

Comprehensive Approaches to Preventing and Managing Urinary Tract Infections in Nursing Facilities: Antimicrobial Stewardship

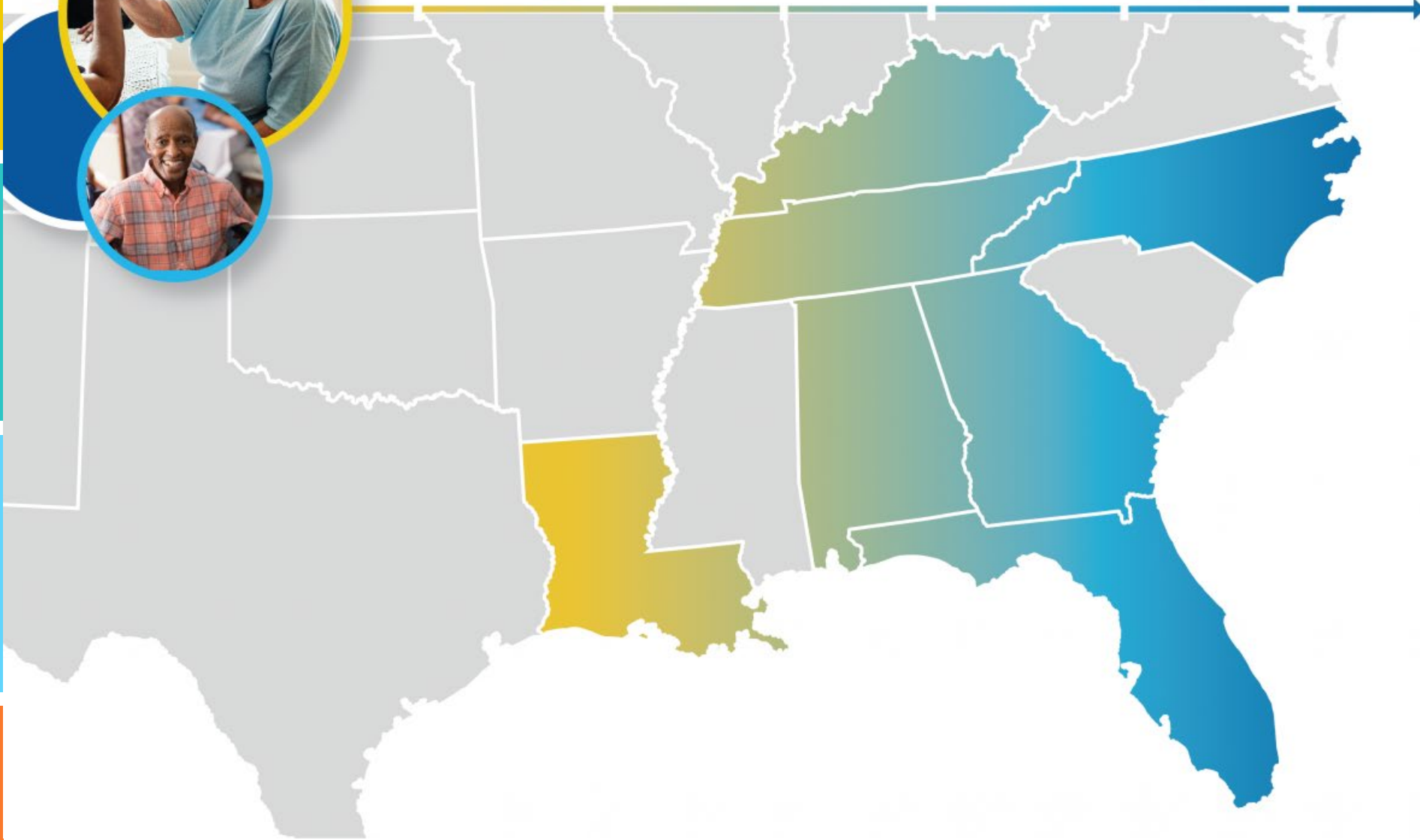


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HEALTH SOLUTIONS

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Quality Innovation Network -
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CENTERS FOR MEDICARE & MEDICAID SERVICES
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Making Health Care Better *Together*



About Alliant Health Solutions

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CONSULTANT PHARMACIST

Brandi Van Valkenburg is a consultant pharmacist with Health Direct Pharmacy in Syracuse, N.Y. She earned her PharmD from Albany College of Pharmacy and her bachelor's degree in chemical engineering from Clarkson University.

Since becoming the mid-state director for the New York Chapter of ASCP in 2009, Van Valkenburg has organized successful continuing education meetings for consultant pharmacists in New York. She is active in long-term care and has worked to create successful antibiotic stewardship programs for Health Direct and the nursing homes they service.



UTIs and Antimicrobial Stewardship

Presented By:
Brandi Van Valkenburg, PharmD, BCGP
Consultant Pharmacist

HEALTHDIRECT 
PHARMACY SERVICES

Game Plan

- Emphasize the need to properly identify asymptomatic bacteriuria (ASB) and avoid inappropriate antibiotic use/prescribing for ASB.
- Discuss the appropriate antibiotic treatments/duration for a true UTI.
- Underscore the need for antimicrobial stewardship when managing UTIs.



Antibiotic Stewardship

*“Antibiotic stewardship refers to a set of commitments and activities designed to **optimize the treatment of infections while reducing the adverse events associated with antibiotic use.**”*

~CDC Core Elements

Why?

OIG report: Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries (OEI-06-11-00370), February 2014

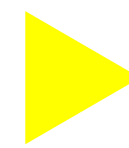
Infections accounted for 26% of adverse events → 56% of those were deemed preventable

Type of Infection	Preventable Event
Urinary Tract-catheter	71%
C. Difficile	71%
Pneumonia, URI	33%

Increased frequency of antibiotics prescribed in nursing homes

- Up to 70% of NH patients received antibiotics during the year
- **Up to 75%** of antibiotics are prescribed incorrectly!
 - *WRONG antibiotic*
 - *WRONG dose*
 - *WRONG duration*
 - *WRONG indication*

Antibiotics



Antibiotics are not benign medications!

H High

- Clindamycin
- Fluoroquinolones
- 3rd or 4th generation Cephalosporins (e.g., Ceftriaxone, cefepime)

M Moderate

- Trimethoprim/Sulfamethoxazole
- Macrolides
- Penicillins
- 1st or 2nd generation Cephalosporins (e.g., cefazolin, cephalexin, cefuroxime, cefdinir)

L Low

- Tetracyclines
- Nitrofurantoin

- Overuse can lead to multi-drug-resistant bacteria
- Drug interactions
- Side effects: allergic reactions, fever, n/v, diarrhea, rash, kidney damage
- Adverse drug events: One of the most common reasons for ED visits for drug-related adverse events
- Increases risk of C. Difficile infections
—*Risk further increases when using broad-spectrum antibiotics.*

▶ **So where do we get started**



CDC Core Elements for Antibiotic Stewardship in Nursing Homes

Leadership Commitment	✓ Designate leaders that are committed to improving antibiotic use.
Accountability	✓ Prescriber, nursing, and pharmacy leads should be identified. These individuals are responsible for promoting and overseeing antibiotic stewardship activities in the facility.
Drug Expertise	✓ Establishing access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship.
Action	✓ Implement at least one policy or practice to improve antibiotic use.
Tracking & Reporting	✓ Monitor both antibiotic use practices and outcomes related to antibiotics in order to guide practice changes and track the impact of few interventions.
Education	✓ Provide resources for clinicians, nursing staff, residents, and families about antibiotic resistance and opportunities for improving antibiotic use.

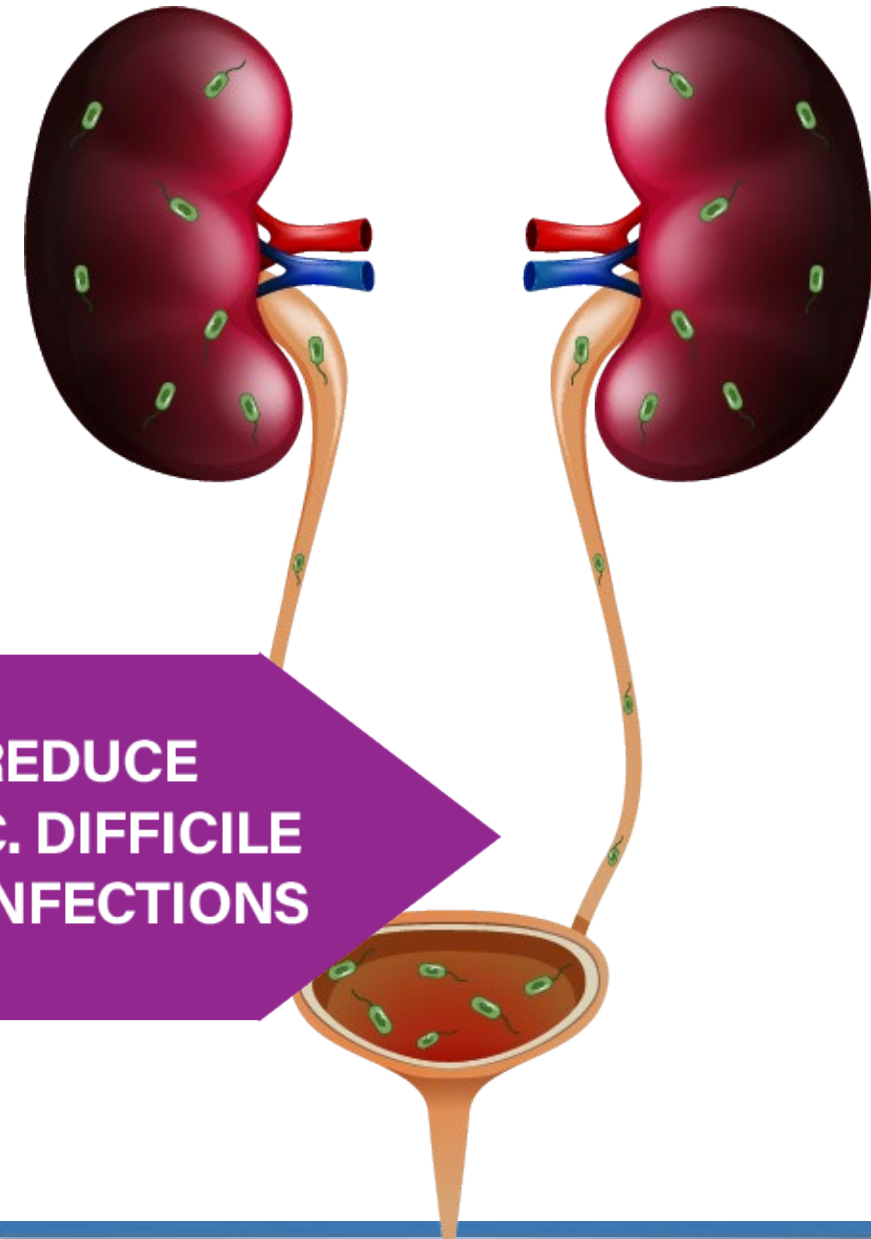
Antibiotic Stewardship

FOCUS: Urinary Tract Infections

REDUCE
URINARY
TRACT
INFECTIONS

REDUCE
ANTIBIOTIC
USE

REDUCE
C. DIFFICILE
INFECTIONS



Asymptomatic Bacteriuria

▶ OFTEN ASSOCIATED **PYURIA**
(≥ 10 WBC in urine)

- ▶ **ASB is common in NH residents**
- Women 20-50%
 - Men 15-40%
 - Indwelling catheter 20-50%

RESIDENTS WITH

- A Positive Urine Culture
—OR—
- A Positive Urinalysis



**NO SYMPTOMS
of Infection**



NOT A UTI!
Asymptomatic Bacteriuria
and Should NOT be Treated

Asymptomatic Bacteriuria (ABS)

- ? • How do we prevent unnecessary treatment of ASB?
 - Only order a UA and/or culture if a patient has signs/symptoms of a UTI.
 - It is not recommended to screen for or treat ASB in LTC patients.
- ? • What do you do for residents with dark or foul-smelling urine?
 - Most likely indicates dehydration---hydrate!
- ? • Change in mental status?
 - Many reasons that are not related to UTIs.
 - Assess for dehydration, pain, change in medications, constipation, insomnia, and mood disorders.

Revised McGeer Criteria (Stone)

Used For Surveillance

(A) Clinical

(Must satisfy one of the following scenarios)

1. Either of the following:

- Acute dysuria or
- Acute pain, swelling or tenderness of testes, epididymis or prostate

2. If either FEVER or LEUKOCYTOSIS present need to include

ONE or more of the following:

- Acute costovertebral angle pain or tenderness
- Suprapubic pain
- Gross hematuria
- New or marked increase in incontinence
- New or marked increase in urgency
- New or marked increase frequency

3. If neither FEVER or LEUKOCYTOSIS present INCLUDE TWO or more of the ABOVE (Box #2).



(B) lab (at least one of the following must be met)

1. Voided specimen: positive urine culture ($> 10^5$ cfu/ml) no more than 2 organisms
2. Straight catheter specimen: positive urine culture ($> 10^2$ cfu/ml) any number of organisms

Loeb Minimum Criteria

Used For Clinical Decision

(A) Clinical (Must satisfy one of the following scenarios)

1. Acute dysuria

2. FEVER (Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline) plus ONE or more of the following:

- New or worsening urgency
- New or worsening frequency
- Suprapubic pain
- Gross hematuria
- Costovertebral angle tenderness
- Urinary incontinence

Stone N. Infect Control Hosp Epidemiol. 2012;33(10):965-77
Loeb M. Infect Control Hosp Epidemiol. 2001;22(2):120-4.

Updated McGeer Criteria

UTI with indwelling catheter Must fulfill both 1 AND 2

1, At least 1 of the following signs/symptoms

- Fever, rigors, or new-onset hypotension, with no alternate site of infection
- Either acute change in mental status or acute functional decline, with no alternate diagnosis and leukocytosis
- New-onset suprapubic pain or costovertebral angle pain or tenderness
- Purulent discharge from around the catheter or
- Acute pain, swelling, or tenderness of the testes, epididymis, or prostate



2. Urinary catheter specimen culture with $\geq 10^5$ cfu/mL of any organisms

Loeb Minimum Criteria

At least one of the following criteria

- Rigors
- Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline
- New onset delirium
- New costovertebral angle tenderness

Stone N. Infect Control Hosp Epidemiol. 2012;33(10):965-77
Loeb M. Infect Control Hosp Epidemiol. 2001;22(2):120-4.

When Should You Send A Urinalysis and Urine Culture?

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

Signs & Symptoms of a UTI

For Residents Without a Urinary Catheter

- 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

For Residents With a Urinary Catheter or if Nonverbal

- 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)

<https://www.ahrq.gov/antibiotic-use/long-term-care/best-practices/uti-assess.html>



Cloudy, dark, foul-smelling urine are symptoms of a UTI.





▶ Dark urine may indicate a patient is **dehydrated and needs more fluids.**

Foul-smelling urine **may be due to dehydration, vitamins, foods and certain health conditions.**

**Mental status changes only
indicates a UTI in a patient
without a catheter.**





▶ There are **several reasons** a patient may have a change in their mental status.

These include: dehydration, dementia, adverse effects from medication, sleepiness, head trauma, vascular disease, and other infections.

A positive urinalysis — or finding bacteria, nitrates, and/or white blood cells — indicates the patient has a UTI, even if they show no other signs of infection.





There are other reasons why a patient may have a positive urinalysis.

- Contamination
- Catheters-indwelling catheters become colonized rapidly
 - Bacteriuria incidence is up to 8% per every 24-hour period!
 - 100% of patients with indwelling urinary catheters will be colonized within 30 days
- Stones
- Tumors
- Other infections

Antibiograms and Empiric Treatment

Percent of Non-Duplicate Patient Isolates Susceptible Serum Levels

ORGANISM	No. of Non-duplicate Isolates	Amikacin	Gentamicin	Tobramycin	Ampicillin	Amoxicillin-Clavulanate	Ampicillin-Sulbactam	Penicillin	Piperacillin/Tazobactam	Oxacillin	Imipenem	Meropenem	Ertapenem	Aztreonam	Cefazolin	Cefipime	Ceftriaxone	Vancomycin	Linezolid	Erythromycin	Clindamycin	TMP-SMZ	Ciprofloxacin	Moxifloxacin	Nitrofurantoin ^a	Tetracycline	Tigecycline	
<i>E. coli</i>	68	100	95	100	48		69		98		100	100	100	92	86	100	90					90	65		100			100
<i>Kleb. pneumoniae</i>	28	100	90	100	0		78		92			100	100	71	89	100	88					100	82		94			100
<i>Proteus mirabilis</i>	48	100	95	93	79		89		97		100	100	100	95	93	100	93					85	77					
<i>Ps. aeruginosa</i>	24	100	100	100					100		91	95		94		100							91					
<i>Staph aureus</i>	16		100			43	18		43						43			100	100	43	62	87		21	100	100	100	
<i>Enterococcus faecalis</i>	20		88 ^b		100			100										100	100						95	40	100	

^aSusceptible to achievable levels in urine only

^bSusceptible to high level gentamicin

Antibiograms and Empiric Treatment

Percent of Non-Duplicate Patient Isolates Susceptible Serum Levels

Let's Take
A Closer
Look...

Antibiotic	Row 1 (%)	Row 2 (%)
Erythromycin	90	100
Clindamycin	100	85
TMP-SMZ	90	82
Ciprofloxacin	65	77
Moxifloxacin	82	91
Nitrofurantoin ^a	100	94
Tetracycline	94	85

A Susceptible to achievable levels in urine only

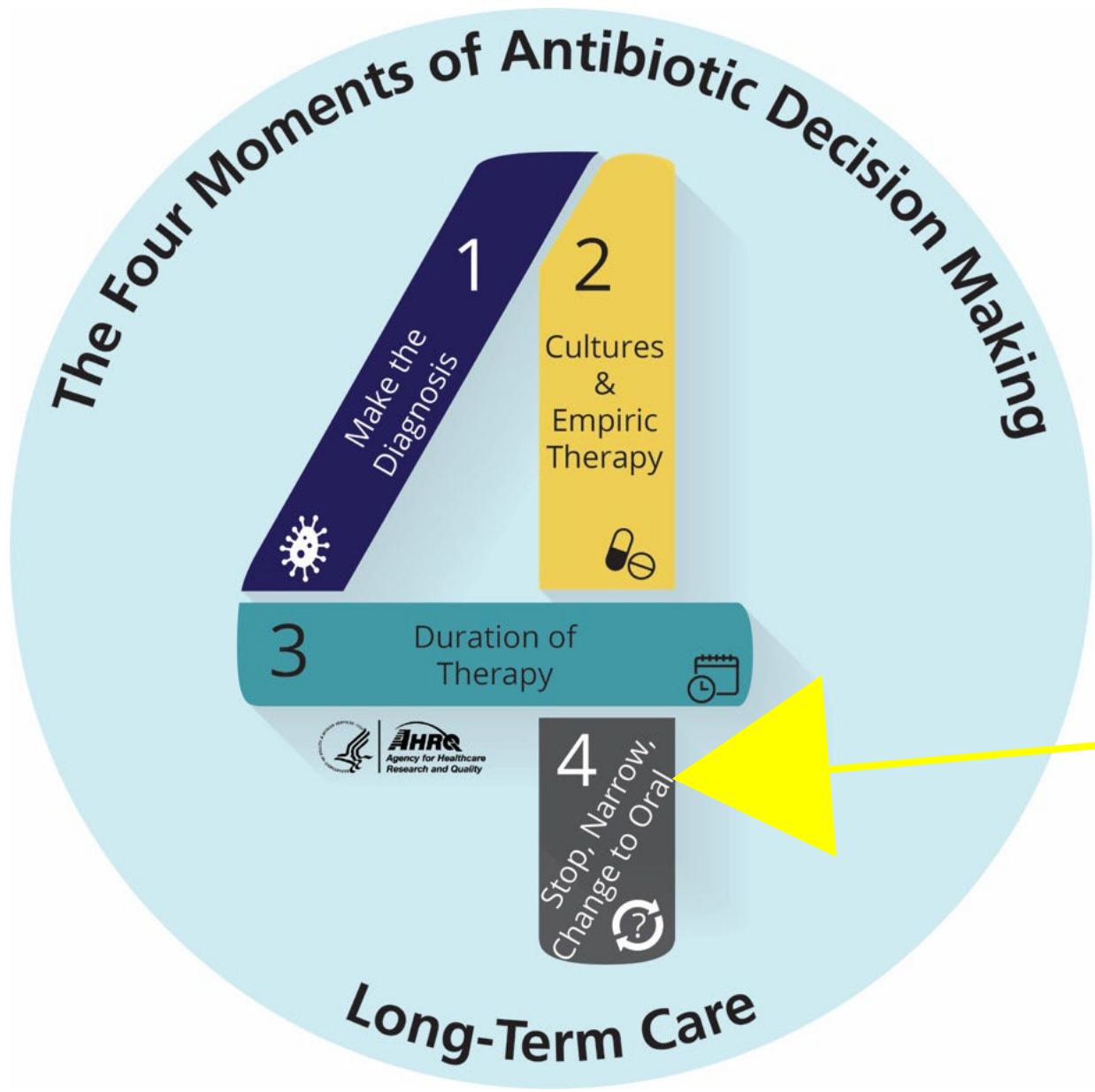
B Susceptible to high level gentamicin

Treatment: Cystitis/Lower UTI

	Antibiotic	Duration	Notes
1st line	Nitrofurantoin (Macrobid)	5 days (some favor 7 days in men)	Avoid if CrCl<30 ml/min Avoid if systemic signs of infection (pyelonephritis or prostatitis) Does NOT cover Proteus
	TMP-SMX (Bactrim)	3 days	Major interaction with Warfarin Monitor K if on ACEI, ARB, Aldactone Renally dosed
2nd line	Cephalexin (Keflex)	5 days (some favor 7 days in men)	Activity against E. coli, Proteus, and Klebsiella
3rd line	Fosfomycin	1 dose	Active against E. coli, enterococcus, ESBL positive E. coli Does not concentrate in the kidneys (do not use in Pyelo)
	Quinolones	3 days	Not preferred due to increasing resistance and adverse effects
Catheter-related UTI		7 days if rapid improvement 10-14 days if delayed response	

Treatment: Pyelonephritis/Upper UTI

Antibiotic	Duration	Notes
Ceftriaxone (Rocephin)	1 dose	All treatment should start out with a single IV/IM dose of Rocephin then step down to one of the following options:
TMP-SMX (Bactrim)	10-14 days	Use if resistance is < 20%
Cipro/Levaquin	5-7 days	If Bactrim is not an option and if sensitive
β lactam	10-14 days	These are inferior to Bactrim or quinolones for pyleonephritis
Catheter-related UTI		7 days if rapid improvement 10-14 days if delayed response





Antibiotic Time Out Tool

Date: _____ Patient Name or Identifier: _____

Directions: This form should be completed by frontline clinicians on a daily basis for patients receiving antibiotics.

Is the patient receiving antibiotics for any of the following conditions even though antibiotics are NOT typically recommended?

- Positive urine culture without symptoms of a UTI (Exceptions: pregnancy or impending urologic surgery where mucosal bleeding is expected)
- Enterococcus* in sputum
- Coagulase-negative staphylococci in a single blood culture
- Candida* in sputum or urine
- Surgical prophylaxis beyond 24 hours
- Noninfectious etiology of symptoms

Answer Yes or No questions below based on patient's clinical status and culture results.

- | | | |
|--|------------------------------|-----------------------------|
| Can any of the antibiotics be discontinued? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Can existing therapy be changed to a more narrow spectrum regimen? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Should additional agents or broader-spectrum agents be added? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Are there any IV agents that can be changed to the PO route? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Are the antibiotics selected consistent with local guidelines? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

What is the planned duration of antibiotic therapy?

Antibiotic 1: _____ Planned duration: _____ Consistent with recommended duration? Yes No

Important



Answer Yes or No questions below based on patient's clinical status and culture results.

Can any of the antibiotics be discontinued?

Yes

No

Can existing therapy be changed to a more narrow spectrum regimen?

Yes

No

Should additional agents or broader-spectrum agents be added?

Yes

No

Are there any IV agents that can be changed to the PO route?

Yes

No

Are the antibiotics selected consistent with local guidelines?

Yes

No

What is the planned duration of antibiotic therapy?

Antibiotic 1: _____

Planned duration: _____ Consistent with recommended

duration? Yes No

Culture and Sensitivities (C/S)

- The culture should be taken prior to initiation of any antibiotics. If antibiotics are taken prior, it can alter the results, and the pathogen may not be identifiable.
- The C/S will tell you which antibiotics will target the organism in question.
- Do not use an antibiotic that comes back as an I or R.

ANTIBIOTIC	MIC (ug/ML)	INTERPRETATION
AMPICILLIN	>16	R
AMPICILLIN/SULBACTAM	8/4	I
CEFAZOLIN	<=4	S
CIPROFLOXACIN	<=0.25	S
TMP-SMX	<=0.5/9.5	S
NITROFURANTOIN	<16	S

CASE 1: Betsy

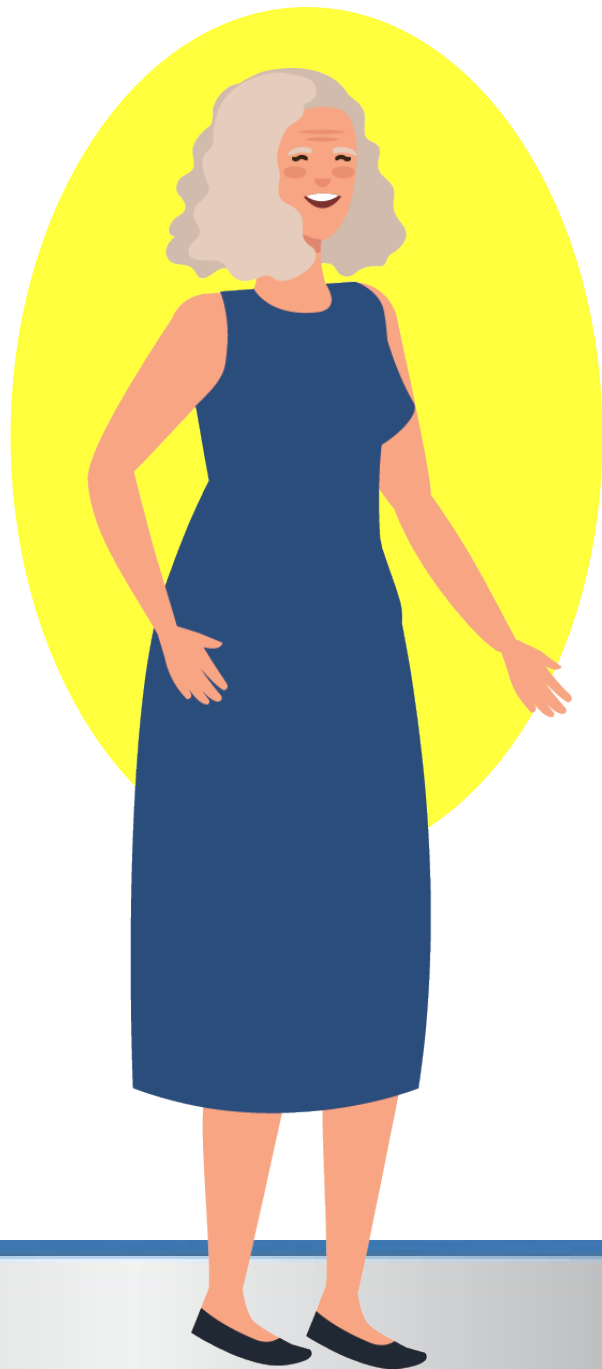
Betsy is a 78-year-old female patient

- Experienced a fall in the dining room. Sent to the ED.
- Urinalysis (UA) sent by ED.
 - UA returned positive with >100 WBCs/hpf, positive nitrates.
- ED sends her back to the nursing home on Ciprofloxacin 500 mg bid for seven days.
- No urinary symptoms the day of the fall and still without urinary complaints. No reported dysuria, fever, chills, frequency, etc.
- No catheter.



▶ **Do you think Betsy
needs an antibiotic**





CASE 1: **Betsy**

- **NO!!!**
- **Betsy has ASB**
- **Plan: Stop antibiotic**

NOTE: *All antibiotic prescriptions that come from the hospital should be re-evaluated when the patient is transferred back to LTC.*

CASE 2: Noelle

Noelle is an 86-year-old patient.

- Complaint: “It hurts when I urinate. I feel like I have to go really bad, and then nothing comes out when I try.”
- No catheter.



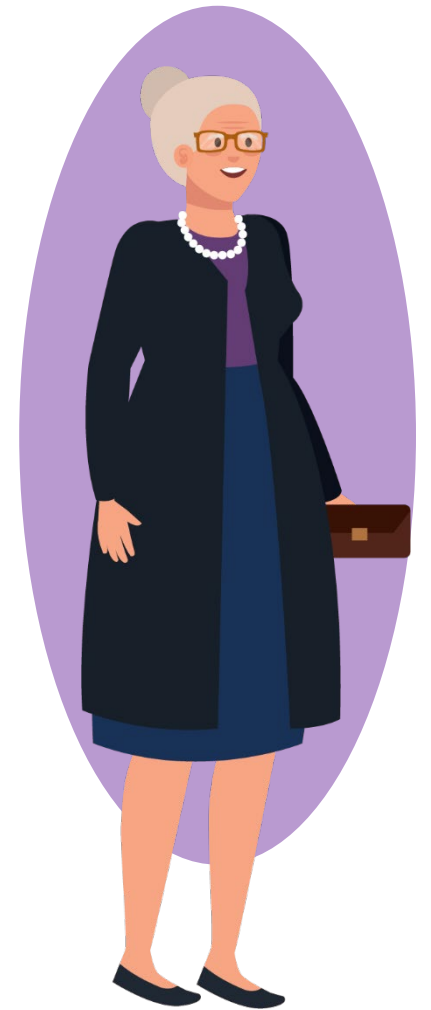
▶ Do you think a UA should be ordered



CASE 2: Noelle

▶ **YES!** Patient with complaints of dysuria.

- A UA and culture are obtained.
- No allergies noted.
- Routine medications are Amlodipine 10 mg daily, Atorvastatin 20 mg daily, and Aspirin 81 mg daily.
- Patient's CrCl is found to be 65 ml/min. Noelle is started on TMP-SMX (Bactrim bid for three days for cystitis).



CASE 2: Noelle






>100,000 CFU/mL ESCHERICHIA COLI

ANTIBIOTIC	MIC (ug/ML)	INTERPRETATION
AMPICILLIN	>16	R
AMPICILLIN/SULBACTAM	8/4	I
CEFAZOLIN	≤4	S
CIPROFLOXACIN	≤0.25	S
TMP-SMX	≤0.5/9.5	S
NITROFURANTOIN	<16	S

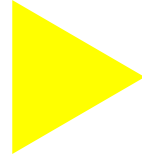
The 5 Ds of Stewardship for UTI

Description

Main Challenge Successful Intervention Strategies

	Description	Main Challenge	Successful Intervention Strategies
 Diagnosis	Make and document the right diagnosis	Determining which patients have UTI	Clinical decision aids Appropriate collection of cultures Urine procurement by catheterization Reflex urine cultures Computerized decision support systems Selective reporting of urine culture results Text accompanying results to provide interpretation
 Drug	Use the right empiric antibiotic	Rising resistance makes empiric treatment challenging	Local susceptibility reports and stratified antibiograms Selective and cascade reporting of antibiotic susceptibility Provider education Computerized decision support systems Post-prescription review by pharmacists Audit and feedback
 Dose	Use the right dose of antibiotic based on site of infection and renal or hepatic dysfunction	Dosage errors are common	Computerized decision support systems Electronic order sets Audit and feedback
 Duration	Use antibiotics for the recommended duration	Many studies show a "longer is better" mentality	Computerized decision support systems Electronic order sets Audit and feedback
 De-escalation	De-escalate therapy based on susceptibilities and when urine cultures are negative	Labor intensive and occurs too late with UTI to make much impact	Post-prescription review by pharmacists

Resources



Presentation resources referenced in this presentation are provided via a separate PDF document.



TAKING CONTROL OF YOUR
Antibiotic Stewardship Program:
A UTI FOCUS

HEALTHDIRECT
PHARMACY SERVICES
Personalized care. Direct to you.

Presentation Resources

Slide 9:
CDC Core Elements for Antibiotic Stewardship in Nursing Homes:
<https://www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-H.pdf>

Slide 12:
SMART (Specific, Measurable, Attainable, Relevant, & Time-Bound) Goals Log:

Slide 18:
When Should You Send A Urinalysis and Urine Culture?
<https://www.ahrq.gov/antibiotic-use/long-term-care/best-practices/uti-assess.html>

Slide 28:
Recommended UTI Antibiotic Durations
<https://www.ahrq.gov/antibiotic-use/long-term-care/best-practices/uti-assess.html>

Slide 30:
Antibiotic Time Out Tool:
www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/improve/antibiotic-time-out-tool.docx

Slide 46:
The 5 D's of Stewardship for UTIs
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8404614/figure/F2/>

Slide 48:
CDC's Core Elements of Antibiotic Stewardship in Nursing Homes:
<https://www.cdc.gov/longtermcare/pdfs/core-elements-antibiotic-stewardship.pdf>

CDC's About Antimicrobial Resistance: A Brief Overview:
<https://www.cdc.gov/drugresistance/about.html>

CDC's Antibiotic/Antimicrobial Resistance (Communication Resources):
<https://www.cdc.gov/drugresistance/resources.html>

Questions?

*Thank
you*

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HEALTHDIRECT 
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Antibiotic Interactions

Antibiotic	Offending Medication	Timing of Administration
Ciprofloxacin (Cipro)	magnesium/aluminum antacids, sucralfate, multivitamin, or other products containing calcium, iron or zinc (including dairy products)	Take Cipro at least 2 hours before or 6 hours after
Levofloxacin (Levaquin)	magnesium/aluminum antacids, sucralfate, multivitamin, or other products containing calcium, iron or zinc	Take Levaquin at least 2 hours before or 2 hours after
Moxifloxacin (Avelox)	antacids (Mg/Al), multivitamins containing iron or zinc, sucralfate *Does NOT interact with Calcium	Take Avelox at least 4 hours before or 8 hours after
Doxycycline/Tetracycline	Antacids (Mg/Al)	Take Doxy/Tetra 1-2 hours before or 6 hours after antacids
Doxycycline/Tetracycline	Iron	Give 3 hours before or 2 hours after antibiotic dose
Tetracycline	Milk Products	Take on an empty stomach at least 1 hour prior to meals/milk or 2 hours after
Cefpodoxime (Vantin)/Cefuroxime (Ceftin)	Antacids	Administer antibiotic at least 2 hours after
Cefpodoxime (Vantin)/Cefuroxime (Ceftin)	H2 Antagonists (Zantac, Pepcid), PPI's	These Antibiotics require a low gastric pH, avoid use

Antibiotic Interactions

Antibiotic	Adverse Reactions	Drug/Drug Interactions
Fluoroquinolones (ciprofloxacin, levofloxacin, moxifloxacin)	QT prolongation Damage to tendons, joints, muscles, nerves Hypoglycemia	Warfarin-increase INR Other medications that prolong QT interval Supplements
Nitrofurantoin (Macrobid)	Pulmonary/liver toxicity with long term use. Peripheral neuropathy Avoid CrCl <30 ml/min	Rare
Trimethoprim/Sulfamethoxazole (Bactrim)	Rash Increased Potassium Increased Creatinine	Warfarin-can double INR.
Penicillins/Cephalosporins	Rash Hypersensitivity reactions Cephalosporins can be used if patient has a PCN allergy if not a severe reaction (hives/anaphylaxis).	Allopurinol can increase risk of rash

Nursing Home and Partnership for Community Health: CMS 12th SOW GOALS

						
<p>OPIOID UTILIZATION AND MISUSE</p> <ul style="list-style-type: none"> Promote opioid best practices Reduce opioid adverse drug events in all settings 	<p>PATIENT SAFETY</p> <ul style="list-style-type: none"> Reduce hospitalizations due to c. diff Reduce adverse drug events Reduce facility acquired infections 	<p>CHRONIC DISEASE SELF-MANAGEMENT</p> <ul style="list-style-type: none"> Increase instances of adequately diagnosed and controlled hypertension Increase use of cardiac rehabilitation programs Reduce instances of uncontrolled diabetes Identify patients at high-risk for kidney disease and improve outcomes 	<p>CARE COORDINATION</p> <ul style="list-style-type: none"> Convene community coalitions Reduce avoidable readmissions, admissions to hospitals and preventable emergency department visits Identify and promote optimal care for super utilizers 	<p>COVID-19</p> <ul style="list-style-type: none"> Support nursing homes by establishing a safe visitor policy and cohort plan Provide virtual events to support infection control and prevention Support nursing homes and community coalitions with emergency preparedness plans 	<p>IMMUNIZATION</p> <ul style="list-style-type: none"> Increase influenza, pneumococcal, and COVID-19 vaccination rates 	<p>TRAINING</p> <ul style="list-style-type: none"> Encourage completion of infection control and prevention trainings by front line clinical and management staff

Thank You for Your Time!

Contact the AHS Patient Safety Team

patientsafety@allianthealth.org

<https://quality.allianthealth.org/topic/infection-control/>



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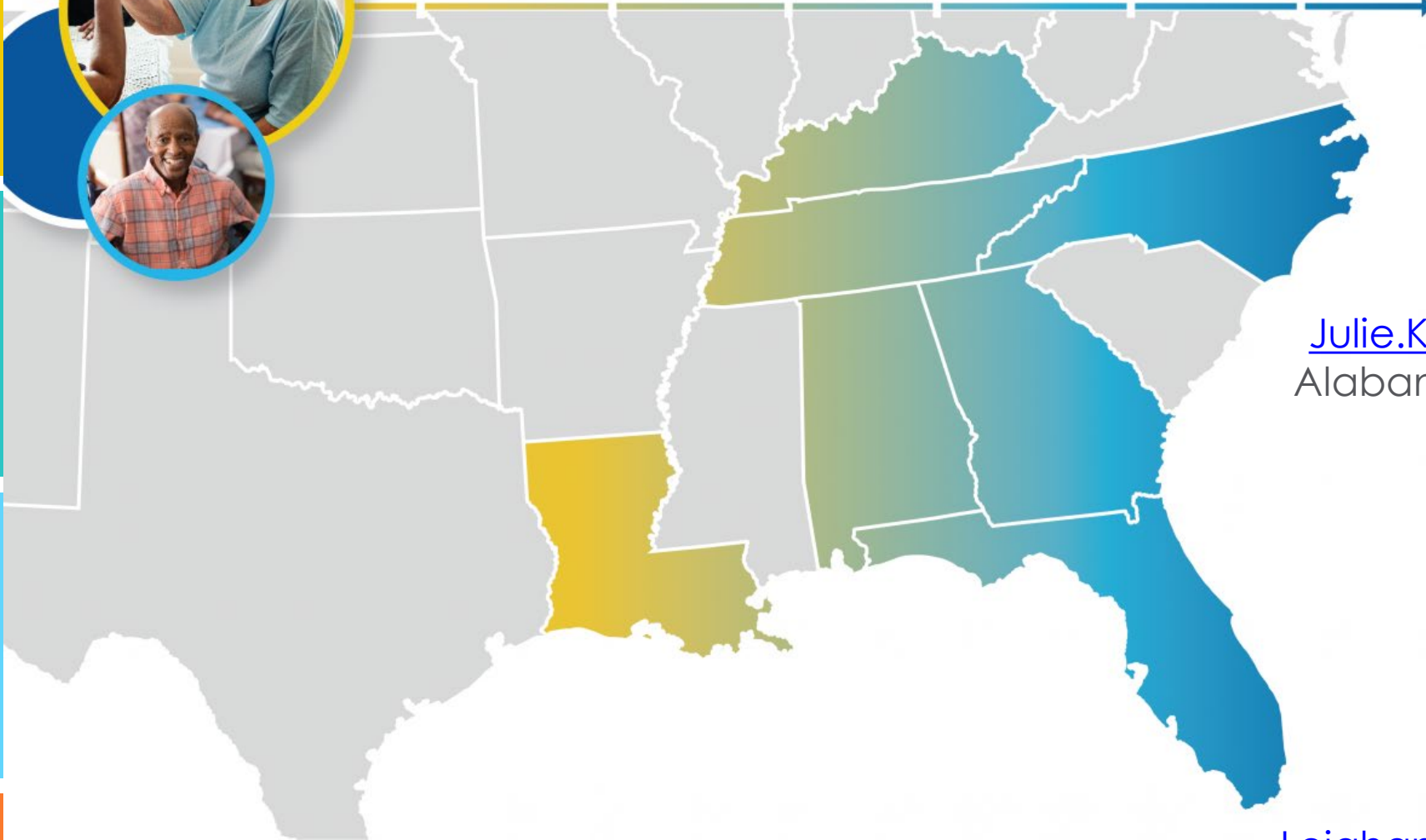


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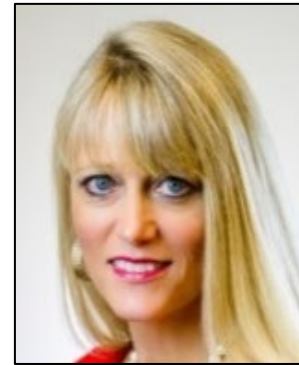
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