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The impact of psychiatric comorbidities on the length of hospital stay in patients with heart failure

Paul Carter [a], Jennifer Reynolds [b], Andrew Carter [c], Siri Potluri [d], Hardeep Uppal [e], Suresh Chandran [f], Rahul Potluri [e,*]

[a] Royal Free London NHS Trust, London, UK
[b] University of Birmingham, Birmingham, UK
[c] University of Exeter, Exeter, UK
[d] School of Medicine, Cardiff University, Cardiff, UK
[e] ACALM Study Unit in collaboration with Aston Medical School, Aston University, Birmingham, UK
[f] Department of Acute Medicine, North Western Deanery, UK

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ABSTRACT

Background: Heart failure (HF) is a major healthcare problem contributing significantly to hospital admission stays and National Health Service (NHS) spending. Reducing length of hospital stay (LoS) in HF is paramount in reducing this burden and is influenced by factors relating to the condition, sociodemographics and comorbidities. Psychiatric comorbidities are being increasingly identified amongst HF patients but their impact on LoS has not been studied in the UK.

Methods: We investigated the impact of psychiatric comorbidities on LoS amongst 31,760 HF patients admitted to hospitals in North England between 1st January 2000 and 31st March 2013 from the ACALM (Algorithm for Comorbidities, Associations, Length of stay and Mortality) study. The ACALM protocol uses ICD-10 and OPCS-4 coding to trace HF patients, psychiatric comorbidities and demographics including LoS.

Results: Amongst 31,760 HF patients mean LoS in the absence of psychiatric comorbidities was 11.2 days. The presence of a psychiatric comorbidity increased LoS by 3.3 days. Logistic regression accounting for age, gender and ethnicity showed that LoS was significantly longer in patients suffering from depression (3.4 days, $p < 0.001$), bipolar disorder (8.8 days, $p < 0.001$) and all types of dementia (4.2 days, $p < 0.001$).

Conclusions: Our results demonstrate that psychiatric comorbidities have a significant and clinically important impact on LoS in HF patients in the UK. Clinicians should be actively aware of psychiatric conditions amongst HF patients and manage them to reduce LoS and ultimately the risk for patients and financial burden for the NHS.

1. Introduction

Heart failure is an important pandemic affecting 26 million people globally [1]. In the United Kingdom alone it affects approximately 900,000 patients [2] and with a short survival time it is one of the leading causes of death [3]. 10-year mortality rate was estimated to be 42.8% by the NHANES-1 study which is comparable to the mortality rate associated with cancer [4,5]. This high morbidity and mortality means that heart failure consequently has a considerable global economic burden, which has been estimated to be $108 billion (€100 billion) annually [6]. Expensive pharmacological treatments, community care and the frequent and pronged hospital admissions [7,8] associated with the clinical course of the disease are important contributors to these costs. As a result, heart failure patients consume a considerable proportion of National Health Service (NHS) spending on hospital admissions, contributing 2% of all NHS in-patient bed-days and 5% of emergency admissions [2]. The average cost of a non-elective inpatient stay for heart failure patients is £1542 ($2300 or €2100) and every excess day costs £275 ($410 or €380) [9]. The burden of prolonged stays in heart failure patients is further demonstrated by the fivefold greater costs associated with an increase in length of hospital stay (LoS) from <4 days to >7 days [10], so it is essential that steps are taken to prevent prolonged inpatient stay. Reducing LoS could also prevent serious complications associated with hospital admissions, such as hospital-acquired infections which have a prevalence of 6.4% [11] and contribute significantly to mortality. These problems associated with extended LoS will become increasingly important as the burden of the disease rises with an ageing population and improved survival from the condition [12]. Optimising the timing of hospital discharge in heart failure patients could combat the health and social implications for the patient and financial implications for the NHS associated with prolonged LoS.

* Corresponding author at: Honorary Clinical Lecturer in Cardiology, Aston University, Birmingham B4 7ET, UK.
E-mail address: rahulpotluri@outlook.com (R. Potluri).

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Research examining the determinants of prolonged length of stay in heart failure patients is therefore required. Although these factors have not been extensively studied there is some evidence for LoS being influenced by a number of factors relating to the condition such as the aetiology [13] and disease severity [14], clinical presentation [15], the ejection fraction [14] and the presence of peripheral oedema [10]. Other medical factors include those relating to treatment of heart failure, such as the duration of intravenous diuretic therapy [10], use of harmful drugs [16] or development of iatrogenic complications [17]. Also important are socio-demographic factors [18,19] or the presence of either social problems or medical comorbidities which require treatment [10,18–20] of which various studies demonstrated renal impairment as a particularly important determinant of LoS in heart failure. These factors could be targeted; although the literature suggests LoS for heart failure patients has been shortening over recent times [21] so this data from older studies may not be relevant. As the LoS is heavily influenced by NICE guidelines and protocols, newer studies based in the United Kingdom may identify new and more relevant determinants of length of stay to focus on.

An array of studies have demonstrated that suffering from comorbid psychiatric conditions are associated with significantly longer LoS [23–26] ranging from an extra 2.5 to 8.2 days in hospital [27]. Furthermore, a large review of 26 international outcome studies which were all focused on LoS in medical and surgical inpatients with comorbid psychiatric disease, LoS was increased and in particular was prolonged by diagnoses of dementia, delirium, depression and personality disorders [28]. These longer admission times represent a significant financial burden, with 1 in every £8 ($12 or €10) of NHS spending estimated to be spent on psychiatric comorbidities. These detectable and manageable conditions are thus an important putative determinant of LoS in heart failure patients. The evidence for a similar impact of psychiatric conditions on LoS in heart failure patients is limited. Hochlehnert et al. demonstrated that cardiovascular inpatients in a German university hospital diagnosed with psychiatric conditions by the treating clinicians stayed in hospital for an average of 3 days longer [29]. This has been translated in the context of heart failure more specifically. In a study of 21,429 American patients LoS for those with a coded psychiatric comorbidity stayed in hospital up to 1.4 days longer and hospital costs for these patients were up to $7763 higher [30]. Aside from the financial cost, the LoS also has important implications on other clinical outcomes and is associated with increased readmission and higher mortality rates at 30 days and 1 year [31]. These studies together emphasise the importance of reducing costs and improving patient outcomes by reducing the LoS, but more studies are required to characterise the impact of psychiatric conditions in heart failure patients in the United Kingdom specifically.

With this in mind we aimed to study the impact of psychiatric comorbidities on LoS in a large database of patients admitted to hospitals in the North of England with heart failure. It has been previously demonstrated in two papers using this database that there is a large burden of cardiovascular disease amongst patients with psychiatric disease, with approximately 1 in 4 suffering from a cardiovascular comorbidity [32,33]. Psychiatric and cardiovascular disease is commonly seen together but the impact of these conditions on outcomes such as LoS should be studied further.

2. Methods

2.1. Study population

We examined the impact of psychiatric co-morbidity on LoS in patients diagnosed with heart failure using an entirely anonymous database of adult patients compiled using the ACALM (Algorithm of Comorbidities, Associations, Length of stay and Mortality) study protocol which has been previously used and described by our group [32–46]. The ACALM study protocol uses ICD-10 (International Classification of Diseases and Related Health Problems, revision 10) diagnosis and OPCS-4 (Office of Population Censuses and Surveys Classification of Interventions and Procedures, version 4) procedure codes to identify patients from completely anonymous electronic hospital records.

The study population consisted of all 929,552 adult patients admitted to seven hospitals in North of England, UK, between 1st January 2000 and 31st March 2013. This start date was selected because it is when ICD-10 coding started being used widely in the hospitals included in the study. For patients with several hospitalisations, only the LoS data for their first hospitalisation was included in the study. The target population we studied consisted of all 31,760 heart failure patients (3.4%) that were hospitalised during the study period. All patients with heart failure, diagnosed according to NICE guidelines [2], and given an ICD-10 code for heart failure were included. Patients under the age of 18 were excluded. Data on LoS, age, gender, ethnicity, mortality and co-morbidities were available for all patients.

2.2. Psychiatric co-morbidities

The ACALM protocol was also used to identify patients coded for any psychiatric conditions. Anonymous raw information of registered discharge diagnoses of all patients admitted to seven hospitals in North of England, UK between 1st January 2000 and 31st March 2013 were received from the computerized analysis register of the local health authority. The ACALM protocol was then applied to transfer this raw data into an anonymous research database.

Psychiatric co-morbidities were traced using ICD-10 and OPCS-4 coding. We included any of psychiatric co-morbidity with a prevalence of 0.1% or greater for analysis. This consisted of the following ICD-10 codes; alcohol abuse, anxiety, bipolar disorder, all types of dementia, depression, opioid abuse, overdose, parasuicide, phobic disorders and schizophrenia. Physical comorbidities were also analysed as a comparison (type 2 diabetes mellitus, hypertension, chronic kidney disease, cerebrovascular disease, atrial fibrillation and anaemia). The final diagnoses, co-morbidities and procedural codes entered for each patient are taken from the discharge diagnosis and therefore include clinical information that becomes available later in the hospital stay.

2.3. Data analysis

SPSS version 20.0 (SPSS Inc. Chicago, IL) was used for data analysis. To examine the impact of each psychiatric co-morbidity on length of stay a Student's t test was applied comparing mean LoS in patients with and without each co-morbidity in turn. A Levene's test for equality of variances was applied prior to the t test. P values were calculated two-tailed and $p < 0.05$ was taken as significant. The methodology has been previously described and similarly used by our group and other groups previously.

2.4. Research governance

The data used in this study was completely anonymous, non-identifiable and non-traceable. Appropriate ethics and research and development approvals were sought and obtained.

3. Results

Out of 929,552 patients admitted during the study period there were 31,760 patients (3.4%) with heart failure. Demographics of the heart failure population are shown in Table 1. The mean age of heart failure patients was 73.6, 50.3% were male and the majority were of Caucasian origin (85.1%). The majority of patients (66.4%) died during the study period.

The prevalence of psychiatric co-morbidities amongst heart failure patients were analysed and 12.7% were found to have at least one. All of the psychiatric co-morbidities with a prevalence of at least 0.1%