

Using Chlorhexidine Baths to Control ICU Infection

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Chlorhexidine Baths: Adoption of New Ideas Comes Slowly

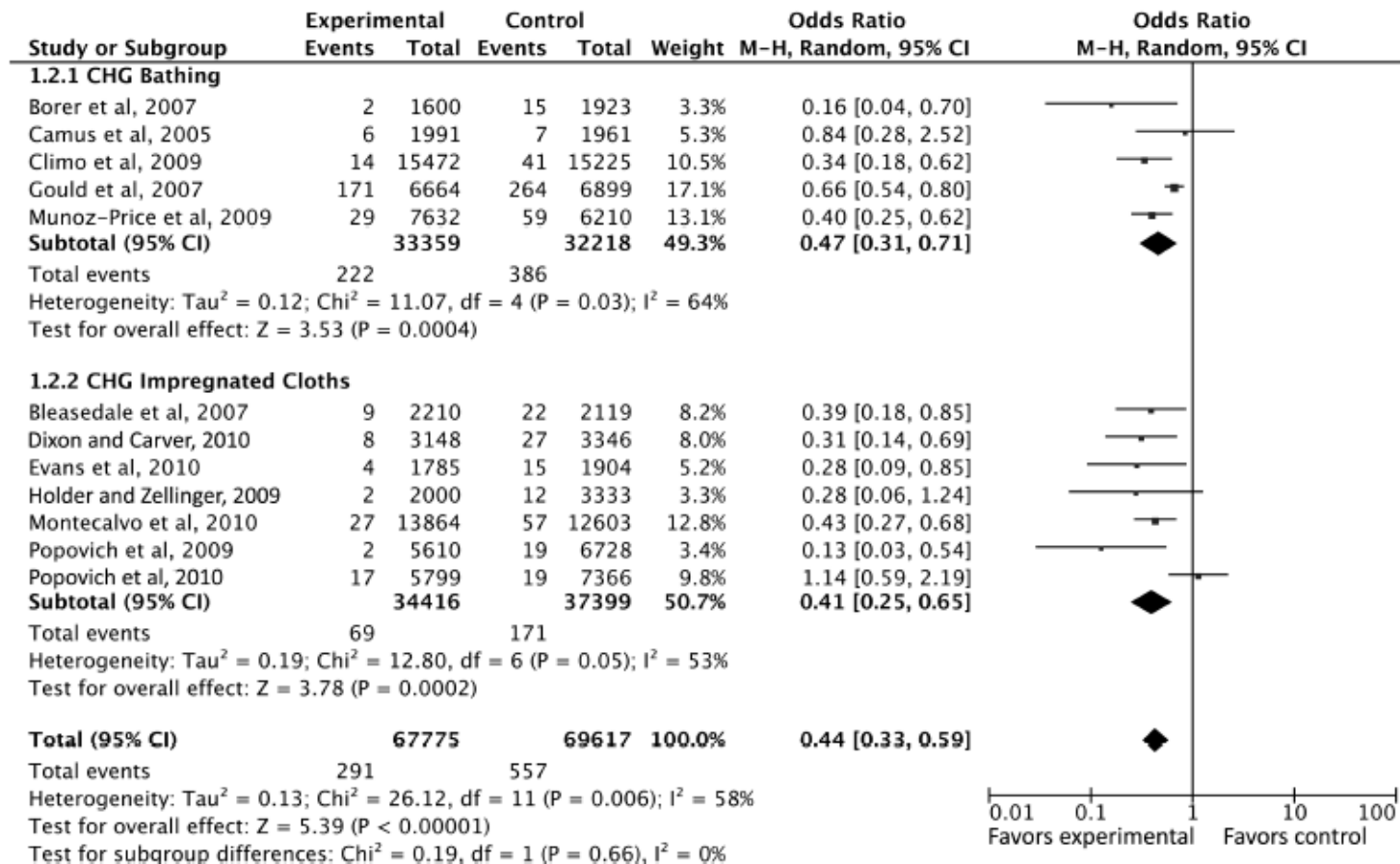


Meta-Analysis of Chlorhexidine Bathing

- 12 trials (only 1 RCT) showed reduction in BSIs (OR=0.44) including CLABSIs (OR=0.40)
 - Limited monitoring of compliance
- Does not matter if cloth or liquid wash
- Cost is low, so likely cost effective (<\$10/day) , not studied
- May not have as much benefit in surgical patients: ? limited effect on wound infections
- ? Wash off CHG or leave on skin. Authors favor leaving on skin
 - O'Horo JC, et al. ICHE 2012; 33:257-267

Meta-Analysis of Chlorhexidine Bathing

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Risk of healthcare-associated bloodstream infection (BSI) with chlorhexidine (CHG) bathing and comparator,

Systematic Review of CHG Bathing

- 7 studies
- Reduction in MRSA acquisition : evaluated in 3 studies
- Reduction in MRSA infection: 1 study
- Reduced VRE carriage and infection : 1 study
- No evidence of efficacy against GNB
- Derde LPG,et al. Intensive Care Med 2012; 38:931-39

Table 3 Summary of findings

Study	Patients included (n)	Duration (months)	Infection	Colonization
Batra [13]	4,570	51		70 % reduction in acquisition of endemic MRSA strains (rate ratio 0.3), but increased acquisition (rate ratio 3.85) with an outbreak MRSA strain
Bleasdale [10]	836	12	61 % incidence reduction in all-cause primary BSIs; rate difference 6.3/1,000 ptdays 16.8 versus 6.4 BSIs per 1,000 central line-days ($p = 0.01$) No significant reduction in all-cause UTI, VAP, and secondary BSIs	
Camus [14]	256	30	No significant reduction in all-cause ICU-acquired infections ($p = 0.919$) ^a No significant reduction in all-cause total infections ^a No significant reduction in all-cause device-related infections ^b	
Climo [15]	5,043	12	No reduction in MRSA bacteremia ^c 78 % reduction in ICU acquired VRE bacteremias (-2.64 per 1,000 ptdays) ^c	25 % reduction in acquisition of MRSA colonization (-0.66 per 1,000 ptdays) ^c 45 % reduction in acquisition of VRE colonization (-1.51 per 1,000 ptdays) ^c
Gould [16]	2,653	48	No significant reduction in MRSA or MSSA bacteremia	11.4 decrease ($p = 0.005$) in proportion of patients with MRSA (colonization or infection)
Popovich [17]	3,048	24	No significant reduction in ICU-acquired all-cause CLABSIs ($p = 0.57$) Significant decrease in incidence rate of MRSA clinical cultures (0.68 versus 1.03 per 1,000 ptdays, $p = 0.49$) No significant reduction in ICU-acquired other infections (all p values >0.18)	
Raineri [18]	3,978	120	Decrease of MRSA infection rate from 3.5 to 1.7 per 1,000 ptdays ($p = 0.0023$) No significant difference in MRSA-VAP Decrease in MRSA-BSI incidence rate from 1.65 to 0.29 cases per 1,000 ptdays ($p = 0.02$)	

Chlorhexidene Body Washes To Reduce Gram Positive Resistant Pathogen Acquisition and Infection

- Daily Chlorhexidine body washes

- Multicenter, cluster-randomized, crossover trial of 2% chlorhexidine washcloth daily
- 9 ICUs or BMT unit
- 7727 patients. 23% reduction in MDRO acquisition with chlorhexidine.
- 28% fewer **BSIs**. Impact on gram positives, not GNB
- Greater effect in MICU than SICU

- Climo MW, et al. NEJM 2013; 168:533-42

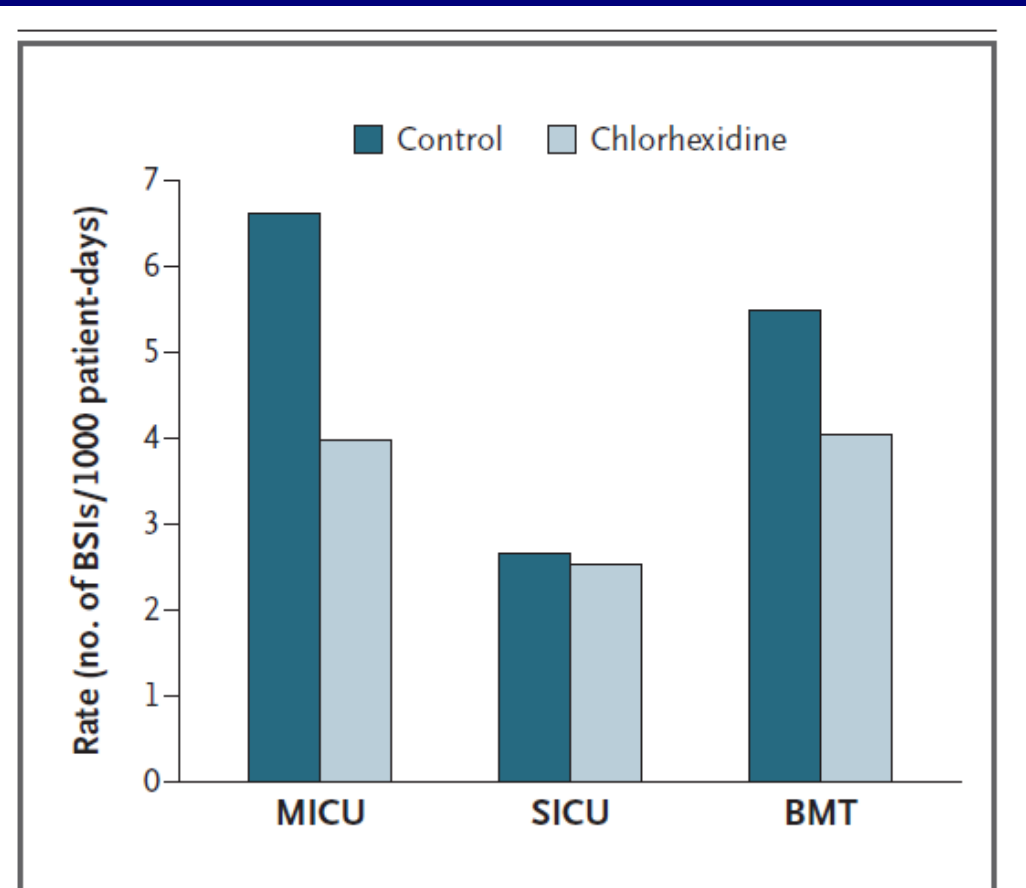


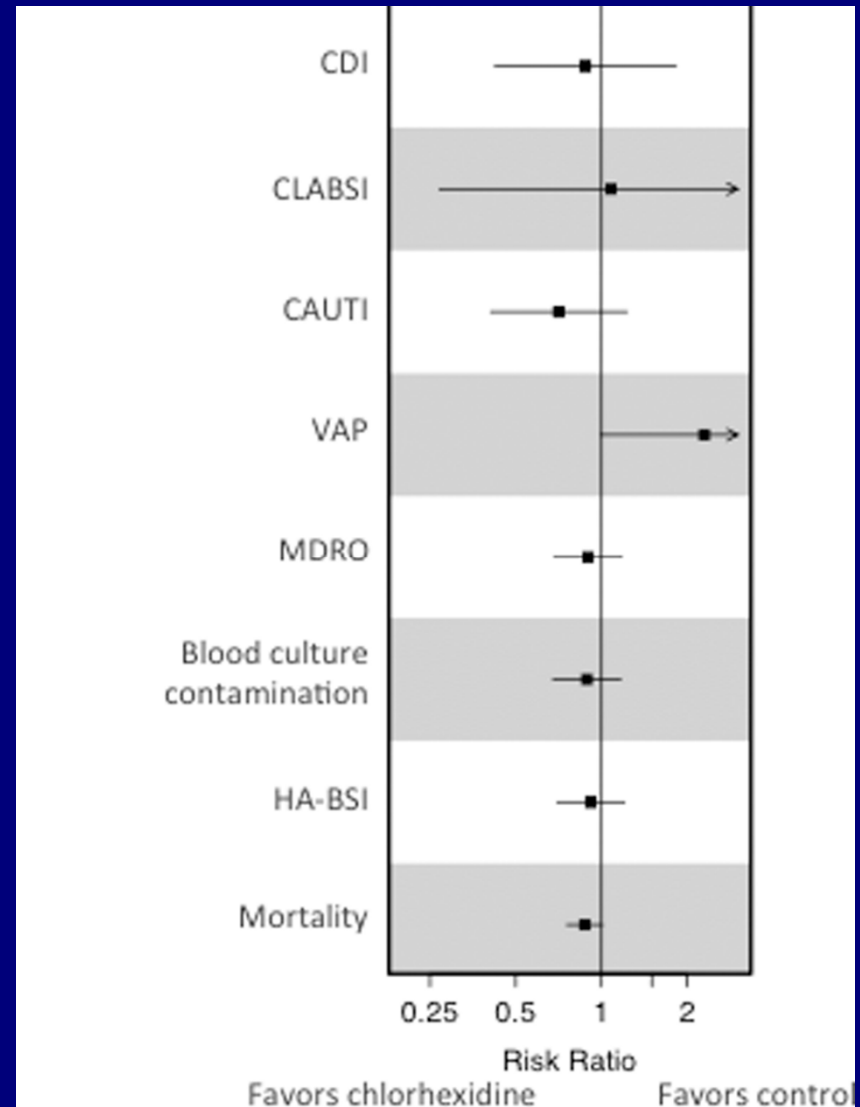
Figure 2. Rates of Primary Bloodstream Infections According to the Type of Hospital Unit.

Efficacy of Daily Chlorhexidine Baths vs. MRSA

- Prospective pre and post study with **intervention (SICU) and control (MICU) ICU**
- 4% CHG soap in water for final 0.125% CHG water, applied with a cloth, not above neck, in perineum, or open wound
- 35,124 patient days intervention, 18,402 days in controls
- 20.7% decrease in **MRSA acquisition** (had surveillance cultures), 41.3% reduction in **ICU-acquired MRSA infection** (not clear which sites) in intervention ICU. No change in control ICU
 - Viray MA, et al. ICHE 2014; 35: 243-50

A Negative Study of Chlorhexidine Baths

- Pragmatic, cluster randomized trial of 9340 patients in 5 ICUs
- 10 weeks chlorhexidine 2% cloths, 2 weeks washout, 10 weeks other rx. (or other way). Cycle repeated 3 times
- Primary outcome: CLABSI, CAUTI, VAP, C. diff colitis
 - No difference in any infection, but rates low (55 chlorhex, 60 control, 8 total CLABSI)
 - Lower mortality: ? why
 - Noto MJ, et al. JAMA 2015; 313:369-378



Why Conflicting Results?

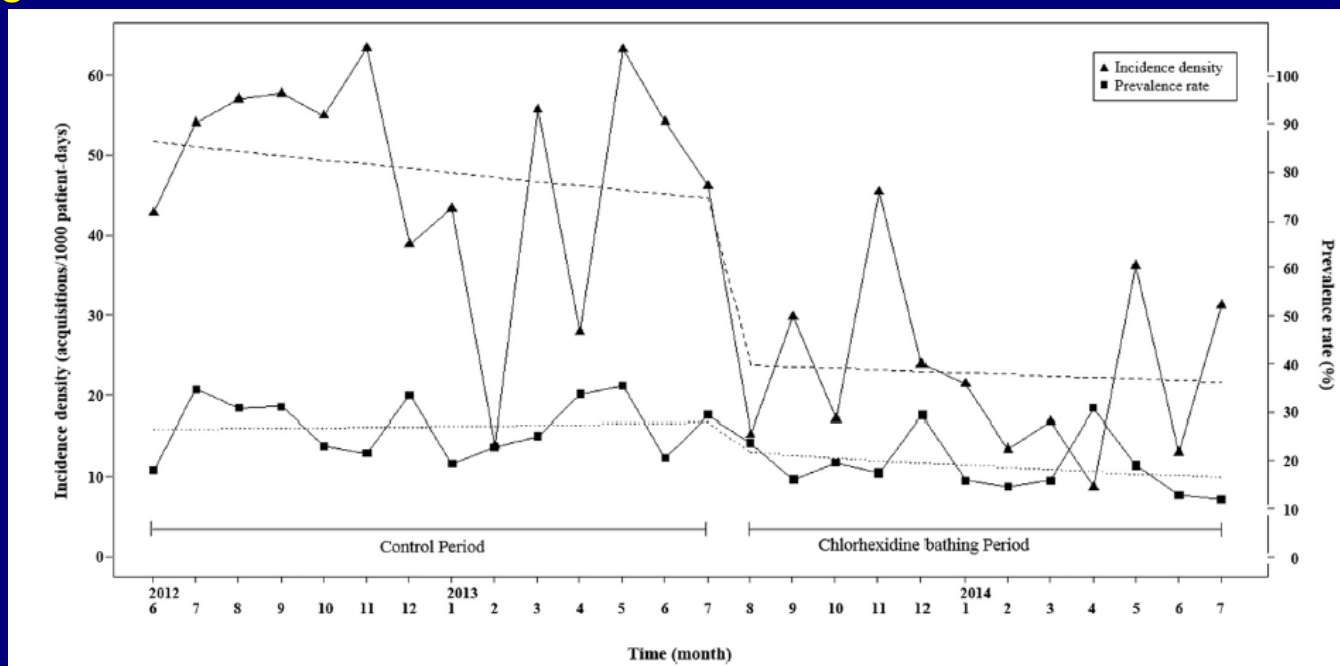
- Noto study included all HAIs, not just BSIs
 - Low rate of infection, including BSIs
 - 10 week chlorhexidine cycle vs 24 weeks in Climo study
 - Active MRSA and VRE surveillance with Climo , not Noto
 - No assessment of bathing compliance in Noto trial
- Since main impact has been on CRBSI and gram-positives, may have little benefit if a low rate of BSI due to other precautions

Chlorhexidine Baths and Acinetobacter Infection

- 327 patients with 2% chlorhexidine wipes over 6 months in Mexican ICU, after 6 month baseline
- 149 isolates (80 baseline, 69 intervention) of Acinetobacter: 110 respiratory, 24 blood, 6 urine, 3 central lines, 4 wound, 2 abdomen abscess
- CHG MIC values in Acinetobacter declined over time.
- CHG changed clonal patterns (by PFGE) of AB, to strain with more biofilm production.
- Mendoza-Olazarán S, et al. AJIC 2014; 42:874-8

Chlorhexidine Baths and Carbapenem Resistant Acinetobacter (CRAB)

- Active surveillance, contact isolation and environmental cleaning did not reduce endemic CRAB in Korean ICU
 - Interrupted time series of CHG bathing in ICU with CRAB endemicity
 - 14 months baseline, 12 months intervention of daily bathing with 2% CHG cloths
- 52% reduction in CRAB acquisition, decline in incidence density, but not prevalence
 - No change in CHG MICs
 - Chung YK, et al. AJIC 2015; 43: 1171-7

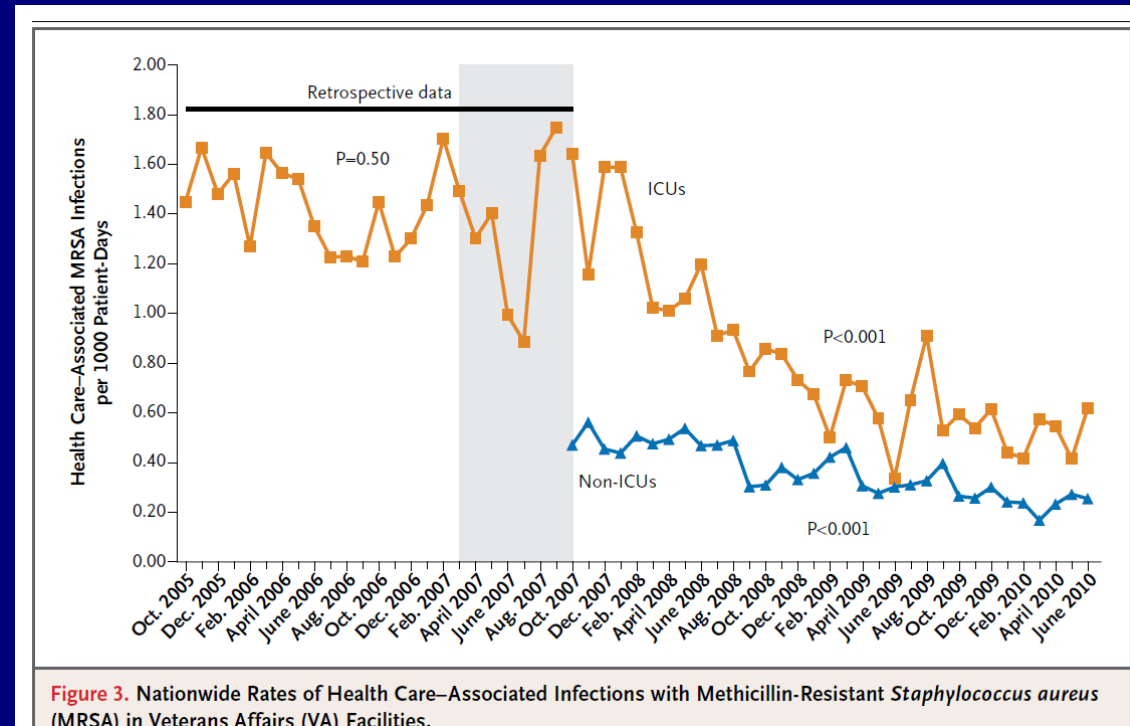


Universal Barrier Precautions? NO

- Cluster-randomized trial in 20 ICUs of routine of **universal gowns and gloves** vs. usual care (targeted barrier precautions per CDC)
- **No impact** on the acquisition of MRSA and VRE, although some reduction in MRSA acquisition only.
 - Harris AD , et al. JAMA 2013; On line Oct 4,2013
- **STAR ICU Trial**: randomized to standard care vs. surveillance cultures with **enhanced barrier precautions**. Found **no impact** on MRSA or VRE colonization or infection. Suboptimal compliance with barrier precautions.
 - Huskins WC, et al. NEJM 2011; 364:1407-1418

Barrier Precautions and Isolation: YES, BUT.....

- Hand hygiene and surveillance with barrier precautions have reduced the rate of MRSA bacteremias
- **MRSA bundle:** universal surveillance, hand hygiene, contact precautions. Led to reduction in MRSA infections over 33 months in the VA system. Jain et al. NEJM 2011;364: 1419-30
- **HOWEVER,** use of barrier precautions leads to less patient contact by HCWs

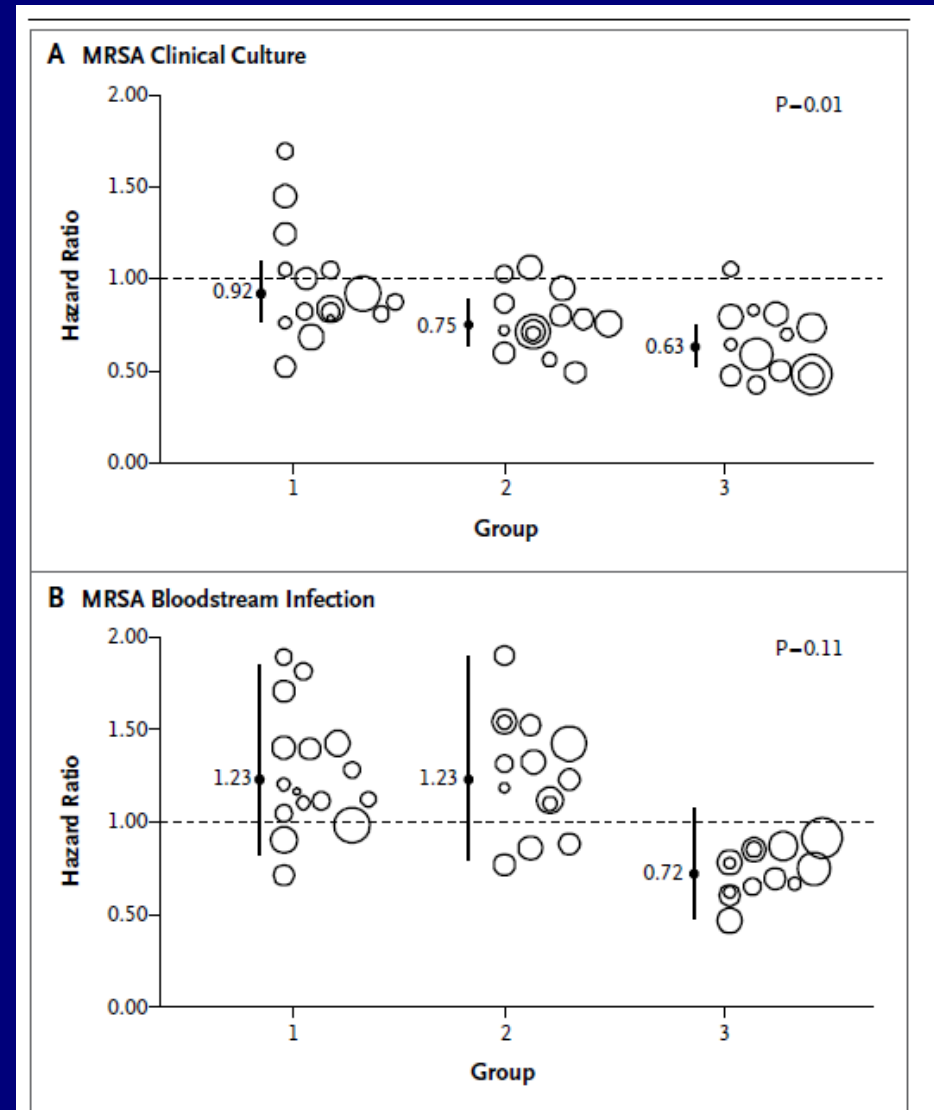


Barrier Precautions and Isolation: YES, BUT WITH RISKS

- Hand hygiene can reduce the spread of resistant organisms
- Reduction in CRBSI with use of maximal barrier precautions during insertion in 108 ICUs in Michigan. **Pronovost et al. NEJM 2006; 355: 2725-32.**
- **Surveillance and barrier precautions** can reduce MRSA and VRE infection rates , while being cost effective. **Thampi M, Morris AM. Crit Care 2012; 16:202**
- **HOWEVER,** use of barrier precautions leads to less patient contact by HCWs

Targeted vs. Universal Decolonization

- Cluster-randomized trial of 74,256 patients
 - 12 month baseline 18 month intervention
- **Groups:** 1. MRSA screen and isolation; 2. Targeted: MRSA screen, isolation, decolonization; 3. Universal: no screen, nasal mupirocin BID x 5, daily 2% chlorhexidine cloth bath
 - Group 3 with lowest MRSA isolation and BSI rates
 - Huang SS, et al. NEJM 2013; 368:2255-2265



Conclusions

- Chlorhexidine bathing can reduce the acquisition of MRSA in the ICU
- CHG may reduce the frequency of MRSA infection in the ICU
- Cloth or liquid wash are effective. Not costly
- Mixed evidence of efficacy in SICU patients
- May have limited benefit if low rates of infection , esp low rates MRSA BSIs, and if no routine surveillance
- Role vs. Gram Negatives needs more exploration
- As a part of universal decolonization may improve infection control without patient isolation