The Core Elements of
Hospital Antibiotic Stewardship Programs

National Center for Emerging and Zoonotic Infectious Diseases
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Introduction

Antibiotics have transformed the practice of medicine, making once lethal infections readily treatable and making other medical advances, like cancer chemotherapy and organ transplants, possible. The prompt initiation of antibiotics to treat infections has been proven to reduce morbidity and save lives, with a recent example being the rapid administration of antibiotics in the management of sepsis.[1] However, 20–50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate.[2–7] Like all medications, antibiotics have serious side effects, including adverse drug reactions and *Clostridium difficile* infection (CDI).[8–11] Patients who are unnecessarily exposed to antibiotics are placed at risk for serious adverse events with no clinical benefit. The misuse of antibiotics has also contributed to the growing problem of antibiotic resistance, which has become one of the most serious and growing threats to public health.[12] Unlike other medications, the potential for spread of resistant organisms means that the misuse of antibiotics can adversely impact the health of patients who are not even exposed to them. The Centers for Disease Control and Prevention (CDC) estimates more than two million people are infected with antibiotic-resistant organisms, resulting in approximately 23,000 deaths annually.[13]

Improving the use of antibiotics is an important patient safety and public health issue as well as a national priority.[14] The 2006 CDC guideline "Management of Multi-Drug Resistant Organisms in Healthcare Settings" stated that control of multi-drug resistant organisms in healthcare "must include attention to judicious antimicrobial use."[15] In 2009, CDC launched the "Get Smart for Healthcare Campaign" to promote improved use of antibiotics in acute care hospitals and in 2013;[16] the CDC highlighted the need to improve antibiotic use as one of four key strategies required to address the problem of antibiotic resistance in the U.S.[13]

A growing body of evidence demonstrates that hospital based programs dedicated to improving antibiotic use, commonly referred to as "Antibiotic Stewardship Programs (ASPs)," can both optimize the treatment of infections and reduce adverse events associated with antibiotic use.[17, 18] These programs help clinicians improve the quality of patient care[19] and improve patient safety through increased infection cure rates, reduced treatment failures, and increased frequency of correct prescribing for therapy and prophylaxis.[20, 21] They also significantly reduce hospital rates of CDI[22–24] and antibiotic resistance.[25, 26] Moreover these programs often achieve these benefits while saving hospitals money.[17, 27–30] In recognition of the urgent need

to improve antibiotic use in hospitals and the benefits of antibiotic stewardship programs, in 2014 CDC recommended that all acute care hospitals implement Antibiotic Stewardship Programs.[7]

This document summarizes core elements of successful hospital Antibiotic Stewardship Programs. It complements existing guidelines on ASPs from organizations including the Infectious Diseases Society of America in conjunction with the Society for Healthcare Epidemiology of America, American Society of Health System Pharmacists, and The Joint Commission.[6, 31, 32] There is no single template for a program to optimize antibiotic prescribing in hospitals. The complexity of medical decision making surrounding antibiotic use and the variability in the size and types of care among U.S. hospitals require flexibility in implementation. However, experience demonstrates that antibiotic stewardship programs can be implemented effectively in a wide variety of hospitals and that success is dependent on defined leadership and a coordinated multidisciplinary approach.[33–36]

Summary of Core Elements of Hospital Antibiotic Stewardship Programs

- **Leadership Commitment:** Dedicating necessary human, financial and information technology resources.
- **Accountability:** Appointing a single leader responsible for program outcomes. Experience with successful programs show that a physician leader is effective.
- **Drug Expertise:** Appointing a single pharmacist leader responsible for working to improve antibiotic use.
- **Action:** Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e. "antibiotic time out" after 48 hours).
- **Tracking:** Monitoring antibiotic prescribing and resistance patterns.
- **Reporting:** Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff.
- **Education:** Educating clinicians about resistance and optimal prescribing.

Leadership Commitment

Leadership support is critical to the success of antibiotic stewardship programs and can take a number of forms, including:

- Formal statements that the facility supports efforts to improve and monitor antibiotic use.
- Including stewardship-related duties in job descriptions and annual performance reviews.
- Ensuring staff from relevant departments are given sufficient time to contribute to stewardship activities.
- Supporting training and education.
- Ensuring participation from the many groups that can support stewardship activities.

Financial support greatly augments the capacity and impact of a stewardship program and stewardship programs will often pay for themselves, both through savings in both antibiotic expenditures and indirect costs.[17, 27–30]

Accountability and Drug Expertise

- **Stewardship program leader:** Identify a single leader who will be responsible for program outcomes. Physicians have been highly effective in this role.[6]
- **Pharmacy leader:** Identify a single pharmacy leader who will co-lead the program.

Formal training in infectious diseases and/or antibiotic stewardship benefits stewardship program leaders.[6, 37, 38] Larger facilities have achieved success by hiring full time staff to develop and manage stewardship programs while smaller facilities report other arrangements, including use of part-time, off-site expertise and hospitalists.[33] Hospitalists can be ideal physician leaders for efforts to improve antibiotic use given their increasing presence in inpatient care, the frequency with which they use antibiotics and their commitment to quality improvement.[37, 38] The Pharmacy and Therapeutics committee should not be considered the stewardship team within a hospital if only performing its traditional duties of managing the formulary and monitoring drug-related patient safety, though in some smaller facilities the pharmacy and therapeutics committee has expanded its role to assess and improve antibiotic use.[33–36]

Key Support

The work of stewardship program leaders is greatly enhanced by the support of other key groups in hospitals where they are available.

- **Clinicians and department heads.** As the prescribers of antibiotics, it is vital that clinicians are fully engaged in and supportive of efforts to improve antibiotic use in hospitals.
- **Infection preventionists and hospital epidemiologists** coordinate facility-wide monitoring and prevention of healthcare-associated infections and can readily bring their skills to auditing, analyzing and reporting data. They can also assist with monitoring and reporting of resistance and CDI trends, educating staff on the importance of appropriate antibiotic use, and implementing strategies to optimize the use of antibiotics.[39]
- **Quality improvement staff** can also be key partners given that optimizing antibiotic use is a medical quality and patient safety issue.
- **Laboratory staff** can guide the proper use of tests and the flow of results. They can also guide empiric therapy by creating and interpreting a facility cumulative antibiotic resistance report, known as an antibiogram. Lab and stewardship staff can work collaboratively to ensure that lab reports present data in a way that supports optimal antibiotic use. For facilities that have laboratory services performed offsite, information provided should be useful to stewardship efforts and contracts should be written to ensure this is the case.
- **Information technology staff** are critical to integrating stewardship protocols into existing workflow. Examples include embedding relevant information and protocols at the point of care (e.g., immediate access to facility-specific guidelines at point of prescribing); implementing clinical decision support for antibiotic use; creating prompts for action to review antibiotics in key situations and facilitating the collection and reporting of antibiotic use data.[40–45]
- **Nurses** can assure that cultures are performed before starting antibiotics. In addition, nurses review medications as part of their routine duties and can prompt discussions of antibiotic treatment, indication, and duration.[46, 47]

Implement Policies and Interventions to Improve Antibiotic Use

Key points

- Implement policies that support optimal antibiotic use.
- Utilize specific interventions that can be divided into three categories: broad, pharmacy driven and infection and syndrome specific.
- Avoid implementing too many policies and interventions simultaneously; always prioritize interventions based on the needs of the hospital as defined by measures of overall use and other tracking and reporting metrics.

Policies that support optimal antibiotic use

Implement policies that apply in all situations to support optimal antibiotic prescribing, for example:

- **Document dose, duration, and indication.** Specify the dose, duration and indication for all courses of antibiotics so they are readily identifiable. Making this information accessible helps ensure that antibiotics are modified as needed and/or discontinued in a timely manner.[4, 48, 49]
- **Develop and implement facility specific treatment recommendations.** Facility-specific treatment recommendations, based on national guidelines and local susceptibilities and formulary options can optimize antibiotic selection and duration, particularly for common indications for antibiotic use like community-acquired pneumonia, urinary tract infection, intra-abdominal infections, skin and soft tissue infections and surgical prophylaxis.

Interventions to improve antibiotic use

Choose interventions based on the needs of the facility as well as the availability of resources and content expertise; stewardship programs should be careful not to implement too many interventions at once.[50] Many potential interventions are highlighted in the CDC/Institute for Healthcare Improvement "Antibiotic Stewardship Driver Diagram and Change Package."[51] Assessments of the use of antibiotics as mentioned in the "Process Measures" section of this document can be a starting point for selecting specific interventions.[52]

Stewardship interventions are listed in three categories below: broad, pharmacy-driven; and infection and syndrome specific.

Broad interventions

- **Antibiotic "Time outs."** Antibiotics are often started empirically in hospitalized patients while diagnostic information is being obtained. However, providers often do not revisit the selection of the antibiotic after more clinical and laboratory data (including culture results) become available.[53–56] An antibiotic "time out" prompts a reassessment of the continuing need and choice of antibiotics when the clinical picture is clearer and more diagnostic information is available. All clinicians should perform a review of antibiotics 48 hours after antibiotics are initiated to answer these key questions:
    - Does this patient have an infection that will respond to antibiotics?
    - If so, is the patient on the right antibiotic(s), dose, and route of administration?
    - Can a more targeted antibiotic be used to treat the infection (de-escalate)?
    - How long should the patient receive the antibiotic(s)?
- **Prior authorization.** Some facilities restrict the use of certain antibiotics based on the spectrum of activity, cost, or associated toxicities[57] to ensure that use is reviewed with an antibiotic expert before therapy is initiated. This intervention requires the availability of expertise in antibiotic use and infectious diseases and authorization needs to be completed in a timely manner.
- **Prospective audit and feedback.** External reviews of antibiotic therapy by an expert in antibiotic use have been highly effective in optimizing antibiotics in critically ill patients and in cases where broad spectrum or multiple antibiotics are being used.[25, 58, 59] Prospective audit and feedback is different from an antibiotic "time out" because the audits are conducted by staff other than the treating team. Audit and feedback requires the availability of expertise and some smaller facilities have shown success by engaging external experts to advise on case reviews.[33]

Pharmacy-driven Interventions

- **Automatic changes from intravenous to oral antibiotic therapy** in appropriate situations and for antibiotics with good absorption (e.g., fluoroquinolones, trimethoprim-sulfamethoxazole, linezolid, etc.),[60, 61] which improves patient safety by reducing the need for intravenous access.

- **Dose adjustments** in cases of organ dysfunction (e.g. renal adjustment).
- **Dose optimization** including dose adjustments based on therapeutic drug monitoring, optimizing therapy for highly drug-resistant bacteria, achieving central nervous system penetration, extended-infusion administration of beta-lactams, etc.[62, 63]
- **Automatic alerts in situations where therapy might be unnecessarily duplicative** including simultaneous use of multiple agents with overlapping spectra e.g. anaerobic activity, atypical activity, Gram-negative activity and resistant Gram-positive activity.[64]
- **Time-sensitive automatic stop orders** for specified antibiotic prescriptions, especially antibiotics administered for surgical prophylaxis.[65]
- **Detection and prevention of antibiotic-related drug-drug interactions** e.g. interactions between some orally administered fluoroquinolones and certain vitamins.

Infection and syndrome specific interventions

The interventions below are intended to improve prescribing for specific syndromes; however, these should not interfere with prompt and effective treatment for severe infection or sepsis.

- **Community-acquired pneumonia.** Interventions for community-acquired pneumonia have focused on correcting recognized problems in therapy, including: improving diagnostic accuracy, tailoring of therapy to culture results and optimizing the duration of treatment to ensure compliance with guidelines.[66–70]
- **Urinary tract infections (UTIs).** Many patients who get antibiotics for UTIs actually have asymptomatic bacteriuria and not infections.[71, 72] Interventions for UTIs focus on avoiding unnecessary urine cultures and treatment of patients who are asymptomatic and ensuring that patients receive appropriate therapy based on local susceptibilities and for the recommended duration.[73–77]
- **Skin and soft tissue infections.** Interventions for skin and soft tissue infections have focused on ensuring patients do not get antibiotics with overly broad spectra and ensuring the correct duration of treatment.[60, 78, 79]

- **Empiric coverage of methicillin-resistant *Staphylococcus aureus* (MRSA) infections.** In many cases, therapy for MRSA can be stopped if the patient does not have an MRSA infection or changed to a beta-lactam if the cause is methicillin-sensitive *Staphylococcus aureus*.[58, 80]

- ***Clostridium difficile* infections.** Treatment guidelines for CDI urge providers to stop unnecessary antibiotics in all patients diagnosed with CDI, but this often does not occur.[81–84] Reviewing antibiotics in patients with new diagnoses of CDI can identify opportunities to stop unnecessary antibiotics which improve the clinical response of CDI to treatment and reduces the risk of recurrence.[82, 85]

- **Treatment of culture proven invasive infections.** Invasive infections (e.g. blood stream infections) present good opportunities for interventions to improve antibiotic use because they are easily identified from microbiology results. The culture and susceptibility testing often provides information needed to tailor antibiotics or discontinue them due to growth of contaminants.[86]

Tracking and Reporting Antibiotic Use and Outcomes

Monitoring antibiotic prescribing

Measurement is critical to identify opportunities for improvement and assess the impact of improvement efforts.[87] For antibiotic stewardship, measurement may involve evaluation of both process (Are policies and guidelines being followed as expected?) and outcome (Have interventions improved antibiotic use and patient outcomes?).

Antibiotic use process measures

Perform periodic assessments of the use of antibiotics or the treatment of infections to determine the quality of antibiotic use. Examples include determining if prescribers have: accurately applied diagnostic criteria for infections; prescribed recommended agents for a particular indication; documented the indication and planned duration of antibiotic therapy; obtained cultures and relevant tests prior to treatment; and modified antibiotic choices appropriately to microbiological findings. Standardized tools such as those for drug use evaluations or antibiotic audit forms like those developed by CDC can assist in these reviews.[88] Likewise, assess if antibiotics are

being given in a timely manner and assess compliance with hospital antibiotic use policies such as the documentation of dose, duration and indication or the performance of reassessments of therapy (antibiotic time outs). These reviews can be done retrospectively on charts which could be identified based on pharmacy records or discharge diagnoses. If conducted over time, process reviews assess the impact of efforts to improve use. For interventions that provide feedback to clinicians, it is also important to document interventions and track responses to feedback (e.g., acceptance).

Antibiotic use measures

Measure antibiotic use as either days of therapy (DOT) or defined daily dose (DDD). DOT is an aggregate sum of days for which any amount of a specific antimicrobial agent is administered or dispensed to a particular patient (numerator) divided by a standardized denominator (e.g., patient days, days present, or admissions).[44, 89] If a patient is receiving two antibiotics for 10 days, the DOT numerator would be 20. An alternative measure of antibiotic use is defined daily dose (DDD). This metric estimates antibiotic use in hospitals by aggregating the total number of grams of each antibiotic purchased, dispensed, or administered during a period of interest divided by the World Health Organization-assigned DDD.[90] DDDs are often available in facilities with pharmacy systems that cannot calculate DOTs. Compared to DOT, DDD estimates are not appropriate for children, are problematic for patients with reduced drug excretion such as renal impairment, and are less accurate for between-facility benchmarking.[91] However, DDDs can be a useful measure of progress when tracked using a consistent methodology over time.[92–95] In addition to measuring overall hospital antibiotic use, antibiotic stewardship programs should also focus analyses on specific antibiotic(s) and hospital locations where stewardship actions are implemented. For example, the assessment of an intervention to improve the treatment of community-acquired pneumonia (CAP) would be expected to impact the use of antibiotics most commonly used to treat CAP on medical wards, rather than surgical wards.

As part of the National Healthcare Safety Network (NHSN), CDC has developed an Antibiotic Use (AU) Option that automatically collects and reports monthly DOT data, which can be analyzed in aggregate and by specific agents and patient care locations. The AU module is available to facilities that have information system capability to submit electronic medication administration records (eMAR) and/or bar coding medication records (BCMA) using an HL7 standardized clinical document architecture. To participate in the AU option, facility personnel can work with their information technology staff and potentially with their pharmacy information software providers to

configure their system to enable the generation of standard formatted file(s) to be imported into NHSN.[44, 89] As more facilities enroll in the AU option, CDC will begin to establish risk adjusted facility benchmarks for antibiotic use. This type of benchmarking has been helpful in improving outcomes in hospital infection control and has been identified by stewardship experts as a high priority for the U.S.[96]

Outcome measures

Track clinical outcomes that measure the impact of interventions to improve antibiotic use. Improving antibiotic use has a significant impact on rates of hospital onset CDI and the current challenge of CDI in hospitals makes this an important target for stewardship programs.[10, 18, 24, 57] An advantage of this measure is that most acute care hospitals are already monitoring and reporting information on CDI into NHSN as part of the Centers for Medicare and Medicaid Services Hospital Inpatient Quality Reporting Program.

Reducing antibiotic resistance is another important goal of efforts to improve antibiotic use and presents another option for measurement. The development and spread of antibiotic resistance is multi-factorial and studies assessing the impact of improved antibiotic use on resistance rates have shown mixed results.[97–99] The impact of stewardship interventions on resistance is best assessed when measurement is focused on pathogens that are recovered from patients after admission (when patients are under the influence of the stewardship interventions). Monitoring resistance at the patient level (i.e. what percent of patients develop resistant super-infections) has also been shown to be useful.[99]

Stewardship programs can result in significant annual drug cost savings and even larger savings when other costs are included.[18, 20, 21, 100] These savings have been helpful in garnering support for antibiotic stewardship programs. If hospitals monitor antibiotic costs, consideration should be given to assessing the pace at which antibiotic costs were rising before the start of the stewardship program.[101] After an initial period of marked costs savings, antibiotic use patterns and savings often stabilize, so continuous decreases in antibiotic use and cost should not be expected; however, it is important to continue support for stewardship to maintain gains as costs can increase if programs are terminated.[30]

Education

Antibiotic stewardship programs should provide regular updates on antibiotic prescribing, antibiotic resistance, and infectious disease management that address both national and local issues.[2] Sharing facility-specific information on antibiotic use is a tool to motivate improved prescribing, particularly if wide variations in the patterns of use exist among similar patient care locations.[102] There are many options for providing education on antibiotic use such as didactic presentations which can be done in formal and informal settings, messaging through posters and flyers and newsletters or electronic communication to staff groups. Reviewing de-identified cases with providers where changes in antibiotic therapy could have been made is another useful approach. A variety of web-based educational resources are available that can help facilities develop education content.[103, 104] Education has been found to be most effective when paired with corresponding interventions and measurement of outcomes.[6]

Emerging Developments in Antibiotic Stewardship

Strategies for improving antibiotic use and evidence for best practices in antibiotic stewardship are evolving. The integration of IT into the clinical data presentation and decision-making for antibiotic use will expand with increased uptake and capabilities of electronic health records. The role of diagnostic laboratory testing is another area of evolution. Rapid diagnostic tests such as procalcitonin, fluorescence in situ hybridization using peptide nucleic acid probes (PNA FISH), and matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) mass spectrometric analysis have been successfully incorporated by some stewardship programs and may become important additions to stewardship efforts.[105–108] The use of these diagnostic tools on patient care is an area of great interest, and further research is needed to determine how they can best be applied to stewardship efforts. Another area of on-going work is better characterization of the impact of antibiotic stewardship interventions on resistance. As more facilities engage in efforts to optimize antibiotic use, future work is needed to evaluate which interventions or antibiotic targets yield the greatest benefit in combating antibiotic resistance. In order to support this work, CDC's NHSN will launch the Antimicrobial Resistance (AR) Option in the summer of 2014 to facilitate evaluation of antimicrobial resistance data using a standardized approach.[89]

Checklist for Core Elements of Hospital Antibiotic Stewardship Programs

The following checklist is a companion to *Core Elements of Hospital Antibiotic Stewardship Programs.* This checklist should be used to systematically assess key elements and actions to ensure optimal antibiotic prescribing and limit overuse and misuse of antibiotics in hospitals. CDC recommends that all hospitals implement an Antibiotic Stewardship Program.

Facilities using this checklist should involve one or more knowledgeable staff to determine if the following principles and actions to improve antibiotic use are in place. The elements in this checklist have been shown in previous studies to be helpful in improving antibiotic use though not all of the elements might be feasible in all hospitals.

LEADERSHIP SUPPORT	ESTABLISHED AT FACILITY
A. Does your facility have a formal, written statement of support from leadership that supports efforts to improve antibiotic use (antibiotic stewardship)?	❑ Yes ❑ No
B. Does your facility receive any budgeted financial support for antibiotic stewardship activities (e.g., support for salary, training, or IT support)?	❑ Yes ❑ No
ACCOUNTABILITY	
A. Is there a physician leader responsible for program outcomes of stewardship activities at your facility?	❑ Yes ❑ No
DRUG EXPERTISE	
A. Is there a pharmacist leader responsible for working to improve antibiotic use at your facility?	❑ Yes ❑ No
KEY SUPPORT FOR THE ANTIBIOTIC STEWARDSHIP PROGRAM ***Does any of the staff below work with the stewardship leaders to improve antibiotic use?***	
B. Clinicians	❑ Yes ❑ No
C. Infection Prevention and Healthcare Epidemiology	❑ Yes ❑ No
D. Quality Improvement	❑ Yes ❑ No
E. Microbiology (Laboratory)	❑ Yes ❑ No
F. Information Technology (IT)	❑ Yes ❑ No
G. Nursing	❑ Yes ❑ No

ACTIONS TO SUPPORT OPTIMAL ANTIBIOTIC USE

POLICIES	POLICY ESTABLISHED
A. Does your facility have a policy that requires prescribers to document in the medical record or during order entry a dose, duration, and indication for all antibiotic prescriptions?	❑ Yes ❑ No
B. Does your facility have facility-specific treatment recommendations, based on national guidelines and local susceptibility, to assist with antibiotic selection for common clinical conditions?	❑ Yes ❑ No

SPECIFIC INTERVENTIONS TO IMPROVE ANTIBIOTIC USE

Are the following actions to improve antibiotic prescribing conducted in your facility?

BROAD INTERVENTIONS	ACTION PERFORMED
C. Is there a formal procedure for all clinicians to review the appropriateness of all antibiotics 48 hours after the initial orders (e.g. antibiotic time out)?	❑ Yes ❑ No
D. Do specified antibiotic agents need to be approved by a physician or pharmacist prior to dispensing (i.e., pre-authorization) at your facility?	❑ Yes ❑ No
E. Does a physician or pharmacist review courses of therapy for specified antibiotic agents (i.e., prospective audit with feedback) at your facility?	❑ Yes ❑ No

PHARMACY-DRIVEN INTERVENTIONS ***Are the following actions implemented in your facility?***	ACTION PERFORMED
F. Automatic changes from intravenous to oral antibiotic therapy in appropriate situations?	❑ Yes ❑ No
G. Dose adjustments in cases of organ dysfunction?	❑ Yes ❑ No
H. Dose optimization (pharmacokinetics/pharmacodynamics) to optimize the treatment of organisms with reduced susceptibility?	❑ Yes ❑ No
I. Automatic alerts in situations where therapy might be unnecessarily duplicative?	❑ Yes ❑ No
J. Time-sensitive automatic stop orders for specified antibiotic prescriptions?	❑ Yes ❑ No

DIAGNOSIS AND INFECTIONS SPECIFIC INTERVENTIONS ***Does your facility have specific interventions in place to ensure optimal use of antibiotics to treat the following common infections?***	ACTION PERFORMED
K. Community-acquired pneumonia	❑ Yes ❑ No
L. Urinary tract infection	❑ Yes ❑ No
M. Skin and soft tissue infections	❑ Yes ❑ No
N. Surgical prophylaxis	❑ Yes ❑ No
O. Empiric treatment of Methicillin-resistant Staphylococcus aureus (MRSA)	❑ Yes ❑ No
P. Non-C. Difficile infection (CDI) antibiotics in new cases of CDI	❑ Yes ❑ No
Q. Culture-proven invasive (e.g., blood stream) infections	❑ Yes ❑ No

TRACKING: MONITORING ANTIBIOTIC PRESCRIBING, USE, AND RESISTANCE

PROCESS MEASURES	MEASURE PERFORMED
A. Does your stewardship program monitor adherence to a documentation policy (dose, duration, and indication)?	❑ Yes ❑ No
B. Does your stewardship program monitor adherence to facility-specific treatment recommendations?	❑ Yes ❑ No
C. Does your stewardship program monitor compliance with one of more of the specific interventions in place?	❑ Yes ❑ No

ANTIBIOTIC USE AND OUTCOME MEASURES	MEASURE PERFORMED
D. Does your facility track rates of C. difficile infection?	❑ Yes ❑ No
E. Does your facility produce an antibiogram (cumulative antibiotic susceptibility report?	❑ Yes ❑ No

Does your facility monitor antibiotic use (consumption) at the unit and/or facility wide level by one of the following metrics:	MEASURE PERFORMED
F. By counts of antibiotic(s) administered to patients per day (Days of Therapy; DOT)?	❑ Yes ❑ No
G. By number of grams of antibiotics used (Defined Daily Dose, DDD)?	❑ Yes ❑ No
H. By direct expenditure for antibiotics (purchasing costs)?	❑ Yes ❑ No

REPORTING INFORMATION TO STAFF ON IMPROVING ANTIBIOTIC USE AND RESISTANCE

A. Does you stewardship program share facility-specific reports on antibiotic use with prescribers?	❑ Yes ❑ No
B. Has a current antibiogram been distributed to prescribers at your facility?	❑ Yes ❑ No
C. Do prescribers ever receive direct, personalized communication about how they can improve their antibiotic prescribing?	❑ Yes ❑ No

EDUCATION

A. Does your stewardship program provide education to clinicians and other relevant staff on improving antibiotic prescribing?	❑ Yes ❑ No

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