B-type natriuretic peptide testing in a nurse-led heart failure clinic

Heart failure has a significant impact on health and its prevalence increases with age (Cowie et al, 1997). Coronary heart disease (CHD) and hypertension are the most common causes (Cowie et al, 1999). The National Service Framework for Coronary Heart Disease identifies that people with suspected heart failure should be offered appropriate investigations to confirm the diagnosis and identify the cause (DoH, 2000). Also, those with confirmed heart failure should be offered treatment to relieve symptoms and reduce the risk of death. The National Institute for Clinical Excellence will publish guidelines this summer, which will aim to improve the management of heart failure.

**Difficulty with diagnosis** It is difficult to diagnose heart failure based on history and physical examination alone. Symptoms are often non-specific, and the clinical signs are not sensitive enough to make an accurate diagnosis without additional investigations (Remme et al, 2001). Symptoms vary but commonly include breathlessness, reduced exercise tolerance, lethargy and oedema. However, all of these may be attributed to other pathologies such as respiratory disease or obesity.

**Investigation for heart failure** The aims are to:

- Confirm or refute the presence of heart failure;
- Identify the aetiology;
- Exclude other conditions;
- Assess left ventricular function;
- Estimate prognosis and risk of mortality (DoH, 2000).

Investigations that can aid diagnosis include:

- **12-lead electrocardiogram (ECG)** This is a relatively simple, cheap, painless and accessible non-invasive test. It is unusual for a patient with heart failure to have a normal ECG. Specific abnormalities such as Q waves or left bundle branch block may be suggestive of previous myocardial infarction, or there may be changes that indicate left ventricular hypertrophy (thickening of the ventricle wall).

- **Chest X-ray (CXR)** This may provide evidence of cardiomegaly (enlarged heart) but this is not always associated with left ventricular dysfunction. The CXR may identify the presence of pulmonary oedema or help to determine if the symptoms are due to respiratory disease.

- **Echocardiogram** This is the best assessment of heart failure, as it provides valuable information about the structure and function of the heart. It can assess the degree of left ventricular dysfunction, and identify possible causes, such as disease of the heart valves.

Other investigations Full blood count, profile of renal function, and liver function tests.

Although the ECG is used widely in primary care, facilities for CXR and echocardiograms are usually situated in secondary care and access may be limited. This may contribute to many patients in the UK being diagnosed and treated for heart failure without proper objective evidence of cardiac dysfunction.

**Natriuretic peptides** Biochemical markers have become an important additional diagnostic tool in cardiology. B-type natriuretic peptide (BNP) is a cardiac neurohormone secreted mainly from the ventricles of the heart in response to stretching, which is caused by increased volume of blood or increased pressure.

A BNP level within the normal range (<18.4 picograms per millilitre (pg/ml) is used in this study) is an indication that the patient’s symptoms are highly unlikely to be due to heart failure, and that another cause should be considered. It can therefore be used as a test to rule out heart failure (McDonagh et al, 1998). The normal range was determined locally by the biochemist. Elevated levels suggest that the symptoms may be due to heart failure, and that further testing is required, usually by echocardiography. It is suggested that using BNP testing and the ECG, in addition to patient history and clinical findings, could form the basis of the initial assessment of patients with suspected heart failure.

**Pilot study** In response to the NSF, a heart failure clinic was set up at St Thomas’ Hospital in London. A nurse consultant in cardiology was appointed; areas requiring service improvements were identified; and initial clinic objectives were outlined. The objectives were to:

- Improve the diagnosis of heart failure;
- Provide optimal patient management using evidence-based protocols;
- Manage medicine changes in a controlled environment;
- Improve continuity of care;
- Provide education and support, and promote self-management strategies.

It was hypothesised that BNP testing has the potential to improve heart failure diagnosis and could be used in a nurse-led triage heart failure clinic. It was thought it might also reduce referrals for echocardiography and assessment by a cardiologist, so promoting more efficient and appropriate use of resources.

**Method** Ten local practices were identified as pilot sites for using BNP as a diagnostic test, and were visited by the nurse consultant. Referrals to the nurse-led triage heart failure clinic were invited for patients with newly suspected heart failure. The clinic was designed to be a one-stop service, with patients having all tests carried out in one session. The use of BNP testing could be an additional diagnostic tool in a nurse-led heart failure clinic.
out in one visit. For the study, all patients underwent ECG, echocardiography and blood tests. CXRs were ordered, if indicated, after patient assessment. The nurse consultant assessed the patients, and recorded their medical histories and results of clinical examinations and diagnostic tests.

Ten consecutively referred patients had a venous blood sample collected to establish their BNP level. These were analysed retrospectively, so results were not known at the time of the consultation or initiation of any treatments.

**Results**  Four patients had BNP levels within the normal reference range used in this study (<18.4 pg/ml). The ECG was normal in three of these patients, and one patient had some minor non-significant changes. The ECG recordings demonstrated good left and right ventricular function for all four patients and they were referred back to primary care, as heart failure was unlikely to be the cause of the presenting symptoms.

The other six patients had BNP levels above the normal range (Table 1). Five patients had abnormal ECGs and confirmed left ventricular dysfunction on echocardiogram and were subsequently treated in the heart failure clinic. One patient with an elevated BNP level but normal heart function on echocardiogram was referred to the renal team for further investigation, after abnormal renal and liver function results were recorded.

**Conclusion**  The findings of this pilot study indicate that with appropriate diagnostic tools, nurses can identify patients who do not have heart failure. The remaining patients can then be referred for specialist assessment. Use of patient history, clinical findings, and relatively simple tests such as the ECG and BNP may reduce both demand for echocardiography and the need for assessment by a cardiologist. This is a service model with the potential for use in primary care.

**Progress on the prevention and treatment of coronary heart disease**

The National Service Framework for Coronary Heart Disease (Department of Health, 2000) has set the agenda for the modernisation of CHD services and identified 12 standards for improved prevention, access to care, diagnosis, treatment and rehabilitation.

NHS nurses are implementing the NSF in many areas, including: primary and secondary prevention; heart failure clinics; rapid-access chest pain clinics; rehabilitation services; emergency services; and in the management of heart surgery patients. Currently, there are more than 22 consultant cardiac nurses in England.

The Priorities and Planning Framework (DoH, 2002) outlines key CHD targets for England. The PPF has brought forward the target date for achieving a maximum three-month wait for a heart operation from 2008 to March 2005.

There are 28 cardiac centres across the country that provide cardiac services. Patient care advisers (PCAs) are in post at each centre to ensure effective management of patients and their carers. PCAs are experienced nurses who provide continuity and consistency, and ensure direct access to information.

Heart failure is another key area outlined in the PPF. Although the number of deaths from CHD continues to fall, an ageing population and improved care after myocardial infarction mean that heart failure is increasingly common. If not properly managed in the community, it can increase pressure on hospital beds through emergency admissions and re-admissions.

Nurses have begun to make an impact through heart failure clinics in primary and secondary care.

Since the NSF was published, nurses in cardiac care have adopted new ways of working. They order diagnostic tests, make direct referrals to CCU, cardiac wards or chest pain clinics, and supply treatments such as thrombolysis under patient group directions.

Patients are already benefiting from the implementation of the NSF but as this is a 10-year programme of reform, there is still much to do and nurses have an active part to play.

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**REFERENCES**


**TABLE 1. ECG AND ECHOCARDIOGRAM RESULTS FOR PATIENTS WITH ELEVATED BNP LEVELS**

<table>
<thead>
<tr>
<th>BNP level</th>
<th>ECG</th>
<th>Echocardiogram</th>
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<tbody>
<tr>
<td>(Normal BNP reference range</td>
<td>Normal</td>
<td>Normal function</td>
</tr>
<tr>
<td>&lt;18.4 pg/ml</td>
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<td>175.6 pg/ml</td>
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