Antibiotic Stewardship in Long Term Care

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- I have no financial disclosures or conflicts of interest.

Agenda

- Why does Antibiotic Stewardship (AS) matter?
- AS Principles and Requirements
- AS Clinical Cases
  - Catheter-associated urinary tract infection
  - Aspiration pneumonia
  - Chronic sacral ulcer
- AS Strategies and Tools

Scope of the Problem

LTCF and Antibiotic Overuse

- Over 1.3 million Americans reside in long term care facilities (LTCF) on a given day
- Antibiotics are among the highest prescribed medications in LTCF
  - 8-24% of LTCF residents are receiving an antibiotic on a given day
- 40-75% of antibiotic prescriptions in LTCF are unnecessary or inappropriate
- One in 3 antibiotics prescribed in LTCF are considered "broad spectrum" agents
  - Most common antibiotic: FLUOROQUINOLONES

Description of antibiotic use variability among US nursing homes using electronic health record data

- Survey of antibiotic prescribing at 1,664 U.S. nursing homes in 2016
    - Over 300,000 residents included
- 49% received 1 course of antibiotics
- 35% received 2-3 courses
- **16% received ≥4 courses!**
- Median duration 7 days (IQR 5-10 days)

Antibiotic Use and HAIs

- The "Urine-Culturing Cascade" to *C. diff*
  - Brown 2021: retrospective survey of Canadian LTCF from 2014-2017
  - Urine culture (UCx) utilization tied with antibiotic use
  - Doubling of UCx rate associated with *C. difficile* IRR of 1.18
- High risk antibiotics increase MDRO colonization
  - Gontjes 2022: prospective cohort study at 6 Michigan LTCF
  - Receipt of **any** antibiotic associated with ~1.7 odds ratio of MDRO colonization of the resident and their environment
 - OR even higher (~2) after antibiotics associated with *C. diff*

Consequences of Inappropriate Antibiotic Use

- For LTCF residents directly receiving antibiotics:
  - Adverse drug-drug interactions
  - Nephrotoxicity and/or complications related to CKD
  - *C. difficile* infections*
  - Colonization (and infections) from multidrug resistant organisms*

- *Residing in a high-AU facility increases risk of antibiotic related adverse events even for those residents not actively receiving antibiotics.

CANDIDA AURIS

Deadly fungus
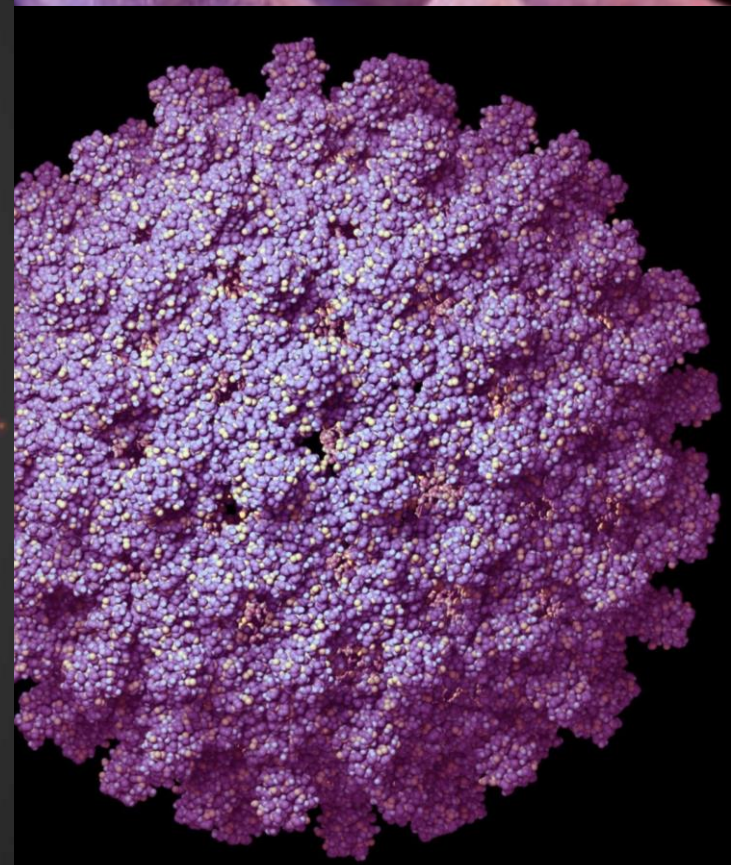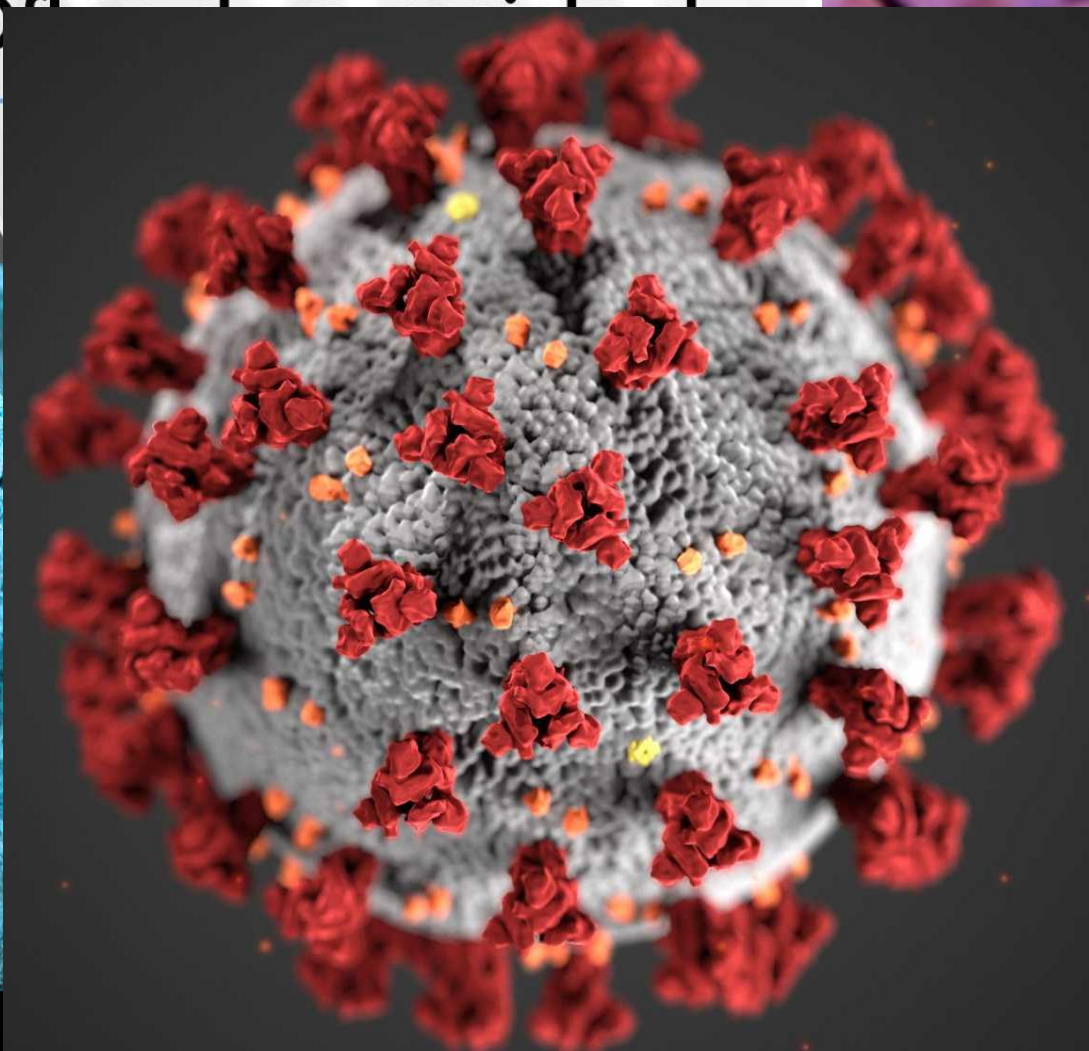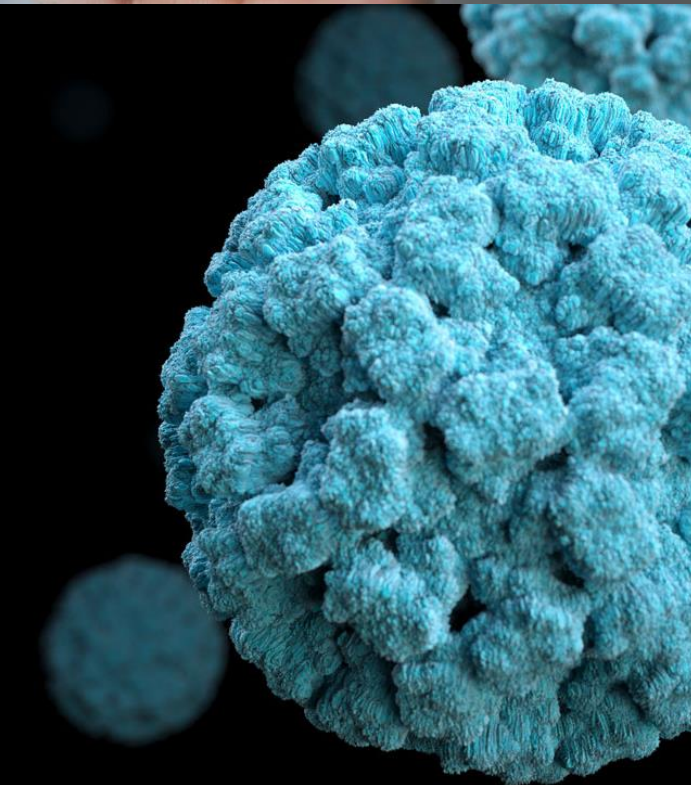
What is Antimicrobial Stewardship?

Principles of Antimicrobial Stewardship (AS)

- Process of measuring and improving antibiotic use to improve patient outcomes, reduce antibiotic resistance, and reduce the spread of antibiotic resistant infections.

- Are we treating:
  - For the right indication?
  - With the right drug?
  - At the right dose?
  - For the right duration?

AHRQ Four Moments

The Four Moments of Antibiotic Decision Making

1. Make the Diagnosis
2. Cultures & Empiric Therapy
3. Duration of Therapy
4. Stop, Narrow, Change to Oral

Long-Term Care
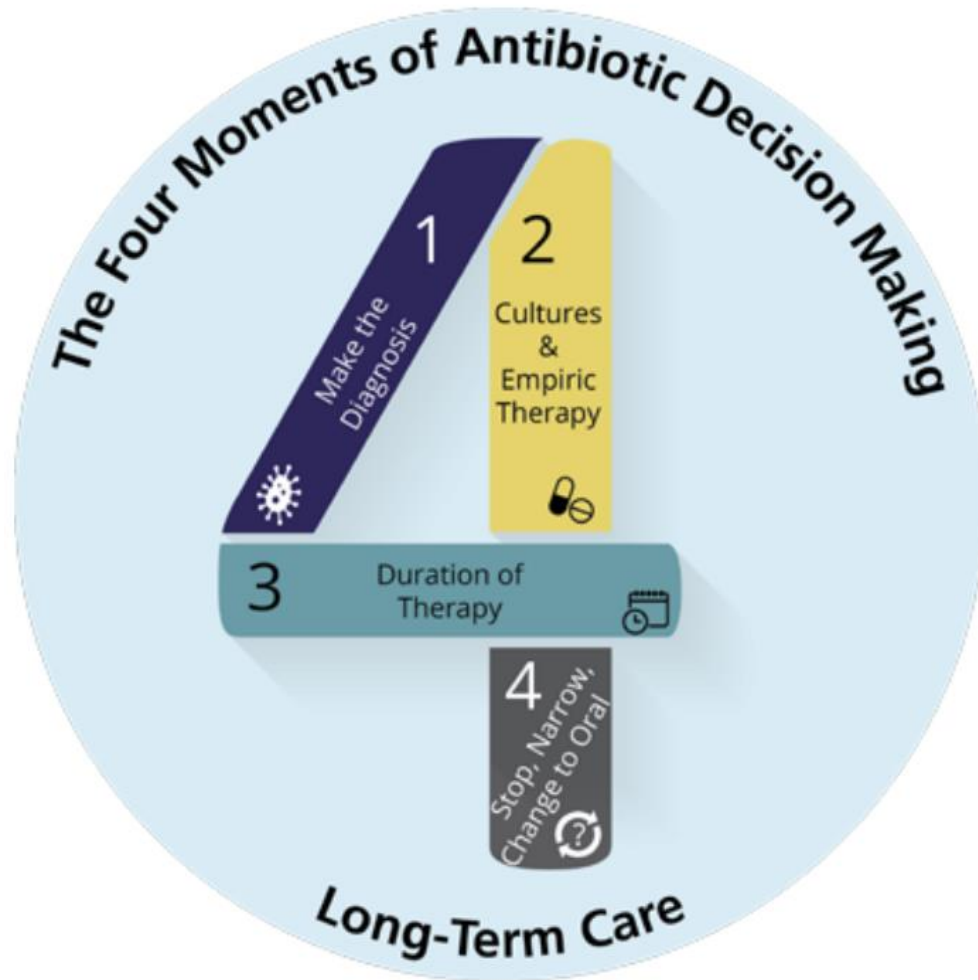
The Core Elements of
Antibiotic Stewardship for Nursing Homes

CDC's Core Elements of Antibiotic Stewardship

Leadership commitment
Demonstrate support and commitment to safe and appropriate antibiotic use in your facility

Accountability
Identify physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities in your facility

Drug expertise
Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility

Action
Implement **at least one** policy or practice to improve antibiotic use

Tracking
Monitor **at least one process** measure of antibiotic use and **at least one outcome** from antibiotic use in your facility

Reporting
Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff and other relevant staff

Education
Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use

Leadership Commitment

- Does the facility have…
  - A written commitment to improving antibiotic use?
  - A medical or nursing director with specific AS responsibilities?
  - Antibiotic use and resistance data included in quality assurance meetings?

Accountability

- Does the facility have…
  - Designated AS leadership including representation from physicians, pharmacists, and nursing?

Drug Expertise

- Does the facility have…
  - A consulting pharmacist with AS training?
  - An external infectious diseases or AS consultant?
  - A partnership with an acute care hospital AS program?

Action

- Does the facility…
  - Require providers to document dose, duration, and indication for antibiotic orders?
  - Have specific guidelines for assessing and diagnosing infections?
  - Have specific guidelines for treating common infectious syndromes (i.e. UTI, pneumonia, cellulitis)?

Tracking

- Does the facility monitor…
  - Adherence to diagnostic and treatment guidelines?
  - Rates of *C. difficile* and other antibiotic-related adverse events?
  - Some measure of antibiotic use (i.e. DOT/1000 patient-days, new antibiotic starts)

Reporting

- Does the facility…
  - Regularly report measures of antibiotic use?
  - Regularly report antibiotic use outcomes?
  - Provide feedback to individual antibiotic prescribers?

Education

- Does the facility provide AS educational materials for…
    - Antibiotic prescribers?
    - Nursing staff?
    - Patients and families?

Antibiotic Stewardship is Challenging

- Staffing limitations
  - Clinical providers often offsite
  - Limited access to pharmacy and infectious disease consultants
  - High staff turnover (esp. for bedside personnel)
  - Competing responsibilities (especially during COVID-19 pandemic)

- Facility limitations
  - Limited or no onsite lab capabilities
  - Lack of EMR (and EMAR)

- Difficulty in diagnosing infection in LTCF resident population
  - High prevalence of functional and cognitive impairment
  - High prevalence of chronic catheters and other medical devices

Antibiotic Stewardship is Mandatory!

- Having an AS program is a CMS requirement for LTCF as of 2017 – before it was required for acute care hospitals!

- Program should have participation from medical director, consulting pharmacist, nursing and administrative leadership, and a representative from infection control

- Must have protocol(s) guiding antibiotic prescribing

- Must include a system for monitoring and reporting antibiotic use and resistance data

- Must be reviewed on a regular basis: annually and as needed

Key Elements of Noncompliance

- Failure to develop and implement protocols to ensure residents are prescribed appropriate antibiotics
- Failure to develop and implement protocols addressing inappropriate antibiotic use
- Failure to implement a facility-wide system to monitor antibiotic use

Example: Level 3 Deficiency

"The facility did not develop a program for antibiotic stewardship, and did not develop or implement a system to monitor antibiotic use.

Based on record review, one resident was currently being treated with antibiotics without an appropriate indication for use. The resident had an indwelling urinary catheter and was asymptomatic for an UTI. There was no established criteria for use in the facility for when to treat a catheter-associated urinary tract infection.

As a result of the antibiotic therapy, the resident developed nausea and diarrhea that caused avoidable dehydration and prevented the resident from participating in activities and appropriate sleep. The medical record revealed that the antibiotic was stopped and the resident did not have any further adverse effects. The resident was treated via oral rehydration but did not require hospitalization and fully recovered."

Clinical Cases in AS

"UTI": To Treat, or Not to Treat

You are reviewing the case of Gerald, an 82 year old man who is about to be transferred from the hospital to your long term care facility.

He has neurogenic bladder due to type 2 diabetes, BPH, and a chronic urethral catheter.

While reviewing his laboratory results, you note the following urinalysis and urine culture results…

Test Name	Results	Units	Ref. Range
URINE PH	7.5		4.6-8.0
URINE COLOR	Yellow		
URINE CLARITY	Turbid		Ref: Clear
URINE GRAVITY	1.009	L	1.016-1.022
URINE PROTEIN	100	Mg/dL	Ref: Neg.
URINE GLUCOSE	Negative	Mg/dL	Ref: Neg
URINE KETONES	Negative	Mg/dL	Ref: Neg
URINE BLOOD	Moderate		Ref: Neg
ESTERASE (WBC)	Large		Ref: Neg
NITRITE, URINE	Positive		Ref: Neg
RBC/HPF	46H	/hpf	1-5
WBC/HPF	26H	/hpf	1-5
URINE BACTERIA	1+		

**CULTURE RESULTS: >100,000 CFU/ML
PROVIDENCIA RETTGERI
ANTIBIOTIC SUSCEPTIBILITY TEST RESULTS:
PROVIDENCIA RETTGERI**

	SUSC	INTP	
AMPICILLIN	R	R	MCG/ML
CEFAZOLIN	>=32	R	MCG/ML
CIPROFLOXACIN	I	I	MCG/ML
TRIMETH/SULFA	>=320	R	MCG/ML
CEFTRIAXONE	<=1	S	
NITROFURANTOIN	256	R	
AMPICILLIN/SULR		R	MCG/ML

Urinalysis was sent due to "AMS" and "dark urine"

"UTI":
To Treat, or
Not to Treat

- Does this patient have a UTI?

"UTI":
To Treat, or Not to Treat

- Does this patient have a UTI? MAYBE
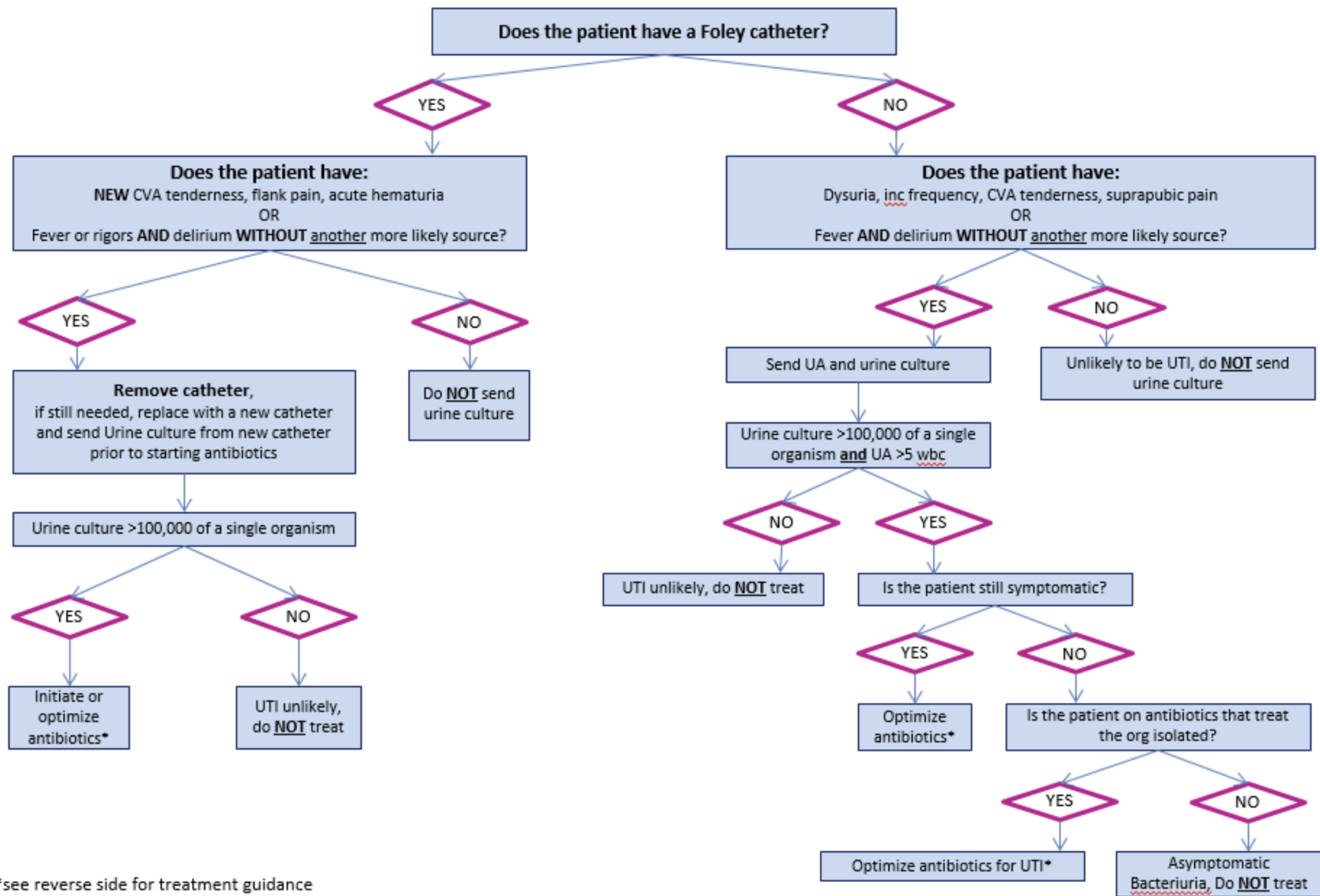
"UTI":
To Treat, or Not to Treat

- Does this patient have a UTI?   MAYBE

- What other information do you need?

"UTI":
To Treat, or Not to Treat

- Does this patient have a UTI?   MAYBE

- What other information do you need?   SYMPTOMS

"UTI": To Treat, or Not to Treat

- Does this patient have a UTI?   MAYBE
- What other information do you need?   SYMPTOMS

- Localizing urinary signs/symptoms (suprapubic pain, unexplained hematuria), or
- Fever + mental status change without another cause

Does the patient have a Foley catheter?

YES

Does the patient have:
NEW CVA tenderness, flank pain, acute hematuria
OR
Fever or rigors **AND** delirium **WITHOUT** another more likely source?

YES

Remove catheter,
if still needed, replace with a new catheter
and send Urine culture from new catheter
prior to starting antibiotics

Urine culture >100,000 of a single organism

YES

Initiate or
optimize
antibiotics*

NO

UTI unlikely,
do **NOT** treat

NO

Do **NOT** send
urine culture

NO

Does the patient have:
Dysuria, inc frequency, CVA tenderness, suprapubic pain
OR
Fever **AND** delirium **WITHOUT** another more likely source?

YES

Send UA and urine culture

Urine culture >100,000 of a single
organism **and** UA >5 wbc

NO

UTI unlikely, do **NOT** treat

YES

Is the patient still symptomatic?

YES

Optimize
antibiotics*

NO

Is the patient on antibiotics that treat
the org isolated?

YES

Optimize antibiotics for UTI*

NO

Asymptomatic
Bacteriuria, Do **NOT** treat

NO

Unlikely to be UTI, do **NOT** send
urine culture

*see reverse side for treatment guidance

"UTI":
To Treat, or Not to Treat

Gerald now has a temperature of 100.6 and suprapubic tenderness, so you decide to treat him for a catheter-associated UTI (CAUTI).

You start ceftriaxone initially and continue based on his urine culture results.

After 3 days, his fever and pain have resolved.
- How long should you treat him?
- Do you have to continue IV antibiotics?

Pneumonitis vs. Pneumonia

Elizabeth has advanced dementia and difficulty swallowing related to head and neck cancer treated several years ago.

One day while Elizabeth is eating breakfast, she aspirates. During the day she is coughing, and by bedtime she needs 2L/min of oxygen by nasal cannula which is new for her.

Pneumonitis vs. Pneumonia
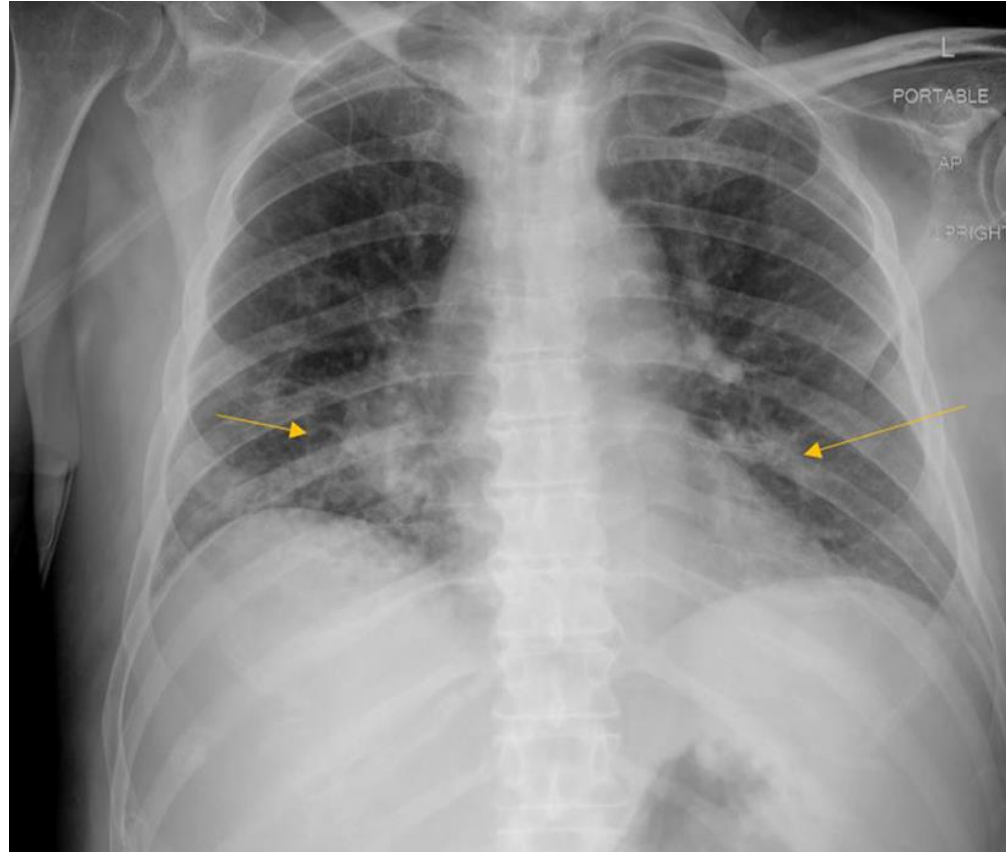
Is this an infection? Does Elizabeth need antibiotics? Maybe not…

Pneumonitis vs. Pneumonia

	Aspiration Pneumonitis	Aspiration Pneumonia
Pathophysiology	Acute lung injury from acidic material	Progression to bacterial infection
Clinical features	No symptoms or productive cough, respiratory distress 2–5 hours after aspiration with improvement within 24 hours	Tachypnea, cough, and fever
Treatment	Active monitoring Prevention—speech and swallow evaluation	Antibiotics Respiratory support

Only 20-25% of patients with aspiration pneumonitis will develop aspiration pneumonia

Pneumonitis vs. Pneumonia

You decide to observe Elizabeth without antibiotics, and by the next day, her cough is improving and she no longer needs supplemental oxygen.

Avoided 5-7 days (or longer!) of unnecessary antibiotics!
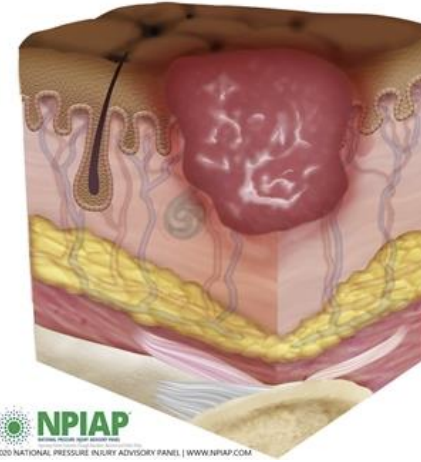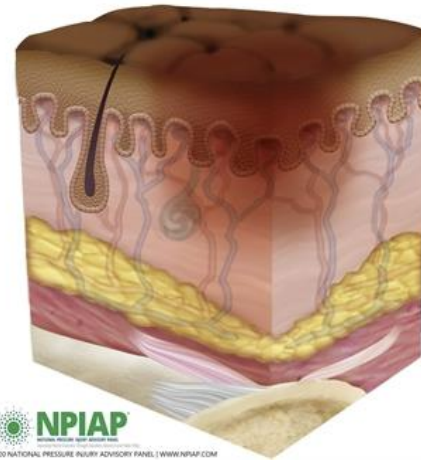
Sacral Ulcers: Infected or Colonized?

Maria is transferring back to your facility after a long hospitalization for acute-on-chronic heart failure and aspiration pneumonia.

She has systolic heart failure, dementia and hemiplegia related to a prior stroke, and a Stage 4 sacral pressure injury.

Reviewing her hospital records you see a "wound culture, sacrum" collected 3 days ago that grew MRSA, Pseudomonas aeruginosa, and Enterobacter cloaecae. It is not mentioned in the discharge summary, and she is not on antibiotics.

Sacral Ulcers: Infected or Colonized?
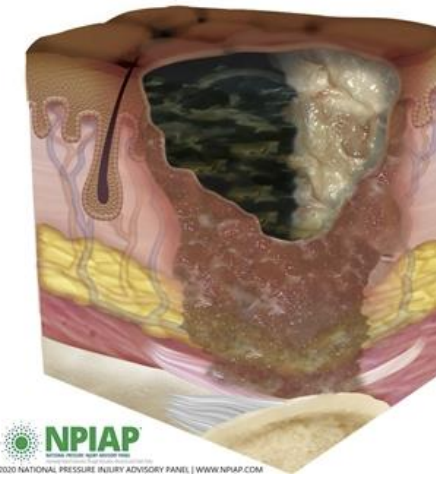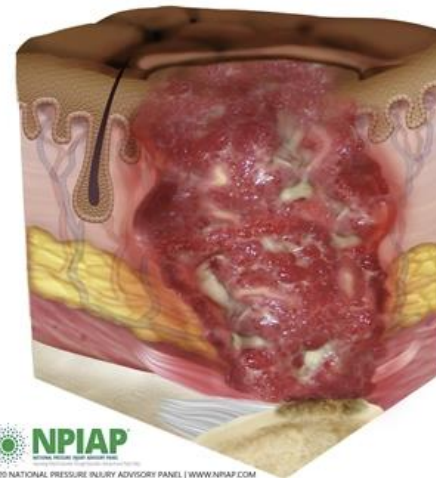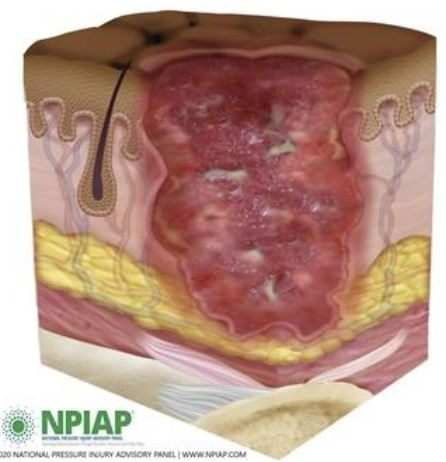
Sacral Ulcers: Infected or Colonized?

- Signs of infection:
  - New or worsening pain
  - Increased redness, drainage, or necrosis
  - Fever, confusion (with no other cause)
- Wound care may be sufficient, but if antibiotics are needed, PO is equivalent to IV
- Surface wound swabs are not clinically useful
  - Presence of bacteria does not indicate presence of infection
  - Even if infection is present, the surface bacteria may not necessarily be the cause
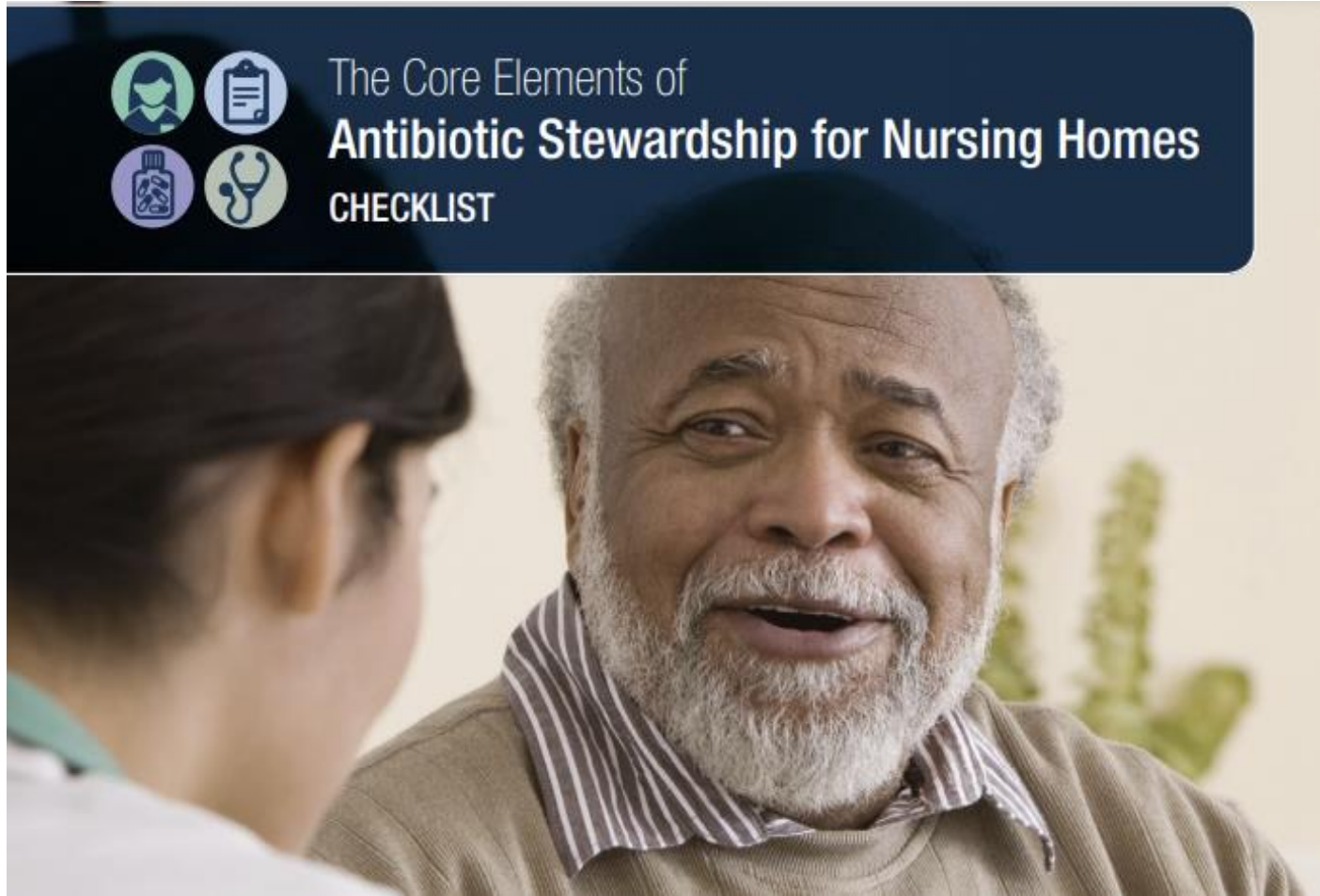
Sacral Ulcers: Infected or Colonized?

Maria is afebrile, at her baseline mental status (alert, pleasant, oriented to self only) and denies any new pain from her back.

However, her son says a doctor in the hospital told him she needs antibiotics "for her ulcer." How do you respond?

AS Tools and Resources

CDC
7 Core Elements (+Checklist)

Practical, "big picture" elements needed for a functional AS program

CDC
7 Core
Elements
(+Checklist)

Leadership Commitment

Nursing home leaders commit to improving antibiotic use. Facility leadership, both owners and administrators, as well as regional and national leaders if the facility is part of a larger corporation, can demonstrate their support in the following ways:

Write statements in support of improving antibiotic use to be shared with staff, residents and families

Include stewardship-related duties in position descriptions for the medical director, clinical nurse leads, and consultant pharmacists in the facility

Communicate with nursing staff and prescribing clinicians the facility's expectations about use of antibiotics and the monitoring and enforcement of stewardship policies

Create a culture, through messaging, education, and celebrating improvement, which promotes antibiotic stewardship

LEADERSHIP SUPPORT

1. Can your facility demonstrate leadership support for antibiotic stewardship through one or more of the following actions?

   If yes, indicate which of the following are in place (select all that apply)
   - ❏ Written statement of leadership support to improve antibiotic use
   - ❏ Antibiotic stewardship duties included in medical director position description
   - ❏ Antibiotic stewardship duties included in director of nursing position description
   - ❏ Leadership monitors whether antibiotic stewardship policies are followed
   - ❏ Antibiotic use and resistance data is reviewed in quality assurance meetings

AHRQ Toolkits

- Resources for:
  - Creating a new AS program
  - Performing a gap analysis on an existing program
  - AS program sustainability planning
- Educational tools for:
  - Prescribers on antibiotic use best practices
  - Nursing staff on when and how to collect microbiologic specimens
  - Healthcare team members on communicating with patients and families about infections and antibiotics

Suspected Urinary Tract Infection (UTI) in Long-Term Care Residents

Signs & Symptoms of a UTI

For Residents Without a Urinary Catheter	For Residents With a Urinary Catheter or if Nonverbal
☐ Dysuria **OR** ☐ Fever (>100°F or >2°F above baseline) **AND** at least one of the following symptoms that is new or worsening: ☐ Urgency ☐ Frequency ☐ Suprapubic pain ☐ Gross hematuria ☐ Costovertebral angle tenderness ☐ Urinary incontinence	One or more of the following *without another recognized cause:* ☐ Fever (>100°F or a 2°F increase from baseline) ☐ New costovertebral angle tenderness ☐ Rigors ☐ New-onset delirium* *If adequate workup for other causes of delirium has been performed and no other cause for delirium is identified*

- ☐ Send a urinalysis (UA) & urine culture (UCx)
- ☐ Increase hydration
- ☐ Start antibiotics before UA and UCx results, if resident appears ill
- ☐ If UA & UCx are positive and the resident has ongoing UTI symptoms, modify antibiotics or start antibiotics (if not receiving active antibiotics)

Do NOT Send a Urinalysis and Urine Culture:
- ☐ If the urine is foul smelling or cloudy, without other urinary symptoms
- ☐ Routinely after urethral catheter change
- ☐ Routinely upon admission
- ☐ After treatment to "document care" or "test of cure"
- ☐ For mental status changes (without vital sign changes or urinary symptoms for noncatheterized residents)

PREVENT HAIs
Healthcare Associated Infections

Urine Culture Collection

- Health care workers and residents should perform hand hygiene before collecting urine cultures; health care workers should wear gloves and use a sterile container.

- Assist residents with cleaning the peri-urethral region before collecting urine cultures.

- Collect a midstream clean-catch specimen; if this not possible, perform an in-and-out catheterization.

- For residents with catheters, urine culture specimens should be obtained from newly placed catheters whenever possible.

- Transport urine samples to the lab within 15 minutes. Immediately place samples in the refrigerator if this is not possible.
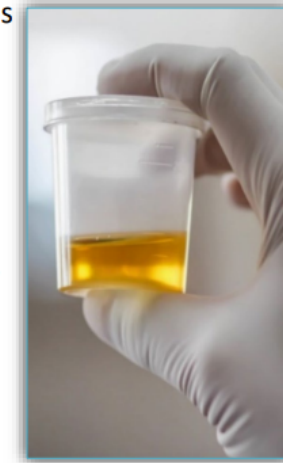
DESC

DESC Technique
for Conflict With Residents and Families

Describe the specific situation.

Express your concerns about the action.

Suggest other alternatives.

Consequences should be stated and consensus should be reached.

AHRQ Toolkits Work

- Katz et al, 2022, JAMA Network Open
  - 523→439 U.S. LTCF
  - 15 AS webinars delivered from 12/2018 to 12/2019, plus other interventions (educational materials, site visits)
  - Outcomes: antibiotic starts per 1000 patient days, antibiotic days of therapy (DOT) per 1000 resident days, number of UCx per 1000 resident days, and *C. difficile* lab ID events per 1000 resident days
  - Significant reduction in new antibiotic starts (especially FQs) and urine cultures sent. No significant reduction in antibiotic DOT or *C. difficile* incidence.
  - Programs with higher program engagement saw greater reductions in antibiotic use and adverse events.

Conclusions

- Antibiotic overuse directly impacts millions of LTCF residents and indirectly impacts all of us through the propagation of antibiotic resistance

- Antibiotic Stewardship (AS) is a framework for systematically evaluating and improving antibiotic use, and is a CMS requirement for long-term care facilities (and hospitals)

- Scientifically validated, practical tools to create, improve, and sustain AS programs are available through organizations like the CDC and AHRQ

- Clear communication between healthcare team members, residents, and their families is essential for effective AS

Questions?

Contact: rebecca.choudhury@mountsinai.org

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