

Heart Failure – Part 1

According to 2023 ESC guidelines

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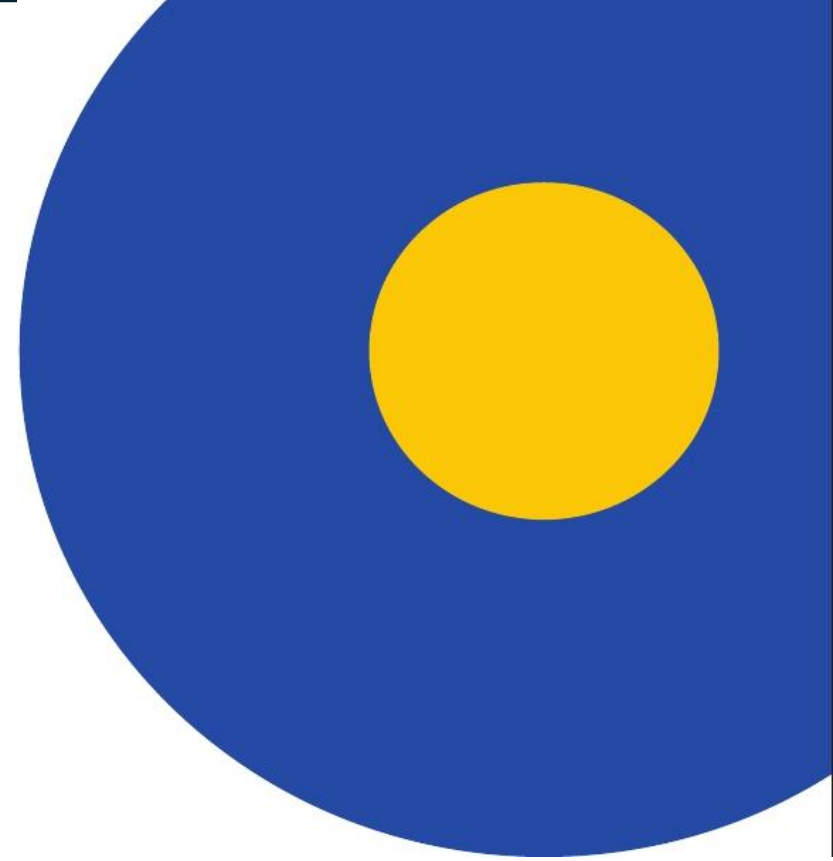
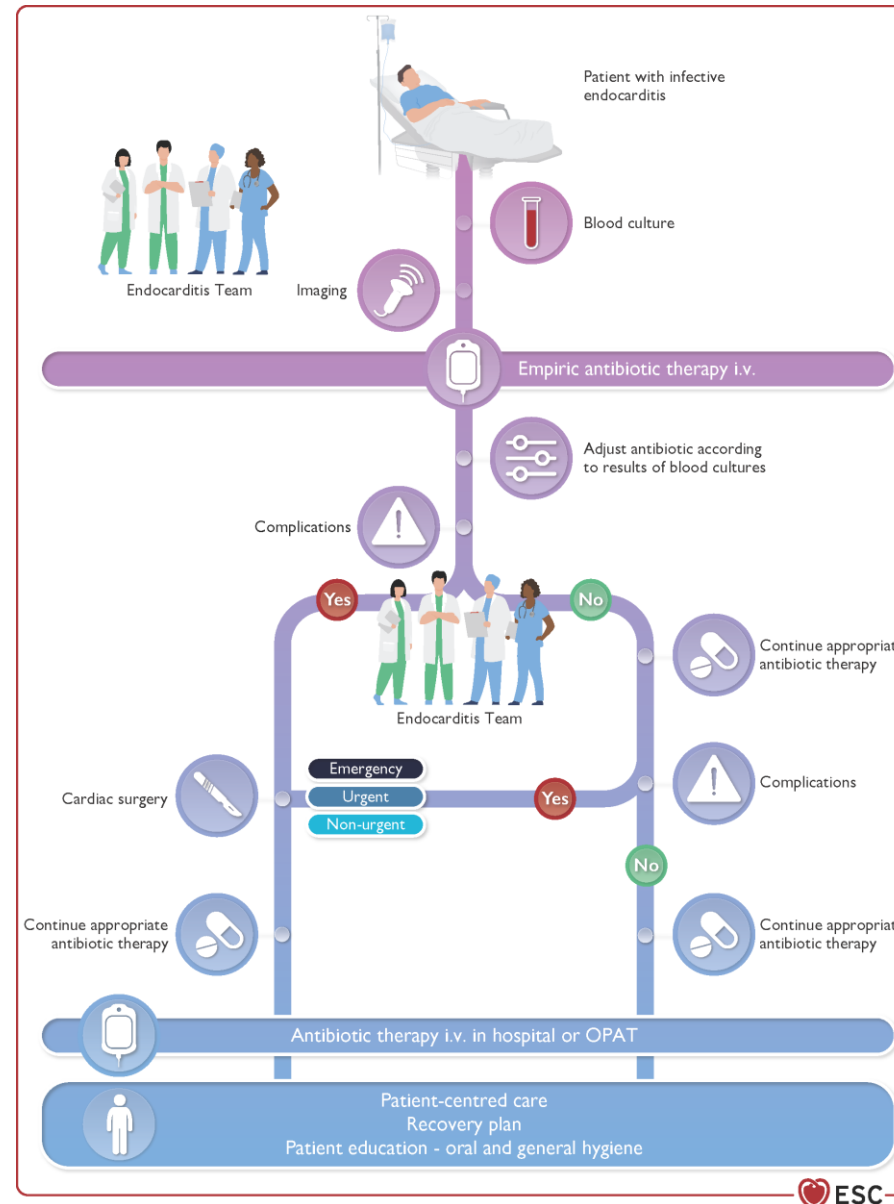


Figure 1

Management of patients with infective endocarditis



General prevention measures to be followed in patients at high and intermediate risk for infective endocarditis

Patients should be encouraged to maintain twice daily tooth cleaning and to seek professional dental cleaning and follow-up at least twice yearly for high-risk patients and yearly for others

Strict cutaneous hygiene, including optimized treatment of chronic skin conditions

Disinfection of wounds

Curative antibiotics for any focus of bacterial infection

No self-medication with antibiotics

Strict infection control measures for any at-risk procedure

Discouragement of piercing and tattooing

Limitation of infusion catheters and invasive procedures when possible. Strict adherence to care bundles for central and peripheral cannulae should be performed

Recommendations for antibiotic prophylaxis in patients with cardiovascular diseases undergoing oro-dental procedures at increased risk for IE (1)

Recommendations	Class	Level
General prevention measures are recommended in individuals at high and intermediate risk for IE.	I	C
Antibiotic prophylaxis is recommended in patients with previous IE.	I	B
Antibiotic prophylaxis is recommended in patients with surgically implanted prosthetic valves and with any material used for surgical cardiac valve repair.	I	C
Antibiotic prophylaxis is recommended in patients with transcatheter implanted aortic and pulmonary valvular prostheses.	I	C
Antibiotic prophylaxis is recommended in patients with untreated cyanotic CHD, and patients treated with surgery or transcatheter procedures with post-operative palliative shunts, conduits, or other prostheses. After surgical repair, in the absence of residual defects or valve prostheses, antibiotic prophylaxis is recommended only for the first 6 months after the procedure.	I	C

Recommendations for antibiotic prophylaxis in patients with cardiovascular diseases undergoing oro-dental procedures at increased risk for IE (2)



Recommendations	Class	Level
Antibiotic prophylaxis is recommended in patients with ventricular assist devices.	I	C
Antibiotic prophylaxis should be considered in patients with transcatheter mitral and tricuspid valve repair.	IIa	C
Antibiotic prophylaxis may be considered in recipients of heart transplant.	IIb	C
Antibiotic prophylaxis is not recommended in other patients at low risk for IE.	III	C

Recommendations for infective endocarditis prevention in high-risk patients

Recommendations	Class	Level
Antibiotic prophylaxis is recommended in dental extractions, oral surgery procedures, and procedures requiring manipulation of the gingival or periapical region of the teeth.	I	B
Systemic antibiotic prophylaxis may be considered for high-risk patients undergoing an invasive diagnostic or therapeutic procedure of the respiratory, gastrointestinal, genitourinary tract, skin, or musculoskeletal systems.	IIb	C

Figure 2

Education of high-risk patients to prevent infective endocarditis

Education of high-risk patients to prevent infective endocarditis

- Maintain good dental hygiene**
 - Use dental floss daily
 - Brush teeth morning and evening
 - See your dentist for regular check-ups
- Maintain good skin hygiene**
 - Minimize risk of skin lesions
 - In case of lesions, observe for signs of infection (redness, swelling, tenderness, puss)
 - Avoid tattoos and piercings
- Be mindful of infections**
 - If experiencing fever for no obvious reason, contact your doctor, and discuss appropriate action based on your risk of endocarditis
- Do not self prescribe antibiotics**
- Show this card to your doctors before any interventions**

Recommendations for infective endocarditis prevention in cardiac procedures (1)

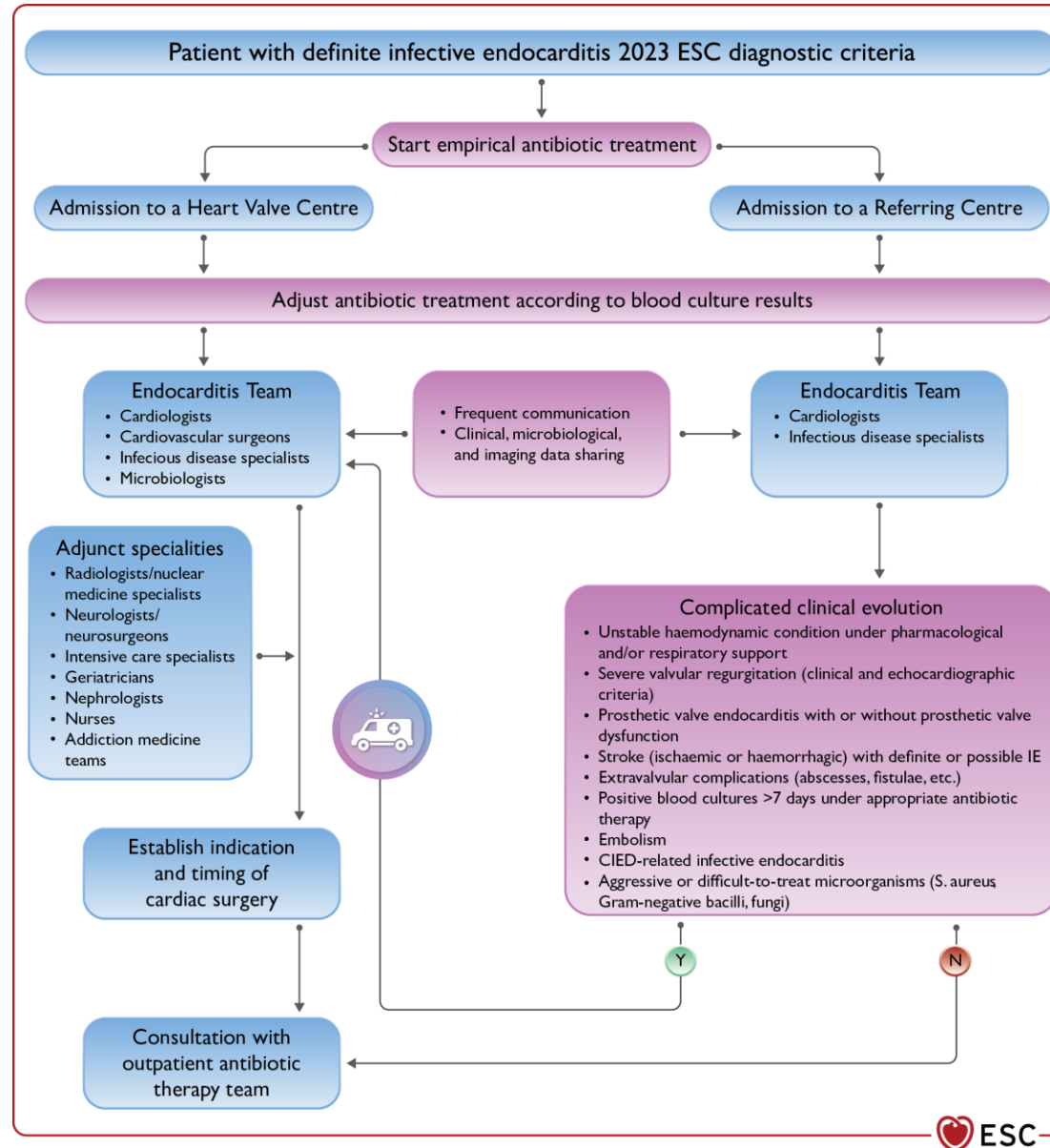
Recommendations	Class	Level
Pre-operative screening for nasal carriage of <i>S. aureus</i> is recommended before elective cardiac surgery or transcatheter valve implantation to treat carriers.	I	A
Peri-operative antibiotic prophylaxis is recommended before placement of a CIED.	I	A
Optimal pre-procedural aseptic measures of the site of implantation is recommended to prevent CIED infections.	I	B
Periprocedural antibiotic prophylaxis is recommended in patients undergoing surgical or transcatheter implantation of a prosthetic valve, intravascular prosthetic, or other foreign material.	I	B
Surgical standard aseptic measures are recommended during the insertion and manipulation of catheters in the catheterization laboratory environment.	I	C

Recommendations for infective endocarditis prevention in cardiac procedures (2)

Recommendations	Class	Level
Elimination of potential sources of sepsis (including of dental origin) should be considered ≥ 2 weeks before implantation of a prosthetic valve or other intracardiac or intravascular foreign material, except in urgent procedures.	IIa	C
Antibiotic prophylaxis covering for common skin flora including <i>Enterococcus</i> spp. and <i>S. aureus</i> should be considered before TAVI and other transcatheter valvular procedures.	IIa	C
Systematic skin or nasal decolonization without screening for <i>S. aureus</i> is not recommended.	III	C

Figure 3

Management of patients with infective endocarditis: positioning of the Endocarditis Team

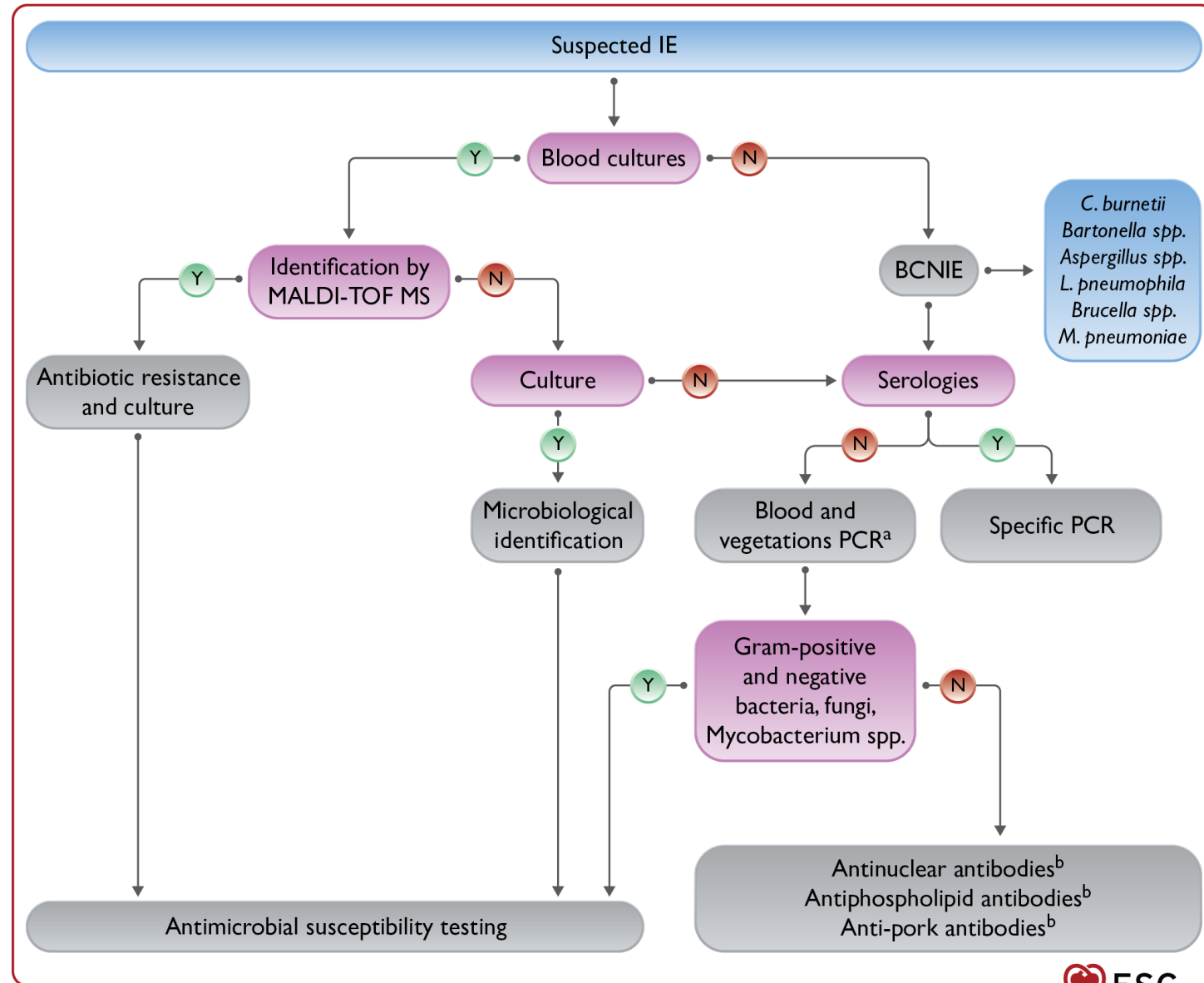


Cardiac and non-cardiac risk factors

Cardiac risk factors	Non-cardiac risk factors
<ul style="list-style-type: none">• Previous infective endocarditis• Valvular heart disease• Prosthetic heart valve• Central venous or arterial catheter• Transvenous cardiac implantable electronic device• Congenital heart disease	<ul style="list-style-type: none">• Central venous catheter• People who inject drugs• Immunosuppression• Recent dental or surgical procedures• Recent hospitalization• Haemodialysis

Figure 4

Microbiological diagnostic algorithm in culture-positive and culture-negative infective endocarditis



Recommendations for the role of echocardiography in infective endocarditis (1)



Recommendations	Class	Level
A. Diagnosis		
TTE is recommended as the first-line imaging modality in suspected IE.	I	B
TOE is recommended in all patients with clinical suspicion of IE and a negative or non-diagnostic TTE.	I	B
TOE is recommended in patients with clinical suspicion of IE, when a prosthetic heart valve or an intracardiac device is present.	I	B
Repeating TTE and/or TOE within 5–7 days is recommended in cases of initially negative or inconclusive examination when clinical suspicion of IE remains high.	I	C
TOE is recommended in patients with suspected IE, even in cases with positive TTE, except in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic findings.	I	C
Performing an echocardiography should be considered in <i>S. aureus</i> , <i>E. faecalis</i> , and some <i>Streptococcus</i> spp. bacteraemia.	IIa	B

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Recommendations for the role of echocardiography in infective endocarditis (2)



Recommendations	Class	Level
<i>B. Follow-up under medical therapy</i>		
Repeating TTE and/or TOE is recommended as soon as a new complication of IE is suspected (new murmur, embolism, persisting fever and bacteraemia, HF, abscess, AVB).	I	B
TOE is recommended when patient is stable before switching from intravenous to oral antibiotic therapy.	I	B
During follow-up of uncomplicated IE, repeat TTE and/or TOE should be considered to detect new silent complications. The timing of repeat TTE and/or TOE depends on the initial findings, type of microorganism, and initial response to therapy.	IIa	B

Recommendations for the role of echocardiography in infective endocarditis (3)



Recommendations	Class	Level
<i>C. Intra-operative echocardiography</i>		
Intra-operative echocardiography is recommended in all cases of IE requiring surgery.	I	C
<i>D. Following completion of therapy</i>		
TTE and/or TOE are recommended at completion of antibiotic therapy for evaluation of cardiac and valve morphology and function in patients with IE who did not undergo heart valve surgery.	I	C

Recommendations for the role of computed tomography, nuclear imaging, and magnetic resonance in infective endocarditis (1)

Recommendations	Class	Level
Cardiac CTA is recommended in patients with possible NVE to detect valvular lesions and confirm the diagnosis of IE.	I	B
[18F]FDG-PET/CT(A) and cardiac CTA are recommended in possible PVE to detect valvular lesions and confirm the diagnosis of IE.	I	B
Cardiac CTA is recommended in NVE and PVE to diagnose paravalvular or periprosthetic complications if echocardiography is inconclusive.	I	B
Brain and whole-body imaging (CT, [18F]FDG-PET/CT, and/or MRI) are recommended in symptomatic patients with NVE and PVE to detect peripheral lesions or add minor diagnostic criteria.	I	B

Recommendations for the role of computed tomography, nuclear imaging, and magnetic resonance in infective endocarditis (2)

Recommendations	Class	Level
WBC SPECT/CT should be considered in patients with high clinical suspicion of PVE when echocardiography is negative or inconclusive and when PET/CT is unavailable.	IIa	C
[18F]FDG-PET/CT(A) may be considered in possible CIED-related IE to confirm the diagnosis of IE.	IIb	B
Brain and whole-body imaging (CT, [18F]FDG-PET/CT, and MRI) in NVE and PVE may be considered for screening of peripheral lesions in asymptomatic patients.	IIb	B

Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis (1)

Major criteria

(i) Blood cultures positive for IE

(a) Typical microorganisms consistent with IE from two separate blood cultures:

Oral streptococci, *Streptococcus gallolyticus* (formerly *S. bovis*), HACEK group, *S. aureus*, *E. faecalis*

(b) Microorganisms consistent with IE from continuously positive blood cultures:

- ≥ 2 positive blood cultures of blood samples drawn >12 h apart
- All of 3 or a majority of ≥ 4 separate cultures of blood (with first and last samples drawn ≥ 1 h apart)

(c) Single positive blood culture for *C. burnetii* or phase I IgG antibody titre $>1:800$

Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis (2)

Major criteria (continued)

(ii) Imaging positive for IE

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

- Echocardiography (TTE and TOE)
- Cardiac CT
- [18F]-FDG-PET/CT(A)
- WBC SPECT/CT

Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis (3)

Minor criteria

(i) Predisposing conditions (i.e. predisposing heart condition at high or intermediate risk of IE or PWIDs)

(ii) Fever defined as temperature $>38^{\circ}\text{C}$

(iii) Embolic vascular dissemination (including those asymptomatic detected by imaging only):

- Major systemic and pulmonary emboli/infarcts and abscesses
- Haematogenous osteoarticular septic complications (i.e. spondylodiscitis)
- Mycotic aneurysms
- Intracranial ischaemic/haemorrhagic lesions
- Conjunctival haemorrhages
- Janeway's lesions

Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis (4)

Minor criteria (continued)

(iv) Immunological phenomena:

- Glomerulonephritis
- Osler nodes and Roth spots
- Rheumatoid factor

(v) Microbiological evidence:

- Positive blood culture but does not meet a major criterion as noted above
- Serological evidence of active infection with organism consistent with IE

Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis (5)

IE CLASSIFICATION (at admission and during follow-up)

Definite:

- 2 major criteria
- 1 major criterion and at least 3 minor criteria
- 5 minor criteria

Possible:

- 1 major criterion and 1 or 2 minor criteria
- 3–4 minor criteria

Rejected:

- Does not meet criteria for definite or possible at admission with or without a firm alternative diagnosis

Figure 5

European Society of Cardiology 2023 algorithm for diagnosis of native valve infective endocarditis

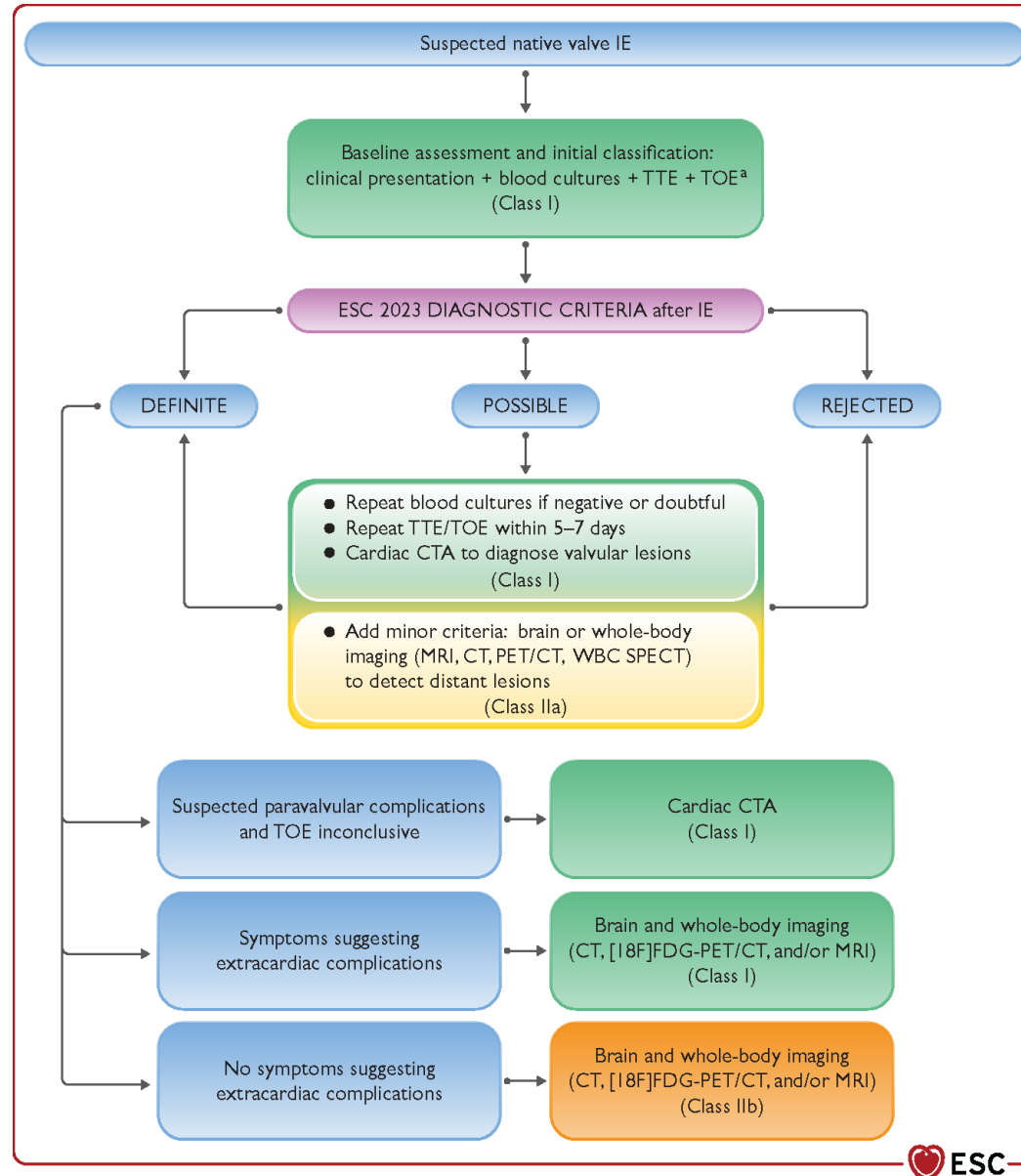


Figure 6

European Society of Cardiology 2023 algorithm for diagnosis of prosthetic valve infective endocarditis

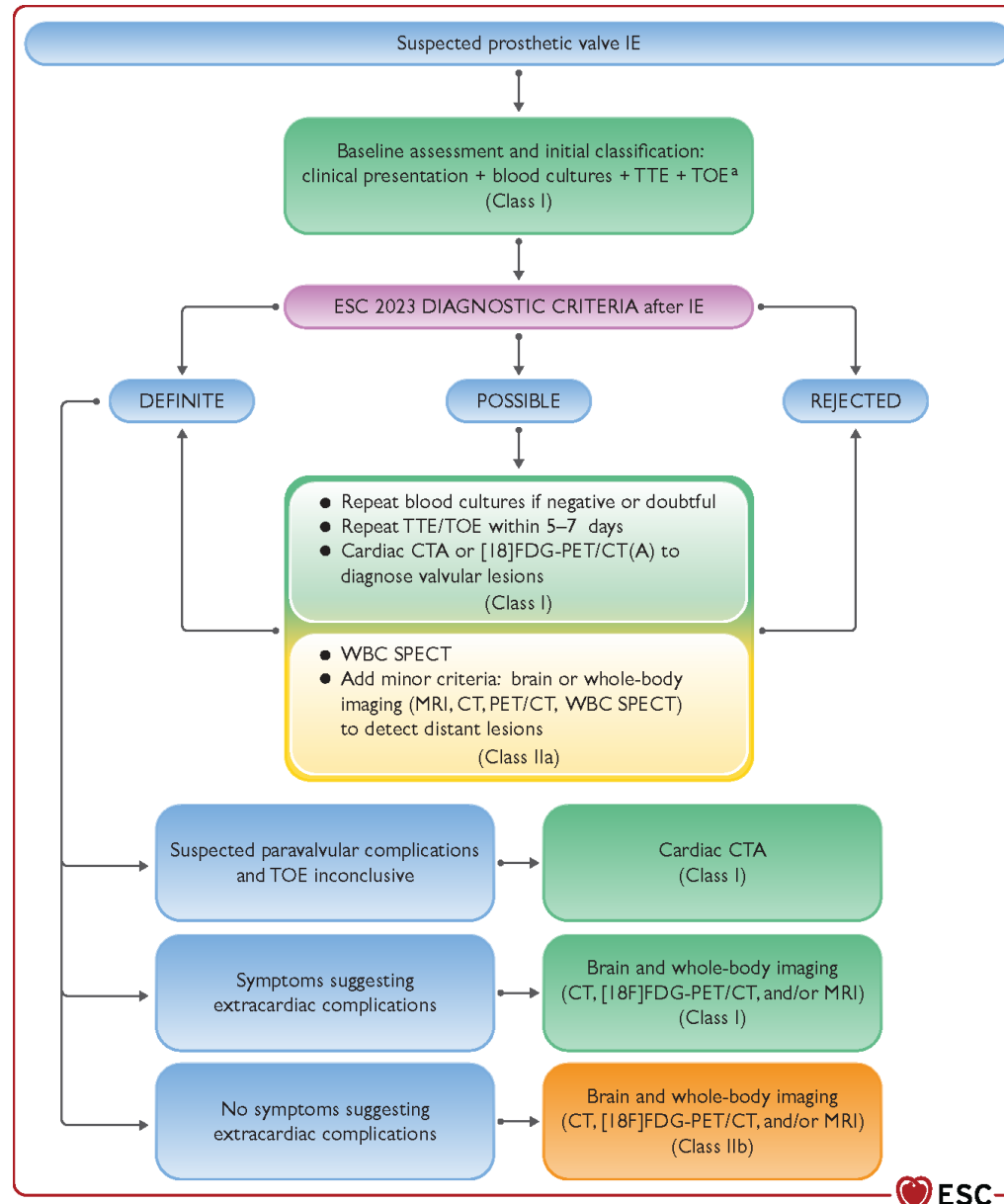


Figure 7
**European Society of
 Cardiology 2023
 algorithm for
 diagnosis of cardiac
 device-related
 infective endocarditis**

