

Diagnosis of patients with chronic heart failure in primary care: usefulness of history, examination, and investigations

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SUMMARY

Chronic heart failure is a common clinical syndrome that may have different causes. Its incidence and prevalence are predicted to rise substantially over the next 10 years. There are therefore major consequences for resource provision, especially in primary care, where most patients are managed. Chronic heart failure is a serious condition with high morbidity and mortality. There is good evidence to show that treatment with angiotensin-converting enzyme (ACE) inhibitors in patients with left ventricular systolic dysfunction improves symptoms and signs, slows progression of heart failure, reduces hospitalisation rates, and improves survival. Despite this evidence, primary care studies show that patients with heart failure are incorrectly diagnosed and inadequately treated. Most patients present in general practice, and because effective treatment relies on a correct diagnosis, this is a key step in the appropriate management of heart failure. The aim of this paper is to review the evidence about the usefulness of signs, symptoms, and investigations in diagnosing heart failure in primary care. To identify relevant studies for this review, four strategies were used: a MEDLINE search from 1993 to January 1998 using the diagnosis search filter; a MEDLINE search from 1993 to January 1998 using the guideline search filter to locate published heart failure guidelines; a search for review articles in the Cochrane Library; and a check of references in the studies identified. The search terms included MeSH terms and the keywords 'heart failure' and 'diagnosis'. All searches were limited to humans and English language articles. Studies were included in this review on the basis of quality and relevance to primary care. The review shows that symptoms and signs are important because they alert clinicians to the possibility of heart failure as a diagnosis. However, they are not sufficiently specific for confirming left ventricular systolic dysfunction. From the evidence available, a patient with suspected heart failure must have objective tests to confirm the diagnosis. These should include an electrocardiogram and, ideally, an echocardiogram. Further research is also needed on the usefulness of signs and symptoms in primary care, as most studies of heart failure have been conducted in secondary care.

Keywords: heart failure; symptoms; signs; investigations; diagnosis.

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Introduction

CHRONIC heart failure is a common clinical syndrome that may have different causes and treatments.¹ It is defined as 'symptomatic left ventricular systolic dysfunction'.^{2,3} Epidemiological data suggest that it is becoming increasingly common, affecting up to 500 000 people in the United Kingdom,⁴⁻⁶ and incidence and prevalence are predicted to rise substantially over the next 10 years.⁷ Therefore, there are major consequences for health services and resource provision, especially in primary care, where most patients are managed.⁸ The annual direct cost of heart failure accounts for over 1% of the total NHS budget and 10% of NHS expenditure on diseases of the circulatory system,⁹ the majority owing to costs of hospitalisation.¹⁰ The cost of drug treatment of heart failure is minimal in comparison.¹⁰

Chronic heart failure is a serious condition with five-year survival rates of 25% in men and 38% in women.¹¹ Quality of life is worse than with angina, diabetes, chronic obstructive airways disease, and many gastrointestinal diseases.¹² However, recent advances in treatment can reduce mortality and morbidity.¹³⁻¹⁵ When given with diuretics, angiotensin-converting enzyme (ACE) inhibitors improve the symptoms and signs of all grades of heart failure and improve exercise tolerance.^{13,14,16} Progression of heart failure from mild to severe is reduced,¹⁷ as are hospitalisation rates, and survival is improved in all grades of failure.¹³⁻¹⁴ Treatment with ACE inhibitor also enhances functional status.^{13,14}

The majority of these patients present in general practice and, because effective treatment relies on a correct diagnosis,¹⁸ this is a key step in the appropriate management of heart failure. The aim of this paper is to review the evidence about the usefulness of signs, symptoms, and investigations of heart failure owing to left ventricular systolic dysfunction in primary care. We have not reviewed the literature on isolated diastolic heart failure as there is little known about how to treat these patients.¹⁹

Method

To identify relevant studies for this review, four strategies were used: a MEDLINE search from 1993 to January 1998 using the diagnosis search filter;²⁰ a MEDLINE search from 1993 to January 1998 using the guideline search filter (Box 1)²⁰ to locate published heart failure guidelines; a search for review articles in the Cochrane Library;²¹ and a check of references in the studies identified. The search terms included MeSH terms and the keywords 'heart failure' and 'diagnosis'. All searches were limited to humans and English language articles. The MEDLINE search using the diagnosis filter (Box 2)^{20,22} yielded 841 articles with abstracts, all of which were examined by KK in order to identify those that were relevant. The guideline filter identified six guidelines of relevance to primary care.^{3,23-27} Studies were included in this review on the basis of quality and relevance to primary care.

Prevalence and aetiology

In the Framingham study, the average annual incidence rates of

- #1 guideline.pt.
- #2 practice guideline.pt.
- #3 exp guidelines/
- #4 health planning guidelines/
- #5 #1 or #2 or #3 or #4

Box 1. Guidelines methodological filter for MEDLINE.²⁰

- #1 exp 'sensitivity-and-specificity'/
- #2 sensitivity.tw.
- #3 exp diagnosis/
- #4 exp pathology/
- #5 specificity.tw.
- #6 #1 or #2 or #3 or #4 or #5

Box 2. Diagnosis methodological filter for MEDLINE.²⁰

heart failure were 2.3 per 1000 in males and 1.4 per 1000 in females.²⁸ The prevalence of heart failure in general practice has been estimated to be 0.4% to 1.5%;^{4,8,29,30} however, relatively small numbers of patients were included in these studies and cases were often identified on clinical grounds only. In contrast, the prevalence of left-ventricular systolic dysfunction confirmed by echocardiography in a recent cross-sectional survey in Glasgow was 2.9%.² The dysfunction was symptomatic in 1.5% and asymptomatic in 1.4%.² Variations in reported prevalence may be explained by variations in definitions of heart failure, differences in sampling methods, or true differences between practices in the studies. Generally, studies of the aetiology of heart failure have also involved only small numbers of patients.^{4,29,30} Ischaemic heart disease has been identified as responsible for 82% to 95% cases; hypertension for 64% to 80%, valve disease for 25% to 32%; cor-pulmonale for 3% to 7%; cardiomyopathy for 1% to 2%, and congenital heart diseases in 1% to 2%.^{2,4,29,30} In the Glasgow survey, 50% were found to have had a previous myocardial infarction and 62% had a history of angina.²

Diagnostic criteria

In practice, the diagnosis of heart failure relies on a combination of history, physical examination, and appropriate investigations,¹ but there are no generally accepted diagnostic criteria.³¹ Lack of consensus about diagnostic criteria was illustrated by a survey of 2700 practising physicians;³² a problem that is exacerbated because many studies of heart failure have been carried out without using explicit diagnostic criteria.³³ Furthermore, symptoms reported by patients, while important, are subjective, and do not always relate closely to outcome.³⁴ For an item of clinical history or physical examination to be accurate, it must be reliably identifiable so that two clinicians examining the same patient would agree on the presence or absence of the symptom or sign.³⁵ Clinical diagnosis may be easy when the condition is advanced with symptoms of fluid retention, fatigue, and dyspnoea; however, it can be difficult in early disease.

Left ventricular systolic dysfunction is difficult to confirm solely on the basis of signs and symptoms. Primary care studies have shown that many patients with breathlessness thought to have heart failure have been misdiagnosed.^{8,29} Another primary care study of newly diagnosed patients with heart failure found that a false-positive diagnosis of heart failure was common in primary care, although diagnosis was more accurate in women than men.³⁶

The New York Heart Association (NYHA) classification is widely used to grade the severity of symptoms of heart failure in adults.³¹ Mortality is related to symptom severity, with one-year mortality rates of approximately 50% in severe heart failure, four-year mortality rates of 40% to 50% in moderate heart fail-

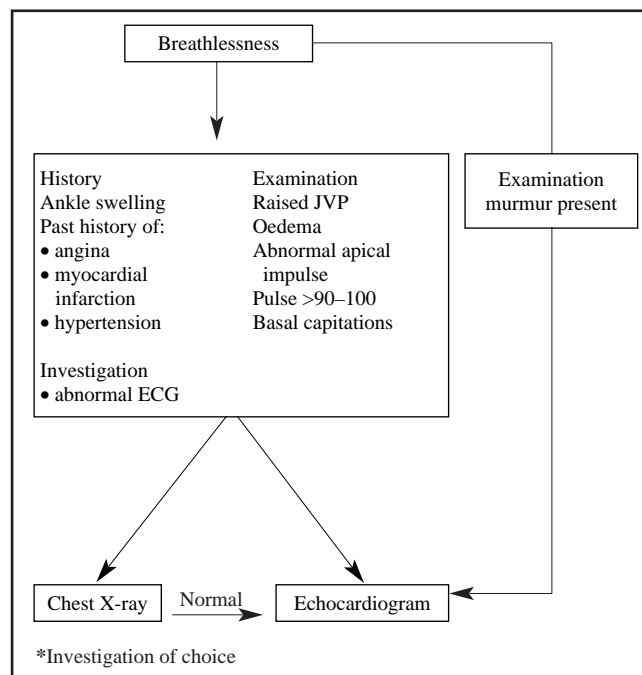


Figure 1. Algorithm for use of symptoms, signs, and investigations in diagnosing patients with suspected heart failure.

ure, and 20% to 30% in mild heart failure.¹³⁻¹⁵ Criteria established for use in the Framingham Study²⁸ have been used in investigations of the epidemiology of heart failure. Neither of these systems has been validated by comparison with objective physiological measures.³³ However, the Boston Clinical Criteria^{36,37} have been validated with ventricular ejection fraction, pulmonary capillary wedge pressure measurements, and echocardiography.^{38,39} The Framingham and Boston Criteria are based on similar clinical elements, and incidence rates determined by them are similar.²⁹

The evidence about the roles of symptoms, signs, and investigations in diagnosing heart failure will be discussed in detail in the following sections.

Symptoms

Typical symptoms may include breathlessness or fatigue, either at rest or during exertion, and ankle swelling. However, since the specificity of symptoms is low, they can only be used to suggest the possibility of heart failure rather than confirm diagnosis.¹ Breathlessness on exertion and orthopnoea can be useful for suggesting the possibility of left ventricular dysfunction.⁴⁰ However, breathlessness is a symptom with more than 30 causes and is a common presentation in hospital and ambulatory settings.^{41,42} The prevalence of dyspnoea in the community has been documented to be 3% to 25%.⁴⁰ In addition, breathlessness, ankle swelling, and fatigue may be difficult to interpret, particularly among elderly patients, the obese, and in women,³ and, in consequence, the level of inter-observer agreement on the presence or absence of symptoms may be low.⁴³ Nevertheless, once the diagnosis has been confirmed, symptoms may be used to classify the severity of heart failure and to monitor the effects of therapy.³

Past medical history may also provide clues in assessing patients with suspected heart failure. The most common cause of heart failure is ischaemic heart disease and, in particular, myocardial infarction.^{2,44} Past history of hypertension may also predispose a patient to developing heart failure.^{2,4,29,30,45}

Clinical examination

One systematic review to determine the value of clinical examination in patients with dyspnoea concluded that the initial assessment was approximately 70% accurate in determining the cause.⁴⁰ A recent systematic review concluded that abnormal apical impulse was the best clinical indicator of systolic dysfunction.⁴⁵ Other somewhat less helpful findings were a pulse greater than 90 to 100 beats per minute, systolic blood pressure less than 90 mmHg, and crepitations. A third heart sound may be helpful,⁴⁵ although this sign is not specific to heart failure.⁴⁶ Absence of a third heart sound is not uncommon in patients with mildly impaired ejection fraction.⁴⁷ Isolated basal crepitations are a poor predictor of left ventricular systolic dysfunction, with the sign having a sensitivity as low as 13% and specificity as low as 35%.⁴⁸ Davie and colleagues studied the predictive value of signs and symptoms in hospitalised patients.⁴⁴ They concluded that the best predictor of left ventricular systolic dysfunction is a displaced apex beat with a sensitivity of 66% and a specificity of 96%. This study also showed that if a patient with breathlessness gives a history of past myocardial infarction and has a displaced apex beat, then the diagnosis of left ventricular dysfunction is almost certainly correct.⁴⁴ They concluded that these patients may not require echocardiography; however, this needs to be evaluated in further trials, particularly in primary care.

Another secondary care study showed that some physical findings — crepitations, peripheral oedema, and neck vein distension — were found relatively infrequently but had high specificity.⁴⁹ Raised jugular venous pressure and oedema are only helpful when present.⁴⁵ Patients, even if in severe heart failure, may not have an elevated jugular venous pressure.⁵⁰ A particular problem limits the value of clinical findings in confirming a diagnosis of heart failure. There is wide variability in reports of the precision of clinical findings, reflecting the subtle nature of findings and the varied abilities of clinicians.⁵¹ Most studies suggest that clinician variability is partly attributable to subspecialty training and examiner experience.^{43,52-55}

Valve disease has been an aetiological factor for heart failure in 9% to 32% of patients in primary care studies.^{2,30,36} A recent systematic review concluded that clinical examination by a cardiologist is accurate for detecting various causes of abnormal systolic murmurs.⁵⁶ We were unable to find studies of clinical examination by general practitioners.

Investigations

Although symptoms and signs are useful for alerting clinicians to the possibility of heart failure, diagnosis must be confirmed by more objective tests.^{3,38} Investigations available to general practitioners include an electrocardiogram, chest radiograph, and echocardiography.

Electrocardiogram

Most guidelines recommend a 12-lead electrocardiogram (ECG).^{3,24-27} Patients with left ventricular systolic dysfunction are unlikely to have a normal ECG.^{2,44,58} In particular, anterior Q-waves and left bundle branch block can indicate left ventricular systolic dysfunction. Although many general practitioners and some hospital doctors lack the skills to interpret ECGs,^{59,60} automated machines can report the ECG.

Some indication of the place of electrocardiography in diagnosing heart failure is provided by studies involving patients in secondary care. Both cardiologists and general practitioners had high sensitivity (89%) but poor specificity (46%) in predicting left ventricular systolic dysfunction in a study involving patients attending a hospital heart failure clinic who had undergone an

ECG and an echocardiogram.⁶¹ In one community screening study, 77% of symptomatic patients with left ventricular systolic dysfunction had an abnormal ECG.² However, 8% of patients with normal left ventricular dysfunction had an abnormal ECG.

In a study of patients admitted to hospital with acute dyspnoea, the sensitivity and specificity of clinical assessment alone in detecting left ventricular systolic dysfunction were 81% and 47% respectively. The specificity was improved to 76% with addition of electrocardiography.⁶² However, this study was based on patients with heart failure severe enough to warrant an admission. An abnormal ECG should not, therefore, be relied on to confirm a diagnosis of heart failure but is an indication for further investigation. The ECG is also useful for confirming the heart rhythm.

Chest radiograph

Guidelines recommend that a chest X-ray should be performed for patients with suspected heart failure.^{25-27,57} Cardiomegaly or venous congestion are the most specific radiographic findings in heart failure.⁶³ However, neither finding alone can adequately exclude or confirm left ventricular dysfunction.⁶³

The relationship between heart size on X-ray and left ventricular function is poor.⁶⁴⁻⁶⁷ Cardiomegaly in symptomatic patients is highly suggestive of heart failure, especially when accompanied by pulmonary venous congestion.²⁵ Absence of cardiomegaly, even with clinical evidence suggesting chronic heart failure, indicates that the diagnosis should be carefully reviewed.^{25,33} The chest X-ray is also useful in excluding pulmonary disease, which may cause symptoms similar to those of heart failure.³³ In a critical review, cardiomegaly on a chest X-ray had a 51% sensitivity in detecting a decreased ejection fraction, while pulmonary redistribution had a sensitivity of 37%. Furthermore, inter-observer agreement for reporting chest X-rays was fair to moderate.⁶³

In patients admitted to hospital with acute dyspnoea, full clinical assessment was sensitive in detecting left ventricular systolic dysfunction, with specificity improved to 92% by chest radiography. However it is not possible to extrapolate these findings to primary care.⁶²

Echocardiogram

Echocardiography is the current 'gold standard' for assessing left ventricular systolic dysfunction.⁵⁷ It assesses left ventricular efficiency, the integrity of the valves, chamber dimensions and wall motions, degree of ventricular hypertrophy, and adequately assesses systolic and diastolic ventricular function.⁵⁷ With the addition of Doppler measurement, a quantitative assessment of valve gradients, right ventricular systolic pressure, and blood flow characteristics can be made.³³ However, general practice studies in the United Kingdom have shown that only about 30% of patients with heart failure have an echocardiogram.^{30,68-70}

Access to echocardiography

Confirmation of diagnosis by echocardiography can help avoid misdiagnosis and enable treatment to be tailored to the particular functional deficit.^{1,71} A policy of referring all cases of possible heart failure for echocardiography has serious service implications and creates practical difficulties for doctors who do not have access to echocardiography.

Many providers are now offering open access to cardiac investigations, including one-stop electrocardiogram and echocardiography services, although there are no economic evaluations of open-access echocardiography. A recent Working Group of the British Cardiac Society suggested this may lead to the indiscriminate use of limited diagnostic services.⁷² Nevertheless, there is

evidence that general practitioners refer appropriate patients to echocardiography services.⁷³ In a recent survey, general practitioners were aware that echocardiography is a valuable tool, but the importance of early diagnosis and treatment of left ventricular systolic dysfunction was not fully appreciated.⁷⁴ Murphy and colleagues showed that open-access echocardiography was popular with general practitioners and the information resulted in appropriate decisions.¹ If general practitioners do not have access to echocardiography, some patients will receive unnecessary treatment. In open-access echocardiography studies, left ventricular systolic dysfunction was identified in only 20% to 26% of patients and valve disease in 3% to 5%.^{1,73} We are currently conducting a randomised controlled trial to evaluate the cost effectiveness of guidelines in improving use of echocardiography in general practice.

Conclusion

Chronic heart failure is common and in most cases is initially diagnosed in primary care. It causes a shorter life expectancy than many common malignancies, and a poorer quality of life compared with many chronic disorders. Symptoms and signs are important because they alert clinicians to the possibility of heart failure as a diagnosis. However, they are not sufficiently specific for confirming left ventricular systolic dysfunction. From the evidence available, a patient with suspected heart failure must have objective tests to confirm the diagnosis. These should include an ECG and, ideally, an echocardiogram. An abnormal ECG is an indication for further investigations. Additional tests may be introduced in the future, such as concentrations of natriuretic peptides,⁷⁵ but evidence is not available to judge their usefulness. Further research is also needed on the usefulness of signs and symptoms in primary care, as most studies of heart failure have been conducted in secondary care.

Keypoints

- Chronic heart failure is becoming increasingly common and has major consequences for the health service, especially in primary care, where most patients are managed.
- Despite recent advances in treatment that reduce mortality, chronic heart failure is misdiagnosed and patients are inappropriately managed in primary care.
- Symptoms and signs are important in suggesting heart failure, but they are not sufficiently specific for confirming the diagnosis.
- In practice, the diagnosis of heart failure relies on a combination of history, physical examination, and appropriate investigations.
- Symptoms may be used to classify the severity of heart failure and to monitor the effects of therapy.
- An abnormal apical impulse is the best clinical indicator of systolic dysfunction. The most common predisposing causes of heart failure are ischaemic heart disease and hypertension.
- A patient with suspected heart failure must have objective tests to confirm the diagnosis. These should include an ECG and an echocardiogram.

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