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Health
Organization**



**World Health
Organization**

REGIONAL OFFICE FOR THE **Americas**

Recommendations

- Please turn off your microphones
- The presentation will be one hour with additional time for questions
- Please send questions in writing, via Webex chat or email infectioncontrol@paho.org
- The presentation will be available on PAHO website in 48 horas at:
http://www.paho.org/hq/index.php?option=com_topics&view=article&id=342&Itemid=40930&lang=en

Acknowledgement

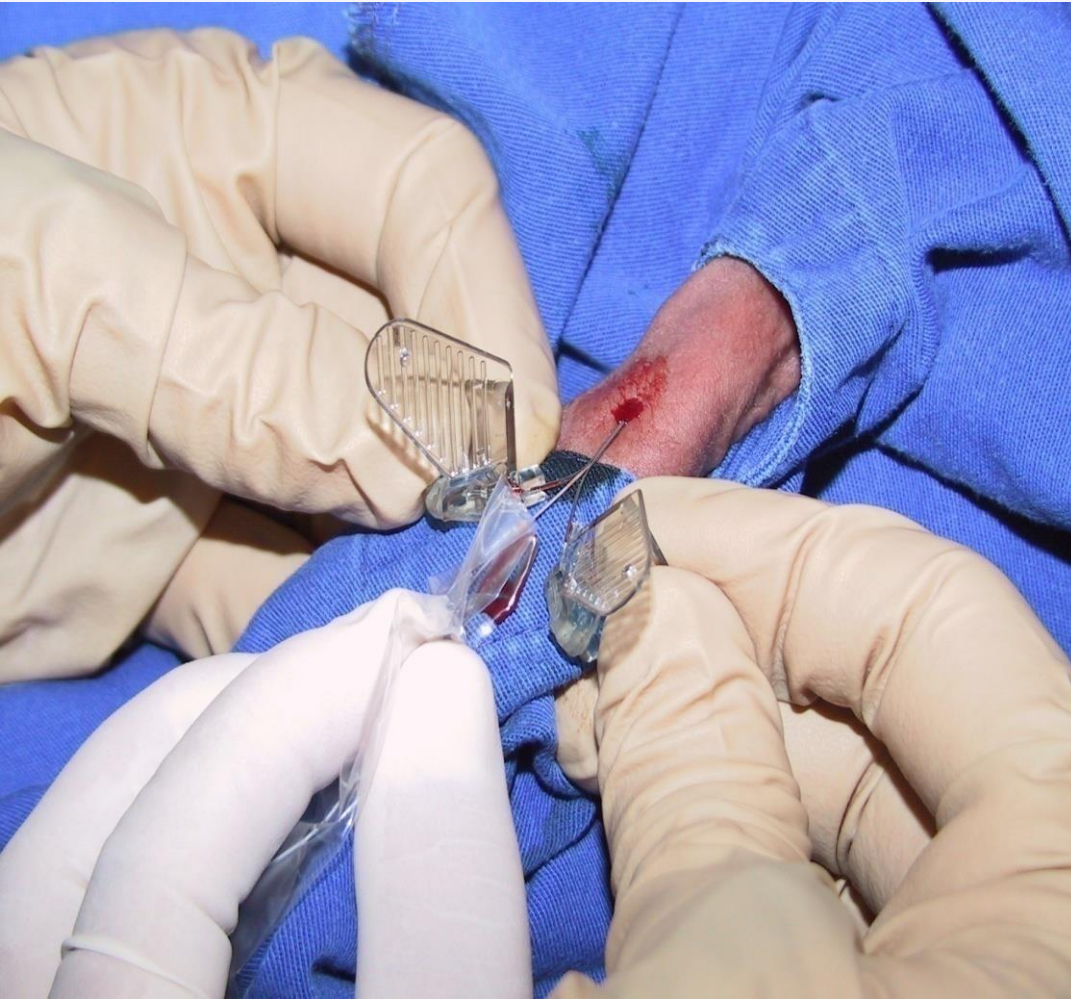
This webinar is made possible thanks to the auspice and cooperation of the Infection Control Center(CDC), under agreement CDC-RFA-CK13-1302. “BUILDING CAPACITY AND NETWORKS TO ADDRESS EMERGING INFECTIOUS DISEASES IN THE AMERICAS”

Prevention BSI/CVC: Children are Not Small Adults

Bundle of prevention of BSI: what can be applied and what is effective

*Profa Dra Roseli Calil
CAISM/UNICAMP*

Catheter associated HAI



Definition

Risk Factors

Diagnostic

Prevention







Identification of the Infection Site

A- primary bloodstream infection with lab results

Positive Blood culture

(recommendation - two!)

B- bloodstream infection without lab results – clinical
sepsis

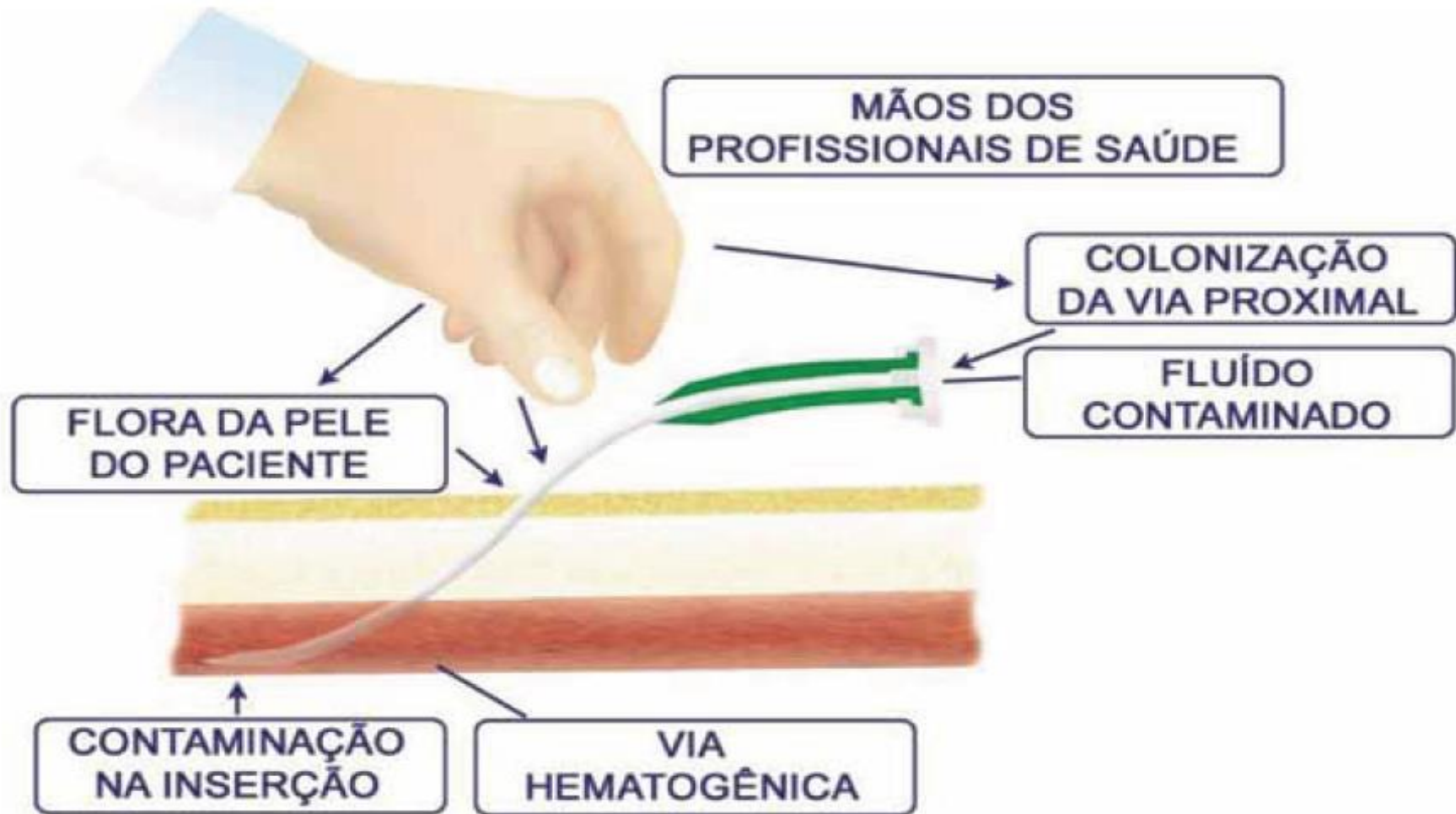
Clinical criteria + Laboratorial

Primary Bloodstream Infection Associated with Central Catheter

**Catheter present at the time of
diagnosis
or up to 48 hours after removal**

CDC-EUA NHSN/ANVISA-Brasil

Pathophysiology of Primary Bloodstream Infection (PBSI) associated with CVC



Do BSI Prevention Bundles Work Uniformly?

[Infect Control Hosp Epidemiol](#). Author manuscript; available in PMC 2015 Nov 4.

PMCID: PMC4632847

Published in final edited form as:

NIHMSID: NIHMS732128

[Infect Control Hosp Epidemiol](#). 2014 Sep; 35(9): 1126–1132.

Published online 2014 Jul 25. doi: [10.1086/677636](https://doi.org/10.1086/677636)

Infection Prevention Practices in Neonatal Intensive Care Units Reporting to the National Healthcare Safety Network

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Methods

- An on-line survey was conducted with infection control teams at NICUs reporting to the National Healthcare Safety Network (NHSN) to learn the strategies used to prevent the transmission of MRSA and associated bloodstream infections in NICUs.
- Period January 2010 to 18/02/2010

Methods

- Identified NICUs who reported data from CLABSI to the National Healthcare Safety Network (NHSN) from January 1 to December 31, 2009.
- In December 2010, contacts designated by the NHSN at each identified institution were sent to research using an online search tool that was delivered via email to the search link.
- The response needed to be forwarded by a member of each institution, and discussion among team members was allowed.
- Reminders were sent at two-week intervals for non-responders until the survey was terminated on February 18, 2011.

Results

- Response rate of 47.3%: Staff 162 of 342 NICU responded
- 92.3% NICUs use insertion bundle and central catheter maintenance
- Maintenance practices vary, including antiseptics product and bandage replacement frequency.
- 42% reported routine colonization by MRSA on admission for all patients.
- 82 NICUs (51.3%) reported use of Chlorhexidine Gluconate (CHG) for central catheter care for at least one indication: catheter insertion, dressing change, or antiseptics port / cap
- Among the 65 NICUs that answered the questions, regarding some restriction of CHG use, 46.2% answered without restriction

Conclusion

- This study / evaluation, carried out by the CDC, illustrated the heterogeneity of CLABSI and MRSA prevention practices.
- It highlights the need for additional research to define optimal strategies and evidence-based prevention recommendations for newborns

CATHETER RELATED INFECTIONS

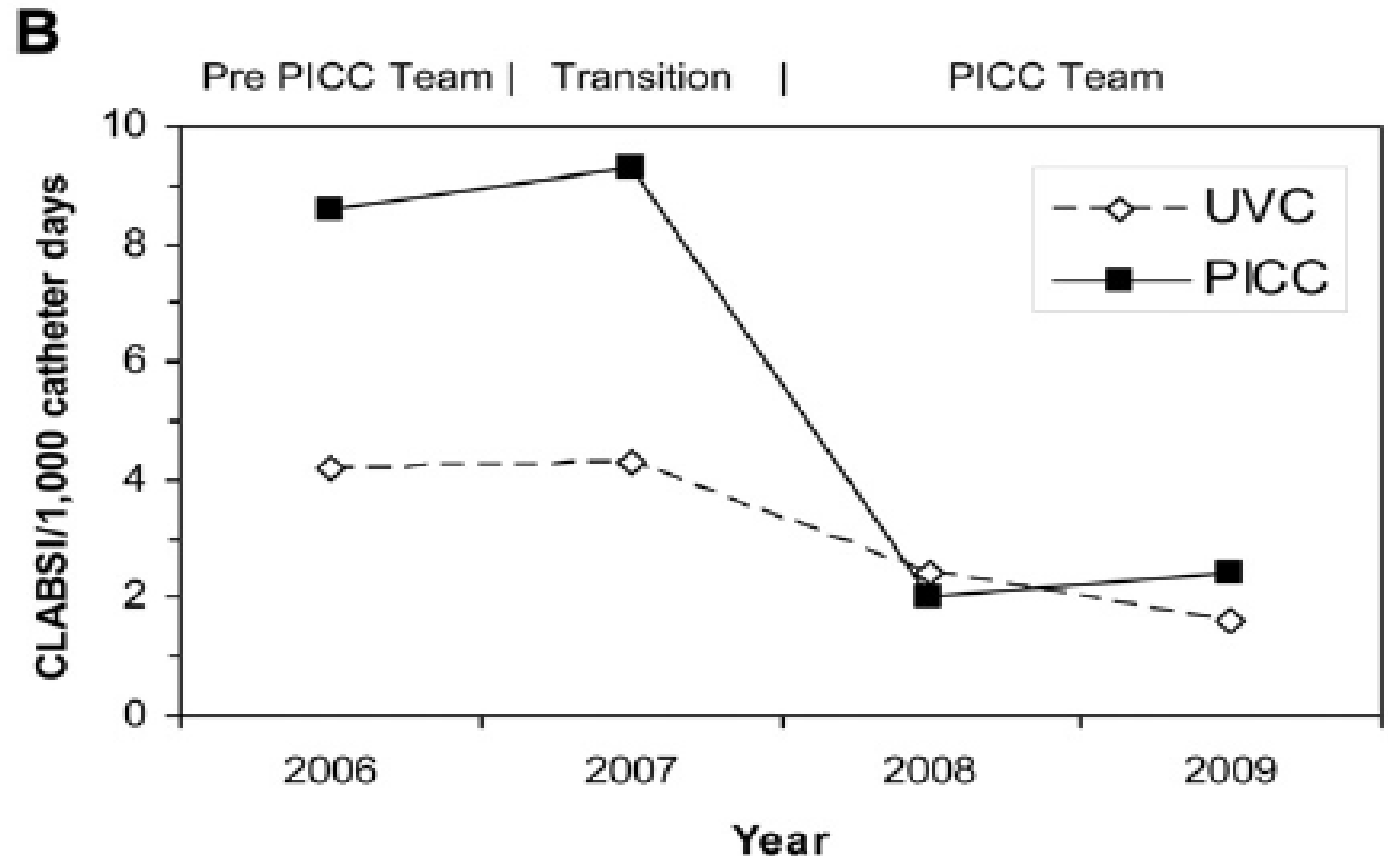
Prevention Measures

- **Planning for Venous Access**
- **Selection of the catheter (better polyurethane and silicone)**
- **Aseptic insertion**
- **Anti-sepsis and skin / dressing**
- **Preparation and quality control of infusions**
- **Infusion time of parenteral fluids**
- **Equipment and connection exchanges**
- **Surveillance of connections**

CDC ; MMWR vol 51/RR 10, 2002

Impact DI BSI/CVC – Time of PICC

There was a reduction in BSI DI associated with UVC and PICC after introduction of the PICC team
A sharp reduction in DI-PICC



Use of Catheter - Risk for sepsis?

Umbilical Catheter

> 5 days - Artery OR = 16.5

> 5 days - Vein OR = 21.2

PICC - OR = 2.0

Phlebotomy - OR = 2.5

Results

Table II. Association of CLABSI rates with catheter duration

Catheter in place	CLABSI/1000 catheter days		Relative risk (95% CI)	
	UVC	PICC	UVC	PICC
≤7 days	1.0	6.1	1	1
8-10 days	5.4	1.4	5 (0.98-51.00)	0.2 (0.02-1.60)
11-14 days	21	3.8	20 (5-185)	0.6 (0.2-3.1)
>14 days	32	9.2	31 (4-368)	1.5 (0.6-5.8)

Results

Table III. Regression model for CLABSI

Factor	OR (95% CI)	P value
Year (2006, 2007 vs 2008, 2009)	4.10 (1.29-13.0)	.02
Birthweight, kg	0.20 (0.02-1.71)	.14
Gestational age, weeks	0.92 (0.70-1.20)	.52
UVC in place >7 days	5.48 (1.18-25.50)	.03
Initial antibiotics >3 days	0.28 (0.10-0.76)	.01

In a multivariate regression model to control birth weight, gestational age, catheter care practices over time, and use of antibiotics

 the group > 7 days UVC remained associated with an increased risk of infection.

Author conclusion

"Contrary to the conclusions of our randomized and based on the results of the current study, WE RECOMMEND “:

- Replacement of a UVC with a PICC should be considered when necessary to maintain the use of CVC after 7 days of life.
- In the current era of evidence-based PICC care, changing BSI-CVC risks should make PICC the preferred choice of long-term central venous access

Insertion - Peripheral Vein

- **Hand washing with chlorhexidine degermant**
- **Antisepsis with 70% alcohol or chlorhexidine alcoholic, wait time for action (2 minutes)**
- **Use of procedure gloves**
- **Avoid multiple puncture**



Central Catheter Insertion

- Full paramentation
- Skin preparation with alcoholic chlorhexidine > 0.5% (category I A)
- Avoid use of PVPI
- Preferably use silicone or polyurethane catheter



INSTRUÇÕES

- VERIFICAR COM FREQUÊNCIA O NÍVEL DO OXÍGENO NO SANGUE DO BEBÊ.
- SE O NÍVEL DO OXÍGENO NO SANGUE DO BEBÊ FOR BAIXO, AVISAR O ENFERMEIRO.
- SE O BEBÊ APRESENTAR SINAIS DE DISTRESS RESPIRATÓRIO (RESPIRAÇÃO RÁPIDA E SUPERFICIAL, CIBANO, SÍNDROME DE TIRAGEM), AVISAR O ENFERMEIRO.
- SE O BEBÊ APRESENTAR SINAIS DE DISTRESS CIRCULATÓRIO (CORPORESCAZÃO, SINAIS DE CIBANO), AVISAR O ENFERMEIRO.
- SE O BEBÊ APRESENTAR SINAIS DE DISTRESS NEUROLÓGICO (RIGIDEZ MUSCULAR, SINAIS DE CIBANO), AVISAR O ENFERMEIRO.

Use of Prophylactic Antibiotic

- DO NOT use antibiotics as prophylaxis prior to insertion or during intravascular catheter use to prevent catheter-related colonization or infection

Category IB

CDC Prevention - 2011

Umbilical Catheterization

Avoid skin lesions

In extremely premature - hydrocolloid plaque may be an option



Bridge Fixing

Allows cleaning of catheter insertion

Prevents catheter displacement



Good Practices in the insertion of the PICC

- Elective procedure
- Trained nursing professional (in 2 people)
- Maximum barrier of PPE
- Skin antisepsis with chlorhexidine soap 2%, saline removal
- Complementation of antisepsis with alcoholic chlorhexidine 0.5%
- Do not cut tip of the catheter for insertion by risk of mechanical complication

Trimming of Peripherally Inserted Central Catheters: The End Result



Figure 1. Instruments used to trim catheters, including scissors, a trimming tool, and scalpel blade.

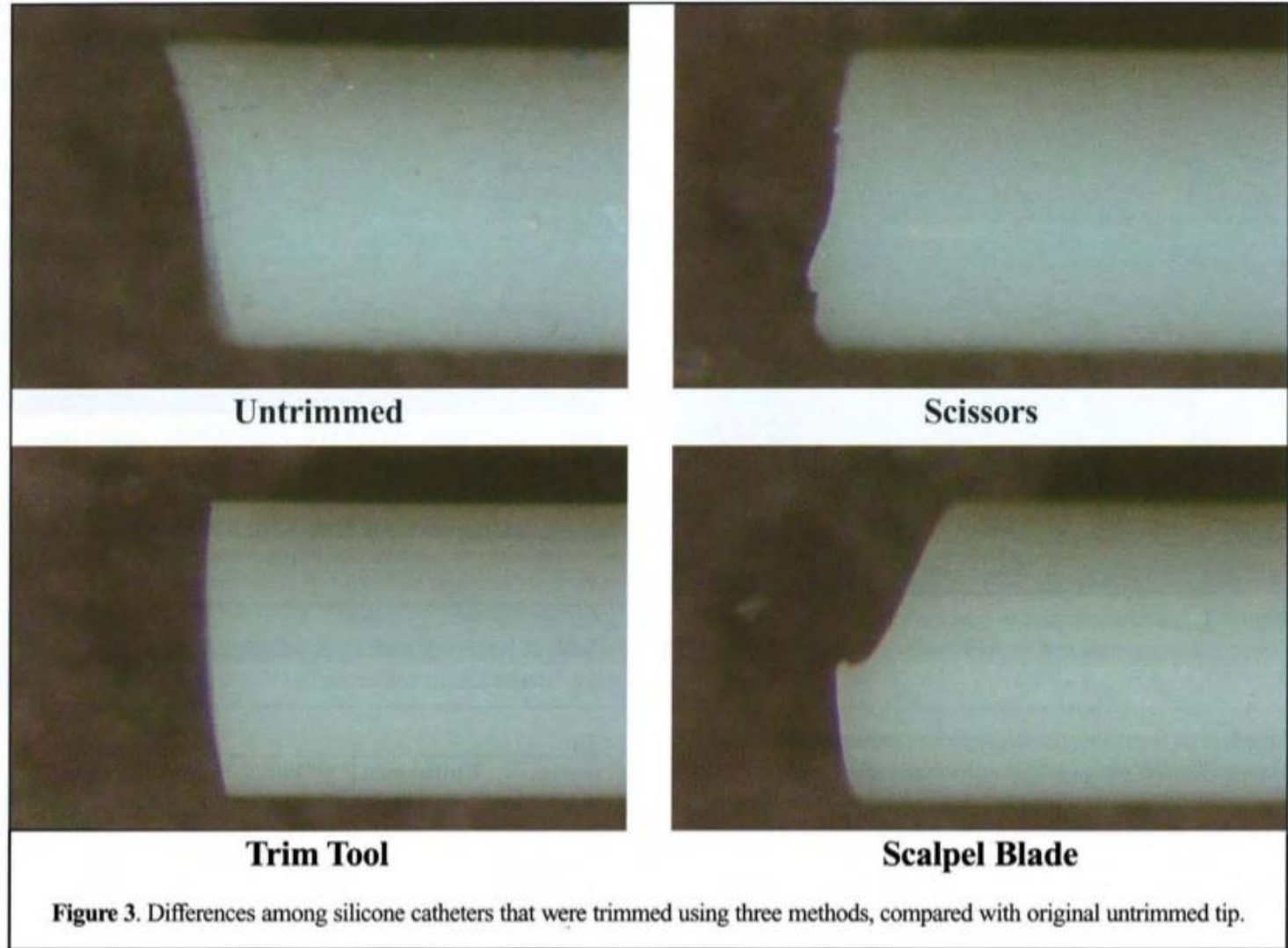
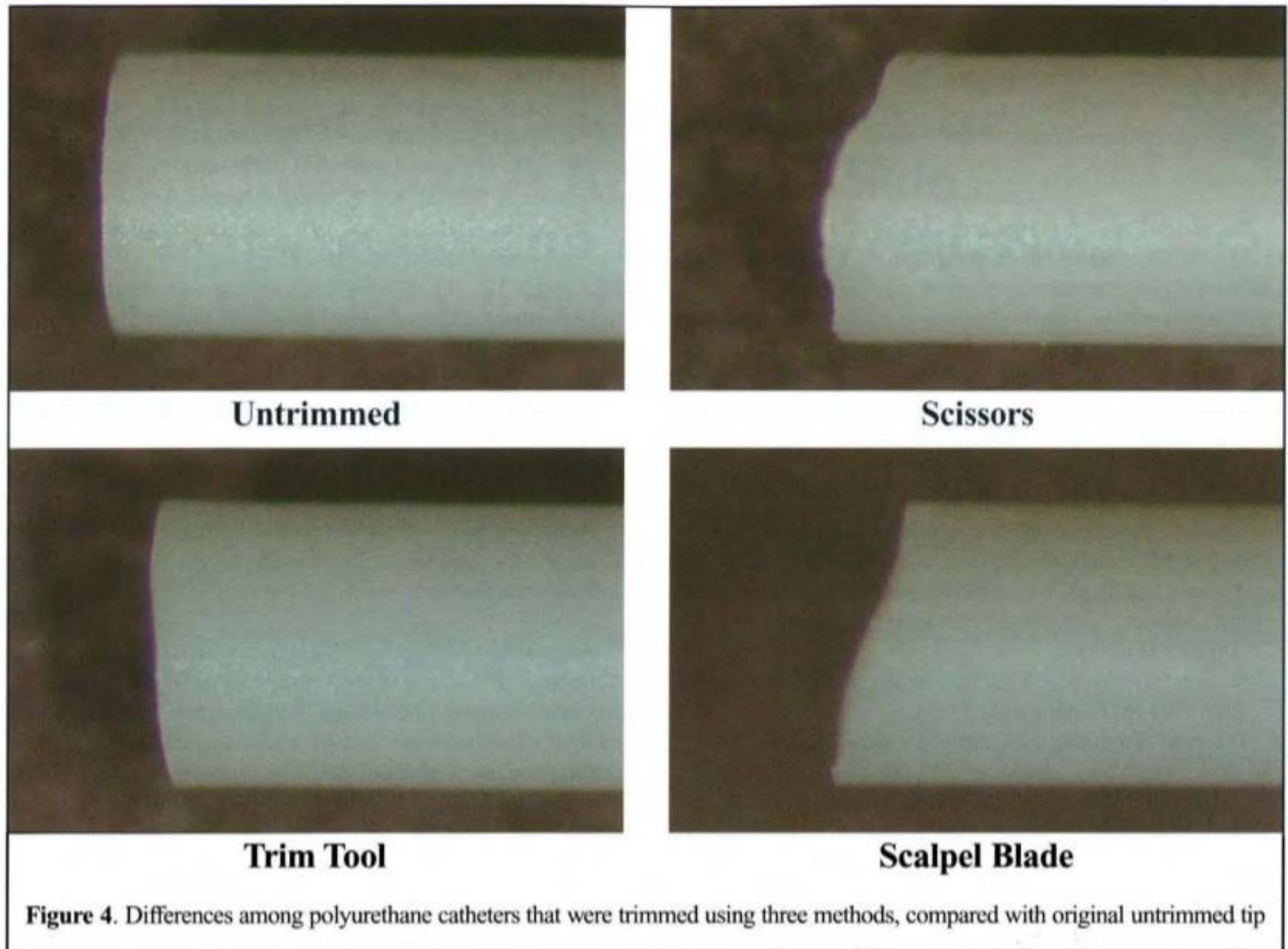


Figure 3. Differences among silicone catheters that were trimmed using three methods, compared with original untrimmed tip.

Trimming of Peripherally Inserted Central Catheters: The End Result



Figure 1. Instruments used to trim catheters, including scissors, a trimming tool, and scalpel blade.





Use 5 -10ml syringes to test for perfusion



Fixing the PICC



Do not cut catheter tip at insertion, risk of mechanical complication



Avoid situations like this

PPN
Must have a
dedicated line

Option for administration of several Central Catheter drugs with double lumen



Changing Bandages - What Has Changed?

➤ Gauze dressing: 48 hours or earlier if necessary

 Clear dressing - only peeling or signs of bleeding

Hand hygiene with antiseptic

Use of 0.9% SF and alcoholic chlorhexidine

PICC - dressing exchange

Use aseptic technique

Always make 2 people to avoid traction of the catheter

CDC Prevention 2011

Preparation of IV Solutions

- Ideal - single dose from the pharmacy - fractionated with aseptic technique in laminar flow.

What possible: "Nursing Station"

- Surface cleaning with 70% alcohol
- Hygiene of hands with antiseptic solution
- Masking / not talking during the procedure
- Disregard content in case of technical breakdown

Manipulation of Venous Access

- **Hand hygiene**
- **Disinfection of the "Hub" with alcohol at 70%**
- **Caution with equipment and connections - immediate exchange in case of technical breakdown**

Associated Infection Prevention Catheter Lines exchange and connections

Lines

- Hemoderivatives - immediate withdrawal after use
- NPP - 24 hours *
- Other solutions: 72-96 hours (48-72 hrs/CDC 2002*)
- UTI Neonatal - pondering change every 24 hours

Hub 3 ways (avoid if possible)

- On the occasion of the exchange of lines
- Presence of blood - immediate exchange

CDC Prevention, 2011

* *Journal Hosp. Infection (2008) 68, 293 - 300*

A randomised, controlled trial of heparin in total parenteral nutrition to prevent sepsis associated with neonatal long lines: the Heparin in Long Line Total Parenteral Nutrition (HILLTOP) trial

What this study adds

The use of heparin in TPN when infused through the neonatal central catheter reduces the incidence of bloodstream infection without adverse events

 **Caution: Beware of dilution errors**

Pita Birch, Simon Ogden, Michael Hewson - Downloaded from fn.bmj.com on August 2, 2010

Guideline CDC Prevention 2011

Anticoagulants

Do not routinely use anticoagulant to reduce the risk of catheter-related infection in the general patient population.

Category II

Add low doses of heparin (0.25-1.0 U / ml) for infusion into the umbilical artery catheter Category IB

Guideline CDC 2011

- No recommendation regarding lumens exclusive to TPN - Unresolved Issue
 - ➔ Brazil MoH RDC 272/1998 – Exclusive route for TPN administration.
- Removing any intravascular catheter as soon as possible, not prolonging the use is essential. Category IA
- Catheter inserted in the urgency without adherence of aseptic procedure, replace the catheter as soon as possible within 48 hours Category IB


Catheter X Bath

- Do not immerse the catheter in water
- Bath should be allowed with precautions to reduce the risk of introducing microorganisms into the catheter, in which case use impermeable cover, for example **Category IB**

Umbilical Catheter

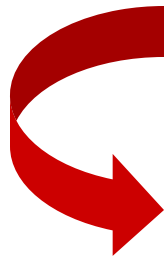
- Remove and not replace arterial catheter if there are signs of SBI or signs of vascular insufficiency or thrombosis Category II
- Remove and not replace umbilical venous catheter if there are signs of ICS or thrombosis Category II
CDC prevention 2011
- Remove as soon as possible and do not extend beyond 5 days arterial catheter and 7 days venous catheter provided maintained aseptic technique

Catheter removal - When?

- PICC: no complications no definite time
 Caution, over 14 days some studies point to an increased risk of infection
- Central catheter by phlebotomy - termination of use or local infectious complications
- Umbilical - as early as possible Preferably do not exceed 7 days

Management of the Catheter in Suspected Sepsis

Observe the catheter insertion site



No Flogistic
Signs

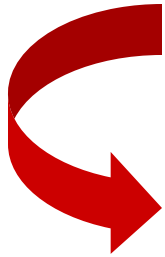


Initiate empirical use of antibiotic

- Wait for results of blood cultures
- Observe clinical evolution

Management of the Catheter in Suspected Sepsis

Observe the catheter insertion site



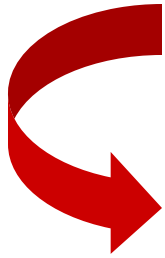
With flogistic
signs



- Collect 2 blood samples
- Remove catheter immediately
- Start antibiotic use
- Catheter tip culture - optional / routine CCIH

Management of the Catheter in Suspected Sepsis

No flogistic signs insetion site



Blood culture positive for
fungus



- Remove catheter
- Start using anti fungal
- Maintain treatment for 14 days from the 1st negative BC

Management of the Catheter in Suspected Sepsis

No flogistic signs insetion site



Blood culture positive for Gram negative bacile



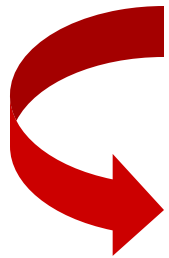
- Remove Catheter
- Adequate antibiotic s / n



- If Catheter is maintained
- Blood culture sample in 24 hours

Management of the Catheter in Suspected Sepsis

Positive blood culture



Staphylococcus aureus

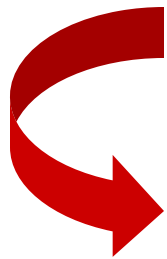


- Stable NB, maintain catheter
- Adequate antibiotic if necessary
- Collect blood cultures in 24 hours of adequate treatment

- NB Unstable
- Remove Catheter
- Adequate antibiotic if necessary

Management of the Catheter in Suspected Sepsis

Positive blood culture



Staphilococcus epidermidis



Stable RN

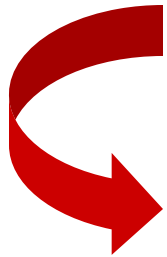
- maintain catheter
- Adequate antibiotic if necessary
- Collect blood cultures in 48-72 hours



- NB Unstable
- Remove Catheter
- Adequate antibiotic if necessary

Management of the Catheter in Suspected Sepsis

Gram negative or gram positive bacteria



Clinical deterioration and / or persistence of positive blood cultures

Other complications - Venous thrombosis, endocarditis, osteomyelitis



Remove Catheter

EMPIRICAL TREATMENT OF CATHETER ASSOCIATED INFECTIONS

- First option: oxacillin + amikacin
- Second option: vancomycin associated with cefotaxime or cefepime

 Adequate antibiotic according to results of cultures (blood cultures, CSF, Uroculture

Use of vancomycin in the initial empirical scheme: When?

- Justified only in neonatal intensive care units with high prevalence of bloodstream infections (BSI) by methicillin / oxacillin resistant *Staphylococcus aureus*.

 Not indicated

In units with a high prevalence of BSI by Coagulase-negative *Staphylococcus*, even if resistant to oxacillin, considering that these infections are of low morbidity / mortality, which allows safe exchange time when this agent is isolated in blood cultures

*We have a long way to go,
but I think we're on the right track ...*

calil@unicamp.br

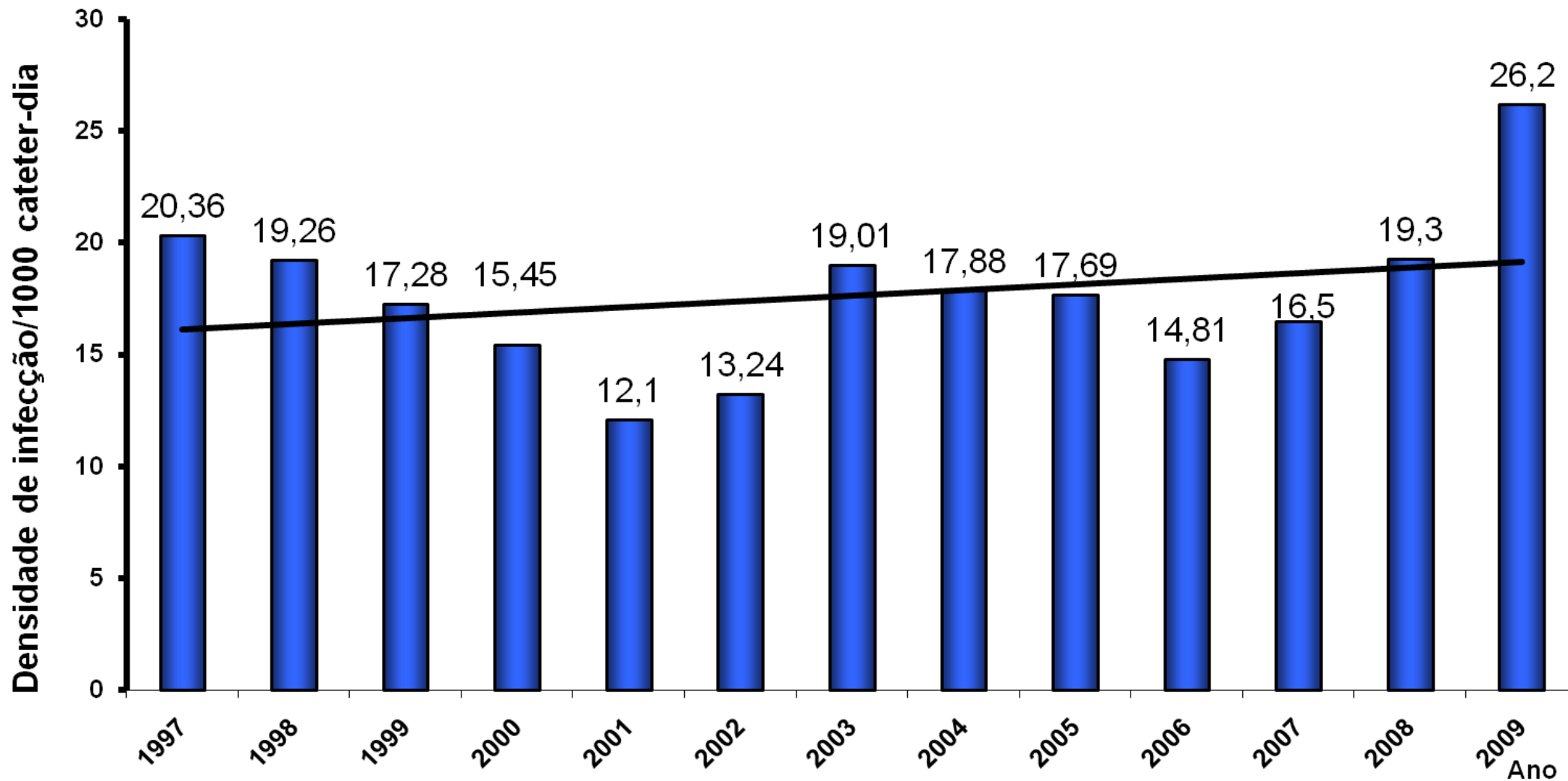
CAISM/UNICAMP Experience

Bloodstream Infection Control Associated
with Central Catheter

Implementation of the bundle of actions
related to Insertion and Maintenance of
the Central Catheter

BSI DI Associated with Catheter 1997-2009

Neonatology CAISM/UNICAMP



Controle de Infecção em Neonatologia - O que posso mudar ?

não posso mudar



Fatores de risco para infecção intrínsecos do RN

- ⊗ Prematuridade.
- ⊗ Baixo peso.
- ⊗ Estado imunológico.
- ⊗ Doenças associadas ao nascimento.
- ⊗ Colonização da pele.

A necessidade de procedimentos invasivos de acordo com a gravidade do RN

O que posso mudar



- ✓ O processo de trabalho
 - Adesão de toda equipe as medidas de prevenção e controle de infecção.
 - Adesão às boas práticas nos procedimentos invasivos.
- ✓ Inserção do cateter central; Técnica asséptica
 - Higienização das mãos com clorexedina degermante.
 - Uso de barreira máxima (gorro, máscara, avental e luva estéril).
 - Uso de clorexedina na antisepsia da pele do RN.
- ✓ Acesso venoso periférico
 - Higienização das mãos com clorexedina degermante.
 - Luvas de procedimento.
 - Antisepsia da pele com clorexidina alcoólica.
 - Evitar múltiplas punções.
- ✓ Manuseio do cateter central ou acesso venoso periférico
 - Higienizar as mãos antes e após o manuseio.
 - Utilizar luva de procedimento sempre que houver risco de contaminação com sangue.
 - Desconectar o sistema somente com técnica asséptica.
 - Ao desconectar a tampa protetora da torneira de 3 vias ou plug do sistema, substitua por outro estéril.
 - Na manipulação do hub, torneiras de 3 vias e extensores, realizar fricção com álcool a 70% por 10 segundos em toda superfície.

O que posso mudar

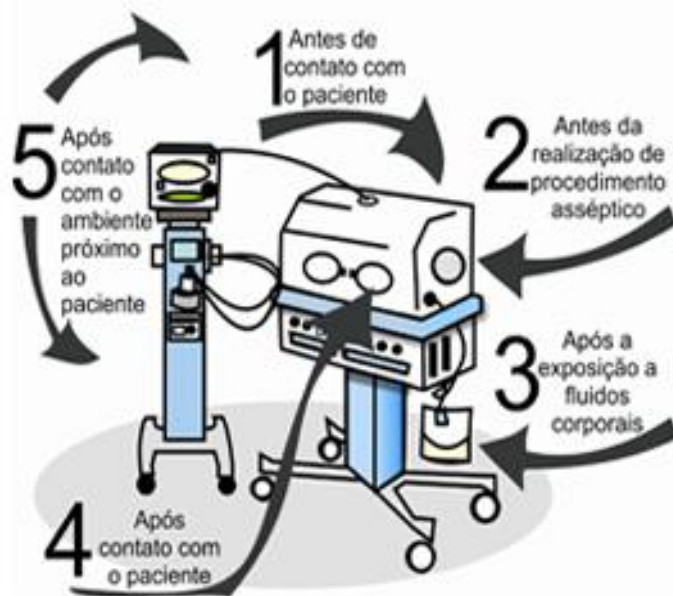


- Na coleta de sangue através de cateter arterial umbilical realizar fricção com álcool a 70 % no plug antes da punção.
- ✓ Troca de dispositivos (extensor, conectores e torneira de 3 vias)
 - Realizar diariamente, ou antes, se houver quebra de técnica ou acúmulo de sangue.
- ✓ Troca de curativos
 - Realizar em 2 pessoas utilizando técnica asséptica.
 - Curativo com gaze a cada 24 horas, ou antes, se houver suidade.
- ✓ Troca curativo transparente somente se necessário
 - Acompanhamento da inserção do cateter por um profissional de enfermagem.
 - Preencher o check list de vigilância do cateter no momento da inserção, após controle radiológico, após realização de curativo e retirada do cateter.
 - Vigilância constante com relação a infusão de fluidos.
 - Avaliação diária das condições do cateter.
 - Avaliação diária da necessidade de manutenção do cateter.

O que posso mudar



Adesão a Higienização das Mãos



5 momentos para a higienização das mãos

Referências Bibliográficas:

-Cooley K, Grady S. Minimizing catheter-related bloodstream infections: one unit's approach. *Adv Neonatal Care*.2009 Oct;9(5):209-26; quiz 227-8.

-World Health organization. *Clean Care is Safer Care.SAVE LIVES: Clean Your Hands*. [Acesso em 16 nov 2009]; Disponível em: <http://www.who.int/gpsc/5may/en/index.html>

-Mendonça SHF. Impacto do uso de conectores sem agulha para sistema fechado de infusão na ocorrência de infecção de corrente sanguínea relacionada ao cateter venoso central: evidências de uma revisão sistemática [Dissertação-Mestrado] São Paulo-SP: Universidade de São Paulo; 2008.

Realização:

SERVIÇO DE ENFERMAGEM EM NEONATOLOGIA
CCIH CAISM/UNICAMP
GRUPO DE ESTUDO DE CATETERES VENOSO

Criação/Arte
Malim Luci José Ciurcio
Giovanna Mantovani Chaves



Dezembro 2009



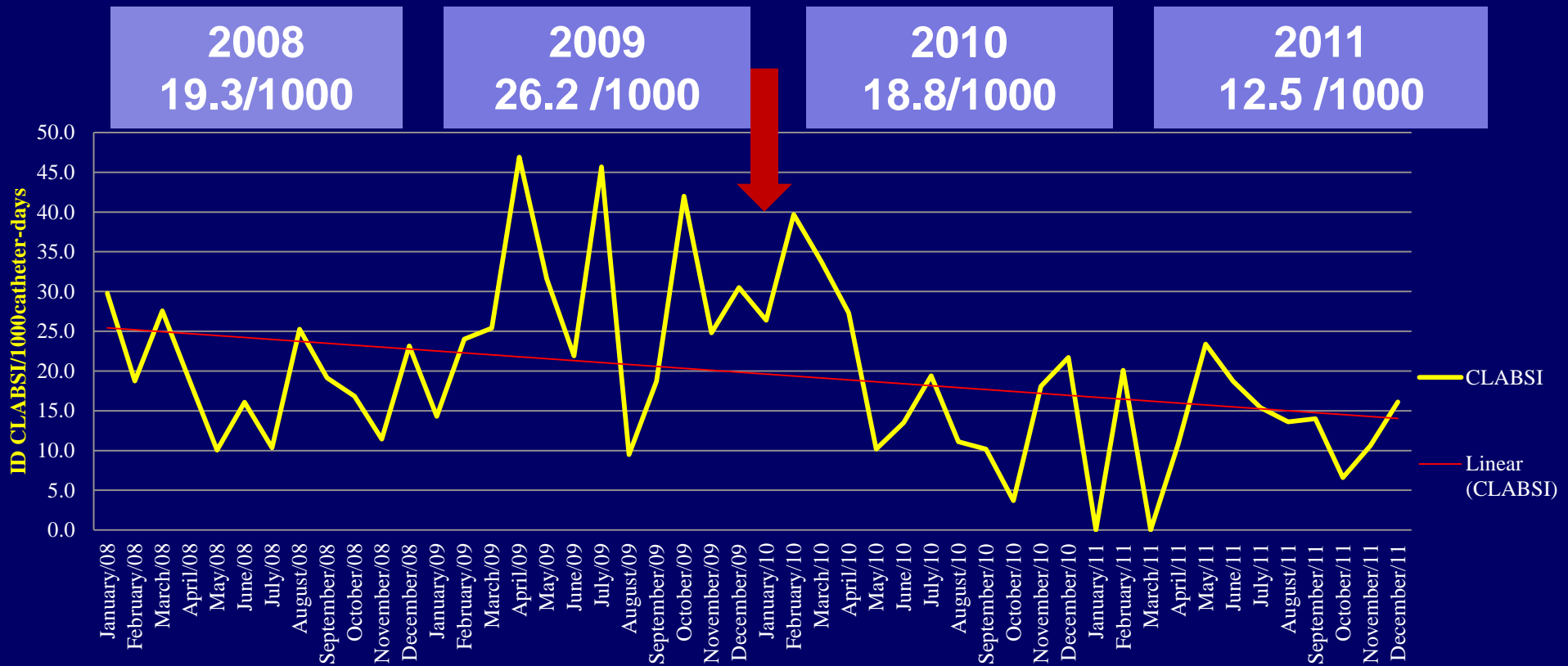
Hospital da Mulher-CAISM-Unicamp

Prevenção de Infecção em Neonatologia



NICU - UNICAMP 2008-2011

ID CLABSI/1000 catheter-day



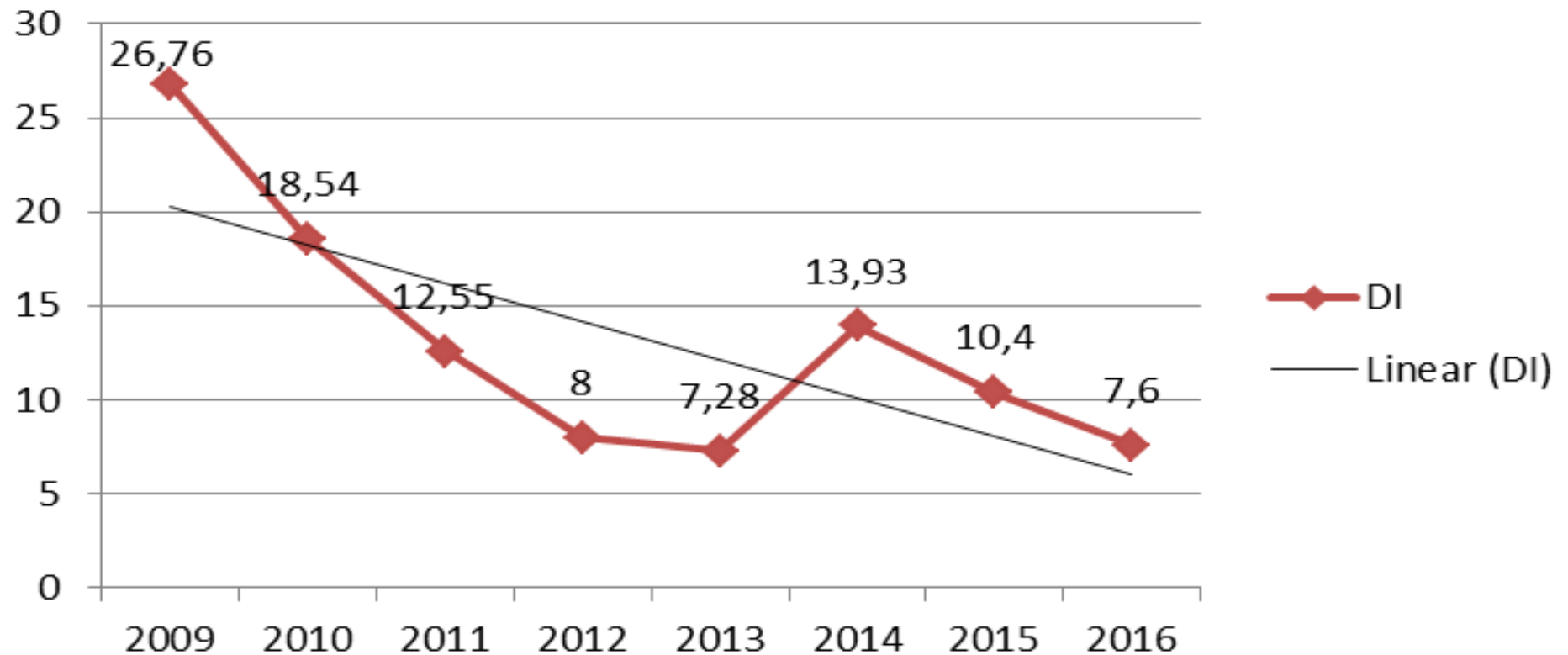
70% CLABSI was laboratory confirmed

76,6% *Staphylococcus coagulase negative* species, 2% *Candida sp*

Staphylococcus epidermidis was the main agent of CLABSI

Calil et al, 2012

Densidade de incidência de IPSC associada a cateteres na Neonatologia. Caism/Unicamp, 2009 - Ago. 2016



DI BSI: $\frac{\text{number of catheter-associated bloodstream infections} \times 1000}{\text{Total number catheter-day}}$

What do we learn?

- Have a trained team (catheter team) for central catheter insertion (PICC and Umbilical) but ensure adherence to good practices in catheter maintenance with training of the entire nursing group.
- Remove the umbilical catheter as soon as possible

Do not to exceed 7 days

- Replace UVC with a PICC if you need to maintain longer IV fluid infusion time.

Where to go?

Eliminating CLABSI, A National Patient Safety Imperative

A Progress Report on the National On the CUSP: Stop BSI
Project, Neonatal CLABSI Prevention

A Project of

Health Research & Educational Trust

Neonatal CLABSI in partnership with:
Perinatal Quality Collaborative of North Carolina (PQNC)
NHSOU (Center for Patient Safety) (NHSOU)

Disclaimer: This report was developed with data collected and analyzed under contract with the Agency for Healthcare Research and Quality (AHRQ). The information and opinions expressed herein reflect solely the position of the authors. Funding herein should be construed to indicate AHRQ support or endorsement of its content.

October 2012



Eliminating CLABSI, A National Patient
Safety Imperative A Progress Report on the
National Eliminating CLABSI, A National
Patient Safety Imperative A Progress Report
on the National On the CUSP: **Stop BSI**

Project, Neonatal CLABSI Prevention On the
CUSP: Stop BSI Project, Neonatal CLABSI
Prevention

Project, Neonatal CLABSI Prevention On the CUSP: Stop BSI Project, Neonatal CLABSI Prevention

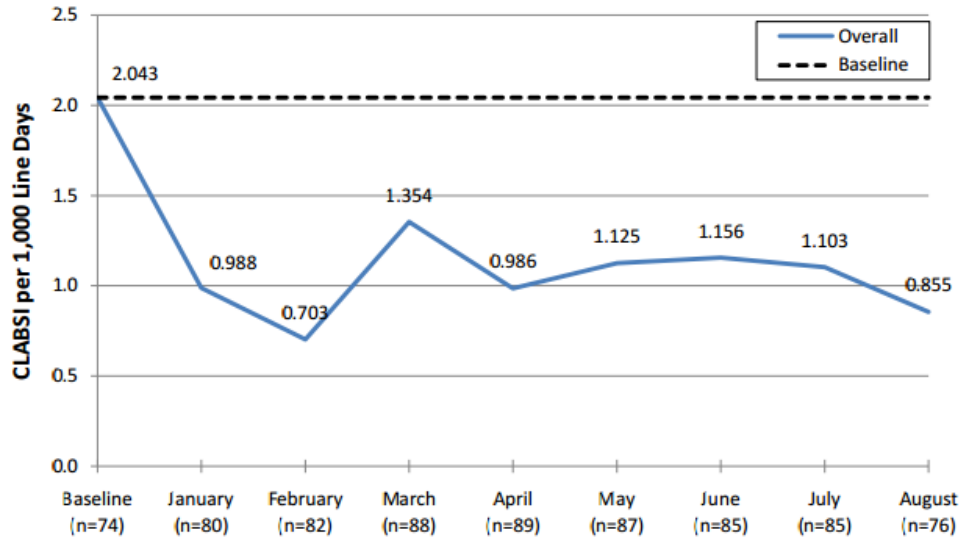
- In August 2011, the Health Research & Educational Trust (HRET), in partnership with the Perinatal Quality Collaborative of North Carolina (PQCNC), implemented a neon
- Development of a project Blood Stream Infection Reduction Project (NCLABSI) in NICUs.
- This effort was a component of the national project funded by AHRQ to reduce CLABSI

Rates

Rate Overall

Baseline data was collected during the months of October, November, and December 2011. Overall, units reported a baseline CLABSI rate of 2.043. Relative to baseline, a NCLABSI rate reduction of 46 percent occurred in July increasing to 58 percent in the month of August.

Figure 2. CLABSI rate over time – overall*



*Sample size per time period represents the number of facilities providing data during that period. Facilities not contributing to the denominator (i.e. zero line days) are not included in the count of facilities.

Project, Neonatal CLABSI Prevention On the CUSP: Stop BSI


Project, Neonatal CLABSI Prevention

- A total of 100 units participated representing 9 States.
- Throughout the study, more than 17,000 central lines were placed.
- More than 127,000 maintenance notes were recorded, representing more than 8,400 unique patients.
- CLABSI rates decreased from 2,043 at the baseline to 0.855 in August 2012, a 58 percent relative reduction.
- During the course of the study, 131 infections were estimated
- It translates into an estimated 14 to 41 deaths avoided and over \$ 2.2 million in excess
- Costs avoided.

Project, Neonatal CLABSI Prevention On the CUSP: Stop BSI

Project, Neonatal CLABSI Prevention

- CLABSI rates decreased from 2,043 to August 1985 (58% relative reduction).
- During the course of the study, 131 infections were prevented which translates into an estimated 14 to 41 deaths avoided and more than \$ 2.2 million in excess of costs avoided



*We have a long way to go,
but I think we're on the right track ...*

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calil@unicamp.br