Understanding secondary bacterial infections associated with COVID-19 and influenza

Evaluating how a nasal colonization risk mitigation strategy can help improve patient outcomes

Housekeeping

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Introduction

Gwen Borlaug MPH, CIC, FAPIC

Consultant

Disclosure: Gwen Borlaug, member of the Global Life Technologies Corp. Speaker's Bureau

Learning Objectives

- Describe how secondary bacterial infections impact patients with respiratory viral infections such as COVID-19 and influenza.
- Describe the interactions among influenza virus, the nasal microbiome and *Staphylococcus aureus.*
- Identify nasal and skin decolonization as a potential strategy to mitigate risk of MSSA and MRSA secondary infections associated with respiratory viral infections.
- List the benefits of universal, house-wide nasal and skin decolonization for hospital patients.

Topics

I. Secondary bacterial infection in viral respiratory disease

II. Bacterial colonization: A risk factor for secondary bacterial infection

III. Exploring risk mitigation strategies

IV. Universal nasal decolonization: A strategy to prevent healthcare-associated *S. aureus* infections

Secondary bacterial infections following viral respiratory disease

Section I

Gwen Borlaug MPH, CIC, FAPIC

Secondary bacterial infections (SBI)

Bacterial co-infection – a bacterial infection occurring simultaneously with onset of respiratory viral infections

Secondary bacterial infection – most commonly presents as bacterial infection (e.g. pneumonia), occurring after onset or in recovery phase of respiratory viral infections

These infections are associated with:

- greater severity of illness
- greater use of healthcare resources
- increased risk of death

Secondary bacterial infection among COVID-19 patients

SBI in COVID-19 patients increase morbidity, mortality and antimicrobial resistance (AMR) threat

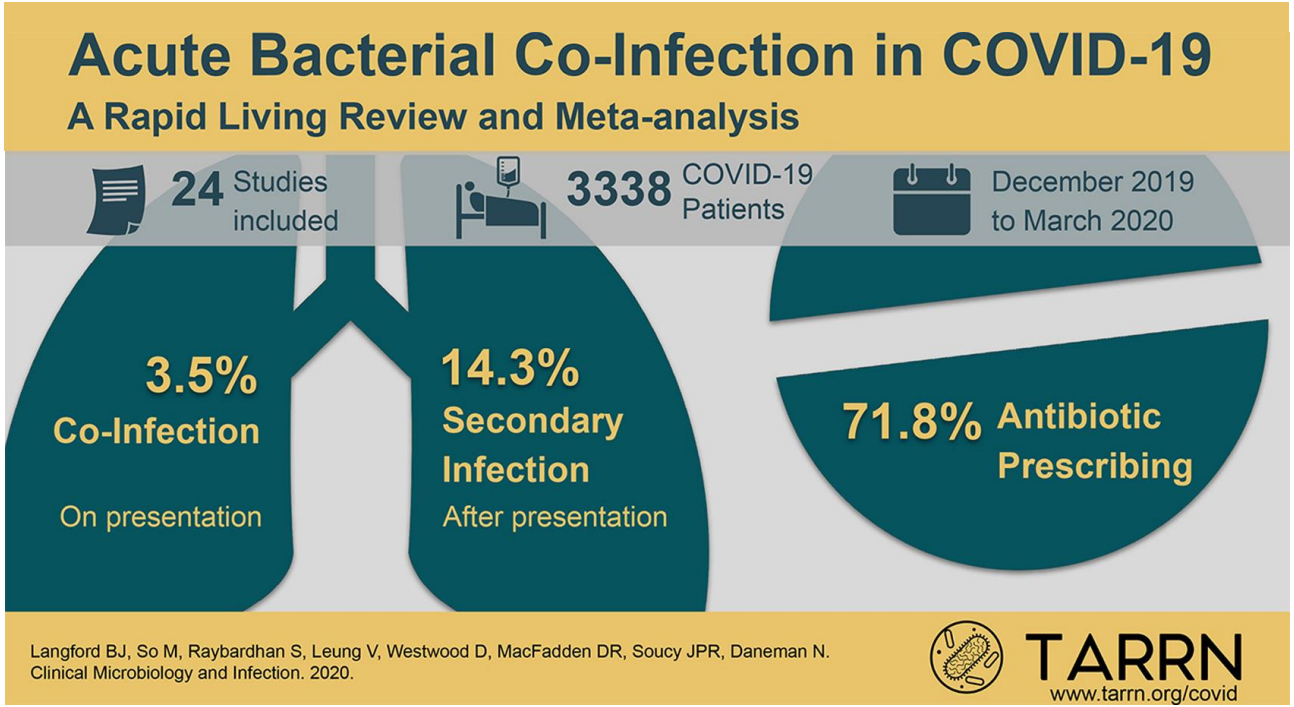
Most prevalent pathogens:

S. aureus
S. pneumoniae
N. menigitides
H. influenzae
K. pneumoniae

- Hospital acquired-infection in **13.5%** patients (Yang et al.)
- **50%** of non-survivor cases had SBI
- VAP in **31%** of patients requiring invasive respiratory support (Zhou et al.)
- **57.9%** of severely and critically ill patients developed secondary bacterial infections. (Zhang et al.)
- SBI developed at a median of **17** days after illness onset (Zhou et al.)

* Manohar *et al*. Frontiers in Medicine. August 2020 (7). Doi10.3389/fmed.2020.00420
Zhou F et al. The Lancet. Vol395, 10299, P1054-1062. March 28 2020
Zhang H et al. Emerging Microbes and Infections. Vol 9, P1958-1964 2020
Yang X et al. Lancet Respir Med. 2020;8(5):475–481.

Acute bacterial co-infections associated with COVID-19 illness



4.9%
(2.6 to 7.1)
Co-infection

16%
(12.4 to 19.6)
Secondary Infection

UPDATE: October 29, 2020
38 studies

Accessed February 22, 2021

Multicenter, Case-Control Study

Risk Factors and Outcomes of Hospitalized Patients with Severe COVID-19 and Secondary Bloodstream Infections: A Multicenter, Case-Control Study

- 34% (128/375) of COVID-19 patients developed secondary BSI
- 91% caused by bacterial pathogens
  - *S. aureus*
  - *Enterococcus spp.*
  - *E. coli*
- 51% were hospital-associated
- Sources
  - Unknown
  - CLABSI
- Increased hospital stays and worse clinical outcomes
- Conclusions
  - Antimicrobial measures in hospitals need to be improved
  - Further studies need to develop prevention and treatment protocols

Bhatt P. et al. *Clin Infect Dis.*2020 Nov 20

Secondary bacterial infections among COVID-19 patients

Retrospective observational case series of patients with coronavirus disease 2019 (COVID-19) who developed secondary *S. aureus* bacteremia across 2 New York City hospitals.

42 hospital patients with secondary *S. aureus* bacteremia

55% and 67% died at 14 days and 30 days respectively following first positive blood culture

Independent risk factors for 14 day mortality included hospital onset bacteremia and age

Docherty AB et al. medRxiv: 2020.

Secondary bacterial infections associated with COVID-19: Risk

Endogenous colonization with flora harboring antimicrobial resistance

Data is suggestive of nosocomial transmission of hospital organisms in critically ill ventilated patients

Colonization is a risk:

- COPD is comorbidity in severe COVID-19. COPD patients are colonized by bacterial pathogens even at the stable phase of the disease, making it likely that SBI infection occurs in patients already colonized with bacteria.

Nosocomial acquisition likely:

- The median LOS of COVID-19 patients: 7 days (can reach ≥14 days)
- Risk of a hospital-associated pneumonia increases significantly the longer the hospitalization period.
- More than 90% of hospital-associated pneumonias are associated with mechanical ventilation, one of the therapeutics used in COVID-19 patients admitted in the ICU.

Docherty AB et al. medRxiv: 2020.

SBI in COVID-19: *Statement from front-line intensive care experts*

The experts suggest closely monitoring the signs of **secondary infection**, especially in critically ill patients with COVID-19 who have been admitted to ICU > 48 h (expert opinion).

Rationale

- Both long course of the disease and immunosuppressive state place the severe and critical COVID-19 patients at a high risk of secondary infection (including bacteria and fungus).
- The data on the epidemiology of secondary infection in COVID-19 patients are lacking.
- Based on the evidence from H1N1, **secondary infection** is **very common** in patients admitted to ICU > 48 h.
- Strategies for **preventing healthcare-acquired infections** should be effectively implemented, and multiple site samples (blood, sputum, etc.) should be routinely collected to monitor the signs of secondary infection.

* **Management of critically ill patients with COVID-19 in ICU: Statement from front-line intensive care experts in Wuhan, China**
Ann. Intensive Care **10,** 73 (2020).

The national standard infection ratio for central line-associated bloodstream infections increased:

in 2020 Q2 vs. 2019 Q2

Healio

Source: Patel PR, et al. *Infect Control Hosp Epidemiol*. 2021;doi:10.1017/ice.2021.108.

Secondary bacterial infections associated with influenza

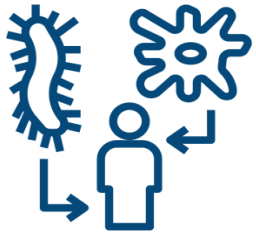
Influenza virus infects 5%–20% of the US population yearly, with 23,000 to 61,000 deaths annually.

Up to 75% of those infected with influenza that go on to acquire pneumonia are confirmed to have SBI

USA: influenza and pneumonia currently rank 8th overall as a cause of death, annually.

In seasonal epidemics, SBI associated with influenza is associated with:

- increases in hospital admissions
- more severe symptoms
- increases in mortality (mortality rates ranging from 11- to 15-fold higher than those of influenza alone)

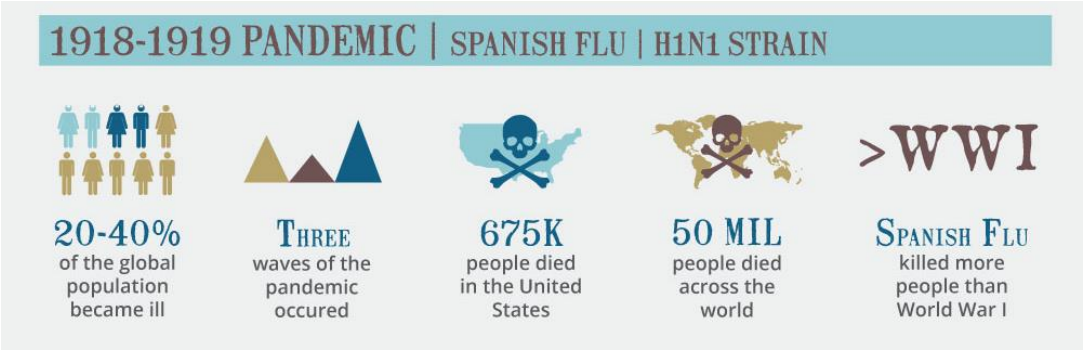


Most common causative pathogens

Streptococcus pnuemoniae
Staphylococcus aureus,
Haemophilus influenzae

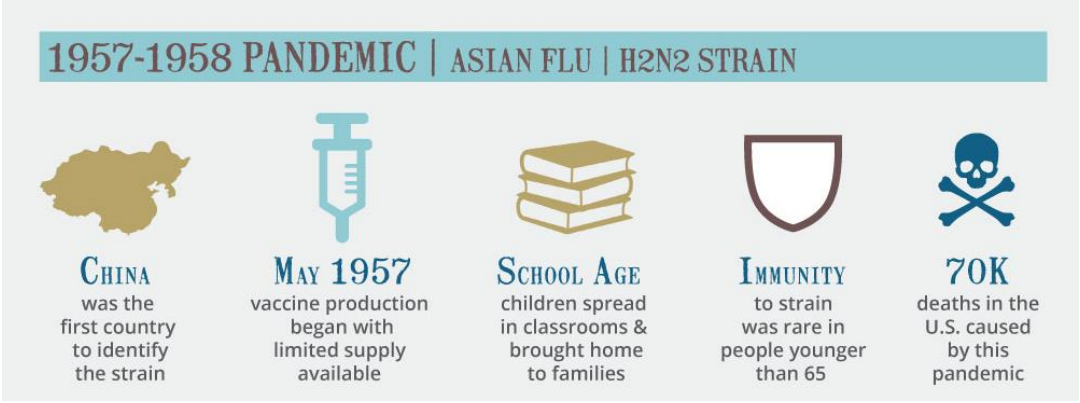
* Hoyert DL, Xu J. Deaths: preliminary data for 2011. Natl Vital Stat Rep. 2012;61:1-51.

Secondary bacterial infections during influenza pandemics



>95% of deaths attributable to secondary bacterial pneumonia (est.)

Streptococcus pneumoniae most frequently recovered etiologic agents



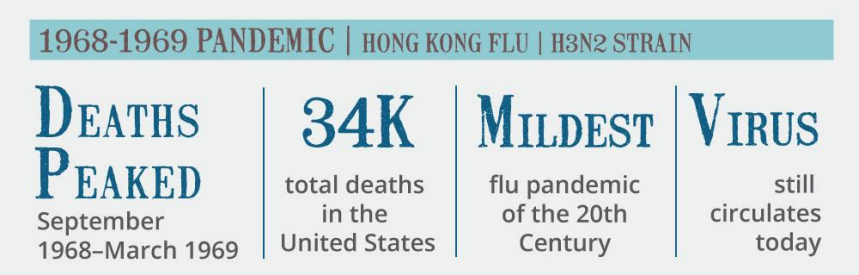
1.5 million deaths worldwide

Staphylococci assumed a novel prominence as the leading etiologic agent

Secondary **staphylococcal** infections continued to be seen through the second wave of the “Asian flu” in 1960–1961

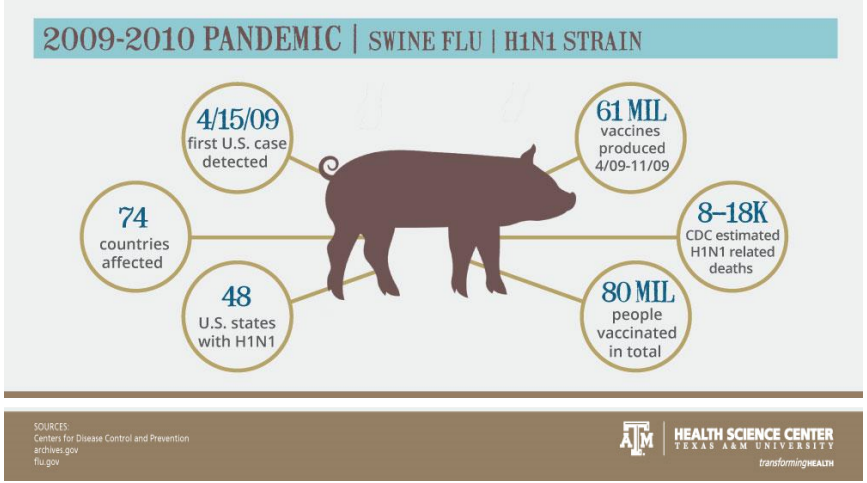
* Morens DM, Taubenberger JK, Fauci AS., *J Infect Dis* 2008, vol. 198 (pg. 962-70)

Secondary bacterial infections during influenza pandemics



Higher risk age/group: elderly

A high correlation between pneumonia, especially **staphylococcal** pneumonia, and influenza infection was documented.



Higher risk age/group: children, teens and young adults

30-55% of case mortality associated with bacterial pneumonia

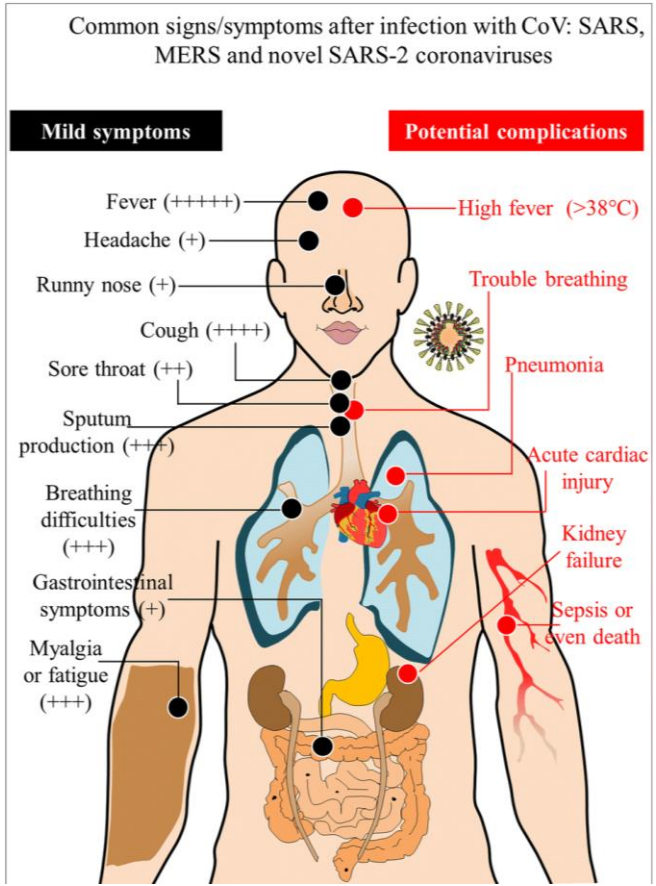
S. pneumoniae most common bacteria identified

Pediatric ICU studies:

- 33% with SBI, ***S. aureus/MRSA*** most common (26%)
- 51% with SBI, ***S. aureus*** most common (35%)

* Morris D. et al. Front. Microbiol 2017. 8:1041
MacIntyre, C.R., *et al. BMC Infect Dis* **18,** 637 (2018)
Schwarzmann SW, et al. *Arch Intern Med*, 1971, vol. 127(pg. 1037-41)

Secondary bacterial infections during previous coronavirus outbreaks



SARS-CoV (2002) and **MERS-CoV** (2012) caused severe pneumonia and death.

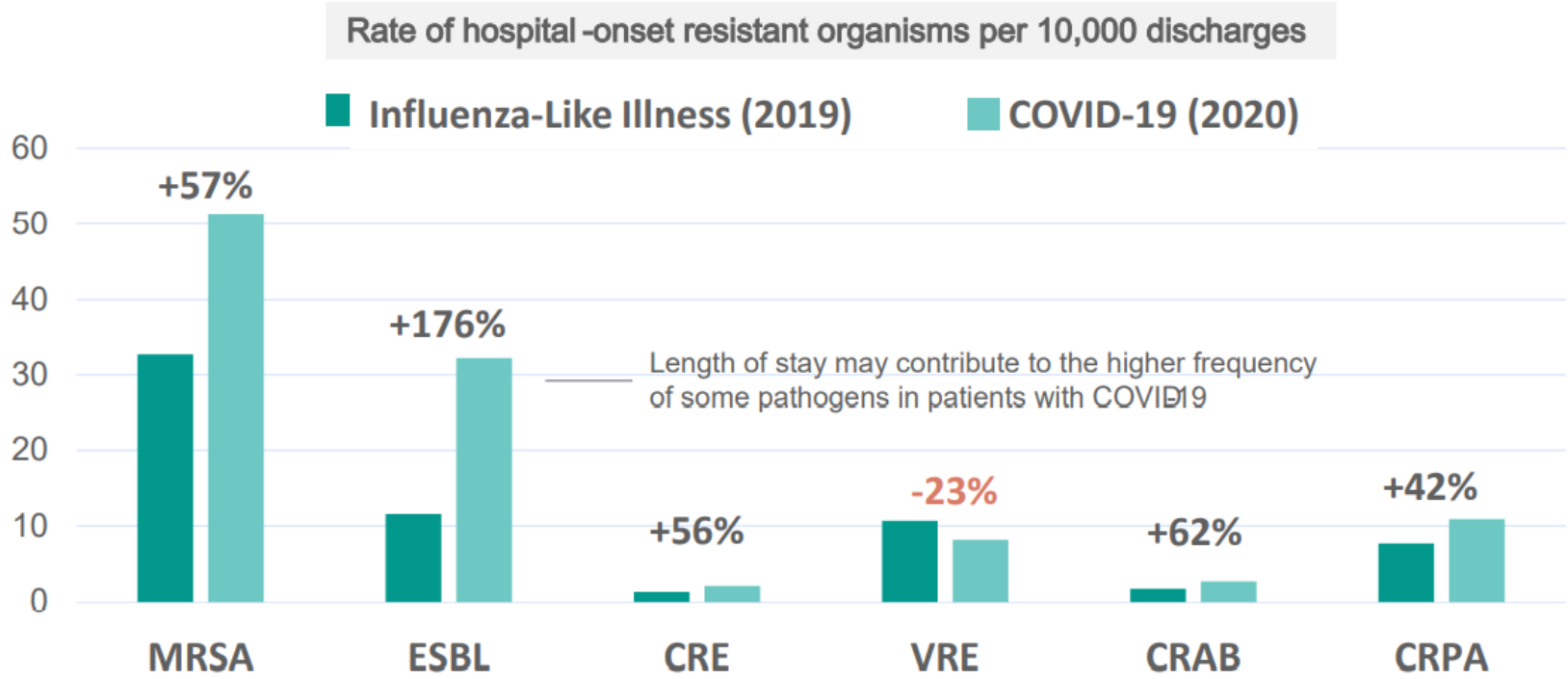
SARS-CoV**:** up to 30% of patients diagnosed with secondary bacterial infections (positively associated with disease severity)

Common etiologic agents:

- SARS-CoV—**MRSA**, Klebsiella, P. aeruginosa and Streptococcus
- MERS—**MRSA**, others included carbapenem-resistant *Acinetobacter baumannii*, VRE and *S. pneumoniae*

* da Costa, et al. *Arch Virol* **165,** 1517–1526 (2020).
Mizraei R. IUBMB Life 2020;1-15

Antibiotic-Resistant Pathogens in Hospitalized Patients: Hospital-onset



The Intersection of Antibiotic Resistance (AR), Antibiotic Use (AU), and COVID-19 (hhs.gov)

Of the six pathogens, MRSA and ESBL contribute the most to total costs nationally due to their high burden despite having lower healthcare costs per case. The paper was published in *Clinical Infectious Diseases* in early 2021.

Clinical Infectious Diseases, Volume 72, Issue Supplement_1, 15 January 2021, Pages S17–S26, https://doi.org/10.1093/cid/ciaa1581

Key Takeaways

- **Healthcare infection control is critical to fighting AR and SARS-CoV-2 infections**
  - No clear evidence that COVID-19 patients are more susceptible to bacterial/fungal infections—similar frequency as patients with influenza-like illness (ILI). **However, we are seeing sporadic outbreaks of AR infections in COVID units & higher rates of hospital onset infections**
  - COVID-19 creates perfect storm for AR infections **in healthcare settings:** length of stay, crowding, sick patients, antibiotic use, infection control issues
- **Antibiotic use fluctuated, appears stable but remains too high**
  - Hospitals: Spiked in early 2020 but flattened as pandemic continued
  - Outpatient, nursing homes: Significant drops from previous years
- Highlights continued importance of infection control and antibiotic stewardship—**both are dependent on the resiliency of these programs**

The Intersection of Antibiotic Resistance (AR), Antibiotic Use (AU), and COVID-19 (hhs.gov)

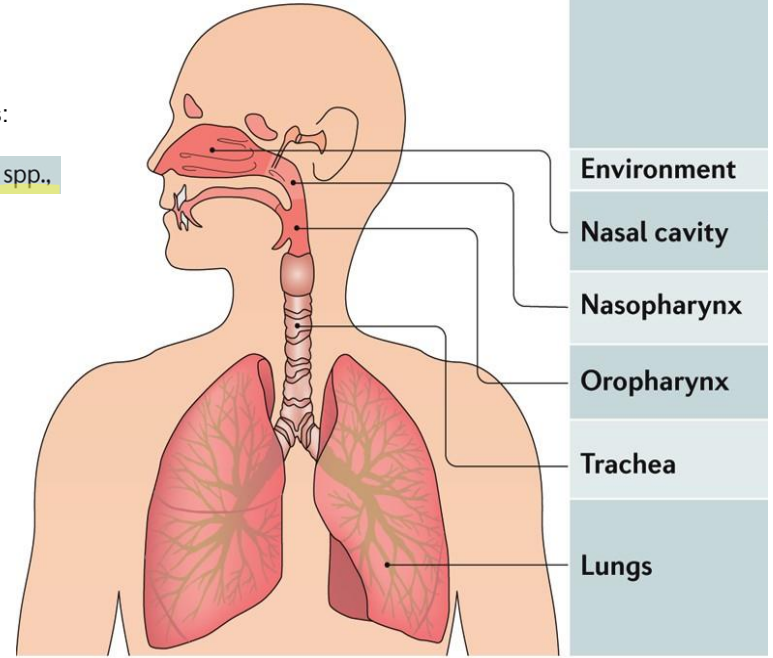
Bacterial colonization: a risk factor for secondary bacterial infection

Section II

Gwen Borlaug MPH, CIC, FAPIC

Colonization in respiratory tract

Anterior nares: reservoir
Staphylococcus spp.,



Viral infections are associated with increased colonization by potentially pathogenic bacteria (known as "pathobionts" or **opportunistic pathogens**).

Staphylococcus spp., *Propionibacterium* spp., *Corynebacterium* spp., *Moraxella* spp. and *Streptococcus* spp.

Moraxella spp., *Staphylococcus* spp., *Corynebacterium* spp., *Dolosigranulum* spp., *Haemophilus* spp. and *Streptococcus* spp.

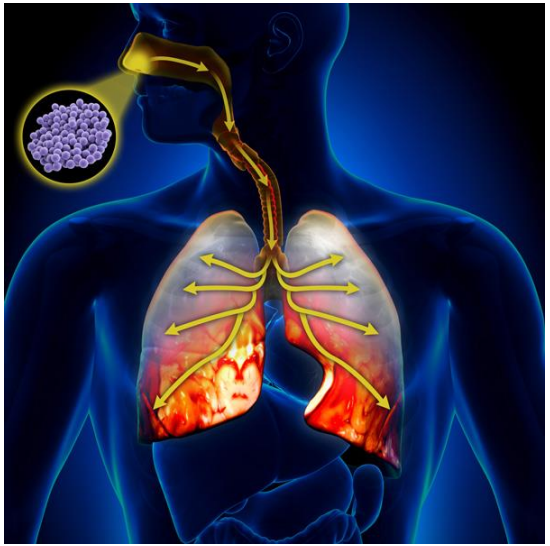
Streptococcus spp., *Rothia* spp., *Veillonella* spp., *Prevotella* spp. and *Leptotrichia* spp.

Prevotella spp., *Veillonella* spp., *Streptococcus* spp. and *Tropheryma whipplei*

Nature Reviews | Microbiology

Bacterial colonization in upper respiratory tract

Bacterial colonization of the upper respiratory tract (URT) is generally considered as the first step in the development of invasive bacterial infections, including secondary bacterial infections following respiratory viral infection.



Possible **mechanisms** by which influenza and other viral infections might predispose infected hosts to secondary bacterial pneumonia is by:

- fostering enhanced growth of pathogens; increasing nasal colonization ***S. aureus***
- facilitating the subsequent entry of large bacterial loads into the lower respiratory tract (LRT)

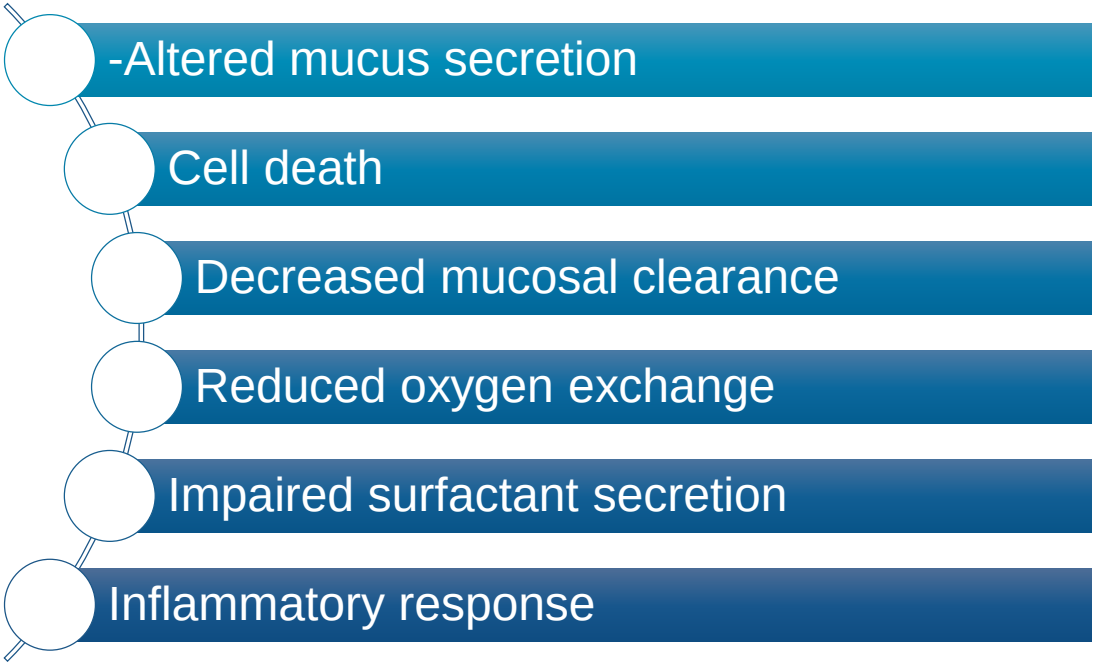
Influenza virus infection is believed to facilitate migration of bacteria from URT to LRT where pathogens can now cause serious disease.

* Wertheim HFL, et al. *Lancet Infect Dis*. (2005) 5:751–62.
Bogaert D, et al.. *Lancet Infect Dis*. (2004) 4:144–54.
Takase H, et a. *Microbiol Immunol*. (1999) 43:905–7.

Mechanisms responsible for SBI with viral respiratory infections

Viral infections promote bacterial colonization of the airway through a variety of mechanisms/detrimental changes:

Damage to cells and lung infrastructure enables bacteria to increase adherence and invasion



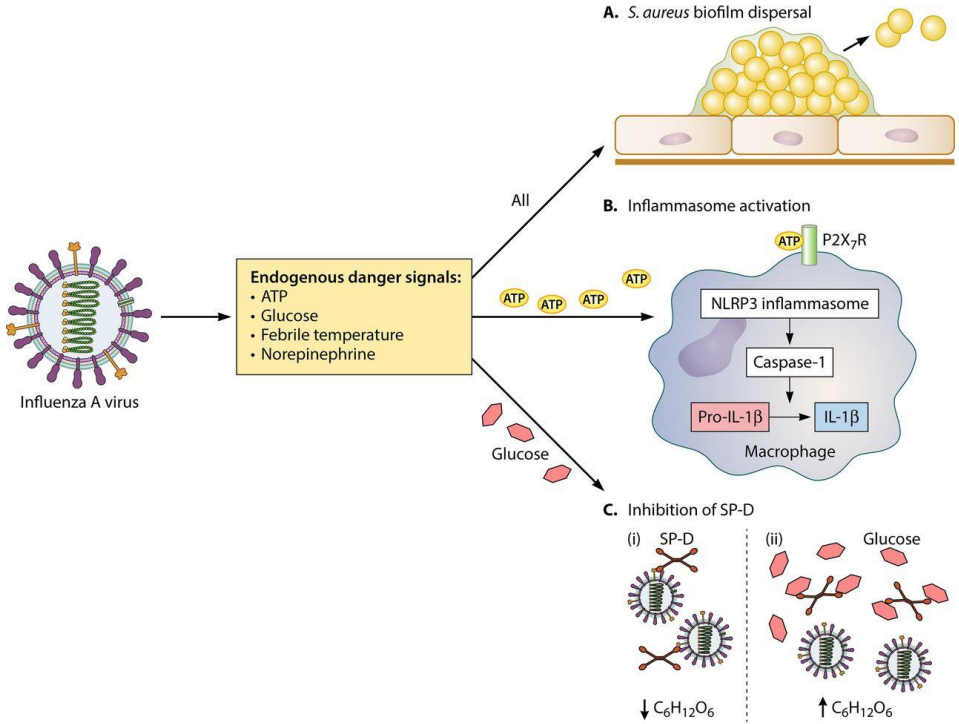
Nasal colonization: *Staph aureus* and influenza

Nasal carriage of *S. aureus* is a significant risk factor for secondary staphylococcal pneumonia in influenza A virus (IAV)-infected hosts.

Persistent nasal carriers of ***S. aureus*** are predisposed to invasive disease, including secondary staphylococcal respiratory infection.

S. aureus may be aspirated from the nose into the lung, with the potential to cause respiratory infection in a host made susceptible by presence of IAV.

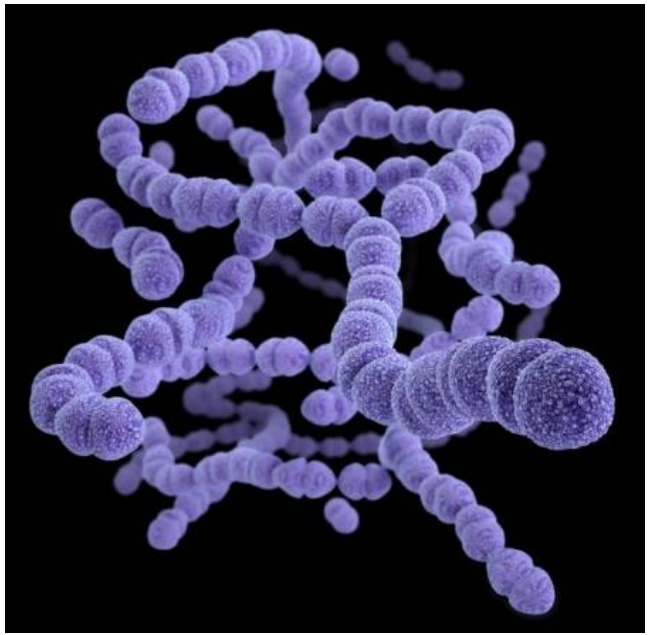
S. aureus biofilm dispersal from the nasal environment into the lung is another mechanism of potential inoculation.



Roles of endogenous danger signals during influenza A viral infection.

Michelle E. Mulcahy, and Rachel M. McLoughlin mBio 2016; doi:10.1128/mBio.02068-16

Streptococcus pneumoniae



- Most common bacteria found in SBIs
- High mortality and morbidity during influenza epidemics and pandemics.
- Most common cause of community-acquired pneumonia and invasive disease (sepsis and meningitis) worldwide. (30% lab-confirmed cases of CAP involve bacterial-viral co-infection)
- 4 million cases of infection and 22,000 deaths annually in USA (2011 data*)
- **Pneumococcal vaccination** has shown to reduce risk of secondary bacterial pneumonia.
- Vaccine implementation has successfully reduced pneumococcal disease, (**45% reduction** in **incidence** in those with influenza)

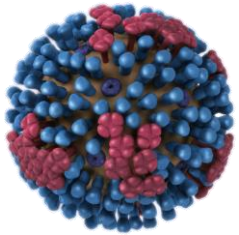
Morris D. et al. Front. Microbiol 2017. 8:1041

Staphylococcus aureus

- *S. aureus* infection in the intensive care unit (ICU) most commonly manifests as sepsis, VAP, and infection of surgical sites and indwelling medical devices.
- ***S. aureus* nasal colonization has been identified as a major risk factor for the development of nosocomial staphylococcal infection**.
- 20–30% of the healthy population is persistently colonized by *S. aureus* and 60% are intermittently colonized
- Although vaccine development has lowered the mortality of other bacterial infections, all vaccination attempts aimed at preventing *S. aureus* invasive infections have failed in human trials.

* Wertheim, H.F.; et al. *Lancet Infect. Dis.* **2005**, *5*, 751–76
Kuehnert MJ, J Infect Dis. 2006 Jan 15;193(2):172-9

Staphylococcus aureus and influenza



- Complicates influenza infection, increasingly so in more recent years/pandemics.
- Common cause of pneumonia, specifically necrotizing pneumonia caused by MRSA (30% mortality rate)
- MRSA currently accounts for 20%–40% of hospital-acquired and ventilator-associated pneumonias and 9% of community-acquired pneumonias.
- Increased intensive care admission, mechanical ventilation, and mortality have been described in children and young adults with influenza A and concomitant *S. aureus* infection compared to those with either influenza or *S. aureus* infection alone.

* Morris D. et al. Front. Microbiol. 2017. 8:1041
Rubinstein E, et al . Clin Infect Dis. 2008;46(Suppl 5):S378–85.
Vardakas KZ, et al. Eur Respir J. 2009;34:1148–58.
Williams DJ, et al. Arch Pediatr Adolesc Med. 2011;165:506–12.

Exploring risk mitigation strategies

Section III

Mitigating risk

Most effective risk mitigation strategies:

#1 Influenza vaccine !!!

Pneumococcal vaccine
Haemophilus influenzae vaccine
Prompt antiviral treatment/prophylaxis

Eventually: SARS-CoV-2 vaccine

Risk mitigation for staphylococcal SBI

Modifiable risk factors

Respiratory viral infection promotes nasal colonization. Preventive measures can be directed at reducing nasal colonization to mitigate the risk of subclinical aspiration of bacteria colonizing the nose.

Nasal colonization

Nasal carriage of *S. aureus* is a significant risk factor for secondary staphylococcal pneumonia.

Colonization—subsequent infection

Transmission/ acquisition HAI

Secondary infections can be acquired from the patient's environment i.e., hospital-acquired or nosocomial infections.

Transmission—acquisition—subsequent infection

S. aureus nasal colonization, a risk factor for infections

S. aureus nasal colonization, a risk factor for infections.

***S. aureus* nasal colonization, a risk factor for**	**Reference**		
Surgical site infections after orthopedic surgeries	Kalmeijer et al., 2000; Yano et al., 2000; Weiser and Moucha, 2015	*S. aureus* infections in HIV-infected patients	Nguyen et al., 1999; Sissolak et al., 2002
Surgical site infections after cardiac surgeries	Kluytmans et al., 1995; Muñoz et al., 2008	ICU-associated *S. aureus* infections	Honda et al., 2010
Bacteremia in nonsurgical patients	Wertheim et al., 2004	Recurrent furunculosis and impetigo	Durupt et al., 2007; Demos et al., 2012
Catheter-related infections in dialysis patients	Luzar et al., 1990; Katneni and Hedayati, 2007	Diabetic foot ulcer infections	Dunyach-Remy et al., 2017

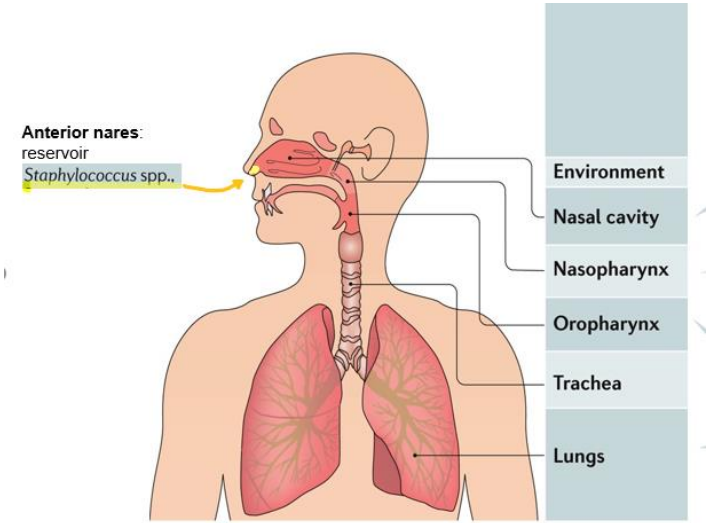
Nasal carriage of *S. aureus* is a significant risk factor for secondary staphylococcal pneumonia in influenza A virus (IAV)-infected hosts.

* Mulcahi et al. mBio 7(6) 2016
Sakr A, et al Front Microbiol. 2018; 9: 2419. 2018 Oct

Can nasal decolonization be considered a supplemental risk mitigation strategy to prevent secondary staphylococcal pneumonia?

Risk mitigation for staphylococcal SBI

Nasal decolonization as a risk mitigation strategy??



Pathogenesis of HAP and HCAP in non-intubated patients

- Micro-aspiration of contaminated nasal/oropharyngeal secretions into the lung in persons with compromised defense mechanisms

~ MAYBE

Pathogenesis of VAP

- Aspiration of oropharyngeal or gastric contents that have been colonized by endogenous flora

~ MAYBE

Pathogens from the environment / Acquisition

- hands or attire of healthcare workers
- pathogens attached to respiratory equipment

~ YES, as source control

* Guide to Infection Control in the Healthcare Setting: Pneumonia. International Society for Infectious Diseases. 2018. https://isid.org/guide/hospital/pneumonia Accessed November 3, 2020.

Risk mitigation for staphylococcal SBI

Should nasal and skin staphylococcal decolonization protocols be deployed in long-term care facility COVID-19 units as source control to mitigate transmission of MSSA and MRSA??

Universal nasal decolonization:
A strategy to prevent hospital-onset *S. aureus* infections

Section IV

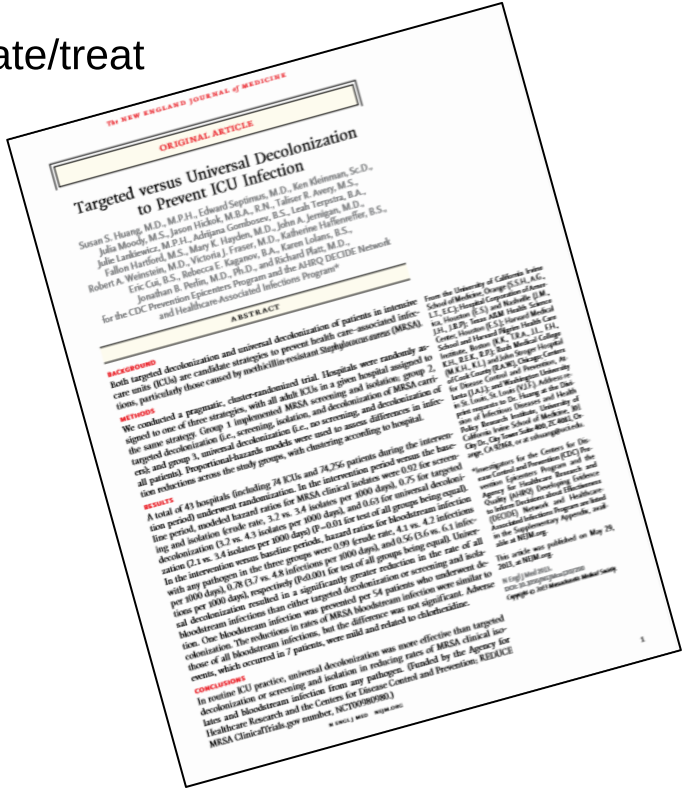
Gwen Borlaug MPH, CIC, FAPIC

Universal Staphylococcal Decolonization

Huang et al 2013 -
Universal decolonization superior to screen and isolate/treat

- Fewer infections
- Lower costs

"In routine ICU practice, universal decolonization was more effective than targeted decolonization or screening and isolation in reducing rates of MRSA clinical isolates and bloodstream infection from any pathogen."



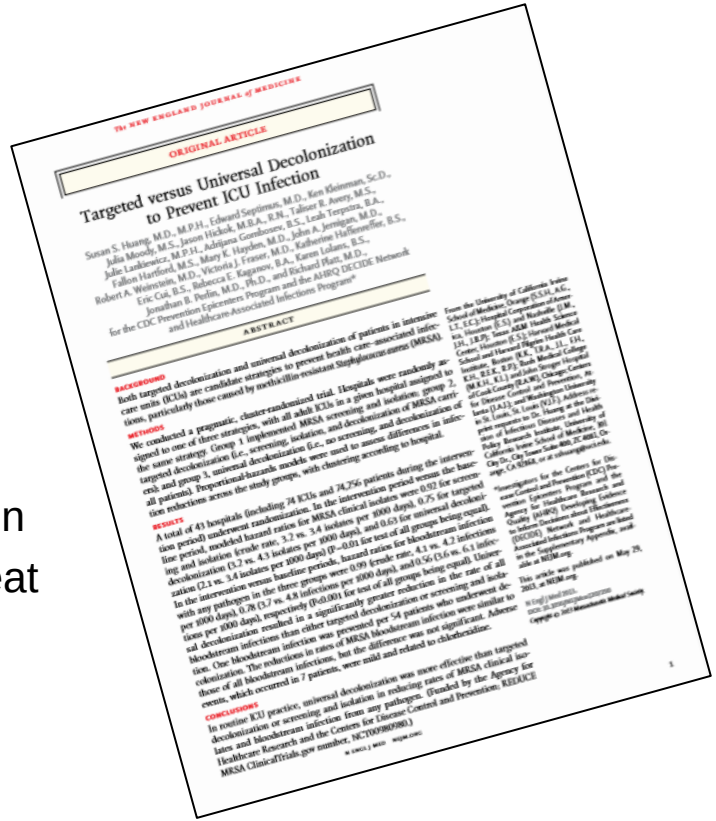
* Huang SS et al. Targeted vs. universal decolonization to prevent ICU infection.
N Engl J Med 2013; 368 (24) 2255-65

Universal Staphylococcal Decolonization

Study Results:

Reduction of: 37% in MRSA clinical cultures
28% in MRSA BSI
44% in all-pathogen BSI

Prevention of: 9 BSI/1,000 ICU admissions
Average of 23 BSI avoided annually in a 30 bed ICU costing $418K/yr. to treat



THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Targeted versus Universal Decolonization to Prevent ICU Infection

Susan S. Huang, M.D., M.P.H., Edward Septimus, M.D., Ken Kleinman, Sc.D., Julia Moody, M.S., Jason Hickok, M.B.A., R.N., Tahaar R. Avery, M.S., Julie Lankiewicz, M.P.H., Adrijana Gombosev, B.S., Leah Terpstra, B.A., Fallon Hartford, M.S., Mary K. Hayden, M.D., John A. Jernigan, M.D., Robert A. Weinstein, M.D., Victoria J. Fraser, M.D., Katherine Hoffmeyer, B.S., Eric Cox, B.S., Rebecca E. Kagarise, B.A., Richard Platt, M.D., Jonathan B. Perlin, M.D., Ph.D., and Richard Platt, M.D., for the CDC Prevention Epicenters Program and the AHRQ DECIDE Network and Healthcare-Associated Infections Programs*

ABSTRACT

BACKGROUND
Both targeted decolonization and universal decolonization of patients in intensive-care units (ICUs) are candidate strategies to prevent health care–associated infections, particularly those caused by methicillin-resistant Staphylococcus aureus (MRSA).

METHODS
We conducted a pragmatic, cluster-randomized trial. Hospitals were randomly assigned to one of three strategies, with all adult ICUs in a given hospital assigned to the same strategy: (group 1 implemented MRSA screening and isolation; group 2, targeted decolonization [i.e., screening, isolation, and decolonization of MRSA carriers]; and group 3, universal decolonization [i.e., no screening, and decolonization of all patients]). Proportional-hazards models were used to assess differences in infection reductions across the study groups, with clustering according to hospital.

RESULTS
A total of 43 hospitals (including 74 ICUs and 74,256 patients during the intervention period) underwent randomization. In the intervention period versus the baseline period, modeled hazard ratios for MRSA clinical isolates were 0.92 for screening and isolation (crude rate, 3.2 vs. 3.4 isolates per 1000 days), 0.75 for targeted decolonization (3.2 vs. 4.3 isolates per 1000 days) ($P=0.01$ for test of all groups being equal), and 0.63 for universal decolonization (2.2 vs. 3.4 isolates per 1000 days; $P<0.001$ for test of all groups being equal). In the intervention versus baseline periods, hazard ratios for bloodstream infection with any pathogen in the three groups were 0.99 (crude rate, 4.1 vs. 4.2 infections per 1000 days), 0.78 (3.7 vs. 4.8 infections per 1000 days), and 0.56 (2.6 vs. 4.6 infections per 1000 days), respectively ($P<0.001$ for test of all groups being equal). Universal decolonization resulted in a significantly greater reduction in the rate of all bloodstream infections than either targeted decolonization or screening and isolation. One bloodstream infection was prevented per 54 patients who underwent decolonization. The reductions in rates of MRSA bloodstream infection were similar to those of all bloodstream infections, but the difference was not significant. Adverse events, which occurred in 7 patients, were mild and related to chlorhexidine.

CONCLUSIONS
In routine ICU practice, universal decolonization was more effective than targeted decolonization or screening and isolation in reducing rates of MRSA clinical isolates and bloodstream infection from any pathogen. (Funded by the Agency for Healthcare Research and the Centers for Disease Control and Prevention; REDUCE MRSA ClinicalTrials.gov number, NCT00980980.)

Recommendations for Mupirocin Use in Routine Decolonization

2013 Huang study: If this practice (universal decolonization) is widely implemented, vigilance for emerging resistance will be required.

2006 CDC Guidelines for Managing Patients with MDRO: Routine decolonization is not recommended, however, when decolonization does occur, mupirocin antibiotic susceptibility testing should be performed each time patients undergo mupirocin decolonization to avoid treatment failures.

2009 CID mupirocin resistance article: A strategy for monitoring the prevalence of resistance should be developed and implemented whenever mupirocin is to be routinely used.

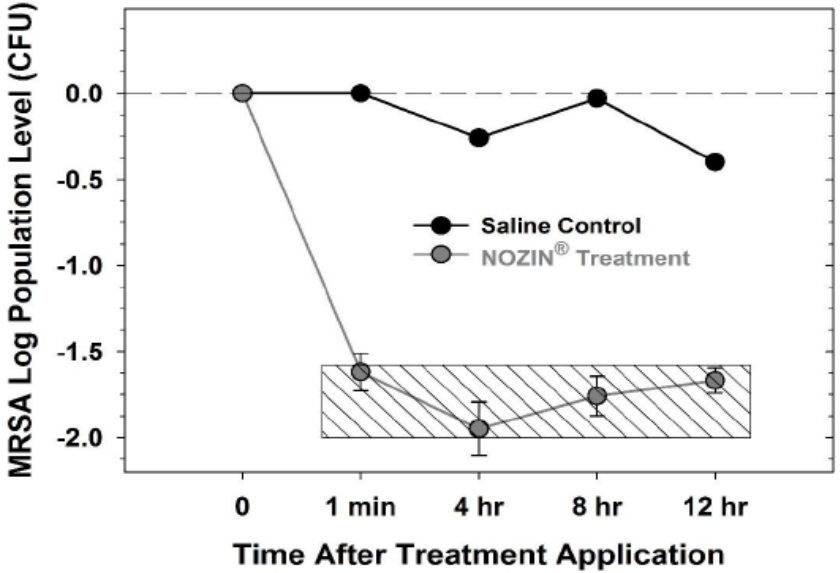
2013 ASHP guidelines: When decolonization therapy (e.g., mupirocin) is used as an adjunctive measure to prevent *S. aureus* SSI, surveillance of susceptibility of *S. aureus* isolated from SSIs to mupirocin is recommended.

Nasal Decolonization Agents

Benefits	Alcohol-based antiseptic	Antibiotic prophylactic (mupirocin)	Povidone iodine antiseptic
Effective vs. MRSA/MSSA – 99%	✓	✓	✓
Non-antibiotic--no reported resistance	✓	✗	✓
Effective day 1	✓	✗	✓
Easy to use	✓	✗	✓
Suitable for daily use (2x/day)	✓	✗	✗
Compliance assurance – pre-op	✓	✗	✓

In vitro Activity of Alcohol-Based Nasal Antiseptic

Evaluation of antimicrobial persistence of alcohol-based nasal antiseptic intended for use to decolonize the human anterior nares. A standard skin explant model was used to evaluate bacteriostatic effect of the product at 20 percent of recommended dose vs. MRSA-ATCC #33592. The baseline surface inoculation and post-treatment levels (cfu/cm^2) in six replicates for each time point were confirmed by direct count and compared to negative controls.



BioScience Laboratories
Bozeman, Montana

In vivo Activity of Alcohol-Based Nasal Antiseptic

NIH U.S. National Library of Medicine
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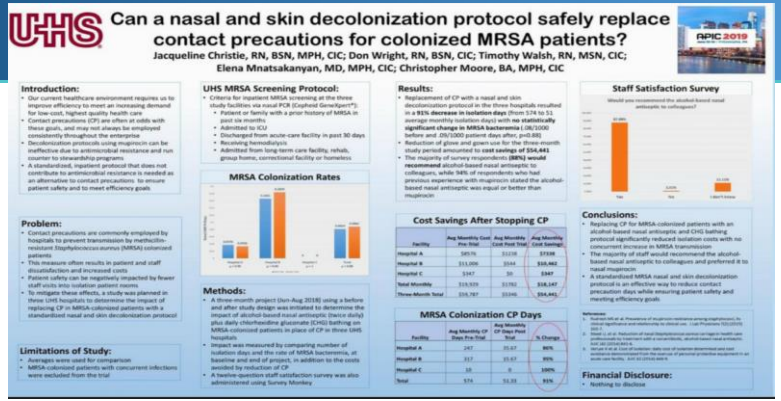
Save this study

Reduction of Staph Aureus Carriage by alcohol-based nasal antiseptic

Arm/Group Title	Alcohol-Based Nasal Antiseptic	Placebo
Arm/Group Description:	Participants known to exhibit Staph aureus carriage by previous nasal swab screening and randomly assigned received application by nasal swab of alcohol-based nasal antiseptic (Nozin® Nasal Sanitizer®) at 0, 4 and 8 hrs.	Participants known to exhibit Staph aureus carriage by previous nasal swab screening and randomly assigned received application of placebo treatment with phosphate-buffered saline at 0, 4 and 8 hrs.
Overall Number of Participants Analyzed	20	19
Median (Inter-Quartile Range) Unit of Measure: Percent change in colonization		
	-99.8 (-100 to -80.6)	-13.5 (-69.3 to 149.4)

Study



Can a nasal and skin decolonization protocol safely replace contact precautions for colonized MRSA patients?

Introduction:

Our current healthcare environment requires us to improve efficiency to met an increasing demand for low-cost, highest quality health care

Contact precautions (CP) are often at odds with these goals, and may not always be employed consistently throughout the enterprise

Decolonization protocols using mupirocin can be ineffective due to antimicrobial resistance and run counter to stewardship programs

A standardized, inpatient protocol that does not contribute to antimicrobial resistance in needed as an alternative to contact precautions to ensure patient safety and to meet efficiency goals

Conclusions:

Replacing CP for MRSA-colonized patients with an alcohol-based nasal antiseptic and CHG bathing protocol significantly reduced isolation costs with no concurrent increase in MRSA transmission

The majority of staff would recommend the alcohol-based nasal antiseptic to colleagues and preferred it to nasal mupirocin

A standardized MRSA nasal and skin decolonization protocol is an effective way to reduce contact precaution days while ensuring patient safety and meeting efficiency goals.

Study

Can a nasal and skin decolonization protocol safely replace contact precautions for MRSA-colonized patients?

"…mupirocin is unpleasant to use and must be consecutively dosed twice a day for 5 days to achieve a log kill indicative of nasal decolonization."

"…patients find povidone iodine unpleasant due to its skin staining properties and odor."

"…subsequent development of an alcohol-based nasal antiseptic offers enhanced effects when compared to PVI and mupirocin: it does not stain, is clean and well tolerated by patients, has a pleasant citrus odor, is suitable for self application and has no known mechanisms that contribute to microbial resistance…achieves a log kill consistent with decolonization after one application."

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Practice Forum

Can a nasal and skin decolonization protocol safely replace contact precautions for MRSA-colonized patients?

Jacqueline Christie RN, BSN, MPH, CIC *, Don Wright RN, BSN, MPH, CIC,
Jacalyn Liebowitz RN, BSN, MBA, DNP, NEA-BC, FACHE, CPHQ, Paul Stefanacci MD, FACS, MBA

Departments of Quality and Nursing, Universal Health Services, Inc., King of Prussia, PA

Conclusion:

Replacing contact precautions for high-risk MRSA-colonized patients with an alcohol-based nasal antiseptic and CHG bathing significantly reduced isolation costs with no increase in MRSA bacteremia. In addition, the alcohol-based nasal antiseptic was preferred by staff when compared to nasal mupirocin.

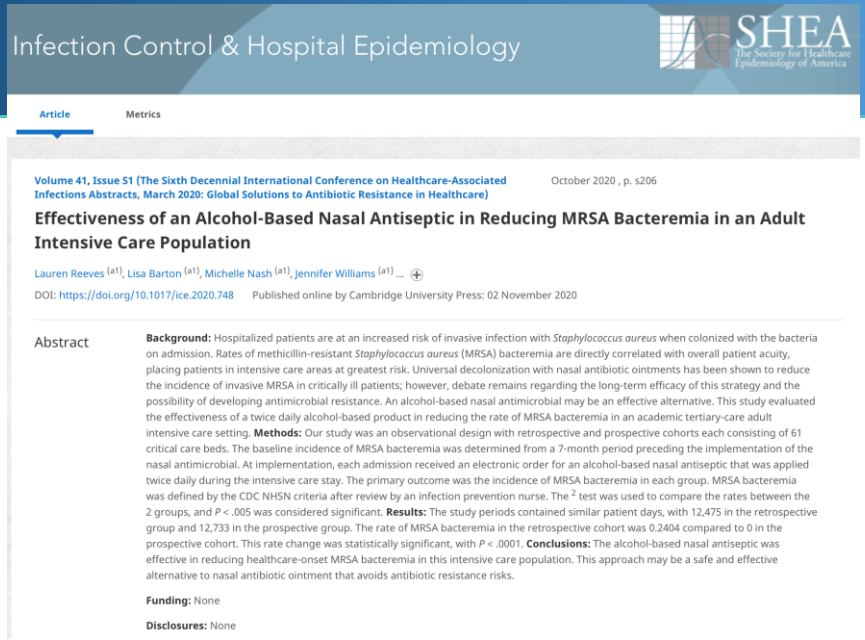
* Christie J, Wright D, et al *Am J Infect Control,* Vol. 48, Issue 8, p922–924, August 2020

Study

Effectiveness of an Alcohol-Based Nasal Antiseptic in Reducing MRSA Bacteremia in an Adult Intensive Care Population

Conclusion:

Incidence of MRSA bacteremia in a 61-bed adult ICU was reduced from 0.24 infections per 1000 for approximately 12,000 patient days ($p < 0.001$) by replacing mupirocin with a staphylococcal decolonization protocol of alcohol-based nasal decolonization in addition to CHG bathing.



Infection Control & Hospital Epidemiology

SHEA The Society for Healthcare Epidemiology of America

Article Metrics

Volume 41, Issue S1 (The Sixth Decennial International Conference on Healthcare-Associated Infections Abstracts, March 2020: Global Solutions to Antibiotic Resistance in Healthcare) October 2020 , p. s206

Effectiveness of an Alcohol-Based Nasal Antiseptic in Reducing MRSA Bacteremia in an Adult Intensive Care Population

Lauren Reeves [a1], Lisa Barton [a1], Michelle Nash [a1], Jennifer Williams [a1] ...

DOI: https://doi.org/10.1017/ice.2020.748 Published online by Cambridge University Press: 02 November 2020

Abstract

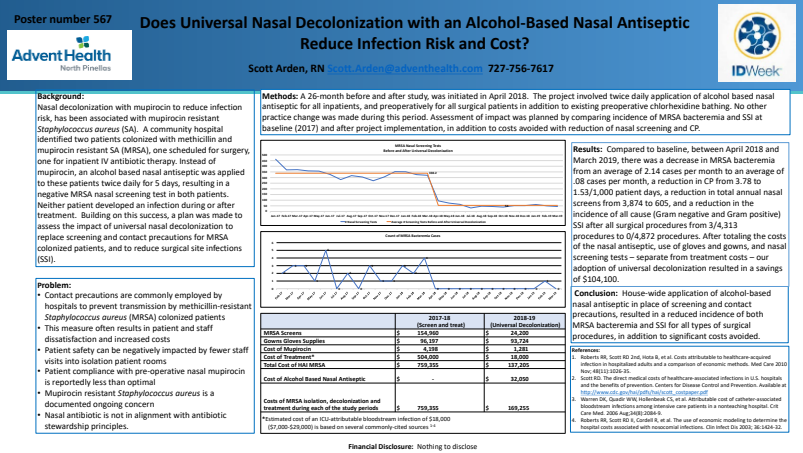
Background: Hospitalized patients are at an increased risk of invasive infection with *Staphylococcus aureus* when colonized with the bacteria on admission. Rates of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia are directly correlated with overall patient acuity, placing patients in intensive care areas at greatest risk. Universal decolonization with nasal antibiotic ointments has been shown to reduce the incidence of invasive MRSA in critically ill patients; however, debate remains regarding the long-term efficacy of this strategy and the possibility of developing antimicrobial resistance. An alcohol-based nasal antimicrobial may be an effective alternative. This study evaluated the effectiveness of a twice daily alcohol-based product in reducing the rate of MRSA bacteremia in an academic tertiary-care adult intensive care setting. **Methods:** Our study was an observational design with retrospective and prospective cohorts each consisting of 61 critical care beds. The baseline incidence of MRSA bacteremia was determined from a 7-month period preceding the implementation of the nasal antimicrobial. At implementation, each admission received an electronic order for an alcohol-based nasal antiseptic that was applied twice daily during the intensive care stay. The primary outcome was the incidence of MRSA bacteremia in each group. MRSA bacteremia was defined by the CDC NHSN criteria after review by an infection prevention nurse. The ^{2} test was used to compare the rates between the 2 groups, and $P < .005$ was considered significant. **Results:** The study periods contained similar patient days, with 12,475 in the retrospective group and 12,733 in the prospective group. The rate of MRSA bacteremia in the retrospective cohort was 0.2404 compared to 0 in the prospective cohort. This rate change was statistically significant, with $P < .0001$. **Conclusions:** The alcohol-based nasal antiseptic was effective in reducing healthcare-onset MRSA bacteremia in this intensive care population. This approach may be a safe and effective alternative to nasal antibiotic ointment that avoids antibiotic resistance risks.

Funding: None

Disclosures: None

* Reeves L et al. ICHE Vol 41, Issue S1 p.s206 October 2020

Study



Poster number 567

AdventHealth North Pinellas

Does Universal Nasal Decolonization with an Alcohol-Based Nasal Antiseptic Reduce Infection Risk and Cost?

Scott Arden, RN Scott.Arden@adventhealth.com 727-756-7617

IDWeek

Background:
Nasal decolonization with mupirocin to reduce infection risk, has been associated with mupirocin resistant *Staphylococcus aureus* (SA). A community hospital identified two patients colonized with methicillin and mupirocin resistant SA (MRSA), one scheduled for surgery, one for inpatient IV antibiotic therapy. Instead of mupirocin, an alcohol based nasal antiseptic was applied to these patients twice daily for 5 days, resulting in a negative MRSA nasal screening test in both patients. Neither patient developed an infection during or after treatment. Building on this success, a plan was made to assess the impact of universal nasal decolonization to replace screening and contact precautions for MRSA colonized patients, and to reduce surgical site infections (SSI).

Problem:
- Contact precautions are commonly employed by hospitals to prevent transmission by methicillin-resistant *Staphylococcus aureus* (MRSA) colonized patients
- This measure often results in patient and staff dissatisfaction and increased costs
- Patient safety can be negatively impacted by fewer staff visits into isolation patient rooms
- Patient compliance with pre-operative nasal mupirocin is reportedly less than optimal
- Mupirocin resistant *Staphylococcus aureus* is a documented ongoing concern
- Nasal antibiotic is not in alignment with antibiotic stewardship principles.

Methods: A 26-month before and after study, was initiated in April 2018. The project involved twice daily application of alcohol based nasal antiseptic for all inpatients, and preoperatively for all surgical patients in addition to existing preoperative chlorhexidine bathing. No other practice change was made during this period. Assessment of impact was planned by comparing incidence of MRSA bacteremia and SSI at baseline (2017) and after project implementation, in addition to costs avoided with reduction of nasal screening and CP.

MRSA Nasal Screening Tests
Before and After Universal Decolonization

Count of MRSA Bacteremia Cases

	2017-18 (Screen and treat)	2018-19 (Universal Decolonization)
MRSA Screens	$ 154,960	$ 24,200
Gowns Gloves Supplies	$ 96,197	$ 93,724
Cost of Mupirocin	$ 4,198	$ 1,281
Cost of Treatment*	$ 504,000	$ 18,000
Total Cost of HAI MRSA	$ 759,355	$ 137,205
Cost of Alcohol Based Nasal Antiseptic	$ -	$ 32,050
Costs of MRSA isolation, decolonization and treatment during each of the study periods	$ 759,355	$ 169,255

*Estimated cost of an ICU-attributable bloodstream infection of $18,000 ($7,000-$29,000) is based on several commonly-cited sources [1-3]

Financial Disclosure: Nothing to disclose

Results: Compared to baseline, between April 2018 and March 2019, there was a decrease in MRSA bacteremia from an average of 2.14 cases per month to an average of .08 cases per month, a reduction in CP from 3.78 to 1.53/1,000 patient days, a reduction in total annual nasal screens from 3,874 to 605, and a reduction in the incidence of all cause (Gram negative and Gram positive) SSI after all surgical procedures from 3/4,313 procedures to 0/4,872 procedures. After totaling the costs of the nasal antiseptic, use of gloves and gowns, and nasal screening tests – separate from treatment costs – our adoption of universal decolonization resulted in a savings of $104,100.

Conclusion: House-wide application of alcohol-based nasal antiseptic in place of screening and contact precautions, resulted in a reduced incidence of both MRSA bacteremia and SSI for all types of surgical procedures, in addition to significant costs avoided.

References:
1. Roberts RR, Scott RD 2nd, Hota B, et al. Costs attributable to healthcare-acquired infection in hospitalized adults and a comparison of economic methods. Med Care 2010 Nov; 48(11):1026-35.
2. Scott RD. The direct medical costs of healthcare-associated infections in U.S. hospitals and the benefits of prevention. Centers for Disease Control and Prevention. Available at http://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf
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4. Roberts RR, Scott RD 3, Cordell R, et al. The use of economic modeling to determine the hospital costs associated with nosocomial infections. Clin Infect Dis 2003; 36:1424-32.

Does Universal Nasal Decolonization with an Alcohol-Based Nasal Antiseptic Reduce Infection Risk and Cost?

Results:

Compared with baseline, between April 2018 and March 2019, there was:

- a decrease in MRSA bacteremia from 3/1,000 patient-days to 0/1,000 patient-days
- a reduction in CP from 3.78 to 1.53/1,000 patient-days, a reduction in nasal screens from 3,874 to 605
- a reduction of all-cause (Gram-negative and Gram-positive) SSI after all surgical procedures from 3/4,313 procedures to 0/4,872 procedures.
- After accounting for the cost of the nasal antiseptic, the reduction in gowns, gloves and nasal screening tests resulted in $104,099.91 costs avoided.

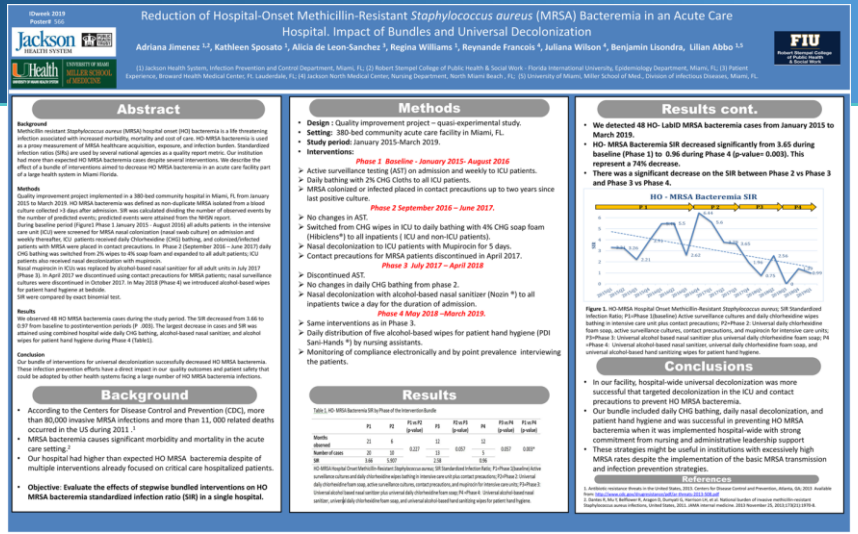
Conclusion:

- House-wide application of alcohol-based nasal antiseptic in place of screening and contact precautions, resulted in a reduced incidence of both MRSA bacteremia and SSI for all types of surgical procedures, in addition to significant costs avoided.

* Arden S. Open Forum Infectious Diseases. 6 (Supp_2):S268-S268 October 2019

Study

Reduction of Hospital-Onset Methicillin-Resistant Staphylococcus aureus (MRSA) Bacteremia in an Acute Care Hospital: Impact of Bundles and Universal Decolonization



IDweek 2019
Poster# 160

Reduction of Hospital-Onset Methicillin-Resistant *Staphylococcus aureus* (MRSA) Bacteremia in an Acute Care Hospital. Impact of Bundles and Universal Decolonization

Adriana Jimenez [1,2], Kathleen Sposato [1], Alicia de Leon-Sanchez [1], Regina Williams [1], Reynande Francois [4], Juliana Wilson [4], Benjamin Lisondra, Lilian Abbo [1,5]

(1) Jackson Health System, Infection Prevention and Control Department, Miami, FL; (2) Robert Stempel College of Public Health & Social Work - Florida International University, Epidemiology Department, Miami, FL; (3) Patient Experience, Broward Health Medical Center, Ft. Lauderdale, FL; (4) Jackson North Medical Center, Nursing Department, North Miami Beach , FL; (5) University of Miami, Miller School of Med., Division of Infectious Diseases, Miami, FL.

Abstract

Background
Methicillin-resistant *Staphylococcus aureus* (MRSA) hospital onset (HO) bacteremia is a life threatening infection associated with increased morbidity, mortality and cost of care. HO-MRSA bacteremia is used as a proxy measurement of MRSA healthcare acquisition, exposure, and infection burden. Standardized infection ratios (SIRs) are used by several national agencies as a quality report metric. Our institution had more than expected HO MRSA bacteremia cases despite several interventions. We describe the effect of a bundle of interventions aimed to decrease HO MRSA bacteremia in an acute care facility part of a large health system in Miami Florida.

Methods
Quality improvement project implemented in a 380-bed community hospital in Miami, FL from January 2015 to March 2019. HO MRSA bacteremia was defined as non-duplicate MRSA isolated from a blood culture collected >3 days after admission. SIR was calculated dividing the number of observed events by the number of predicted events; predicted events were attained from the NHSN report.
During baseline period (Figure) Phase 1 January 2015 - August 2016) all adults patients in the intensive care unit (ICU) were screened for MRSA nasal colonization (nasal swab culture) on admission and weekly thereafter. ICU patients received daily Chlorhexidine (CHG) bathing, and colonized/infected patients with MRSA were placed in contact precautions. In Phase 2 (September 2016 – June 2017) daily CHG bathing was switched from 2% wipes to 4% soap foam and expanded to all adult patients; ICU patients also received nasal decolonization with mupirocin.
Nasal mupirocin in ICUs was replaced by alcohol-based nasal sanitizer for all adult units in July 2017 (Phase 3). In April 2017 we discontinued using contact precautions for MRSA patients; nasal surveillance cultures were discontinued in October 2017. In May 2018 (Phase 4) we introduced alcohol-based wipes for patient hand hygiene at bedside.
SIR were compared by exact binomial test.

Results
We observed 48 HO MRSA bacteremia cases during the study period. The SIR decreased from 3.66 to 0.97 from baseline to postintervention periods (*P* .003). The largest decrease in cases and SIR was attained using combined hospital-wide daily CHG bathing, alcohol-based nasal sanitizer, and alcohol wipes for patient hand hygiene during Phase 4 (Table1).

Conclusion
Our bundle of interventions for universal decolonization successfully decreased HO MRSA bacteremia. These infection prevention efforts have a direct impact in our quality outcomes and patient safety that could be adopted by other health systems facing a large number of HO MRSA bacteremia infections.

Background

- According to the Centers for Disease Control and Prevention (CDC), more than 80,000 invasive MRSA infections and more than 11, 000 related deaths occurred in the US during 2011 .[1]
- MRSA bacteremia causes significant morbidity and mortality in the acute care setting.[2]
- Our hospital had higher than expected HO MRSA bacteremia despite of multiple interventions already focused on critical care hospitalized patients.
- **Objective: Evaluate the effects of stepwise bundled interventions on HO MRSA bacteremia standardized infection ratio (SIR) in a single hospital.**

Methods

- **Design :** Quality improvement project – quasi-experimental study.
- **Setting:** 380-bed community acute care facility in Miami, FL.
- **Study period:** January 2015-March 2019.
- **Interventions:**

Phase 1 Baseline - January 2015- August 2016

➢ Active surveillance testing (AST) on admission and weekly to ICU patients.
➢ Daily bathing with 2% CHG Cloths to all ICU patients.
➢ MRSA colonized or infected placed in contact precautions up to two years since last positive culture.

Phase 2 September 2016 – June 2017.

➢ No changes in AST.
➢ Switched from CHG wipes in ICU to daily bathing with 4% CHG soap foam (Hibiclens®) to all inpatients (ICU and non-ICU patients).
➢ Nasal decolonization to ICU patients with Mupirocin for 5 days.
➢ Contact precautions for MRSA patients discontinued in April 2017.

Phase 3 July 2017 – April 2018

➢ Discontinued AST.
➢ No changes in daily CHG bathing from phase 2.
➢ Nasal decolonization with alcohol-based nasal sanitizer (Nozin ®) to all inpatients twice a day for the duration of admission.

Phase 4 May 2018 –March 2019.

➢ Same interventions as in Phase 3.
➢ Daily distribution of five alcohol-based wipes for patient hand hygiene (PDI Sani-Hands ®) by nursing assistants.
➢ Monitoring of compliance electronically and by point prevalence interviewing the patients.

Results

Table 1. HO- MRSA Bacteremia SIR by Phase of the Intervention Bundle

	P1	P2	P1 vs P2 (p-value)	P3	P1 vs P3 (p-value)	P4	P1 vs P4 (p-value)	P2 vs P4 (p-value)
Months observed	21	6		12		12		
Number of cases	20	10	0.227	13	0.057	5	0.007	0.007*
SIR	3.66	5.907		2.58		0.95		

HO-MRSA Hospital Onset Methicillin-Resistant Staphylococcus aureus; SIR Standardized Infection Ratio; P1=Phase 1(baseline) Active surveillance cultures and daily chlorhexidine wipes bathing in intensive care unit plus contact precautions; P2=Phase 2: Universal daily chlorhexidine foam soap, active surveillance cultures, contact precautions, and mupirocin for intensive care units; P3=Phase 3: Universal alcohol based nasal sanitizer plus universal daily chlorhexidine foam soap; P4 =Phase 4: Universal alcohol-based nasal sanitizer, universal daily chlorhexidine foam soap, and universal alcohol-based hand sanitizing wipes for patient hand hygiene.

Results cont.

- **We detected 48 HO- LabID MRSA bacteremia cases from January 2015 to March 2019.**
- **HO- MRSA Bacteremia SIR decreased significantly from 3.65 during baseline (Phase 1) to 0.96 during Phase 4 (p-value= 0.003). This represent a 74% decrease.**
- **There was a significant decrease on the SIR between Phase 2 vs Phase 3 and Phase 3 vs Phase 4.**

HO - MRSA Bacteremia SIR

Figure 1. HO-MRSA Hospital Onset Methicillin-Resistant *Staphylococcus aureus*; SIR Standardized Infection Ratio; P1=Phase 1(baseline) Active surveillance cultures and daily chlorhexidine wipes bathing in intensive care unit plus contact precautions; P2=Phase 2: Universal daily chlorhexidine foam soap, active surveillance cultures, contact precautions, and mupirocin for intensive care units; P3=Phase 3: Universal alcohol based nasal sanitizer plus universal daily chlorhexidine foam soap; P4 =Phase 4: Universal alcohol-based nasal sanitizer, universal daily chlorhexidine foam soap, and universal alcohol-based hand sanitizing wipes for patient hand hygiene.

Conclusions

- In our facility, hospital-wide universal decolonization was more successful that targeted decolonization in the ICU and contact precautions to prevent HO MRSA bacteremia.
- Our bundle included daily CHG bathing, daily nasal decolonization, and patient hand hygiene and was successful in preventing HO MRSA bacteremia when it was implemented hospital-wide with strong commitment from nursing and administrative leadership support
- These strategies might be useful in institutions with excessively high MRSA rates despite the implementation of the basic MRSA transmission and infection prevention strategies.

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* Jimenez A et al. Open Forum Infectious Diseases. 6 (Supp_2):S268-S268 October 2019

Results:

The SIR decreased from 3.66 to 0.97 from baseline to post-intervention periods (*P* = 0.003).

The largest decrease in cases and SIR was attained using combined hospital-wide daily CHG bathing, alcohol-based nasal sanitizer, and alcohol wipes for patient hand hygiene during Phase 4 (Table 1).

Our bundle of interventions for universal decolonization was successful in decreasing HO MRSA bacteremia.

Conclusion:

Our bundle of interventions for universal decolonization was successful in decreasing HO MRSA bacteremia.

MRSA bacteremia reduction

Reduction	Author (location)	ICU	Hospital-wide	CP/Isolation discontinued	Additional	Existing CHG
100%	Arden (Pinellas, FL)	✓	✓	✓	No CHG added	
74%	Jimenez (Jackson, FL)	✓	✓	✓	Bundled nasal decolonization, CHG bathing and patient hand hygiene	in ICU
100%	Reeves (Methodist, TN)	✓			No CHG added	

Savings from replacing Contact Precautions

Cost Savings	Author (location)	Screening discontinued	Additional	Period
$104K	Arden (Pinellas, FL)	✓	Hospital wide.	12-month
$64K	Deatherage (Marshall, CA)	✓	Hospital wide.	12-month
$1.4 mill	Whitaker (Tampa, FL)	✓	Hospital wide.	12-month
$223K	Landis (Frederick, MD)	✓	Hospital wide. Includes savings from CP replacement, screening and SSI cost avoidance.	Annual
$200K	Steigmeier (Wesley Chapel, FL)	✓	High risk patient population.	12-month
$430K	Christie* (UHS, PA)		MRSA colonized patients. Combined savings in 7 hospitals.	10-month

Reduction in use of Contact Precautions for MRSA colonization

Reduction	Author (location)
88%	Christie* (UHS, PA)
60%	Arden (Pinellas, FL)
38%	Steigmeier (Westley Chapel, FL)
42%	Whitaker (Tampa, FL)

Key points

- The anterior nares are the primary sites of *S. aureus* carriage, which is a precursor to and the primary risk factor for development of *S. aureus* infections.
- Nasal and skin decolonization is a recognized strategy to reduce healthcare-associated *S. aureus* infections.
- Nasal colonization with *S. aureus* increases the risk of secondary staphylococcal infections among patients with influenza infection (and possibly COVID-19 patients?)
- Nasal and skin decolonization may have the potential to also reduce the risk of secondary staphylococcal pneumonia (currently no clinical evidence).

Recommendations for reducing hospital-onset *Staphylococcus aureus* infections

Centers for Disease Control and Prevention
Society for Healthcare Epidemiology of America

Gwen Borlaug MPH, CIC, FAPIC

Centers for Disease Control and Prevention (2019)

Strategies to Prevent Hospital-onset(HO) *Staphylococcus aureus* Bloodstream Infections in Acute Care Facilities

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

1. Prevent Healthcare-Associated Infections

Central line-associated bloodstream infections (CLABSI)

Surgical site infections (SSI)

BSI among hemodialysis patients

Ventilator-associated pneumonia (VAP)

* https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html
https://www.cdc.gov/infectioncontrol/pdf/guidelines/bsi-guidelines-H.pdf
https://jamanetwork.com/journals/jamasurgery/fullarticle/2623725
https://www.cdc.gov/dialysis/PDFs/Dialysis-Core-Interventions-5_10_13.pdf
https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/strategies-to-prevent-ventilatorassociated-pneumonia-in-acute-care-hospitals-2014-update/2D8A9D3BFD8BC8A68E04906B5C2CEF66

Centers for Disease Control and Prevention (2019)

Strategies to Prevent Hospital-onset *Staphylococcus aureus* Bloodstream Infections in Acute Care Facilities

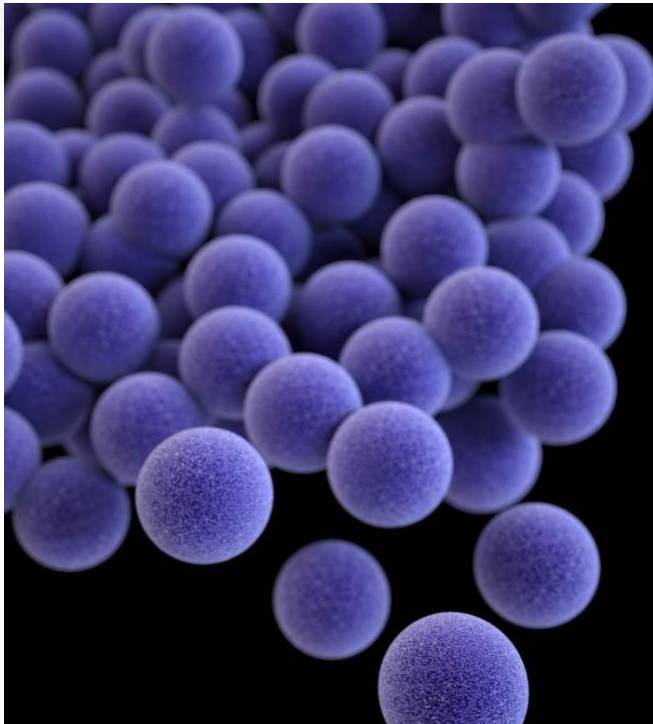
CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

2. Practice Source Control

ICU patients: Decolonize all patients with intranasal staphylococcal antibiotic/antiseptic plus topical CHG (core strategy).

Non-ICU patients: Decolonize patients with CVC or midline catheter with intranasal staphylococcal antibiotic/antiseptic plus topical CHG (supplemental strategy).

Surgical patients: For all patients undergoing high risk surgeries (e.g. cardiothoracic, orthopedic, and neurosurgery), unless known to be *S. aureus* negative, use an intranasal anti-staphylococcal antibiotic/antiseptic and CHG wash or wipes prior to surgery (core strategy).



* https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html

Centers for Disease Control and Prevention (2019)

Strategies to Prevent Hospital-onset *Staphylococcus aureus* Bloodstream Infections in Acute Care Facilities

3. Prevent Transmission of MRSA

Place MRSA colonized or infected patients in private rooms and on contact precautions.

Use dedicated patient-care equipment (e.g. blood pressure cuffs, stethoscopes), and single use disposable items (e.g. single patient digital thermometer) whenever possible. If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient.

Provide regular competency-based training on use of PPE and monitor adherence.

Place patients with excessive wound drainage on contact precautions and in a private room regardless of MDRO status.

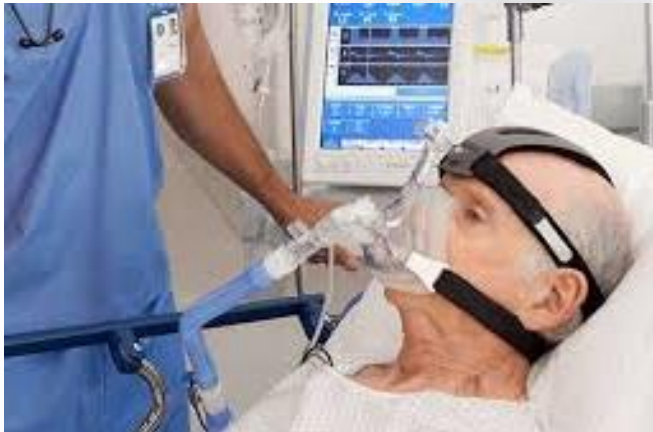
* https://www.cdc.gov/hai/prevent/staph-prevention-strategies.html

Society for Healthcare Epidemiology of America (2014)

Strategies to Prevent Methicillin-Resistant *Staphylococcus aureus* Transmission and Infection in Acute Care Hospitals: 2014 Update

ICU: MRSA decolonization can be targeted to MRSA-colonized persons or applied universally to populations deemed to be at high risk for infection.

(Level 1 Evidence: Provide universal decolonization to ICU patients when MRSA not effectively controlled).



* https://doi.org/10.1017/S0899823X00193882

Benefits of universal decolonization programs

- Mitigates risk of infection to the colonized patient.
- Mitigates risk of acquisition in the non-colonized patient.
- More effective than targeted (screening) decolonization in reducing healthcare-associated infections caused by staphylococcal organisms.
- Decolonizes patients with MSSA in addition to those with MRSA.
- Provides source control, reducing contamination of HCP hands, the patient environment and equipment and thus decreasing risk of transmission to other patients.
- Costs less to decolonize an entire patient population at risk than to screen and place in contact precautions.
- Eliminates the need for contact precautions, thus improving both patient and staff satisfaction.

Benefits of expanding to house-wide decolonization programs

- Eliminates the need to manage MSSA and MRSA colonized patients with contact precautions in all units.
- Inclusion of all patients facility-wide simplifies and improves compliance with the decolonization protocol and provides consistency across all units.
- Delivers cost savings when replacing ”screen and isolate” protocols with universal decolonization.
- Improves patient flow and throughput.
- Increases patient and staff satisfaction throughout the facility.
- May be beneficial to general ward patients with respiratory viral illnesses as a strategy to prevent secondary bacterial infections.

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.

Huang SS et al. Targeted vs. universal decolonization to prevent ICU infection. *N Engl J Med* 2013; 368 (24) 2255-65.

Huang SS et al. Chlorhexidine vs. routine bathing to prevent multidrug-resistant organisms and all-cause bloodstream infections in general medical and surgical units (ABATE infection trial): a cluster-randomized trial. *The Lancet* 2019; 393: 1205-1215.

In summary…

…universal staphylococcal decolonization using alcohol-based nasal antiseptics is an evidence-based, cost-effective strategy, that, when used in addition to current infection prevention practices (HAI prevention bundles, hand hygiene, environmental cleaning and disinfection), mitigates risk of hospital-acquired MSSA and MRSA infections.

Who benefits?

- ✓ ICU patients
- ✓ Surgical patients
- ✓ General ward patients with central/midline catheters
- ✓ Patients with respiratory viral infections who are at risk of acquiring SBI
- ✓ Healthcare personnel
- ✓ Chief financial officer
- ✓ Materials Management staff

Questions?

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