Bugs Be Gone: A Comprehensive Approach for Reducing Multidrug Resistant Organisms



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Disclosures

- Consultant-Michigan Hospital Association Keystone Center
- Subject matter expert for CAUTI, CALBSI, CDI, Sepsis, HAPI and culture of Safety for HIIN/CMS
- ▲ Consultant and speaker bureau:
 - \triangle Stryker Sage
 - △ Potrero Medical
 - △ Ondine Biomedical
 - △ Baxter Healthcare



Session Objectives

- Identify modes of transmission for the spread of microorganism in the healthcare environment
- Evaluate key evidence-based care practices that can reduce bacterial load and/or prevent health care acquired infections.

A Discuss key program steps for creating a source control program within your practice environment or organization.



Incidence, Mortality & Cost of MDRO's in US & Canada

- \Lambda Canada 2014-2018
 - △ MRSA BSI 个 59% from .66 to 1.05 per 10,000 pt days
 - △ VRE BSI ↑ 143% from .14 to .34 per 10,000 pt days
 - \triangle CRE remain low and stable
 - △ Cost: Canada large teaching hospital
 35 million a year
 - $\bigtriangleup\,$ 1 billion per year to health system
- 2018: 5400 deaths attributably to antibiotic resistance

- \Lambda US 2019
 - △ 23,000 deaths associated with MDRO's
 - △ Between \$1700 to \$4600 per stay
 - △ 2.39 billion in treatment costs
 - \triangle Staff bacteremia's 2017
 - △ 119,000 blood stream infections
 - \triangle 20,000s death
- A Rate of improvement has slowed nationally

Morbidity and Mortality Weekly Report (MMWR), March 2019 Johnston KJ, et al Health Services Research, 2019 Mar 12. doi: 10.1111/1475-6773.13135 Canadian Nosocomial Infection Surveillance Program. Can Commun Dis Rep 2020;46(5):99–112. Council of Canadian Academies

Independent Predictors of Acquiring an MDRO Infection

- A Prolonged prior hospital or ICU stay
- A Recent surgery or procedure
- A Presence of invasive devices
- A Recent exposure to antibiotics







Common Routes of Transmission





HAI in the ICU was the patients' endogenous flora (40%-60%); cross-infection via the hands of health care personnel (HCP; 20%-40%); antibiotic-driven changes in flora (20%-25%); and other(including contamination of the environment; 20%). Weinstein RA.. Am J Med 1991;91(Suppl):179S-184S.

Vertical vs. Horizontal

- Vertical approach refers to a narrow-based program focusing on a single pathogen (selective of the specific MDRO)
 - △ AST to identify carriers
 - Implementation of measures aimed at preventing transmission from carriers to other patients
 - Isolation
 - Hand hygiene

- Horizontal approach to infection prevention and control measures refers to broad-based approaches attempting reduction of all infections due to all pathogens
 - \triangle no screening
 - △ Universal nasal coverage
 - \triangle Bathing
 - \triangle No isolation
 - \triangle Limit lines/tubes
 - \triangle Hand hygiene

Active Surveillance-When

- A Prior to surgical procedures to determine carriage or active infection
- Use AST -Active surveillance testing
- Based on locations or populations of patients with unacceptably high rates of MRSA despite basics MRSA transmission prevention strategies in place
- ▲ Canada: for MRSA/VRE
 - △ IPAC supports ongoing screening and CP
 - △ Based on local epidemiology
 - △ If screening or CP reduced much watch cultures
- Screening for CRE among high risk populations is recommended based on regional epidemiology
 - △ LTAC, prior travel to foreign countries with high rates, transferred from another hospital, recent hospital stay





Calfee DP, et al. Infect Control Hosp Epidemiol, 2014;35(7):772-796 Huang SS, et al. New Engl J of Med, 2013;368(24):2255-65 Health Research & Educational Trust (2017). MDRO Change Packect. Accessed at www.hret-hiin.org.



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"I use so much alcohol-based hand sanitizer, my hands had to join a 12-step program!"



Question



What is the average number of times a clinician should be cleaning their hands in a shift?

A. 35

B. 50

C. 75

D. 100

Hand Hygiene is the Single Most Important Factor in Preventing the Spread of Infection

Healthcare providers clean their hands less than half of the times they should!!



Most Efficient Measure in Reducing MDRO-GNB in ICU

Guidelines for Hand Hygiene in Health Care Settings

- Alcohol-based hand rub frontline method for decontaminating hands (20-30 seconds)
- Visibly soiled or exposure to potential spore forming organisms, wash with a non-antimicrobial or antimicrobial soap & water (40-60 seconds)
- △ Do not use Triclosan containing soaps
- ▲ Decontaminate hands after removing gloves
- A Provide HCW with hand lotions & creams to minimize occurrence of irritant contact dermatitis
- △ Use multidimensional strategies to improve hand hygiene practice
- △ Do not wear artificial fingernails or extenders

CDC. Hand Hygiene Guidelines: MMWR 2002; 51(No. RR-16):[1-45] WHO Hand Hygiene Guidelines 2009 Ellingson K, et al. Infect control & Hosp Epidemiology, 2014;35(2): S155-S178 https://www.cdc.gov/handhygiene/science/index.html



hand in left palm and vice versa

Handwashing Technique with Soap and Water



dry thoroughly with a single use towel use towel to turn off faucet/tap

...and your hands are safe.

MDRO on Hands of HCW

- Determine prevalence of MDRO on HCP hand in adult acute care
- ▲ 59 article-6840 hand cultures
- 47.5% of samples taken during direct pt care
- A North America higher rates of MRSA
- ▲ ICU's slightly higher
 Pseudomonas and trend for 个
 Acinetobacter





Pittet D. Infect Control Hosp Epidemiol, 2009;30(7):611-622 WHO Hand Hygiene Guidelines 2009 Ellingson K, et al. Infect control & Hosp Epidemiology, 2014;35(2): S155-S178

Hand Hygiene Measurement Methods

- Direct Observation
- A Product Usage/Volume
- Automation monitoring can improve compliance
 - Electronic versus direct observation more accurate in measuring compliance

Morgan DJ, et al. AJIC, 2012;40:955-959

Unit B Soap + San combined (Beds: 101-300, Category: NON-ICU



Intervention period (Baseline = period 0)

Increase use of alcohol hand rub (measure by volume use) correlated significantly (p=0.014) with improvement in MRSA rates Sroka S, et al. J of Hosp Infect, 2010;74:704-211

> Haas and Larson Journal of Hospital Infection 2007;66:6-14 Polgreen PM, et al. Infect Control & Hosp Epidemiol, 2010;31:1294-1297 Ellingson K, et al. Infect Control & Hosp Epidemiol, 2014;35(S2):S155-178

Hand Hygiene: Should We use Automated Systems



- A Pro: Prolific amount of data; provider specific data
- ▲ Con: Lose real time correction; can be bulky and expensive

Without a process to address low compliance in a professional accountable manner it will just be a lot of data –Dr Talbot

HIIN 2018; Discovery and Direction Series: Horizontal Practices accessed at http://www.hrethiin.org/resources/display/discovery-and-direction-series-horizontal-practices



The Environment

"Substantial scientific evidence has accumulated that contamination of environmental surfaces in hospital rooms plays an important role in the transmission of several key health care—associated pathogens"

Weber DJ, AMIC, 2016;44:77-84



The Environment: What is the Problem?

A patient is at increased risk of picking up pathogens like, MRSA, VRE, & C. diff. when admitted to room where prior patient had one of these

- \land Huang SS (2006)¹
- △ Drees M (2008)²
- △ Zhou Q (2008)³
- △ Moore C (2008)⁴
- △ Hamel M (2010)⁵
- △ Shaughnessy et al. 2011





"The patient in the next bed is highly infectious. Thank God for these curtains."

Huang SS, et al. Arch Intern Med. 2006;166(18):1945-1951.
 Drees M, et al. Clin Infect Dis. 2008;46(5):678-685.
 Zhou Q, et al. Infect Control Hosp Epidemiol. 2008;29(5):398-403
 Moore C, et al. Infect Control Hosp Epidemiol. 2008;29(7):600-606.
 Hamel M, et al. Am J Infect Control. 2010;38(3):173-181.
 Cohen et al. ICHE 2018;39:541-546





Application of Recommendations for Environmental Cleaning

- A Resources to ensure effective cleaning and decontamination
 - Use of a check list
 - Clean equipment that is transported from room to room
 - Dedicated equipment in isolation rooms
 - Reduce load-adequate time to clean
 - Education of healthcare workers and support staff
- △ Daily disinfection of non-critical surfaces vs. just visibly soiled
- ▲ Feedback method using removal of intentional applied marks visible only under UV light
- Mipes that keep the surface wet for 1-2 minutes
- A Reusable cloths change with each room clean and use 3 per room

The Near Future: Advancing the science and technology around continuous decontamination

Weber et al. AJIC 2019:47:A72

Huang SS, et al. Arch Intern Med 2006;166(18):1945-1951 Weber DJ, AJIC, 2016;44:77-84 Mills JP, et al. Infect Dis Clin N AM 2021;35:969-994 Rutala & Weber. AJIC 2019;47A96-A105

Improving Environmental Hygiene In 27 ICUs Decreased MDRO Transmission

- A 27 acute care hospitals (25 beds to 709 beds)
- A Fluorescent targeting method
- Systematic covert monitoring was performed Results:
- 3532 environmental surfaces were assessed after terminal cleaning in 260 ICU unit rooms
- 49.5% of services cleaned it baseline
- A Post-intervention with multiple cycles of objective performance feedback resulted in 82% of environmental services cleaned (p < .0001)</p>



No Touch Cleaning

- Use of a no touch method leads to a decreased rate of infection in patients subsequently admitted to a room where the prior occupant was colonized or infected.
- Use of a no touch method leads to a decreased rate of facility-wide colonization and infection.
- Hydrogen peroxide vapor & aerosolized significantly reduce MDRO load in terminal cleaning. (vapor:1.5 to 2.5hrs, aerosolized: 2-3hrs)
 - \bigtriangleup Aerosolized not well studied versus vapor
 - \triangle Contaminated surfaces reduced to 0% to <5%
- Iltraviolet–C to kill pathogens.
 - △ 10-45 minutes of use, *C. difficile* spores
 - △ 10-25 minutes for non-spore forming bacteria
 - \bigtriangleup Contaminated surfaces reduced <1% to <11%

Nerandzic MM, et al. *BMC Infect Dis* 2010 Jul 8;10:197 Havill NL et al. Infect Control Hosp Epidemiol, 2012;33:507-512 Sattar SA, et al. AJIC, 2013;S97-104 Passaretti Cl, et al. Clin Infect Dis,2013;56:37-35 Weber DJ, AJIC, 2016;44:77-84 Mills JP, et al. Infect Dis Clin N AM 2021;35:969-994Rutala & Weber. AJIC 2019;47A96-A105

Reducing the Load in the Environment: Additional Factors

- ▲ Hospital curtains **potential** source of transmission¹
 - \triangle Novel curtains increase time to first contamination (7x longer)²
- ▲ Daily cleaning of high touch surfaces³
- Disinfecting surfaces (copper/silver coating)⁴
- ▲ ECG disposable or reusable?⁵
 - Cluster-randomized controlled design
 - Match ICU's randomized to get disposable
 or reusable ECG
 - △ Measured infection rates





1.Trillis F, et al. Infect Control Hosp Epidemiol, 2008;29(11):1074-1076 2.Schweizer M et al. Infect Control Hosp Epidemiol 2012;33:1081-1085 3.Kundrapu S, et al. Infect Control Hosp Epidemiol 2012;33(10):1039-42 4. Salgado CD, et al. Infect Control Hosp Epidemiol 2013;34:479-86 5.Ablert NM, et al. Amer J of Critical Care, 2014;23:460-468



Reducing Bacterial Load on the Patient: A Horizontal Strategy



Nasal Decolonization

Question

- Based on the current evidence, what type of daily bathing should be performed with Critically ill patients
 - A. Soap and water bath
 - B. Antisepsis bathing
 - C. Packaged bath cloths
 - D. Package cloths that are activated by water





Bleasdale SC, e tal. Arch Intern Med. 2007;167(19):2073-2079

Bath Basins: Potential Source of Infection

Large multi-center study evaluates presence of multi-drug resistant organisms

Total hospitals:88Total basins:1,103





Mechanisms of Contamination

- \Lambda Skin flora
- ▲ Multiple-use basins
 - \triangle Incontinence cleansing
 - \triangle Emesis
 - \triangle Product storage
- A Bacterial biofilm from tap water



Shannon RJ, et al. J Health Care Safety Compliance Infect Control. 1999;3:180-184. Larson EL, et al. J Clin Microbiol. 1986;23(3):604-608. Johnson D, et al. Am J Crit Care, 2009;18(1):31-38, 41. Marchaim D, et al. Am J Infect Control. 2012;40(6):562-564. Used with Permission Advancing Nursing LLC

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Understanding Water

- All water with the exception of sterile water and filtered water is contaminated with microbes (eg, potable water, tap water, showers, and ice).
- △ In healthy persons, contact or ingestion of such water rarely leads to infection.
- A However, contact or ingestion of such water may cause infection in immunocompromised persons or when applied to non-intact skin
- A Transmission of these pathogens from a water reservoir may occur by direct and indirect contact, ingestion and aspiration of contaminated water, or inhalation of aerosols*
- Compared sink & water based care activities to non sink and non water based care activities on GNB colonization in ICU. Found rate dropped from 26.1 to 21.6 colonization pre 1000 ICU days. Greater reduction with longer ICU LOS's

Kanamori H, Weber DJ, Rutala WA. 2016;62(11):1423-1435. *Decker BK, et al. Opin Infect Dis 2013; 26:345–51 Hopman, J., et al. Antimi*crob Resist Infect Control* **6**, 59 (2017).

Biofilms are Ubiquitous



Waterborne Infection

Hospital Tap Water

- A Bacterial biofilm
- △ Most overlooked source for pathogens
- 29 studies demonstrate an association with HAIs and outbreaks
- A Transmission:

 \triangle Drinking

 $\bigtriangleup \mathsf{Bathing}$

 $\bigtriangleup \text{Rinsing items}$

- \triangle Contaminated environmental surfaces
- Immunocompromised patients at greatest risk





Anaissie EJ, et al. Arch Intern Med. 2002;162(13):1483-1492. Cervia JS, et al. Arch Intern Med, 2007;167:92-93 Trautmann M, et al. Am J of Infect Control, 2005;33(5):S41-S49, https://www.pinterest.com/pin/332914597437828576/?I=t

Pre-Operative for Reduction in SSI's

CDC – Guideline for Prevention of Surgical Site Infections, 2017¹

"Before surgery, patients should shower or bathe (full body) with soap (antimicrobial or nonantimicrobial) or an antiseptic agent on at least the night before the operative day" (Category IBstrong recommendation; accepted practice.)

SHEA/IDSA* – Strategies to Prevent Surgical Site Infections, 2014²

"Preoperative bathing with chlorhexidine-containing products" (Unresolved issue). To gain the maximum antiseptic effect of chlorhexidine, adequate levels of CHG must be achieved and maintained on the skin.

AORN – Perioperative Standards and Recommended Practices, 2018³

- "The collective evidence supports that preoperative patient bathing may reduce the microbial flora on the patient's skin before surgery."
- "The patient should be instructed to bathe or shower before surgery with either soap or a skin antiseptic on at least the night before or the day of surgery."
- Although many studies support the use of 2% CHG cloths for preoperative bathing, additional research is needed before a practice recommendation can be made."

Centers for Disease Control and Prevention, "Guideline for Prevention of Surgical Site Infections," JAMA Surg. doi:10.1001/jamasurg.2017.0904
 Anderson, D.J., et al, Strategies to Prevent Surgical Site Infection in Acute Care Hospitals: 2014 Update. Infect Control Hosp Epidemiol 2014; 35(6): 605-627.
 AORN. Guidelines for Perioperative Practice, Denver, Colorado: AORN, Inc : 2018

Pre-Op CHG bathing

- A Review by Webster did not show a statistically significant reduction in SSI, the studies included were limited to use of 4% CHG¹
- Meta-analysis by Chlebicki, et al did not find a significant reduction in SSI rates²
 - △ Varying/lack of application protocols (multiple vs. single application) and CHG concentrations
- Additional studies specifically examining the effect of 2% CHG cloths demonstrate an appreciable impact on SSI³⁻⁸
 - △ Recent systematic review that included studies with consistent bathing protocols of two preoperative baths, found that the use of 2% CHG cloths significantly reduced SSI risk⁷
 - △ Low risk and low-cost intervention that has shown effective in reducing bacteria on the skin, a risk factor for SSI
 - 1. Webster J, Osborne S. *The Cochrane Library* 2012;
 - 2. Chlebicki MP, et al.. *AJIC* 2013; 41:167-73.
 - 3. Eislet D.. Orthopaedic Nursing 2009; 28(3): 141-45.
 - Johnson AJ, et al. J Arthroplasty 2010; 25(Suppl 6): 98-102.
 - 5. Zywiel MG, et al.. International Orthopaedics 2011; 35(7): 1001-06.
 - 6. Graling PR, Vasaly FW. AORN 2013; 97(5): 547-51.
 - 7. Kapadia BH, et al.. J Arthroplasty 2013; 28:490–93.
 - 8. Karki S, Cheng AC.. J Hosp Infect 2012; 82:71-84.



Bathing with CHG Basinless Cloths

- A Prospective sequential group single arm clinical trial
- 1787 patients bathed
 - \triangle Period 1: soap & water
 - △ Period 2: CHG basinless cloth bath
 - \triangle Period 3: non-medicated basinless cloth bath





26 colonization's with VRE per 1000 patients days vs. 9 colonization's per 1000 patient days with CHG bath

Veron MO et al. Archives Internal Med 2006;166:306-312



Impact on VRE with 2% CHG Cloth Bathing

The Efficacy of Daily Bathing with Chlorhexidine for Reducing Healthcare-Associated Bloodstream Infections: A Meta-analysis

John C. O'Horo, MD;¹ Germana L. M. Silva, MD;² L. Silvia Munoz-Price, MD;³ Nasia Safdar, MD, PhD⁴

	Experimental		Control		Odds Ratio		Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
1.2.1 CHG Bathing							
Borer et al, 2007	2	1600	15	1923	3.3%	0.16 [0.04, 0.70]	· · · · · ·
Camus et al, 2005	6	1991	7	1961	5.3%	0.84 [0.28, 2.52]	
Climo et al, 2009	14	15472	41	15225	10.5%	0.34 [0.18, 0.62]	
Gould et al, 2007	171	6664	264	6899	17.1%	0.66 [0.54, 0.80]	*
Munoz-Price et al, 2009	29	7632	59	6210	13.1%	0.40 [0.25, 0.62]	
Subtotal (95% CI)		33359		32218	49.3%	0.47 [0.31, 0.71]	•
Total events	222		386				
Heterogeneity: $Tau^2 = 0.1$	2; Chi2 =	11.07, 0	df = 4 (P	= 0.03);	$1^2 = 64\%$		
Test for overall effect: Z =	3.53 (P =	= 0.0004	4)				
1.2.2 CHG Impregnated	Cloths						
Bleasedale et al, 2007	9	2210	22	2119	8.2%	0.39 [0.18, 0.85]	
Dixon and Carver, 2010	8	3148	27	3346	8.0%	0.31 [0.14, 0.69]	
Evans et al, 2010	4	1785	15	1904	5.2%	0.28 [0.09, 0.85]	
Holder and Zellinger, 2009	2	2000	12	3333	3.3%	0.28 [0.06, 1.24]	
Montecalvo et al, 2010	27	13864	57	12603	12.8%	0.43 [0.27, 0.68]	
Popovich et al, 2009	2	5610	19	6728	3.4%	0.13 [0.03, 0.54]	
Popovich et al, 2010	17	5799	19	7366	9.8%	1.14 [0.59, 2.19]	
Subtotal (95% CI)		34416		37399	50.7%	0.41 [0.25, 0.65]	◆
Total events	69		171				
Heterogeneity: $Tau^2 = 0.1$ Test for overall effect: $7 =$	9; Chi ² =	12.80, 0	df = 6 (P)	= 0.05);	l ² = 53%		
reserver or stall circle E -	3.1.0 (1 -	0.0001				3 1002070000 NO.000	
Total (95% CI)		67775		69617	100.0%	0.44 [0.33, 0.59]	◆
Total events	291		557				Q Q R
Heterogeneity: $Tau^2 = 0.1$	3; Chi ² =	26.12, 0	df = 11 (l)	P = 0.00	6); $I^2 = 5$	8%	
Test for overall effect: Z =	5.39 (P	< 0.0000)1)				Favors experimental Favors control
Test for subgroup differen	nces: Chi ²	= 0.19.	df = 1 (F	P = 0.66	$ ^2 = 0\%$		and a superintental interest control

The Evidence: Impact of Antisepsis Bathing Evaluate effect of daily bathing with CHG on acquisition of multidrug resistant organism's (MDRO's) and incidence of CLABSI

9ICU's and Bone Marrow Transplant unit Randomly assigned 7727 patient:

- a. No-rinse, Antisepsis washcloths
- b. Non-antimicrobial, no-rinse bath cloths

Results of 2% CHG bathing



Impact of Antisepsis Baths

Study to determine the best method for reducing spread of methicillin-resistant Staphylococcus aureus (MRSA) and MDROs

3 protocols tested:

- a)Swab for MRSA on admission to ICU
 △ Isolate if positive
 b)Swab for MRSA on admission to ICU
 △ Isolate if positive
 △ Nasal mucopiricin x 5 days
 △ antisepsis bathing for entire ICU stay
 c)No swab
 △ Nasal mucopiricin x 5 days
 - \triangle Antisepsis bath for entire ICU stay

Results: No Swab Group Universal Decolonization Demonstrated





Antisepsis vs. Routine Bathing to Prevent MDRO and CLABSI in General Medical and Surgical Units

- 53 hospitals in 14 states
- Compared routine bathing (nonmedicated disposable cloth or showering) to decolonization with universal chlorhexidine and targeted nasal mupirocin in noncritical-care units.
- 12-month baseline period, 2 month phase and 21 month intervention

Decolonization with universal chlorhexidine bathing and targeted mupirocin for MRSA carriers did not significantly reduce multidrug-resistant organisms in non-critical-care patients

Patients with medical devices had a 32% greater reduction in all cause bacteremia and a 37% greater reduction in MRSA or VRE clinical cultures compared with the routine care group

Differential Effects of Antisepsis Skin Cleansing Methods

Rhee Y, et al. Infect Control Hosp Epidemiol 2018;39:405-411

- A Prospective, randomized 2center study with blinded assessment.
- A To determine whether 3 different CHG skin cleansing methods yield similar residual CHG concentrations and bacterial densities on skin.



Method A- 2% CHG cloth Method B- 4% CHG liquid poured onto nonmedicated cloth Method C-4% CHG liquid on cotton wash cloth



Nasal Decolonization

S. aureus colonization

- Carriage is the most important independent risk factor for developing an SSI²
- Usually associated with the nares (~70%)
- Other sites includes the skin, axilla, groin / perineal space
- Carriers of high numbers of S. aureus have 3-6 times the risk of HAIs¹
- ▲ Swabbing the nares identifies 80%-90% of MRSA carriers²
- A Patients may have S. aureus on the skin and other sites and not in the nose
- ▲ Decolonization of nasal and extranasal sites may reduce infection risk⁴
 - ASHSP report mupirocin should be used intranasally for all patients with documented colonization with Staph aureus (Strength of evidence for prophylaxis = A)³

Bode, Lonneke G. M. et. al. *N* Engl J Med 362;1 January 7, 2010
 Prokuski, Laura. J Am Acad Orthop Surg 2008;16:283-293
 Bratzler D, et al. J Health-Syst Pharm.2013; 70:195-283
 Courville, et. al. ICHE February 2012; 33(2):152-159.

Nasal Decolonization for Reducing SSI's

△ 2014 SHEA/IDSA Practice Recommendation

- △ If unacceptably high SSI rates exist for surgical populations despite implementation of the basic SSI prevention strategies, then applying standard infection control methods for outbreak investigation and management are recommended, including:
 - Screen surgical patients for S. aureus and decolonize preoperatively for high risk procedures, including some orthopedic and cardiac procedures
- △ Routine preoperative decolonization with mupirocin without screening and targeted use is not currently recommended due to concerns about evolving resistance.

▲ WHO 2017 Recommendations

- △ Nasal decolonization with mupirocin for Cardio or Ortho surgeries: Patients with known nasal carriage of S. aureus should receive intranasal application of mupirocin ointment. (Strong recommendation)
- △ Nasal decolonization with mupirocin for other surgeries: Use of nasal mupirocin ointment is suggested (Conditional recommendation)

▲ AORN 2021 Recommendations

- △ Create an interdisciplinary team to develop facility wide decolonization protocols
- \bigtriangleup Use a risk based approach
- △ Establish a preoperative S aureus decolonization program
 - Choose universal, targeted or blended

Nasal Decolonization Used-Surgery & ICU's



- \bigtriangleup Concerns on widespread implementation
 - Antibiotic resistance identified in multiple studies & results in decolonization failure
 - In opposition to antimicrobial stewardship
 - Resulted in widespread adoption of the skin decolonization but not nasal
- \triangle Other potential barriers
 - Unpleasant to use
 - Dosed 2x daily for 5 days to achieve log kill (compliance issues)



Frontiers in Nasal Decolonization

- A Povidone Iodine-Studies show effective in combination with CHG prep for SSI
 - \triangle Activity against gram + & gram-
 - $\vartriangle\,$ 5% and 10% solution
 - \triangle Effective within 1hr-lasts up to 12hrs-
 - time from application to surgery matters
 - △ Application each nostril for 30 sec (2 different parts) with 1 applicators each nostril and then repeated



Frontiers in Nasal Decolonization

- Alcohol based nasal antiseptics-antimicrobial by denaturing proteins, fights against gram + and gram- including MDRO's
 - \triangle More studies needed
 - \triangle 3x per day pre & post surgical till d/c (con't 5-7 days) post d/c
 - \bigtriangleup Potential compliance issues

Frontiers in Nasal Decolonization

- A Photo dynamic therapy-use of laser to eliminate S aureus, gram +, gram- and viruses, and fungi
- Combines light activated chemical & cool infrared red wavelength
 - \bigtriangleup In human testing: eliminated nasal MRSA in < 10 min
 - \bigtriangleup Published trial showing reduction in SSI/More studies needed
 - △ One-time tx for surgical pre-op-5 min
 - △ Sustain elimination for 3 days
 - △ No adverse events reported

A Vancouver General Experience over 10 years

- \triangle 78% reduction in SSI
- \triangle 53 fewer SSI per year
- △ 4.2 million per year in cost avoidance

Septimus EJ. AJIC, 2019;A53-A57. Bryce E, et al. *J Hosp Infect*. 2014;88(2):89-95.







Reducing MDRO's

- Contact precautions for MRSA colonized & MRSA infected patients and VRE
 - \triangle Slower time from ER to inpatient bed (1 hr)
 - △ Slower to discharge to extended care facility (1.7 days)
 - △ Delays in diagnostic imaging
 - \triangle Visited by healthcare workers 20-30% less
 - △ Greater patient dissatisfaction, depression and anxiety.



Contact Precautions Isolation



Reconsidering Contact Precautions for Endemic Methicillin-Resistant Staphylococcus aureus and Vancomycin-Resistant Enterococcus



No high quality data support or reject use of CP for endemic MRSA or VRE. Our survey found more than 90% of responding hospitals currently use CP for MRSA and VRE, but approximately 60% are interested in using CP in a different manner. More than 30 US hospitals do not use CP for control of endemic MRSA or VRE.

Organizations Journey of Discontinuing Contact Precautions (CP) for MRSA & VRE

- ▲ 865-bed, safety-net, academic medical center.
- Quasi-experimental, before-and-after study (30 months)
- ▲ Discontinuing CPs for MRSA or VRE colonized/infected patients
- During intervention period: hand hygiene, daily chlorhexidine bathing of all inpatients (except infants) & bare below the elbows protocol for inpatient care.

▲ Results:

- \bigtriangleup No difference in MRSA and VRE rates before & after discontinuation of CP
- △ Lower CLABSI rates after discontinuation of CP

Impact of D/C Contact Precautions for MRSA & VRE

△ Quasi-experimental (2011-2016), Interrupted time series, CP changes April 2013



Bearman G, et al. Infect Control Hosp Epidemiol 2018;39:676-682

Practice Device Bundles 220,000 HAI's per year 1 in 9 hospitalized patients

- Evidence- based strategies for reducing the risk of CAUTIS
- Evidence-based strategies for reducing the risk of CLABSI's
- Evidence-based strategies for reducing the risk of VAP/Non-vent HAP

Antibiotic Stewardship



- △ Core measure in prevention of MDR-GNB
- Program that promotes appropriate selection, dose, route and duration of antimicrobial therapy
 - Primary goal: optimize clinical outcomes while reducing unintended consequences of antimicrobial use; Toxicity, colonization of pathogenic organisms, Antibiotic resistance
 - △ Secondary goal: reduce health care costs associated with diseases such as CDI and antimicrobial resistance from inappropriate use
- Metanalysis 32 studies showed 51% risk reduction of MDR-GNB acquisition with AMS
- ▲ Comprehensive programs both large & small hospitals shown ↓ in antimicrobial use between 22%-36% with annual savings of \$200,000 to \$900,000.

Health Research & Educational Trust (2017). Clostridium difficile Infection Change Package: 2017 Update. Chicago, IL: Health Research & Educational Trust. Accessed at <u>www.hret-hiin.org</u>. Mills JP, et al. Infect Dis Clin N AM 2021;35:969-994 Baur D, et al. *The Lancet Infectious Diseases*. 2017;17(9):990-1001.

Horizontal Approach: It Works

- A Retrospective, observational study in the surgical ICU of a tertiary care medical center in Boston, MA, from 2005 to 2012
- ▲ N=6,697 patients in the surgical ICU



↓21% per
year
Since 2008
Zero MRSA
infections

WHEN WOULD NOW BE A GOOD TIME TO DO THIS?

It is not enough to down ur best; you must know what to do, and THEN do your best. ~ W. Edwards Deminer

Bugging Out





HAI prevention courses by Kathleen Vollman

https://www.medbridgeeducation.co m/advancing-nursing





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