

# The refer for echocardiogram, clinical decision rule and N-terminal pro-B-type natriuretic peptide (NT-proBNP) in the diagnosis of heart failure

<b>Submission date</b> 28/02/2011	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 21/06/2011	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 19/02/2021	<b>Condition category</b> Circulatory System	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Heart failure is caused by the heart muscle becoming weak or stiff and failing to pump enough blood around the body. It significantly reduces quality of life and life expectancy. The costs to the NHS are high due to frequent hospitalisation and GP visits. Heart failure is a common problem in primary care, but diagnosis is difficult and GPs must decide which patients need further tests. Heart failure can be diagnosed by ultrasound (an echocardiogram) but it is expensive and limited. Therefore, GPs rely on less effective tests, resulting in under-diagnosis. Accurate diagnosis, appropriate treatment and cost-effective use of NHS resources are needed to improve quality of life and life expectancy. However, there is uncertainty in these areas. We aim to find out if a clinical decision rule (CDR) can help GPs determine which patients should be referred for an echocardiogram and if it is cost-effective. The study will tell us if a simple rule involving symptoms, physical examination and blood testing can be used for better diagnosis and targeting of further diagnostic tests for heart failure, helping to improve quality of care and save money.

### Who can participate?

Patients aged 55 or over visiting their GP with new symptoms of breathlessness, lethargy (tiredness) or ankle oedema (swelling)

### What does the study involve?

The GP refers all patients for chest x-ray (as usual), and then to a central research clinic. Information on symptoms and quality of life are collected, and patients undergo an electrocardiogram (measuring the electrical activity of the heart), an echocardiogram (an ultrasound scan of the heart), and provide a blood sample. We want to find out whether the CDR can correctly identify all cases with heart failure. We follow-up patients after 6 and 12 months to collect medical and quality of life information.

What are the possible benefits and risks of participating?  
Not provided at time of registration

Where is the study run from?  
University of Oxford (UK)

When is the study starting and how long is it expected to run for?  
April 2011 to June 2014

Who is funding the study?  
Medical Research Council (MRC)/National Institute of Health Research (NIHR) (UK) - Efficacy and Mechanism Evaluation (EME) Programme (UK)

Who is the main contact?  
Prof Richard Hobbs

## Contact information

**Type(s)**  
Scientific

**Contact name**  
Prof Richard Hobbs

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## Additional identifiers

**EudraCT/CTIS number**

**IRAS number**

**ClinicalTrials.gov number**

**Secondary identifying numbers**  
09/160/13

## Study information

**Scientific Title**  
The REFer for Echocardiogram, clinical decision rule and N-terminal pro-B-type natriuretic peptide (NT-proBNP) in the diagnosis of heart failure: a prospective validation study

**Acronym**

REFER

**Study objectives**

The clinical decision rule (CDR) will discriminate between patients who have sufficiently high probability of heart failure (HF) that they should be referred for echo and those who should have a natriuretic peptide (NP) test first, with referral for echo dependent upon the natriuretic peptide results.

**Ethics approval required**

Old ethics approval format

**Ethics approval(s)**

The South Birmingham Research Ethics Committee, 15/10/2009

**Study design**

Multicentre prospective observational diagnostic validation study

**Primary study design**

Observational

**Secondary study design**

Diagnostic validation study

**Study setting(s)**

GP practice

**Study type(s)**

Diagnostic

**Participant information sheet**

Not available in web format, please use the contact details below to request a patient information sheet

**Health condition(s) or problem(s) studied**

Heart failure

**Interventions**

The general practitioner (GP) will have arranged for all patients to receive a chest x-ray when consenting patients for referral (as is usual practice). Within 7 days of referral, the research assessment clinical team will obtain written informed consent, collect baseline demographics, administer quality of life questionnaires (EQ-5D and SF12), clinically assess patients, perform a 12-lead electrocardiogram (ECG) and Echo and take blood for N-terminal pro b-type natriuretic peptide (NT-proBNP), along with creatinine for a renal dysfunction test, calculating an estimated Glomerular Filtration Rate (eGFR) (serum profile)

**Intervention Type**

Other

**Phase**

Not Applicable

### **Primary outcome measure**

1. Test performance of the CDR, estimating the sensitivity and specificity, positive predictive value (PPV) and negative predictive value (NPV) of the CDR for diagnosis of HF in symptomatic patients presenting with shortness of breath, lethargy or ankle oedema of over 48 hours duration
2. Test performance of the diagnostic accuracy of NT-proBNP for diagnosis of HF in symptomatic patients, including sensitivity, specificity, PPV and NPV
3. Proportion of patients with left ventricular systolic dysfunction (LVSD) or not, (ejection fraction < 40%) and HF or not

### **Secondary outcome measures**

1. Combination of the CDR and NT-proBNP
2. Modelling of CDR test performance and epidemiological data to ascertain the most cost-effective strategy in the diagnosis of HF in primary care, incorporating data on quality of life (EQ-5D and SF12 widely used questionnaires), clinical events and health care resource use
3. Reliability of GP clinical judgment alone in diagnosing HF
4. Reliability of individual clinical features
5. Reliability of ECG interpretation
6. Estimation of the best performing cut-offs for NT-proBNP to maximise diagnostic yield and for maximising cost-effective referrals
7. Determine the use of variable echocardiographic markers of diastolic function in the diagnosis of HF with preserved ejection fraction

### **Overall study start date**

01/04/2011

### **Completion date**

01/06/2014

## **Eligibility**

### **Key inclusion criteria**

Current inclusion criteria as of 12/12/2011:

1. All patients 55 years of age or over presenting to their GP with new onset symptoms of breathlessness, lethargy or ankle oedema of over 48 hours duration, with no obvious recurrent, acute or self-limiting cause
2. Able to give informed consent

Previous inclusion criteria:

1. All patients 55 years of age or over presenting to their GP with new onset symptoms of breathlessness, lethargy or ankle oedema of over 48 hours duration, with no obvious acute and self-limiting cause
2. Able to give informed consent

### **Participant type(s)**

Patient

### **Age group**

Adult

**Sex**

Both

**Target number of participants**

500

**Total final enrolment**

304

**Key exclusion criteria**

Current exclusion criteria as of 12/12/2011

1. All patients with known pre-existing heart failure or left ventricular systolic dysfunction of any cause. However, patients with a pre-existing label of heart failure but without objective evidence (i.e. echocardiography) of this will not be excluded
2. Severe symptoms requiring urgent assessment or stabilisation (e.g. breathless at rest, hypotension, confusion)
3. Obvious clinically determined alternative diagnoses such as chest infection, exacerbation of chronic obstructive pulmonary disease or asthma
4. Recent acute coronary syndrome (within 60 days)
5. Major co-morbidity or other alternative diagnoses of no obvious acute and self-limiting cause (e.g. malignancy, severe respiratory disease, renal diagnosis, mental health problem)
6. Unable to provide informed consent

Previous exclusion criteria

1. All patients with known pre-existing heart failure or left ventricular systolic dysfunction of any cause. However, patients with a pre-existing label of heart failure but without objective evidence (i.e. echocardiography) of this will not be excluded
2. Severe symptoms requiring urgent assessment or stabilisation (e.g. breathless at rest, hypotension, confusion)
3. Obvious clinically determined alternative diagnoses such as chest infection, exacerbation of chronic obstructive pulmonary disease or asthma
4. Recent acute coronary syndrome (within 60 days)
5. Major co-morbidity or other alternative diagnoses of no obvious acute and self-limiting cause (e.g. active malignancy, severe respiratory disease, renal diagnosis, severe psychiatric disease)
6. Unable to provide informed consent

**Date of first enrolment**

01/04/2011

**Date of final enrolment**

01/06/2014

**Locations****Countries of recruitment**

England

United Kingdom

**Study participating centre**  
**University of Oxford**  
Oxford  
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OX1 2ET

## **Sponsor information**

**Organisation**  
Oxford Radcliffe Hospitals NHS Trust (UK)

**Sponsor details**  
Heather House  
Clinical Trials and Research Governance  
Manor House  
John Radcliffe Hospital  
Headington  
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OX3 9DZ

**Sponsor type**  
Hospital/treatment centre

**ROR**  
<https://ror.org/03h2bh287>

## **Funder(s)**

**Funder type**  
Government

**Funder Name**  
Medical Research Council (MRC)/National Institute of Health Research (NIHR) (UK) - Efficacy and Mechanism Evaluation (EME) Programme (ref: 09/160/13)

## **Results and Publications**

**Publication and dissemination plan**  
Not provided at time of registration

**Intention to publish date**

**Individual participant data (IPD) sharing plan**

**IPD sharing plan summary**

Not provided at time of registration

**Study outputs**

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Protocol article</a>	protocol	30/10/2012		Yes	No
<a href="#">Results article</a>	results	01/04/2017	19/02/2021	Yes	No