

Gemelli



Fondazione Policlinico Universitario A. Gemelli
Università Cattolica del Sacro Cuore

GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine

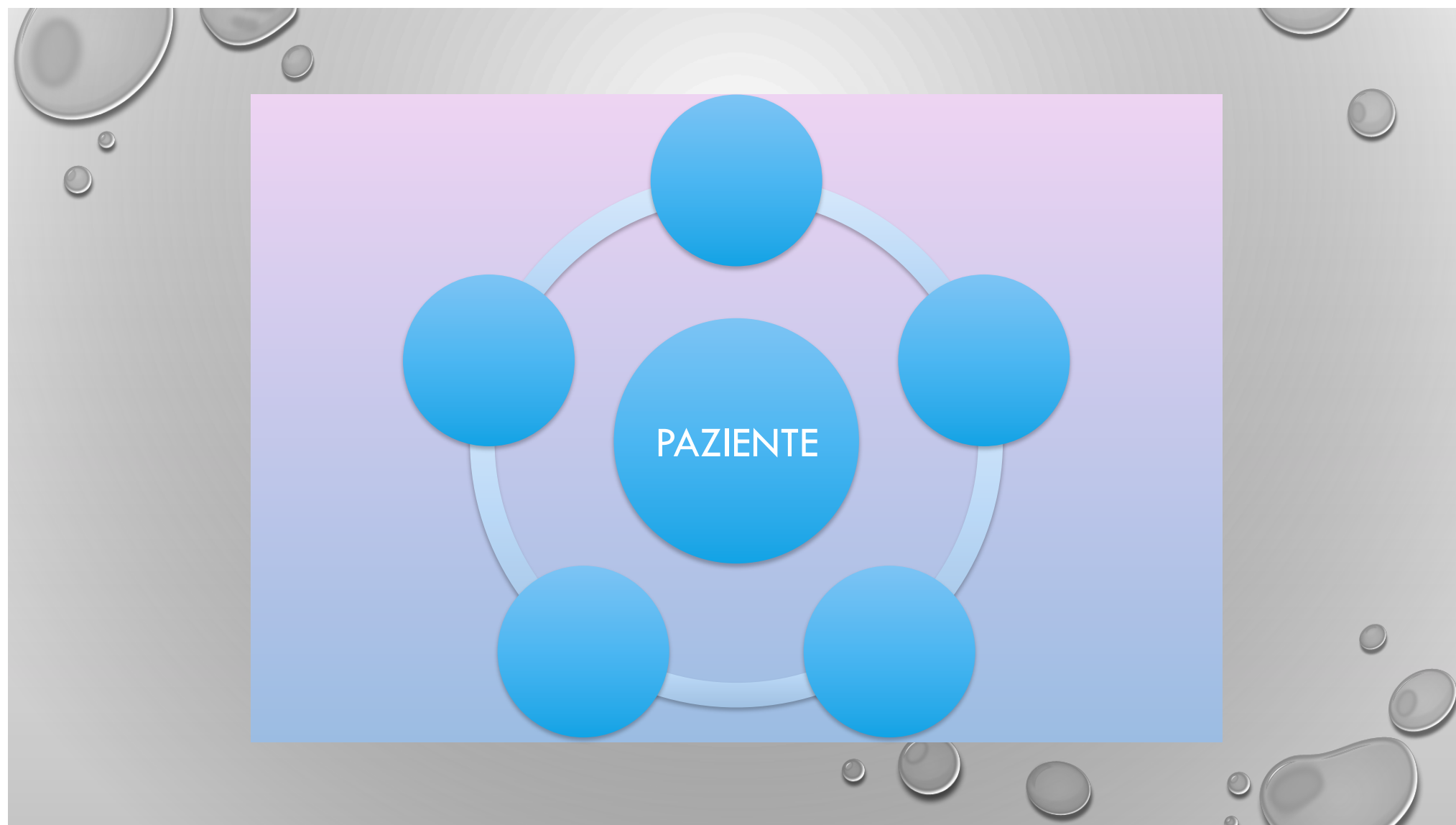


LA CORRETTA GESTIONE DEL PAZIENTE CON SOSPETTA INFEZIONE DA PICC

GIANCARLO SCOPPETTUOLO

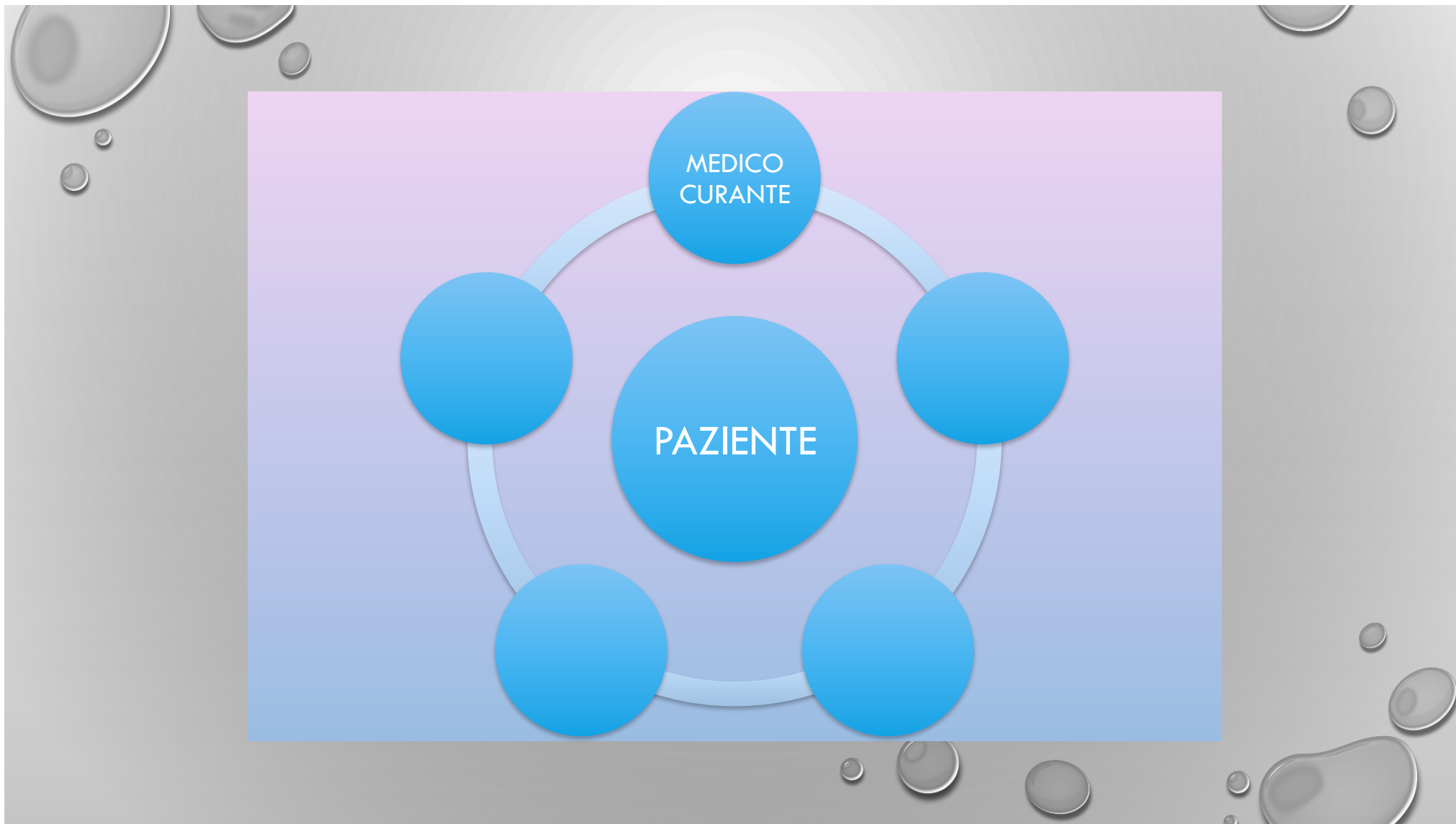
FONDAZIONE POLICLINICO UNIVERSITARIO "A. GEMELLI", IRCCS - ROMA

UNIVERSITÀ CATTOLICA DEL SACRO CUORE - ROMA



MEDICO
CURANTE

PAZIENTE



PRIMA TENTAZIONE DEL MEDICO....

- ATTRIBUIRE IMMEDIATAMENTE LA RESPONSABILITA' DELLA FEBBRE AL PICC, ANCORA PRIMA DI AVERE ESEGUITO ALCUNA INDAGINE DIAGNOSTICA
 - SOPRATTUTTO NEL PAZIENTE OSPEDALIZZATO (MA ANCHE NEL PAZIENTE DOMICILIARE) IL PICC È SOLO UNA DELLE POSSIBILI CAUSE DI INFEZIONE
- RIMUOVERE IL PICC
 - IN LETTERATURA È BEN DESCRITTO CHE CIRCA IL 70% DEI CVC RIMOSI SOLO CON CRITERIO EMPIRICO NON HANNO RAGIONE DI ESSERE RIMOSI
 - CRITERI PER LA RIMOZIONE IMMEDIATA DI UN PICC (IMPIANTATO DA ALMENO 48 ORE): PAZIENTE SETTICO, CON CHIARA EVIDENZA CHE IL PICC SIA IL FOCOLAIO SEPSIGENO (ES. SECREZIONE PURULENTA DALL'EXIT SITE) OPPURE PAZIENTE SETTICO CHE, NONOSTANTE L'INFUSIONE DI LIQUIDI E DI INOTROPI E L'INIZIO DI UNA TERAPIA ANTIBIOTICA A LARGO SPETTRO, SI MANTENGA EMODINAMICAMENTE INSTABILE
- RICHIEDERE SUBITO DOPO LA RIMOZIONE IL POSIZIONAMENTO DI UN NUOVO PICC...

CONCISE COMMUNICATION

Unnecessary Removal of Central Venous Catheters in Cancer Patients with Bloodstream Infections

Anne Marie Chaftari, MD;¹ Ray Hachem, MD;¹
Sammy Raad, MS;¹ Ying Jiang, MS;¹
Elizabeth Natividad, RN;² Patrick Chaftari, MD;³
Issam Raad, MD¹

We evaluated the rate of central venous catheter (CVC) removal in 283 cancer patients with bloodstream infections (BSIs). Removal of CVCs occurred unnecessarily in 57% of patients with non-central-line-associated BSI (non-CLABSI), which was equivalent to the rate of CVC removal in patients with CLABSIs. Physician education and safe interventions to salvage the vascular access are warranted.

Infect Control Hosp Epidemiol 2018;1–4

from our institutional review board and a waiver of informed consent was obtained.

Statistical Analysis

Descriptive statistics were used to summarize patients' demographics and clinical characteristics.

The χ^2 or Fisher exact tests were used to compare categorical variables, as appropriate. Continuous variables were compared using Wilcoxon rank-sum tests because of the data's deviation from normal distribution. All tests were 2-sided, and statistical significance was set at *P*-value of .05. The statistical analyses were performed using R statistical software (version 3.2.1; R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

We identified 283 patients who had a CVC and had simultaneous blood cultures drawn from the CVC and the peripheral

RESEARCH**Open Access**

Should central venous catheter be systematically removed in patients with suspected catheter related infection?

Leonardo Lorente^{1*}, María M Martín², Pablo Vidal³, Sergio Rebollo⁴, María I Ostabal⁵, Jordi Solé-Violán⁶
and Working Group on Catheter Related Infection Suspicion Management of GTEIS/SEMICYUC

Abstract

Introduction: Best clinical practice for patients with suspected catheter-related infection (CRI) remains unclear according to the latest Infectious Diseases Society of America (IDSA) guidelines. Thus, the objective of this study was to analyze clinical practice concerning the central venous catheter (CVC) and its impact on prognosis in patients with suspected CRI.

Methods: We performed a prospective, multicenter, observational study in 18 Spanish Intensive Care Units (ICUs). Inclusion criteria were patients with CVC and suspected CRI. The following exclusion criteria were used: age less than 18 years; pregnancy; lactation; human immunodeficiency virus; neutropenia; solid or haematological tumor; immunosuppressive or radiation therapy; transplanted organ; intravascular foreign body; haemodynamic instability; suppuration or frank erythema/induration at the insertion site of the CVC, and patients with bacteremia or fungemia. The end-point of the study was mortality at 30 days of CRI suspicion.

Results: The study included 384 patients. In 214 (55.8%) patients, CVC was removed at the moment of CRI suspicion, in 114 (29.7%) CVC was removed later and in 56 (14.6%) CVC was not removed. We did not find significant differences between survivors ($n=311$) and non-survivors ($n=73$) at 30 days according to CVC decision ($P=0.26$). The rate of confirmed catheter-related bloodstream infection (CRBSI) was higher in survivors than in non-survivors (14.5% versus 4.1%; $P=0.02$). Mortality rate was lower in patients with CRBSI than in the group of patients whose clinical symptoms were due to other causes (3/48 (6.25%) versus 70/336 (20.8%); $P=0.02$). We did not find significant differences in mortality in patients with confirmed CRBSI according to CVC removal at the moment of CRI suspicion ($n=38$) or later ($n=10$) (7.9% versus 0; $P=0.99$).

Conclusion: In patients with suspected CRI, immediate CVC removal may be not necessary in all patients. Other aspects should be taken into account in the decision-making, such as vascular accessibility, the risk of mechanical complications during new cannulation that may be life-threatening, and the possibility that the CVC may not be the origin of the suspected CRI.

DIFFICOLTÀ DIAGNOSTICHE

- CRITERI CLINICI (FEBBRE, BRIVIDI...) ASSOLUTAMENTE POCO SPECIFICI
- CLINICA ESTREMAMENTE POLIMORFA (FEBBRE ISOLATA CON CARATTERISTICHE VARIABILI FINO A SEPSI E SHOCK SETTICO)
- SEGNI LOCALI DI INFEZIONE MOLTO SPECIFICI MA POCO SENSIBILI

Clinical Practice Guidelines for the Diagnosis and Management of Intravascular Catheter-Related Infection: 2009 Update by the Infectious Diseases Society of America

Leonard A. Mermel,¹ Michael Allon,² Emilio Bouza,⁹ Donald E. Craven,³ Patricia Flynn,⁴ Naomi P. O'Grady,⁵ Issam I. Raad,⁶ Bart J. A. Rijnders,¹⁰ Robert J. Sherertz,⁷ and David K. Warren⁸

¹Division of Infectious Diseases, Warren Alpert Medical School of Brown University, Providence, Rhode Island; ²University of Alabama-Birmingham Hospital, Birmingham, Alabama; ³Tufts University School of Medicine, Lahey Clinic Medical Center, Burlington, Massachusetts; ⁴St. Jude Children's Research Hospital, Children's Infection Defense Center, Memphis, Tennessee; ⁵National Institutes of Health, Critical Care Medicine Department, Bethesda, Maryland; ⁶Section of Infectious Diseases, University of Texas-Cancer Center, Houston; ⁷Section of Infectious Diseases, Wake Forest University School of Medicine, Winston-Salem, North Carolina; ⁸Division of Infectious Diseases, Washington University School of Medicine, St Louis, Missouri; ⁹Servicio de Microbiología Clínica y E. Infecciosas Hospital General "Gregorio Marañón," Madrid, Spain; and ¹⁰Internal Medicine and Infectious Diseases, Erasmus University Medical Center, Rotterdam, the Netherlands



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CONSENSUS STATEMENT

Diagnosis and treatment of catheter-related bloodstream infection: Clinical guidelines of the Spanish Society of Infectious Diseases and Clinical Microbiology and (SEIMC) and the Spanish Society of Spanish Society of Intensive and Critical Care Medicine and Coronary Units (SEMICYUC)[☆]



F. Chaves^a, J. Garnacho-Montero^{b,*}, J.L. del Pozo (Coordinators)^c,
Authors: E. Bouza^d, J.A. Capdevila^e, M. de Cueto^f, M.Á. Domínguez^g,
J. Esteban^h, N. Fernández-Hidalgoⁱ, M. Fernández Sampedro^j, J. Fortún^k,
M. Guembe^l, L. Lorente^m, J.R. Pañoⁿ, P. Ramírez^o, M. Salavert^p,
M. Sánchez^q, J. Vallés^r

DIFFICOLTÀ DIAGNOSTICHE

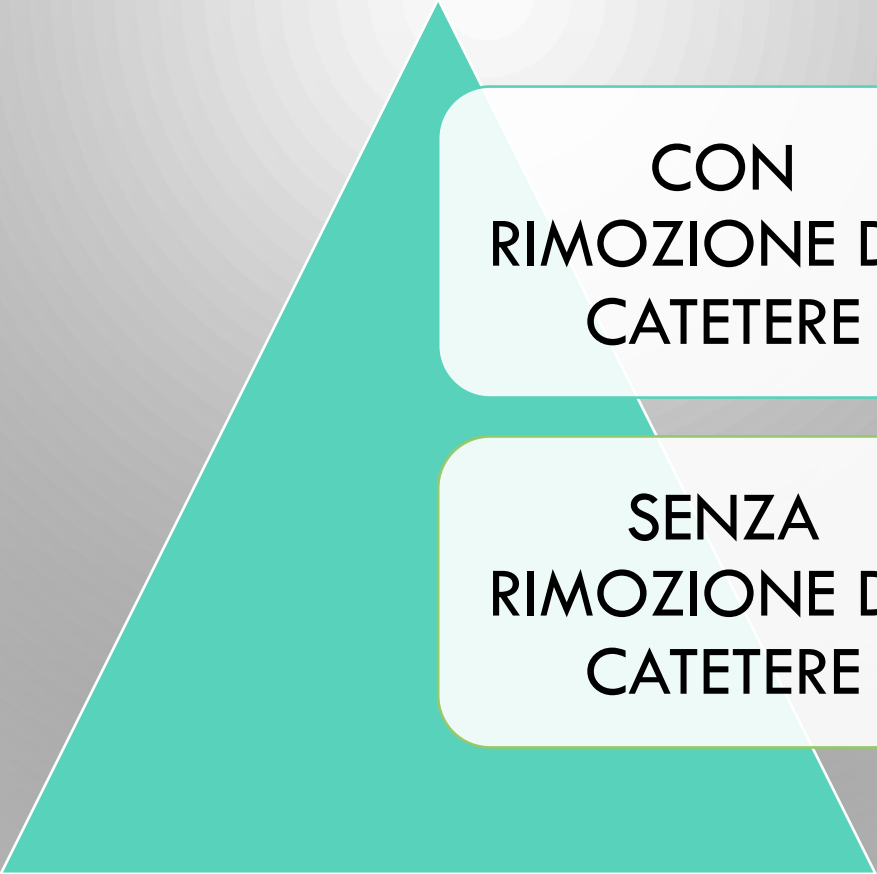
- DIFFERENTI TESTS DI LABORATORIO, CON DIVERSA SENSIBILITÀ E SPECIFICITÀ

SEPSI CATETERE CORRELATE (LCBSI)

- **IN UN PAZIENTE PORTATORE DI CATETERE INTRAVASCOLARE, MANIFESTAZIONI CLINICHE DI INFEZIONE (FEBBRE, BRIVIDI, E/O IPOTENSIONE), SENZA FONTI APPARENTI DI INFEZIONE E CON ALMENO UNO DEI SEGUENTI CRITERI:**
 - COLTURA QUANTITATIVA O SEMIQUANTITATIVA DI UN CATETERE CON L'ISOLAMENTO DELLO STESSO MICRORGANISMO (STESSA SPECIE E ANTIBIOGRAMMA) DAL SANGUE E DAL CATETERE
 - EMOCOLTURE QUANTITATIVE DA SANGUE PERIFERICO E DA SANGUE DA CATETERE CON UN RAPPORTO DI CRESCITA $\geq 3:1$ (CVC VS SANGUE PERIFERICO)
 - POSITIVIZZAZIONE DI EMOCOLTURE DA SANGUE PERIFERICO 2 O PIÙ ORE DOPO LA POSITIVIZZAZIONE DI EMOCOLTURE DA CATETERE.

Mermel LA et al. Guidelines for the management of intravascular catheter-related infections. CID, 2009

DIAGNOSI MICROBIOLOGICA



CON
RIMOZIONE DEL
CATETERE

SENZA
RIMOZIONE DEL
CATETERE

COLTURA SEMIQUANTITATIVA DI UN SEGMENTO DEL CATETERE

- UN SEGMENTO SOTTOCUTANEO DEL CATETERE (5-7 CM) VIENE FATTO “ROTOLARE” PER QUATTRO VOLTE SU UNA PIASTRA CONTENENTE AGAR SANGUE E MESSO AD INCUBARE
- POSITIVITÀ: ≥ 15 CFU
- 19 STUDI CONSIDERATI (14 SU CVC A BREVE TERMINE, 1 A LUNGO TERMINE E 4 SU ENTRAMBI)
- SENSIBILITÀ: 85%
- SPECIFICITÀ: 82%



Maki, Ann Inter Med 2005

COLTURA QUANTITATIVA DI UN SEGMENTO DEL CATETERE

- UN SEGMENTO DEL CATETERE RIMOSSO È “LAVATO” CON BRODO DI COLTURA O SOTTOPOSTO A “VORTEXING” O TRATTAMENTO CON ULTRASUONI IN BRODO; TALE BRODO, DOPO DILUIZIONI SERIATE, VIENE SEMINATO SU UNA PIASTRA DI AGAR SANGUE E MESSO AD INCUBARE
- POSITIVITÀ: ≥ 1000 CFU
- 14 STUDI CONSIDERATI
- SENSIBILITÀ: 83%
- SPECIFICITÀ 87%

Maki, Ann Inter Med 2005



EMOCOLTURE QUANTITATIVE APPAIATE

- EMOCOLTURE CONVENZIONALI PRELEVATE CONTEMPORANEAMENTE DAL CATETERE E DAL SANGUE PERIFERICO
- POSITIVITÀ: POSITIVITÀ DELLE COLTURE DA ENTRAMBI I SITI, CON UNA CONCENTRAZIONE DI MICRORGANISMI DAL CATETERE 3-5 VOLTE SUPERIORE A QUELLA DEL SANGUE PERIFERICO
- 10 STUDI CONSIDERATI
- SENSIBILITÀ: 87%
- SPECIFICITÀ: 98%
- **TEST PIU' ACCURATO IN ASSOLUTO!**



DIFFERENTIAL TIME TO POSITIVITY

- EMOCOLTURE CONVENZIONALI PRELEVATE CONTEMPORANEAMENTE DAL CATETERE E DAL SANGUE PERIFERICO
- POSITIVITÀ: POSITIVITÀ DELLE COLTURE DA ENTRAMBI I SITI, CON QUELLE CENTRALI POSITIVE 2 E PIÙ ORE PRIMA RISPETTO A QUELLE DAL SANGUE PERIFERICO
- 10 STUDI CONSIDERATI
- SENSIBILITÀ 85%
- SPECIFICITÀ: 81%



Maki, Ann Inter Med 2005

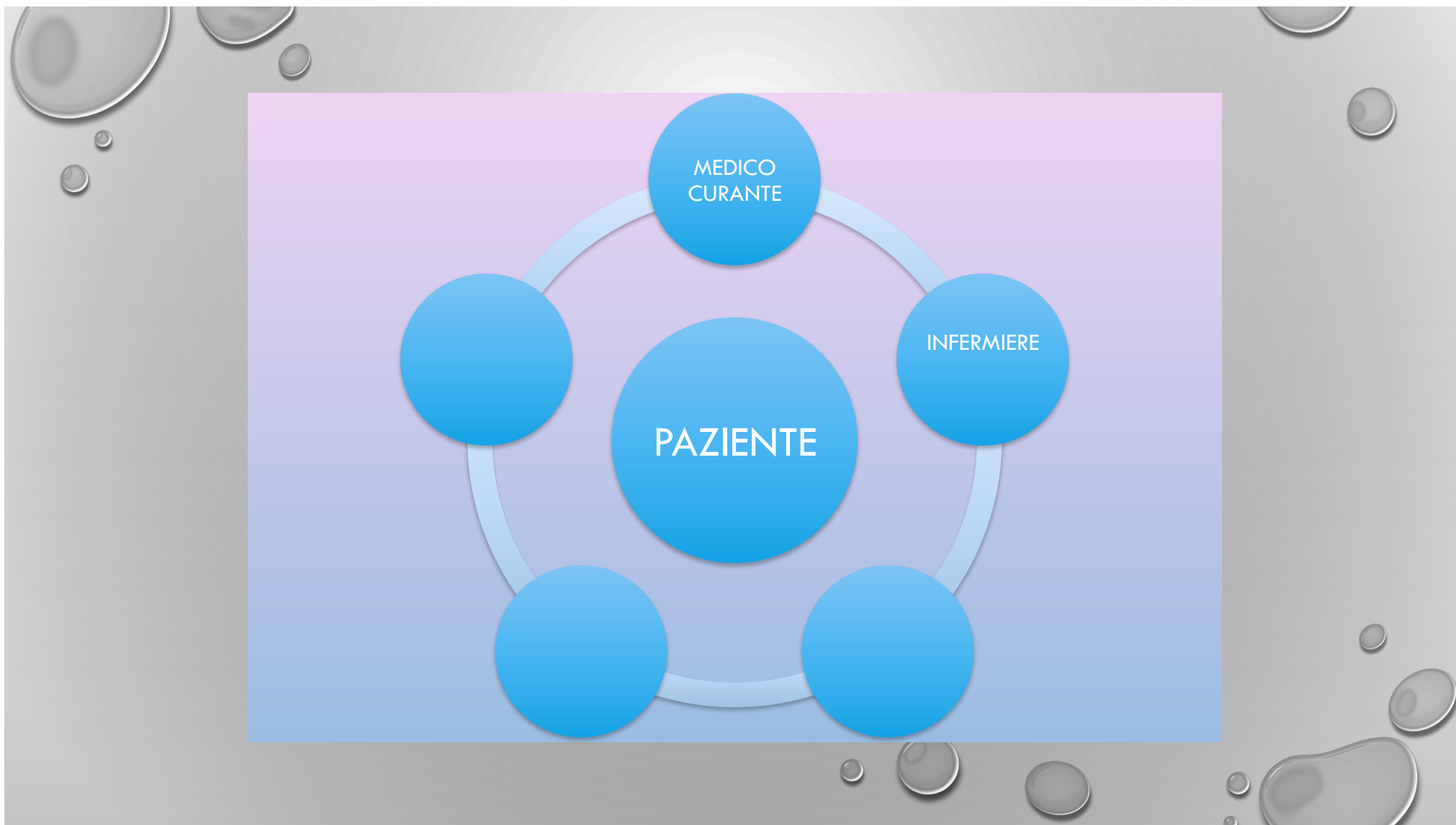
Table 2 Summary of main diagnostic methods for catheter-related bloodstream infections.

	Criteria for positivity	Interpretation	Comments	Recommendation
<i>Diagnosis without catheter withdrawal</i>				
Paired quantitative blood cultures	Ratio $\geq 3:1$	Both sets are positive for the same microorganism and the set obtained through the catheter has $\geq 3:1$ fold-higher colony count than the peripheral culture	Sensitivity $\approx 79\%$ Specificity $\approx 99\%$ Labor intensive and expensive	A-II
Paired blood cultures for differential time to positivity (DTP)	≥ 120 min	Both sets are positive for the same microorganism and the set obtained through the catheter becomes positive ≥ 120 min earlier	Sensitivity: 72% to 96% Specificity: 90% to 95% Less specificity for long-term catheters The interpretation of DTP should take into account adherence to the technical procedure and the type of microorganism	A-II
Endoluminal brushing	>100 CFU	Indicative of CRBSI	Sensitivity: 95% to 100% Specificity: 84% to 89% It may underestimate CRBSI in short-term catheters Risk of pathogen dissemination and thrombotic complications	C-III

Superficial cultures (semiquantitative cultures of skin surrounding the portal entry and catheter hubs)	≥ 15 CFU per plate	Indicative of CRBSI	Sensitivity: 78% Specificity: 92% Must be combined with peripheral blood culture	B-II
Gram stain-acridine orange leukocyte cytospin of catheter blood	Presence of any microorganisms in a minimum of 100 high-powered fields	Indicative of CRBSI	Sensitivity $\approx 79\%$ Specificity $\approx 87\%$ The technique is simple and rapid, but requires cytospin technology	B-II
<i>Diagnosis with catheter withdrawal</i>				
Semiquantitative catheter culture	≥ 15 CFU	The same microorganism in at least one percutaneous blood culture and catheter tip culture	Sensitivity $\approx 84\%$ Specificity $\approx 86\%$ This method mainly detects colonization on the external surface	A-II
Quantitative catheter segment culture (vortexing or flushing internal surface)	$\geq 10^3$ CFU	The same microorganism in at least one percutaneous blood culture and catheter tip culture	Sensitivity $\approx 83\%$ Specificity $\approx 91\%$ All quantitative methods are time consuming	A-II
Quantitative catheter segment culture (sonication)	$\geq 10^2$ CFU	The same microorganism in at least one percutaneous blood culture and catheter tip culture	Sensitivity $\approx 83\%$ Specificity $\approx 91\%$ All quantitative methods are time consuming	A-II

DIFFICOLTÀ DIAGNOSTICHE

- MANCANZA DI PROTOCOLLI OMOGENEI PER L'ESECUZIONE DELLE EMOCOLTURE (NUMERO DI PRELIEVI DA EFFETTUARE, SITO DEL PRELIEVO, DISINFEZIONE DELLA CUTE, TIMING DI PRELIEVI SERIATI, VOLUME DI SANGUE DA PRELEVARE, CONTAMINAZIONI...)
- DIFFICOLTA' NELLA INTERPRETAZIONE DEI RISULTATI DELLE EMOCOLTURE



**PROCEDURA PER
LA ESECUZIONE DELLE EMOCOLTURE**

Rev.: 0

PRO.POL.RMA.201

**Procedura per
la Esecuzione delle Emocolture
PRO.POL.RMA.201**

	NOME	DATA	FIRMA
Redatto da:	Gruppo di lavoro		
Verificato da:	CIO		
Approvato da:	Prof. Pierluigi Granone		
	Dott. Andrea Cambieri		

PURPOSE OF BLOOD CULTURES

- CULTURE OF BLOOD IS THE MOST SENSITIVE METHOD FOR DETECTION OF BACTEREMIA OR FUNGEMIA.
- BLOOD CULTURES SHOULD BE OBTAINED PRIOR TO INITIATION OF ANTIMICROBIAL THERAPY IN ANY PATIENT WITH FEVER, LEUKOCYTOSIS OR LEUKOPENIA.
- A NORMAL WBC DOES NOT RULE OUT BACTEREMIA.
- TIMELY, EARLY INITIATION OF GOAL-DIRECTED THERAPY, CAN BE LIFE-SAVING!

Courtesy of E.J Baron, PhD, Dir of Microbiology Lab, Stanford Hospital.

ACCURATE BLOOD CULTURE RESULTS

- ACCURATE, CAREFUL BLOOD CULTURE COLLECTION IS CRITICAL TO:
 - ACCURATE IDENTIFICATION OF THE OFFENDING MICROORGANISM
 - ALLOWING TAILORED ANTIMICROBIAL THERAPY
 - AVOIDING FALSE POSITIVES

Courtesy of E.J Baron, PhD, Dir of Microbiology Lab, Stanford Hospital.

MOST COMMON CONTAMINANTS

- ORGANISMS FOR WHICH IT IS DIFFICULT TO DISTINGUISH BETWEEN PATHOGENICITY & CONTAMINATION:
 - COAG NEG STAPH
 - BACILLUS SPECIES
 - CORYNEBACTERIUM SPECIES
 - PROPIONIBACTERIUM SPECIES
- LIKELIHOOD OF PATHOGENICITY IS INCREASED IF THE ORGANISM IS OBSERVED IN MULTIPLE BLOOD CULTURES BY INDEPENDENT VENIPUNCTURES.

Courtesy of E.J Baron, PhD, Dir of Microbiology Lab, Stanford Hospital.

* PROBLEMS WITH CONTAMINATION OF BLOOD CULTURES

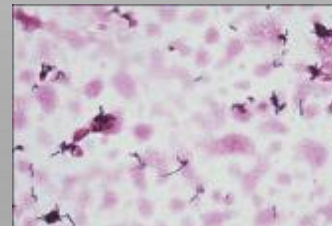
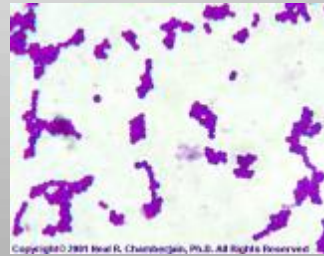
- * ONGOING PROBLEM WITH PERIPHERAL & CATHETER BCS.
- * THERE ARE 2 KEY FACTORS IN GETTING OPTIMAL RESULTS FROM THIS EXPENSIVE & IMPORTANT TEST.
- **KEY FACTORS** IN BLOOD CULTURES:
- OBTAIN THE **CORRECT VOLUME OF BLOOD.**
- **EFFECTIVE SKIN DISINFECTION BEFORE INSERTING NEEDLE.**

Courtesy of E.J Baron, PhD, Dir of Microbiology Lab, Stanford Hospital.

EMOCOLTURE “CONTAMINATE”

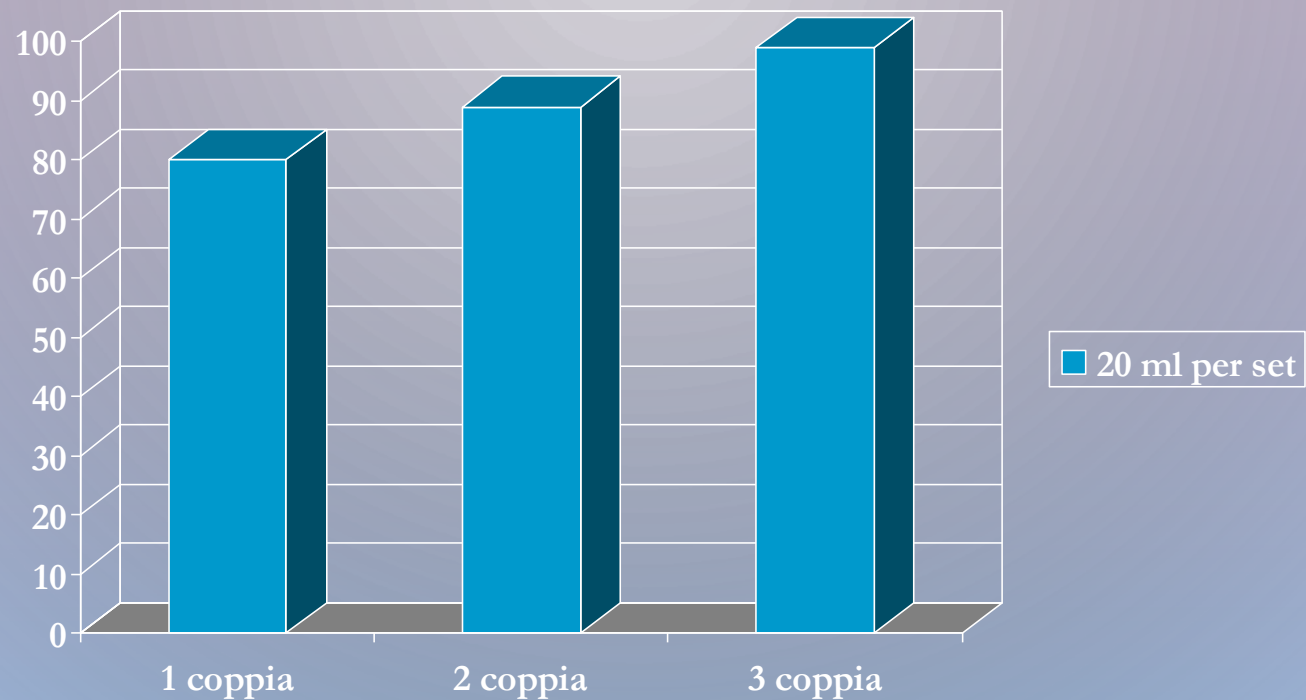
- E' DEFINITA “CONTAMINATA” UNA SINGOLA EMOCOLTURA TRA DIVERSE EFFETTUATE POSITIVA PER:

- STAFILOCOCCHI COAGULASI NEGATIVI
- CORYNEBACTERIUM SPP
- MICROCOCCUS
- PROPIONIBACTERIUM
- BACILLUS



Baron, AVA 2006

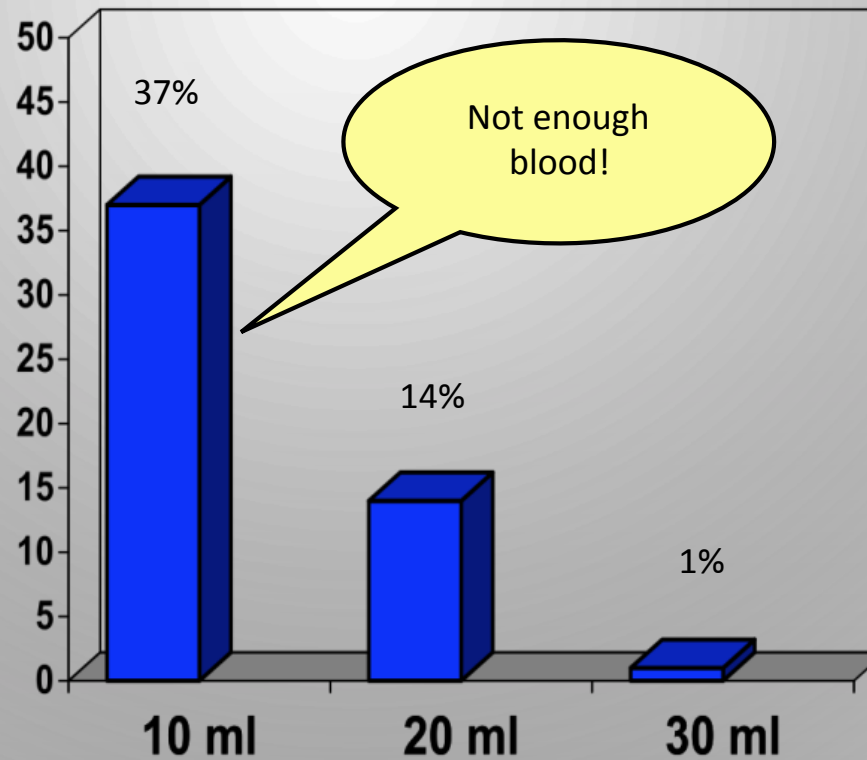
% DI EMOCOLTURE POSITIVE RISPETTO AL NUMERO EFFETTUATO



Mayo Clinic Study, 2006

% False Negative vs. Volume of Blood

% False Negative
(blood culture is negative but patient is really septicemic)

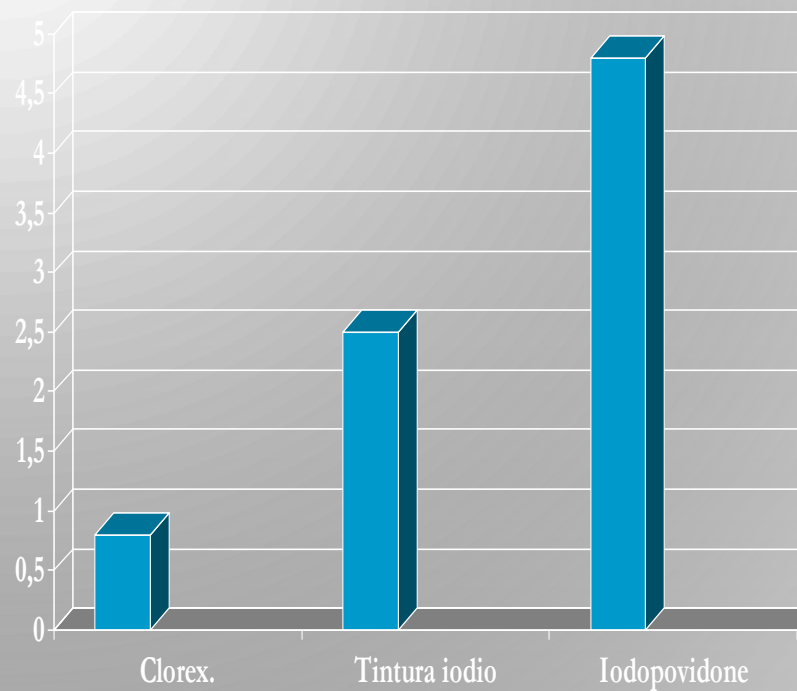
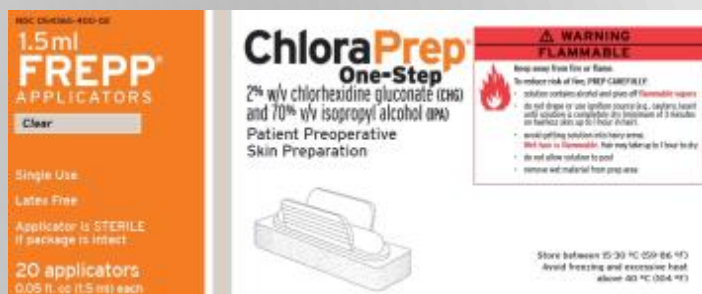


Courtesy of E.J Baron, PhD, Dir of Microbiology Lab, Stanford Hosp

VOLUME DI SANGUE

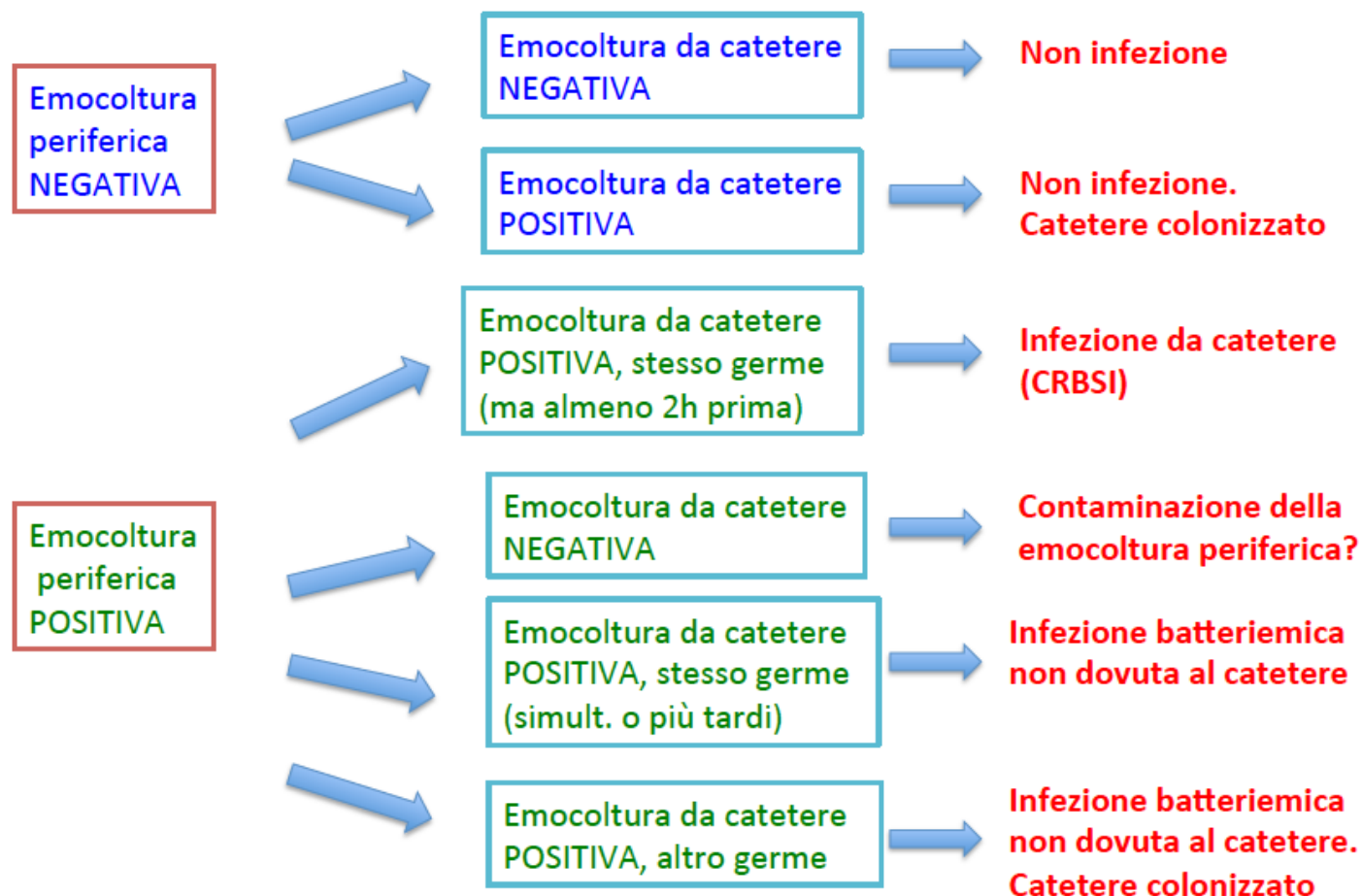
Peso (Kg)	ml per contenitore	ml per coppia
< 9	1	2
9-14	3	6
15-27	5	10
28-41	10	20
> 42	20	40

CONTAMINAZIONE DELLE EMOCOLTURE RISPETTO ALL'ANTISEPTICO IMPIEGATO



Baylor, 2006

Interpretazione della DTP



Clinical Practice Guidelines for the Diagnosis and Management of Intravascular Catheter-Related Infection: 2009 Update by the Infectious Diseases Society of America

Leonard A. Mermel,¹ Michael Allon,² Emilio Bouza,³ Donald E. Craven,³ Patricia Flynn,⁴ Naomi P. O'Grady,⁵ Issam I. Raad,⁶ Bart J. A. Rijnders,¹⁰ Robert J. Sherertz,⁷ and David K. Warren⁸

¹Division of Infectious Diseases, Warren Alpert Medical School of Brown University, Providence, Rhode Island; ²University of Alabama-Birmingham Hospital, Birmingham, Alabama; ³Tufts University School of Medicine, Lahey Clinic Medical Center, Burlington, Massachusetts; ⁴St. Jude Children's Research Hospital, Children's Infection Defense Center, Memphis, Tennessee; ⁵National Institutes of Health, Critical Care Medicine Department, Bethesda, Maryland; ⁶Section of Infectious Diseases, University of Texas-Cancer Center, Houston; ⁷Section of Infectious Diseases, Wake Forest University School of Medicine, Winston-Salem, North Carolina; ⁸Division of Infectious Diseases, Washington University School of Medicine, St Louis, Missouri; ⁹Servicio de Microbiología Clínica y E. Infecciosas Hospital General "Gregorio Marañón," Madrid, Spain; and ¹⁰Internal Medicine and Infectious Diseases, Erasmus University Medical Center, Rotterdam, the Netherlands

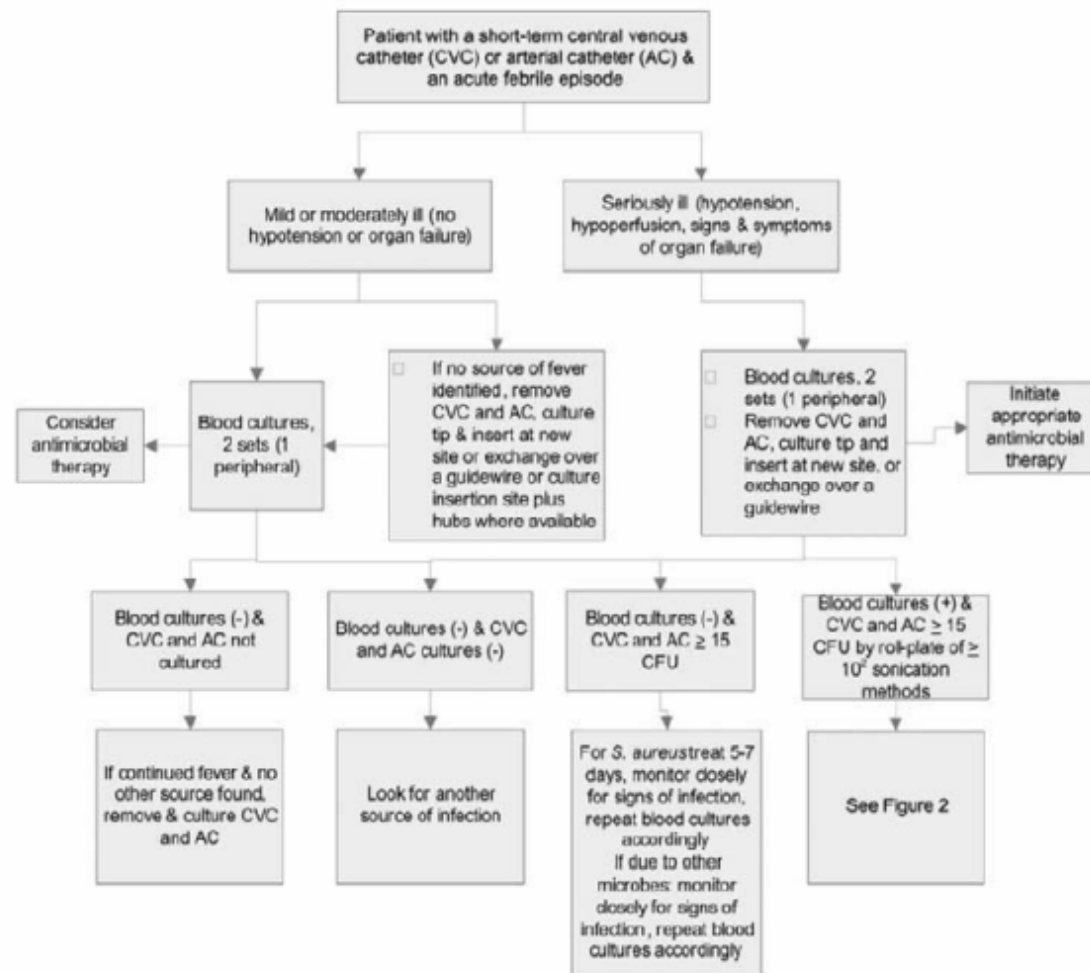


Figure 1. Methods for the diagnosis of acute fever for a patient suspected of having short-term central venous catheter infection or arterial catheter infection. CFU, colony-forming units.



HHS Public Access

Author manuscript

JAMA. Author manuscript; available in PMC 2016 August 01.

Published in final edited form as:

JAMA. 2016 February 23; 315(8): 801–810. doi:10.1001/jama.2016.0287.

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Mervyn Singer, MD, FRCP, Clifford S. Deutschman, MD, MS, Christopher Warren Seymour, MD, MSc, Manu Shankar-Hari, MSc, MD, FFICM, Djillali Annane, MD, PhD, Michael Bauer, MD, Rinaldo Bellomo, MD, Gordon R. Bernard, MD, Jean-Daniel Chiche, MD, PhD, Craig M. Coopersmith, MD, Richard S. Hotchkiss, MD, Mitchell M. Levy, MD, John C. Marshall, MD, Greg S. Martin, MD, MSc, Steven M. Opal, MD, Gordon D. Rubenfeld, MD, MS, Tom van der Poll, MD, PhD, Jean-Louis Vincent, MD, PhD, and Derek C. Angus, MD, MPH

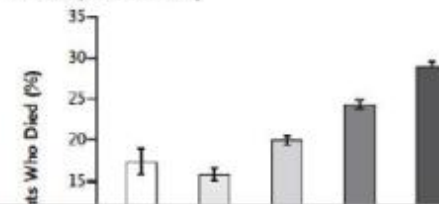
SIRS Sensitivity

Systemic Inflammatory Response Syndrome Criteria in Defining Severe Sepsis

Kirsi-Maija Kaukonen, M.D., Ph.D., Michael Bailey, Ph.D., David Pilcher, F.C.I.C.M.,
D. Jamie Cooper, M.D., Ph.D., and Rinaldo Bellomo, M.D., Ph.D.

N Engl J Med 2015;372:1629-38.

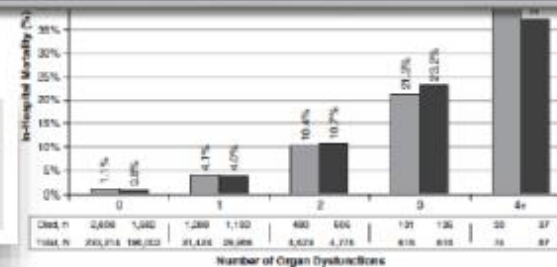
A Unadjusted Mortality



SIRS is an *appropriate* response to infection –
or any other stimulus that activates inflammation

Am J Respir Crit Care Med 2015; 192:958-964

Conclusions: Almost half of patients hospitalized on the wards developed SIRS at least once during their ward stay. Our findings suggest that screening ward patients using SIRS criteria for identifying those with sepsis would be impractical.



Society of
Critical Care Medicine



The Definition of Sepsis

Sepsis is life-threatening organ dysfunction caused by a dysregulated host response to infection



Society of
Critical Care Medicine
The Intensive Care Professionals



The Definition of Sepsis

Key Distinctions

Sepsis is life-threatening **organ dysfunction** caused by a dysregulated host response to infection

So ... “sepsis” now = the old “severe sepsis”



Society of
Critical Care Medicine
The Intensive Care Professionals



The Definition of Sepsis

Key Distinctions

Sepsis is life-threatening organ dysfunction caused by a ***dysregulated host response*** to infection

As opposed to the
“regulated host response”
that characterizes the non-septic response to infection



Society of
Critical Care Medicine
The Intensive Care Professionals

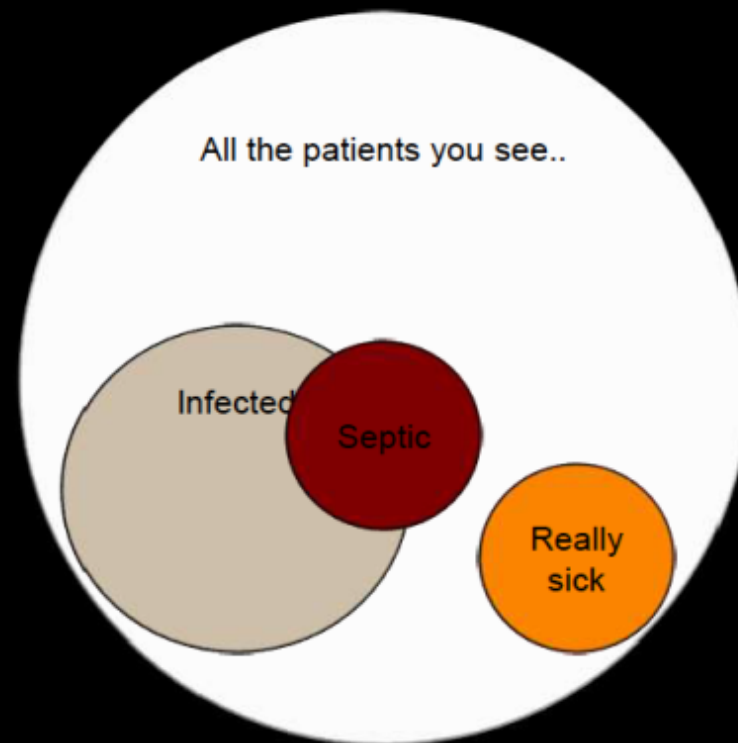


The Definition of Septic Shock

- What tangibly differentiates septic shock from sepsis ?
 - MORTALITY
 - Septic shock is “really bad” sepsis

Septic shock is a subset of sepsis in which profound circulatory, cellular and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone

What is sepsis?



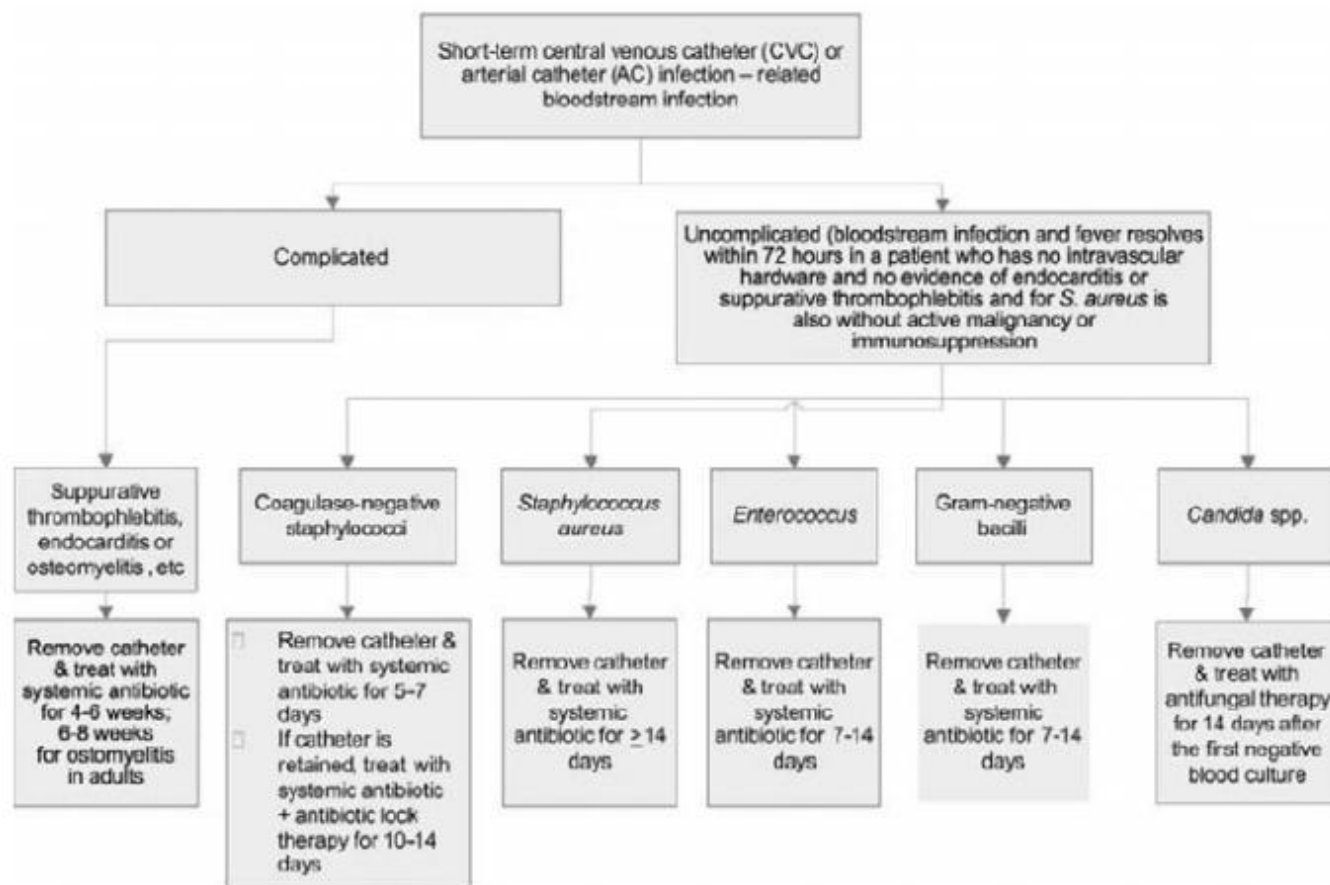


Figure 2. Approach to the management of patients with short-term central venous catheter–related or arterial catheter–related bloodstream infection. CFU, colony-forming units; *S. aureus*, *Staphylococcus aureus*.

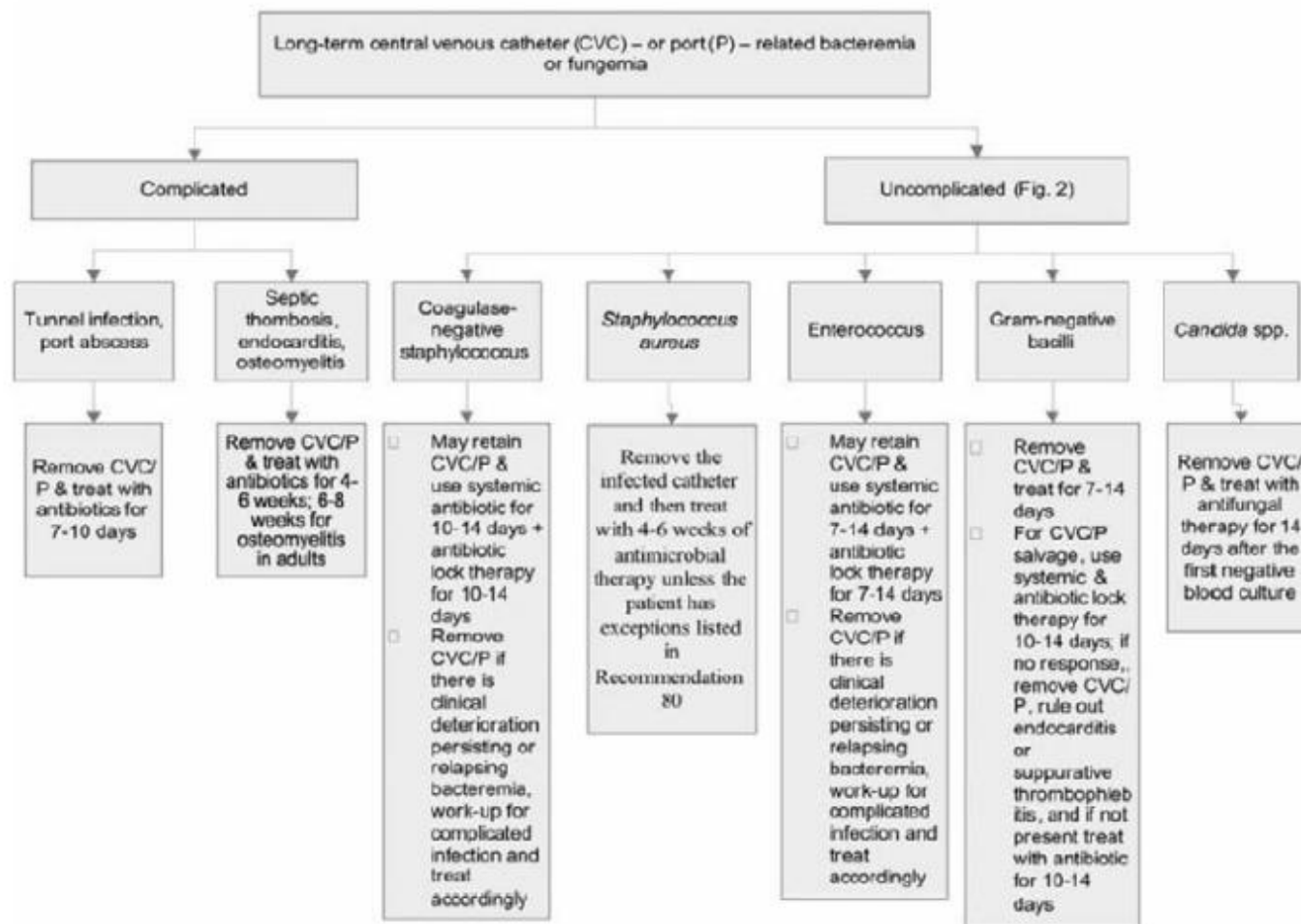


Figure 3. Approach to the treatment of a patient with a long-term central venous catheter (CVC) or a port (P)-related bloodstream infection.



medicina *intensiva*

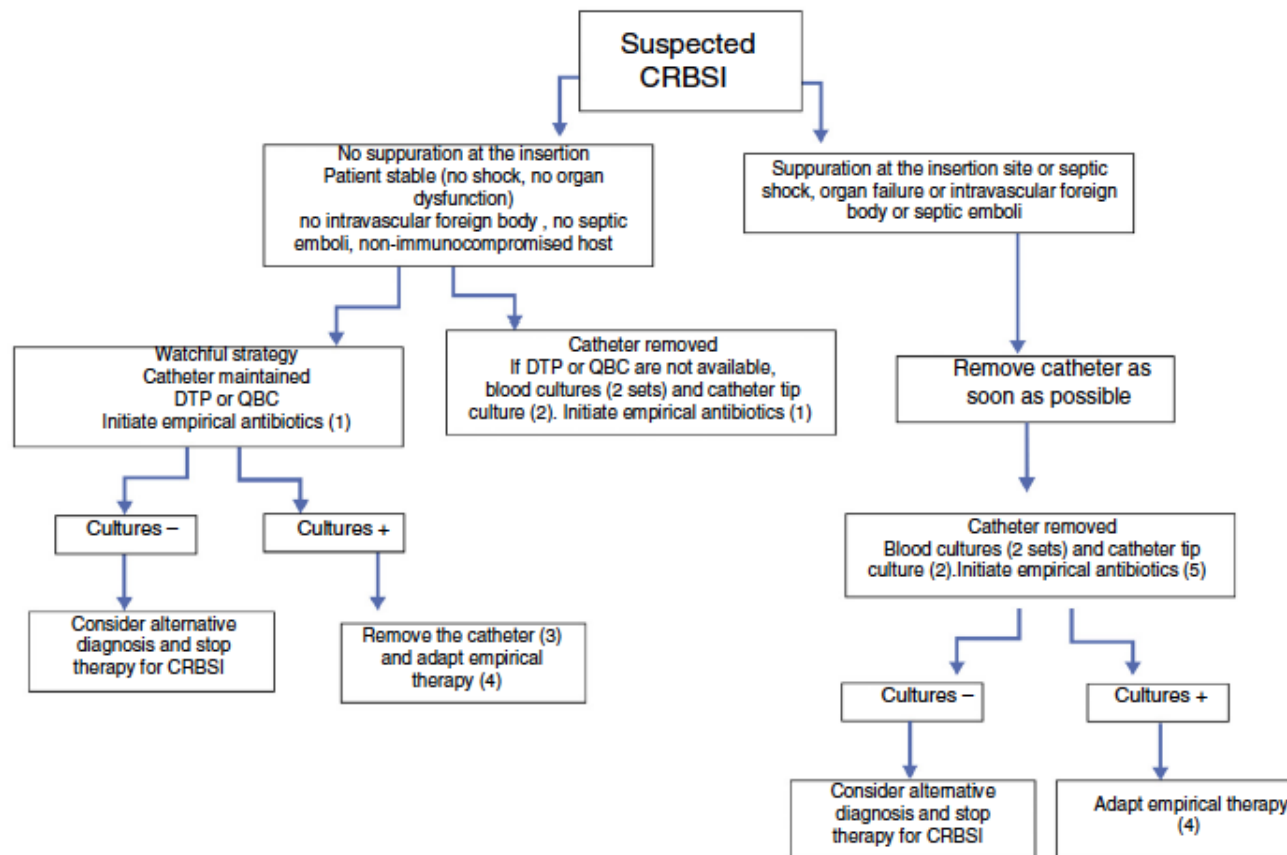
www.elsevier.es/medintensiva



CONSENSUS STATEMENT

Diagnosis and treatment of catheter-related bloodstream infection: Clinical guidelines of the Spanish Society of Infectious Diseases and Clinical Microbiology and (SEIMC) and the Spanish Society of Intensive and Critical Care Medicine and Coronary Units (SEMICYUC)★





Confirmed CRBSI

Coagulase-Negative
Staphylococcus

- CoNS (1)
- Consider catheter removal (if not done) (2)
- Antimicrobial therapy for 5 days (3)
- Vancomycin is the first option (4)
- Echocardiography is not mandatory (5)
- Remove catheter if *S. lugdunensis* is isolated
- Catheter retained
 - Antimicrobial therapy for 10-14 days
 - Vancomycin in the first option (4)
 - ALT with vancomycin for 10-14 days
 - Echocardiography is not mandatory (5)

Staphylococcus aureus

- Removal of the catheter is mandatory
- Antimicrobial therapy for 14 days (6)
- Cloxacillin or cefazolin are the alternatives for MSSA
- Vancomycin or daptomycin are the alternatives for MRSA (7) (8)
- Echocardiography is mandatory

Enterococcus spp.

- Removal of the catheter is mandatory
- Antimicrobial therapy for 7-14 days
- Ampicillin is the drug of choice for susceptible strains (9)
- Vancomycin is the alternative for strains resistant to ampicillin (10)
- Echocardiography is mandatory

Gram-negative
bacilli

- Remove the catheter (if not done) (2)
- Antimicrobial therapy for at least 7 days (3)
- Antimicrobial therapy must be chosen based on the susceptibility results
- Echocardiography is not mandatory (5)
- Catheter retained (11)
 - Antimicrobial therapy for 10-14 days
 - Antimicrobial therapy must be chosen based on the susceptibility results
 - ALT for 10-14 days
 - Echocardiography is not mandatory (5)

Candida spp.

- Removal of the catheter is mandatory
- Antifungal therapy for 14 days after the first negative blood culture (12)
- Targeted antifungal therapy must be chosen based on the susceptibility results (13)
- Echocardiography is mandatory

Table 4 Indications for catheter removal in patients with CRBSI.

CRBSI presenting with septic shock

CRBSI caused by certain pathogens: *S. aureus*,
non-fermenting Gram-negative bacilli, *Candida* spp.
or *Mycobacterium*

Metastatic complications (endocarditis, thrombophlebitis
or septic pulmonary embolism)

Bacteremia (or candidemia) persisting after 72 h of
adequate treatment

Pus is observed at the insertion site

Signs of infection at the subcutaneous tunnel

No possibility of antibiotic lock therapy

The importance of central venous catheter removal in patients with candidaemia: time to rethink our practice?

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ABSTRACT

The issue of central venous catheter (CVC) removal in adult patients with candidaemia remains controversial. Although removal of CVCs has been advocated as an adjunctive strategy for treating patients with candidaemia, most studies have failed to control for important variables, e.g., the severity of illness and persistence of neutropenia. Multivariate analysis has failed to identify a significant effect of CVC removal on the prognosis for patients with candidaemia. A properly designed randomised trial that controls for confounding variables is necessary to clarify the importance of CVC removal in such patients. Until this evidence is available, systematic removal of all CVCs in these patients seems not to be justified.

Keywords Candidaemia, catheter removal, central venous catheters, outcome, risk-factors, prognosis

Clin Microbiol Infect 2008; 14: 2–4

Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America

Peter G. Pappas,¹ Carol A. Kauffman,² David R. Andes,³ Cornelius J. Clancy,⁴ Kieren A. Marr,⁵ Luis Ostrosky-Zeichner,⁶ Annette C. Reboli,⁷ Mindy G. Schuster,⁸ Jose A. Vazquez,⁹ Thomas J. Walsh,¹⁰ Theoklis E. Zaoutis,¹¹ and Jack D. Sobel¹²

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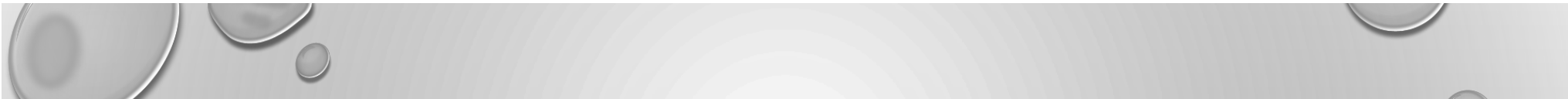
It is important to realize that guidelines cannot always account for individual variation among patients. They are not intended to supplant physician judgment with respect to particular patients or special clinical situations. IDSA considers adherence to these guidelines to be voluntary, with the ultimate determination regarding their application to be made by the physician in the light of each patient's individual circumstances.

Keywords. candidemia; invasive candidiasis; fungal diagnostics; azoles; echinocandins.

II. Should Central Venous Catheters Be Removed in Nonneutropenic Patients With Candidemia?

Recommendation

13. CVCs should be removed as early as possible in the course of candidemia when the source is presumed to be the CVC and the catheter can be removed safely; this decision should be individualized for each patient (*strong recommendation; moderate-quality evidence*).



Evidence Summary

Central venous catheters and other intravascular devices are important risk factors in the development and persistence of candidemia in nonneutropenic patients [5, 7–9, 184]. A CVC is present in at least 70% of nonneutropenic patients with candidemia at the time that the diagnostic blood culture is obtained [5, 7–9, 170, 184–187]. The relationship of candidemia to CVCs has been assumed on the basis of observation, clinical experience, and an understanding of the role of biofilm in the genesis of bloodstream infections [188, 189]. That candidemia in nonneutropenic patients is commonly due to contaminated CVCs is undeniable, but there remains controversy as to how best to distinguish a catheter-associated candidemia from one that is related to another source, such as the gastrointestinal tract.

There have been no prospective clinical studies designed to examine CVC management as a primary measurement related to outcome. Moreover, several retrospective analyses have led to very different conclusions regarding the necessity and timing of CVC removal in the candidemic patient [19, 190–193]. Thus, the controversy continues, with some groups arguing for a strictly individualized approach to each patient [190] and others for an approach that removes CVCs in all nonneutropenic candidemic patients in whom it is safe and feasible to do so [19]. No prospective study has demonstrated a survival benefit to early CVC removal in patients who have candidemia, but most studies have demonstrated a shorter duration of candidemia and/or a trend toward improved outcomes [14, 21–23, 27, 28, 168, 192–200]. The recent combined analysis of 7 candidemia trials



Central venous catheter (CVC) removal for patients of all ages with candidaemia.

Janum S¹, Afshari A.

⊕ Author information

Abstract

BACKGROUND: Candida bloodstream infections most often affect those already suffering serious, potentially life-threatening conditions and often cause significant morbidity and mortality. Most affected persons have a central venous catheter (CVC) in place. The best CVC management in these cases has been widely debated in recent years, while the incidence of candidaemia has markedly increased.

OBJECTIVES: The main purpose of this review is to examine the impact of removing versus retaining a CVC on mortality in adults and children with candidaemia who have a CVC in place.

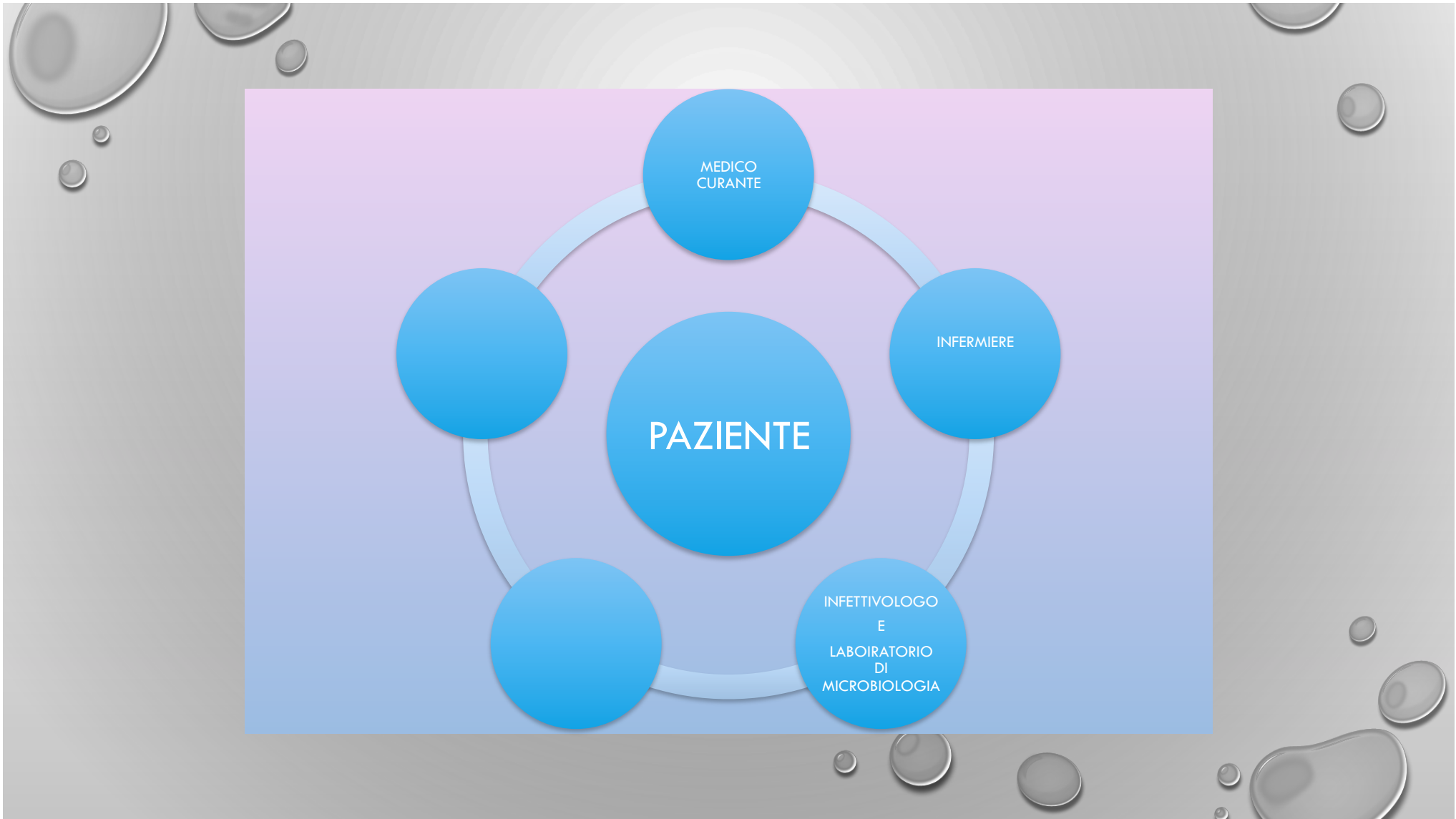
SEARCH METHODS: We searched the following databases from inception to 3 December 2015: Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE (Ovid SP), EMBASE (Ovid SP), the Commonwealth Agricultural Bureau (CAB), Web of Science and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). We searched for missed, unreported and ongoing trials in trial registries and in reference lists of excluded articles.

SELECTION CRITERIA: We searched for randomized controlled trials (RCTs) and quasi-RCTs involving adults and children with candidaemia and in which participants were randomized for removal of a CVC (the intervention under study), irrespective of publication status, date of publication, blinding status, outcomes published or language. However, two major factors make the conduct of RCTs in this population a difficult task: the large sample size required to document the impact of catheter removal in terms of overall mortality; and lack of economic interest from the industry in conducting such a trial.

DATA COLLECTION AND ANALYSIS: Our primary outcome measure was mortality. Several secondary outcome measures such as required time for clearance of blood cultures for *Candida* species, frequency of persistent candidaemia, complications, duration of mechanical ventilation and length of stay in the intensive care unit (ICU) and in the hospital were planned, as were various subgroup and sensitivity analyses, according to our protocol. We assessed papers and abstracts for eligibility and resolved disagreements by discussion. However, we were not able to include any RCTs or quasi-RCTs in this review and, as a result, have carried out no meta-analyses. However, we have chosen to provide a brief overview of excluded observational studies.

MAIN RESULTS: We found no RCT and thus no available data for evaluation of the primary outcome (mortality) nor secondary outcomes or adverse effects. Therefore, we conducted no statistical analysis. A total of 73 observational studies reported on various clinically relevant outcomes following catheter removal or catheter retention. Most of these excluded, observational studies reported a beneficial effect of catheter removal in patients with candidaemia. None of the observational studies reported results in favour of retaining a catheter. However, the observational studies were very heterogeneous with regards to population, pathogens and interventions. Furthermore, they suffered from confounding by indication and an overall high risk of bias. As a consequence, we are not able to provide recommendations or to draw firm conclusions because of the difficulties involved in interpreting the results of these observational studies (very low quality of evidence, GRADE - Grades of Recommendation, Assessment, Development and Evaluation Working Group).

AUTHORS' CONCLUSIONS: Despite indications from observational studies in favour of early catheter removal, we found no eligible RCTs or quasi-RCTs to support these practices and therefore could draw no firm conclusions. At this stage, RCTs have provided no evidence to support the benefit of early or late catheter removal for survival or other important outcomes among patients with candidaemia; no evidence with regards to assessment of harm or benefit with prompt central venous catheter removal and subsequent re-insertion of new catheters to continue treatment; and no evidence on optimal timing of insertion of a new central venous catheter.



LA TERAPIA ANTIBIOTICA

- LA TERAPIA ANTIBIOTICA DEVE ESSERE INIZIATA IL PRIMA POSSIBILE (IDEALMENTE ENTRO 1 ORA), UNA VOLTA CHE SIA STATA RICONOSCIUTA LA SEPSI GRAVE E SIANO STATI ESEGUITI I PRELIEVI PER GLI ESAMI COLTURALI
- TALE TERAPIA ANDRÀ POI RIVALUTATA A 48 ORE (O APPENA DISPONIBILE ANTIBIOGRAMMA) PER UTILIZZARE ANTIBIOTICI MIRATI, A SPETTRO PIÙ STRETTO, PER RIDURRE L'INSORGENZA DI RESISTENZE, LIMITARE LA TOSSICITÀ E I COSTI

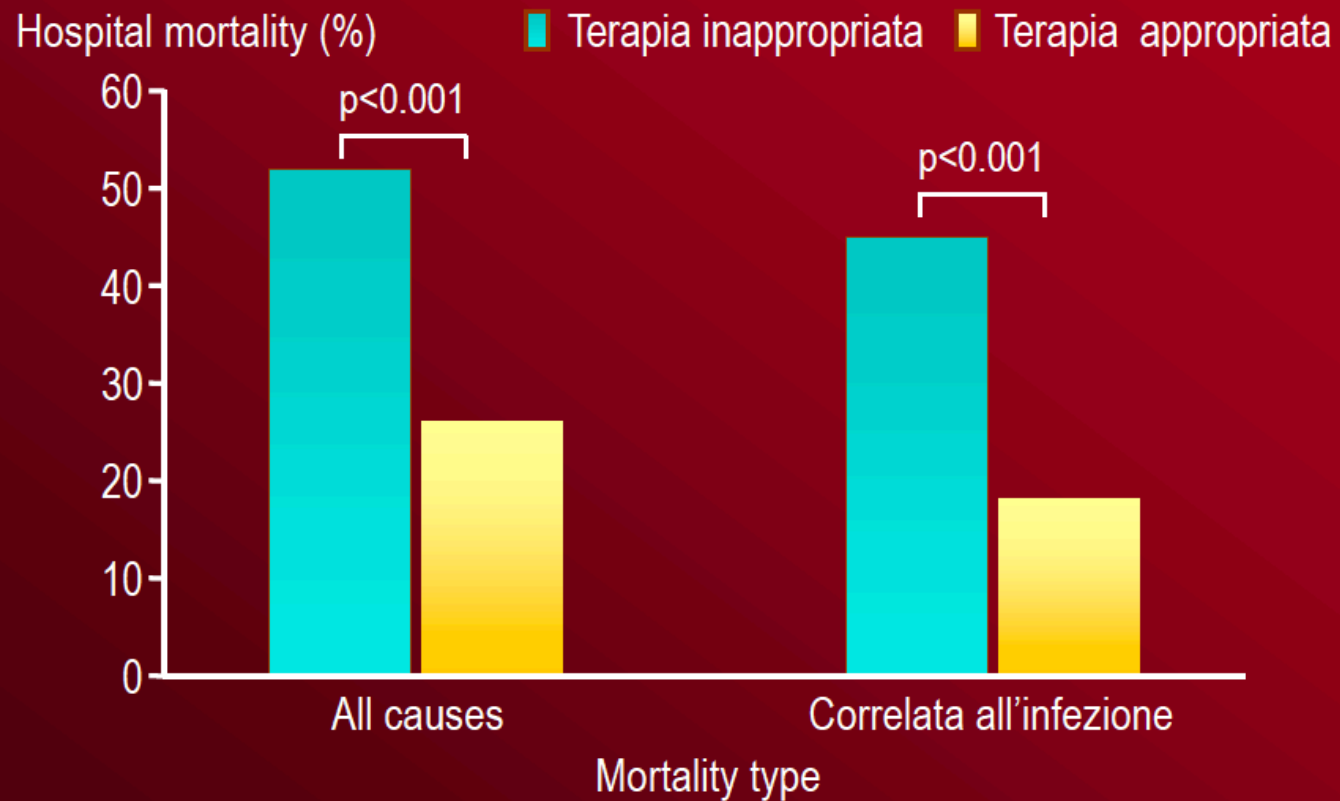
LETALITA' DI SEPSI E SHOCK SETTICO E TIMING DI SOMMINISTRAZIONE DELLA TERAPIA ANTIBIOTICA

- In patients with severe sepsis or septic shock the administration of antibiotics within the first hour
- Ogni ora di ritardo nell'inizio della terapia antibiotica empirica è associata ad un aumento della mortalità di circa il 7,6 %
- Every hour of delay in antibiotic administration after diagnosis is associated with an average decrease in survival of 7.6%, thus, every 10 min, survival is decreased by 1%

Textoris J Crit Care 2011

Courtesy of C. Franchi

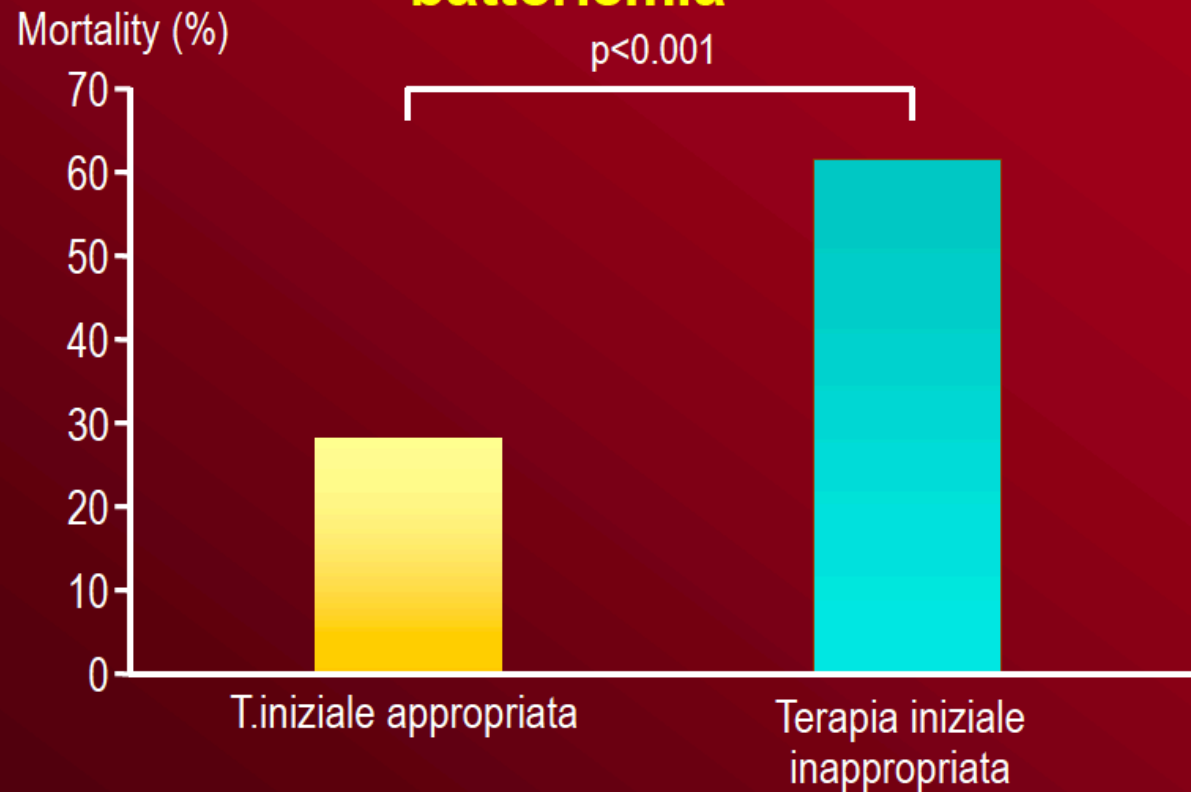
Terapia antibiotica inappropriata e rischio di mortalità in ICU



Kollef et al. Chest 1999;115:462-474

Courtesy of C. Franchi

Terapia antibiotica appropriata e tempestiva riduce il rischio di mortalità nei pazienti con batteriemia



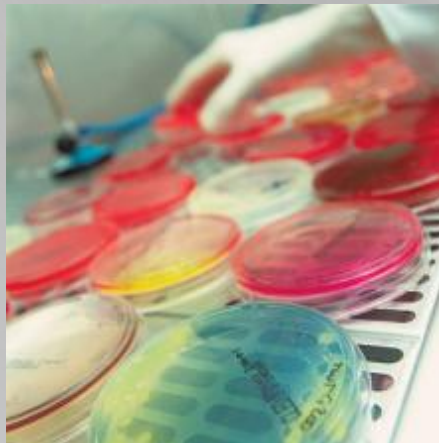
Courtesy of C. Franchi

TERAPIA ANTIBIOTICA EMPIRICA DELLA SEPSI

- FARMACI BATTERICIDI
- VIA PARENTERALE
- ALTE DOSI
- IMPIEGO DI ASSOCIAZIONI ANTIBIOTICHE
 - MAGGIORE SPETTRO DI AZIONE
 - EFFETTO SINERGICO
 - INFEZIONI POLIMICROBICHE

Suspected Source of Infection	Suggested Antibiotics
Unknown (includes catheter related blood stream infection)‡	Vancomycin IV per pharmacy consult (initial 25mg/kg loading dose) PLUS EITHER Piperacillin/tazobactam 4.5g IV q8h, infused over 4 hours OR Cefepime 1 gm IV q6hr +/- Tobramycin 7 mg/kg IV EIAD <u>Severe beta-lactam allergy (anaphylaxis, hives):</u> Vancomycin IV per pharmacy consult (initial 25mg/kg loading dose) PLUS Aztreonam 2 gm IV q8h +/- Tobramycin 7 mg/kg IV EIAD ‡Consider Micafungin 100mg IV qday in patients at high risk for invasive candidiasis. Major risk factors predicting candidemia at TNMC include: 1) Broad-spectrum antibiotics, 2) Central venous catheter, 3) Receipt of TPN, 4) Abdominal surgery, and 5) Steroid use. Presence of 2 or fewer of the risk factors suggests a 99.4% chance of not developing candidemia, while patients with >2 risk factors have a 4.7% risk of developing candidemia. See Institutional Guidelines for the Treatment of Invasive Candidiasis for further information.
Intra-abdominal Source	Piperacillin/tazobactam 4.5g IV q8h, infused over 4 hours OR Cefepime 1g q6h hours PLUS Metronidazole 500 mg IV q8h +/- Gentamicin OR Tobramycin 7 mg/kg IV EIAD +/- Vancomycin per pharmacy consult (initial 25mg/kg loading dose)





1 **Full-Length Paper**

2

3 **Optimized Use of the MALDI BioTyper System and FilmArray BCID Panel for the Direct**
4 **Identification of Microbial Pathogens from Positive Blood Cultures**

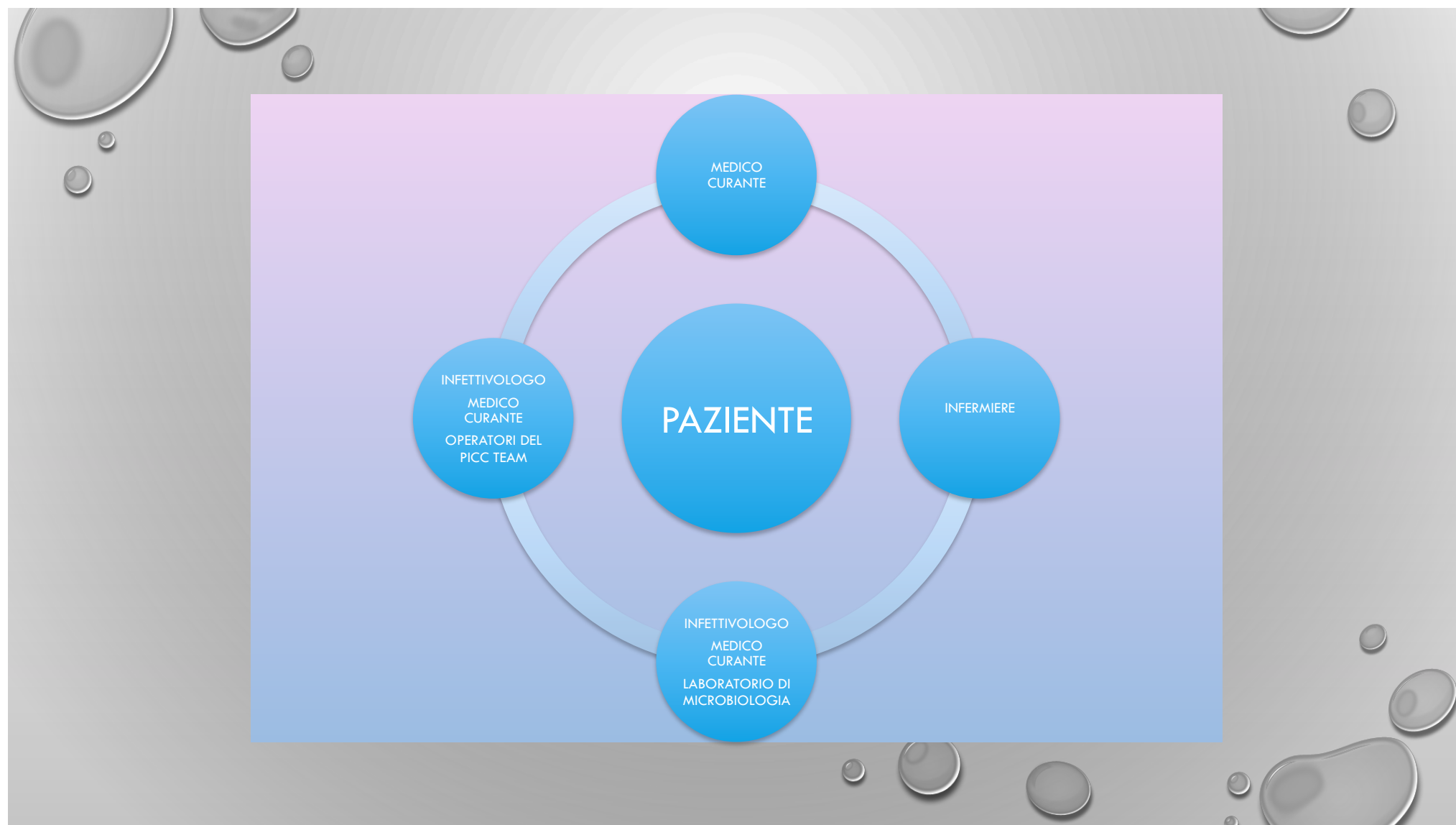
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6 **B. Fiori,^{a,#} T. D’Inzeo,^{a,#} A. Giaquinto,^a G. Menchinelli,^a F. M. Liotti,^a F. de Maio,^a G. De**
7 **Angelis,^a G. Quaranta,^a D. Nagel,^a M. Tumbarello,^b B. Posteraro,^c M. Sanguinetti,^a T. Spanu^a**

8 **Institute of Microbiology^a, Institute of Infectious Diseases^b, and Institute of Public Health (Section**
9 **of Hygiene)^c, Università Cattolica del Sacro Cuore, Rome, Italy**

UNITÀ DI CONSULENZA INFETTIVOLOGICA INTEGRATA

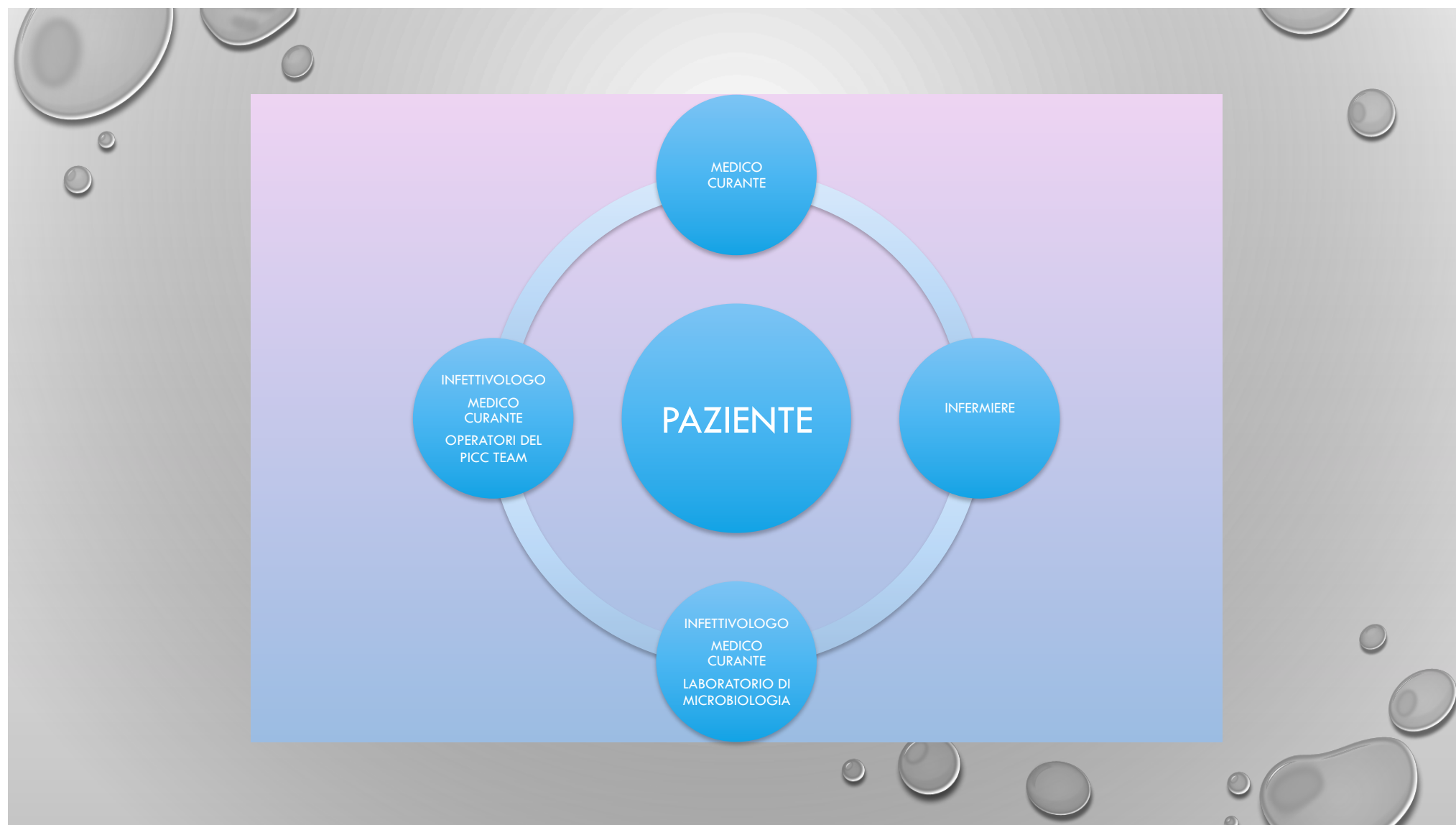
- CINQUE INFETTIVOLOGI
- CONSULENZE IN TUTTI I REPARTI DELL'OSPEDALE
- RICHIESTA PER VIA INFORMATICA
- EROGAZIONE DELLA CONSULENZA ENTRO 24 ORE (> 80% ENTRO 3-4 ORE)
- PROGRAMMA GRES PER LA IMPOSTAZIONE RAPIDA DELLA TERAPIA EMPIRICA NEI PAZIENTI CON EMOCOLTURE POSITIVE
- INTERAZIONE STRETTA CON MICROBIOLOGIA, FARMACIA, CIO, MEDICINA PREVENTIVA, RISK MANAGEMENT
- INTERAZIONE STRETTA CON TEAM ACCESSI VASCOLARI



- 
- The background of the slide features a series of concentric circles centered in the upper half, creating a ripple effect. Scattered around the edges are several realistic water droplets of varying sizes, some with highlights and shadows, giving a sense of depth and texture.
- TERAPIA ANTIBIOTICA MIRATA
 - VALUTAZIONE DELLA NECESSITÀ DI RIMOZIONE DEL PICC

SCELTA DEL DISPOSITIVO DA IMPIANTARE PER IL TRATTAMENTO DELLA SEPSI

- CONDIZIONI DEL PAZIENTE
- TERAPIA PRESCRITTA (ANTIBIOTICA; INOTROPI; NP...)
- EVENTUALE POSSIBILITÀ DI SWITCH A TERAPIA ANTIBIOTICA ORALE
 - CATETERE VENOSO CENTRALE ANTIMICROBICO
 - NUOVO PICC (CON MAGGIORE PROBABILITÀ DI COLONIZZAZIONE PER VIA EMATOGENA)
 - AGOCANNULA
 - CANNULA PERIFERICA LUNGA
 - MIDLINE





Grazie per l'attenzione!

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