Brief Communication

Rehospitalization for heart failure in the elderly

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ABSTRACT

Objectives: To determine the burden of preventable rehospitalization for decompensated heart failure in the elderly.

Methods: This was a retrospective study performed in a Nigerian University Teaching Hospital,. Demographic variables, etiology, and participants of heart failure were retrieved from data of elderly patients with heart failure admitted between January 2014 and December 2015. The participants were classified and described as either preventable, or unpreventable to determine whether the hospitalizations were preventable or not. The frequency of the groups with preventable participants (hospitalization) was derived.

Results: Five groups of participants were preventable (55.5%), while 4 groups (44.5%) were unpreventable. The preventable participants were poor drug compliance (24 [23.4%]), uncontrolled hypertension (7 [6.9%]), infectious (34 [33.3%]), pulmonary thromboembolism (1 [1%]), and anemia (1 [1%]). The unpreventable participants include arrhythmias (19 [18.6%]), acute kidney injury (2 [2%]), acute coronary syndrome (1 [1%]), and progressive ventricular dysfunction (13 [12.7%]).

Conclusion: Multiple rehospitalization for heart failure is a challenge for the elderly, but 55.5% of these readmissions are preventable. Poor drug compliance and pulmonary infections were the most common preventable participants. Multidisciplinary measures involving patient education, home based care, and physician training will reduce the number of hospitalizations for heart failure in the elderly.

Heart failure is associated with significant morbidity and mortality. It is therefore a major public health concern and over 23 million persons are affected worldwide.[1] The population of elderly persons living with heart failure is on the rise due to better living conditions and improved therapies for cardiovascular diseases. Age related cardiovascular changes and longer exposure to non-communicable diseases which is on the rise in the developing world are also contributory factors. One of the major causes of frequent medical hospitalization were people aged ≥65 years. The prevalence of heart failure ranges from 10-20% in the elderly compared with 1-2% in the general population.[2] Despite recent advances in the management of heart failure, the rates of readmission after discharge remain high particularly in the elderly. More than 50% of patients readmitted within 6 months after discharge.[3] These readmissions were associated with high risk in hospital mortality and increased economic burden for both patient and healthcare system. The rates, causes and predictors of rehospitalization in heart failure were reported in previous studies,[4,5] but only few studies evaluated this problem of multiple hospitalizations from the perspective of prevention.[6,7] The main objective of this study is to determine the (burden) proportion of preventable rehospitalization for decompensated heart failure in the elderly with a view of reducing this problem.

Methods. This is a retrospective observational study carried out in the geriatric ward of a tertiary healthcare center. The protocol was approved by the hospital's research and ethics committee and the study is according to the Helsinki Declaration. Data of elderly patients (≥65 years) admitted for heart failure in the past 2 years (January 2014 and December 2015) was retrieved from the heart failure registry. A total of 102 heart failure cases were studied

Inclusion criteria were elderly patients with more than one admission for heart failure were included. Exclusion criteria were elderly patients admitted once for heart failure were excluded. Patients with first heart failure admission were excluded whether in the study center, or in other hospitals.

The clinical demographic data retrieved include age, gender, blood pressure, weight, and height and body mass index. Other data were the presence of hypertension, or diabetes and the total number of heart failure admissions in the past one year prior to admission.

The etiology and participants of heart failure were also retrieved. The diagnoses of the participants were based on the clinical features and relevant investigations: pneumonia (cough, fever, radiological findings on chest x-ray, sputum microscopy, and culture), urinary tract infection (dysuria, fever, positive urine microscopy, and culture), infective endocarditis (application of modified Duke's criteria, the 2 major, or one major + 3 minor criteria), uncontrolled hypertension (systolic blood

pressure ≥160 mm Hg, or diastolic blood pressure ≥100 mm Hg, atrial fibrillation (irregularly, irregular pulse, absence of P-waves, and irregular QRS complexes on electrocardiography), supraventricular tachycardia (a ventricular rate greater a hundred with either narrow or broad QRS complexes), poor drug compliance (intermittent or complete cessation of medications), acute kidney injury (oliguria, elevated blood urea nitrogen), pulmonary thromboembolism (pleuritic chest pain, cough, dyspnoea hypoxemia, elevated D dimer test), progressive ventricular dysfunction (no precipitant was identified), anemia (hemoglobin level <12 mg/dl for females and 13 mg/dl for males, acute coronary syndrome (ST segment elevation myocardial infarction, chest discomfort/pain, ST segment elevation, elevated cardiac biomarkers [troponin]).

These participants were further classified into groups for example pneumonia, infective endocarditis and urinary tract infections were classified as infections, while abnormal electrocardiogram rhythms such as atrial fibrillation and supraventricular arrhythmias were group as arrhythmias. Each group was described as either preventable, or unpreventable precipitant to enable us determine if the hospitalization was preventable or not.

Data were analyzed using Statistical Package for Social Sciences version 16 (SPSS Inc Chicago, IL, USA). The mean, standard deviation, and frequency were derived for continuous and categorical variables. The frequency (proportion) of preventable participants (rehospitalization) was derived as (number of preventable participant groups/total number of precipitant groups) × 100.

Results. A total of 102 cases of decompensated heart failure were studied, and the clinical demographic variables are shown in **Table 1**. There were 53 (52%) females and 49 (48%) males. Eighty-six (84.3%) were hypertensive while 32 (31.4%) were diabetic.

Table 1 - Baseline clinical variables of all patients

Variables	Mean±SD
Age (years)	74.76 ± 7.33
Weight (kgs)	63.24 ± 14.97
Height (ms)	1.60 ± 0.11
Body mass index (kg/m²)	24.81 ± 6.18
Systolic blood pressure (mm Hg)	133.81 ± 34.35
Diastolic blood pressure (mm Hg)	81.96 ± 18.35

Hypertensive heart disease was the most common cause of heart failure (74 [72.5%]). The others were valvular heart disease (11 [10.8%]), chronic lung diseases (8 [7.8%]), ischemic heart disease (3 [2.9])% and dilated cardiomyopathy (6 [5.9%]). Seventy-three (71.6%) of patients were admitted twice for heart failure while 29 (28.4%) had 3 heart failure related admissions. Eighty-seven (85.3%) of the cases had potential participants for decompensated heart failure, but 13 (12.7%) were due to progressive left ventricular dysfunction. There were 9 precipitant groups, 5 groups were preventable (55.5%), while 4 groups (44.5%) were unpreventable.

Table 2 - Frequency of precipitants of decompensated heart failure

Participants	n	(%)
Poor drug compliance	24	(23.4)
Pneumonia	21	(20.6)
Atrial fibrillation	15	(14.7)
Progressive ventricular dysfunction	13	(12.7)
Urinary tract infections	11	(10.8)
Uncontrolled hypertension	7	(6.9)
Supraventricular tachycardia	4	(3.9)
Acute Kidney Injury	2	(2.0)
Infective endocarditis	2	(2.0)
Acute coronary syndrome	1	(1.0)
Pulmonary thromboembolism	1	(1.0)
Anemia	1	(1.0)

Table 3 - Precipitant groups description and frequency.

Precipitants	Description	n	(%)
Arrhythmias	UP	19	(18.6)
Infections	PP	34	(33.3)
Acute kidney injury	UP	2	(2.0)
Anemia	PP	1	(1.0)
Uncontrolled hypertension	PP	7	(6.9)
Acute coronary syndrome	UP	1	(1.0)
Progressive ventricular dysfunction	UP	13	(12.7)
Poor drug compliance	PP	24	(23.5)
Pulmonary thromboembolism	PP	1	(1.0)

UP - unpreventable precipitant (rehospitalization), PP - preventable precipitant (rehospitalization)

Discussion. Hypertensive heart disease was the most common (72.5%) cause of heart failure. This is not unusual as hypertension is the most prevalent cardiovascular disease in our population. It is especially common in the elderly because the prevalence of hypertension increases with age and the mean age in this study was 74.76 ± 7.33 years (**Table 1**). Ojji et al[8] reported a similar finding.

The results also showed that 55.5% of participants for decompensated heart failure were preventable. This implies that over half of the rehospitalization for decompensated heart failure in the elderly can be prevented. These avoidable readmissions reduce the quality of life of the patients, increase the economic burden of heart failure, and the risk of in hospital mortality.

Poor drug compliance (24 [23.4%]) was the most frequent preventable participant (**Table 2**). This is not surprising because elderly patients generally do not comply with medications. This may be attributed to conditions such as dementia, or depression which are common in the elderly. Inadequate family or social support and financial dependence also hinder compliance to medications. Diaz et al[9] documented a similar finding in their study; this is most probably due to similarity in the population studied.

Pneumonia was the second most common preventable precipitant (21 [20.5%]) of heart failure after poor drug compliance (**Table 2**). This is not surprising because the elderly, have an impaired ability to clear secretions from the congested airways, these retained secretions predispose to chest infections (pneumonia). Elevated pulmonary pressure from poor drug compliance also contributes to pulmonary congestion. The elderly are also more vulnerable to infections compared with younger age groups because their immune function is compromised.

Eleven (10.8%) of the patients had urinary tract infections (UTI). This could arise from chronic urinary retention from benign prostatic hypertrophy (BPH), or bladder dysfunction and poor personal hygiene all predispose to UTI in the elderly. Poor drug compliance (23.5%) and pulmonary infections (20.5%) were the most frequent preventable participants for decompensated heart failure in the elderly. Other preventable participants include uncontrolled hypertension (7 [6.9%]) and the least common were anemia and pulmonary thromboembolism (1 [1%]) respectively (**Table 3**).

Arrhythmias were the most common unpreventable precipitant (19 [18.6%]) and atrial fibrillation (AF) was the most prevalent type of arrhythmia (15 [14.7%]).

The high prevalence of AF in this study was expected as both ageing and heart failure are risk factors for AF. It has an unfavorable hemodynamic effect on the failing heart with a high risk for stroke and multiple rehospitalization. Other unpreventable precipitant include progressive ventricular dysfunction (13 [12.7%]), acute kidney injury (2%), and acute coronary syndrome (1 [(1%]) of cases.

Proposed recommendations for prevention of multiple rehospitalization in heart failure include patient, or caregiver education, home-based interventions, improved hygiene, and possible vaccination against pneumonia. Pre discharge risk assessment will aid early identification of patients at high risk of readmission.[10] Establishment of dedicated heart failure clinics would also improve care.

The limitations of the study include the fact that inadequate or poorly conceived medical therapy was not considered, dietary salt and fluid excesses could not be quantified. These may have contributed to the deterioration in cardiac function. It was also a retrospective study with a sample size of 102. Nevertheless, this study provides ample evidence for the burden of preventable rehospitalization for decompensated heart failure in the elderly.

Implications for future studies include the need for a larger prospective study and determination of an association between pneumonia as a common precipitant of heart failure and the type of heart failure (systolic or diastolic heart failure). The common causes of poor drug compliance in elderly heart failure patients in our practice should also be determined.

In conclusion, multiple hospitalizations for heart failure is a challenge for the elderly, but over half of these rehospitalization (55.5%) can be prevented. Poor drug compliance and pulmonary infections were the most common preventable participants. Multidisciplinary measures involving patient education, home based care, and physician training will reduce the number of hospitalizations for decompensated heart failure in the elderly.

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