

Clinical Indications & Triage of Transthoracic Echocardiography **- INPATIENT Requests**

These guidelines are based on expert clinical opinion and evidence where appropriate literature exists.

All inpatient echocardiogram requests should be requested via the electronic requesting system. If you require an emergency echocardiogram, please make direct contact with the echocardiography team (extension: 88174), the precise timeframe for performing the study will be decided between the referring clinician and the operator.

Individual patient scenarios and local practice pathways remain an equally significant factor in triage. Triage of inpatient and emergency/critical care patient should therefore be facilitated by the referrer by providing the specific, appropriate clinical information within the request.

Accurate triage is an effective tool to release resources to patients who need it. This document is provided as a guide and a focus for discussion amongst local teams, not as a protocol. Timeframes for completion may occasionally vary in extreme circumstances based on the availability of personnel and resources. In the event of a shift in resources after initial triage, re-triage may be required.

Guideline Key:

- 'Indicated as inpatient' - meets criteria for an inpatient echocardiogram, please submit Lorenzo request.
- 'Not indicated' - does not meet criteria for an inpatient echocardiogram.
- 'Refer to outpatient guidelines' - does not meet inpatient criteria, for consideration of outpatient echocardiogram.

INPATIENT INDICATIONS

1. CHEST PAIN

1.1 INDICATED AS INPATIENT

- Following confirmed AMI to assess infarct size, LV function and complications.
- New murmur following a recent myocardial infarction.
- Chest pain with haemodynamic instability.
- Assessment of suspected type I aortic dissection often in conjunction with cross-sectional imaging however first line of investigation should be CT.

1.2 NOT INDICATED

- Evaluation of cardiac chest pain with a normal ECG, no murmur and negative cardiac biomarkers (high sensitivity Troponin T <14ng/l).

2. SUSPECTED HEART FAILURE

2.1 INDICATED AS INPATIENT

- Patients admitted for suspected heart failure with a pro BNP level >2000 pg/ml.
- Cardiogenic shock as judged by an appropriately senior clinician.
- Return of circulation following cardiac arrest.

2.2 REFER TO OUTPATIENT GUIDELINES

- Patients admitted for suspected heart failure with a pro BNP level <2000 pg/ml, if clinically well.

3. ASSESSMENT OF LEFT VENTRICULAR FUNCTION

3.1 INDICATED AS INPATIENT

- Following cardiac arrest and return of circulation.
- In cases of severe malnutrition.
- Where underlying cardiomyopathy is clinically suspected.

3.2 NOT INDICATED

- Where clinical information is otherwise adequate to answer the clinical question.

4. ASSESSMENT OF RIGHT HEART FUNCTION (see below section for pulmonary emboli)

4.1 INDICATED AS INPATIENT

- Where acute right heart dysfunction is clinically suspected, for example due to the use of a high Positive End Expiratory Pressure ventilation strategy or where ECG changes suggest right ventricular infarction.

5. SYNCOPE

5.1 INDICATED AS INPATIENT

- Murmur detected clinically.
- Arrhythmia-associated syncope.
- Significantly abnormal ECG.

5.2 NOT INDICATED

- No murmur detected or documented malignant arrhythmias.
- Vaso-vagal or situational syncope.

6. INFECTIVE ENDOCARDITIS

6.1 INDICATED AS INPATIENT

- Persistent bacteraemia of unknown source, any positive blood culture but particularly in staphylococcal aureus infection.
- To characterise valve lesions and haemodynamic consequences where Duke's criteria are positive. Where at least two of the minor criteria are met and/or one of the major criteria are met - with the exception of positive blood cultures, which is as stipulated above, that this alone meets the indication as inpatient. NOTE: please include detail of the specific met Duke ISVIC IE criteria within the request (see appendices 1.0 and 2.0 for Duke-ISVIC IE minor and major criteria respectively).
- One week following a negative TTE study in cases of high clinical suspicion where a Transoesophageal Echo is not possible.
- Detection of high-risk complications when suspected (e.g. fistula, abscess, mass lesions).
- Clinical suspicion of infective endocarditis with evidence of acute cardiac failure, valve decompensation, or root abscess.

6.2 NOT INDICATED

- Fever with no other positive Duke's criteria.
- Repeat assessment in a clinically stable patient with known vegetations.
- For patients whose image quality is sub-optimal and where TTE will therefore offer no definitive advancement.

7. SUSPICION OF ACUTE VALVULAR PATHOLOGY

7.1 INDICATED AS INPATIENT

- Where the history and examination findings suggest that the clinical picture and/or organ failure may be due to critical or acute valve dysfunction, e.g. flail mitral valve.

7.2 NOT INDICATED

- Where history examination and current illness are not supportive of a diagnosis of valve dysfunction as a cause for haemodynamic compromise.

8. ASSESSMENT OF THE PERICARDIAL SPACE

8.1 INDICATED AS INPATIENT

- If known pericardial effusion for monitoring purposes (Cardiology request only).
- Where there is clinical suspicion of pyopericardium from clinical, microbiological and radiological information.
- Where clinical findings suggest that known or suspected pericardial fluid is either contributing to haemodynamic compromise or causing acute cardiac tamponade.

8.2 NOT INDICATED

- Small volume pericardial effusion is noted on CT in the context of critical illness without haemodynamic effects.

9. ACUTE STROKE

9.1 INDICATED AS INPATIENT

- Patient in new AF.
- New audible murmurs.
- Suspected RWMA from clinical assessment or ECG.
- If patient is <45 years old.

9.2 REFER TO OUTPATIENT GUIDELINES

- Patient not in AF with no murmurs or suspicion of regional wall motion abnormality (scan to be performed as an outpatient), unless <45 years old - Cardiology review.

10. EMERGENCY PRE-OP

10.1 INDICATED AS INPATIENT

Please refer to specific pre-operative echocardiography guidelines.

10.2 NOT INDICATED

- Known ventricular or valvular dysfunction by previous echocardiogram dated within 12 months.
- AF without signs of congestive cardiac failure or murmur.
- Referral based on age or frailty only.

11. ARRHYTHMIAS

11.1 INDICATED AS INPATIENT

- Arrhythmia associated with hypotension.
- VT or VF.

11.2 NOT INDICATED

- Fast AF without hypotension or suspicion of structural heart disease.
- Symptomatic ectopics (defer to outpatient following Holter monitoring).

12. POST CARDIAC OPERATION OR PROCEDURE

12.1 INDICATED AS INPATIENT

- Concern regarding cardiac tamponade following structural heart disease procedure, coronary intervention or permanent/temporary pace-maker insertion or lead extraction.

12.2 NOT INDICATED

- Following routine elective coronary revascularisation in stable patients.

13. SUSPECTED OR ESTABLISHED PULMONARY EMBOLISM

13.1 INDICATED AS INPATIENT

- Re-evaluation where cardiovascular compromise or symptoms persist following initial therapy.
- To establish right heart function in clinically unstable patients to facilitate therapy decisions.

13.2 REFER TO OUTPATIENT GUIDELINES

- Pre-discharge to evaluate for features of persisting right ventricular overload in clinically stable patients (defer to 3 months).

13.3 NOT INDICATED

- Asymptomatic or minimally symptomatic patient post therapy for CTPA confirmed Pulmonary Embolism.

14. ASSESSMENT OF COMPLEX FLUID BALANCE

14.1 INDICATED AS INPATIENT

- To determine filling status in anuric state.
- To guide renal replacement therapy and fluid therapy planning.
- Where despite evidence to the contrary hypovolaemia may be the cause of hypotension/perfusion e.g. following large volume resuscitation or where peripheral oedema is present.

14.2 NOT INDICATED

- Prior to clinical assessment and initial management.

15. SPECIAL CIRCUMSTANCES

Due to the variety of pathology seen in critical care requests for TTE, where the literature is scarce, patients should be triaged on a case-by-case basis between the clinical and echo teams.

15.1 INDICATED AS INPATIENT

- Assessment of cardiac function to facilitate organ donation.
- Search for penetrating objects or assessment of cardiac structure following trauma to the thorax.

References

Clinical Indications and Triage of Echocardiography in emergency, in-patients and critical care. BSE. 2021., Claire Colebourn, Kelly Victor, Richard Fisher, Tom Ingram, Daniel Augustine, Keith Pearce.

British Cardiovascular Society working group report: out of hours cardiovascular care: management of cardiac emergencies and hospital in-patients. BCS documents. September 2016. Seven Day services clinical standards. HS documents. February 2016. Indications for emergency TTE (Level I or II operator). S Clarke et al.

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Reference Number CG-CLIN/1939/23	Version: 2.0.1		Status Final	
Version / Amendment History	Version	Date	Author	Reason
	2	Dec 2023	Dr Nauman Ahmed	review
Intended Recipients: Clinical staff				
Training and Dissemination: How will you implement the Clinical Guideline, cascade the information and address training				
Development of Guideline: Anne Bebbington (v1) Clinical Physiologist, Dr Nauman Ahmed (v2) Job Title: Consultant Cardiologist				
Consultation with: Dr Bose, Dr Leonnie				
Linked Documents: State the name(s) of any other relevant documents				
Keywords:				
Business Unit Sign Off			Group: Cardiology, SMBU2 Date: Dec 2023	
Divisional Sign Off			Group: Medicine Division Date: Jan 2024	
Date of Upload			January 2024	
Review Date			January 2027	
Contact for Review			Dr N Ahmed	

Appendices

Appendix 1.0



The 2023 Duke-ISCVID IE Criteria (Minor)

Proposed Changes in Bold Type

Minor	
Predisposition	- Previous history of IE - Prosthetic valve - Previous valve repair - Congenital heart disease - More than mild regurgitation or stenosis of any etiology - Endovascular CIED - Hypertrophic obstructive cardiomyopathy - Injection drug use
Fever	Documented temperature greater than 38.0 degrees Centigrade (100.4 degrees Fahrenheit)
Vascular Phenomena	Clinical or radiological evidence of arterial emboli, septic pulmonary infarcts, cerebral or splenic abscess , mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, Janeway lesions, purulent purpura
Immunologic Phenomena	Positive rheumatoid factor, Osler's nodes, Roth's spots, or immune complex-mediated glomerulonephritis
Microbiologic Evidence, Falling Short of a Major Criterion	1) Positive blood cultures for a microorganism consistent with IE but not meeting the requirements for Major Criterion 2) Positive culture, PCR or other nucleic acid based test (amplicon or shotgun sequencing, in situ hybridization) for an organism consistent with IE from a sterile body site other than cardiac tissue, cardiac prosthesis, or embolus; or a single finding of a skin bacterium by PCR on a valve or wire without additional clinical or microbiological supporting evidence
Imaging	Abnormal metabolic activity as detected by [18F]FDG PET/CT within 3 months of implantation of prosthetic valve, ascending aortic graft (with concomitant evidence of valve involvement), intracardiac device leads or other prosthetic material
Physical Examination	New valvular regurgitation identified on auscultation, if echocardiography is not available. Worsening or changing of pre-existing murmur not sufficient

Please note additional predisposing conditions (transcatheter valve implants, endovascular cardiac implantable electronic devices, prior IE) were clarified.

Clinical Infectious Diseases, 04 May 2023
<https://doi.org/10.1093/cid/ciad271>

Appendix 2.0



The 2023 Duke-ISCVID IE Criteria (Major)

Proposed Changes in Bold Type

Major	
Microbiologic	(1) Positive blood cultures <ul style="list-style-type: none"> i. Microorganisms that commonly cause IE isolated from two or more separate blood culture sets or ii. Microorganisms that occasionally or rarely cause IE isolated from three or more separate blood culture sets (2) Positive laboratory tests <ul style="list-style-type: none"> i. Positive PCR or other nucleic acid-based technique for <i>Coxiella burnetii</i>, <i>Bartonella species</i>, or <i>Tropheryma whippelii</i> from blood or ii. <i>Coxiella burnetii</i> antiphase I IgG antibody titer > 1:800, or isolated from a single blood culture or iii. Indirect immunofluorescence assays (IFA) for detection of IgM and IgG antibodies to <i>Bartonella henselae</i> or <i>Bartonella quintana</i> with IgG titer > 1:800
Imaging	(1) Echocardiography and Cardiac Computed Tomography Imaging <ul style="list-style-type: none"> I. Echocardiography and/or Cardiac CT showing vegetation, valvular/leaflet perforation, valvular/leaflet aneurysm, abscess, pseudoaneurysm, or intracardiac fistula or II. Significant new valvular regurgitation on echocardiography as compared to previous imaging. Worsening or changing of pre-existing regurgitation is not sufficient. or III. New partial dehiscence of prosthetic valve as compared to previous imaging (2) [18F]FDG PET/CT Imaging Abnormal metabolic activity involving a native or prosthetic valve, ascending aortic graft (with concomitant evidence of valve involvement), intracardiac device leads or other prosthetic material
Surgical	Evidence of IE documented by direct inspection during heart surgery neither Major Imaging Criteria nor subsequent histologic or microbiologic confirmation

Please note significant changes, including new microbiology diagnostics, imaging, and inclusion of surgical inspection as a new Major Clinical Criterion.

Clinical Infectious Diseases, 04 May 2023
<https://doi.org/10.1093/cid/ciad271>