

Antimicrobial Stewardship and Long-Term Care

Minnesota Department of Health

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Objectives

- Describe antimicrobial use/overuse and consequences in long-term care (LTC)
- Define antimicrobial stewardship
- Differentiate urinary tract infection (UTI) vs asymptomatic bacteriuria
- Demonstrate how UTI can be an opportunity for antimicrobial stewardship in LTC

Antimicrobial Use/Overuse and Consequences

Antibiotic Use in Long-term Care

- Antimicrobials account for approximately 40% of all systemic drugs prescribed in LTC – primarily over the phone
- Up to 70% of LTC residents receive an antibiotic every year
- Antibiotics are often prescribed empirically – without culture or antimicrobial sensitivity data

Antibiotic Use in Long-term Care (cont.)

- 19% of respiratory tract infections unnecessarily treated
 - 65%: acute bronchitis
- UTI is most frequent indication for antibiotic use in LTC
 - 41%: abnormal urinalysis unnecessarily treated
 - 56%: inappropriate drug
 - 67%: excessive duration

Antibiotic Misuse

Hospitals



- Pulmonary infiltrates in ICU patients
- Contaminated blood cultures

Outpatient Clinics



- Upper respiratory tract infections

Long-term Care



- Asymptomatic bacteriuria
- Viral upper respiratory infection
- Treatment of colonization instead of infection

Antibiotic misuse is prevalent throughout the medical system

Antibiotic Misuse in Long-term Care

Resident Factors

- Chronic medical conditions, debilitation
- Impaired communication
- Difficulty obtaining specimens
- Family concerns

System Factors

- Lack of care continuity
- Time constraints and limited staffing
- Limited diagnostic resources
- Staff turnover

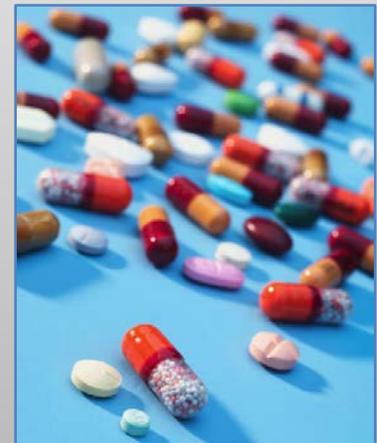
Provider Factors

- Telephone ordering
- Limited direct evaluation
- Lack of access to information at time of decision making

Up to 75% of antibiotic use is inappropriate in LTC

Antibiotic Misuse: Consequences

- Antibiotic resistance, multidrug-resistant organisms
- Adverse drug effects or drug interactions
- Secondary infections (*Clostridium difficile*)
- Increased cost of care



Emerging Multidrug-resistant Organisms

Susceptibility Profile of *Klebsiella pneumoniae* carbapenemase (KPC)-Producing *K. pneumoniae*

Antimicrobial	Interpretation	Antimicrobial	Interpretation
Amikacin	I	Chloramphenicol	R
Amox/clav	R	Ciprofloxacin	R
Ampicillin	R	Ertapenem	R
Aztreonam	R	Gentamicin	R
Cefazolin	R	Imipenem	R
Cefpodoxime	R	Meropenem	R
Cefotaxime	R	Piperacillin/Tazo	R
Cetotetan	R	Tobramycin	R
Cefoxitin	R	Trimeth/Sulfa	R
Ceftazidime	R	Polymyxin B	MIC >4µg/ml
Ceftriaxone	R	Colistin	MIC >4µg/ml
Cefepime	R	Tigecycline	S

I: intermediate, S: susceptible, R: resistant

Antimicrobial Stewardship

What is Antimicrobial Stewardship?

- A multidisciplinary approach to optimizing antimicrobial use through appropriate selection, dosing, and duration while minimizing unintended consequences.
- Goal: Ensure the 5 D's of optimal antimicrobial therapy:

D agnosis	➡	Does the condition require antibiotic therapy?
D rug	➡	Is the bacteria susceptible?
D ose	➡	What is the recommended dose?
D uration	➡	What is the recommended duration?
D e-escalation	➡	Can the antibiotic be switched from IV to oral?

Antimicrobial Stewardship in Hospitals

- Implemented in many acute care hospitals
- Demonstrated positive outcomes
 - Community-acquired pneumonia – decreased mortality, intubation
 - Decreased number of antimicrobial prescriptions
 - Decreased antimicrobial days
 - Decreased *C. difficile* infection
- **All** healthcare facilities (hospitals, ambulatory care, LTC) should implement antimicrobial stewardship programs per Infectious Disease Society of America (IDSA) and Society of Healthcare Epidemiology of America (SHEA)

Hauck LD. *Ann Epidemiol* 2004

Koppel R. *JAMA* 2005

Davey. *Cochrane Database Syst Rev* 2013

Antimicrobial Stewardship Strategies

- Multidisciplinary approach: prescribers, pharmacy, infection prevention, microbiology, nursing, administration, information specialists
- Education (alone is not enough)
- Thorough resident assessment
- Documentation and communication
- Guidelines and clinical pathways
- Optimization of antimicrobial therapy
- Review of microbiology results / revision / de-escalation of empiric prescribing

What Does Antimicrobial Stewardship Look Like?

- Standardized process for eliciting information and communicating a change in resident condition from nursing assistants to nurses
- Standardized processes for communicating clinical information from nurses to providers
- Standardized protocols for lab testing
- Standardized treatment algorithms
 - Evidence-based recommendations (ex: Loeb, 2001)
- Processes must work in the facility
 - Start small; trial and error will determine what fits for the facility
 - Integrate into existing systems

Role of the Provider in Antimicrobial Stewardship

Three steps to ensure wise prescribing and optimal use:

1. All orders must contain **dose, duration, and indication**
2. When placing orders, include **microbiology cultures**
3. When culture results come back in 24-48 hours, take an **antibiotic time-out** to reassess therapy
 - Is this antibiotic still warranted?
 - Is this antibiotic still effective against this organism?



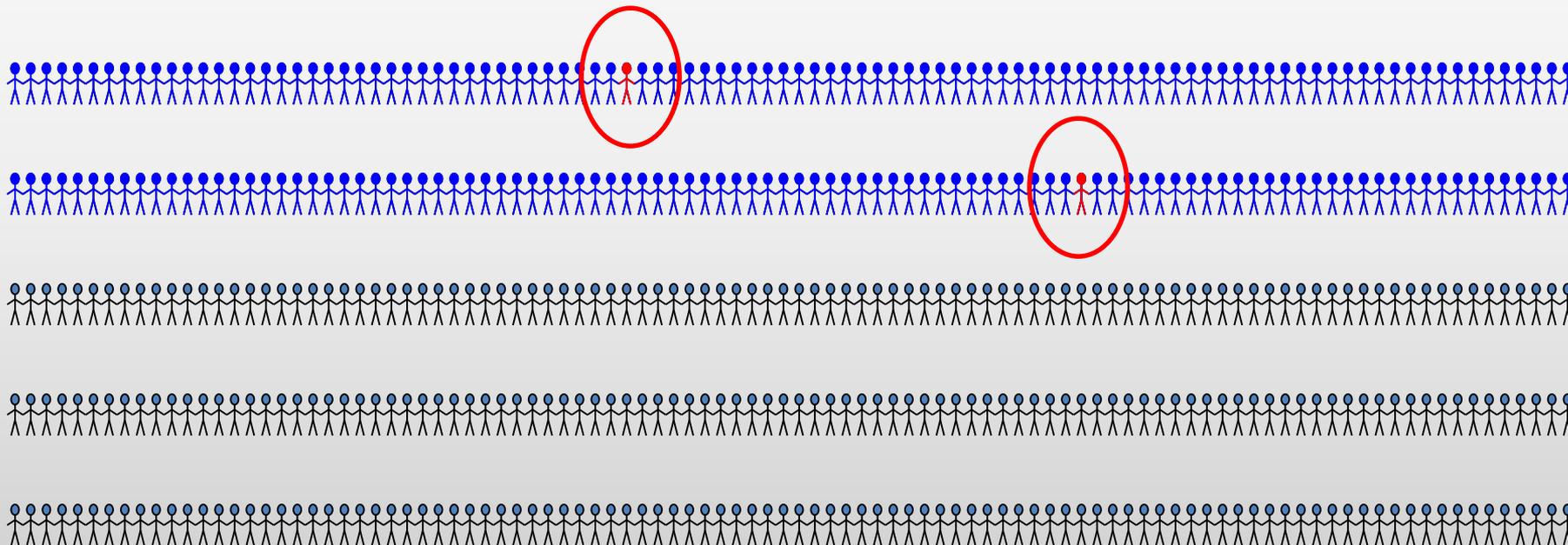
UTI vs. Asymptomatic Bacteriuria: An Opportunity for Antimicrobial Stewardship

Quiz Question

If you collected urine cultures on every resident in a 500-bed LTC facility, how many residents would have a UTI requiring antibiotic treatment?



Example: 500 Bed Long-term Care Facility



-  Resident in facility
-  Resident with bacteriuria
-  Resident with UTI requiring treatment

Quiz Answer

Number of residents with urine cultures = **500**

Number of residents with positive urine cultures = **200** (40%)

Number of residents with true symptomatic UTI requiring treatment = **1 to 2**

Conclusions:

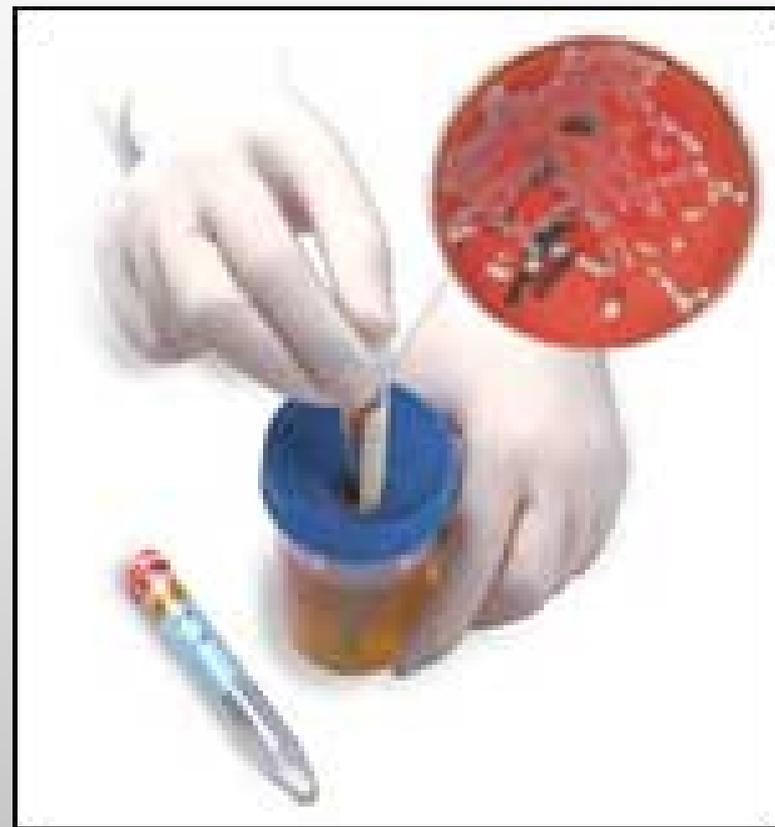
- Majority of residents with positive cultures would not require antibiotics.
- Use of urine culture to determine who needs treatment is not very helpful without additional information.

How is a UTI Diagnosed?

If there are > 10 WBC/HPF on the UA
OR
 $\geq 10^5$ CFU/ml on the urine culture

...then an infection is present, right?

Unfortunately, no.



CFU: colony-forming unit
HPF: high power field

UTI Diagnosis

- The diagnosis of UTI is primarily clinical
- Based on symptoms and objective findings from resident assessment
- Urinalysis and culture can provide supportive evidence, but are not helpful without clinical signs/symptoms
- A negative urinalysis and culture can exclude UTI

Bacteriuria \neq UTI

- $\geq 10^5$ CFU is just a number
 - Number was only validated in young women with bacteriuria

However,

- $\geq 10^5$ CFU alone does not indicate infection
- $< 10^5$ does not disprove infection



Presence of symptoms and bacteriuria indicates an infection

Pyuria \neq UTI

- > 90% of persons with bacteriuria will also have pyuria, so this is not generally helpful
 - Pyuria is expected as it indicates host response to a stimulus such as bacteria
- Presence of pyuria does not differentiate true infection from asymptomatic bacteriuria
- Absence of pyuria in an immunocompetent host may be used to rule out UTI; should not be used to rule in UTI

Malodorous Urine \neq UTI

- Abnormal odor caused by many factors
 - Dehydration, diet, bacteriuria
- Urine odor to identify bacteriuria resulted in error in 1/3 of cases
- Even if urine odor is caused by bacteriuria, this does not indicate infection that needs to be treated unless other symptoms are present
- First step: Always encourage increased fluids, if not fluid restricted



Fever Alone + Bacteriuria \neq UTI Without an Indwelling Catheter

- Most residents (90%) with fever and no urinary symptoms have another explanation for fever
- Most residents with bacteriuria do not have a clinical UTI needing antimicrobial treatment
- The positive predictive value of a positive urine culture for a UTI is ~12%

Orr. *Am J Med* 1996

Urinary Tract Infection is Primarily a Clinical Diagnosis

Asymptomatic Bacteriuria

- Definition: presence of bacteria in the urine without any symptoms of infection
- Very common in LTC residents
 - 25-50% of female residents
 - 15-40% of male residents
 - Nearly 100% of people with chronic indwelling catheters
 - Ratio of asymptomatic bacteriuria to symptomatic UTI in LTC is > 100:1

Antibiotic Treatment of Asymptomatic Bacteriuria in LTC: Results of Randomized Trials

- No effect on
 - Morbidity or mortality
 - Symptoms of chronic incontinence
 - Acute episodes of UTI
- Negative consequences
 - Increased drug side effects
 - Increased future isolation of resistant organisms
 - Increased cost



Nicolle et al. *NEJM* 1983

Nicolle et al. *Am J Med* 1987

Ouslander et al. *Annals Int Med* 1995

Treatment of Asymptomatic Bacteriuria in LTC Residents: The Down-Side

- Increased adverse drug effects, notably *C. difficile* infection (especially after quinolone antibiotics)
- Re-colonization with antibiotic-resistant organisms
- Conclusion:
 - Do not test residents without symptoms - and do not treat
 - Do not treat cloudy-uria or smelly-uria; these alone are not symptoms of UTI

IDSA Guidelines for the Diagnosis and Treatment of Asymptomatic Bacteriuria in Adults.
Clin Infect Dis 2005;40:643-54.

Colgan. *Am Fam Physician* 2006

Nicolle. *Am J Med* 1987

Nicolle. *NEJM* 1983

Ouslander. *Annals Int Med* 1995

Darouiche. *Clin Inf Dis* 2005

UTI: Clinical Diagnosis

- Acute genitourinary symptoms
 - Dysuria
 - Frequency or urgency
 - Suprapubic or costovertebral pain
 - Gross hematuria
 - New incontinence (chronic incontinence \neq UTI)
- Fever
 - Present in most serious infections – may be an increase relative to resident's baseline
 - May be absent in elderly

Loeb Minimum Criteria For Antibiotics Residents without urinary catheter

Acute Dysuria

OR

Fever

+

At least ONE of:

- Urgency
- Frequency
- Suprapubic pain
- CVA tenderness
- Gross hematuria
- New incontinence

Loeb Minimum Criteria For Antibiotics Residents with urinary catheter

At least ONE of:

- **Fever**
- **Rigors**
- **New CVA
tenderness**
- **New delirium**

UTI: Treatment Considerations

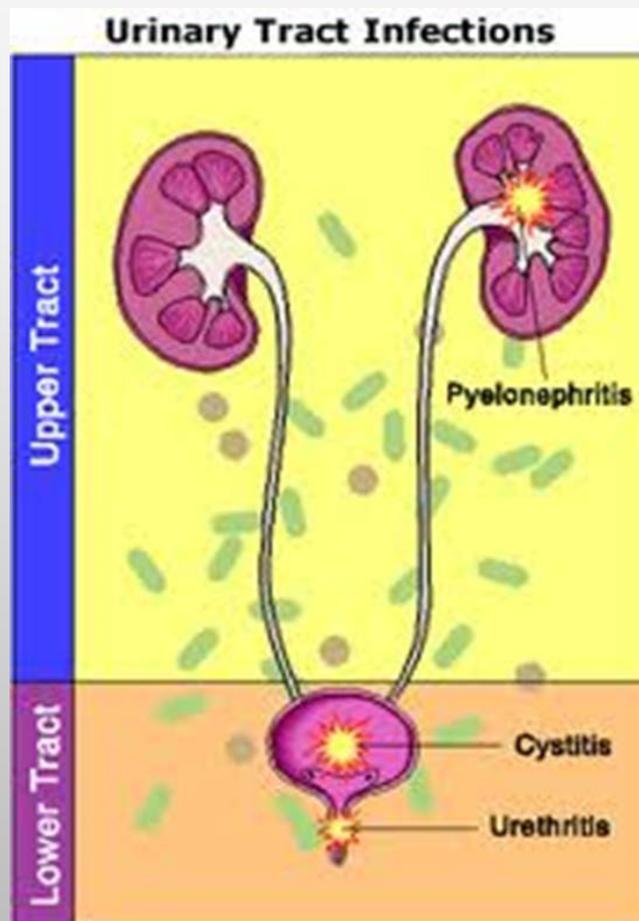
- **Prevention: Get the catheters out**
- Do not treat asymptomatic bacteriuria
- Focus on acute clinical symptoms attributable to genitourinary system
- Obtain urine culture prior to starting antibiotics

UTI: Treatment Considerations (cont.)

- Antibiotic choice depends on several factors:
 - Local susceptibility data
 - Prior culture data and antibiotic use in the resident
 - Potential for drug interactions or side effects
 - Resident drug allergies
- Reassess antibiotic therapy when susceptibilities are available
- Use narrow-spectrum agents whenever possible

UTI: Treatment Considerations (cont.)

- Antibiotic therapy - generally:
 - 3-6 days for cystitis
 - 7-14 days for pyelonephritis
- Post-therapy urine cultures are not recommended unless symptoms recur
- Majority of residents will re-acquire bacteriuria by 6 weeks after treatment



Summary

- Antibiotics are misused in all health care settings, including LTC
- Asymptomatic bacteriuria is more common in LTC residents than symptomatic UTI
- Asymptomatic bacteriuria should not be treated in LTC residents
- UTI is a clinical diagnostic – lab results can provide supporting data
- Antimicrobial stewardship programs can improve the quality of resident care and improve resident safety; providers play a very important role

Infection Control and Antimicrobial Resistance Unit

Minnesota Department of Health

www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance