Title

Universal decolonization was better than MRSA screening and isolation for preventing nosocomial ICU infections.

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Universal decolonization was better than MRSA screening and isolation for preventing nosocomial ICU infections

Huang SS, Septimus E, Kleinman K, et al; CDC Prevention Epicenters Program and AHRQ DECIDE Network and Healthcare-Associated Infections Program.

Targeted versus universal decolonization to prevent ICU infection. *N Engl J Med. 2013;368:2255-65.*

Clinical impact ratings: ★★★★★★★ ★★★★★★★

Question

How do universal decolonization, targeted decolonization, and methicillin-resistant *Staphylococcus aureus* (MRSA) screening and isolation in intensive care units (ICUs) compare for preventing MRSA clinical isolates and infections in adults?

Methods

Design: Pragmatic, cluster-randomized, controlled trial (Randomized Evaluation of Decolonization versus Universal Clearance to Eliminate MRSA [REDUCE MRSA] trial). ClinicalTrials.gov NCT00980980.

Allocation: Concealed.*

Blinding: Unblinded.*

Follow-up period: 12 months for the baseline period and 18 months for the intervention period.

Setting: 78 adult ICUs in 45 Hospital Corporation of America hospitals in the USA that had stable infection prevention procedures and used intranasal mupirocin or chlorhexidine bathing in 30% of patients at baseline.

Patients: 48 390 patients in the baseline period and 74 256 in the intervention period (median age 65 to 66 y, 53% men in both periods) who were admitted to participating ICUs.

Intervention: Universal decolonization in all patients using intranasal mupirocin, twice daily for 5 days, plus daily bathing with chlorhexidine-impregnated cloths during ICU stay (29 ICUs, 26 024 patients during intervention); MRSA screening at ICU admission, with targeted decolonization in patients with MRSA colonization or infection using 5 days of intranasal mupirocin, twice daily, and 5 days of daily bathing with chlorhexidine- impregnated cloths (22 ICUs, 24 752 patients); or MRSA screening at ICU admission without decolonization (23 ICUs, 23 480 patients). All groups used contact precautions for patients with past MRSA colonization or infection or those with a positive MRSA test.

Outcomes: Primary outcome was ICU-attributable, MRSA-positive clinical culture. Other outcomes included ICU-attributable bloodstream infection caused by MRSA or any pathogen.

Follow-up: 95% of ICUs in 96% of hospitals (intention-to-treat analysis).

Main results
The main results are in the Table.

Universal decolonization vs targeted decolonization vs MRSA screening and isolation in adult intensive care units†

Outcomes	Hazard ratio (95% CI) between baseline and intervention periods			*P* value
	Universal decolonization	Targeted decolonization	Screening and isolation	
MRSA-positive culture‡	0.63 (0.52 to 0.75)	—	0.92 (0.77 to 1.10)	0.003
	—	0.75 (0.63 to 0.89)	0.92 (0.77 to 1.10)	0.09
	0.63 (0.52 to 0.75)	0.75 (0.63 to 0.89)	—	0.16
MRSA bloodstream infection§	0.72 (0.48 to 1.08)	1.23 (0.80 to 1.90)	1.23 (0.82 to 1.85)	0.11
Any bloodstream infection‖	0.56 (0.49 to 0.65)	—	0.99 (0.84 to 1.16)	< 0.001
	—	0.78 (0.66 to 0.91)	0.99 (0.84 to 1.16)	0.04
	0.56 (0.49 to 0.65)	0.78 (0.66 to 0.91)	—	0.003

†MRSA = methicillin-resistant Staphylococcus aureus. *CI defined in Glossary.*

‡Rates per 1000 patient-days in baseline/intervention periods: universal 3.4/2.1 vs targeted 4.3/3.2 vs screening and isolation 3.4/3.2.

§Pair-wise comparisons not reported because the overall comparison was not significant. Rates per 1000 patient-days in baseline/intervention periods: universal 0.6/0.5 vs targeted 0.5/0.6 vs screening and isolation 0.6/0.7.

‖Rates per 1000 patient-days in baseline/intervention periods: universal 6.1/3.6 vs targeted 4.8/3.7 vs screening and isolation 4.2/4.1.

Conclusions
Universal but not targeted decolonization reduced MRSA-positive cultures compared with MRSA screening and isolation in adults in intensive care. Universal and, to a lesser extent, targeted decolonization reduced bloodstream infections due to any pathogen.

**See Glossary.*

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Commentary

Colonization with multidrug-resistant organisms is a frequent precursor to nosocomial infection. Infection risk is amplified in the setting of invasive devices and impaired immunity, making the ICU an ideal place to study interventions that interrupt this chain of events.

Using an elegant cluster-randomized design to compare 3 MRSA surveillance and decolonization strategies, Huang and colleagues showed that universal empiric decolonization with nasal mupirocin and daily chlorhexidine baths reduced MRSA-positive cultures by 37% and bloodstream infections due to any pathogens by 44%. The effect on infections due to pathogens that are not eliminated with mupirocin suggests that chlorhexidine baths were the key component of the intervention. Other studies have shown this effect of chlorhexidine bathing (1).

Mupirocin-resistant MRSA may fail decolonization attempts, but it has not been attributed to prior mupirocin use (2). The potential for generating chlorhexidine-resistant flora with this strategy is unknown and merits further research.

The number needed to treat to prevent 1 additional bloodstream infection was 54, but the minimal toxicity, with 7 mild skin reactions among 48 129 patients at risk, makes this approach worthy of broad implementation. Although the added value of mupirocin was unclear, these results underscore and the results effectively close the book on universal MRSA testing in the ICU the tangible benefits of chlorhexidine daily baths, and the results effectively close the book on universal MRSA testing in the ICU.

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