

Heart failure in a district general hospital

ABSTRACT—The frequency, clinical characteristics, and outcome of patients admitted with heart failure to a district general hospital in North-West London serving a population of approximately 155,000 was assessed over a six-month period. The number of patients with heart failure was determined by both a prospective ward survey and a retrospective study of all patient records with diagnostic codes for heart failure or pulmonary oedema. During those six months, 2,877 patients were admitted to the medical and geriatric services of whom 140 (4.9%) had heart failure. Only 29 patients in heart failure were under the age of 65 years. In 86 patients the mode of presentation was acute pulmonary oedema. Fifty-two (37%) patients had an arrhythmia at the time of admission of whom 48 had atrial fibrillation. An electrocardiogram, a chest X-ray, and an echocardiogram were performed in 137, 136, and 81 patients respectively. The aetiology of heart failure was considered to be coronary artery disease (41%), valve disease (9%), hypertension (6%), cor pulmonale (4%), a dilated cardiomyopathy (1%), congenital heart disease (1%), thyrotoxicosis (1%), and unknown (36%). During the period of hospital stay 42 patients (30%) died; a further 20 patients (14%) died in a one-year follow-up. In a district general hospital heart failure is a common reason for admission and patients remain in hospital for a considerable time. Arrhythmias are commonly associated with heart failure. The prognosis is poor and the hospital mortality high. The management of heart failure is an important consideration in allocating hospital resources in a district general hospital.

Although heart failure is thought to be a common problem in district general hospitals in the United Kingdom there is little information on the proportion of admissions who have heart failure, the admission rate relative to the population served, or the outcome. A contemporary account of the clinical presentation, the aetiology, the frequency and results of investigations, and the treatment of such patients does not exist with respect to a British hospital.

We attempted to establish the number of patients with heart failure admitted to a district general hospi-

tal in North-West London and to describe the clinical features and the outcome of such patients in the late 1980s.

Methods

Hillingdon Hospital is a district general hospital serving approximately two-thirds of the population of the borough of Hillingdon in North-West London. The demographic profile of the population served was obtained from Office of Population Census and Surveys estimates and hospital statistics. The social class distribution of the population of Hillingdon borough is reasonably typical of the population of England and Wales, although there are relatively few people in social class III(N) and more than average in social class II.

The total number of admissions to the adult medicine and geriatric services during the six-month period from 1 October, 1987 to 31 March, 1988 was obtained from hospital records by adding together the number of deaths and discharges. In order to establish the number of patients admitted with or developing heart failure during this period, a prospective weekly ward survey was carried out by one of the authors both by examining the patients and by reviewing the hospital notes. In order to check that no patient had been omitted, the medical records of all patients with diagnostic codes for heart failure and pulmonary oedema were examined retrospectively over the same period by the same author who did the ward survey.

In this study, heart failure was defined as the development of fluid retention (pulmonary or peripheral) in the presence of heart disease. Patients were only included if they were admitted because of heart failure, or heart failure became an active problem (requiring more than a continuation of their usual therapy) during their hospital stay. Patients who had had heart failure in the past and were now stable but had been admitted for other reasons were not included.

The mode of presentation, the cardiac investigations carried out, the aetiology of heart failure, the drug treatment of the patients, and the outcome were also noted. The hospital mortality and the one-year mortality were assessed.

Results

Hillingdon Hospital serves a population numbering approximately 155,000. During the six months of the study the total number of admissions to the medical and geriatric services was 2,877. Of these, 140 patients (4.9%) were considered to have been admitted with heart failure. Twenty of the 71 men and 69 women

J. PARAMESHWAR, MRCP, *Registrar in Cardiology*
P. A. POOLE-WILSON, MD, FRCP, *Professor of Cardiology, The National Heart and Lung Institute, London*
G. C. SUTTON, MD, FRCP, *Consultant Cardiologist, Hillingdon Hospital, Middlesex*

had been admitted on more than one occasion during the six-month period; their mean age was 73 ± 11.5 years. Table 1 shows the age distribution of the population served by the hospital and that of the patients admitted with heart failure.

The prospective weekly ward survey identified 91 patients with heart failure. Examination of medical records for the same six-month period revealed that 96 patients had diagnostic codes for heart failure or pulmonary oedema. However, inspection of the notes showed that 27 of them had been wrongly coded and that of the 69 patients correctly coded, 49 had not been identified by the ward survey. Seventy-one patients who were found by the ward survey had not been coded as 'heart failure'. Thus the total number of 140 patients was made up of 91 found by ward survey and 49 from the diagnostic index.

Mode of presentation

Eighty-six (61.4%) of the 140 patients with heart failure presented with acute pulmonary oedema confirmed by a chest X-ray. This number included 15 patients who were admitted with an acute myocardial infarction and developed pulmonary oedema while in hospital. The remaining 54 patients (38.6%) presented with peripheral oedema and raised jugular venous pressure.

Arrhythmias

An arrhythmia was present on admission in 52 patients (37%). Of these, 48 patients had atrial fibrillation, one an atrial tachycardia, two had ventricular tachycardia, and one ventricular fibrillation.

Investigations

Of the 140 patients, 137 and 136 respectively had an electrocardiogram and chest X-ray. The patients who did not undergo these investigations had presented *in extremis* and died in the emergency department. M-mode and cross-sectional echocardiography had been performed in 81 patients (57.8%). The hospital is not equipped to carry out either nuclear ventriculography or contrast angiography.

Aetiology of heart failure

Table 2 shows the aetiology of heart failure in the 140 patients. Of the 57 patients with coronary artery disease, 15 presented with a fresh myocardial infarct and 28 were known to have had myocardial infarcts in the past. In all cases a diagnosis of myocardial infarction was confirmed by electrocardiograms and a twofold rise in cardiac enzymes. Fourteen patients who had chest pain associated with electrocardiographic changes at rest or on exercise completed the group.

Table 1. Age distribution

Population served				
Age	0-64	65-74	75+	Total
Men	66,200	5,866	3,333	75,399
Women	65,133	7,400	6,533	79,066
Total	131,333	13,266	9,866	154,465

Patients with heart failure: total and number per 1,000				
Men	20 (0.3)	21 (3.58)	30 (9.0)	71 (0.94)
Women	9 (0.14)	18 (2.43)	42 (6.43)	69 (0.87)
Total	29 (0.22)	39 (2.94)	72 (7.3)	140 (0.91)

All four patients with cor pulmonale suffered from chronic obstructive airways disease. The patients with congenital heart disease included one with an ostium primum atrial septal defect and one with pulmonary hypertension after ligation of a patent ductus arteriosus in adult life. Both patients with thyrotoxicosis had normal left ventricular systolic function on echocardiography. Of the 51 patients in whom a definite aetiology could not be assigned, echocardiography had been carried out in 17. Two of them had regional wall motion abnormalities suggestive of coronary artery disease, and one patient had a hypertrophied left ventricle in the absence of systemic hypertension. The remaining 14 patients had a dilated left ventricle with global hypokinesis.

There were 13 patients with primary valve disease and nine with known preceding hypertension. Two patients had a dilated cardiomyopathy and normal coronary arteries at cardiac catheterisation.

Treatment and outcome

All the patients were treated with diuretics. Digoxin was used only in patients who were in atrial fibrillation. An angiotensin converting enzyme inhibitor was either already being used or was introduced during the hospital stay in 34 patients, and 21 were prescribed nitrates. The mean duration of hospital stay was

Table 2. Aetiology of heart disease

Aetiology	Number	Percentage
Coronary artery disease	57	40.7
Valve disease	13	9.3
Hypertension	9	6.4
Cor pulmonale	4	2.9
Dilated cardiomyopathy	2	1.4
Congenital heart disease	2	1.4
Thyrotoxicosis	2	1.4
Unknown	51	36.4

16.7±16.7 days. Forty-two patients (30%) died in hospital; of these, 26 had presented with acute pulmonary oedema. An autopsy was obtained in 15 patients and did not contribute to the clinical cardiovascular diagnosis in any case. One year following admission a further 20 patients (14%) had died.

Discussion

During the past three decades a considerable body of knowledge has been accumulated on the epidemiology of chronic cardiovascular diseases such as hypertension and coronary artery disease. The study of the development of heart failure in patients with cardiovascular disease has been hampered by the absence of uniform criteria for diagnosis and the different ways in which the clinical syndrome is defined. In an attempt to avoid some of these problems, the Framingham study [1] adopted a set of major and minor criteria in a manner similar to the Jones criteria [2] for rheumatic fever. We adopted a clinical definition for heart failure which is easy to apply: patients had clinical evidence of heart disease and had either pulmonary oedema on chest X-ray or peripheral oedema with a raised jugular venous pressure.

The discrepancy in finding patients with heart failure between our prospective ward survey and the retrospective analysis of patient records by hospital diagnostic index coding was very striking. At Hillingdon Hospital, during the period of the survey diagnostic codes were assigned not by doctors but by clerical staff who read clinical notes. Such notes may frequently be flimsy, illegible, lack typewritten discharge summaries, and be compiled by inexperienced doctors. Although the effect of medical audit is to alter all these aspects for the better, we believe that during the period (1987–88) Hillingdon Hospital was not significantly different from most hospitals in Britain. Thus only 20 of the 140 patients were picked up both by the ward survey and the diagnostic code, while 71 patients were found in the ward survey but not coded as 'heart failure', and 49 patients were correctly coded but missed by the ward survey. The principal reasons for missing patients from the ward survey were that they had died shortly after presenting at the casualty department and before reaching the ward, or that the ward survey was not carried out frequently enough.

Comparative heart failure admission data are scanty. Gillum [3] examined data from the National Hospital Discharge Survey of the National Centre for Health Statistics in the United States. In 1985, a total of 585,000 hospital discharges were coded with congestive heart failure as the principal or first listed diagnosis. There were also 1,731,000 discharges with congestive heart failure as any of up to seven coded diagnoses. Klainer *et al* [4] in 1965 reported that hospital admissions for heart failure totalled 1–2% (approximately) of all admissions to selected hospitals in Australia, Canada, and the United States. In Eng-

land and Wales the figure was 0.6%, derived from morbidity statistics in general practice in 1958 [5]. The Hospital In-patient Enquiry [6] organised jointly by the Department of Health and Social Security and the Office of Population Censuses and Surveys provides information on illness among hospital patients as a guide to morbidity occurrence in the community. The last report from this body was in 1985, and reports on cardiovascular morbidity under five groups including 'Diseases of pulmonary circulation and other forms of heart disease'. While heart failure is included in this group, it is not separately classified. This system depends on accurate coding of medical records in hospitals throughout the country, and we have already referred to the inaccuracies of such a system when tested in our own hospital.

An attempt was made to determine the aetiology of heart failure in every case. Coronary artery disease was regarded as the aetiology using conventional criteria for its diagnosis: prior myocardial infarction, a history of angina, or coronary arteriographic findings. This resulted in 41% of the patients being classified under this diagnosis. However, the proportion is likely to be much higher because of a large group of patients (36%) who were classified as 'unknown'. Included in this latter group were patients with regional wall motion abnormalities on echocardiography (likely to be due to coronary artery disease) and others with global left ventricular systolic malfunction which might or might not be due to coronary artery disease. There is no evidence to suggest that 'idiopathic' dilated cardiomyopathy is common in North-West London, but detailed investigation involving cardiac catheterisation with coronary arteriography is seldom carried out on predominantly elderly people with heart failure in district hospitals.

Although virtually all patients had electrocardiograms and chest X-rays, only 81 patients (58%) had echocardiography. A reluctance to investigate the elderly and perhaps a failure on the part of general physicians, including those specialising in geriatric medicine, to appreciate the usefulness of echocardiography have contributed to this. Whether demonstration of cardiac anatomical or functional abnormalities by echocardiography would alter the outcome in patients being treated for heart failure is not established. However, as a simple non-invasive test which might reveal either a normal result or an undiagnosed valve abnormality which may be relevant to treatment, it seems sensible for the practising clinician to do it.

In the Framingham study [1] hypertension preceded the onset of heart failure in 75% of patients and was by far the most important aetiological factor. It is, of course, difficult to assess the contribution of coronary artery disease in the pathogenesis of heart failure in these hypertensive patients. Since that time great attention has been paid to the early recognition and aggressive treatment of hypertension. Killip [7] analysed 100 consecutive discharges from the Henry Ford

Hospital in Detroit, and found that hypertension was present in 31%. A recent review of the aetiology of heart failure in patients enrolled in clinical studies suggested that at least half had coronary artery disease and that hypertension accounted for only 3.8% of the patients [8]. In a report from the SOLVD Investigators the aetiology of heart failure was coronary artery disease in the majority (70%) [9]. These figures suggest that there has been a real decline in the incidence of hypertensive heart failure and puts our figure of 6.4% into perspective.

The frequency with which atrial fibrillation (either paroxysmal or established) accompanies heart failure is shown by our study. Of the 48 patients who had atrial fibrillation, 18 presented in pulmonary oedema and 30 with peripheral fluid retention. A rhythm disturbance is an important factor in precipitating an acute exacerbation of chronic heart failure.

Several studies have demonstrated the poor prognosis of patients with heart failure [1,10,11], but none has established the figure for the spectrum of patient deaths within a British hospital. Forty-two patients (30%) of the 140 patients in our study died during hospital admission. A one-year follow-up of the survivors revealed 20 further deaths (14% of the original cohort). These figures confirm the poor prognosis of patients with heart failure requiring hospital admission (44% dead in one year) and provide a standard against which medical interventions might be compared. This study also demonstrated that most of these patients are elderly and that their stay in hospital is quite lengthy.

The present study establishes the importance of heart failure in the setting of a British district hospital and highlights some of the problems which occur in producing accurate figures for admissions. Our study provides information about a common condition and is particularly useful at a time when medical audit is increasingly important for planning the allocation of

resources. Heart failure patients in district general hospitals are usually elderly, and the most frequent aetiology is coronary artery disease, while hypertension appears to be an uncommon aetiological factor. Diagnostic practices are such that a significant proportion of patients do not have an aetiology established. The prognosis of patients admitted with heart failure is poor.

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Address for correspondence: Dr G. C. Sutton, Hillingdon Hospital, Uxbridge, Middlesex UB8 3NN.