



The Core Elements of  
**Antibiotic Stewardship for Nursing Homes**  
APPENDIX A: Policy and Practice Actions to Improve Antibiotic Use



National Center for Emerging and Zoonotic Infectious Diseases  
Division of Healthcare Quality Promotion





## Appendix A: Policy and practice actions to improve antibiotic use

This document contains more detailed explanations of policy and practice actions which can be taken by nursing homes as part of their antibiotic stewardship activities.

### Antibiotic prescribing and use policies

#### **Documentation of dose, duration, and indication.**

Specify the dose (including route), duration (i.e., start date, end date, and planned days of therapy), and indication, which includes both rationale (i.e., prophylaxis vs. therapeutic) and treatment site (i.e., urinary tract, respiratory tract), for every course of antibiotics. This bundle of antibiotic prescribing elements should be documented for both nursing home-initiated antibiotic courses as well as courses continued in the nursing home which were initiated by a transferring facility or emergency department. Documenting and making this information accessible (e.g., verifying indication and planned duration is documented on transfer paperwork) helps ensure that antibiotics can be modified as needed based on additional laboratory and clinical data and/or discontinued in a timely manner.<sup>1</sup>

### **Establish best practices for use of microbiology testing.**

Inappropriate use of microbiology tests in nursing homes may drive unnecessary antibiotic treatment.<sup>2</sup> For example, submitting urine cultures or *C. difficile* stool tests to demonstrate “test of cure” following clinical resolution after an appropriate treatment course may uncover asymptomatic colonization and drive additional unnecessary antibiotic exposure. Review the current protocols and laboratory testing practices to ensure that laboratory tests are used correctly in your facility (e.g., your facility should not require one or more negative *C. difficile* stool studies following completion of therapy for *C. difficile* infection). Identifying and reducing inappropriate use of laboratory testing may be a high-yield effort for improving antibiotic use and reducing other management costs.

### **Develop facility-specific treatment recommendations.**

Facility-specific treatment recommendations, based on national guidelines<sup>3,4</sup> and local susceptibilities can optimize antibiotic selection and duration, particularly for common indications for antibiotic use like pneumonia, urinary tract infection, and skin and soft tissue infections.

### **Review the antibiotic agents available in the facility**

**including** an inventory of drugs accessible during off hours (e.g., emergency kit or overnight box) to ensure availability is not a barrier to use of preferred agents.

## **Broad interventions to improve antibiotic use**

### **Develop and implement algorithms for the assessment of residents**

suspected of having an infection using evidence-based guidance.<sup>4,5</sup>

### **Utilize a communication tool for residents suspected of having an infection.**

Since attending physicians, nurse practitioners and/or physician assistants are not always available on-site in nursing homes, a significant amount of management of nursing home residents is mediated via phone interactions. Clinical providers must rely on the assessment and information conveyed to them by the front-line nursing staff to make diagnostic and treatment decisions. Barriers to effective telephone interactions between physicians and nurses, such as inadequate preparation or feeling rushed on the phone,

likely impact the quality of information exchange.<sup>6</sup> Implementing structured communication tools to guide nursing-physician interactions (e.g., situation, background, assessment, recommendation, or SBAR protocol) may improve the quality of communication and the subsequent management process<sup>7,8</sup> when an infection is suspected. Communication tools used to facilitate information when a resident is suspected of having an infection should include key pieces of the clinical history including new symptoms and complaints, physical exam findings (e.g., vital signs, pulse oximetry, localizing pain, etc.) and other relevant information (e.g., previous antibiotic exposure, previous culture and susceptibility results, current medications, and medication allergy history). Forms used for this information exchange could not only include information about the resident from nursing staff, but also options for how the off-site provider may want to manage the resident based on the information provided (e.g., hydrate and monitor, send further diagnostic tests, initiate treatment). In addition, any tools or forms utilized to improve communication should become part of the resident's medical record to improve documentation of decision making.

**Develop and disseminate a facility-specific report of antibiotic susceptibility to clinical providers.** Nursing homes should work with consultant laboratories to create a facility-specific summary of antibiotic susceptibility patterns from the organisms commonly isolated in microbiology cultures. One example of a susceptibility summary is called an antibiogram. Antibiograms are tables developed by the microbiology laboratory showing the percent susceptibility for a panel of common bacteria tested against a panel of common antibiotics.<sup>9</sup> Nursing home laboratories may have to tailor the antibiogram based on the facility's diagnostic testing practices. For example, a nursing home antibiogram may only include organisms causing urinary tract infection if urine cultures are the most frequent test sent to the laboratory.<sup>10</sup> Antibiograms may be updated every 12 to 24 months, based on the number of cultures submitted by a facility. Summaries of susceptibility patterns should be disseminated to front-line nursing staff, clinical providers and consultant pharmacists as an educational tool and to guide management decisions.

**Perform antibiotic “time outs.”** Antibiotics are often started empirically in nursing home residents when the resident has a change in

physical or mental status while diagnostic information is being obtained. However, providers often do not revisit the selection of the antibiotic after more clinical and laboratory data (including culture results) become available.<sup>11,12</sup> An antibiotic “time out” is a formal process designed to prompt a reassessment of the ongoing need for and choice of an antibiotic once more data is available including: the clinical response, additional diagnostic information, and alternate explanations for the status change which prompted the antibiotic start. Nursing homes should have a process in place for a review of antibiotics by the clinical team two to three days after antibiotics are initiated to answer these key questions:

- Does this resident have a bacterial infection that will respond to antibiotics?
- If so, is the resident on the most appropriate antibiotic(s), dose, and route of administration?
- Can the spectrum of the antibiotic be narrowed or the duration of therapy shortened (i.e., de-escalation)?
- Would the resident benefit from additional infectious disease/antibiotic expertise to ensure optimal treatment of the suspected or confirmed infection?

**Reduce prolonged antibiotic treatment courses for common infections.** A large study of antibiotic prescribing practices in nursing homes demonstrated that over 50% of antibiotic treatment courses extended beyond a week with no correlation with resident characteristics or type of infection being treated.<sup>13</sup> Given the growing body of evidence that short courses of antibiotics are effective for common infections,<sup>14-16</sup> interventions designed to decrease antibiotic duration among nursing home residents may reduce the complications and adverse events associated with antibiotic exposure.

## Pharmacy interventions to improve antibiotic use

**Review of antibiotic prescriptions** as part of the drug regimen review (F-tag 428) for new medications is an existing practice for the

consultant pharmacist.<sup>17</sup> Elements of the antibiotic review should include dosing and administration data, to ensure prescribers are making appropriate adjustments for renal function and potential drug interactions. Consultant pharmacists can also review indication and justification of use to verify that antibiotics are used in accordance with facility-specific treatment guidelines.

**Establish standards on laboratory testing** to monitor for adverse drug events related to use of antibiotics and other high risk medications such as warfarin.<sup>18,19</sup>

**Review of microbiology culture results** by the consultant pharmacist can add an additional level of feedback to prescribing clinicians on initial antibiotic selection and subsequent modifications of therapy once data is available. Consultant pharmacists can be given a predefined set of criteria and/or guidance developed in collaboration with physician support<sup>20,21</sup> to help optimize antibiotic use.

## Infection specific interventions to improve antibiotic use

**Reduce antibiotic use in asymptomatic bacteriuria (ASB).** The prevalence of ASB, bacteriuria without localizing signs or symptoms of infection, ranges from 25% to 50% in non-catheterized nursing home residents and up to 100% among those with long-term urinary catheters.<sup>22</sup> Antibiotic use for treatment of ASB in nursing home residents does not confer any long-term benefits in preventing symptomatic urinary tract infections (UTI) or improving mortality, and may actually increase the incidence of adverse drug events and result in subsequent infections with antibiotic-resistant pathogens.<sup>23</sup> The unreliable clinical assessment for infections in nursing home residents coupled with the diagnostic uncertainties in differentiating ASB from infection contributes greatly to inappropriate antibiotic use and its related complications. Suspected UTIs account for 30% to 60% of antibiotic prescriptions in nursing homes.<sup>24</sup> Implementing a set of diagnostic testing and management algorithms to help providers differentiate ASB from symptomatic UTI has been shown to reduce inappropriate antibiotic use for ASB.<sup>25,26</sup>

### **Reduce antibiotic prophylaxis for prevention of UTI.**

Surveys of antibiotic use have shown that UTI prophylaxis accounts for a significant proportion of antibiotic prescriptions.<sup>27</sup> Very few studies support antibiotic use for UTI prophylaxis, especially in older adults, and many studies have shown this antibiotic exposure increases risk of side effects and resistant organisms.<sup>23</sup> Therefore, efforts to educate providers on the potential harm of antibiotics for UTI prophylaxis could reduce unnecessary antibiotic exposure and improve resident outcomes.

**Optimize management of nursing home-associated pneumonia.** Limited access to high-quality diagnostic testing makes the differentiation of viral and bacterial causes of lower respiratory tract infections very difficult in nursing home residents.<sup>28</sup> Implementation of algorithms for diagnosis and management of nursing home-associated pneumonia may be valuable in helping guide decision-making about use of antibiotics and need for hospital transfer.<sup>29-31</sup>

**Optimize use of superficial cultures for management of chronic wounds.** Although obtaining specimens for wound culture can help guide antimicrobial treatment, reliance on superficial swab cultures alone may drive inappropriate or unnecessary antibiotic use. Superficial wound swabs cannot differentiate bacterial colonization from infection and there may be a lack of correlation between organisms identified by superficial swab cultures compared with deep tissue cultures.<sup>32</sup> Reviewing the indications for obtaining cultures in residents with chronic wounds (e.g., presence of purulent drainage) and assessing the type of specimen submitted for culture (e.g., superficial swab vs. tissue specimen from debrided wound base) may identify opportunities for improving antibiotic use in residents with chronic wounds.<sup>33</sup>

# References

1. Centers for Disease Control and Prevention. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2014
2. Phillips CD, Adepoju O, Stone N Asymptomatic bacteriuria, antibiotic use, and suspected urinary tract infections in four nursing homes *BMC Geriatr.* 2012 Nov 23;12:73
3. Nicolle LE, Bentley D, Garibaldi R, et al. Antimicrobial use in long-term care facilities. *Infect Control Hosp Epidemiol* 2000; 21:537–45.
4. High K, Bradley SF, Gravenstein S et al. Clinical practice guideline for the evaluation of fever and infection in older adult residents of long term care facilities. *Clin Infect Dis.* 2009; 48: 149-171
5. Loeb M, Bentley DW, Bradley S, et al. Development of minimum criteria for the initiation of antibiotics in residents of long-term care facilities: Results of a consensus conference. *Infect Control Hosp Epidemiol* 2001; 22: 120-4.
6. Tjia J, Mazor KM, Field T, Meterko V, Spenard A, Gurwitz JH Nurse-physician communication in the long-term care setting: perceived barriers and impact on patient safety *J Patient Saf.* 2009;5(3):145-52
7. Ouslander JG, Bonner A, Herndon L, Shutes J. The interventions to reduce acute care transfers (INTERACT) quality improvement program: An overview for medical directors and primary care clinicians in long term care. *J Am Med Dir Assoc.* 2014;15(3):162-70
8. Renz SM, Boltz MP, Wagner LM, Capezuti EA, Lawrence TE. Examining the feasibility and utility of an SBAR protocol in long-term care. *Geriatr Nurs.* 2013;34(4):295-301
9. Furuno JP, Comer AC, Johnson JK, et al. Using antibiograms to improve antibiotic prescribing in skilled nursing facilities. *Infect Control Hosp Epidemiol.* 2014;35 (Suppl 3):S56-61.
10. Drinka P, Podzorski RP, Griffin V, Crnich CJ. Antibiogram of urinary isolates. *J Am Med Dir Assoc.* 2013;14(6):443
11. Katz PR, Beam TR Jr., Brand F, Boyce K. Antibiotic use in the nursing home: Physician practice patterns. *Arch Int Med.* 1990; 150: 1465-1468
12. Shirts BH, Perera S, Hanlon JT, et al. Provider management of and satisfaction with laboratory testing in the nursing home setting: Results of a national internet-based survey. *J Am Med Dir Assoc.* 2009;10: 161–166.
13. Daneman N, Gruneir A, Bronskill SE et al. Prolonged antibiotic treatment in long-term care: role of the prescriber. *JAMA Intern Med.* 2013; 173 (8): 673-682
14. Lutters M, Vogt-Ferrier NB. Antibiotic duration for treating uncomplicated, symptomatic lower urinary tract infections in elderly women. *Cochrane Database Syst Rev.* 2008;(3):CD001535.
15. Hepburn MJ, Dooley DP, Skidmore PJ, Ellis MW, Starnes WF, Hasewinkle WC. Comparison of short-course (5 days) and standard (10 days) treatment for uncomplicated cellulitis. *Arch Intern Med.* 2004;164(15):1669-1674.
16. El Moussaoui R, de Borgie CA, van den Broek P, et al. Effectiveness of discontinuing antibiotic treatment after three days versus eight days in mild to moderate severe community-acquired pneumonia: randomised, double blind study. *BMJ.*2006;332(7554):1355.



17. Centers for Medicare and Medicaid Services. Summary of Requirements for Drug Regimen Review- F428 State Operations Manual (SOM); Appendix PP; Rev 107, 04-04-2014 Pages 539 – 548: [https://cms.gov/manuals/Downloads/som107ap\\_pp\\_guidelines\\_itcf.pdf](https://cms.gov/manuals/Downloads/som107ap_pp_guidelines_itcf.pdf) Accessed 9/30/2014.
18. Baillargeon J1, Holmes HM, Lin YL. Concurrent use of warfarin and antibiotics and the risk of bleeding in older adults. *Am J Med.* 2012 Feb;125(2):183-9
19. Hines LE, Murphy JE. Potentially harmful drug-drug interactions in the elderly: a review. *Am J Geriatr Pharmacother.* 2011; 9(6): 364-377
20. Faulks JT, Drinka P, Gauerke C, Miller J. Pharmacy review of culture and sensitivity with prompting of physicians to reduce antibiotic pressure. *J Am Geriatr Soc.* 2001 Sep;49(9):1259-60
21. Gugkaeva Z, Franson M. Pharmacist-led model of antibiotic stewardship in a long-term care facility. *Annals of Long Term Care.* 2012; 20(10). <http://www.annalsoflongtermcare.com/article/pharmacist-led-model-antibiotic-stewardship-long-term-care-facility> Accessed 12/30/2014.
22. Nicolle LE. Urinary tract infections in long-term-care facilities. *Infect Control Hosp Epidemiol* 2001; 22:167–75.
23. Nicolle LE. Asymptomatic bacteriuria: Review and discussion of the IDSA guidelines *Int J Antimicrob Agents* 2006; 28S:S42–S48.
24. Benoit SR, Nsa W, Richards CL et al. Factors associated with antimicrobial use in nursing homes: A multilevel model. *J Am Geriatr Soc.* 2008; 56:2039–2044
25. Loeb M, Brazil K, Lohfeld L, et al. Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infections in residents of nursing homes: cluster randomised controlled trial. *British Med J* 2005; 331: 669
26. Zarbarsky TF, Sethi AK, Donskey CJ. Sustained reduction in inappropriate treatment of asymptomatic bacteriuria in a long-term care facility through an educational intervention. *Am J Infect Contr* 2008; 36: 476-480
27. Latour K, Catry B, Broex E et al. Indications for antimicrobial prescribing in European nursing homes: results from a point prevalence survey. *Pharmacoepidem and drug safety.* 2012; 21: 937–944
28. Mubareka S, Duckworth H, Cheang M, et al. Use of diagnostic tests for presumed lower respiratory tract infection in long-term care facilities. *J Am Geriatr Soc.* 2007; 55:1365–1370
29. Carusone SC, Loeb M, Lohfeld L. A clinical pathway for treating pneumonia in the nursing home: part I: the nursing perspective. *J Am Med Dir Assoc.* 2006;7(5):271-8.
30. Carusone SC, Loeb M, Lohfeld L. A clinical pathway for treating pneumonia in the nursing home: part II: the administrators' perspective and how it differs from nurses' views. *J Am Med Dir Assoc.* 2006;7(5):279-286.
31. Loeb M, Carusone SC, Goeree R et al. Effect of a clinical pathway to reduce hospitalizations in nursing home residents with pneumonia: a randomized controlled trial. *JAMA.* 2006;295(21):2503-10
32. Mutluoglu M, Uzun G, Turhan V et al. How reliable are cultures of specimens from superficial swabs compared with those of deep tissue in patients with diabetic foot ulcers? *J Diabetes Comp.* 2012; 26: 225-229
33. Drinka P, Bonham P, Crnich CJ. Swab culture of purulent skin infection to detect infection or colonization with antibiotic-resistant bacteria. *J Am Med Dir Assoc.* 2012; 13: 75-79