Nouveautés sur la prévention des infections sur cathéters en réanimation

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Infection • Antimicrobiens • Modélisation • Evolution

Gifav 6 avril 2022

Conflicts of interest

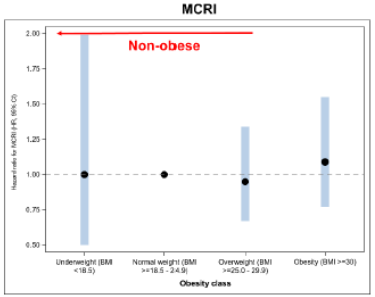
- Symposium, Adboards
  - Merck
  - Pfizer
  - Shionogi
  - Becton-Dickinson
- Grants to my research unit/ university
  - Pfizer
  - Merck
  - Thermofischer
  - Biomerieux

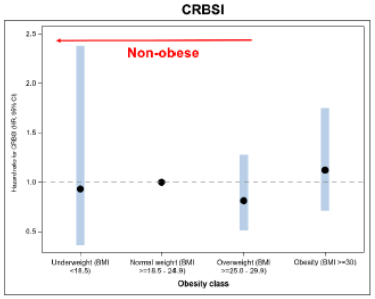
Let’s start from the basics

- Bundles
  - Hand hygiene
  - Strict surgical aseptic conditions
  - Use 2% alcoholic CHG
  - Subclavian and radial catheters preferentially
  - Remove useless catheters
  - Immediate change of dressings disrupted, soiled or moistened
- Continuous quality improvement program
- Surveillance, participation to a network

→ Acceptable levels of CR-BSI (< 1 / 1000 per catheter-days)

Population a risque: le grand obèse





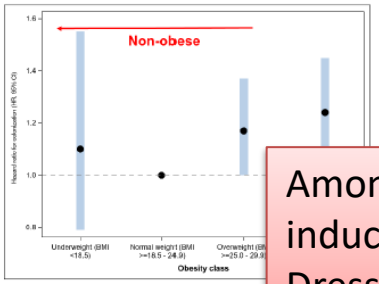


Table S2: Association between CRBSI and BMI ≥40 using multivariable Cox models.

		HR for CRBSI	95% CI	p-value
BMI ≥40 (*versus* <40)		**2.192**	**[1.189 ; 4.041]**	**0.0119**
Sex	Female	1.104	[0.604 ; 2.018]	0.7487
SAPS II		0.981	[0.965 ; 0.998]	0.0259
Catheter type and insertion site	Femoral AC	2.524	[0.445 ; 14.330]	0.2960
	Radial AC	1.274	[0.312 ; 5.209]	0.7363
	Femoral CVC	2.441	[0.577 ; 10.322]	0.2250
	Jugular CVC	2.005	[0.564 ; 7.134]	0.2825
	Femoral DC	6.692	[1.576 ; 28.410]	0.0100
	Jugular DC	4.634	[0.983 ; 21.855]	0.0526
	Reference: subclavian CVC			0.1148*
Experience of the operator	<50 procedures	1.439	[0.742 ; 2.791]	0.2809
Skin antisepsis	Non-CHG	2.114	[0.902 ; 4.954]	0.0851
CHG-impregnated dressing		0.234	[0.037 ; 1.490]	0.1242
Vasopressor at insertion		1.154	[0.626 ; 2.126]	0.6458
Antibiotics at insertion		0.801	[0.378 ; 1.698]	0.5634
Mechanical ventilation at insertion		0.715	[0.328 ; 1.558]	0.3979

Legend. HR: Hazard ratio. CI: Confidence interval. BMI: Body mass index. SAPS: Simplified Acute Physiology

Among obese patients, BMI>40 increases the risk of CRBSI and the overisk induced by insertion site

Dressing disruption is higher if BMI>40 as compared to BMI of 30-40

interval, *MCRI* major catheter-related infection, *CRBSI* catheter-related bloodstream infection

Buetti et al - Intensive Care Med. 2021;47(4):435-43

Décubitus ventral. Situation à risque

PRONE POSITION UNEXPOSED-EXPOSED study

- 202 patients matched: age, sex, year of hospitalisation, centre, SAPS II at admission and length of ICU stay

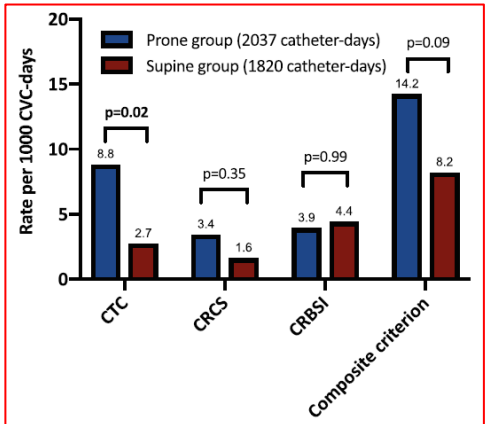


Fig. 2 Incidences in the exposed and unexposed groups of central venous catheter (CVC) tip colonization (CTC), catheter-related clinical sepsis (CRCS), catheter-related bloodstream infection (CRBSI), and a composite outcome composed of CTC and/or CRCS and/or CRBSI

Multivariate analysis identified PP as a factor related to catheter colonization or infection (p=0.04)

Louis *et al.* BMC Infectious Diseases (2021) 21:534. https://doi.org/10.1186/s12879-021-06197-2

RESEARCH Open Access

Local signs at insertion site and catheter-related bloodstream infections: an observational post hoc analysis using individual data of four RCTs

Niccolò Buetti[1,10*], Stéphane Ruckly[1], Jean-Christophe Lucet[1,2], Lila Bouadma[1,3], Maité Garrouste-Orgeas[1,4], Carole Schwebel[5,11], Olivier Mimoz[6,7,8], Bertrand Souweine[9] and Jean-François Timsit[1,3]

5RCTs/ 25 ICUs
6976 patients/14,590 catheters
(101,182 catheter-days)
114 CRBSI

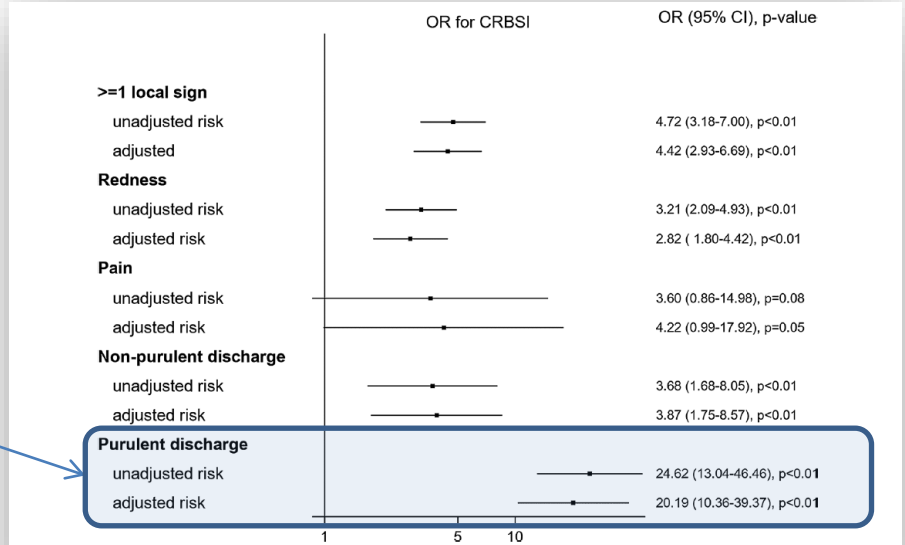
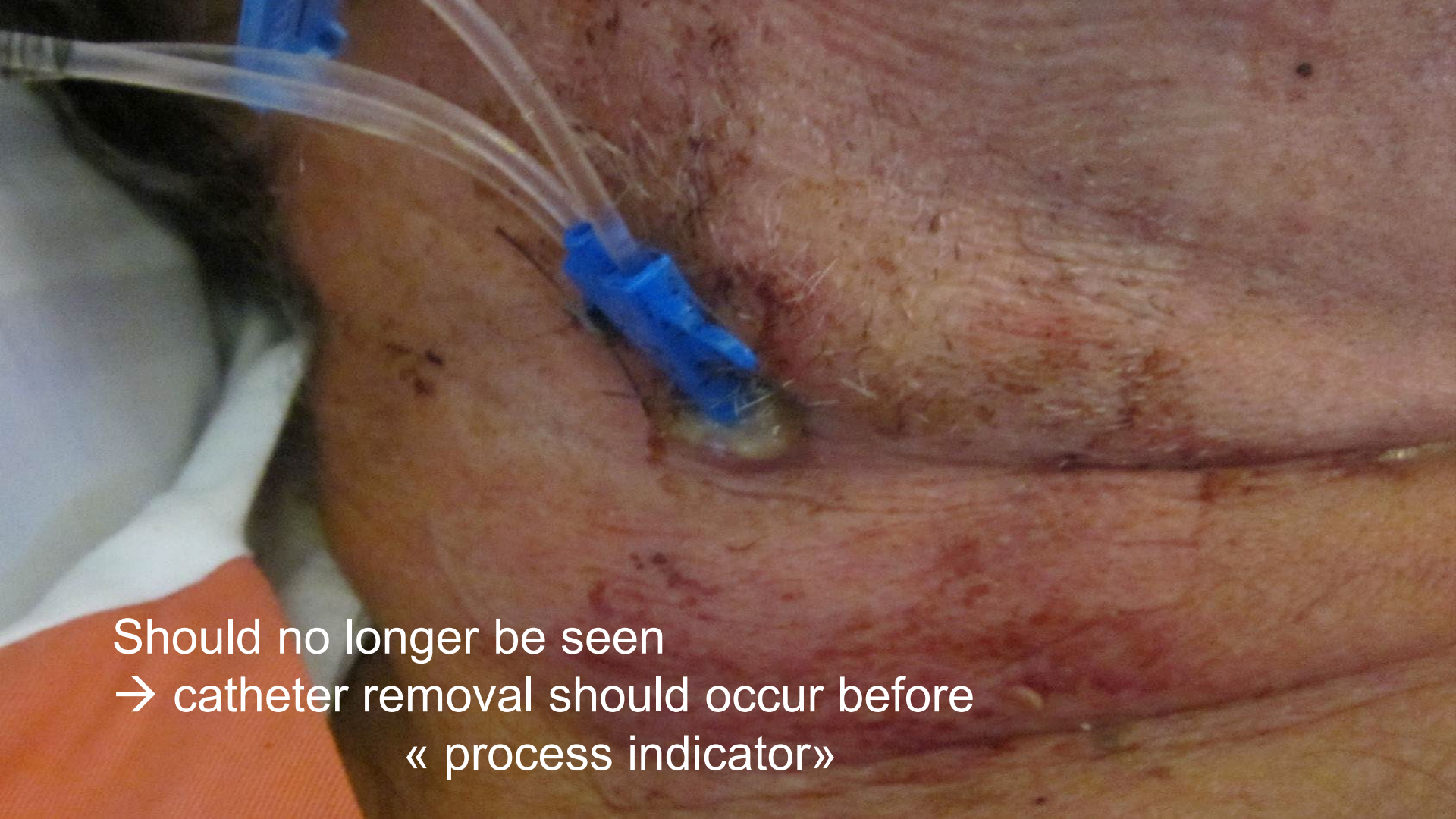


Fig. 1 Unadjusted and adjusted local sign risk for catheter-related bloodstream infection. We adjusted for the following confounding factors for CRBSI: Sex, SOFA, catheter days, catheter type, experience of the operator, insertion site, skin antisepsis, CHG-dressing and antibiotics at insertion. OR, odds ratio; CI, confidence interval; CRBSI, catheter-related bloodstream infection

Buetti et al. Crit Care (2020) 24:694 https://doi.org/10.1186/s13054-020-03425-0


Should no longer be seen
→ catheter removal should occur before
« process indicator»

Maximal barrier sterile precautions

Echo-guidage

- R1.9 - Il faut insérer les cathéters veineux **jugulaires internes** sous contrôle échographique pour réduire le nombre de complications mécaniques.

GRADE 1+

- R1.10 - Il faut probablement insérer les cathéters **sous-claviers** sous contrôle échographique pour diminuer le nombre de complications mécaniques.

GRADE 2+

- R1.11 - Les experts suggèrent d'insérer les cathéters **fémoraux** sous contrôle échographique pour diminuer le nombre de complications mécaniques

AVIS D'EXPERTS

- R1.12 - Les experts suggèrent de canuler **l'artère radiale et fémorale** sous contrôle échographique pour réduire le nombre de complications mécaniques.

AVIS D'EXPERTS

- Ped R.2 - Pour l'abord veineux central chez le nourrisson et l'enfant, à l'exclusion de la néonatalogie, il faut probablement privilégier **l'abord supra claviculaire échoguidé** de la veine brachiocéphalique pour diminuer le nombre de ponctions et les complications mécaniques immédiates.

GRADE 2+

- Ped R.3 - Chez l'enfant, les experts suggèrent le **site radial plus que fémoral** lors de la pose d'un cathéter artériel afin de diminuer le risque de thrombose.

AVIS D'EXPERTS

Expert consensus-based clinical practice guidelines management of intravascular catheters in the intensive care unit. Ann Intensive Care. 2020 Sep 7;10(1):118. doi: 10.1186/s13613-020-00713-4

Clinical Infectious Diseases
MAJOR ARTICLE

Ultrasound Guidance and Risk for Central Venous Catheter–Related Infections in the Intensive Care Unit: A Post Hoc Analysis of Individual Data of 3 Multicenter Randomized Trials

Niccolò Buetti,[1,2] Olivier Mimoz,[3] Leonard Mermel,[4] Stéphane Ruckly,[1] Nicolas Mongardon,[5] Claire Dupuis,[1] Jean-Paul Mira,[6] Jean-Christophe Lucet,[1,7] Bruno Mégarbane,[8] Sébastien Bailly,[9] Jean-Jacques Parienti,[10,11] and Jean-François Timsit[1,12]

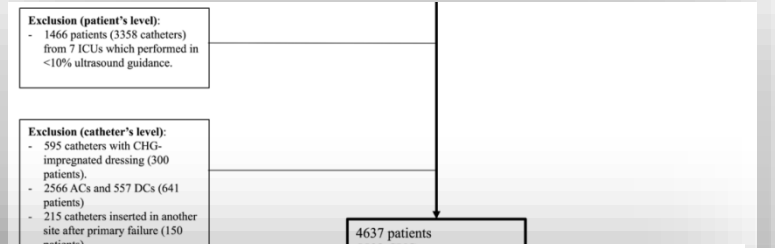
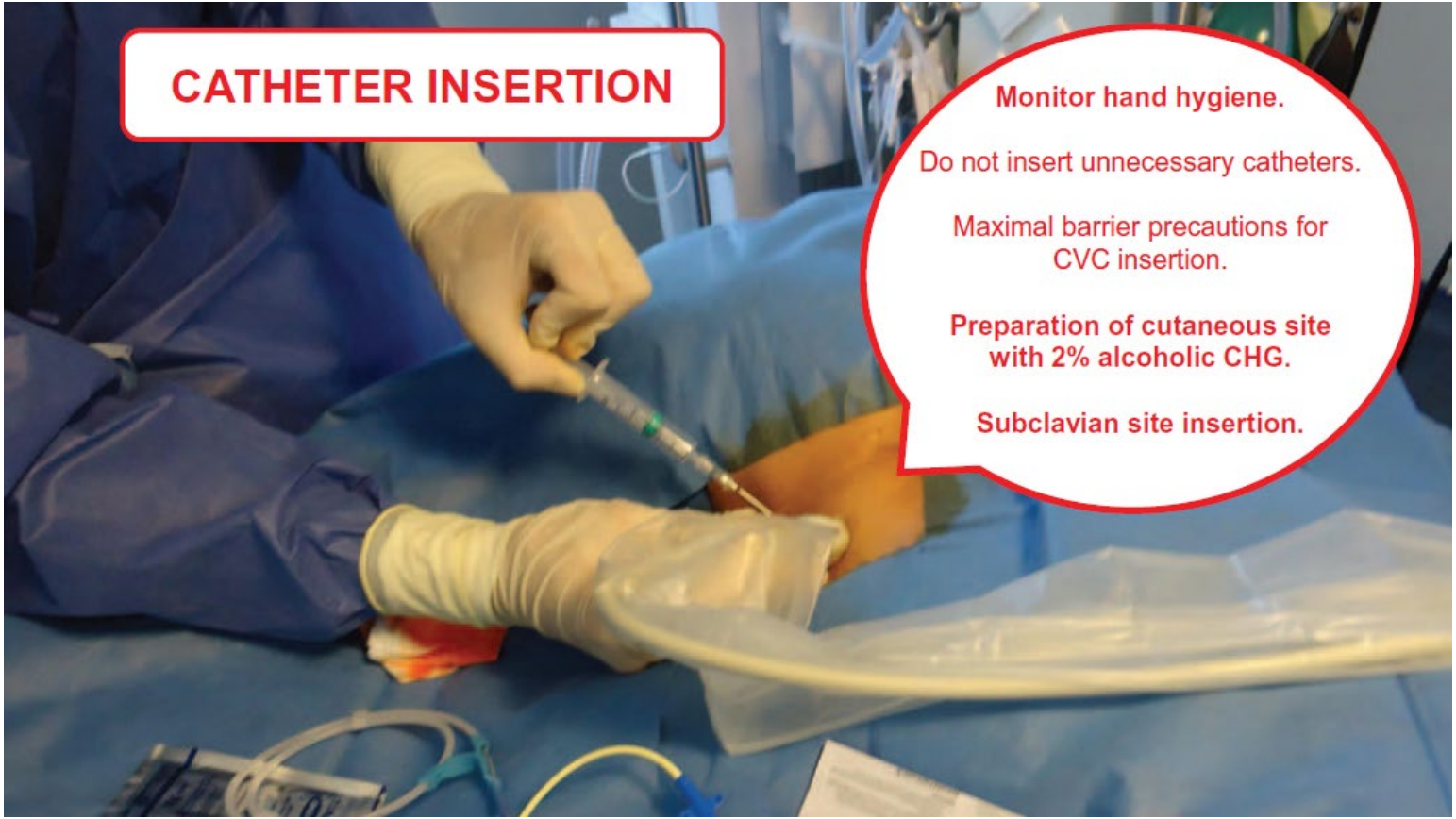


Table 3. Key Points for Optimal Ultrasound-Guided Central Venous Catheter Insertion With Focus on Infection Prevention Measures

1. Preprocedure
Operators should be familiar with the operation of their specific US machine prior to initiation of a vascular access procedure.
Use a high-frequency linear transducer with a long sterile sheath to perform vascular access procedures.
Use single-use sterile transmission gel.
Operators should evaluate the target blood vessel size and depth during preprocedural ultrasound evaluation.
2. Techniques
Operators should use a standardized procedure checklist that includes the use of real-time US guidance.
US guidance should be combined with aseptic technique and maximal sterile barrier precautions.
The needle tip should never be in contact with the sterile sheath of transducer.
3. Training
Novice operators should complete a systematic training program before attempting US-guided CVC insertion independently on patients.
Cognitive training in US guided CVC insertion should include infection prevention strategies.
Trainees should demonstrate minimal competence in infection prevention measures before placing US-guided CVCs independently.
Competency assessments should include formal evaluation of knowledge in infection prevention measures using standardized assessment tools.
Periodic proficiency assessment of all operators should be conducted to ensure maintenance of competency.

Clinical Infectious Diseases. 2021 Sep 7;73(5):e1054-e1061



Buetti et al - Curr Opin Crit Care 2020, 26:459–465

A non adherent dressing need to be changed immediately

Dressings

Timsit et al - Crit Care Med 2012; 40: 1707

Les pansements

ECOG scale (p<0.0001)

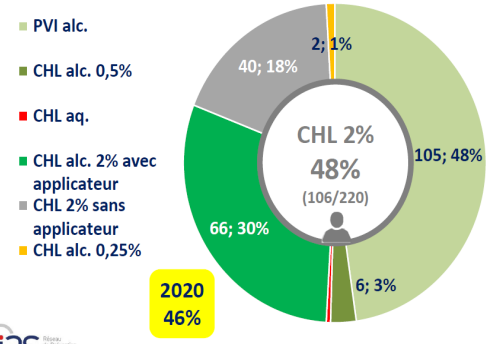
- **Une réfection programmée tous les 7 jours n'est pas inférieure à une réfection programmée tous les 3 jours[1]**
- **Le décollement du dernier pansement avant ablation est associé à un risque 15 fois supérieur d'ILC en réanimation[2]**
- **Les pansements plus adhérents diminuent le taux de décollement mais augmentent l'intolérance cutanée la colonisation de la peau et du cathéter[3]**
- **Les nouveaux matériaux ne diminuent pas le taux de décollement et de complications[4]**
- **La désinfection de la peau à la CHG alcoolique sans détersion est la méthode la plus coût-efficace pour réduire le risque d'infection[5]**
- **Les pansements imprégnés de CHG gel ou les éponges CHG diminuent de risque d'infection de 60% [2,3]**

1: Timsit et al – Jama 2009; 2 Timsit et al - Crit Care Med 2012; 40: 1707-1714; 3- Timsit et al Am J Respir Crit Care Med , 2012:1272-78; 4- Gunther S et al – Intensive Care Med 2016; Nov;42(11):1753-1765 ; 5- Mimoz et al - Lancet 2016

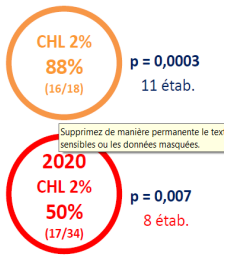
Enquête de pratique 2021

P1 L'antiseptique et pose de cathéters centraux (n=220)

Chlorhexidine à 2% fortement recommandée (SF2H 2016)

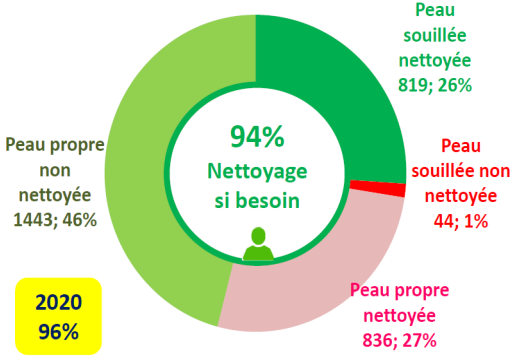


CATHETER de DIALYSE

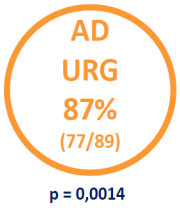


Le nettoyage de la peau chez l'adulte (n=3142)

Nettoyage si souillures visibles (SF2H 2019)



CVP



Anne-Sophie Valentin -
https://www.spiadi.fr/app/files/observa4.144aa35fabe8a52ad0b4e8d178d22a8e.pdf

Buetti et al. Critical Care (2020) 24:458
https://doi.org/10.1186/s13054-020-03174-0

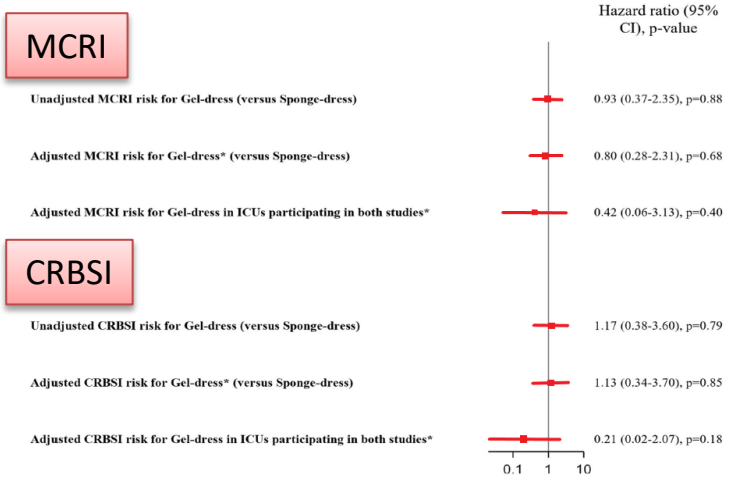
Critical Care

RESEARCH Open Access

Chlorhexidine-impregnated sponge versus chlorhexidine gel dressing for short-term intravascular catheters: which one is better?

Niccolò Buetti[1*], Stéphane Ruckly[1], Carole Schwebel[2,3], Olivier Mimoz[4,5,6], Bertrand Souweine[7], Jean-Christophe Lucet[1,8] and Jean-François Timsit[1,9]

MCRI

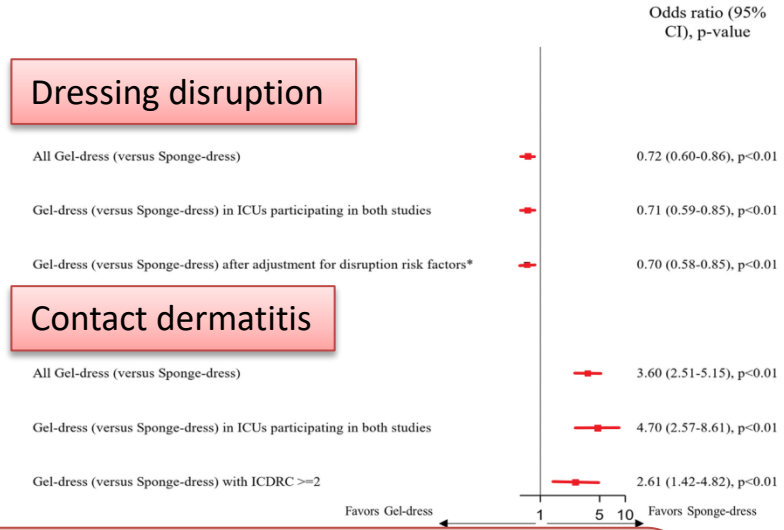


CRBSI

Fig. 2 Unadjusted and adjusted MCRI and CRBSI risk using marginal Cox models. Legend. MCRI: major catheter-related infection. CRBSI: catheter-related bloodstream infection. Sponge-dress: chlorhexidine-impregnated sponges. Gel-dress variables were sex, mechanical ventilation at admission, experience of the operator, and ICUs participating in both studies, we performed an additional analysis stratifying for IC CI 0.06–1.48, $p = 0.14$) and CRBSI (HR 0.16, 95% CI 0.02–1.70, $p = 0.13$)

3483 patients and 7941 catheters (16 ICUs)
Sponge-dress n=1953, Gel dress 2108 catheters

Dressing disruption



Contact dermatitis

Equal infectious risk reduction
Less dressing disruption with gels
Less contact dermatitis with sponge

4-day vs 7-day use of infusion sets

- RCT/ 10 hospitals, 2941 adult and paediatric patients
  - Equivalent for CVC and non inferior for AC
  - Costs were lower in the 7-day infusion set replacement group.

CVC:
CRBSI: 20/1124 **(1,78%)** (7-day) vs 16/1097 **(1,46%)** (4-day)(abs. risk diff 0·32%, 95CI −0·73 to 1·37).

Arterial cath:
CRBSI 1/357 **(0·28%)** 7-day vs 0/363 **(0%)** (4-day) (Abs risk diff 0·28%, −0·27% to 0·83%)

	4-day:	7-day::	
Infusion sets§ replaced	2 (2 to 3)	1 (2 to 2)	<0·0001
			p

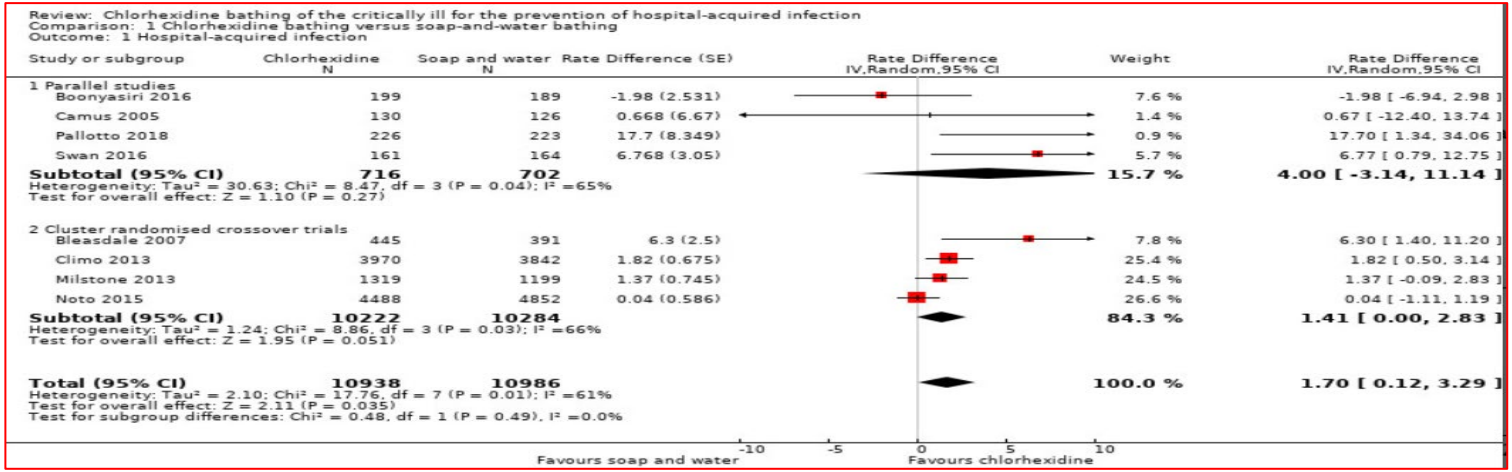
Rickard C et al - Lancet 2021; 397: 1447–58

Other issues?

- CHG impregnated catheters
  - No sufficient evidence IF other thing are made properly
  - If your CRI level is acceptable
- CHG body washes
  - Discordant results
  - Possible effect mainly on Gram positive
  - Increase in MIC to CHG with use
  - Only in specific circumstances

CHG bathing

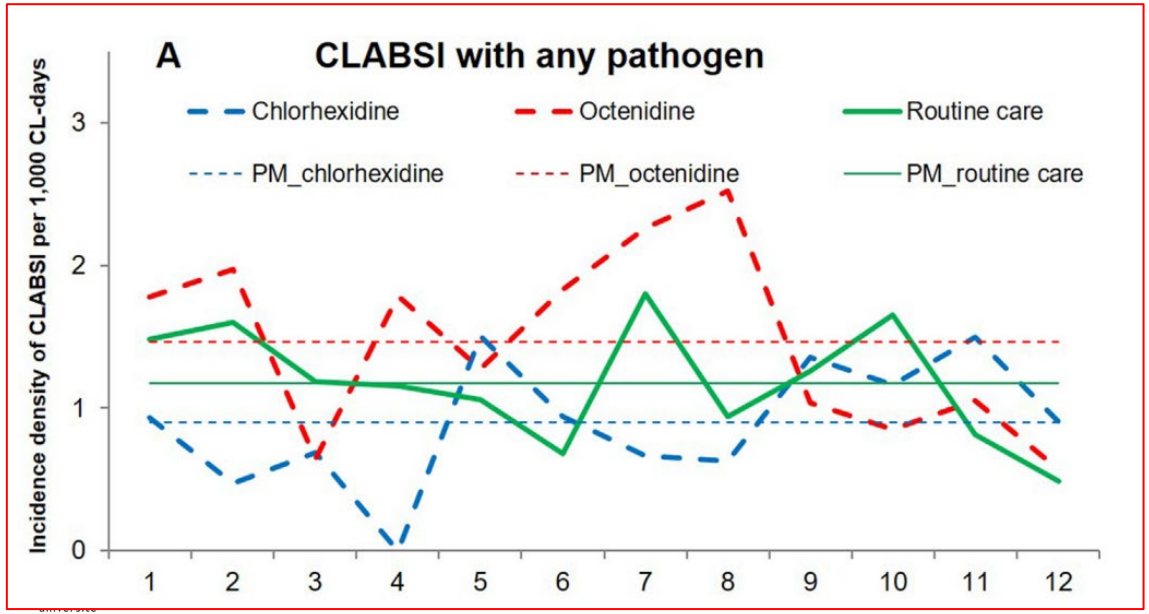
- *"it is not clear whether bathing with chlorhexidine reduces hospital-acquired infections, mortality, or length of stay in the ICU".*



Lewis SR et al. Cochrane Database Syst Rev. 2019. doi: 10.1002/14651858.CD012248.pub2.

CHG and octenidine baths

- Cluster RCT Germany: 72 ICUs with 76 815 patients



Adjusted IRR of CLABSI:
- 0.69 (0.37-1.22), **p=0.28** for CHX
- 1.22 (0.54-2.75), **p=0.65** octenidine

Underpowered?

Denkel LA *et al.* Clinical Microbiology and Infection, 2022, https://doi.org/10.1016/j.cmi.2021.12.023.

Messages

1. Connaissez vos chiffres
2. Adaptez les recommandations a votre situation locale
3. La base c'est
    1. Asepsie chirurgicale (attention abord US)
    2. Pose sous échographie raisonnée après programme d'enseignement étroit
    3. Ablation systématique si inutile
    4. Réfection rapide des pansements décollés
    5. Sous Clavière
    6. CHG-alc 2% sauf allergies
4. Beaucoup de nouvelles technologies logiques d'efficacité non prouvées
5. Les pansements imprégnés de CHG sont efficaces
6. Décolonisation universelle par toilette CHG → « the jury is still out »
7. CHG pour tout??
    1. Attention à la diversité biologique!!
        1. Synergie PVI/CHG?
        2. Autres AS?: octenidine…?
8. Dans tous les cas surveillance (culture des cathéters suspects)

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OUTCOME REA