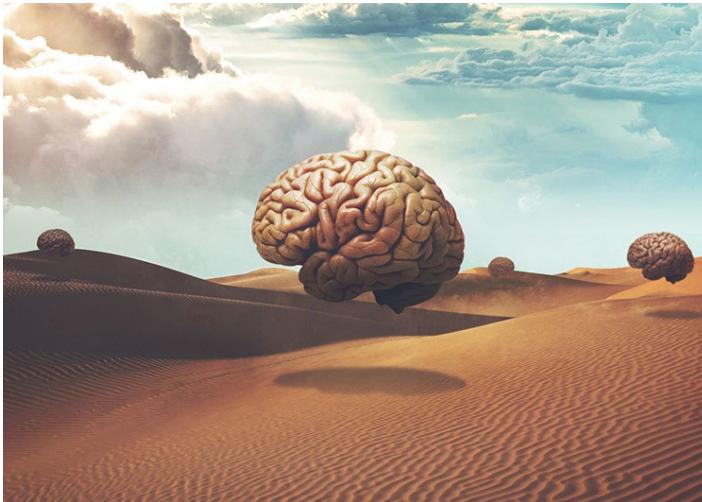


# INFECCIONES ASOCIADAS A DISPOSITIVOS EN SISTEMA NERVIOSO CENTRAL



Iván Pelegrín  
Servicio de Enfermedades Infecciosas  
20 Marzo 2025



## INTRODUCCIÓN

- Infecciones complejas que pueden asociar mortalidad, secuelas neurológicas y consumo de recursos
- Manejo poco homogéneo debido pocos casos por centro y evidencia científica basada en estudios retrospectivos

NEUROCIRUGIA. 2012;23(2):54–59

Jiménez-Martínez et al. *Antimicrobial Resistance and Infection Control*  
(2019) 8:69

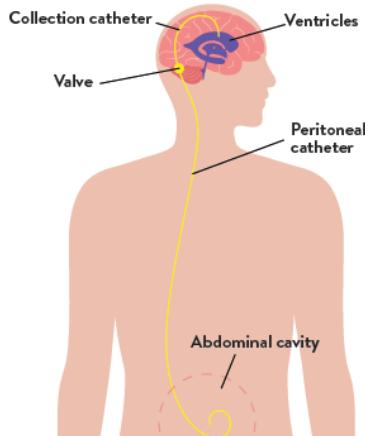
*J Neurol Neurosurg Psychiatry* 2009;80:1381–1385.

# INFECCIONES ASOCIADAS A DISPOSITIVOS

## Dispositivos de derivación de LCR

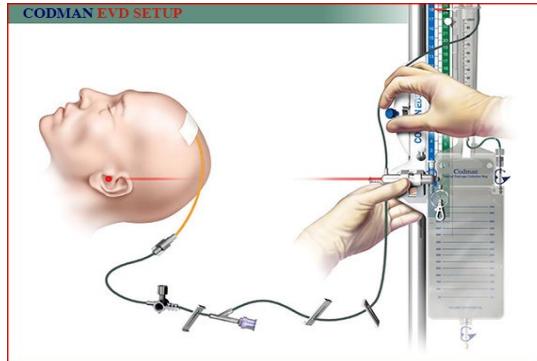
Permanentes:DVP

Infección  
2-13%



Temporales: DVE/DLE

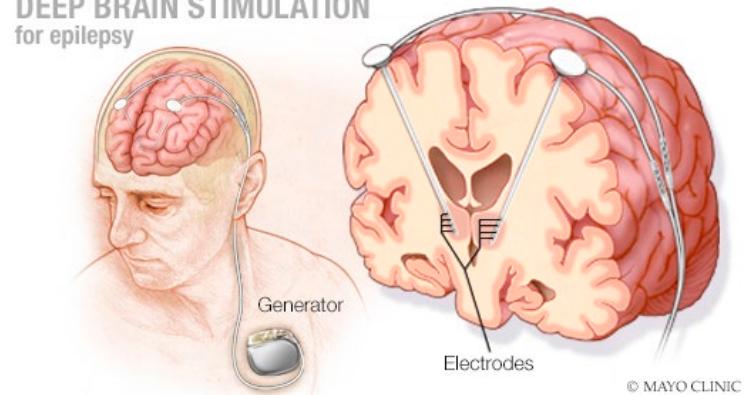
Infección  
2-20%



## Neuroestimuladores corticales/ cerebrales

Infección  
3-9%

DEEP BRAIN STIMULATION  
for epilepsy

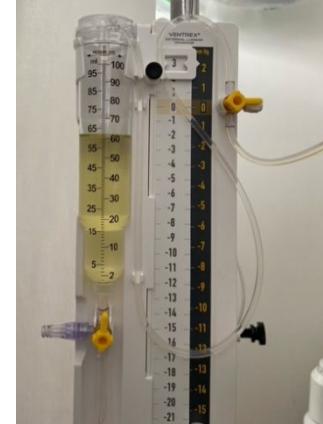
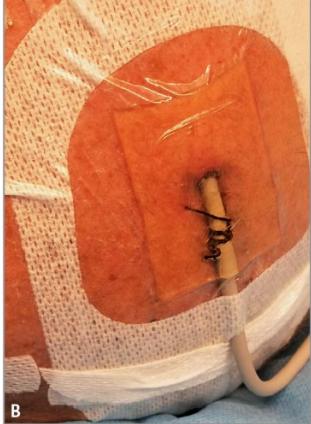


## Dispositivos de derivación de LCR

Hidrocefalia: desbalance producción/absorción LCR

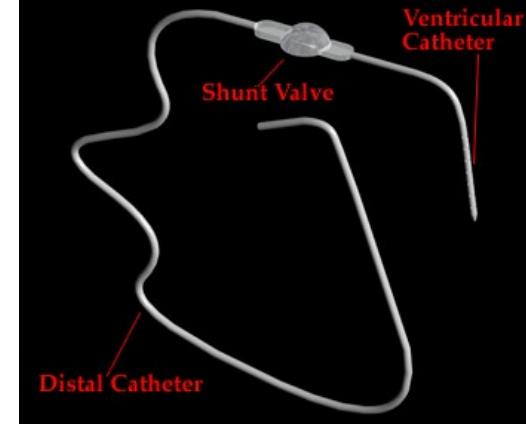
Tratamiento de la hidrocefalia aguda

DVE/DLE

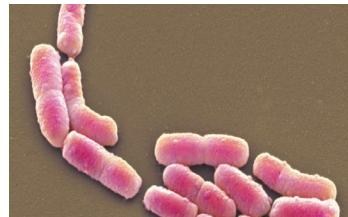
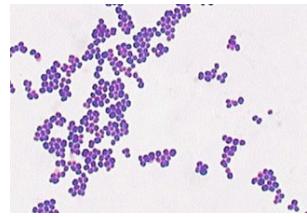


Tratamiento de la hidrocefalia crónica

DVP



# ETIOPATOGENIA

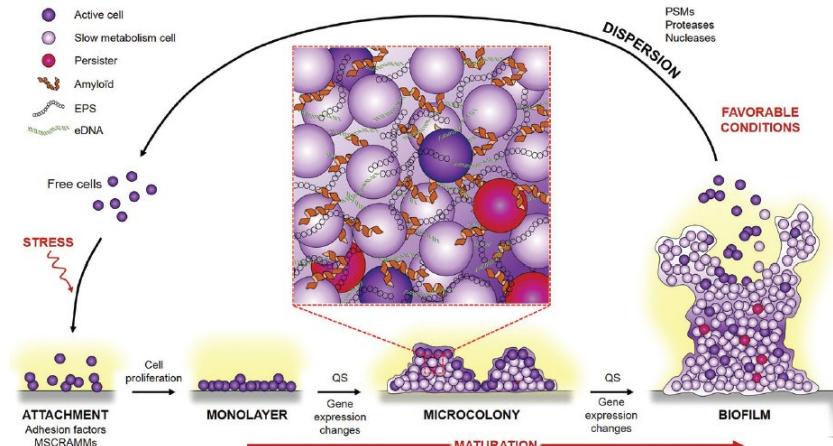


Incremento de infecciones por bacilos Gram – en inf DVE

**Table 3** Microbiology of EVD-related ventriculomeningitis

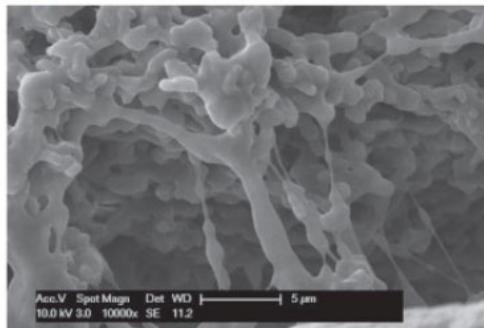
<i>Staphylococcus epidermidis</i>	70 %
<i>Staphylococcus aureus</i>	10 %
Others (including gram negative bacteria and fungi)	< 20 %
– Gram negative rods ( <i>Klebsiella</i> spp., <i>E. coli</i> , <i>Pseudomonas</i> spp.)	15 %
– Anaerobes	rare
– <i>Candida</i> spp.	very rare

## Biofilm

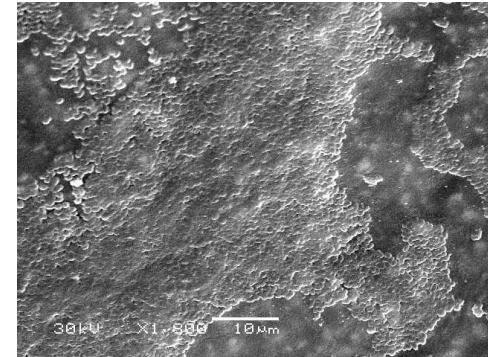
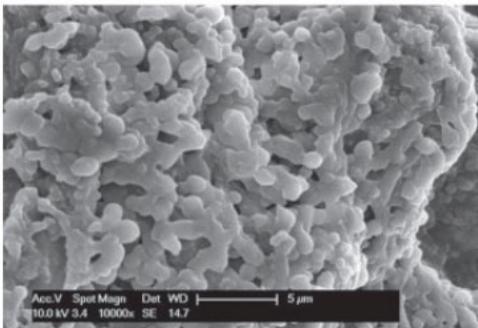


## MICROSCOPIA ELECTRÓNICA

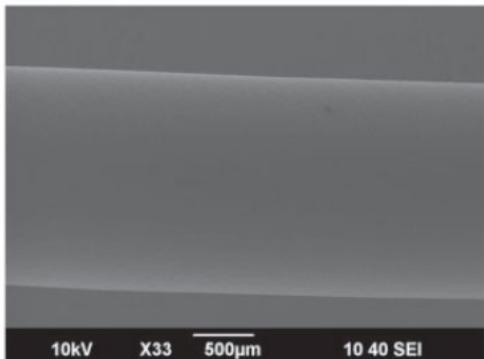
(a)



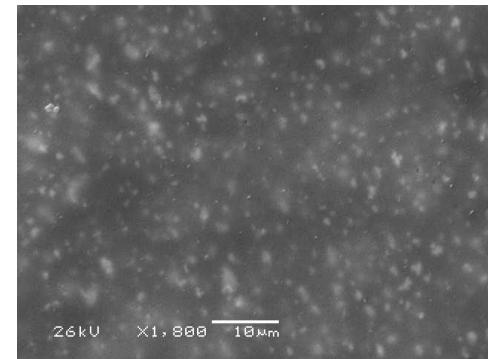
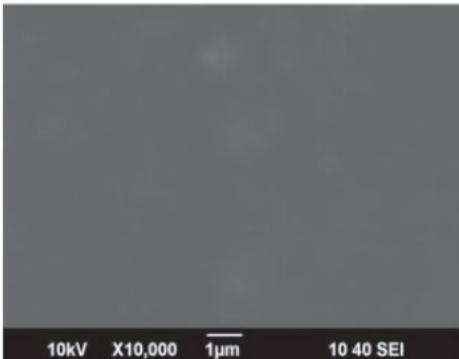
(b)



(c)



(d)



# Dificultades en el tratamiento de las infecciones asociadas a dispositivos

## 1. Biofilm

## 2. MO multiR

## 3. Falta de inflamación en BHE

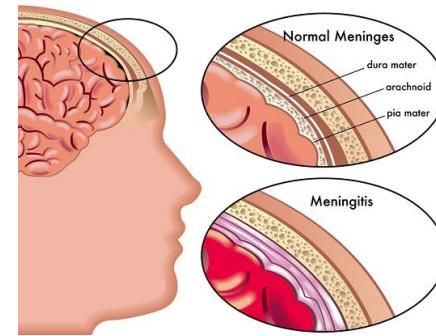


TABLA 2. Agentes etiológicos aislados en infecciones de shunts

Microorganismos	Porcentaje
Cocos grampositivos	65-85
<i>Staphylococcus epidermidis</i> *	32-78
<i>Staphylococcus</i> spp. coagulasa negativos*	38-39
<i>Staphylococcus aureus</i> *	11-38
<i>Streptococcus</i> spp.	5
<i>Enterococcus</i> spp.	1,4
Bacilos gramnegativos	10-25
<i>Escherichia coli</i>	5
<i>Pseudomonas aeruginosa</i>	5
<i>Klebsiella pneumoniae</i>	5
<i>Enterobacter</i> spp.	2
<i>Acinetobacter baumannii</i>	2
Bacterias anaerobias	3-15
<i>Propionibacterium acnes</i>	3-20
Otros	3
<i>Bacillus</i> spp.	1,5
<i>Corynebacterium</i> spp.	1,5
Hongos	4-17
<i>Candida</i> spp.	1-11
Aislamientos polimicrobianos	10-15

\*El 50% de ellos son resistentes a meticilina.

Dismisión de la [ ]  
de ATB en LCR



Table 1. Factors influencing antibiotic concentrations in CSF.

Factor(s) [reference]	Example	Effect
Drug lipophilicity [21-23]	Fluoroquinolones Rifampin	Rapid entry into CSF Relatively good CSF concentrations, $T_{1/2}$ similar to serum
High degree of ionization [21, 23]	$\beta$ -Lactam antibiotics	Low lipid solubility, poor penetration through BBB
High serum protein binding [24]	Ceftriaxone	Delayed entry into CSF, long CSF and serum $T_{1/2}$
Active transport system [25-27]	Penicillin	Relatively rapid entry into CSF, short duration of effective CSF levels
Inflammation [21-23, 28-30]	Meningitis	Increased penetration of hydrophilic agents (minimal effect on lipophilic agents)

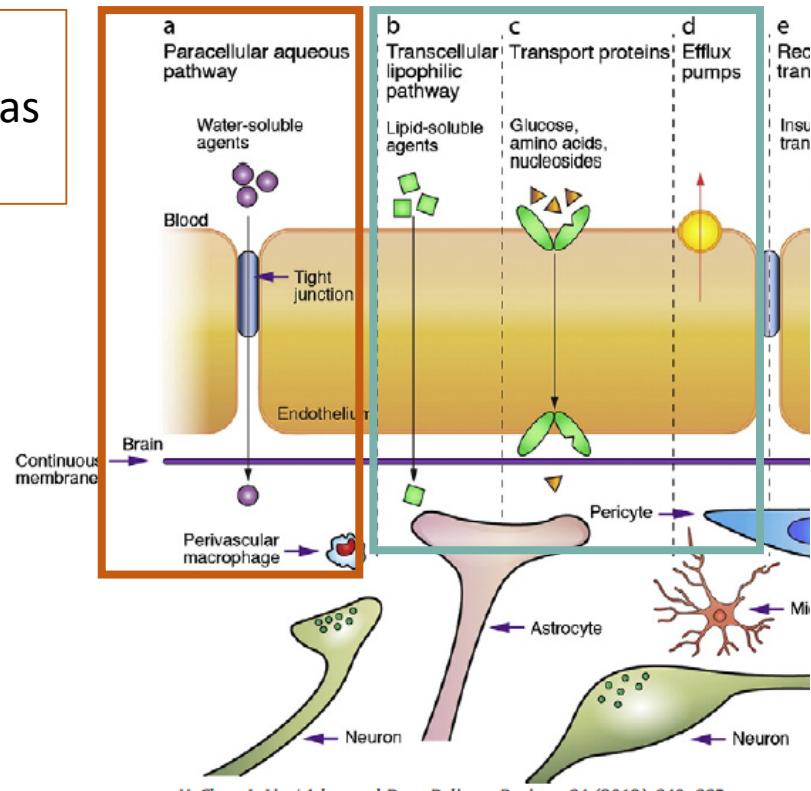
## Penetración en LCR de diferentes antibióticos con meninge inflamada/ no inflamada

	ATB	Meninge inflamada	Meninge no inflamada	Hidrosoluble/lipo soluble
Betalactámicos	Penicilina	20%	2%	H
	Cefalosporinas	15%	0.7-1%	H
	Meropenem	39%	4.7-21%	H
	Fluorquinolonas	70-90%	30-70%	L
Varios	Linezolid	-	90%	L
	Metronidazol	87%	-	L
	Rifampicina	-	22%	L
	Vancomicina	30%	15%	H
	Cotrimoxazol			L
	Sulfametoxazol	42-51%	18%	
	Trimetroprim	24-30%	12%	

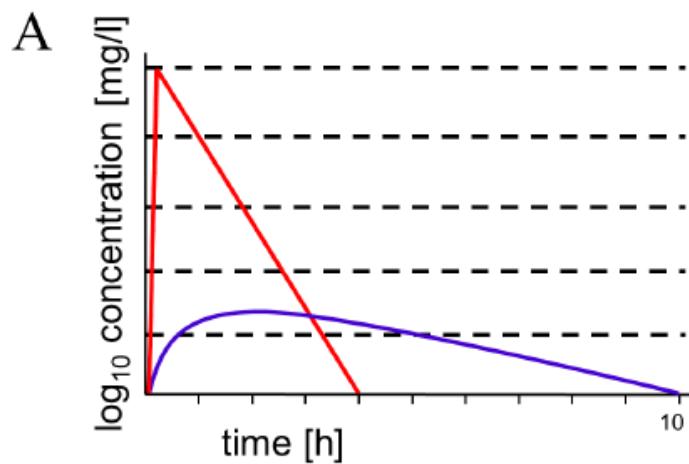
## Penetración en LCR de diferentes antibióticos

ATB hidrofílicos  
Moléculas hidrofílicas  
y pequeñas

ATB lipofílicos  
Bajo peso molecular  
Forma no ionizada



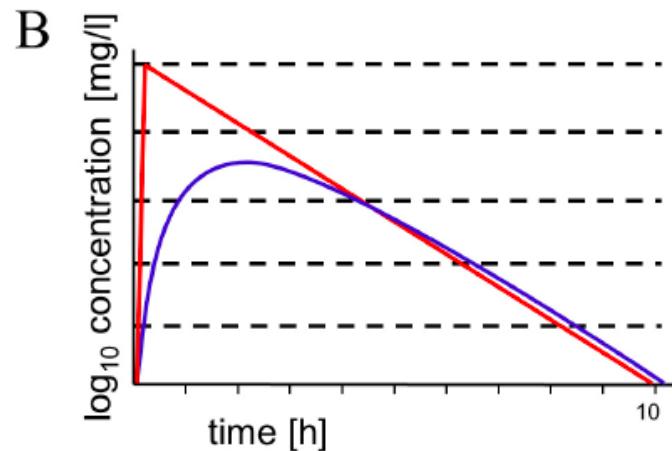
ATB hidrofílicos



Curvas concentración/tiempo en serum rojo y en LCR (azul)

Penetración ≠ Eficacia

ATB lipofílicos



Curvas concentración/tiempo en serum rojo y en LCR(azul)

# 2017 Infectious Diseases Society of America's Clinical Practice Guidelines for Healthcare-Associated Ventriculitis and Meningitis\*

Allan R. Tunkel,<sup>1</sup> Rodrigo Hasbun,<sup>2</sup> Adarsh Bhimraj,<sup>3</sup> Karin Byers,<sup>4</sup> Sheldon L. Kaplan,<sup>5</sup> W. Michael Scheld,<sup>6</sup> Diederik van de Beek,<sup>7</sup> Thomas P. Bleck,<sup>8</sup> Hugh J. L. Garton,<sup>9</sup> and Joseph R. Zunt<sup>10</sup>

CID 2017;64 (15 March) • Tunkel et al

Inicio rápido de tratamiento  
ATB empírico

+

Retirada/recambio drenaje

Vancomicina 1g/12-8h ev + Meropenem 2g/8h ev  
(Ceftazidima 2g/8h ev o Cefepime 2g/8h ev)

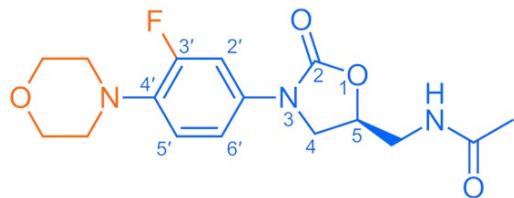
Si alergia a betalactámicos confirmada:  
Aztreonam 2g/8h ev

Duración tratamiento  
antibiótico 10-14 días

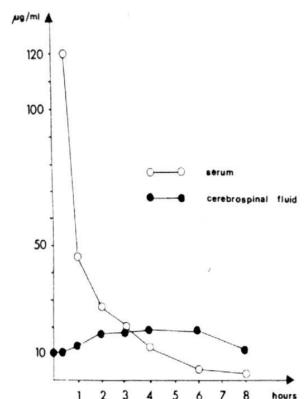
SCN	10-14d
SA	14d
BGN	14-21d

## Estrategias para optimización de la exposición antibiótica

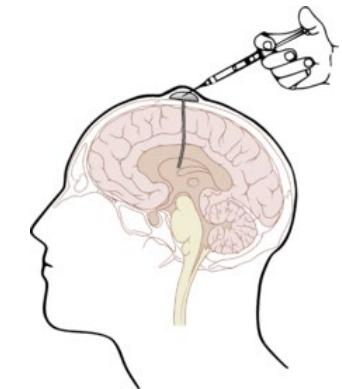
Linezolid/ nuevos fármacos



Ajuste de dosis/posología



Tratamiento intraventricular



# Linezolid for therapy of *Staphylococcus aureus* meningitis: a cohort study of 26 patients

Vicente Pintado<sup>a</sup> , Rosario Pazos<sup>a,b</sup>, Manuel Enrique Jiménez-Mejías<sup>c</sup>, Azucena Rodríguez-Guardado<sup>d</sup>, Beatriz Díaz-Pollán<sup>e</sup>, Carmen Cabellos<sup>f</sup>, Juan Manuel García-Lechuz<sup>g,h</sup>, Jaime Lora-Tamayo<sup>i</sup>, Pere Domingo<sup>j</sup>, Elena Muñez<sup>k</sup>, Diego Domingo<sup>l</sup>, Fernando González-Romo<sup>m</sup>, José Antonio Lepe-Jiménez<sup>c</sup>, Carlos Rodríguez-Lucas<sup>d</sup>, Eulalia Valencia<sup>e</sup>, Iván Pelegrín<sup>f</sup>, Fernando Chaves<sup>n</sup>, Virginia Pomar<sup>i</sup>, Antonio Ramos<sup>k</sup>, Teresa Alarcón<sup>i</sup> and Elisa Pérez-Cecilia<sup>m</sup>

INFECTIOUS DISEASES,  
2020; VOL. 0,  
NO. 0, 1-8



International Journal of Antimicrobial Agents 44 (2014) 409–415

Contents lists available at ScienceDirect

International Journal of Antimicrobial Agents

Journal homepage: <http://www.elsevier.com/locate/ijantimicag>

- 350 meningitis SA
- 26 pacientes, 83% nosocomial, 50% dispositivo
- 10 pacientes empírico, 10 dirigido y 6 de rescate de vancomicina
- Mortalidad con vancomicina: Linezolid 9% vs 20% vancomicina ( $p=0.16$ )
- Efectos adversos 14%, STOP 1 paciente.

Plasma and cerebrospinal fluid concentrations of linezolid in neurosurgical critically ill patients with proven or suspected central nervous system infections

S. Luque<sup>a</sup>, S. Grau<sup>a,b</sup>, F. Alvarez-Lerma<sup>c</sup>, O. Ferrández<sup>a</sup>, N. Campillo<sup>a</sup>, J.P. Horcajada<sup>d</sup>, M. Basas<sup>c</sup>, J. Lipman<sup>e,f</sup>, J.A. Roberts<sup>e,f,\*</sup>

11 pacientes neurocríticos con DVE  
afectos de infección neuroquirúrgica  
Medición de niveles Linezolid plasma y  
LCR

$$\text{AUC}_{\text{csf}}/\text{AUC}_{\text{blood}} = 0.77$$

Variabilidad de niveles  
entre pacientes

**Table 1. Recommended Antimicrobial Therapy in Patients With Healthcare-Associated Ventriculitis and Meningitis Based on Isolated Pathogen and In Vitro Susceptibility Testing**

Microorganism	Standard Therapy	Alternative Therapies
<i>Staphylococci</i> <sup>a</sup>		
Methicillin sensitive	Nafcillin or oxacillin	Vancomycin
Methicillin resistant	Vancomycin	Daptomycin, trimethoprim-sulfamethoxazole, or linezolid
<i>Propionibacterium acnes</i>	Penicillin G	Third-generation cephalosporin, <sup>b</sup> vancomycin, daptomycin, or linezolid

Clinical Microbiology and Infection 30 (2024) 66–89



Contents lists available at ScienceDirect

## Clinical Microbiology and Infection

journal homepage: [www.clinicalmicrobiologyandinfection.com](http://www.clinicalmicrobiologyandinfection.com)



### Guidelines

European society of Clinical Microbiology and Infectious Diseases guidelines on diagnosis and treatment of brain abscess in children and adults

Jacob Bodilsen <sup>1, 2, 3, \*</sup>, Quintino Giorgio D'Alessandris <sup>4, 5</sup>, Hilary Humphreys <sup>6</sup>, Mildred A. Iro <sup>7</sup>, Matthias Klein <sup>3, 8, 9</sup>, Katharina Last <sup>3, 10</sup>, Inmaculada López Montesinos <sup>11, 12</sup>, Pasquale Pagliano <sup>3, 13, 14</sup>, Oğuz Reşat Sipahi <sup>3, 15, 16</sup>, Rafael San-Juan <sup>12, 17, 18</sup>, Pierre Tattevin <sup>3, 19</sup>, Majda Thurnher <sup>20</sup>, Rogelio de J. Treviño-Rangel <sup>21, 22, 23, 24</sup>, Matthijs C. Brouwer <sup>3, 25</sup>, for the ESCMID Study Group for Infections of the Brain (ESGIB)

We conditionally recommend meropenem combined with vancomycin or linezolid for empirical treatment of post-neurosurgical brain abscess.

Conditional

Low

Vancomycin should be used if infection is caused by methicillin-resistant *S. aureus* (MRSA). If the patient is infected with MRSA strains that have a vancomycin MIC of  $\geq 1 \mu\text{g/mL}$ , linezolid, daptomycin, or trimethoprim-sulfamethoxazole should be considered [96]. If staph-

Tratamiento individualizado

Toxicidad hematológica  
(>14días)

Resistencia (SCN linezolid R)

*Review*

# New Antibiotics for the Treatment of Nosocomial Central Nervous System Infections

Roland Nau <sup>1,2,\*</sup>, Jana Seele <sup>1,2</sup> and Helmut Eiffert <sup>1,3</sup>

Cefiderocol

Dalbavancina

Ceftolozano/tazobactam

Oritavancina

Ceftazidima/avibactam

Tedizolid



# Dose optimisation of antibiotics used for meningitis

Aaron J. Heffernan<sup>a,b</sup> and Jason A. Roberts<sup>a,c,d</sup>

Betalactámicos

[ ]peak en LCR  $\geq$  10 CMI  
para el mo

Estudios en enfermos críticos con  
betalactámicos en perfusión  
extendida/continua T100%>CMI

En SNC estudios contradictorios  
Cinética en LCR es diferente  
No está claro el uso óptimo

Controversia



## Tratamiento intraventricular

- Uso no aprobado por FDA
- En situaciones clínicas especiales:
  - Fracaso clínico y/o microbiológico.
  - Gérmenes multirresistentes que no tengan un buen tratamiento ATB ([ ] no elevadas de ATB frente a una MIC alta).
- Uso combinado ev + IT: rápida esterilización y curación microbiológica.
- Neurotoxicidad
- Ajuste de dosis y monitorizar niveles

IDSA GUIDELINE

Table 3 Common Intraventricular/Intrathecal Treatment Options

Drug	Recommended Adult Daily Dose <sup>#2</sup>	Loading Dose Suggested	Adverse Events Reported <sup>136</sup>	Targeted Pathogens <sup>2,136</sup>
Amikacin	5–50mg	–	Transient hearing loss, seizures, chemical meningitis, radiculopathy (IT)	DTR Gram-negatives
Colistin	10mg	40mg	Chemical meningitis, seizures	DTR Gram-negatives
Daptomycin	5mg	–	Limited data available	Gram-positives non-responding to systemic treatment
Gentamycin	4–8mg	–	Equivalent to amikacin	DTR Gram-negatives
Polymyxin B	5mg	–	Equivalent to colistin	DTR Gram-negatives
Tigecycline <sup>*176</sup>	4–8mg	–	None attributed to the drug	DTR Gram-negatives, especially if colistin-resistant as well; potentially VRE <sup>177</sup>
Tobramycin	5–20mg	–	Equivalent to amikacin	DTR Gram-negatives
Vancomycin	5–20mg	–	CSF pleocytosis, headache	Gram-positives non-responding to systemic treatment

Notes: \*Limited data available. <sup>#</sup>Apart from tigecycline, according to Infectious Disease Society of America recommendations.<sup>2</sup>  
Abbreviations: CSF, cerebrospinal fluid; DTR, difficult-to-treat resistant; IT, intrathecal; VRE, vancomycin-resistant enterococci.

*Review*

# Clinical Experience with Off-Label Intrathecal Administration of Selected Antibiotics in Adults: An Overview with Pharmacometric Considerations

Anouk E. Muller <sup>1,2,3,\*</sup>, Peter van Vliet <sup>4</sup> and Birgit C. P. Koch <sup>3,5</sup>

Tamaño del sistema ventricular

Intraventricular/intralumbar

Flujo de drenaje (ml/día)

Normal: 250-326ml  
Hidrocefalia comunicante: 488ml  
Hidrocefalia no comunicante: 593ml

[ ] diferentes en LCR ventrículo  
y LCR lumbar

1 dosis diaria si drenaje normal

Clampaje DVE 30-120 min



Contents lists available at ScienceDirect

# International Journal of Antimicrobial Agents

journal homepage: [www.elsevier.com/locate/ijantimicag](http://www.elsevier.com/locate/ijantimicag)



18 estudios retrospectivos  
602 pacientes con  
meningitis/ventriculitis postqx  
por BGN

Review

Intrathecal or intraventricular antimicrobial therapy for post-neurosurgical Gram-negative bacillary meningitis or ventriculitis: a systematic review and meta-analysis



Meng-Ting Li <sup>a,†</sup>, Qi-Quan Wu <sup>b,†</sup>, Jia-Bao Li <sup>a</sup>, Ji-Sheng Chen <sup>a,\*</sup>

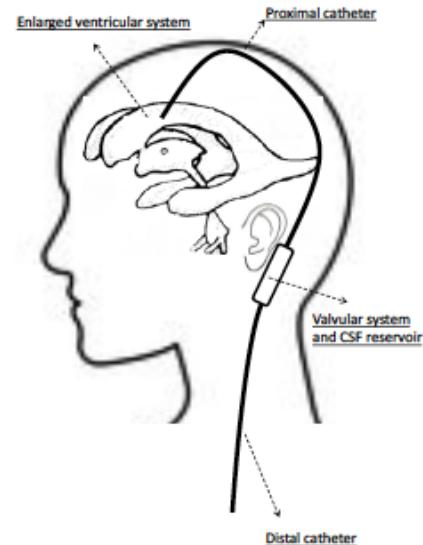
Endpoint primario:  
Mortalidad 30d  
Aclaramiento LCR al final del  
tratamiento  
Efectos adversos raros

Tratamiento  
endovenoso+intratecal

<mortalidad OR 0.30 (0.19-0.47), especialmente BGN  
XDR 0.15 (0.08-0.28)  
Efectos adversos aceptables (meningitis/ventriculitis)  
Aclaramiento microbiológico mayor en BGN XDR

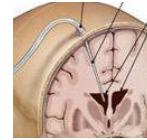
Reduce los signos clínicos  
de meningitis (fiebre,  
rigidez nucal y mejora  
GCS)

# Infecciones asociadas a drenaje ventriculoperitoneales



# Manejo de las infecciones de DVP

Vancomicina 15-  
20mg/Kg +  
Betalactámico  
antipseudomónico



OA

Sólo ATB

SR

Retirada de shunt + ATB

OSSR

Exteriorización del catéter distal  
Esterilización del LCR con ATB  
Una vez estéril, recambio de shunt en 1  
tiempo quirúrgico

TSSR

Retirada del shunt infectado  
+/- DVE +ATB  
Implantación de nuevo dispositivo una  
vez que LCR estéril

OA

Shunt dependiente?

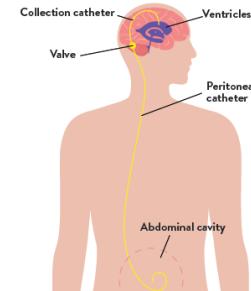
YES

NO

OSSR

TSSR

SR



# Management of Ventriculoperitoneal Shunt Infections in Adults: Analysis of Risk Factors Associated With Treatment Failure

Iván Pelegrín,<sup>1</sup> Jaime Lora-Tamayo,<sup>1,2</sup> Joan Gómez-Junyent,<sup>1</sup> Nuria Sabé,<sup>1</sup> Dolors Garcia-Somoza,<sup>3</sup> Andreu Gabarrós,<sup>4</sup> Javier Ariza,<sup>1</sup> Pedro Fernández Viladrich,<sup>1</sup> and Carmen Cabellos<sup>1</sup>

Cohorte de 108 pacientes adultos con infección de shunt VP desde 1980 a 2014

2017; 64:989-97

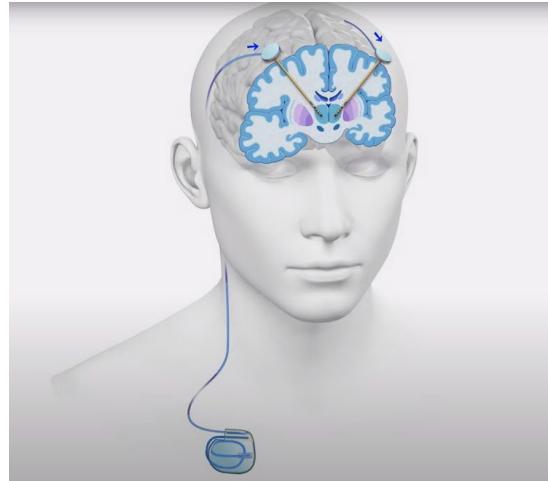


análisis de 86 estrategias

Retirada del shunt infectado se asoció a un mejor pronóstico

La retirada de shunt VP, particularmente TSSR cuando el paciente es shunt dependiente, permanece la opción óptima de tratamiento y no aumenta la morbilidad.

# Infecciones asociadas a neuroestimuladores corticales/cerebrales profundos





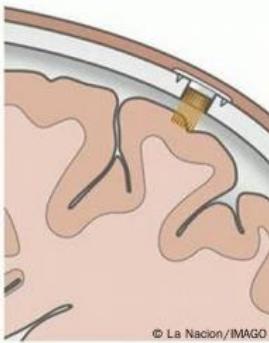
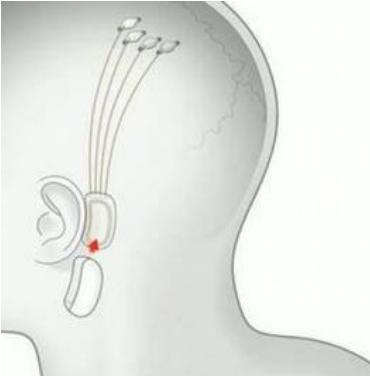
## Tecnología

TU TECNOLOGÍA · CIBERSEGURIDAD · PRIVACIDAD · INTELIGENCIA ARTIFICIAL · INTERNET · GRANDES TECNOLÓGICAS · ÚLTIMAS NOTICIAS

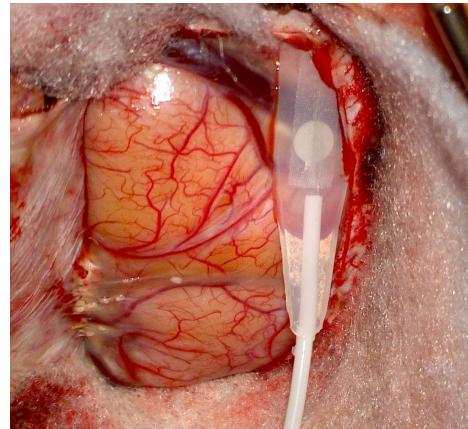
NEURALINK &gt;

# La firma Neuralink, de Elon Musk, probará implantes cerebrales para mover brazos robóticos

El objetivo de la tecnología es permitir utilizar extremidades mecánicas a personas con paraplejia



## Neuroestimuladores corticales



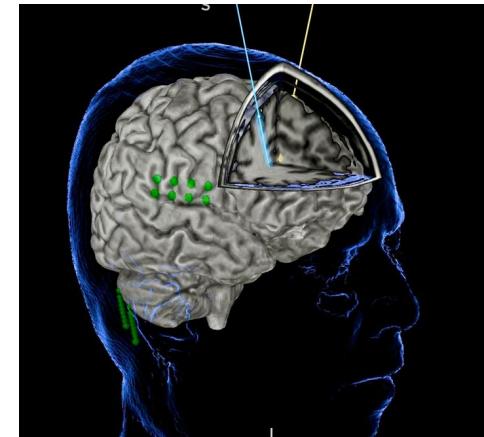
- Colocación puede ser en 1T o en 2T(electrodo y generador por separado)

Imágenes cortesía de Dra Gloria Villalba

## Estimuladores cerebrales profundos



- Abordaje ideal: retirada dispositivo + ATB
- Dificultad en algunos casos en retirar el dispositivo



Imágenes cortesía de Dra Gloria Villalba

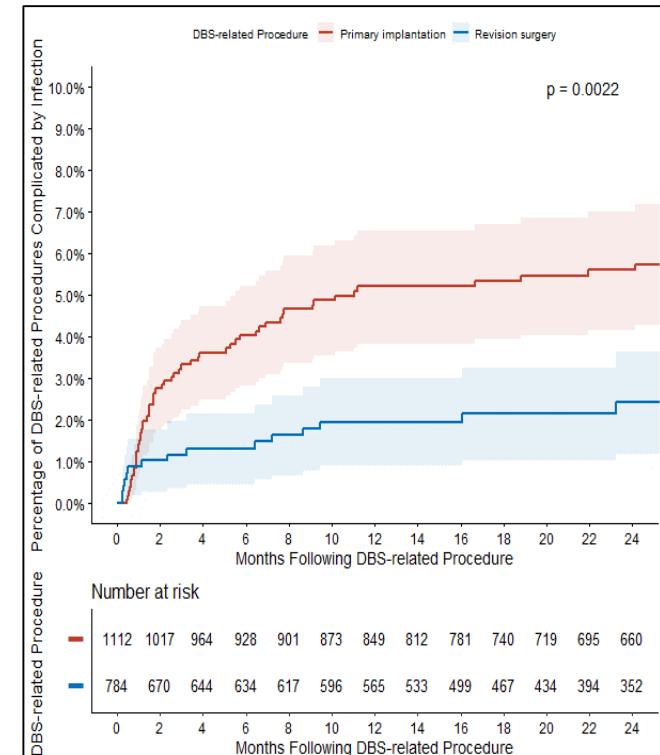
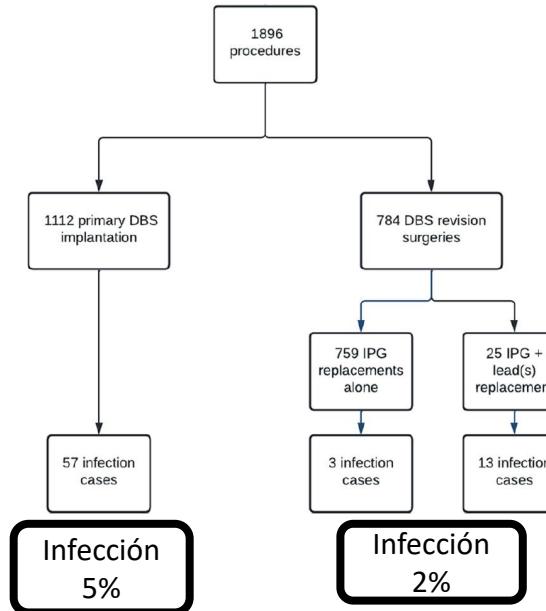
# Deep Brain Stimulator Device Infection: The Mayo Clinic Rochester Experience

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- Estudio retrospectivo en adultos con implantación/revisión DBS 2000-2020

- Tiempo de infección  
2.1 (0.9-6.9 IQR)  
meses



- FR de infección: IMC, Duración IQ, Hombres, DM y edad joven
- Más infecciones en grupo 2T IQ pero  $p>0.05$ .
- No diferencias en pacientes con antibióticos tópicos (Bacitracina, vancomicina)

**Table 4. Microbiology of DBS-Related Infections (n = 114)**

Gram-Positive Pathogens	No. of Isolates (%)	Gram-Negative Pathogens	No. of Isolates (%)
<i>S. aureus</i>	39 (34.2)	<i>Citrobacter koseri</i>	2 (1.8)
• Methicillin resistant	4	<i>P. aeruginosa</i>	2 (1.8)
• Methicillin susceptible	35	<i>K. aerogenes</i>	2 (1.8)
CoNS	31 (27.2)	<i>Klebsiella pneumoniae</i>	1 (0.9)
• <i>S. epidermidis</i>	11	<i>Serratia marcescens</i>	1 (0.9)
• <i>S. capitis</i>	11	<i>S. maltophilia</i>	1 (0.9)
• <i>S. lugdunensis</i>	2		
• <i>S. hominis</i>	1		
• <i>S. intermedius</i>	1		
• <i>S. devriesei/ haemolyticus</i>	1		
• Other CoNS	4		
<i>C. acnes</i>	27 (23.7)		
<i>Streptococcus viridans group</i>	1 (0.9)		
<i>S. agalactiae</i>	1 (0.9)		
<i>Bacillus</i> spp.	1 (0.9)		
<i>C. amycolatum</i>	1 (0.9)		
<i>C. kroppenstedtii</i>	1 (0.9)		
<i>Peptocophilus</i>	1 (0.9)		
<i>E. faecalis</i>	1 (0.9)		
<i>Finegoldia magna</i>	1 (0.9)		

Infections	n (%)
Superficial	17 (23%)
Deep uncomplicated	53 (73%)
Deep complicated	3 (4%)
Total	73



1 Cerebritis  
1 Brain abscess  
1 Pus intracranial electrodes

**Table 1. Definition of DBS-Related Infection**

Depth of DBS-Related Infection	Definition
1. Superficial skin and soft tissue infection related to DBS	A patient is considered to have superficial DBS-related SSTI if ≥2 of the following signs are present around the DBS parts: skin erythema, skin swelling, tenderness, wound dehiscence, and wound drainage; with or without positive intraoperative wound cultures AND no evidence of deep infection as defined below. Infection must involve parts overlying the DBS components to be considered related to the DBS device.
2. Deep uncomplicated DBS-related infection	A patient is considered to have deep uncomplicated DBS-related infection if any of the following is present:
3. Deep complicated DBS-related infection	<p>1. Device exposure to the outside or sinus tract communicating with the device.</p> <p>2. Deep purulent collection surrounding DBS parts detected intraoperatively or by ultrasound-guided needle aspiration.</p> <p>3. Positive growth of microorganisms in cultures from any of the following:</p> <ul style="list-style-type: none"> <li>(a) Deep intraoperative tissue or fluid surrounding DBS parts;</li> <li>(b) DBS device parts;</li> <li>(c) Deep fluid aspirate from IPG pocket; AND no evidence of complications as defined below.</li> </ul> <p>A patient is considered to have deep complicated DBS-related infection if criteria for deep uncomplicated are met AND they have evidence of ≥1 of the following: intracranial pus, intracranial organized abscess, meningitis, or encephalitis.<sup>a</sup></p>

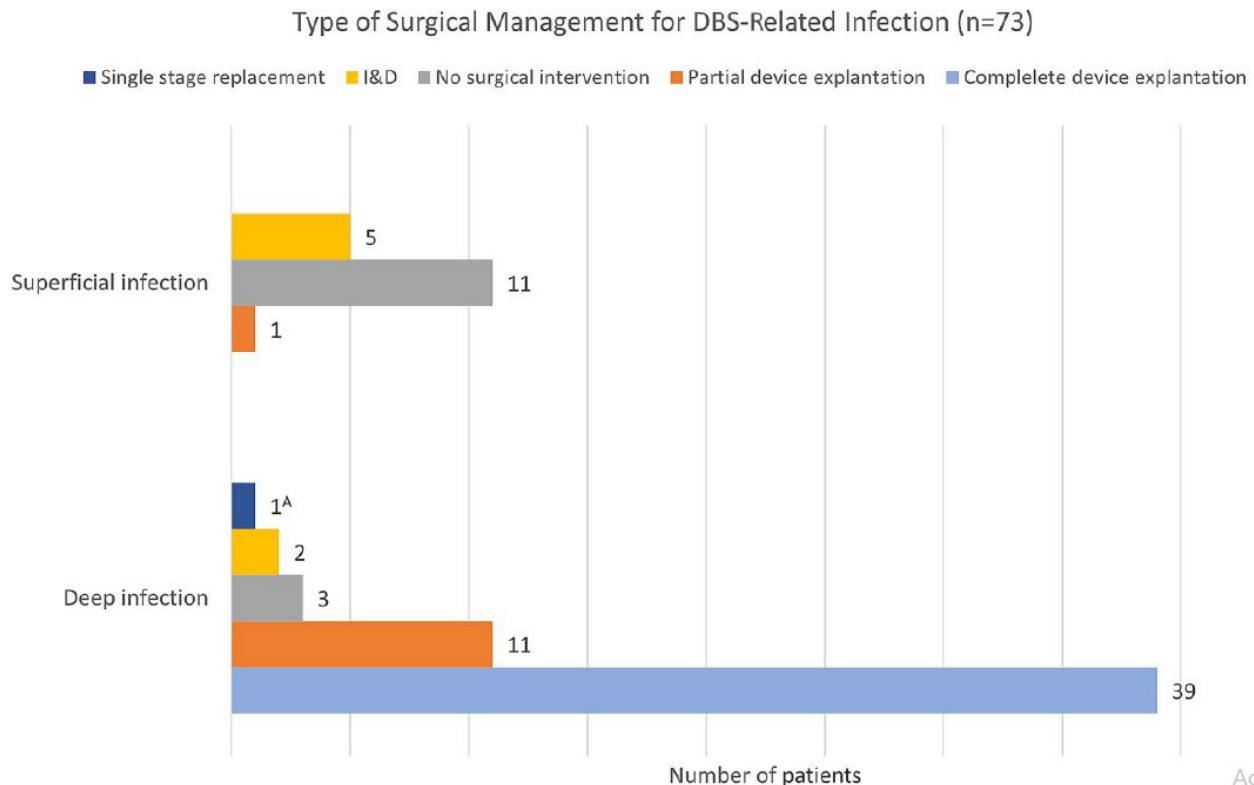
Abbreviations: DBS, deep brain stimulator; SSTI, skin and soft tissue infection.

<sup>a</sup>Growth of microorganisms in cultures from intracranial leads in the absence of intracranial pus, intracranial organized abscess, meningitis, or encephalitis is considered deep

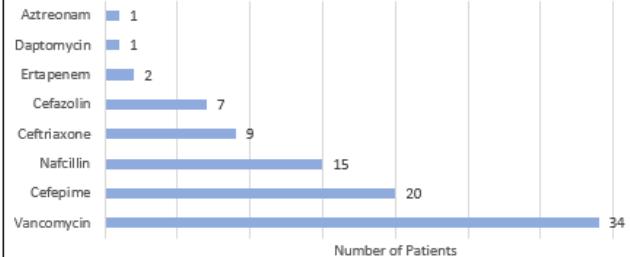
**Table 2. Device Management Groups**

Device Management	Definition
1. Medical management	Antimicrobial therapy alone without surgical intervention.
2. Complete device explantation	Removal of the entire DBS system at time of presentation.
3. Surgical intervention with device retention	Complete or partial retention or immediate replacement of DBS parts at time of presentation. Such as with: (a) Incision and debridement. (b) Single-stage replacement, defined as immediate replacement of infected DBS part(s) with new part(s). (c) Partial device explanation, defined as removal of grossly infected part(s) with retention of other DBS parts.

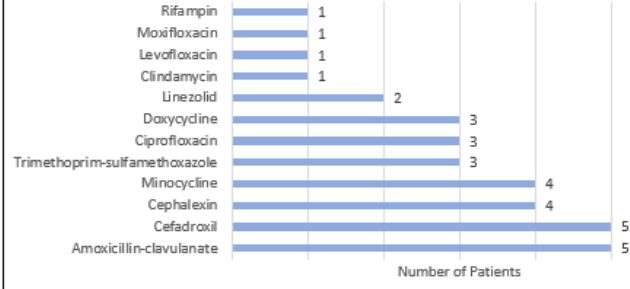
Infections	Time ATB Md (IQR) days
Superficial	14 (11-16)
Deep	15 (14-21)



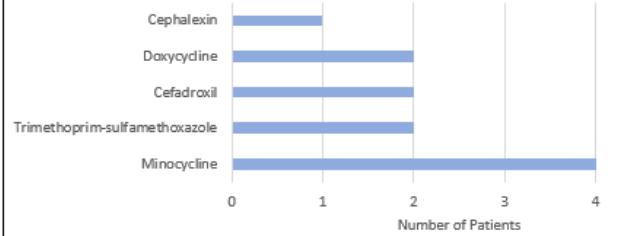
(A) IV Antibiotics Prescribed for DBS-related Infection (N=69)



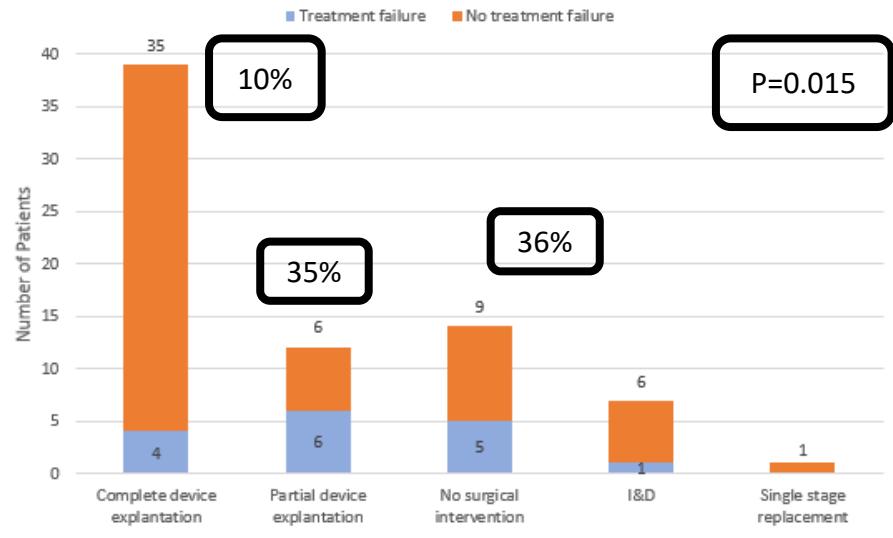
(B) Oral Antibiotics Prescribed for DBS-related Infection (N=31)



(C) Chronic Antimicrobial Suppression (N=11)



Treatment Failure Events Based on Surgical Intervention



Supplementary Figure 4. Number of treatment failure events occurring after each surgical intervention type.

Abbreviations: I&D: incision and drainage.

- Reimplantation:
  - Complete explantation: 2.9 (IQR 2.1-5.1) months
  - Partial explantation: 2.3 (1.4-6.8) months

Supplementary Figure 3. Antibiotics prescribed for DBS-related infections.

# Prevención de infecciones asociadas a dispositivos

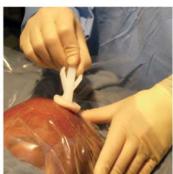


# Care bundles

A Wide clipping and chlorhexidine prep #1



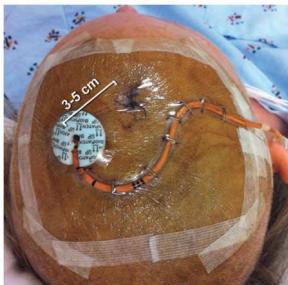
Full drape and chlorhexidine prep #2



Full barrier precautions



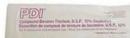
B Transparent dressing film



Chlorhexidine patch



Benzoin tincture



Staple line



Adhesive strips



Antibiotic-coated EVD catheter

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Review

## Chlorhexidine dressings could reduce external ventricular drain infections: results from a systematic review and meta-analysis

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S. Larkin <sup>h</sup>, M.D. Jenkinson <sup>e,f</sup>, H.C. Patel <sup>a,b</sup>



## IDSA GUIDELINE

Recambio profiláctico del DVE X

Toma de muestras para monitorización X

Profilaxis antibiótica ampliada X

Profilaxis antibiótica en la colocación ✓

# Tipos de drenajes ventriculares externos impregnados

Drenajes con nanopartículas de plata

Silverline

Drenajes impregnados con ATB

1. Bactiseal (Rifampicina 0.15%  
+clindamicina 0.054%)

2. Ventriclear (Rifampicina+minociclina)



0.15%



0.054%





# Antibiotic or silver versus standard ventriculoperitoneal shunts (BASICS): a multicentre, single-blinded, randomised trial and economic evaluation



Conor L Mallucci\*, Michael D Jenkinson\*, Elizabeth J Conroy, John C Hartley, Michaela Brown, Joanne Dalton, Tom Kearns, Tracy Moitt, Michael J Griffiths, Giovanna Culeddu, Tom Solomon, Dyfrig Hughes, Carroll Gamble, for the BASICS Study collaborators†

	Standard shunt	Antibiotic shunt	Silver shunt	Total
<b>Surgeries</b>				
Patients eligible for primary outcome*	533	535	526	1594
No shunt removal or revision	403 (76%)	403 (75%)	390 (74%)	1196 (75%)
Shunt removal or revision (for any cause)	130 (24%)	132 (25%)	136 (26%)	398 (25%)
<b>Reason for revision as classified by central review</b>				
Patients revised for infection	32 (6%)	12 (2%)	31 (6%)	75 (5%)

## Conclusiones

- Las infecciones asociadas a dispositivos en SNC son infecciones de difícil manejo que obligan a realizar un tratamiento individualizado
- Existen nuevas estrategias en el manejo de las infecciones asociadas a dispositivos, no incluidas en las guías actuales, como el uso de linezolid, el ajuste de dosificación y posología y el tratamiento intraventricular
- Existen nuevas estrategias centradas en prevención de las infecciones asociadas a dispositivos como los drenajes impregnados en antibióticos

•Imagen:[lacabezaenlasnubes.com](http://lacabezaenlasnubes.com)

