Title	**Systematic Review and Individual Patient Data Meta-Analysis of Diagnosis of Heart Failure, with Modeling of the Implications of Different Diagnostic Strategies in Primary Care**
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Aim

To assess the accuracy of clinical features and investigations in diagnosing heart failure and to determine: (1) whether a clinical scoring system based on symptoms and signs can usefully predict the presence of heart failure; (2) the optimum cut-off points for plasma natriuretic peptides (BNP); (3) whether diagnostic performance of BNP varies according to patient characteristics; and (4) the accuracy of the combination of BNP and electrocardiography (ECG).

Conclusions and results

In the systematic review, dyspnea was the only symptom or sign with high sensitivity (89%), but it had poor specificity (51%). Several clinical features had relatively high specificity, including history of myocardial infarction (89%), orthopnea (89%), edema (72%), elevated JVP (70%); cardiomegaly (85%), added heart sounds (99%), lung crepitations (81%), hepatomegaly (97%). However the sensitivity of all these features was low, ranging from 11% (added heart sounds) to 53% (edema). ECG, BNP, and NT-proBNP all had high sensitivities (89%, 93%, 93% respectively). CXR was moderately specific (76%-83%), but insensitive (67%-68%). BNP was more accurate than ECG, with a relative diagnostic odds ratio of ECG/BNP of 0.32, 95% CI 0.12–0.87. There was no difference between the diagnostic accuracy of BNP and NT-proBNP. In the individual patient data analysis, a model based upon simple clinical features (male gender, history of myocardial infarction, basal crepitations, edema) and BNP derived from one data set was found to have good validity when applied to other data sets, with AUC between 0.84 and 0.96, and reasonable calibration. A model substituting ECG for BNP was less predictive. From this, a simple clinical rule was developed:

In a patient presenting with symptoms such as breathlessness in which heart failure is suspected, refer straight to echocardiography if the patient has any one of: 1) history of MI, OR 2) basal crepitations, OR 3) male with ankle edema. See Executive Summary link at www.hta.ac.uk/project/1509.asp.

Recommendations

1) Patients with symptoms suggestive of heart failure, eg, breathlessness, should be referred straight for echocardiography if they have a history of myocardial infarction, or if they have basal crepitations on examination, or if they are male with ankle edema. 2) Otherwise, they should have a BNP test, and the decision to refer for echocardiography should depend on this result. 3) There is no need to perform an ECG as part of the assessment to determine whether or not heart failure is present.

Methods

See Executive Summary link at www.hta.ac.uk/project/1509.asp.

Further research/reviews required

See Executive Summary link at www.hta.ac.uk/project/1509.asp.

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