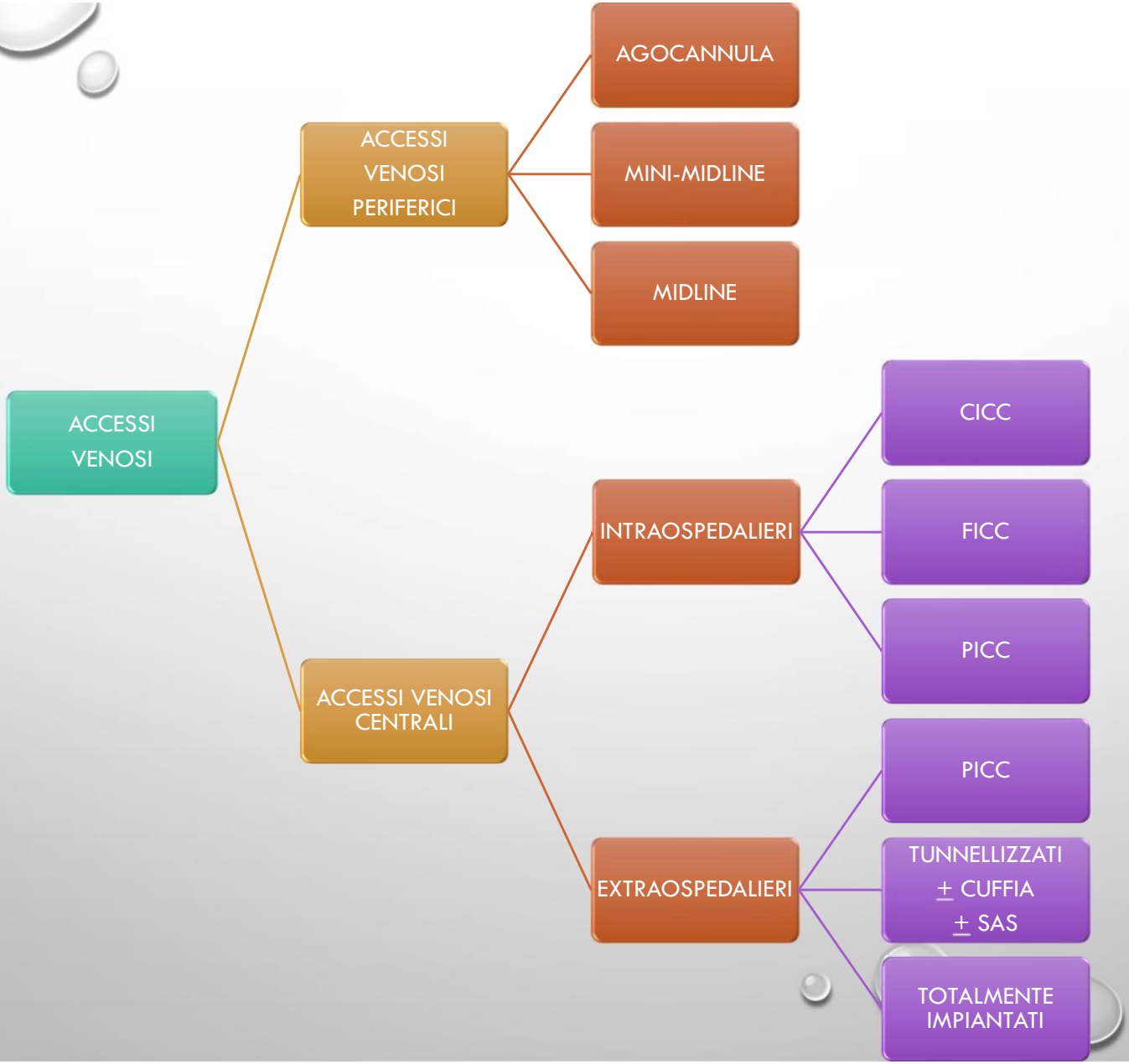
GAVePed
Gruppo Accessi Venosi Pediatrici

COME FARE DIAGNOSI DI INFEZIONE CATETERE-CORRELATA NEL BAMBINO E NEL NEONATO

GIANCARLO SCOPPETTUOLO

FONDAZIONE POLICLINICO UNIVERSITARIO A. GEMELLI IRCCS, ROMA

BOLOGNA, 13-14 MAGGIO 2024


ACCESSI VENOSI
ACCESSI VENOSI PERIFERICI
AGOCANNULA
MINI-MIDLINE
MIDLINE
ACCESSI VENOSI CENTRALI
INTRAOSPEDALIERI
CICC
FICC
PICC
EXTRAOSPEDALIERI
PICC
TUNNELLIZZATI ± CUFFIA ± SAS
TOTALMENTE IMPIANTATI

PRIMA TENTAZIONE DEL MEDICO….

- ATTRIBUIRE IMMEDIATAMENTE LA RESPONSABILITA' DELLA FEBBRE AL CV, ANCORA PRIMA DI AVERE ESEGUITO ALCUNA INDAGINE DIAGNOSTICA
  - SOPRATTUTTO NEL PAZIENTE OSPEDALIZZATO (MA ANCHE NEL PAZIENTE DOMICILIARE) IL CV **È SOLO UNA DELLE POSSIBILI CAUSE DI INFEZIONE**
- RIMUOVERE IL CATETERE VASCOLARE
  - IN LETTERATURA È BEN DESCRITTO CHE CIRCA IL 70% DEI CVC RIMOSSI SOLO CON CRITERIO EMPIRICO NON HANNO RAGIONE DI ESSERE RIMOSSI
  - CRITERI PER LA RIMOZIONE IMMEDIATA DI UN CATETERE VASCOLARE? SI, MA IN CASI SELEZIONATI
- RICHIEDERE SUBITO DOPO LA RIMOZIONE IL POSIZIONAMENTO DI UN NUOVO CATETERE…

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. Warren[8]

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Med Intensiva. 2018;42(1):5–36

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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-Hidalgo[i], M. Fernández Sampedro[j], J. Fortún[k], M. Guembe[l], L. Lorente[m], J.R. Paño[n], P. Ramírez[o], M. Salavert[p], M. Sánchez[q], J. Vallés[r]

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, MD[1]

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

Lorente et al. Critical Care 2014, 18:564
http://ccforum.com/content/18/5/564

CRITICAL CARE

RESEARCH Open Access

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

Leonardo Lorente[1*], María M Martín[2], Pablo Vidal[3], Sergio Rebollo[4], María I Ostabal[5], Jordi Solé-Violán[6] 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

DIFFICOLTÀ DIAGNOSTICHE

- DIFFERENTI TESTS DI LABORATORIO, CON DIVERSA SENSIBILITÀ E SPECIFICITÀ

CLABSI/LCBSI E CRBSI

Table 1.

Two definitions of central venous catheter-related bloodstream infections

Bloodstream infection	Definitions
Catheter-related bloodstream infection	Clinical signs of sepsis and positive peripheral blood culture in the absence of an obvious source other than CVC with one of the following:
	Positive semiquantitative (>15 CFU) or quantitative (>103 CFU) culture from a part of the catheter with the same organisms isolated peripherally
	Simultaneous quantitative blood cultures with a ratio of ≥3:1 (CVC vs. peripheral)
	Time difference of ≤2 hours leading to culture positive between CVC and peripheral cultures
Central line-associated bloodstream infection	Primary bloodstream infection in a patient who had a central line within the 48 hours period before development of infection
	Infection must not be related to an alternative cause

CVC, central venous catheter; CFU, colony forming unit.

Adapted from Bell T, et al. Infect Dis Clin North Am 2017;31:551-9, with permission of Elsevier. [3]

NHSN
NATIONAL HEALTHCARE SAFETY NETWORK

January 2024

Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-central Line Associated Bloodstream Infection)

Table of Contents

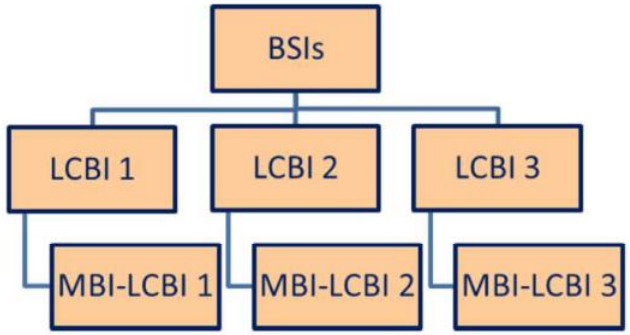
- NHSN CLABSI DEFINITION, JAN 2024

Definitions Specific to Bloodstream Infection (BSI) / Central Line Associated Bloodstream Infection (CLABSI) Surveillance:

Primary bloodstream infection (BSI): A Laboratory Confirmed Bloodstream Infection (LCBI) that is not secondary to an infection at another body site (see Appendix: Secondary BSI Guide and CDC/NHSN Surveillance Definitions for Specific Types of Infection [Ch-17], urinary tract infection (UTI) [Ch-7], pneumonia (PNEU) [Ch-6], and surgical site infection (SSI) [Ch- 9].

Laboratory Confirmed Bloodstream Infection (LCBIs) Hierarchy; Types of LCBIs

(see Table 1 and Table 2):



Secondary BSI: A BSI that is thought to be seeded from a site-specific infection at another body site (see Appendix: Secondary BSI Guide and CDC/NHSN Surveillance Definitions for Specific Types of Infection, UTI, PNEU, and SSI).

Central line (CL): An intravascular catheter that terminates at or close to the heart, **or** in one of the great vessels **AND** is used for infusion, withdrawal of blood, or hemodynamic monitoring. Consider the following great vessels when making determinations about CLABSI events and counting CL device days:

- Aorta
- Pulmonary artery
- Superior vena cava
- Inferior vena cava
- Brachiocephalic veins
- Internal jugular veins
- Subclavian veins
- External iliac veins
- Common iliac veins
- Femoral veins
- In neonates, the umbilical artery/vein.

Notes:

1. Neither the type of device nor the insertion site is used to determine if a device is considered a central line for NHSN reporting purposes.
2. At times, a CL may migrate from its original central location after confirmation of proper placement. NHSN does not require ongoing verification of proper line placement. Therefore, once a line has been designated a CL it remains a CL, regardless of migration, until removed from the body or patient discharge, whichever comes first. CL days are included for any CLABSI surveillance conducted in that location.
3. An introducer is an intravascular catheter, and depending on the location of the tip and its use, may be considered a CL.
4. A non-lumened intravascular catheter that terminates at or close to the heart or in a great vessel that is not used for infusion, withdrawal of blood or hemodynamic monitoring is not considered a CL for NHSN reporting purposes (for example, non-lumened pacemaker wires.)
    - There are some pacemaker wires that do have lumens, which may be considered a central line.

Types of Central Lines for NHSN reporting purposes:

1. Permanent central line: Includes:
    a. Tunneled catheters, including tunneled dialysis catheters
    b. Implanted catheters (including ports)
2. Temporary central line: A non-tunneled, non-implanted catheter
3. Umbilical catheter**:** A vascular catheter inserted through the umbilical artery or vein in a neonate. All umbilical catheters are central lines

Eligible Central Line: A CL that has been in place for **more than two consecutive calendar days** (on or after CL day 3), following the *first access* of the central line, in an inpatient location, during the current admission. Such lines are eligible for CLABSI events and remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first. (See Table 3 for examples).

Eligible BSI Organism: Any organism that is eligible for use to meet LCBI or MBI-LCBI criteria. In other words, an organism that is not an excluded pathogen for use in meeting LCBI or MBI-LCBI criteria. These organisms may or may not be included on the NHSN Organisms List accessed via the spreadsheet or refer to the new NHSN Terminology Browser. Contact NHSN for guidance regarding organisms that are not included on the NHSN Organisms List.

Devices **Not** Considered Central Lines for NHSN Reporting Purposes:

- Arterial catheters unless in the pulmonary artery, aorta, or umbilical artery
- Arteriovenous fistula
- Arteriovenous graft
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Extracorporeal life support (ECMO)
- Hemodialysis reliable outflow (HERO) dialysis catheter
- Intra-aortic balloon pump (IABP) devices
- Peripheral IV or Midlines
- Ventricular Assist Device (VAD)

Table 1: Laboratory-Confirmed Bloodstream Infection Criteria:

Must meet **one** of the following LCBI criteria:

Criterion	*Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria.* Once an LCBI determination is made, proceed to the MBI-LCBI definitions, and determine if the corresponding MBI-LCBI criteria are also met (for example, after meeting LCBI 2, investigate for potential MBI-LCBI 2)
LCBI 1 If LCBI 1 criterion is met, consider MBI-LCBI 1	Patient of any age has a recognized bacterial or fungal pathogen, not included on the NHSN common commensal list: 1. Identified from one or more blood specimens obtained by a culture **OR** 2. Identified to the genus or species level by non-culture based microbiologic testing (NCT)* methods (for example, T2 Magnetic Resonance [T2MR] or next-generation sequencing (NGS). ***Note:*** *If blood is collected for culture within 2 days before, or 1 day after the NCT, disregard the result of the NCT and use only the result of the CULTURE to make an LCBI surveillance determination. If no blood is collected for culture within this time period, use the result of the NCT for LCBI surveillance determination.* **AND** Organism(s) identified in blood is not related to an infection at another site (See Appendix: Secondary BSI Guide). *For the purposes of meeting LCBI 1, NCT is defined as a methodology that identifies an organism directly from a blood specimen without inoculation of the blood specimen to any culture media.

LCBI 2 If LCBI 2 criterion is met, consider MBI-LCBI 2	Patient of any age has at least ***one*** of the following signs or symptoms: fever (>38.0°C), chills, or hypotension **AND** Organism(s) identified in blood is not related to an infection at another site (See Appendix: Secondary BSI Guide). **AND** The same NHSN common commensal is identified by culture from two or more **blood specimens** collected on separate occasions (see Blood Specimen Collection). For common commensal organisms, see the Common Commensal tab of the NHSN Organism List accessed via the spreadsheet or refer to the new NHSN Terminology Browser. **Notes:** 1. Criterion elements must occur within the 7-day IWP (as defined in Chapter 2) which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after. 2. The two matching common commensal specimens represent a single element for use in meeting LCBI 2 criterion, and the collection date of the first specimen is used to determine the BSI IWP. 3. At least one element (specifically, a sign or symptom of fever, chills, or hypotension) is required to meet LCBI 2 criterion; the LCBI 2 DOE will always be the date the first element occurs for the first time during the BSI IWP, whether that be a sign or symptom or the positive blood specimen.

LCBI 3 If LCBI 3 criterion is met, consider MBI-LCBI 3	Patient ≤ 1 year of age has at least one of the following signs or symptoms: fever (>38.0°C), hypothermia (<36.0°C), apnea, or bradycardia **AND** Organism(s) identified in blood is not related to an infection at another site (See Appendix: Secondary BSI Guide). **AND** The same NHSN common commensal is identified by a culture from two or more blood specimens collected on separate occasions (see Blood Specimen Collection). For common commensal organisms, see the Common Commensal tab of the NHSN Organism List accessed via the spreadsheet or refer to the new NHSN Terminology Browser. **Notes:** 1. Criterion elements must occur within the 7-day IWP (as defined in Chapter 2) which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after. 2. The two matching common commensal specimens represent a single element for use in meeting LCBI 3 criterion, and the date of the first is used to determine the BSI IWP.

Table 2: Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MBI-LCBI)

An MBI-LCBI is a subset of the LCBI criteria; therefore, a BSI event must fully meet an LCBI criterion before evaluating for the corresponding MBI-LCBI criterion.

The MBI-LCBI DOE will always be the date the prerequisite LCBI criteria are met. Abnormal ANC and WBC values reflect risk factors for acquiring an MBI-LCBI, not symptoms of infection and therefore are not used in DOE determinations.

Must meet **one** of the following MBI-LCBI criteria

MBI-LCBI 1	MBI-LCBI 2	MBI-LCBI 3
Patient of **any age** fully meets LCBI 1 criterion	Patient of **any age** fully meets LCBI 2 criterion	Patient **≤1 year of age** fully meets LCBI 3 criterion
with at least **one** blood specimen	with at least **two matching** blood specimens	
with **ONLY intestinal organisms** from the NHSN MBI organism list*	with **ONLY Viridans Group *Streptococcus*** *and/or* ***Rothia spp.*** alone but no other organisms†	
identified by culture or non-culture based microbiologic testing method	identified by culture	

AND

Patient meets at least *one* of the following:

1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with **one of the following** documented during same hospitalization as positive blood specimen:
   a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD]
   OR
   b. ≥1-liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within the 7 calendar days before the date the positive blood specimen was collected.

   OR

2. Is neutropenic, defined as at least two separate days with ANC† and/or WBC values <500 cells/mm^3 collected within a 7-day time period which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after (See Table 5).

Blood Specimen Collection

The "two or more blood specimens drawn on separate occasions" criterion is met if there is blood collected from at least two separate blood draws on the same or consecutive calendar days.

AND

the blood cultures are assigned separate specimen numbers, processed individually, and are reported separately in the final laboratory report.

1. Specimen Collection Considerations: Blood specimens drawn through central lines can have a higher rate of contamination than blood specimens collected through peripheral venipuncture. [3, 4] However, all positive blood specimens, regardless of the site from which they are drawn or the purpose for which they are collected, must be included when conducting in-plan CLABSI surveillance (for example, weekly blood cultures performed in hematology and oncology locations).

2. Catheter tip cultures cannot be used in place of blood specimens for meeting LCBI criteria.

Table 1 The main features of currently used surveillance criteria of neonatal CLABSI summarised

From: Sustainable neonatal CLABSI surveillance: consensus towards new criteria in the Netherlands

	CDC	NEO-KISS	Dutch neonatal CLABSI criteria
Target patient population	≤ 1 year	Very low birthweight infants: birthweight < 1500 g	Neonates: postnatal age ≤ 28 days for term and up to postmenstrual age of 44 weeks for preterm infants
Description of CLABSI criteria	Laboratory-confirmed bloodstream infection (1) with a detected pathogen OR (2) with the same common commensal[a] confirmed by a second blood specimen	Laboratory-confirmed bloodstream infection (1) with a detected pathogen OR (2) with CoNS confirmed by a second blood specimen or one out of 4 laboratory elements	Laboratory-confirmed bloodstream infection (1) with a detected pathogen OR (2) with same common commensal[a] confirmed by a second blood specimen OR (3) with a common commensal and CRP > 10 mg/L
		Clinical sepsis (3) no detected pathogen	
Clinical findings used in criteria	One out of four[b] clinical symptoms for CoNS CLABSI criteria	Two or more out of 16[c] findings bundled in seven categories for all CLABSI criteria	Clinical symptoms of neonatal sepsis according to the treating physician for "common commensal CLABSI criteria"
Challenges for application in the Dutch setting	Two blood cultures for one event (not common practice, single blood culture policy)	Numerous clinical elements (labour intensive surveillance and possible interference with interrater agreement)	–

CDC, Centers for Disease Control; CLABSI, central line-associated bloodstream infections; CoNS, Coagulase-negative Staphylococci species; CRP, C-reactive protein; NEO-KISS, NEO-Krankenhaus Infektions Surveillance System

[a]According to the NHSN Master Organism List

[b]CDC clinical findings: fever (> 38 °C), hypothermia (< 36.5 °C), apnoea, or bradycardia

[c]NEO-KISS clinical findings: (1) fever (> 38 °C) or temperature instability or hypothermia (< 36.5 °C); (2) tachycardia (> 200/min) or new increasing bradycardia (< 80/min); 3) capillary refill time > 2 s; (4) new or increasing apnoea (> 20 s); (5) otherwise unexplained metabolic acidosis (BE < – 10 mval/L); (6) new onset of hyperglycaemia (> 140 mg/dL); (7) other sighs of sepsis (skin colour, biochemical signs, increasing oxygen requirement, unstable general status, apathy)

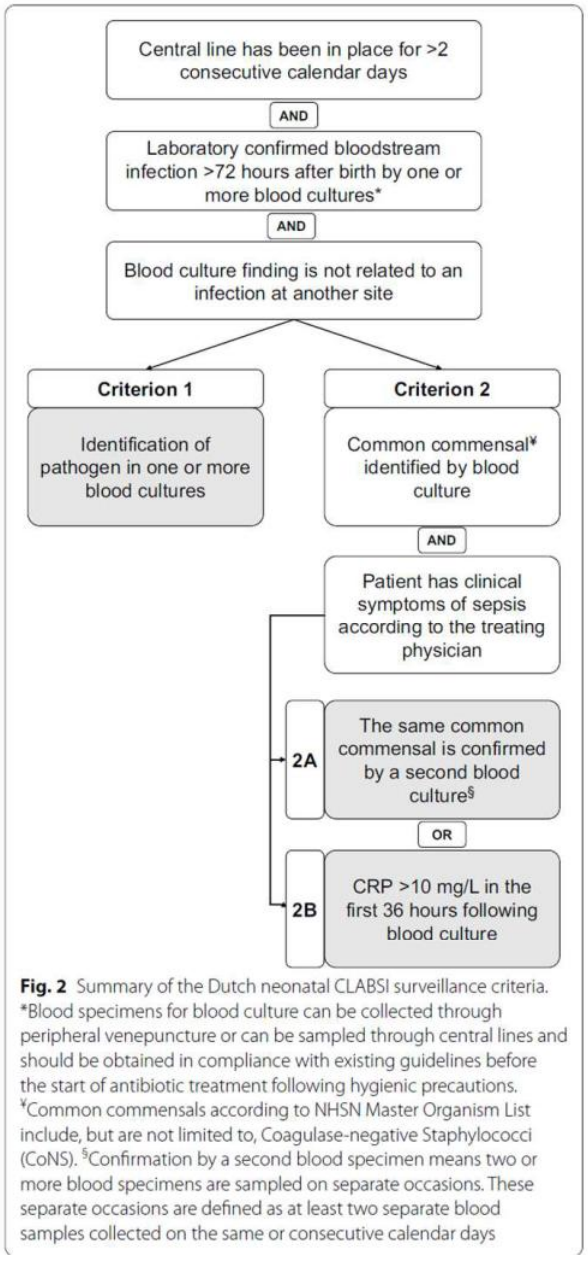


Fig. 2 Summary of the Dutch neonatal CLABSI surveillance criteria. *Blood specimens for blood culture can be collected through peripheral venepuncture or can be sampled through central lines and should be obtained in compliance with existing guidelines before the start of antibiotic treatment following hygienic precautions. ¥Common commensals according to NHSN Master Organism List include, but are not limited to, Coagulase-negative Staphylococci (CoNS). §Confirmation by a second blood specimen means two or more blood specimens are sampled on separate occasions. These separate occasions are defined as at least two separate blood samples collected on the same or consecutive calendar days

prevention and control [21]. Setting up any surveillance starts with a clear and suitable surveillance case definition. Consensus on neonatal CLABSI criteria is therefore an essential step. Surveillance data are more likely to be accepted when the surveillance case definitions match with the clinicians' expectations [22, 23]. Therefore, an expert panel composed of clinicians representing the NICUs in the Netherlands participated in a modified Delphi procedure concerning the development of neonatal CLABSI SC.

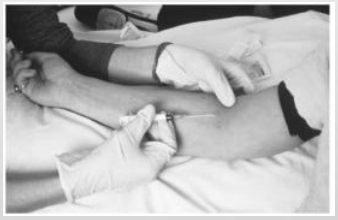
The expert panel concluded that the internationally used neonatal CLABSI SC (CDC, ECDC and NEO-KISS) were not suitable for the Dutch neonatal setting. The CDC and ECDC criteria would substantially underestimate our neonatal CLABSI incidence. Particularly, CLABSI caused by common commensals (mainly CoNS) are missed since according to these criteria, a second blood culture is required for confirmation while the Netherlands follows a single blood culture policy. CoNS are common CLABSI causing pathogens in neonates, and not including CoNS would result in an underestimation of the true CLABSI incidence rate [24]. A single blood culture policy is preferred due to restricted vessel access in neonates, the potential risk for increased transfusion requirements by repeated blood sampling, the possible rapid deterioration of neonates in the setting of sepsis and the aim to start antibiotics as soon as possible. A large variation in blood culture practices for the diagnosis of bloodstream infections in newborns exists worldwide, ranging from sample site (peripheral, central or both) to the number of blood samples taken [25, 26]. Studies in the neonatal population have shown conflicting results with regard to the need for blood cultures collected from multiple sites for optimal organism detection [27, 28]. In neonatal practices aiming for more than one blood culture for bloodstream infection confirmation, many factors such as technical difficulties can still result in only a single obtained blood specimen [28]. In our opinion, this variation in clinical practice should be taken into account when developing neonatal CLABSI SC in order to make them generally applicable in neonatal care. Our expert panel included C-reactive protein (CRP) as a

	A	B	C	D
1	**Common Commensals (CC)**			
2	It is possible that your laboratory may identify an organism that cannot be found when referencing the NHSN Organism List. DO NOT interpret the absence of an organism to mean the event is not reportable. If you have an organism which is not found on the NHSN Organism List, please contact us at nhsn@cdc.gov for guidance on appropriate reporting.			
3	**NHSN Code**	**NHSN Display Name**	**SNOMED Preferred Term**	**SNOMED Code**
4	ACTSP	Actinomyces	Actinomyces	40560008
5	ACTBO	Actinomyces bovis	Actinomyces bovis	59806008
6	ACTDENT	Actinomyces dentalis	Actinomyces dentalis	426330001
7	ACTFUNK	Actinomyces funkei	Actinomyces funkei	419012004
8	ACTGR	Actinomyces gerencseriae	Actinomyces gerencseriae	113416002
9	ACTGRAE	Actinomyces graevenitzii	Actinomyces graevenitzii	113417006
10	ACTIS	Actinomyces israelii	Actinomyces israelii	46369004
11	ACTNA	Actinomyces naeslundii	Actinomyces naeslundii	8940004
12	ACTORIC	Actinomyces oricola	Actinomyces oricola	425488009
13	ACTORIS	Actinomyces oris	Actinomyces oris	447175005
14	ACTRADI	Actinomyces radicidentis	Actinomyces radicidentis	427691003
15	ACTUROG	Actinomyces urogenitalis	Actinomyces urogenitalis	409827009
16	ACTVI	Actinomyces viscosus	Actinomyces viscosus	33529006
17	AEGU	Aerococcus	Aerococcus	9008009
18	AECH	Aerococcus christensenii	Aerococcus christensenii	409818008
19	AESGN	Aerococcus sanguinicola	Aerococcus sanguinicola	427222006
20	AEUR	Aerococcus urinae	Aerococcus urinae	243230001
21	AEURQ	Aerococcus urinaeequi	Aerococcus urinaeequi	430979003
22	AEURH	Aerococcus urinaehominis	Aerococcus urinaehominis	409819000
23	AEVI	Aerococcus viridans	Aerococcus viridans	78803006
24	ASNSP	Alpha-hemolytic Streptococcus, not S pneumoniae	Alpha-hemolytic Streptococcus not Streptococcus pneumoniae	713921004
25	ARCSP	Arcanobacterium	Arcanobacterium	51714009
26	ARCHA	Arcanobacterium haemolyticum	Arcanobacterium haemolyticum	44723000
27	ARCPLUR	Arcanobacterium pluranimalium	Arcanobacterium pluranimalium	428939003
28	ARTSP	Arthrobacter	Arthrobacter	56214009
29	ARTAGIL	Arthrobacter agilis	Arthrobacter agilis	113432004
30	ARTASTR	Arthrobacter astrocyaneus	Arthrobacter astrocyaneus	113433009
31	ARTCITR	Arthrobacter citreus	Arthrobacter citreus	44955005
32	ARTCRYS	Arthrobacter crystallopoietes	Arthrobacter crystallopoietes	113435002
33	ARTFLAV	Arthrobacter flavus	Arthrobacter flavus	429762004
34	ARTGAND	Arthrobacter gandavensis	Arthrobacter gandavensis	428332000

DIAGNOSI MICROBIOLOGICA

EMOCOLTURE QUANTITATIVE APPAIATE

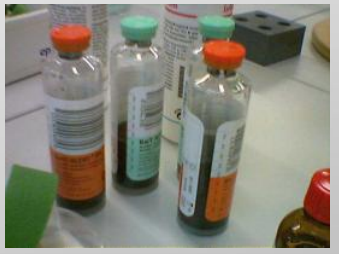
- EMOCOLTURE CONVENZIONALI PRELEVATE CONTEMPORANEAMENTE DAL CATETERE E DAL SANGUE PERIFERICO
- POSITIVITÀ: POSITIVITÀ DELLE COLTURE DA ENTRAMBI I SITI, CON UNA CONCENTRAZIONE DI MICRORGANISMI DAL CATETERE 3-5 VOLTE SUPERIORE A QUELLA DEL SANGUE PERIFERICO
- 10 STUDI CONSIDERATI
- SENSIBILITÀ: 87%
- SPECIFICITÀ: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



Maki, Ann Inter Med 2005

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
Diagnosis without catheter withdrawal				
Paired quantitative blood cultures	Ratio ≥3:1	Both sets are positive for the same microorganism and the set obtained through the catheter has ≥3:1 fold-higher colony count than the peripheral culture	Sensitivity ≈79% Specificity ≈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

DIFFICOLTÀ DIAGNOSTICHE

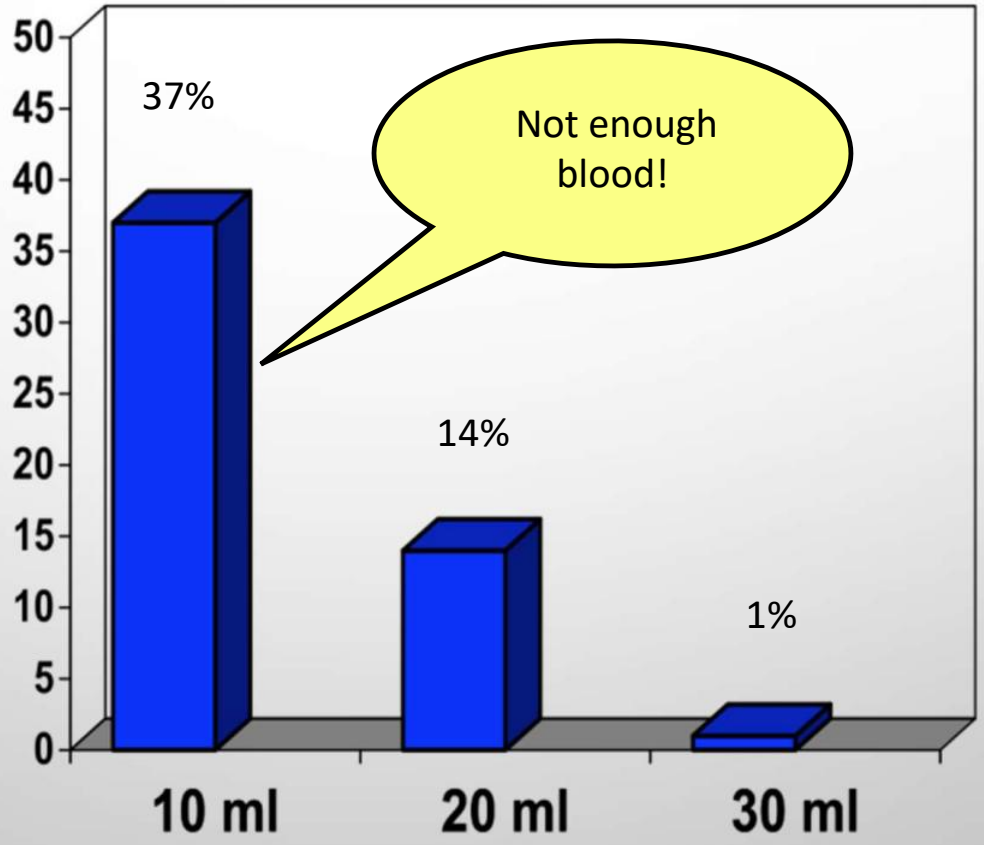
- MANCANZA DI PROTOCOLLI OMOGENEI PER L'ESECUZIONE DELLE EMOCOLTURE (NUMERO DI PRELIEVI DA EFFETTUARE, SITO DEL PRELIEVO, DISINFEZIONE DELLA CUTE, TIMING DI PRELIEVI SERIATI, VOLUME DI SANGUE DA PRELEVARE, CONTAMINAZIONI…)
- DIFFICOLTA' NELLA INTERPRETAZIONE DEI RISULTATI DELLE EMOCOLTURE

EMOCOLTURE

- QUANTE?
- QUANDO?
- QUANTO SANGUE?
- QUALE ANTISETTICO?
- “DISCARD VOLUME”?

% False Negative vs. Volume of Blood

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



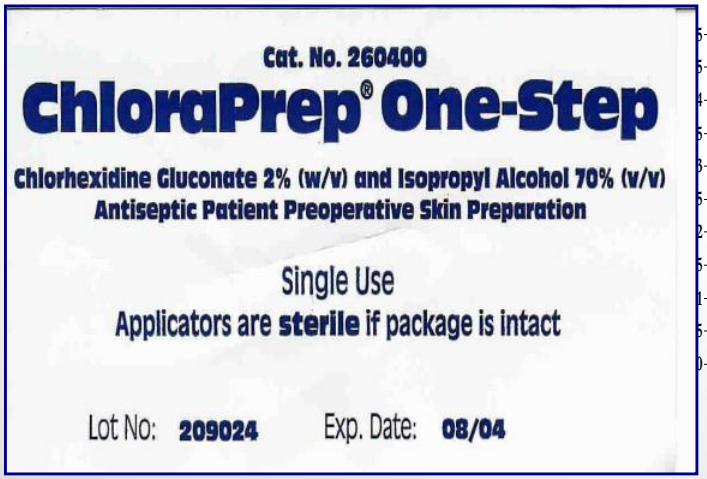
Courtesy of E.J Baron, PhD, Dir of Microbiology Lab, Stanford Hosp

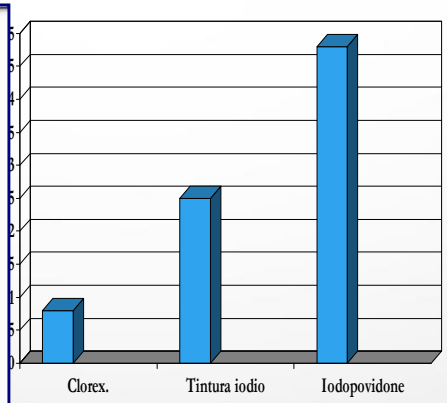
VOLUME DI SANGUE

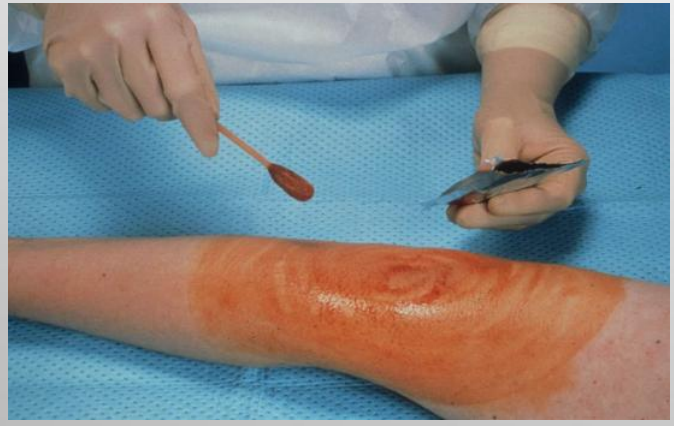
Peso (Kg)	ml per contenitore	ml per coppia
< 9	1	2
9-14	3	6
15-27	5	10
28-41	10	20
> 42	20	40

Baron, AVA 2006

CONTAMINAZIONE DELLE EMOCOLTURE RISPETTO ALL'ANTISETTICO IMPIEGATO

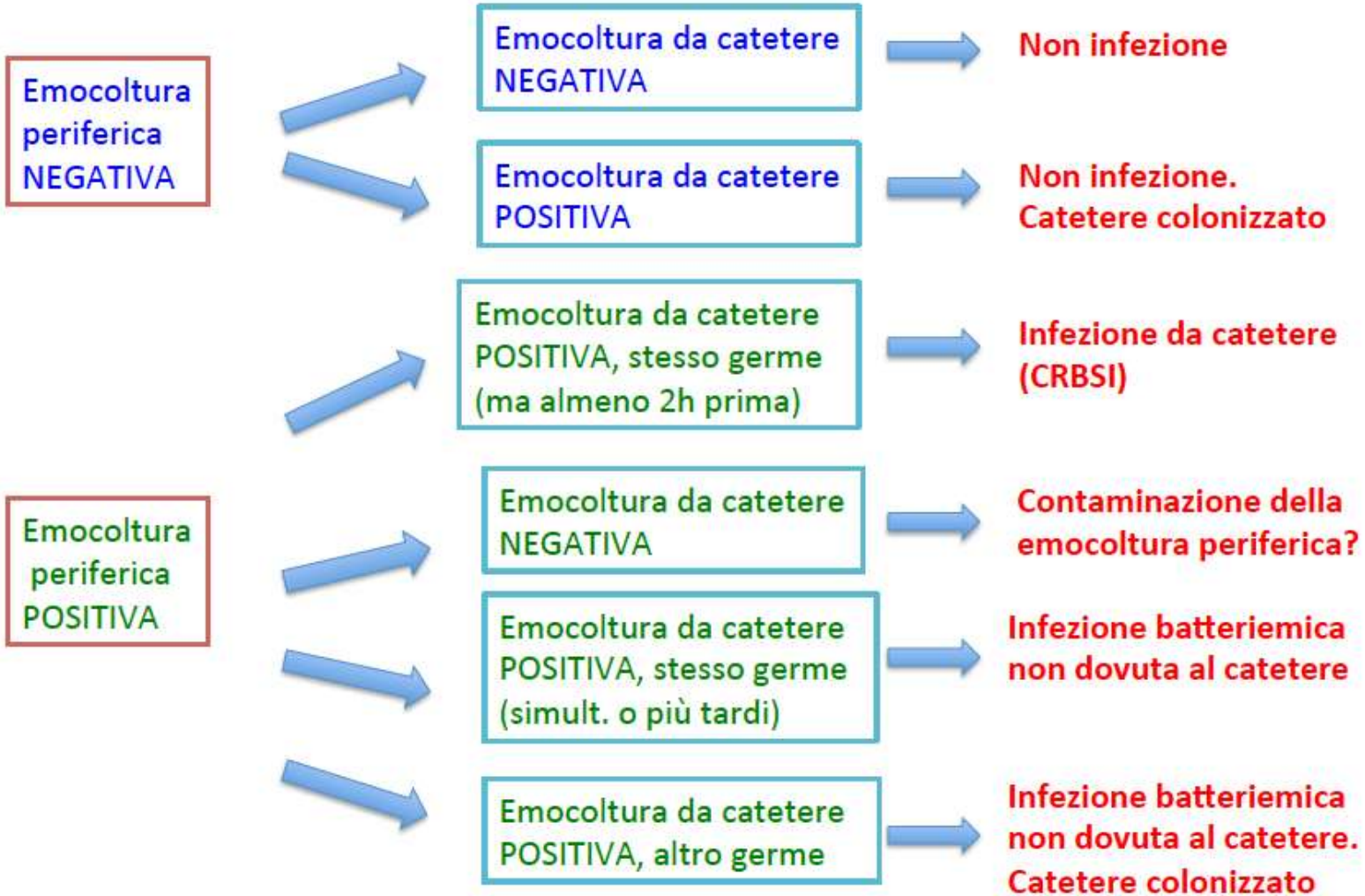






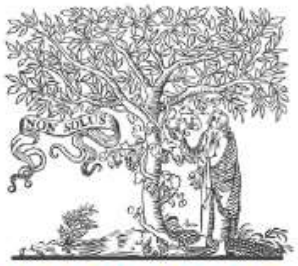
Baylor, 2006

Interpretazione della DTP



Pittiruti e Scoppettuolo 2017
www.gavecelt.info

Med Intensiva. 2018;42(1):5–36



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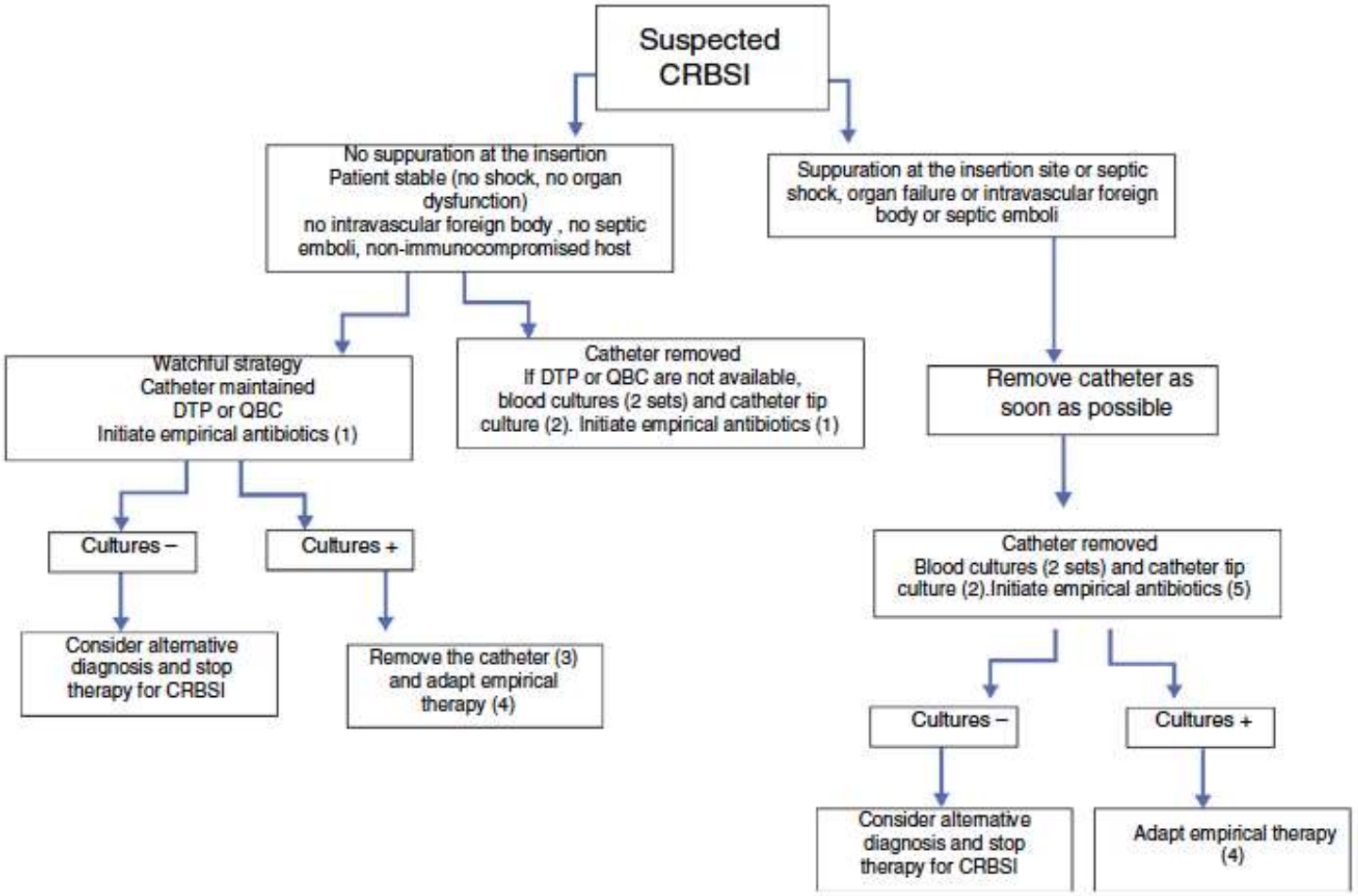
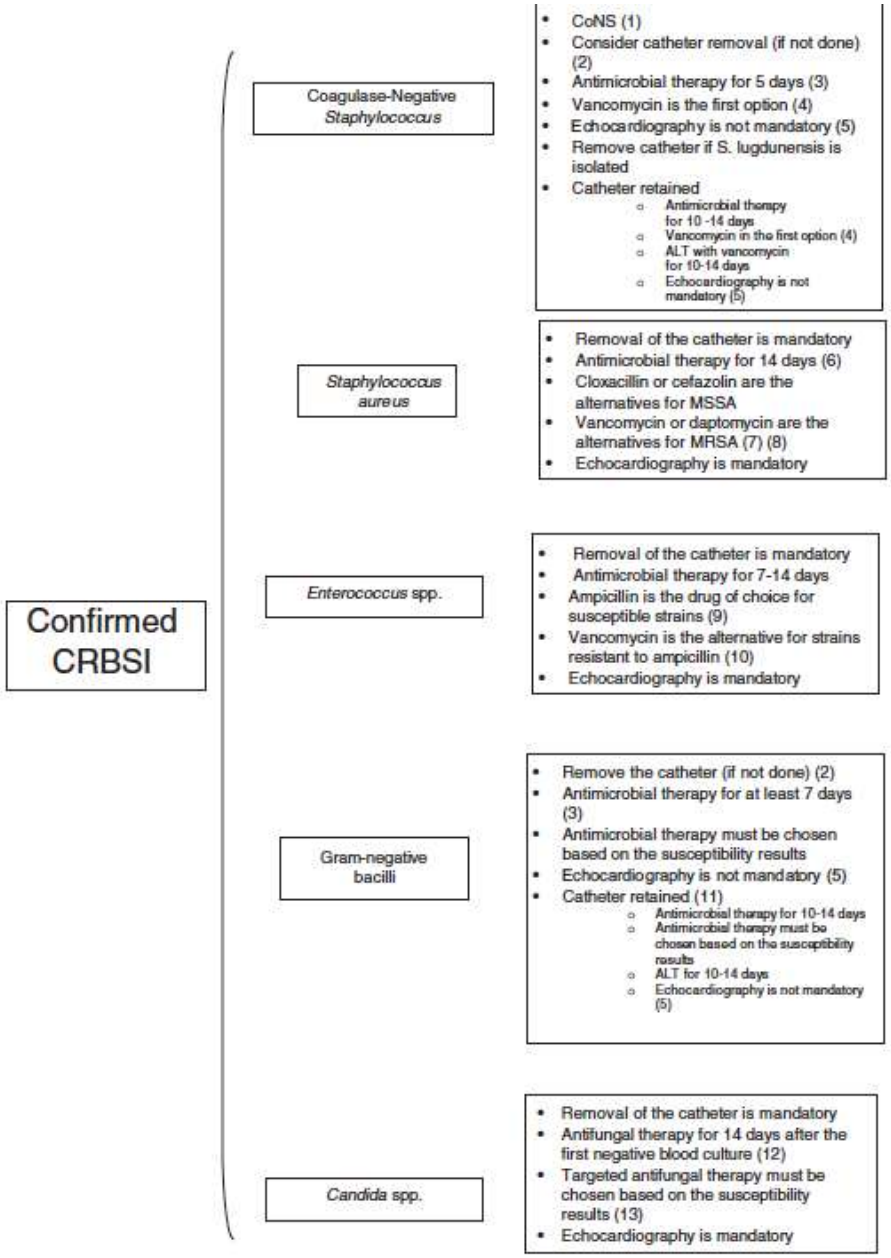
CONSENSUS STATEMENT

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)☆


Suspected CRBSI
No suppuration at the insertion
Patient stable (no shock, no organ dysfunction)
no intravascular foreign body , no septic emboli, non-immunocompromised host
Suppuration at the insertion site or septic shock, organ failure or intravascular foreign body or septic emboli
Watchful strategy
Catheter maintained
DTP or QBC
Initiate empirical antibiotics (1)
Catheter removed
If DTP or QBC are not available,
blood cultures (2 sets) and catheter tip culture (2). Initiate empirical antibiotics (1)
Remove catheter as soon as possible
Cultures –
Cultures +
Consider alternative diagnosis and stop therapy for CRBSI
Remove the catheter (3) and adapt empirical therapy (4)
Catheter removed
Blood cultures (2 sets) and catheter tip culture (2).Initiate empirical antibiotics (5)
Cultures –
Cultures +
Consider alternative diagnosis and stop therapy for CRBSI
Adapt empirical therapy (4)


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

CONCLUSIONI

- LA DECISIONE DI RIMUOVERE O MENO UN CATETERE VASCOLARE IN CORSO DI EPISODIO FEBBRILE DEVE ESSERE ASSOLUTAMENTE INDIVIDUALIZZATA
- TALE DECISIONE E' STRETTAMENTE DIPENDENTE DALL'ACCURATEZZA DELLA DIAGNOSI DI CRBSI
- E' NECESSARIO AVERE UNA DISTINZIONE CHIARA TRA DEFINIZIONE DI CRBSI (UTILE A FINI CLINICI) E DI CLABSI (UTILE A FINE DI MONITORAGGIO EPIDEMIOLOGICO)
- E' ALTRETTANTO NECESSARIO OTTIMIZZARE GLI STRUMENTI CHE CI PERMETTONO A GIUNGERE A UNA DIAGNOSI DI CRBSI, PRIMI FRA TUTTI LE EMOCOLTURE, TENTANDO DI AZZERARE LA PERCENTUALE DI FALSI POSITIVI E FALSI NEGATIVI

«Cos'è più importante» chiese Grande Panda,
«il viaggio o la meta?»

«La compagnia» rispose Piccolo Drago.

GAVePed
Gruppo Accessi Venosi Pediatrici

GRAZIE PER L'ATTENZIONE!

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