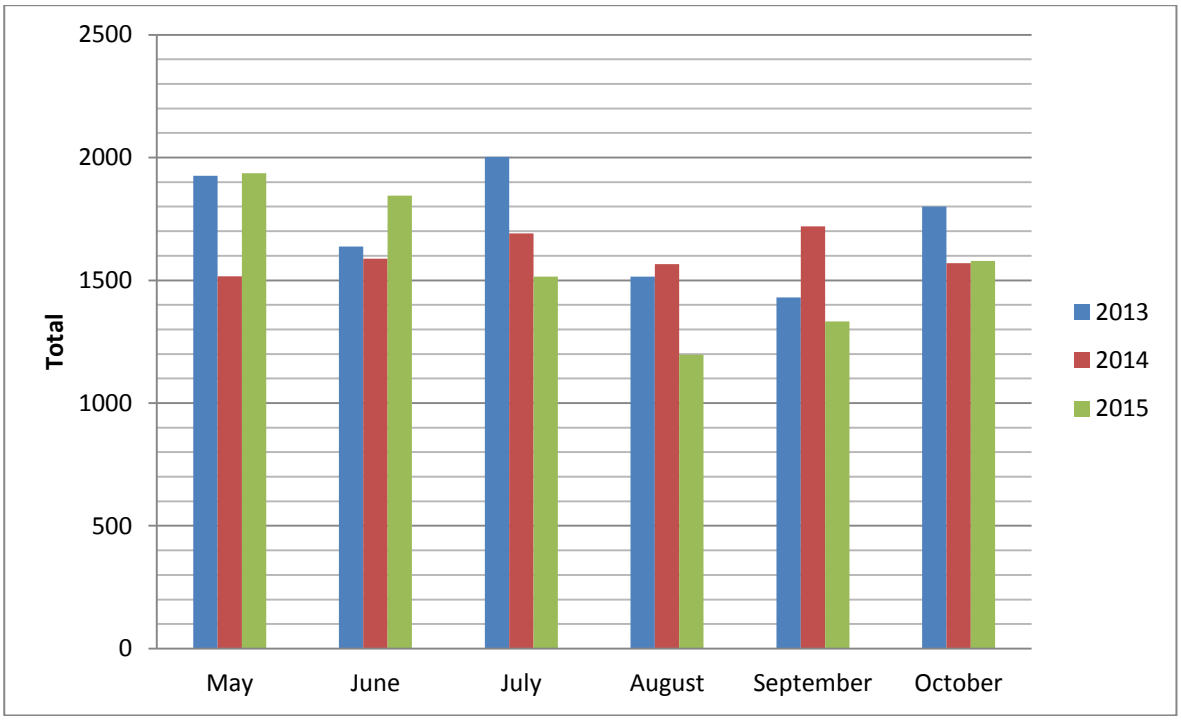



***Chart 9***

Rehospitalizations of the last three years of the HUV during the period from May to October

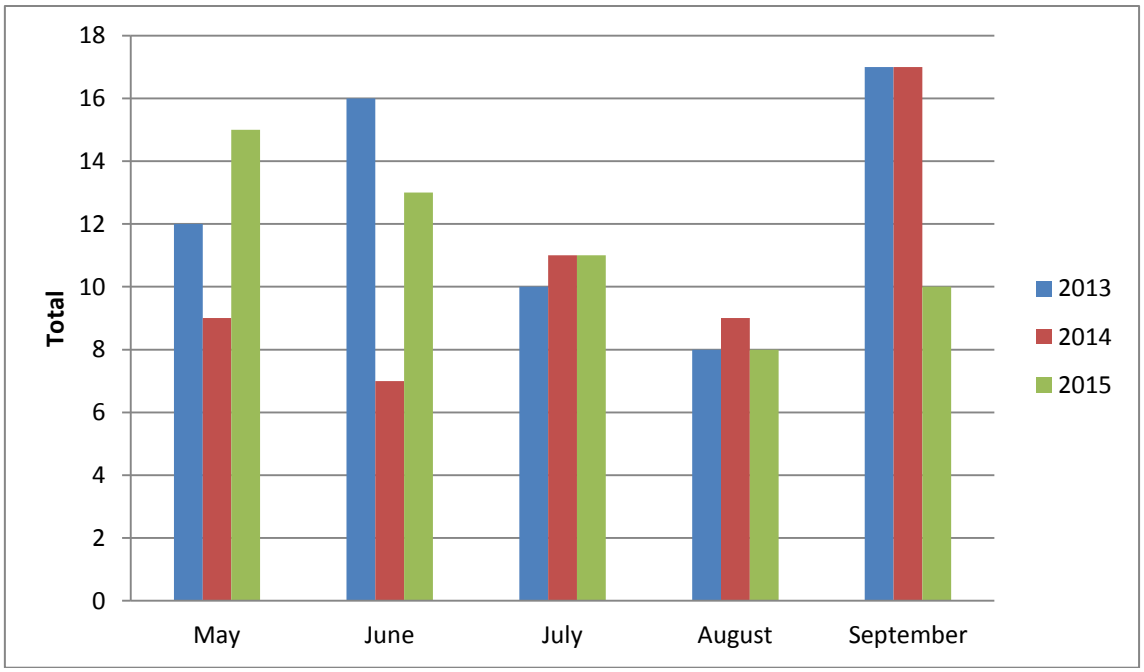
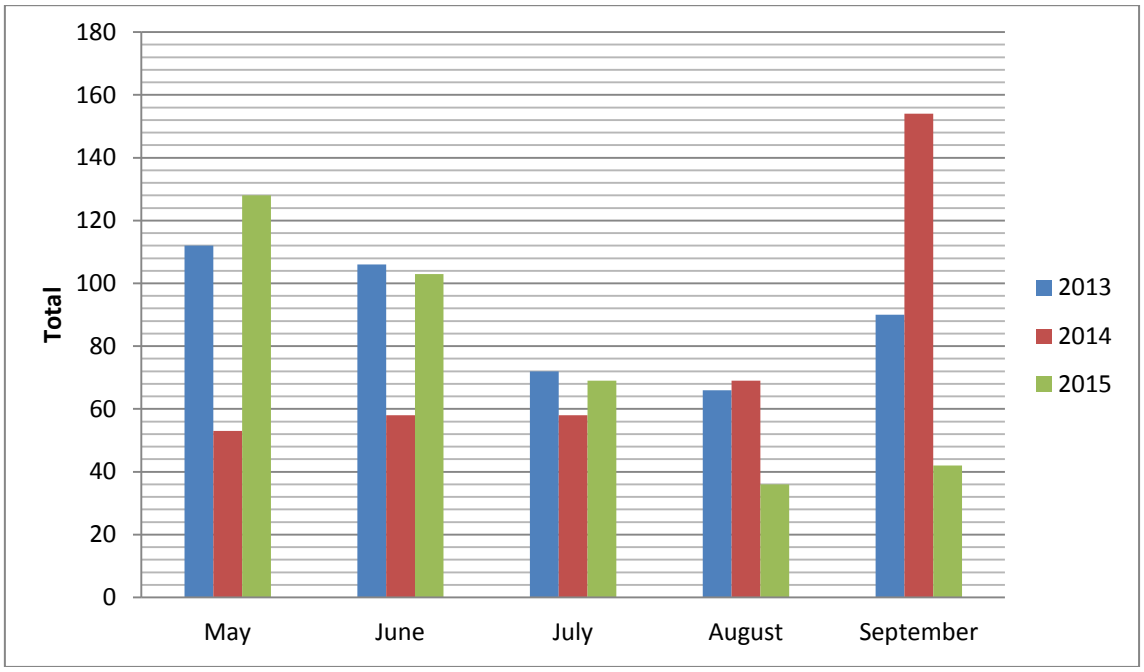


***Chart 10***

Rehospitalization stays of the last three years in the HUV, during the period from May to October




With the obtained data from the Qlick View we can see that there is a trend to reduce the number of hospitalizations, stays, rehospitalizations and stays of rehospitalizations during the period of 2015 when the DCH was opened (from May to October), except the number of rehospitalizations in comparison to 2014, when there was an increase of 4 rehospitalizations (that supposes an increase of 7,5%). However, when we have analyzed the number of rehospitalizations month by month, we have found that the fundamental role of readmissions of 2015 is concentrated in the first months of the comparison (May and June). Later (from July to October), there has been an improvement in the number of rehospitalizations (Chart 13 and Chart 14).

Taking into account that there is a generalized reduction of hospitalizations, hospitable stays, rehospitalizations and rehospitalizations stays, and that in the first months of 2015 there was an important flu epidemic, we can consider that the results since the DCH opening are favorable.

When a new service is opened, there is a learning period that can vary, where the workers have to adapt to the new system. We have considered that, with the DCH opening, we have had a learning period of two months (from May to June), so we have broken down the data of hospitalizations, stays, rehospitalizations and stays of rehospitalizations of the HUV in different months. Charts 9-12 show the obtained results.

***Chart 11***

Hospitalizations of the last 3 years in the HUV broken down in months

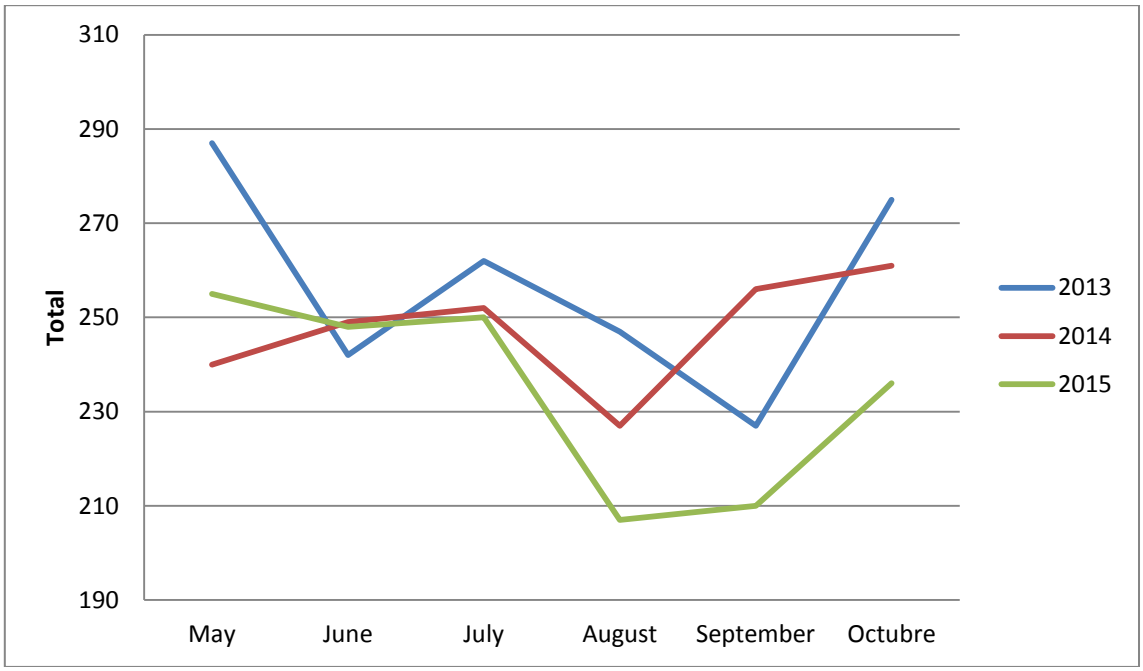



***Chart 12***

Stays of the last 3 years in the HUV broken down in months

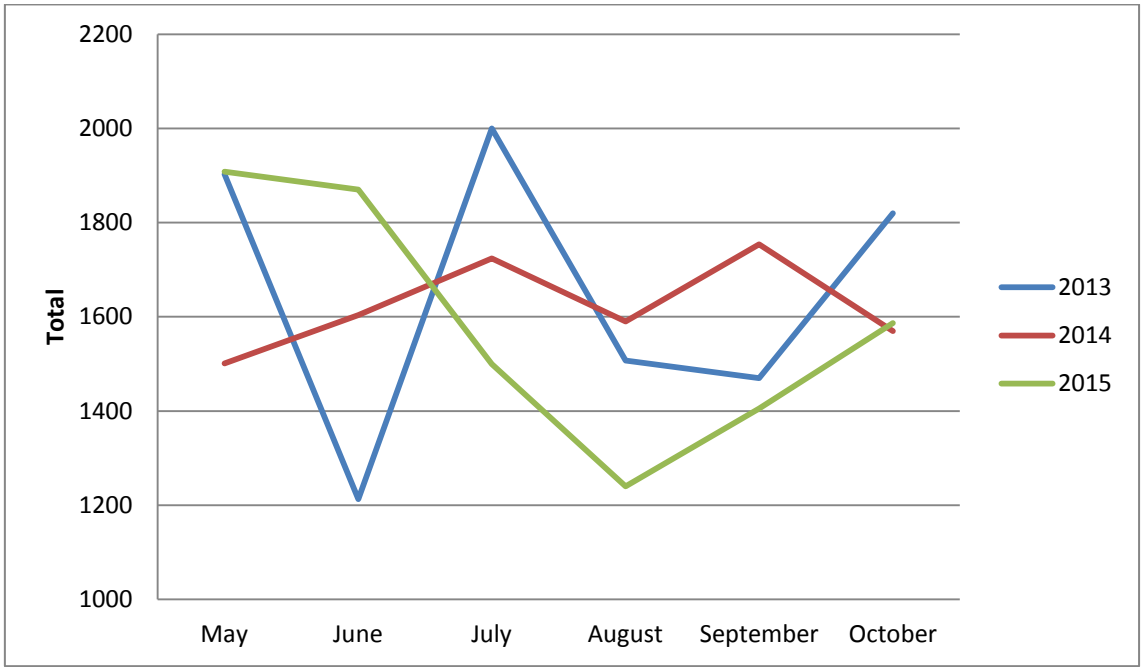


***Chart 13***

Rehospitalizations of the last 3 years in the HUV broken down in months

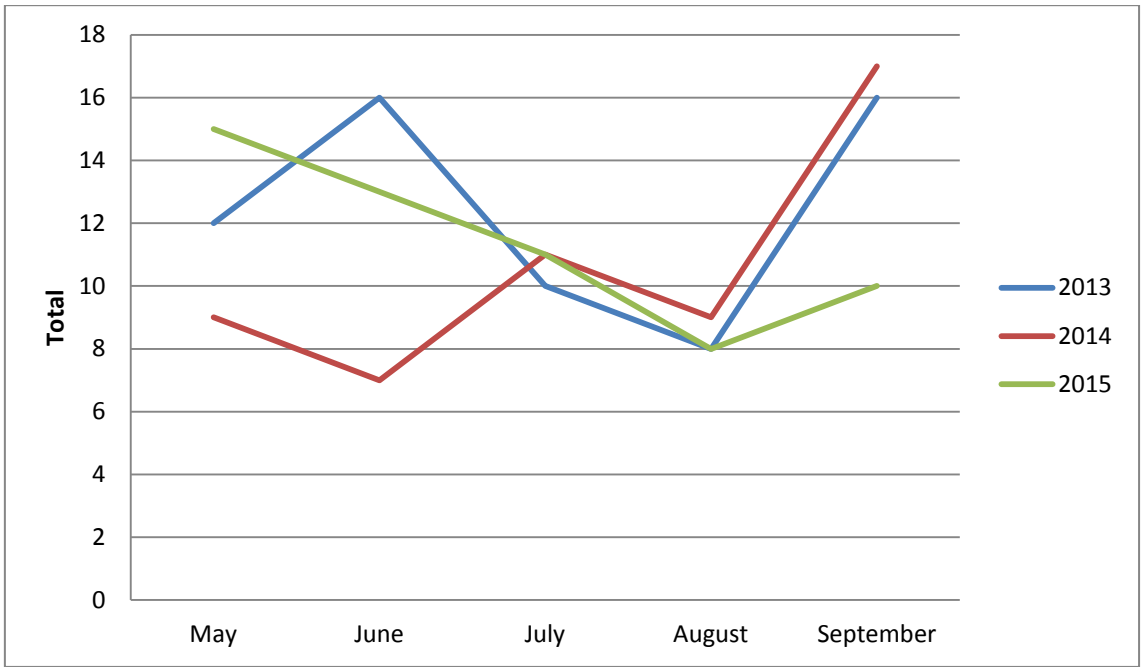
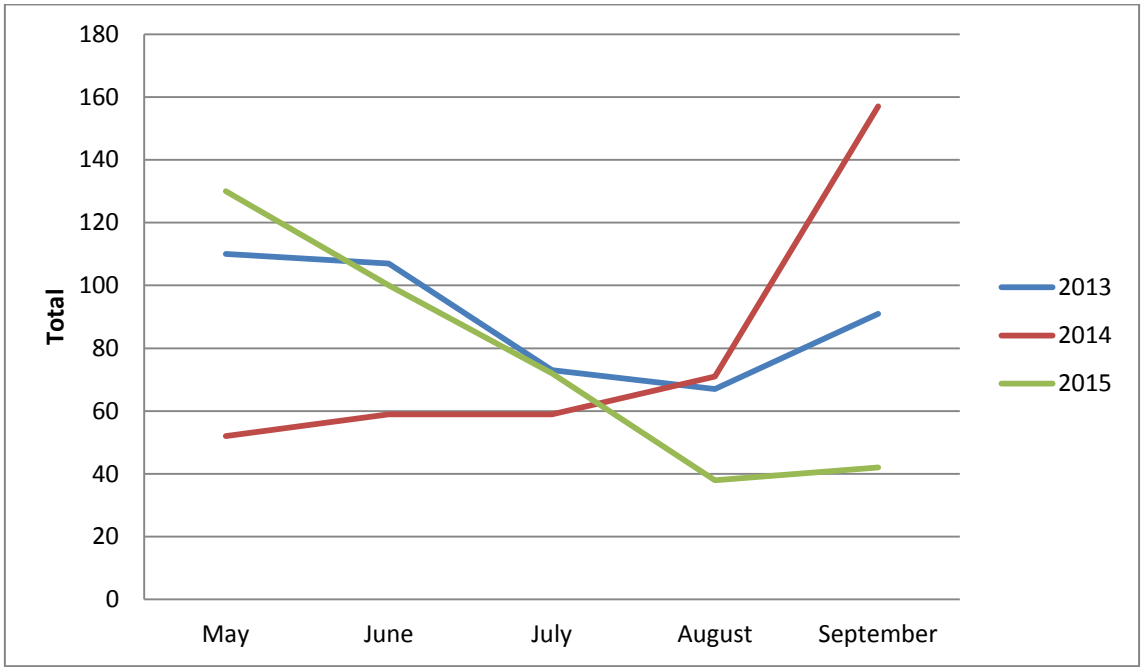



***Chart 14***

Stays of rehospitalizations of the last 3 years in the HUV broken down in months




As shown in Charts 11-14, since July there is a reduction in hospitalizations, stays, rehospitalizations and stays of rehospitalizations in the HUV.

Although we have not found statistical signification in the number of rehospitalizations and rehospitalizations stays, it is probably due to a low number of rehospitalizations.

We have used the SPSS application to calculate if there was statistical signification in this reduction of hospitalizations and with the obtained results we have designed the Table 12 and Table 13.

***Table 12***

Statistical correlations of hospitalizations in the HUV during the period from July to October

| | Differences in independent data | | | | | Statistical signification |
|---|---|---|---|---|---|---|
| **Compared data** | Mean | SD | Mean of standard error | Confidence interval (95%) | | |
| | | | | Lower | Upper | |
| **Hospitalizations 2013 vs. 2015** | 30,75 | 14,45 | 7,23 | 7,75 | 53,75 | **0,02** |
| **Hospitalizations 2014 vs. 2015** | 26,25 | 18,93 | 9,46 | -3,87 | 56,37 | 0,07 |
| **Hospitalizations 2013 vs. 2014** | 4,5 | 19,96 | 9,98 | -27,26 | 36,26 | 0,68 |

***Table 16***

Statistical correlations of hospitable stays in the HUV during the period from July to October

| | Differences in independent data | | | | | Statistical signification |
|---|---|---|---|---|---|---|
| **Compared data** | Mean | SD | Mean of standard error | Confidence interval (95%) | | |
| | | | | Lower | Upper | |
| **Hospitalizations 2013 vs. 2015** | 281,25 | 164,88 | 82,44 | 18,89 | 543,61 | **0,04** |
| **Hospitalizations 2014 vs. 2015** | 230,75 | 186,19 | 93,1 | -65,53 | 527,03 | 0,09 |
| **Hospitalizations 2013 vs. 2014** | 50,5 | 275,2 | 137,6 | -387,4 | 488,4 | 0,74 |

With these data we can see that there has been a statistical signification in the reduction of the hospitalizations (p value 0,02) and hospitable stays (p value 0,04) in 2015 in comparison to 2013 during the period from July to October. We have also detected a reduction of the arithmetic mean of the hospitalizations and hospitable stays between 2014 and 2015, although the values are in the limit of no statistical signification (0,07 and 0,09, respectively).

The arithmetic means of hospitalizations and hospitable stays have clearly no statistical significance differences between 2013 and 2014.

# 9. CONCLUSIONS

Throughout the years many new Day Care Hospitals have been created and developed to cover the needs generated by the increase of the life's expectancy and, in consequence, the increase of chronic diseases, which it is translated to a major number of hospitalizations in general. DCHs have allowed improving the attention of the patients that had to be hospitalized before the creation of the DCHs.

The medical Day Care Hospital of Hospitari Universitari de Vic was opened in May, 2015 to attend the patients with moderate to severe exacerbations of their chronic pathologies, concretely in heart failures, pulmonary chronic diseases and liver cirrhosis. One of the aims for what was created is to reduce the hospitalizations and the hospitable stays, to create a better use of the medical resources and to create a closer attention service to the patient.

It was also created the Rapid Diagnosis Unit (RDU) in the medical DCH, which allows diagnosing those patients that are under suspicion of a severe disease that has not vital immediate risk. The RDU allows realizing the diagnosis more rapidly, since there is a major availability of diagnostic technologies.

Practically there are no published studies that evaluate the efficiency and the profitability of the medical DCH, but there are studies of psychiatric or oncologic DCH, that are the most frequent types of DCH in Spain.

Since we were interested in evaluating the functioning of this DCH and there is no great data of DCHs, we have decided to realize this study.

In Vic's medical DCH three types of pathologies are attended at the moment of the exacerbation of the disease: the pulmonary chronic disease, the liver cirrhosis and the heart failure, which is the most frequently attended. In other studies, other diseases were treated: anemia, neoplasia, infections and digestive diseases (1). Since the HUV has already got a psychiatric and an oncologic DCH, the related pathologies are treated in these other services.

Our medical DCH attends patients mostly derived from Primary Care (37,2%), from the Emergency Room (30,8%) and from the hospitalization service (25,6%) for the control post-hospitalization, in order to avoid the rehospitalizations.

The majority of patients are pluripatologic, with 2 or more comorbidities (57,5%) and a Charlson index mean of 2.67, with an average of age of 71,8 years. Patients are mostly men (64,1%).

COPD is the most frequent type of pulmonary chronic disease attended in our DCH (63,6%). All the patients with COPD or CAFO diagnose were treated with bronchodilators, 94,4% of which were treated correctly according to the medical indications of the GesEPOC Guide (8).

The diagnoses of the exacerbations of the patients have been principally two: respiratory infections (40,9%) and respiratory insufficiency (50,0%). Along the exacerbation, nebulized bronchodilators (77,3%) and intravenous corticoids (63,6%) have been administrated.

We have collected 4 exitus of the patients that have been attended in the DCH: two of them were patients with pulmonary diseases and the other two patients had liver cirrhosis. Three of the exitus were related to the basal disease that the DCH was treating. The other one was related to the administration of opiates.

The attended patients in our medical DCH with a diagnose of liver cirrhosis had mostly as etiology the alcohol (88,2%). They had multiple previous complications (a mean of 2,28 previous complications per patient). They are patients with multiple basal treatments for their cirrhosis (52,9%) and they have mostly a Child-Pugh B or C (76,5%), what is traduced as an unfavorable disease.

The most frequent exacerbation that has suffered the patients is the edemato-ascitic decompensation (76,5%). For that reason, the most frequent interventions that have been realized in the DCH for these patients have been the evacuative paracentesis (76,5%), the intravenous albumin administration (70,6%) and the oral diuretic administration (70,6%).

Finally, patients with HF, which are the most frequent patients in our medical DCH (50,9%), receive multiple treatment combinations, where diuretics (82,1%), beta-blockers (56,4%), antiaggregates (51,3%) and oral anticoagulants (51,3%) predominate.
The major part of the patients have a functional class of II (64,1%), with ejection fractions of the left ventricle conserved (the mean of the ejection fraction is 51%). During the exacerbation, the symptoms that have predominated are: the apparition of dyspnea (89,7%), the edemas (51,3%) and the orthopnea (38,5%). In the DCH we have administrated oral diuretics in 94,9% of the patients and

intravenous diuretics in 35,9% of the patients.

During the period of DCH opening (from May to October, 2015), 270 visits have been realized in the medical DCH, with a mean of 3,46 visits per patient.

The hospitalizations during the period before the DCH opening were 0,82 hospitalizations per patient, while in the period after the DCH opening were 0,40 hospitalizations per patient. This supposes a reduction of 51,2% of the number of hospitalizations. This difference has statistical significance (p value 0,001).

The hospitable stay before the opening of the DCH was 3,17 days per patient, whereas the hospitable stay after the DCH opening was 1,27 days per patient. It has been a reduction of 59,9% of the hospitable stays. This difference has statistical significance (p value 0,015).

In spite of the fact that there is a reduction of more than 50% in the hospitalizations and hospitable stays, we cannot affirm that this is due to the opening of the DCH, since there are multiple factors that can influence:

- The period of the year, since on winter there are more viral epidemics.
- The creation of the PANORAMA program, which doesn't only consist on the creation and opening of the DCH, but promotes the nearby medicine between medical specialists and Primary Care and the high resolution medicine.

The analysis of the results does not allow us inferring causality because the results have not been compared to a control group of patients not included in the DCH, with the same characteristics and in the same period of time.

There has also been a reduction of the number of assistances to the Emergency Room, since before the opening of the DCH there were 99 visits at the ER and after that there were 47 visits (that supposes a reduction of 52,8%). There is a statistical significance (p value 0,002).

With the obtained data from the Qlick View application of hospitalizations and hospitable stays of the last three years we have observed that:

- The first four-month period of 2015 (from January to April) has been the one that has had major number of hospitalizations (1354) and hospitable stays (10200) of the last three years. This increase of the hospitalizations could be justified by the flu epidemic that was more notable in 2015 than in the last 2 years.

- During the period of the DCH opening (from May to October, 2015) the hospitalizations (1396), the hospitable stays (9405) and the rehospitalizations stays (378) have diminished in comparison to the same period of time of the two previous years (2013 and 2014). It is necessary to bear in mind that the income and the hospitable stays of the first 4 months of 2015 were higher than the ones of 2013 and 2014. So the reduction of hospitalizations and hospitable stays has been more important than it seems.
- The hospitalizations, the hospitable stays, the rehospitalizations and the rehospitalizations stays have diminished considerably from the last four months of DCH opening (from July to October, 2015), that has been the period when the DCH was totally functioning and the learning period had passed. Comparing it with the two previous years (2013 and 2014) and bearing in mind that during the first four-months period of 2015 there was a trend to hospitalize more, we can affirm that there is an important reduction of the hospitalizations and the hospitable stays.

  With the analysis of the obtained information with the SPSS application, we have obtained:
  - A reduction with statistical significance in the differences of the hospitalizations and the hospitable stays between 2013 and 2015 (p value 0,02 and 0,04 respectively).
  - A reduction with statistical significance in the differences of the hospitalizations and the hospitable stays between 2014 and 2015 (p value 0,07 and 0,09 respectively).
  - There have not been found statistical significances between 2013 and 2014 in the differences of hospitalizations and hospitable stays (p value >0,06 in both cases). In these two years, the DCH was not functioning.

With the data obtained from Google Flu Trends application we have observed that there has been a major trend to consult the doctor for seasonal flu at the beginning of the year 2015. This fact indicates us that the viral epidemic of this year has been more prevalent than the viral epidemic of the last two years (2013 and 2014). This is a factor that supports the efficacy of our intervention, because it justifies the increase of hospitalizations during the first months of the year.

Then, we can conclude that there has been a reduction of the hospitalizations and the hospitable stays during the period in which the DCH has been functioning in comparison to the two previous years, but we cannot attribute exclusively the result to the proper opening of the DCH, since there are multiple factors that can have determined this reduction.

It is difficult to measure with accuracy the real benefits in this kind of interventions. In this study, we have tried it by two methods:

1. Observing the subjects submitted to the intervention (DCH) and analyzing their clinical evolution before and after the intervention.
2. Comparing the number of hospitalizations and hospitable stays at the HUV during the months of the intervention (the DCH functioning) and the same period of time in the two previous years (period of no intervention).

Although we cannot conclude that the variations in results are due to this intervention, the both gauges are positive (hospitalizations and hospitable stays) and consistent with the expected benefits of the intervention.

This limitation is due to the design of the study, which does not include a control group of patients without intervention (not included to the DCH). However, given the results in previous studies, it is considered that by definition the inclusion of a patient in the DCH is done to improve the chronic patient care. Therefore, we considered that the fact of no including the patients with the same characteristics was an unethical decision, so it was finally decided to use indirect gauges that will have to be followed longitudinally over time.

## 10. ETHICAL CONSIDERATIONS

This study has been carried out taking into account the human rights and the ethical principles for medical research described by the World Medical Association (WMA), collected in “Ethical Principles for Medical Research involving human subjects”, from the Declaration of Helsinki, June 1964. The last review was conducted in October 2013 (24).

Personal data of the patients will not be distributed or will not be misused.

Confidentiality of the patient's data has been in accordance with the “Ley orgánica 15/1999, de 13 de diciembre, de Protección de Datos de Carácter Personal” (25). Patient's data have been encrypted anonymously when collected and have been identified with the clinical history number to guarantee the anonymity of patient's data. Participants have the right to modify, access, oppose or delete their personal data from the database at any time, and they have been informed of it before starting the study.

The study protocol has been presented to the “Comitè d'Ètica d'Investigació Clínica de l'Hospital de Vic (CEIC)” to be evaluated and approved, and is now pending approval. On 24$^{th}$ of November, the CEIC would meet to approve the protocol.

To include patient's data to the DCH Database there is not medical consent needed.

The researchers of this project claim that there is no conflict of interest.

## 11. STUDY LIMITATIONS

The first limitation that we have is the study design: a before-and-after design. This type of study is a quasi-experimental design that doesn't allow assuring that the observed changes are due to our own intervention (the opening of the DCH) or due to other interventions or non-controlled factors.

In spite of that we have seen that there has been a reduction of the number of hospitalizations and a reduction of the days of hospitable stay, we cannot affirm exclusively that it is due to the opening the DCH.

We can only affirm that a relation exists between both variables, but we cannot affirm that it is a causality relation.

Another limitation is the presence of confusional variables, as viral epidemics, air pollution changes, season changes that cause temperature drops, etc., that can increase the prevalence of infections in the patients that we have studied, because they have chronic diseases and are more susceptible to suffer it.

The study has been realized during one year (six months before the opening of the DCH and six months after it), so we have to take into account that in the cold seasons (autumn and winter) the prevalence of infectious respiratory diseases is major than during the hot season (spring and summer). So we have to evaluate the results of the study considering this limitation.

The fact that we have used a consecutive no-probabilistic sampling can affect the final results of the study, since the obtained information cannot be representative of the population, because we haven't randomized the population to obtain a representative sample.

We can also be limited by the fact that the professionals of the HUV have put as aim to avoid as many hospitalizations as possible since the PANORAMA program has been implanted. This means that professionals of HUV are trying to avoid unnecessary hospitalizations, but they are not avoided hospitalizations by the DCH.

A very important limitation of our study is the progress of the diseases that we have evaluated in the chronic patients that have been attended in the DCH. These diseases are progressive in time and deteriorate the patient state considerably. So as time passes by, the disease progresses and can cause multiple complications and exacerbations, which can be another confusion variable.

It is necessary to take into account that the previous hospitalizations of the disease can affect to the

nature of the disease, so every hospitalization suffered previously can have an impact in the state of the disease.

So, as more previous hospitalizations have happened, the patient will have more progression of the disease and worse basal state of the disease.

The time that we have been observing the patients is reduced, since the patients have only been evaluated one year.

A more extended study should be done to evaluate the DCH functioning and to appraise if the response of the DCH is being positive or not.

Finally, the most important thing is to take into account that results cannot be extrapolated to other types of more specific DCH (psychiatric, oncologic…), since the information that we have obtained is related to medical chronic diseases that have a different progression from other diseases that we haven't evaluated.

Our results can only be extrapolated to other medical DCH that attend patients with a high risk of exacerbations of the three diseases that we have studied: CP, HF and LC.

## 12. CLINICAL AND HEALTHCARE IMPACT

This study provides information about the impact that has the opening of the medical DCH in Vic in the hospitalizations of the patients who are attended there.

The obtained information allows us to see that there is a significant reduction of the hospitalizations on the patients who have been attended in the medical DCH in comparison to the total number of hospitalizations that existed before the creation of the DCH.

With the obtained results, other sanitary centers that are interested in opening a medical polyvalent DCH can value the advantage that would suppose the opening of their own DCH.

The realization of this study allows us to value the advantages that the medical DCH provides to the HUV: with the creation of the DCH, the hospitalizations of the chronic patients with HF, CP and LC that are in risk of exacerbation have been reduced, and the hospitable stay have been reduced too.

With these obtained data, we could suppose that:

1. The economic costs of hospitalization in the chronic patients with HF, CP and LC should have been reduced.
2. The associated complications of the hospitalizations should have been avoided.
3. The quality of life of the patients should be better now with lower hospitalizations.

These three supposals could be a new idea to carry out a new study in the future.

Finally, the patients who are attended to the DCH in Vic have fundamentally three types of pathologies: HF, CP and LC. These diseases have a great importance in our country, since they are prevalent diseases and generate many sanitary expenses:

- The **HF** has a general prevalence of 2-3% in Spain, and can reach the 10-20% of prevalence in population with >75 years (7). In addition, this prevalence is increasing, since the population is aging and there is major survival of the patients who suffer coronary events.

  The HF concerns in a great proportion of the sanitary costs of the world. In England it is the reason of 5% of the urgent hospitalizations, causes the 10% of occupation of the hospitalization beds and represents the 2% of the sanitary national expenses due to the high cost of the hospitalization (16).
- The **CP** is the third cause of death in the world. In 2010 it was observed that the number of persons with COPD had increased with regard to 1990: from 210 million persons in 1990 to more than 328 million in 2010. It has been estimated than 73% of patients with COPD are not

still diagnosed, so they are not treated either (8).

The COPD exacerbations affect 80% of the patients with COPD. 7-9% of the exacerbations need to be hospitalized (10). Bearing in mind that the mortality of these hospitalized patients is about 10-15% (10), it is so important to try to prevent hospitalizations.

- **LC** is the final state of many chronic progressive hepatic diseases. In 40-60% of cases it is caused by the abuse of alcohol and the non-alcoholic fatty liver disease (19). Though the exact prevalence is not known, it is the final stage of many hepatic diseases, so it has a great importance in our population.

  The main complications that can appear in the LC are the dropsy, the hemorrhage for esophagus varicose veins, the coagulation disorders and the hepatic encephalopathy. These clinical situations require medical attentions and, in so many cases, require conventional hospitalization (19).

For these reasons, our study can provide many advantages, since there have been studied the effects that the DCH has on the patients with frequent diseases in our country.

## 13. WORK PLAN AND CHRONOGRAM SCHEME

This study has been realized for 3 months and a half, and it has been done according to the following phases:

1. **PHASE OF STUDY DESIGN (2 weeks)** [Principal researcher] – Completed phase:

**1.1. Bibliographic research:** the principal researcher has realized a bibliographical extensive search about the current data of the DCHs.

2. **PHASE OF COORDINATION (1 month)** [Principal researcher and other researchers] – Completed phase:

**2.1. Establishment of the study:** during this phase, the principal idea of the protocol has been designed. The principal researcher of the study has realized initiation and management functions to find resources for the study.

**2.2. Follow-up meetings:** the first personal meeting was realized by the researchers to present the study design and the execution plan. The procedure to carry out the study in the most effective way was debated. The necessary information to carry out the study in a suitable way was provided.

**2.3. Establishment of the frame:** the principal researcher assured the participation of the personnel of the DCH to get the information in the most trustworthy way as possible. Also, the principal researcher agreed the follow-up time of the study.

**2.4. Final design of the study**

**2.5. Evaluation and final approval of the study:** the project was presented to the "Comitè d'Ètica d'Investigació Clínica de l'Hospital Universitari de Vic" and is pending approval.

3. **PHASE OF DATA COMPILATION (2weeks)** [Principal researcher and other researchers] – Completed phase

**3.1. Patient recruitment phase:** throughout October there have been collected the patients of whom the information will be obtained. Patients have been picked up until reaching the needed sample.

**3.2. Data collection:** during October 2015, data of the patients has been collected using the clinical computerized history, which has been introduced in the DCH Form and has been registered in the DCH Database. The information that has been collected is the included between November 4th, 2014 to October 30th, 2015. The Principal researcher has introduced the data in the Form.

**3.3. Personal meetings:** they have been carried out once the collection has been finished.

4. **PHASE OF STATISTICAL ANALYSIS OF THE INFORMATION (2 weeks)** [Principal researcher, other researchers and Statistical researcher] – Completed phase

**4.1. Final analysis of the information:** it has been realized once the information has been collected.

5. **PHASE OF THE FINAL REPORT (1 month)** [Principal researcher and other researchers] – Complete phase

**5.1. Interpretation of the results:** the results have been analyzed and interpreted. The researchers have carried out the final discussion and the conclusions of the study.

**5.2. Personal meetings:** the last meeting has been realized on November 4th, 2015 to discuss the findings.

**5.3. Elaboration of the final report**

6. **PHASE OF PUBLICATION AND DISSEMINATION (1 month)** [Principal researcher]

The final results of the study will be published and spread in articles of magazines, reports or presentations in conferences.

The following chronogram shows the tasks realized along the study:

| Month | August | | | | | September | | | | | October | | | | | November | | | | | December | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Days of the month | 1 | 7 | 15 | 21 | 30 | 1 | 7 | 15 | 21 | 30 | 1 | 7 | 15 | 21 | 31 | 1 | 7 | 15 | 21 | 30 | 1 | 7 | 15 | 21 | 31 |
| Tasks | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. PHASE OF STUDY DESIGN | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bibliographic research | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. PHASE OF COORDINATION | | | | | | | | | | | | | | | | | | | | | | | | | |
| Establishment of the study | | | | | | | | | | | | | | | | | | | | | | | | | |
| Follow-up meetings | | | | | | | | | | | | | | | | | | | | | | | | | |
| Establishment of the frame | | | | | | | | | | | | | | | | | | | | | | | | | |
| Final design of the study | | | | | | | | | | | | | | | | | | | | | | | | | |
| Evaluation and final approval | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. PHASE OF DATA COMPILATION | | | | | | | | | | | | | | | | | | | | | | | | | |
| Patient recruitment phase | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data collection | | | | | | | | | | | | | | | | | | | | | | | | | |
| Personal meetings | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. PHASE OF STATISTICAL ANALYSIS OF THE INFORMATION | | | | | | | | | | | | | | | | | | | | | | | | | |
| Final analysis of the information | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. PHASE OF THE FINAL REPORT | | | | | | | | | | | | | | | | | | | | | | | | | |
| Interpretation of the results | | | | | | | | | | | | | | | | | | | | | | | | | |
| Personal meetings | | | | | | | | | | | | | | | | | | | | | | | | | |
| Elaboration of the final report | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. PHASE OF PUBLICATION AND DISSEMINATION | | | | | | | | | | | | | | | | | | | | | | | | | |
| Articles, conferences | | | | | | | | | | | | | | | | | | | | | | | | | |
| Congresses | | | | | | | | | | | | | | | | | | | | | | | | | |

## 14. FEASIBILITY

The “Hospital Universitari de Vic” has a database in which the characteristics of the patient that we have evaluated are included. The number of hospitalizations and the days of hospitable stay can be collected from this database.

With the data of the clinical histories of the HUV we have created a DCH Database exclusively to carry out this study. Then, it is easy to obtain the information that we have evaluated.

The study design is cheap and easy to realize. It does not need a lot of time to carry out it (only three months and a half) and the needed professionals to realize it are only three: two researchers and a Statistical researcher.

The study design adapts to our initial hypotheses and allows us to see the data of the two periods that we are studying (before the opening of the DCH and after that), specially the reduction of the number and the days of hospitalization.

The required sample is small, which allows us to obtain it easily and in a short time. The patients that are used as cases are their own controls, so the sample is small.

The professionals of the DCH are capable to carry out the study without difficulties.

For these reasons, this study is viable and easy to be carried out.

## 15. BUDGET

| Item | Cost per unit | Number of units | Total cost |
|---|---|---|---|
| **COSTS OF STAFF** | | | |
| **Statistical consultor** | 35 €/hour | 30 hours | 1.050,00 € |
| **Researchers** | 0€/hour | 200 hours | 0,00 € |
| | | **Subtotal** | **1.050,00 €** |
| **COSTS OF PUBLICATION** | | | |
| **Charges of publishing articles** | 1.500,00 € | 1 publication | 1.500,00 € |
| | | **Subtotal** | **1.500,00 €** |
| **COSTS OF CONFERENCES** | | | |
| **National conferences inscription** | 500,00 € | 2 conferences | 1.000,00 € |
| **Transport** | 100,00 € | 2 conferences | 200,00 € |
| **Accommodation** | 200,00 € | 2 conferences | 400,00 € |
| | | **Subtotal** | **1.600,00 €** |
| | | **TOTAL COST** | **4.150,00 €** |

There will be no added expenses.

The researchers who collaborate in the project will not receive any economic compensation.

## 16. BIBLIOGRAPHY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# 17. ANNEXES

## ANNEX 1: FORM OF THE "HOSPITAL DE DIA MÈDIC"

# Hospital de Dia mèdic de Vic

**Dades dels pacients atesos a l'HDia de Vic**

**PÀGINA 1: DADES BÀSIQUES**

**Número d'història clínica:** _____.
**Edat: _____.**
**Sexe:** home/dona.
**Enolisme:** No/Actiu/Exenòlic.
**Tabaquisme:** No/Actiu/Exfumador.

**Procedència:**

- Urgències
- Atenció primària
- Hospitalització a la planta de medicina interna
- Altres especialitats

**Tipus de patologia per la qual consulta:**

- Insuficiència cardíaca (contestar pàg. 2)
- Malaltia pulmonar obstructiva crònica o Obstrucció crònica al flux aeri (OCFA) (contestar pàg. 3)
- Cirrosi hepàtica (contestar pàg. 4)

**Comorbiditats:**

- Diabetis mellitus insulinodependent
- Hipertensió arterial
- Insuficiència renal crònica
- Dislipèmia
- Insuficiència cardíaca
- Malaltia vascular cerebral
- MPOC (sempre i quan la malaltia per la qual consulta a HDia no sigui MPOC)
- Neoplàsia activa
- VIH+
- Malaltia hepàtica
- Malaltia neurològica (demència)
- Arteriopatia perifèrica
- Patologia del teixit connectiu
- Malaltia ulcerosa
- Hemiplegia

## PÀGINA 2: DADES SOBRE LA INSUFICIÈNCIA CARDÍACA

**Etiologia de la IC:**

- Miocardiopatia hipertensiva
- Valvular severa
- Miocardiopatia hipertròfica obstructiva
- Miocardiopatia dilatada
- Cardiopatia isquèmica
- Altres: _____.

**Tractament de base:**

- IECA
- Beta-bloquejants
- Antiagregant
- Anticoagulant
- Diürètic
- Inotròpics
- Ivabradina
- ARA-II
- Hipolipemiants
- Antagonistes receptors mineralocorticoides
- Ranolazina
- Antagonistes del calci no dihidropiridínics
- Altres: _____.

**Fracció d'ejecció última ecocardiograma (%):** _____.

**Classe funcional de base (segons NYHA):** ____.

**Diagnòstic de l'agudització:**

- IC descompensada
- Anèmia
- Ferropènia
- Insuficiència renal
- Insuficiència respiratòria (Sat02 <92%)
- Embassament pleural
- Descompensació comorbiditats
- Altres: _____.

**Clínica a l'agudització:**

- Ortopnea
- Dispnea d'esforç o empitjorament de la dispnea de base
- Edemes
- Dispnea paroxística nocturna
- Tos
- Sibilants
- Edema agut de pulmó
- Nictúria
- Fatigabilitat
- Palpitacions
- Altres: _____.

**Tractament a l'agudització:**

- Toracocentesi
- Ferro endovenós
- Ferro via oral
- IECA
- Beta-bloquejant
- Anticoagulant
- Antiagregant
- Retirar tractaments
- ARA-II
- Oxigen
- Diürètics endovenosos
- Diürètics via oral
- Altres: _____.

**Èxitus del pacient:**

- Sí (contestar pàg. 5)
- No

**PÀGINA 3: DADES SOBRE LA MPOC O OCFA**

**Malaltia pulmonar de base:**

- OCFA
- OCFA amb bronquiectàsies
- MPOC-asma (fenotip mixte)
- MPOC bronquitis crònica
- MPOC emfisema
- Pneumopatia restrictiva

**Tractament de base:**

- SABA
- SAMA
- LABA
- LAMA
- Teofilines
- Alfa-1-antitripsina
- Corticoides inhalats
- IPE-4
- Antibiòtic
- Mucolítics
- Fisioteràpia respiratòria
- Altres: _____.

**Característiques del pacient:**

- Fenòmens de multiresistència
- Exacerbador
- Oxigenoteràpia contínua domiciliària
- Corticodependència

**Grau de dispnea durant l'agudització (escala MRC):** _____.

**Diagnòstic de l'agudització:**

- Infecció
- Broncospasme
- Infecció multiresistent
- Insuficiència respiratòria aguda
- Descompensació comorbiditats
- Altres: _____.

**Tractament administrat a l'agudització:**

- Broncodilatadors nebulitzats
- Corticoides
- Oxigen
- IPE-4
- Antibiòtic
- Altres: _____.

**Èxitus del pacient:**

- Sí (contestar pàg. 5)
- No

**PÀGINA 4: DADES SOBRE LA CIRROSI HEPÀTICA**

**Etiologia de la cirrosi:**

- Enol
- VHC
- VHB
- Autoimmune
- Esteatohepatitis
- Criptogenètica
- Altres: _____.

**Tractament de base:**

- Diürètics
- Antibiòtic
- Albúmina
- Laxants
- Antivirals
- Rifaximina
- Terlipresina
- Tiamina

**Child-Pugh de base:** _____.
**Índex MELD de base: _____.**
**Complicacions prèvies a l'agudització:**

- DAE
- PBE
- EH
- SHR
- HDA
- Varius esofàgiques/colopatia portal/gastropatia portal
- Hiperesplenisme
- Hepatocarcinoma
- Trombosi portal
- Altres: _____.

**Clínica de l'agudització:**

- DAE
- PBE
- EH
- SHR
- HDA

**Diagnòstic final de la descompensació:**

- Hemorràgia digestiva alta
- Descompensació ascítico-edematosa
- Encefalopatia hepàtica
- Peritonitis bacteriana aguda
- Ascites toràcica
- Descompensació comorbiditats

**Tractament a l'agudització:**

- Paracentesi
- Antibiòtic
- Laxant
- Ènemes
- Albúmina
- Diürètic
- Tractament retirat
- Altres: _____.

**Èxitus del pacient:**

- Sí (contestar pàg. 5)
- No

| **PÀGINA 5: ÈXITUS** |
|---|
| **L'èxitus està relacionat amb la patologia de base del pacient?**<br>• Sí<br>• No |

| **PÀGINA 6: DADES SOBRE INGRESSOS HOSPITALARIS** | |
|---|---|
| **Temps de seguiment post-HDia (mesos): _____.**<br>**Número d'ingressos pre-HDia: _____.**<br>**Número d'ingressos post-HDia: _____.**<br>**Dies d'estada hospitalària pre-HDia: _____.**<br>**Dies d'estada hospitalària post-HDia: _____.** | **Visites a HDia: _____.**<br>**Ingressos des de l'HDia: _____.**<br>**Atencions a urgències pre-HDia: _____.**<br>**Atencions a urgències post-HDia: _____.** |