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572. Relationship Between Chlorhexidine Gluconate (CHG) Skin Concentrations and Microbial Skin Colonization among Medical Intensive Care Unit (MICU) Patients

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Type	Number	Male	Age	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	P value MRSA
Whole cohort								
Whole cohort	447,579	430,356 (96.2%)	68.3 +/- 12.4	67.4% 95% CI (67.0%-67.9%)	83.0% 95% CI (82.8%-83.1%)	31.4% 95% CI (31.2%-31.6%)	95.7% 95% CI (95.6%-95.7%)	<0.0001
Blood								
Blood	64,128	62,265 (97.1%)	68.1 +/- 11.9	69.9% 95% CI (68.7%-71.0%)	82.5% 95% CI (82.1%-82.8%)	30.1% 95% CI (29.6%-30.6%)	96.2% 95% CI (96.1%-96.3%)	<0.0001
Intra-abdominal								
Intra-abdominal	8,071	7,754 (96.1%)	65.0 +/- 11.4	64.0% 95% CI (59.1%-68.6%)	90.9% 95% CI (90.2%-91.5%)	27.2% 95% CI (25.2%-29.2%)	97.9% 95% CI (97.7%-98.2%)	<0.0001
Intra-abdominal sterile	7,426	7,135 (96.1%)	65.2 +/- 11.3	62.5% 95% CI (57.1%-67.8%)	91.0% 95% CI (90.3%-91.7%)	24.5% 95% CI (22.5%-26.7%)	98.1% 95% CI (97.8%-98.4%)	<0.0001
Pulmonary								
Respiratory tract	75,242	73,575 (97.8%)	68.8 +/- 11.4	76.2% 95% CI (75.4%-77.0%)	83.1% 95% CI (82.8%-83.4%)	43.8% 95% CI (43.3%-44.3%)	95.3% 95% CI (95.1%-95.4%)	<0.0001
Sterile Respiratory	15,583	15,204 (97.6%)	67.0 +/- 11.0	74.6% 95% CI (72.7%-76.4%)	84.7% 95% CI (84.1%-85.3%)	44.7% 95% CI (43.6%-45.9%)	95.2% 95% CI (94.9%-95.6%)	<0.0001
Renal System								
Renal system	164,330	155,547 (94.7%)	71.0 +/- 12.7	72.5% 95% CI (71.1%-73.8%)	81.6% 95% CI (81.4%-81.8%)	9.8% 95% CI (9.6%-10.0%)	99.1% 95% CI (99.0%-99.1%)	<0.0001
Wound								
Wound	95,832	92,816 (96.7%)	64.7 +/- 11.9	59.7% 95% CI (59.0%-60.5%)	85.5% 95% CI (85.2%-85.7%)	48.1% 95% CI (47.5%-48.6%)	90.4% 95% CI (90.3%-90.6%)	<0.0001
Wound Sterile	51,793	50,180 (96.9%)	64.4 +/- 11.3	58.3% 95% CI (57.3%-59.3%)	87.6% 95% CI (87.3%-88.0%)	49.6% 95% CI (48.9%-50.4%)	91.0% 95% CI (90.8%-91.2%)	<0.0001

Disclosures. All authors: No reported disclosures.

572. Relationship Between Chlorhexidine Gluconate (CHG) Skin Concentrations and Microbial Skin Colonization among Medical Intensive Care Unit (MICU) Patients

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Background. CHG bathing is used to suppress patients' microbial skin colonization, in order to prevent infections and transmission of multidrug-resistant organisms. Prior work has suggested that microbial growth is inhibited when CHG skin concentrations exceed threshold levels.

Methods. We conducted 6 single-day surveys from January 2018 to February 2019 in 7 academic hospital MICUs with established CHG patient bathing. Adult patients were eligible to have skin swabbed from adjacent 25 cm² areas on the neck, axilla, and inguinal region for culture and CHG concentration determination. CHG skin concentrations were measured by a semi-quantitative colorimetric assay. Selective media were used to isolate targeted microorganisms (Table 1). Species were confirmed by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry; antibiotic susceptibility was determined by MicroScan (Beckman Coulter). We modeled the relationship between CHG skin concentrations (log₂-transformed) and microorganism recovery (yes/no as primary outcome) using multilevel models controlling for clustering of body sites within patients and within ICUs, assessing slope and threshold effects.

Results. We enrolled 736/759 (97%) patients and sampled 2176 skin sites. Gram-positive bacteria were detected most frequently (Table 1). The adjusted odds of identifying gram-positive organisms decreased linearly as CHG skin levels increased (Figure 1a), without evidence of a threshold effect. We also found significant negative linear slopes

without evidence of threshold effects for other pathogens tested (Table 2; Figure 1), with the exception of gram-negative bacteria and vancomycin-resistant enterococci. When modeling quantitative culture results (colony-forming units) for gram-positive organisms as a continuous outcome variable, a similar relationship was found.

Conclusion. Higher concentrations of CHG were associated with less frequent recovery of gram-positive bacteria and *Candida* species on the skin of MICU patients who were bathed routinely with CHG. For microbial inhibition, we did not identify a threshold concentration of CHG on the skin; rather, increasing CHG skin concentrations led to additional gains in inhibition. For infection prevention, aiming for high CHG skin levels may be beneficial.

Table 1: Prevalence of Microorganisms Recovered by Culture from Skin of Medical Intensive Care Unit Patients at 7 Hospitals

Organism	Neck	Axilla	Inguinal	Total
Gram-Positive Bacteria	612/729 (84)	461/728 (63)	456/709 (64)	1529/2166 (71)
<i>Staphylococcus aureus</i>	64/732 (9)	24/730 (3)	32/714 (5)	12/2176 (6)
Methicillin-resistant <i>S. aureus</i>	21/730 (3)	8/727 (1)	12/709 (2)	41/2166 (2)
<i>Enterococcus</i> species	63/732 (9)	38/730 (5)	118/714 (17)	219/2176 (10)
Vancomycin-resistant enterococci	26/729 (4)	16/727 (2)	50/708 (7)	92/2164 (4)
Gram-Negative Bacteria	63/731 (9)	47/729 (7)	93/713 (13)	203/2173 (9)
<i>Candida</i> species	77/721 (11)	62/722 (34)	118/704 (17)	257/2147 (12)
<i>Candida auris</i>	0/721 (0)	2/722 (0.3)	0/704 (0)	2/2147 (0.1)

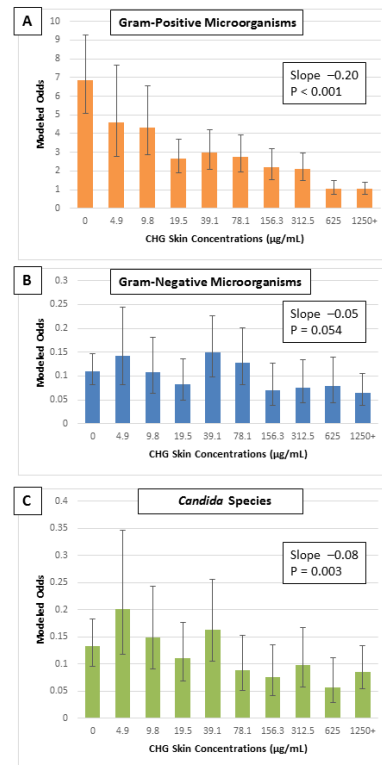
Note. Cells represent n/N (%) = number of positive skin sites / number of skin sites sampled for target microorganism. Total represents all three body sites combined.

Table 2: Linear Effects of Chlorhexidine Gluconate Skin Concentration on Microbial Recovery by Culture from Skin

Organism	Change in odds/log ₂ CHG unit	P value
Gram-Positive Bacteria	-0.20	<0.001
<i>Staphylococcus aureus</i>	-0.18	<0.001
Methicillin-resistant <i>S. aureus</i>	-0.19	0.003
<i>Enterococcus</i> species	-0.07	0.003
Vancomycin-resistant enterococci	-0.06	0.12
Gram-Negative Bacteria	-0.05	0.054
<i>Candida</i> species	-0.08	0.003

Note. Slope represents change in microorganism recovery by culture from patient skin for every unit increase in log₂-CHG skin concentration (i.e., for each doubling of CHG skin concentration).

Figure 1. Relationship Between Chlorhexidine Gluconate (CHG) Skin Concentrations and Modeled Odds of Microorganism Culture Detection Among Medical Intensive Care Unit Patients



Note. Odds of microorganism culture detection on the skin at each CHG skin concentration were estimated using mixed effects models that controlled for body site clustered within patients and within ICUs. Bars represent 95% confidence intervals. Slope represents change in odds of microorganism recovery for every unit increase in CHG skin concentration.

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573. Enterococcal Bacteremia in a Tertiary Care Center in Mexico: A Retrospective Analysis Focus on Vancomycin-Resistant *E. faecium* and Ampicillin-Resistant *E. faecalis*

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