To evaluate the quality of patient care in specific disease states, the Centers for Medicare and Medicaid Services (CMS) tracks hospital adherence to specific evidence-based performance measures. The performance measures are processes of care for which there is a strong link between the process and patient outcomes; they provide objective evaluations of hospital performance and patient care. Currently, CMS supports initiatives in several areas: heart failure, myocardial infarction, community-acquired pneumonia (CAP), and postsurgical complications (through the Surgical Care Improvement Project [SCIP]). CMS performance measures, as well as other quality-improvement initiatives, work synergistically with antimicrobial stewardship programs (ASPs), which are also strategies for improving drug use and patient care. Like ASPs, core performance strategies, among other goals, promote appropriate antimicrobial selection and use. Thus, performance measures can bolster the influence of ASPs, and ASPs can facilitate the implementation of performance measures. This article reviews CAP performance measures, SCIP, and strategies for genitourinary infections, and their intersection with ASPs.

**CENTERS FOR MEDICARE AND MEDICAID SERVICES PERFORMANCE MEASURES AND QUALITY OF CARE INITIATIVES**

To evaluate the quality of patient care and provide objective means to assess improvement in care in specific disease states, the Centers for Medicare and Medicaid Services (CMS) tracks hospital adherence to specific, evidence-based performance measures. The performance measures are processes of care for which there is a strong link between the process and patient outcomes [1, 2]. Performance measures are based on processes of care (eg, choice of diagnostic studies or antimicrobials), which are encounters between patients and health care workers (HCW) that are tangible, quantitative, and within the control of the HCW. They are based on evidence-based guidelines; as such they provide objective evaluations of hospital performance and patient care. Process of care measures are unlike measurements of patient outcomes, which are often dependent on factors outside the control of the HCW (eg, patients’ comorbid status, lifestyle choices, and adherence to prescribed medications) [1]. Currently, CMS supports quality improvement initiatives in several resource-intensive diseases: heart failure, myocardial infarction, community-acquired pneumonia (CAP), and prevention of postsurgical complications (the Surgical Care Improvement Project [SCIP]).

Ideally, CMS performance measures, as well as other quality improvement initiatives, should work synergistically with antimicrobial stewardship programs (ASPs), which are, in themselves, strategies for improving drug...
use and patient care. Like ASPs, core performance strategies, in addition to promoting smoking cessation counseling, vaccination, and education, are designed to promote appropriate antimicrobial selection and use. Thus, performance measures issued and supported by government agencies and/or professional societies can help bolster the influence of ASPs and ASPs, in turn, can facilitate and control the implementation of performance measures.

COMMUNITY-ACQUIRED PNEUMONIA: CENTERS FOR MEDICARE AND MEDICAID SERVICES CORE PERFORMANCE MEASURES

In 2007, pneumonia/influenza was the eighth leading cause of death in the United States, accounting for 52,717 deaths or 2.2% of all deaths and 1.1 million hospital discharges [3, 4]. Although this represented a 9% decrease in deaths from 2006, the crude pneumonia/influenza-associated mortality rate was, nevertheless, 17.5 per 100,000 population. The economic burden associated with CAP remains substantial at $17 billion annually in the United States [5].

The current CMS performance measures for CAP include blood cultures, timely antimicrobial therapy, appropriate antimicrobial selection, smoking cessation, vaccination, and measuring mortality (Table 1) [3]. The recommendations are based on the most recent Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) CAP guidelines, and some are used to determine hospital eligibility for reimbursement (Table 1). The implementation of performance measures is variable, and there is a potential for unintended consequences [7]. The goal for rates of compliance of these measures should have a realistic benchmark limit instead of 100% since they were not designed to cover all possible host and epidemiological settings. Deviation from a performance measure should be acceptable if it is well documented in the chart and based on sound reason. National comparative rates of compliance of the specific core measures are listed in Table 2 indicating significant improvement over the past decade. Indeed, in light of the very high compliance rate of measurement of blood gases or pulse oximetry, this measure was retired in 2009.

Measures of particular relevance to ASPs are the recommendations for antimicrobial timing and antimicrobial selection. Presently, the timing measure lists that antimicrobial therapy be initiated within 6 hours of presentation to the institution. The rational underlying specific timing was based on to 2 large (>10,000 patient databases), multicenter, retrospective cohort studies in Medicare-recipient inpatients [8, 9]. Initially, the time listed was 8 hours and then changed to 4 hours on the basis of the second trial, suggesting additional benefit [9]. However, the 4-hour measure was viewed by many as possibly

Table 1. Centers for Medicare and Medicaid Services Performance Measures for Inpatients With Community-Acquired Pneumonia (CAP) [3, 6]

<table>
<thead>
<tr>
<th>Measure</th>
<th>Applicable patient groupsa</th>
<th>Status</th>
<th>Reimbursement measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood cultures</td>
<td>All ICU patients, those with active alcohol abuse, and those with pleural effusion</td>
<td>Current</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Optional for patients in general wards</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Taken prior to antimicrobial treatment if obtained in emergency department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimicrobial therapy within 6 hours of presentation</td>
<td>All patients</td>
<td>Current</td>
<td>Exempt</td>
</tr>
<tr>
<td>Antimicrobial selection according to guideline recommendations</td>
<td>All patients (exceptions: pathogen-directed therapy, clinical studies, diagnostic uncertainty)</td>
<td>Current</td>
<td>Yes</td>
</tr>
<tr>
<td>Measurement of blood gases or pulse oximetry</td>
<td>All patients</td>
<td>Retired 2009 (nearly 100% compliance)</td>
<td>Retired</td>
</tr>
<tr>
<td>Assessment/administration of pneumococcal and influenza vaccine</td>
<td>All patients admitted to hospital (universal measure)</td>
<td>Current</td>
<td>Yes</td>
</tr>
<tr>
<td>Smoking-cessation counseling</td>
<td>All patients admitted to hospital (universal measure)</td>
<td>Current</td>
<td>Yes</td>
</tr>
<tr>
<td>CAP mortalityb</td>
<td>All patients</td>
<td>Current</td>
<td>NA</td>
</tr>
</tbody>
</table>

**NOTE.** NA, not applicable.

a Applies to patients 18 years of age and older except for pneumococcal vaccine (age ≥ 65) and influenza vaccine (age ≥ 50).

b Goal is to correlate mortality with compliance with performance measures.
promoting indiscriminate use of antimicrobials by prescribers in an effort to achieve high rates of compliance in patients who have little evidence of pneumonia in order "to not miss a possible case" [10–13]. The actual effect of antibiotic timing on indiscriminate antibiotic use is uncertain since most critical literature has come from single-institution studies providing little national systematic evidence of adverse consequences [11]. Nevertheless, specific timing for this measure was subsequently changed to 6 hours in part to address these concerns [14]. Data collection to more clearly address this question may be facilitated by ASPs acting as an internal, hospital-specific hub for tracking unintended consequences and preventing inappropriate antimicrobial use and overuse.

The current IDSA/ATS pneumonia practice guideline addresses the issue of time to initial dose by focusing on administering the first dose of antimicrobial agent as soon as possible but does not list a specific time; rather, the guideline states that patients admitted through the emergency department receive the first antimicrobial dose before leaving the emergency department [6]. The guidelines writing committee chose this recommendation because of concern that a specific time requirement would result in overuse or inappropriate use of antimicrobial agents [6]. It should also be noted that the present core measure provides exceptions for patients who are transfers from acute care facility, are comfort care only, have received antibiotics within 24 hours prior to arrival, are enrolled in clinical trials, or have "diagnostic uncertainty." Diagnostic uncertainty includes patients whose differential diagnosis includes pneumonia but cannot be confirmed because of atypical presentations (eg, abdominal pain, neurological deficits, ventricular tachycardia) or presentations with pulmonary symptoms of unclear origins (eg, chronic obstructive pulmonary disease, heart failure) [15].

For ASP administrators, the timing measure means developing an ability to quickly address and fill orders and, if needed, rapidly review antimicrobial selection and recommend administration of the first dose in the emergency room (ER) [6]. Potential methods to improve compliance with this core measure and maintain appropriate AS principles include:

- Development of a policy for triaging patients with possible pneumonia diagnosis in the ER area
- Development of standardized order sets—use of electronic records with computerized physician order entry systems can facilitate this process
- Having appropriate antimicrobials readily available in the ER

The core measure of appropriate antimicrobial selection is directly related to ASPs. Appropriate selection of an initial antimicrobial agent is essential for an optimal outcome. Inappropriate initial antimicrobial therapy, as compared with appropriate initial therapy, is associated with prolonged length of hospital stay, greater rates of clinical failure, a greater need for additional antimicrobial therapy, readmission to hospital, and death [14]. Recommended antimicrobial agents are shown in Table 3.

### SURGICAL SITE INFECTIONS: THE SCIP INITIATIVE

Surgical site infections (SSIs), like pneumonia, are a major public health burden. An estimated 2%–5% of ~30 million surgical procedures (1.5 million) result in an SSI each year in the United States [16, 17].

Each infection occurring in hospital is associated with an additional 7–10 hospital days. Estimates of the economic burden of SSIs are widely variable, ranging from $3000 to $29,000, depending on the procedure performed, the type of infection (vide infra), and the type of pathogen [16]. Surgical site infections account for nearly half of all hospital-acquired infections (Figure 1). Up to 60% of SSIs may be preventable [17].

The CDC divides SSIs into 3 subtypes: superficial incisional infections, deep incisional infections, and organ-space infections. The latter 2 are collectively termed complex SSIs [18]. Complex SSIs are serious infections typically requiring additional hospitalization, reoperation, and intravenous antimicrobial therapy. By comparison, superficial infections that generally do not require hospitalization are frequently diagnosed during post-discharge surveillance [18]. SSIs have a diverse etiology; however, the most frequently identified pathogens are methicillin-susceptible and methicillin-resistant Staphylococcus aureus (MRSA) (Figure 2) [19].

The Institute for Healthcare Improvement (IHI) initiated the SCIP project with the goal of preventing SSIs. There are 9 core publicly reported SCIP measures, 4 of which focus on antimicrobial use (Table 4) [20, 21]. The SCIP infection prevention process measures are (1) initiation of prophylactic antimicrobial therapy 1 hour prior to surgery (2 hours for vancomycin because of potential nephrotoxicity).
of its longer infusion time; (2) appropriate antimicrobial selection (Table 5) and dosing according to actual patient body weight; (3) discontinuing antimicrobial therapy within 24 hours of surgery (48 hours for cardiac surgical patients); and (4) appropriate redosing for patients undergoing prolonged procedures [20, 21]. Although participation in SCIP is voluntary, CMS reduces reimbursement for hospitals that fail to report SCIP measures [20].

Collectively, the SCIP infection prevention processes appear to reduce the incidence of SSIs [20]. A recent retrospective analysis evaluated outcomes in 405,720 surgical patients operated on between July 2006 and March 2008 in 398 US hospitals participating in SCIP. There were a total of 3,996 postoperative infections. A composite endpoint of adherence to any 2 SCIP infection-prevention measures was significantly associated with a decreased risk of a postoperative infection from 14.2 to 6.8 per 1000 discharges (adjusted odds ratio [OR], 0.65; 95% confidence interval [CI], .76–.95). The composite endpoint of adherence to all 3 infection-prevention measures predicted a decrease in postoperative infection rates from 11.5 to 5.3 per 1000 discharges, which did not achieve statistical significance (adjusted OR, 0.86; 95% CI, 0.74–1.01) [20]. No individual measure was associated with a reduction in postoperative infections [20]. The results suggest that the totality of the infection-control processes improve patient care to some extent but that other efforts are needed, as well.

Recently, 2 studies attempted to reduce postoperative infections in S. aureus carriers undergoing surgical procedures.

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### Table 3. Centers for Medicare and Medicaid Services Antimicrobial Consensus Recommendations for Community-Acquired Pneumonia [3]

<table>
<thead>
<tr>
<th>Non-ICU patients</th>
<th>ICU patients</th>
<th>Non-ICU patients with pseudomonal risk&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>β-Lactam (IV or IM)&lt;sup&gt;b&lt;/sup&gt; + macrolide (IV or oral)&lt;sup&gt;c&lt;/sup&gt; Or</td>
<td>Macrolide (IV)&lt;sup&gt;d&lt;/sup&gt; + either β-lactam (IV)&lt;sup&gt;e&lt;/sup&gt; or antipseudomococal/antipseudomonal β-lactam (IV)&lt;sup&gt;f&lt;/sup&gt; Or</td>
<td>Antipseudomococal/antipseudomonal β-lactam (IV)&lt;sup&gt;g&lt;/sup&gt; + antipseudomococal/antipseudomonal quinolone (IV or oral)&lt;sup&gt;h&lt;/sup&gt; Or</td>
</tr>
<tr>
<td>Antipeumococcal quinolone monotherapy (IV or oral)&lt;sup&gt;i&lt;/sup&gt; Or</td>
<td>Antipeumococcal quinolone (IV)&lt;sup&gt;j&lt;/sup&gt; or antipseudomococal/antipseudomonal β-lactam (IV)&lt;sup&gt;k&lt;/sup&gt; Or</td>
<td>Antipseudomococal quinolone (IV)&lt;sup&gt;l&lt;/sup&gt; + β-lactam (IV)&lt;sup&gt;m&lt;/sup&gt; Or</td>
</tr>
<tr>
<td>β-Lactam (IV or IM)&lt;sup&gt;b&lt;/sup&gt; + doxycycline (IV or oral) Or</td>
<td>Antipeumococcal/antipseudomonal β-lactam (IV)&lt;sup&gt;n&lt;/sup&gt; + aminoglycoside (IV)&lt;sup&gt;o&lt;/sup&gt; Or</td>
<td>Aztreonam (IV or IM)&lt;sup&gt;p&lt;/sup&gt; + antipeumococcal quinolone (IV or oral)&lt;sup&gt;q&lt;/sup&gt; + aminoglycoside (IV)&lt;sup&gt;r&lt;/sup&gt; Or</td>
</tr>
<tr>
<td>Tigecycline Monotherapy (IV) Or</td>
<td>Macrolide monotherapy (IV or oral)&lt;sup&gt;s&lt;/sup&gt;,&lt;sup&gt;t&lt;/sup&gt;</td>
<td>Aztreonam (IV or IM)&lt;sup&gt;p&lt;/sup&gt; + antipeumococcal quinolone (IV or oral)&lt;sup&gt;q&lt;/sup&gt; + aminoglycoside (IV)&lt;sup&gt;r&lt;/sup&gt; Or</td>
</tr>
</tbody>
</table>

**NOTE.** ICU, intensive care unit; IM, intramuscular; IV, intravenous.


<sup>a</sup> These antibiotics are acceptable for non-ICU patients with pseudomonal risk only.

<sup>b</sup> Ceftriaxone, cefotaxime, ampicillin/subactam, ertapenem (cefpirole soon to be added).

<sup>c</sup> Erythromycin, clarithromycin, azithromycin.

<sup>d</sup> Levofloxacin 750 mg, moxifloxacin, gemifloxacin.

<sup>e</sup> If <65 years of age with no risk factors for drug-resistant Pneumococcus.

<sup>f</sup> Erythromycin, azithromycin.

<sup>g</sup> Cefpirole, cefotaxime, ampicillin/subactam.

<sup>h</sup> Cefepime, imipenem, meropenem, piperacillin/tazobactam, doripenem.

<sup>i</sup> Levofloxacin 750 mg, moxifloxacin.

<sup>j</sup> Ertapenem, aztreonam, levofloxacin.

<sup>k</sup> Gentamicin, tobramycin, amikacin.

<sup>l</sup> If documented β-lactam allergy.

<sup>m</sup> For patients with renal insufficiency.
Bode and colleagues screened 6771 patients for nasal *S. aureus* and found 1251 carriers [26]. Of these, 918 underwent randomization to mupirocin nasal ointment plus chlorhexidine soap or were assigned to placebo. Infection rates were substantially lower with active treatment than placebo for carriers (3.4% vs 7.7%, respectively; relative risk [RR], 0.42; 95% CI, .23–.75). The risk reduction was most pronounced in the incidence of deep SSIs: 0.9% with treatment vs 4.4% with placebo (RR, 0.21; 95% CI, .07–.62) [26].

A similarly conducted study focusing on patients undergoing cardiothoracic surgery also reported that screening and intervention strategies reduced the incidence of SSIs caused by MRSA [27]. In this study, the incidence of SSIs was compared before and after a comprehensive intervention of preoperative screening for MRSA colonization, intravenous vancomycin for carriers, intranasal mupirocin calcium ointment for all patients for 5 days beginning 1 day before surgery, and application of mupirocin to chest-tube sites at the time of removal. The incidence of postoperative MRSA SSIs decreased by 93% from 32 infections per 2767 cases in the preintervention period to 2 infections per 2496 cases after the intervention ($P < .001$) [26].

Although it is unclear if individual SCIP infection prevention measures do, in fact, reduce the incidence of SSIs, it is clear that SSIs are reduced if the measures are collectively implemented, and if other, targeted prevention measures are undertaken. Implementation should be undertaken by a perioperative care committee with leadership from preoperative testing, anesthesia, operating room nursing, pharmacy, and infection control personnel. This collaboration is greatly facilitated by the presence of a physician champion. This individual most commonly will be a surgeon. Here, too, there is a role for ASPs: ensuring antimicrobial selection conforms to guidelines, monitoring start and stop times of therapy, monitoring resistance patterns and implementing control strategies when needed. The net result of these activities is a uniformly applied set of standing orders reflecting national best practices, with limited physician-specific choices.

### QUALITY IMPROVEMENT IN ASYMPTOMATIC BACTERIURIA AND URINARY TRACT INFECTIONS

Asymptomatic bacteriuria (ASB) is frequently overtreated and therefore can be a fruitful area for stewardship intervention in outpatient, long-term care and hospital settings. ASPs should develop education regarding the definition of ASB and the rare situations in which therapy is indicated.

ASB is defined as the presence of a significant colony count of bacteria in the urine without symptoms of an infection [28]. In noncatheterized patients a significant colony count is considered to be $10^5$ colony-forming units/mL in a voided clean-catch specimen; women must have the same organism in at least 2 consecutive voided specimens. In catheterized patients, a significant colony count is considered to be $10^2$ colony-forming units/mL.

### Table 4. Description of Surgical Care Improvement Project (SCIP) Infection-Prevention Measures [20]

<table>
<thead>
<tr>
<th>Individual SCIP measures</th>
<th>Composite Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INF-1:</strong> patients who received prophylactic antibiotics within 1 h prior to surgical incision (2 h if receiving vancomycin)</td>
<td><strong>S-INF-Core:</strong> patient data on all 3 original SCIP measures: INF-1, INF-2, and INF-3</td>
</tr>
<tr>
<td><strong>INF-2:</strong> patients who received prophylactic antibiotics recommended for their specific surgical procedure</td>
<td><strong>S-INF:</strong> all patients with $\geq$2 recorded SCIP infection-prevention measures in a single visit (any combination of INF-1, INF-2, INF-3, INF-4, INF-6, and INF-7)</td>
</tr>
<tr>
<td><strong>INF-3:</strong> patients whose prophylactic antibiotics were discontinued within 24 h after surgery end time (48 h for coronary artery bypass graft surgery or other cardiac surgery)</td>
<td>NOTE. Stulberg JJ et al. Adherence to surgical care improvement project measures and the association with postoperative infections. JAMA. 2010;303:2479-2485. (2010) American Medical Association. All rights reserved.</td>
</tr>
<tr>
<td><strong>INF-4:</strong> cardiac surgery patients with controlled 6 AM postoperative blood glucose level [\leq 200 mg/dL, \leq 11.1 mmol/L]</td>
<td></td>
</tr>
<tr>
<td><strong>INF-6:</strong> surgery patients with appropriate surgical-site hair removal with clippers or depilatory or those not requiring surgical-site hair removal</td>
<td></td>
</tr>
<tr>
<td><strong>INF-7:</strong> colorectal surgery patients with immediate postoperative normothermia (first recorded temperature was $\geq 96.8^\circ F$ within first 15 minutes after leaving the operating room)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4. Description of Surgical Care Improvement Project (SCIP) Infection-Prevention Measures [20]**

**Figure 2.** Percent of SSIs associated with selected pathogens: January 2006–October 2007 [19].
units/mL of 1 or more bacterial species in a single catheter urine specimen. Determining whether bacteriuria in a catheterized patient represents asymptomatic colonization or true infection is particularly challenging because the signs and symptoms of urinary tract infection (UTI) in catheterized patients—fever, rigors, change in mental status, suprapubic or flank pain, and hematuria—can be nonspecific or potentially attributable to another source of infection. It is relevant to note that in both noncatheterized and catheterized patients, the presence of pyuria is not an independent indication for treatment and that its absence suggests an alternative diagnosis.

The prevalence of ABS is surprisingly high even in healthy patients. A prevalence of 1%–5% has been estimated in premenopausal women and 2.8%–8.6% in postmenopausal women. ABS is most prevalent in residents of long-term care facilities (up to 50% of cases in women and 40% of cases in men), and women with diabetes (9%–27%) [29].

Testing for and treatment of ABS is recommended in only a small group of patients. Screening of pregnant women at 12–16 weeks gestation for ABS is recommended because of a strong association between ABS and pyleonephritis during pregnancy [30]. Treatment of ABS also appears to prevent puerperal labor and low birth weight in infants [31]. In addition, treatment is recommended for patients with ABS who are undergoing TURP or other urologic procedures where mucosal bleeding is expected, given the risk of postprocedure urosepsis without treatment [32]. Randomized trials conducted in other populations have not demonstrated a benefit of treating ABS, and many have demonstrated an association with treatment and subsequent emergence of antibiotic-resistant bacteria [33–38].

A few recent studies have demonstrated that inappropriate treatment of ABS occurs in one-third to one-half of patients with urinary catheters and in one-third of patients without urinary catheters [39–41]. Reasons for this high rate of inappropriate treatment are complex, although a reasonable portion of ABS cases are likely treated because clinicians have difficulty ignoring a positive urine culture. A survey of intensive care unit (ICU) physicians in Canada indicated that, although most felt that positive urine cultures were of low risk for leading to subsequent complications such as bacteremia, 19% would treat ABS and 53% would treat ABS in the setting of MRSA pneumonia and systemic inflammatory response syndrome [42].

Educational interventions have been successful in decreasing rates of treatment of ABS and have addressed both the indications for sending a urinalysis and urine culture (to avoid having positive urine cultures that tempt providers to treat) and the interpretation of positive urine cultures. The most robust of these studies have been performed in long-term care settings. Loeb and colleagues performed a cluster-randomized study in 24 nursing homes in Ontario and Idaho to evaluate the effect of diagnosis and treatment algorithms for suspected UTIs combined with education for physicians and nurses on reducing antibiotic prescriptions for suspected UTI [43]. The 12 nursing homes that received the intervention had fewer urine cultures sent and a lower rate of antimicrobial prescriptions for UTIs without differences in need for hospital admission or death [43].

Similar results were seen with an educational intervention at a Veterans Affairs long-term care facility that included feedback to providers about their antimicrobial use [44]. Inappropriate urine collections, cases of ABS treated, and number of antimicrobial days decreased 6 months postintervention, and this was sustained throughout the 30-month follow-up period. Similar interventions and outcomes have also been reported at geriatric and university hospitals [45, 46].

ASPs may also wish to evaluate appropriateness of antimicrobial therapy directed at true UTIs. Such evaluation could include an assessment of the choice of empiric therapy, and, when culture data return, an evaluation of whether the causative pathogen is susceptible to the chosen antibiotic, an agent with an appropriately narrow spectrum is used, and the appropriate duration of therapy is selected.

Recommendations for empiric therapy for UTIs should be evaluated at the institution level given increasing rates of
Escherichia coli resistance to the 2 most commonly prescribed agents for UTI—trimethoprim/sulfamethoxazole and fluoroquinolones. Some authors have suggested that if rates of E. coli resistance to these agents are \( \geq 20\% \), alternative choices for empiric therapy should be employed; annual review of an antibioticgram looking specifically at urine organisms is critical in assessing rates of resistance [47]. Alternatives include first-generation cephalosporins and nitrofurantoin for cystitis and broader-spectrum agents such as ceftriaxone, ertapenem, and cefepime for upper-tract disease or in patients with systemic illness. Therapy should be narrowed when culture data return.

Duration of therapy for uncomplicated UTI in women is 3 days if trimethoprim/sulfamethoxazole or fluoroquinolones are used and 7 days if cephalosporins or nitrofurantoin are used. The recommendation for longer courses with the latter agents relates to studies suggesting higher rates of recurrence when shorter courses are used [47]. Duration of therapy for complicated UTI (eg, male patient, presence of a urologic abnormality) or a catheter-associated UTI (CAUTI) should be 7–14 days based on clinical response to therapy and extent of urinary tract abnormalities. One exception is that women aged 65 or younger with CAUTI can be treated for 3 days if the catheter is removed [48].

**ROLE OF ANTIMICROBIAL STEWARDSHIP PROGRAMS IN QUALITY-IMPROVEMENT INITIATIVES**

ASPs can act as a central hub for all antimicrobial use and should, as per the IDSA stewardship guidelines, play a role in educational initiatives, infection control strategies, and interdepartmental and interdisciplinary communication and collaboration. As such, ASPs can be pivotal in the rollout, implementation, and maintenance of government-sponsored mandatory and voluntary quality improvement programs, as well as locally motivated, hospital-specific initiatives. Importantly, in community hospitals as elsewhere, ASPs can also serve as a launching point for improving the quality of care in specific diseases.

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**References**


