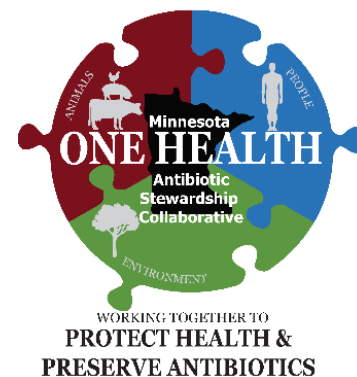


Recommendations for Optimizing Antimicrobial Stewardship Programs

MOHASC HUMAN HEALTH WORK GROUP



Purpose

The Minnesota One Health Antibiotic Stewardship Collaborative (MOHASC) Human Health Work Group seeks to provide state-specific guidance for antimicrobial stewardship programs (ASP) to improve antimicrobial use and reduce the development of resistance. These recommendations expand upon those of national organizations and regulatory agencies to provide further specificity on designing effective ASPs.

This document provides antimicrobial stewardship recommendations for the following settings:

- Acute care hospitals and health systems.
- Critical access hospitals.
- Long-term care, skilled nursing facilities, and nursing homes.
- Outpatient centers including ambulatory clinics, urgent care, dental offices, and dialysis centers.

Goals

1. Suggest resource allocation minimums to support the development of new programs or expansion and sustainability of existing programs.
2. Provide expert opinion on resource utilization to improve program effectiveness.
3. List key resources and examples of successful programs in a convenient format.

Recommendation development process

These recommendations were initially drafted by the MOHASC Human Health Work Group subcommittee on ASP guidelines. Subcommittee members included three infectious diseases pharmacist members with experience in both inpatient and outpatient antimicrobial stewardship and one epidemiologist member from the Minnesota Department of Health. Recommendations were developed using existing literature, organizational guidelines such as the Centers for Disease Control and Prevention (CDC), and expert opinion from committee members. An initial draft was reviewed by the Human Health Work Group, Minnesota Antimicrobial Stewardship Network for Pharmacists, Minnesota Department of Health experts, and Hennepin County Long-term Care Stewardship Subcommittee. Input was sought and incorporated from a variety of practice settings over the course of one year. The Human Health Work Group subcommittee aims to review and revise these recommendations annually or as compelling information arises.

Program resource recommendations

Acute care hospitals

Adequate ASP resources are a key driver of program success. One study found that each 0.5 increase in ASP full-time employee (FTE) resulted in 58% increased odds of program effectiveness (Doernberg, 2018), yet most programs are perceived as under-staffed. Only 7% of programs in a national survey reported no financial barriers to program success (Doernberg 2018). The CDC Antimicrobial Stewardship Core Elements for acute care, critical access hospitals, nursing homes, and outpatient environments refer to accountability, expertise, and informational technology support as essential components of ASPs. They describe the need for designated leaders that are accountable for program development and impact but make no recommendation on optimal personnel resources. Studies to suggest optimal staffing ratios are largely based on expert opinion, and national recommendations vary widely from 2 to 6.7 FTEs per 1000 beds (Pulcini, 2017).

The Centers for Medicare and Medicaid Services (CMS) indicate a minimum pharmacist FTE of 1.0 and physician of 0.4 for an average size hospital (approximately 124 beds) as well as a minimum of 0.05 analyst FTE to assist with dashboard maintenance and/or on demand data needs. There are inherent limitations to designing staffing minimums around current program resources, especially given the large number of programs that describe themselves as ‘under-resourced.’ Echevarria and colleagues developed and validated an ASP resource calculator to account for both program management time as well as direct patient care activities. They determined that the optimal pharmacist staffing ratio was 6.7 FTEs per 1000 beds (Echevarria, 2017). This is the only study to date that has relied on objective time parameters and tasks rather than expert opinion. Some activities listed in this calculation may not apply to all centers, such as time for outpatient parenteral antimicrobial therapy (OPAT) management or review of surgical prophylaxis.

Based on the available evidence, an FTE-to-bed ratio described by several studies is a reasonable minimum (1.4 FTEs for 100-300 beds; 1.6 FTEs for 301-500; 2.6 FTEs for 501-1000; 4.0 FTEs for >1000 in a physician-to-pharmacist ratio of 1:3) (Doernberg 2018, Greene 2019). The American College of Clinical Pharmacists recently published a white paper on pharmacist staffing ratios which recommended three ASP pharmacists per 1000 beds (Martello, 2024). Based on these minimums and the calculations developed by Echevarria, a reasonable *ideal* staffing target should include two FTEs for 100-300 beds; three FTEs per 301-500; five FTEs per 501-1000; and eight FTEs for >1000 beds.

It should be noted that minimum FTE recommendations do not necessarily reflect best practice and may not generate the desired program goals. FTE requirements do not increase linearly with bed size since program management activities have similarities irrespective of bed size. Complexities associated with navigating multi-hospital programs are difficult to account for in these bed-size estimates. Complex patient populations such as transplant and burn and patient acuity are also difficult to account for and may require more resource support.

A minimum analyst time of 0.05 is required for optimal data tracking and outcome reporting as suggested by CMS. Analyst FTEs are difficult to estimate given lack of published data and variability of self-service data platforms across institutions. Larger, more robust programs with limited access to institutional dashboards may require more support.

Critical access hospitals

There is significantly less data available to guide adequate staffing for critical access hospitals. Establishing a program leader with pharmacist expertise is recommended by the CDC Core Elements for critical access hospitals. This can be accomplished with existing or contracted staff members who are present on or off site. We recommend small and critical access hospitals have reasonable access to infectious diseases (ID) expertise (physician or pharmacist) when needed. This could be through regularly scheduled stewardship rounds with an ID pharmacist or physician, on-demand telehealth, or access to on-call providers at affiliated hospitals. Health systems may consider including affiliated small or critical access hospitals in their bed-size and FTE estimates to provide equitable stewardship resources to all sites.

Long-term care facilities and nursing homes

According to CDC, long-term care facility (LTCF) and nursing home (NH) ASP leaders may include the medical director, director of nursing, and a consultant pharmacist. There is no published data to guide optimal staffing resources for LTCFs. CMS mandates that institutional infection prevention (IP) programs include antimicrobial stewardship, yet NH IP programs have an average of only 0.32 FTEs (Stone 2019). NHs often lack on-site clinicians and rely primarily on nursing staff to monitor residents. Lack of trained ID physicians and pharmacists has been identified as a significant barrier to implementing antimicrobial stewardship in LTCFs (Morrill, 2016), and availability of personnel with antimicrobial stewardship expertise has been associated with improvements in program sustainability (Seshadri 2021). Given the high rate of unnecessary antibiotic use within NHs and LTCFs and drug-resistant colonization of residents (Peron 2017, Gentjes 2021), we recommend facilities include clinicians with ID experience or training in their program development and have access to ongoing support for patient-specific questions. The optimal dedicated FTE for antimicrobial stewardship is unclear.

Outpatient settings

Outpatient antimicrobial stewardship programs also lack robust data to guide clear FTE recommendations (Louis 2021, Eudy 2020). The Society of Infectious Diseases Pharmacists has advocated for the critical role of pharmacists in outpatient stewardship programs similar to inpatient models (Blanchette 2018). There are several notable differences between acute care and outpatient ASPs. First, there are limited opportunities for financial justification of outpatient ASP related to reducing antibiotic prescriptions which can limit institutional support for these programs. Second, FTEs are unlikely to correlate with number of clinics or prescription volume unlike acute care correlations based on bed size. Lastly, prospective audit and feedback is generally not feasible in the outpatient setting, therefore more FTE time can be spent on program management, data tracking, and education. Based on an extrapolation of time spent on program management in acute care settings (0.67 FTE/1000 beds) (Echevarria 2017), it is reasonable to suggest that an outpatient program may be successfully accomplished by a minimum of 0.5 pharmacist FTE for facilities with >50-100 clinics and urgent cares. This recommendation is based on expert opinion.

Summary of recommendations for antimicrobial stewardship program resources by setting

	Acute Care Hospitals	Critical Access Hospitals	Long-term Care Facilities/ Nursing Homes	Outpatient Settings
Recommendations	Pharmacist and Physician co-leaders Physician-to-Pharmacist ratio of 1:3 Minimum: 1.4 FTEs for 100-300 beds 1.6 FTEs for 301-500 beds 2.6 FTEs for 501-1000 beds 4.0 FTEs for >1000 beds Ideal: 2 FTEs for 100-300 beds 3 FTEs per 301-500 beds 5 FTEs per 501-1000 beds 8 FTEs for >1000 beds Analyst time: Minimum of 0.05 FTE, ideal time is unknown and variable based on existing IT support Sufficient information technology and/or informatics support is essential to program success Ideal time is unknown, but programs should have access to support within a reasonable time period (e.g., the ability to implement electronic health record interventions within six months of conception)	There is insufficient data to make recommendations for dedicated FTEs Minimum resources: Recommend access to clinician or pharmacist with antimicrobial stewardship expertise and/or ID telehealth	There is insufficient data to make recommendations for dedicated FTEs Minimum resources: Recommend access to clinician or pharmacist with antimicrobial stewardship expertise and/or ID telehealth	Recommend optimizing acute care resources and leveraging existing program resources to support outpatient environments Minimum resources: 0.5 pharmacist FTE for large networks of clinics and urgent care facilities (e.g., > 50-100 facilities)
Basis of Recommendations	Evidence-based and expert opinion	Expert opinion	Expert opinion	Expert opinion

Recommendations for antimicrobial stewardship program priorities by setting

Leadership commitment

The best indicator of leadership commitment is demonstrating adequate financial support for the program and ensuring adequate resources are available to meet the program's goals, as described above in the [program resource recommendations](#) section. An executive sponsor should be appointed and meet regularly with program leaders. The sponsor should provide guidance on strategies to achieve program goals and assistance in overcoming perceived barriers. Hospital leaders should support ASP leaders' training and development through online or in-person courses and continuing education.

Acute care hospitals

- Allocate financial resources for program staffing and information technology to support the ASP.
- Hospital leaders ensure program staff have sufficient time and resources to operate the program effectively.

Critical access hospitals

- Issue formal board-approved statement on importance of ASP and include in hospital's annual report.
- Integrate stewardship activities into ongoing quality improvement and/or patient safety efforts in the hospital (e.g., efforts to improve sepsis management).

Long-term care facilities and nursing homes

- Include stewardship-related duties in position descriptions for the medical director, clinical nurse leads, and consultant pharmacists in the facility.
- Communicate with nursing staff and prescribing clinicians the facility's expectations about antibiotic use, monitoring, and enforcement of ASP policies.

Outpatient settings

- Promote organizational leadership commitments to antimicrobial stewardship by displaying , commitment posters, screensavers, marketing materials, etc. during patient encounters.
- Create formal, written outpatient antimicrobial stewardship statement supporting efforts to improve and monitor antibiotic use in outpatient settings.

Accountability

Ideally, every ASP should have a designated leader responsible for program outcomes with ASP responsibilities listed in their job description(s). Program leaders should establish yearly goals and metrics and assume responsibility to program outcomes.

Acute care hospitals

- Co-leaders are appointed, including a physician and pharmacist.
- ASP physician and/or pharmacist leader(s) have ASP responsibilities in their contract, job description, or performance review.
- ASP physician and/or pharmacist leader(s) have completed infectious diseases specialty training, certificate program, or other antimicrobial stewardship training.

Critical access hospitals

- Designate a physician in the C-suite (e.g., chief marketing officer [CMO]) or individual reporting to C-suite to be accountable for ASP outcomes.
- Appoint physician and/or pharmacy leader to provide support to ASP.

Long-term care facilities and nursing homes

- Empower the medical director to set standards for antibiotic prescribing practices for prescribers in facility and be accountable for overseeing adherence.
- Engage the consultant pharmacist in supporting ASP oversight through quality assurance activities (e.g., antibiotic prescription review, antibiotic use (AU) reporting).
- Empower the nursing director to set practice standards for assessing, monitoring, and communicating changes in residents' condition by front-line nursing staff.

Outpatient settings

- Appoint designated leader, or co-leaders, who are accountable for ASP activities.
- Include ASP-related duties in position descriptions or job evaluation criteria.

Pharmacy expertise

Appointment of leaders with infectious diseases pharmacy training is likely to improve program effectiveness. Facilities should financially support program leaders' initial and/or ongoing antimicrobial stewardship education and training.

Acute care hospitals

- A pharmacist is appointed as a leader or co-leader of the program.

Critical access hospitals

- Appoint a pharmacist leader, ideally someone who is on-site either full- or part-time.

Long-term care facilities and nursing homes

- Work with a consultant pharmacist with specialized infectious diseases or antimicrobial stewardship training.

Outpatient settings

- Include pharmacist expertise in program structure, developing goals, and measuring outcomes.

Action

Examples provided below describe common program interventions detailed in the CDC Core Elements. Much of the antimicrobial stewardship literature is limited to retrospective, quasi-experimental studies, and/or institution-specific outcomes that may not be applicable to all types of facilities and patient populations. These interventions do not necessarily represent the only or most efficient way to improve outcomes. Program leaders should identify facility-specific areas of opportunity and develop individualized goals and metrics.

Acute care hospitals

- Document dose, duration, and indication within the medical record.
- Develop and implement facility-specific treatment recommendations, based on national guidelines and local susceptibility, to assist with antibiotic selection for common clinical conditions.
- Perform prospective audit and feedback or preauthorization for specific antibiotic agents (e.g., restricted antibiotic policy).
- Implement strategies to improve clinician adherence to guideline-based treatments.
- Improve use of diagnostic tests that influence treatment decisions (e.g., urine cultures, rapid diagnostics, or procalcitonin tests).
- Improve treatment of penicillin allergic patients through education, allergy history optimization, and/or de-labeling.

Critical access hospitals

- Require an indication for therapy when antibiotics are ordered.
- Implement interventions to improve antibiotic use for community-acquired pneumonia (CAP), urinary tract infections (UTI), and skin and soft tissue infections (SSTIs).
- Identify opportunities for intravenous to oral conversion.
- Engage nurses in antimicrobial stewardship actions.

[John Hopkins Medicine: Toolkit to Enhance Nursing and Antibiotic Stewardship Partnership \(www.hopkinsmedicine.org/antimicrobial-stewardship/nursing-toolkit\)](http://www.hopkinsmedicine.org/antimicrobial-stewardship/nursing-toolkit)

Long-term care facilities and nursing homes

- Document dose, duration, and indication.
- Establish diagnostic stewardship practices for microbiology testing (e.g., avoid “test of cure” with urine culture and *C. difficile* stool tests, appropriate use of wound cultures).
- Develop patient assessment algorithms for suspected infections.
[Loeb and McGeer Criteria: A Practical Guide for Use in Long-term Care \(www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/lrc/loebmcgeer.pdf\)](http://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/lrc/loebmcgeer.pdf)
- Implement structured communication tools to guide nursing-physician interactions for suspected infections.

- Develop facility-specific treatment recommendations for CAP, UTI, and SSTIs with shortest effective antibiotic durations.
- [CDC Core Elements Appendix A: Policy and Practice Actions to Improve Antibiotic Use for Nursing Homes \(www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-appendix-a-508.pdf\)](https://www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-appendix-a-508.pdf)

Outpatient settings

- Establish diagnostic and treatment recommendations for common conditions (e.g., bronchitis, bronchiolitis, common cold, acute otitis media, sinusitis, pharyngitis, UTI, SSTIs) including supportive care.
- Integrate clinical decision support into clinician workflows to assist in diagnostic and therapeutic choices.
- Improve treatment of penicillin allergic patients through education, allergy history optimization, and/or de-labeling.
- Offer communication skills training to assist prescribers in addressing patient expectations around antibiotics.

Tracking and Reporting

Tracking ASP-related metrics allows programs to measure the impact of interventions on antimicrobial use and patient outcomes. This information can be impactful when designing or re-designing action plans to improve the use of antibiotics and inform future program efforts. Reporting these data are important to engaging clinicians and other hospital leaders in antimicrobial stewardship. When feasible, balanced metrics should be incorporated into the evaluation of new interventions to ensure no patient harm occurred and further motivate clinicians and hospital leaders to fully adopt interventions (e.g., readmissions, need for additional antibiotics, repeat ER/office visit). Providing adequate, thoughtful data on the impact of the intervention will increase leadership, clinician, and nursing buy-in for present and future interventions.

Acute care hospitals

- Monitor antibiotic use at unit and facility level (e.g., DOT/1000 patient days).
- Submit antibiotic use and resistance data (AU/AR) to CDC's National Healthcare Safety Network (NHSN).
- Produce facility antibiogram in collaboration with the Microbiology Laboratory Department.
- Monitor adherence to facility-specific treatment recommendations for one or more common clinical conditions.
- Provide a yearly report on program initiatives and outcomes to executive sponsor, facility leadership, and prescribers at least yearly.
- [Duke Antimicrobial Stewardship Outreach Network: Leveraging National Health Safety Network Antibiotic Use Data to Inform, Implement and Assess Antibiotic Stewardship Activities \(https://dason.medicine.duke.edu/research-publications/leveraging-national-health-safety-network-antibiotic-use-data-inform\)](https://dason.medicine.duke.edu/research-publications/leveraging-national-health-safety-network-antibiotic-use-data-inform)

Critical access hospitals

- Monitor antibiotic use. If feasible, track through CDC NHSN AU.
- Monitor adherence to treatment recommendations for CAP, UTI, and SSTI.
- Share regular reports on antibiotic use measures with prescribers and leadership.

Long-term care facilities and nursing homes

- Monitor adherence to facility antibiotic use policies and practices.
- Track antibiotic use patterns (e.g., days of therapy (DOTs) or point prevalence assessments) pre and post ASP interventions.
- Track *C. difficile* rates and adverse drug events related to antibiotics.
- Share data with clinicians and nurses to maintain awareness about the progress in AS.
- [CDC Core Elements Appendix B: Measures of Antibiotic Prescribing, Use and Outcomes for Nursing Homes \(www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-appendix-b-508.pdf\)](http://www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-appendix-b-508.pdf)
- [CDC Core Elements Appendix C: Data Sources, Elements, and Measures for Tracking Antibiotic Use in Nursing Homes \(www.cdc.gov/antibiotic-use/core-elements/pdfs/Nursing-Homes-Core-Elements-C-508.pdf\)](http://www.cdc.gov/antibiotic-use/core-elements/pdfs/Nursing-Homes-Core-Elements-C-508.pdf)

Outpatient settings

- Track and report metrics on antibiotic prescribing practices (e.g., percent of all visits leading to antibiotic prescriptions).
- Track antibiotic prescribing rate for ≥ 1 high-priority condition (e.g., bronchitis, a Tier 3 condition for which antibiotics are almost never indicated).
- Track use of first-line antibiotics for specific infections (e.g., penicillin or amoxicillin for pharyngitis).
- Track and compare duration of antibiotic prescriptions to institutional or national guideline recommendations.
- [CDC: Measurement and evaluation approaches to improve outpatient antibiotic prescribing in health systems \(www.cdc.gov/antibiotic-use/pdfs/measurement-evaluation-improve-outpatient-508.pdf\)](http://www.cdc.gov/antibiotic-use/pdfs/measurement-evaluation-improve-outpatient-508.pdf)
- [JAC-Antimicrobial Resistance: Metrics for evaluating antibiotic use and prescribing in outpatient settings \(https://pubmed.ncbi.nlm.nih.gov/34286273/\)](https://pubmed.ncbi.nlm.nih.gov/34286273/)
- [Journal of the Pediatric Infectious Diseases Society: Benchmarking of Outpatient Pediatric Antibiotic Prescribing \(https://pubmed.ncbi.nlm.nih.gov/37262431/\)](https://pubmed.ncbi.nlm.nih.gov/37262431/)
- [JAMA Network Open: Implementation of an Antibiotic Stewardship Initiative in a Large Urgent Care Network \(https://pubmed.ncbi.nlm.nih.gov/37166794/\)](https://pubmed.ncbi.nlm.nih.gov/37166794/)
- [Open Forum Infectious Diseases: Evaluation of Multisite Programmatic Bundle to Reduce Unnecessary Antibiotic Prescribing for Respiratory Infections: A Retrospective Cohort Study \(https://pubmed.ncbi.nlm.nih.gov/38111752/\)](https://pubmed.ncbi.nlm.nih.gov/38111752/)

Education

Education is a core tenet of every ASP and should target clinicians, pharmacists, nurses, and patients. Education can encompass general tenets of appropriate antibiotic use, disease-specific updates, institutional ASP information, or patient-specific recommendations. Education can take various forms such as print materials, talking points for clinicians, electronic tools within the medical record (decision support), presentations, and one-on-one conversations with ASP staff (e.g., handshake stewardship). Educational efforts can be difficult to sustain at facilities with revolving staff, such as medical residents; therefore, programs should develop education strategies specific to the needs of their institutions.

Acute care hospitals

- Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.
- Educate all staff on the institution ASP and resources.

Critical access hospitals

- Provide education on optimizing diagnosis and treatment for CAP, UTI, and SSTI to clinicians.
- Include information on antibiotics in patient education materials.
[CDC: You've Been Prescribed an Antibiotic in the Hospital for an Infection \(www.cdc.gov/antibiotic-use/media/pdfs/Inpatient-Fact-Sheet-P.pdf\)](http://www.cdc.gov/antibiotic-use/media/pdfs/Inpatient-Fact-Sheet-P.pdf)

Long-term care facilities and nursing homes

- Provide education and/or academic detailing to clinical providers and nursing staff on goal of antibiotic stewardship intervention and the responsibility of each group for ensuring its implementation.
- Offer effective communication strategies to nursing home prescribers.
- Provide patient and family education about antibiotics in nursing homes.
- [Nursing Home Healthcare Professionals: Be Antibiotics Aware \(www.cdc.gov/antibiotic-use/pdfs/NursingHome-Toolkit-508.pdf\)](http://www.cdc.gov/antibiotic-use/pdfs/NursingHome-Toolkit-508.pdf)

Outpatient settings

- Provide continuing education or maintenance of certification training to prescribers, pharmacists, and related leaders on appropriate antibiotic use.
- Ensure timely access to people with expertise.
- Provide patient educational resources on appropriate antibiotic use and antibiotic-related adverse events.

Resources for Antimicrobial Stewardship Programs

Minnesota Department of Health

- [MDH: Antimicrobial Stewardship Programs \(ASP\)](http://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/index.html)
(www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/index.html)
- [Minnesota Antimicrobial Stewardship Program Resources for Long-term Care Facilities](http://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/ltc/index.html)
(www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/ltc/index.html)
- [Acute Care Antibiotic Stewardship Program Resource List](http://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/ac/aspresources.pdf)
(www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/ac/aspresources.pdf)
- [Minnesota Antimicrobial Stewardship Program Toolkit for Outpatient Clinics](http://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/out/index.html)
(www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/out/index.html)

CDC Core Elements

- [CDC: Core Elements of Antibiotic Stewardship](http://www.cdc.gov/antibiotic-use/core-elements/index.html) (www.cdc.gov/antibiotic-use/core-elements/index.html)
- [CDC: Core Elements of Hospital Antibiotic Stewardship Programs](http://www.cdc.gov/antibiotic-use/hcp/core-elements/hospital.html) (www.cdc.gov/antibiotic-use/hcp/core-elements/hospital.html)
- [CDC: Priorities for Hospital Core Element Implementation](http://www.cdc.gov/antibiotic-use/media/pdfs/hospital-core-elements-priorities-508.pdf) (www.cdc.gov/antibiotic-use/media/pdfs/hospital-core-elements-priorities-508.pdf)
- [CDC: Core Elements of Hospital Antibiotic Stewardship Programs Assessment Tool](http://www.cdc.gov/antibiotic-use/media/pdfs/assessment-tool-P.pdf) (www.cdc.gov/antibiotic-use/media/pdfs/assessment-tool-P.pdf)
- [CDC: Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals](http://www.cdc.gov/antibiotic-use/media/pdfs/core-elements-small-critical-508.pdf) (www.cdc.gov/antibiotic-use/media/pdfs/core-elements-small-critical-508.pdf)
- [CDC: Core Elements of Antibiotic Stewardship for Nursing Homes](http://www.cdc.gov/antibiotic-use/hcp/core-elements/nursing-homes-antibiotic-stewardship.html) (www.cdc.gov/antibiotic-use/hcp/core-elements/nursing-homes-antibiotic-stewardship.html)
- [CDC: The Core Elements of Antibiotic Stewardship for Nursing Homes Checklist](http://www.cdc.gov/antibiotic-use/media/pdfs/core-elements-antibiotic-stewardship-checklist-508.pdf) (www.cdc.gov/antibiotic-use/media/pdfs/core-elements-antibiotic-stewardship-checklist-508.pdf)
- [CDC: Core Elements of Outpatient Antibiotic Stewardship](http://www.cdc.gov/antibiotic-use/hcp/core-elements/outpatient-antibiotic-stewardship.html) (www.cdc.gov/antibiotic-use/hcp/core-elements/outpatient-antibiotic-stewardship.html)

The Joint Commission

- [Joint Commission R3 Report Issue 35: New and Revised Requirements for Antibiotic Stewardship](http://www.jointcommission.org/en-us/standards/r3-report/r3-report-35)
(www.jointcommission.org/en-us/standards/r3-report/r3-report-35)
Requirements for accredited hospitals and critical access hospitals
- [Joint Commission R3 Report Issue 23: Antimicrobial Stewardship in Ambulatory Health Care](http://www.jointcommission.org/en-us/standards/r3-report/r3-report-23)
(www.jointcommission.org/en-us/standards/r3-report/r3-report-23)
Requirements for accredited ambulatory healthcare organizations that routinely prescribe antimicrobial medications

Antimicrobial Stewardship Toolkits

- [AHRQ: Toolkit To Improve Antibiotic Use in Acute Care Hospitals](http://www.ahrq.gov/antibiotic-use/acute-care/index.html) (www.ahrq.gov/antibiotic-use/acute-care/index.html)
- [AHRQ: Toolkit To Improve Antibiotic Use in Ambulatory Care](http://www.ahrq.gov/antibiotic-use/ambulatory-care/index.html) (www.ahrq.gov/antibiotic-use/ambulatory-care/index.html)
- [AHRQ: Toolkit To Improve Antibiotic Use in Long-Term Care](http://www.ahrq.gov/antibiotic-use/long-term-care/index.html) (www.ahrq.gov/antibiotic-use/long-term-care/index.html)
- [Johns Hopkins: Toolkit to Enhance Nursing and Antibiotic Stewardship Partnership](http://www.hopkinsmedicine.org/antimicrobial-stewardship/nursing-toolkit)
(www.hopkinsmedicine.org/antimicrobial-stewardship/nursing-toolkit)
- [Pediatric Infectious Diseases Society \(PIDS\): Pediatric ASP Toolkit](https://pids.org/pediatric-asp-toolkit/) (<https://pids.org/pediatric-asp-toolkit/>)
- [American Society of Consultant Pharmacists \(ASCP\): Antimicrobial Stewardship in LTPAC](http://www.ascp.com/page/asp) (www.ascp.com/page/asp)
- [Wisconsin Long-Term Care Urinary Tract Infection Toolkit](https://qid.wisc.edu/uti-toolkit/index.php) (<https://qid.wisc.edu/uti-toolkit/index.php>)

Pediatric Clinical Pathways

- [Children's Minnesota: Clinical guidelines and decision support \(www.childrensmn.org/for-health-professionals/clinical-guidelines-decision-support/\)](http://www.childrensmn.org/for-health-professionals/clinical-guidelines-decision-support/)
- [Children's Hospital of Philadelphia: Clinical Pathways Library \(www.chop.edu/pathways-library\)](http://www.chop.edu/pathways-library)

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