

## Diagnosis

- Most respiratory tract infections are caused by viruses, not bacteria, and do not require antibiotic therapy.<sup>1-3</sup>
- Common infectious syndromes caused by respiratory viruses include:
  - Common cold<sup>3</sup>
  - Uncomplicated sinus infections with symptoms present for <2 weeks<sup>4-5</sup>
  - Acute bronchitis (approximately 90% caused by viruses)<sup>6</sup>
  - Exacerbations of chronic obstructive pulmonary disease (approximately 50% caused by viruses)<sup>7-8</sup>
- Common respiratory viruses that affect long-term care residents include influenza, SARs-CoV-2, rhinovirus, parainfluenza, human metapneumovirus, and respiratory syncytial virus (RSV)<sup>3</sup>

## Signs and Symptoms of Viral Respiratory Infections

Respiratory virus infections typically present with several of the following symptoms:

- Fever<sup>9</sup>
  - Criteria for fever in older adults: any temperature >100°F, repeated temperatures >99°F or >2°F above resident's baseline
- Headache<sup>1</sup>
- Nasal congestion<sup>1</sup>
- Shortness of breath<sup>1</sup>
- Cough (dry or productive)<sup>1</sup>
- Wheezing<sup>1</sup>

In addition to the above, the following may indicate COVID-19\* infection in the long-term care population:<sup>10-13</sup>

- Temperature ≥ 99.0°F
- Loss of taste or smell
- Diarrhea
- Acute mental status change

\*COVID-19, caused by SARS-CoV-2, is a rapidly evolving situation. The information included here reflects the current state of understanding as of May 5, 2021. For ongoing updates, see <https://www.cdc.gov/coronavirus/2019-ncov/index.html>

## Workup for Suspected Viral Respiratory Tract Infection

- Test for influenza (particularly during peak influenza season October–March) and SARS-CoV-2 or can send a respiratory virus panel if available<sup>11,14-17</sup>,
- For individuals with severe illness or clinical deterioration, consider:
  - CBC to evaluate for leukocytosis (high white blood cell count suggests bacterial pneumonia)<sup>18</sup>
  - Pulse oximetry<sup>19,20</sup>
  - Chest x ray<sup>21,22</sup>
    - Viruses can involve the lower respiratory tract and lead to changes on chest x ray
      - Most often the findings are bilateral interstitial changes or ground-glass opacities
    - Bacterial pneumonia is more commonly associated with lobar consolidations

## Treatment for Viral Respiratory Tract Infections

- Supportive care: cough suppressants, fluids, supplemental oxygen, nebulizer treatments, chest physical therapy, encourage smoking cessation.<sup>1</sup>
- If a resident is diagnosed with influenza, start antiviral treatment and screen other residents for symptoms of influenza-like illness.<sup>23</sup>
- If consistent with goals of care, transfer the resident to an acute-care facility if the resident appears clinically unstable (e.g., unable to maintain O<sub>2</sub> saturation, hypotension, tachycardia)<sup>20</sup>

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## Diagnosis

- Case definition:  $\geq 3$  unformed stools in a 24-hour period without an alternative explanation and a positive stool test for *C. difficile*.<sup>1</sup>
- Clinical spectrum of infection ranges from watery diarrhea with lower abdominal pain, cramping, and nausea (with or without low-grade fevers and leukocytosis) to severe or fulminant colitis.<sup>2,3</sup>
- Up to 50 percent of nursing home residents are colonized with *C. difficile* but are not actively infected.<sup>2,4</sup>
- Consider pre-emptive contact precautions while waiting for the results of *C. difficile* test results.<sup>1</sup>
- *C. difficile* testing recommendations<sup>1</sup>
  - Do not test formed stool samples.
  - Confirm the resident has not received a laxative in the previous 48 hours.
  - Confirm that the resident has not recently started or changed enteral nutrition (tube feeds).
  - Do not repeat testing within 7 days.
  - Do not perform tests of cure.

## Treatment

- Residents with positive CDI tests who do not have symptoms of CDI should not be treated for CDI.<sup>2,5</sup>
- **Transfer residents with severe or fulminant CDI to an acute care setting.**<sup>1,6</sup>
  - Severe CDI: WBC  $\geq 15,000$  cells/mL OR acute increase in serum creatinine to  $\geq 1.5$  mg/dL OR acute kidney injury associated with CDI.
  - Individuals with severe disease may have ileus without stool output; they generally have colitis identified on imaging, abdominal pain/distention, and systemic illness.
  - Fulminant CDI: hypotension or shock, intestinal perforation, toxic megacolon.
- **Nonsevere CDI**
  - Oral vancomycin (125 mg orally [PO] 4 times a day) or fidaxomicin (200 mg PO 2 times a day) for 10 days.
  - If access to oral vancomycin or fidaxomicin is limited, consider oral metronidazole (500 mg PO 3 times a day) for 10 days.<sup>1</sup>
  - Discontinue antibiotics not needed for CDI treatment whenever possible.<sup>1</sup>
  - If antibiotic therapy is still needed, select the narrowest agent possible and avoid agents with a strong association with CDI (i.e., fluoroquinolones, clindamycin, and third- and fourth-generation cephalosporins).<sup>7</sup>
  - Discontinue gastric-acid suppression medications whenever possible.<sup>2,8</sup>
  - Avoid antimotility agents.<sup>1,9,10</sup>
- **Recurrent CDI**
  - About 25 percent of people have recurrent CDI. Recurrent disease may be nonsevere, severe, or fulminant. The risk of recurrence increases with age.<sup>1,2,11,12</sup>
  - Avoiding systemic antibiotics is the best way to prevent recurrent CDI.<sup>1</sup>
  - Loose or soft stool may persist for weeks to months following treatment for CDI.<sup>13,14</sup>
  - For residents who meet the case definition ( $\geq 3$  unformed stools in a 24-hour period without an alternative explanation), retest to confirm the diagnosis.<sup>1</sup>
  - If metronidazole was used for the initial episode, consider oral vancomycin (125 mg PO 4 times a day).
  - If oral vancomycin was used for the initial episode, consider fidaxomicin (200 mg PO 2 times a day) for 10 days OR tapered oral vancomycin (125 mg PO 4 times a day for 10–14 days, 2 times per day for 7 days, 1 time per day for 7 days, every 2–3 days for 2–8 weeks).

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## Diagnosis

- Influenza should be suspected during influenza season (October–March) in nursing home residents with typical symptoms: sudden onset of fever, headache, sore throat, cough, myalgias, rhinorrhea.<sup>1-3</sup>
- Influenza testing should occur for residents with recent onset of signs and symptoms suggestive of influenza or acute respiratory illness, even if it's not influenza season.<sup>4</sup>
  - Once a laboratory-confirmed case of influenza has been identified in a resident, it is likely that there are additional cases in the nursing home.
    - Active influenza surveillance should occur until at least 1 week after the last influenza case has been identified.
    - Local public health and State health departments should be notified of every suspected or confirmed influenza outbreak in long-term care facilities.

**Note: Infection with SARS CoV-2 should be considered in the differential for a resident with respiratory symptoms who is suspected of having influenza, and consideration should be given to appropriate isolation and testing for SARS CoV-2.**<sup>5,6</sup>

## Treatment

- All long-term care facility residents who have confirmed or suspected influenza should receive antiviral treatment immediately.<sup>3,4</sup>
- Antivirals are most effective if started  $\leq 48$  hours after symptom onset.<sup>3,4</sup>
- Antivirals may be started up to 96 hours after symptom onset and still reduce illness severity.<sup>7</sup>
- All nonsymptomatic residents on the unit should start oseltamivir promptly for a minimum of 2 weeks for chemoprophylaxis, regardless of whether they have received influenza vaccination.<sup>4,5</sup>
- Antivirals need to be dosed according to the resident's renal function. See the table below for suggested dosing.<sup>4,8</sup>

Indication	Usual Dose	Adjusted Dose	
Treatment	75mg twice daily x 5 days	CrCl 31-60	30mg twice daily
		CrCl 10-30	30mg once daily
		Dialysis	30mg after dialysis on dialysis days
Chemo-prophylaxis	75mg once daily for 2 weeks or 7 days after last known case whichever is longer	CrCl 31-60	30mg once daily
		CrCl 10-30	30mg every other day
		Dialysis	30mg after every other dialysis

CrCl = creatinine clearance

## Prevention

- Influenza vaccination should be provided annually to all residents and health care personnel of long-term care facilities, ideally by the end of October.<sup>4,9</sup>
- Standard and droplet precautions should be initiated for all residents with suspected or confirmed influenza.<sup>4</sup>

## References

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# AHRQ Safety Program for Improving Antibiotic Use



## Implementation Guide for the Toolkit To Improve Antibiotic Use in Long-Term Care

### Introduction

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Developing an antibiotic stewardship program (ASP) or improving an existing ASP can take time. If you are starting a stewardship program or growing a nascent program, the resources provided in the AHRQ Safety Program toolkit are intended to be introduced and implemented over several months. If you have an existing ASP, you should assess what elements of the toolkit will improve your program. Regardless of the stage of your ASP, you should begin by reviewing all elements of the toolkit, as described below. Implementation of the AHRQ Safety Program for Improving Antibiotic Use can help long-term care facilities address the Centers for Disease Control and Prevention's [Core Elements of Antibiotic Stewardship for Nursing Homes](#).

A comprehensive [timeline](#) on the AHRQ Safety program Toolkit Web site describes the toolkit, lists associated supporting materials for each presentation, and lists recommended activities for the stewardship team and frontline providers. The timeline was created to guide facilities that wish to follow this program in a step-by-step approach, from developing the stewardship program to sustaining it. Some facilities may be at different stages in the development of the stewardship program, so we encourage you to tailor the use of this timeline to meet your facility's specific needs.

### Develop and Improve Your Stewardship Program

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We recommend starting with the introductory presentations in the section “Developing your Stewardship Program.” These presentations are directed at ASP leaders and cover the concept of using both technical and adaptive approaches to form stewardship interventions as well as methods to collect data and track your progress. The following presentations will walk you through how to identify and develop your ASP team and engage senior executives for support. Each presentation throughout the toolkit includes both a slide set and a script, referred to in the toolkit as a facilitator guide.

- “[Developing an Antibiotic Stewardship Program](#)” introduces general principles of antibiotic stewardship. The presentation also describes antibiotic stewardship team members and interventions that are relevant to long-term care settings, including ways to measure and share outcomes of stewardship interventions.
- “[Tracking and Measuring Antibiotic Use](#)” includes an introduction to a comprehensive data collection form and a link to the form, which will help track antibiotic use as well as orders for urine cultures and *Clostridioides difficile*–positive LabID events. LabID events are defined on this CDC site: <https://www.cdc.gov/nhsn/faqs/faq-mdro-cdi.html>. The ASP can use this information to monitor outcomes from its interventions.



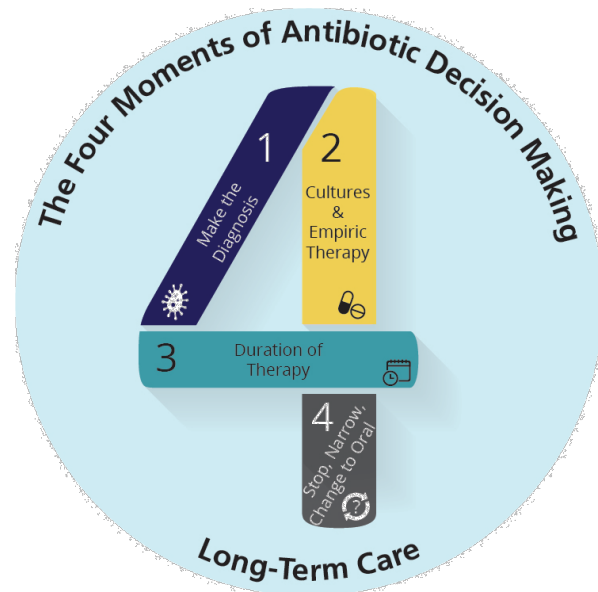
- The goal of the presentation “[Appropriate Collection of Microbiological Specimens](#)” is to help frontline staff collect high-quality samples for microbiological cultures, which will lead to better decisions about antibiotic prescriptions for residents.

The presentations on developing an ASP and the [gap analysis tool](#) can be used to determine what areas of your stewardship program may benefit from improvement. If, after completing the gap analysis, you note major deficiencies in your ASP, particularly those that might lead to noncompliance with new Centers for Medicare & Medicaid Services (CMS) guidelines, you should meet with your administrative leadership to determine how to manage the deficiencies. A management plan may include developing a business case for additional physician or pharmacist resources or gaining access to data analysis resources.

A signable [Commitment Poster](#) indicating to your residents, their friends and family, and staff that your facility is dedicated to using antibiotics judiciously is available. Sign and post the Commitment Poster in public areas so it is clear your facility is committed to prescribing antibiotic use judiciously.

### Four Moments of Antibiotic Decision Making Framework

Next, review the Four Moments of Antibiotic Decision Making framework and determine how to present it to frontline staff at your facility. This framework identifies the critical time periods of antibiotic decision making throughout a course of antibiotics. It is intended to be disseminated to all frontline staff to help ensure that staff are using a similar, rational thought process when deciding whether antibiotics are needed and, if so, what the most appropriate regimen is. Even if you have a robust ASP, consider taking the additional step of introducing the Four Moments framework so that frontline staff, residents, and even family members can be active participants in the process of improving antibiotic prescribing.



Several actions can be taken to integrate the Four Moments into regular practice:

- Local guidelines should be developed using the Four Moments framework. Thus, guidelines should use appropriate diagnostic criteria to determine if a patient has an infection, cite common causative organisms and cultures that should be obtained, and give recommendations for empiric therapy, duration of therapy, and narrowing or stopping therapy.
- Posters and pocket cards are available in this section that can be reproduced for posting on units and distributing to staff to remind them of the Four Moments. These also can be used as content for screen savers on facility computers. There are also mock dialogues for discussion

with residents and family members when they are concerned for infection using the Four Moments, and sharing with staff is encouraged.

- Direct interactions by the ASP with nursing staff and health care practitioners to assist them in (1) understanding the purpose of the Four Moments and (2) determining how they will be operationalized on a daily basis, such as during a morning meeting. The ASP is encouraged to meet with frontline teams and providers to review some portion of patients receiving antibiotics; this review can be guided by use of the Team Antibiotic Review Form.

## **Develop a Culture of Safety Around Antibiotic Prescribing**

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Next, as you focus on setting up or revitalizing your ASP, it is important to work on changing the culture of antibiotic prescribing at your facility. Under the [Create a Culture of Safety Around Antibiotic Prescribing](#) section, several presentations can help you achieve this goal. Institutional behavior change can be challenging, and ASPs and frontline providers may be inclined to skip the step of addressing cultural and behavioral issues (adaptive learning) associated with antibiotic prescribing. However, we strongly recommend that the ASP team view these presentations in order to engage frontline providers to optimize antibiotic prescribing and improve communication as a team. Below is a summary of these presentations.

- [Improving Antibiotic Use Is a Patient Safety Issue](#) provides a general overview of why improving antibiotic use is important from a patient safety perspective. ASP team members should use slides from this presentation to demonstrate to leadership and frontline clinicians the potential harms associated with antibiotic use and why all individuals should work together to use antibiotics in the best possible way.
  - The [Staff Safety Assessment](#) form can be used at meetings or left on units for frontline providers to complete when they identify a potential antibiotic-associated adverse event or other problems associated with antibiotic prescribing
  - The [Intervention Worksheet](#) and the [Checkpoint Tool](#) help you identify potential interventions based on patient safety needs and track the progress of these interventions.
- [Improving Teamwork and Communication](#) addresses common pitfalls in how we communicate medical information to each other and approaches to improve communication and teamwork in antibiotic prescription decisions. It includes a case-based discussion on use of the SBAR (Situation, Background, Assessment, Recommendation) form and other methods to improve communication between the healthcare team.
- [Identifying Targets To Improve Antibiotic Use](#) addresses identifying technical versus behavioral (also known as adaptive) problems leading to antibiotic-associated adverse events as well as first- and second-order problem-solving approaches. The ASP and frontline providers are encouraged to characterize all antibiotic prescribing problems as technical, adaptive, or both, and craft solutions based on that information through multidisciplinary teams.

- [Changing the System To Improve Patient Safety](#) provides a specific framework for developing and implementing solutions to problems that lead to antibiotic-associated harm. Two forms are provided to assist with these discussions between ASPs and frontline staff:
  - The [Learning From Antibiotic-Associated Adverse Events](#) form is similar to a root cause analysis form and can be completed during structured meetings to guide strategies to prevent future antibiotic-associated adverse events.

## **Learn Best Practices for the Diagnosis and Treatment of Infectious Syndromes**

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Next, review the material under the [Learn Best Practices for Common Infectious Syndromes](#) section. Each syndrome is associated with a presentation and support materials that are listed at the end of the presentation. The specific infectious diseases topics addressed are case based and focused on common scenarios in the long-term care setting. They cover: how to collect cultures, assessment and management of the resident with a suspected urinary tract infection, and assessment of and management of the resident with a suspected respiratory tract infection (including community-acquired pneumonia, aspiration events, and chronic obstructive pulmonary disease exacerbations). Narrated presentations are paired with some presentations—these prerecorded files contain the same information as the similarly titled presentations and may be more easily absorbed by individual learners. Additional narrated presentations are also available that cover assessing the resident with a suspected skin and soft tissue infection and approaching the patient with a penicillin allergy.

The ASP should determine how to present the material to frontline providers over time. Each of the above topics includes presentation slides as well as a facilitator guide. Suggestions for presenting the material include:

- Standing monthly meetings and conferences with frontline staff to review topic-specific presentations, identify high-yield topics for the facility, and develop and implement relevant guidelines with feedback from frontline staff.
- Distribution of the supporting materials so that they are available at the point of care (e.g., local Web site, common workstations, break rooms).
- Regular followup from the ASP with frontline staff both through routine post-prescription review and feedback and through use of the Team Antibiotic Review Form during scheduled in-person meetings. ASPs may also consider encouraging the frontline teams to review the presentations themselves.
- Incorporation of training presentations or narrated presentations into staff onboarding or orientation materials, or a yearly infection prevention and antibiotic resistance day.

ASPs may consider focusing on a specific syndrome every few months. During that period, the activities of the ASP would include developing or updating guidelines on the syndrome, disseminating information about the syndrome, focusing its daily interventions (e.g., post-prescription review and feedback and use of the Team Antibiotic Review Form) on patients with the syndrome, and collecting data and providing feedback to clinicians managing these syndromes.

Ultimately, local guidelines for all of the covered topics as well as other topics identified by the ASP and frontline staff should be developed and made available at the point of care.

## **Solidify Communication Between Caregivers and Sustain Stewardship Efforts**

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At the completion of the technical topics, we have included three final presentations that address communication and another presentation that has recommendations to help ensure that stewardship efforts are sustained long term.

- [Communicating Infectious Concerns With Antibiotic Prescribers](#) provides the framework for constructive discussions between the health care team to guide antibiotic decision making and prevent resident harm. This information is also available as a prerecorded narrated presentation.
- [Discussing Infectious Concerns About Residents With Family Members and Caregivers](#) guides some difficult conversations in counseling family members regarding potential infections as well as end-of-life care. This information is also available as a prerecorded narrated presentation.
- The [Talking With Family Members About Antibiotics](#) poster provides mock dialogues for the discussion around common syndromes in the long-term care setting to frame an effective conversation and educate family about the risk of antibiotics.
- [Sustaining Your Antibiotic Stewardship Program](#) provides recommendations and tools to continue your stewardship efforts, track your progress, share successes, and garner support for continuing your program. Several supporting materials are available to help you meet your stewardship goals, including the [Guide to Sustainability Planning](#). More supporting materials are listed in a checklist on the last slide of each presentation.

## **Conclusion**

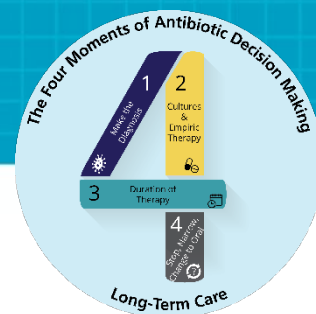
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The Toolkit for Improving Antibiotic Use in Long-Term Care provides a pathway for ASPs to develop and improve their stewardship programs. ASPs are encouraged to consider how all elements of the toolkit can be applied at their facilities to improve antibiotic use and enhance the safety of residents receiving antibiotics.





# AHRQ Safety Program for Improving Antibiotic Use



## Four Moments of Antibiotic Decision Making Form

The purpose of this form is to help your team incorporate the Four Moments of Antibiotic Decision Making into daily practice at your facility. It may also help identify opportunities to make changes that improve systems around antibiotic use. Please use the Completion Guide for the Four Moments of Antibiotic Decision Making Form to guide you through filling out this form.

**DIRECTIONS:** Use this form when a complete blood count (CBC), urinalysis/urine culture, or antibiotic is ordered for a resident in your facility. Review cases in real time or at a scheduled time once or twice each week with a goal of reviewing 5–10 cases a month.

### MOMENT 1

#### DOES MY PATIENT HAVE AN INFECTION THAT REQUIRES ANTIBIOTICS?

1. Does the resident have signs or symptoms suggestive of an infection? ☐ Yes ☐ No

2. What are the signs/symptoms? (Check all that apply)

- |  |   |
|--|---|
| <input type="checkbox"/> Fever                         | <input type="checkbox"/> Wound with gross pus or drainage |
| <input type="checkbox"/> Increased oxygen requirements | <input type="checkbox"/> Red, hot, or swollen skin        |
| <input type="checkbox"/> Increased respiratory rate    | <input type="checkbox"/> Confusion                        |
| <input type="checkbox"/> Cough                         | <input type="checkbox"/> Sleepiness                       |
| <input type="checkbox"/> Painful urination             | <input type="checkbox"/> Diarrhea                         |
| <input type="checkbox"/> New/worse incontinence        | <input type="checkbox"/> Lack of cooperation with staff   |

3. Were supportive measures attempted? ☐ Yes ☐ No

4. What were they?

- |  |  |
|--|--|
| <input type="checkbox"/> Pain medications  | <input type="checkbox"/> Wound care          |
| <input type="checkbox"/> Reassurance       | <input type="checkbox"/> Nebulizer treatment |
| <input type="checkbox"/> Medication review | <input type="checkbox"/> Other _____         |
| <input type="checkbox"/> Oral hydration    |  |



## MOMENT 2

HAVE I ORDERED APPROPRIATE CULTURES BEFORE STARTING ANTIBIOTICS?  
WHAT EMPIRIC THERAPY SHOULD I INITIATE?

5. Were antibiotics started? ☐ Yes ☐ No

(If YES, keep going.) (If NO, skip to question 11.)

6. What is the role of the prescriber?

- ☐ Hospital provider
- ☐ Long-term care provider
- ☐ Emergency department provider
- ☐ Specialist not at hospital or emergency department (i.e., output clinic provider)
- ☐ Other \_\_\_\_\_

7. Antibiotic regimen and indication:

Antibiotic: \_\_\_\_\_

Indication: \_\_\_\_\_

8. Were appropriate cultures ordered before antibiotics were started? ☐ Yes ☐ No

## MOMENT 3

WHAT DURATION OF ANTIBIOTIC THERAPY IS NEEDED FOR RESIDENT'S DIAGNOSIS?

9. Has a planned duration been documented in the medical record? ☐ Yes ☐ No

(If YES, keep going.) (If NO, skip to question 11.)

10. Is the planned duration consistent with local guidelines?

(See general recommendations for treatment durations below.)

DISEASE PROCESS	DURATION OF THERAPY
Uncomplicated cystitis	3–5 days, depending on antibiotic
Complicated urinary tract infection/ pyelonephritis	7–14 days, depending on response to therapy
Lower respiratory tract infection	5–7 days
Skin and soft tissue infections	5 days

QUESTIONS 11–14 SHOULD BE ANSWERED FOR PATIENTS ON ANTIBIOTICS > 24 HOURS, IN ADDITION TO QUESTIONS ON THE LAST PAGES.

## MOMENT 4

A DAY OR MORE HAS PASSED. CAN WE STOP ANTIBIOTICS? CAN WE NARROW THERAPY?

- |   |                           |                          |
|---|---------------------------|--------------------------|
| 11. Are antibiotics still needed?   | <input type="radio"/> Yes | <input type="radio"/> No |
| 12. If antibiotics are not needed, will you stop them today?                  | <input type="radio"/> Yes | <input type="radio"/> No |
| 13. If antibiotics are still needed, can you narrow therapy?                  | <input type="radio"/> Yes | <input type="radio"/> No |
| 14. If antibiotics are still needed, can you switch from intravenous to oral? | <input type="radio"/> Yes | <input type="radio"/> No |

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# Chronic Obstructive Pulmonary Disease (COPD)

## Exacerbations



### Diagnosis

- A COPD exacerbation should be considered in a resident with a known history of COPD and increased cough, shortness of breath, or sputum production from baseline.<sup>1-3</sup>
- COPD exacerbations are commonly triggered by respiratory virus infections (e.g., rhinovirus, influenza, COVID-19) and testing for these should be considered.<sup>4</sup>
  - Even if it's not influenza season, test residents who are symptomatic for influenza, especially if two or more develop symptoms within 72 hours of each other.<sup>5</sup>
- Distinguishing COPD exacerbations and community-acquired pneumonia in a resident with a known history of COPD can be challenging.<sup>1,6,7</sup>
  - If a chest x-ray does not show a new infiltrate, a COPD exacerbation is more likely.
- When bacteria are involved with COPD exacerbation, the most common are *Haemophilus influenzae*, *Moraxella catarrhalis*, and *Streptococcus pneumoniae*.<sup>8,9</sup>
- *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and other Gram-negative bacteria are less commonly associated with COPD exacerbations and are usually limited to residents with COPD who have had extensive antibiotic exposure. Sputum culture should be obtained for residents with this risk factor.<sup>1,8,9</sup>

### Treatment

- In addition to standard treatment modalities (e.g., bronchodilators, anti-inflammatory agents, anticholinergics), antibiotics are generally recommended in patients with new sputum purulence plus either worsened shortness of breath or increased sputum production.<sup>1-3</sup>
- Known adverse events associated with antibiotics should be carefully weighed against the potentially marginal benefits that antibiotics provide prior to prescribing antibiotics to residents with mild COPD exacerbations.<sup>2</sup>
- Empiric treatment<sup>1,2</sup>
  - Azithromycin 500 mg orally once daily for 3 days or doxycycline 100 mg orally twice a day for 5 days<sup>10-17</sup>
    - Azithromycin has a long half-life; 3 days provides coverage for ~ 1 week.<sup>18</sup>
    - Azithromycin and doxycycline are less likely to cause *Clostridioides difficile* infection compared to alternate options<sup>19-21</sup>
  - If a resident recently received azithromycin or doxycycline, or is taking azithromycin prophylaxis, alternate options include amoxicillin/clavulanate or oral second and third generation cephalosporins<sup>22</sup>
  - Fluoroquinolones are discouraged unless the resident has a known history of infection due to organisms resistant to standard therapy.<sup>22</sup>
- Prophylactic antibiotics for individuals with recurrent COPD exacerbations (at least two per year) may result in a modest decrease in the frequency of future exacerbations.<sup>1,23</sup>
  - Prophylaxis should only be considered for residents who are already receiving maximized non-antimicrobial treatment
  - The decision to initiate prophylaxis should be made on a case-by-case basis taking into account frequency of exacerbations, resident preferences, potential risk factors, financial constraints, and input from the resident's pulmonologist and/or primary care practitioner.
- Recommended prophylactic regimens are azithromycin 250 mg orally daily or 500 mg three times a week.<sup>1,23,24</sup>
  - Azithromycin use has been associated with QTc prolongation
  - If Azithromycin prophylaxis is being considered, a baseline electrocardiogram should be obtained and additional QTc prolonging agents should be avoided whenever possible.

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# Collection of Microbiological Cultures

Only collect bacterial cultures in symptomatic patients

## Urine Cultures

Symptom-Free Pee → Let It Be!

### Residents without a catheter

- Midstream clean catch is preferred method
  - Always clean urethral meatus prior to collection
  - Consider collecting urine after the resident has taken a bath
- In-and-out catheterization if unable to obtain midstream specimen
  - This requires sterile technique and should be performed by a registered nurse
  - Alternative to in-and-out catheterization for men: place and obtain specimen from newly placed condom catheter

### Residents with a catheter

- Change urinary catheter prior to collecting sample if catheter has been in place for more than 2 weeks or an unknown period
- To obtain a urine sample from a clean, newly placed urinary catheter, follow these steps:
  1. Wash your hands and put on new sterile gloves before obtaining your specimen.
  2. If no urine is in the tube, clamp the tube for 15–30 minutes prior to procedure.
  3. Clean the collecting port with an alcohol wipe prior to access.
  4. Insert a 10cc syringe at an angle into the port. Draw back 3–5 ml.
  5. Insert specimen into sterile container.
  6. Date, label, and time the specimen. Transfer to lab or refrigerator **within 15 minutes**.

## Respiratory Cultures

### When to collect a specimen

- Only if pneumonia is suspected—not for chronic obstructive pulmonary disease (COPD), bronchitis, or upper respiratory tract infections
- Prior to antibiotic administration

NOTE: A positive specimen does not necessarily mean that the organism is causing an infection. Many organisms are naturally present in the oral flora, and clinical context must be considered.

### How to collect a specimen

1. Wash hands and use new gloves.
2. Obtain an early morning specimen.
3. Ask the resident to rinse his/her mouth out with water before collection and tell the resident you need phlegm from deep in his/her lungs.
4. Collect specimen in a sterile container.
5. Transfer to the lab or the refrigerator **within 15 minutes**.

## References

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CDC Specimen Collection Guidelines.

<https://www.cdc.gov/urdo/downloads/SpecCollectionGuidelines.pdf>.

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## Diagnosis

Pneumonia is lung inflammation described as infiltrates on chest x ray

Signs and symptoms of pneumonia include:

- New or worsening shortness of breath or cough, often with sputum production<sup>1</sup>
- Fever (temperature >100°F or repeated temperatures above resident's baseline)<sup>1</sup>
- Decreased room air pulse oximetry (or increased oxygen requirements)<sup>2</sup>
- Pleuritic chest pain (pain with breathing) in the chest, upper abdomen, or back<sup>3</sup>

In adults, about 75% of pneumonia is caused by bacteria and 25% is caused by viruses<sup>4</sup>

- A positive test for a respiratory virus (e.g., influenza, COVID-19) in a resident with infiltrates on chest x ray usually indicates viral pneumonia<sup>5,6</sup>
- Fewer than 15% of nursing home residents have bacterial and viral pneumonia at the same time<sup>7,8</sup>

## Evaluation for Suspected Pneumonia

- Pulse oximetry to evaluate for decreased oxygenation<sup>2,3</sup>
- CBC to evaluate for increased white blood cell count or presence of bands<sup>9</sup>
- Chest x ray; a new infiltrate suggests pneumonia; helpful to compare to prior imaging<sup>3,9</sup>
- Sputum Gram stain and culture<sup>3,9</sup>
- Test for influenza (particularly during peak influenza season, October–March) and COVID-19 or can send a respiratory viral panel if available<sup>3,9-14</sup>
- *Streptococcus pneumoniae* urinary antigen, *Legionella* urinary antigen (if available)<sup>3,9,15</sup>

## Treatment for Bacterial Pneumonia

- Supportive care: cough suppressants, fluids, supplemental oxygen, nebulizer treatments, chest physical therapy
- Residents with influenza should receive oseltamivir<sup>16</sup>
- Residents who are generally in reasonable health and who have not been hospitalized or exposed to broad-spectrum antibiotics in the previous 90 days, consider:<sup>13,17</sup>
  - Amoxicillin-clavulanic acid or a second or third generation oral cephalosporin for 5–7 days PLUS doxycycline (for 5–7 days) or azithromycin (for 3 days)
  - If severe penicillin allergy\*: moxifloxacin or levofloxacin for 5–7 days
- Residents with risk factors for resistant Gram-negative bacteria (hospitalized or broad-spectrum antibiotics in the previous 90 days, history of *Pseudomonas*, immunocompromised, bronchiectasis, or tracheostomy), consider:<sup>13,17</sup>
  - Cefepime or piperacillin-tazobactam for 7 days PLUS doxycycline (for 7 days) or azithromycin (for 3 days)
  - If severe penicillin allergy: levofloxacin
- If severe illness, consider adding vancomycin OR linezolid to either of the above regimens (for coverage of methicillin-resistant *Staphylococcus aureus*)<sup>13,17</sup>
- Longer treatment courses than those recommended do not improve outcomes<sup>17,18</sup>
- Modify therapy if microbiology results indicate a narrower-spectrum agent can be used<sup>9,13,17</sup>
- Consider hospital transfer if no clinical improvement within 24 hours of starting antibiotics or clinical instability (e.g., unable to maintain O2 saturation, hypotension, tachycardia)<sup>3</sup>

\*Recommend determining allergy risk and prescribing beta-lactam antibiotics if low risk. Fluoroquinolones may cause several serious side effects such as *Clostridioides difficile* infections, prolonged QTc intervals, tendinopathy and tendon rupture, aortic dissections, seizures, or peripheral neuropathy.

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# Approach to Residents With Reported Penicillin Allergy



## Ask about the associated antibiotic, timing, and outcome of the reaction

- What antibiotic was the resident taking when he or she had the reaction? \_\_\_\_\_
- What year was it or how old was the resident when the reaction happened? \_\_\_\_\_
- How soon after starting the antibiotic did the reaction happen (e.g., minutes to hours or after several days)? \_\_\_\_\_
- Did the resident seek medical care for the reaction? \_\_\_\_\_
  - Did the resident need to be hospitalized? \_\_\_\_\_

## What was the reaction?

*Check the appropriate boxes*

<b>Intolerance</b> <ul style="list-style-type: none"> <li>These are not allergies and should not be labeled as an allergic reaction</li> </ul>	<input type="checkbox"/> Isolated gastrointestinal symptoms (nausea, diarrhea) <input type="checkbox"/> Headache <input type="checkbox"/> Itching without rash <input type="checkbox"/> Yeast infection
<b>Laboratory abnormality related to antibiotics (including <i>Clostridioides difficile</i> infection)</b>	<input type="checkbox"/> Elevated liver enzymes <input type="checkbox"/> Kidney dysfunction <input type="checkbox"/> Low blood counts <input type="checkbox"/> <i>C. difficile</i> infection <input type="checkbox"/> QTc prolongation <input type="checkbox"/> Other _____
<b>Low-risk antibiotic allergy</b>	<input type="checkbox"/> Maculopapular rash <ul style="list-style-type: none"> <li>Begins days after antibiotic start</li> <li>Red, minimally raised, and rough to the touch like fine-grit sandpaper</li> <li>Generally involves the trunk and extremities</li> </ul> <input type="checkbox"/> No need for hospitalization due to rash
<b>Medium-risk antibiotic allergy</b>	<input type="checkbox"/> Hives with no other symptoms <ul style="list-style-type: none"> <li>Hives are red, raised, smooth, itchy bumps often with white centers that can be different sizes</li> </ul> <input type="checkbox"/> Severe maculopapular rash that required hospital admission
<b>High-risk antibiotic allergy</b>	<input type="checkbox"/> Anaphylaxis <ul style="list-style-type: none"> <li>Reaction occurs within minutes to hours after antibiotic start</li> <li>Angioedema (face swelling), wheezing, hives, low blood pressure</li> </ul> <input type="checkbox"/> Rash consisting of blisters, skin peeling, and/or involvement of mucous membranes <ul style="list-style-type: none"> <li>Suggests Stevens-Johnson syndrome, toxic epidermal necrolysis</li> </ul>

## Next steps

Intolerance	Remove the medication from the allergy list and document intolerance. Consider a different beta-lactam antibiotic or medication to help with symptoms if the same antibiotic is indicated.
Lab abnormality	Evaluate the type and severity of the abnormality and the need for the associated antibiotic to determine whether to rechallenge or select a different antibiotic.
Low risk	Consider an alternative beta-lactam antibiotic such as a cephalosporin.
Medium risk	Residents with isolated hives and/or a reaction severe enough to require hospitalization should be evaluated by an allergy specialist before considering beta-lactam antibiotics.
High risk	These residents should NOT receive penicillin or other beta-lactam antibiotics in the absence of consultation with an allergy specialist to confirm the diagnosis.

History obtained by \_\_\_\_\_ Date/time \_\_\_\_\_

Reviewed by physician \_\_\_\_\_ Date/time \_\_\_\_\_

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## Risk of antibiotic side effects and adverse reactions

- Antibiotic use is the most important risk factor for developing multidrug-resistant infections, which contribute to over 35,000 deaths in the United States each year
- Antibiotic-associated adverse events are one of the most common reasons for emergency department (ED) visits for drug-related adverse events
- 1 in 1,000 antibiotic prescriptions leads to an ED visit for an adverse event.

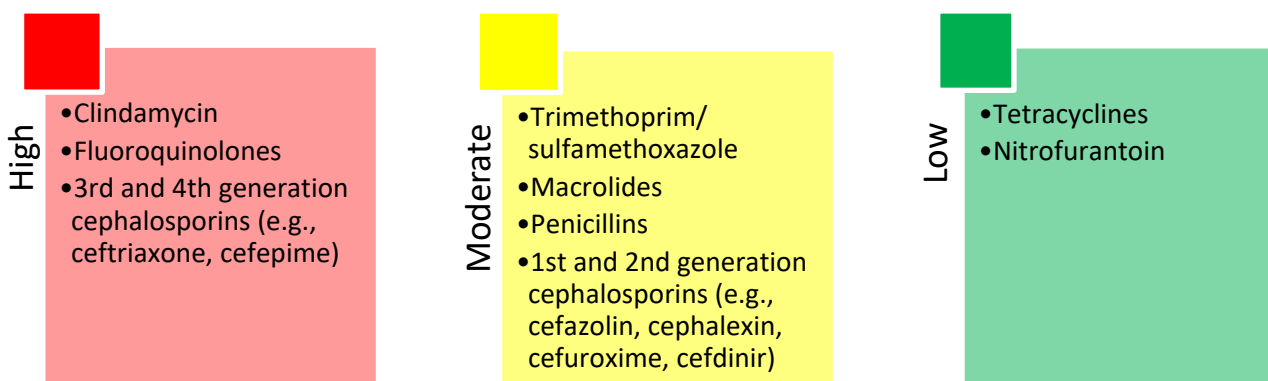
## Common side effects and adverse reactions

- Gastrointestinal disturbances (such as diarrhea) occur with most antibiotics (5–25%)
- Antibiotics can lead to nephrotoxicity (damage to kidneys), neurotoxicity (damage to central and/or peripheral nervous system), skin reactions such as rashes, or yeast infections
- Antibiotics can cause *Clostridioides difficile* infections

## Potential adverse reactions and drug-drug interactions of commonly used antibiotics

Antibiotic	Potential Adverse Reactions	Drug-Drug Interactions
Fluoroquinolones (e.g., ciprofloxacin, levofloxacin, moxifloxacin)	<ul style="list-style-type: none"> <li>• Damage to tendons, joints, muscles, and nerves</li> <li>• Delirium</li> <li>• QTc prolongation</li> </ul>	Significant interaction with warfarin
Trimethoprim-sulfamethoxazole	<ul style="list-style-type: none"> <li>• Rash</li> <li>• Increase in potassium and/or creatinine</li> </ul>	Significant interaction with warfarin
Nitrofurantoin	With prolonged exposure (weeks to months), increased risk for pulmonary toxicity in patients with CrCl $\leq$ 30 ml/min	Rare interactions
Penicillins (e.g., amoxicillin, ampicillin-sulbactam, piperacillin-tazobactam) and cephalosporins	Rash, hypersensitivity reactions	Allopurinol may increase risk of amoxicillin rash

## Antibiotic classes and risk for *Clostridioides difficile* infections



## References

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Deshpande A, Pasupuleti V, Thota P, et al. Community-associated *Clostridium difficile* infection and antibiotics: a meta-analysis. J Antimicrob Chemother. 2013 Apr;68(9):1951-61. PMID: 23620467.

Stevens V, Dumyati G, Fine LS, et al. Cumulative antibiotic exposures over time and the risk of *Clostridium difficile* infection. Clin Infect Dis. 2011 Jul;53(1):42-8. PMID: 21653301.

## **AHRQ Toolkit to Improve Antibiotic Use in Long-Term Care**

The Long-Term Care Toolkit explains the Four Moments of Antibiotic Decision Making, and has tools to support their implementation and improve prescribing in three areas: developing and improving an antibiotic stewardship program, creating a safety culture around antibiotic prescribing, and disseminating best practices for common infectious diseases.

Welcome to the Toolkit to Improve Antibiotic Use in Long-Term Care. The components of the Toolkit can be accessed by clicking on the links below. They include an explanation of the Four Moments of Antibiotic Decision Making and how to apply them in practice. They also include presentations and tools to support implementation of the Four Moments and improve antibiotic prescribing, focusing on three critical areas:

1. Developing and improving your antibiotic stewardship program.
2. Creating a culture of safety around antibiotic prescribing in your facility.
3. Learning and disseminating best practices for common infectious disease syndromes.

### **Create a Culture of Safety Around Antibiotic Prescribing**

Improving antibiotic use should be viewed as a patient safety issue. Both frontline staff and prescribing clinicians should be encouraged to understand both the benefits and risks of antibiotic use and be engaged in reducing harm associated with antibiotic use. Reducing harm often requires changes in thinking and behavior.

The five presentations below are designed to help effect change in behaviors around antibiotic prescribing. They discuss how to present antibiotic use as a patient safety issue, improve communication and teamwork around prescribing, identify and address problems around antibiotic prescribing, and motivate appropriate prescribing. All of these presentations are pertinent to both health care practitioners and nursing staff.

### **Partnering with a Senior Executive**

After viewing or presenting this presentation, viewers will be able to:

- Identify the qualities a senior executive brings to a team and recognize how they can help improve patient safety.
- Describe the responsibilities of the senior executive.
- Identify strategies for engaging executive leaders in your safety and quality projects.

The materials below are intended for health care practitioners and nursing staff.

Partnering with a Senior Executive - Slides

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/partnering-executive-slides.pptx>

Partnering with a Senior Executive – Facilitator Guide

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/partnering-executive-facilitator-guide.docx>

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## **Improving Antibiotic Use is a Patient Safety Issue**

After viewing or presenting this presentation viewers will be able to:

- Discuss the potential harms associated with antibiotic use.
- Recognize that patient harm is largely preventable.
- Recognize that changes to the system, not just to the behavior of individuals, leads to sustained improvements.

The materials below are intended for health care practitioners and nursing staff.

Improving Antibiotic Use is a Patient Safety Issue – Slides

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/antibiotic-patient-safety-slides.pptx>

Improving Antibiotic Use is a Patient Safety Issue – Facilitator Guide

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/antibiotic-patient-safety-facilitator-guide.docx>

## **Improving Teamwork and Communication**

After viewing or presenting this presentation, viewers will be able to:

- Recognize the importance of seeking input from all team members when making antibiotic prescribing decisions.
- Summarize how to use available AHRQ Safety Tools, such as SBAR (Situation, Background of the change, Assessment or appearance, and Request for action) to improve communication related to antibiotic prescribing.
- Describe how to effectively communicate the potential harms of antibiotics to other health care practitioners and to residents.

The materials below are intended for health care practitioners and nursing staff.

Improving Teamwork and Communication:

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/communication-slides.pptx>

Improving Teamwork and Communication – Facilitator Guide

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/communication-facilitator-guide.docx>

Poster – Talking With Residents and Family Members About Antibiotics

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/family-members-UTI.pdf>

Poster – Talking with Residents and Family Members About Urinary Tract Infections

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/family-members-UTI.pdf>

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Poster – Talking with Residents and Family Members About Respiratory Tract Infections

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/family-RTI.pdf>

Poster – DESC Technique

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/DESC-technique.pdf>

The link below is intended for nursing staff

### **Learn Best Practices for Common Infectious Syndromes**

#### **Suspected Urinary Tract Infection SBAR Tool**

[https://www.ahrq.gov/sites/default/files/wysiwyg/nhguide/4\\_TK1\\_T1-SBAR\\_UTI\\_Final.pdf](https://www.ahrq.gov/sites/default/files/wysiwyg/nhguide/4_TK1_T1-SBAR_UTI_Final.pdf)

#### **Identifying Targets to Improve Antibiotic Use**

After viewing or presenting this presentation, viewers will be able to:

- Identify opportunities to improve antibiotic prescribing.
- Recognize how to leverage frontline staff to guide safety improvement efforts around antibiotic prescribing.
- Recognize opportunities to use the Four Moments of Antibiotic Decision-Making framework to improve antibiotic use.

The materials below are intended for health care practitioners and nursing staff.

#### **Identifying Targets to Improve Antibiotic Use – Slides**

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/antibiotic-targets-slides.pptx>

#### **Identifying Targets to Improve Antibiotic Use – Facilitator Guide**

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/antibiotic-targets-facilitator-guide.docx>

#### **Staff Safety Assessment**

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/staff-safety-assessment.docx>

### **Changing the System to Improve Antibiotic Safety**

After viewing or presenting this presentation viewers will be able to:

- Use barriers as opportunities to improve systems and prevent problems from recurring.
- List factors that may compromise patient safety.
- Develop an intervention to reduce barriers and evaluate if the intervention is effective.

The materials below are intended for health care practitioners and nursing staff.

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Changing the System to Improve Antibiotic Safety – Slides

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/changing-system-slides.pptx>

Changing the System to Improve Antibiotic Safety – Facilitator Guide

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/changing-system-facilitator-guide.docx>

Learning from Antibiotic-Associated Adverse Events

<https://www.ahrq.gov/antibiotic-use/long-term-care/four-moments/review-form.html>

### **The Four Moments of Antibiotic Decision-Making Form**

A facility's antibiotic stewardship team is encouraged to use Four Moments of Antibiotic Decision-Making Form to review 5-1 residents each month. The residents reviewed should be individuals who are being evaluated for or treated for an infection.

The materials below are primarily intended for health care practitioners and nursing staff.

The Four Moments of Antibiotic Decision Making Form

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/four-moments-form.pdf>

Completion Guide for the Four Moments of Antibiotic Decision Making Form

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/four-moments-completion-guide.pdf>

<https://www.ahrq.gov/antibiotic-use/long-term-care/index.html>

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## AHRQ – Develop and Improve Your Stewardship Program

Presentations and tools to help a nursing facility develop an antibiotic stewardship program from scratch or improve the effectiveness of an existing program. (For information on how the materials below can be integrated into institutional efforts to improve antibiotic use, read the Implementation Guide for Long-Term Care Antibiotic Stewardship Programs

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/ltc-implementation-guide.pdf>.

These six presentations can help you develop a program from scratch to improve the effectiveness of your existing program. Slides and facilitator guides are available for all of the presentations listed below. Three presentations about appropriate collection of microbiological samples, discussing infectious concerns about residents with health care practitioners, and discussing infectious concerns about residents with family members and caregivers are also offered as narrated presentations that you can view and listen to. All of these presentations are pertinent to both health care practitioners and nursing staff.

Developing an Antibiotic Stewardship Program (presentation)

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/program.html>

Tracking and Measuring Antibiotic Use (presentation)

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/track-measure.html>

Appropriate Collection of Microbiological Specimens (presentation, narrated presentation, and one-page document) <https://www.ahrq.gov/antibiotic-use/long-term-care/improve/collection.html>

Communicating Infectious Concerns with Antibiotic Prescribers (presentation and narrated presentation)

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/communicate-prescribers.html>

Discussing Infectious Concerns about Residents with Family Members and Caregivers (presentation and narrated presentation)

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/discuss-family.html>

Sustaining Your Antibiotic Stewardship Program (presentation)

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/sustain.html>

### Tools

The tools below are designed to aid in the development of your antibiotic stewardship program and are pertinent to both health care practitioners and nursing staff. The Comprehensive Timeline and Supporting Materials integrates presentations, narrated presentation, and tools with specific activities to develop or enhance antibiotic stewardship at your facility.

Other tools support overall implementation as well as use input from your team and other staff members to develop an intervention and then measure change to assess interventions. Assuring good

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specimen collection techniques can help improve antibiotic use, as can fostering effective communication about the potential risks and benefits of antibiotic use.

Use “Sustaining Your Antibiotic Stewardship Program Guide”, in the list below, as a guide to sustain your antibiotic stewardship program and continue to build on your team’s successes.

Implementation Guide for Long-Term Care Antibiotic Stewardship Programs

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/ltc-implementation-guide.pdf>

Comprehensive Program with Timeline and Supporting Materials

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/timeline-tasks.pdf>

General Implementation Tools

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/tools.html>

Choosing an Intervention and Measuring Change

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/intervention.html>

Collecting Microbiological Specimens

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/specimens.html>

Discussing Infectious Concerns About Residents

<https://www.ahrq.gov/antibiotic-use/long-term-care/improve/discuss-concerns.html>

Sustaining Your Antibiotic Stewardship Program Guide

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/sustainability-plan.pdf>

<https://www.ahrq.gov/sites/default/files/wysiwyg/antibiotic-use/long-term-care/sustainability-plan.pdf>

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