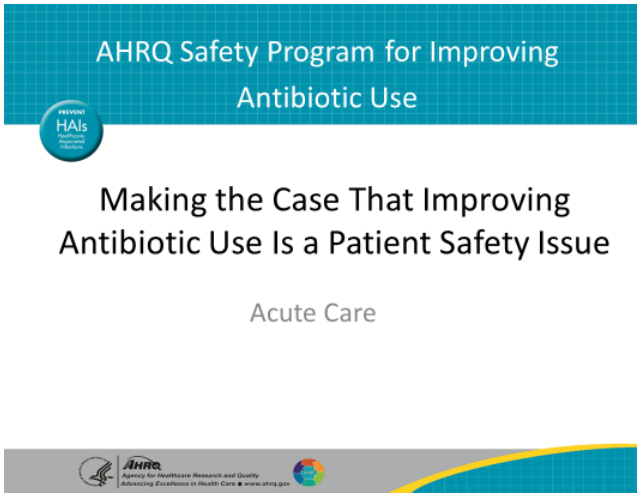
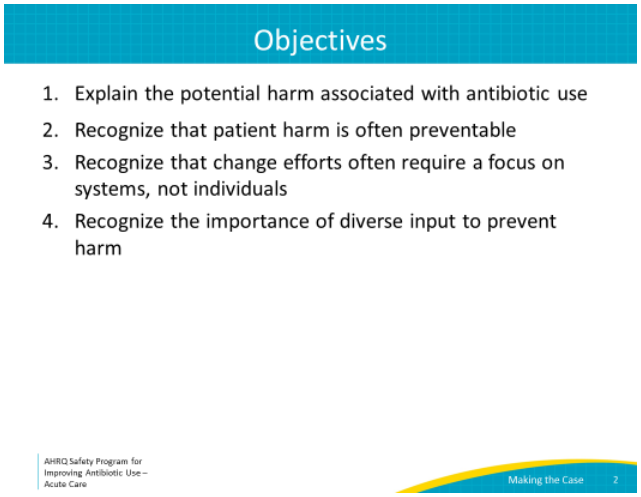
Making the Case That Improving Antibiotic Use Is a Patient Safety Issue

Acute Care

Slide Title and Commentary	Slide Number and Slide
AHRQ Safety Program for Improving Antibiotic Use **Acute Care** **Making the Case That Improving Antibiotic Use is a Patient Safety Issue** SAY: Thank you for joining us. This presentation is titled "Making the Case That Improving Antibiotic Prescribing Is a Patient Safety Issue."	**Slide 1** 
Objectives SAY: By the end of this presentation, participants will be able to: • Explain the potential harm associated with antibiotic use • Recognize that patient harm is often preventable • Recognize that change efforts often require a focus on systems, not individuals —and— • Recognize the importance of diverse input to prevent harm	**Slide 2** 

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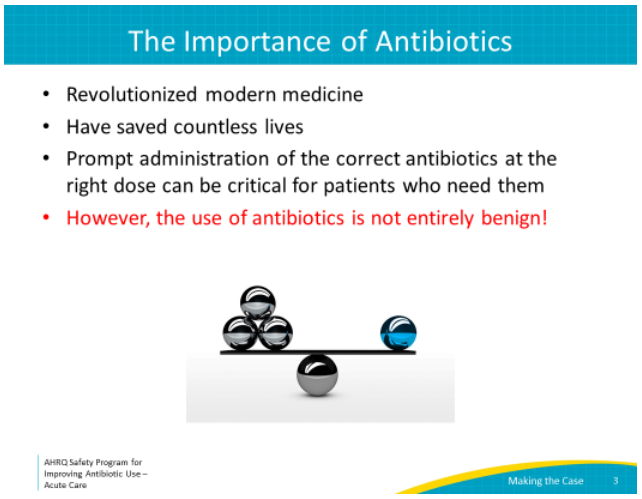
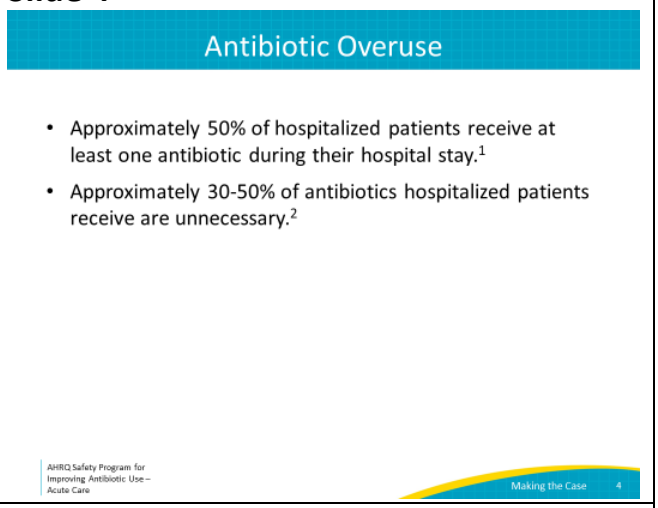
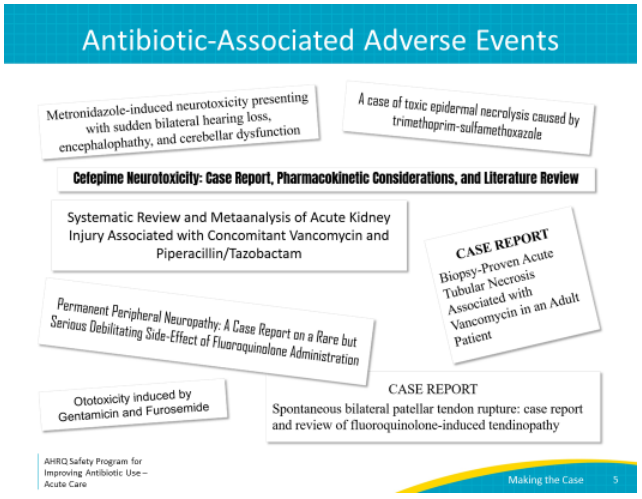
The Importance of Antibiotics SAY: Antibiotics have revolutionized modern medicine and have saved countless lives. The prompt administration of the correct antibiotic at the right dose is critical to improving the outcomes of patients with serious infections. However, we must remind ourselves that antibiotics, whether necessary or not, are not entirely benign. They can be associated with adverse events, and when administered to patients who do not need them, can cause more harm than good.	**Slide 3** 
Antibiotic Overuse SAY: Approximately 50 percent of hospitalized patients receive at least one antibiotic during their hospital stay. However, 30–50 percent of these antibiotics are considered unnecessary.	**Slide 4** 
Antibiotic-Associated Adverse Events SAY: All antibiotics have the potential to harm patients. Every time we prescribe an antibiotic to a patient, it is important to remind ourselves of the potential side effects associated with the antibiotic(s). Often, these adverse events occur after a patient is discharged from the hospital. Patients may present to their primary care provider, to local emergency departments, or to other hospitals with antibiotic-associated adverse events, and we may not always be aware of the harm associated with antibiotics we have prescribed.	**Slide 5** 

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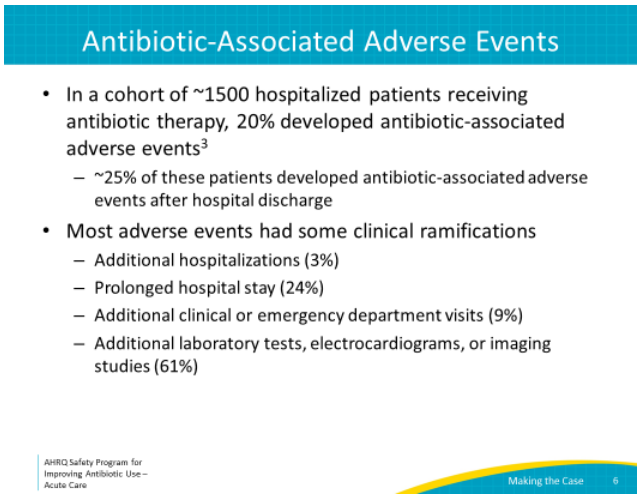
Antibiotic-Associated Adverse Events SAY: In a study of hospitalized patients, all adults who received at least 24 hours of antibiotic therapy over a 9-month period were evaluated for the development of antibiotic-associated adverse events. Only patients admitted to the general wards were included. The development of systemic reactions or more focal ones such as gastrointestinal, hematologic, hepatobiliary, renal, neurologic, dermatologic, cardiac, or muscular impairment was evaluated for 30 days after antibiotic initiation. Patients were also evaluated for the development of *Clostridioides difficile* infections and subsequent infections with multidrug-resistant organisms for 90 days after antibiotic initiation. Overall, 20 percent of patients developed at least 1 antibiotic-associated adverse event. For 25 percent of patients, these events occurred after hospital discharge. Antibiotic-associated adverse drug events then were categorized into clinically significant and non-clinically significant categories. Only one category was selected per patient, with the more severe category selected when multiple categories were met. These included additional hospitalizations for 3 percent of patients, prolonged hospital stays for 24 percent of patients, additional clinical or emergency department visits for 9 percent of patients, and additional laboratory tests, electrocardiograms, or imaging studies for 61 percent of patients.	**Slide 6** 

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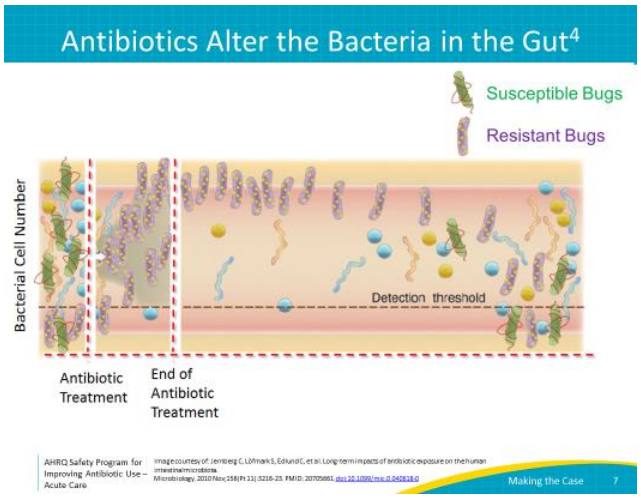
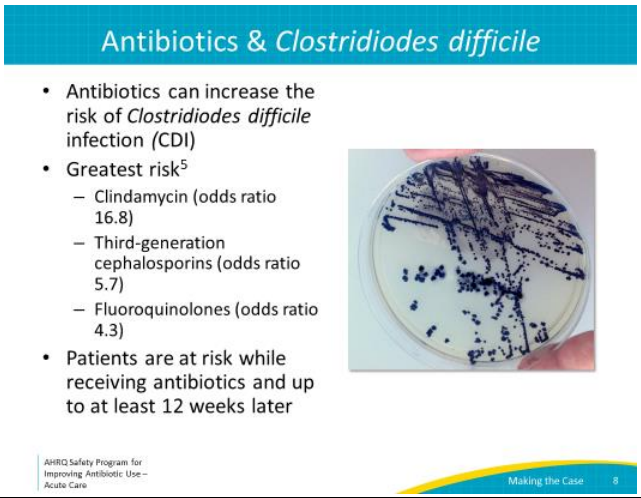
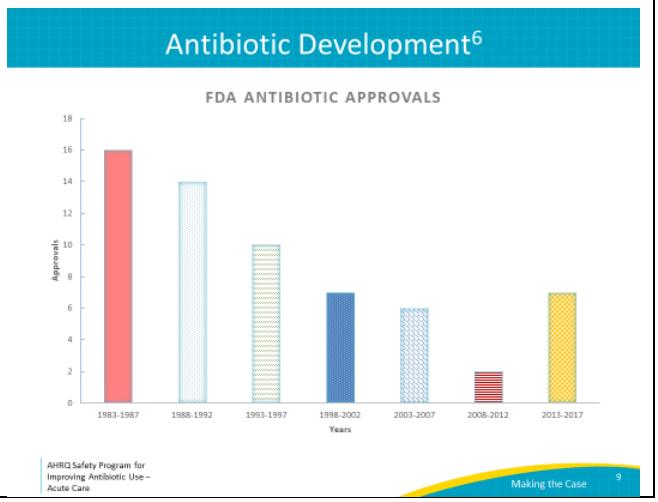
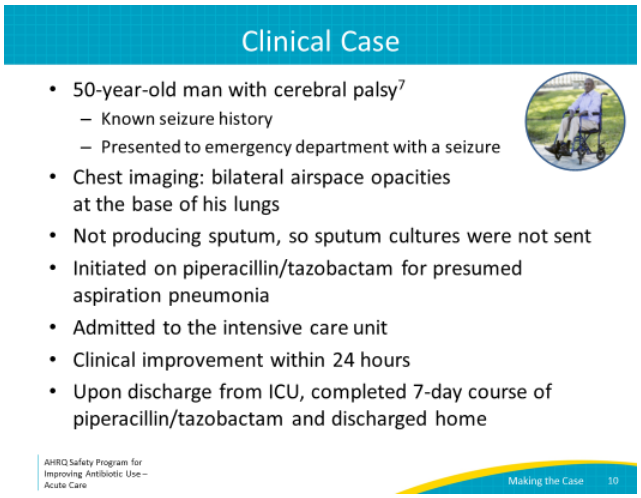
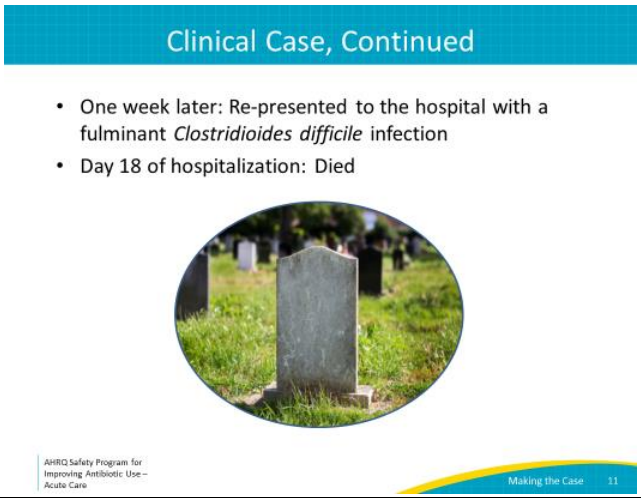
Antibiotics Alter the Bacteria in the Gut SAY: Antibiotics also disrupt the microbiome. They increase the likelihood that resistant bacteria and *C. difficile* flourish and persist. They also increase the likelihood that these organisms will lead to clinical infections. In the figure on this slide, four patients received a 7-day course of clindamycin. The purple bacteria represent resistant bacteria, and you can see that the quantity of resistant bacteria increased while patients received antibiotics and persisted after the clindamycin was discontinued. Surprisingly, it can take up to 2 years for the intestinal microbiome to return to how it was prior to antibiotic use.	**Slide 7** 
Antibiotics & *Clostridium difficile* SAY: Virtually all antibiotics can increase the risk of a subsequent *C. difficile* infection. However, the greatest risk occurs with clindamycin, third- and fourth-generation cephalosporins like ceftriaxone and cefepime, and fluoroquinolones. The risk is highest when patients are still receiving antibiotics, but this risk remains elevated for several months after antibiotics are discontinued.	**Slide 8** 
Antibiotic Development Is on the Decline SAY: Furthermore, the number of new antibiotics being developed or in advanced phases of development has decreased over the past few decades. There has been an upswing in antibiotic development recently, but novel antibiotics to treat infections with highly resistant organisms such as *Pseudomonas aeruginosa* and *Acinetobacter baumannii* are still needed. Antibiotics remain a very precious resource, and appropriate antibiotic use is critical to preserve the efficacy of existing and future agents.	**Slide 9** 

Slide Title and Commentary	Slide Number and Slide
Clinical Case SAY: Let's review the clinical case of a 50-year-old man with cerebral palsy and a known seizure disorder who presented to the emergency department with a seizure. In the emergency department, he was noted to have some persistent confusion and drowsiness. He was afebrile with a normal heart rate. His oxygen saturation was 100 percent on 2 liters of oxygen via nasal cannula. A chest x ray demonstrated bilateral airspace opacities at the base of his lungs. The patient was not producing sputum, so sputum cultures were not obtained. He was initiated on piperacillin/tazobactam for presumed aspiration pneumonia. The patient was admitted to the intensive care unit for monitoring due to his prolonged post-ictal state and within 24 hours demonstrated clinical improvement with resolution of his mental status changes and oxygen requirement. He was then transferred to the medical floor. Piperacillin/tazobactam therapy was continued and he completed a 7-day course of antibiotics. He was discharged home.	**Slide 10** 
Clinical Case, Continued SAY: One week later, he re-presented to the hospital with a fulminant *Clostridioides difficile* infection. Unfortunately, the patient died on day 18 of this hospitalization from complications of severe *C. difficile* infection.	**Slide 11** 

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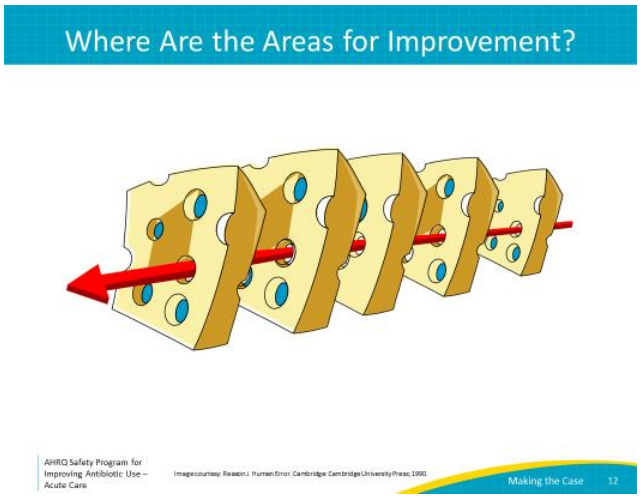
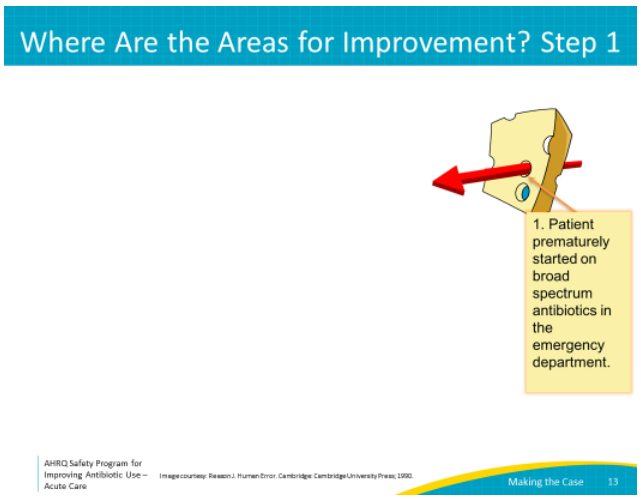
Where Are the Areas for Improvement? SAY: A number of issues ultimately led to the demise of this patient. In this slide, you will see what we refer to as the Swiss cheese model. Each slice represents a potential safety check. The holes are the errors in your system that occur and risk harming a patient. Notice that there are several slices, which means that there are many chances for a harmful situation to be avoided. But when the holes all line up, as they did in the case you just heard, the likelihood of patient harm increases.	**Slide 12** 
Where Are the Areas for Improvement? Step 1 SAY: When this patient first presented to the emergency department with his seizure, he was noted to have bilateral lower lung field infiltrates, and there was a concern by the emergency department clinicians that he had aspiration pneumonia. However, his lack of purulent sputum and fevers makes pneumonia unlikely. Aspiration pneumonitis is an acute chemical lung injury caused by inhalation of gastric contents. It has a rapid onset and can progress quickly to respiratory failure followed by rapid improvement within 1–2 days of the initial insult. Supportive care is the mainstay of therapy. A portion of patients with aspiration events (about 25%) develop bacterial pneumonia in the ensuing 2 to 7 days, and this becomes apparent because of new fevers and a worsening respiratory status. Our patient was prematurely started on broad spectrum antibiotics when supportive care without antibiotic therapy would have been sufficient given his relative stability. When the clinical status of a patient is concerning, it is reasonable to initiate antibiotics; however, the decision to continue antibiotics should be revisited on at least a daily basis to ensure they are still needed or need to be modified.	**Slide 13** 

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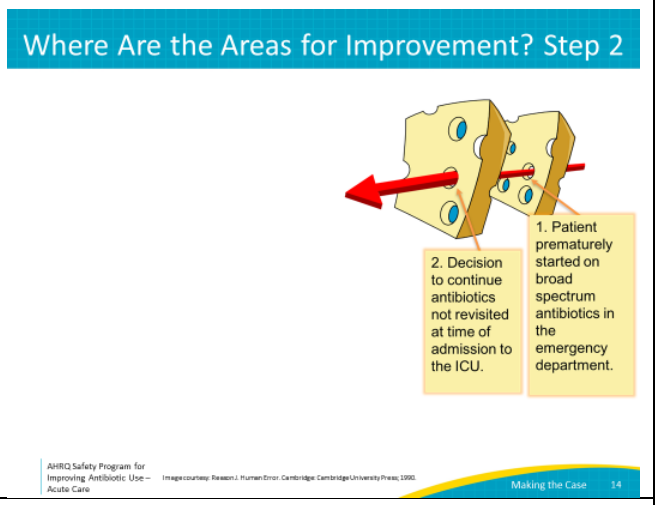
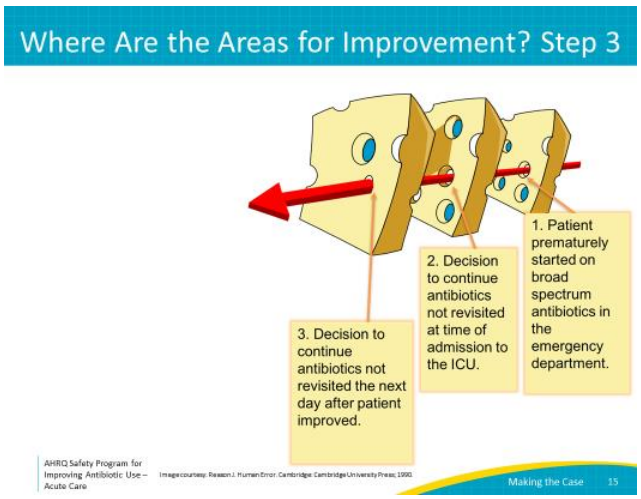
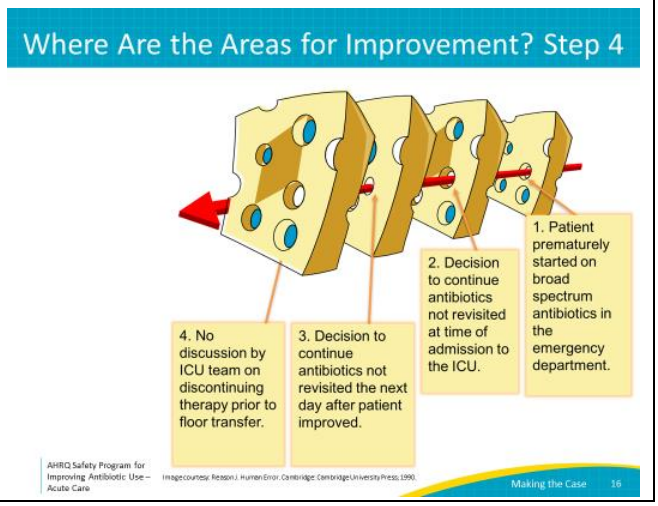
Where Are the Areas for Improvement? Step 2 SAY: While it is understandable why there might have been concern for an infectious process, the decision to continue antibiotics was not revisited at the time of admission to the intensive care unit.	**Slide 14** 
Where Are the Areas for Improvement? Step 3 SAY: Similarly, the decision to continue antibiotics was not revisited the next day after the patient improved. It is unlikely for pneumonia to improve so rapidly, making aspiration pneumonitis much more likely.	**Slide 15** 
Where Are the Areas for Improvement? Step 4 SAY: Prior to transferring the patient to the floor, it would have been very reasonable and appropriate for the ICU team to discuss stopping antibiotic therapy during clinical rounds.	**Slide 16** 

Where Are the Areas for Improvement? Step 5

SAY:

Another opportunity for intervention was upon transfer to the floor. The floor team should have re-evaluated the need for continued antibiotics. When all of the holes lined up, the patient was harmed.

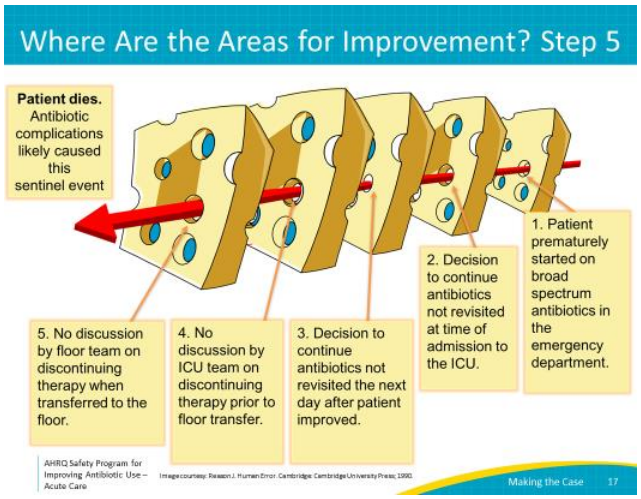
It is important to recognize that the clinical status of a patient evolves during the hospital stay. Although antibiotics may be started in the setting of clinical uncertainty, it is important to readdress the issue of whether antibiotics are still needed or if therapy can be adjusted as more information becomes available on subsequent days.

This can be best achieved by including antibiotic time outs during patient rounds. There is an example of a time out tool on the AHRQ Safety Program for Improving Antibiotic Use Web site. You can use this form electronically, print it out, or add the questions to any daily goals sheets that are being used in your units. Consider having the bedside nurse, pharmacist, or another member of the clinical team go through the questions on a daily basis for every patient receiving antibiotics. This will prompt discussion of whether antibiotics should be stopped or adjusted in some way.

It is always best to perform antibiotic time outs when members with diverse medical backgrounds are together. In this patient's case, for example, the respiratory therapists and nurses taking care of this patient could have been asked whether purulent secretions have been noted or if the patient had required increased respiratory support or oxygen over the past 24 hours. This information would have helped the clinician decide whether the diagnosis of pneumonia was likely.

It is important to foster a culture of safety where all team members understand that they can contribute to improving care of their patients and reducing unnecessary harm. Team members should not remain silent when they have something to say that will improve care or reduce harm for a patient. You should never worry about offending the clinician who initiated

Slide 17



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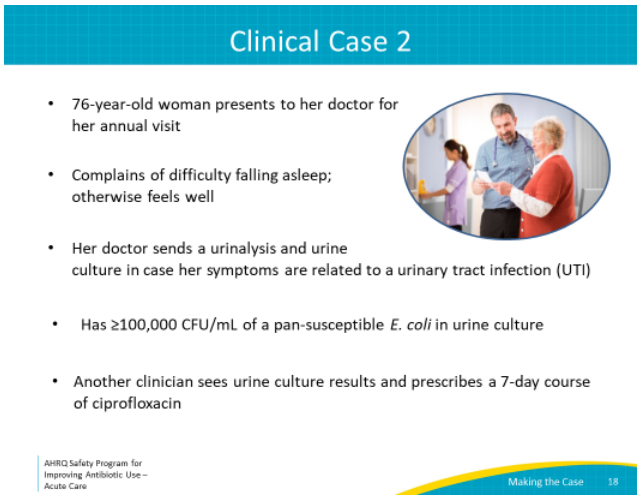
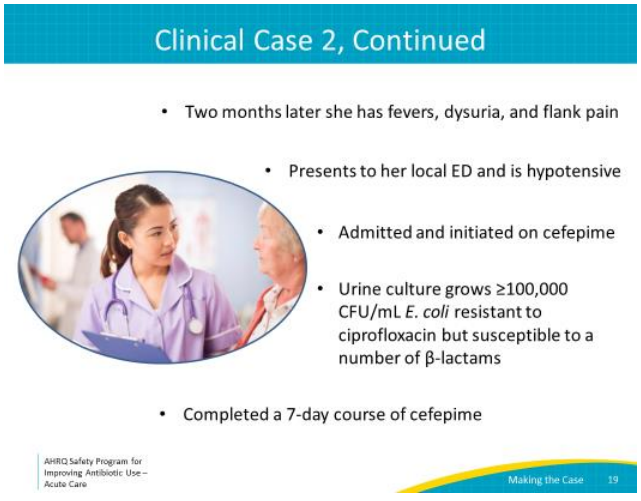
the antibiotic course. Conversely, a clinician should never feel attacked if questioned about an antibiotic course. A culture of respect and the best interest of the patient should allow you to speak up and question others when you are concerned about patient harm. Approaches to communicate effectively with other health care providers is addressed in the presentation titled: "Improving Communication and Teamwork Around Antibiotic Decision Making."	
Clinical Case 2 SAY: Let's discuss another case. A 76-year-old woman presents to her primary care clinic for her annual visit. She complains of difficulty falling asleep but otherwise reports feeling well. Her doctor sends a urinalysis and a urine culture in case her symptoms are related to a urinary tract infection. She has evidence of pyuria, urine containing at least 10 white blood cells per high-powered field, and has over 100,000 colony-forming units per mL of a pan-susceptible *E. coli* in her urine culture. Another clinician in the practice sees the results when they are available 2 days after the clinic visit and prescribes a 7-day course of ciprofloxacin for a urinary tract infection.	**Slide 18** 
Clinical Case 2, Continued SAY: The patient completes the antibiotic course. Two months later, she has fevers, dysuria, and flank pain. She presents to her local emergency department and is febrile and hypotensive. She is admitted and prescribed cefepime. Her urine culture grows greater than 100,000 colony-forming units per mL of *E. coli* resistant to ciprofloxacin, but sensitive to multiple other classes of antibiotics. She completes a 7-day course of IV cefepime for pyelonephritis and is discharged on hospital day 8.	**Slide 19** 

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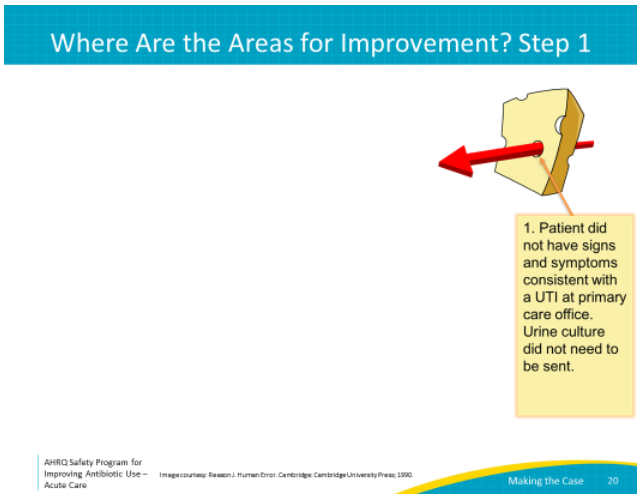
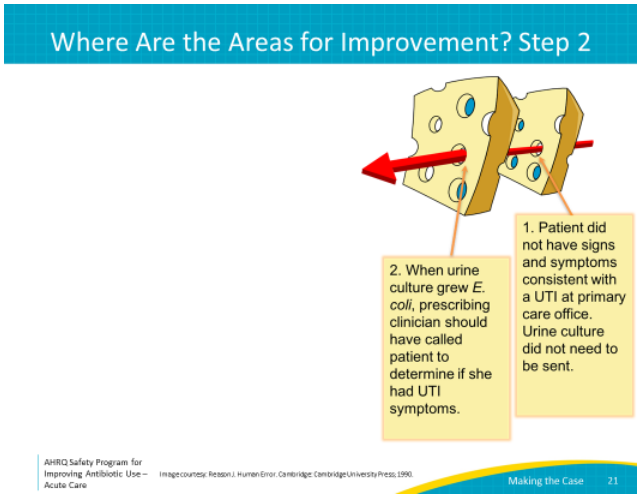
Where Are the Areas for Improvement? Step 1 SAY: When the patient first presented to her primary care clinic, she did not have any signs or symptoms consistent with a urinary tract infection or a UTI. During this visit, a urinalysis and urine culture did not need to be obtained. The lack of clinical symptoms consistent with a urinary tract infection, despite the results of her urinalysis and urine culture, are consistent with a diagnosis of asymptomatic bacteriuria. As discussed in the presentation titled "Best Practices in the Diagnosis and Treatment of Asymptomatic Bacteriuria and Urinary Tract Infections," it is not uncommon for postmenopausal women to have pyuria and bacteriuria without any clinical signs or symptoms of a UTI.	**Slide 20** 
Where Are the Areas for Improvement? Step 2 SAY: A second issue occurred when another clinician in the practice decided to treat the patient with antibiotics for asymptomatic bacteriuria. Asymptomatic bacteriuria does not require antibiotic therapy. In fact, data show that treating women with asymptomatic bacteriuria increases the risk of subsequent, clinically significant UTIs and increases the risk that these future UTIs are caused by antibiotic-resistant organisms. Treating asymptomatic bacteriuria can be harmful to patients. Commonly, when we see culture results on a patient, we make an almost reflex decision to treat with antibiotics. In this case, the prescribing clinician should have called the patient to see if she was symptomatic before making the decision about whether to start antibiotics.	**Slide 21** 

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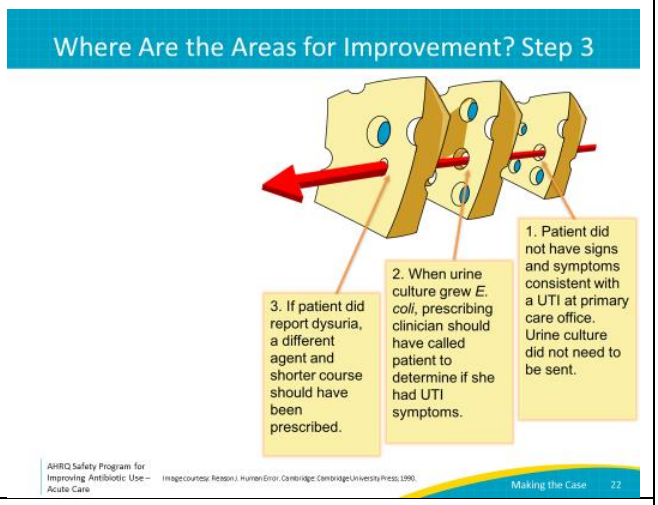
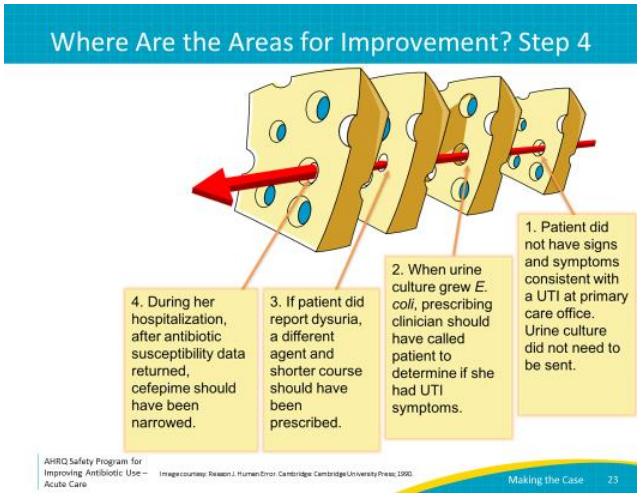
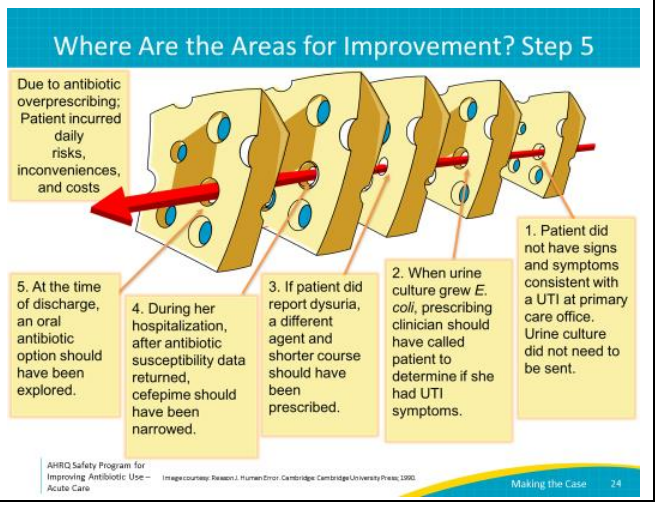
Where Are the Areas for Improvement? Step 3 SAY: The second prescriber in the practice should not have to worry about "offending" the clinician who ordered the urine culture if he or she decided to not treat with antibiotics. This case highlights the need to promote a culture of safety where the ultimate goal is to do what is best for our patients. If the prescribing clinician called the patient and she did have dysuria, a different agent, such as trimethoprim-sulfamethoxazole, for 3 days would have been sufficient.	**Slide 22** 
Where Are the Areas for Improvement? Step 4 SAY: After the patient was hospitalized with pyelonephritis, cefepime was initiated. When antibiotic susceptibility data became available and it was clear that there were narrower spectrum antibiotic choices available, cefepime should have been narrowed to another agent, such as trimethoprim-sulfamethoxazole, to continue the treatment course for pyelonephritis.	**Slide 23** 
Where Are the Areas for Improvement? Step 5 SAY: Similarly, as soon as the patient was able to tolerate an oral option, an oral antibiotic could have been explored instead of subjecting this patient to the daily risks, inconvenience, and costs associated with intravenous antibiotics.	**Slide 24** 

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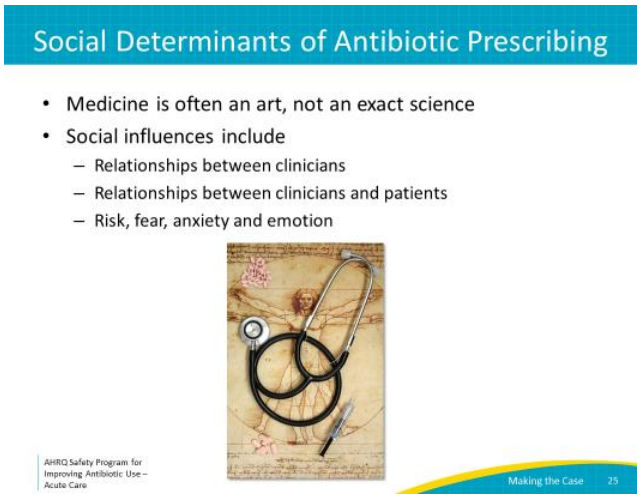
Social Determinants of Antibiotic Prescribing SAY: As is apparent from the two cases, medicine is often an art and not an exact science. There are a number of social factors that influence antibiotic prescribing decisions beyond clinicians' knowledge of infections and antibiotics. Some of these decisions are associated with relationships between clinicians. Clinicians may worry that they will be viewed as dismissive or disrespectful if they stop or change antibiotics initiated by another clinician. They may worry about what patients or families will think of them if they don't prescribe antibiotics. There may be other emotional issues involved, too. For example, if a patient is at the end of life, clinicians may start antibiotics just to "do something" because they feel helpless. They may not pay attention to the fact that these antibiotics can cause unnecessary harm and inconvenience for their patients, and may provide no benefit. To promote a culture of safety around antibiotic prescribing, the potential harms associated with antibiotic use must be conveyed to prescribers, patients, and family members so that the potential risks versus benefits are considered every time an antibiotic is prescribed. A commitment poster is available on the AHRQ Safety Program Web site that explains that antibiotics can be lifesaving drugs but can also have harmful side effects. The poster also acknowledges that providers in your institution are committed to prescribing the most appropriate antibiotics when they are needed and to not prescribing antibiotics when they are not needed. You are encouraged to print these posters, brand them with your institution's logo, and place them in an area where patients and family members can see them. You may want to include the photographs of relevant leaders and clinicians in your hospital on these posters.	**Slide 25** 

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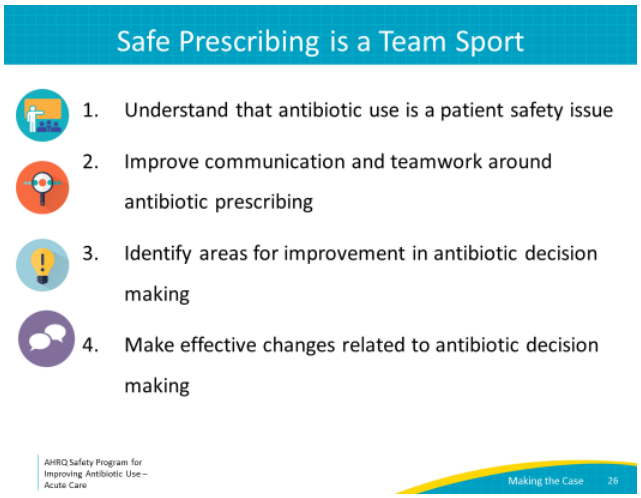
Safe Prescribing Is a Team Sport SAY: Presentations in the AHRQ Safety Program for Improving Antibiotic Use Toolkit, located in the sections "Develop and Improve Your Antibiotic Stewardship Program" and "Develop a Culture of Safety Around Prescribing," focus on recognizing and improving behavioral issues that impact antibiotic prescribing and how healthcare providers on your unit can work as a team to improve antibiotic decision making. This presentation is focused on why antibiotic use is a patient safety issue. Additional presentations discuss how to improve communication and teamwork around antibiotic prescribing, how to identify areas for improvement in antibiotic decision making, and how to develop solutions with multidisciplinary input when you notice issues related to antibiotic prescribing. Regardless of whether antibiotics are necessary or not, they can be associated with harm. Standardizing care, eliminating unnecessary steps, and creating independent checks can minimize this harm. You can standardize antibiotic prescribing by developing local guidelines and order sets, or developing communication tools to use when new diagnostic tests are improved. To make these most effective, it is always helpful to receive input from both prescribers and nonprescribers such as pharmacists, nurses, respiratory therapists, etc., depending on the topic. On the AHRQ Safety Program Acute Care Toolkit Web site you will find a series of one-page documents that summarize best practices for a variety of syndromes for which antibiotics are commonly prescribed such as community-acquired pneumonia, chronic obstructive pulmonary disease exacerbations, cellulitis and soft tissue abscesses, etc. You can disseminate these to provide education to your fellow health care workers or you can use these to develop your own local diagnosis and treatment guidelines to help standardize practices.	**Slide 26** 

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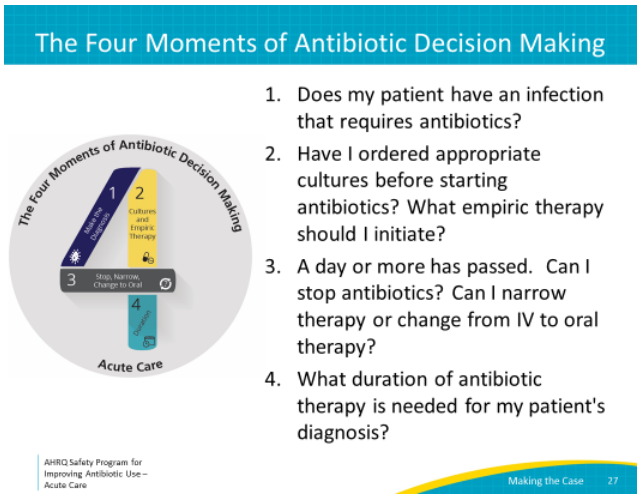
The Four Moments of Antibiotic Decision Making SAY: These are the Four Moments of Antibiotic Decision Making. This framework is used throughout the AHRQ Safety Program to ensure we are optimizing antibiotic prescribing using a standardized approach, particularly when we discuss best practices in the diagnosis and treatment of specific infectious syndromes. Moment 1 occurs at the time that initiation of antibiotic therapy is being considered. The prescriber should ask, "Does my patient have an infection that requires antibiotics?" Some patients may have a very low risk of having an infectious cause of their symptoms and others may not need antibiotics immediately. Moment 2 occurs at the time that the decision has been made to start antibiotics. It includes two questions. "Have I ordered appropriate cultures before starting antibiotics? What empiric therapy should I initiate?" Empiric therapy, or antibiotic therapy started before culture results are available, should be based on what organisms are likely to cause the suspected infectious process, the severity of illness, and characteristics of the patient. Ideally, guidelines for empiric therapy for different infectious processes will be developed by the antibiotic stewardship team in collaboration with prescribers. Moment 3 occurs on every subsequent day of antibiotic therapy and addresses three main considerations. "Can I stop antibiotics? Can I narrow therapy or change from IV to oral therapy?" Moment 4 should occur as soon as it is clear what infectious process is being treated and the patient is demonstrating a response to therapy. The prescriber should ask, "What duration of antibiotic therapy is needed for my patient's diagnosis?	**Slide 27** 

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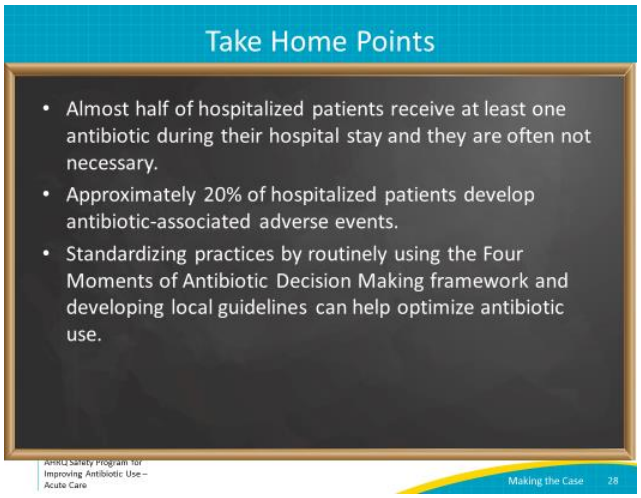
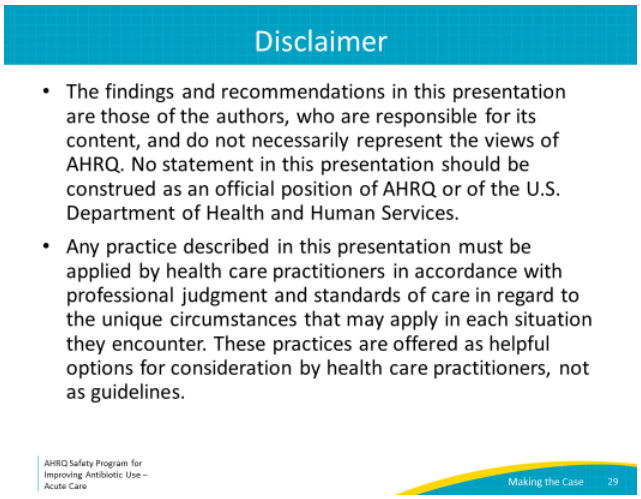
Take Home Points SAY: Remember, almost half of hospitalized patients receive at least one antibiotic during their hospital stay, and these antibiotics are often not necessary. Approximately 20 percent of hospitalized patients develop antibiotic-associated adverse events. It is important that all healthcare workers on your unit understand that although antibiotics can be very helpful for some patients, they are not without harm—both when they are indicated as well as when they are not indicated. Throughout the course of the AHRQ Safety Program for Improving Antibiotic Use we will learn both behavioral and technical approaches to reduce the potential harm caused by antibiotics. Standardizing practices by routinely using the Four Moments of Antibiotic Decision Making framework and the development of local diagnosis and treatment guidelines can help optimize antibiotic use.	**Slide 28** 
Disclaimer SAY: • The findings and recommendations in this presentation are those of the authors, who are responsible for its content, and do not necessarily represent the views of AHRQ. No statement in this presentation should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services. • Any practice described in this presentation must be applied by health care practitioners in accordance with professional judgment and standards of care in regard to the unique circumstances that may apply in each situation they encounter. These practices are offered as helpful options for consideration by health care practitioners, not as guidelines.	**Slide 29** 

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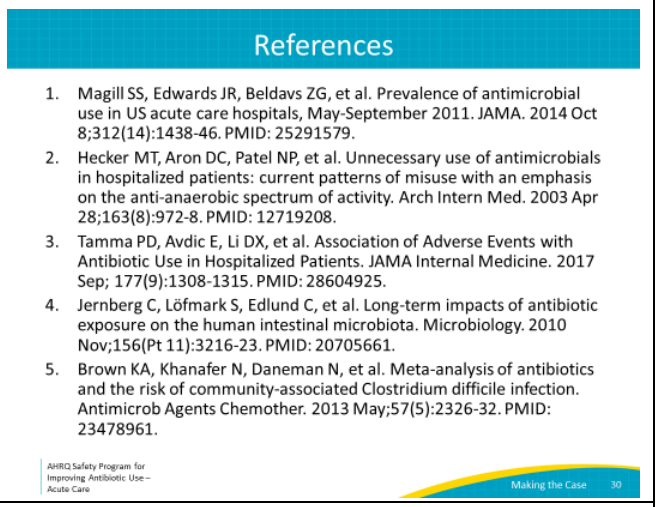
References	**Slide 30** 
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