Brian Sandoval
Governor

Richard Whitley
Director

State of Nevada
Department of Health and Human Services

Antibiotic Stewardship Standard

Office of Public Health Informatics and Epidemiology
CODY L. PHINNEY, MPH
Administrator, DPBH
March 07, 2017

Nevada Department of Health and Human Services
DIVISION OF PUBLIC AND BEHAVIORAL HEALTH

Statewide Antibiotic Stewardship Tool Kit

David Schmitt-Culp
Health Program Manager
Office of Healthcare Informatics and Epidemiology
775-684-5283
dculp@health.nv.gov

Introduction

Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration. Antimicrobial stewards seek to achieve optimal clinical outcomes related to antimicrobial use, minimize toxicity and other adverse events, reduce the costs of healthcare for infections, and limit the selection for antimicrobial resistant strains

Hospital's Antimicrobial Stewardship Core Elements

- **Leadership Commitment**
- **Accountability**
- **Drug Expertise**
- **Action**
- **Tracking**
- **Reporting**
- **Measurement**

Leadership Commitment

Because ASPs involve many departments and key personnel within a hospital, they must have support from the hospital's executive leadership to ensure they have sufficient budget, authority and resources. A high performing antimicrobial program will require investment in education, software and time. An effective ASP will also demand the attention of management to identify appropriate goals, prioritize policies and monitor program results.

- Including:
  - Formal statements that the facility supports efforts to improve and monitor antibiotic use
  - Ensuring staff from relevant departments are given sufficient time to contribute stewardship activities
  - Supporting training and education

Leadership Commitment cont.

- Accountability documents
- Budget plans
- Infection prevention plans
- Performance improvement plans
- Strategic planning
- Using the electronic health record to collect antimicrobial stewardship data

Accountability

- The success of an ASP depends to a large degree on the active leadership of a local champion, frequently an infectious disease specialist. An effective champion advocates the use of good antimicrobial practices throughout the organization and can persuade other leaders to adopt antimicrobial stewardship practices in their department. Perhaps most importantly, a strong champion commands sufficient respect to enable conversation about the need to change prescribing practices with the hospitals senior physicians, who may be resistant to altering their established practices and preferences without direction communication from a convincing pier.

Note: Part-time staff, consultant staff, and telehealth staff are acceptable as members of the antimicrobial stewardship multidisciplinary team

Drug Expertise

- A senior pharmacist, ideally with training in infectious disease, must also be integrally involved in the program to ensure prescribing practices conform to recommended standards, alert physicians to bug/drug mismatches, and ensure documentation supports appropriate drug, dose and duration for key organisms and conditions.
  - Stewardship program leader: Identify a single leader who will be responsible for program outcomes. 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.
  - Pharmacy Leader: Identify a single pharmacy leader who will co-lead the program.

Action

- ASPs can include a large number of policies and each hospital should determine which it expects to have the biggest effect first, and roll out with policies one at a time. The phased introduction of antimicrobial stewardship elements prevents overload, avoids confusion and ensures adoption of initial strategies before adding more. Ultimately, however, a comprehensive antimicrobial stewardship program will include components that track resistance, encourage appropriate antimicrobial use and work with infection prevention and control to minimize the spread of infections.

Tracking

- Perform periodic assessments of the use of antibiotics or the treatment of infections to determine the quality of antibiotic use.
- Examples include if prescribers have:
  - Accurately applied diagnostic criteria for infections; prescribed recommended agents for 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.
  - Tracking trends of antibiotic resistance patterns should also be performed through the utilization of an anitbiogram.

Reporting

- Regular reports provide feedback to all parties on which policies have been embraced by the organization and where improvements are needed. Reporting enables the hospital to track performance over time, command adoption of best practices, and direct interventions for the greatest impact. High performing ASPs typically share data with prescribers including the hospitals antibiogram and personalized reports on prescribing patterns and opportunities for improvement.
  - periodic assessments of the use of antibiotics to determine the quality of use

Measurement

Determining which strategies are working and which need refinement or increased training require clear metrics and easy access to data from departments throughout the hospital, including microbiology, labs, pharmacy, admission/discharge/transfer and electronic health records.

Measurement cont.

- The impact of an ASP may be assessed by tracking antibiotic use and costs, monitoring changes in hospital and unit antibiogram, and noting rates of healthcare associated infections.
  - Refer to CDC's Standardized Antimicrobial Administration Ration (SAAR)
    - The SAAR metric is constructed by using an indirect standardization method for comparing observed to predicted days of therapy.
    - https://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf

Education

Staff Education:

- Educate all staff and licensed independent practitioners involved in antimicrobial ordering, dispensing, administration, and monitoring about antimicrobial resistance and antimicrobial stewardship practices.
- Educate upon hire and periodically.
- http://www.cdc.gov/getsmart/community/materials-references/print-materials/hcp/index.html

Patient and Family Education

- Educates patients, and their families as needed, regarding the appropriate use of antimicrobial medications, including antibiotics.
- Virus or bacteria chart: http://www.cdc.gov/getsmart/community/downloads/getsmart-chart.pdf

Policies that Support Optimal Antibiotic Use

- Choose interventions based on the needs of the facility as well as the availability of resources and content expertise.
- Stewardship interventions are listed in three categories below:
  - Broad
  - Pharmacy-driven
  - Infection and syndrome specific.

Broad Interventions

- **Antibiotic “time out"** 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 become available. 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 the 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)?

Broad Interventions cont.

Prior Authorization. Preauthorization is a strategy to improve antibiotic use by requiring clinicians to get approval for certain antibiotics before they are prescribed. This intervention requires the availability of expertise in antibiotic use and infectious diseases, and authorization needs to be completed in a timely manner.

- Reduces initiation of unnecessary/inappropriate antibiotics
- Optimizes empiric choices and influences downstream use
- Prompts review of clinical data/prior cultures at the time of initiation of therapy
- Decreases antibiotic costs, including those due to high-cost agents

Broad Interventions cont.

Prospective audit and feedback. Prospective audit and feedback (PAF) is an intervention that engages the provider after an antibiotic is prescribed, and has been shown to improve antibiotic use, reduce antibiotic resistance, and reduce CDI rates. Prospective audit and feedback is different from antibiotic "time out" because the audits are conducted by staff other than the treating team (clinical pharmacist or and/or infectious disease physician).

Broad Interventions cont.

Audit and feedback requires the availability of expertise and some smaller facilities have shown success by engaging external experts to advise on case reviews.

- Can increase visibility of antimicrobial stewardship program and build collegial relationships
- More clinical data available for recommendations, enhancing uptake by prescribers
- Greater flexibility in timing of recommendations
- Can be done on less than daily basis if resources are limited
- Prescriber autonomy maintained

Broad Interventions cont.

Streamlining or de-escalation of therapy. Good stewardship to optimize empirical initial antimicrobial therapy may conflict with good stewardship to promote judicious use, because continuing excessively broad therapy contributes to the selection of antimicrobial resistant pathogens. This conflict can be resolved when culture results become available by streamlining or de-escalating antimicrobial therapy to more targeted therapy that decreases antimicrobial exposure and contains cost.

Broad Interventions cont.

Parenteral to oral conversions. Antimicrobial therapy for patients with serious infections requiring hospitalization is generally initiated with parenteral therapy. Enhanced oral bioavailability among certain antimicrobials allows conversion to oral therapy once a patient meets defined clinical criteria. This can result in reduced length of hospital stay, healthcare costs, and potential complications due to intravenous access

Pharmacy Driven Interventions

- All Med-Surg, ICU, Emergency, and Infusion Center patients receiving antimicrobials will be evaluated for appropriateness of therapy within 24 hours of initiation of therapy. If the Pharmacist determines that an antimicrobial is not optimal, the Pharmacist will contact and collaborate with the Physician on duty to modify the antimicrobial therapy unless modification is otherwise pre-approved by hospital policy.
- Prior to making dosing recommendations, the Pharmacist will review all pertinent information including most recent laboratory results, renal function, other medications ordered, physician notes, etc. to determine the patient's overall status.
- Review culture and sensitivity reports for inpatients daily.

Pharmacy Driven Interventions cont.

- Attend daily interdisciplinary rounds for inpatients and recommend changes to antimicrobial therapy when deemed necessary.
- Reference Carson Valley Medical Center's Antibiotic Stewardship Policy for a list of suggested prescriptions requiring a mandatory pharmacist review.

Microsoft Word
7 - 2003 Documer

Pharmacy Driven Interventions cont.

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

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

- **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.

Pharmacy Driven Interventions cont.

- **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.
- **Time-sensitive automatic stop orders** for specified antibiotic prescriptions, especially antibiotics administered for surgical prophylaxis.
- **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

Performs secondary monitoring and review of all positive cultures, STIs, and other infectious organisms for antibiotic appropriateness (primary monitoring and intervention will be done by department nursing staff). This information is also used to identify any potential HAIs. Any discrepancies will be forwarded to the treating provider if not already addressed by other clinical staff.

- Keep a log of all positive cultures, STIs, and other infectious organisms and antimicrobials used for these organisms.
- Perform investigation of any possible outbreaks of infectious organisms.
- Collaborate with and report to the Nevada Division of Public and Behavioral Health as necessary.
- Monitor for HAIs using NHSN criteria and report to the ASC, administration, applicable clinical department, and Board of Directors.

Infection and Syndrome Specific Interventions cont.

- **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.
- **Urinary Tract Infections (UTIs).** Many patients who get antibiotics for UTIs actually have asymptomatic bacteriuria and not infections. Interventions for UTIs focus on avoiding unnecessary urine cultures and treatment of patients receive appropriate therapy based on local susceptibilities and for the recommended duration.

Infection and Syndrome Specific Interventions cont.

- **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.
- **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.*

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

Infection and Syndrome Specific Interventions cont.

- ***Clostridium difficile* Infections.** C. diff infection therapy should be based on the principle of: treat the symptom/patient, not the test result. The PCR test may be 100% sensitive, but only a 45% positive predictive value for CDI-actual disease (Polage CR, et al., 2015).
  - 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 reduce the risk of recurrence.
- **Treatment of Culture Proven Invasive Infections.** Invasive infection (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.

Microbiology Laboratory

The clinical microbiology laboratory plays a critical role in the timely identification of microbial pathogens and the performance of susceptibility testing. Prioritization of tested antimicrobials and selective reporting of susceptibility profiles (e.g., not routinely reporting susceptibility of S*. aureus* to rifampin to prevent inadvertent monotherapy with rifampin) can aid in the prudent use of antimicrobials and direct appropriate therapy based on the local guidelines. The advance of molecular diagnostics allows the identification of difficult-to-culture pathogens, potentially avoiding the need for extended courses of broad spectrum empirical therapy.

- Provide an easily accessible antibiogram on a routine basis.
- Report all positive cultures, STIs, and other infectious organisms to Infection Control.
- Alert Infection Control with any unusual increase in findings of an infectious organism
- C. diff is not necessarily a laboratory defined diagnosis, but must be based on clinical signs and symptoms and only then backed up by lab tests if needed (Polage CR, et al., 2015).

Tools to Support an Effective Antibiotic Stewardship Program

- Increased focus on medical errors and patient safety led to a series of reports by the Institute of Medicine's National Roundtable on Health Care Quality to emphasize the role of information technology in the delivery of healthcare. The Leapfrog Group has identified computer physician order entry (CPOE) as 1 of the 3 most important "leaps" that organizations can take to substantially improve patient safety. CPOE has the potential to incorporate clinical decision support and to facilitate quality monitoring.

Tools to Support an Effective Antibiotic Stewardship Program cont.

- Automated systems that combine surveillance and clinical decision support tools provide a strong foundation for ASPs by generating alerts on HAIs and MDRO trends, flagging bug/drug mismatches and unnecessary therapy, prompting changes in delivery methods (IV to oral), indicating "time outs" to verify antibiotic need, and tracking patient indicators of adjustments needed to dosage or medication.

Tools to Support an Effective Antibiotic Stewardship Program cont.

- They also identify patients who receive antimicrobial therapy that are likely to be inadequate or ineffective, based on microbiology and lab results matched against patient record and pharmacy data.
- In addition, automated systems can generate a real-time continuously updated antibiogram that provides timely, facility specific data for a range of customizable reports. These reports enable management to see the effectiveness of the program in terms of the organization's preselected metrics such as prescribing trends, costs, interventions and patient outcomes. They also provide clear feedback to prescribers about their antimicrobial use patterns, compliance with ASP policies, and opportunities for care improvement

Tools to Support an Effective Antibiotic Stewardship Program cont.

Data Analysis Software Desirable Characteristics:

- Capability to send data through real-time interface or periodically export results to an analysis program
- Consistent format to facilitate analysis and interpretation of data
- Ability to import all verified, finalized susceptibility test results
- Software must be versatile and flexible
  - Analyze data for a defined time period
  - Remove or edit incorrect data

Conclusions

This guideline discuses a broad range of possible ASP interventions. We have emphasized the need for each site to assess its clinical needs and available resources and individualize its ASP with that assessment in mind.

Despite the recognition that much more research is needed, this guideline identifies core interventions for all ASPs as well as other interventions that can be implemented based on facility-specific assessments of need and resources. Every healthcare facility is able to perform stewardship, and institution of an ASP is attainable and of great importance to public health.

References

American Society of Health-System Pharmacists. "A Hospital Pharmacist's Guide to Antimicrobial Stewardship Programs." Retrieved from http://www.ashpadvantage.com/docs/stewardship-white-paper.pdf

Barlam et al. Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. *Clin Infect Dis* 2016;62:51-77

Boucher HW et al. Bad Bugs, No Drugs: No ESKAPE! An Update from the Infectious Diseases Society of America. Clin Infect Dis. 2009 Jan 1;48(1):1-12.

Centers for Disease Control and Prevention. "Core Elements of Hospital Antibiotic Stewardship Program." *US Department of Health and Human Services, CDC*; 2014. Retrieved from https://www.cdc.gov/getsmart/healthcare/pdfs/core-elements.pdf

Centers for Disease Control and Prevention. "Get Smart for Healthcare: Know When Antibiotics Work." *National Center for Emerging and Zoonotic Infectious Disease. Division of Healthcare Quality Promotion*. Retrieved from https://www.cdc.gov/getsmart/community/index.html

Centers for Disease Control and Prevention. "Antibiotic resistance threats in the United States." *Center for Disease Control and Prevention* 2013. Retrieved from https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf

Chang HT, et al. Onset of Symptoms and Time to Diagnosis of Clostridium difficile–Associated Disease Following Discharge From an Acute Care Hospital". *Infection Control & Hospital Epidemiology*, 28(8), pp. 926–931. doi: 10.1086/519178

Dellit et al. "Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship." *Clin Infect Dis* 2007; 44 (2): 159-177. doi: 10.1086/510393

Fridkin S, Baggs J, Fagan R, et al. Vital signs: improving antibiotic use among hospitalized patients. MMWR Morb Mortal Wkly Rep. Mar 7 2014;63(9):194-200.

Joint Commission. "New Antimicrobial Stewardship Standard.". *Joint Commission Perspectives.* 2016, 33 (7):1-8. Retrieved from https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf

Polage CR, et al. Overdiagnosis of *Clostridium difficile* Infection in the Molecular Test Era. *JAMA Intern Med.* 2015;175(11):1792-1801. doi:10.1001/jamainternmed.2015.4114

Spellberg B. New Antibiotic Development: Barriers and Opportunities in 2012. APUA (30):1. 2012.

Spellberg B, Barlett JG, Gilbert DN. The Future of Antibiotic Resistance. N Engl J Med 2013; 368:299-302January 24, 2013DOI: 10.1056/NEJMp1215093

World Health Organization. Antimicrobial resistance: no action today, no cure tomorrow, 2011. Retrieved from http://www.who.int/dg/speeches/2011/WHD_20110407/en/

Additional Resources

- Charles Krasner M.D ckrasner@med.unr.edu

C. diff Jan 26 2017.pptx

- James Wilson M.D. FAAP jameswilson@unr.edu
  University of Nevada, Reno Antimicrobial Resistance Intelligence System

- Lei Chen Ph.D lchen@washoecounty.us
  Washoe County Antibiogram http://tinyurl.com/WashoeAntibiogram

- University of Nevada, Reno School of Medicine Project Echo http://med.unr.edu/echo

- Cara Cruz, B.A., RN, CIC ccruz@cvmchospital.org

Microsoft Word 7 - 2003 Documer