



DCPHR

## Antibiotic use in nursing homes

*A summary of guideline recommendations for common indications*

**Background:** Antimicrobial stewardship is the effort to measure and improve how clinicians prescribe antibiotics and patients use them. Improving antibiotic prescribing and use is critical to effectively treat infections, protect patients from harms caused by unnecessary antibiotic use, and combat antibiotic resistance. Nursing homes are a focus area for antimicrobial stewardship due to high rates of antibiotic prescribing and multidrug resistant organisms. As many as 70% of nursing home residents receive antibiotics each year. As many as 75% of these antibiotics are prescribed incorrectly. High rates of antibiotic use increase the risk of adverse effects among all facility residents.<sup>1</sup> The Colorado Department of Public Health and Environment (CDPHE) supports antibiotic stewardship by providing resources and support for prescribers and members of nursing home care teams.

Centers for Disease Control and Prevention (CDC) provides a framework for antimicrobial stewardship with the [Core Elements of Antibiotic Stewardship for Nursing Homes](#). The “Action” and “Tracking” core elements include the development and monitoring of facility-specific treatment recommendations for common infections. CDPHE summarized nationally-recognized guidelines and recommendations that can be adapted to create facility-specific treatment guidelines. The tables below provide information for three common indications for antibiotics in nursing homes: urinary tract infection, community-acquired bacterial pneumonia, and skin and soft tissue infection. Facilities should evaluate each patient individually and use the right antibiotic, right dose, right time, and right duration. Considerations in antibiotic selection may include: antibiotic availability, clinical condition, comorbidities, cost, local resistance patterns and susceptibilities, potential drug-drug interactions, and resident allergies.<sup>2</sup>

**Scope:** This is a summary of existing published evidence-based guidance to assist outpatient nursing home antimicrobial stewardship programs to support goals of “right antibiotic,” “right dose,” and “right duration.” Refer to each reference for additional details. This summary is a tool and not a state treatment guideline. Guidance may not apply to all clinical scenarios.

The treating physician should use clinical judgment to prescribe appropriately.

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## Urinary tract infection

### Loeb minimum criteria for initiating antibiotics for urinary tract infection (UTI)<sup>4</sup>

Catheter presence	Criteria for initiating antibiotics
No chronic indwelling catheter	Acute dysuria alone OR
	Fever (>100° F [37.9° C] or 2.4° F [1.5° C] increase above baseline temperature) AND at least one of the following: <ul style="list-style-type: none"> <li>• Costovertebral angle (CVA) tenderness</li> <li>• Frequency</li> <li>• Gross hematuria</li> <li>• New or worsening urgency</li> <li>• Suprapubic pain</li> <li>• Urinary incontinence</li> </ul>
Chronic indwelling catheter (indwelling Foley catheter or suprapubic catheter)	At least one of the following: <ul style="list-style-type: none"> <li>• Fever (&gt;100° F [37.9° C] or 2.4° F [1.5° C] increase above baseline temperature)</li> </ul>

- New CVA tenderness
- New onset of delirium
- Rigors

### Guidelines summary for urinary tract infection<sup>2-3,5-7</sup>

UTI syndrome	Diagnostic findings	Treatment and duration	Note	Reference
Asymptomatic bacteriuria (ASB)	<p>≥100,000 CFU/mL of bacteria, no signs or symptoms localized to genitourinary tract</p>	No antibiotics	<p>Screening for and treatment of ASB is not recommended</p> <p>Prior to urologic procedure with mucosal trauma is exception-visit <a href="#">Ashraf</a> for details</p>	<p><a href="#">Ashraf MS, et al. JAMDA. 2020;21:12e24.</a></p> <p><a href="#">Hooten TM, et al. Clin Infect Dis. 2010;50(5):625-63.</a></p> <p><a href="#">Nicolle LE, et al. Clin Infect Dis. 2019;68(10):1611-1615.</a></p>
Simple cystitis	<p>≥100,000 CFU/mL of ≤ 2 species of bacteria or ≥100 CFU/mL of ≥ 1 species of bacteria in specimen by straight catheter</p> <p>Localized symptoms: acute dysuria, frequency, gross hematuria, new/worsening incontinence, suprapubic tenderness, urgency</p>	<p>Nitrofurantoin* x 5 days</p> <p>OR</p> <p>TMP-SMX† x 3 days</p> <p>OR</p> <p>beta-lactams (amox-clav, cefaclor, cefdinir, cephalexin, cefpodoxime) x 5 days</p> <p>OR</p> <p>fosfomycin x 1 dose</p> <p>OR</p> <p>fluoroquinolones (FQ) x 3 days</p>	<p>FQ use should be minimized, not considered first-line</p> <p>TMP-SMX only recommended if local resistance rates &lt; 20% (<a href="#">IDSA</a>)</p> <p>If high-risk for treatment failure, may require 7 days of treatment-visit <a href="#">Ashraf</a> for details</p> <p>Additional doses of fosfomycin required if duration &gt; 3 days</p>	<p><a href="#">Ashraf MS, et al. JAMDA. 2020;21:12e24.</a></p> <p><a href="#">Gupta K, et al. Clin Infect Dis. 2011;52(5):e103-20.</a></p> <p><a href="#">Jump RLP, et al. J Am Geriatr Soc. 2018;66(4):789-803.</a></p>

<p>Catheter-associated UTI (CAUTI)</p>	<p>≥100,000 CFU/mL of ≥ 1 species of bacteria</p> <p>Systemic symptoms such as fever, rigors, chills, new onset delirium with no identified cause or localized symptoms as above + suprapubic/CVA tenderness or acute pain/swelling/tenderness of testes, epididymis, or prostate</p>	<p>If symptoms resolve quickly, treat for 7 days; if delayed response, 10-14 days</p>	<p>If acute pain/swelling/tenderness, evaluate for prostatitis or epididymitis</p> <p>Most CAUTI will have &gt; 100,000 CFU/mL Replacement of catheter recommended if present ≥2 weeks due to biofilm Obtaining specimen through freshly inserted catheter provides more appropriate specimen (<a href="#">Jump</a>)</p>	<p><a href="#">Ashraf MS, et al. JAMDA. 2020;21:12e24.</a></p> <p><a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a></p> <p><a href="#">Nicolle LE, et al. Clin Infect Dis.2019;68(10):1611-1615.</a></p>
<p>Pyelonephritis</p>	<p>≥100,000 CFU/mL of ≤ 2 species of bacteria or ≥100 CFU/mL of ≥ 1 species of bacteria in specimen by straight catheter</p> <p>Systemic symptoms: CVA tenderness, fatigue/malaise, fever, nausea/vomiting, rigors/chills, suprapubic tenderness, local symptoms above</p>	<p>TMP-SMX x 14 days OR ciprofloxacin x 7 days OR levofloxacin 750 mg x 5 days (<a href="#">IDSA</a>) OR beta-lactams x 10-14 days (<a href="#">Ashraf</a>)</p> <p>Initial dose of IV agent such as 1g of ceftriaxone or an aminoglycoside could be considered (<a href="#">IDSA</a>)</p>	<p>If pelvic or perineal pain in men, evaluate for prostatitis</p> <p>Nitrofurantoin and fosfomycin are not recommended for pyelonephritis</p> <p>7-10 day course of TMP-SMX may be appropriate if rapid defervescence</p>	<p><a href="#">Ashraf MS, et al. JAMDA. 2020;21:12e24.</a></p> <p><a href="#">Gupta K, et al. Clin Infect Dis.2011;52(5):e103-20.</a></p>
<p>Prophylaxis</p>		<p>Local (vaginal) estrogen may reduce recurrent UTIs</p> <p>Due to potential harms of long-term antibiotic use and prevalence of multidrug-resistant</p>		<p><a href="#">Ashraf MS, et al. JAMDA. 2020;21:12e24.</a></p> <p><a href="#">Nicolle LE, et al. Clin Infect Dis.2019;68(10):1611-1615.</a></p>

		organisms among residents, long-term antibiotic prophylaxis is <u>not</u> recommended Antibiotic prophylaxis also <u>not</u> recommended in residents with short or long term catheters		
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CFU=colony-forming units, CVA=costovertebral angle, TMP-SMX=trimethoprim-sulfamethoxazole

\*Avoid nitrofurantoin if CrCl < 30 mL/min or for long-term suppression<sup>8</sup>

†Use alternative antibiotic if CrCl < 15 mL/min<sup>8</sup>

## Community-acquired bacterial pneumonia

Loeb minimum criteria for initiating antibiotics for lower respiratory tract infection<sup>4</sup>

Lower respiratory tract infection with or without symptom of fever	Criteria for initiating antibiotics
Temperature >102°F [38.9°C]	At least one of the following: <ul style="list-style-type: none"> <li>• Respiratory rate &gt; 25 breaths per minute</li> <li>• Productive cough</li> </ul>
Temperature >100°F [37.9°C] (or a 2.4°F [1.5°C] increase above baseline temperature), but ≤ 102°F [38.9°C]	Presence of a cough <b>and</b> at least one of the following: <ul style="list-style-type: none"> <li>• Delirium</li> <li>• Pulse &gt; 100 beats per minute</li> <li>• Respiratory rate &gt; 25 breaths per minute</li> <li>• Rigors</li> </ul>
Afebrile <b>and</b> without chronic obstructive pulmonary disease (COPD)	New cough with purulent sputum production <b>AND</b> at least one of the following: <ul style="list-style-type: none"> <li>• Delirium</li> <li>• Respiratory rate &gt; 25 breaths per minute</li> </ul>

COPD Exacerbation	Outside of scope of these recommendations. For recommendations, visit the <a href="#">GOLD Guidelines</a> .
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### Guidelines summary for community-acquired bacterial pneumonia<sup>7,9</sup>

Risk factors	Antibiotics	Duration	Note	Reference
No risk factors* for MRSA or <i>Pseudomonas aeruginosa</i> or chronic comorbidities <sup>†</sup>	Amoxicillin OR doxycycline	5 days	Macrolide monotherapy (i.e. azithromycin) not recommended due to local pneumococcal resistance > 25%	<a href="#">Metlay JP, et al. Am J Respir Crit Care Med. 2019;200(7):e45-e67.</a>  <a href="#">Jump RLP, et al. J Am Geriatr Soc. 2018 Apr;66(4):789-803.</a>
Chronic comorbidities <sup>†</sup>	Amoxicillin/clavulanate PLUS azithromycin or doxycycline  OR  Cefpodoxime PLUS azithromycin or doxycycline OR  Cefuroxime PLUS azithromycin or doxycycline  OR  Monotherapy with levofloxacin or moxifloxacin	5 days		<a href="#">Metlay JP, et al. Am J Respir Crit Care Med. 2019;200(7):e45-e67.</a>

Risk factors* for MRSA or <i>Pseudomonas aeruginosa</i>	Vancomycin or linezolid if concern for MRSA  Cefepime, ceftazidime, imipenem, meropenem, piperacillin-tazobactam, or aztreonam if concern for <i>Pseudomonas</i> .	5 days, 7 days if proven MRSA or <i>Pseudomonas aeruginosa</i>	Note: inpatient antibiotic regimens for severe bacterial pneumonia may differ  If risk factor of IV antibiotics in previous 90 days, recommend standard empiric therapy with microbiological testing for resistant pathogens  If prior respiratory isolation of MRSA or <i>Pseudomonas</i> , recommend empiric therapy with activity against prior organism	<a href="#">Metlay JP, et al. Am J Respir Crit Care Med. 2019 ;200(7):e45-e67.</a>
Aspiration pneumonia	Not recommended to routinely add anaerobic coverage for suspected aspiration pneumonia unless suspicion for lung abscess or empyema.			<a href="#">Metlay JP, et al. Am J Respir Crit Care Med. 2019 ;200(7):e45-e67.</a>

\*Risk factors=prior respiratory isolation of MRSA or *Pseudomonas aeruginosa* or recent hospitalization with receipt of intravenous antibiotics in previous 90 days

†Comorbidities=chronic heart, lung, liver, renal disease; alcoholism, asplenia, diabetes mellitus, or malignancy

## Skin and soft tissue infection

Loeb minimum criteria for initiating antibiotics for skin and soft tissue infection<sup>7</sup>

Criteria for initiating antibiotics

New or increasing purulent drainage at a wound, skin, or soft-tissue site

OR

At least two of the following:

- Fever (temperature > 100°F [37.9°C] or an increase of 2.4°F [1.5°C] above baseline temperatures taken at any site)
- New or increasing swelling at the affected site
- Redness
- Tenderness
- Warmth

#### Guidelines summary for select\* skin and soft tissue infections<sup>7,10</sup>

Type of skin and soft tissue infection	Description	Treatment	Duration	Reference
Non-purulent	Cellulitis, erysipelas Often caused by <i>Streptococcus</i> spp Consider additional coverage for MRSA if cellulitis associated with: penetrating trauma, concurrent MRSA infection or nasal colonization with MRSA, injection drug use, or if severe symptoms ( <a href="#">IDSA</a> )	See below	See below	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a> <a href="#">Stevens DL ,et al. Clin Infect Dis.2014;59(2):e10-52.</a>
	Mild: cellulitis/erysipelas without focus area of purulence or systemic signs of infection	Cephalexin or other cephalosporin, clindamycin, dicloxacillin, or penicillin	5 days <sup>†</sup>	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a> <a href="#">Stevens DL ,et al. Clin Infect Dis.2014;59(2):e10-52.</a>



	Moderate: cellulitis/erysipelas with systemic signs of infection	Cefazolin, clindamycin, ceftriaxone, or penicillin	5 days*	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a>  <a href="#">Stevens DL ,et al. Clin Infect Dis.2014;59(2):e10-52.</a>
	Severe: failed oral therapy, systemic signs of infection, immunocompromised, or deeper infection with hypotension or organ dysfunction	Vancomycin PLUS piperacillin-tazobactam, imipenem, or meropenem	5 days*	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a>  <a href="#">Stevens DL ,et al. Clin Infect Dis.2014;59(2):e10-52.</a>
Purulent	Furuncle, carbuncle, abscess Often caused by <i>Staphylococcus</i> spp Incision and drainage recommended for most infections.	See below	See below	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a>
	Mild: purulent infection without systemic signs of infection	Incision and drainage <b>without</b> antibiotics, antibiotics if fails incision and drainage	N/A	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a>  <a href="#">Stevens DL ,et al. Clin Infect Dis.2014;59(2):e10-52.</a>
	Moderate: purulent infection with systemic signs of infection	Incision and drainage with culture and susceptibility; TMP/SMX or doxycycline	Minimum of 5 days*	<a href="#">Jump RLP, et al. J Am Geriatr Soc.2018;66(4):789-803.</a>  <a href="#">Stevens DL ,et al. Clin Infect Dis.2014;59(2):e10-52.</a>

	Severe: failed incision and drainage with oral therapy, systemic signs of infection, immunocompromised, or deeper infection with hypotension or organ dysfunction	Emergent incision and drainage Vancomycin, linezolid, daptomycin, or ceftaroline	See reference	<a href="#">Jump RLP, et al. J Am Geriatr Soc. 2018;66(4):789-803.</a>  <a href="#">Stevens DL, et al. Clin Infect Dis. 2014;59(2):e10-52.</a>
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\*Additional information on infections such as impetigo, surgical site infections, necrotizing fasciitis, gangrene, bites, pyomyositis, recurrent cellulitis, and ectoparasites can be found in [Jump](#) and [IDSA](#) references

†Recommended duration of antibiotics is 5 days, though may be extended if infection has not improved<sup>10</sup>

## References

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