

# A Culture of Stewardship: Antibiotic Stewardship Starts with the Urine Culture



# Presenter

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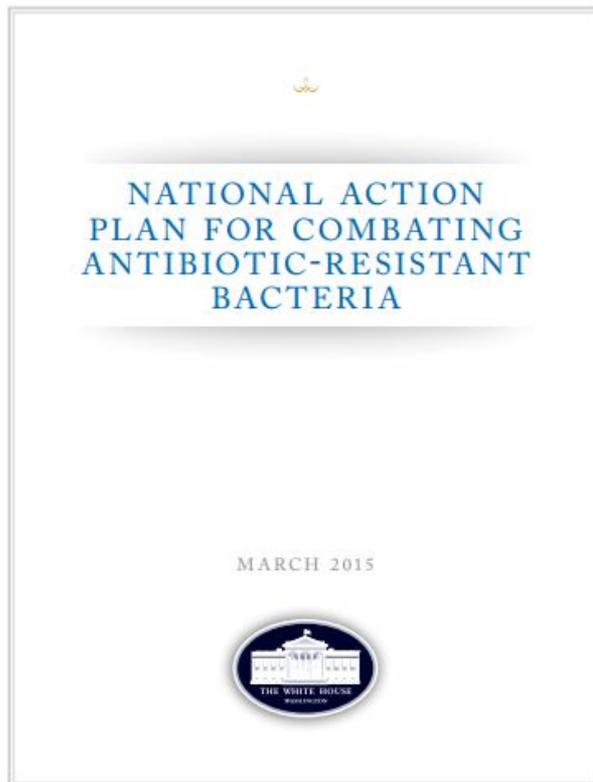
# Learning Objectives

- Discuss the role asymptomatic bacteriuria (ASB) plays in antibiotic stewardship
- Describe the downstream effect of urine cultures on antimicrobial resistance
- Identify how to introduce urine testing stewardship to your facility



# The Rise of Antibiotic Resistance and Antibiotic Stewardship

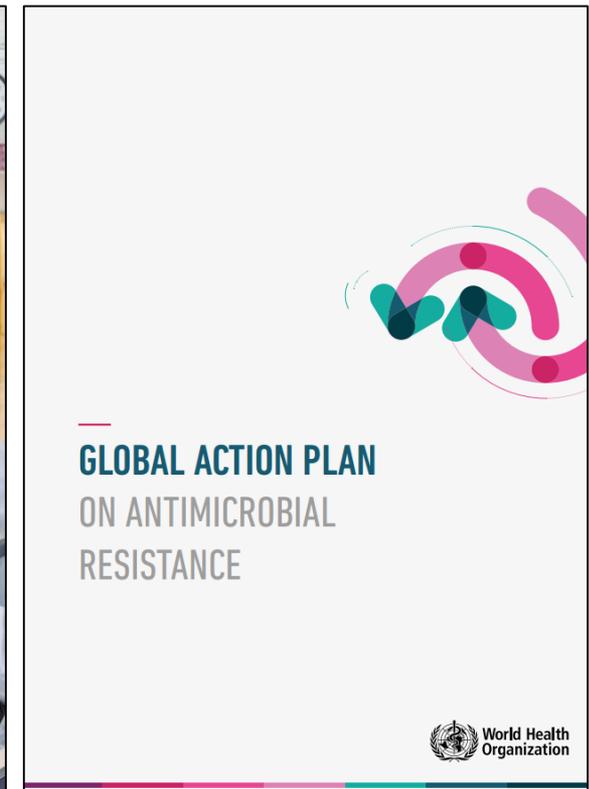
## The White House



## CDC



## WHO



*(The White House, 2015; Core Elements of Hospital Antibiotic Stewardship Programs, CDC, 2014; Antibiotic/Antimicrobial Resistance, CDC, 2017; WHO, 2015)*



# Goals of 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.”

The Goal is ...

- to have the **RIGHT DRUG**
- for the **RIGHT PERSON**
- over the **RIGHT TIME FRAME**

*(Core Elements of Hospital Antibiotic Stewardship Program, CDC, 2014)*



# Inappropriate Management of UTI and CAUTI is a Stewardship Issue

Suspected urinary tract infection (UTI) is one of the most common causes of inappropriate antibiotic prescribing in the inpatient setting

– **Wrong drug**

- Inappropriate choice of first-line therapy

– **Wrong person**

- Treating patients with asymptomatic bacteriuria (ASB)

– **Wrong duration**

- Treating UTI/CAUTI too long



*(Magill SS, JAMA, 2011)*

# What are the Signs and Symptoms of CAUTI?

## YES: CAUTI

- Fever
- Rigors
- Altered mental status
- Malaise/lethargy
- Flank pain
- Costovertebral angle tenderness
- Acute hematuria
- Pelvic discomfort
- Dysuria, urgency, frequency
- Suprapubic pain or tenderness

## NO: Not CAUTI

- Change in urine color
- Foul smelling urine
- Cloudy urine
- Urinary sediment

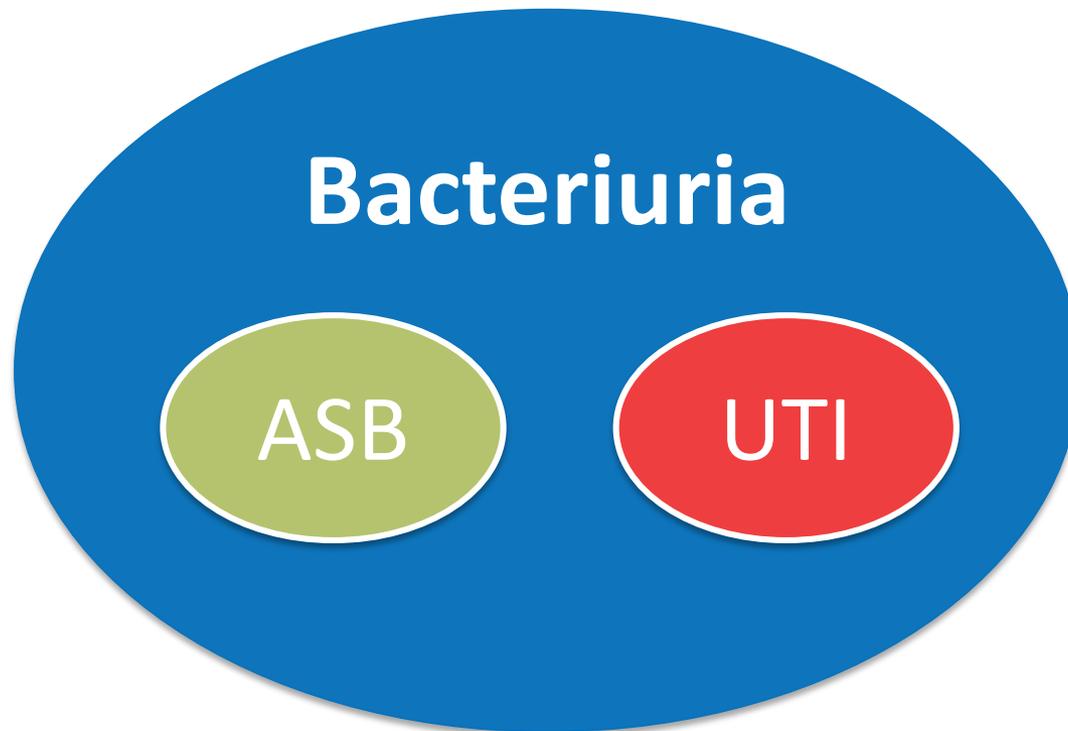
**Why?  
Chronically-  
catheterized patients  
have bacteriuria 98%  
of the time**

*(Hooton TM, Clin Infect Dis, 2010)*



# Relationship of Bacteriuria to ASB and UTI

Bacteriuria means a positive urine culture



*(Warren, J Infect Dis, 1982)*



# Downstream Impact of Urine Cultures

- 20% to 83% of patients with asymptomatic bacteriuria receive un-needed antibiotics to treat their suspected UTI
- Positive urine cultures lead to inappropriate antibiotics
  - 57% of asymptomatic patients received antibiotics when their urine culture results from admission turned positive

*(Trautner BW, Infect Dis Clin North Am, 2014; Leis JA, Infect Control Hosp Epidemiol, 2013)*

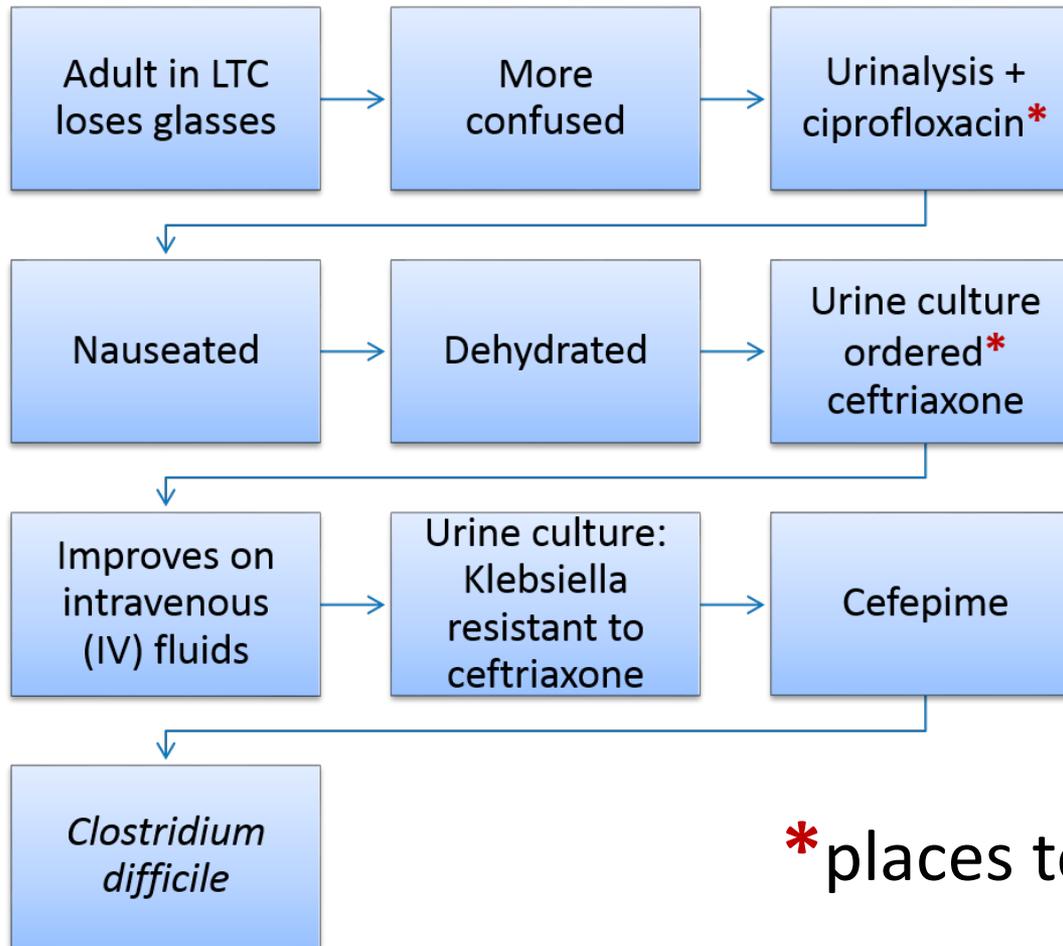


# Urinalysis and Pyuria

- Over 90% of older adults with positive urine cultures (bacteriuria) have pyuria
- If leukocyte esterase (LE) and nitrite are both negative, it is strongly predictive that a UTI is **NOT** present
- Urinalysis can rule out UTI but **cannot rule in** UTI



# What Happens in Real Life



\*places to intervene



# Technical Strategies for Urine Culture Stewardship

*Do **NOT** culture urine unless it is clinically indicated*

- When to obtain a urine culture
  - Focal symptoms suggestive of a UTI or CAUTI
    - Symptoms include: costovertebral angle tenderness, flank pain, pelvic discomfort, acute hematuria, fever, rigors
  - Signs and symptoms of sepsis in patients with no clear source
- When to **AVOID** obtaining a urine culture
  - Screening on admission without signs and symptoms
  - Screening for non-urologic surgery
  - Automatic triggers for cultures
    - Increased temperature
    - White blood cells in the urine



# Socio-Adaptive Strategies for Urine Testing Stewardship

- Unit and hospital culture
- Effective communication
  - Complete, clear, brief and timely
  - TeamSTEPPS communication tools
    - SBAR, CUS, Two-Challenge Rule, etc.
  - Joint Commission handoff tool



(Sentinel Event Data Root Causes by Event Type, 2004 – 2014, Joint Commission; 8 Tips for High Quality Hand-Offs, Joint Commission, TeamSTEPPS, AHRQ)



# Additional Resources on Antibiotic and Urine Culture Stewardship

- [IHI Antibiotic Stewardship Driver Diagram and Change Package](#)
- [CDC Clinician Guide to Collecting Cultures](#)
- [AHRQ Urine Culture Practices in the ICU Presentation](#)



# Know When to Obtain a Urine Culture

Discourage Urine Culture Use	Appropriate Urine Culture Use
<p>Urine quality: color, smell, sediments, turbidity (do not constitute signs of infection)</p>	<p>Part of an evaluation of sepsis without a clear source (CAUTI is often a diagnosis by exclusion)</p>
<p>Screening urine cultures (whether on admission or before non-urologic surgeries)</p>	<p>Based on local findings suggestive of CAUTI (example, pelvic discomfort or flank pain)</p>
<p>Standing orders for urinalysis or urine cultures without an appropriate indication</p>	<p>Prior to urologic surgeries where mucosal bleeding anticipated or transurethral resection of prostate</p>
<p>“PAN” culturing (mindfulness in evaluating source is key)</p>	<p>Early pregnancy (avoid urinary catheters if possible)</p>
<p>Obtaining urine cultures based on pyuria in an asymptomatic patient</p>	
<p>Asymptomatic elderly and diabetics (high prevalence of asymptomatic bacteriuria)</p>	



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# Speaker Notes



# Speaker Notes: Slide 1

Welcome to the final Tier 1 module of the Catheter-Associated Urinary Tract Infection (CAUTI) Prevention course. This module, titled “A Culture of Stewardship: Antibiotic Stewardship Starts with the Urine Culture” will explore the connection between urine culture practices and antibiotic stewardship.



# Speaker Notes: Slide 2

This module was developed by national infection prevention experts devoted to improving patient safety and infection prevention efforts.



# Speaker Notes: Slide 3

After completing this module you will be able to:

- Discuss the role asymptomatic bacteriuria (ASB) plays in antibiotic stewardship,
- Describe the downstream effect of urine cultures on antimicrobial resistance, and
- Identify how to introduce urine testing stewardship to your facility.



# Speaker Notes: Slide 4

This module begins with some background information. Here are three important organizations—the White House, the Centers for Disease Control and Prevention, or CDC, and the World Health Organization, WHO, that are all emphasizing the importance of antibiotic stewardship and combating the growing threat of antibiotic resistance. Antibiotics are an essential part of modern health care, greatly reducing illness and death from infectious diseases. However, antibiotic resistance is on the rise. The CDC estimates that in the U.S. at least 2 million people become infected with resistant bacteria every year and about 23,000 people die every year from these infections.



# Speaker Notes: Slide 4 Continued

Widespread use of antibiotics has contributed to increasing rates of antibiotic resistant bacteria. Recent studies estimate that “between 20-50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate.” Health care antibiotic stewardship efforts are a vital element to combat this growing threat of antibiotic resistance. Additionally, antibiotic stewardship programs improve patient safety, reduce antibiotic harms and reduce rates of *Clostridioides difficile* infection (which are intimately tied to antibiotic use).



# Speaker Notes: Slide 4 Continued

To read more about the White House National Action Plan for Combatting Antibiotic-Resistant Bacteria, the CDC's Core Elements of Hospital Antibiotic Stewardship Programs, and/or the WHO's Global Action Plan on Antimicrobial Resistance, click on the corresponding image.



# Speaker Notes: Slide 5

Antibiotic stewardship is a set of commitments and activities designed to “optimize the treatment of infections while reducing the adverse events associated with antibiotic use.” In essence, antibiotic stewardship is having the right drug, for the right person over the right time frame.

The remainder of this module discusses how urine culture stewardship is linked to antibiotic stewardship and using antibiotics appropriately.



# Speaker Notes: Slide 6

Suspected urinary tract infection (UTI), including catheter-associated urinary tract infections (CAUTIs), is one of the most common causes of inappropriate antibiotic prescribing in the inpatient setting. Providers often choose a broader spectrum antibiotic for UTI than is necessary, mistakenly treat asymptomatic bacteriuria thinking it is a CAUTI or UTI, and prescribe an unnecessarily long duration of therapy. In essence, treating asymptomatic bacteriuria is a “wrong person” issue in stewardship. And it all starts with testing the urine with either a urinalysis or urine culture in a patient without specific symptoms of UTI.



# Speaker Notes: Slide 7

This slide reviews the clinical signs and symptoms of a CAUTI. The left-hand side of your screen lists the signs and symptoms as described by the Infectious Diseases Society of America, IDSA, in their 2009 guidelines. These guidelines were designed to help guide clinicians in making a decision about whether to test or treat—so they may differ slightly from surveillance definitions of CAUTI.

The right-hand side of your screen lists the signs and symptoms that are commonly mistaken as indications of an infection. Change in urine color, foul smelling urine, cloudy urine and urinary sediment are not indicative of a CAUTI.



# Speaker Notes: Slide 7 Continued

These are all too non-specific to point towards UTI. The reason is chronically catheterized patients have bacteria their urine 98 percent of the time, which will result in cloudy urine that smells bad. But that doesn't mean the patient has any symptoms of UTI. Similarly, certain foods and medications can cause the urine color or odor to change, and again these changes don't mean the patient has a symptomatic UTI.

The point is that urine culture stewardship means only ordering urine cultures when patients have true signs and symptoms of an UTI or CAUTI.



# Speaker Notes: Slide 8

Urine cultures test for the presence of bacteria in the urine, or bacteriuria. But bacteriuria is not exclusively indicative of UTIs or CAUTIs. As the graphic on the slide shows, bacteriuria, or a positive urine culture, is a set that includes the two conditions of asymptomatic bacteriuria (ASB) and UTI. Asymptomatic bacteriuria occurs when patients have a positive urine culture, but lack specific UTI symptoms. Often this will present as cloudy urine or dirty urine, with a “dirty urinalysis.” And as we discussed on the previous slide and in the antibiotic stewardship module on urinary tract infections, ASB should not be treated with antibiotics.



# Speaker Notes: Slide 8 Continued

The hardest part for most people about dealing with ASB is learning to leave well enough alone. In health care we don't like to do that, we see a positive test result or urine culture and we want to do something about it. We fear that doing "nothing" will hurt our patients. But remember that in this instance you aren't doing nothing when you leave asymptomatic bacteriuria alone. In fact, you are protecting your patient from the harms of unnecessary antibiotics.



# Speaker Notes: Slide 8 Continued

Additionally, false positive urine tests can also overly inflate a hospital's CAUTI rate. Positive urine cultures in a patient with a fever and an indwelling urinary catheter have to be counted as CAUTI—even if the patient has pneumonia, or cellulitis, or some other non-urinary cause of fever. So improving your urine culture testing practices can also help to reduce your hospital's CAUTI rate.



# Speaker Notes: Slide 9

The literature highlights the magnitude of over-treating asymptomatic bacteriuria. Recent studies document that between 20 to 83 percent of asymptomatic patients with positive urine cultures were treated with antibiotics. Similarly, the time point when a urine culture result appears in the chart is a period of risk for patients to receive extra and unnecessary antibiotics. A small study by Leis and colleagues found that 12 out of 21 of asymptomatic patients received antibiotics when the urine culture result came back positive, usually two days into the hospital stay.



# Speaker Notes: Slide 10

Lastly, it is also important to keep in mind that over 90 percent of elderly adults with bacteriuria are going to have pyuria. So, testing for pyuria, like bacteriuria, does not help differentiate between ASB and UTI or CAUTI. If the leukocyte esterase (LE) and nitrite are both negative on the urine analysis, it is strongly predictive that a urinary tract infection is not present. But you cannot use the urinalysis to rule in a UTI because pyuria is non-specific.



# Speaker Notes: Slide 11

Here is a sample case that illustrates how inappropriate urine testing can put patients at risk.

Mrs. Jones is an 87-year-old patient at a long-term acute care hospital or LTACH recovering from hip surgery. On Monday she loses her glasses, and on Wednesday her care nurse notices she seems confused and a urinalysis was obtained. Her physician starts her on ciprofloxacin to “cover all the bases.” However, she soon becomes nauseated from the Ciprofloxacin and dehydrated. As her condition appears to worsen, she is taken to the emergency room and a urine culture is obtained and there she is placed on ceftriaxone and IV fluids. She begins to improve on the IV fluids.



# Speaker Notes: Slide 11 Continued

However, the results of her urine culture returns several days in hospitalization and now it grows *Klebsiella* resistant to Ceftriaxone. So she starts on cefepime. She begins to have abdominal pain and diarrhea and is found to have developed a *Clostridioides difficile* infection.

This is a classic case of a urinalysis and urine culture being ordered when the patient did not have clear signs or symptoms that localized to the urinary tract, her confusion in the first place could be due to the loss of her glasses and subsequent blurred vision. The IDSA guidelines indicate that there is no benefit to screening and treating older patients for ASB.



# Speaker Notes: Slide 11 Continued

The US Preventive Services Task Force and American Board of Internal Medicine or ABIM foundation also discourage screening for and treating ASB.

On the slide, the red asterisks indicate where a testing stewardship program could have intervened and prevented the use of unnecessary antibiotics.



# Speaker Notes: Slide 12

In order to achieve urine testing stewardship at your hospital, it is important to not culture the urine unless it is clinically indicated. Clinically indicated symptoms include:

- Focal symptoms suggestive of a UTI, CAUTI or other urinary complication, such as costovertebral angle tenderness, flank pain, pelvic discomfort, acute hematuria, fever, rigors, etc.
- Or if the patient is showing signs and symptoms of sepsis with no other clear source of infection.

One easy step you can take to improve urine culture testing stewardship at your facility is to stop automatically screening patients for UTI. Many hospitals and units automatically screen patients on admission, even if they don't have signs or symptoms related to the urine.



# Speaker Notes: Slide 12 Continued

Similarly, surgical patients should not be screened unless they are being seen for urologic problems. And finally, some hospitals or units have automatic triggers for urine cultures, such as increased temperature or if white blood cells are found in the urine. Such automatic triggers can lead to unnecessary urine cultures and as we have discussed in this module, subsequent antibiotic overuse.



# Speaker Notes: Slide 13

It is also important to consider socio-adaptive strategies that can impact your testing stewardship efforts. As we have discussed in previous modules, tackling socio-adaptive strategies for improvement are often more challenging. Unit and hospital culture can have a big impact on urine testing practices. You should promote a unit and hospital culture where staff are committed to using evidence-based practices, working hard to follow and implement best practices. Likewise, staff should be encouraged to be mindful about urine culturing practices, rather than sending cultures reflexively. Consider arming staff with communication tools to help them in their conversations about if a urine culture is truly necessary and to properly communicate patient information so that evidence-based best practices are easily followed.



# Speaker Notes: Slide 14

In addition to the antibiotic stewardship guides referenced at the beginning of this module, you may find the resources on this slide helpful as you begin to implement urine testing stewardship efforts in your hospital or unit.



# Speaker Notes: Slide 15

To summarize, urine testing stewardship depends upon knowing when to obtain a culture. It is important to provide education combined with audit and feedback of appropriate urine testing practices. Foul smelling or turbid urine, screening urine cultures, standing orders for automatic culturing, pan culturing and culturing of asymptomatic patients should all be discouraged. However, maintaining awareness of a potential urinary tract infection is also important. CAUTI is often a diagnosis of exclusion in a sepsis work up. Local findings such a pelvic discomfort or flank pain may be indicative of a CAUTI.



# Speaker Notes: Slide 15 Continued

Urine cultures are also important in urological procedures where mucosal bleeding is anticipated. It is important to screen for and treat ASB in early pregnancy – that is one of the situations in which treatment for ASB can improve clinical outcomes. Knowing the indications for urine cultures is an important step in decreasing inappropriate antibiotic usage and the emergence of resistant organisms.



# Speaker Notes: Slide 16

No notes.

