

UTI Management in Long-Term Care: Applying McGeer Criteria for Targeted UTI Treatment

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Key Takeaways:

- *The McGeer Criteria can help guide if antibiotic treatment is needed for a UTI.*
- *In most instances, asymptomatic bacteriuria does not need antibiotic therapy.*
- *Ensure the antibiotic is appropriate for the suspected UTI-causing bacteria, if a culture is not available.*
- *Avoid broad-spectrum agents to reduce antibiotic resistance, if possible.*
- *Impaired kidney function may require antibiotic dose adjustment.*
- *Consider the BEERS criteria when choosing antibiotic regimen for older adults.*

Introduction

Urinary Tract Infections (UTIs) are estimated to be the second most common infection in long-term care facilities (LTCF). There are a variety of risk factors that lead to increased UTI in LTCF residents, including but not limited to, decreased mobility, pre-existing health conditions like diabetes, dehydration, catheter use, increased incontinence, and age-related changes to the urinary tract.

In older adults, a UTI can present with atypical symptoms, such as acute mental status changes, including inattention, fatigue, or confusion. Moreover, in older adults with cognitive dysfunction, UTIs are among the most common infections in long-term care (LTC) settings and can be difficult to diagnose in older adults. Distinguishing between asymptomatic bacteriuria and UTI is crucial to prevent unnecessary antibiotic use, which can lead to resistance and side effects from antibiotic use (e.g., diarrhea, nausea).

The McGeer Criteria offers a standardized approach for infection surveillance in LTC facilities, aiding in appropriate diagnosis and management. The purpose of this article is to review the McGeer Criteria for UTIs, determine common pathogens, and appropriate drug therapy treatment, including dose adjustments for impaired kidney function and consideration for appropriate antibiotic selection as per the Beers Criteria.

Understanding the McGeer Criteria

The McGeer Criteria was developed to provide consistent definitions for infection surveillance in LTC settings. The McGeer Criteria includes UTI, respiratory tract infections, skin and soft tissue infections, and gastrointestinal tract infections. For this article, we isolated the review to guidance for UTIs. An abbreviated version of the McGeer Criteria focusing on UTI is detailed in Figure 1. As a quick note, the criteria differ based on whether a resident has an indwelling catheter.

Treatment Considerations:

When treatment is warranted based on the McGeer Criteria, selecting appropriate antibiotics for the bacteria causing the infection is essential. Common bacteria that cause UTI include:

- *Escherichia coli (E. coli)*
- *Klebsiella pneumoniae*
- *Proteus mirabilis*
- *Enterococcus species*
- *Pseudomonas aeruginosa*
- *Staphylococcus saprophyticus*

Antibiotic Selection

- Tailor antibiotic choice based on local antibiograms and resident-specific factors. Table 2 shows antibiotic options for uncomplicated and complicated UTIs based on bacterial coverage.
- Adjust dosages according to renal function to prevent toxicity. Table 3 shows dosing adjustments for altered kidney function.
- Avoid antibiotics with a high risk of adverse effects in the elderly, such as fluoroquinolones, unless no alternatives are available.

BEERS Criteria Considerations

When selecting antibiotics for older adults, it's important to consider recommendations from the BEERS Criteria to minimize the risk of adverse effects. Below are key points related to commonly used agents for UTI treatment.

Table 1

Antibiotic	BEERS Recommendation
Nitrofurantoin	Risk of inadequate urinary concentration and increased toxicity (e.g. hepatic, peripheral neuropathy) in patients with CrCl <30mL/min
Sulfamethoxazole-Trimethoprim	Risk of hyperkalemia in patients on ACE inhibitors, ARBs, or with reduced renal function
Fluoroquinolones	<p>Avoid when possible: risk of tendon rupture, peripheral neuropathy, CNS effects (delirium, confusion)</p> <p>Can worsen QT prolongation when taken with other QT-prolonging drugs (antiarrhythmics, antipsychotics, macrolides).</p> <p>Decreased absorption when taken with antacids, calcium, magnesium, iron, or multivitamins with minerals; space doses by 2-4 hours</p> <p>Ciprofloxacin inhibits CYP1A2, which can increase levels of other drugs metabolized by it (amiodarone, verapamil, fluvoxamine)</p>
Beta-lactams	Risk of C. difficile infection with broad-spectrum use

Figure 1

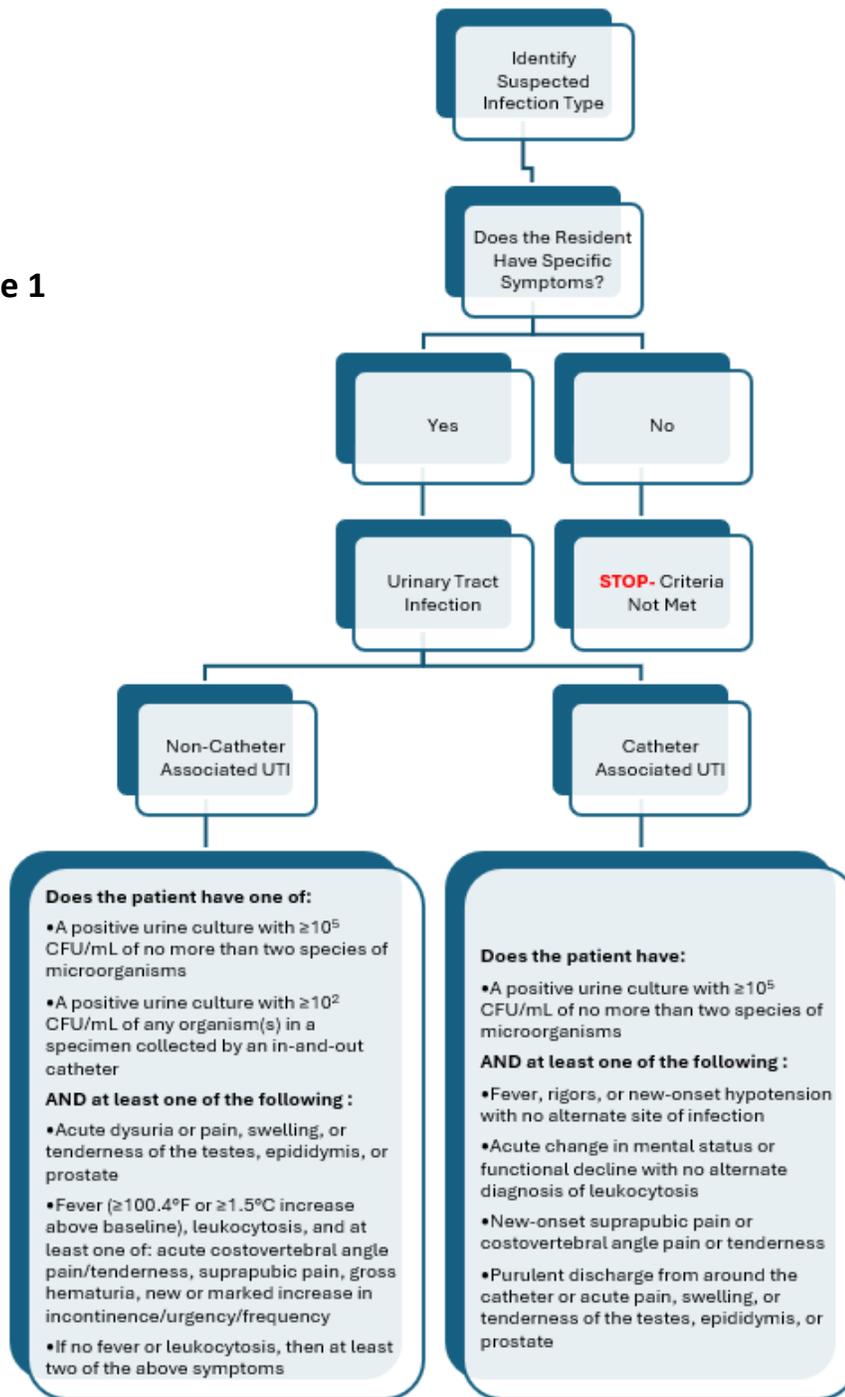


Table 2

Pathogen	Uncomplicated UTI	Complicated UTI/Pyelonephritis
<i>E. coli</i>	<p><u>Oral Therapies:</u></p> <ul style="list-style-type: none"> • Nitrofurantoin 100mg BID x5d • Sulfamethoxazole-Trimethoprim DS 1 BID x3d • Fosfomycin 3g x1 dose • Levofloxacin 250mg QD x3-5d • Ciprofloxacin 250mg Q12h x3-5d • <i>Alternative option:</i> Amoxicillin/Clavulanate 500/125mg BID x5-7d 	<p><u>Oral Therapies:</u></p> <ul style="list-style-type: none"> • Sulfamethoxazole-Trimethoprim DS 1 BID x14d • Ciprofloxacin 500mg Q12h x5-7d • Levofloxacin 750mg QD x5-7d • <i>Alternative option:</i> Amoxicillin/Clavulanate 500/125mg BID x10-14d <p><u>IV Therapies:</u></p> <ul style="list-style-type: none"> • Ceftriaxone 1g Q24h x5-14d • Cefepime 1-2g Q8-12h x5-14d • <i>If ESBL-producing:</i> Ertapenem 1g QD x5-14d
<i>Klebsiella spp.</i>	<p><u>Oral Therapies:</u></p> <ul style="list-style-type: none"> • Sulfamethoxazole-Trimethoprim DS 1 BID x3d • Nitrofurantoin 100mg BID x5d • Fosfomycin 3g x1 dose 	<p><u>IV Therapies:</u></p> <ul style="list-style-type: none"> • Ceftriaxone 1g Q24h x5-14d • Piperacillin/tazobactam 3.375g Q6h x5-10d • <i>If ESBL-producing:</i> Ertapenem 1g QD x5-14d
<i>Proteus mirabilis</i>	<p><u>Oral Therapies:</u></p> <ul style="list-style-type: none"> • Sulfamethoxazole-Trimethoprim DS 1 BID x3d • <i>Alternative option:</i> Amoxicillin/Clavulanate 500/125mg BID x5-7d 	<p><u>IV Therapies:</u></p> <ul style="list-style-type: none"> • Piperacillin/tazobactam 3.375g Q6h x5-10d • Ceftriaxone 1g Q24h x5-14d
<i>Enterococcus spp.</i>	<p><u>Oral Therapies:</u></p> <ul style="list-style-type: none"> • Amoxicillin 500mg Q8H x5d • Nitrofurantoin 100mg BID x5d • Fosfomycin 3g x1 dose • <i>Alternative option:</i> Amoxicillin/Clavulanate 500/125mg BID x5-7d 	<p><u>IV Therapies:</u></p> <ul style="list-style-type: none"> • Ampicillin 1-2g Q4-6h +gentamicin 5-7mg/kg QD x5-14d • <i>If ampicillin resistant:</i> Vancomycin 15-20mg/kg Q8-12h x7-14d
<i>Pseudomonas aeruginosa</i>		<p><u>IV Therapies:</u></p> <ul style="list-style-type: none"> • Piperacillin/tazobactam 3.375g Q6h x5-10d • Cefepime 1-2g Q12h x5-14d • Meropenem 1g Q8h x5-14d • Ceftazidime-avibactam 2.5g Q8h x5-14d
<i>Staph. saprophyticus</i>	<p><u>Oral Therapies</u></p> <ul style="list-style-type: none"> • Nitrofurantoin 100mg BID x5d • Sulfamethoxazole-Trimethoprim DS 1 BID x3d • Beta-lactams (e.g. cephalexin 500mg BID x5-7d) 	

No liver adjustments noted for any of the regimens above

*Kidney Function Adjustments are necessary for all regimens (besides Ceftriaxone) and are listed in Table 2

Table 3

Antibiotic	Renal Dosing Adjustment
Nitrofurantoin	<ul style="list-style-type: none"> • CrCl <30mL/min: avoid use
Sulfamethoxazole/Trimethoprim	<ul style="list-style-type: none"> • CrCl 15-30mL/min: reduce dose to 50% of normal dose • CrCl <15mL/min: reduce dose to 25-50% of normal dose • Hemodialysis/Peritoneal Dialysis: follow dosing for CrCl<15mL/min • CRRT/PIRRT: no adjustments necessary
Fosfomycin	<ul style="list-style-type: none"> • CrCl 30-40mL/min: 75% of normal dose • CrCl 20-30mL/min: 60% of normal dose • CrCl 10-20mL/min: 40% of normal dose • CrCl <10mL/min: 20% of normal dose
Amoxicillin	<ul style="list-style-type: none"> • CrCl 10-30mL/min: adjust dosing to Q12H • CrCl <10mL/min: adjust dosing to q12-24h • Hemodialysis: adjust dosing to Q12-24h • Peritoneal dialysis: adjust dosing to Q12h
Cephalexin	<ul style="list-style-type: none"> • CrCl 15-30mL/min: 500mg Q24h or 250mg Q12h • CrCl <15mL/min: 250mg Q24h • Hemodialysis: administer after dialysis • Peritoneal dialysis: dose as for CrCl <15mL/min
Piperacillin/Tazobactam	<ul style="list-style-type: none"> • CrCl 20-40mL/min: 2.25g Q6h • CrCl <20mL/min: 2.25g Q8h
Ciprofloxacin (only necessary for complicated UTI dosing)	<ul style="list-style-type: none"> • CrCl <30mL/min: 500mg Q24h • Dialysis: 500mg Q24h
Levofloxacin (only necessary for complicated UTI dosing)	<ul style="list-style-type: none"> • CrCl 20-50mL/min: 750mg Q48h • CrCl <20: 750mg as one dose, then 500mg Q48h thereafter • Dialysis: 750mg as one dose, then 500mg Q48h thereafter
Ertapenem	<ul style="list-style-type: none"> • CrCl <30mL/min: 500mg QD • Dialysis: 500mg QD
Cefepime	<ul style="list-style-type: none"> • CrCl 30-60mL/min: if 2g, cut to 1g Q12h. if 1g, dose Q24h • CrCl 11-29mL/min: if 2g, cut to 1g Q24h. If 1g, cut to 500mg Q24h • CrCl <11mL/min: if 2g, cut to 500mg Q24h. If 1g, cut to 250mg Q24h

<p>Ampicillin</p>	<ul style="list-style-type: none"> • CrCl 30-50mL/min: change frequency to Q8h • CrCl 15-30mL/min: change frequency to Q12h • CrCl <15mL/min: change frequency to Q24h • Dialysis: change frequency to Q24h
<p>Gentamicin</p>	<ul style="list-style-type: none"> • CrCl 40-60mL/min: change frequency to Q36h • CrCl 20-40mL/min: change frequency to Q48h • CrCl <20mL/min: administer first dose then determine subsequent dose on serum • Hemodialysis: 1-1.5mg/kg/dose three times weekly after dialysis • Peritoneal dialysis: 1-3mg/kg/dose Q48-72h based on serum concentrations
<p>Meropenem</p>	<ul style="list-style-type: none"> • CrCl 25-50mL/min: 1g Q12h • CrCl 10-25mL/min: 500mg Q12h • CrCl <10mL/min: 500mg Q24h • Dialysis: 500mg Q24h
<p>Ceftazidime/avibactam</p>	<ul style="list-style-type: none"> • CrCl 30-50mL/min: 1.25g Q8h • CrCl 15-30mL/min: 0.94g Q12h • CrCl 5-15mL/min: 0.94g Q24h • CrCl <5mL/min: 0.94g Q48h
<p>Amoxicillin/Clavulanate</p>	<ul style="list-style-type: none"> • CrCl 10-30mL/min: 250-500mg Q12h • CrCl <10mL/min: 250-500mg Q12-24h • Dialysis: 250-500mg Q12h

Conclusion - Antibiotic Stewardship

Applying the McGeer Criteria for UTI surveillance in LTC settings ensures accurate diagnosis and appropriate treatment.

Implementing antibiotic stewardship programs in LTC facilities can lead to better outcomes:

- Reduce unnecessary antibiotic use
- Decrease the incidence of antibiotic-resistant organisms
- Minimize adverse drug events

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