

2023

Essential Messages from ESC Guidelines

Clinical Practice

Guidelines Committee

ENDOCARDITIS

Guidelines for the management of
endocarditis



ESC

European Society
of Cardiology

Essential Messages

2023 ESC Guidelines for the management of endocarditis

Developed by the task force on the management of endocarditis of the European Society of Cardiology (ESC).

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Associations: Association of Cardiovascular Nursing & Allied Professions (ACNAP), Association for Acute CardioVascular Care (ACVC), European Association of Cardiovascular Imaging (EACVI), European Association of Preventive Cardiology (EAPC), European Association of Percutaneous Cardiovascular Interventions (EAPCI), European Heart Rhythm Association (EHRA), Heart Failure Association (HFA).

Councils: Council for Cardiology Practice, Council on Stroke.

Working Groups: Adult Congenital Heart Disease, Cardiovascular Surgery.

Patient Forum

ESSENTIAL MESSAGES FROM THE 2023 ESC GUIDELINES FOR THE MANAGEMENT OF ENDOCARDITIS

Table of contents

- **Section 1 - Key messages**
- Section 2 - Gaps in evidence

Key messages

1. Prevention:

- Populations at high risk for IE include patients with previous IE, patients with surgical or transcatheter prosthetic valves or post-cardiac valve repair, and patients with untreated CHD and surgically corrected CHD.
- Prevention of IE comprise hygienic measures (including oral hygiene) for all individuals and antibiotic prophylaxis for patients at high risk of IE undergoing oro-dental procedures.

2. The Endocarditis Team:

- The diagnosis and management of patients with IE should be discussed with the Endocarditis Team which includes healthcare professionals with the expertise to diagnose and treat IE and its complications.
- Uncomplicated IE can be managed in a Referring Centre that remains in early and regular communication with the Endocarditis Team of the Heart Valve Centre.
- Patients with complicated IE should be treated in the Heart Valve Centre, which must offer a wide range of ancillary specialty support including onsite cardiac surgery expertise.

3. Diagnosis:

- The diagnosis of IE is based on major criteria, which include positive blood cultures and valvular and perivalvular/periprosthetic anatomic and metabolic lesions detected on imaging, and on minor criteria which have been updated to include frequent embolic vascular dissemination including asymptomatic lesions detected by imaging only.
- Clear diagnostic algorithms have been established to diagnose NVE, PVE, and right-sided IE.

4. Antimicrobial therapy - principles and methods:

- Successful treatment of IE relies on microbial eradication by antimicrobial drugs. Surgery contributes by removing infected material and draining abscesses.
- Antibiotic treatment of PVE should last longer (≥ 6 weeks) than that of NVE (2-6 weeks).
- In both NVE and PVE, the duration of treatment is based on the first day of effective antibiotic therapy (negative blood culture in the case of initial positive blood culture), not on the day of surgery.
- The initial choice of empirical treatment depends on the use of previous antibiotic therapy, whether IE is NVE or PVE [and if so, when surgery was performed (early vs. late PVE)], the place where the infection took place (community, nosocomial, or non-nosocomial healthcare-associated IE), and knowledge of the local epidemiology.

Key messages

- The antibiotic treatment of IE has two phases. The first phase consists of 2 weeks of in-hospital i.v. treatment. In this initial phase, cardiac surgery should be performed if indicated, infected foreign bodies should be removed, and cardiac as well as extracardiac abscesses should be drained. In the second phase, in selected patients, the antibiotic treatment can be completed within an outpatient parenteral or oral antibiotic programme for up to 6 weeks.
 - Aminoglycosides are not recommended in staphylococcal NVE because their clinical benefits have not been demonstrated. In IE caused by other microorganisms in which aminoglycosides are indicated, they should be prescribed in a single daily dose to reduce nephrotoxicity.
 - Rifampin should be used only in IE involving foreign material, such as PVE, after 3-5 days of effective antibiotic therapy.
 - When daptomycin is indicated, it must be given at high doses (10 mg/kg once daily) and combined with a second antibiotic (beta-lactams or fosfomycin in beta-lactam allergic patients) to increase activity and avoid the development of resistance.
 - OPAT can only start when a TOE shows absence of local progression and complications (eg. severe valvular dysfunction).
 - In the OPAT programme, patients continue with the same antibiotics administered in the acute phase, if possible.
5. Indications for surgery and management of main infective endocarditis complications:
- There are three main reasons to undergo surgery in the setting of acute IE: HF, uncontrolled infection, and prevention of septic embolization.
 - While surgery during the acute phase of IE is usually performed on an urgent basis (i.e. the patient undergoes surgery within 3-5 days), some cases require emergency surgery (i.e. within 24 h), irrespective of the pre-operative duration of antibiotic treatment.
6. Other complications of infective endocarditis:
- Stroke may be the first presenting symptom in patients with IE. Unexplained fever accompanying a stroke in a patient with risk factors for IE should trigger the suspicion of IE.
 - Epicardial pacemaker implantation should be considered in patients undergoing surgery for IE with complete AVB and other risk factors.
 - MRI or PET/CT are indicated in patients with suspected spondylodiscitis and vertebral osteomyelitis complicating IE.

7. Surgical therapy principles and methods:

- The indication to perform invasive coronary angiography or CTA prior to surgery for IE should be based on the presence of cardiovascular risk factors in patients with aortic valve IE.
- Surgery should not be delayed in patients with non-haemorrhagic stroke and clear indications for surgery. In patients with significant pre-operative haemorrhagic stroke, a delay in operative management (≥ 4 weeks) is generally recommended.
- The decision of not offering surgery when indicated should be made in the setting of an Endocarditis Team.

8. Outcome after discharge - follow-up and long-term prognosis:

- Relapse is a repeat episode of IE caused by the same microorganism and represents a failure of treatment, and mandates a search for a persistent focus of infection and an evaluation towards surgical therapy.
- Reinfection is an infection caused by a different microorganism, usually more than 6 months after the initial episode.
- Once antibiotic treatment has been completed, blood cultures should be performed.
- Patients discharged after the first episode of IE should remain under close surveillance for potential long-term complications.

9. Management of specific situations:

- Antibiotic prophylaxis to prevent CIED-related IE before dental and other non-cardiac interventions is not warranted.
- A single positive blood culture with no other clinical evidence of infection should not result in removal of the CIED. Complete CIED removal is recommended for all patients with confirmed infection of the lead(s).
- The indication for CIED reimplantation should always be re-evaluated and no part of the removed system should be reimplanted. In pacemaker-dependent patients, an active-fixation lead may be introduced and connected to an external pacemaker for up to 6 weeks.
- Surgical treatment of right-sided IE is indicated in patients with persistent bacteraemia, right ventricular dysfunction, recurrent septic pulmonary embolism and respiratory compromise, and involvement of left-sided structures.
- Multidisciplinary care of CHD patients with IE, from diagnosis to treatment, should be provided in specialized CHD centres with expertise in CHD cardiac imaging, CHD surgery, and intensive care.

10. Patient-centred care and shared decision-making in infective endocarditis:

- In patients with IE, shared decision-making enables the integration of patients' preferences, values, and priorities to achieve a good treatment decision.
- In patients with IE and without support networks or severely impacted by social determinants, a recovery plan developed in collaboration with the patient should be established, highlighting the information about the risk of recurrence and preventive measures.

11. Sex differences:

- Female sex is less common in patients diagnosed with IE, being present in approximately one third of cases.

Gaps in evidence

The majority of the recommendations with a level of evidence B are based on observational studies rather than single RCTs or meta-analyses from RCTs.

1. Prevention:

- In the intermediate or unknown risk condition groups, there is no evidence to recommend antibiotic prophylaxis.
- There is currently no evidence to support the use of antibiotic prophylaxis after the implantation of a left atrial appendage occlusion device.

2. Diagnosis:

- More data on the accuracy of diagnosis of culture-negative IE using molecular biology techniques, or the determination of bacterial/fungal cell-free DNA in blood samples, is required.
- Standardization of the methodology to assess the size of the vegetations has not been established.
- More data on the diagnostic performance of intracardiac echocardiography in PVE are needed.
- The role of [18F]FDG-PET/CT(A) in NVE needs to be established.
- Routine use of imaging tests to screen the presence of embolic events, especially brain imaging, is not well established.
- In fungal endocarditis, the role of molecular and biochemical indicators to establish the diagnosis is not well studied.

3. Antimicrobial therapy - principles and methods:

- Clinical trials are needed to assess the efficacy and safety of recommended antimicrobial treatment regimens and new combinations or antimicrobials. Many recommendations come from clinical trials for bacteraemia and not for IE.
- Effective antibiotic treatment in patients with highly penicillin-resistant oral streptococci should be investigated.
- Randomized data to establish the best medical strategy in staphylococcal IE are required.
- Effective antibiotic treatments for patients with HLAR *E. faecalis* IE and hypersensitivity to beta-lactams need further research.
- Effective treatments for vancomycin-resistant enterococcal IE need further research.
- Randomized head-to-head comparisons of different antibiotics to better judge efficacy and toxicity (e.g. for aminoglycosides) are needed.

Gaps in evidence

- The duration of antibiotic treatment has been established empirically and no randomized data have been published.
 - The efficacy of combined antifungal therapy has not been studied.
 - The empirical use of an aminoglycoside-sparing empirical combination regimen has not been extensively studied.
 - More data on implementation of oral treatment in large studies are needed.
4. Indications for surgery and management of main infective endocarditis complications:
- The indication of surgical treatment in patients with IE rely mainly on expert opinion based on observational studies.
 - RCTs are required to establish the indication and timing of surgery in patients with:
 - increased surgical risk;
 - large vegetations but without other indications for surgery;
 - cerebral emboli or bleeding;
 - patients with uncontrolled infection.
 - More data on the need and timing of coronary angiogram before endocarditis surgery.
 - There is lack of information on timing and sequence of interventions in patients with multiple septic sources.
 - More data are needed on the efficacy and safety of vegetation extraction systems in right-sided IE.
5. Other complications of infective endocarditis:
- There is limited information on the safety and efficacy of mechanical thrombectomy in IE-related embolic strokes.
 - There are no prospective data on the timing and safety of splenectomy for splenic abscess, complicating IE in relation to surgical valve treatment.
6. Surgical therapy principles and methods:
- There is a significant need for scores to predict futility of surgical management in very high-risk patients.
 - There is a lack of data on the most appropriate anticoagulation regime in patients with PVE complicated by haemorrhagic stroke.
7. Outcome after discharge: follow-up and long-term prognosis:
- Clinical trials are required to assess the efficacy of rehabilitation, including optimal timing, duration, methods, and components.
 - Data on patient-reported outcomes during short- and long-term follow-up are needed.

Gaps in evidence

8. Management of specific situations:

- Additional data on the incidence, characteristics and outcomes of IE in patients treated with transcatheter valve therapies or left atrial appendage occluders are needed.
- There is an unmet clinical question on the efficacy and safety of surgical treatment of IE in patients previously treated with transcatheter valve therapies.
- Randomized data on the timing of CIED reimplantation after device removal after CIED infection are needed.
- There is a lack of evidence on whether or not CIED removal should be routinely performed in patients with left-sided IE.
- Randomized data on surgery in right-sided IE are required.

9. Patient-centred care and shared decision-making in infective endocarditis:

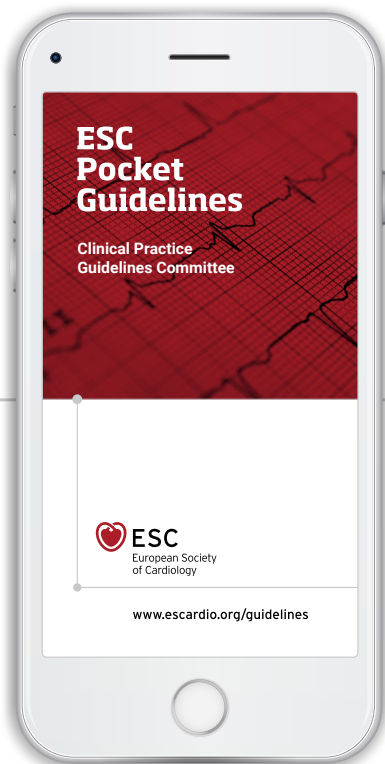
- As no disease specific evidence exists, data on patient-centred care and shared decision-making in IE is needed.
- Data on how patient-centred care and shared decision-making in patients with social and mental health vulnerabilities can improve their outcomes are lacking.
- Data on the effect of patient-centred care and shared decision-making interventions are required to implement effective strategies.

10. Sex differences:

- Further data are required to determine why IE is less frequently observed, and why the outcomes are worse, in female patients.
- The reasons for lower referral to surgery in female patients with IE as compared with male patients need to be determined and addressed.

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The following material was adapted from the 2023 ESC Guidelines for the management of endocarditis (European Heart Journal; 2023 - doi: 10.1093/eurheartj/ehad193).

Post-publication corrections and updates are available at: www.escardio.org/guidelines

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