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Le infezioni associate a devices intravascolari

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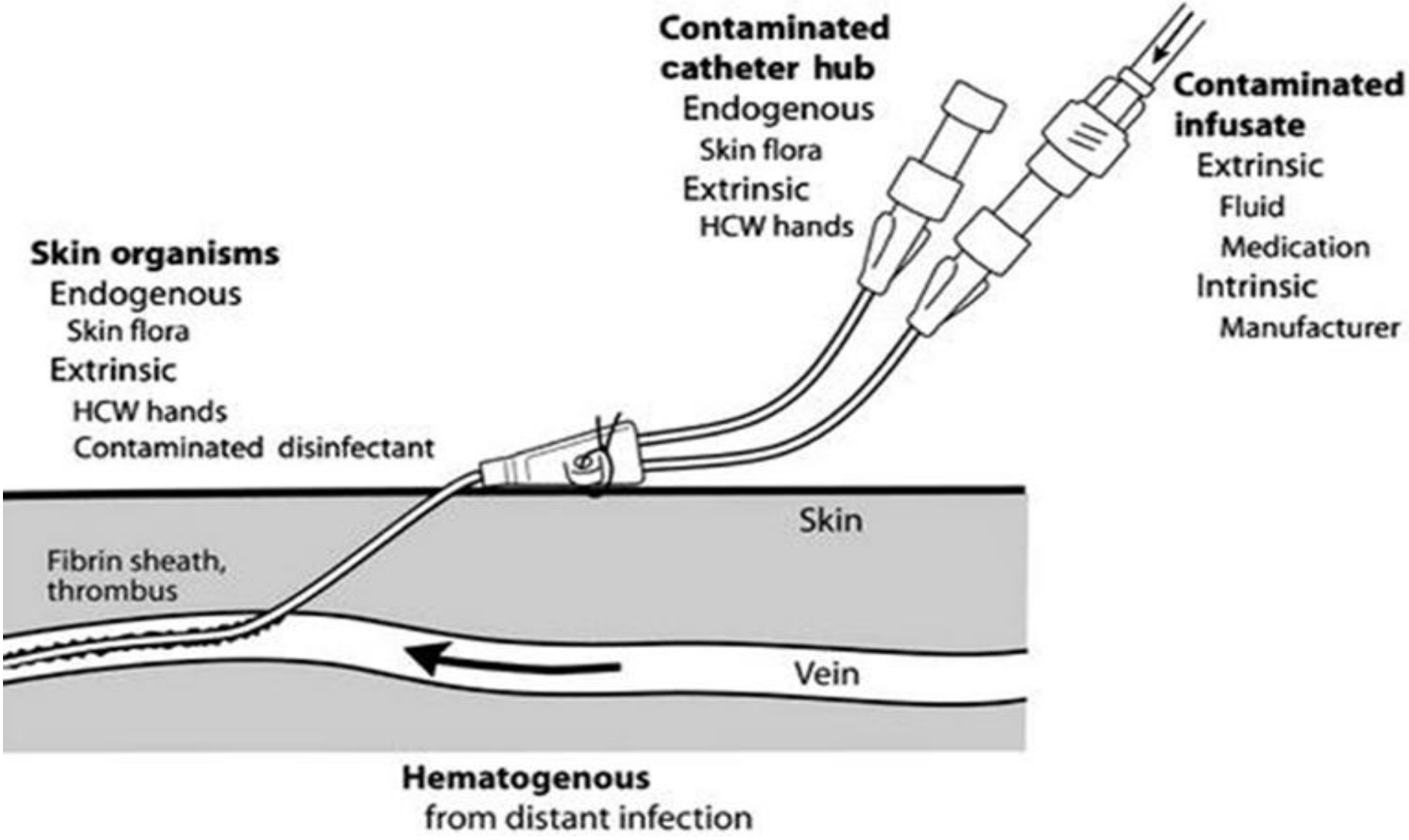
Types of intravascular devices

Type of intravascular device	Comments
Peripheral venous catheter	Usually inserted into the veins of the forearm or the hand; most commonly used short-term intravascular device; rarely associated with bloodstream infection
Peripheral arterial catheter	For short-term use; commonly used to monitor hemodynamic status and to determine blood gas levels of critically ill patients; risk of bloodstream infection may approach that of CVCs
Midline catheter	Peripheral catheter (size, 7.6–20.3 cm) is inserted via the antecubital fossa into the proximal basilic or cephalic veins, but it does not enter central veins; is associated with lower rates of phlebitis and infection than are CVCs
Nontunneled CVC	Most commonly used CVC; accounts for an estimated 90% of all catheter-related bloodstream infections; increased risk of infection with internal jugular vein site of insertion
Pulmonary artery catheter	Inserted through a Teflon introducer and typically remains in place for an average duration of only 3 days; most catheters are heparin bonded to reduce catheter thrombosis and microbial adherence to the catheter
Pressure-monitoring system	Used in conjunction with arterial catheter; associated with both epidemic and endemic nosocomial bloodstream infections; source is often the fluid column in the tubing between the patient's intravascular catheter and the pressure-monitoring apparatus, contaminated infusate, or nondisposable transducers
Peripherally inserted central catheter	Provides an alternative to subclavian or jugular vein catheterization; is inserted via the peripheral vein into the superior vena cava, usually by way of cephalic and basilar veins; is easier to maintain and is associated with fewer mechanical complications (e.g., hemothorax) than are nontunneled CVCs
Tunneled CVC	Surgically implanted CVC (e.g., Hickman, Broviac, Groshong, or Quinton catheter) with the tunneled portion exiting the skin and a Dacron cuff just inside the exit site; the cuff inhibits migration of organisms into the catheter tract by stimulating growth of surrounding tissue, thus the sealing catheter tract; used to provide vascular access to patients who require prolonged iv chemotherapy, home-infusion therapy, or hemodialysis (figure 4)
Totally implantable device	A subcutaneous port or reservoir with self-sealing septum is tunneled beneath the skin and is accessed by a needle through intact skin; low rates of infection

NOTE. CVC, central venous catheter.

Types of intravascular devices



The Epidemiology of Sepsis in the United States from 1979 through 2000

Greg S. Martin, M.D., David M. Mannino, M.D., Stephanie Eaton, M.D., and Marc Moss, M.D.

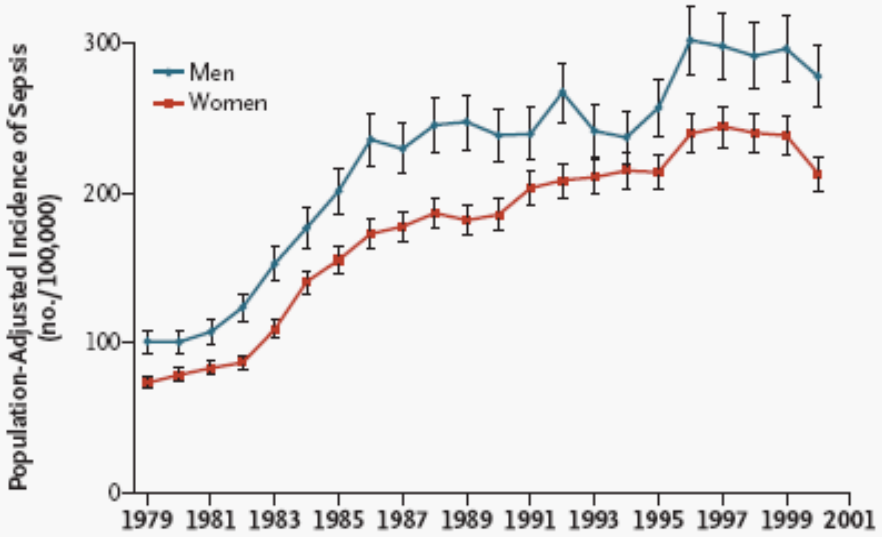


Figure 1. Population-Adjusted Incidence of Sepsis, According to Sex, 1979–2000.
Points represent the annual incidence rate, and I bars the standard error.

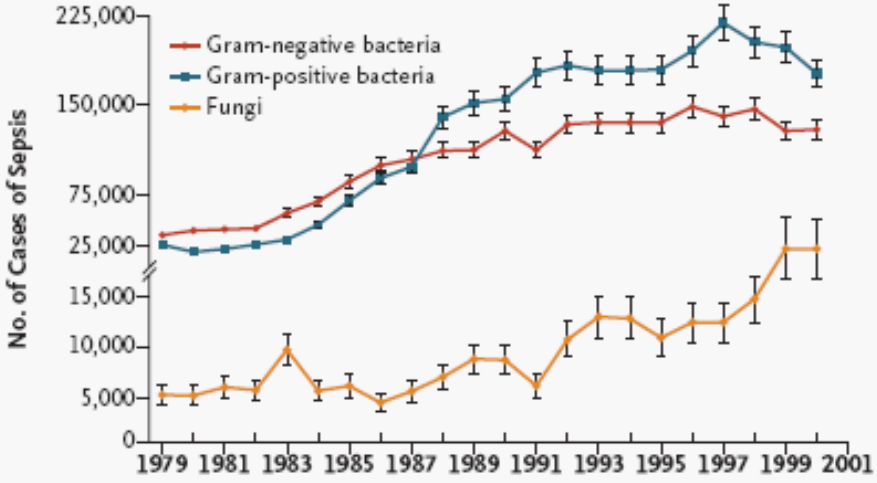


Figure 3. Numbers of Cases of Sepsis in the United States, According to the Causative Organism, 1979–2000.
Points represent the number of cases for the given year, and I bars the standard error.

Pampa et al. N Engl J Med 2003;348:1546-54

Implications of CVC use

- Increase of bacteremia due to methicillin-resistant CNS
- Increase of MRSA bacteremia
- Community spread of MRSA
- Increase of candidemia
- emergence of “non albicans” *Candida*
- Emergence of low-virulence and opportunistic bacteria and fungi

Staphylococcus species non *S. aureus*

- *S. epidermidis*
- *S. hominis*
- *S. warneri*
- *S. haemolyticus*
- *S. caprae*
- *S. pasteuri*
- *S. auriculari*
- *S. lugdunensis*
- *S. saprophyticus*
- *S. saccharolyticus*
- *S.xilosus*
- *S. capitis*
- *S. cohnii*
- *S. simulans*
- *S. schleiferi*
- *S. intermedius*

Teicoplanin use and emergence of *Staphylococcus haemolyticus*: is there a link?

ANNO	REPARTO	OSSERVAZIONE
1992-	Farmacia	consumo annuale di teico ca. 17.000 fl
2000		vs vanco ca. 7000 fl (500 mg)
2000-	Lab. Centrale	*S.haemolyticus* seconda specie CNS
2003	Microbiologia	22-24% isolatI dal sangue. Teico-R: 11-29%
6/2000	Ematologia tutte	MR *S.haemolyticus* identificato in 18% di le batteriemie stafilococciche.

Falcone M & Venditti M. Clin Microbiol Infect. 2006

Falcone M, Stefani S & Venditti M Diagn Microbiol Infect Dis , 2007

ER Diagnostic Microbiology and Infectious Disease 61 (2008) 227–231
www.elsevier.com/loca

In vitro activity of daptomycin against methicillin- and multi-resistant *Staphylococcus haemolyticus* invasive isolates carrying different *mec* complexes☆

Floriana Campanile[a], Dafne Bongiorno[a], Sonia Borbone[a], Marco Falcone[b], Maddalena Giannella[b], Mario Venditti[b], Stefania Stefani[a,*]

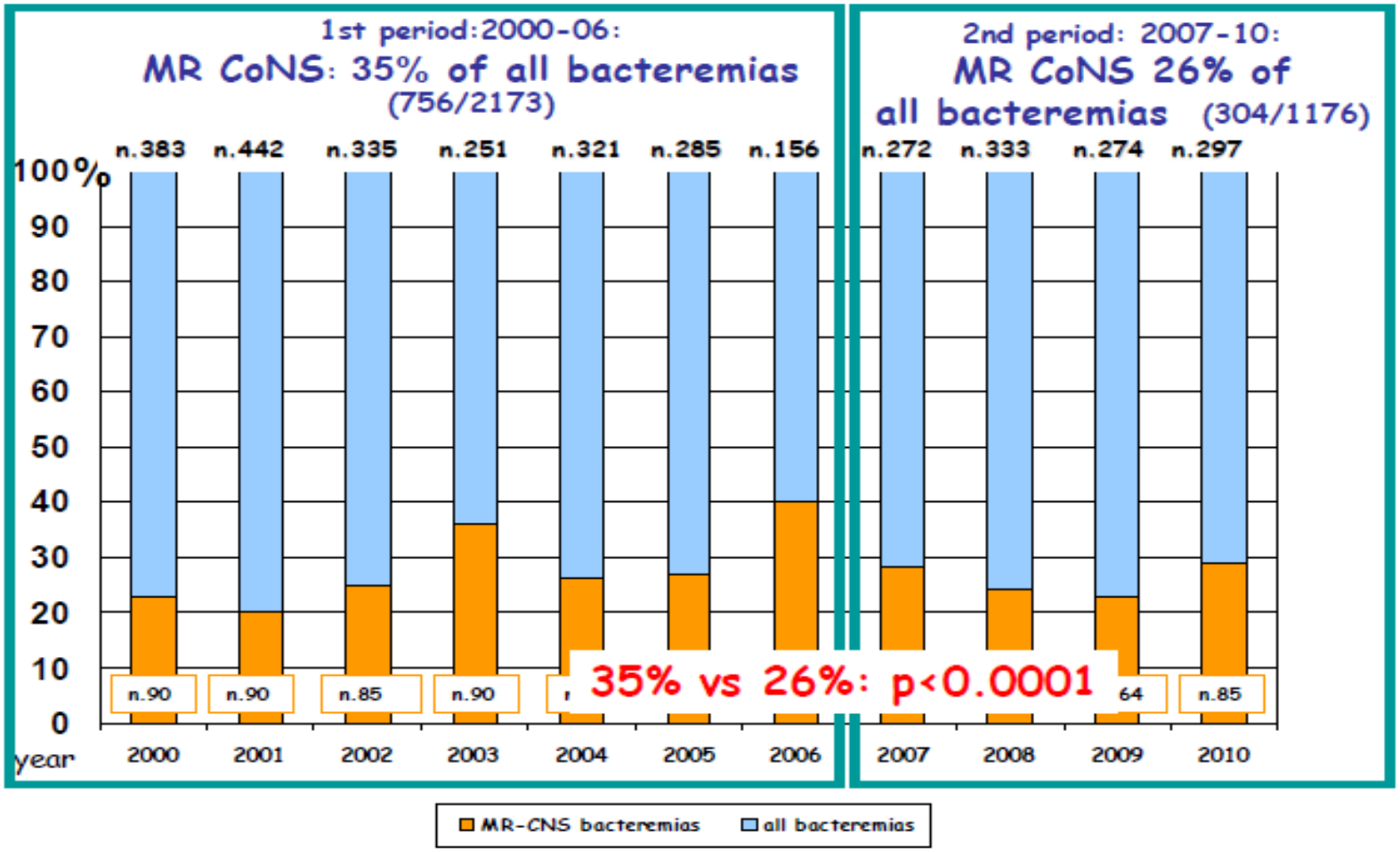
In vitro activity of daptomycin compared with other antibiotics versus *Staphylococcus haemolyticus* isolates

Antibiotics	Range	MIC_{50} mg/L	MIC_{90} mg/L	%S	%R
Daptomycin	0.12–2	0.5	1	100	0
Quinopristin/dalfopristin	0.12–1	0.25	0.5	100	0
Vancomycin *	0.5–8	1	2	100	0
Linezolid	1–2	2	2	100	0
Teicoplanin ***	0.25–≥64	8	32	62	38
Erythromycin	0.25–≥64	32	≥64	14	86
Clindamycin **	0.25–≥64	0.25	≥64	72	28
Ciprofloxacin	0.5–≥64	32	≥64	12	88
Levofloxacin	0.25–≥64	32	≥64	38	62
Gentamicin	0.25–≥64	≥64	≥64	8	92
Cotrimoxazole	0.12–≥64	8	≥64	38	62
Imipenem	0.12–≥64	32	≥64	34	66
Meropenem	0.12–≥64	32	≥64	12	88
Rifampin	≤0.06–≥64	0.12	0.25	88	12
Tetracycline	≤0.06–32	0.12	0.5	96	4

MIC susceptibility breakpoints for *Staphylococcus* spp. were according to CLSI guidelines.

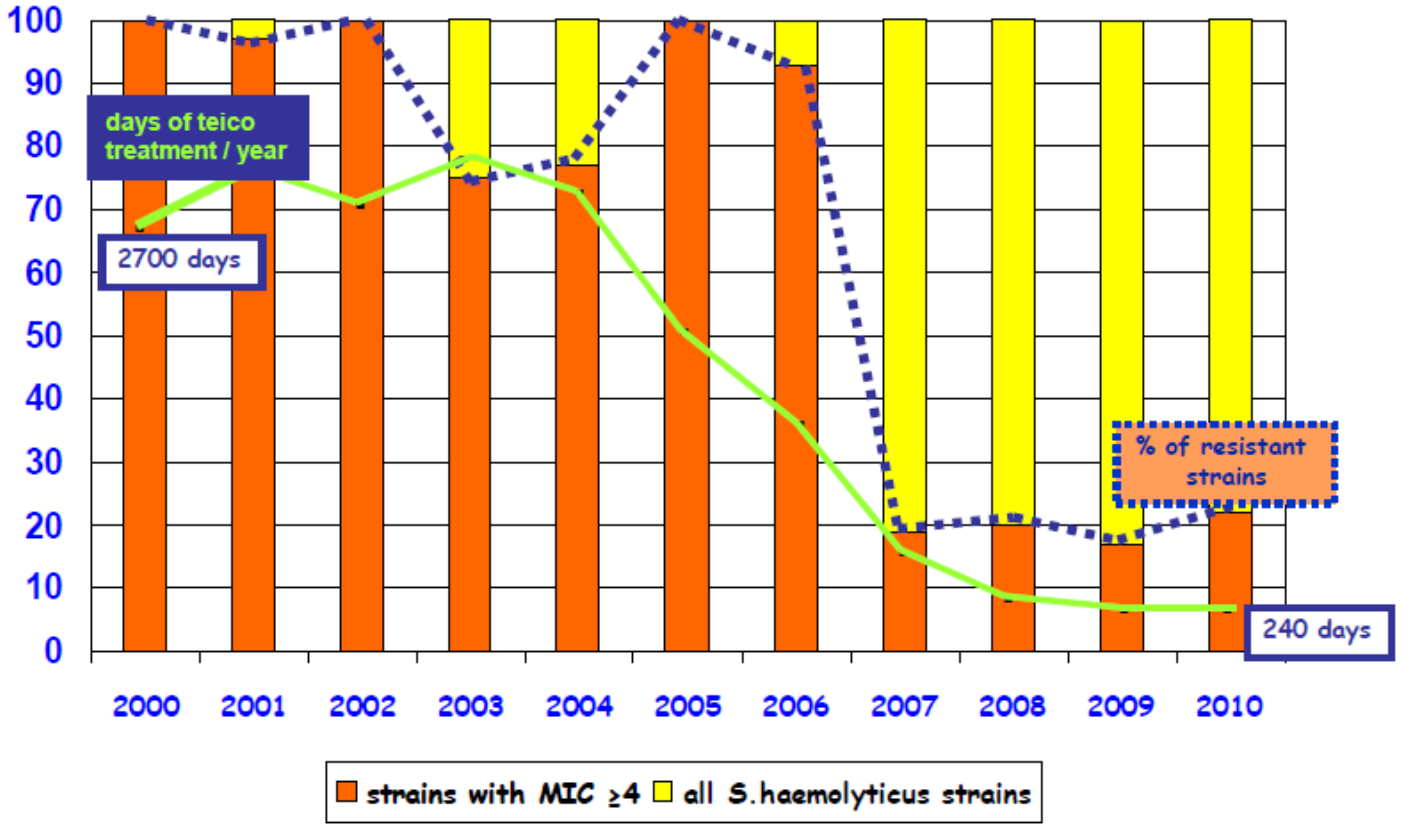
* hVISA: the two hetero-resistant strains showed daptomycin MIC values of 2 mg/L one dilution higher with respect to their wild-type strains.

Changing of Antimicrobial Susceptibility of 175 *Staphylococcus haemolyticus* Blood Isolates from Neutropenic Patients with Hematological Malignancies: Comparison of Two Different Periods (2000-2006 vs 2007-2010)



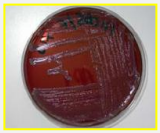
Micozzi A, Girmenia C, Gentile G et al ICAAC 2011,(ABT. K 1122)

Changing of Antimicrobial Susceptibility of 175 *Staphylococcus haemolyticus* Blood Isolates from Neutropenic Patients with Hematological Malignancies: Comparison of Two Different Periods (2000-2006 vs 2007-2010)



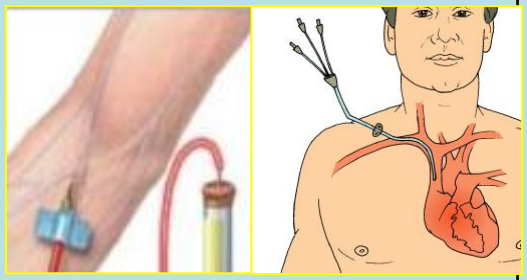
Micozzi A, Girmenia C, Gentile G et al ICAAC 2011,(ABT. K 1122)

Non conservative diagnostic methods

Qualitative	**Broth culture of distal catheter tip**	**Sensibility 95% Specificity 75% Not recommended**
Semiquantitative "Maki tecnique" 	**Culture of catheter tip on agar plate Cut-off > 15 CFU./plate**	**Sensibility 85% Specificity 85%**
Quantitative	**Flushing Vortexing Sonication Cut-off ≥ 10^3 CFU./ml**	**Sensibility 83% Specificity 95%**

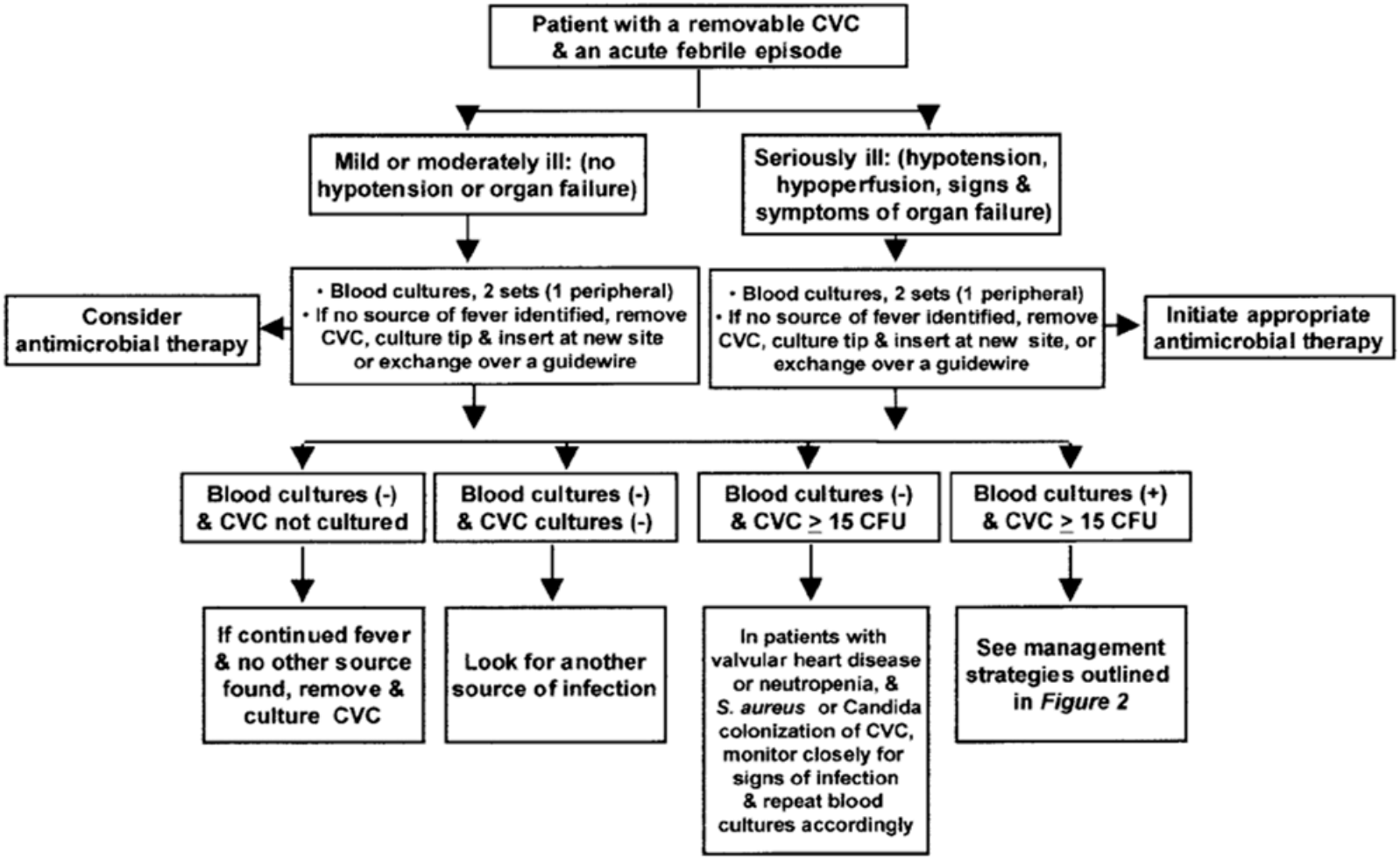
Safdar et al. Ann Intern Med 2005

Conservative methods

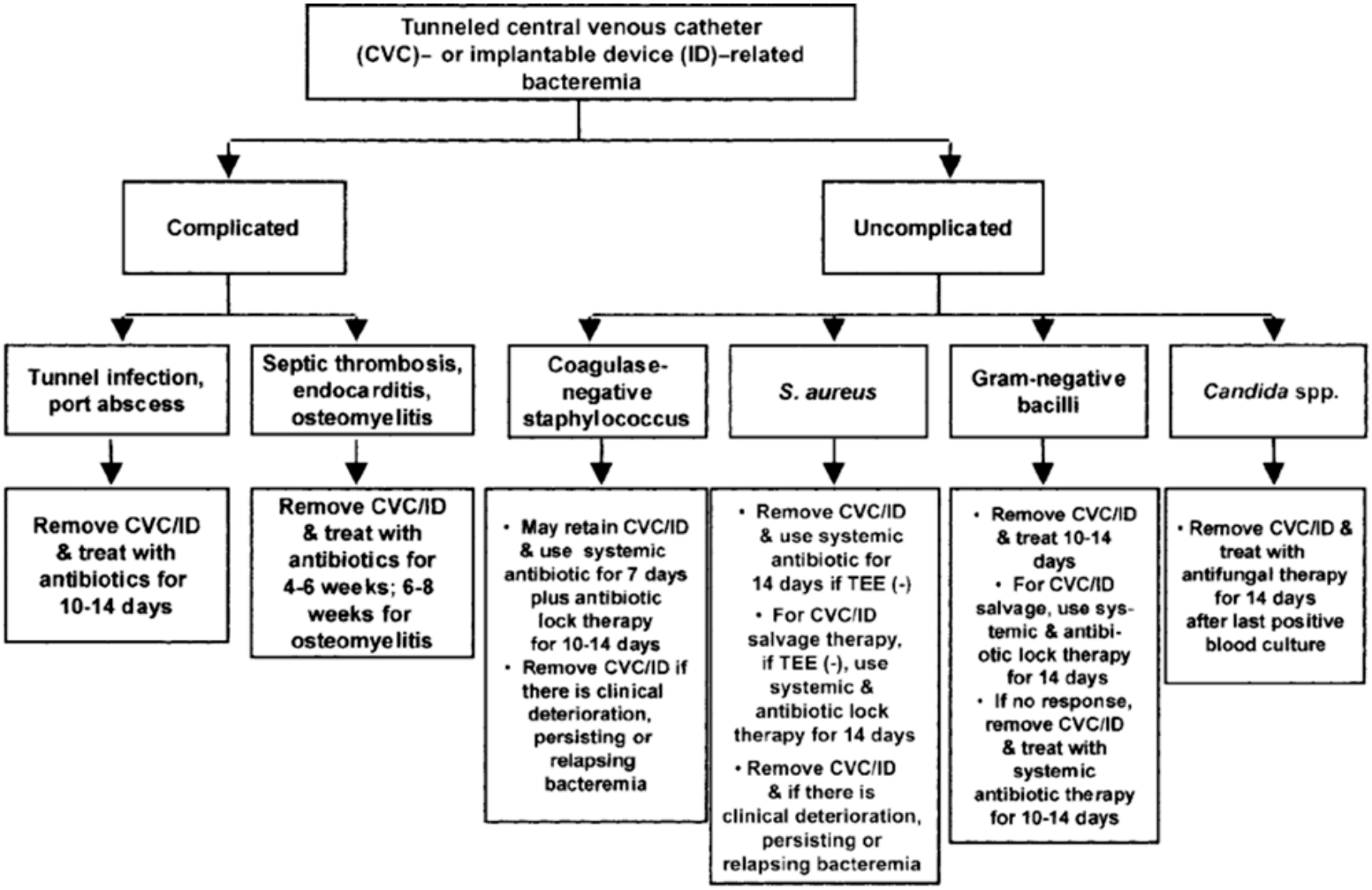
Quntitative blood cultures 	Centrifugation/lysis of 10 ml of blood from CVC and peripheral blood Increase of CFU/ml from CVC respect peripheral blood (ratio 5-10:1)	Most accurate methodology Short-term CVC: Sens. 75% Spec. 97% Long-term CVC: Sens. 93% Spec. 100% Time wasting, complex
Time to positivity of blood cultures 	Automated methods Differential time from blood cultures drawn from CVC and peripheral blood **Cut-off >120 min**	Sensibility 94% Specificity 91% Reduced specificity during antibiotic treatment

Safdar et al. Ann Intern med 2005 Raad et al. Ann Intern Med 2004

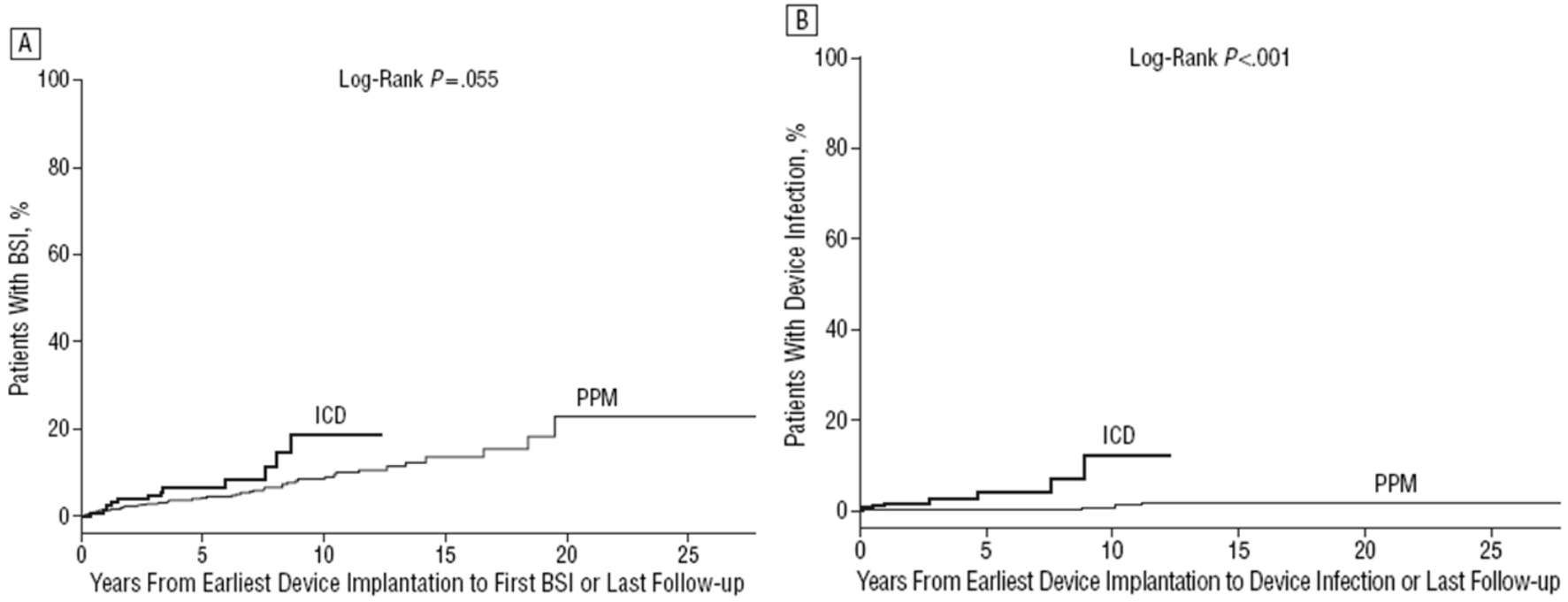
Management of non tunneled CVC infection



Management of tunneled CVC infection



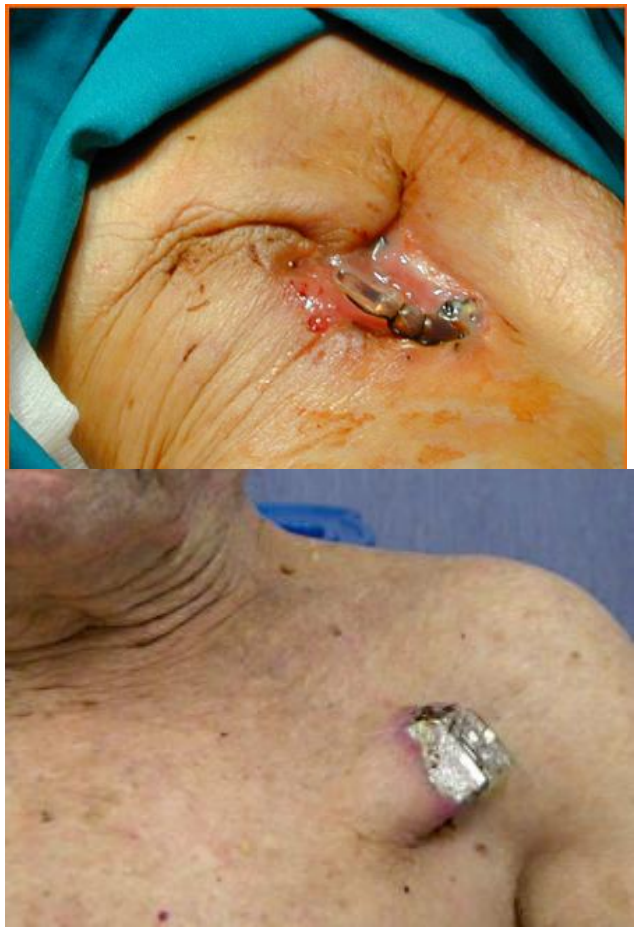
Pacemaker and Implantable Cardioverter Defibrillator Infection



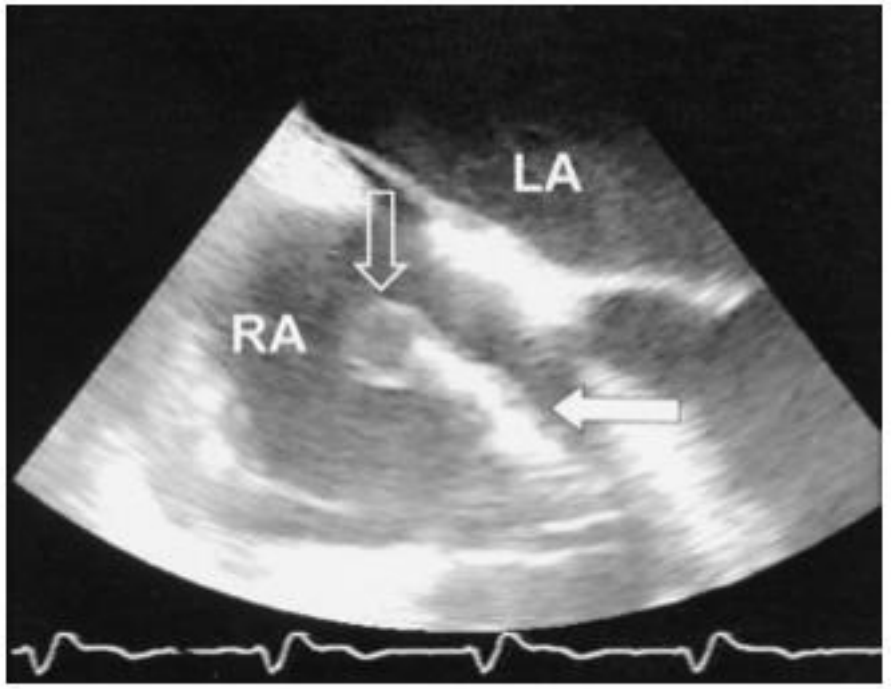
Uslan DZ, et al. Arch Intern Med 2007; 167: 670, 2007

Pacemaker and Implantable Cardioverter Defibrillator Infection

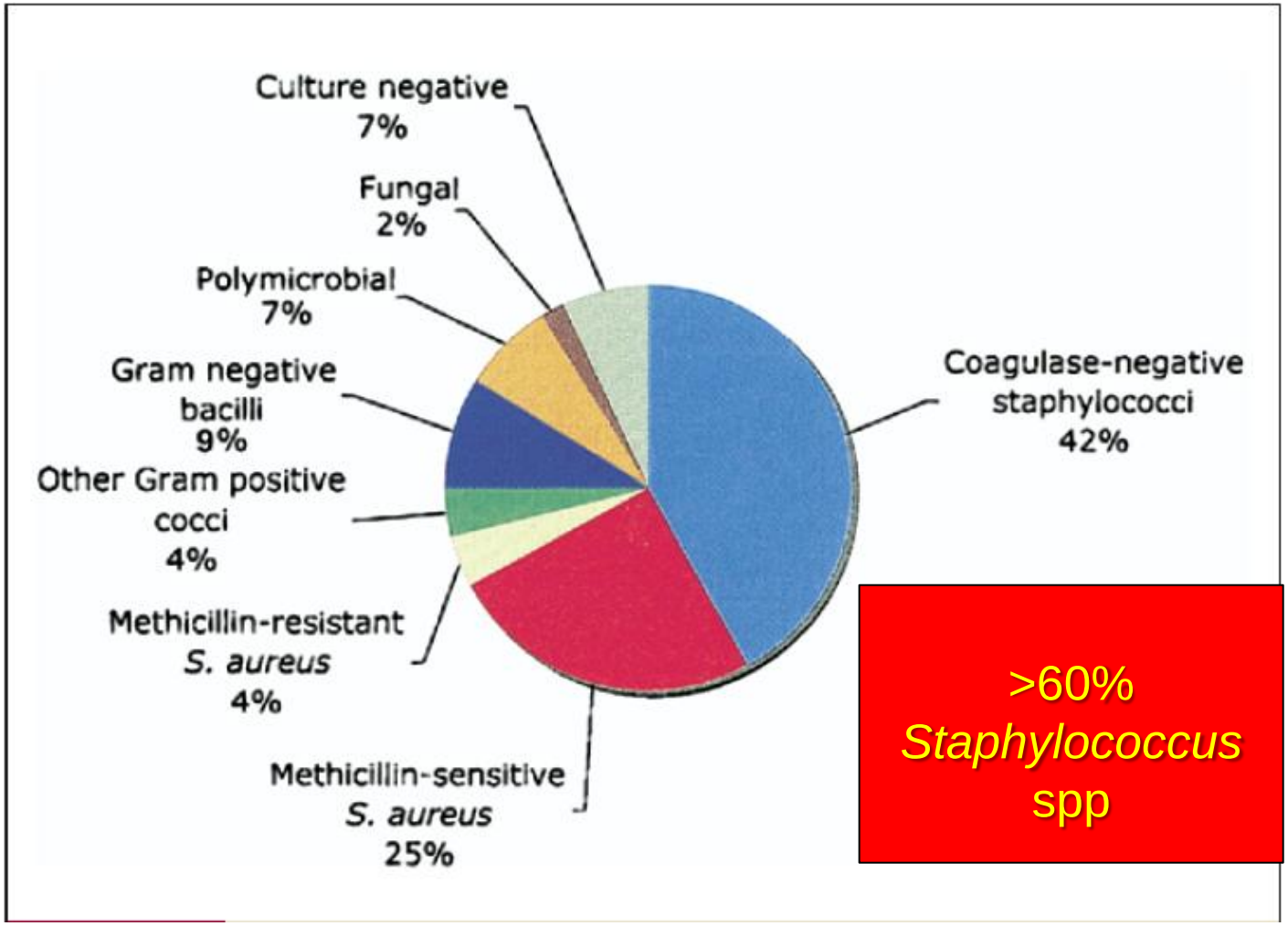
Local infection about 70-80%



Endocarditis about 15-25%



Management and Outcome of Permanent Pacemaker and Implantable Cardioverter-Defibrillator Infections



Sohail MR et al J Am Coll Cardiol 2007; 49: 1852

Sonication of Explanted Cardiac Implants Improves Microbial Detection in Cardiac Device Infections

Alessandra Oliva,[a] Bich Lien Nguyen,[b] Maria T. Mascellino,[a] Alessandra D'Abramo,[a] Marco Iannetta,[a] Antonio Ciccaglioni,[b] Vincenzo Vullo,[a] Claudio M. Mastroianni[a,c]

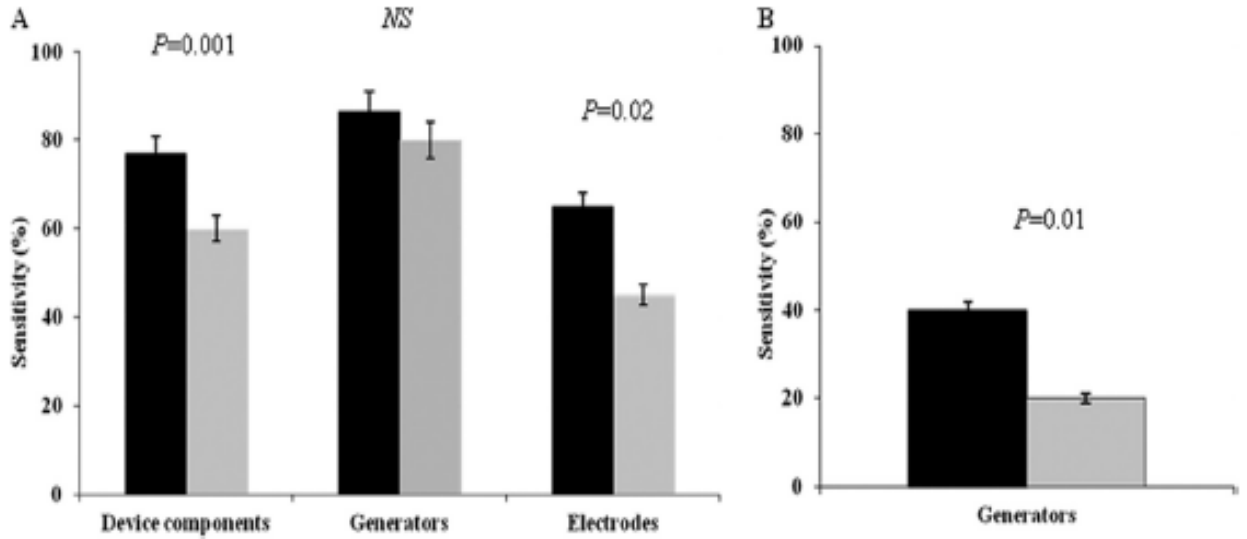


FIG 1 Sensitivity of sonication culture (black bars) and traditional culture (gray bars) for microbial detection in device components removed from infected (A) and uninfected (B) patients. Electrodes include atrial and ventricular electrodes. NS, not significant.

J Clin Microbiol. 2013 Feb;51(2):496-502

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TABLE 2. Pathogen detection in sonication (SC) and traditional (TC) culture

Type of infection	Components *n*	Microorganisms (n)[a]
Subjects with CDI (*n* = 20)	60	
positive SC/ negative TC	10	*S. epidermidis* (6); *C. striatum* (2); *Brevundimonas* spp (1); *S. hominis* (1)
positive SC/ positive TC	36	*S. epidermidis* (*n* = 26); *S. hominis* (*n* = 3); *P. aeruginosa* (*n* = 3); *S. aureus* (*n* = 1); *S. haemolyticus* (*n* = 1); *Bacillus* spp (*n* = 1); *Klebsiella* spp (*n* = 1)
negative SC/ positive TC	0	No bacterial detection
negative SC/ negative TC	14	No bacterial detection
Subjects without CDIs (*n* = 20)	20	
positive SC/ negative TC	4	coagulase-negative staphylococci
positive SC/ positive TC	4	coagulase-positive staphylococcus (*n* = 1); coagulase-negative staphylococci (*n* = 3)
negative SC/ positive TC	0	No bacterial detection
negative SC/ negative TC	12	No bacterial detection

CDI: cardiac device infection.

[a] Polimicrobial cultures were found in 5 generators (*S. epidermidis/S. hominis* (*n* = 3); *S. epidermidis/Bacillus* spp (*n* = 1) *S. epidermidis/Klebsiella* spp).

J Clin Microbiol. 2013 Feb;51(2):496-502

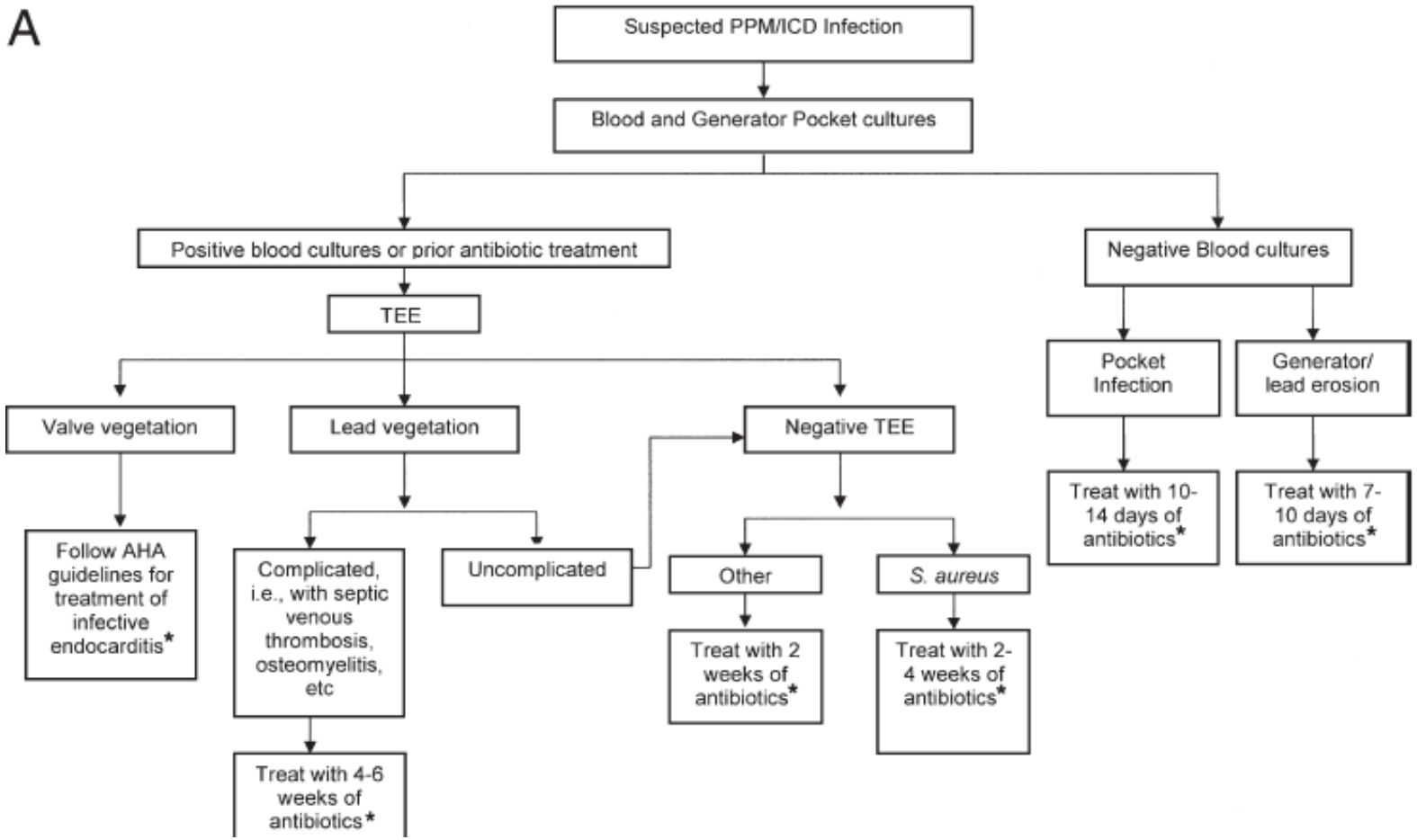
Pacemaker Lead Endocarditis Due to Multidrug-Resistant *Corynebacterium striatum* Detected with Sonication of the Device[▽]

Alessandra Oliva,[1] Valeria Belvisi,[1,2] Marco Iannetta,[1] Carolina Andreoni,[1] Maria T. Mascellino,[1] Miriam Lichtner,[1,2] Vincenzo Vullo,[1] and Claudio M. Mastroianni[1,2]*

Corynebacterium striatum **is a commensal of human skin and has been recently recognized as an emerging pathogen. A case of nosocomial pacemaker lead endocarditis due to a multidrug-resistant *C. striatum* strain is described, highlighting the role of sonication as a diagnostic tool in cardiac device infections (CDIs).**

JOURNAL OF CLINICAL MICROBIOLOGY, Dec. 2010,

Management and Outcome of Permanent Pacemaker and Implantable Cardioverter-Defibrillator Infections



Sohail MR et al J Am Coll Cardiol 2007; 49: 1852

Clinical Characteristics and Outcome of Infective Endocarditis Involving Implantable Cardiac Devices

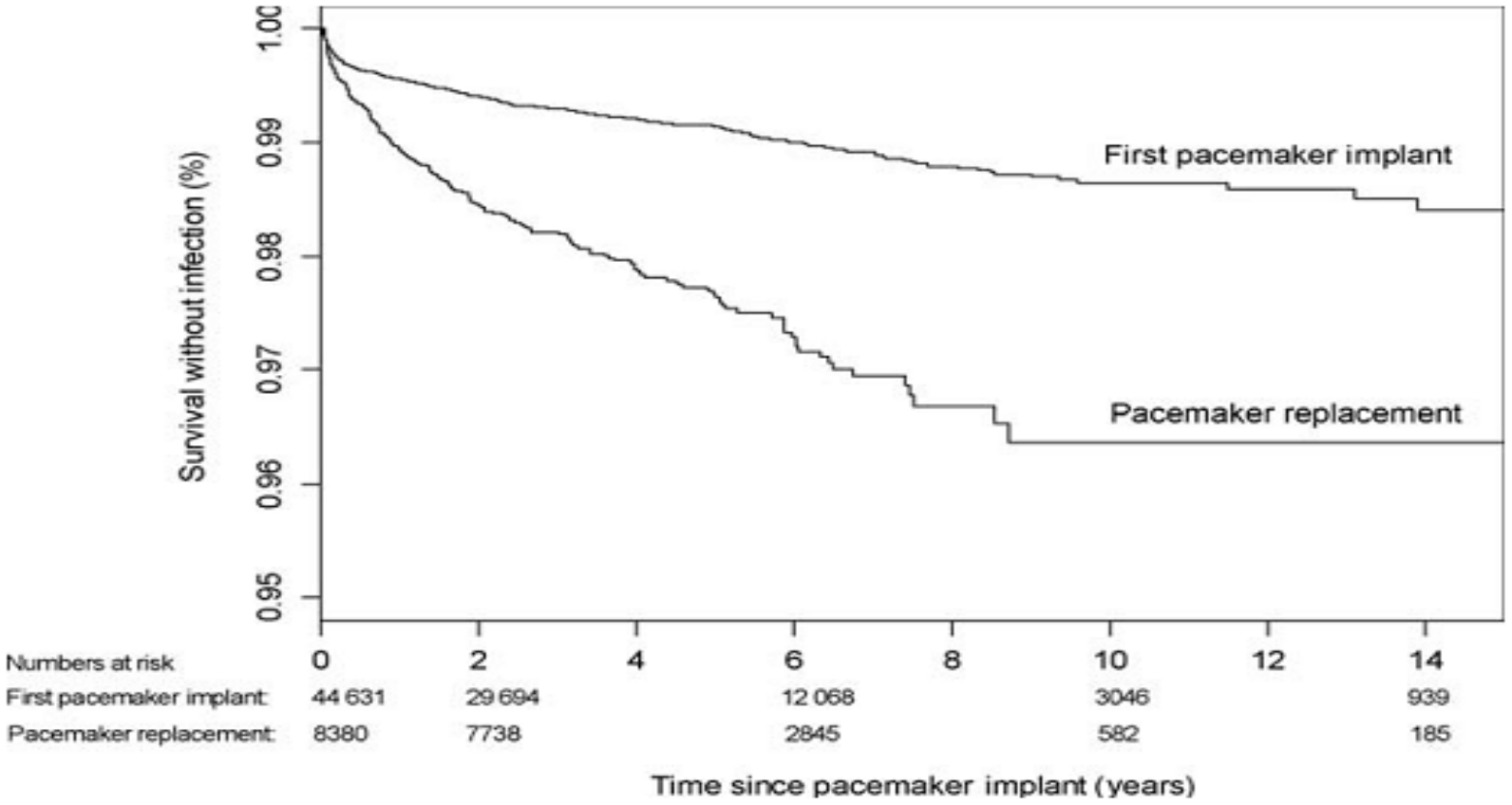
Table 2. Characteristics of Patients With Cardiac Device Infective Endocarditis and With or Without Cardiac Device Removal During Hospitalization

Variable	Device Removal (n = 141)	No Device Removal (n = 34)	*P* Value
Age, median (IQR), y	70.1 (59.8-76.3)	70.4 (68.1-78.6)	.13
Diabetes mellitus	39 (27.7)	8 (23.5)	.76
Hemodialysis	9 (6.4)	2 (5.9)	.93
History of cancer	13 (9.2)	6 (17.7)	.14
Transferred from another hospital	61 (43.3)	16 (47.1)	.61
Positive blood cultures	114 (80.9)	34 (100)	.006
Staphylococcus aureus	47 (33.3)	15 (44.1)	.24
Coagulase-negative staphylococci	46 (32.6)	10 (29.4)	.72
Health care–associated infection	62 (44.0)	19 (55.9)	.21
Concomitant valve vegetation	54 (38.3)	9 (26.5)	.20
Heart failure	18 (12.8)	9 (26.5)	.03
Pulmonary embolism	14 (9.9)	2 (5.9)	.46
In-hospital mortality	18 (12.8)	8 (23.5)	.12
1-y mortality	28 (19.9)	13 (38.2)	.02

Abbreviation: IQR, interquartile range.

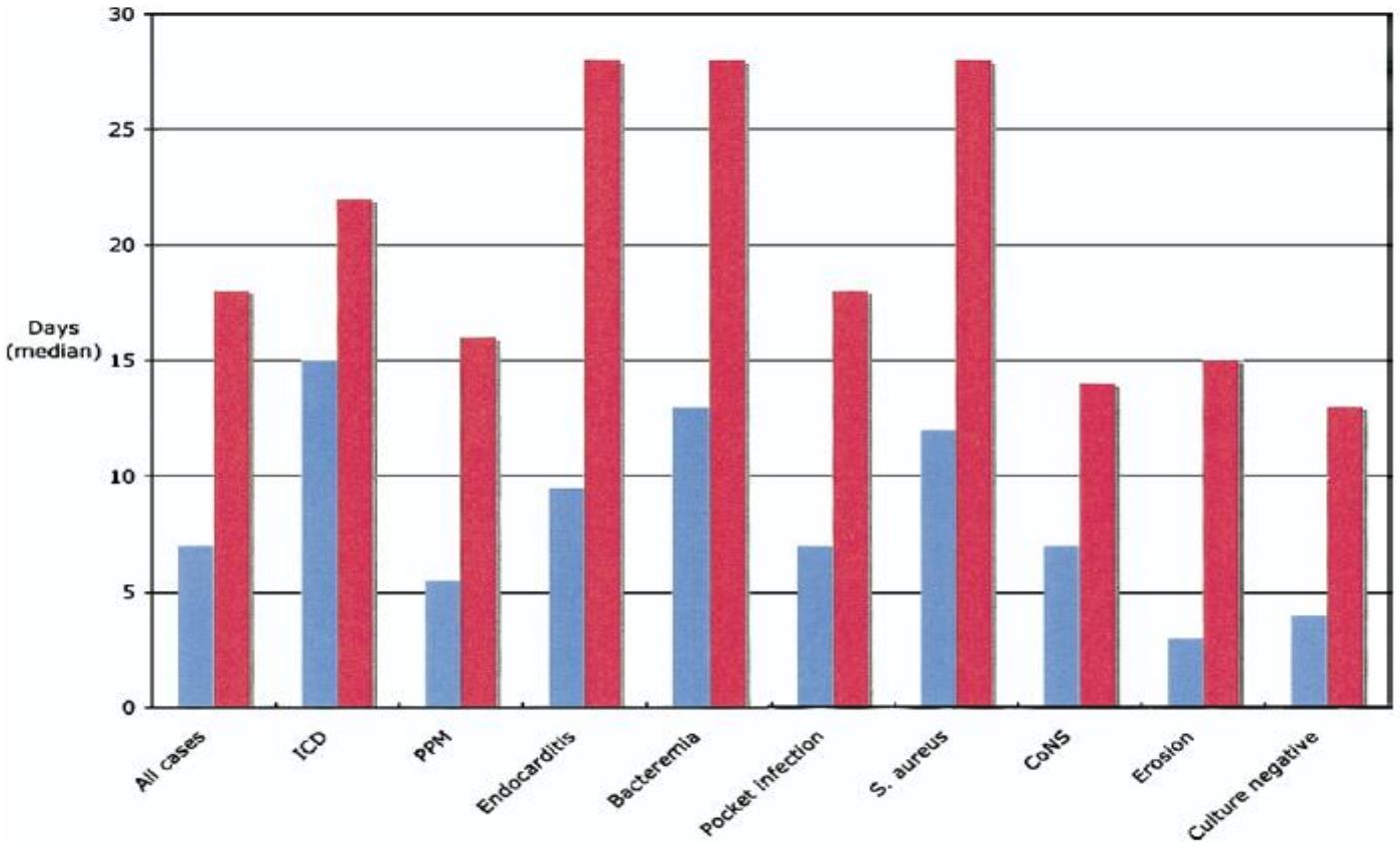
Infection after pacemaker implantation: infection rates and risk factors associated with infection in a population-based cohort study of 46299 consecutive patients

European Heart Journal (2011) **32**, 991–998
doi:10.1093/eurheartj/ehq497



Management and Outcome of Permanent Pacemaker and Implantable Cardioverter-Defibrillator Infections

Time from remocal and reimplantation of disposal (Blue) and time of antibiotic therapy (red)



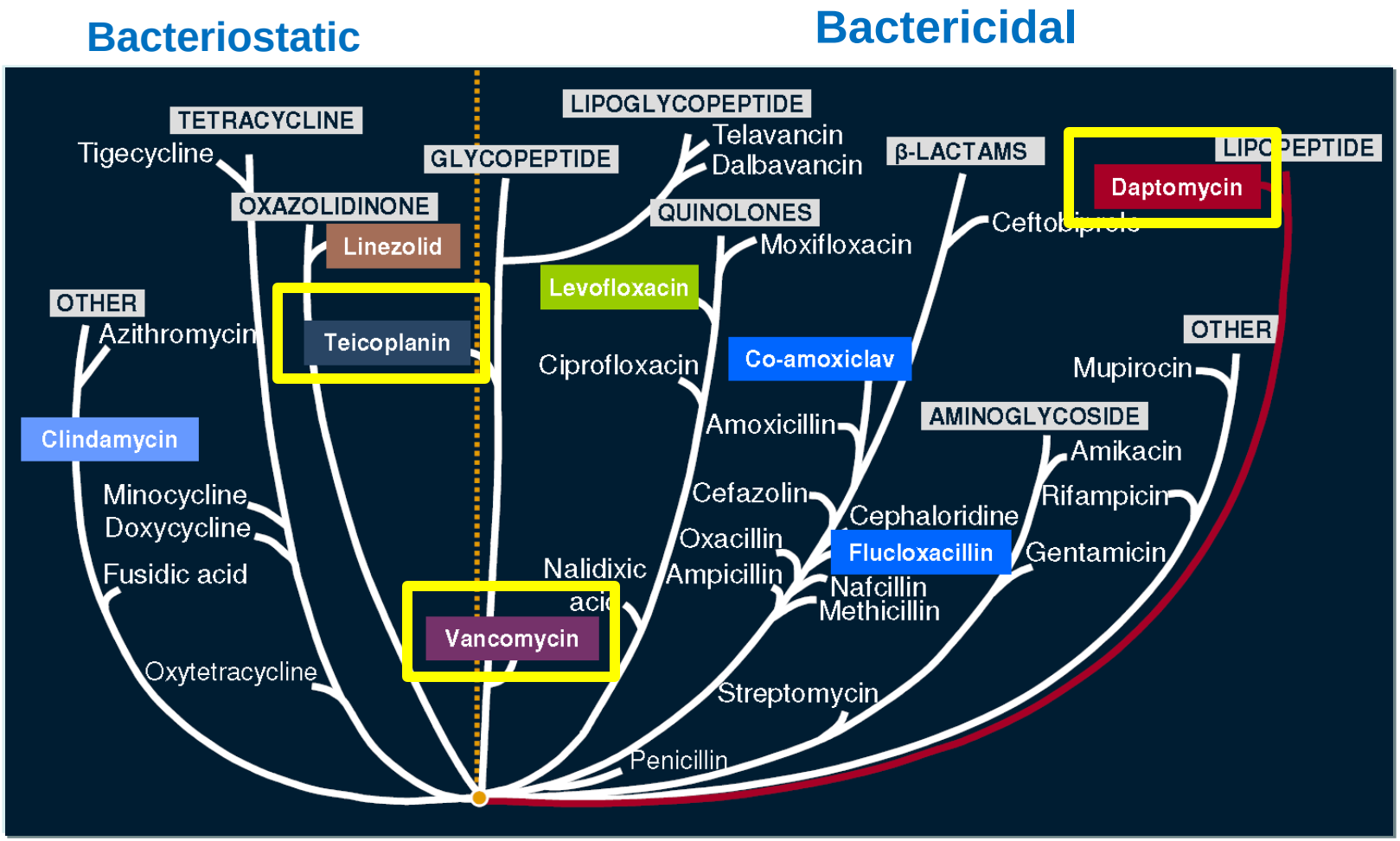
Sohail MR et al J Am Coll Cardiol 2007; 49: 1852

Antibiotic review: sepsis from catheter-related bloodstream infection (CRBSI)

Infection	Example antibiotic regimens
CRBSI	Daptomycin or vancomycin [1] + antipseudomonal β-lactam[2,3] +/- aminoglycoside or rifampin [4]
Fungemia risk factors	+ echinocandin[5] or fluconazole

1 high rates of vancomycin MIC ≥ 2 μg/mL
2 piperacillin/tazobactam, cefepime
3 meropenem, imipenem, doripenem
4 gentamicin, tobramycin, amikacin
5 caspofungin, micafungin, anidulafungin

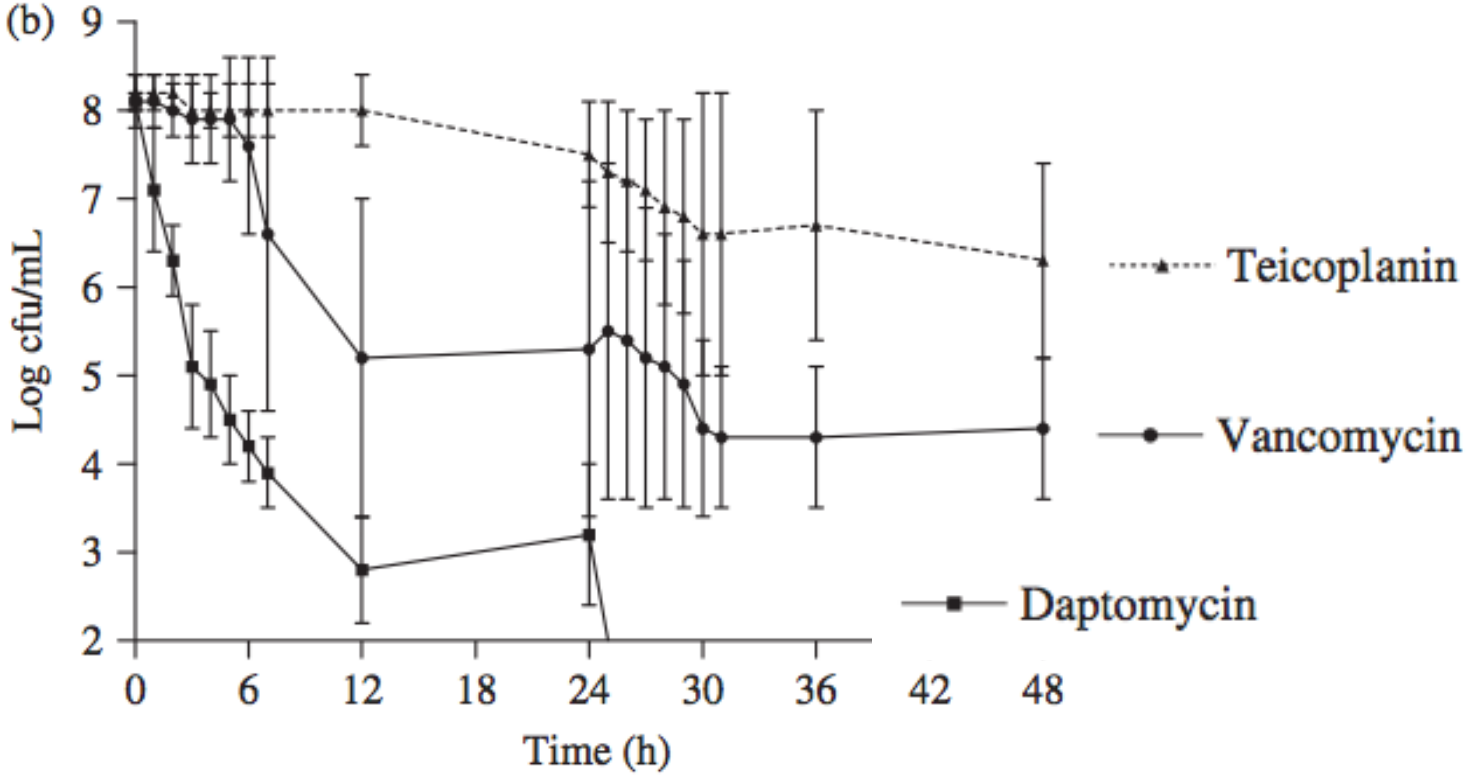
Bacteriostatic and bactericidal antibacterials active against Gram positive



Rolinson GN, Geddes AM. Int J Antimicrob Agents 2007;29:3–8

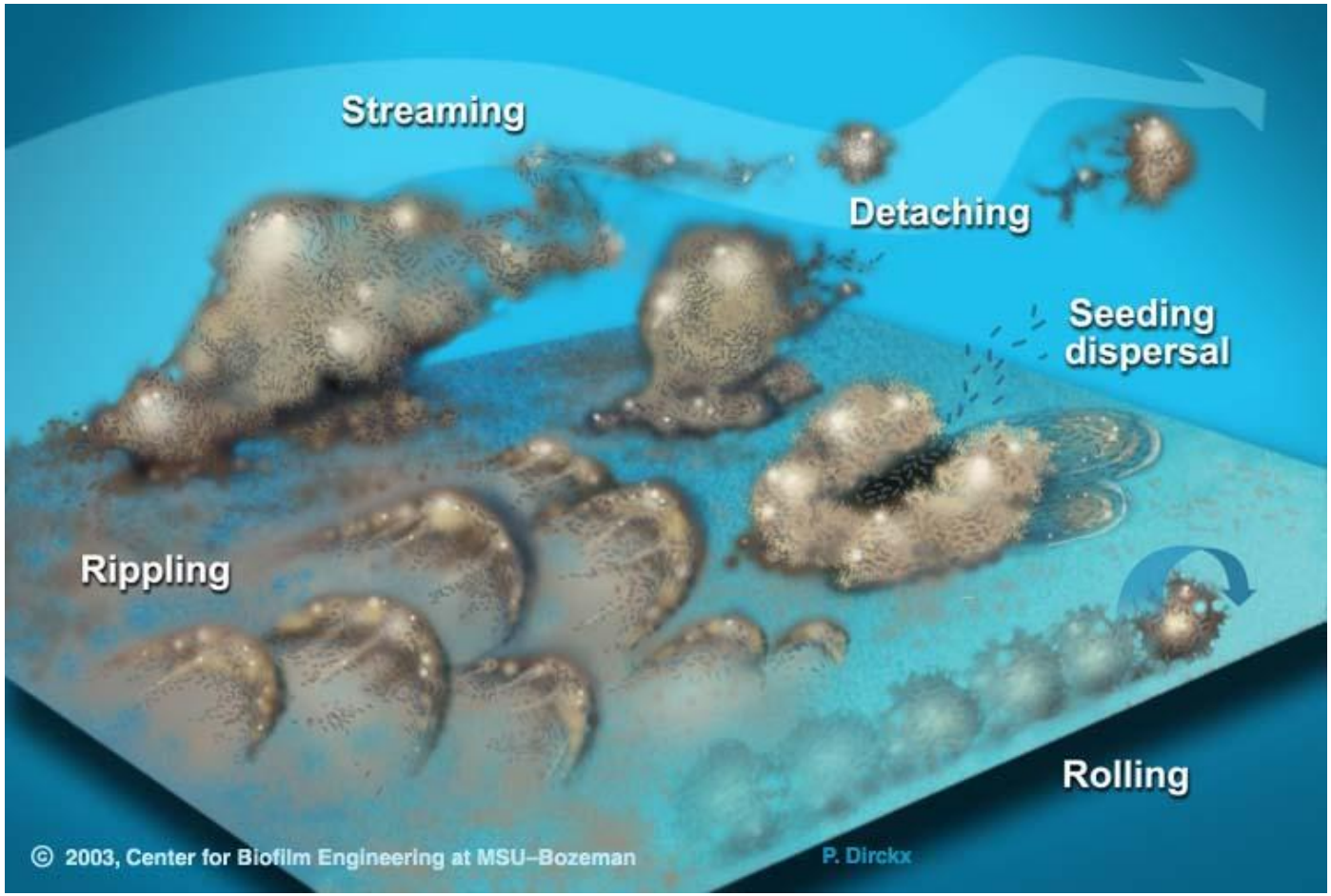
Comparative antibacterial effects of daptomycin, vancomycin and teicoplanin studied in an *in vitro* pharmacokinetic model of infection

Karen E. Bowker*, Alan R. Noel and Alasdair P. MacGowan

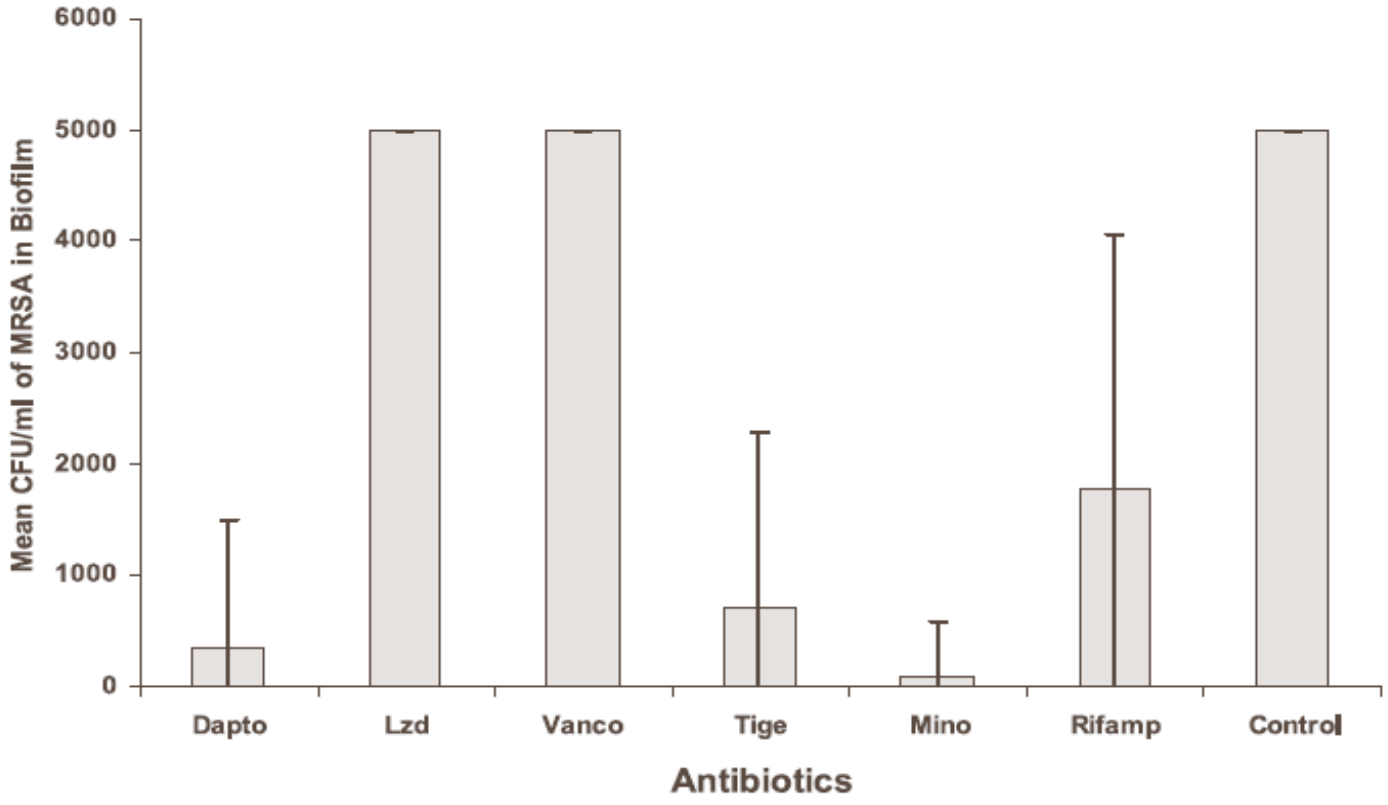


Journal of Antimicrobial Chemotherapy (2009) 64, 1044–1051

The biofilm problem



Comparative Activities of Daptomycin, Linezolid, and Tigecycline against Catheter-Related Methicillin-Resistant *Staphylococcus* Bacteremic Isolates Embedded in Biofilm[▽]



Raad et al Antimicrob Agents Chemother 2007; 51:1656-60

A retrospective case control analysis of patients with staphylococcal infections receiving daptomycin or glycopeptides therapy

Variable	Daptomycin ($n = 43$)	Vancomycin or teicoplanin ($n=63$)	$p =$
Presence of at least 2 comorbidities	30 (69.8%)	44 (69.8%)	1.0
Renal replacement therapy	8 (18.6%)	5 (7.9%)	0.13
Creatinine clearance < 35 ml/h	6 (14%)	14 (22.2%)	0.32
Recent surgery (previous 30 days)	16 (37.2%)	9 (14.3%)	**0.008**
Removable intravascular device	34 (79.1%)	30 (47.6%)	**0.001**
CVC	24 (55.8%)	23 (36.5%)	
Pace-maker	10 (23.3%)	7 (11.1%)	
Fever	23 (53.5%)	25 (39.7%)	0.17
Immunosuppressive therapy	4 (9.3%)	3 (4.8%)	0.64
Severe sepsis or septic shock	19 (44.2%)	25 (39.7%)	0.69
SOFA score (mean)	2.65	2.04	0.15
Mean duration of antibiotic therapy (DAYS)	16.4	22.2	**<0.001**
Mean length of hospital stay (days)	26.5	31.8	**0.04**

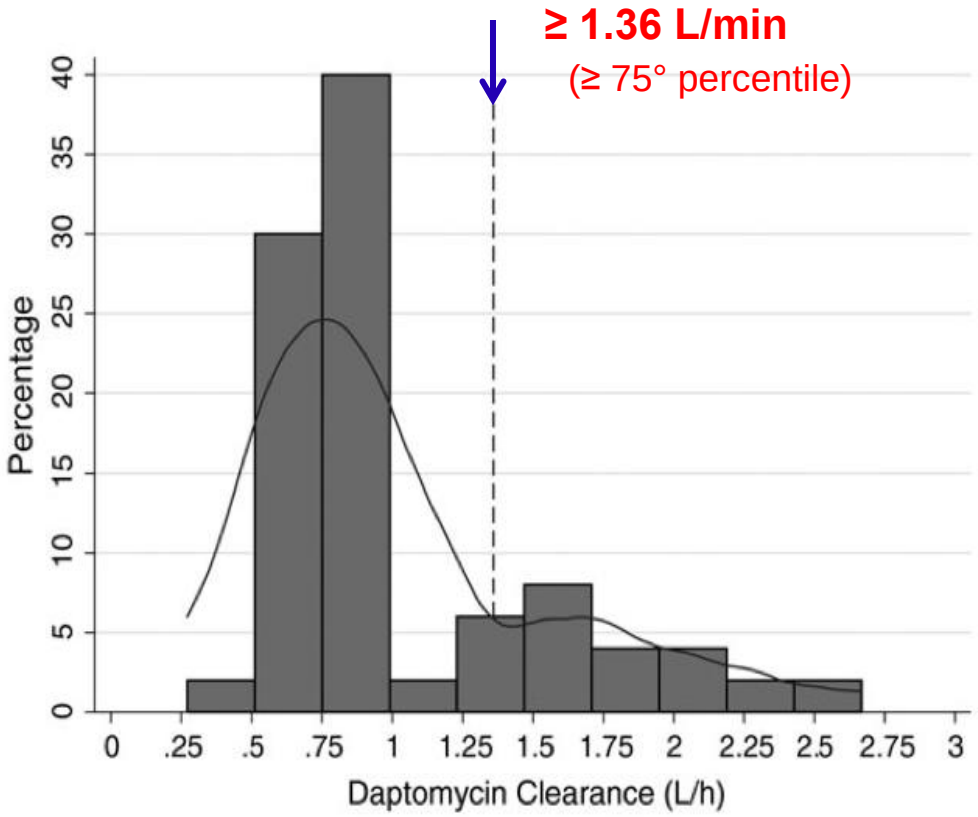
Falcone M et al Int J Antimicrob Agents 2012:39: 64– 68

Daptomycin: which dosages to what patients?

MAJOR ARTICLE

Considerations for Higher Doses of Daptomycin in Critically Ill Patients With Methicillin-Resistant *Staphylococcus aureus* Bacteremia

Marco Falcone,[1] Alessandro Russo,[1] Mario Venditti,[1] Andrea Novelli,[2] and Manjunath P. Pai[3]



Clin Infect Dis 2013; 57:1568-76

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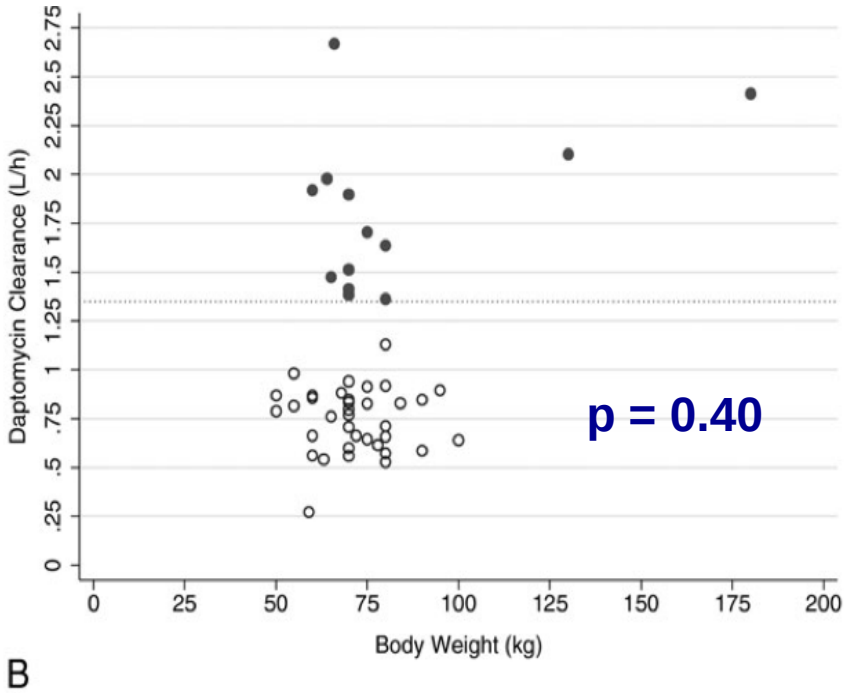
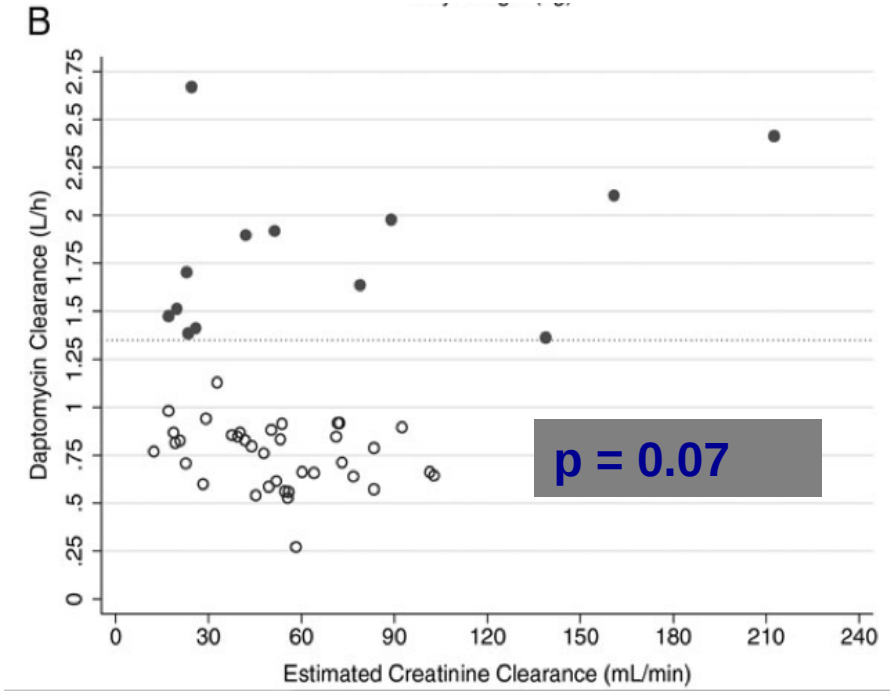
Correlation between daptomycin clearance, body weight, and CRCl





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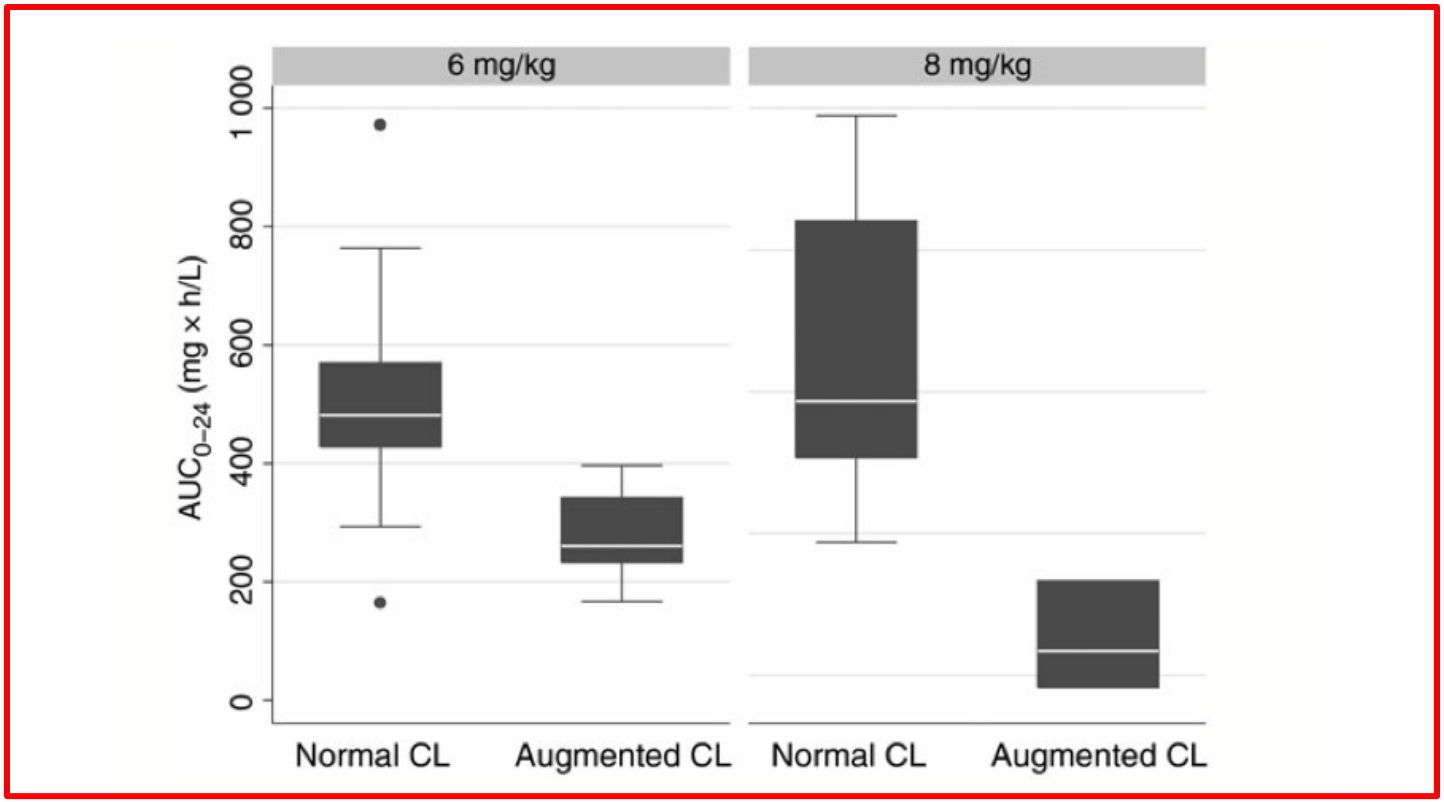

Clin Infect Dis 2013; 57:1568-76

MAJOR ARTICLE

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Variable	Augmented CL (n = 13)	Normal CL (n = 37)	*P* Value
Type of infection			
Bacteremia—endocarditis	13 (100%)	8 (21.6%)	<.001
Skin and soft tissue infection	0	20 (54.1%)	<.001
Prosthetic joint infection	0	6 (16.2%)	<.001
Osteomyelitis	0	4 (10.8%)	<.001
Causative pathogen			
MRSA	11 (84.6%)	2 (5.2%)	<.001
MRSE	0	8 (21%)	<.001
MRSH	0	7 (18.4%)	<.001
Other	2 (15.4%)	14 (36.8%)	<.001
Comorbidities and outcomes			
COPD	8 (61.5%)	21 (55.2%)	.71
Heart failure	7 (53.8%)	19 (50%)	.29
Diabetes mellitus	7 (53.8%)	18 (47.3%)	.18
Neoplasm	2 (15.3%)	4 (10.5%)	.68
Chronic liver disease	3 (23%)	7 (18.4%)	.08
Presence of at least 2 comorbidities	9 (69.2%)	22 (57.8%)	.09
Recent surgery, previous 30 d	6 (46.1%)	9 (24.3%)	.07
ICU acquisition of infection	8 (61.5%)	12 (31.5%)	.04
Severe sepsis or septic shock[a]	13 (100%)	9 (24.3%)	.01
SOFA score, mean (SD)	3.31 (1.03)	2.11 (0.84)	<.001
Mean length of hospital stay, days	36.8	22.5	<.001
In-hospital mortality	4 (30.7%)	4 (10.8%)	<.001

Clinical features of patients with augmented daptomycin clearance

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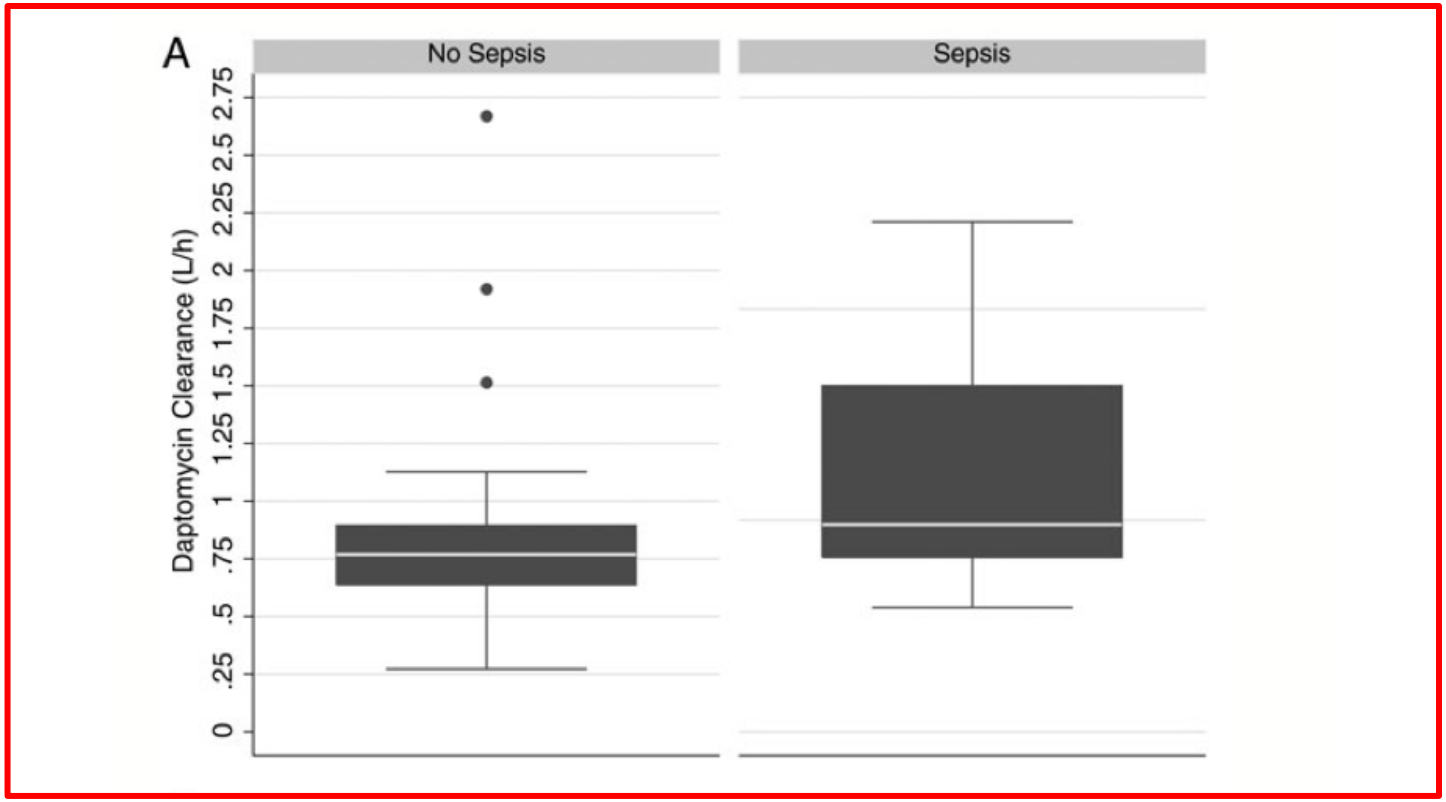


Clin Infect Dis 2013; 57:1568-76

Probability of target attainment (PTA) and toxicity in patients with severe sepsis or septic shock at Monte Carlo simulation

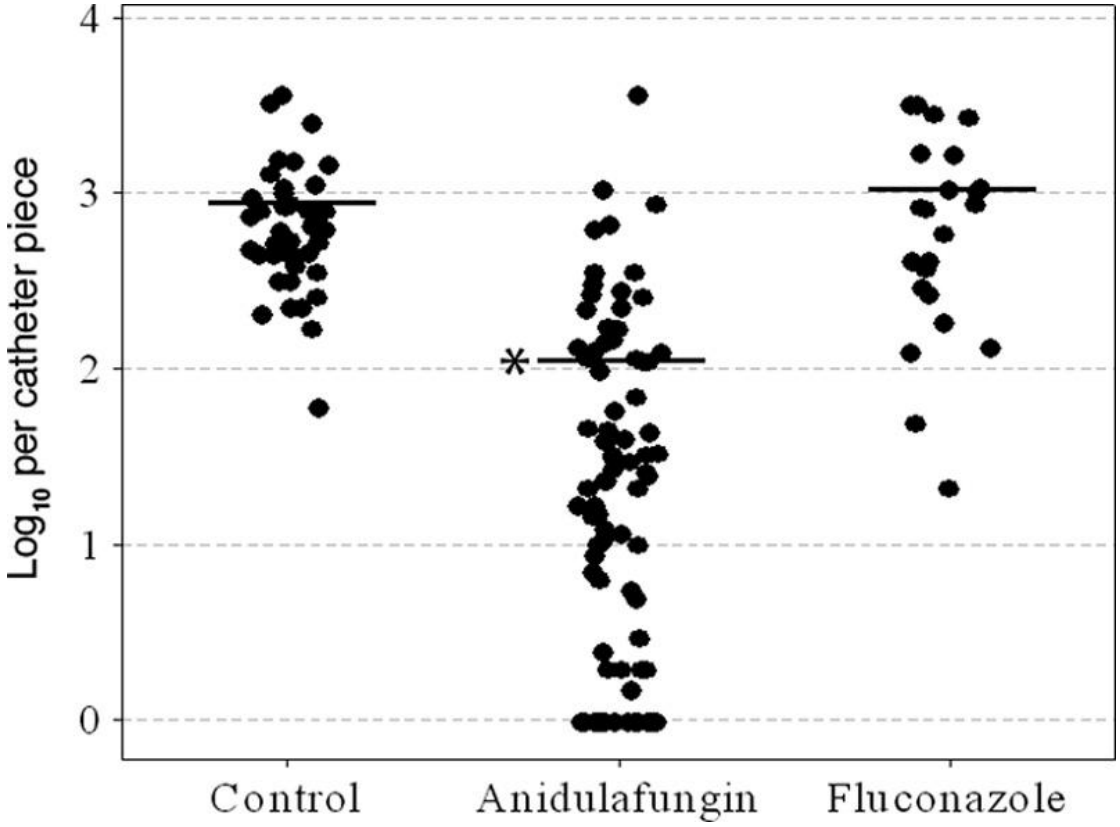
Daily Dose	% CFR Based on AUC_{0-24}/MIC ≥579	≥666	≥753	% Probability C_{min} ≥ 24.3 mg/L
Weight-based dosing				
6 mg/kg/d	87.3	82.1	77.2	0.08
8 mg/kg/d	94.1	91.3	88.0	0.78
10 mg/kg/d	97.1	95.4	93.4	2.64
Fixed dosing				
500 mg/d	93.1	89.2	84.8	0.02
750 mg/d	98.4	97.3	95.6	1.26
1000 mg/d	99.5	99.1	98.5	6.20

Clin Infect Dis 2013; 57:1568-76

Probability of target attainment (PTA) and toxicity in patients without sepsis at Monte Carlo simulation

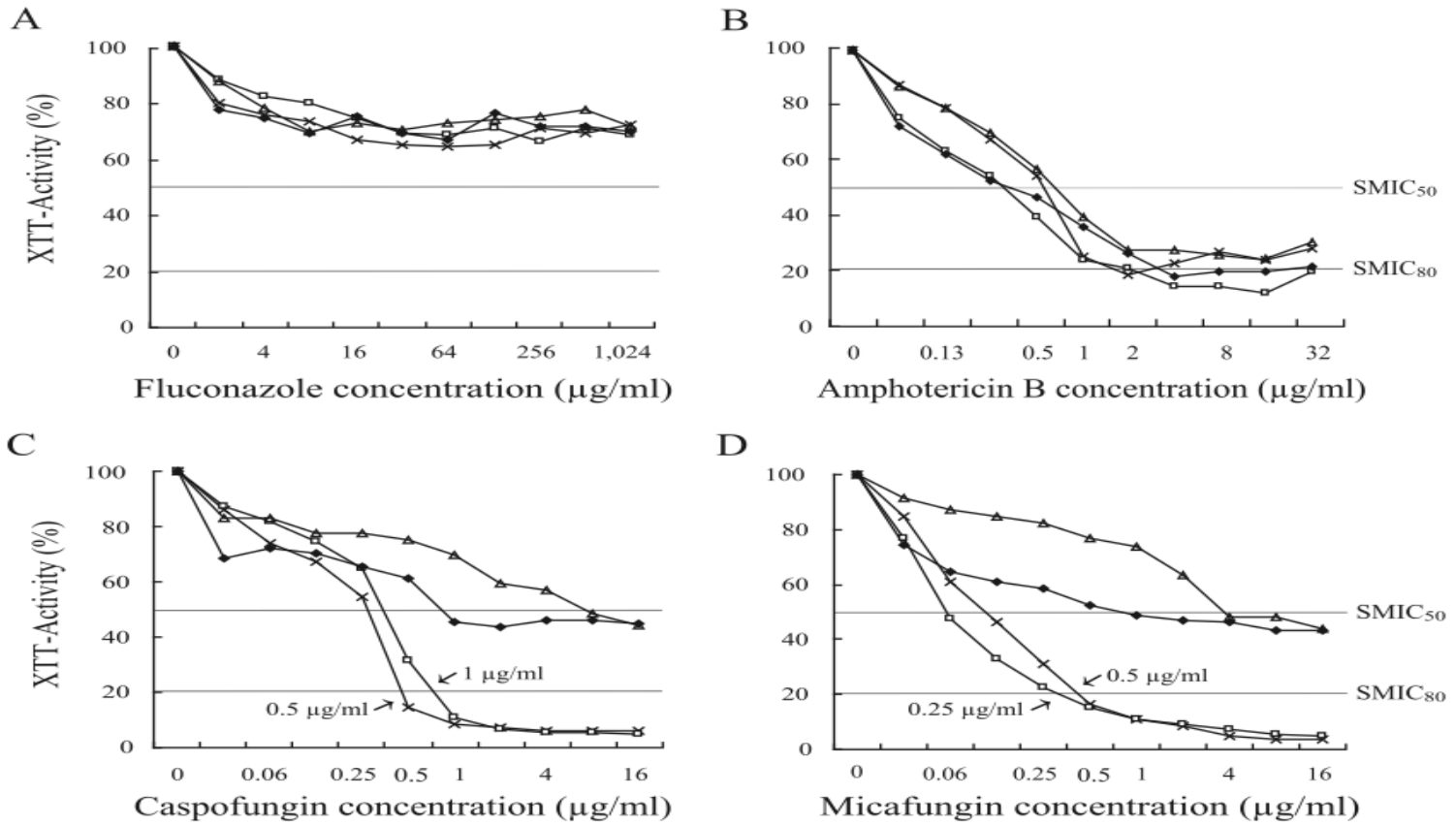
Daily Dose	% CFR Based on AUC_{0-24}/MIC ≥579	≥666	≥753	% Probability $C_{min} \geq 24.3$ mg/L
Weight-based dosing				
6 mg/kg/d	94.8	92.3	89.5	1.52
8 mg/kg/d	97.9	96.7	95.1	4.88
10 mg/kg/d	99.1	98.6	97.6	11.0
Fixed dosing				
500 mg/d	96.8	95.1	92.9	1.38
750 mg/d	99.3	98.8	98.1	7.64
1000 mg/d	99.8	99.7	99.4	19.3

Effect of antifungal treatment on mature *Candida* biofilms*



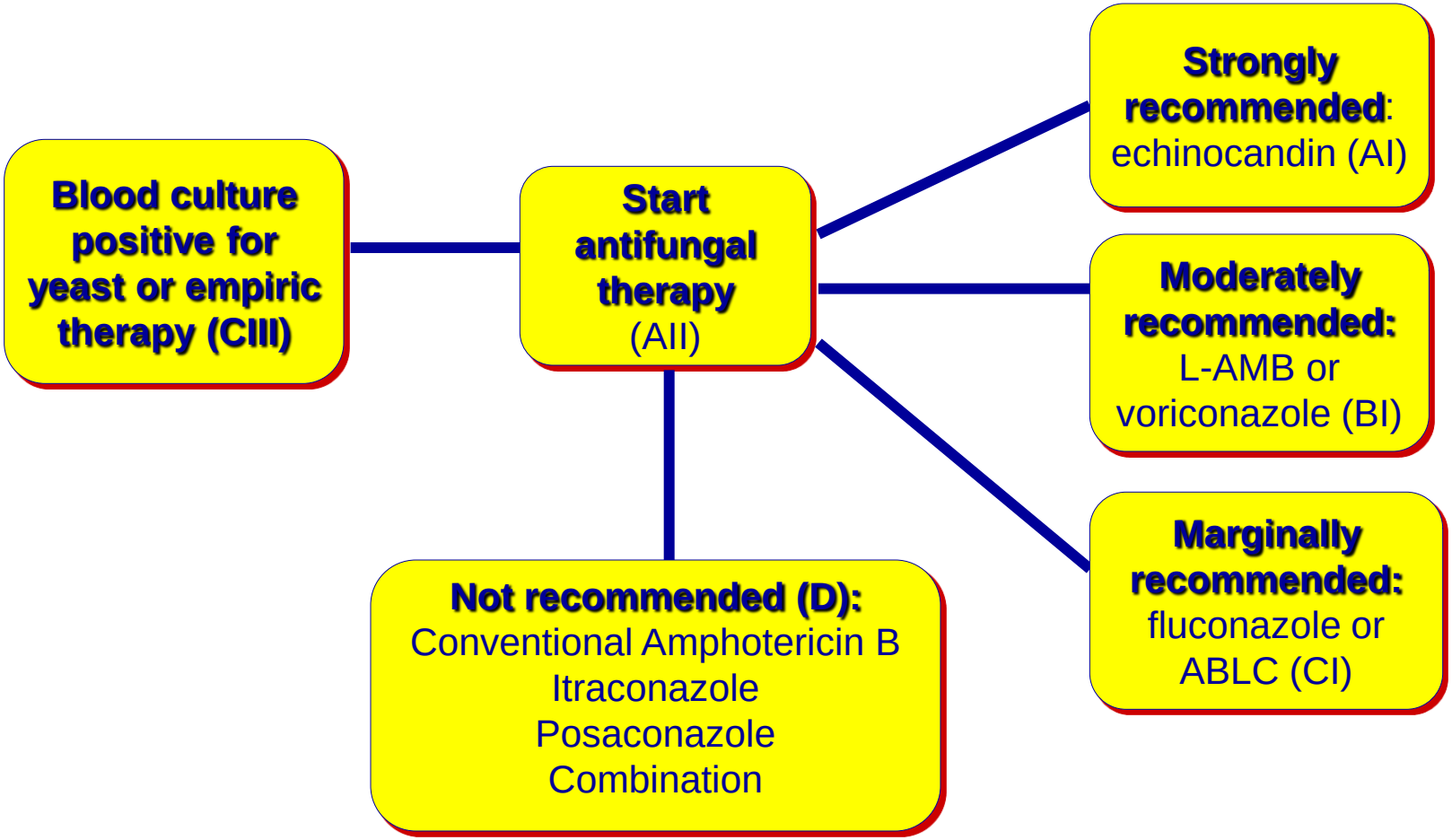
Kucharíkova S et al., Antimicrob Agents Chemother, 2010; Katragkou A et al., J Infect Dis, 2010

Antifungals and biofilm



Choi HW et al. Species-specific differences in the susceptibilities of biofilms formed by Candida bloodstream isolates to echinocandin antifungals. Antimicrobial Agents Chemother 2007, 1520-1523

Treatment of *Candida* in non-neutropenic patients (ESCMID guidelines 2012)

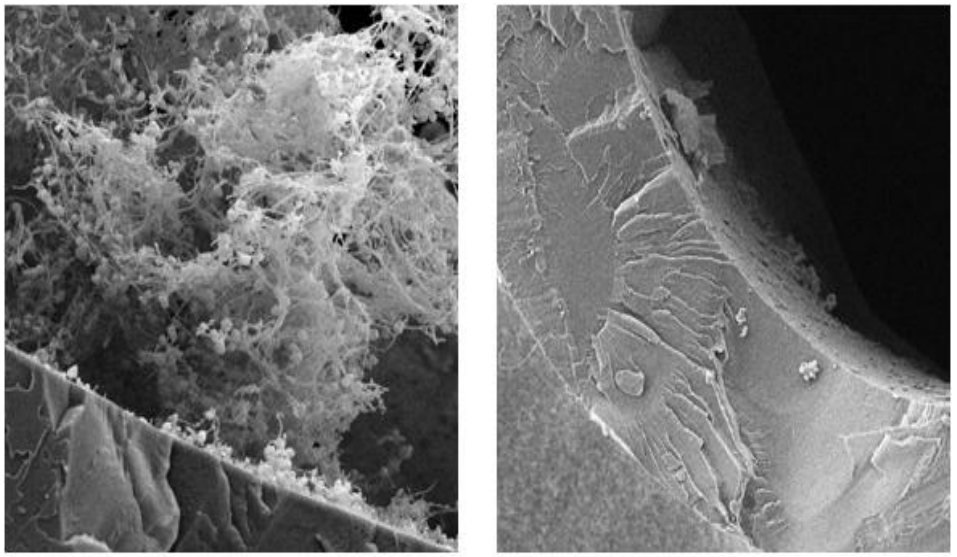


Clin Microbiol Infect. 2012 Dec;18 Suppl 7:19-37.

Removal of all foreign objects correlates with better outcomes*

C. albicans biofilms formed on an implanted medical device ex. CVC, urinary catheter, ETT, prosthetic heart valve, or pacemaker play a role in the persistence and profileration of Candidiasis. Cells in biofilms are much more resistant to antifungal agents*.

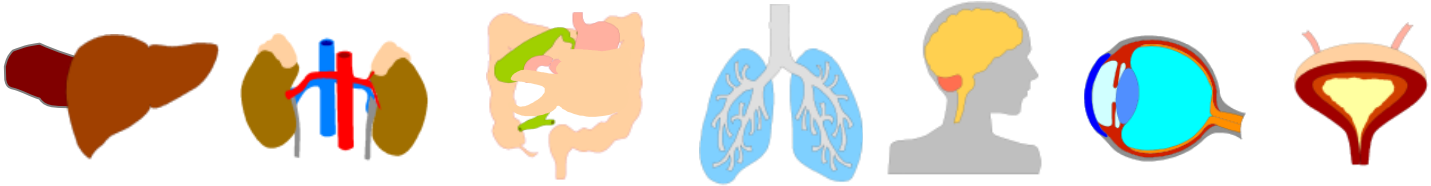
The echinocandins have penetration and action in *Candida* biofilms and thus may have an advantage in this setting**.



C. *albicans* adhesion as a virulence factor

* Nucci M et al. 2002. CID; 34: 591-599.
** Kuhn et al. 2002. Antimicrob Agents Chemother; 46:1773-1780.

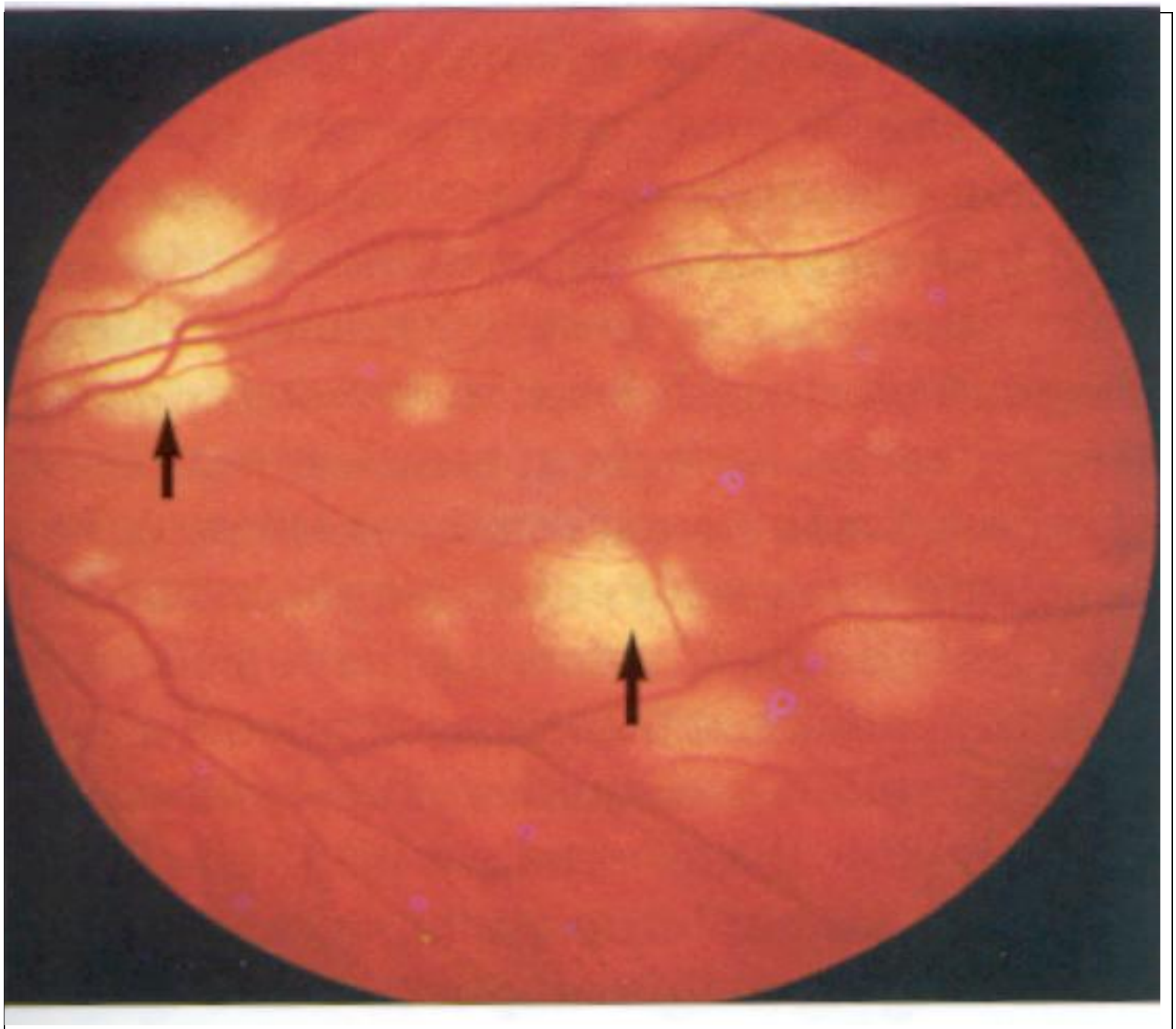
Antifungal PK: Drug Distribution



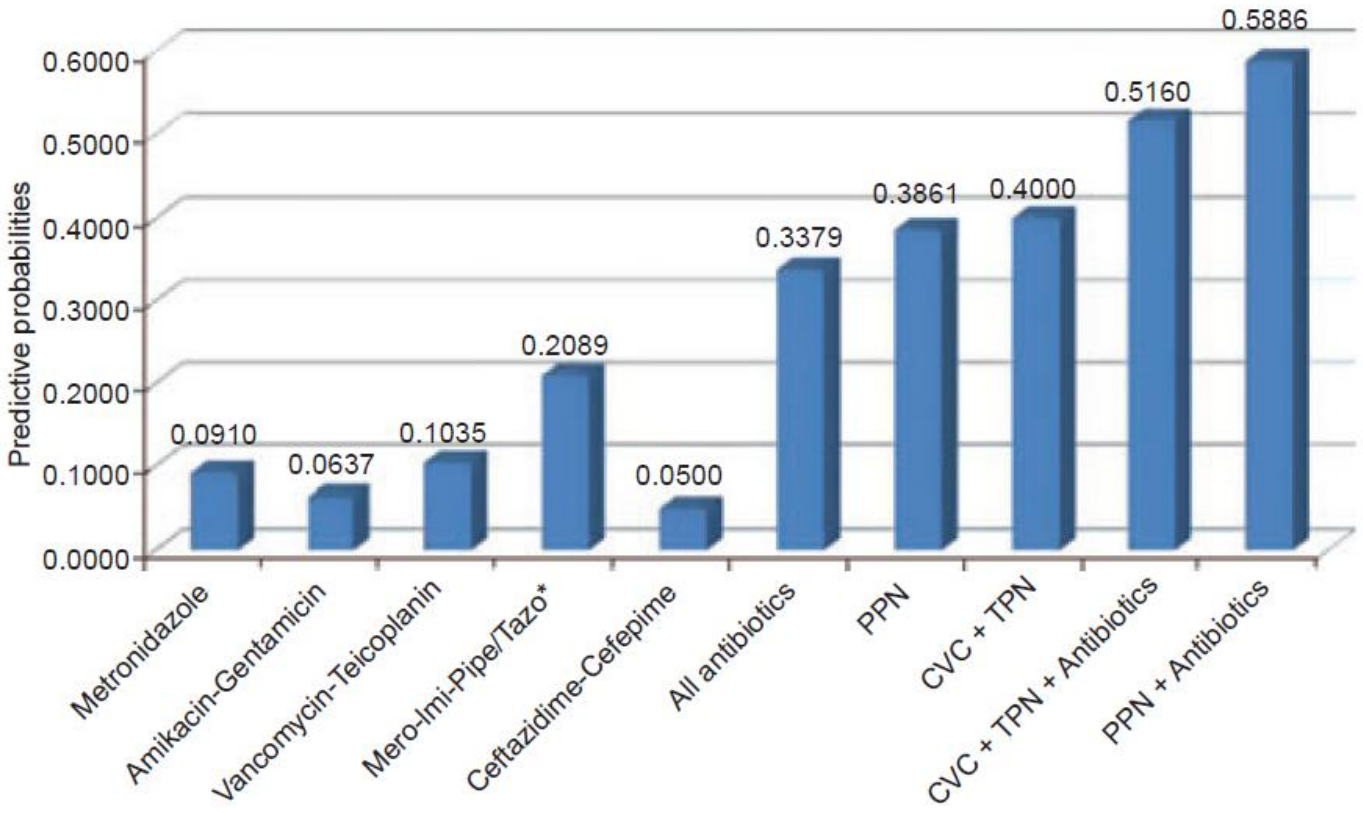
	Liver/ Spleen	Kidneys	Gut/gall bladder	Lungs	Brain/ CSF	Eyes	Bladder /urine
AMB	+	+	+	+	–	–	–
5FC	+	+	+	+	+	+	+
FLU	+	+	+	+	+	+	+
ITR	+	+	+	+	–	–	–
VOR	+	+	+	+	+	+	–
POS*	+	+	+	+	–	–	–
Echino	+	+	+	+	–	–	–

+, ≥50% of serum concentrations.
–, <10% of serum concentrations.
*Predicted.

1. Dodds-Ashley ES, et al . *Clin Infect Dis.* 2006;43:S28-S39.
2. Groll AH, et al. *Adv Pharmacol.* 1998;44:343-500.
3. Eschenauer G, et al. *Ther Clin Risk Manage*. 2007;3:71-97.



Peripheral and total parenteral nutrition as the strongest risk factors for nosocomial candidemia in elderly patients: a matched case–control study



Mycoses 2013 ahead of print

Candidemia Subsequent to Severe Infection Due to *Clostridium difficile*: Is There a Link?

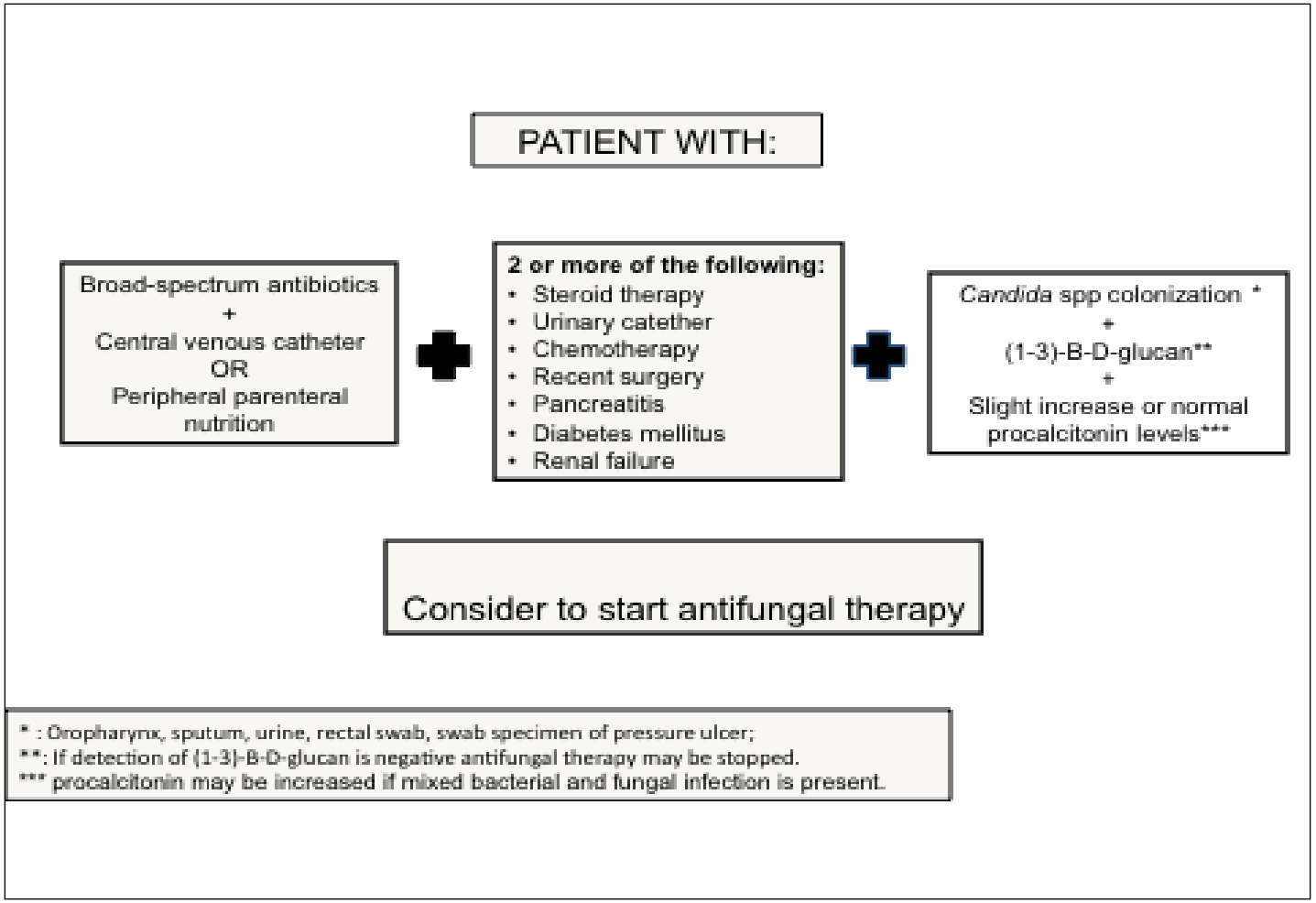
Maurizio Guastalegname,[a] Alessandro Russo,[a] Marco Falcone, Simone Giuliano, and Mario Venditti

Patient Number, Sex, Age, Ward of Hospitalization	Cause of Hospital Admission	Previous Antimicrobial Chemotherapy	Antimicrobial Regimen for Primary CDI	CDI Relapse (Time to Relapse[a])	Antimicrobial Regimen for CDI Relapse	Time at Risk for Candidemia[b]	Candidemia Risk Factors	*Candida* Species and Antifungal Chemotherapy	Clinical Outcome
1, female, 76, medical ward A	HCAP (patient coming from a nursing home)	Piperacillin/ tazobactam, ciprofloxacin	Oral vancomycin (125 mg qid)	Yes (24 d)	Oral vancomycin (125 mg qid) + IV metronidazole (500 mg qid)	16 d	• PICC • TPN • Type 2 diabetes mellitus	*Candida glabrata*	Survived
								Fluconazole (800 mg loading dose followed by 400 mg qd) for 14 d	
2, female, 84, medical ward B	Acute heart failure	Ceftriaxone	Oral vancomycin (125 mg qid)	Yes (37 d)	Oral vancomycin (125 mg qid) + IV metronidazole (500 mg qid)	44 d	• PICC • TPN • Chronic renal failure • Glucocorticoids	*Candida albicans*	Death at day 3 of antifungal therapy
								Micafungin (100 mg qd)	
3, male, 87, medical ward C	Pyelonephritis	Levofloxacin	Oral vancomycin (125 mg qid)	Yes (21 d)	Oral vancomycin (125 mg qid) + IV metronidazole (500 mg qid)	10 d	• PICC • TPN • Chronic renal failure	*Candida albicans*	Survived
								Anidulafungin (200 mg loading dose followed by 100 mg qd) for 19 d	
4, male, 82, medical ward C	Hypothyroidism and hypokalemia	Levofloxacin	Oral vancomycin (125 mg qid)	Yes (32 d)	Oral vancomycin (125 mg qid) + IV metronidazole (500 mg qid)	13 d	• PICC • TPN	*Candida parapsilosis*	Death at day 13 of antifungal therapy
								Anidulafungin (200 mg loading dose followed by 100 mg qd)	

Clinical Infectious Diseases 2013;57(5):772–4

Identification and management of invasive mycoses in Internal Medicine: a road-map for physicians

Falcone M, Concia E, Iori I, Lo Cascio G, Mazzone A, Pea F, Violi F, and Venditti M



Intern Emerg Med 2014 in press

Conclusions

✓ Intravascular devices are a major cause of infection in western countries

✓ Use algorythm for appropriate diagnosis and therapy

✓ Importance of biofilm activity of antibiotics and antifungals used

✓ Consider the patient and individualize therapy