ENDOCARDITIS I PROSTATITIS

Alexandra Retamero Delgado Marta Florit Sureda 19 /02/ 2014

PRESENTACIÓ DEL CAS

Home de 48 anys d'edat, natural de la Índia

Sense al·lèrgies medicamentoses conegudes

Parcialment depenent per les ABVD

Bevedor de 15 cerveses/dia

Fumador actiu

Antecedents:

- Hèrnia de hiat
- Tumor dermoide a nivell L1-L3: intervingut en 3 ocasions. Com a seqüeles presenta incontinència urinària per bufeta neuròGena i poliradiculopatia lumbosacre

Medicació habitual:

- Omeprazol 20 mg/24h
- Oxibutinina 5 mg/12h
- Lorazepam 1 mg/24h

Motiu de consulta:

- Febre de fins a 40ºC de 4 dies d'evolució
- Malestar general
- Dolor abdominal
- Nàusees i vòmits
- Dificultat miccional important

Constants inicials:

- TA 81/57 mmHg
- FC 140 bpm
- Tº 38,2ºC
- Sat O_2 99%

URGÈNCIES

4/10/2013

Analítica:

	04-Oct-13 13:56	Unitats	Referencia
GLUCOSA Serum	76	mg/dl	70 - 105
UREA Serum	43	mg/dl	10 - 50
CREATININA Serum	2.33	mg/dL	.6 - 1.4
F. GLOMERULAR ESTIMA	32	ml/min/1.73m2	>60 -
SODI Serum	132.4	mmol/l	135 - 146
POTASSI Serum	3.76	mmol/l	3.5 - 5.1
CLOR Serum	106.0	mmol/l	98 - 111
pH/venosa	7.38	U.pH	7.31 - 7.41
pCO2/venosa	21	mmHg	42 - 55
pO2/venosa	55	mmHg	25 - 75
HCO3/venosa	12.4	mmol/l	22 - 28
Ac. LACTIC	11.9	mmol/l	.5 - 2.2
PROTEINA C REACTIVA	18.4	mg/dl	0 - .8

Tractament:

- Sobrecàrrega de volum i bicarbonat

Proves:

- Sol·licitud d'ecografia renal per descartar patologia

URGÈNCIES

5/10/2013

Hemocultiu (HC):

	04-10-13 14:06	04-10-13 13:56
T. GRAM HEMOCULTIU AEROBI	CGPSTR	CGPSTR
T. GRAM HEMOCULTIU ANAERO	CGPSTR	CGPSTR
HEMOCULTIU AEROBI	P	P
HEMOCULTIU ANAEROBI	P	P

Urinocultiu (UC):

	04-10-13 15:12	04-10-13 14:06
CULTIU Orina	P	
TINCIO GRAM Orina	CGP	

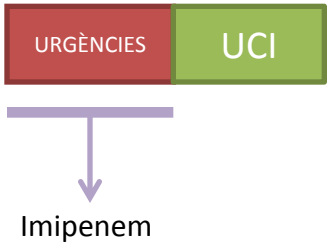
OD: XOC SÈPTIC D'ORIGEN URINARI

Tractament:

- Imipenem 500 mg/8h

INGRÈS A UCI

6/10/2013



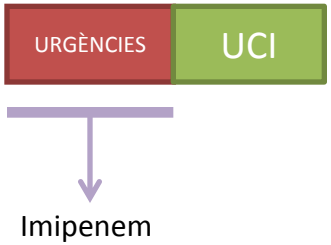
Signes i símtpomes:

- Millora clínica

Analítica:

	06-Oct-13 09:50	Unitats	Referencia
GLUCOSA Serum	99	mg/dl	70 - 105
UREA Serum	47	mg/dl	10 - 50
CREATININA Serum	1.73	mg/dL	.6 - 1.4
F. GLOMERULAR ESTIMA	45	ml/min/1.73m2	>60 -
SODI Serum	137.6	mmol/l	135 - 146
POTASSI Serum	3.67	mmol/l	3.5 - 5.1
CLOR Serum	117.4	mmol/l	98 - 111
pH/venosa	7.33	U.pH	7.31 - 7.41
pCO2/venosa	32	mmHg	42 - 55
pO2/venosa	38	mmHg	25 - 75
HCO3/venosa	16.9	mmol/l	22 - 28
Ac. LACTIC	1.1	mmol/l	.5 - 2.2
PROTEINA C REACTIVA	13.4	mg/dl	0 - .8

Ecografia renal: descarta patologia d'origen renal



Antibiograma UC i HC:

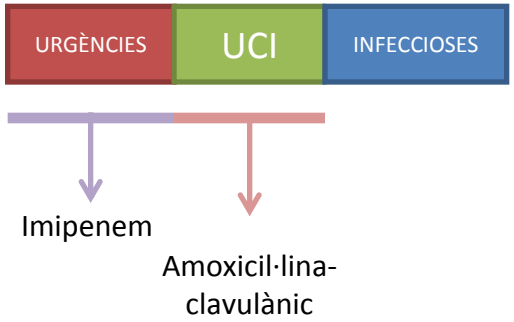
	Streptococcus agalactiae gr. B	
Ampicil·lina	Sensible	<=1
Eritromicina	Sensible	<=0.25
Linezolid	Sensible	<=1
Tetraciclina	Sensible	<=1
Vancomicina	Sensible	<=1

Tractament:

- Imipenem 500 mg/8h → amoxicil·lina/clavulànic 1 g/8h

INGRÈS A INFECCIOSES

8-10/10/2013



Exploració física:

- Buf sistòlic a vàlvula mitral no conegut prèviament
- Lesions petequials/nodulars a nivell palmo-plantar

Signes i símptomes:

- Febre

Hemocultiu: positiu per Streptococcus agalactiae

OD: ENDOCARDITIS INFECCIOSA EN VÀLVULA NATIVA

Tractament:

- Ampicil·lina 2g/6h + gentamicina 200mg/24h

Proves:

- Sol·licitud d'ecocardiograma transtoràcic (TTE)

ENDOCARDITIS INFECCIOSA

EPIDEMIOLOGIA

- Malaltia infecciosa poc freqüent, amb una **incidència** estimada entre 3,1-3,7 episodisis cada 100.000 habitants i any i que és màxima en persones d'edat avançada
- Tendència lentament creixent (1991: 2,4, 1999: 3,1 i 2008: 3,4)
- Els **microorganismes** més freqüents són:

Tabla 1
Etiología de la endocarditis infecciosa en diferentes series españolas

Microorganismo	Fernández-Hidalgo et al[8], 2000-2011; 1 hospital (n=438)	Núñez Aragón et al[9], 2003-2010; 1 hospital (n=212)	Martínez-Sellés et al[10], 1994-2005; 1 hospital (n=222)	Gálvez-Acebal et al[11], 1984-2006; 7 hospitales (n=705)
Estreptococos	163 (37)	72 (34)		234 (33)
Streptococcus viridans	103 (24)	40 (19)	37 (17)	156 (22)
Streptococcus bovis	33 (8)	21 (10)	7 (3)	19 (3)
Otros	27 (6)			
Estafilococos	143 (33)	74 (35)	95 (43)	239 (34)
Staphylococcus aureus	99 (23)	46 (22)	59 (27)	137 (19)
SARM	23/99 (23)	9/46 (20)		
ECN	44 (10)	28 (13)		102 (15)
Enterococos	59 (14)	22 (10)	25 (11)	78 (11)
Bacilos Gram-negativos	19 (4)	7 (3)		25 (4)
Otros microorganismos	30 (7)			
Etiología desconocida	24 (6)	29 (14)		71 (10)

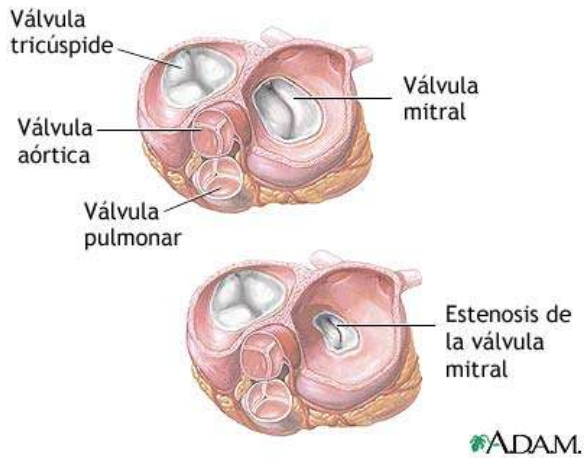
S. agalactiae

ECN: estafilococos coagulasa negativo; SARM: *Staphylococcus aureus* resistente a la meticilina.
Los valores expresan n (%).

Fernández-Hidalgo, N., & Tornos Mas, P. (2013). Epidemiología de la endocarditis infecciosa en España en los últimos 20 años. *Revista Española de Cardiología*, *66*(9), 728-733.

EPIDEMIOLOGIA

Factors de risc	
Cardiològics	**No cardiològics**
Valvulopatia reumàtica	Infecció relacionada amb l'atenció sanitària
Cardiopatia congènita	Edat
	Cirrosi hepàtica
	Addicció a drogues per via parenteral



Fernández-Hidalgo, N., & Tornos Mas, P. (2013). Epidemiología de la endocarditis infecciosa en España en los últimos 20 años. *Revista Española de Cardiología*, *66*(9), 728-733.

EPIDEMIOLOGIA

Valvular and Congenital Heart Disease

Clinical profile of *Streptococcus agalactiae* native valve endocarditis

María Jesús Rollán, MD, PhD,[a] José Alberto San Román, MD, PhD,[b] Isidre Vilacosta, MD, PhD,[c] Cristina Sarriá, MD, PhD,[d] Javier López, MD,[b] María Acuña, MD,[b] and José Luis Bratos, MD[a] *Valladolid and Madrid, Spain*

Background *Streptococcus agalactiae* is an unusual pathogen in adults who are not pregnant. *S agalactiae* endocarditis is a poorly defined entity because it is uncommon; in contrast to other streptococcal endocarditis, it bears a high mortality rate. The aim of this study was to define its clinical, prognostic, and therapeutic profile on the basis of a series of 9 consecutive patients.

Methods We conducted a prospective and multicenter study of patients with infectious endocarditis in which 310 episodes were included.

Results *S agalactiae* grew in 9 patients (3%) who had no valve prosthesis. All patients except 1 had underlying diseases, and all patients had serious complications; the most common complications were major emboli, heart failure, and shock. The valve affected was the mitral valve in 4 patients, the aortic valve in 2 patients, both the mitral and aortic valves in 2 patients, and the tricuspid valve in 1 patient. All episodes were on native valves. Vegetations tended to be large (maximal diameter >10 mm in all patients), very mobile, and pedunculated. An abscess was found in 2 patients, and a perforation of the valve developed in 3 patients. Five patients died (mortality rate, 56%), 3 of whom had received antibiotic therapy alone. The 4 patients who survived underwent combined medical-surgical therapy.

Conclusion *S agalactiae* native valve endocarditis is very aggressive, and early surgery should be considered to prevent the destruction of valves and development of serious complications. (Am Heart J 2003;146:1095–8.)

EPIDEMIOLOGIA

Clinical Infectious Diseases 2002; 34:1576–84

Streptococcus agalactiae Infective Endocarditis: Analysis of 30 Cases and Review of the Literature, 1962–1998

A. Sambola,[1] J. M. Miro,[1] M. P. Tornos,[2] B. Almirante,[2] A. Moreno-Torrico,[4] M. Gurgui,[3] E. Martinez,[1] A. Del Rio,[1] M. Azqueta,[1] F. Marco,[1] J. M. Gatell,[1] and the *Streptococcus agalactiae* Endocarditis Study Group[a]

[1]Hospital Clinic–Institut d'Investigacions Biomediques August Pi i Sunyer, University of Barcelona, [2]Hospital Universitari Vall d'Hebrón, and [3]Hospital de la Santa Creu i Sant Pau, Barcelona, and [4]Hospital General de Asturias, Oviedo, Spain

We describe 30 cases (1.7%) of community-acquired penicillin-susceptible *Streptococcus agalactiae* endocarditis among 1771 episodes of endocarditis diagnosed in 4 Spanish hospitals from 1975 through 1998. Endocarditis affected a native valve (most often the mitral valve) in 25 cases (83%). Surgical valve replacement was performed for 12 patients (40%). Fourteen patients (47%) died. Mortality rates for patients with native and prosthetic valve endocarditis were 36% and 100%, respectively ($P = .01$). The mortality rate for native valve endocarditis decreased during the last 6 years of the study (from 61% in 1975–1992 to 8% in 1993–1998; $P < .05$). Additionally, 115 cases in the literature from 1962–1998 were reviewed. During 1980–1998, the percentage of patients who underwent cardiac surgery increased from 24% (in the previous period, 1962–1979) to 43% ($P = .05$) and the mortality rate decreased from 45% to 34% (P = NS). *S. agalactiae* is an uncommon cause of endocarditis with a high mortality rate, although the prognosis of native valve endocarditis has improved in recent years, probably because of an increased use of cardiac surgery.

CLASSIFICACIÓ

Table 3 Classification and definitions of infective endocarditis

IE according to localization of infection and presence or absence of intracardiac material	
• Left-sided native valve IE	
• Left-sided prosthetic valve IE (PVE)	
- Early PVE: < 1 year after valve surgery	
- Late PVE: > 1 year after valve surgery	
• Right-sided IE	
• Device-related IE (permanent pacemaker or cardioverter-defibrillator)	
IE according to the mode of acquisition[a]	
• Health care-associated IE	
- Nosocomial:	IE developing in a patient hospitalized > 48 hours prior to the onset of signs / symptoms consistent with IE
- Non nosocomial:	Signs and / or symptoms of IE starting < 48 hours after admission in a patient with health care contact defined as: 1) home-based nursing or intravenous therapy, haemodialysis, or intravenous chemotherapy < 30 days before the onset of IE; or 2) hospitalized in an acute care facility < 90 days before the onset of IE; or 3) resident in a nursing home or long-term care facility
• Community-acquired IE	Signs and / or symptoms of IE starting < 48 hours after admission in a patient not fulfilling the criteria for health care-associated infection
• Intravenous drug abuse-associated IE	IE in an active injection drug user without alternative source of infection
Active IE	
• IE with persistent fever and positive blood cultures *or*	
• Active inflammatory morphology found at surgery *or*	
• Patient still under antibiotic therapy *or*	
• Histopathological evidence of active IE	
Recurrence	
• Relapse:	Repeat episodes of IE caused by the same microorganism < 6 months after the initial episode
• Reinfection:	Infection with a different microorganism Repeat episode of IE caused by the same microorganism > 6 months after the initial episode

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

TRACTAMENT EMPÍRIC

Table 17 Proposed antibiotic regimens for initial empirical treatment of infective endocarditis. (before or without pathogen identification)

Antibiotic	Dosage and route	Duration (weeks)	Level of evidence	Comments
Native valves				
Ampicillin-Sulbactam, *or*	12 g/day i.v. in 4 doses	4–6	IIb C	Patients with blood-culture negative IE should be treated in consultation with an infectious disease specialist.
Amoxicillin-Clavulanate, *with*	12 g/day i.v. in 4 doses	4–6	IIb C	
Gentamicin[a]	3 mg/kg/day i.v. or i.m. in 2 or 3 doses.	4–6		
Vancomycin[b] *with*	30 mg/kg/day i.v. in 2 doses	4–6	IIb C	For patients unable to tolerate β-lactams.
Gentamicin[a] *with*	3 mg/kg/day i.v. or i.m. in 2 or 3 doses.	4–6		
Ciprofloxacin	1000 mg/day orally in 2 doses or 800 mg/day i.v. in 2 doses	4–6		Ciprofloxacin is not uniformly active on *Bartonella* spp. Addition of doxycycline (see *Table 16*) is an option if *Bartonella* spp. is likely.
Prosthetic valves (early, < 12 months post surgery)				
Vancomycin[b] *with*	30 mg/kg/day i.v. in 2 doses	6	IIb C	If no clinical response, surgery and maybe extension of the antibiotic spectrum to gram-negative pathogens must be considered.
Gentamicin[a] *with*	3 mg/kg/day i.v. or i.m. in 2 or 3 doses.	2		
Rifampin	1200 mg/day orally in 2 doses			
Prosthetic valves (late, > 12 months post surgery)				
Same as for native valves				

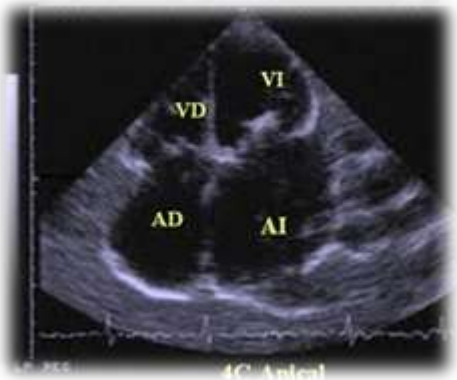
[a,b]Monitoring of gentamicin and vancomycin dosages is as in *Table 13* and *Table 14*.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

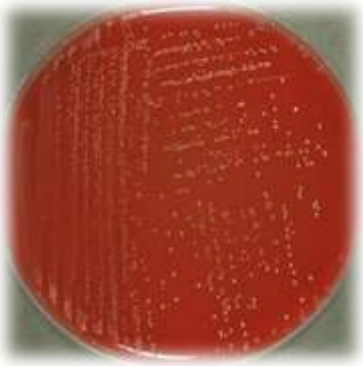
DIAGNÒSTIC

- Clínic

- Ecocardiogràfic



- Microbiològic



DIAGNÒSTIC: CLÍNIC

Table 7 Clinical presentation of infective endocarditis

IE must be suspected in the following situations

1. New regurgitant heart murmur
2. Embolic events of unknown origin
3. Sepsis of unknown origin (especially if associated with IE causative organism)
4. Fever: the most frequent sign of IE.*

   IE should be suspected if fever is associated with:
   a. Intracardiac prosthetic material (e.g. prosthetic valve, pacemaker, implantable defibrillator, surgical baffle/conduit)
   b. Previous history of IE
   c. Previous valvular or congenital heart disease
   d. Other predisposition for IE (e.g. immunocompromised state, IVDA)
   e. Predisposition and recent intervention with associated bacteraemia
   f. Evidence of congestive heart failure
   g. New conduction disturbance
   h. Positive blood cultures with typical IE causative organism or positive serology for chronic Q fever (microbiological findings may precede cardiac manifestations)
   i. Vascular or immunologic phenomena: embolic event, Roth spots, splinter haemorrhages, Janeway lesions, Osler's nodes
   j. Focal or non-specific neurological symptoms and signs
   k. Evidence of pulmonary embolism/infiltration (right-sided IE)
   l. Peripheral abscesses (renal, splenic, cerebral, vertebral) of unknown cause

*NB: Fever may be absent in the elderly, after antibiotic pre-treatment, in the immunocompromised patient and in IE involving less virulent or atypical organisms.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

DIAGNÒSTIC: ECOCARDIOGRÀFIC

Table 8 Role of echocardiography in infective endocarditis

Recommendations: echocardiography	Class[a]	Level[b]
A - Diagnosis:		
1. TTE is recommended as the first-line imaging modality in suspected IE	I	B
2. TEE is recommended in patients with high clinical suspicion of IE and a normal TTE	I	B
3. Repeat TTE / TEE within 7–10 days are recommended in the case of an initially negative examination when clinical suspicion of IE remains high	I	B
4. TEE should be considered in the majority of adult patients with suspected IE, even in cases with positive TTE, owing to its better sensitivity and specificity, particularly for the diagnosis of abscesses and measurement of vegetation size.	IIa	C
5. TEE is not indicated in patients with a good-quality negative TTE and low clinical suspicion of IE	III	C
B - Follow-up under medical therapy		
1. Repeat TTE and TEE are recommended as soon as a new complication of IE is suspected (new murmur, embolism, persisting fever, heart failure, abscess, atrioventricular block)	I	B
2. Repeat TTE and TEE should be considered during follow-up of uncomplicated IE, in order to detect new silent complication and monitor vegetation size. The timing and mode (TTE or TEE) of repeat examination depend on the initial findings, type of microorganism, and initial response to therapy	IIa	B
C - Intra-operative echocardiography		
Intra-operative echocardiography is recommended in all cases of IE requiring surgery	I	C
D - Following completion of therapy		
TTE is recommended at completion of antibiotic therapy for evaluation of cardiac and valve morphology and function	I	C

[a]Class of recommendation.
[b]Level of evidence.
TEE = transoesophageal echocardiography; TTE = transthoracic echocardiography.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

DIAGNÒSTIC: ECOCARDIOGRÀFIC

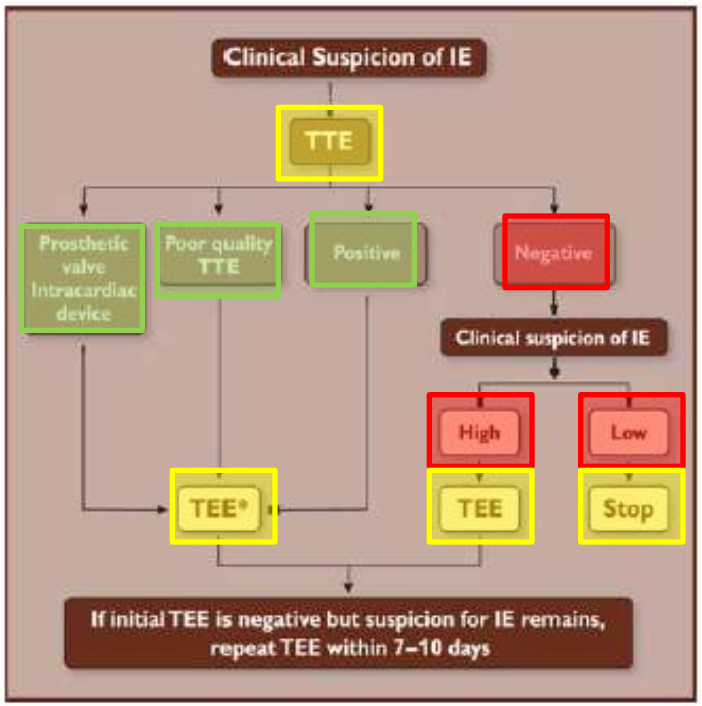


Figure 1 Indications for echocardiography in suspected infective endocarditis. IE = infective endocarditis; TEE = transoesophageal echocardiography; TTE = transthoracic echocardiography. *TEE is not mandatory in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic findings.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30, 2369-2413

DIAGNÒSTIC: MICROBIOLÒGIC

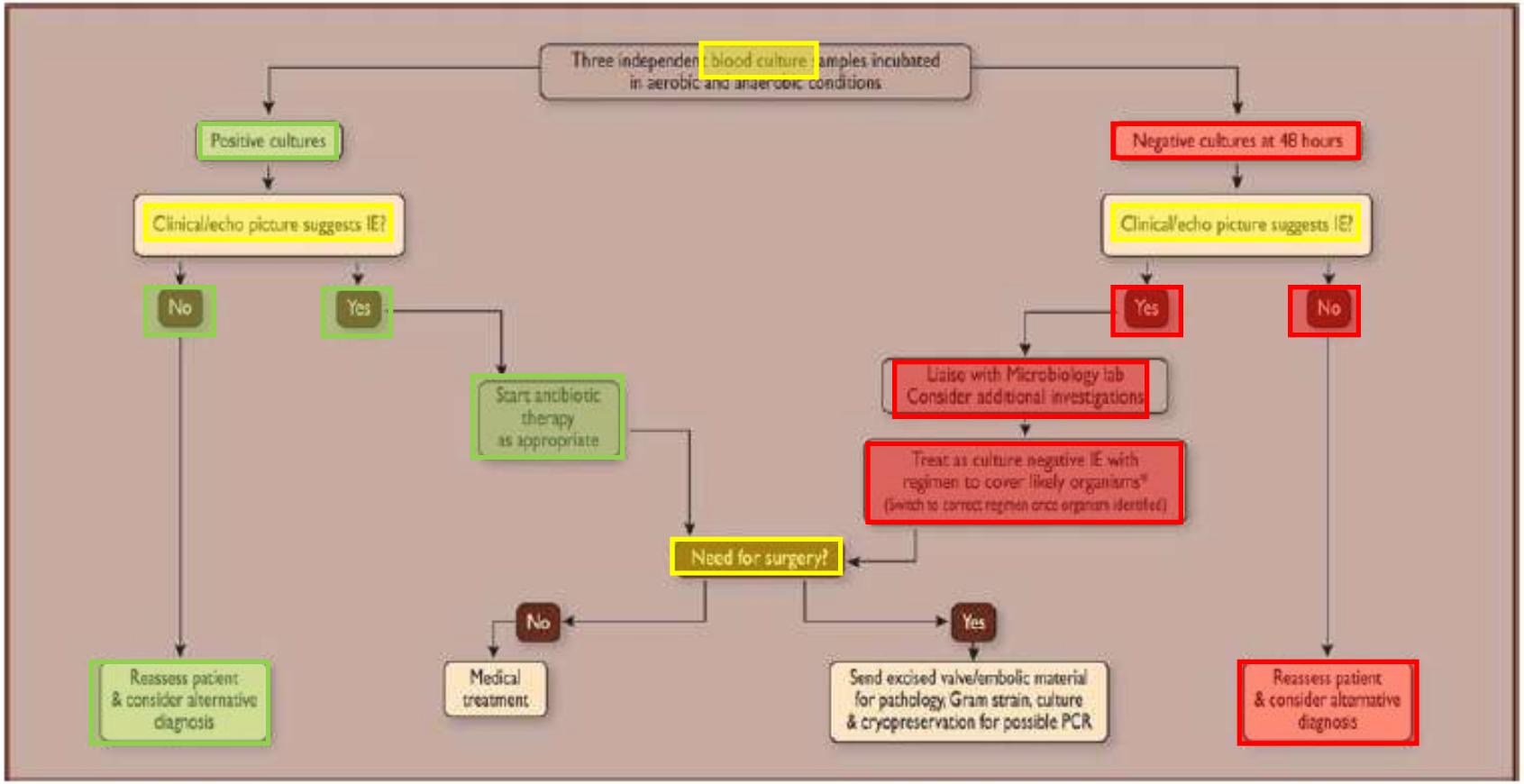


Figure 2 Microbiological diagnosis in culture-positive and culture-negative infective endocarditis. IE = infective endocarditis; PCR = polymerase chain reaction. *If the organism remains unidentified and the patient is stable, consider antibiotic withdrawal and repeat blood cultures.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30, 2369-2413

DIAGNÒSTIC: MICROBIOLÒGIC

TABLE 15. Epidemiological Clues in Etiological Diagnosis of Culture-Negative Endocarditis

Epidemiological Feature	Common Microorganism(s)
Injection drug use	*S aureus*, including community-acquired oxacillin-resistant strains Coagulase-negative staphylococci β-Hemolytic streptococci Fungi Aerobic Gram-negative bacilli, including *Pseudomonas aeruginosa* Polymicrobial
Indwelling cardiovascular medical devices	*S aureus* Coagulase-negative staphylococci Fungi Aerobic Gram-negative bacilli *Corynebacterium* sp
Genitourinary disorders, infection, manipulation, including pregnancy, delivery, and abortion	*Enterococcus* sp Group B streptococci (*S agalactiae*) *Listeria monocytogenes* Aerobic Gram-negative bacilli *Neisseria gonorrhoeae*
Chronic skin disorders, including recurrent infections	*S aureus* β-Hemolytic streptococci
Poor dental health, dental procedures	Viridans group streptococci "Nutritionally variant streptococci" *Abiotrophia defectiva* *Granulicatella* sp *Gemella* sp HACEK organisms
Alcoholism, cirrhosis	*Bartonella* sp *Aeromonas* sp *Listeria* sp *S pneumoniae* β-Hemolytic streptococci
Burn patients	*S aureus* Aerobic Gram-negative bacilli, including *P aeruginosa* Fungi
Diabetes mellitus	*S aureus* β-Hemolytic streptococci *S pneumoniae*
Early (≤1 y) prosthetic valve placement	Coagulase-negative staphylococci *S aureus* Aerobic Gram-negative bacilli Fungi *Corynebacterium* sp *Legionella* sp
Late (>1 y) prosthetic valve placement	Coagulase-negative staphylococci *S aureus* Viridans group streptococci *Enterococcus* species Fungi *Corynebacterium* sp
Dog–cat exposure	*Bartonella* sp *Pasteurella* sp *Capnocytophaga* sp
Contact with contaminated milk or infected farm animals	*Brucella* sp *Coxiella burnetii* *Erysipelothrix* sp
Homeless, body lice	*Bartonella* sp
AIDS	*Salmonella* sp *S pneumoniae* *S aureus*
Pneumonia, meningitis	*S pneumoniae*
Solid organ transplant	*S aureus* *Aspergillus fumigatus* *Enterococcus* sp *Candida* sp
Gastrointestinal lesions	*S bovis* *Enterococcus* sp *Clostridium septicum*

Baddour LM, et al. Infective endocarditis: diagnosis and management. Circulation 2005; 113 (23): 394-434

DIAGNÒSTIC: CRITERIS DE DUKE MODIFICATS

Table 11 Modified Duke criteria for the diagnosis of infective endocarditis (adapted from Li *et al*[94])

MAJOR CRITERIA

Blood cultures positive for IE:

- Typical microorganisms consistent with IE from two separate blood cultures:
  Viridans streptococci, *Streptococcus bovis*, HACEK group, *Staphylococcus aureus*; or
  Community-acquired enterococci, in the absence of a primary focus;

or

- Microorganisms consistent with IE from persistently positive blood cultures:
  At least two positive blood cultures of blood samples drawn > 12 h apart; or
  All of three or a majority of ≥ 4 separate cultures of blood (with first and last sample drawn at least 1 h apart)

or

- Single positive blood culture for *Coxiella burnetii* or phase I IgG antibody titer > 1 : 800

Evidence of endocardial involvement

- Echocardiography positive for IE
  Vegetation - Abscess - New partial dehiscence of prosthetic valve
- New valvular regurgitation

MINOR CRITERIA

- Predisposition: predisposing heart condition, injection drug use
- Fever: temperature > 38°C
- Vascular phenomena: major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial haemorrhages, conjunctival haemorrhages, Janeway lesions
- Immunologic phenomena: glomerulonephritis, Osler's nodes, Roth's spots, rheumatoid factor
- Microbiological evidence: positive blood culture but does not meet a major criterion or serological evidence of active infection with organism consistent with IE

Diagnosis of IE is definite in the presence of	Diagnosis of IE is possible in the presence of
2 major criteria, or *1 major and 3 minor criteria, or* *5 minor criteria*	*1 major and 1 minor criteria, or* *3 minor criteria*

Adapted from Li JS, Sexton DJ, Mick N, Nettles R, Fowler VG, Jr., Ryan T, Bashore T, Corey GR. Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. *Clin Infect Dis* 2000;**30**:633–638.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

INGRÉS A CARDIOLOGIA

11/10/2013

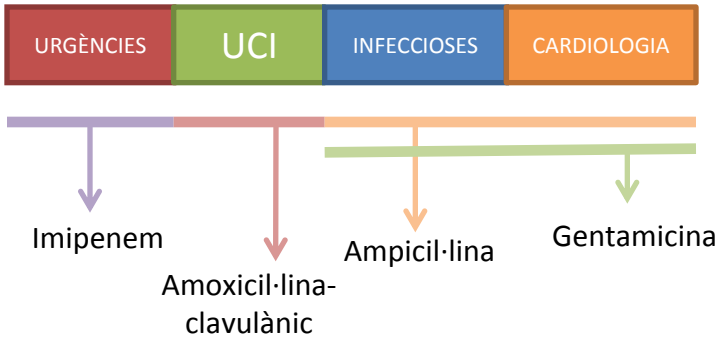
Exploració física:

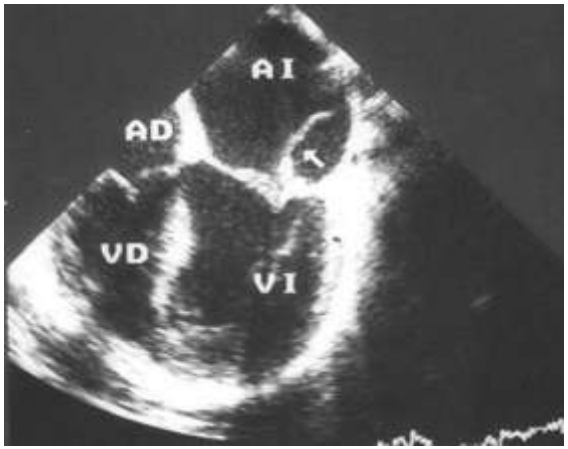
- Buf sistòlic a vàlvula mitral no conegut prèviament
- Lesions petequials/nodulars a nivell palmo-plantar

Signes i símptomes:

- Febre

Hemocultiu: positiu per *Streptoccocus agalactiae*





TTE:

- S'observa una vegetació de mida gran (16x14 mm) a la vàlvula mitral

D: ENDOCARDITIS INFECCIOSA EN VÀLVULA NATIVA

DIAGNÒSTIC: CRITERIS DE DUKE MODIFICATS

Table 11 Modified Duke criteria for the diagnosis of infective endocarditis (adapted from Li *et al*.[94])

MAJOR CRITERIA

Blood cultures positive for IE:

- Typical microorganisms consistent with IE from two separate blood cultures:
  Viridans streptococci, *Streptococcus bovis*, HACEK group, *Staphylococcus aureus*; or
  Community-acquired enterococci, in the absence of a primary focus;

or

- Microorganisms consistent with IE from persistently positive blood cultures:
  At least two positive blood cultures of blood samples drawn > 12 h apart; or
  All of three or a majority of ≥ 4 separate cultures of blood (with first and last sample drawn at least 1 h apart)

or

- Single positive blood culture for *Coxiella burnetii* or phase I IgG antibody titer > 1 : 800

Evidence of endocardial involvement

- Echocardiography positive for IE
  Vegetation - Abscess - New partial dehiscence of prosthetic valve
- New valvular regurgitation

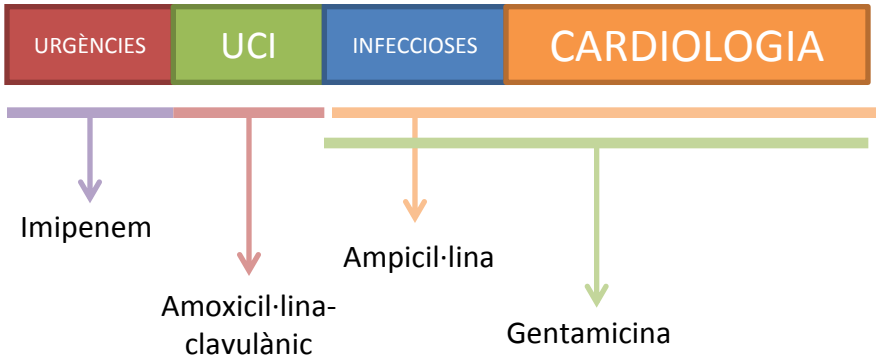
MINOR CRITERIA

- Predisposition: predisposing heart condition, injection drug use
- Fever: temperature > 38°C
- Vascular phenomena: major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial haemorrhages, conjunctival haemorrhages, Janeway lesions
- Immunologic phenomena: glomerulonephritis, Osler's nodes, Roth's spots, rheumatoid factor
- Microbiological evidence: positive blood culture but does not meet a major criterion or serological evidence of active infection with organism consistent with IE

Diagnosis of IE is definite in the presence of	Diagnosis of IE is possible in the presence of
2 major criteria, or 1 major and 3 minor criteria, or 5 minor criteria	1 major and 1 minor criteria, or 3 minor criteria

Adapted from Li JS, Sexton DJ, Mick N, Nettles R, Fowler VG, Jr., Ryan T, Bashore T, Corey GR. Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. *Clin Infect Dis* 2000;**30**:633–638.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413



Tractament:

- Ampicil·lina 2g/6h + gentamicina 200 mg/24h → ceftriaxona 2g/24h + gentamicina 200 mg/24h

Proves:

- Sol·licitud de nivells de gentamicina
- Sol·licitud ecocardiograma transesofàgic (TEE)

TRACTAMENT ANTIBIÒTIC

β-lactam antibiotic. In general, strains of group B, C, and G streptococci are slightly more resistant to penicillin than are strains of group A streptococci. Some authorities recommend the addition of gentamicin to penicillin or a cephalosporin for at least the first 2 weeks of a 4- to 6-week course of antimicrobial therapy for group B, C, and G streptococcal IE.[69,70] There is a clinical impression[71,72] that early cardiac surgery intervention has improved overall survival rates among more recently treated patients with β-hemolytic streptococcal endocarditis as compared with patients treated decades ago. Because of the relative infrequency of endocarditis caused by these microorganisms, consultation with an infectious diseases specialist for the treatment of these patients is recommended.

Baddour LM, et al. Infective endocarditis: diagnosis and management. Circulation 2005; 113 (23): 394-434

TRACTAMENT ANTIBIÒTIC

Table 13 Antibiotic treatment of infective endocarditis due to oral streptococci and group D streptococci[a]

Antibiotic	Dosage and route	Duration (weeks)	Level of evidence
Strains fully susceptible to penicillin (MIC <0.125 mg/L)			
Standard treatment			
Penicillin G[b]	12–18 million U/day i.v. in 6 doses	4[c]	I B
or			
Amoxicillin[d]	100–200 mg/kg/day i.v. in 4–6 doses	4[c]	I B
or			
Ceftriaxone[e]	2 g/day i.v. or i.m. in 1 dose	4[c]	I B
	Paediatric doses:[f] Penicillin G 200,000 U/kg/day i.v. in 4–6 divided doses. Amoxicillin 300 mg/kg/day i.v. in 4–6 equally divided doses. Ceftriaxone 100 mg/kg/day i.v. or i.m. in 1 dose.		
Two-week treatment[g]	**Only if non complicated native valve IE**		
Penicillin G	12–18 million U/day i.v. in 6 doses	2	I B
or			
Amoxicillin[d]	100–200 mg/kg/day i.v. in 4–6 doses	2	I B
or			
Ceftriaxone[e]	2 g/day i.v. or i.m. in 1 dose	2	I B
with	**Preferred for outpatient therapy**		
Gentamicin[h]	3 mg/kg/day i.v. or i.m. in 1 dose	2	I B
or	**Renal function and serum gentamicin concentrations should be monitored once a week**		
Netilmicin	4–5 mg/kg/day i.v. in 1 dose	2	I B
	Paediatric doses:[f] Penicillin, amoxicillin and ceftriaxone as above. Gentamicin 3 mg/kg/day i.v. or i.m. in 1 dose or in 3 equally divided doses.		
In beta-lactam allergic patients			
Vancomycin[i]	30 mg/kg/day i.v. in 2 doses	4[c]	I C
	Paediatric doses:[f] Vancomycin 40 mg/kg/day i.v. in 2–3 equally divided doses.		

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

TRACTAMENT ANTIBIÒTIC

Strains relatively resistant to penicillin (MIC 0.125–2 mg/L)			
Standard treatment			
Penicillin G *or* Amoxicillin[d] *with* Gentamicin[h]	24 million U/day i.v. in 6 doses 200 mg/kg/day i.v. in 4–6 doses 3 mg/kg/day i.v. or i.m. in 1 dose	4[c] 4[c] 2	I B I B
In beta-lactam allergic patients			
Vancomycin[i]	30 mg/kg/day i.v. in 2 doses ***Paediatric doses:***[f] As above.	4[c]	I C
with Gentamicin[h]	3 mg/kg/day i.v. or i.m. in 1 dose	2	

[a]See text for other streptococcal species.
[b]Preferred in patients >65 years or with impaired renal function.
[c]6-week therapy in PVE.
[d]Or ampicillin, same dosages as amoxicillin.
[e]Preferred for outpatient therapy.
[f]Paediatric doses should not exceed adult doses.
[g]Only if non complicated native valve IE.
[h]Renal function and serum gentamicin concentrations should be monitored once a week. When given in a single daily dose, pre-dose (trough) concentrations should be <1 mg/L and post-dose (peak; 1 h after injection) serum concentrations should be ~10–12 mg/L.[112]
[i]Serum vancomycin concentrations should achieve 10–15 mg/L at pre-dose (trough) level and 30–45 mg/L at post-dose level (peak; 1 h after infusion is completed).

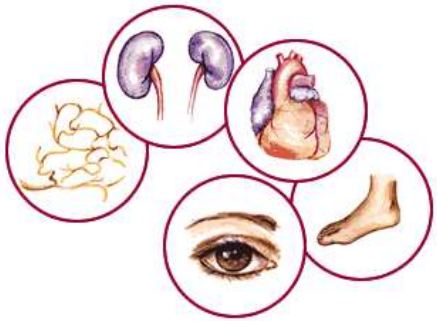
Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

COMPLICACIONS DE L'ENDOCARDITIS

Insuficiència cardíaca

Embolisme

Miocarditis
Pericarditis



Xoc

Abscés esplènic

COMPLICACIONS

Complicacions neurològiques

Complicacions reumàtiques

Aneurisma

Insuficiència renal aguda

TRACTAMENT QUIRÚRGIC

Table 19 Indications and timing of surgery in left-sided native valve infective endocarditis

Recommendations: Indications for surgery	Timing*	Class*	Level[b]
A - HEART FAILURE			
Aortic or mitral IE with severe acute regurgitation or valve obstruction causing refractory pulmonary oedema or cardiogenic shock	Emergency	I	B
Aortic or mitral IE with fistula into a cardiac chamber or pericardium causing refractory pulmonary oedema or shock	Emergency	I	B
Aortic or mitral IE with severe acute regurgitation or valve obstruction and persisting heart failure or echocardiographic signs of poor haemodynamic tolerance (early mitral closure or pulmonary hypertension)	Urgent	I	B
Aortic or mitral IE with severe regurgitation and no HF	Elective	IIa	B
B - UNCONTROLLED INFECTION			
Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation)	Urgent	I	B
Persisting fever and positive blood cultures > 7–10 days	Urgent	I	B
Infection caused by fungi or multiresistant organisms	Urgent/elective	I	B
C - PREVENTION OF EMBOLISM			
Aortic or mitral IE with large vegetations (> 10 mm) following one or more embolic episodes despite appropriate antibiotic therapy	Urgent	I	B
Aortic or mitral IE with large vegetations (> 10 mm) and other predictors of complicated course (heart failure, persistent infection, abscess)	Urgent	I	C
Isolated very large vegetations (> 15 mm)#	Urgent	IIb	C

*Class of recommendation.
[b]Level of evidence.
*Emergency surgery: surgery performed within 24 h, urgent surgery: within a few days, elective surgery: after at least 1 or 2 weeks of antibiotic therapy.
#Surgery may be preferred if procedure preserving the native valve is feasible.

Habib G, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. European Heart Journal 2009; 30: 2369-2413

GENTAMICINA

- Antibiòtic de la família dels **aminoglucòsids**

- **Eficàcia**, depèn de 3 factors:
  - Activitat bactericida, concentració-depenent: concentracions > 10 CMI es consideren efectives
  - Efecte post antibiòtic: 0.5-8 hores
  - Resistència adaptativa

- **Distribució:**
  - Principalment a fluids extracel·lulars; no arriba SNC
  - Baixa unió a proteïnes plasmàtiques
  - Semivida aproximada de 2 hores

- **Eliminació:**
  - S'elimina per filtració glomerular sense metabolitzar

Garcia Benito. Manual de rotación del residente por la unidad de farmacocinética clínica. Madrid: Luzan 5; 2011

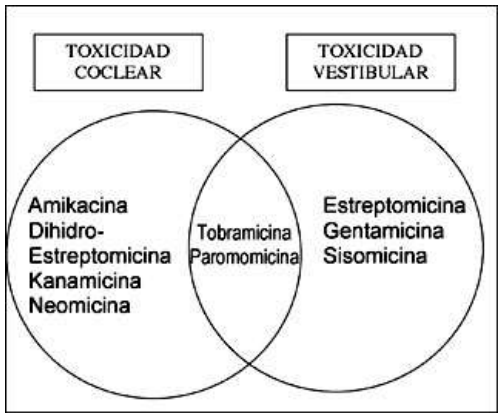
GENTAMICINA

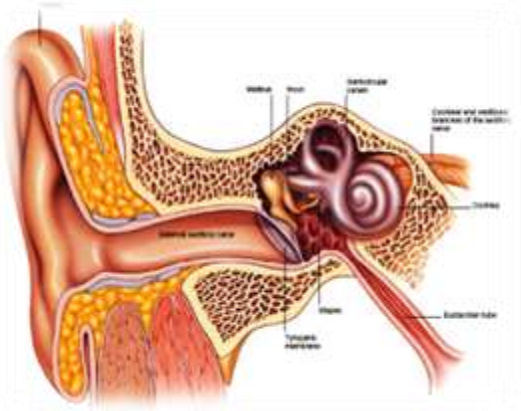
- **Espectre d'acció**:
  - Bacils gramnegatius aerobis (Enterobacteris)
  - Bacils no fermentadors com *Pseudomonas aeruginosa* i *Acinetobacter spp*
  - L'associació amb antibiòtics que actuen sobre la paret bacteriana ha mostrat **sinergia** front a diversos microorganismes (*E. faecalis*, *E. faecium*, estreptococs del grup *viridans*, *S. pyogenes*, *S. aureus*, *S epidermidis*, *E coli*, *K. pneumoniae*, *P aeruginosa* i *Serratia marescens*)
  - Cocs grampositius (estafilococs, enterococs i estreptococs) degut a aquesta sinergia en associació

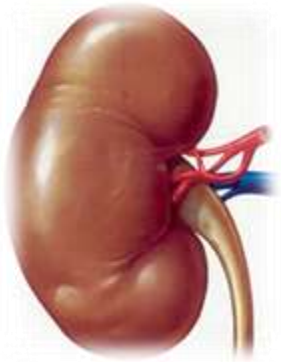
Palomino J, Pachon J. Aminoglucósidos. Enferm Infecc Microbiol Clin 2003;21(2):105-15

GENTAMICINA

- **Dosificació:**
  - Mètode de dosificació múltiple diària: endocarditis per *Staphylococcus sp i Enterococcus sp*
  - Mètode de dosificació d'ampliació d'interval: endocarditis per *Streptococcus sp*
  - En obesos dosifiquem en funció del pes ajustat
- **Inici de tractament:** 5 mg/Kg/24h
- **Efectes adversos:** ototoxicitat, nefrotoxicitat, toxicitat neuromuscular







Garcia Benito. Manual de rotación del residente por la unidad de farmacocinética clínica. Madrid: Luzan 5; 2011

Mercado M Víctor, Burgos S Rodolfo, Muñoz V Claudio. Ototoxicidad por medicamentos. Rev. Otorrinolaringol. Cir. Cabeza Cuello [revista en la Internet]. 2007 Ago; 67(2): 167-177

GENTAMICINA

- Monitorització

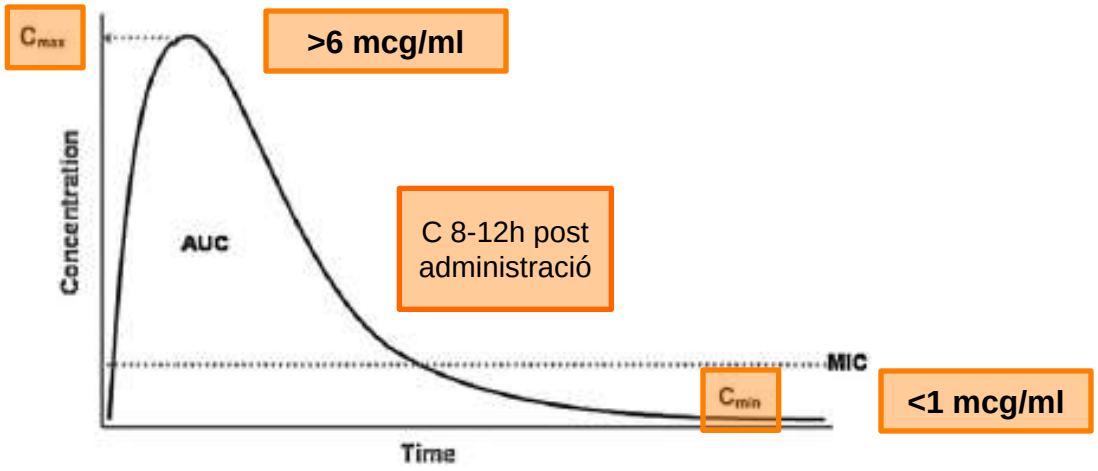


Figure 1 Pharmacokinetic parameters. AUC_{0-24}, area under the curve (24-h dosing interval); C_{max}, maximum concentration; C_{min}, minimum concentration; MIC, minimum inhibitory concentration (of the organism the antibiotic is targeting).

Álvarez-Lerma F, Olaechea P, Grau S, Marín M, Domínguez, A, Martínez-Lanao J, et al. Recomendaciones para la monitorización de antibióticos en pacientes críticos ingresados en UCI. *Enferm Infecc y MicrobiolClin. 2008 Apr; 26*(4): 230-239.

GENTAMICINA

- Monitorització de gentamicina al Servei de Farmàcia de l'Hospital del Mar

1. Sol·licitud de nivells mitjançant una interconsulta
2. Extracció de la mostra a les 10h post-administració
3. Determinació de la C10h de l'antibiòtic
4. Recepció del full de sol·licitud de nivells

GENTAMICINA

Servei de Farmàcia – Hospital del Mar

PETICIÓ PER A LA DETERMINACIÓ DE NIVELLS PLASMÀTICS D'ANTIBIÒTICS
- VANCOMICINA – AMIKACINA – GENTAMICINA –

DADES DEL PACIENT

Nom del pacient:

EDAT: _____ anys
SEXE: _____
PES: _____ kg
ALÇADA: _____ cm

HC: LLIT:

SOL·LICITANT

Metge:
Servei:
Data:

SOL·LICITUD DE NIVELLS PLASMÀTICS DE: _____

MOTIU DE LA SOL·LICITUD

control rutinari
mala evolució clínica
sospita infradosificació
sospita nivells tòxics
altres: (especificar)

DADES DEL TRACTAMENT

Indicació:

Inici : Data: __ / __ / __ hora: ___ : ___

Pauta: Dosi: _____ mg / ____ h

Canvis de pauta:

ALTERACIONS FISIOPATOLOGIQUES

Insuficiència renal
Tractament amb nefrotòxics: (indicar quin)_____
Diàlisi
Edemes
Insuficiència hepàtica
Altres:

EXTRACCIÓ DE LA MOSTRA

Infermera: _____

Darrera administració de l'antibiòtic: data: __ / __ / __ hora: ___ : ___

Temps de perfusió: _____ hores

Extracció mostra/es: data: __ / __ / __ hora: ___ : ___

data: __ / __ / __ hora: ___ : ___

INFORME FARMACOCINÈTIC

Farmacèutic: _____ Data: ___ / __ / ___

Imprescindible complimentar totes les dades per a la realització dels nivells

GENTAMICINA

- Monitorització de gentamicina al Servei de Farmàcia de l'Hospital del Mar

1. Sol·licitud de nivells mitjançant una interconsulta
2. Extracció de la mostra a les 10h post-administració
3. Determinació de la C10h de l'antibiòtic
4. Recepció del full de sol·licitud de nivells
5. Repàs de la història clínica
6. Omplir el full de monitorització

GENTAMICINA

MONITORIZACIÓN : ☐ **VANCOMICINA** ☐ **AMIKACINA** ☐ **GENTAMICINA** ☐ **TOBRAMICINA**

Paciente:

☐ Espe ☐ Forum

Cama: NH:

Sexo: ☐♀ ☐♂ Edad: años

Peso: kg Altura: cm

Fecha ingreso: __/__/__ Fecha alta: __/__/__

Estancia: días

Diagnóstico de ingreso:

Diagnósticos 2º:

☐ Insuficiencia renal ☐ CVVHD ☐ CCVHF ☐ CCVHDF

☐ Edemas: ☐ Nefrotóxicos:

☐ IQx: ☐ Alergias:

☐ Obesidad (IMC: kg/m2) ☐ Amputación:

☐ Otros: (especificar)

☐ Localización infección:

Antibióticos previos:

Antibióticos concomitantes:

DADES DEMOGRÀFIQUES I FISIOPATOLÒGIQUES

Fecha cultivo	Localización	Microorganismo	Antibiograma
			R: S:
			R: S:
			R: S:
			R: S:
			R: S:
			R: S:

CULTIUS

Fecha presc	Hora adm	Pauta	Comentarios

PAUTA

Fecha niveles	Hora extracc	Conc	Observaciones	Cálculos cinéticos
				$T_{1/2}$: SS: AUC:
				$T_{1/2}$: SS: AUC:
				$T_{1/2}$: SS: AUC:
				$T_{1/2}$: SS: AUC:

NIVELLS

GENTAMICINA

ANALÍTICA:

Fecha															
Cr (mg/dL) [0.6-1.4]															
Urea (mg/dL) [10-50]															
FG (mL/min)															
Leucocitos ($x10^3$/µl) [4-11]															
Neutrofilos % [55-75]															
Albúmina (g/dL) [3.8-5.1]															
ClCr (mL/min):_____															

INTERVENCIONES REALIZADAS:

Día	Intervención	Medio utilizado	Receptor	Aceptada

RESPUESTA AL TRATAMIENTO:

☐ 1. Curación/Alta

☐ 2. Fallo/Escalada a _____

☐ 3. Exitus

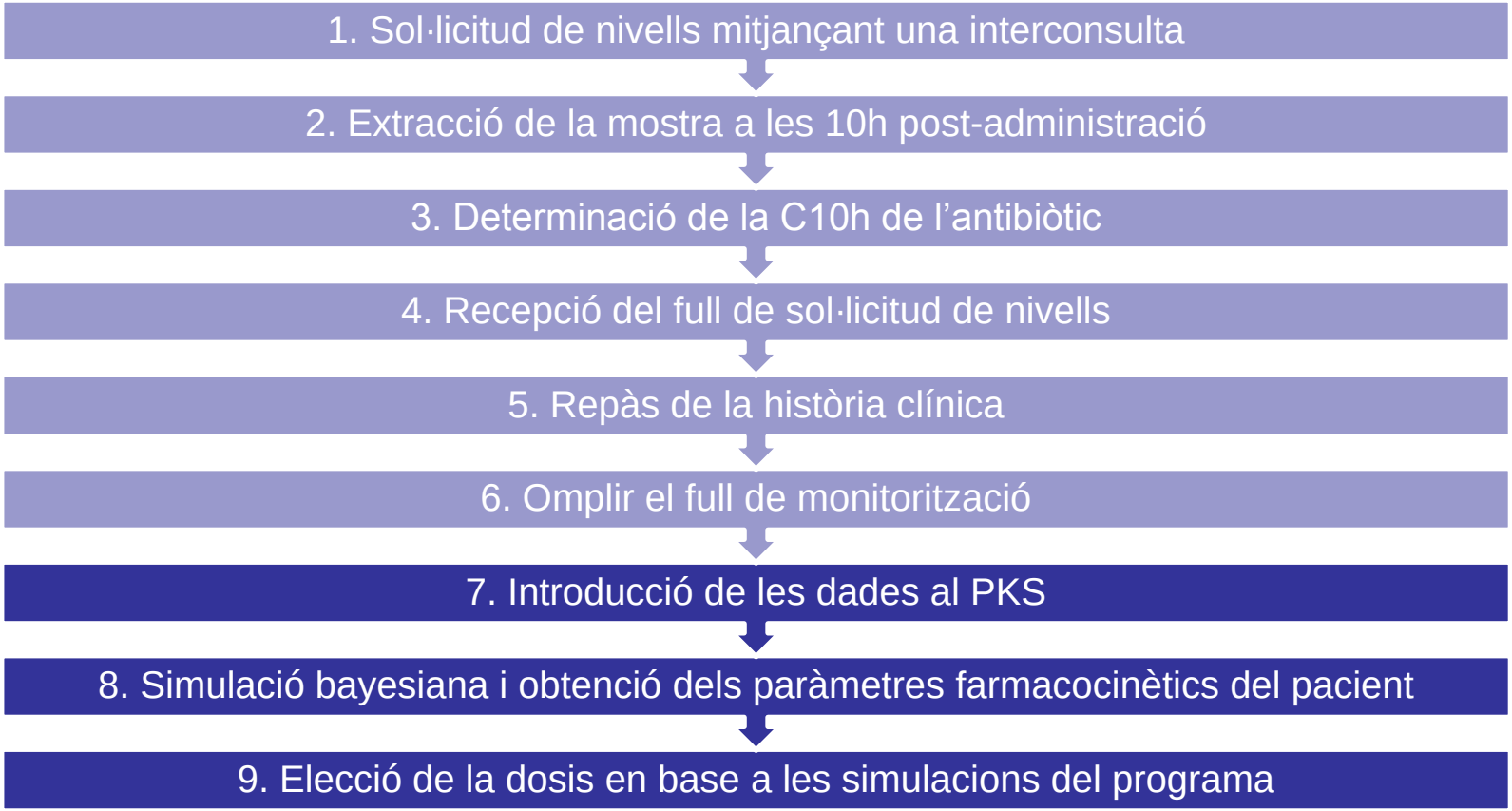
☐ 4. Cambio ATB: Desescalar/OR a _____

☐ 5. Adición otro ATB _____

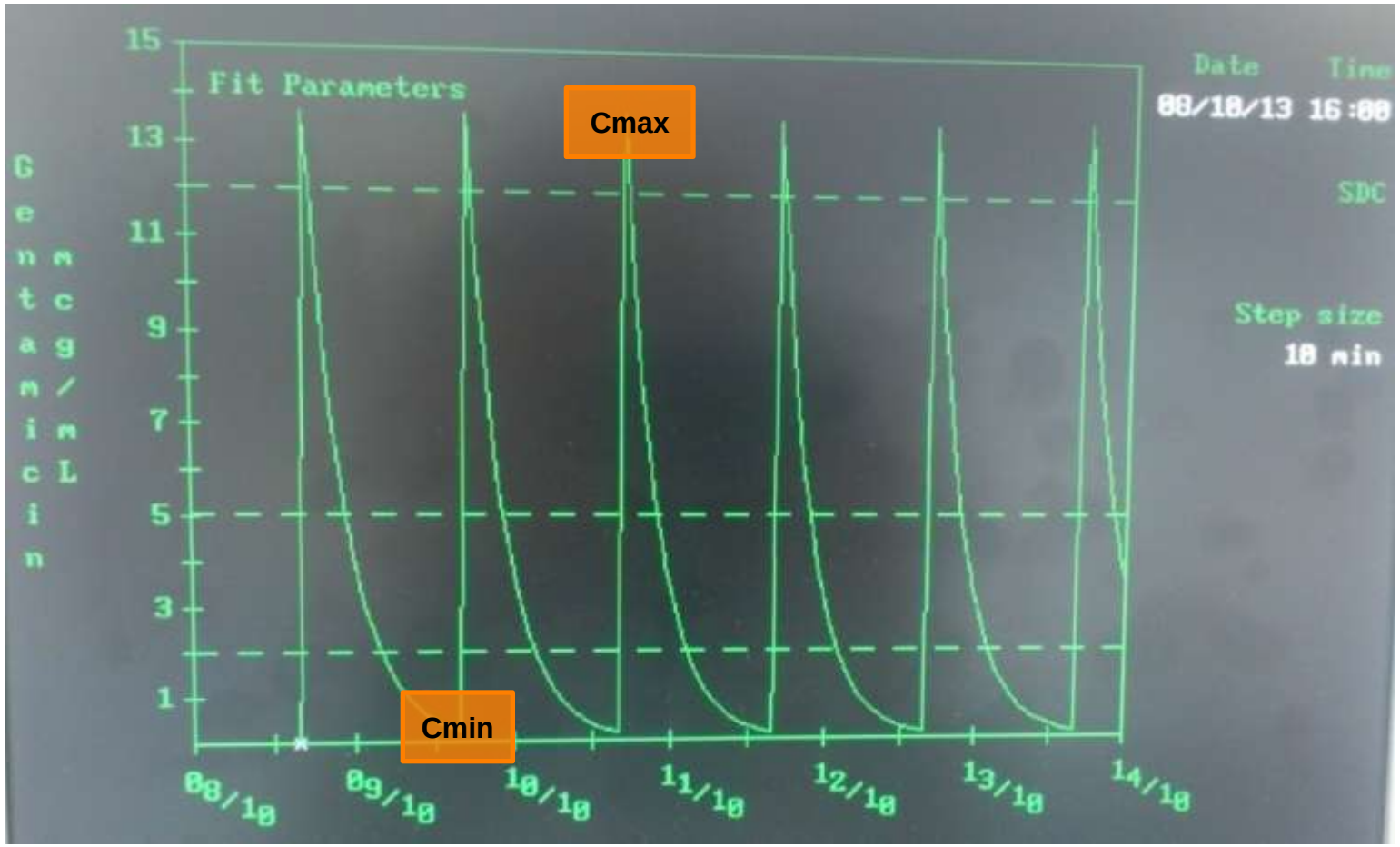
☐ 6. Efecto adverso: _____

GENTAMICINA

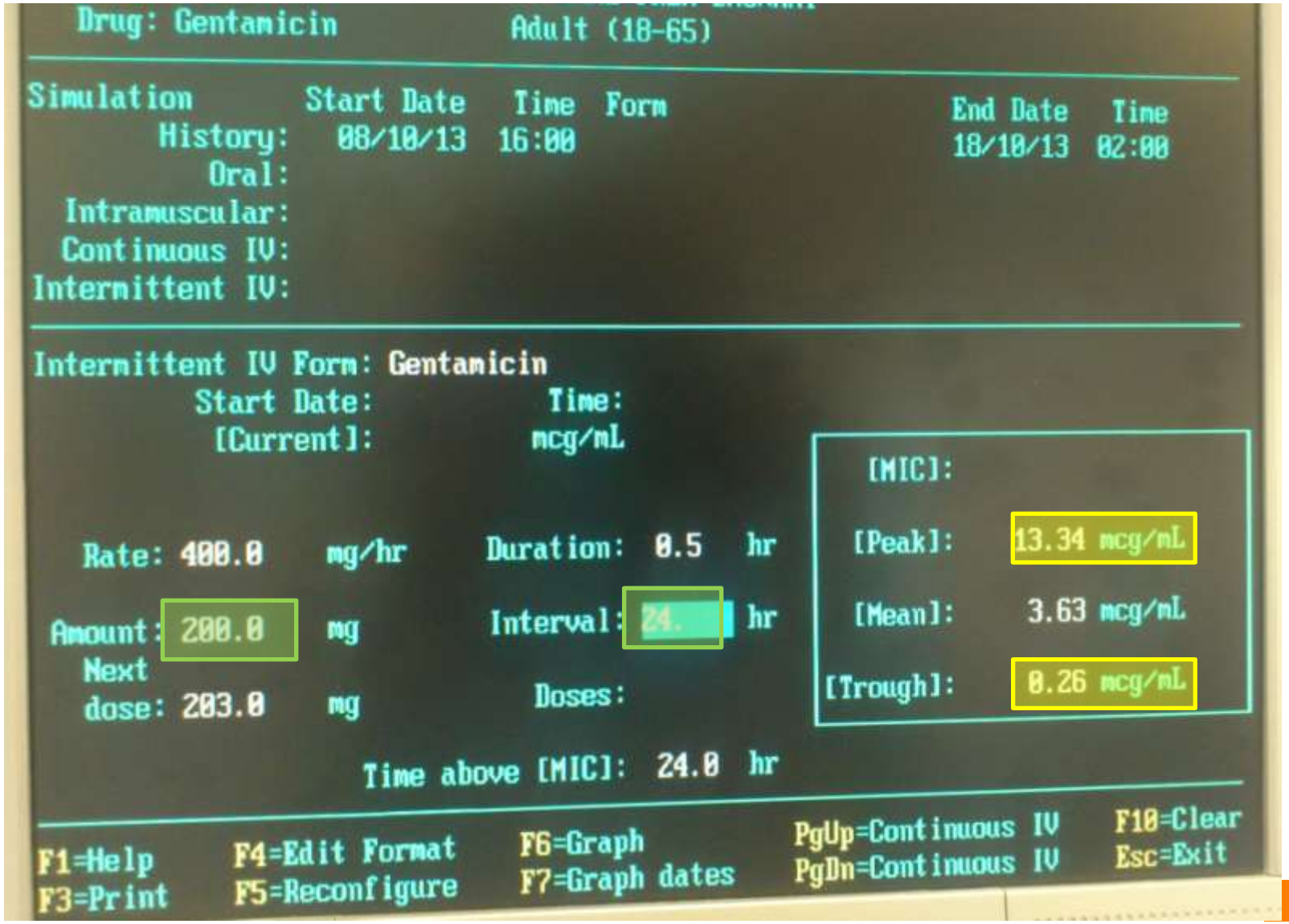
- Monitorització de gentamicina al Servei de Farmàcia de l'Hospital del Mar



GENTAMICINA



GENTAMICINA



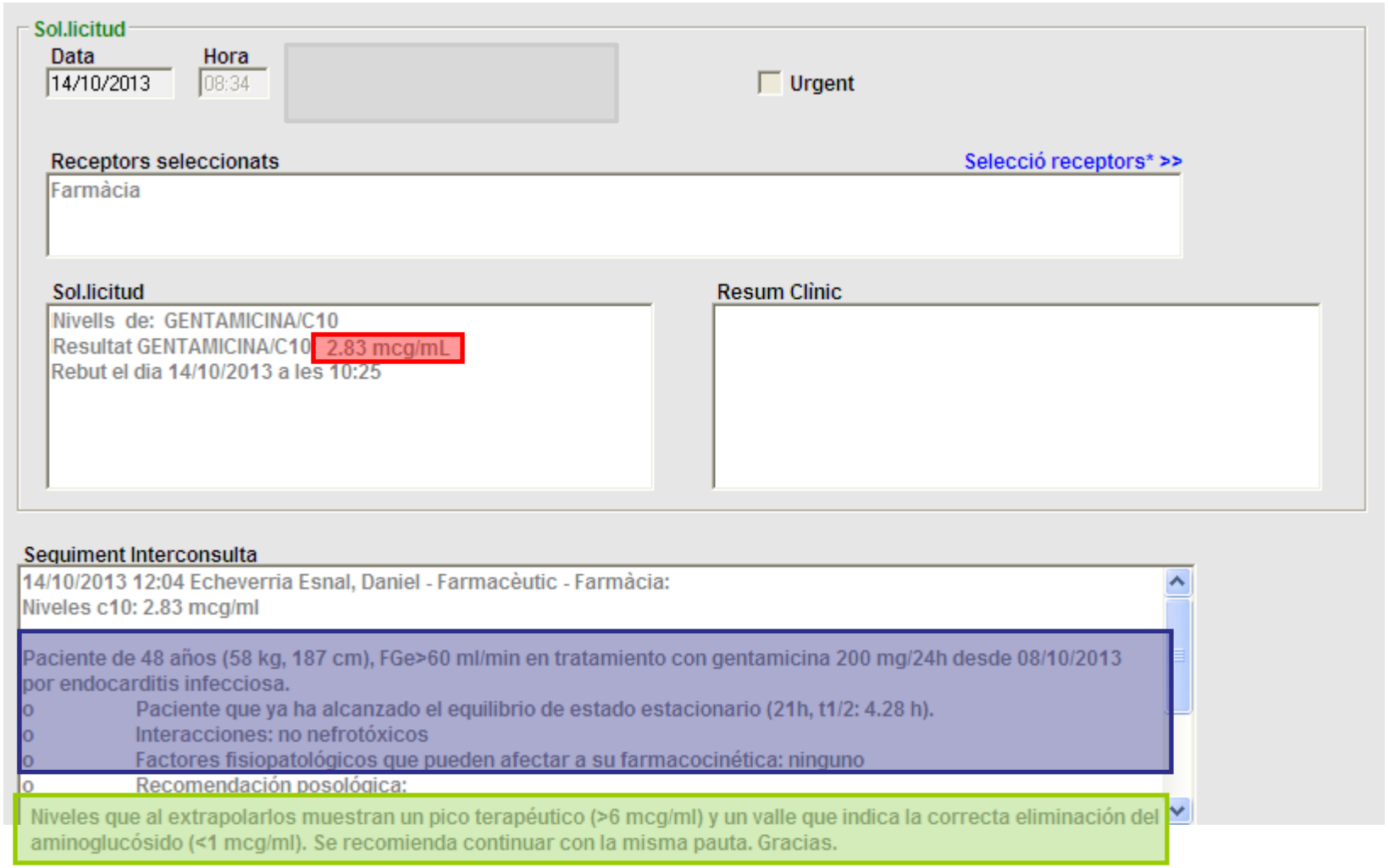
GENTAMICINA

- Monitorització de gentamicina al Servei de Farmàcia de l'Hospital del Mar

1. Sol·licitud de nivells mitjançant una interconsulta
2. Extracció de la mostra a les 10h post-administració
3. Determinació de la C10h de l'antibiòtic
4. Recepció del full de sol·licitud de nivells
5. Repàs de la història clínica
6. Omplir el full de monitorització
7. Introducció de les dades al PKS
8. Simulació bayesiana i obtenció dels paràmetres farmacocinètics del pacient
9. Elecció de la dosis en base a les simulacions del programa
10. Resposta a la interconsulta amb la nova recomanació posològica

CARDIOLOGIA

14/10/2013



GENTAMICINA

LETTER TO THE EDITOR

Infective endocarditis caused by Group B *Streptococcus*: The role of aminoglycoside-combination

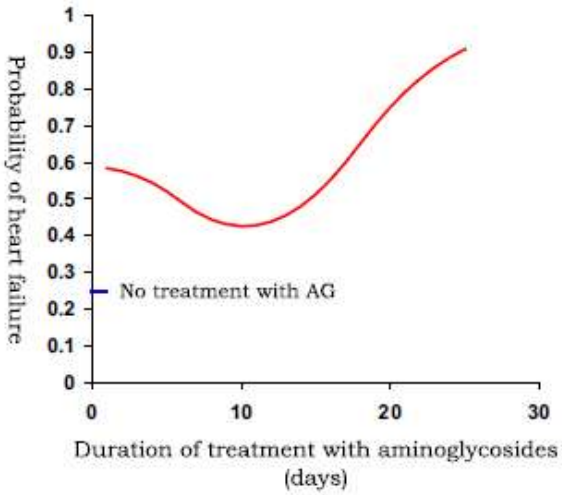


Figure 1 Logistic regression analysis with spline function to calculate the probability of heart failure with aminoglycoside treatment in patients with infective endocarditis due to Group B *Streptococcus* and without previous heart failure. AG, aminoglycoside.

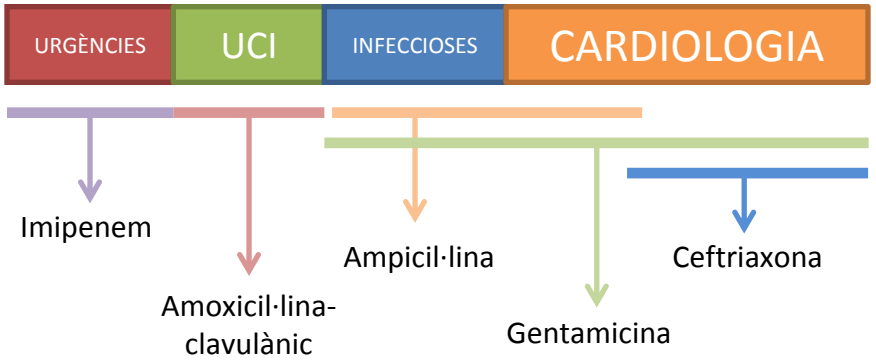
Table 1 The use of aminoglycosides in association with outcome in 74 episodes of infective endocarditis due to Group B *Streptococcus*.

	Duration of aminoglycoside treatment (days)			
	0	1–7	≥8	*P*
	n = 20 (27)	*n* = 16 (22)	*n* = 38 (51)	
Heart failure prior to treatment	5 (25)	5 (31)	9 (24)	ns
New heart failure during treatment	2 (10)[a]	4 (20)	14 (70)[a]	0.035
Ongoing or new heart failure during treatment	5 (25)[a]	7 (44)	21 (55)[a]	0.050
Days on ward, median (IQR)	36 (29–57)	33 (29–54)	32 (26–47)	ns
Mortality	1 (5)	4 (25)	5 (13)	ns

Data are no. (%) of cases, unless otherwise indicated. The episode numbers of each category (20, 16, and 38) were used as denominators. IQR, interquartile range.

[a] Heart failure was significantly more often present in patients that were treated with aminoglycoside for ≥8 days than in patients without aminoglycoside treatment.

Sendi P, Ericsson M, Olaison L. Infective endocarditis caused by group B Streptococcus: the role of aminoglycoside-combination. J Infect 2012; Jan;64(1):127-9



Signes i símptomes:

- Persisteix febril
- Diarrea
- Edemes
- Taquicardia

Analítica:

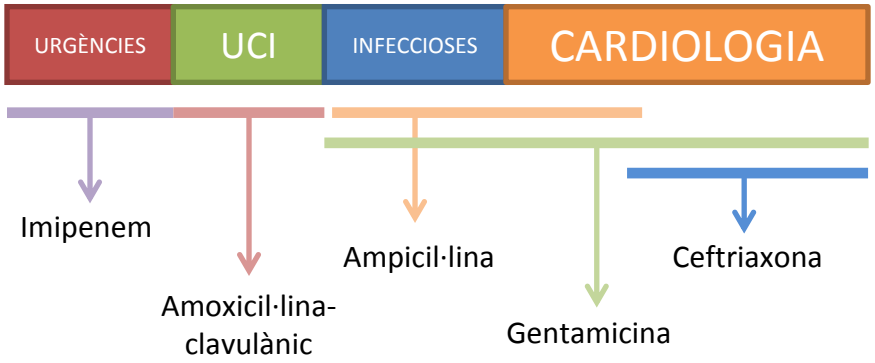
PROTEÏNA C REACTIVA	4,63	6,4	mg/dl	0-0,6

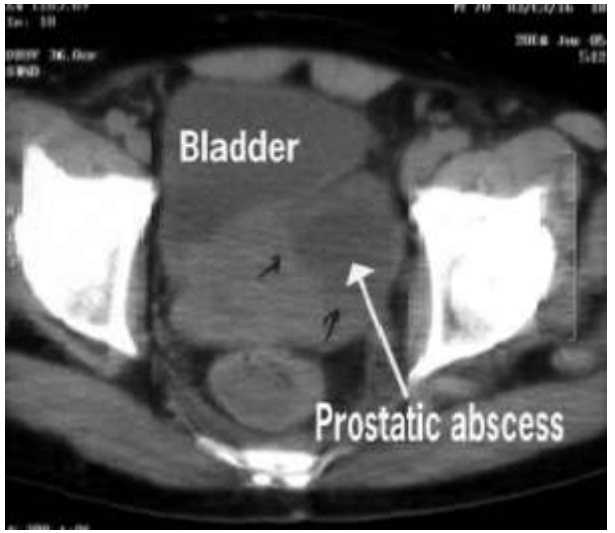
TEE:

- Insuficiència mitral lleu
- Vàlvula aòrtica bicúspide amb dilatació d'arrel aòrtica (47 mm) en context d'enolisme sever

Proves:

- Sol·licitud de TTE i TC abdomino-pèlvic per persistència de febre





TTE:

- Reducció de la vegetació a la vàlvula mitral (8x8 mm)

TC abdomino-pèlvic:

- Destaquen a nivell prostàtic 3 col·leccions de 14 i 12 mm a LPD i 9 mm a LPE. Es contacta amb Urologia

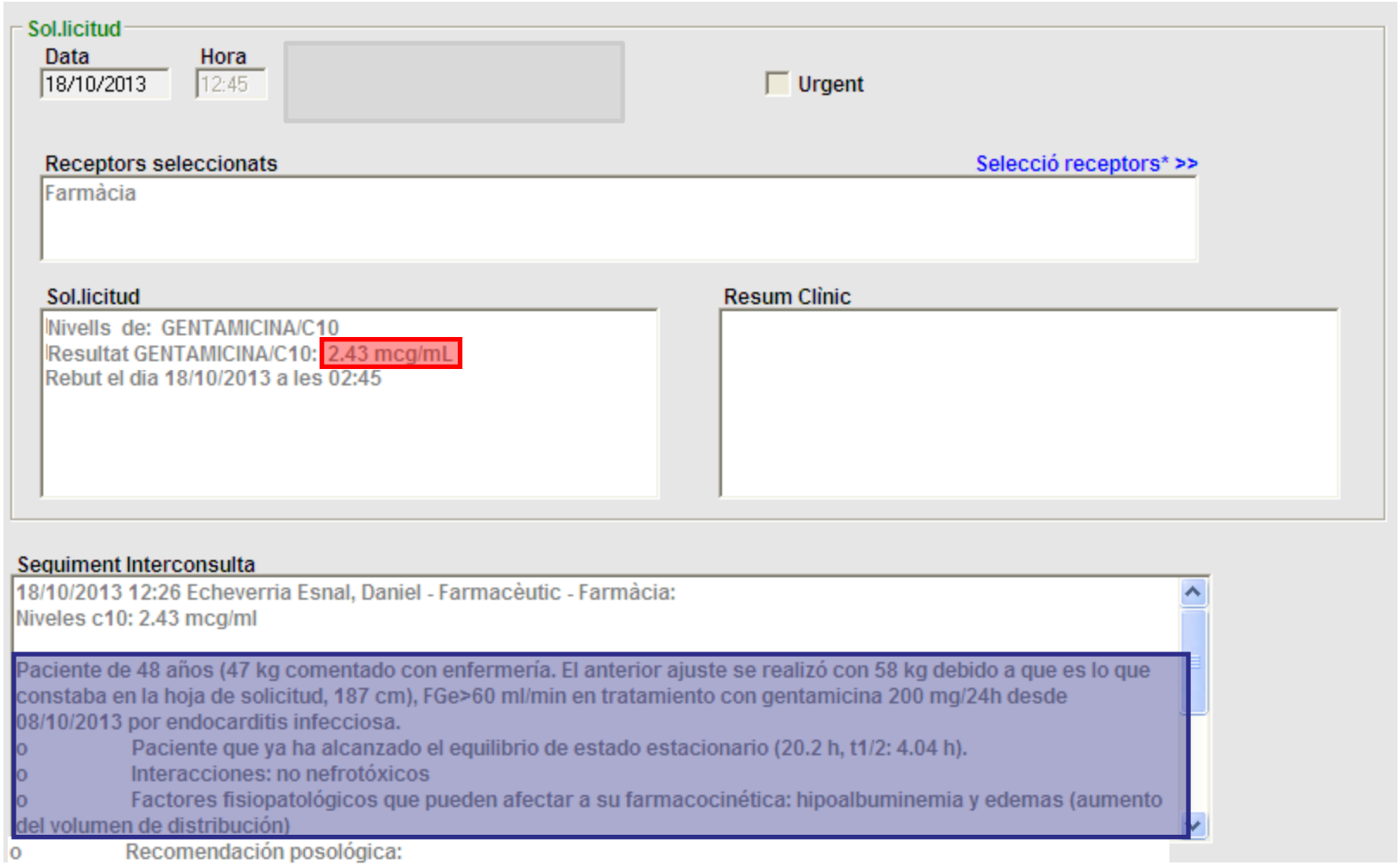
OD: PROSTATITIS AGUDA BACTERIANA

Proves:

- Sol·licitud de nivells de gentamicina

CARDIOLOGIA

18/10/2013



Niveles que al extrapolarlos muestran un pico terapéutico (>6 mcg/ml) y un valle que indica la correcta eliminación del aminoglucósido (<1 mcg/ml). Se recomienda continuar con la misma pauta. Gracias.

PROSTATITIS AGUDA BACTERIANA

EPIDEMIOLOGIA

- Infecció relativament poc freqüent; tot i així s'estima que el 50% dels homes presenten alguna vegada símptomes de prostatitis

- La **prevalença** estimada es troba entre 2-16%

- **Simptomatologia**:
  - Febre
  - Calfreds
  - Dolor lumbar-sacre, perineal o suprapúbic
  - Malestar general
  - Molèsties miccionals (disúria, coïssor miccional, pol·laciúria, obstrucció miccional)

Mandell G, Benet J, Dolin R, editors. Principles and practice of Infectious Diseases. 7 ed. Philadelphia: Elsevier; 2010.

ETIOLOGIA

Table 9.4: The most common pathogens in prostatitis

Aetiologically recognized pathogens*
Escherichia coli
Klebsiella spp.
Proteus mirabilis
Enterococcus faecalis
Pseudomonas aeruginosa
Organisms of debatable significance
Staphylococci
Streptococci
Corynebacterium spp.
Chlamydia trachomatis
Ureaplasma urealyticum
Mycoplasma hominis

*Adapted from Weidner et al. (2) and Schneider et al. (14).

Naher KG, Bergman B, Bishop MC, Bierklund-Johansen TE, Botto H, Lobel B, et al. EAU guidelines for the management of urinary and male genital tract infections. *Eur Urol* 2001; Nov;40(5):576-88

CLASSIFICACIÓ

Table 9.3: Classification of prostatitis and CPPS according to NIDDK/NIH (3-5)

Type	Name and description
I	Acute bacterial prostatitis
II	Chronic bacterial prostatitis
III	Chronic abacterial prostatitis - chronic pelvic pain syndrome (CPPS)
	A. Inflammatory CPPS (white cells in semen/EPS/VB3)
	B. Non-inflammatory CPPS (no white cells in semen/EPS/VB3)
IV	Asymptomatic inflammatory prostatitis (histological prostatitis)

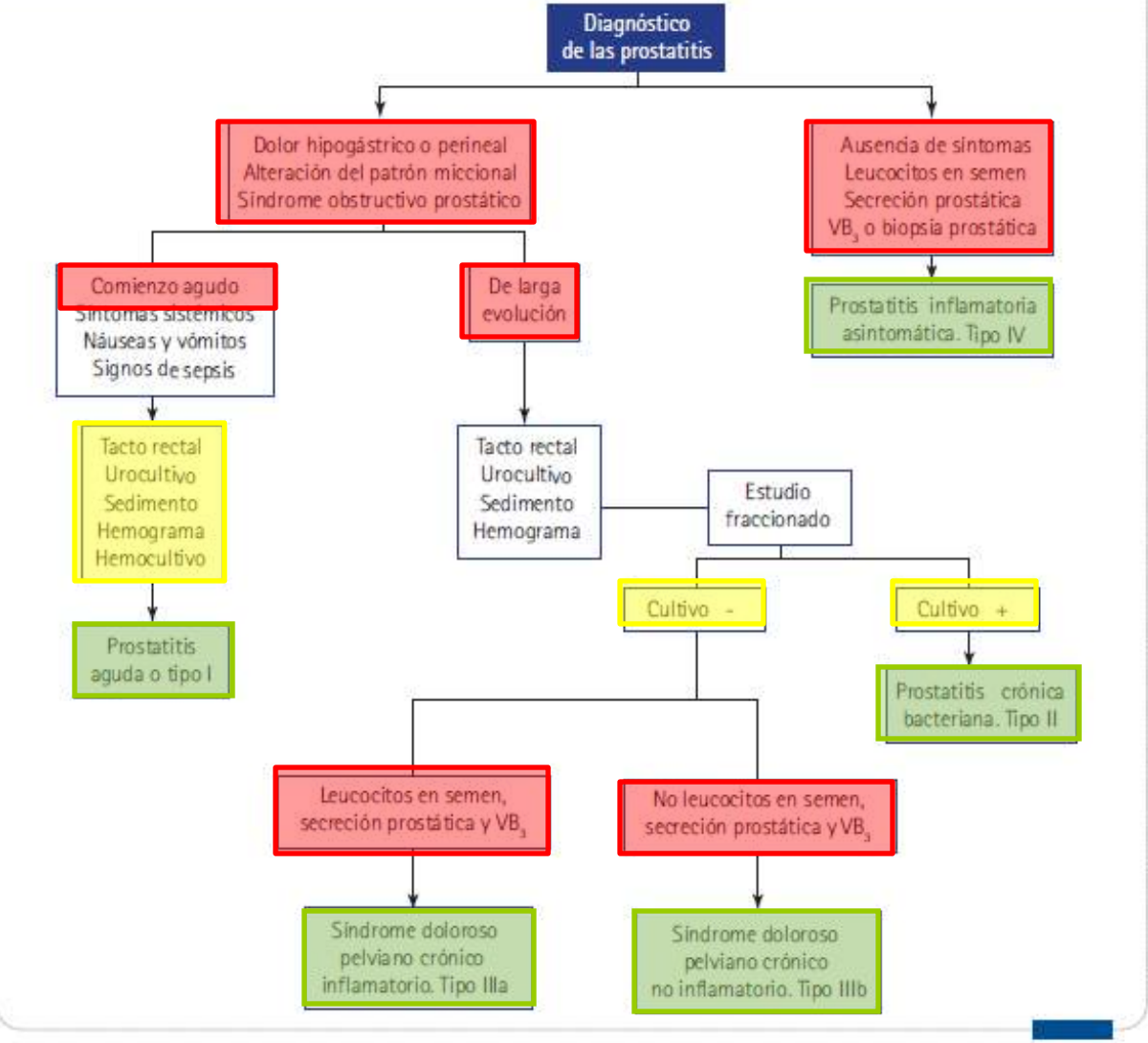
CPPS = chronic pelvic pain syndrome; EPS = expressed prostatic secretion; VB3 = voided bladder urine 3 (urine following prostatic massage).

Naher KG, Bergman B, Bishop MC, Bierklund-Johansen TE, Botto H, Lobel B, et al. EAU guidelines for the management of urinary and male genital tract infections. *Eur Urol* 2001; Nov;40(5):576-88

DIAGNÒSTIC

Figura 1.

Clasificación diagnóstica de las prostatitis.

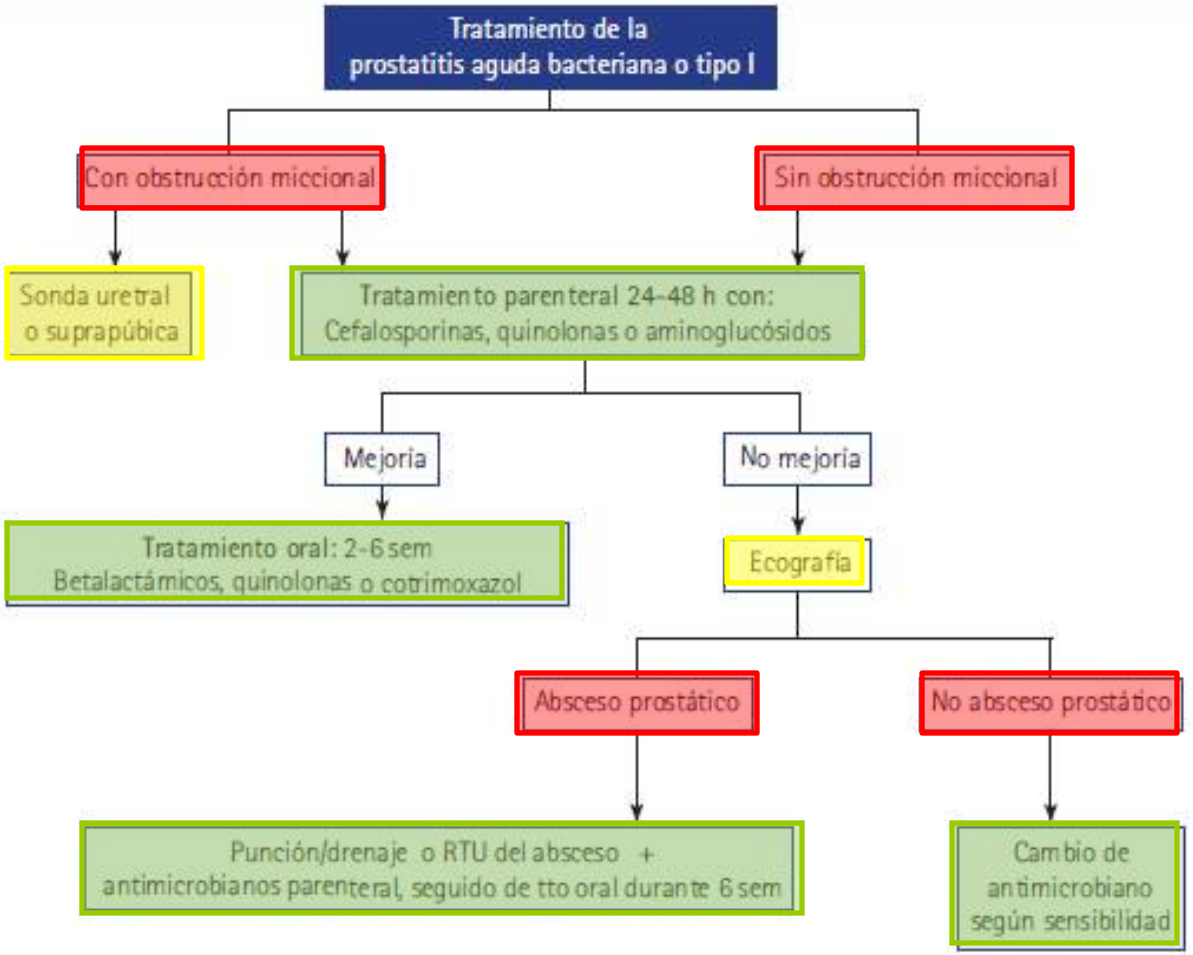


Broseta E. Capítulo 8: clasificación, diagnóstico y manejo terapéutico de la prostatitis en: Carlos Pigrau editor. Infección del tracto urinario. Barcelona: Ediciones Salvat; 2013. p. 105-120

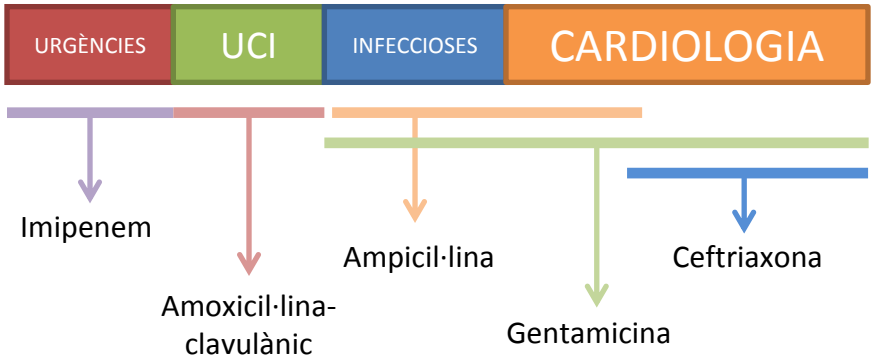
TRACTAMENT ANTIBIÒTIC

Figura 2.

Enfoque terapéutico de la Prostatitis aguda bacteriana o tipo I.



Broseta E. Capítulo 8: clasificación, diagnóstico y manejo terapéutico de la prostatitis en: Carlos Pigrau editor. Infección del tracto urinario. Barcelona: Ediciones Salvat; 2013. p.105-120



IC urologia:

- Drenatge dels abscessos prostàtics dels que s'extreu material purulent

Cultiu de l'abscés prostàtic:

CULTIU AEROBI Absces	P
CULTIU ANAEROBI Absces	P

Antibiograma de l'abscés prostàtic:

	Klebsiella pneumoniae Com.: Beta-lactamasa d'ampli espectre		Enterococcus faecium	
Amikacina	Intermedi	<=8		
Ampicil·lina			Resistent	>8
Amox/Clavulat K	Intermedi	16/8		
Aztreonam	Resistent	16		
Ceftazidima	Resistent	>16		
Cefalotina	Resistent	>16		
Cefotaxima	Resistent	>32		
Cefoxitina	Sensible	<=8		
Cefazolina	Resistent	>16		
Ciprofloxacina	Sensible	1		
Cefepime	Resistent	16		
Cefuroxima	Resistent	>16		
Eritromicina			Resistent	>4
Ertapenem	Sensible	<=0.5		
Sinergisme gentamicina			Sensible	<=500
Gentamicina	Resistent	>8		
Imipenem	Sensible	<=1		
Linezolid			Sensible	2
Piperacil·lina tazobactam	Intermedi	<=8		
Singergisme estreptomicina			Resistent	>1000
Trimet/Sulfa	Resistent	>2/38		
Tetraciclina			Resistent	>8
Teicoplanina			Sensible	<=1
Tigeciclina	Sensible	<=1		
Tobramicina	Resistent	>8		
Vancomicina			Sensible	<=1

Tractament:

- Ciprofloxacino IV 400mg/12h

+

linezolid oral 600mg/12h

ETIOLOGIA

Table 9.4: The most common pathogens in prostatitis

Aetiologically recognized pathogens*
Escherichia coli
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Proteus mirabilis
Enterococcus faecalis
Pseudomonas aeruginosa
Organisms of debatable significance
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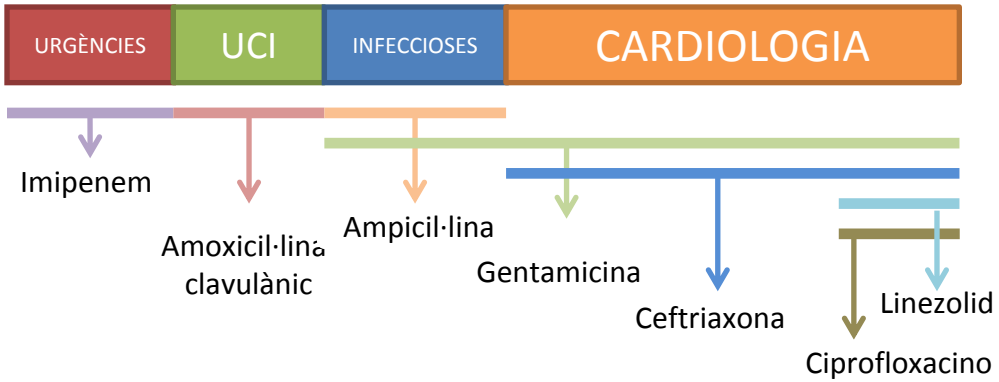
Streptococci
Corynebacterium spp.
Chlamydia trachomatis
Ureaplasma urealyticum
Mycoplasma hominis

*Adapted from Weidner et al. (2) and Schneider et al. (14).

Naher KG, Bergman B, Bishop MC, Bierklund-Johansen TE, Botto H, Lobel B, et al. EAU guidelines for the management of urinary and male genital tract infections. *Eur Urol* 2001; Nov;40(5):576-88



Proves:

- Sol·licitud HC
- Sol·licitud TEE
- Sol·licitud ecografia transrectal

Signes i símptomes:

- Persistència de diarrea
- Pruït i eritema en extremitats després de l'administració del ciprofloxacino

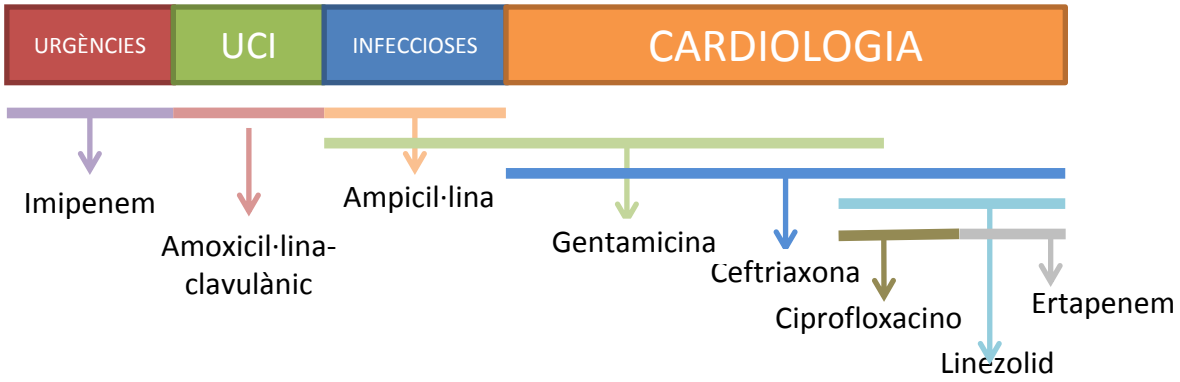
Tractament:

Ciprofloxacino 400 mg/12h → ertapenem 1g/24h

Hausermann P, Scherer K, Weber M, Bircher AJ. Ciprofloxacin-induced acute generalized exanthematous pustulosis mimicking bullous drug eruption confirmed by a positive patch test. Dermatology.2005; 211 (3): 277-80.

CARDIOLOGIA

22-23/10/13



Analítica:

	22-10-13 23:46	21-10-13 08:08
UREA Serum	30	19
CREATININA Serum	1.52	0.96
F. GLOMERULAR ESTIMAT (MD	52	>60

PROTEÏNA C REACTIVA	3,3	3,07	mg/dl	0-0,6

Hemocultiu:

- Negatiu

Tractament:

- **STOP** gentamicina per:
  - Cumpliment dels 15 dies de tractament
  - HC negatiu
  - Empitjorament de la FR

Proves:

- Sol·licitud de toxina de Clostridium
- Sol·licitud de nivells de linezolid

LINEZOLID

- Antibiòtic de la familia **oxazolidinones**

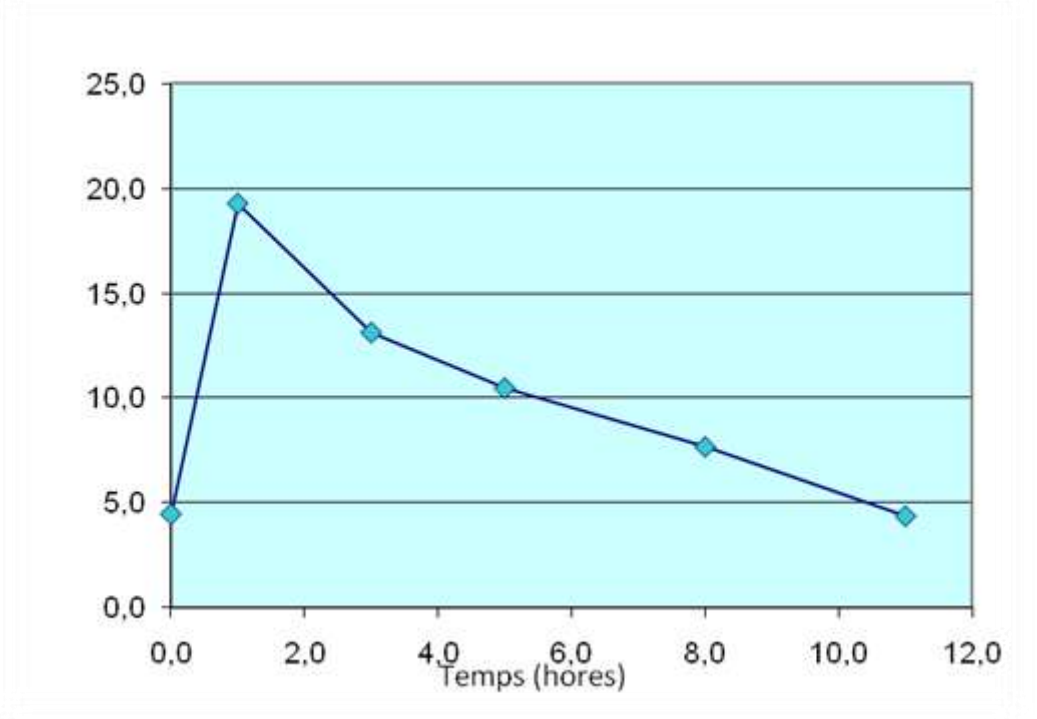
- **Eficàcia**, depèn de 4 factors:
  - Activitat antibacteriana temps-depenent. Els índexs PK/PD predictors d'eficàcia són:
    - AUC/CMI entre 40-50 en pacients no crítics i entre 80-100 en pacients crítics
    - Temps > CMI entre 40-50% en pacients no crítics i 80-100% en pacients crítics
  - Punt de tall de sensibilitat: CMI 2-4mg/L
  - Efecte post antibiòtic: 1-3h
  - Resistència adaptativa

Dryden, MS. Linezolid pharmacokinetics and pharmacodynamics in clinical treatment. *J Antimicrob Chemother.2011; 66* Suppl 4: iv7-iv15.

LINEZOLID

- **Absorció:**
  - BD oral 100% (pic per via oral a les 2h post-administració de la dosi)

- **Distribució:**
  - Bona penetració a diferents teixits i fluids (pulmó, líquid alveolar, saliva, SNC)



Concentració plasmàtica de linezolid (mcg/ml) vs temps (hores)

Dryden, MS. Linezolid pharmacokinetics and pharmacodynamics in clinical treatment. *J Antimicrob Chemother.2011; 66 S*uppl 4: iv7-iv15.

LINEZOLID

- **Metabolisme:**
  - Metabolisme oxidatiu, no enzimàtic
- **Eliminació:**
  - S'elimina 65% per via no renal, 30% per via renal i 5% via fecal
  - No s'ajusta en IR
  - S'elimina per tècniques de depuració extrarenal
- **Dosificació:**
  - 400-600 mg/12h oral i IV
  - En obesos no hi ha estudis concloents que recomanin un augment de dosi

TABLE 4
Linezolid (Zyvox) Dosing Recommendations

Infection	*Dosage/route*	*Recommended duration (days)*
Nosocomial pneumonia	600 mg IV or PO every 12 hours	10 to 14
Complicated skin/skin structure infections	As above	As above
Community-acquired pneumonia, including concurrent bacteremia	As above	As above
Vancomycin-resistant *Enterococcus faecium* infections, including concurrent bacteremia	600 mg IV or PO every 12 hours	14 to 28
Uncomplicated skin/skin structure infections	400 mg PO every 12 hours	10 to 14

IV = intravenous; PO = oral

Reproduced with permission from Zyvox (linezolid) approved as super antibiotic, new treatment option for hospital-acquired and drug-resistant bacteria. Pharmacia Corporation: Peapack, N.J.: April 18, 2000.

Ament P W, Jamshed N, Horne JP. Linezolid: its role in the treatment of gram-positive, drug-resistant bacterial infections. *Am Fam Physician.* 2002; *65*(4), 663-70.

Niwa T, Watanabe T, Suzuki A, Ohmori T, Tsuchiya M, Suzuki T, et al. Reduction of linezolid-associated thrombocytopenia by the dose adjustment based on the risk factors such as basal platelet count and body weight. 2014. *Diagnostic Microbiology and Infectious Disease*.

LINEZOLID

J Clin Pharmacol. 2013 Sep;53(9):967-73. doi: 10.1002/jcph.133.

Population pharmacokinetic analysis of linezolid in low body weight patients with renal dysfunction.

Tsuji Y, Yukawa E, Hiraki Y, Matsumoto K, Mizoguchi A, Morita K, Kamimura H, Karube Y, To H.

Author information

Abstract

Linezolid has antibacterial activity against aerobic Gram-positive cocci, including methicillin-resistant Staphylococcus aureus (MRSA). Adjustment of the dose of linezolid has been proposed to be unnecessary in patients with reduced renal function. However, platelet counts and hemoglobin levels were shown to be significantly lower in such patients than in patients with normal renal function. The population pharmacokinetic (PPK) of linezolid was investigated in MRSA infected patients with renal dysfunction. Linezolid concentrations in serum were measured by high-performance liquid chromatography. PPK analysis was performed in the nonlinear mixed effects model (NONMEM) computer program. In the final PPK model, total body weight (TBW), estimated glomerular filtration rate (eGFR), hemoglobin (HB), and alanine amino transferase (ALT) were influential covariates on total body clearance (CL), and the volume of distribution (Vd) was affected by TBW, which was expressed as CL (L/h) = 0.00327 × TBW × eGFR(0.428) × HB(0.502) × 0.283 (ALT ≥ 100 IU/L) and CL (L/h) = 0.00327 × TBW × eGFR(0.428) × HB(0.502) (ALT < 100 IU/L), Vd (L) = 1.310 × TBW. The PPK parameters of linezolid obtained here are useful for the optimal use of linezolid with similar patient population characteristics.

LINEZOLID

- **Espectre d'acció:**
  - Cocs grampositius (estafilococs, estreptococs, enterococs i pnemococs) incloent soques resistents a penicil·lina, meticil·lina i vancomicina
  - Bacils (Clostridium, Corynbacterium, Lactobacillus, Rhodococcus equi, Pediococcus, Listeria, Leuconostoc i Bacillus)
  - Altres: Legionella, Moraxella catarrhalis i Bordetella pertussis, Peptostreptococcus, Prevotella, Fusobacterium nucleatum, Pausterella multocida, Chryseobacterium meningosepticum, Nocardia, Mycobacterium tuberculosis i M. Avium complex

LINEZOLID

- **Efectes adversos**:
  - Gastrointestinals (nàusees, diarrea)
  - Cefalea
  - Dolor en el punt d'injecció
  - Mielosupressió (trombocitopènia i anèmia) reversible. S'han identificat diversos factors de risc:
    - Funció renal deteriorada
    - Durada del tractament > 14 dies
    - Valor basal de plaquetes < $200x10^9/L$
    - Nivells plasmàtics elevats (vall)

Hiraki Y, Tsuji Y, Matsumoto K, Morita K, Kamimura,H & Karube Y. Influence of linezolid clearance on the induction of thrombocytopenia and reduction of hemoglobin. *American J Med Sci.* 2011; *342*(6), 456-460.

LINEZOLID

Influence of Linezolid Clearance on the Induction of Thrombocytopenia and Reduction of Hemoglobin

Yoichi Hiraki, BSc, Yasuhiro Tsuji, PhD, Kana Matsumoto, PhD, Kunihiko Morita, PhD, Hidetoshi Kamimura, PhD and Yoshiharu Karube, PhD

Abstract: *Introduction:* Although linezolid (LZD) has proven effective for the treatment of infections caused by multidrug-resistant Gram-positive cocci, thrombocytopenia and anemia associated with reduced hemoglobin (Hb) levels are common side effects. To study the association between the development of these adverse effects and blood LZD levels, the authors evaluated the correlation between LZD clearance (LZD-CL), platelet (PLT) counts and Hb levels. *Methods:* Sixteen patients with methicillin-resistant *Staphylococcus aureus* infection were administered LZD over a period of 4 to 41 days, and blood was collected at variable time points beginning on day 4 (n = 31). Blood LZD levels were measured by high-performance liquid chromatography, and LZD-CL was estimated by the population pharmacokinetics mean parameter and Bayesian methods. The relationship between the estimated LZD-CL and reductions in PLT counts and Hb levels was then evaluated by regression analysis. *Results:* During the LZD treatment period, a weak correlation was identified between the LZD-CL rate and PLT counts ($r^2 = 0.31$, n = 31). Significantly, the regression analysis between LZD-CL and Hb levels showed a stronger correlation ($r^2 = 0.54$, n = 31), with Hb levels clearly decreasing with reductions in the LZD-CL rate. *Conclusions:* In patients undergoing treatment with LZD, low LZD-CL rates correlated with reductions of both PLT counts and Hb levels, suggesting that increase of blood LZD levels influences hematopoietic function. Because a strong correlation was noted between LZD-CL and Hb levels, closely monitoring changes in Hb levels during treatment with LZD may detect the development of adverse effects such as thrombocytopenia and anemia.

Hiraki Y, Tsuji Y, Matsumoto K, Morita K, Kamimura,H & Karube Y. Influence of linezolid clearance on the induction of thrombocytopenia and reduction of hemoglobin. *American J Med Sci.* 2011; *342*(6), 456-460.

LINEZOLID

- **Interaccions:**
  - Fàrmacs serotoninèrgis: síndrome serotoninèrgic

Clinical Relevance of Linezolid-Associated Serotonin Toxicity

Melanie R Woytowish, Lena M Maynor

OBJECTIVE: To evaluate and review the literature surrounding serotonin toxicity in patients receiving linezolid and determine the clinical relevance of this reaction.

DATA SOURCES: Literature was accessed via MEDLINE/PubMed and Google Scholar (both through February 2013) using the search terms linezolid, serotonin syndrome, serotonin toxicity, and adverse reaction.

STUDY SELECTION AND DATA EXTRACTION: Relevant case reports, retrospective studies, surveys, and review articles were included. Bibliographies of all relevant articles were reviewed for additional sources.

DATA SYNTHESIS: Linezolid exhibits mild, nonselective inhibition of monoamine oxidase and has been associated with serotonin toxicity when used in combination with other serotonergic agents. Based on published reports, the incidence of linezolid-associated serotonin toxicity is between 0.54% and 18.2%. Our review identified 32 documented cases, including 3 fatalities. Most cases occurred in patients concurrently receiving selective serotonin reuptake inhibitors. Receipt of multiple agents with serotonergic activity seems to increase the risk of serotonin toxicity. Both onset and resolution of symptoms varied from hours to days.

CONCLUSIONS: Current Food and Drug Administration recommendations to avoid the use of linezolid in patients receiving select serotonergic agents highlight the need to carefully balance the risk/benefit ratio in this situation. Although linezolid has been available for 12 years, reports of serotonin toxicity with this agent are uncommon. While clinicians should be aware of this potentially severe interaction and closely monitor patients who are receiving linezolid in combination with serotonergic agents, our findings show that linezolid is not contraindicated in this situation.

Ann Pharmacother 2013;47:388-97.

Published Online, 19 Feb 2013, *theannals.com*, doi: 10.1345/aph.1R386

LINEZOLID

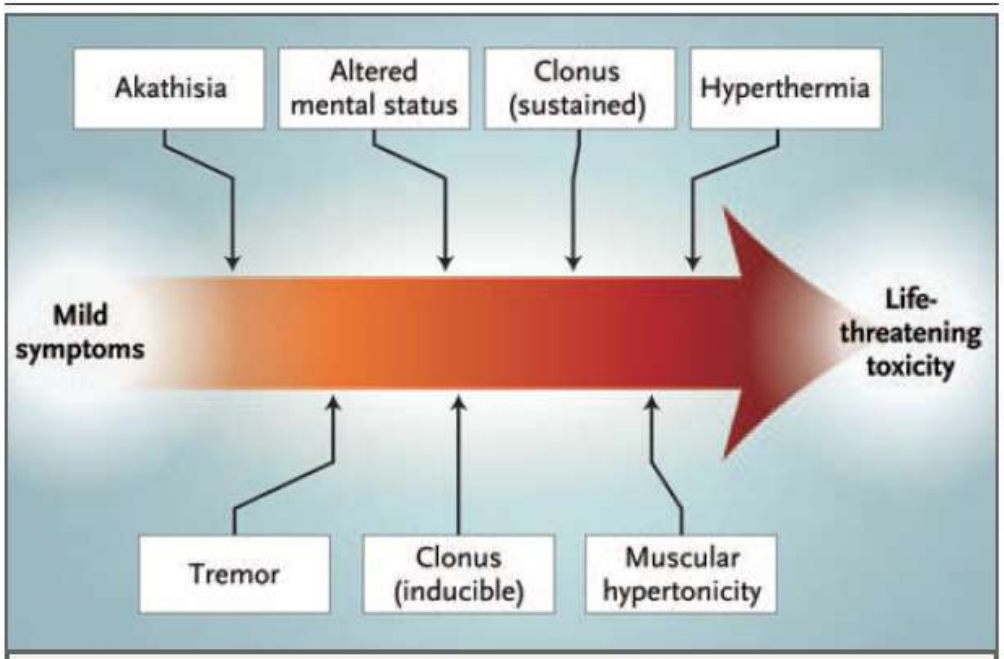


Figure 1. Spectrum of Clinical Findings.

Manifestations of the serotonin syndrome range from mild to life-threatening. The vertical arrows suggest the approximate point at which clinical findings initially appear in the spectrum of the disease, but all findings may not be consistently present in a single patient with the serotonin syndrome. Severe signs may mask other clinical findings. For example, muscular hypertonicity can overwhelm tremor and hyperreflexia.

Boyer EW & Shannon M. The serotonin syndrome. *N Engl J Med.2005; 352*(11), 1112-1120.

Nivells de linezolid:

Sol.licitud

Data: 23/10/2013 Hora: 15:58 Urgent

Receptors seleccionats — Selecció receptors* >>

Farmàcia

Sol.licitud

Paciente con endocarditis por streptococo agalactiae y abcesos prostáticos que se han drenado. En cultivo de dichos abcesos se aisla Enterococo fecium por lo que se encuentra a tratamiento con Linezolid. Solicitamos niveles de linezolid.

Resum Clínic

Seguiment Interconsulta

25/10/2013 12:10 Luque Pardos Sonia - Farmacèutic - Farmàcia:
Resultats dels nivells de linezolid:

- Concentració plasmàtica vall: 22,8 mcg/ml
- Concentració plasmàtica pic: 36,4 mcg/ml

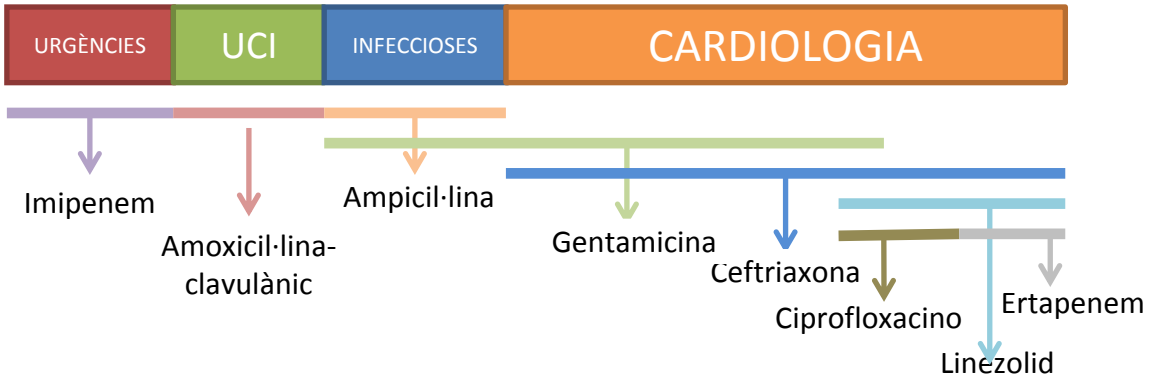
Gràcies

	Enterococcus faecium	
Linezolid	Sensible	2

Reduir la dosi a 300mg/12h

CARDIOLOGIA

25/10/2013



Signes i símptomes:

- Persistència de diarrea
- Persistència de pics febrils

Analítica:

	25-10-13 08:07	22-10-13 23:46	21-10-13 08:08
UREA Serum		30	19
CREATININA Serum	1.89	1.52	0.96
F. GLOMERULAR ESTIMAT (MD	41	52	>60

PROTEÏNA C REACTIVA	5,04	3,3	mg/dl	0-0,6

Ecografia transrectal:

- Persistència de les 3 col·leccions prostàtiques

Toxina de *Clostridium*:

C.difficile TOXINA A/B Fe	N
C. difficile ANTIGEN en F	N

TEE:

- Possible perforació del vel anterior de la vàlvula mitral, sense complicacions perianulars

IC Urología:

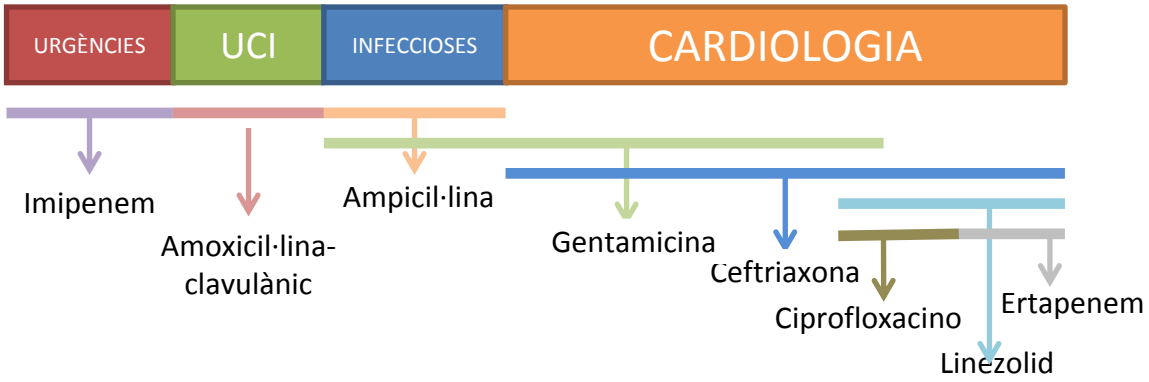
- Valorar tractament més agressiu dels abscessos prostàtics, ja que en cas de mala evolució de l'endocarditis, això suposaria una contraindicació quirúrgica per al recanvi valvular

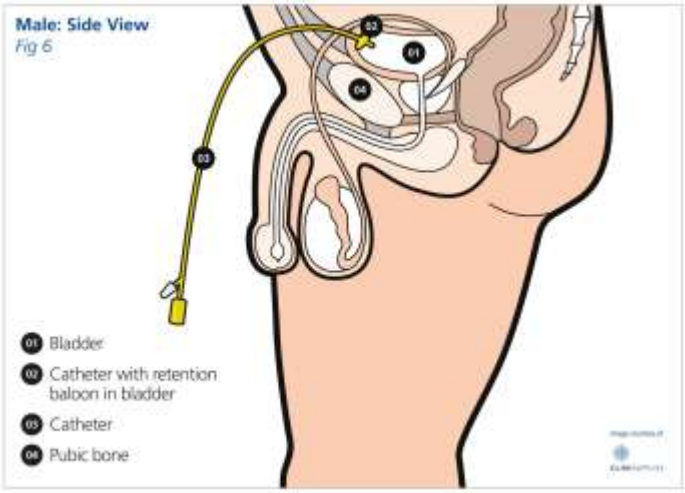
Tractament:

- Linezolid 600 mg/12h oral → linezolid 600mg/12h IV

CARDIOLOGIA

26-27/10/2013





IC urologia:

- Nou drenatge dels abscessos del que s'extreu material purulent
- Col·locació de sonda suprapúbica

Cultiu de l'abscés prostàtic:

CULTIU AEROBI Absces	Negatiu
CULTIU ANAEROBI Absc	Negatiu
TINCIO GRAM Absces	No s'observen microorganismes
CULTIU Micobacteris	Vegeu comentari
CULTIU Micobacteris	Pendent
CULTIU Micobacteris	Negatiu
TINCIO AURAMINA Biop	Negatiu
T. ZIEHL Micobacteri	Negatiu

Proves:

- Sol·licitud de nivells de linezolid
- Sol·licitud ecografia transrectal

CARDIOLOGIA 28/10/2013

Nivells de linezolid:

Sol.licitud

Data: 25/10/2013 Hora: 14:58 Urgent

Receptors seleccionats — Selecció receptors* >>

Farmàcia

Sol.licitud	Resum Clínic
niveles de linezolid proximo lunes 28/10	niveles de linezolid proximo lunes 28/10

Seguiment Interconsulta

28/10/2013 15:14 Luque Pardos Sonia - Farmacèutic - Farmàcia:
Resultats dels nivells de linezolid extretes avui 28-10-13

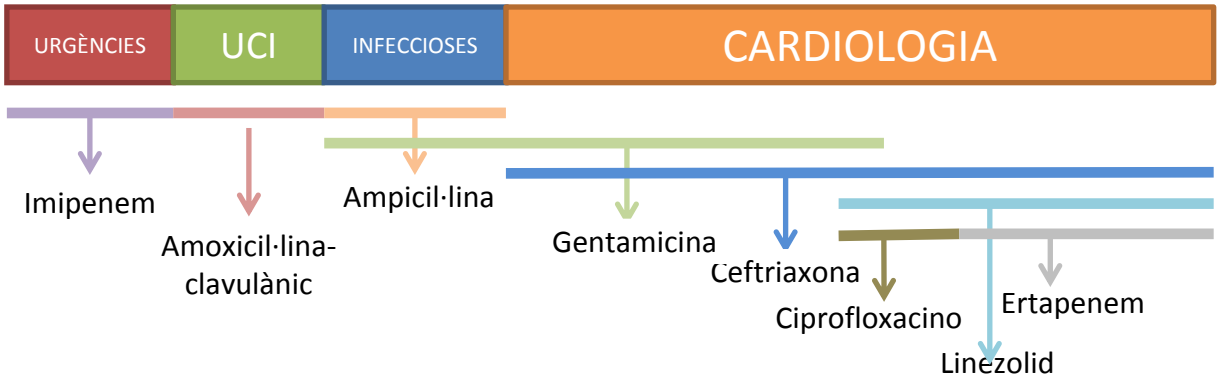
- Concentració plasmàtica vall: 14,7 mcg/ml
- Concentració plasmàtica pic: 30,2 mcg/ml

Reduir la dosi a 300mg/12h

	28-10-13 08:59	25-10-13 15:45	25-10-13 08:07	25-10-13 03:13
- Bioquímica				
GLUCOSA Serum				74
UREA Serum	25			26
CREATININA Serum	1.37		1.89	1.60
F. GLOMERULAR ESTIMAT	59		41	49

CARDIOLOGIA

28-31/10/2013



Signes i símptomes:

- Afebril
- Sense diarrees

Analítica:

	31-10-13 08:09	28-10-13 08:59	25-10-13 15:45	25-10-13 08:07	25-10-13 03:13
- Bioquímica					
GLUCOSA Serum					74
UREA Serum	18	25			26
CREATININA Serum	1.05	1.37		1.89	1.60
F. GLOMERULAR ESTIMAT	>60	59		41	49

PROTEÏNA C REACTIVA	2,11	5,04	mg/dl	0-0,6

Ecografia transrectal:

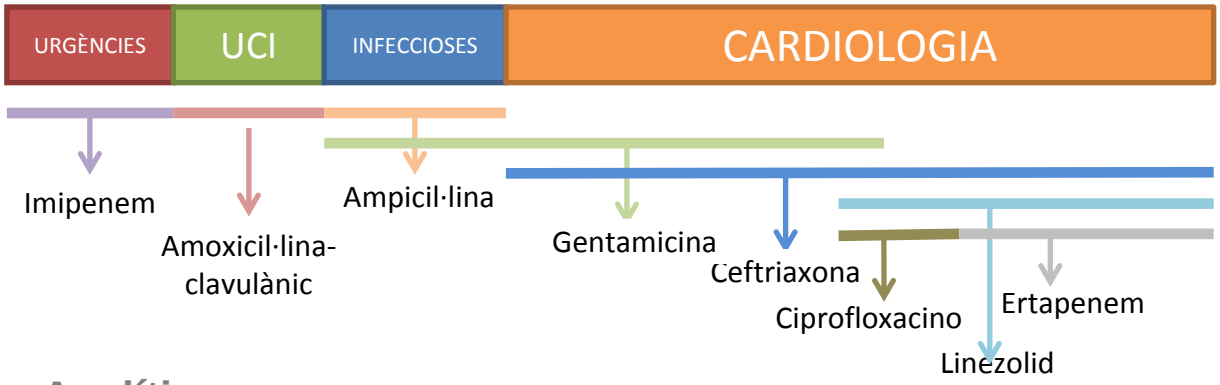
- Resolució dels abscessos prostàtics

Tractament:

- Linezolid 600 mg/12h IV → linezolid 300 mg/12h IV

CARDIOLOGIA

5-8/11/2013



Analítica:

PROTEÏNA C REACTIVA	0,57	2,13	mg/dl	0-0,6

Tractament:

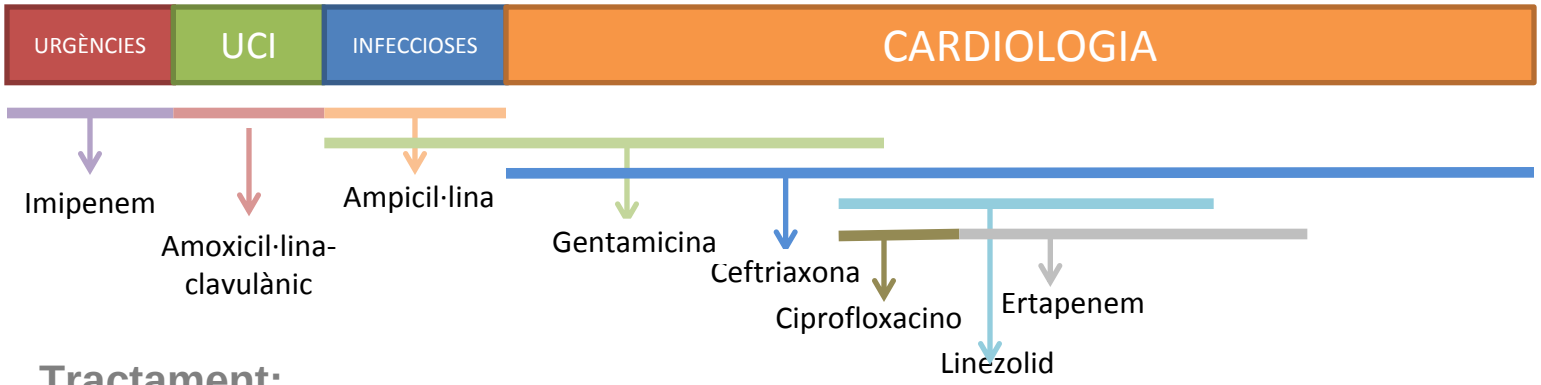
- **STOP** linezolid per:
  - Resolució dels abcessos prostàtics
  - Cultiu de l'abscés prostàtic negatiu
  - Trombopenia progressiva

TINCIO GRAM Absces	NSOM
CULTIU AEROBI Absces	N
CULTIU ANAEROBI Absces	N

DATA	20/11	11/11	5/11	31/10	28/10	25/10	22/10	21/10
PLAQUETES	**299**	**137**	**130**	**142**	**218**	**238**	**212**	**251**

Proves:

- Sol·licitud TTE
- Sol·licitud TC abdomino-pèlvic



Tractament:

- **STOP** ertapenem

IC urologia:

- Retirar la sonda suprapúbica

TTE:

- No s'evidencia vegetació a la vàlvula mitral
- Es confirma la perforació del vel anterior de la vàlvula mitral
- Insuficiència mitral moderada-severa, grau III
- Insuficiència aòrtica moderada, grau II

TC abdomino-pèlvic

- Pròstata pràcticament homogènia, sense signes d'abscés

ALTA

19-26/11/2013

- **STOP** ceftriaxona

INFORME D'ALTA

- Es considera al pacient tributari d'intervenció quirúrgica, de moment amb focus urinari controlat, sense objectivar indicació de tractament antibiòtic però sí d'alt risc de reinfecció o complicació hemodinàmica donades les característiques del TTE

- Control amb visita i hemocultius


MOLTES GRÀCIES!