SCIENTIFIC MEDICAL CLINICAL AFFAIRS

NEWS & VIEWS

schülke

Jan 2025

Preventive washing

as a simple measure to prevent infection

Washing without water replaces wash bowls in intensive care units

Cleanliness and hygiene promote health and protect against infections. What is true in everyday life has also become routine in intensive care units (ICUs) globally. Daily washing of patients as part of standard care is part of everyday practice and is also recommended by the German Commission for Hospital Hygiene and Infection Prevention (KRINKO).

It is estimated that 8.9 million people in Europe alone contract a nosocomial infection each year[1], which is associated with additional costs of EUR 7 billion.[3]

The risk of nosocomial infections is particularly high in intensive care units. According to a survey carried out by the European CDC (ECDC) in 2017, 8.3% of all ICU patients with inpatient stays of more than 2 days suffered a nosocomial infection. 3.7% of these were serious bloodstream infections (BSIs).[2] Given that the skin is an important source for infection, antiseptic washing in ICUs is becoming increasingly important as reflected in both, national and international guidelines.

The German KRINKO recommends …

> [...] performing antiseptic body washes for the decolonization of the skin (Cat. II) using an antiseptic with proven efficacy [...] and good skin tolerability (Cat. II)[4]

> [...] carrying out daily antiseptic whole-body washes of patients in intensive care units of internal medicine wards as part of standard care to prevent bloodstream infections (Cat. IB)[6]"

> [...] antiseptic body washes to prevent VRE infections in patients with high CVC use rates [...][5]"

Antiseptic washing is used for universal decolonization. As such, it is particularly useful for removing multidrug resistant organisms, which are difficult to treat with antibiotics alone and, therefore, frequently cause life-threatening infections. According to the ECDC, nosocomial infections requiring anti-bacterial treatment amounted to 500,000 patient-days.[2]

… lower costs

- Through a reduction in purchasing/storing and sanitizing costs, for example, for wash bowls, washcloths, dry wipes.
- Decontamination with wash mitts is cheaper than systemic treatment with antibiotics.[8]

… reduction of infection risk.[6,10]

The WHO recommends …

> […] mupirocin nasal ointment in combination with chlorhexidine (CHG)-containing body washes in MRSA carriers pre-surgery.[7]

There are two methods available for patient body washes in intensive care units. One is the rinse-off method with water and soap which is still frequently practised. For the rinse-off method, large bowls of water are used and the patient is then washed with wet, disposable washcloths and wash lotion. Subsequently, the skin is dried off with dry wipes. The leave-on method uses impregnated antiseptic wipes or wash mitts. As there is no extra step of dry-wiping required, the antiseptic remains on the skin and, thus, contributes to a prolonged antibacterial effect (residual effect).
In a survey on the practicability and effectiveness of the two methods, all nursing staff questioned said they preferred the finished product. Patient washing with impregnated wipes took less time, was easier in the handling and required less material.[9] Additionally, 75% of the questioned nursing staff stated that using the impregnated wipes was more pleasant for the patient.[9]

… less time-consuming and less effort

- No preparation of wash bowls, washcloths etc. required as compared to rinse-off products.
- Average nursing care time is reduced from approx. 4 min to 3 min.[9]

… no bacterial cross-contamination

- Octenidine- or chlorhexidine-based products help to reduce bacterial cross-contamination.

The WHO states that the use of CHG wipes can help to reduce bloodstream infections more effectively than the use of CHG-containing soaps.[7]

INTERNATIONAL GUIDELINES

Rituals and behaviours in the operating theatre – joint guidelines of the Healthcare Infection Society and the European Society of Clinical Microbiology and Infectious Diseases

The working party evaluated with regard of the Healthcare Infection Society and the European Society of Clinical Microbiology and Infectious Diseases currently available evidence for different practices and classified which are recommended and which are ungrounded.

> Encourage patients to shower/bathe before surgery for personal hygiene reasons. Consider using alternatives (e.g., wipes) immediately before surgery for patients who are not able to shower or bathe before surgery.[11]

General showering or bathing before surgery is part of the current practice. Despite the lack of evidence, the working party speaks out for encouraging this practice whenever possible.
Pre-operative bathing/showering with an antiseptic skin wash for the purpose of prevention of surgical site infections (SSI) is also well accepted and commonly used. Chlorhexidine wipes can be used to reduce the incidence of SSI.

The extent to which pre-operative bathing/showering reduces SSI is still unclear. For this reason, the working group does not make an exact recommendation, but simply defines good practice points, which should help to ensure that patients bathe/shower before an operation. Postponing a surgery of patients who are unable to wash themselves should be avoided and alternative options such as wipes should be used instead. To avoid injury and infection, patients should be instructed not to shave the surgical area themselves.[11]

epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

The guidelines, elaborated of a group of specialist infection prevention and control researchers, provide comprehensive recommendations for preventing healthcare-associated infections based on the best critically appraised evidence currently available.

> Consider the use of daily cleansing with chlorhexidine daily in adult patients with a central venous catheter as a strategy to reduce catheter-related bloodstream infection.[12]

Among intensive care unit (ICU) patients, daily bathing with chlorhexidine or the daily use of chlorhexidine cloths reduces the risk of catheter-related bloodstream infections (CR-BSI).
Octenidine can be used as an alternative to chlorhexidine. For prevention of central venous catheter- (CVC) associated infections, octenidine in alcohol solution is preferable to alcohol alone.

The guideline recommends to consider the use of chlorhexidine impregnated sponge dressings as well as the daily cleaning with chlorhexidine in adult patients with a central venous catheter as a strategy to reduce CR-BSI.[12]

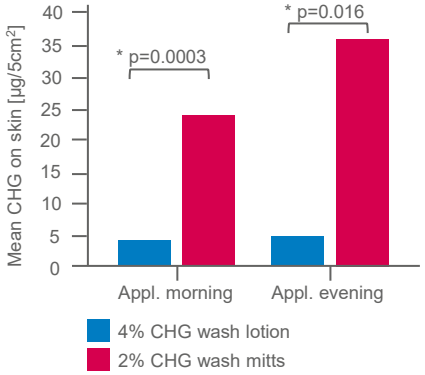
Wash mitts leave significantly more antiseptic on the skin

Prospective, randomised cohort study
- **72 intensive care units**
- **Over 70,000 patients**

Subjects Day 1
- 4% CHG wash solution
- Showering with wash solution

Subjects Day 8
- 2% CHG wash mitts
- Application according to a fixed scheme

Ryder et al. (2007) investigated the amount of chlorhexidine (CHG) remaining on the skin after use of a 4% CHG wash solution compared to wash mitts impregnated with 2% CHG. They found that the amount of CHG remaining on the skin was significantly higher (p=0.0003,) for the wash mitts than the rinse-off product. Additionally, the amount of CHG increased significantly with multiple use (p=0.016).[13]



CHG: chlorhexidine / Appl.: Application
Figure adapted from: Ryder M., Improving Skin Antisepsis: 2% No-Rinse CHG Cloths Improve Antiseptic Persistence on Patient Skin Over 4% CHG Rinse-Off Solution, 2007, Conference Poster

Universal patient decolonization reduces the risk of bloodstream infections significantly, by more than 40%

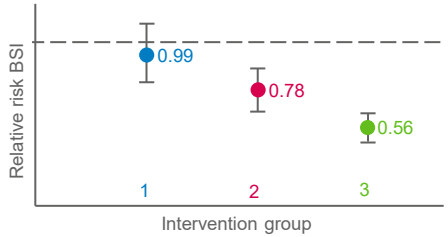
Cluster-randomised clinical trial
- **72 intensive care units**

23,480 patients
- MRSA screening
- Isolation, no decolonization

22,105 patients
- MRSA screening
- Isolation, targeted decolonization

26,024 patients
- No MRSA screening
- Universal decolonization

In a first major study, Huang et al. (2013) investigated the effect of various sanitization strategies on bloodstream infections (BSIs) caused by MRSA. The study found that universal decolonization, which included patients regardless of their MRSA status, was superior to the other strategies. The risk of BSI was reduced by over 40% in this group (relative risk 0.56).[14]



MRSA: Methicillin-resistant *Staphylococcus aureus* / p-value: p ≤ 0.001
Figure adapted from: Huang SS, Septimus E, Kleinman K, Moody J, Hickok J, Avery TR, Lankiewicz J, Gombosev A, Terpstra L, Hartford F, Hayden MK, Jernigan JA, Weinstein RA, Fraser VJ, Haffenreffer K, Cui E, Kaganov RE, Lolans K, Perlin JB, Platt R; CDC Prevention Epicenters Program; AHRQ DECIDE Network and Healthcare-Associated Infections Program. Targeted versus universal decolonization to prevent ICU infection. Maurer M et al. N Engl J Med 2013; 368: 2013 Jun 13;368(24):2255-65. doi: 10.1056/NEJMoa1207290. Epub 2013 May 29. Erratum in: N Engl J Med. 2013 Aug 8;369(6):587. Erratum in: N Engl J Med. 2014 Feb 27;370(9):886. PMID: 23718152

Daily washing with 2% CHG impregnated wipes significantly reduces bloodstream infections

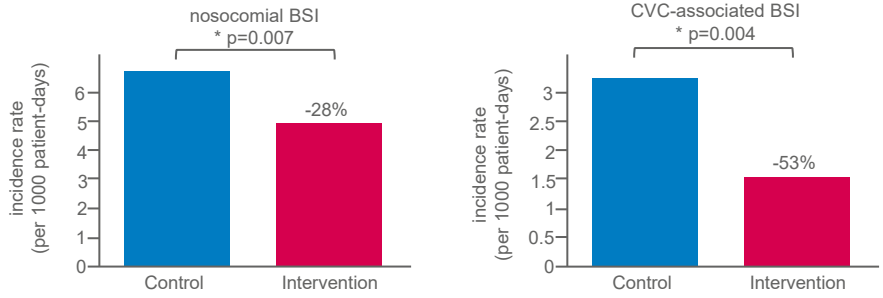
Clinical, multicentric, cluster-randomised cross-over study

- **9 intensive care units and bone marrow transplant centres**
- **6 hospitals**
- **Approx. 8,000 patients**

- Daily washing
- 2% chlorhexidine-containing wipes

- Daily washing
- Non-antimicrobial wipes

Preventive washing with 2% CHG impregnated wipes was also shown to be effective against BSI by Climo et al. (2013). Daily washing reduced the number of nosocomial BSIs by 28% (p=0.007) and catheter (CVC)-associated BSIs were even reduced by 53% (p=0.004).[15]



BSI: Bloodstream infection / CHG: chlorhexidine / Control: daily washing with non-antimicrobial wipes / CVC: Central venous catheter / MDRO: Multidrug-resistant organism / Intervention: daily washing with antimicrobial wipes
Figure adapted from: Climo MW, Yokoe DS, Warren DK, Perl TM, Bolon M, Herwaldt LA, Weinstein RA, Sepkowitz KA, Jernigan JA, Sanogo K, Wong ES. Effect of daily chlorhexidine bathing on hospital-acquired infection. N Engl J Med. 2013 Feb 7;368(6):533-42. doi:10.1056/NEJMoa1113849. Erratum in: N Engl J Med. 2013 Jun 13;368(24):2341. PMID: 23388005; PMCID: PMC5703051

Preventive washing with CHG has a clear advantage in reducing bloodstream infections

Musuuza et al. (2019) carried out a meta-analysis on the effect of preventive washing with CHG on nosocomial BSIs. The authors' overall conclusion was that the risk of nosocomial BSI was reduced by 37% by preventive washing with 2% CHG.[16]

It is known that MRSA sensitivity to CHG can be reduced by washing with CHG- containing products. So far, this adaptation has not yet been observed for octenidine.[17] A lower sensitivity to antibiotics (polymyxin, gentamicin) was also evident in some clinical isolates when exposed to CHG, which was not observed for octenidine.[18,19]

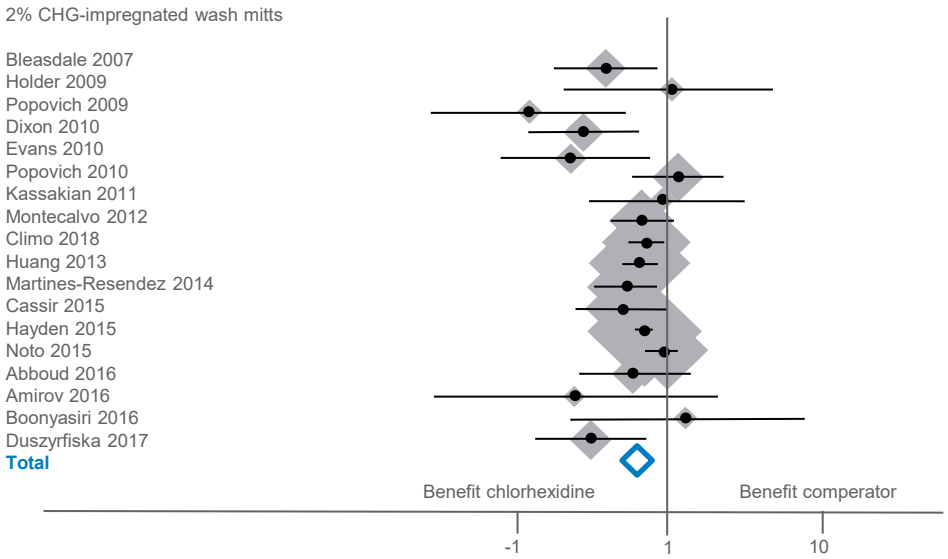


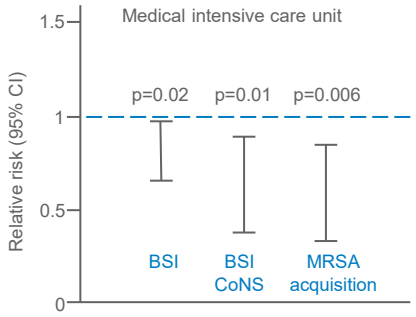
Figure adapted from: Musuuza JS, Guru PK, O'Horo JC, Bongiorno CM, Korobkin MA, Gangnon RE, Safdar N. The impact of chlorhexidine bathing on hospital-acquired bloodstream infections: a systematic review and meta-analysis. BMC Infect Dis. 2019 May 14;19(1):416. doi: 10.1186/s12879-019-4002-7. PMID: 31088521; PMCID: PMC6518712.

Bloodstream infections and MDRO colonization significantly reduced after decolonization with octenidine

Prospective cohort study over 25 months
- **17 intensive care units at Charité Berlin**
- **Approx. 30,000 patients**

- 5 days octenidine-containing nasal gel
- Daily use of octenidine-containing wash mitts during study period

Gastmeier et al. (2016) investigated the effect of universal decolonization with octenidine-containing wash mitts on the incidence of BSI in surgical and medical intensive care units. BSIs were significantly reduced in medical intensive care units , with the number of BSI cases decreasing from 5.03 to 3.98/1000 patient-days. This was equivalent to a reduction of 21% (relative risk 0.79). Acquisition of MRSA was reduced by up to 47% (relative risk 0.53).[20]



BSI: Bloodstream infection / MRSA: Methicillin-resistant *Staphylococcus aureus* / CI: Confidence interval / BSI CoNS: Bloodstream infection with coagulase-negative staphylococci
Figure adapted from: Gastmeier P, Kämpf KP, Behnke M, Geffers C, Schwab F. An observational study of the universal use of octenidine to decrease nosocomial bloodstream infections and MDR organisms. J Antimicrob Chemother. 2016 Sep;71(9):2569- 76. doi: 10.1093/jac/dkw170. Epub 2016 May 27. PMID: 27234462.

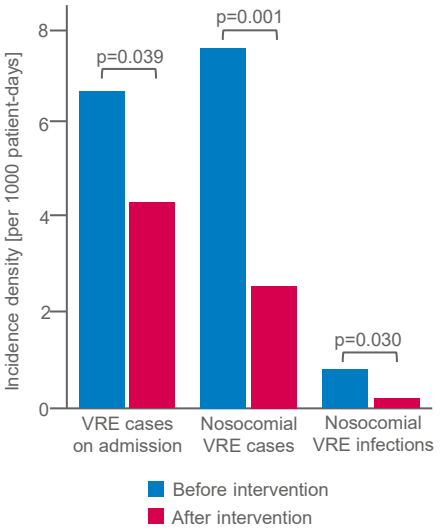
Preventive washing with octenisan® has a positive effect on reducing nosocomial VRE cases

Before-after intervention study
- **Intensive care units in Cologne Hospital**

- Before intervention up to August 2013
- Screening for VRE on admission and every 2 days

- Intervention from August 2013 onwards
- Daily washing with octenidine-containing wash lotion
- Screening for VRE on admission and every 2 days

Other multidrug-resistant bacteria (MDRO) can also be successfully controlled with antiseptic washes. These include vancomycin-resistant enterococci (VRE). By introducing universal decolonization with an octenidine-conatining wash lotion, the number of VRE cases was reduced from 7.55 to 2.61/1000 patient-days (p=0.001). This was equivalent to a reduction of approx. 66%. VRE infections also decreased significantly from 0.85 to 0.13/1000 patient-days (p=0.03). Through the intervention, BSIs were reduced from 2.98 to 2.06/1000 patient-days (p=0.15).[21]



VRE: Vancomycin-resistant *Enterococcus faecium*
Figure adapted from: Messler S, Klare I, Wappler F, Werner G, Ligges U, Sakka SG, Mattner F. Reduction of nosocomial bloodstream infections and nosocomial vancomycin-resistant *Enterococcus faecium* on an intensive care unit after introduction of antiseptic octenidine-based bathing. J Hosp Infect. 2019 Mar;101(3):264-271. doi: 10.1016/j.jhin.2018.10.023. Epub 2018 Nov 5. PMID: 30408504.

EFFECT study

ICU-aquired primary bacteremia can be prevented with daily antiseptic bathing with octenidine

Schaumburg et al. (2024) evaluates daily bathing with octenidine in preventing intensive care unit (ICU)-aquired primary bacteremia and ICU-acquired multidrug-resistant organisms (MDROs).

Published in Intensive Care Medicine

Multicenter, placebo-controlled, cluster-randomized, double-blind, cross-over EFFECT study

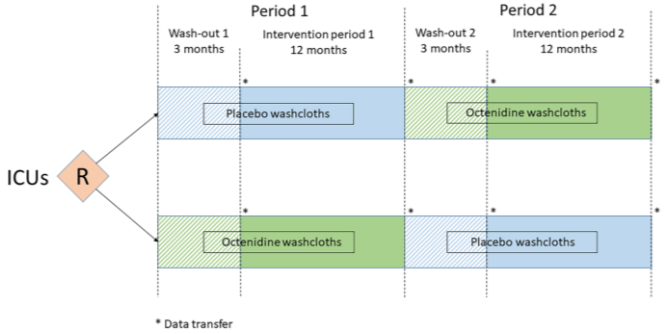
- **104,039 ICU episodes from 93,438 patients**
- **44 ICUs in 23 hospitals**

Investigational product:

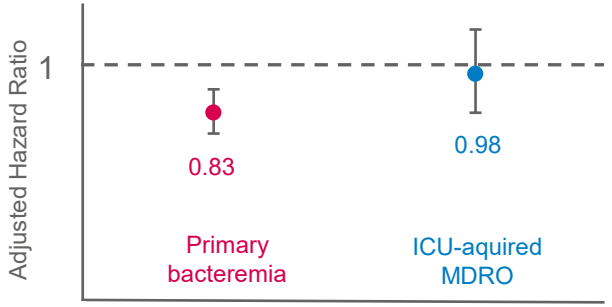
- **0.08% octenidine-impregnated washcloths**

Comparator:

- **0.9% 2-phenoxyethanol placebo washcloths**



Flowchart of the EFFECT cross-over study design
ICUs were randomized by starting with either octenidine or placebo washcloth packages. Afterwards an AB/BA cross-over design was used in order to compare single ICUs to themselves. Each ICU participated in two 12-month intervention periods, both preceded by a 3-month wash-out period.



A 17% risk reduction of ICU-acquired primary bacteremia was demonstrated with a hazard ratio of 0.83 (95% CI [0.75; 0.92], p=0.0003).
The treatment effect is similar in magnitude for **all organisms**, except Gram-negative organisms, where the confidence interval is wide due to the small number of events and the effect appears smaller. A similar effect is seen for **each type of bacteremia**, with a hazard ratio of 0.844 (95% CI [0.779; 0.923], p=0.00017).
However, there was no statistically significant result in favor of either placebo or octenidine-containing washcloths for the acquisition of MDROs.

> Antiseptic bathing with octenidine prevents intensive care unit (ICU)-aquired primary bacteremia. Integrating octenidine-based antiseptic bathing routines as part of an infection prevention measures bundle can help to reduce nosocomial infections on ICUs.

ICU: Intensive care unit / MDRO: Multi drug-resistant organisms

Figure adapted from: Schaumburg T, Köhler N, Breitenstein Y, Kolbe-Busch S, Hasenclever D, Chaberny IF. EFFECT of daily antiseptic bathing with octenidine on ICU-acquired bacteremia and ICU-acquired multidrug-resistant organisms: a multicenter, cluster-randomized, double-blind, placebo-controlled, cross-over study. Intensive Care Med. 2024 Dec;50(12):2073-2082. doi: 10.1007/s00134-024-07667-2. Epub 2024 Oct 17. PMID: 39417875; PMCID: PMC11588887.

Advantages at a glance

Data shows significant reduction in nosocomial infections with preventive washing

- Significant reduction in colonization and infections with antibiotic-resistant bacteria as well as the risk of bloodstream infections.
- Benefit also confirmed by meta-analyses.
- Significantly more antiseptic remains on the skin with ready-to-use wash mitts as compared with a wash solution.
- Cumulative effect with multiple use.

Included in international (WHO) and national (e.g. German KRINKO) guidelines

- Whole-body, antiseptic patient washes are recommended for infection prevention and decolonization of antibiotic-resistant bacteria such as MRSA and VRE.

Lower costs

- Decolonization with wash mitts is cheaper than systemic treatment with antibiotics.

Less time-consuming and less effort for nursing staff

- Wash mitts are ready-to-use products and easy to apply.
- No preparation of wash bowls and washcloths, saving working time.

References:

1. Suetens C et al., Euro Surveill. 2018 Nov;23(46):1800516
2. European Centre for Disease Prevention and Control. Healthcare-associated infections acquired in intensive care units. In: ECDC. Annual epidemiological report for 2017. Stockholm: ECDC; 2019.
3. Report of the Burden of Endemic Health Care-Associated Infection Worldwide, World Health Organization, 2011
4. KRINKO, Empfehlungen zur Prävention und Kontrolle von Methicillinresistenten Staphylococcus aureus-Stämmen (MRSA) in medizinischen und pflegerischen Einrichtungen, 2014
5. KRINKO, Hygienemaßnahmen zur Prävention der Infektion durch Enterokokken mit speziellen Antibiotikaresistenzen, 2018
6. KRINKO, Prävention von Infektionen, die von Gefäßkathetern ausgehen Teil 1 – Nichtgetunnelte zentralvenöse Katheter, 2017
7. Global guidelines for the prevention of surgical site infection, second edition. Geneva: World Health Organization; 2018
8. Pichler G., Pux, C., Babeluk, R. et al., Eur J Clin Microbiol Infect Dis, 37, 21–27 (2018)
9. Ritz J et al., J Nurs Care Qual. 2012 Apr-Jun;27(2):171-5
10. CDC, Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011
11. Humphreys H et al., J Hosp Infect. 2023 Oct;140:165.e1-165.e28
12. Loveday HP et al., J Hosp Infect. 2014 Jan;86 Suppl 1:S1-70
13. Ryder M., 2007, Conference Poster
14. Huang SS et al., N Engl J Med. 2013 Jun 13;368(24):2255-65
15. Climo MW et al., N Engl J Med. 2013 Feb 7;368(6):533-42
16. Musuuza JS et al., BMC Infect Dis. 2019 May 14;19(1):416
17. Htun HL et al., Clin Microbiol Infect. 2019 Sep;25(9):1154.e1-1154.e7
18. Lescat, M et al., Antibiotics 2022,11, 50
19. Tattawasart U et al., Int J Antimicrob Agents. 2000 Nov;16(3):233-8
20. Gastmeier P et al., J Antimicrob Chemother. 2016 Sep;71(9):2569-76
21. Messler S et al., J Hosp Infect. 2019 Mar;101(3):264-271
22. Schaumburg T et al., Intensive Care Med. 2024 Dec;50(12):2073-2082