



Doncaster and Bassetlaw
Teaching Hospitals
NHS Foundation Trust

Guideline for the initial investigation and diagnosis of Infective Endocarditis (IE) in Adults

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Date: October 2023

Approved by Trust Drug and Therapeutics Committee

Date of approval: October 2023

Implementation date: October 2023

For Review: October 2026

Infective Endocarditis (IE)

For all patients with suspected or confirmed endocarditis:

- Consult with an infection specialist and cardiologist promptly.

IE is an infection involving the endocardial surface of the heart, including the valvular structures, the chordae tendineae, sites of septal defects, or the mural endocardium.

IE often presents non-specifically, most commonly with fever and symptoms/signs of embolism. Consider endocarditis in the context of sepsis or fever of unknown origin in the presence of risk factors (see below). The most frequent clinical features of endocarditis are fever, cardiac murmur and congestive heart failure. Examination is usually non-specific, but may present with cardiac murmur, peripheral emboli, Osler nodes, Roth spots, or Janeway lesions, although these are rare. Atypical presentations are common in the elderly and immunocompromised. Please see appendix A for the 2023 ESC modified diagnostic criteria for IE.

Risk factors:	
Cardiac risk factors:	Non-cardiac risk factors:
Previous infective endocarditis	Central venous or arterial catheter
Known valvular heart disease	People who inject drugs
Prosthetic heart valve	Immunosuppression
Transvenous cardiac electronic device(s)	Recent dental or surgical procedures
Congenital heart disease	Recent hospitalisation
	Haemodialysis

Diagnosis

- Blood Cultures (minimum of 3 sets obtained at 30min intervals prior to antibiotic therapy)
ENSURE ASEPTIC TECHNIQUE APPLIED
DO NOT COLLECT BLOOD FROM OR DURING ACT OF VENOUS CANNULATION.
- Echocardiography must be performed as soon as possible in all patients with suspected IE
- All patients with *Staphylococcus aureus* bacteraemia or candidaemia require echocardiography (ideally within the first week of treatment or within 24 hours if there is evidence to suggest IE)
- In cases with an initially negative TTE/TOE, repeat TTE/TOE should be performed 7-10 days later if clinical suspicion of IE remains high.
- TTE is recommended at completion of endocarditis antibiotic therapy for evaluation of cardiac and valve morphology and function.

Microbiology Diagnosis

- In patients with chronic or subacute presentation, collect minimum **three sets of blood cultures**, from separate sites (20ml per set) before treatment. This should be undertaken **BEFORE ANTIBIOTICS ARE COMMENCED** and ideally with >6 hours between them provided the patient is clinically stable.
- In patients with sepsis features, **take three sets of blood cultures** (at 30 minute intervals prior to antibiotic therapy) to allow empirical treatment to be commenced without delay.
- In patients with suspected IE who are stable but are already on antibiotic therapy, consider stopping treatment and performing three sets of blood cultures off antibiotics. Antibiotic therapy may need to be stopped for 7-10 days before blood cultures become positive.
- Blood cultures should be repeated if a patient is still febrile after 7 days of treatment.
- Avoid sampling of intravascular line, unless part of paired through-line and peripheral sampling to diagnose concurrent catheter-related bloodstream infection.
- Avoid sampling from groin sinus to take blood cultures in groin-injecting IV drug users.
- In culture negative IE, please discuss with Infection doctor. It is important to note that most cases of culture negative IE are due to antibiotics being commenced before blood cultures are taken.

Antibiotic selection

- Discuss with Infection Specialist
- Ensure above investigations are undertaken/planned

Referral to cardiac surgery:

- A surgical opinion should be sought at the earliest opportunity in the following cases after discussing with Cardiology and Infectious Diseases consultants:
 - Prosthetic valve endocarditis or ICED-associated endocarditis
 - Uncontrolled infection
 - Heart failure
 - Prevention of embolism in patients with large vegetation (>10mm)
- Contact the Infectious Diseases team to facilitate referral to the S Yorkshire Infective Endocarditis MDT

References

-The guidelines on the antibiotics treatment of endocarditis in adults from the British Society of Antimicrobial Chemotherapy published in 2004 and updated guidelines published in 2012

- 2023 ESC (European Society of Cardiology) Guidelines for the management of endocarditis. European Heart Journal (2023) 00, 1-95; <https://doi.org/10.1093/eurheartj/ehad193>

Appendix A - 2023 ESC modified diagnostic criteria for infective endocarditis

Major criteria:

1. Positive blood culture for IE:
 - Typical micro-organism for IE from 2 separate blood cultures
 - Microorganism consistent with IE from continuously positive blood cultures; either:
 - ≥ 2 positive blood cultures of blood samples drawn >12 hours apart OR
 - All of 3 or a majority of ≥ 4 separate cultures of blood (with first and last samples drawn ≥ 1 hour apart) OR

A single positive blood culture for *C.burnettii*; or antiphase I IgG antibody titre $>1:800$

2. Imaging positive for IE:

Valvular, perivalvular/periprosthetic and foreign material anatomic and metabolic lesions characteristic of IE detected by any of the following:

- Echo (TTE/TOE)
- Cardiac CT
- FDG-PET/CT
- WBC SPECT/CT

Minor criteria:

1. Predisposing heart condition or intravenous drug use
2. Fever $> 38^{\circ}\text{C}$
3. Embolic vascular phenomenon (including asymptomatic lesions detected by imaging alone) such as major systemic and pulmonary emboli/infarcts, , haematogenous osteoarticular septic complications (i.e. spondylodiscitis), mycotic aneurysm, intracranial ischaemic/haemorrhagic lesions, conjunctival haemorrhage, Janeway's lesions
4. Immunological phenomenon:
 - Glomerulonephritis, Osler nodes, Roth spots or Rheumatoid factor
5. Microbiological evidence:
 - Positive blood cultures not meeting major criteria

Serological evidence of active infection with organism consistent with IE.

Clinical criteria for **definite IE** requires: 2 major criteria; or 1 major and 3 minor criteria; or 5 minor criteria

Clinical criteria for **possible IE** requires 1 major and 1 or 2 minor criterion; or 3 - 4 minor criteria