



Community Echocardiography for Heart Failure.

A consensus statement from representatives of the British Society of Echocardiography, British Heart Failure Society, CHD collaborative and Primary Care Cardiovascular Society

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1. Introduction

- This document is about echocardiography, which is pivotal in the diagnosis of heart failure (Table 1)^{1,2}
- Echocardiography can make the diagnosis of heart failure, determine the aetiology and help plan treatment
- Echocardiography must always be considered in the context of the overall management of heart failure
- An echocardiography service must be integral to a general local plan for heart failure. There is no place for isolated open access echocardiography.
- The favoured model of care is probably the one-stop heart failure clinic offering diagnosis and initial treatment whilst liaising with general practitioners and nurses for maintenance and palliative services³
- Community and hospital-based medical care are part of a continuum in which barriers are artificial
- Community echocardiography is also indicated for heart murmurs, atrial fibrillation and hypertension although these are not the subject of this document

Table 1. Estimated need for echocardiography in heart failure²

After abnormal BNP level	3.6 – 6 per 1000 population p.a.
After a change in clinical state	4 per 1000 population p.a.
Screening in high risk groups	1.6 per 1000 population p.a.

2. Initial diagnosis

Screening

- Clinical assessment alone is unreliable since the symptoms and signs of heart failure may be insensitive and non-specific⁴
- Most algorithms do not recommend echocardiography if both the BNP level and 12 lead ECG are normal since the chance of finding LV systolic dysfunction is < 10%⁵
- The 12 lead ECG must be completely normal. If there is no computer-assisted reporting, many general practitioners do not feel confident to diagnose a normal ECG. BNP alone may then be used for screening
- Normal ranges for BNP vary with age and gender and by laboratory⁶⁻⁸. The specificity of the chosen cut-point will vary between 30% and 50%⁹.
- Screening echocardiography (section 3) has been shown¹⁰ to be reliable at excluding abnormal LV systolic function and can reduce demand on conventional echocardiography services

Diagnosis

- Standard echocardiography is the technique of choice (section 4)
- Many measures may be used to assess LV systolic function including dimensions and wall thickness, LV ejection fraction, systolic velocity integral, long-axis function, systolic volume, wall motion, tissue Doppler
- The diagnosis of diastolic heart failure remains difficult and must be made by a combination of the clinical context and a complex echocardiogram (section 4)

3. Types of echocardiography for heart failure services

- The NICE guidelines¹ state '*Doppler 2D echocardiographic examination should be performed to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle and detect intracardiac shunts.*' It also states that '*Echocardiography should be performed on high resolution equipment by experienced operators trained to the relevant professional standards. Need and demands should not compromise quality.*' '*The reporting of echocardiography should be by those experienced in doing so.*'
- Echocardiography is expanding and includes at least five separate types of study. The type of study is mainly determined by the clinical question, but also depends on the level of experience of the operator and the type of machine.

- Broadly there are standard machines usually required for standard and advanced studies and portable systems capable of ultrasonic stethoscopy and screening alone. However these divisions are not stable since portable systems vary in their capability and simpler versions of advanced systems are being introduced for basic functions and without the ability to perform stress or contrast studies.
- The five main types of echocardiographic studies are:

3.1 Standard transthoracic study

- This is what is traditionally meant by an echocardiogram.
- It takes 30 - 40 minutes
- It is usually performed at a hospital, but can also be performed by a suitably accredited general practitioner with a special interest (GPwSI) or other operator within the community
- It leads to archived material and a formal report

It is indicated as part of a heart failure service for:

- Detection and quantification of LV systolic dysfunction
- After a change in condition in a patient with known heart failure
- To assess the aetiology e.g. coronary disease from wall motion abnormality
- The exclusion of basic conditions that mimic conventional heart failure (e.g. myxoma)
- The exclusion of significant valve disease amenable to surgery
- The exclusion of severe obstructive valve disease as a relative contraindication to using an angiotensin converting enzyme inhibitor

3.2 'Focused' or 'limited' or 'point-of-care' study

- This takes about 5-10 minutes and leads to archived material and a formal short report.
- It is performed by an accredited echocardiographer usually, but not necessarily, in a hospital. Studies can be performed with a standard or portable system.
- Compared with a full echocardiogram, up to 25% of 'focused' studies may miss an abnormality although these are usually minor.
- The 'focused' study is directed at specific clinical questions e.g. in a patient with known heart failure and an exacerbation, has there been a change in wall motion?
- The fact that a 'focused' rather than standard echocardiogram was performed should be stated

The characteristics of a 'focused' echocardiogram are:

- It is requested only by a clinician aware of the clinical context of the case
- The clinician takes responsibility for the echocardiographer not examining areas of the heart outside the focus of enquiry
- Usually there is a 'baseline' standard echocardiogram

3.3 Screening echocardiogram

- This is similar to the 'focused' echocardiogram but may take longer, up to 10 – 15 minutes.
- It must lead to a report incorporated in the clinical notes
- Archiving is ideal and likely to become essential both to allow quality control and medico-legal review
- It may be performed in a hospital or community setting usually with a portable system.
- Like the 'focused' study, responsibility rests with the requesting clinician for the echocardiographer not performing a standard study.
- It differs from a 'focused' study in some important ways:
 - Usually there is no baseline standard echocardiogram
 - The 'screening' study is usually to rule out abnormality
 - If abnormal the 'screening' study should lead to a standard echocardiogram
- Examples of 'rule out' questions in a heart failure service are:

- In a patient with suspected heart failure that there is no evidence of
 - systolic LV or RV dysfunction,
 - valve thickening or regurgitation
 - left ventricular hypertrophy
 - In a patient with a high risk of LV dysfunction (e.g. Q waves on the ECG) that there is no evidence of a wall motion abnormality
- If the 'screening' echocardiogram is normal, the chance of heart failure is reduced and the respiratory and other routes can be explored preferentially
- There are cautions :
 - Normal systolic function does not exclude diastolic heart failure
 - Normal systolic function does not exclude a cardiac source for symptoms e.g. angina

3.4 Ultrasonic stethoscope

- This is used as an extension of the clinical examination
- It usually takes 3 minutes or less
- There is no archived material and no report. The result is recorded in the notes
- It can be performed anywhere and uses a portable system
- This has no role in a heart failure service since echocardiography without archiving is not amenable to quality control.

3.5 Complex echocardiograms

- Complex studies include a dobutamine stress study, contrast echocardiogram, or a detailed haemodynamic assessment
- They usually take one hour
- They require highly specialised echocardiographers
- They require advanced machines and are performed in a hospital
- As part of a heart failure service, a complex echocardiogram is indicated for:
 - The diagnosis of diastolic heart failure
 - The diagnosis of pericardial constriction
 - Complicated valve disease e.g. low gradient low flow aortic stenosis
 - The detection of myocardial hibernation using stress echocardiography
 - Determining the need for biventricular or short AV delay pacing
 - Determining the need for surgical correction for mitral valve disease which may require transoesophageal examination

4. Models of community echocardiography

- Echocardiography services will extend between hospital and community without artificial barriers.
- Screening echocardiograms will usually be performed in the community or at a heart failure clinic based in a hospital. Standard studies will be usually be performed at a hospital or, occasionally, in a community-based service. Complex studies will be performed within the main hospital department
- Community-based services can be provided at a community hospital or large GP practice
- Echocardiography services must include the following properties:
 - Training
 - Quality assurance
 - Continuing education (CPD)
 - Second opinions for difficult studies
 - Clinical back-up if problems are identified by echocardiography
 - Provision of a range of types of study including 'screening', standard and complex
- These properties are expected to involve a BSE-accredited department which will usually be hospital-based.

- The BSE-accredited department and community echocardiographer should ideally have an electronic link for second-opinions, quality assurance and clinical back-up

5. GPwSI or practitioner with a special interest (PwSI) and Echocardiography

- Echocardiographers must be adequately trained and supervised for their expected level of operation
- Some GPs are already expert and experienced echocardiographers
- A new generation of GPwSI is likely to be trained in general cardiology at diploma courses e.g. South Middlesex, Bradford
- Such courses will discuss the indications for and interpretation of echo reports and are also likely to offer practical exposure to echocardiography
- The BSE is discussing certification in echocardiography under the auspices of a local BSE accredited echocardiography department
- Certification is expected to qualify the GPwSI or PwSI to perform screening echocardiograms
- BSE accreditation in community echocardiography will start in October 2004 and will qualify a GPwSI or PwSI in standard echocardiography
 - It is equivalent to the BSE adult accreditation process but differs by reflecting a community rather than hospital-based case-mix.
 - The process involves a written examination and a log-book of 200 cases.
 - It will be possible to gain accreditation with experience and training in a BSE accredited department or under supervision using a portable machine in the community with regular sessions at a hospital department.
- It is essential to encourage PCTs to support the training of GPs

6. Status of portable systems

- Portable systems vary and must be matched to the type of echocardiogram required
- A basic system incorporating only imaging and colour flow can be used as an ultrasonic stethoscope
- Screening echocardiography can also be performed with a system including only imaging and colour but should ideally have an archive facility
- Standard echocardiograms require high quality imaging including second harmonics together with colour mapping and both pulsed and continuous wave spectral Doppler. Archiving is essential.

7. Conclusion

- The demand for echocardiography already exceeds the capacity of current services
- GPwSI and PwSI are expected to collaborate with hospital-based departments to accommodate increases in demand
- Organisation of services should be based around a BSE accredited department but organised as a network avoiding barriers between community and hospital
- PCTs and Hospital Trusts must recognise that the needs of echocardiography extend beyond service delivery to include quality assurance, training, and continuing education.
- BSE accreditation in community echocardiography has already been developed and there probably needs to be an additional system for certifying GPwSI and PwSI in basic 'screening' echocardiography
- There is no place for using portable systems in the absence of adequate training or outside an organised echocardiography service
- Using a portable system as an ultrasonic stethoscope cannot substitute for 'screening', 'focused' or standard echocardiograms

8 References

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