Protect All Patients: A Paradigm Shift Focusing on the Impact of the Nose on Infections

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Disclosures

Consultant: ECRI

Consultant: Global Life Technologies Corp.

Consultant: Medical Illumination Inc.

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Session Goal and Learning Objectives

Session Goal

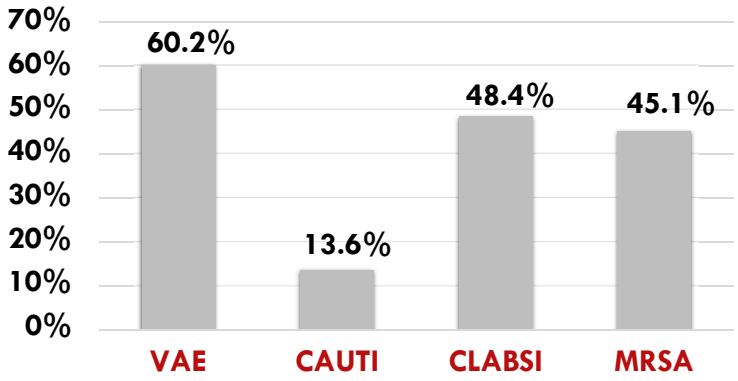
Present the scientific rationale for a paradigm shift on how universal nasal decolonization can improve HAI patient outcomes, be cost effective, and improve staff efficiency and throughput.

Objectives

1. Discuss the role of the nose on colonization pressure, transmission, and infection.
2. Review past, current, and emerging strategies to combat HAIs.
3. Describe how universal nasal decolonization strategies have reduced HAIs.

Urgent Need to Respond to Increased HAIs

Increase in rate comparing Q3 2021 to Q3 2019 as reported to the NHSN



Lastinger, L., et al. *Infection Control & Hospital Epidemiology*, 1-5. doi:10.1017/ice.2022.116

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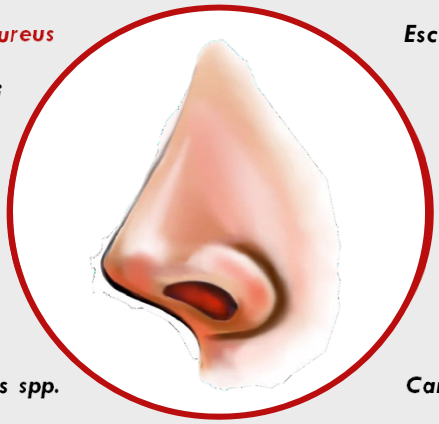
Microorganisms of the Nasal Vestibule

Gram (+)

Staphylococcus aureus
Coagulase-negative staphylococci
Corynebacterium spp.
Propionibacterium spp.
Streptococcus spp.
Lactobacillus spp.
Enterococcus spp.



Gram (-)

Escherichia coli
Klebsiella spp
Enterobacter spp
Pseudomonas aeruginosa
Proteus spp

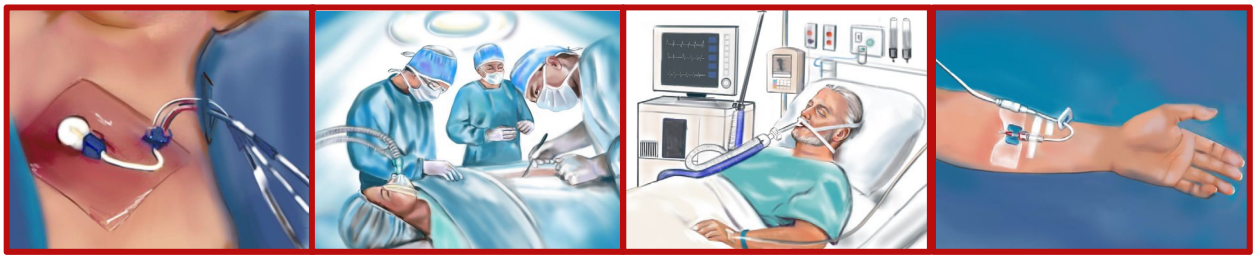
Yeast

Candida auris

Antiseptics are effective against each of these pathogens

Weiner-Lastinger L. et al. (2020). ICHE, 41,1-18

Staph aureus #1Reported Pathogen



CLABSI **SSI** **PVAP** **PVC-BSI**

[1] Weiner-Lastinger L, et al. (2020). *ICHE*, 41:1-18. [2] Ripa, Antimicrob Agents Chemother 2018 11 24;62(11). [3] Helm R. Journal of Infusion Nursing. May/June 2015: Vol 38, 3:190-203.

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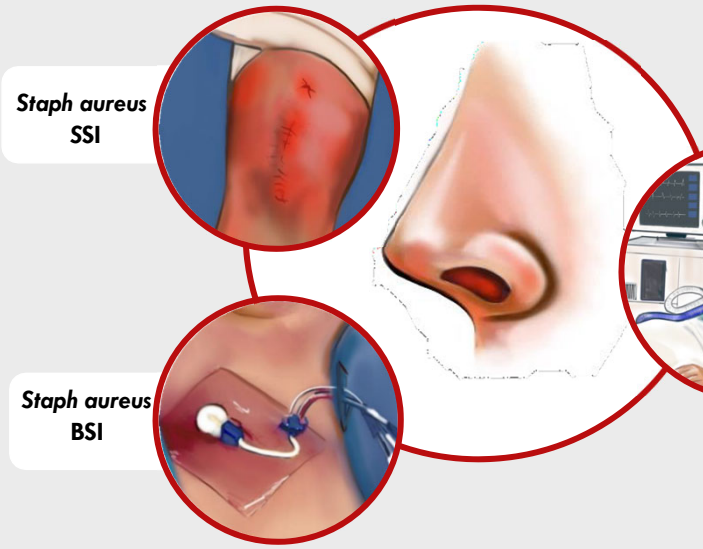
Role of *Staph aureus* in HAI



Nasal colonization is the main risk factor for infection[1,2]

80% of *Staph aureus* BSI[1,2] and SSI[3] and 94% of *Staph aureus* nasal and bronchial strains[4,5] can be traced to the patient's own nasal flora.

[1] Von Eiff, NEJM, Vol. 344, No.1 Jan 4, 2001 [2] Wertheim HF, Lancet 2004; 364: 703–05 [3] Kalmeijer, ICHE 2000;21:319-323 [4] Rubinstein E, et al . Clin Infect Dis. 2008;46(Suppl 5):S378–85. [5] Corne P, et al. *J Clin Microbiol.* 2005;43(7):3491-3493.

Staph aureus Carriage Prevalence & the Role of the Nose

The main reservoir for *S. aureus* is the nasal vestibule[1]

- **30% of the population are *S. aureus* nasal carriers**[2]
- **Up to 13% of ICU admits are MRSA carriers**[4]
- **~ 8% rate of MRSA carriage acquisition in the ICU**[5]
- **When the nose is decolonized, there is a significant reduction in the number of *S. aureus* recovered from the skin**[6]

[1] Cell Host Microbe. 2013 Dec 11; 14(6): 631–640. [2] Wertheim HF, Lancet 2005; 5: 751–762 [3] Kepler et al, CID 2004 Sep; 39(6):776–782 [4] Honda H, ICHE 2010 Jun; 31(6): 584–591 [5] Mermel LA et al. J Clin Microbiol 2011;49:1119 [6] Bacteriol Rev, 1963 Mar; 27(1): 56–71.

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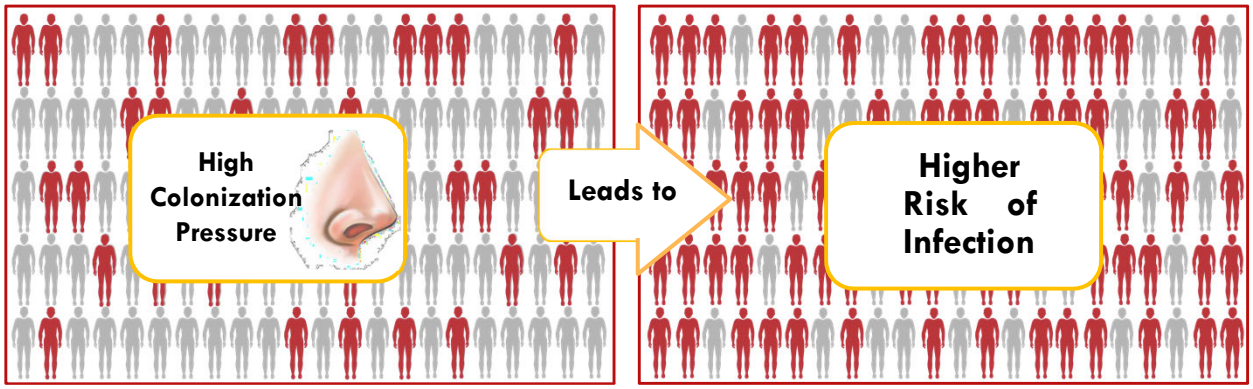
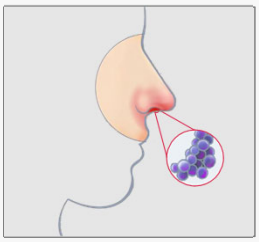
Colonization Pressure

Transmission and Acquisition Increase Colonization Pressure



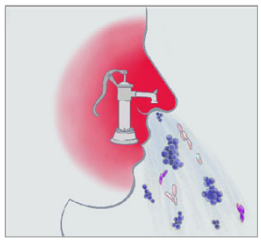
The Chain of Infection of *Staph aureus* Patients

THE MAIN RESERVOIR



Nasal Colonization

PORTAL OF EXIT



The Nose

TRANSMISSION

Endogenous Source
- Self-Inoculation

Exogenous Source
- Direct Contact
  Hands
- Indirect Contact
  Environment
- Respiratory
  Short Range

PATIENT PORTAL OF ENTRY
- Mucous membranes
- Non-intact skin
- Devices

Examples
- Ports
- Drains
- Tubings
- Hubbs
- Dressings
- Tracheotomy Site
- Surgical Incision
- Wounds
- Pressure Sores

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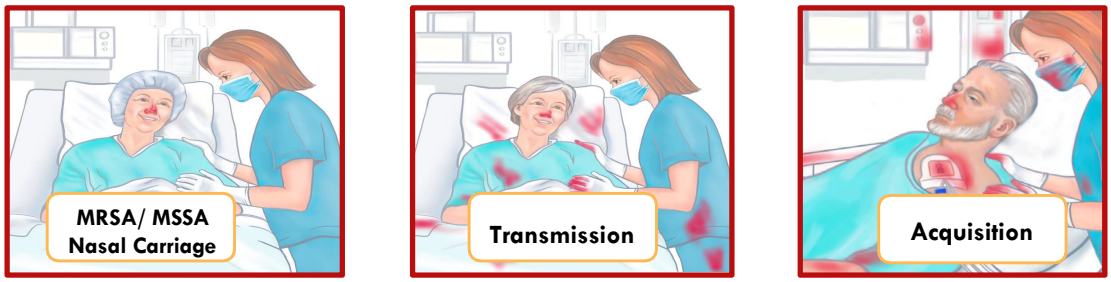
Transmission to Other Patients - Acquisition

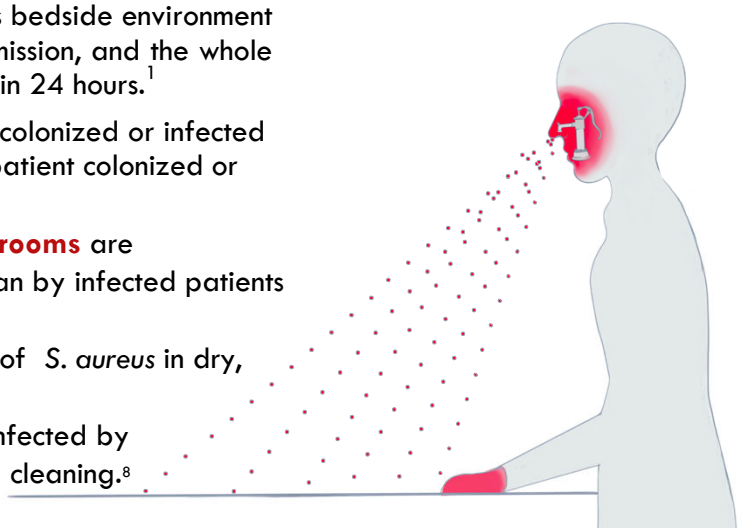
- **Transmission** responsible for 60% of MRSA infections in the ICU and 40% in non-ICU Units[1]
- **15 - 25%** of carriers develop MRSA infection during hospitalization or within 18 months[2]



[1]Jain et al, N Engl J Med 2011; 364:1419-1430 [2] Huang SS et al. PloS ONE. 2011;6(9):e24340

Transmission – Environment to New Patient Acquisition

- **Within a few hours,** the patient's bedside environment becomes contaminated after admission, and the whole room becomes contaminated within 24 hours.[1]
- **39%** increased risk of becoming colonized or infected with prior room occupancy of a patient colonized or infected with MRSA.[2,3,4,5]
- **Colonized MRSA/VRE patients' rooms** are contaminated more frequently than by infected patients (p=.033).[6]
- ***7 days to 5 years*** survival times of *S. aureus* in dry, inanimate surfaces[7]
- **~68% of surfaces** are NOT disinfected by routine daily cleaning or terminal cleaning.[8]



[1] Istenes N ,AJIC. 2013 Sep;41(9):793-8. [2] Mitchell BG,. J Hosp Infect. 2015 Nov;91(3):211-7 [3] Dancer S. *.Clin Microbiol Rev.* 2014; 27: 665-690 [4] Carling PC. Infect Dis Clin North Am. 2016 Sep;30(3):639-60. [5] Carling P.AJIC. 2013; 14: S20-S25 [6] *ICHE* 2014;35(7):872-875 7 Suleyman, G., et al.. *Curr Infect Dis Rep* 20, 12 (2018). 8 Carling et al European Society of Clinical Microbiology and Infectious Diseases, Milan, Italy, May 2011

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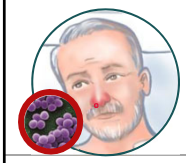
History of *S. aureus* and Nasal Colonization Risk Mitigation

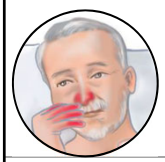
STAPH AUREUS



1889
Discovered in the nose

History of *S. aureus* and Nasal Colonization Risk Mitigation

AUTO-INFECTION



1932
The nose to finger wound concept introduced

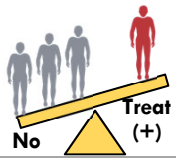
1ST MRSA OUTBREAK

1968
USA Hospital

ISOLATION PRECAUTIONS

1983
CDC - Isolate Culture (+) for MRSA

HIGH-RISK TARGETED DECOLONIZATION

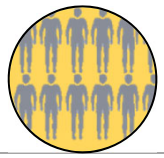


1996 Surgeries
2003 Patients
Treat (+) with Mupirocin

SCREEN & ISOLATE

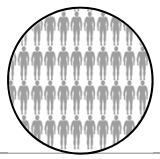
2006/2007
Active Surveillance CDC updates for high MRSA endemic rates

ICU UNIVERSAL DECOLONIZATION



2013
Treat all ICU patients with Mupirocin

NEW PARADIGM SHIFT
ALL PATIENTS
UNIVERSAL DECOLONIZATION



2014
Active Source Control for all patients with daily alcohol-based nasal antiseptic

MRSA (+)

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REDUCE MRSA Study

RANDOMIZED CONTROL STUDY:

- 43 hospitals, 74 ICUs, 16 states
- ~75,000 patients, 283,000 ICU patient days
- 18-month intervention
- Decolonization agent antibiotic mupirocin

Arm 1: SCREEN AND ISOLATE

- Screened isolated all MRSA (+) ICU patients

Arm 2: TARGETED DECOLONIZATION

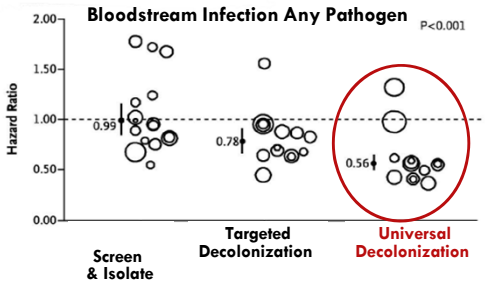
- Screened, isolated all MRSA (+) ICU patients
- Targeted nasal decolonization/CHG bathing only for **known MRSA (+)**

Arm 3: UNIVERSAL DECOLONIZATION

- No screening
- Universal nasal decolonization/CHG bathing for all ICU patients

RESULTS

Universal Decolonization Superior to Screen & Isolate and Target Decolonization



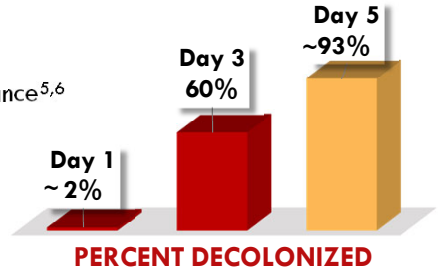
44% decrease in all-cause bloodstream infections

Huang SS et al. NEJM 2013; 368 (24):2255-65

Limitations of Mupirocin

Antibiotic - Mupirocin (Bactroban®) Limitations to Consider:

- **5-day BID course – limited effectiveness until day 3 of treatment**[1,2]
  - **42% compliance with 5-day BID**[3]
  - **Treatment failure** with eradication rate as low as 51%[4]
- **Antibiotic stewardship**
  - **Resistance -** Repeated users have a higher rate of resistance[5,6]
  - **Transfer of resistance to CoNS**[7]
    - Mupirocin-resistant CoNS has been reported at rates of 32.7% up to 75.2%.[8,9]
- **Selective mechanism**
  - **Narrow spectrum -** for gram-positive bacteria
- **Local hypersensitivity** reactions with mupirocin[10]



[1] Anderson 2015 Antimicr Agents & Chemotherapy 59 (5), pp. 2765-2773. [2] Casewell MW et al. J Antimicrob Chemother 1985;15:523 [3] Saraswat,. Annals of Thoracic Surgery 2017. [4] Liu Q-Z, et al. 2010. Int J Antimicrob Agents 2010;35:114-8. [5] Dadashi M et al. 2020. J Glob Antimicrob Resistance 20:238-247. [6] Deeny S, et al. 2015. J Antimicrob Chemother 70:3366-3378 [7] Eed E, et al. 2019. Am J Infect Control 47:1319-1323. [8] Bhatt MP, et al. 2016. Med J Armed Forces India 7254-8. [9] Sader HS et al. 2012. Diagn Microbiol Infect Dis 73:212-4. [10]Contact Dermatitis. 2019 Jun;80(6):397-398

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Nasal Decolonization Agents

Benefits	Alcohol-based antiseptic	Antibiotic prophylactic (mupirocin)	Povidone iodine antiseptic
Effective for gram (+) and (-)	✓	✗	✓
Non-antibiotic--no reported resistance	✓	✗	✓
99% reduction within the first minute	✓	✗	✓
Suitable for daily use	✓	✗	✗
Compliance assurance – easy and pleasant to use	✓	✗	✗

[1] Arden S. Op Forum Infect. Dis. 2019. 6(S2), [2] Anderson 2015 Antimicr Agents & Chemotherapy 59 (5), pp. 2765-2773. 3 Stern RA, et al. ICHE. 2022 Sep 26:1-4.

In Vitro Studies
Alcohol Nasal Antiseptic Pathogen Kill Test

GRAM-POSITIVE STAIN MICROORGANISMS

Challenge Microorganism	Exposure Time in Seconds	Percent Reduction
Enterococcus faecalis[1]	15	99.99
Mycobacterium smegmatis[2]	60	99.99
Staphylococcus aureus MRSA[2]	60	99.99
Staphylococcus aureus MSSA[2]	15	99.99
Staphylococcus epidermidis[1]	30	99.99
Streptococcus pneumoniae[2]	60	99.99
Streptococcus pyogenes[2]	60	99.99
Candida albicans[1]	15	99.99
Candida auris[1]	60	99.99

GRAM-NEGATIVE STAIN MICROORGANISMS

Challenge Microorganism	Exposure Time in Seconds	Percent Reduction
Acinetobacter baumannii[1]	15	99.99
Enterobacter aerogenes[1]	30	99.99
Escherichia coli[1]	15	99.99
Haemophilus influenzae[2]	60	99.99
Klebsiella aerogenes[1]	30	99.99
Klebsiella pneumoniae[1]	30	99.99
Proteus mirabilis[1]	30	99.99
Pseudomonas aeruginosa[1]	15	99.99

1 GLTC/Nozin® Testing: Microbiological Consultants, Inc., Huntington, WV
2 GLTC/Nozin® Testing: BioScience Laboratories, Inc., Bozeman, MT

This list is not exhaustive and does not include many others of the approximate 1,200 bacterial and fungal human pathogens known, to be highly susceptible to killing by alcohol nasal antiseptic is an OTC topical drug. No claim is made that it has an effect on any specific disease. This message is intended for healthcare professionals.

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Why Universal Nasal Decolonization for Every Inpatient?

Radically new definition of how to leverage the power of nasal decolonization to protect patients better, reduce cost and improve throughput

Definition	Objective
Decolonize every patient daily for length of stay with an alcohol-based nasal antiseptic.	Source control. Decolonization controls the reservoir, decreases the risk of endogenous infection in carriers, helps prevent transmission between patients, and reduces the incidence of HAIs.

What is the Paradigm Shift?

Radically new definition of how to leverage the power of nasal decolonization to protect patients better, reduce cost and improve throughput

Historical and Current		Destination
Screen and Isolate	Long	Universal Pre-Op
Targeted Pre-op and/or ICU		Universal ICU
"High-risk" patients	Journey	Universal non-ICU
No Risk Mitigation		**Protect ALL Patients**

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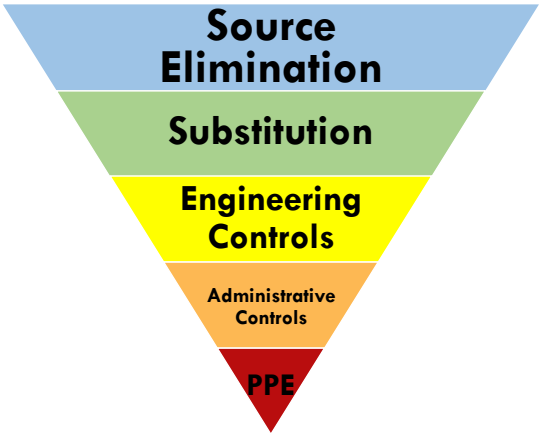
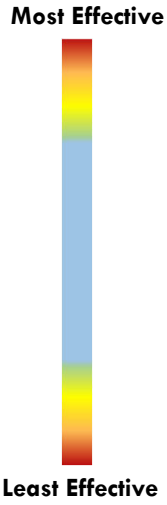
CDC NIOSH Hierarchy of Controls





CDC/NIOSH Hierarchy of Controls

PPE usage failure – HCP contaminated their skin or clothing nearly 50 - 80% during observations.

Transmission Based Precautions

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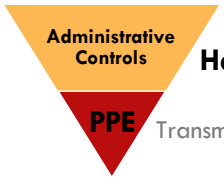
CDC/NIOSH Hierarchy of Controls

50% compliance after contact with the environment and 80% after direct patient contact.

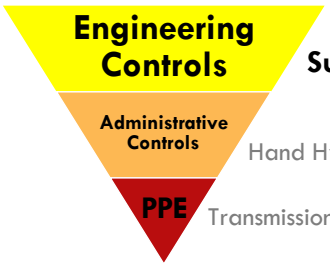


Hand Hygiene

Transmission Based Precautions

CDC/NIOSH Hierarchy of Controls

~ 50 - 68% of surfaces are NOT disinfected by routine daily cleaning or terminal cleaning.



Surface Disinfection

Hand Hygiene

Transmission Based Precautions

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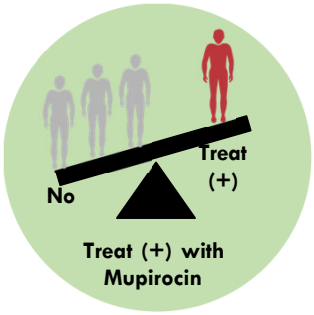
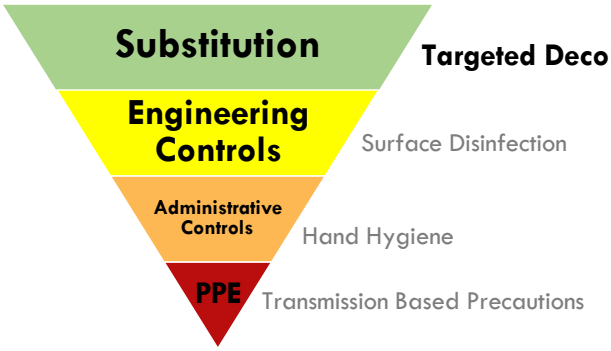
CDC NIOSH Hierarchy of Controls

35% of colonized patients were not detected when targeting patients for nasal decolonization

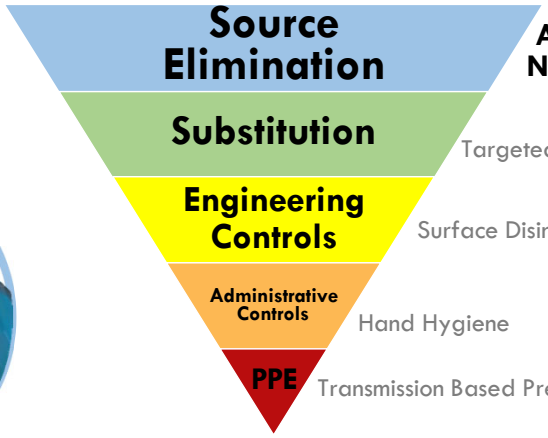




Targeted Decolonization
Surface Disinfection
Hand Hygiene
Transmission Based Precautions

CDC NIOSH Hierarchy of Controls

99% Antiseptic Decolonization Efficacy



Antiseptic Universal Nasal Decolonization
Targeted Decolonization
Surface Disinfection
Hand Hygiene
Transmission Based Precautions

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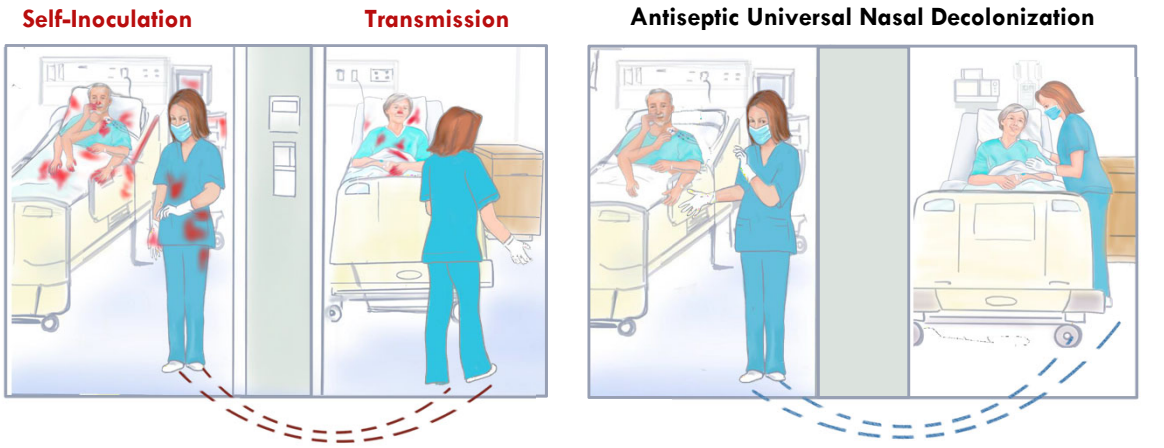
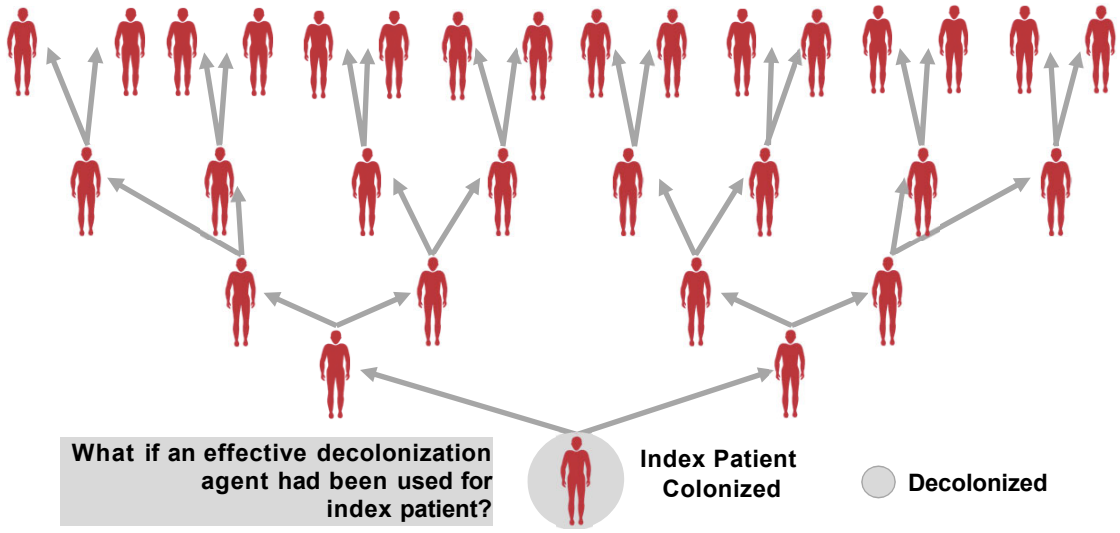
Successful Programs Must Address Both Sources of Infection Risks



TARGETING PREVENTION PROGRAMS DO NOT ADDRESS
Self-inoculation/Transmission infection risks simultaneously

ACTIVE SOURCE CONTROL PROGRAMS PROTECT ALL PATIENTS
From Self-inoculation/Transmission infection risks simultaneously

Decolonization as a Strategy for Preventing Antimicrobial-Resistant Infections - Dr. John A. Jernigan, MS, MS, CDC



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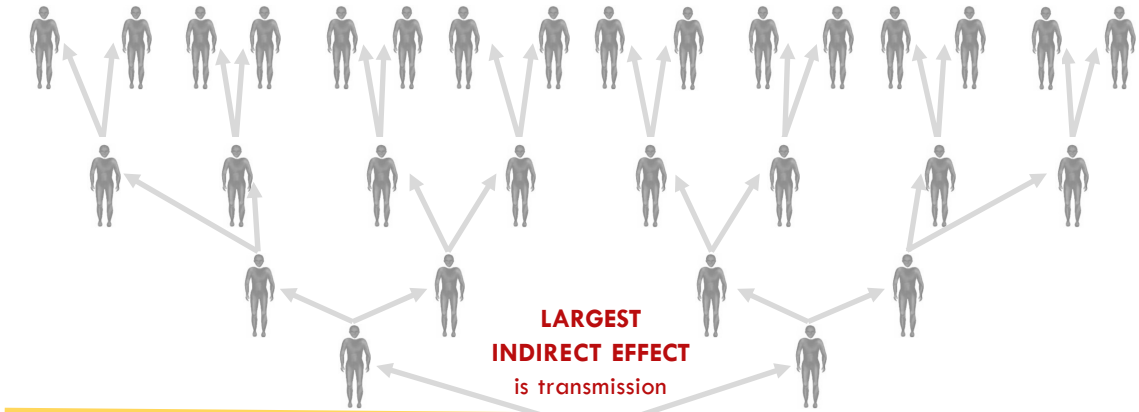
Decolonization as a Strategy for Preventing Antimicrobial-Resistant Infections - Dr. John A. Jernigan, MS, MS, CDC



Decolonizing 1 patient could prevent an estimated ~9 infections and ~3 deaths.

Clinical Evidence
Active Source Control Strategy

Daily Universal Nasal Antiseptic Decolonization

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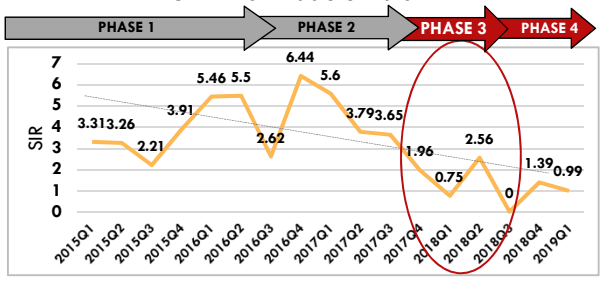
MRSA Bacteremia Reduction

Impact of a stepwise intervention on HO MRSA Bacteremia SIR

ICU PATIENTS Phase 1(Baseline)	ICU PATIENTS Phase 2	ADD ALL INPATIENTS Phase 3	CONTINUE ALL INPATIENTS Phase 4
-Target, Screen, and Isolate detected MRSA (+) -Universal daily CHG wipes.	• Continue Targeting, Screening, and Isolating for detected MRSA (+) • **Add** 5 BID course with mupirocin for all ICU patients • **Add** Daily CHG bathing for all inpatients	• **Stop** Targeting, Screening, Isolating, and Mupirocin • **Add** Universal Decolonization with Daily Nasal Antiseptic for LOS • Continue CHG bathing	• Continue Universal Decolonization with Daily Nasal Antiseptic for LOS • Continue CHG bathing • **Add** Hand-sanitizing wipes

HO – MRSA Bacteremia SIR



74% Reduction in MRSA bacteremia SIR

MRSA Bacteremia SIR decreased significantly from 3.65 (Phase I baseline) to 0.96 (Phase 4)* p-value= 0.003

380-bed community hospital in Miami, FL , 51-month project

Jimenez A. et al., *Op Forum Infect. Dis.* 2019. 6(S2)

MRSA Bacteremia Reduction

AUTHOR	BASELINE Nasal Product	BASELINE CHG	INTERVENTION	PATIENT POPULATION	OUTCOME Infection Reduction
Arden, 2019 Open Forum Infec. Dis	none	Ø	Universal Decolonization Program with Daily Alcohol Nasal Antiseptic	All Inpatients	100% MRSA Bacteremia (2.14 to 0)
Reeves, 2020 ICHE	none	Ø	Universal Decolonization Program with Daily Alcohol Nasal Antiseptic	All ICU Patients	100% MRSA Bacteremia (.24 to 0)

[1] Arden S. Op Forum Infect. Dis. 2019. 6(S2), S268 [2] Reeves L et al. Infect Control Hosp Epidemiol. 2020. 41(S1)

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Effects of Decolonization Protocols in Pediatric Critical Care Populations

AUTHOR	BASELINE		INTERVENTION	PATIENT POPULATION	OUTCOME Infection Reduction
	Nasal Product	CHG			
Schroeder, 2023 APIC Orlando	none	√	> 2 years Daily Alcohol Nasal Antiseptic <2 years Mupirocin 5 BID	Cardiac Intensive Care Unit (CICU)	86% 1.60 to 0.22 HO MRSA rates 100% 0.53 to 0.00 MRSA Bacteremia
		√	Nasal Decolonization Program with Mupirocin 5 BID	Neonatal Intensive Care Unit (NICU)	46% 1.28 to 0.69 HO MRSA rates 100% 0.35 to 0.00 MRSA Bacteremia

*Pediatric ICU: After including all patients 100% reduction in cases of MRSA bacteremia

Jennifer Schroeder, Effects of Decolonization Protocols in Pediatric Critical Care Populations, APIC Orlando 2023, 20-month study.

SSI Reduction

AUTHOR	BASELINE		INTERVENTION	PATIENT POPULATION	OUTCOME Infection Reduction
	Nasal Product	CHG			
Bostian, 2018 AAOS	none	√	Pre-Op and Post-Op Daily Alcohol Nasal Antiseptic	All Total Joint Arthroplasty Patients	79% All cause SSI total joints (1.5 to .34)
Franklin, 2020 AJIC	none	√	Pre-Op and Post-Op Daily Alcohol Nasal Antiseptic	All Total Joint Arthroplasty Patients	100% All-cause SSI total joints (Hip .91 to 0) (Knee .36 to 0)
Gnass, 2020 Open Forum Infec. Dis	Povidone-Iodine	√	Pre-Op and Post-Op Daily Alcohol Nasal Antiseptic Voluntary Staff Use	All Surgical Patients	63% (2.27 to .80) All-cause SSI
Arden, 2019 Open Forum Infec. Dis	Mupirocin	√	Pre-Op and Post-Op Daily Alcohol Nasal Antiseptic	All Inpatients	100% (.069 to 0) All-cause SSI

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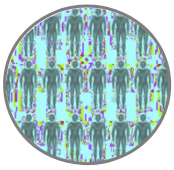
AORN eGUIDELINES+

AORN eGUIDELINES+

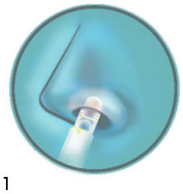
Updated AORN Guidelines on Preoperative Skin Antisepsis (2021)
Highlights on recommendations for nasal decolonization:

Universal Decolonization



Section 1.2.1
Universal decolonization (vs. targeted) resulted in **greater efficiency** and **lower cost** due to **SSIs prevented.**

Antiseptic



Section 1.3.1
An alternative to mupirocin is the use of an antiseptic (including an **alcohol-based antiseptic**)

Post-Op Decolonization

Section 1.4
Postop decolonization: Surgical patients may benefit from relatively short-term decolonization or **until the surgical incision has healed**

Financial Burden

SSI INFECTION[1]	
Excess LOS days	
SSI: 11	MRSA SSI: 23
Cost to treat MRSA Infection	
SSI: $20,785	MRSA SSI: $42,300

CLABSI INFECTION[1]	
Excess LOS days	
CLABSI: 10	MRSA CLABSI: 16
Cost to treat MRSA Infection	
CLABSI: $45,814	MRSA CLABSI: $58,614

[1]Zimlichman E et al.. *JAMA Intern Med.* 2013;173(22):2039-2046.

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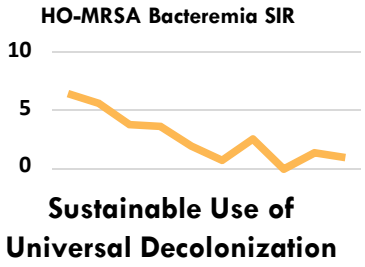
The Key to Success = People

Quality (Process) × **People** = **Results**



Sustainable Use of Universal Decolonization

Feldman, K. GE Change Acceleration Process (CAP). 2018. Retrieved May 12, 2023 @ https://www.isixsigma.com/dictionary/change-accerlartion-process-

The Monument Health Story

365-bed Community Hospital in Rapid City, South Dakota

GO SLOW TO GO FAST

MAKING THE PARADIGM SHIFT HAPPEN

Lou, IP

Ty, IP Director

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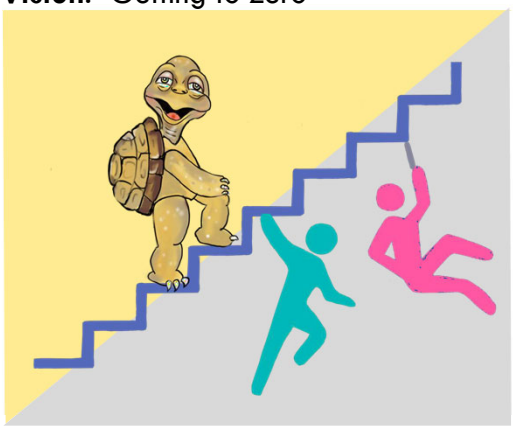
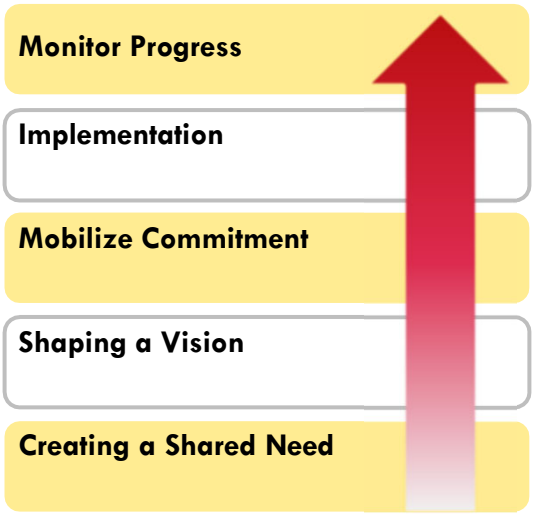
CHANGE MANAGEMENT PROCESS

Problem: Increased CLABSI, Other HAIs
Shared Need: Reduce HAIs
Vision: Getting to Zero





The Classic Change Commitment Curve, Daryl Conner's 8 Stages - Change Management World

The Monument Health Story
Creating a Shared need – Shaping a vision

Colonization Risk	Baseline Estimates	Post-Implementation Estimates
Total MRSA Colonized Patients	2,233	~0
Total MSSA Colonized Patients	5,855	~0
Total MRSA & MSSA Colonized Patients	8,088	~0
Total MRSA & MSSA Colonized Patients Days	29,938	~0
Hospital Staff in Contact with an MRSA & MSSA Colonized Patient	2,658,494	~0
Patients at Elevated Risk of MRSA Infection-related Readmission	2,233	~0

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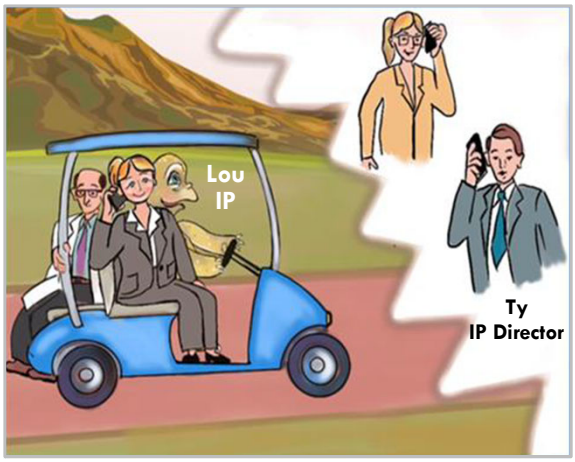
Mobilize Commitment



Change Acceleration Process (CAP) - isixsigma.com

OBJECTIVE:

- Team of committed supporters
  Co-champions, Stakeholders
  - IP
  - Pharmacy
  - Medical Staff
  - CNO
  - C-Suite
  - Frontline Staff
- Identification of potential resistance
- Conversion of key influencers

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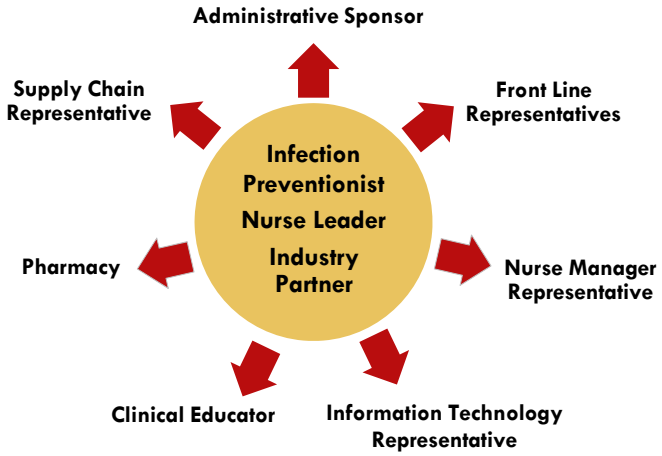
Implementation

Mobilizing Commitment with Frontline Staff



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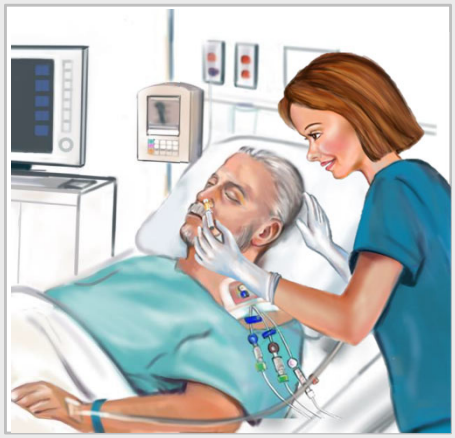
The Monument Health Story
Monitoring – Nasal Decolonization Process

- **Monitor the MAR/EMR documentation**
- **Communicate compliance findings to managers and frontline staff**
- **Address barriers**
  - **Product availability**
  - **Non-compliance**
  - **New staff education**

Nasal Decolonization Patient Experience

IMPROVEMENT IN PATIENT AND STAFF SATISFACTION



Monument Health

- **>90% Compliance**
- **Discontinued Screen and Isolate**
- **Product Acceptance**

- **Shorter Stays**
- **Improved Patient Safety/ Reduced HAIS**

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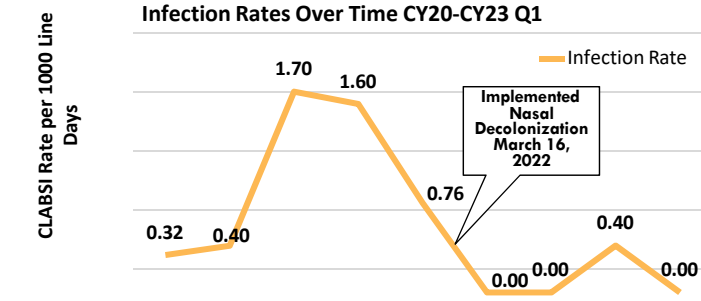
The Monument Health Story Outcomes

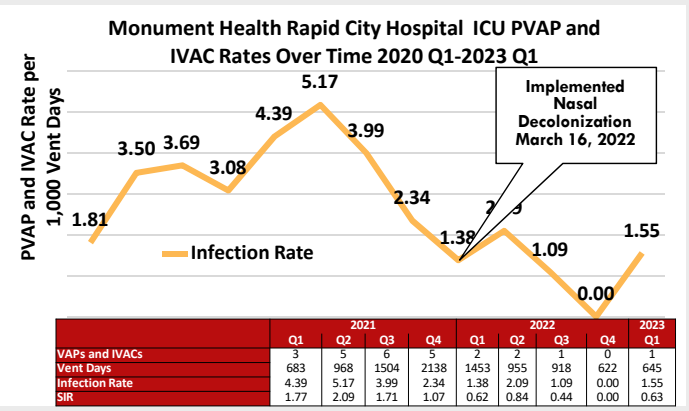


	2021				2022				2023
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
CLABSI #	1	1	5	5	2	0	0	1	0
CL Days	3140	2517	2936	3127	2636	2523	2621	2509	2604
Infection Rate	0.32	0.40	1.70	1.60	0.76	0.00	0.00	0.40	0.00
SIR	0.32	0.40	1.68	1.60	0.78	0.00	0.00	0.41	0.00

White T, Zalusky-Kamm L. 2023. APIC Breakfast Symposium: Getting to Zero: Mission impossible to mission completed. 2023 APIC conference, Orlando; Global life Tech Corp.

The Monument Health Story Outcomes

No change in VAP Bundle
Addition of Daily Application of Alcohol Nasal Antiseptic



	2021				2022				2023
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
VAPs and IVACs	3	5	6	5	2	2	1	0	1
Vent Days	683	968	1504	2138	1453	955	918	622	645
Infection Rate	4.39	5.17	3.99	2.34	1.38	2.09	1.09	0.00	1.55
SIR	1.77	2.09	1.71	1.07	0.62	0.84	0.44	0.00	0.63

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The Monument Health Story Outcomes

Monument Health
~Cost of CLABSI and VAP Pre versus Post-Implementation

Type of Infection	Avg cost/ infection*	12 month - Pre Implementation		12 month - Post Implementation		% Reduction	~Total Estimated Treatment Cost Reduction
		No. of HAIs	~Cost of HAI	No. of HAIs	~Cost of HAI		
CLABSI	$48,108	13	$625,404	1	$48,108	92%	$577,296
VAP	$47,237	9	$425,133	1	$ 47,237	89%	$377,896

White T, Zalusky-Kamm L. 2023. APIC Breakfast Symposium: Getting to Zero: Mission impossible to mission completed. 2023 APIC conference, Orlando; Global life Tech Corp.
Results | Agency for Healthcare Research and Quality (ahrq.gov)

The Monument Health Story Outcomes

Monument Health
Potential Gained Revenue through Excess LOS Days Avoided

Type of Infection	Avg excess LOS for 1 infection	12 month - Pre Implementation		12 month - Post Implementation		% Reduction	Potential Gained Revenue through Excess LOS Days Avoided[3]
		No. of HAIs	Excess LOS	No. of HAIs	Excess LOS		
CLABSI[1]	11.4	13	148	1	11.4	92%	$675,000
VAP[2]	7	9	63	1	7	89%	$277,500

[1] Stewart S, et al. Impact of healthcare-associated infection on length of stay. J Hosp Infect. 2021 Aug; 114:23-31.
[2] Lim WS. Pneumonia—Overview. Encyclopedia of Respiratory Medicine. 2022:185–97.
[3] Excess LOS avoided x census x net revenue per patient day. Based on publicly available information: $7,500.
4.White T, Zalusky-Kamm L. 2023. APIC Breakfast Symposium: Getting to Zero: Mission impossible to mission completed. 2023 APIC conference, Orlando; Global life Tech Corp.

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Monument Health Story

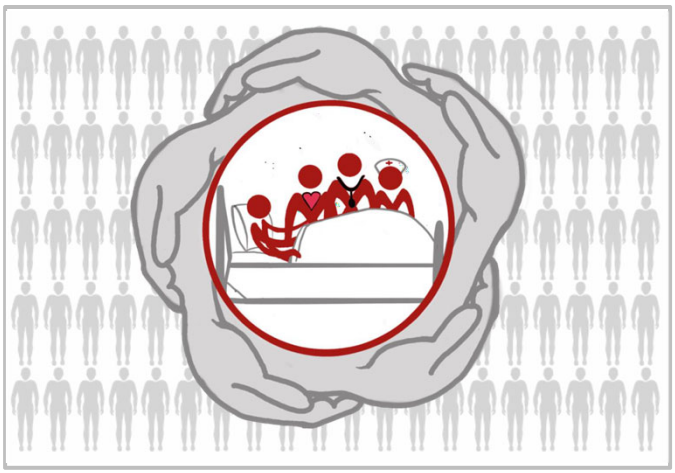
365-bed (39 Adult ICUs)Community Hospital in Rapid City, South Dakota

Actual Cost and Revenue Impact	
12 CLABSI infections avoided ($48,108 each est.)	**$577,296**
8 VAP infections avoided ($47,237 each est.)	**$377,896**
70 estimated avoided MRSA-related readmissions (under 90 days, $12,000 each est.)	**$876,000**
Total Avoidable Treatment Cost (est.)	**$1,831,792**
Product Cost (est.)	**- $465,964**
Potential Overall Savings (est.)	**$1,365,828**
Potential Gained Revenue through 211 Excess LOS Days Avoided	**$952,500**

[1] Stewart S, et al. Impact of healthcare-associated infection on length of stay. J Hosp Infect. 2021 Aug; 114:23-31.
[2] Lim WS. Pneumonia—Overview. Encyclopedia of Respiratory Medicine. 2022:185–97.
[3] Excess LOS avoided x census x net revenue per patient day. Based on publicly available information: $7,500.
4.White T, Zalusky-Kamm L. 2023. APIC Breakfast Symposium: Getting to Zero: Mission impossible to mission completed. 2023 APIC conference, Orlando; Global life Tech Corp.

Paradigm Shift – Protect All Patients

PROTECT ALL PATIENTS



Active Source Control Strategy

Mitigate the risk of colonization through UNIVERSAL NASAL DECOLONIZATION

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Implement a Universal Colonization Risk Mitigation Program

- **Improve HAI patient outcomes -** largest impact on HAI/MRSA infections and readmissions of any single program intervention.
- **Cost-effective**- No capital investment; potentially reduce CMS penalties associated with HACs and excess readmissions.
- **Supports operational efficiency-** Low impact on staff – Improves throughput and easy to deploy and scale
- **Safe and well tolerated-** Improve the quality of patient care and satisfaction; avoids antibiotic resistance

Questions?

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Resources for Staphylococcal Decolonization

Centers for Disease Control and Prevention. Strategies to prevent hospital-onset(HO) *Staphylococcus aureus* bloodstream infections in acute care facilities, 2019. https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html

Society for Healthcare Epidemiology of America. Strategies to prevent methicillin-resistant Staphylococcus aureus transmission and infection in acute care hospitals: 2014 Update. 35(s2) Sept 2014:S108-S132. DOI: https://doi.org/10.1017/S0899823X00193882

Health Research and Educational Trust. Preventing surgical site infections: 2018 Update. http://www.hret-hiin.org/Resources/ssi/18/surgical-site-infections-change-package.pdf

World Health Organization. Global guidelines on the prevention of surgical site infection, 2016. https://www.who.int/gpsc/ssi-prevention-guidelines/en/

Bode et al. Preventing surgical-site infections in nasal carriers of *Staphylococcus aureus*. *N Engl J Med* 2010; 362:9-17.

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Studies

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Candray, K. (2020). Improving patient compliance with preoperative universal decolonization to reduce surgical infection rate and costs. Poster abstract presented at Infectious Diseases Society of America (IDSA) Annual Conference, October 2020. http://bit.ly/IDSA_2020-Candray

Cernich, C. (2020). Universal Preoperative Antiseptic Nasal and Skin Decolonization for Reduction in SSI and Associated Costs. *American Journal of Infection Control,* 48(S8), S50. https://doi.org/10.1016/j.ajic.2020.06.065

Christie, J., Wright, D., Liebowitz, J., & Stefanacci, P. (2020). Can a nasal and skin decolonization protocol safely replace contact precautions for MRSA-colonized patients? *American Journal of Infection Control,* 48(8), 922–924. https://doi.org/10.1016/j.ajic.2019.12.016

Deatherage, N. (2016). Impact of Reduced Isolation and Contact Precaution Procedures on Infection Rates and Facility Costs at a Non-Profit Acute Care Hospital. American Journal of Infection Control, 44(S6), S101–S102. https://doi.org/10.1016/j.ajic.2016.04.091

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Gnass, S. (2020). Improving outcomes with revised preoperative universal decolonization protocol. Poster abstract presented at Infectious Diseases Society of America (IDSA) Annual Conference, October 2020. http://bit.ly/IDSA_2020-Gnass

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Studies

Jimenez, A., Sposato, K., De Leon Sanchez, A., Williams, R., & Francois, R. (2019). Reduction of Hospital-Onset Methicillin-Resistant Staphylococcus aureus (MRSA) Bacteremia in an Acute Care Hospital: Impact of Bundles and Universal Decolonization. *Open Forum Infectious Diseases,* 6(S2), S268. https://doi.org/10.1093/ofid/ofz360.635

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White T, Zalusky-Kamm L. (2023). APIC Breakfast Symposium: Getting to Zero: Mission impossible to mission completed. 2023 APIC conference, Orlando; Global life Tech Corp

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