Joint Trust Guideline for the Management of Echocardiogram requests for Adult Patients undergoing Elective and Emergency Surgery

A clinical guideline recommended for use

In:	All Clinical Areas
By:	All Doctors involved in the care of pre-operative patients
For:	Pre-operative assessment of Adult Patients undergoing Elective or Emergency Surgery
Key words:	Echocardiogram (Echo), Surgery, Systolic murmur, Atrial fibrillation, Impaired Ventricular function, Left Bundle Branch Block
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This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.

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1. Quick reference guidelines

1.1 Adult Patients with a Systolic Murmur

1.2 Adult Patients with Atrial Fibrillation

***** If symptomatic or rate not controlled, please increase or start medication to achieve a better rate as this will both help with symptoms and increase the reliability and usefulness of Outpatient ECHO.

1.3 Adult Patients with Left Bundle Branch Block

*Discuss results with cardiologist. Referral depends on degree of LV impairment and likelihood of biventricular pacing.

1.4 Adult Patients with Impaired Ventricular Function on previous Echo.

1.5 Suspected new diagnosis of impaired ventricular function

Signs and Symptoms of Cardiac Failure:

- Documented ischaemic heart disease with reduced functional capacity (<4 METS),
- Unexplained shortness of breath in the absence of clinical signs of heart failure if ECG and/or CXR abnormal.
- Orthopnoea, paroxysmal nocturnal dyspnoea,
- Unexplained tachycardia esp in young patient, a gallop rhythm, raised JVP, enlarged liver, dyspnoea, tachypnoea.

Risk factors:

- Coronary artery disease, hypertension, atrial fibrillation, diabetes mellitus. Alcohol excess.

If patient presents pre-operatively with history or signs/symptoms of cardiac failure, then order a NT-proBNP.

Other causes for elevated NT-proBNP includes: commonly AF or PAF, minor elevations in acute renal failure, chronic renal failure, pulmonary disease e.g. pulmonary hypertension, chronic obstructive pulmonary disease, pneumonia, pulmonary embolism, acute respiratory distress syndrome, liver cirrhosis.

2. Definitions of Terms Used

ACEI	Angiotensin Converting Enzyme Inhibitor
METS	Metabolic equivalents (of oxygen consumption)
NYHA	New York Heart Association (functional classification system)
CXR	Chest X-ray

3. Objective

These guidelines are designed to aid Anaesthetists and junior surgical staff in requesting of echocardiograms for the pre-operative assessment of elective and emergency surgical patients with cardiac disease.

4. Rationale

Echocardiograms may be of value in the pre-operative assessment of surgical patients either to assess ventricular function or to investigate a systolic murmur.

These recommendations are designed to clarify when an echocardiogram is indicated and the urgency with which it is required. They have been written in conjunction with the cardiology department.

5. Broad recommendations

5.1 Investigation of a systolic murmur

- If the patient is asymptomatic and has a normal ECG and NT proBNP < 400 then an echocardiogram is not indicated. Antibiotic prophylaxis should, however, be given peri-operatively, in accordance with the Joint Trust Guideline for Management of: Prevention of Endocarditis in Adults and Children. JCD0007 – ID no 1322

- Patients who are either symptomatic **or** have ECG changes should be investigated with an echocardiogram before surgery. Urgent requests should only be made for inpatients requiring emergency procedures. Patients undergoing elective surgery should have this done as an outpatient except in exceptional circumstances.

- Some patients will present with known aortic stenosis. The natural history of the disease is such that the **maximum** increase in the aortic gradient is up to 15mm/Hg per year. In a patient with good ventricular function, and in the absence of aortic regurgitation, a gradient of less than 50mm/Hg is acceptable. If it is felt that a repeat echocardiogram is indicated, please discuss this with a consultant cardiologist before submitting a request.

5.2 Atrial fibrillation

- An echocardiogram is indicated in all patients with atrial fibrillation, at some point, to assess their ventricular function, and to inform decisions regarding anticoagulation. The urgency of this investigation will be determined by the patient's physiological status and the urgency of their surgery.

- In patients with good functional capacity (NYHA <3 (Appendix 1), METS ≥4 (Appendix 2)) and NT proBNP < 400 and a controlled rate there is no need for a pre-operative echocardiogram. This should be performed as a non-urgent outpatient investigation following surgery.

- Elective patients whose heart rate is not controlled or those with poor (or unknown) functional capacity should have their surgery postponed until an echocardiogram can be performed as an outpatient. This group of patients may also require a cardiology referral if advice is needed on optimisation of rate controlling or heart failure treatment. If symptomatic or rate not controlled, please increase or start medication to achieve a better rate as this will both help with symptoms and increase the reliability and usefulness of outpatient ECHO.

- Patients undergoing emergency surgery whose heart rate is not controlled or those with poor (or unknown) functional capacity will require an echocardiogram and a cardiology review before surgery.

5.3 Left bundle branch block

- An echocardiogram is indicated in all patients with left bundle branch block, at some point, to assess their ventricular function, but in the present climate a normal NT proBNP will suffice. The urgency of this investigation will be determined by the patient's physiological status and the urgency of their surgery.

- In patients with good functional capacity (NYHA <3 (Appendix 1), METS ≥4 (Appendix 2)) and NT proBNP <400 there is no need for a pre-operative echocardiogram. This should be performed as a non-urgent outpatient investigation following surgery. These patients should also be referred to a cardiologist if they are young and do not have any hypertension

- Elective patients with poor (or unknown) functional capacity should have their surgery postponed until an echocardiogram can be performed as an outpatient. This group of patients will also require a cardiology referral depending on the degree of LV impairment and the likelihood of biventricular pacing. This will have to be discussed with a cardiologist.

- Patients with poor (or unknown) functional capacity undergoing emergency surgery an echocardiogram and a cardiology review will be required before surgery.

5.4 Further investigation of impaired ventricular function

- If previous echocardiographs have shown moderately or severely impaired left ventricular function, there is generally no indication for a repeat examination. A cardiology opinion may be useful in these patients to optimise their cardiac status pre-operatively. If in sinus rhythm do NT pro BNP often and dicsuss with Cardiologist.

- A small number of patients with moderately or severely impaired ventricular function may experience a significant functional improvement after

starting treatment. In a selected group of elective patients, a repeat examination may be indicated to help with risk stratification. All such requests should only be made after discussion with a consultant cardiologist.

5.5 Suspected new diagnosis of impaired ventricular function

- To risk stratify patients and rationalise the use of ECHO services, NT-proBNP can be used in patients with risk factors or symptoms and signs of chronic heart failure. Patients with documented ischaemic heart disease with reduced functional capacity (<4 METS), unexplained shortness of breath in the absence of clinical signs of heart failure if ECG and/or CXR abnormal, orthopnoea, paroxysmal nocturnal dyspnoea, easy fatiguability, ankle oedema, history of syncope, and laterally displaced apex beat and a gallop rhythm, raised JVP, enlarged liver, dyspnoea, tachypnoea.

- Also consider an NTproBNP in patients with coronary artery disease, hypertension, atrial fibrillation, diabetes mellitus and alcohol excess.

- The test should be sent with other preoperative bloods, or can be added on if required after bloods have been taken. The results will need to be reviewed and ECHO booked is NTproBNP is > 400ng/L. If results are above 400ng/L this, in combination with the Revised Cardiac Risk Index can be used to risk stratify patients. Appendix 3

6. Echocardiography requests

All echocardiogram requests should be completed on ICE. In addition to the ICE request, all urgent requests should be made in person or over the telephone with lead echocardiographer extension 5672. If the request is declined, please contact non interventional cardiologist on call via Dect Phone. Requests for pre-operative echocardiograms should ideally be made by a senior anaesthetist. If, as a junior doctor, you feel your patient meets any of the above criteria please discuss this with a senior anaesthetist before submitting your request. Requests may be refused if inadequate detail is put on the request on ICE therefore it is ideal that the requesting consultant anaesthetist makes the request on ICE themselves.

7. Summary of development and consultation process undertaken before registration and dissemination

The authors listed above drafted this guideline on behalf of the Anaesthetic Department who has agreed the final content. During its development it has been circulated for comment to: All contributors, the Clinical Director of Anaesthesia.

8. Distribution list/ dissemination method

Anaesthetic Department, Cardiology Department, Department of Surgery. Hospital Intranet

9. References/ source documents

British Society of Echocardiology. Clinical indications for Echocardiography. 2006 www.bsecho.org
NICE guidance. CG064 Prophylaxis against infective endocarditis. March 2008

http://www.nice.org.uk/nicemedia/pdf/CG64NICEguidance.pdf Joint Trust Guideline for Management of: Prevention of Endocarditis in Adults and Children. JCD0007 – ID no 1322
NICE guidance. Clinical knowledge Summaries, Heart failure – Chronic https://cks.nice.org.uk/topics/heart-failure-chronic/ https://annals.org/aim/article-abstract/2758032/preoperative-n-terminal-pro-b-type-natriuretic-peptide-cardiovascular-events

Appendix 1 – NYHA Class/Patient Symptoms table

NYHA Class	Patient Symptoms
Class I (Mild)	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnoea (shortness of breath).
Class II (Mild)	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, or dyspnoea.
Class III (Moderate)	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnoea.
Class IV (Severe)	Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.

Appendix 2 - Metabolic Equivalents (METs) table

Metabolic Equivalents (METs) Functional capacity:		
Excellent **(> 7 METs)**	**Moderate** **(4-7 METs)**	**Poor** **(< 4 METs)**
Squash	Cycling	Hoovering
Jog 10-minute mile	Golf, no cart	Activities of daily living
Scrubbing floor	Walk 4 mph	Walk 2 mph
Singles tennis	Gardening (eg mowing, weeding)	Writing

Appendix 3 - Revised cardiac Risk Index

a) High Risk surgery?
b) History of ischaemic heart disease?
c) History of congestive heart failure?
d) History of cerebrovascular disease? (stroke or TIA)
e) Diabetes treated with insulin before surgery?
f) Preoperative serum creatinine > 177umol/L (>2mg/dL)?

Preoperative NT-proBNP

a) Less than 400ng/L
b) 400 to less than 1500ng/L
c) Greater or equal to 1500ng/L