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INPATIENT ECHOCARDIOGRAM TRIAGE NGH-PT-1279

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Responsibility for Review:	Leanne Kelly – Principal Cardiac Physiologist. Laura Knight – Head of Echocardiography.
Contributors:	Principle Cardiac Physiologist, Head of Echocardiography, Cardiology Clinical Lead, Cardiology Imaging Lead

PROTOCOL

NGH-PT-1279
Version 3



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October 2024

1. Version Control Summary

Version	Date	Author	Status	Comment
1.0	November 2019	Clinical Lead Cardiology	Ratified	Chair Approved by MPDG Chair
2.0	January 2023	Clinical Lead Cardiology	Ratified	Approved
3.0	July 2024	Principal Cardiac Physiologist, Head of Echocardiography		

2. Statement of Need

This Policy has been set out to provide guidance to clinicians on appropriate and inappropriate inpatient echocardiogram (echo) requests. All recommendations are based on the nationally recognised British Society of Echocardiography (BSE) triage guidelines for echocardiography.

To enable NGH to provide an effective and efficient inpatient echocardiography service that provides an equitable level of service across the Trust site in accordance with nationally recognised standards.

The policy applies to all inpatient echocardiography services provided on all ward areas across the Trust along with emergency departments, assessment centres and the Heart Centre. For the purpose of this policy patients in clinical assessment areas will be considered 'inpatients' as far as the echocardiography service is concerned.

3. Requesting Inpatient Echocardiography

For the purposes of this policy, inpatient echocardiography is defined as transthoracic echocardiography, bubble echocardiography and contrast echocardiography. Other diagnostic imaging investigation such as transoesophageal echocardiography (TOE) and dobutamine stress echocardiography (DSE) must be discussed directly with a Cardiology Consultant and arranged with the Heart Centre. TOE and DSE are not triaged or arranged by the Echocardiography Department.



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Requests that meet the following criteria will be rejected:

- Not enough clinical information to triage
- No clinical question to answer
- Recent echo with no significant clinical change i.e. severe LV function
- Recent echo performed for same indication with no symptomatic change to clinical management
- Heart failure requests with missing BNP value will be rejected

NB: The only reliable way to see if a patient has had a previous echo at NGH is to search on MedCon – not on ICE. This contains all cardiac procedures and all echocardiograms performed here since April 2008.

Authorisation for requesting an echocardiogram

Due to the high demand on the echo service, all inpatient echo requests will be triaged by either Cardiac Clinical Scientists or Specialised/Highly Specialised Cardiac Physiologists on ICE. If the request does not meet the inpatient echo triage guidelines the request will be rejected on ICE. Only in exceptional circumstances, if the requester disagrees with the rejected status, they then can escalate to the on-call Cardiology Consultant. The requester will need to justify (using the same guidelines below) to the Cardiologist why an inpatient echo is warranted.

3.1 The Referral Process

- All inpatient echo requests must be submitted on ICE.
- Referrer is to check if a recent echo has been performed before making a new request. If the referrer is not sure they can speak to the Echocardiography Department team on **ex 4473**.
- When a recent echo has been performed the referer must justify why a repeat echo is necessary otherwise the request will be rejected.
- Referrer **must** ensure the indication for echocardiogram is clearly stated on the request and that all relevant clinical information is on the request. It is helpful if a clear clinical question to be answered is written on the referral form. Ambiguous requests or those which fall outside the accepted guidelines will be rejected. Simply listing medical conditions without context or failing to justify an inpatient echocardiogram is not acceptable and the request will be rejected.
- Referrers must remember the practicalities involved with performing echocardiography. Body habitus (physique type), significant respiratory disease and heart rates >100bpm make transthoracic echocardiogram technically difficult or non-diagnostic.
- For referrals involving a raised BNP it is extremely important the actual BNP measurement is added to the referral. Terminology such as “raised”, “increased” or “result pending” is not acceptable and these requests will be rejected.



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- Referrers must be aware **inpatient echocardiography** should **not** be used for monitoring chronic conditions or where the data obtained has no immediate impact on patient management.
- **Emergency echocardiography** (see details below) should be requested on ICE and a member of the ward team must call **ex 4473** to speak to a cardiac scientist to make them aware.
- Emergency out of hours Echo's should be performed by the registrar on call who has undertaken training with the Echo team. This should only be performed to answer the immediate clinical question and a full echocardiogram should be requested the next day. Any issues should be discussed with the on-call cardiology consultant.

3.1.1 Eligibility to Request Inpatient Echocardiography

- In general, requests for echocardiography will be allowed from any member of clinical staff at agenda for change band 6 or higher. Medical staff at all grades are also eligible to request echocardiography.
- In addition to the above criteria, referrals will be allowed from registered nurses of all grades working on cardiology wards when the referral is part of the acute coronary syndrome clinical pathway.
- Anyone making a referral for echocardiography is **responsible** and **accountable** for their own professional practice, in regard to ensuring the information on the referral form is accurate, complete and relevant.
- Prior to making their first referral for inpatient echocardiography it is essential that staff read and familiarise themselves with this policy and national guidelines regarding referral criteria.

4. Inpatient Echocardiography Requests

4.1 Triage of Inpatient Echocardiography

- Inpatient echocardiography is a finite resource and as such safeguards are necessary to ensure the right patients are seen at the right time to maximise patient safety and clinical effectiveness.
- For this reason, all referrals for inpatient echocardiography will be triaged by a qualified cardiac physiologist or an imaging consultant to national recognised inpatient echo triage guidelines.
- For any referral that does not warrant inpatient echocardiography the reason will be documented on ICE. For referrals with **incomplete information** the request will be returned to the referrer. Some of these may warrant echocardiography but not necessarily as an inpatient. These can be considered for an outpatient request which must be made by the medical team in charge of the patient's care on the ward. An outpatient echocardiogram request will **not** be made by the Echocardiography team.



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- Where a referral is returned due to incomplete information it will be the original referrers responsibility to complete the request.
- All requests for inpatient echocardiography that are accepted as valid will be assigned a colour: **Red requests** (clinically urgent) will aim to be seen within 24 hours and **Amber requests** (clinically appropriate) will aim to be seen within a target of 72 hours. **Green requests** are not deemed to require echocardiography as an inpatient or lack sufficient clinical information and are dealt with as above. The colour coding system will be done in accordance with the schedule of clinical conditions outlined in the policy. It is important to consider that the clinical scientist or cardiac physiologist responsible for triaging inpatient echocardiography may exercise their own clinical judgement and the policy outline below aims to guide rather than instruct on how each referral should be coded. See Figure 1 for flow chart.
- Where a referrer may disagree with the triage priority level assigned to a patient, they may discuss this with an Imaging Consultant who is responsible for making the final decision on priority. This should only be done in exceptional circumstance.
- The Imaging Consultant is also available to provide advice or recommendations to referrers prior to a referral being made for inpatient echocardiography.
- **All triaged referral outcomes will be documented on ICE with an estimated time frame to scan.** For queries around triage the clinician can contact the Echocardiography Team on ext 4473.

The **ONLY** IP Echos deemed discharge dependent are those patients who are under the care of the Cardiology team (request from the Cardiology team) with the relevant clinical indications to warrant IP Echo.

All other IP Echos labelled as 'discharge dependent' by the referring team will be classed as Green Category and are **NOT** for IP echo. Consider urgent OP Echo (within 2 weeks).



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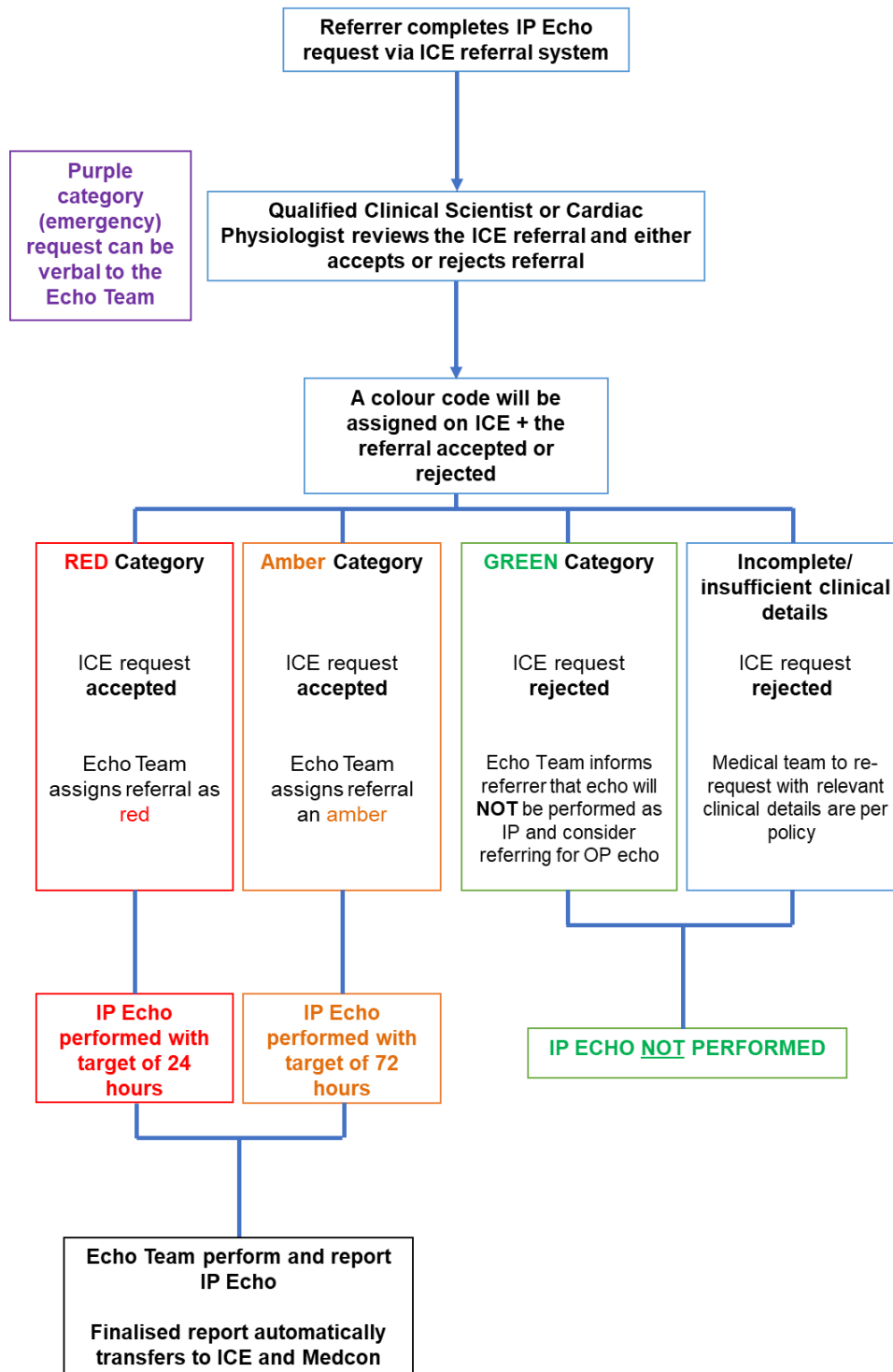


Figure 1. Flow chart to demonstrate inpatient echocardiography referral and triage process.

4.2 Performing Inpatient Echocardiography

- Inpatient echocardiography and reporting will be performed by:
 - a) A qualified clinical scientist, highly specialised cardiac physiologist or specialised cardiac physiologist.
 - b) A specialised cardiac physiologist or SpR working towards BSE accreditation but has been signed off as competent to perform scans independently (reports all countersigned by qualified member of staff).
 - c) A student cardiac physiologist or cardiology registrar working under supervision of a qualified cardiac physiologist.
 - d) Emergency inpatient echocardiography may be performed by an alternative healthcare professional who is suitably trained to perform focussed echocardiography studies.
- All staff performing inpatient echocardiography will follow the trusts hand hygiene policy. The echo probe will be cleaned after each use with a suitable disinfectant wipe. All equipment that has come into contact with the patient will be cleaned in line with trust infection prevention policies and guidelines.
- Patients may have their scans performed in the Echocardiography Department if they can be transported in a chair and accompanied by an HCA, the ward will be contacted with a time to bring the patient to the Department. This permits a greater number of scans to be completed per day. In other circumstances Physiologists may perform echocardiograms on the base ward. The patient will remain under the medical care of the referring ward team and not the Echocardiography Department, regardless of where the IP echo is performed.
- Any patient barriered for D&V may need to have their scan delayed until clear of symptoms for 72 hours.
- Some patients may only require focused echocardiography (i.e. not a full study) in some specific circumstances; as an example, patients requiring an up-to-date EF during ongoing chemotherapy treatment or to reassess size of a pericardial effusion. The referrer may specify focused study on the referral form, or the performing physiologist may decide a focused study is appropriate.

4.3 Reporting Inpatient Echocardiography

- Inpatient echocardiography will be written by a qualified clinical scientist, cardiac physiologist or trainee on the same day as the scan is performed. In special circumstance the echocardiogram may be reported the next working day – this will be communicated to the medical team and a verbal report given by the cardiac physiologist or other qualified medical practitioner.
- All inpatient echocardiography reported once finalised will be automatically populated to ICE. Reports will be finalised by either a qualified clinical scientist or cardiac physiologist or qualified medical team member.
- If a paper copy of the report is required this **must** be collected by the ward team from the Echocardiography Department. Where inpatient echocardiography has been performed in an emergency (purple category patient) a written and verbal report will be given to the clinical team with responsibility for the patient immediately post scan.



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4.4 Auditing Inpatient Echocardiography

- All inpatient echocardiography scans and reports are audited on a regular basis via review meetings and quality assurance meetings. These take place as per British Society of Echocardiography standards and are supervised by either the Imaging Consultant, Head of Echocardiography or Senior British Society of Echocardiography team member.
- Where a significant number of inappropriate referrals are sent from a particular ward area or clinician, retrospective audits of referral quality may also take place at the discretion of the Principal Physiologist, Head of Echocardiography or Imaging Consultant. Any significant findings will be fed back to the referrer in question in the first instance.

4.5 Implementation, Monitoring and Review

- Following approval the policy will be posted on the Trust website to aid dissemination and circulated to all clinical directors, heads of nursing and managing directors in all areas of the Trust.
- A short notice will be sent out via the trust communication team informing all staff that a new policy for inpatient echocardiography is in place and all staff should familiarise themselves with its contents.

5. NGH Echocardiography Priority/Tirage Criteria

5.1 Chest Pain

- Chest pain with haemodynamic instability (**Purple category**).
- Assessment of suspected type 1 aortic dissection often in conjunction with cross sectional imaging (**Purple category**). **Note, Echo cannot exclude aortic dissection. Gold standard is CT Aorta.**
- Murmur following recent confirmed myocardial infarction (MI), i.e.? Papillary muscle rupture (**Red Category**).
- Following acute MI to assess infarct size, LV function and complications (**Amber Category**).
- Evaluation of cardiac sounding chest pain with normal ECG, no new murmurs, and negative cardiac biomarkers (**Green Category**).



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5.2 Suspected Heart Failure

Before requesting an echo for suspected heart failure, the patient **must** have the following:

- ECG – on the same day of the referral
- Cardiovascular examination – ?JVP, ?murmurs, etc.
- Chest x-ray
- Ward team must investigate if the patient has had a previous echo result that would explain the clinical findings

An NT-proBNP <300ng/L effectively rules out the diagnosis of acute HF regardless of the patients age and an alternative diagnosis should be sought.

For ruling in acute HF, the following age-adjusted cut-off points indicate that HF is likely (6,7).

Age (yrs)	<50	50-75	>75
Acute Heart Failure likely if NT-proBNP (ng/L) is	≥450	≥900	≥1800

- All results must be documented on the referral. If the patient clinically has signs and symptoms of heart failure and the above has been completed, then a request form can be sent (**Red category** – however where there is a significant amount of requests these may be >24hrs, but will be triaged in order of clinical need).
- **Known left or right sided heart failure confirmed by previous echo will not be rescanned as an inpatient and should be referred to the heart failure team if clinically indicated**
- **If NT-proBNP concentration is intermediate (above 300 ng/L but below the acute HF levels), reconsider the diagnosis. If after full assessment, including ECG and CXR, HF is likely, request an echocardiogram**

5.3 Syncope

- Murmur detected clinically – please state grade and location (**to be done by competent physician**) (**Red Category**)
- Arrhythmia associated syncope – documented arrhythmia (**Red category**)
- Significantly abnormal ECG (LBBB, RBBB, or LVH) (**Red category**)
- No murmur detected or documented malignant arrhythmias (**Green Category**).
- Vaso-vagal or situational syncope (**Green Category**)
- Normal ECG/ cardiac examination (**Green Category**)



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Important – requests for ‘falls’ must state if mechanical fall or likely syncopal fall and details provided on requests. Please also state if syncope occurred at rest or on exertion.

5.4 Arrhythmias

- Arrhythmia associated with hypotension or strong clinical suspicion of structural heart disease – must be stated on request (**Amber Category**)
- VT or VF episodes (**Red category**)
- Fast AF without hypotension or suspicion of structural heart disease (**Green Category**)
- Incidental finding of AF (**Green Category**)
- Symptomatic ectopics (defer to outpatient following holter monitoring) (**Green Category**)

5.5 Suspected or Established Pulmonary Embolism (PE)

- To establish right heart function in clinically unstable patients to facilitate therapy decision (**Purple Category**)
- Re-evaluation where cardiovascular compromise or symptoms persist following initial therapy (**Red Category**)
- Asymptomatic or minimally symptomatic patient post therapy for CTPA confirmed pulmonary embolism (**Green Category**)
- Pre discharge to evaluate for features of persisting right ventricular overload clinically stable patients (**defer for 3 months**) (**Green Category**)

5.6 Infective Endocarditis

Infective endocarditis (IE) requests will be triaged using a modified Duke’s Criteria (this criteria has been previously audited and will continue to be audited to maintain patient safety). NGH and KGH Modified Duke’s Criteria is as follows:

Major criteria: Positive blood cultures with serologic evidence of active infection with organism consistent with IE:

- Staphylococcus Aureus
- Streptococcus Bovis
- Viridans Streptococci
- Community acquired enterococci
- Coxiella burnetii
- phase I IgG antibody titre >1:800
- HACEK group

Major criteria: New significant murmur / significant change in previously known murmur. Murmur grade and location required.



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Minor Criteria

- Fever > 38°C
- Immunologic phenomena (glomerulonephritis, Osler's nodes, Roth's spots, Rheumatoid factor)
- Vascular phenomena (major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial haemorrhage, conjunctival haemorrhage, Janeway lesions)
- Predisposition (heart condition or IV drug user) (Mitral valve prolapse, prosthetic valves, leads, lines, Bicuspid valve, ACHD, prior confirmed I.E.)
- Microbiologic evidence (positive blood culture but not meeting major criteria or serologic evidence of active infection with organism consistent with IE).

To meet the criteria for IP echo the referral **must** provide evidence of the patient meeting the following criteria:

- **2 Major criteria**
- **1 Major and 1 minor criteria.**
- **3 Minor criteria.**

Please note, if there is a known source of infection this should be treated before applying the Modified Duke's criteria for echo referral.

If modified Duke's criteria is met:

- Clinical suspicion of IE with evidence of acute cardiac heart failure, valve decompensation or root abscess (**Purple Category**)
- To characterise valve lesions and haemodynamic consequences where modified Duke's criteria is positive (**Amber Category**)
- One week following a negative TTE in cases of high clinical suspicion where Transoesophageal echocardiography is not possible (**Amber Category**)
- Detection of high-risk complications when there is a clinical suspicion of suspected fistula, abscess, mass lesions (**Amber Category**)
- Persistent bacteraemia of unknown source. Particularly in Staph Aureus infection. (Please note, echo request must demonstrate other investigations have been undertaken to find other sources of infection). (**Amber category**)
- Baseline re-assessment prior to discharge following completion of treatment for IE (**Amber Category**)
- Repeat assessment in clinically stable patients with known vegetation (**Green Category**).



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5.7 Post Cardiac Operations or Procedures

- Concerns regarding cardiac tamponade following any cardiac or thoracic procedure (Purple Category)
- Concerns regarding cardiac tamponade following structural heart disease procedure, coronary intervention or permanent / temporary pacemaker insertion or lead extraction (Purple Category)
- Following AF ablation / structural heart disease intervention e.g. PFO closure (Amber Category).
- Following routine elective coronary revascularisation in stable patients (Green Category)
- Routine, pre discharge echo following valve replacement in asymptomatic patients. Obtain baseline haemodynamic data at 4-6 weeks post operation (Green Category)

5.8 Acute Stroke

- Patient in AF (Green Category)
- Audible murmurs (Green Category)
- Suspected RWMA from clinical assessment or ECG (Amber Category)
- Young stroke patient (<55 yrs) with suspicion of cardiac abnormality (Amber Category)
- Multifocal stroke confirmed on imaging and consistent with cardioembolic aetiology (Amber Category)
- Clinical suspicion of endocarditis (see above) (Amber Category)

5.9 Emergency Non-Cardiac Surgery

- Clinical suspicion of undiagnosed valvular or ventricular pathology which will alter anaesthetic approach – indications clearly stated on the request (red category)
- Known ventricular or valvular dysfunction established within 12 months without a change in symptoms (Green Category)
- AF without signs of congestive cardiac failure or murmur (Green Category)
- Referral based on age or frailty only (Green Category)

5.10 Specific Indications - Shock

TTE is recommended as the primary assessment tool for the shock state following senior clinical assessment.

- Where initial clinical assessment and management has failed to provide reasonable clinical improvement. (Red Category)
- Prior to clinical assessment and initial management (Green Category)



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5.11 Specific Indications - Assessment of Right Heart Function

- Where acute right heart dysfunction is clinically suspected for example due to the use of high positive end expiratory ventilation strategy or where ECG changes suggest right ventricular infarction. (Red Category)
- For Pulmonary embolism please see section above.

5.12 Specific Indications - Assessment of Left Ventricular Function

- Where there is difficulty maintaining end organ perfusion despite senior assessment and therapy (Purple Category)
- Where a direct effect of pathology on ventricular function is suspected, e.g. septic cardiomyopathy (Purple Category)
- Following cardiac arrest and return of circulation (Red Category)
- In cases of severe malnutrition (Red Category)
- Where underlying cardiomyopathy is suspected as the cause of clinical signs and presentation (Red Category)
- Where clinical information is otherwise adequate to answer the clinical question (Green Category)

5.13 Specific Indications – Assessment of Complex Fluid Balance

- Where other clinical markers suggest euvolaemia or even hypervolaemia, but there remains suspicion that hypotension or hypoperfusion may be caused by persistent intravascular hypovolaemia (Purple Category)
- To determine filling status in anuric state (Red Category)
- To guide renal replacement therapy and fluid therapy planning (Red Category)
- Prior to clinical assessment and initial planning (Green Category)

5.14 Specific Indications – Differentiate between Acute Respiratory Distress Syndrome (ARDS) and Pulmonary Oedema

- Where there is reasonable clinical suspicion that the cause of interstitial fluid seen on chest radiography or lung ultrasound is raised LVEDP (Red Category)
- Where the cause of interstitial fluid appearance on chest radiology is known. For example, acute pneumonitis diagnosed on CT imaging (Green Category)



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5.15 Specific Indications – Suspicion of Acute Valvular Pathology

- Where the history and examination findings suggest the clinical picture and / or organ failure may be due to critical or acute valve dysfunction e.g. flail mitral valve leaflet (**Red Category**)
- Clinical/ radiological signs or symptoms of heart failure with a significant murmur (**Amber Category**)
- Where history, examination and current illness are not supportive of a diagnosis of valve dysfunction as a cause of haemodynamic compromise (**Green Category**)

5.16 Specific Indications – Assessment of Pericardial Space

- Where clinical findings suggest that known or suspected pericardial fluid is either contributing to haemodynamic compromise or causing acute cardiac tamponade. Sign and symptoms must be documented on request. (**Purple Category**)
- Where there is clinical suspicion of pyopericardium from clinical, microbiological and radiological information (**Purple Category**)
- Small volume pericardial effusion is noted on CT in the context of critical illness without haemodynamic effects (**Green Category**)

5.17 Discharge Dependent IP Echo

The **ONLY** IP Echos deemed discharge dependent are those patients who are under the care of the Cardiology team (request from the Cardiology team) with the relevant clinical indications to warrant IP Echo.

All other IP Echos labelled as 'discharge dependent' by the referring team will be classed as Green Category and are **NOT** for IP echo. Consider urgent OP Echo (within 2 weeks).

5.18 Specific Indications – Special Circumstances

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

- Assessment of cardiac function to facilitate organ donation
- Guidance for positioning extra corporeal support cannulae.
- Search for penetrating objects or assessment of cardiac structure following trauma to the thorax
- IP cancer referrals awaiting treatment as an inpatient



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6. Compliance Statements

6.1 Equality and Diversity

This document has been designed to support the Trust's effort to promote Equality, Diversity and Human Rights in the work place in line with the Trust's Equality and Human Rights Strategy. It has also been analysed to ensure that as part of the Public Sector Equality Duty the Trust has demonstrated that it has given 'due regard' to its equality duty and that, as far as is practicable, this document is free from having a potential discriminatory or adverse/negative impact on people or groups of people who have relevant protected characteristics, as defined in the Equality Act of 2010.

6.2 NHS Constitution

The contents of this document incorporates the NHS Constitution and sets out the rights, to which, where applicable, patients, public and staff are entitled, and pledges which the NHS is committed to achieve, together with the responsibilities which, where applicable, public, patients and staff owe to one another. The foundation of this document is based on the Principles and Values of the NHS along with the Vision and Values of Northampton General Hospital NHS Trust.

6.3 Confidentiality Data and Privacy Rights

In line with the UK General Data Protection Regulation (2016) and the Data Protection Act (2018) the Trust is obliged to treat all information in a secure, professional and ethical manner, whilst keeping all person identifiable and personal data confidential. In addition, the Trust will not share employee information with a third party, unless there is a legal basis for disclosure, for example for the detection and prevention of crime, or if it is in the legitimate interest of the Trust.

As part of the Data Security and Protection policies of the Trust and data protection legislation, if the Trust is required to share any reports / information / data relating to the processes and procedures of any of our policies, the data, where possible, will be anonymised to remove person identifiable / confidential data unless there is a justifiable reason not to. It is important that policy leads are aware that policies may be released in response to FOI requests.

For further information regarding a Data Protection Impact Assessment and Sharing Personal Data, please contact the Data Security and Protection Team @ ngh-tr.dpo@nhs.net.



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7. Definitions

Echo	Echocardiogram/echocardiography
TTE	Transthoracic echocardiogram
TOE	Transoesophageal echocardiogram
ECG	Electrocardiograph
ICE	Electronic Requesting system
CCU	Cardiac Care Unit
BSE	British Society of Echocardiography
BNP	Brain Natriuretic Peptide

8. Criteria for Competence

Important – IP Echos should only be requested by clinicians involved in the care of the patient who are able to use this triage protocol appropriately.

9. Clinical Incident Reporting & Management

Any clinical incidents will be reported on the Datix forms as per hospital policy and discussed at the Medicine Governance Meeting where any appropriate action will be agreed implemented and evaluated.

10. References Used for this Policy

1. British Society of Echocardiography. Clinical Indications and Triage of Echocardiography: Emergency, inpatient and critical care level II studies. 2024.
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3. British Society of Echocardiography. Personal Accreditation, Level I.
<https://www.bsecho.org/Public/Accreditation/Personal-accreditation/Level-1/Public/Accreditation/Accreditation-subpages/Personal-accreditation-subpages/Level-1-accreditation>.



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5. Bayes-Genis A et al. Practical algorithms for early diagnosis of heart failure and heart stress using NT-proBNP: A clinical consensus statement from the Heart Failure Association of the ESC. European Journal of Heart Failure. 2023 Nov;25(11):1891-8.
6. Januzzi JL et al. NT-proBNP testing for diagnosis and short-term prognosis in acute destabilized heart failure: An international pooled analysis of 1256 patients: The International Collaborative of NT-proBNP study. Eur Heart J 2006;27:330–337.
7. Januzzi JL, et al. N-terminal pro-B-type natriuretic peptide in the emergency department: the ICON-RELOADED study. J Am Coll Cardiol.2018;71:1191–1200.



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