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# Antibiotic Stewardship in Nursing Homes: Best Practices and Updates

Karen Jones, MPH, RN, CIC, FAPIC
Centers for Research & Innovations in Special Populations
Department of Internal Medicine, Division of Geriatrics
The University of Michigan
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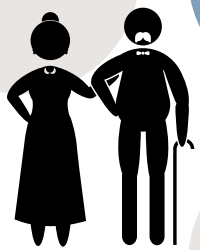
# Objectives

| | |
|---|---|
| Define | Define infection prevention & antibiotic prescribing trends in nursing homes |
| Describe | Describe how antibiotic stewardship can improve nursing home resident outcomes |
| Identify | Identify antibiotic stewardship interventions applicable to nursing home environments |

# Infection risk factors in nursing homes

| | |
|---|---|
| Resident level | • Effects of older age (immune system, mucous membrane & skin changes)<br>• Atypical symptoms of infection |
| Environmental level | • Many shared spaces |
| Therapy-related | • Antibiotic overuse & rise in multi-drug resistant organisms (MDROs) |



Montoya, *Clin Geriatr Med*. 2016

# Antibiotic use in nursing homes

- Antibiotics are among most prescribed meds in nursing homes
- Up to 70% of nursing home residents receive at least one antibiotic every year
- Up to 75% of these antibiotics are prescribed incorrectly (e.g., drug, dose, duration, reason)

CDC's Core Elements for Antibiotic Stewardship for Nursing Homes, page last updated August 20, 2021.

| Antibiotic | Total Courses | | Course Duration (Day | |
|---|---|---|---|---|
| | No. | % | Median | IQR |
| Total | 436,619 | NA | 7 | 5–10 |
| **Genitourinary infections** | | | | |
| Total | 146,239 | NA | 7 | 5–8 |
| Ciprofloxacin | 32,042 | 22 | 7 | 4–8 |
| Nitrofurantoin | 22,995 | 16 | 8 | 6–9 |
| Trimethoprim-sulfamethoxazole | 18,492 | 13 | 7 | 5–8 |
| Levofloxacin | 12,736 | 9 | 6 | 4–7 |
| Cephalexin | 12,351 | 8 | 7 | 5–8 |
| **Respiratory infections** | | | | |
| Total | 100,165 | NA | 7 | 4–8 |
| Levofloxacin | 32,966 | 33 | 7 | 5–8 |
| Azithromycin | 17,879 | 17 | 5 | 4–5 |
| Amoxicillin-Clavulanic Acid | 9,768 | 10 | 8 | 5–10 |
| Doxycycline | 7,359 | 7 | 8 | 6–10 |
| Ceftriaxone | 4,472 | 4 | 5 | 3–7 |

- 1,664 US nursing homes in 2016
- 54% of NH residents received a systemic antibiotic
- High variability among nursing homes

Kabbani et al, 2021.

# Inappropriate antibiotics in nursing homes – not a new problem

| Author | Year | Population | N | % inappropriate |
|---|---|---|---|---|
| Zimmer | 1986 | 42 U.S. NHs | 1748 | 38% |
| Jones | 1987 | 2 Portland NHs | 120 | 51% |
| Loeb | 2001 | 22 chronic care facilities in Canada | 3656 | 51% |
| Mitchell | 2014 | Patients with advanced dementia in 21 Boston NHs | 214 | 56% |
| Rotjapanan | 2011 | Urinary tract infections in 2 Rhode Island NHs | 172 | 73% |

Loeb *JGIM* 2001; Jones *AJM* 1987; Mitchell *JAMA IM* 2014; Rotjapanan *JAMA IM* 2011; Zimmer *JAGS* 1986

# Risks with antibiotic use

- Direct toxicity – risks exists for every organ
  - Liver
  - Kidney
  - Bone Marrow
  - Dermatologic
  - Electrolytes
  - Neurologic
- Allergic reactions
- 13% of adult ED visits for adverse drug events (ADE) are due to antibiotics
- Promotes antimicrobial resistance

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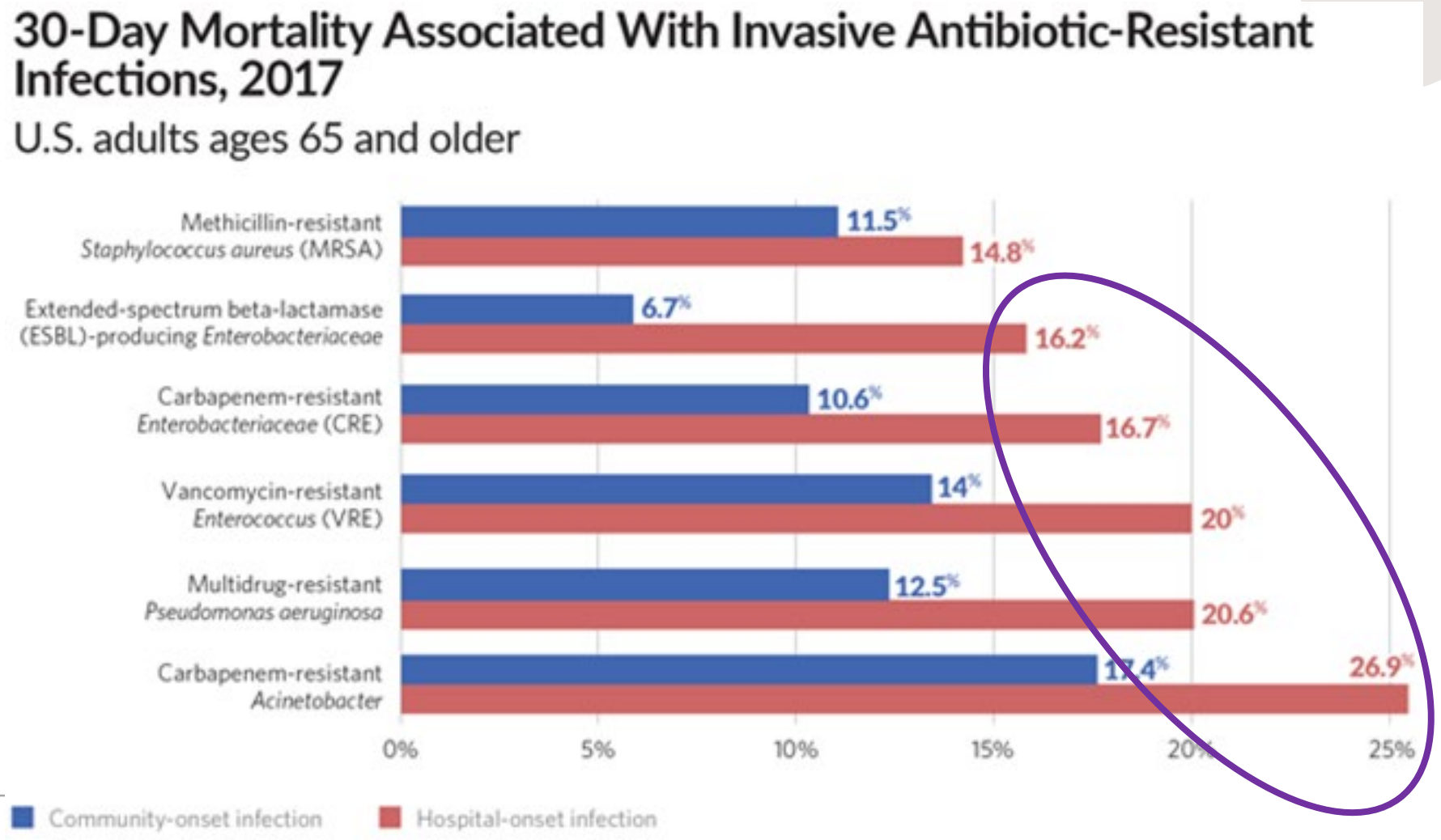
Tamma et al, *JAMA Intern Med* 2017.

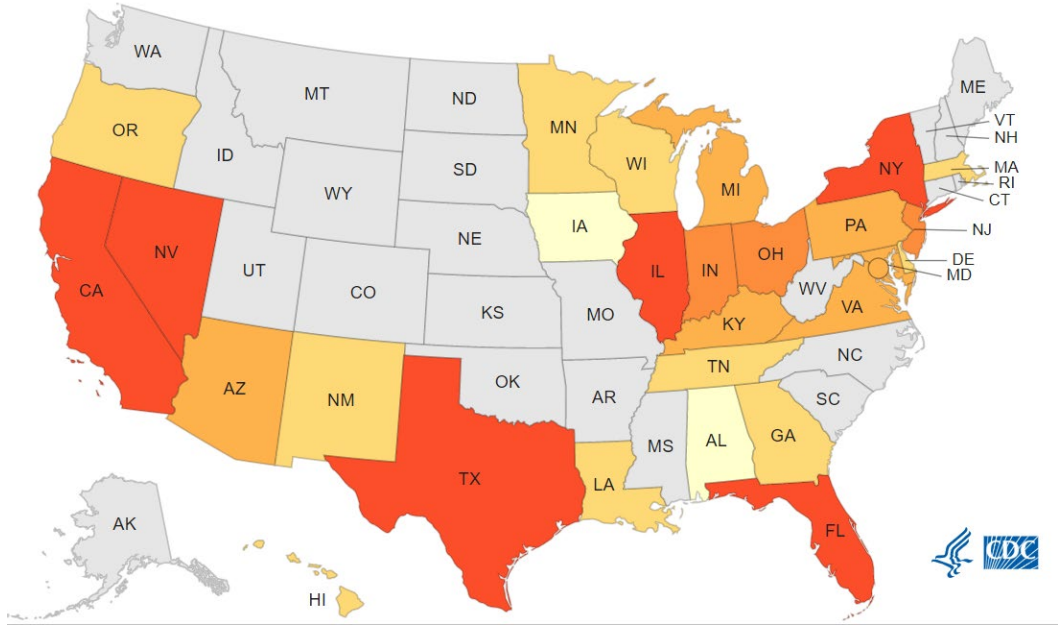
# Deadly: invasive MDROs in older adults




Nelson, *CID*, 2021

Medical News & Perspectives

# On the Rise, *Candida auris* Outwits Treatments and Travels Incognito in Health Care Settings




Number of *C. auris* clinical cases through September 30, 2022.

In the most recent 12 months, there were 1,994 clinical cases and 5,071 screening cases (Oct 2021–Sept 2022).

- 0 clincial cases and ≥1 screening case
- 1 to 10
- 11 to 50
- 51 to 100
- 101 to 500
- 501 to 1000
- 1001 or more

" . . . more likely, though, is that many cases went undetected in 2019, 2020, and 2021, when public health laboratories overwhelmed by COVID-19 and chronic underfunding didn't have the bandwidth to look for *C auris*" – Dr. Natasha Bagdasarian, Chief Medical Executive, MDHHS

Rubin, *JAMA*, 2022.
https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html

# Prescribing trends may affect the entire facility

- Odds of developing an MDRO increase when in a facility with high rates of antibiotic use – even if the resident themselves didn't receive an antibiotic  (Daneman, 2015)
- Do you know your facility's prescribing trends?

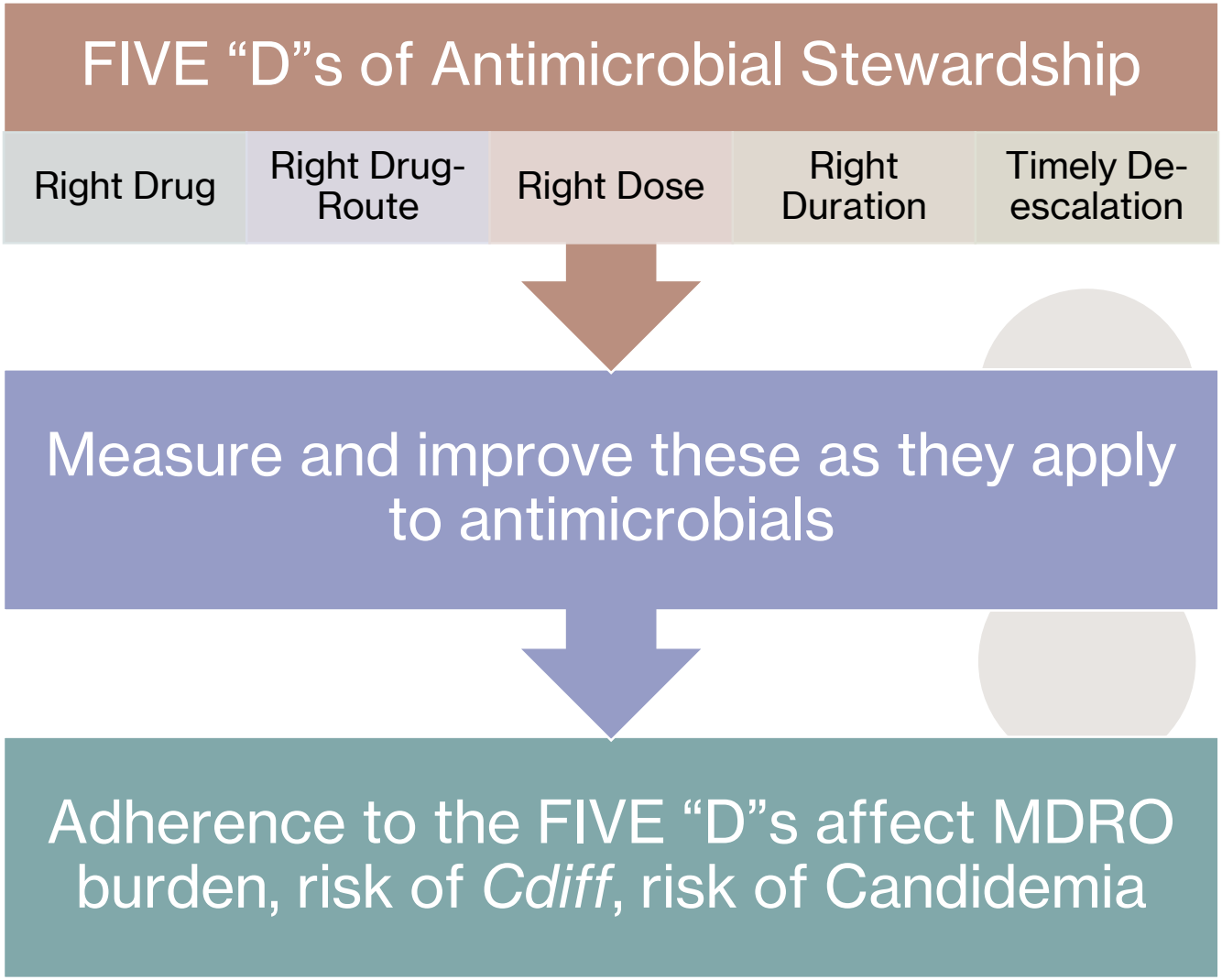
Daneman et al, *JAMA Int Med*, 2015

# Antibiotic Stewardship program in nursing homes

- CMS' 483.3 (2017) stipulated all nursing homes must have an Antibiotic Stewardship program in place
- Wide variability – members, guidelines, engagement
- "7 Core Elements" – CDC guidelines for antibiotic stewardship in nursing homes

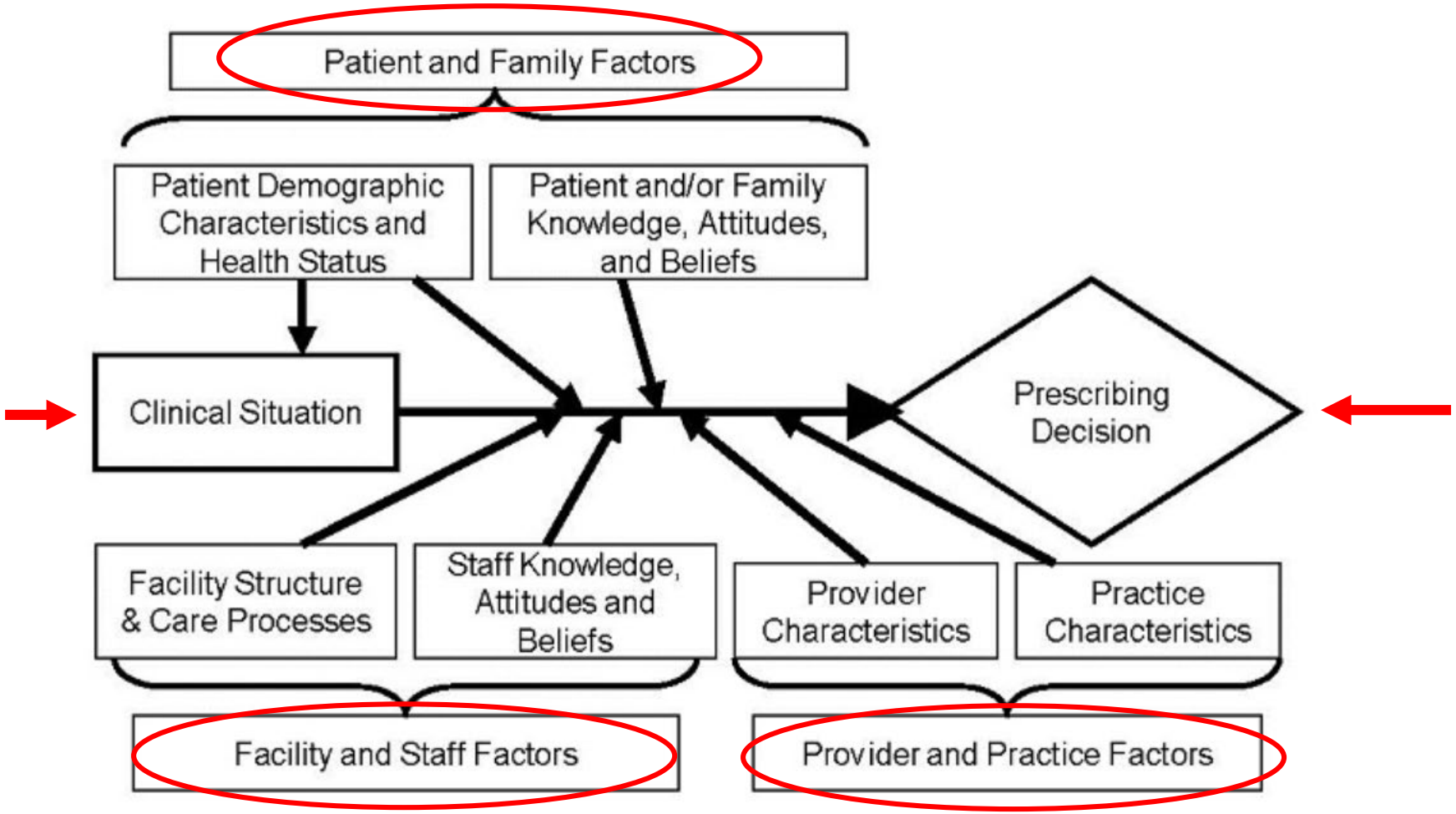
CDC's Core Elements for Antibiotic Stewardship for Nursing Homes.

# Antimicrobial Stewardship




Credit: Payal Patel, MD, MPH

## Figure 1. Conceptual model related to prescribing decisions in residential care/assisted living and nursing homes




Strategies to Reduce Potentially Inappropriate Antibiotic Prescribing in Assisted Living and Nursing Homes, AHRQ.

# Recommended strategies

- Evidence-based provider (prescriber) training
- Use of a standardized communication form
- Resident & family education
- Ongoing monitoring & feedback
- Monthly QI meetings

**Leadership commitment is critical to success**

Strategies to Reduce Potentially Inappropriate Antibiotic Prescribing in Assisted Living and Nursing Homes AHRQ.

# Asymptomatic bacteriuria & “treatment”

- Asymptomatic bacteriuria (ASB) - 1 or more species of bacteria growing in the urine irrespective of the presence of pyuria, in the absence of signs or symptoms attributable to urinary tract infection (Noelle, 2019)
- Inappropriate utilization of urine cultures
  - 210 patients on hospitalist service with urine cultures
  - 54% with inappropriate reason for obtaining culture
  - 45% of negative cultures on antibiotics at time of culture
- Treatment ASB
  - **59 of 60 patients with ASB were treated with antimicrobials =** 453 days of excess antibiotic therapy

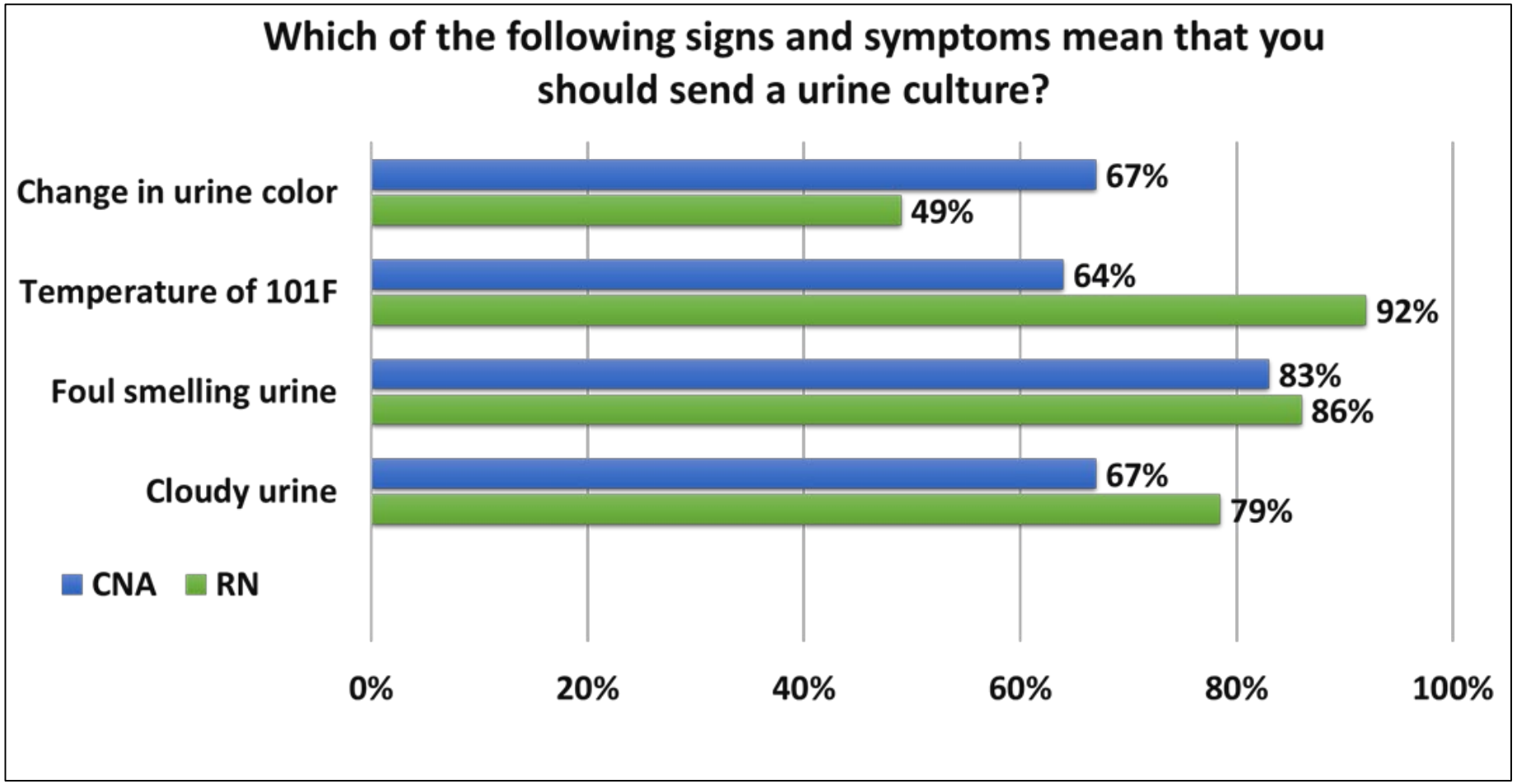
Hartley et al. *ICHE*, 2015.

# Case Scenario

- 92 y/o female resident with a history of recurrent “UTIs” complains of symptoms “similar to prior episodes”
- Symptoms: cloudy urine, smells “bad.” No dysuria or suprapubic pain.
- Resident’s daughter states, “this is always how it starts” and always resolves with antibiotics
- U/A and culture are sent, empiric antibiotics started

Is this how you’d expect your facility to react?

# Nurses and Nursing Assistant Surveys (N=278)




Drekonja, *ICHE*, 2019

# What interventions work?

Systematic review of nursing home antibiotic stewardship programs

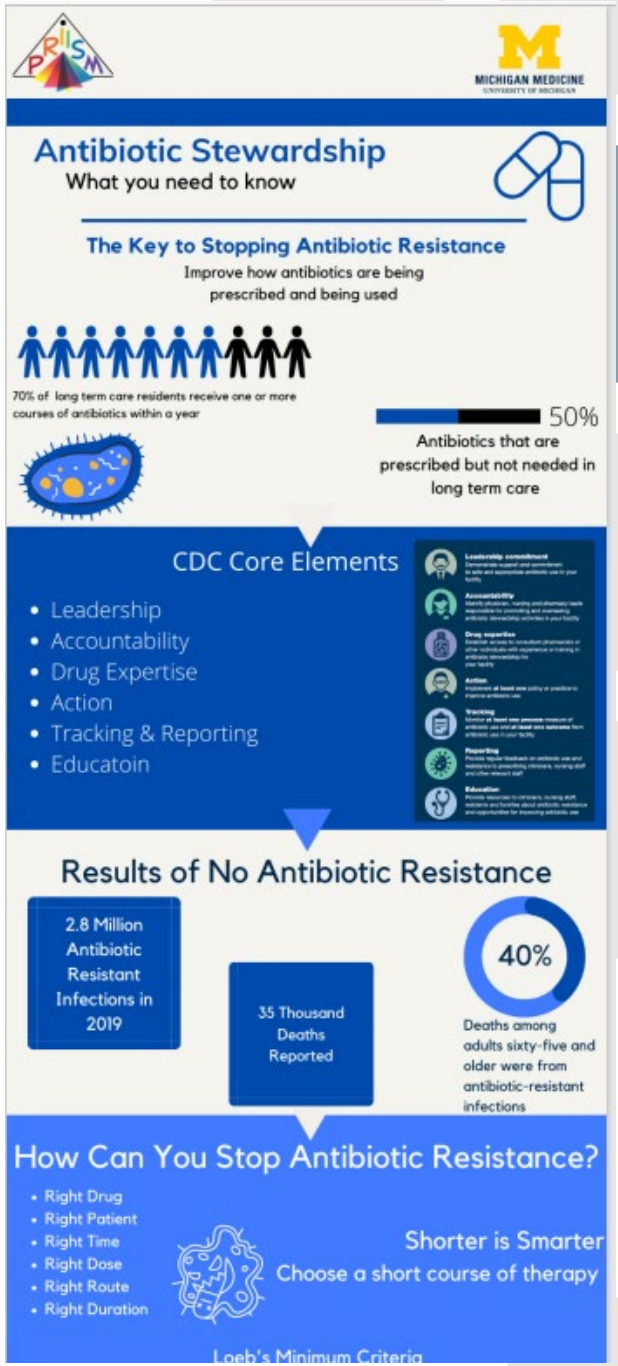
- Most interventions were multi-faceted (13/16, with median of 4 strategies)
- Educational meetings & materials, guidelines
- Interventions were associated with a 13% reduced antibiotic use overall
- Leadership commitment & support was essential

Wu, *J Amer Geria S*, 2019.

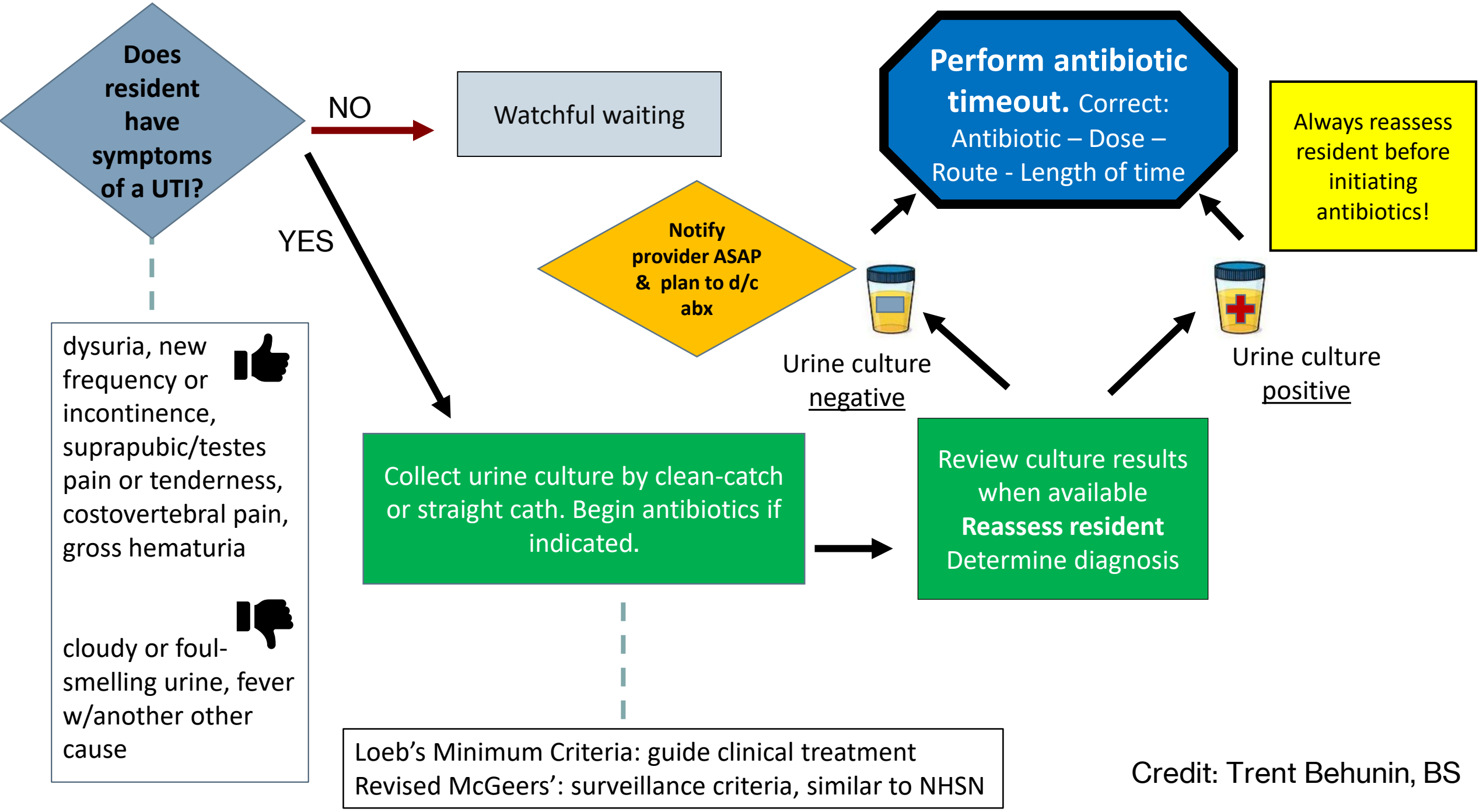
# Resources from UM PRIISM

## Antibiotic Stewardship

- Antibiotic Stewardship Infographic
- Obtaining Urine Testing in Older Adults with Delirium
- Antimicrobial Line Listing
- Antibiotic Time Out: SBAR Communication Tool Template
- Urine Culture Sign and Symptom Reminder flyer
- Asymptomatic Bacteriuria for Nurses infographic
- Promote Hydration: Weekly intake recording from AMMI
- Letter to residents/families from AMMI




PRIISM Resources, https://priism.med.umich.edu/resources




Credit: Trent Behunin, BS

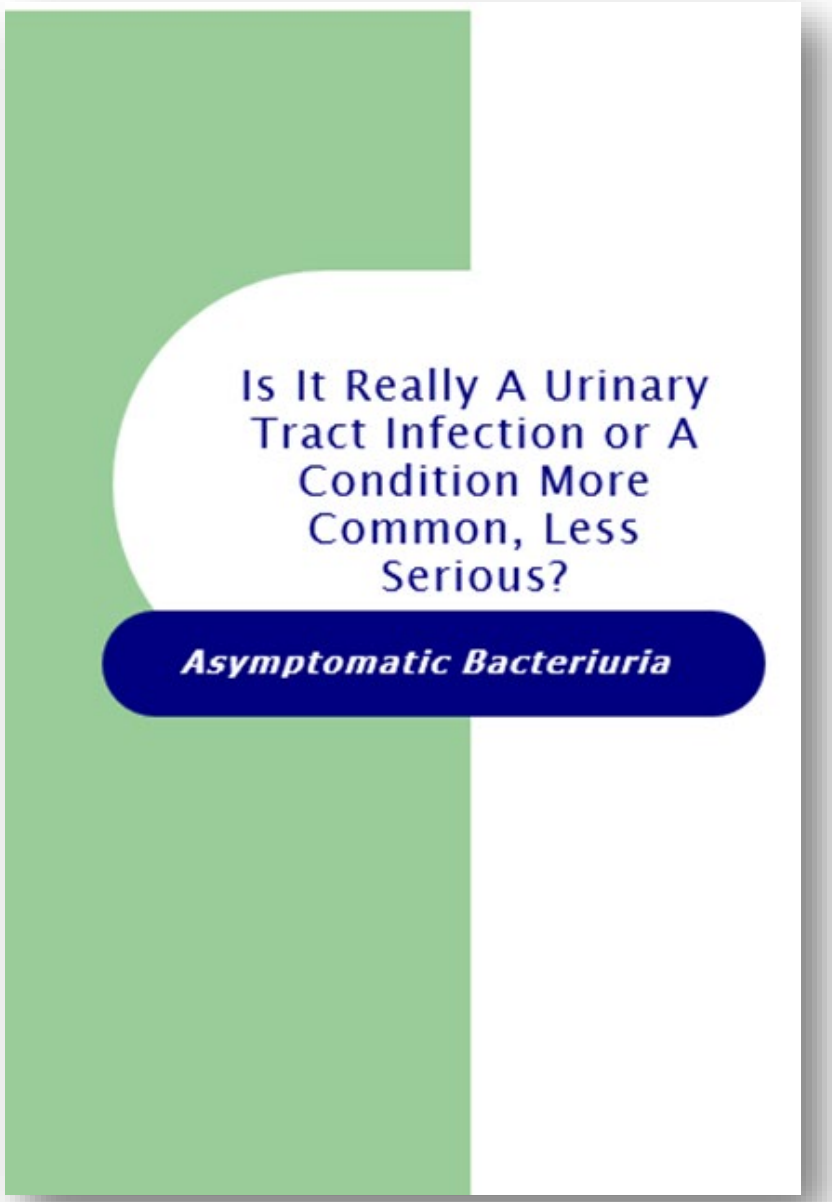
# Engaging Residents & Visitors

QI project at Detroit nursing home

Goal: inform residents/family/staff on hydration & asymptomatic bacteriuria

Staff: Education checklist/script & poster for staff members - during in-services and onboarding

Simple handout for residents & families - at admission/change of condition/during care conferences.



| [Facility Logo] | Resident Label |
|---|---|

**S** — **Situation:** I am calling to follow-up on [resident's name: _____] who was started on antibiotic(s) recently.

**B** — **Background:** This patient was started on:

Antibiotic #1: _____ Start date: _____

Antibiotic #2: _____ Start date: _____

For: ☐UTI ☐Pneumonia ☐Bronchitis ☐Skin infection ☐GI infection

☐Fever of unknown source ☐Other, specify: _____

Vitals at initial presentation were as follows: BP____/____ HR_____ Resp. rate_____ Temp._____ O2 Sats_____

Symptoms and positive exam findings at that time were: _____

The diagnosis fits: ☐McGeer criteria ☐Loeb criteria ☐Neither ☐Assessment tool not used

**A** — **Assessment:**

Current vital signs: BP____/____ HR_____ Resp. rate_____ Temp._____ O2 Sats_____

Since starting antibiotic(s), the resident:

☐now has *no* signs or symptoms of infection ☐has remained the same

☐has improved but continues to have signs and symptoms of: _____

☐has *new or worsening* signs/symptoms of: _____

Microbiology culture result (fax microbiology report if available):

☐has not returned yet ☐has *no* growth ☐was not obtained

☐has positive Gram stain/growth of [specify Gram stain/microorganism: _____]

Is susceptible to the antibiotic(s) prescribed: ☐Yes ☐No ☐Don't know ☐Not tested by lab ☐Not yet performed by lab

Other antibiotics the organism is sensitive to: _____

**R** — **Recommendation:**

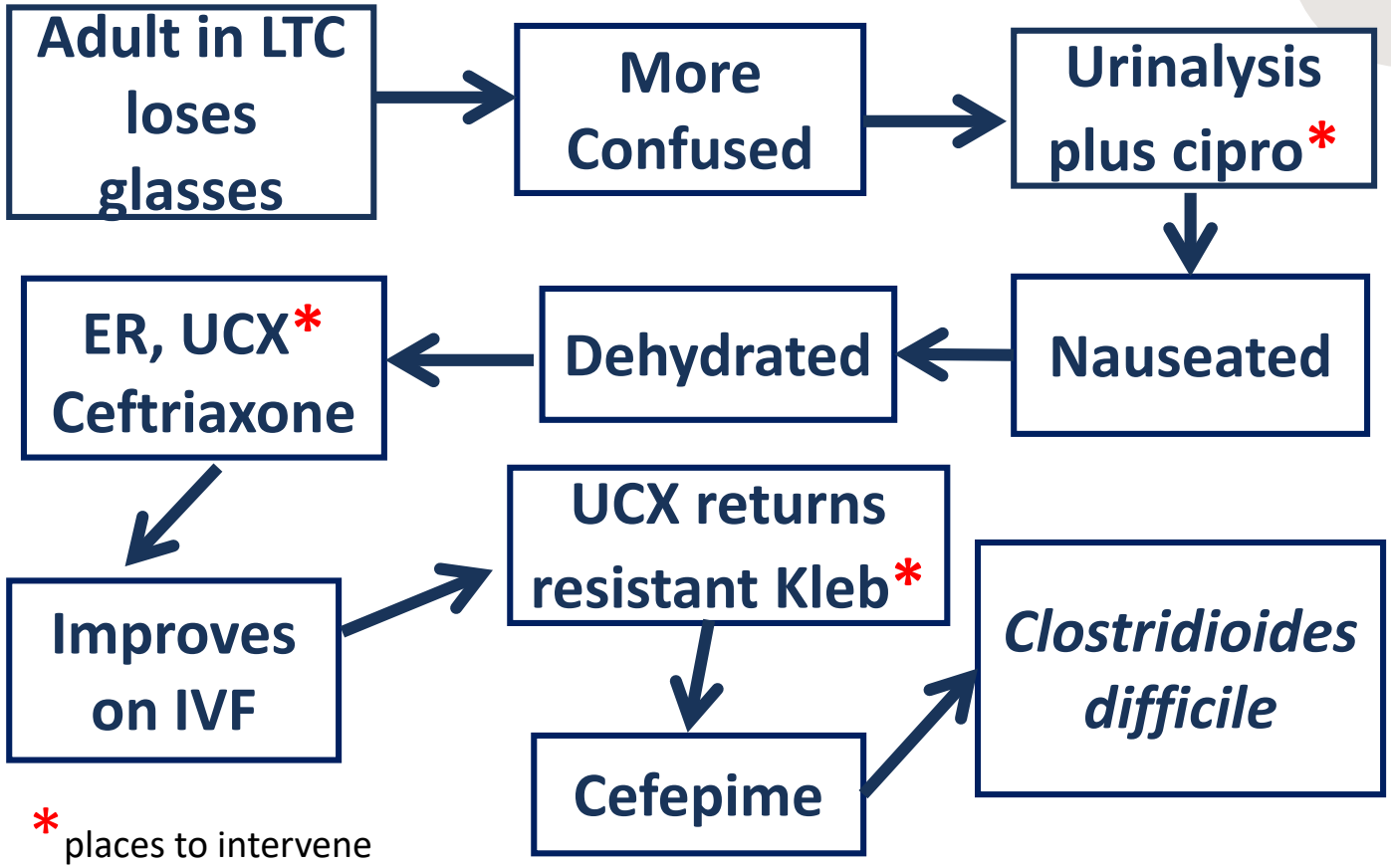
☐Patient **is not improving** and needs further evaluation.

☐Patient **has improved** and needs final antibiotic therapy plan.

SBAR for UTI, AHRQ, 2017


Tamma et al, 2019 *JAMA*. 2019

# A Series of Unfortunate Events, nursing home edition




Credit: Payal Patel, MD, MPH

# Potential target for antimicrobial stewardship

| | |
|---|---|
| **Ordering** urine cultures | • Algorithm to help understand when a urine culture is needed |
| **Choice** of antimicrobials (Restricting Fluoroquinolones) | • Pharmacist contact before Fluoroquinolones can be prescribed |
| **Review** of antimicrobial use | • Understanding trends, outliers |
| **Gathering** data on Duration of Antimicrobial Use | • May be high-yield for stewardship targets |

# Who Can Be An Antimicrobial Steward?

- Administration– support is key
- Medical Director
- Infection preventionist
- Nursing – no one spends more time with the patient
- Administration

# Antibiotic Stewardship Team

- Antibiotic Stewardship is a **core component** of an Infection Prevention & Control (IPC) Program in nursing homes
- The facility **Infection Preventionist (IP)** is often responsible for managing/coordinating the team
  - Identify, inform, educate during implementation, monitor, conduct process & outcome surveillance

Who leads your Antibiotic Stewardship team?

# Leading antibiotic stewardship efforts takes -

- Dedicated time
- Dedicated support
- Dedicated resources


The Infection Preventionist should be given dedicated time, support, and resources if this responsibility is added to his or her existing responsibilities for managing the IPC program.

*CDC Training on Antibiotic Stewardship*, https://www.cdc.gov/antibiotic-use/training/continuing-education.html

# Striving towards partnerships

VIEWPOINT

## Can Infection Prevention Programs in Hospitals and Nursing Facilities Be Integrated?
### From Silos to Partners

Lona Mody, MD, MSc
Division of Geriatric and Palliative Medicine, Department of Internal Medicine, University of Michigan Medical School, Ann Arbor; Institute for Healthcare

**Dissemination and Implementation** of evidence-based interventions have successfully reduced central line–associated bloodstream infections, surgical site infections, and *Clostridium difficile* in many acute care hospitals partly as a result of resourceful, diverse, and proficient hospital infection prevention teams. However, infection prevention programs in nursing facilities are less

tients returned to the hospital, resulting in additional costs, functional decline, and delayed recovery, contributing to a vicious spiral of morbidity and mortality. To deliver quality health care across the continuum of care for this rapidly growing population, an effective, well-funded, and adaptive infection prevention program is critical.

JAMA Network | Open

Original Investigation | Infectious Diseases

## Association of Exposure to High-risk Antibiotics in Acute Care Hospitals With Multidrug-Resistant Organism Burden in Nursing Homes

Kyle J. Gontjes, MPH; Kristen E. Gibson, MPH; Bonnie J. Lansing, LPN; Julia Mantey, MPH, MUP; Karen M. Jones, MPH; Marco Cassone, MD, PhD; Joyce Wang, PhD; John P. Mills, MD; Lona Mody, MD, MSc; Payal K. Patel, MD, MPH

### Abstract

**IMPORTANCE** Little is known about the contribution of hospital antibiotic prescribing to multidrug-resistant organism (MDRO) burden in nursing homes (NHs).

**OBJECTIVES** To characterize antibiotic exposures across the NH patient's health care continuum (preceding health care exposure and NH stay) and to investigate whether recent antibiotic exposure

### Key Points

**Question** Is hospital antibiotic expos associated with multidrug-resistant organism (MDRO) colonization and room environment contamination in nursing homes?

# Antibiotic Stewardship for hospital accreditation - *NEW*

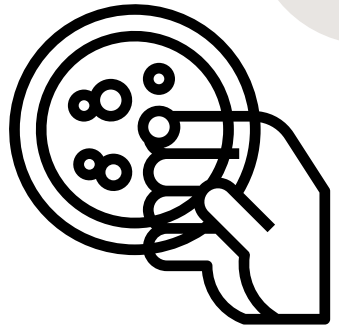
- For all Joint Commission-accredited hospitals & critical access hospitals, 12 **new** and updated requirements


https://www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3_antibioticstewardship_july2022_final.pdf

# What's on patient hands?

## Study: post-acute care patients at admission

- Hand swabs at admission then monthly up to 180 days or until discharged
- Isolated for MRSA, VRE and resistant gram negatives (resistant to Ceftazidime, Ciprofloxacin, or Imipenem)
- **24.1% had at least one MDRO on hands** at admission
- 34.2% during follow-up visit



Cao, *JAMA Intern Med,* 2016.

Hospitals route MDROs into post-acute care, increase during PAC stay

Major opportunities to encourage patient hand hygiene

Table. Baseline Patient Hand Carriage of MDROs in 6 Post-Acute Care Facilities

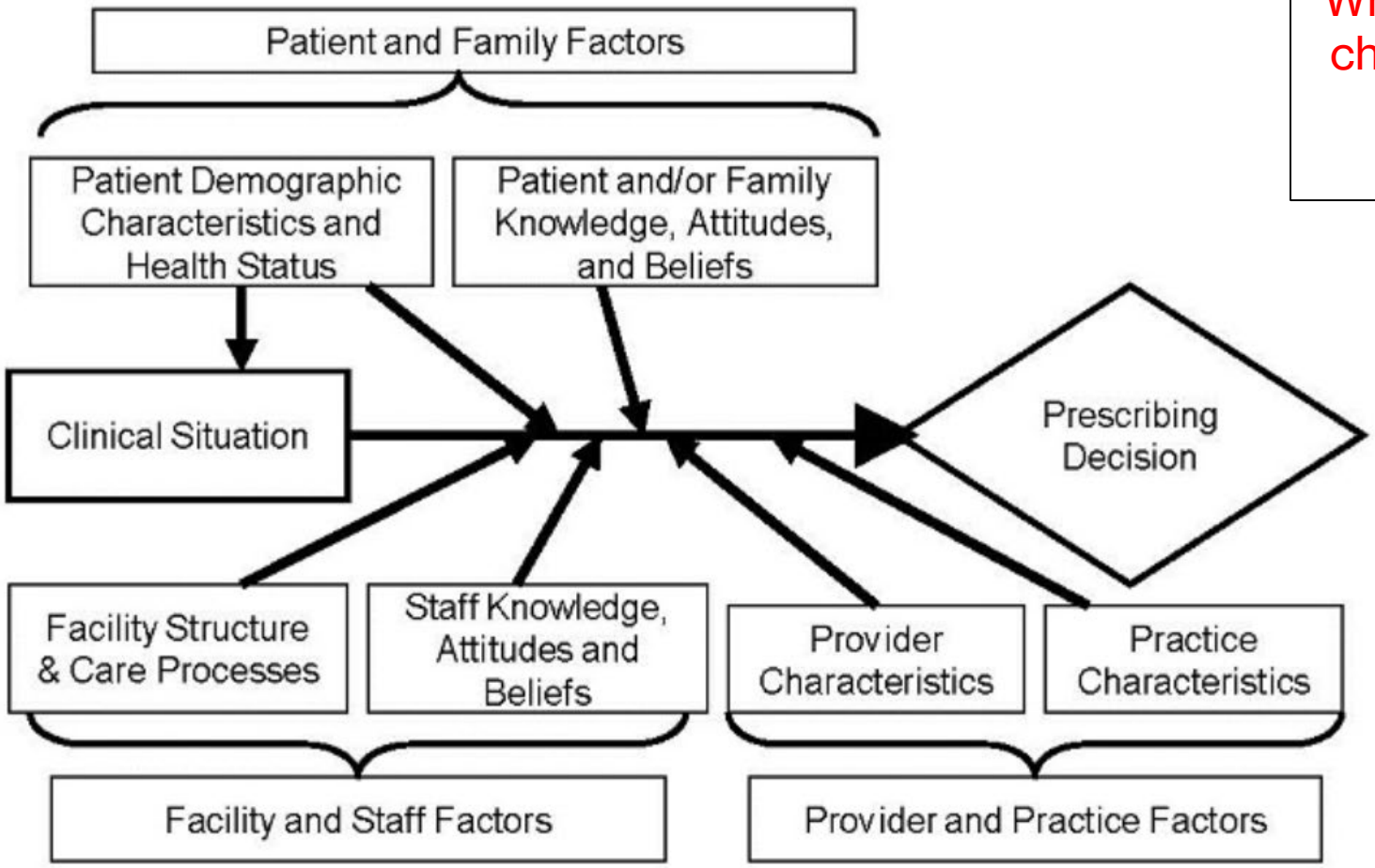
| Facility (Patients, No.) | Organisms, No. (%) | | | |
|---|---|---|---|---|
| | MRSA | VRE | RGNB | Any MDRO[a] |
| 1 (81) | 8 (9.9) | 7 (8.6) | 2 (2.5) | 16 (19.8) |
| 2 (47) | 6 (12.8) | 6 (12.8) | 1 (2.1) | 12 (25.5) |
| 3 (85) | 9 (10.6) | 9 (10.6) | 2 (2.4) | 19 (22.4) |
| 4 (81) | 8 (9.9) | 16 (19.8) | 2 (2.5) | 21 (25.9) |
| 5 (26) | 3 (11.5) | 5 (19.2) | 3 (11.5) | 8 (30.8) |
| 6 (37) | 5 (13.5) | 6 (16.2) | 0 | 10 (27.0) |
| **Total (357)** | **39**(10.9) | **49** (13.7) | **10** (2.8) | **86** (24.1) |

Abbreviations: MDRO, multidrug resistant organism; MRSA, methicillin-resistant *Staphylococcus aureus*; RGNB, resistant-gram negative bacilli; VRE, vancomycin-resistant *Enterococcus*.

[a] At least 1 MDRO.

Cao, *JAMA Intern Med,* 2016.

## Figure 1. Conceptual model related to prescribing decisions in residential care/assisted living and nursing homes

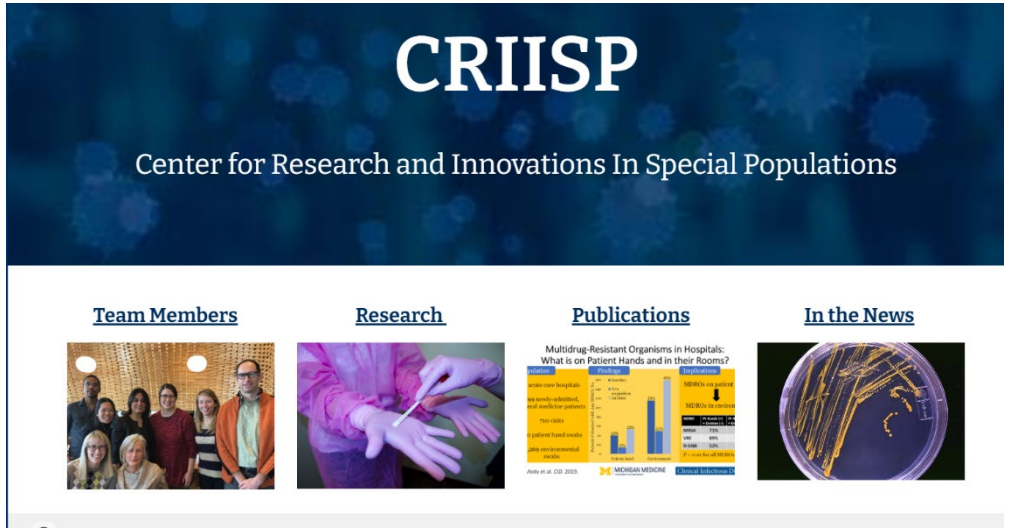



Which is your biggest challenge to improve antibiotic stewardship?

Strategies to Reduce Potentially Inappropriate Antibiotic Prescribing in Assisted Living and Nursing Homes, AHRQ.

# UM CRIISP Projects/Partnerships

- PRIISM Project
- M-ECHO
- Targeted Infection Prevention (TIP) Study
- Pathway from Functional Disability to Antibiotic Resistance in Nursing Home Residents
- Gown and Glove Use to Prevent the Spread of Infection in Community-Based Nursing Homes




The Center for Research and Innovations In Special Populations (CRIISP), led by Dr. Lona Mody, **applies translational epidemiologic research methods to enhance disease outcomes in vulnerable populations**. Our projects utilize a variety of research methods from observational and molecular epidemiology, clinical trials to implementation science with an explicit attention to mentoring junior investigators in research leadership.

https://criisp-mody.lab.medicine.umich.edu/home

# Thank you!

karenjon@med.umich.edu

@jones2RN

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# Questions?
# Other topics for discussion?

# Upcoming Sessions

- **Jan. 25** Quality Assurance and Performance Improvement (QAPI) and Root Cause Analysis (RCA)
- **Feb. 8** Addressing challenging behaviors
- **Feb. 22** Fit Testing
- **March 8** Shine a Light on Stigma

# Continue the Conversation in

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Connect is a shared learning environment for Superior Health participants to come together to foster and promote an all-teach-all-learn climate that provides the framework to improve and sustain mutual health care quality improvement initiatives locally, regionally, and nationally.

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