Infection Prevention Programs in Long-term and Post-acute Care Facilities: Overarching Principles

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INFECTION PREVENTION IN AGING RESEARCH GROUP

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Burden of Infections in Nursing Homes

- 1.4 to 5.2 infections/1000 resident-days
  - Single day, point prevalence of 5.2% to 7.6%
  - MI NH research consortium:
    - No-device: 5.7/1,000 resident-days
    - device: 11/1,000 resident-days
- Using this more recent data
  - Extrapolated to the 1.5 million adults in U.S. NHs suggests 765,000 to 2.8 million infections/yr.
- UTIs, pneumonia, skin and soft tissue, GI infections

Wang L, et al. *Eur J Clin Microbiol Infect Dis* 2012;31:1797-1804.

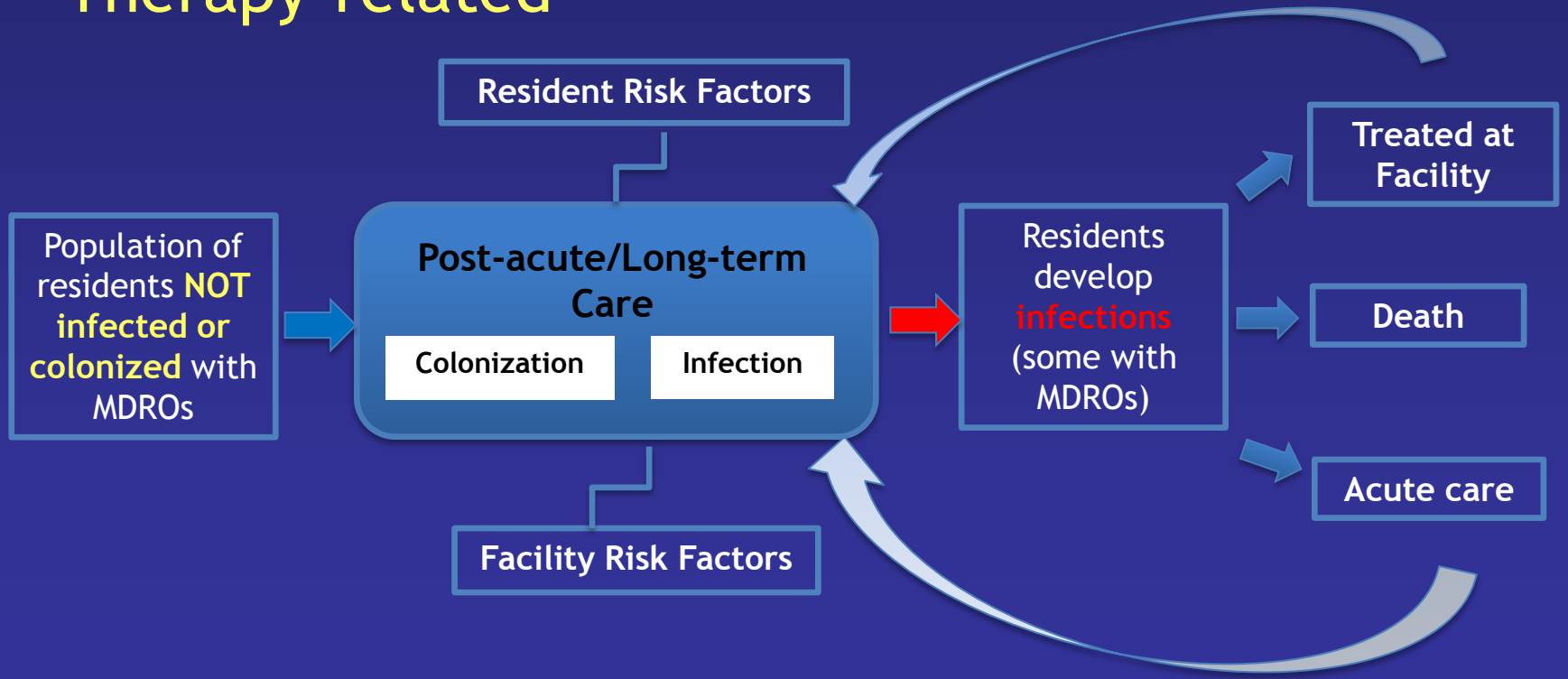
Consequences of NH Infections

- 150,000 – 300,000 transfers due to infections
- At least $675 million in additional healthcare costs
- Leading cause of mortality and morbidity
- Higher antibiotic use = increased MDROs
- A major cause for readmission

Daneman N, et al. *JAMA Intern Med* 2013;173:673-682.
Mody L, et al. *JAMA Intern Med* 2015;175:714-723.

Risk Factors for Infection in NHs

- Resident-level
- Environmental/Institutional-level
- Therapy-related



Montoya A, et al. *Clin Geriatr Med* 2016 (In press)

Resident-Level Risk Factors

- Immunosenescence
- Compromised physical barriers
- Difficulty performing hygiene
- Close caregiver interactions
- Atypical symptoms

Montoya A, et al. *Clin Geriatr Med* 2016 (In revision).

Environmental/Institutional-level Risk Factors

- Common core of spaces
- Slow implementation of recommended infection prevention measures
- Structural operations
  - HCW training
  - Part-time staff

Renita Freeman/The Pagosa Springs Sun 2015

Bryan Baird/DigniCARE 2014

Montoya A, et al. *Clin Geriatr Med* 2016 (In revision).

Prescribing Issues

- Overuse or inappropriate usage of antibiotics
- Empirical and prophylactic antibiotics
- Standardized infection definitions needed

http://www.newhealthadvisor.com/images/1HT04161/Antibiotics.jpg

Montoya A, et al. *Clin Geriatr Med* 2016 (In revision).

What percentage of clinically treated infections meet standardized criteria?

	No. of Infections	
	Device (263 f/u-mon)	Non-Device (644 f/u-mon)
Total infections (Clinical)	87	110
McGeer's 1991 Definitions	8	15
Minimum Criteria	12	10
McGeer's or Minimum	15 (17)	18 (16)

[a] Includes skin and soft tissue infections, *Clostridium difficile* colitis, conjunctivitis, upper respiratory and lower respiratory tract infections.

Wang L, et al. *Eur J Clin Microbiol Infect Dis* 2012;31:1797-1804.

Special Challenges in Diagnosing Infections

- Cognitive deficits
- Atypical manifestation
- Diagnostic difficulties
- Sampling difficulties and limited timely access to technology
- Communication with clinical providers who are often off-site

Crnich CJ, et al. *Drugs Aging* 2015;32:699-716.

Endemic Infections: Urinary Tract Infections (UTI)

- UTI rates:
  - With indwelling catheters:
    - 9.1/1,000 device-days
    - 186/1,000 resident-months (Wang et al)
  - Non-catheterized:
    - 2.8/1,000 device-days
    - 84/1,000 resident months (Wang et al)
- Risk factors
  - Presence of a urinary catheter (UC)
    - Urinary retention (BPH, Diabetes, Neurogenic)
    - Spinal Cord Injuries
    - Comfort- End of Life

Dommeti P, et al. *Infect Control Hosp Epidemiol* 2011;32:177-180.
Wang L, et al. *Eur J Clin Microbiol Infect Dis* 2012;31:1797-1804.
Nicolle LE. Antimicrob Resist Infect Control 2014;3:23.

Endemic Infections: Pneumonia/LRTIs

- Pneumonia, bronchitis, influenza
- Incidence: 0.3-2.5/1,000 resident days
- Aspiration: common, associated with dysphagia
- Pneumonia rates differ by risk factors
  - Residents with feeding tubes: 3.7/1,000 device-days
  - Residents without feeding tubes: 1.1/1,000 days
- Commonly leads to acute care transfers
- Average hospital cost/admission: $ 10,000
- Dental plaque source of bacteria leading to infections
- Poor oral care impacts quality of life

Smith PW, et al. *Infect Control Hosp Epidemiol* 2008;29:785-814.
Wang L, et al. *Eur J Clin Microbiol Infect Dis* 2012;31:1797-1804.
Ma HM, et al. *J Am Med Dir Assoc* 2013;14:109-113.

Skin & Soft Tissue Infections (SSTI)

- Cellulitis, pressure ulcer infections
- *S. aureus*, MRSA is the predominant causative agent
  - 10-25% of NH residents are colonized with MRSA
  - 30-60% *S. aureus* isolates methicillin resistant
- Pressure ulcers in NHs are frequent, preventable, and a quality of care indicator
  - immobility, incontinence, impaired cognition, greater acuity of care, and impaired nutrition
  - lead to infections from cellulitis to osteomyelitis, bacteremia, septicemia, death

Mody L, et al. *Clin Infect Dis* 2008;46:1368-1373.

Common NH Outbreaks

- Respiratory infections
- GI tract infections
- Skin infections
- Common etiologic agents:
  - Influenza viruses
  - Noroviruses
  - *Salmonella* sp.
  - Group A Streptococcus
  - *Clostridium difficile*

Utsumi M, et al. Age Aging 2010;39:299-305.

Infection Control Program

- Overarching Goal:
  - To reduce the risk of institutionally acquired infections and antimicrobial resistant organisms, thereby protecting patients (residents), families, students and volunteers

Infection Control Program: Elements

1	Surveillance, outbreak investigations	Using surveillance infection definitions: -Loeb minimum criteria -CDC/NHSN criteria Reporting and using surveillance data
2	Antibiotic stewardship	Prof. Nicolle Presentation
3	Isolation Precautions	Types of precautions
4	Hand hygiene	Products, monitoring compliance, engaging staff, patients and families
5	Device care	Indwelling urinary catheters, Feeding tubes Peripherally-inserted central catheters (PICC)
6	MDRO Prevention	Bundled interventions
7	Immunizations	Influenza, Pneumonia, Zoster
8	Staff Education	In-services, Hands-on training

Smith PW, et al. *Am J Infect Control* 2008;36:504-535.

Infection Control Committee

- Core members
  - Infection control practitioner (IP)
  - Facility administrator
  - Nursing representative
  - Medical director
  - Consider subcommittees: MDROs, CAUTIs, Antimicrobial Stewardship
- Meet at least quarterly throughout the year and on emergent basis

Smith PW, et al. *Am J Infect Control* 2008;36:504-535.
Schweon S, et al. *APIC* 2013.

Infection Preventionist: Leadership Characteristics

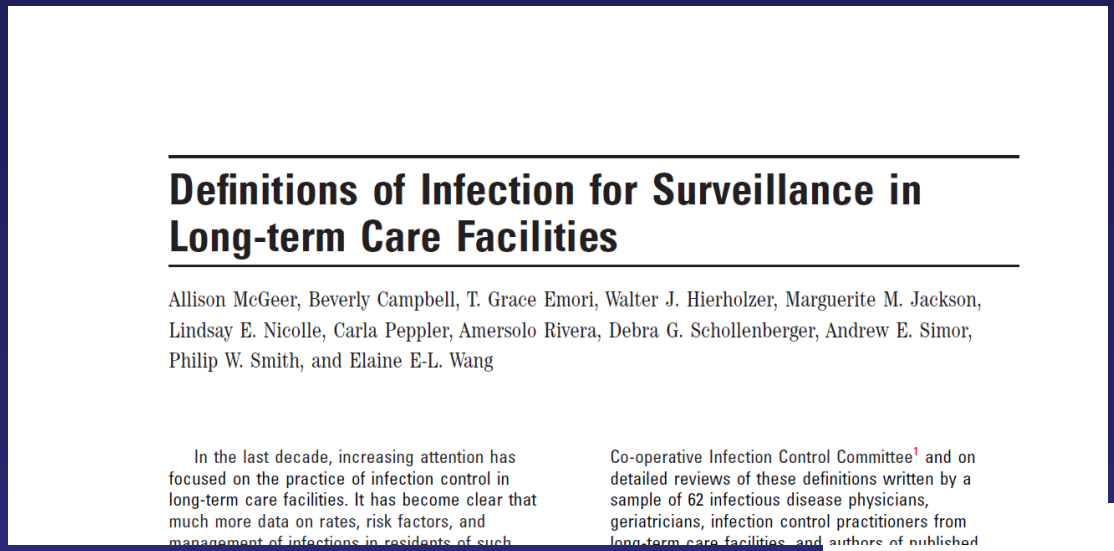
- Cultivate a culture of clinical excellence & effectively communicate it to staff
- Focus on overcoming barriers and deal directly with resistant staff or process issues that impede prevention of HAI
- Inspire employees
- Think strategically while acting locally

Saint S, et al. *Infect Control Hosp Epidemiol* 2010;31:901-907.

1. Surveillance

- The ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with timely dissemination of these data to those who need to know.

Horan and Gaynes in Mayhall et all, 4th ed.

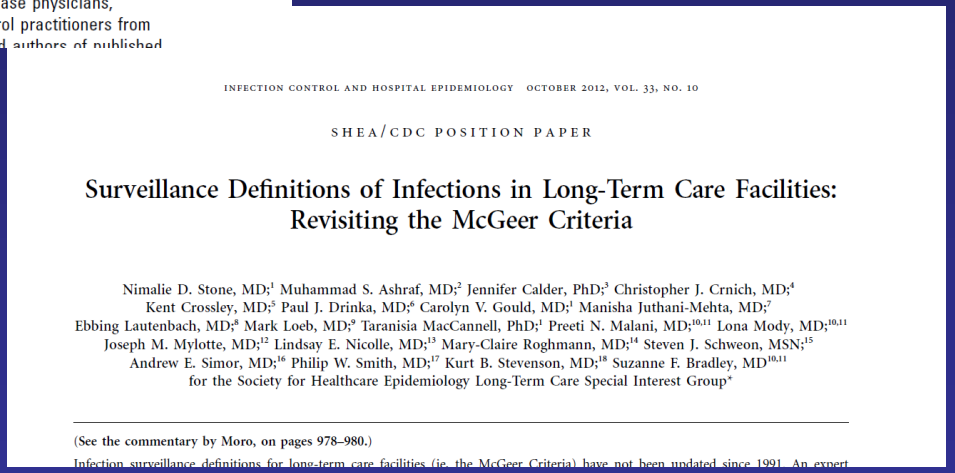


Definitions of Infection for Surveillance in Long-term Care Facilities

Allison McGeer, Beverly Campbell, T. Grace Emori, Walter J. Hierholzer, Marguerite M. Jackson, Lindsay E. Nicolle, Carla Peppler, Amersolo Rivera, Debra G. Schollenberger, Andrew E. Simor, Philip W. Smith, and Elaine E-L. Wang

In the last decade, increasing attention has focused on the practice of infection control in long-term care facilities. It has become clear that much more data on rates, risk factors, and

Co-operative Infection Control Committee[1] and on detailed reviews of these definitions written by a sample of 62 infectious disease physicians, geriatricians, infection control practitioners from



INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY OCTOBER 2012, VOL. 33, NO. 10

SHEA/CDC POSITION PAPER

Surveillance Definitions of Infections in Long-Term Care Facilities: Revisiting the McGeer Criteria

Nimalie D. Stone, MD;[1] Muhammad S. Ashraf, MD;[2] Jennifer Calder, PhD;[3] Christopher J. Crnich, MD;[4] Kent Crossley, MD;[5] Paul J. Drinka, MD;[6] Carolyn V. Gould, MD;[1] Manisha Juthani-Mehta, MD;[7] Ebbing Lautenbach, MD;[8] Mark Loeb, MD;[9] Taranisia MacCannell, PhD;[1] Preeti N. Malani, MD;[10,11] Lona Mody, MD;[10,11] Joseph M. Mylotte, MD;[12] Lindsay E. Nicolle, MD;[13] Mary-Claire Roghmann, MD;[14] Steven J. Schweon, MSN;[15] Andrew E. Simor, MD;[16] Philip W. Smith, MD;[17] Kurt B. Stevenson, MD;[18] Suzanne F. Bradley, MD[10,11] for the Society for Healthcare Epidemiology Long-Term Care Special Interest Group*

(See the commentary by Moro, on pages 978–980.)

Infection surveillance definitions for long-term care facilities (ie, the McGeer Criteria) have not been updated since 1991. An expert

- Notable changes:
  - Constitutional criteria definitions in LTCFs
  - Fever definition
  - Surveillance guidelines

Constitutional criteria

- Fever
  - A single oral temp >37.8°C (100°F) OR
  - Repeated oral temps >37.2°C (99°F) (or rectal temps >37.5°C (99.5°F)) OR
  - A single temp >1.1°C (2°F) over baseline from any site
- Leukocytosis
  - WBC > 14000 WBC/mm^3, or
  - Left shift (>6% bands or >2,500 bands/mm^3)

http://thejoyhome.com/images/resident-temperature.jpg

Stone ND, et al. *Infect Control Hosp Epidemiol* 2012;33:965-977.
High KP, et al. *Clin Infect Dis* 2009;48:149-171.

Constitutional criteria

- Change in mental status from baseline
  - Acute onset
  - Fluctuating course
  - Inattention and
  - Disorganized thinking or altered levels of consciousness
- Acute functional decline in activities of daily living
  - A new 3-point increase in total ADL score (range, 0-28) from baseline, based on the following 7 ADL items, each scored 0 (independent) to 4 (total dependence): bed mobility, transfer, locomotion within LTCF, dressing, toilet use, personal hygiene, eating

Stone ND, et al. *Infect Control Hosp Epidemiol* 2012;33:965-977.

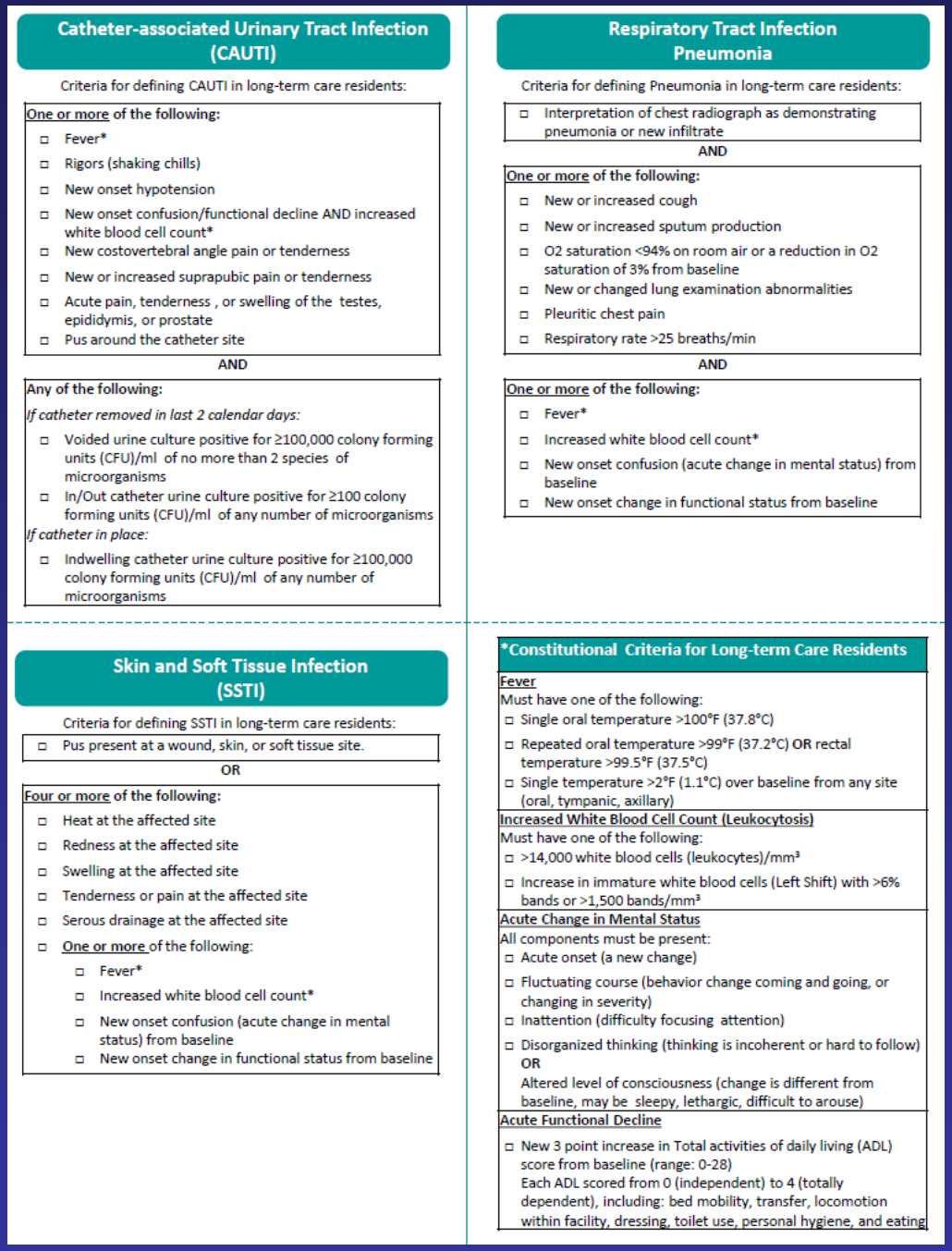
Tips on Applying Surveillance criteria

- Maintain a line listing
  - Should be monitored, updated regularly to identify outbreaks, clusters, unusual patterns
  - Cues: antibiotic starts, resident symptoms
- Clear descriptive documentation

Vague	Clear
Fever	Specific temp reading e.g. 100.1 F
Shortness of breath	Respirator rate, oxygen saturation
Cough	Dry cough, cough with sputum

Tips on Applying Surveillance criteria

- If multiple symptoms present, document date of onset for each symptom
- Many definitions require documenting change from baseline; establish a baseline!
- Use EMR, paper charts, pharmacy records, 24 hr logs for data collection
- Clearly document device use
- Note different microbial parameters used for UTI, CAUTI based on method of collection



Catheter-associated Urinary Tract Infection (CAUTI)

Criteria for defining CAUTI in long-term care residents:

One or more of the following:

- ☐ Fever*
- ☐ Rigors (shaking chills)
- ☐ New onset hypotension
- ☐ New onset confusion/functional decline AND increased white blood cell count*
- ☐ New costovertebral angle pain or tenderness
- ☐ New or increased suprapubic pain or tenderness
- ☐ Acute pain, tenderness , or swelling of the testes, epididymis, or prostate
- ☐ Pus around the catheter site

AND

Any of the following:

If catheter removed in last 2 calendar days:

- ☐ Voided urine culture positive for ≥100,000 colony forming units (CFU)/ml of no more than 2 species of microorganisms
- ☐ In/Out catheter urine culture positive for ≥100 colony forming units (CFU)/ml of any number of microorganisms

If catheter in place:

- ☐ Indwelling catheter urine culture positive for ≥100,000 colony forming units (CFU)/ml of any number of microorganisms

Respiratory Tract Infection Pneumonia

Criteria for defining Pneumonia in long-term care residents:

- ☐ Interpretation of chest radiograph as demonstrating pneumonia or new infiltrate

AND

One or more of the following:

- ☐ New or increased cough
- ☐ New or increased sputum production
- ☐ O2 saturation <94% on room air or a reduction in O2 saturation of 3% from baseline
- ☐ New or changed lung examination abnormalities
- ☐ Pleuritic chest pain
- ☐ Respiratory rate >25 breaths/min

AND

One or more of the following:

- ☐ Fever*
- ☐ Increased white blood cell count*
- ☐ New onset confusion (acute change in mental status) from baseline
- ☐ New onset change in functional status from baseline

Skin and Soft Tissue Infection (SSTI)

Criteria for defining SSTI in long-term care residents:

- ☐ Pus present at a wound, skin, or soft tissue site.

OR

Four or more of the following:

- ☐ Heat at the affected site
- ☐ Redness at the affected site
- ☐ Swelling at the affected site
- ☐ Tenderness or pain at the affected site
- ☐ Serous drainage at the affected site
- ☐ One or more of the following:
  - ☐ Fever*
  - ☐ Increased white blood cell count*
  - ☐ New onset confusion (acute change in mental status) from baseline
  - ☐ New onset change in functional status from baseline

*Constitutional Criteria for Long-term Care Residents

Fever

Must have one of the following:

- ☐ Single oral temperature >100°F (37.8°C)
- ☐ Repeated oral temperature >99°F (37.2°C) OR rectal temperature >99.5°F (37.5°C)
- ☐ Single temperature >2°F (1.1°C) over baseline from any site (oral, tympanic, axillary)

Increased White Blood Cell Count (Leukocytosis)

Must have one of the following:

- ☐ >14,000 white blood cells (leukocytes)/mm³
- ☐ Increase in immature white blood cells (Left Shift) with >6% bands or >1,500 bands/mm³

Acute Change in Mental Status

All components must be present:

- ☐ Acute onset (a new change)
- ☐ Fluctuating course (behavior change coming and going, or changing in severity)
- ☐ Inattention (difficulty focusing attention)
- ☐ Disorganized thinking (thinking is incoherent or hard to follow)

OR

Altered level of consciousness (change is different from baseline, may be sleepy, lethargic, difficult to arouse)

Acute Functional Decline

- ☐ New 3 point increase in Total activities of daily living (ADL) score from baseline (range: 0-28)

Each ADL scored from 0 (independent) to 4 (totally dependent), including: bed mobility, transfer, locomotion within facility, dressing, toilet use, personal hygiene, and eating

Infection Definition Pocket Cards

Criteria for:

- UTIs
- Pneumonia
- Skin & Soft Tissue Infection

TIP Toolkit, page 137

24 Hr Reports

American Journal of Infection Control 42 (2014) 1112-4

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Brief report

The 24-hour report as an effective monitoring and communication tool in infection prevention and control in nursing homes

Jay Fisch MSc [a], Sara E. McNamara MPH, MT(ASCP) [a,b], Bonnie J. Lansing LPN [a,b], Lona Mody MD, MSc [a,b,*]

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Key Words:
Qualitative
Survey
Long-term care

Twenty–four-hour reports are filled out by nurses daily to monitor nursing home residents and document any changes in resident status. Semistructured interviews conducted with ICPs from 12 southeast Michigan nursing homes showed that although 24-hour reports were used, they were not standardized for infection prevention activities. Our results indicate 24-hour reports can be an effective communication tool and potentially aid in early recognition of infections and outbreaks.

Published by Elsevier Inc. on behalf of the Association for Professionals in Infection Control and Epidemiology, Inc.

Fisch J, et al. *Am J Infect Control* 2014;42:1112-1114.

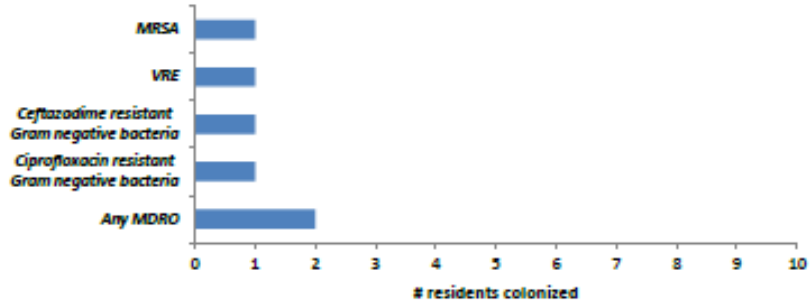
U of M TIP Research Study Report

ABC Medical Care Facility

Month 31: January 2013

Total # Residents Cultured: 4

Figure 1. MDRO Colonization



Two of the 4 residents that were cultured this month were positive for an MDRO. One resident had MRSA and VRE, and one resident had CEFT-R GNB and CIP-R GNB.

Table 1. New MDRO Acquisitions

MDRO	#
MRSA	0
VRE	0
CEFT resistant	1
CIP resistant	0

One of the 4 residents had a newly acquired a CEFT-R GNB since the last study visit.

Table 2. New Infections

# Residents w/ infection	Total # of infections
1	1

One study resident was diagnosed with a new infection (by chart review) this month.

Please follow *Enhanced Barrier Precautions* to reduce the # of residents colonized and help prevent further infections.

Please notify the TIP study team of any new eligible residents.

Thank you for your participation in the study ☺

FEEDBACK

- Monthly Report
  - MDRO rates
  - Infection rates
  - Strategies

Engaging Physicians & Clinical Leadership

- Share the evidence-based information
  - CDC: Get Smart About Antibiotics
  - CDC: Fact Sheet—Antibiotic Use in Nursing Homes
  - FDA: Know when Antibiotics Work
- Use Infection Definitions Pocket Cards
  - NHSN/Revised McGeer's Definitions
  - Loeb's Minimum Criteria for Initiation of Antibiotics
- Highlight why surveillance is important to reduce unnecessary antibiotics and antibiotic resistance
- Discuss alternatives to antibiotics
- Train staff on internal communication strategies

Stone ND, et al. *Infect Control Hosp Epidemiol* 2012; 33:965-77.
Loeb M, et al. *Infect Control Hosp Epidemiol* 2001; 22:120-24.

2. Antibiotic Stewardship Programs

- Prof. Lindsay Nicolle's presentation
- CDC Core elements
  - http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
- Key points:
  - Antibiotics often administered for too long, more broad-spectrum than needed
  - Unnecessary urinary cultures are major source of inappropriate prescriptions
  - Educational interventions have better outcomes when both providers and nurses are engaged

Crnich CJ, et al. *Drugs Aging* 2015;32:699-716.

3. Isolation Precautions

- Standard precautions
  - Hand hygiene
  - Personal protective equipment
  - Respiratory hygiene/cough etiquette
  - Safe injection practices
- Transmission-based isolation precautions
  - Used for residents with documented or suspected infection or colonization with highly transmissible or epidemiologically important pathogens

Pop-Vicas A, et al. *J Am Geriatr Soc* 2008;56:1276-1280.
Siegel JD, et al. *Am J Infect Control* 2007;35:S65-164.

Transmission-based Precautions

		Transmission-based Isolation precautions		
Action	**Standard precautions**	**Contact Precautions**	**Droplet precautions**	**Airborne precautions**
Single room	No	Yes or cohort	Yes or cohort	Yes
Negative air pressure	No	No	No	Yes
Hand hygiene	Non-antimicrobial soap and water or antimicrobial soap and water or alcohol handrub rub	Antimicrobial liquid soap/alcohol handrub for MDROs. Hand washing with antimicrobial soap and water is recommended after care of residents with acute diarrhea (e.g. *C. difficile* infection)	Non-antimicrobial soap and water or antimicrobial soap and water or alcohol handrub	Non-antimicrobial soap and water or antimicrobial soap and water or alcohol handrub

Transmission-based Precautions

		Transmission-based Isolation precautions		
Action	**Standard precautions**	**Contact Precautions**	**Droplet precautions**	**Airborne precautions**
Gloves	When anticipate touching blood, body fluids, secretions, excretions , or non-intact skin	Before contact with resident or environment, and must remove and dispose before leaving patient room and then perform hand hygiene	When anticipate touching blood, body fluids, secretions, excretions, or non-intact skin	When anticipate touching blood, body fluids, secretions, excretions, or non-intact skin,
Gown	When anticipate contact with blood, body fluids, secretions or excretions	Before contact with patient or environment, and must remove and dispose before leaving patient room	When anticipate contact with blood, body fluids, secretions or excretions	When anticipate contact with blood, body fluids, secretions or excretions

Transmission-based Precautions

		Transmission-based Isolation precautions		
Action	**Standard precautions**	**Contact Precautions**	**Droplet precautions**	**Airborne precautions**
Mask	When anticipate splashes or sprays of blood, body fluids, secretions, or excretions	When anticipate splashes or sprays of blood, body fluids, secretions, or excretions	Surgical mask when entering patient's room, and remove at exit to the room. Handle by ties or ear loops	Particulate N95 respirator when entering patient room, and remove outside the room
Goggles/face shield	When anticipate splashes or sprays of blood, body fluids, secretions, or excretions			

4. Hand Hygiene

- Most effective infection control measure in NHs
- Compliance averages at 30-50%
- WHO global campaign to improve HH among HCWs

Kilpatrick C, Pittet D. Infection 2011;39:93-95.

Hand Hygiene Methods

- Hand washing with soap and water
- Use of alcohol-based products
  - Alcohol handrub for HH when hands are not visibly soiled is recommended
  - Has been shown to increase compliance with HH among HCW in NHs
    - Schweon SJ, et al. *AJIC* 2013.
    - Mody L, et al. *ICHE* 2003.

Fellowship Project: What do we grow on our hands?

- To assess the effect of alcohol GEL + educational campaign
  - on hand hygiene compliance in a single NH
  - colonization with pathogens on the hands of health-care workers

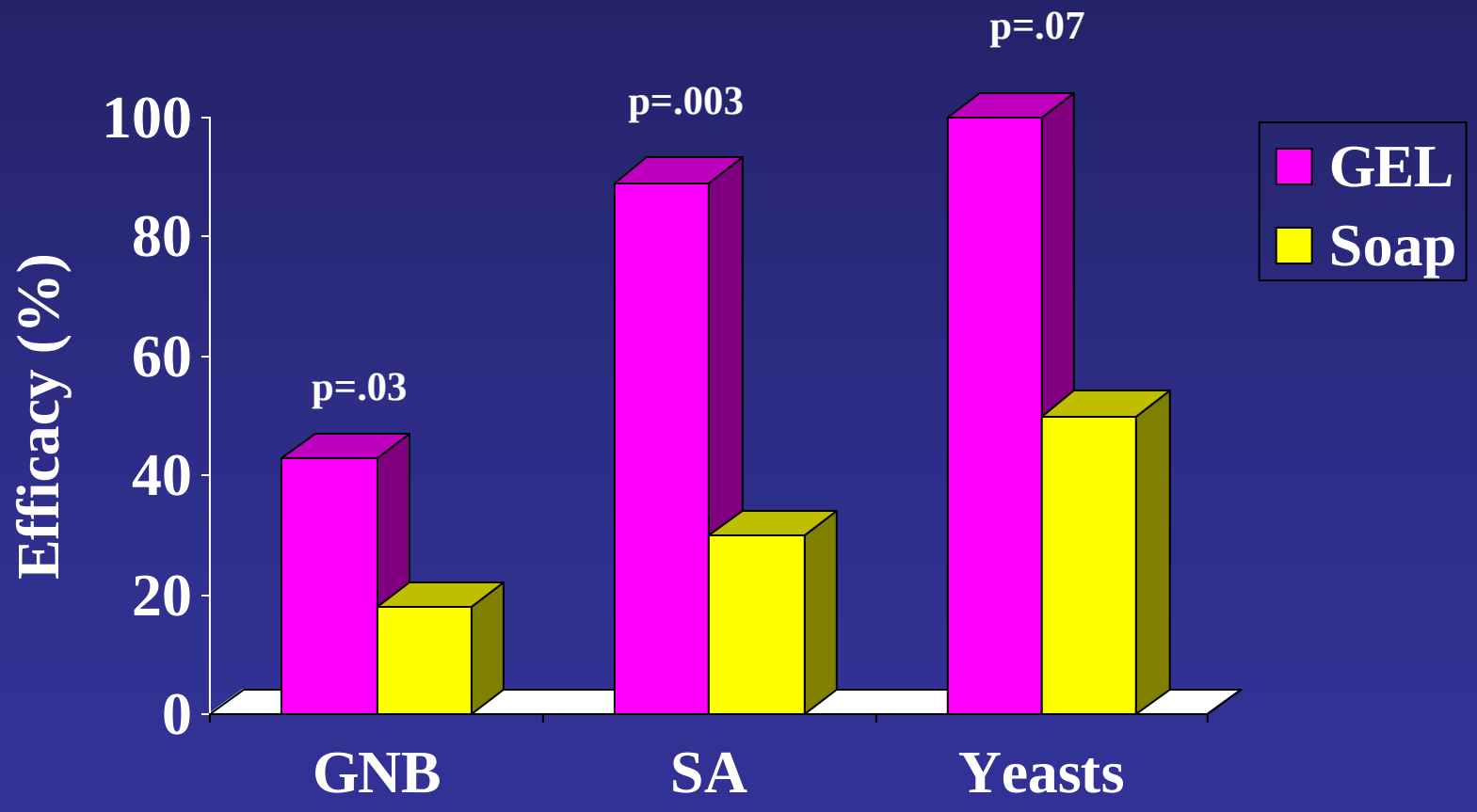
Mody L, et al. *Infect Control Hosp Epidemiol* 2003;24:165-171.

Organisms isolates from the hands of HCWs at baseline

Organism	N (%)
GNB	30 (65)
Yeasts	18 (39)
S. aureus	9 (20)
VRE	4 (9)

Mody L, et al. *Infect Control Hosp Epidemiol* 2003;24:165-171.

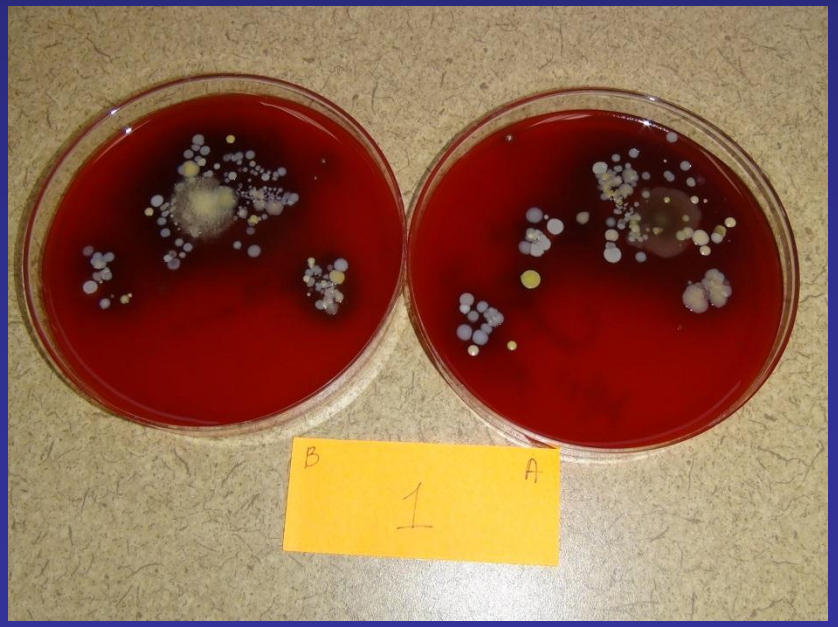
Efficacy of Gel vs. Soap in eliminating pathogens from the hands of HCWs



Mody L, et al. *Infect Control Hosp Epidemiol* 2003;24:165-171.

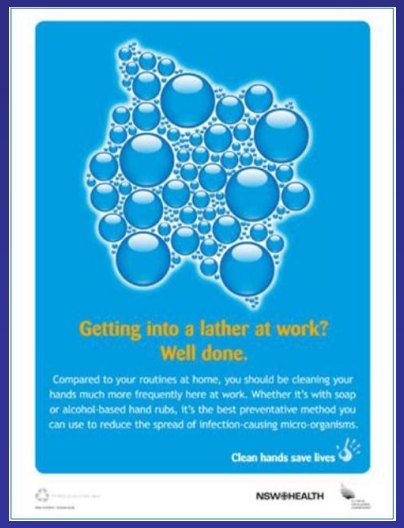
Good Technique

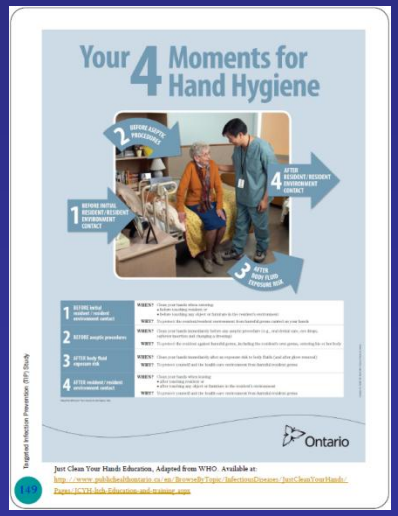
Not-so-Good Technique



Mody L, et al. *JAMA Intern Med* 2015;165:714-723.

Hand Hygiene Posters





Mody L, et al. *JAMA Intern Med* 2015;165:714-723.

Process Surveillance: Hand Hygiene & PPE Use

Facility:_____

HCW Type Key:
1 = Physician
2 = Physician Assistant/Nurse Practitioner
3 = Registered nurse
4 = Licensed practical nurse
5 = Nurse aide
6 = Physical, occupational, speech therapy
7 = Dietitian
8 = Dietary staff
9 = Environmental services/maintenance
10 = Social worker
11 = Administor/manager

Observation Key:
HR = alcohol hand rub
HW = hand washing
Y = Yes
N = No
NA = not applicable

#	Date	Shift	HCW Type	Hand Hygiene BEFORE Touching Resident				Hand Hygiene AFTER touching resident, environment, or equip.				On Contact Precautions		Glove Worn			Gown Worn		
	(MM/DD/YY)	Day, Eve, Night	See Key	YES HR	YES HW	NO	NA	YES HR	YES HW	NO	N/A	Y	N	Y	N	NA	Y	N	NA
1																			
	Reason for Entry:																		
2																			
	Reason for Entry:																		
3																			
	Reason for Entry:																		
4																			
	Reason for Entry:																		
5																			
	Reason for Entry:																		

Mody L, et al. *JAMA Intern Med* 2015;175(5):714-723.
TIP Toolkit, page 154.

Hand Hygiene Bundles

- Useful strategies:
  - Ensure HH resources are accessible facility wide and at the point of care
  - Reinforce HH behavior and accountability
  - Provide regular reminders
  - Establish ongoing monitoring and feedback of HH compliance

Schweizer ML, et al. *Clin Infect Dis* 2014;58:248-259.

Hand Hygiene Bundles

- Useful strategies (Cont'd):
  - Establish ongoing monitoring and feedback on infection rates
  - Establish administrative leadership and support
  - Establish a multidisciplinary design and response team
  - Provide ongoing education and training for staff, patients, families and visitors

Schweizer ML, et al. *Clin Infect Dis* 2014;58:248-259.

5. Device Care

- Indwelling urinary catheters, feeding tubes, and peripherally-inserted central catheters (PICC)
- Inadequate care may contribute to MDRO transmission and infection
  - TIP program (Mody et al, JAMA Intern Med 2015)
    - Increased gown use and hand hygiene when providing care, and reduced MDRO colonization by 23% and catheter-associated infections by 31%.

Common Devices in post-acute and long-term care

- Indwelling urinary Catheters:
  - 9-10% in newly admits, 5% long-term utilization
  - Average use: 108 days, likely bimodal
- Feeding Tubes:
  - 3-5% in newly admits, 5-15% long-term utilization
  - Average use: 109 days with, likely bimodal
- Peripherally inserted central catheters:
  - 10% in newly admits, little long-term utilization
  - Average use 47 days (range of 2-162 days)

Crnich CJ, et al. *Infect Dis Clin N Am* 2012;26:143-164.

Complications of long-term Urinary catheterization

- Asymptomatic bacteriuria: 100% in 30 days
- CAUTIs: 50% patients within 1 yr., often recurrent
- Fever: low grade, common, can resolve without antibiotics
- Fever: high grade, can be associated with bacteremia and death
- Autopsy: 75 NH residents
    - Acute renal inflammation:
        - 38% in residents with catheters
        - 5% in non-catherized residents
- Other complications: catheter obstruction, renal and bladder stone formation

Montoya A, et al. *Aging health* 2011;58:248-259.

Feeding Tubes in Post-acute and LTC

- Used for management of dysphagia particularly in advanced dementia patients
- Prevalence ranges: 3-15%
- Higher mortality, aspiration pneumonia
- Higher risk of MDRO colonization
- PEGs safer than nasogastric feeding tubes for feeding interruption, blocking, leakage and compliance

Crnich CJ, et al. *Infect Dis Clin N Am* 2012;26:143-164.

Complications of Feeding Tube use

- Pulmonary aspiration
- Intolerance to feeding
- Blocked feeding tubes
- Faulty placement
- Other pulmonary complications
  - Hemorrhage, esophageal perforation, pneumonitis
- Skin and soft tissue infections
- MRSA colonization around the tube site and other anatomic sites

Montoya A, et al. *Aging health* 2011;58:248-259.

Recommendations for Practice

- Position
  - 30-45^0 bed elevation
  - Minimize time spent in supine position
- Prevention bacterial contamination
  - Wash hands prior to handling feeding equipment
  - Use disposable gloves when handling feeding equipment
  - Use sterile water if diluting feeds (not tap water)
  - Local care: watch for any secretions, excoriations, pain, erythema
  - Enhanced barrier precautions when splashing expected

Montoya A, et al. *Aging health* 2011;58:248-259.

PICC Lines

- Increasingly used in post-acute care settings
- Average duration of use shorter than other devices in post-acute and long-term care settings
- Common indications: antibiotics, other IV therapies
- Benefits:
  - Long-term access - dwell time varies (can be > one year)
  - Reduces hospital length of stay- allows for IV therapy in non-acute settings i.e. home care /post-acute care settings
  - Cost effective compared to all other central venous access devices
  - Patient satisfaction and comfort
  - Fewer interruptions in IV therapy

Crnich CJ, et al. *Infect Dis Clin N Am* 2012;26:143-164.

PICC Lines: Complications

- Air embolism
- Infection including CLABSI
- Venous thromboembolism
- Nerve damage
- Other considerations:
  - Blood withdrawal can be difficult; may be dependent on catheter length
  - Over time, multiple insertions can cause venous scarring and decrease the ability to reuse the site

Montoya A, et al. *Aging health* 2011;58:248-259.

6. MDRO Prevention

- Major challenges for NHs in planning and implementing prevention initiatives are adapting effective strategies to the structure, workflow, and specific needs of their facility.
- Bundled interventions show promise

Montoya A, et al. *Clin Geriatr Med* 2016 (In revision).

Ho SS, Hong Kong, China, 2012

- Intervention: Infection control program
  - Week 1: clinical-scenario-based study, experience sharing, handwashing assessment, and interactive group activities, skill and practice.
  - Week 2: demonstration and return-demonstration, discussion on guideline, revision on handwashing techniques.

All sites	IV group (N = 15)		P[a]	CT group (N = 15)		P[b]
	Baseline Mean ± SD	Post IV Mean ± SD		Baseline Mean ± SD	Post IV Mean ± SD	
No. MRSA	2.1 ± 1.6	0.4 ± 0.7	0.00*	1.3 ± 1.04	2.3 ± 2.01	0.03*

IV = Intervention, CT = Control, SD = Standard deviation

Ho SS, et al. *J Hosp Infect* 2012;82:49-55.

Ho ML, Hong Kong, China, 2012

Phase	CT Arm (6 homes)		IV arm 1 (6 homes)		IV arm 2 (6 homes)	
	Compliance[a]	P	Compliance[a]	P	Compliance[a]	P
Baseline	19.5	…	27.0	.080	22.2	.980
1 mo after intervention	19.8	…	59.2	<.001	59.9	<.001
4 mo after intervention	21.6	…	60.6	<.001	48.6	<.001
Change in % within arm	2.1	.851	33.6	<.001	26.4	<.001

IV = Intervention, CT = Control

[a] Proportion of HH opportunities resulting in compliant action (%).

Ho ML, et al. *Infect Control Hosp Epidemiol* 2012;33:761-767.

SCHORA DM, ILLINOIS, U.S., 2014

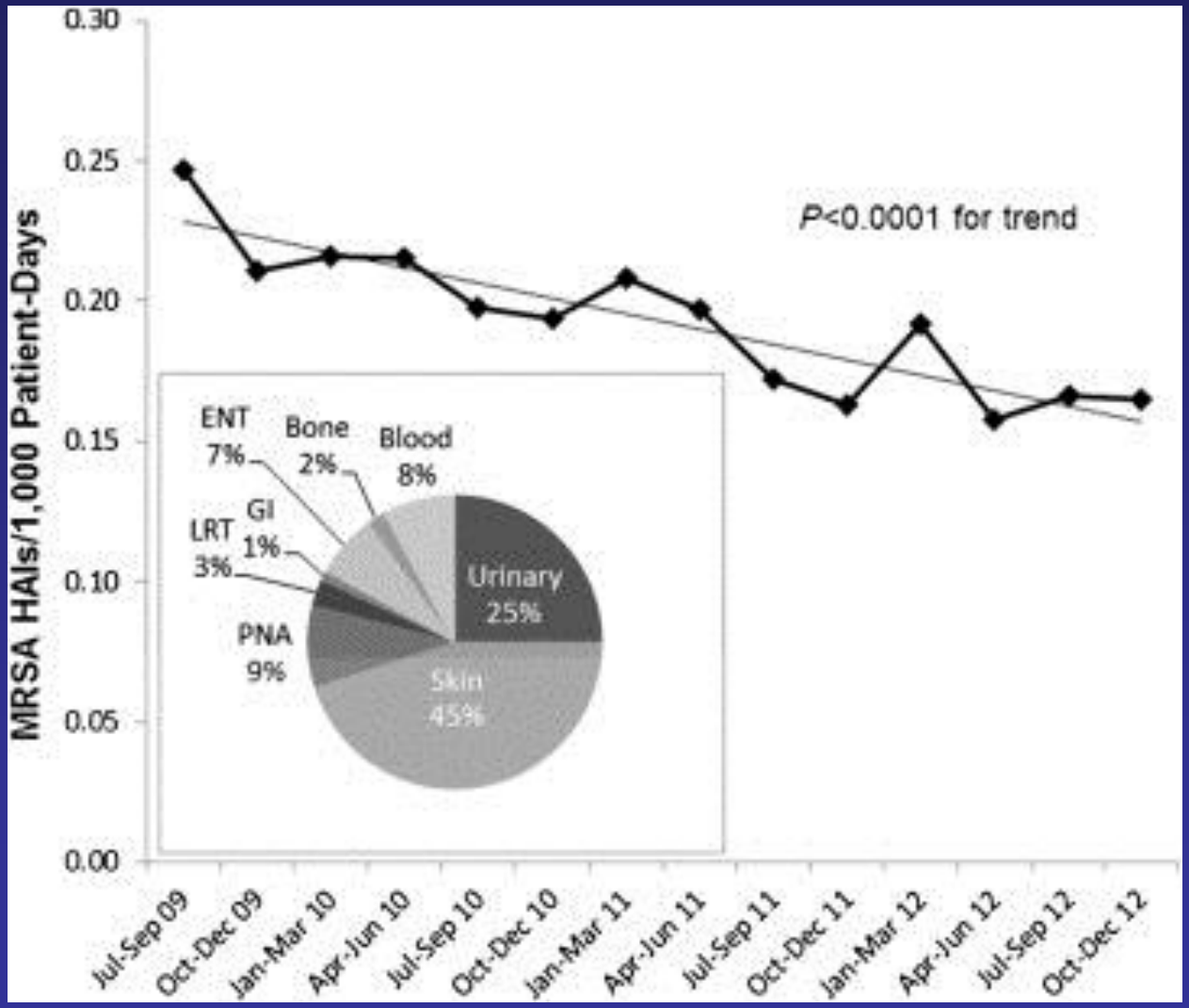
- Intervention: Decolonization program
  - Year 1: decolonization with nasal mupirocin and chlorhexidine bathing, enhanced environmental cleaning with bleach every 4 months.
  - Year 2:all units received IV protocol

Nasal Screen Tests with MRSA PCR	Baseline		Year 1		Year 2	
	I	C	I	C	I	C
No. tests	315	358	715	762	1,044	1,230
Positive MRSA tests[a]	53	59	83	136	134	106
Culture prevalence (%)	16.83	16.48	11.61	17.85	12.84	8.62

I = Intervention, C = Control
[a] Confirmed by culture

Schora DM, et al. *Am J Infect Control* 2014;42:S269-273.

EVANS ME, U.S., 2014



MRSA Prevention Initiative bundle:

(1) Nasal surveillance for MRSA

(2) Contact precautions for MRSA carriers

(3) Hand hygiene

(4) Institutional culture change

Evans ME, et al. *Am J Infect Control* 2014;42:60-62.

TIP Bundle

	Intervention (TIP)	Control (Usual Care)
Barrier Precautions	Preemptive gown/gloves	Standard
MDRO Surveillance	**Active** with **feedback** reports	Passive with no feedback
Infection Surveillance	**Active** with **feedback** reports	Standard, without feedback
Education	✓ Hand hygiene promotion ✓ In-services ✓ Pocket cards ✓ Train-the-trainer	As needed

Mody L, et al. *JAMA Intern Med* 2015;175(5):714-723.

Mody L, Michigan, U.S., 2015

	Intervention		Control		aRR*
	% Positive swabs	MDRO + isolates	% Positive swabs	MDRO + isolates	Cluster, co-variate adjusted
All MDRO	27%	1299	33%	1732	0.77 (0.62-0.94)
CIP-R	20%	738	24%	952	0.75 (0.58-0.97)
MRSA	8%	254	11%	323	0.78 (0.64-0.96)
CTZ-R	5%	185	8%	295	0.94 (0.61-1.44)
VRE	4%	122	5%	162	1.20 (0.82-1.75)

Mody L, et al. *JAMA Intern Med* 2015;175(5):714-723.

7. Immunizations: Influenza Vaccine

- Trivalent flu vaccine protects against two influenza A viruses (H1N1, H3N2) & an influenza B virus:
  - Standard-dose trivalent: 18 - 64 yrs
  - A high-dose trivalent shot: ≥ 65 yrs
  - A trivalent shot, virus grown in cell culture: ≥ 18 yrs
  - A recombinant trivalent shot that is egg-free: ≥ 18 yrs
- The quadrivalent flu vaccine protects against two influenza A viruses and two influenza B viruses:
  - A quadrivalent flu shot: virus grown in eggs; several manufacturers, approved for people of different ages- some in as young as 6 m
  - An intradermal quadrivalent shot: 18 - 64 yrs
  - A quadrivalent nasal spray vaccine: 2 - 49 yrs

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6430a3.htm#Tab

Pneumococcal Vaccine Timing for Adults

Make sure your patients are up to date with pneumococcal vaccination.

Two pneumococcal vaccines are recommended for adults:
- 13-valent pneumococcal conjugate vaccine (PCV13, Prevnar13®)
- 23-valent pneumococcal polysaccharide vaccine (PPSV23, Pneumovax®23)

PCV13 and PPSV23 should not be administered during the same office visit.

When both are indicated, PCV13 should be given before PPSV23 whenever possible.

If either vaccine is inadvertently given earlier than the recommended window, do not repeat the dose.

One dose of PCV13 is recommended for adults:

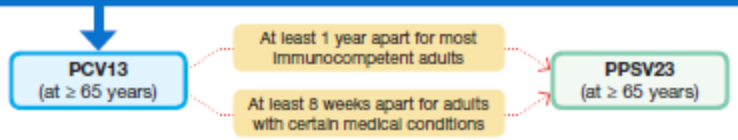
- 65 years or older who have not previously received PCV13.
- 19 years or older with certain medical conditions and who have not previously received PCV13. *See Table 1 for specific guidance.*

One dose of PPSV23 is recommended for adults:

- 65 years or older, regardless of previous history of vaccination with pneumococcal vaccines.
  - Once a dose of PPSV23 is given at age 65 years or older, no additional doses of PPSV23 should be administered.
- 19 through 64 years with certain medical conditions.
  - A second dose may be indicated depending on the medical condition. *See Table 1 for specific guidance.*

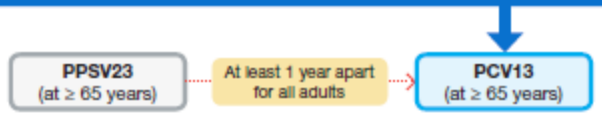
Pneumococcal vaccine timing for adults 65 years or older

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history



- Administer 1 dose of PCV13.
- Administer 1 dose of PPSV23 **at least 1 year** later for most immuno*competent* adults or **at least 8 weeks** later for adults with immuno*compromising* conditions, cerebrospinal fluid leaks, or cochlear implants. *See Table 1 for specific guidance.*

For those who have previously received 1 dose of PPSV23 at ≥ 65 years and no doses of PCV13



- Administer 1 dose of PCV13 **at least 1 year** after the dose of PPSV23 for all adults, regardless of medical conditions.

NCIRDIg410 | 11.30.2015

www.cdc.gov/pneumococcal/vaccination.html

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Varicella Vaccine: ACIP Recommendations

- Recommended for all adults ≥60 years
- Not intended for treating herpes zoster (HZ).
- Recommended whether or not patient reports history of HZ.
- Not recommended for persons who received varicella vaccine.
- No recommendations for re-immunization at present

Slide by K. Helen Talbot, MD, Vanderbilt

8. Staff Education

- In-services, hands-on training, on-the-spot training
- Educational programs should focus on disease transmission, hand hygiene, and standard and transmission-based precautions.
  - Emphasis on clear documentation and early symptom recognition

Montoya A, et al. *Clin Geriatr Med* 2016 (In revision).

Urinary Catheter Care

Didactic

Demonstration

Mody L, et al. *JAMA Intern Med* 2015;175(5):714-723.

Infection Control Jeopardy

Mody L, et al. *JAMA Intern Med* 2015;175(5):714-723.

Take Away Points

- Hand hygiene: Residents, Staff, Visitors
- Prevent disease
  - Get vaccinated (Residents and Staff)
  - Cover your cough
- Wear appropriate PPE
- Emphasize strict asepsis during insertion of invasive devices

Summary

- Unique environment with challenges for infection prevention and control
- ICPs = essential to enforce compliance with HH, device care and increase awareness of MDROs
- Multi-model interventions have been proven to be effective to enhance hand hygiene, reduce MDROs
- Continued efforts to standardized IPC in NHs are necessary.