



2023 ESC Guidelines for the management of endocarditis

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Endocarditis infecciosa

Endocarditis infecciosa es una condición que compromete la vida

Hemocultivos son el estándar

- Seguidos de serologías en casos selectos

Mortalidad persiste en 30%

Los criterios de Duke, 1994, modificados 2000 y nueva modificación 2023

En la actualidad los dispositivos, 10% EI

Liesman RM, Pritt BS 2017. Laboratory diagnosis of infective endocarditis. J Clin Microbiol 55:2599 –2608

Prevención

Sitios de entrada

- Infecciones de la piel, cavidad oral, gastrointestinales o genitourinarias.
- Inoculación directa en personas que se inyectan drogas (PWID) o punción vascular no segura.
- Exposición en entornos de atención médica.

Pacientes de alto riesgo de endocarditis

- Pacientes con historia previa de endocarditis.
- Portadores de válvulas protésicas y dispositivos cardíacos.
- Cardiopatías congénitas, no corregidas y corregidas en los primeros 6 meses.


Factores de riesgo

Table 8 Cardiac and non-cardiac risk factors


Cardiac risk factors
Previous infective endocarditis
Valvular heart disease
Prosthetic heart valve
Central venous or arterial catheter
Transvenous cardiac implantable electronic device
Congenital heart disease
Non-cardiac risk factors
Central venous catheter
People who inject drugs
Immunosuppression
Recent dental or surgical procedures
Recent hospitalization
Haemodialysis

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Prevención

- 

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

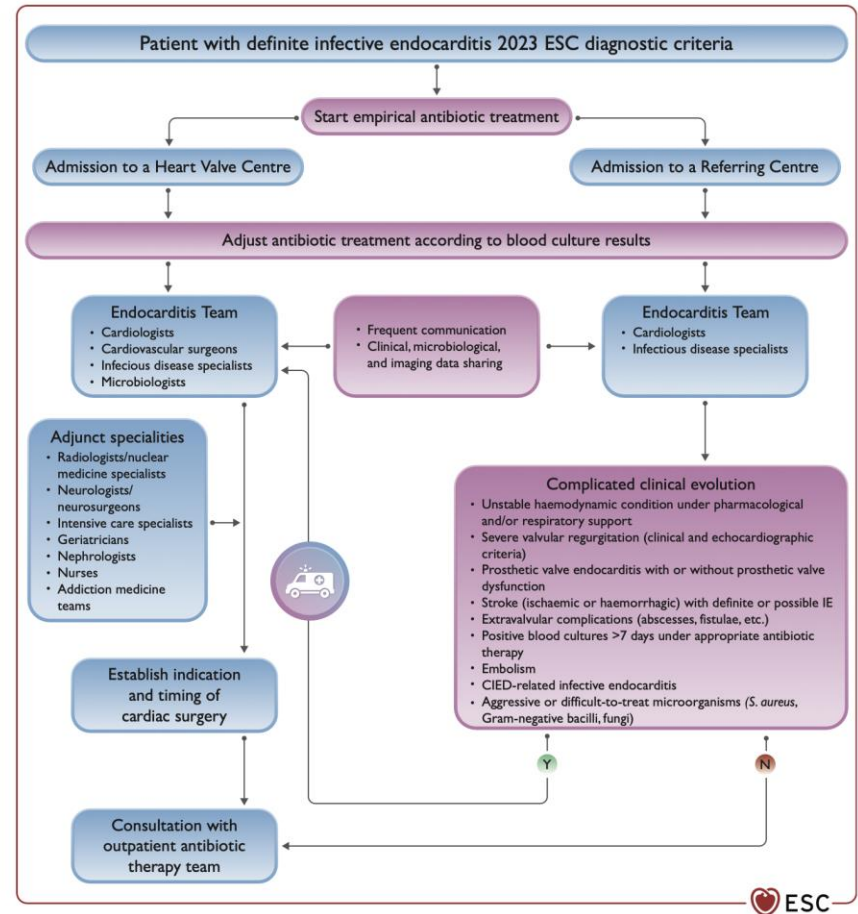
Table 6 Prophylactic antibiotic regime for high-risk dental procedures

Situation	Antibiotic	Single-dose 30–60 min before procedure	
		Adults	Children
No allergy to penicillin or ampicillin	Amoxicillin	2 g orally	50 mg/kg orally
	Ampicillin	2 g i.m. or i.v.	50 mg/kg i.v. or i.m.
	Cefazolin or ceftriaxone	1 g i.m. or i.v.	50 mg/kg i.v. or i.m.
Allergy to penicillin or ampicillin	Cephalexin ^{a,b}	2 g orally	50 mg/kg orally
	Azithromycin or clarithromycin	500 mg orally	15 mg/kg orally
	Doxycycline	100 mg orally	<45 kg, 2.2 mg/kg orally >45 kg, 100 mg orally
	Cefazolin or ceftriaxone ^b	1 g i.m. or i.v.	50 mg/kg i.v. or i.m.

Grupo de endocarditis

Table 7 Members of the Endocarditis Team

	Heart Valve Centre
Core members	<ul style="list-style-type: none"> • Cardiologists. • Cardiac imaging experts. • Cardiovascular surgeons. • Infectious disease specialist (or internal medicine specialist with expertise in infectious diseases). • Microbiologist. • Specialist in outpatient parenteral antibiotic treatment.
Adjunct specialities	<ul style="list-style-type: none"> • Radiologist and nuclear medicine specialist. • Pharmacologist. • Neurologist and neurosurgeon. • Nephrologist. • Anaesthesiologists. • Critical care. • Multidisciplinary addiction medicine teams. • Geriatricians. • Social worker. • Nurses. • Pathologist.



Diagnóstico

Alto índice de sospecha, clínica, microbiología e imagen

Definitivo

- Evidencia de vegetación en la válvula.

La ecocardiografía es la imagen de primera línea

- CT, PET y MRI son estrategias ayudadas.

Laboratorio

- No específico, inflamación y fenómenos inmunológicos.

Microbiológico

- *S. aureus* (31%), *Streptococci* (17%) y CoNS (11%).

Manifestaciones clínicas

	PVE (%) (n = 939)	NVE (%) (n = 1764)	CIED (%) (n = 308)
Signs and symptoms			
Fever	77.3	78.9	72.3
Cough	13.1	20.1	12.8
Dizziness	9.9	11.4	8.8
Cerebrovascular accident	7.3	7.2	2.4
Syncope	2.6	2.8	2.4
Cardiac murmur	65.6	70.8	31.5
Congestive heart failure	27.1	27.7	28.9
Cardiogenic shock	1.4	2.7	2.6
Septic shock	6.3	7.1	5.5

Osler nodes	1.1	2.6	0.6
Janeway lesions	1.9	4.9	0.6
Roth spots	0.4	2.1	0.3
Complications			
Paravalvular abscess	13.8	11.5	7.8
Spondylitis	4.5	5.8	4.5
Embolic events	21.4	30.1	11.7
Pulmonary	9.5	27.5	75.0
Cerebral	51.2	43.3	16.7
Splenic	25.9	22.0	5.6
Coronary	2.0	3.2	2.8
Renal	7.5	11.1	2.8
Hepatic	1.5	2.4	0.0
Peripheral	12.4	12.2	2.8
Haemorrhagic stroke	1.7	2.7	0.6

Victoria Delgado et al. Eur Heart J. 2023 Oct 14;44(39):3948-4042

Características epidemiológicas de la endocarditis infecciosa. Experiencia de seis años

Epidemiological characteristics of infective endocarditis. Six years of experience

Edwin J. Ariza, Edwin U. Suárez*, Santiago Giraldo, Fabián A. Jaimes, Edison Muñoz y Juan M. Senior

Departamento de Medicina Interna, Universidad de Antioquia, Hospital Universitario San Vicente Fundación, Medellín, Colombia

Variable	n = 130	Síntomas	n = 130	Signos	n = 130
Hipertensión arterial (%)	54.6	Fiebre (%)	90	Taquicardia (%)	66.9
Enfermedad renal crónica* (%)	38.4	Astenia/adinamia (%)	53.8	Fenómenos embólicos* (%)	52.5
Diabetes mellitus tipo 2 (%)	21.5	Escalofríos (%)	37.7	Soplo de <i>novo</i> (%)	50
Valvulopatía previa (%)	20.8	Disnea de esfuerzos (%)	36.9	Falla cardíaca (%)	30.8
Dislipidemia (%)	13.8	Edema de extremidades inferiores (%)	25.4	Hipotensión arterial (%)	23.8
Enfermedad pulmonar obstructiva crónica (%)	8.5	Pérdida de peso (%)	23.8	Alteración del estado de consciencia (%)	19.2
Infarto agudo de miocardio previo (%)	7.7	Cefalea (%)	18.5	Esplenomegalia (%)	17.7
Accidente cerebrovascular previo (%)	3.8	Dolor abdominal (%)	17.7	Focalización neurológica (%)	15
Enfermedad arterial oclusiva crónica (%)	3.8	Diarrea (%)	17.7	Cambios en soplo (s) cardíaco (s) (%)	7.7
Endocarditis infecciosa previa (%)	3.8	Mialgias (%)	17.7	Adenopatías (%)	6.2
Usuario de drogas intravenosas (%)	0.8	Ortopnea (%)	14.6	Hepatomegalia (%)	6.2
		Dolor lumbar (%)	13	Nódulos de Osler (%)	4.6
		Náuseas/emesis (%)	13	Bradicardia (%)	0.8
		Dolor torácico (%)	11.5		
		Artralgias (%)	11.5		
		Disnea paroxística nocturna (%)	10.8		
		Palpitaciones (%)	4.6		
		Síncope (%)	3		

Microbiológico

Agente	n
MSSA	51
Sin aislamiento	19
<i>E. faecalis</i>	9
MRSE	4
<i>S. pneumoniae</i>	3
<i>S. sanguinis</i>	3
MRSA	2
<i>P. aeruginosa</i>	2
<i>S. anginosus</i>	2
<i>S. pluranimalium</i>	2
<i>S. gallolyticus</i>	2
<i>C. tropicalis</i>	2
<i>S. mitis</i>	2
<i>C. glabrata</i> + <i>E. cloacae</i>	2
MSSE	1
<i>H. influenzae</i>	1
<i>C. albicans</i>	1
<i>S. lugdunensis</i>	1
<i>S. infantarius</i>	1
<i>S. cristatus</i>	1
<i>K. pneumoniae</i>	1

<i>E. cloacae</i>	1
<i>K. rosea</i>	1
<i>E. coli</i>	1
<i>H. parainfluenzae</i>	1
<i>S. mutans</i>	1
<i>C. parapsilosis</i>	1
<i>S. viridans</i>	1
<i>P. canis</i>	1
<i>S. gordonii</i>	1
<i>S. cohnii</i>	1
<i>S. equi</i>	1
<i>A. junii</i> + <i>C. albicans</i>	1
MSSA+ <i>K. pneumoniae</i> + <i>E. cloacae</i>	1
<i>E. coli</i> + <i>E. faecalis</i>	1
MSSA+ <i>E. faecalis</i>	1
MSSA+Kpn	1
<i>S. mitis</i> + <i>S. oralis</i>	1
<i>S. pneumoniae</i> + <i>E. cloacae</i>	1
<i>E. aerogenes</i> + <i>E. faecalis</i>	1

Agente	n
MSSA	4
<i>E. faecalis</i>	3
<i>S. sanguinis</i>	2
<i>H. capsulatum</i>	1
MSSE	1
MRSE	1
<i>E. cloacae</i>	1

Diagnóstico

Recommendation Table 5 — Recommendations for the role of echocardiography in infective endocarditis

Recommendations	Class ^a	Level ^b
A. Diagnosis		
TTE is recommended as the first-line imaging modality in suspected IE. 166,179	I	B
TOE is recommended in all patients with clinical suspicion of IE and a negative or non-diagnostic TTE. 166,178,179	I	B
TOE is recommended in patients with clinical suspicion of IE, when a prosthetic heart valve or an intracardiac device is present. 166,178,179	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. 178	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. 165,166,179	I	C
Performing an echocardiography should be considered in <i>S. aureus</i> , <i>E. faecalis</i> , and some <i>Streptococcus</i> spp. bacteraemia. 19,149,174	IIa	B

Table S4 Indications for screening echocardiography in patients with bacteraemia

Aetiology of bacteraemia	Name of the score	Score (points)	Screening echocardiography
<i>S. aureus</i>	VIRSTA	≥3	Yes
		<3	No
	PREDICT	≥4	Yes
		<4	No
<i>E. faecalis</i>	DENOVA	≥3	Yes
		<3	No
Streptococci	HANDCOC	≥3	Yes
		<3	No

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Endocarditis con cultivos negativos

Table 9 Investigation of rare causes of blood culture-negative infective endocarditis

Pathogen	Diagnostic procedures		
		<i>T. whipplei</i>	Histology and 16S rRNA sequencing of tissue
<i>Brucella</i> spp.	Serology, blood cultures, tissue culture, immunohistology, and 16S rRNA sequencing of tissue	<i>Mycoplasma</i> spp.	Serology, tissue culture, immunohistology, and 16S rRNA sequencing of tissue
<i>C. burnetii</i>	Serology (IgG phase I >1:800), tissue culture, immunohistology, and 16S rRNA sequencing of tissue	<i>Legionella</i> spp.	Serology, blood cultures, tissue culture, immunohistology, and 16S rRNA sequencing of tissue
<i>Bartonella</i> spp.	Serology (IgG phase I >1:800), blood cultures, tissue culture, immunohistology, and 16S rRNA sequencing of tissue	Fungi	Serology, blood cultures, 18S rRNA sequencing of tissue
		Mycobacteria (including <i>Mycobacterium chimaera</i>)	Specific blood cultures, 16S rRNA sequencing of tissue

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

I. DEFINITE ENDOCARDITIS

A. Pathologic Criteria

(1) **Microorganisms identified^a in the context of clinical signs of active endocarditis in a vegetation; from cardiac tissue; from an explanted prosthetic valve or sewing ring; from an ascending aortic graft (with concomitant evidence of valve involvement); from an endovascular intracardiac implantable electronic device (CIED); or from an arterial embolus**

or

(2) **Active endocarditis^b (may be acute^c or subacute/chronic^d) identified in or on a vegetation; from cardiac tissue; from an explanted prosthetic valve or sewing ring; from an ascending aortic graft (with concomitant evidence of valve involvement); from a CIED; or from an arterial embolus**

B. Clinical Criteria

(1) 2 Major Criteria

or

(2) 1 Major Criterion and 3 Minor Criteria

or

(3) 5 Minor Criteria

II. POSSIBLE ENDOCARDITIS

A. 1 Major Criterion And 1 Minor Criterion

or

B. 3 Minor Criteria

III. REJECTED ENDOCARDITIS

A. Firm alternate diagnosis explaining signs/symptoms^e

or

B. Lack of recurrence despite antibiotic therapy for less than 4 d.

or

C. No pathologic or macroscopic evidence of IE at surgery or autopsy, with antibiotic therapy for less than 4 d

or

D. Does not meet criteria for possible IE, as above

I. MAJOR CRITERIA

A. Microbiologic Major Criteria

(1) Positive blood cultures

i. Microorganisms that commonly cause IE^a isolated from 2 or more separate blood culture sets (Typical)^b

or

ii. Microorganisms that occasionally or rarely cause IE isolated from 3 or more separate blood culture sets (Nontypical)^b

(2) Positive laboratory tests

i. Positive polymerase chain reaction (PCR) or other nucleic acid-based technique^c for *Coxiella burnetii*, *Bartonella* species, or *Tropheryma whippelii* from blood

or

ii. *Coxiella burnetii* antiphase I immunoglobulin G (IgG) antibody titer >1:800 [24]^d, or isolated from a single blood culture

or

iii. Indirect immunofluorescence assays (IFA) for detection of IgM and IgG antibodies to *Bartonella henselae* or *Bartonella quintana* with immunoglobulin G (IgG) titer \geq 1:800 [24, 25]^d

B. Imaging Major Criteria

(1) Echocardiography and **cardiac computed tomography (CT)** imaging

i. Echocardiography and/or cardiac CT showing vegetation,^e valvular/leaflet perforation,^f valvular/leaflet aneurysm,^g abscess,^h pseudoaneurysm,ⁱ or intracardiac fistula^j

or

ii. Significant new valvular regurgitation on echocardiography as compared with previous imaging. Worsening or changing of preexisting regurgitation is not sufficient.

or

iii. New partial dehiscence of prosthetic valve as compared with previous imaging [52]

(2) Positron emission computed tomography with 18F-fluorodeoxyglucose ([18F]FDG PET/CT imaging)

Abnormal metabolic activity^k involving a native or prosthetic valve, ascending aortic graft (with concomitant evidence of valve involvement), intracardiac device leads or other prosthetic material^{l,m}

C. Surgical Major Criteria

Evidence of IE documented by direct inspection during heart surgery neither Major Imaging Criteria nor subsequent histologic or microbiologic confirmationⁿ

II. MINOR CRITERIA

A. Predisposition

- **Previous history of IE**
- Prosthetic valve^o
- Previous valve repair^o
- Congenital heart disease^p
- More than mild regurgitation or stenosis of any etiology
- **Endovascular intracardiac implantable electronic device (CIED)**
- Hypertrophic obstructive cardiomyopathy
- Injection drug use

B. Fever *Documented temperature greater than 38.0 °C (100.4 °F)*

C. 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*

D. Immunologic Phenomena *Positive rheumatoid factor, Osler nodes, Roth spots, or immune complex-mediated glomerulonephritis^q*

E. 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^r

or

- 2) **Positive culture, PCR, or other nucleic acid based test (amplicon or shotgun sequencing, *in situ* hybridization) for an organism consistent with IE^r from a sterile body site other than cardiac tissue, cardiac prosthesis, or arterial embolus; or a single finding of a skin bacterium by PCR on a valve or wire without additional clinical or microbiological supporting evidence [51]**

F. Imaging Criteria

Abnormal metabolic activity as detected by [18F]FDG PET/CT within 3 mo of implantation of prosthetic valve, ascending aortic graft (with concomitant evidence of valve involvement), intracardiac device leads or other prosthetic material

G. Physical Examination Criteria^s

New valvular regurgitation identified on auscultation if echocardiography is not available. Worsening or changing of preexisting murmur not sufficient

CRITERIA	Change
PATHOLOGIC CRITERIA	
Microorganism identification	Microorganisms identified in appropriate sample by PCR, amplicon or metagenomic sequencing, or in situ hybridization
MAJOR CLINICAL CRITERIA	
Microbiology	
Blood cultures	Removed requirements for timing and separate venipunctures for blood cultures.
Definition of typical organisms	Added typical pathogens: 1) <i>S. lugdunensis</i> ; <i>E. faecalis</i> ; all streptococci except <i>S. pneumoniae</i> and <i>S. pyogenes</i> ; <i>Granulicatella</i> spp.; <i>Abiotrophia</i> spp.; and <i>Gemella</i> spp. 2) Organisms to be considered "typical" IE pathogens in the setting of intracardiac prosthetic material: coagulase negative staphylococci, <i>Corynebacterium striatum</i> ; <i>C. jeikeium</i> , <i>Serratia marcescens</i> , <i>Pseudomonas aeruginosa</i> , <i>Cutibacterium acnes</i> , nontuberculous mycobacteria, and <i>Candida</i> spp.
Other microbiologic tests	Added new Major Criteria for fastidious pathogens: 1) PCR or amplicon/metagenomic sequencing identifies <i>C. burnetii</i> , <i>Bartonella</i> spp., or <i>T. whipplei</i> from blood; or 2) IFA $\geq 1:800$ for IgG antibodies identifies <i>B. henselae</i> or <i>B. quintana</i> .
Imaging	
Echocardiography	Similar to earlier versions. Cornerstone of imaging criterion.
Cardiac computed tomography	Added new Major Criterion. Findings equivalent to echocardiography.
[18F]FDG PET/CT	Added new Major Criterion. Findings for native valve, cardiac device, or prosthetic valve >3 mo after cardiac surgery are equivalent to echocardiography.
Surgical	Added new Major Criterion. Intraoperative inspection constitutes Major Criterion in absence of Major Criterion by cardiac imaging or histopathology.
MINOR CLINICAL CRITERIA	
Predisposition	Added transcatheter valve implant/repair, endovascular CIED, and prior diagnosis of IE.
Fever	Unchanged.
Vascular phenomena	Added splenic and cerebral abscess.
Immunologic phenomena	Added definition for immune complex mediated glomerulonephritis.
Microbiological	Added PCR or amplicon/metagenomic sequencing evidence of typical pathogen.
Imaging	Added PET/CT evidence <3 mo of cardiac surgery.
Physical examination	New auscultation of regurgitant murmur when echocardiography is unavailable.

Diagnóstico

IE Classification (at admission and during follow-up)

Definite:

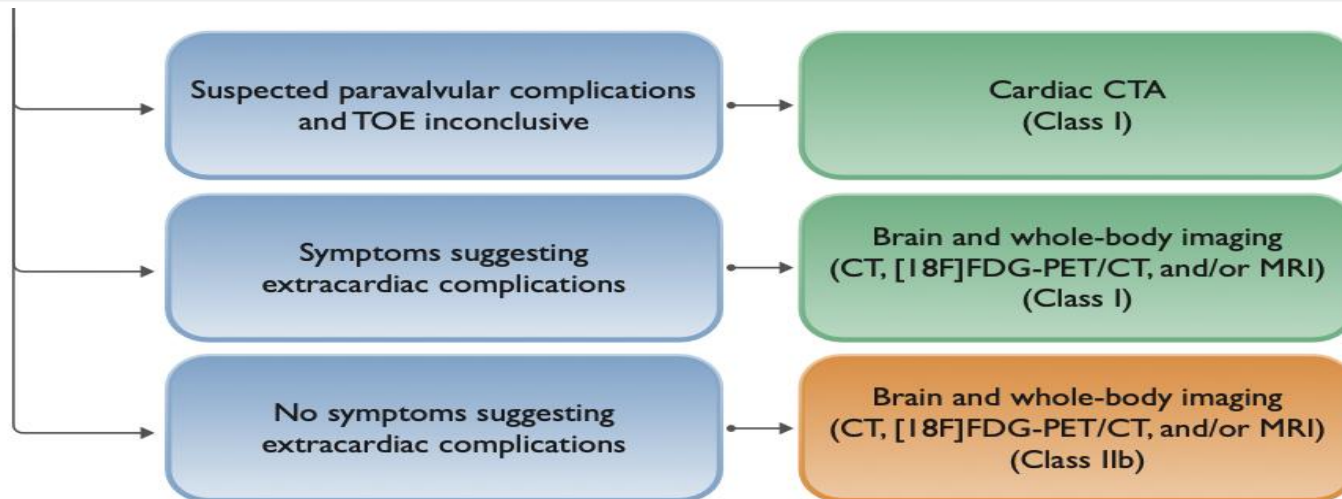
- 2 major criteria.
- 1 major criterion and at least 3 minor criteria.
- 5 minor criteria.

Possible:

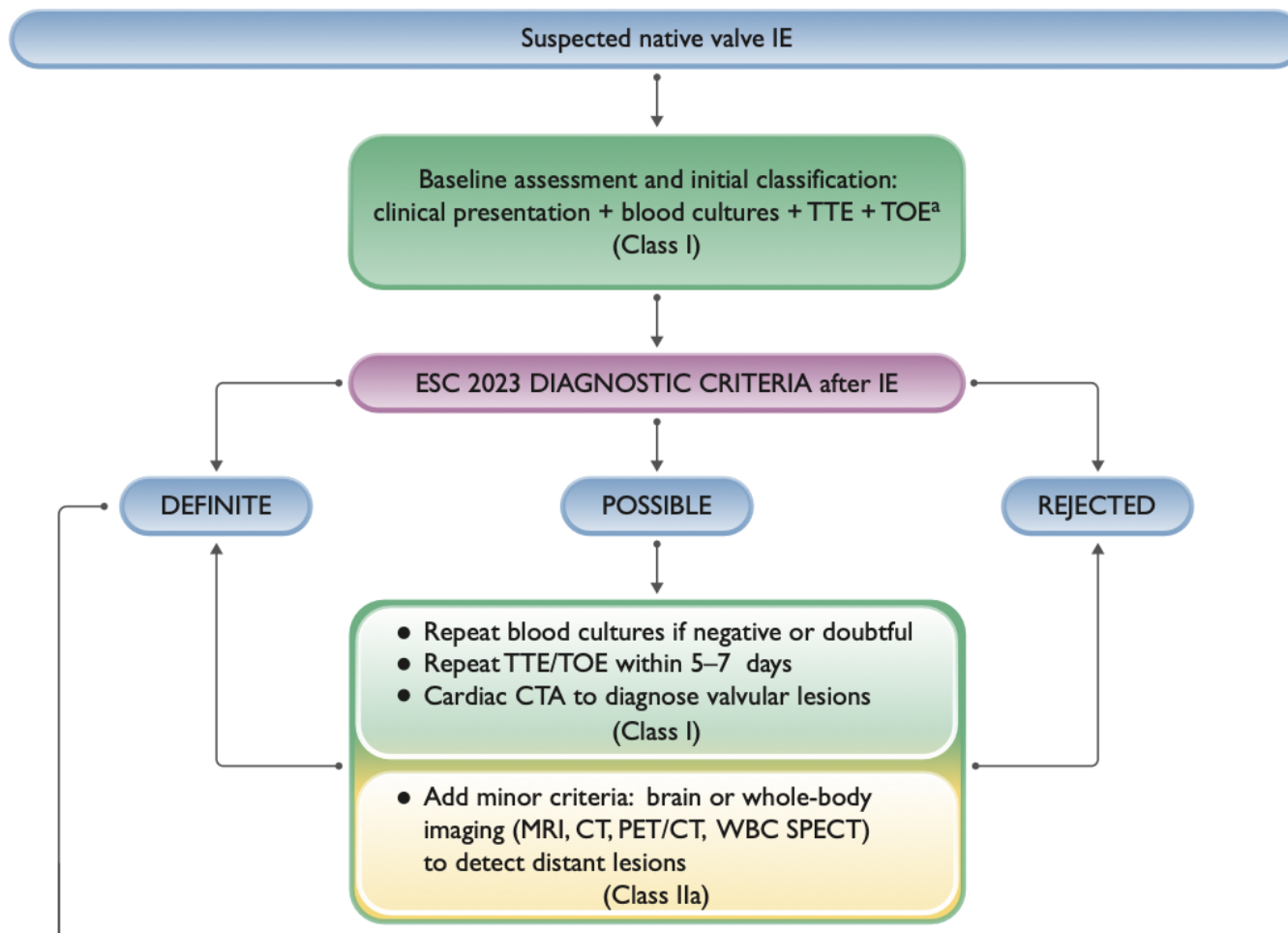
- 1 major criterion and 1 or 2 minor criteria.
- 3–4 minor criteria.

Rejected:

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

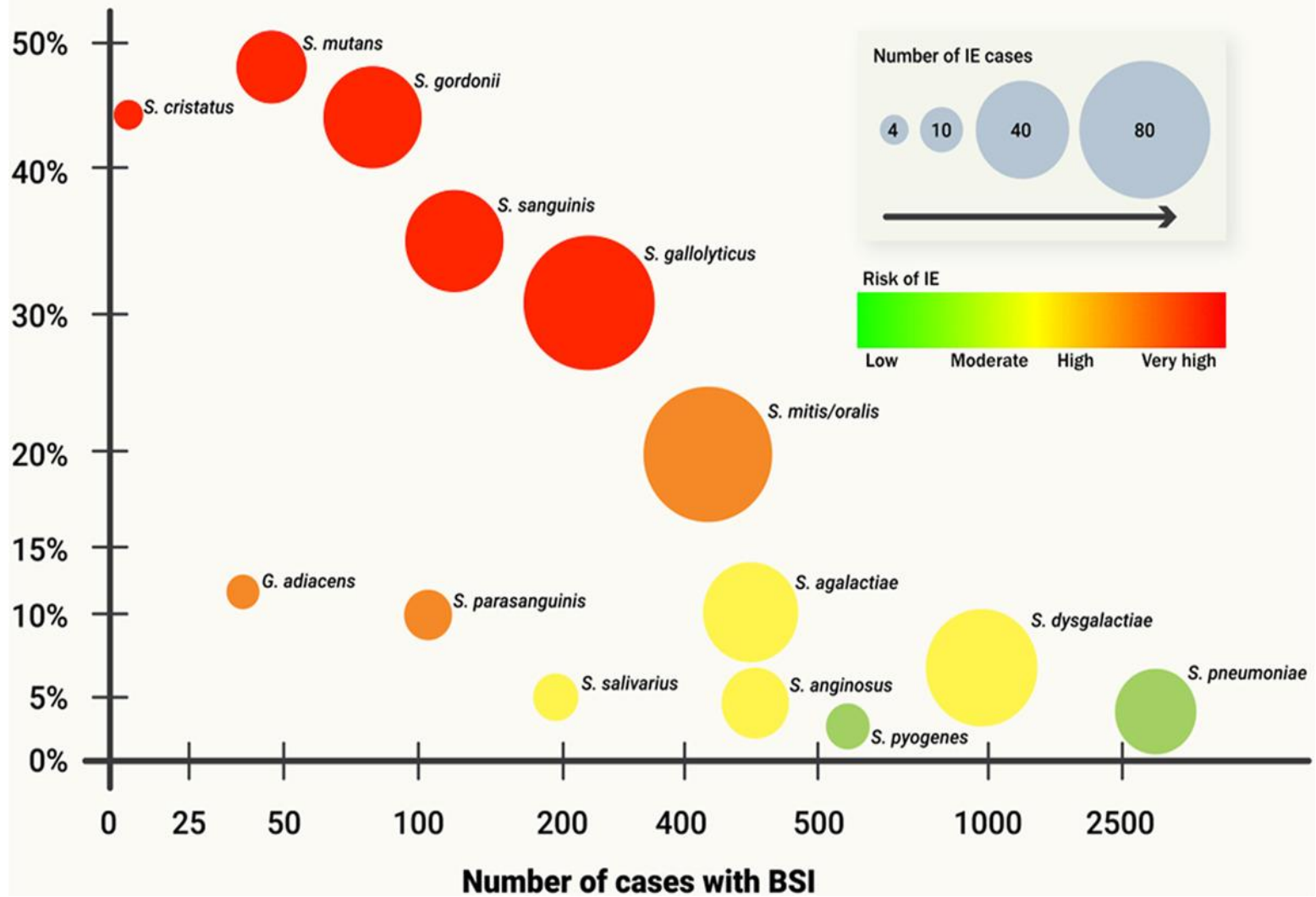


Diagnóstico



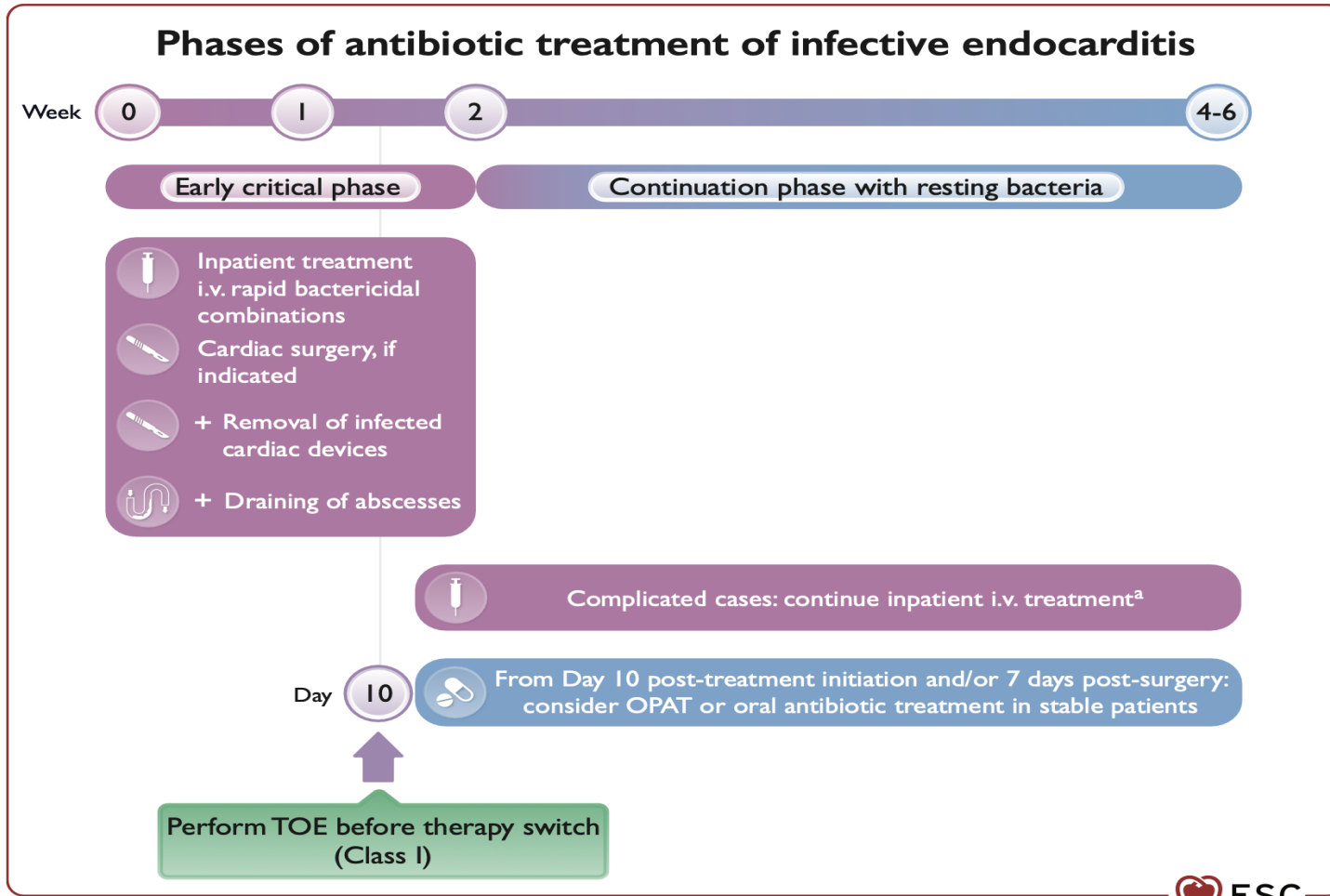
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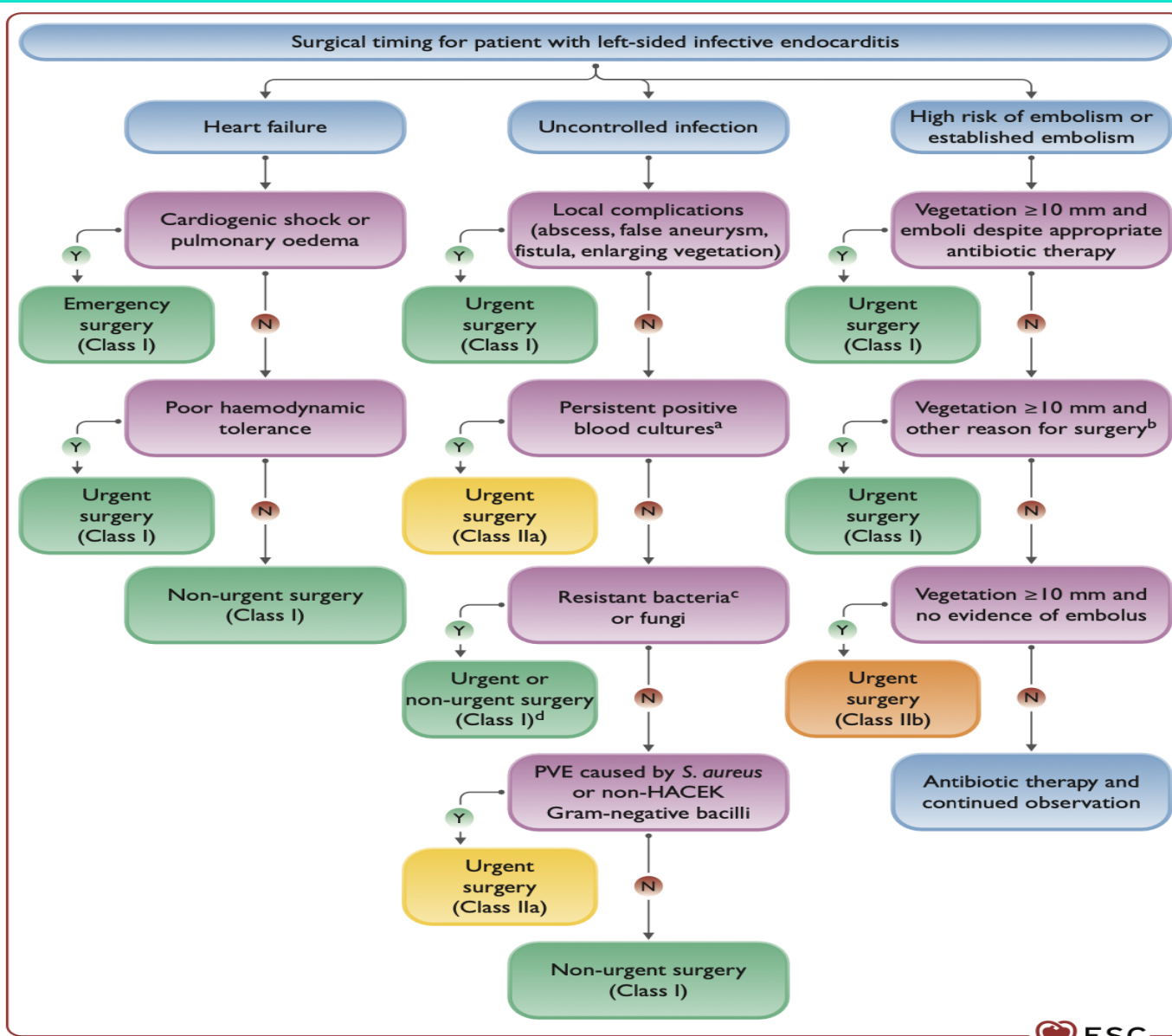
IE prevalence



Sandra Chamat-Hedemand. Circulation. 2020;142:720–730. DOI: 10.1161/CIRCULATIONAHA.120.046723

Tratamiento





Empírico

<i>Adult antibiotic dosage and route</i>		IIa
Ampicillin	12 g/day i.v. in 4–6 doses	
Ceftriaxone	4 g/day i.v. or i.m. in 2 doses	
(Flu)cloxacillin	12 g/day i.v. in 4–6 doses	
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 1 dose	
<i>Paediatric antibiotic dosage and route</i>		IIa
Ampicillin	300 mg/kg/day i.v. in 4–6 equally divided doses	
Ceftriaxone	100 mg/kg i.v. or i.m. in 1 dose	
(Flu)cloxacillin	200–300 mg/kg/day i.v. in 4–6 equally divided doses	
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 3 equally divided doses	
In patients with early PVE (<12 months post-surgery) or nosocomial and non-nosocomial healthcare-associated IE, vancomycin or daptomycin combined with gentamicin and rifampin may be considered using the following doses: ³⁹⁵		
<i>Adult antibiotic dosage and route</i>		IIb
Vancomycin ^e	30 mg/kg/day i.v. in 2 doses	
Daptomycin	10 mg/kg/day i.v. in 1 dose	
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 1 dose	
Rifampin	900–1200 mg i.v. or orally in 2 or 3 doses	

Allergy to beta-lactams		IIb
In patients with community-acquired NVE or late PVE (≥12 months post-surgery) who are allergic to penicillin, cefazolin, or vancomycin in combination with gentamicin may be considered using the following doses:		
<i>Adult antibiotic dosage and route</i>		IIb
Cefazolin	6 g/day i.v. in 3 doses	
Vancomycin ^e	30 mg/kg/day i.v. in 2 doses	
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 1 dose	

Streptococcus spp

Penicillin-susceptible oral streptococci and <i>Streptococcus gallolyticus</i> group	
Standard treatment: 4-week duration in NVE or 6-week duration in PVE	
In patients with IE due to oral streptococci and <i>S. gallolyticus</i> group, penicillin G, amoxicillin, or ceftriaxone are recommended for 4 (in NVE) or 6 weeks (in PVE), using the following doses: ^{277,278}	
<i>Adult antibiotic dosage and route</i>	
Penicillin G	12–18 million ^c U/day i.v. either in 4–6 doses or continuously
Amoxicillin	100–200 mg/kg/day i.v. in 4–6 doses
Ceftriaxone	2 g/day i.v. in 1 dose
<i>Paediatric antibiotic dosage and route</i>	
Penicillin G	200 000 U/kg/day i.v. in 4–6 divided doses
Amoxicillin	100–200 ^c mg/kg/day i.v. in 4–6 doses
Ceftriaxone	100 mg/kg/day i.v. in 1 dose
Allergy to beta-lactams	
In patients allergic to beta-lactams and with IE due to oral streptococci and <i>S. gallolyticus</i> , vancomycin for 4 weeks in NVE or for 6 weeks in PVE is recommended using the following doses: ²⁹²	
<i>Adult antibiotic dosage and route</i>	
Vancomycin ^e	30 mg/kg/day i.v. in 2 doses ^e
<i>Paediatric antibiotic dosage and route</i>	
Vancomycin ^e	30 mg/kg/day i.v. in 2 or 3 equally divided doses ^e

I	B		
		I	C

Staphylococcus spp

IE caused by methicillin-susceptible staphylococci			
In patients with NVE due to methicillin-susceptible staphylococci, (flu)cloxacillin or cefazolin is recommended for 4–6 weeks using the following doses: ^{264,314,316–318}		I	B
<i>Adult antibiotic dosage and route</i>			
(Flu)cloxacillin ^c	12 g/day i.v. in 4–6 doses		
Cefazolin ^e	6 g/day i.v. in 3 doses	I	B
In patients with PVE due to methicillin-susceptible staphylococci, (flu)cloxacillin or cefazolin with rifampin for at least 6 weeks and gentamicin for 2 weeks is recommended using the following doses: ^{264,314,316–318,320}			
<i>Adult antibiotic dosage and route</i>			
(Flu)cloxacillin ^c	12 g/day i.v. in 4–6 doses		
Cefazolin	6 g/day i.v. in 3 doses		
Rifampin	900 mg/day i.v. or orally in 3 equally divided doses		
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 1 (preferred) or 2 doses		
Allergy to beta-lactams			
In patients with NVE due to methicillin-susceptible staphylococci who are allergic to penicillin, cefazolin for 4–6 weeks is recommended using the following doses: ^{322–327}		I	B
<i>Adult antibiotic dosage and route</i>			
Cefazolin ^e	6 g/day i.v. in 3 doses	I	B
<i>Adult antibiotic dosage and route</i>			
Cefazolin ^e	6 g/day i.v. in 3 doses		
Rifampin	900 mg/day i.v. or orally in 3 equally divided doses		
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 1 (preferred) or 2 doses		

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Staphylococcus spp

IE caused by methicillin-resistant staphylococci			
In patients with NVE due to methicillin-resistant staphylococci, vancomycin is recommended for 4–6 weeks using the following doses: ³⁴⁵		I	B
<i>Adult antibiotic dosage and route</i>			
Vancomycin ^h	30–60 mg/kg/day i.v. in 2–3 doses	I	B
<i>Adult antibiotic dosage and route</i>			
Vancomycin ^h	30–60 mg/kg/day i.v. in 2–3 doses		
Rifampin	900–1200 mg/day i.v. or orally in 2 or 3 divided doses	I	B
Gentamicin ^d	3 mg/kg/day i.v. or i.m. in 1 (preferred) or 2 doses		
In patients with NVE due to methicillin-resistant staphylococci, daptomycin combined with cloxacillin, ceftaroline or fosfomycin may be considered using the following doses: ^{335,345–349}		IIb	C
<i>Adult antibiotic dosage and route</i>			
Daptomycin	10 mg/kg/day i.v. in 1 dose		
Cloxacillin ^c	12 g/day i.v. in 6 doses		
OR	OR		
Ceftaroline ^f	1800 mg/day i.v. in 3 doses		
OR	OR		
Fosfomycin ^g	8–12 g/day i.v. in 4 doses		

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Enterococcus spp

Recommendations		Class ^a	Level ^b
Beta-lactam and gentamicin-susceptible strains			
Beta-lactam resistant <i>Enterococcus</i> spp. (<i>E. faecium</i>)^e			
In patients with IE due to beta-lactam resistant <i>Enterococcus</i> spp. (<i>E. faecium</i>), vancomycin for 6 weeks combined with gentamicin for 2 weeks is recommended using the following doses: ^{358,359,369}		I	C
<i>Adult antibiotic dosage and route</i>			
Vancomycin	30 mg/kg/day i.v. in 2 doses		
Gentamicin	3 mg/kg/day i.v. or i.m. in 1 dose		
<i>Paediatric antibiotic dosage and route</i>			
Vancomycin	30 mg/kg/day i.v. in 2–3 equally divided doses		
Gentamicin	3 mg/kg/day i.v. or i.m. in 1 dose		
Vancomycin-resistant <i>Enterococcus</i> spp.^f			
In patients with IE due to vancomycin-resistant <i>Enterococcus</i> spp., daptomycin combined with beta-lactams (ampicillin, ertapenem, or ceftaroline) or fosfomycin is recommended using the following doses: ³⁶⁹		I	C
<i>Adult antibiotic dosage and route</i>			
Daptomycin	10–12 mg/kg/day i.v. in 1 dose		
Ampicillin	300 mg/kg/day i.v. in 4–6 equally divided doses		
Fosfomycin	12 g/day i.v. in 4 doses		
Ceftaroline	1800 mg/day i.v. in 3 doses		
Ertapenem ^g	2 g/day i.v. or i.m. in 1 dose		

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Enterococcus spp

Beta-lactam resistant <i>Enterococcus</i> spp. (<i>E. faecium</i>)^e			
In patients with IE due to beta-lactam resistant <i>Enterococcus</i> spp. (<i>E. faecium</i>), vancomycin for 6 weeks combined with gentamicin for 2 weeks is recommended using the following doses: ^{358,359,369}		I	C
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Vancomycin	30 mg/kg/day i.v. in 2 doses		
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<i>Adult antibiotic dosage and route</i>			
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Ceftaroline	1800 mg/day i.v. in 3 doses		
Ertapenem ^g	2 g/day i.v. or i.m. in 1 dose		

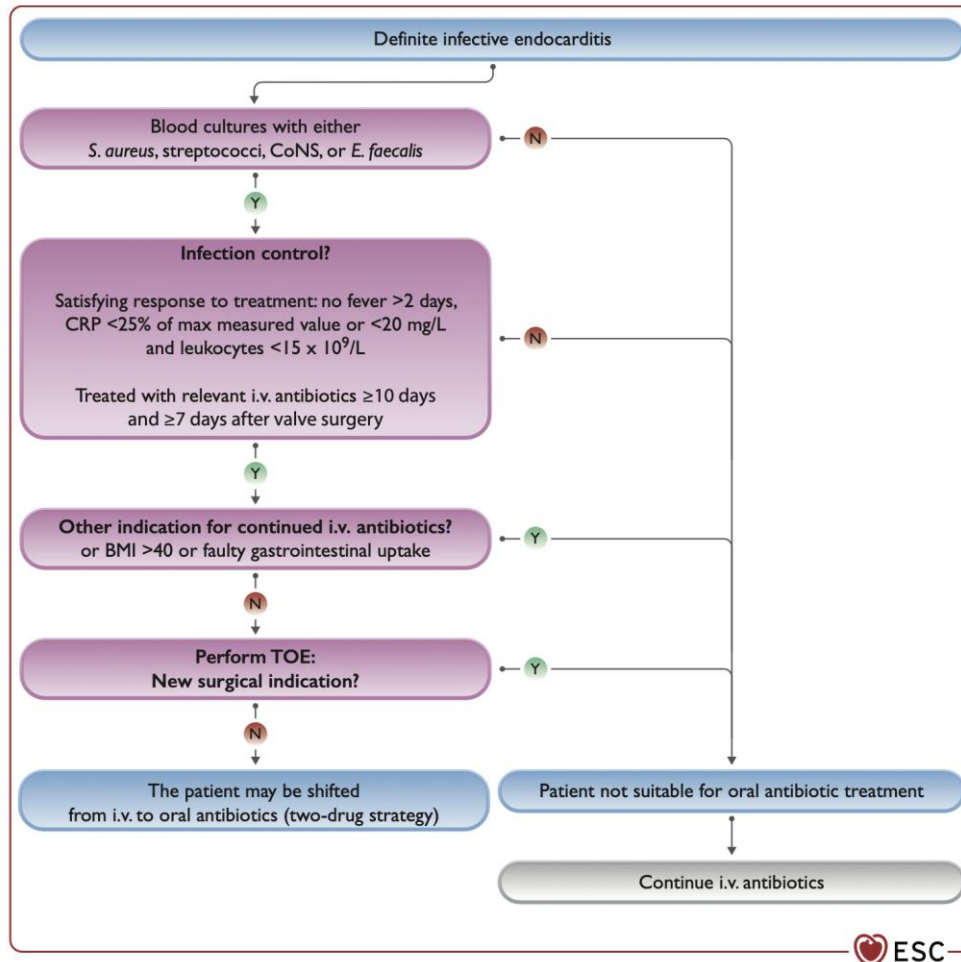
Antibiótico

Pathogens	Proposed therapy ^a	Treatment outcome
<i>Brucella</i> spp.	Doxycycline (200 mg/24 h) plus cotrimoxazole (960 mg/12 h) plus rifampin (300–600 mg/24 h) for ≥3–6 months ^b orally	Treatment success defined as an antibody titre <1:60. Some authors recommend adding gentamicin for the first 3 weeks
<i>C. burnetii</i> (Q fever agent)	Doxycycline (200 mg/24 h) plus hydroxychloroquine (200–600 mg/24 h) ^c orally (>18 months of treatment)	Treatment success defined as anti-phase I IgG titre <1:400, and IgA and IgM titres <1:50
<i>Bartonella</i> spp. ^d	Doxycycline 100 mg/12 h orally for 4 weeks plus gentamicin (3 mg/24 h) i.v. for 2 weeks	Treatment success expected in ≥90%

<i>Legionella</i> spp.	Levofloxacin (500 mg/12 h) i.v. or orally for ≥6 weeks or clarithromycin (500 mg/12 h) i.v. for 2 weeks, then orally for 4 weeks plus rifampin (300–1200 mg/24 h)	Optimal treatment unknown
<i>Mycoplasma</i> spp.	Levofloxacin (500 mg/12 h) i.v. or orally for ≥6 months ^e	Optimal treatment unknown
<i>T. whipplei</i> (Whipple's disease agent) ^f	Doxycycline (200 mg/24 h) plus hydroxychloroquine (200–600 mg/24 h) ^c orally for ≥18 months	Long-term treatment, optimal duration unknown

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Manejo oral



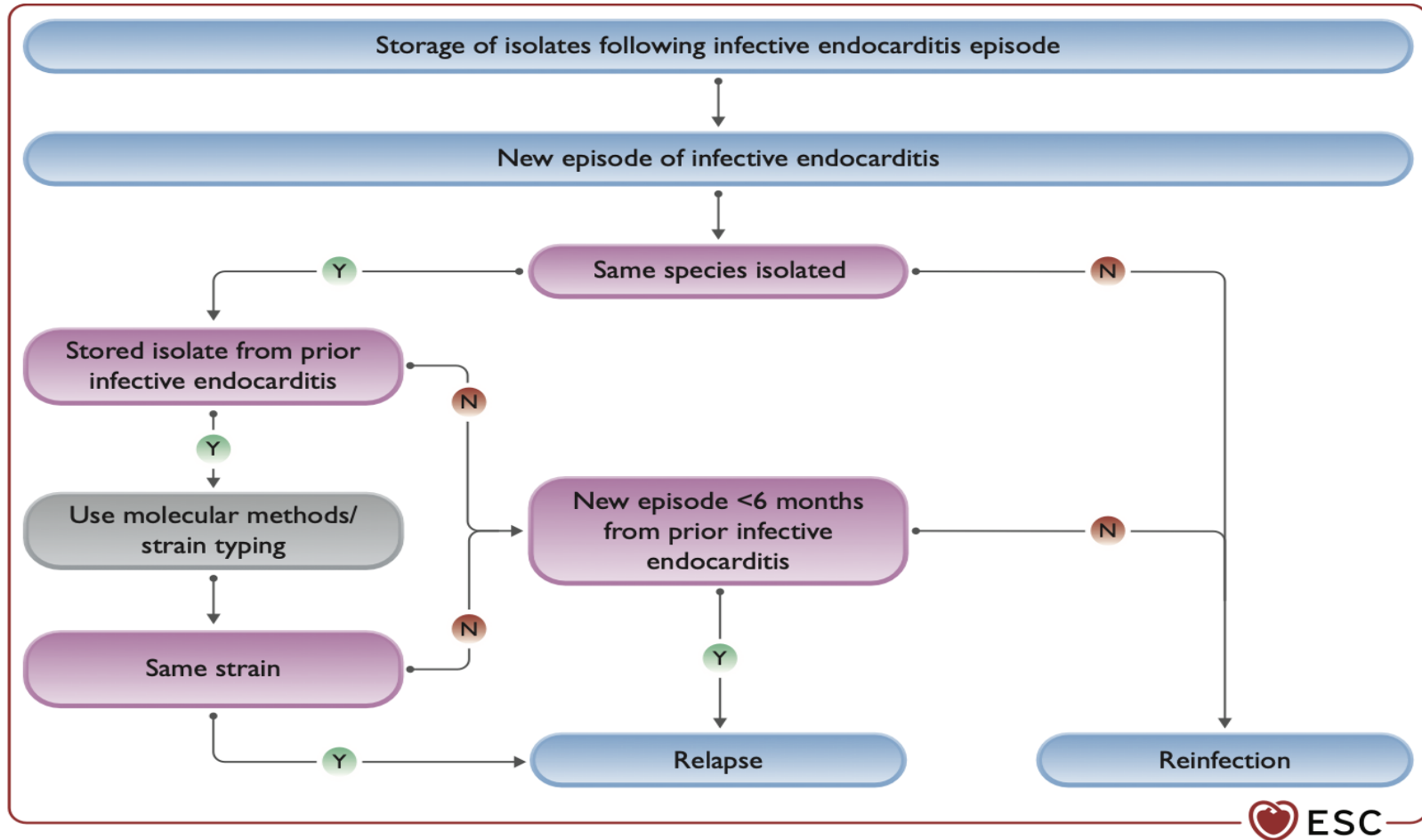
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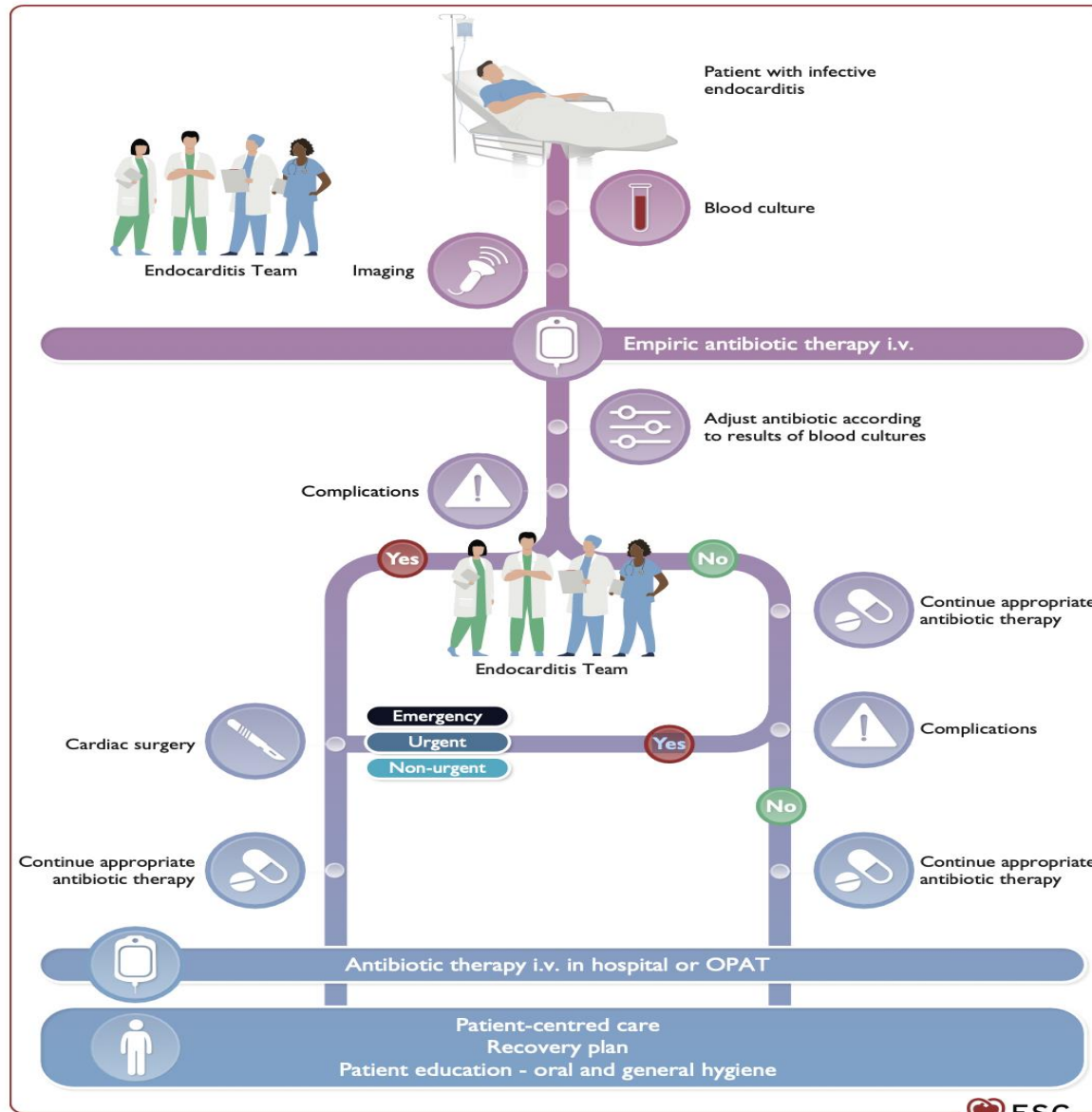
Recaídas

Table 13 Factors associated with an increased rate of relapse of infective endocarditis

Inadequate antibiotic treatment (i.e. agent, dose, duration)
Resistant microorganisms (i.e. <i>Brucella</i> spp., <i>Legionella</i> spp., <i>Chlamydia</i> spp., <i>Mycoplasma</i> spp., <i>Mycobacterium</i> spp., <i>Bartonella</i> spp., <i>C. Burnetii</i> , fungi)
Infective endocarditis caused by <i>S. aureus</i> and <i>Enterococcus</i> spp.
Polymicrobial infection in people who inject drugs
Periannular extension
Prosthetic valve endocarditis
Persistent metastatic foci of infection (abscesses)
Resistance to conventional antibiotic regimens
Positive valve culture
Persistence of fever at the 7th post-operative day
Chronic kidney disease, especially on dialysis
High-risk behaviour, inability to adhere to medical treatment
Poor oral hygiene

Recaídas





Conclusiones

Enfermedad mortal

Recordar el enfoque preventivo

La ecocardiografía es el pilar de imagen

- TTE + TOE

No es necesario hacer hemocultivos seriados

Se puede hacer transición a la terapia antibiótica oral

- Realizar TOE antes de esto