

# Heart Failure

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## Abstract

Heart failure is a growing disease and incidence is seen to be increasing world-wide. One of the main factors driving this is aging populations. Heart failure is now often secondary to coronary artery disease. BNP is a very useful and accurate marker for heart failure management. Its use as a screening tool for symptomatic patients in primary care is widely spread.

**Key words:** Heart failure, BNP

## Case Report

During a home visit consultation, I saw a 95 year old housebound lady. She presented with a 4 day history of worsening shortness of breath. She also complained of pronounced swelling in her ankle which has been increasing slowly over the past week. She denied recent history of chest pain or palpitations. She lives alone and gets carer support calls twice a day. Her past medical history included asthma, chronic heart failure, hypertension, type 2 diabetes, hypertension and atrial fibrillation. She was taking warfarin 5mg OD, Seretide twice daily, atorvastatin 10mg OD, furosemide 40mg OD, metformin 500mg twice daily and amlodipine 10mg, bisoprolol 5mg daily. On examination, she was alert, speaking in sentences, with no signs of pallor or cyanosis. Her chest was tight with scattered wheeze and mild basal crackles and her heart sounds were I +II +0 in AF. She had mild ankle oedema with no significant rise in her JVP. In this instance she was treated for exacerbation of asthma and given a 5 day course of oral prednisolone 40mg daily and 7 day course of co-amoxiclav. Her bloods were taken, and they showed moderate rise in CRP at 50 and BNP of >600, her eGFR indicated CKD3. She showed marked improvement a week later.

I saw her 3 months later in another visit and this time she seemed worse with severe shortness of breath and very low exercise tolerance. She was in overt heart failure with significant signs of fluid overload (i.e. pulmonary oedema and peripheral oedema) and had to be admitted for hospital treatment.

Heart failure (HF) is defined by reduced or impaired cardiac output and/or raised cardiac pressure during activity or at rest. It is usually caused by structural or functional abnormalities. Coronary artery disease is the most common cause of chronic HF in the UK. Around 900,000 people in the UK suffer from HF. The average age at first diagnosis is 76 years with a 30-40% mortality rate in the first year(1).

The cost burden of HF has been increasing over the years. The average 5-year survival rate of HF is 58%. It accounts for 2% of all NHS inpatient bed days and 5% of all emergency medical admissions to hospital. These numbers are expected to rise further in the coming 25 years (2).

One key diagnostic test is the Brain Natriuretic Peptide (BNP). It is a protein secreted by the ventricles of the heart in response to excessive stretching of the cardiac muscles. The significance of this peptide was noted in the 1990's and in 2000's it was developed as a diagnostic test as it was found to be a sensitive indicator of cardiac dysfunction (3,4,5).

The management of heart failure can be divided into two acute and chronic stages. In acute heart failure/new diagnosis, if the BNP is measured at above 400pg/ml the patient should be urgently referred to the HF clinic for an echocardiogram. With readings between 100-400 the patient can be referred to be seen within 6 weeks for and echo and cardiology review(3,4,5).

A study by Wiecek et al concluded that BNP accurately diagnoses left ventricular dysfunction and heart failure where 1050 subjects were studied. When the BNP levels were compared with the NYHA classification of the subjects there was a correlation between increase in BNP levels with increased HF severity. BNP was demonstrated to have a sensitivity of 82% and a 99% specificity for distinguishing between the control subjects and those with heart failure (6,9,10).

Another study looked at 1586 patients who had a BNP check after presenting to the accident and emergency department with shortness of breath. The study found significant differences in HF based on age and race with increased BNP correlating with increased age. It was found to be a strong predictor in younger subjects than older ones. It was also a slightly weaker predictor in females than males (11).

In a further study BNP was found to predict mortality in the elderly. The study looked at a cohort of 85 year olds who were followed up for 5 years. BNP levels were significantly raised with age and patients with CVD the 5-year mortality was correlated with higher BNP (7).

Use of BNP testing in primary care as screening for a patient with suspected HF before referral for echo is strongly indicated. The negative predictive value of BNP >98%. The sensitivity, specificity and positive predictive value are 100%, 49 % and 46.9 % respectively (9). The likely net saving is up to £964.20 without compromising the diagnostic accuracy.

In conclusion, heart failure is an important diagnosis with poor prognosis particularly in the elderly. BNP so far has shown a great value for the diagnosis and measure of prognosis in HF. Its importance as a diagnostic tool to reduce cost to healthcare systems has been demonstrated successfully.

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