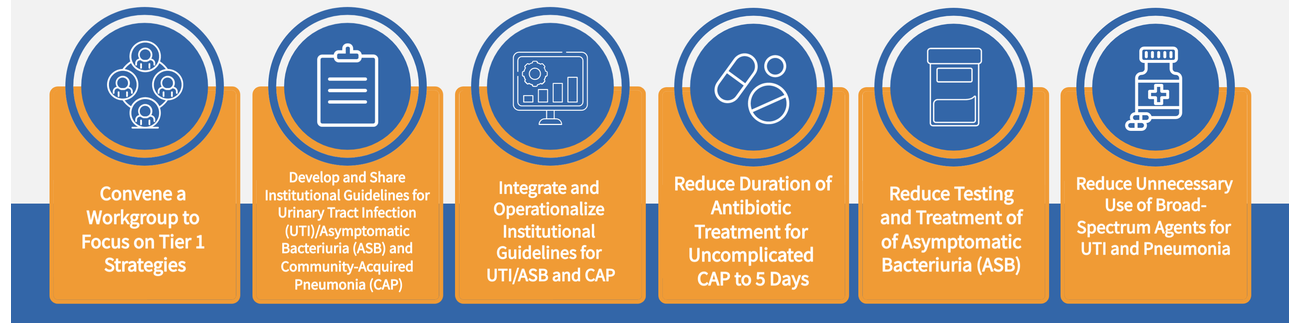


HMS Antimicrobial Use Toolkit

Tier 1: Implement Global Strategies to Improve Antimicrobial Use



Support for HMS is provided by Blue Cross and Blue Shield of Michigan and Blue Care Network as part of the BCBSM Value Partnerships program. Although Blue Cross Blue Shield of Michigan and HMS work collaboratively, the opinions, beliefs and viewpoints expressed by the author do not necessarily reflect the opinions, beliefs and viewpoints of BCBSM or any of its employees.



Nonprofit corporations and independent licensees of the Blue Cross and Blue Shield Association

This toolkit is a live document and will continually be updated as new tools are developed. Please visit the HMS website for the most up-to-date toolkit. If you have tools to be added to the toolkit, please see the HMS contact information below.

Contact Information:

Email: hospmedqi@umich.edu

Website: <http://mi-hms.org/>

Twitter: [@HMS_MI](https://twitter.com/HMS_MI)

1. Convene a Workgroup to Focus on Tier 1 Strategies

Background, Rationale, and Suggested Implementation Strategies

- The workgroup will likely be a new subgroup of your antimicrobial stewardship team.
- For maximum impact, the workgroup should consist of a multidisciplinary team that includes (but is not limited to) key stakeholders, such as hospitalists, infectious diseases physicians and/or pharmacists, emergency medicine physicians, house officers, IT personnel, microbiology lab representatives, and nursing.
- Designate an internal lead for urinary tract infection (UTI) and pneumonia antibiotic-related quality improvement efforts. This person is responsible for ensuring implementation of interventions recommended by the workgroup, as well as identifying barriers and troubleshooting during implementation.
- Meet quarterly to review data, define problem areas, identify underlying causes of problem areas, and determine interventions for improvement.
- Communicate work to local leadership to ensure institutional buy-in.
- Engage key stakeholders in the design of interventions to encourage provider buy-in.
- When implementing interventions, consider using behavioral economic principles or social psychology to provide additional cultural incentives to change: in other words, make the right thing easier (e.g., automatic) and the wrong thing harder (e.g., removing from order sets).
- Implement at least two new interventions per year.
- Assess post-intervention data for success or failure of intervention, and make modifications as needed.

Resources & Tools

- HMS site reports (hard copy distributed at collaborative wide meetings and live reports available daily via the HMS data entry system)
- CDC [Core Elements of Hospital Antibiotic Stewardship Programs](#)
 - Video with Summary of Updates to the Core Elements: [Click Here](#)
- [CDC Antibiotic Training Course Series 1](#) (Webinar-Free CE's available)
- [CDC Antibiotic Training Course Series 2](#) (Webinar-Free CE's available)
- [CDC Strategies to Assess Antibiotic Use to Drive Improvement in Hospitals](#)

- IDSA [Guidelines for Implementing an Antibiotic Stewardship Program](#)
- Quality Improvement Organizations [MITIGATE Antimicrobial Stewardship Toolkit: A practical guide for implementation in adult and pediatric emergency department and urgent care setting](#)
- Society of Hospital Medicine Webinar – [Rapid Clinical Updates: Antimicrobial Stewardship for Hospitalists](#)
- Joint Commission [2023 Antibiotic Stewardship Requirements](#)
- Henry Ford [Antimicrobial Stewardship Transition of Care Program](#)
 - Antimicrobial Stewardship Transition of Care [Gap Analysis Tool](#)
- For HMS Members (Additional authentication may be required):
 - Presentation by Dr. Arjun Srinivasan at the July 31, 2019 HMS Collaborative Wide Meeting: [An Update on National Stewardship Activities 2019](#)

Small Hospitals/Rural Sites:

- CDC [Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals](#)

References

- [ANA/CDC White paper. Redefining the Antimicrobial Stewardship Team. 2017.](#)
 - Demonstrates importance of nursing and multidisciplinary antibiotic stewardship teams, highlighting roles individuals can play in stewardship efforts
- Heil E et al. [Essential Role of Pharmacists in Antimicrobial Stewardship](#) . *Infect Control Hosp Epidemiol* 2016.
 - Highlights the critical role of antimicrobial stewardship-trained pharmacists in a successful hospital stewardship program.
- Saint S et al. [Importance of leadership for successful implementation of interventions to prevent hospital-acquired infections](#). *Infect Control Hosp Epidemiol* 2010.
 - Strong leaders focus on overcoming barriers, inspire their employees, and think strategically while acting locally
- Schoyer, E., et al. [Clostridioides difficile infection](#). *AHRQ Making Healthcare Safer III* 2020.
 - Demonstrates the importance of antimicrobial stewardship in the prevention of *Clostridioides difficile* infection, including a summary of articles published from 2008 to 2018.

- Sikkens JJ et al. [Behavioral Approach to Appropriate Antimicrobial Prescribing in Hospitals: The Dutch Unique Method for Antimicrobial Stewardship \(DUMAS\) Participatory Intervention Study. *JAMA Intern Med* 2017.](#)
 - Shared the problems of inappropriate prescribing and allowed providers free choice to develop an intervention.
 - Inappropriate antimicrobial prescribing decreased
-
-

2. Develop and Share Institutional Guidelines for UTI/ASB and CAP

Background, Rationale, and Suggested Implementation Strategies

- Develop institutional guidelines, locally adapted from national and HMS guidelines, for treatment of community- acquired pneumonia (CAP) and urinary tract infection (UTI)/asymptomatic bacteriuria (ASB). If institution specific guidelines already exist, they should comply with the following:

CAP

Institutional guidelines should:

- Recommend 5-day antibiotic treatment duration for uncomplicated CAP
- Reflect the IDSA/ATS CAP guidelines, taking into account pneumonia severity and risk factors for MRSA and antibiotic-resistant Gram-negative pathogens, which may warrant broader empiric antibiotic therapy
- Provide recommendations for transition to oral therapy
- De-emphasize fluoroquinolones

UTI/ASB

Institutional guidelines should:

- Recommend against sending urine cultures in the absence of urinary symptoms
- Recommend against treating a positive urine culture in the absence of urinary symptoms
- De-emphasize fluoroquinolones
- Provide recommendations for transition to oral therapy
- Share the CAP and UTI/ASB guidelines with members of the work group and frontline providers to get feedback and to ensure buy-in.
- Publish guidelines in multiple formats, including booklets, hospital intranet, or an application for smartphones.
- Share HMS data and local opportunities for improvement institution-wide.

Resources & Tools

Examples of Guidelines that could be locally adapted to your institution:

- National Guidelines:
 - [Infectious Diseases Society of America \(IDSA\)/American Thoracic Society Consensus Guidelines on the Management of Community-Acquired Pneumonia in Adults](#). CID 2019.
 - [IDSA Guidelines for the Diagnosis and Treatment of Asymptomatic Bacteriuria in Adults](#). CID 2019.
 - [IDSA Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria](#). CID 2019.
 - [IDSA and European Society for Microbiology and Infectious Disease Guidelines for Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women](#). CID 2010.
 - [IDSA Guidelines for Diagnosis, Prevention, and Treatment of Catheter-Associated Urinary Tract Infection \(CA-UTI\) in Adults](#). CID 2010.
 - [Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute-Care Hospitals: 2022 Update](#)
 - Podcast discussing this update: [The ICHE Podcast – Episode 40, Volume 44, Issue 8](#)
- HMS Guidelines:
 - [CAP](#)
 - [UTI](#)
- Institutional Guideline Examples:

- [CAP Guideline Example #1](#) (Michigan Medicine)
- [CAP Guideline Example #2](#) (St. Joseph Mercy - Ann Arbor)
- [UTI Guideline Example #1](#) (Michigan Medicine)
- [UTI Guideline Example #2](#) (St. Joseph Mercy - Ann Arbor)
- [UTI Clinical Pathway](#) (Spectrum Health)
- Pocket Cards:
 - [CAP](#)
 - [UTI](#)

References

- Frisbee J et al. [Adverse Outcomes Associated with Potentially Inappropriate Antibiotic Use in Heart Failure Admissions](#). *Open Forum Inf Dis* 2019.
 - ADHF patients who received IV antibiotics without evidence of infection had longer lengths of stay, required more diuretics, and were more likely to be readmitted compared with ADHF patients not exposed to IV antibiotics. ADHF patients are a promising target of antibiotic stewardship interventions.
- Gupta A, et al. [Overdiagnosis of Urinary Tract Infection Linked to Overdiagnosis of Pneumonia: A Multihospital Cohort Study](#). *BMJ Quality & Safety* 2022.
 - Discusses correlation between overdiagnosis of UTI and CAP leading to unnecessary antibiotic use and diagnostic delay.
 - Assessed diagnostic momentum, where overdiagnosed patients started on antibiotics by an emergency medicine clinician remained on antibiotics on day 3 of hospitalization.

3. Integrate and Operationalize Institutional Guidelines for UTI and CAP

Background, Rationale, and Suggested Implementation Strategies

- Educate providers, including hospitalists, internal medicine, family medicine, emergency medicine physicians, residents, advanced practice professionals

(APPs), and nursing staff about antibiotic resistance and appropriate antimicrobial prescribing.

- Educate patients and families about antibiotic resistance and appropriate antimicrobial prescribing.
- During educational sessions, highlight HMS data, showing opportunities for improvement.
- Communicate and promote institution-specific guidelines with frontline providers, including physicians, APPs, nursing, and pharmacy to ensure use of recommendations (morning report, grand rounds, medical staff meetings, division meetings).
- Integrate recommendations into key processes within the healthcare system such as into order sets, individual orders, discharge planning/processes, required yearly education for staff, etc.
- Build systems that can help modify provider behavior. Examples include (but are not limited to): clinical decision support tools and pharmacist review of antibiotic prescribing.
- After 3 months of guideline use, obtain provider feedback from multiple groups (including hospitalists, internal medicine, emergency department, etc.), and modify accordingly.
- Consider social factors in marketing guidelines to frontline providers. Highlight their participation in creation of the guidelines and try to overcome viewpoints of loss of provider autonomy. Instead, emphasize improvement in quality and outcomes.
- Involve hospitalist champions in the education and dissemination process.

Resources & Tools

- Review HMS institution specific data to identify areas for local improvement
- [Clinical Decision Support Tool for CAP](#) (See Appendices A-C in Supplementary Data file)
- [UTI Order Set Example](#) (Michigan Medicine)
- Patient Education Handout Example: [What You Need to Know When You are Prescribed an Antibiotic](#)
- CDC Poster: [Hospital Pharmacists, Be Antibiotics Aware](#)
- Presentations (For HMS Members – Additional authentication may be required):

- Henry Ford Antimicrobial Stewardship Team at the March 21, 2018 HMS Collaborative Wide Meeting: [Implementation of a Short Course Antibiotic Initiative](#)
- Dr. Sara Cosgrove (Director of the Antimicrobial Stewardship Program, Johns Hopkins Hospital) at the July 12, 2018 HMS Collaborative Wide Meeting: [Optimizing Antimicrobial Use in the Inpatient Setting](#)
- Dmitriy Martirosov (Infectious Disease Pharmacist, Beaumont Health System) at the March 8, 2019 HMS Collaborative Wide Meeting: [Curtailing Diagnosis and Treatment of Asymptomatic Bacteriuria \(ASB\)](#)
- Dr. Larissa May (Director of Emergency Department Antibiotic Stewardship, University of California-Davis) at the November 12, 2019 HMS Collaborative Wide Meeting: [Doing What's Best for Our Patients: Antibiotic Stewardship in the ED Setting](#)
- Dr. Stephanie Burdick (Medical Director, Clinical Standardization – Spectrum Health) at the November 2, 2022 HMS Collaborative Wide Meeting: [Community Acquired Pneumonia – Growing a Culture of Stewardship](#)
 - [Order Set examples](#) from this presentation
- Ascension River District Antimicrobial Stewardship Team at the March 15, 2023 HMS Collaborative Wide Meeting: [Journey of a Small Hospital – The CAP Experience](#)

References

- Ciarkowski CE et al. [A Pathway for Community-Acquired Pneumonia with Rapid Conversion to Oral Therapy Improves Health Care Value](#). *Open Forum Infect Dis* 2020.
 - This study noted a shorter length of IV antibiotic therapy when a clinical decision support-driven CAP pathway was implemented, along with active antimicrobial stewardship review.
- Haas MK et al. [Effects of a Syndrome-Specific Antibiotic Stewardship Intervention for Inpatient Community-Acquired Pneumonia](#). *Open Forum Infect Dis* 2016.
 - Reduced duration of CAP treatment by development of institutional guidelines and integration into CPOE for treatment of non-ICU CAP using key stakeholders and hospitalist physician champions.
 - For education/dissemination: utilized emails, posters in work rooms, presentations in Grand Rounds and division meetings

- Hartley S et al. [Evaluating a Hospitalist-Based Intervention to Decrease Unnecessary Antimicrobial Use in Patients With Asymptomatic Bacteriuria.](#) *Infect Control Hosp Epidemiol* 2016.
 - Reduced treatment of ASB with educational sessions and pocket cards for hospitalists at all sites, and a pharmacist-led review of positive urine cultures at one site
- Meeker D et al. [Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial.](#) *JAMA Intern Med* 2014.
 - Displayed poster-sized commitment letters to avoid inappropriate antibiotic prescribing for Acute Respiratory Infections (ARIs) in exam rooms, providing patient/family education and behavioral “nudge”
- Mercurio N, et al. [Pharmacist-Driven Transitions of Care Practice Model for Prescribing Oral Antimicrobials at Hospital Discharge.](#) *JAMA Netw Open* 2022.
 - A pharmacist-driven intervention targeting antimicrobial prescribing at discharge was associated with higher frequency of optimal antimicrobial regimens compared with before the intervention. Patients in the postintervention group had similar rates of mortality, readmission, and clinical resolution and fewer severe antimicrobial-related adverse effects compared with the preintervention group.
- Scymczak J et al. [Pediatrician Perceptions of an Outpatient Antimicrobial Stewardship Intervention.](#) *Infect Control Hosp Epidemiol* 2014.
 - Qualitative study interviewing pediatricians after a stewardship intervention
 - Found skepticism of accuracy of audit and feedback reports.
- Vaughn V et al. [Thoughtless design of the electronic health record drives overuse, but purposeful design can nudge improved patient care.](#) *BMJ Qual & Saf* 2018.
 - A critical step in improving clinician behavior is recognizing that most decisions occur with little active deliberation. When making rapid choices, clinicians are being influenced by EHR design, defaults, diagnostic stimuli, emotion, and social norms – whether purposeful or not. To improve, we must recognize these tendencies and use thoughtful design to capitalize on
- Vaughn V et al. [Antibiotic Overuse at Discharge in Hospitalized Patients with Bacteriuria or Treated for Pneumonia: A Multihospital Study.](#) *Infect Con Hosp Epi* 2020.
 - Antibiotic overuse at discharge is common, varies widely between hospitals, and is associated with patient harm. Antibiotic overuse at discharge is strongly correlated between two disparate diseases, suggesting that prescribing culture or discharge processes contribute to overprescribing.

- Vaughn V et al. [Antibiotic Overuse and Stewardship at Hospital Discharge: A Multi-Hospital Cohort Study](#). *Clin Inf Dis* 2021.
 - Antibiotics are commonly prescribed to patients as they leave the hospital. The aim was to create a comprehensive metric to characterize antibiotic overuse after discharge among hospitalized patients treated for pneumonia or urinary tract infection.
-
-

4. Reduce Duration of Antibiotic Treatment for Uncomplicated CAP to 5 Days

Background, Rationale, and Suggested Implementation Strategies

- Educate providers about elimination of HCAP and new broader CAP definition per 2019 ATS/IDSA CAP guidelines
- Educate providers on the justification for 5 days of therapy for uncomplicated CAP
- Review CAP cases identified by HMS to implement high-yield interventions for recurrent problems
- Evaluate and understand differences in provider groups (e.g., hospitalists, emergency medicine providers). Target interventions to specific provider groups as necessary.
- Evaluate existing order sets to ensure antibiotic preferred options, doses, and durations are consistent with institutional pneumonia guidelines.
- Require documentation of dose and indication and total duration of antibiotics prescribed in the antibiotic order.
- Encourage documentation of dose, indication, and duration of antibiotics in the progress note.
- Require a 72-hour Antibiotic Time Out, during which total duration should be discussed.

- Focus efforts on discharge prescribing, as HMS data shows that discharge prescriptions account for 80% of inappropriate antibiotic treatment for uncomplicated CAP.
- Require documentation of the total duration of antibiotics in the discharge summary, potentially incorporating an area for antibiotic duration to be filled out in an automated discharge process.
- Incorporate nursing and pharmacy into review of the discharge antibiotic.
- Provide audit and feedback directly to providers regarding the duration of antibiotics they use for patients with uncomplicated CAP.
- Consider incorporating compliance with treatment duration for uncomplicated CAP as part of hospitalists' performance targets (for compensation).

Resources & Tools

- HMS Document: [Treatment duration for uncomplicated community-acquired pneumonia: the evidence in support of 5 days.](#)
- Review HMS site reports (hard copy distributed at collaborative wide meetings and live reports available daily via the HMS data entry system) for the following:
 - Uncomplicated CAP treated with 5 days of antibiotics
 - Types of Reports Available via HMS Registry: Hospital Specific, Provider Group Specific (i.e., hospitalist v. emergency room physician), or Provider Specific
- HMS Guideline:
 - [CAP](#)
- [CAP Pocket Card](#)
 - Consider modifying to poster size for posting in workrooms
- [Factsheet Emphasizing Focus on Discharge Prescriptions](#)
- [Antibiotic Time Out Checklist](#)
- [Tiered Antibiotic Use at Discharge Resource](#)
- [Antibiotic Use at Discharge Pocket Card](#) (Michigan Medicine)
- ["Strive for Five" Newsletter Example](#) (Corewell Health – previously Beaumont)
- [Example of email feedback on provider performance for duration of CAP treatment #1](#) - Top Performer (Trinity Health Ann Arbor)
- [Example of email feedback on provider performance for duration of CAP treatment #2](#) - Prolonged Duration of Antibiotics (Trinity Health Ann Arbor)

- [Case Studies: Adult Case - Community Acquired Pneumonia](#) (Presentation for SHEA ASP Training Course, 2021 by Dr. Valerie Vaughn)
- CDC Poster: [Be Antibiotics Aware at Hospital Discharge](#)
- CDC Poster: [Use the Shortest Effective Antibiotic Duration](#)
- Sepsis Alliance Webinar: [The Blind Spot of Antibiotic Stewardship - Antibiotic Overuse at Discharge](#)
 - **Presenter:** Valerie Vaughn, MD, MSc
 - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals
 - **Session Overview:** This presentation will address the current state of antibiotic use at discharge, discuss why providers often overprescribe at discharge, and help improve prescribing and patient outcomes during care transitions.
- Presentation (For HMS Members – Login Required):
 - Dr. Stephanie Burdick (Medical Director, Clinical Standardization – Spectrum Health) at the November 2, 2022 HMS Collaborative Wide Meeting: [Community Acquired Pneumonia – Growing a Culture of Stewardship](#)
 - [Order Set examples](#) from this presentation
 - Ascension River District Antimicrobial Stewardship Team at the March 15, 2023 HMS Collaborative Wide Meeting: [Journey of a Small Hospital – The CAP Experience](#)
 - Slides 14-16 show an example of a Message Center Alert that directs the physician’s ability to quickly identify the antibiotics and number of days the patient received so far

References

- Avdic E, et al. [Impact of an Antimicrobial Stewardship Intervention on Shortening the Duration of Therapy for Community-acquired Pneumonia](#). *Clin Infect Dis* 2012.
 - Reduced treatment duration of CAP with educational lectures based on survey results, and post-prescription pharmacy review with verbal feedback
- Ciarkowski CE, et al. [A Pathway for Community-Acquired Pneumonia with Rapid Conversion to Oral Therapy Improves Health Care Value](#). *Open Forum Infect Dis* 2020.
 - This study noted a shorter length of IV antibiotic therapy when a clinical decision support-driven CAP pathway was implemented, along with active

antimicrobial stewardship review.

- Foolad F, et al. [A multicenter stewardship initiative to decrease excessive duration of antibiotic therapy for the treatment of community acquired pneumonia](#). *J Antimicrob Chemother* 2018
 - Treatment duration for CAP was reduced by updating institutional CAP guidelines, providing educational sessions, and performing daily audit and feedback on appropriate treatment duration for CAP patients.
- Giesler DL, et al. [Reducing Overuse of Antibiotics at Discharge Home: A Single-Center Mixed Methods Pilot Study](#). *Am Journ Inf Con* 2022.
 - A pharmacist-facilitated antibiotic timeout at time of hospital discharge was feasible and holds promise as a method to improve antibiotic use at discharge.
- Petty LA, et al. [Impact of Updated ATS/IDSA CAP Guidelines on Duration of Antibiotics](#). *Open Forum Inf Dis* 2022.
 - Among patients hospitalized with pneumonia, two thirds received an excess antibiotic duration. Prior to the updated IDSA guidelines, the 5-day treatment rate was improving for HCAP and pCAP – suggesting the 2019 guidelines did not have an added effect on improving antibiotic duration.
- Vaughn V, et al. [Antibiotic Stewardship Strategies and Their Association with Antibiotic Overuse After Hospital Discharge: An Analysis of the Reducing Overuse of Antibiotics at Discharge \(ROAD\) Home Framework](#). *Clin Inf Dis* 2022.
 - Antibiotics are frequently prescribed and overprescribed at hospital discharge, leading to patient harm. In 2019, a total of 39 hospitals were surveyed for their antibiotic stewardship strategies around discharge for patients with CAP and UTI. The more stewardship strategies reported, the lower a hospital's antibiotic overuse at discharge.
- Vaughn V, et al. [Excess Antibiotic Treatment Duration and Adverse Events in Patients Hospitalized with Pneumonia](#). *Annals of Int Med* 2019.
 - Patients hospitalized with pneumonia often receive excess antibiotic therapy. Excess antibiotic treatment was associated with patient-reported adverse events.
- Vaughn V, et al. [Antibiotic Overuse and Stewardship at Hospital Discharge: The Reducing Overuse of Antibiotics at Discharge Home Framework](#). *Clin Inf Dis* 2021.
 - Discharge from acute hospitalization is an increasingly recognized source of antibiotic overuse. Key targets for antibiotic stewardship at discharge include unnecessary antibiotics, excess duration, avoidable fluoroquinolones, and improving (or avoiding) intravenous antibiotic therapy.

- Vaughn V, et al. [A Statewide Collaborative Quality Initiative to Improve Antibiotic Duration and Outcomes in Patients Hospitalized with Uncomplicated Community-Acquired Pneumonia](#). *Clin Inf Dis* 2022.
 - Community-acquired pneumonia (CAP) is a common cause for hospitalization and antibiotic overuse. Across diverse hospitals, Michigan Hospital Medicine Safety Consortium (HMS) participation was associated with more appropriate use of short-course therapy and fewer adverse events in hospitalized patients with uncomplicated CAP.
 - Yogo N, et al. [Intervention to Reduce Broad-Spectrum Antibiotics and Treatment Durations Prescribed at the Time of Hospital Discharge: A Novel Stewardship Approach](#). *Infect Control Hosp Epidemiol* 2014
 - Reduced antibiotic duration prescribed at discharge by developing a guideline for antibiotic selection and treatment duration and performing pharmacy audit and feedback of discharge prescriptions
-
-

5. Reduce Testing and Treatment of Asymptomatic Bacteriuria (ASB)

Background, Rationale, and Suggested Implementation Strategies

- Educate providers, including hospitalists, internal medicine, family medicine, emergency medicine physicians, residents, advanced practice professionals (APPs), and nursing staff regarding the diagnosis of ASB vs UTI.
- Educate patients and family members regarding the diagnosis of ASB vs UTI.
- Review ASB cases identified by HMS to direct high-yield intervention for recurrent problems.
- Evaluate and understand differences in provider groups (e.g., hospitalists, emergency department physicians). Target interventions to specific provider groups as necessary.
- Identify a hospitalist and ED champion

- Evaluate existing order sets to ensure preferred antibiotic options, doses, and durations are consistent with institutional UTI guidelines (including pre-operative order sets, ED admission sets, “commonly ordered test” lists).
- Utilize clinical decision support tools to discourage inappropriate urine culture testing in the absence of urinary symptoms, by requiring documentation of symptom(s) as indication for the test.
- Utilize checklists to discourage ordering of urine cultures in the absence of urinary symptoms by frontline clinical care team.
- Require documentation of dose and indication of antibiotics prescribed in the antibiotic order. Consider adding documentation of urinary symptom(s) necessitating treatment.
- Encourage documentation of dose, indication, and duration of antibiotics in the progress note.
- Encourage documentation of the total duration of antibiotics in discharge summary, potentially incorporating an area for antibiotic duration to be filled out in an automated discharge process.
- Provide audit and feedback directly to individual providers regarding their rates of testing and treatment for ASB.
- Consider performing urine cultures only when indicated (example: reflex culture only with positive urinalysis).
- Consider suppressing urine culture results by requiring providers to call the microbiology lab to request results (for non-catheterized patients).
- Create a protocol assessing for UTI in patients whose primary symptom is altered mental status (AMS).
- Consider implementing a diagnostic stewardship intervention. Examples include: removal of urine cultures from a) preoperative, b) emergency department (ED), c) admission, or d) other order sets; addition or removal of reflex testing; hiding urine culture results in some settings; requiring physician order to run urine cultures in ED; two-step urine culture initiative to reduce urine cultures in ED; framing urine culture results in test reporting; AND/OR rejection of some urine culture samples (e.g., based on squamous cells).

Resources & Tools

- Review HMS site reports (hard copy distributed at collaborative wide meetings and live reports available daily via the HMS data entry system) for the following:
- Testing of Asymptomatic Bacteriuria

- Treatment of Asymptomatic Bacteriuria with Antibiotics
 - [Types of Reports Available via HMS Registry](#): Hospital Specific, Provider Group Specific (i.e., hospitalist v. emergency room physician), or Provider Specific
- HMS Guideline:
 - [UTI](#)
- [UTI Pocket Card](#)
 - Consider modifying to poster size for posting in workrooms
- Educational Videos:
 - Nurse Education Video: [ASB vs UTI](#) (Presentation by Dr. Lindsay Petty)
 - Patient Education Video: [Antibiotic Awareness - UTI, Cystitis, or Bladder Infection](#) (Washington State Dept. of Health)
 - Provider Education Video: [The Dangers of Overtreating Asymptomatic Bacteriuria](#) (B. Trautner)
 - Provider Education Video: [Appropriate Treatment for Asymptomatic Bacteriuria](#) (B. Trautner)
- [Checklist for Appropriate Urine Culture Ordering](#)
- Johns Hopkins Medicine: [Urine Cultures One Pager](#)
- Tools for assessing a Urinary Tract Infection (UTI) in patients with Altered Mental Status (AMS)
 - [Inpatient Algorithm Assessing for UTI in Elderly Patients with AMS](#)
 - Mody, L. et al. [Urinary Tract Infections in Older Women: A Clinical Review](#). *JAMA* 2014
- [Example 1 of hospital newsletter incorporating HMS data](#) (Corewell Health – Previously Beaumont)
- Patient Education Materials:
 - ASB Patient Flyer: [Suspect a Urinary Tract Infection? How taking antibiotics when you don't need them can cause more harm than good.](#) (AHRQ)
 - ASB Patient Flyer: [Management of Urinary Tract Infections](#) (Corewell Health – Previously Beaumont)
- Provider Education Materials:
 - ASB Provider Flyer: [Symptom-Free Pee – Let it Be](#) (Trinity Health Grand Rapids – Previously Mercy Health St. Mary's)
 - ASB Provider Flyer: [When it Comes to Urine Testing, Hold it.](#) (Corewell Health – Previously Beaumont)
 - ASB Provider Flyer: [Asymptomatic Bacteriuria](#) (AHRQ)
 - CDC Poster: [Avoid Treatment of Asymptomatic Bacteriuria](#)

- Presentation by Dr. Valerie Vaughn at Infectious Disease Week 2022: [Reducing Unnecessary Antibiotic Treatment for Asymptomatic Bacteriuria: Diagnostic vs. Antibiotic Stewardship](#)
- Presentations (For HMS Members – Additional authentication may be required)
 - Lisa Dumkow (Antimicrobial Stewardship Pharmacist, Mercy Health St. Mary's) at the November 12, 2019 HMS Collaborative Wide Meeting: [Assessing the "Culture of Culturing" in patients with asymptomatic bacteriuria](#)
 - Dr. Anu Malani (Medical Director for Infection Prevention and Antimicrobial Stewardship, St. Joseph Mercy Health System) at the November 14, 2017 HMS Collaborative Wide Meeting: [Successful Interventions for Asymptomatic Bacteriuria and Urinary Tract Infections](#)

References

- Advani S, et al. [Quality Improvement Interventions and Implementation Strategies for Urine Culture Stewardship in the Acute Care Setting: Advances and Challenges](#). *Curr Infect Dis Rep* 2021.
 - The goal of this article is to highlight how and why urinalyses and urine cultures are misused, review quality improvement interventions to optimize urine culture utilization, and highlight how to implement successful, sustainable interventions to improve urine culture practices in the acute care setting.
- Claeys K, et al. [Optimal Urine Culture Diagnostic Stewardship Practice - Results from an Expert Modified-Delphi Procedure](#). *Clin Infect Dis* 2022.
 - A multidisciplinary expert panel utilized a RAND-modified Delphi approach to ascertain diagnostic stewardship best practices. The panel reached a conclusion and provided 18 guidance statements to optimize use of urine cultures for better patient outcomes.
- Daniel M, et al. [An Implementation Guide to Reducing Overtreatment of Asymptomatic Bacteriuria](#). *JAMA Intern Med* 2017.
 - Review of different approaches used in prior studies to decrease treatment of ASB, with recommendations on steps to take to improve use in your own hospital.
- Drekonja D, et al. [Teamwork and Safety Climate Affect Antimicrobial Stewardship for Asymptomatic Bacteriuria](#). *Infect Con Hosp Epi* 2019.

- Revealed substantial misunderstanding regarding management of ASB among providers, nurses, and CNAs. Educating and empowering these professionals to discourage unnecessary urine culturing and inappropriate antibiotic use will be key components of antibiotic stewardship efforts.
- Jones CW, et al. [Reflect urine culture cancellation in the emergency department.](#) *J Emerg Med* 2014.
 - In the ED, authors estimate a 40% reduction in urine cultures if a culture was cancelled when urinalysis did not meet criteria (one of the following: white blood cell >10, + leukocyte esterase, + nitrites, + bacteria)
- Krouss M, et al. [Choosing Wisely Initiative for Reducing Urine Cultures for Asymptomatic Bacteriuria and Catheter-Associated Asymptomatic Bacteriuria in an 11-Hospital Safety Net System.](#) *Am Journ of Inf Con* 2023.
 - Two electronic health record interventions successfully reduced urine cultures by more than 20% in a large safety net system: a mandatory indication on urine culture and a best practice advisory for urine cultures on patients with urinary catheters.
- Leis JA et al. [Reducing Antimicrobial Therapy for Asymptomatic Bacteriuria Among noncatheterized inpatients: a proof-of-concept study.](#) *Clin Infect Dis* 2014.
 - This proof-of-concept study demonstrates that no longer routinely reporting urine culture results from noncatheterized medical and surgical inpatients can greatly reduce unnecessary antimicrobial therapy for ASB without additional workload for the laboratory.
- Morgan, DJ et al. [Diagnostic Stewardship-Leveraging the Laboratory to Improve Antimicrobial Use.](#) *JAMA* 2017.
 - Suggests that implementing stewardship practices in the diagnostic testing process could positively impact the reliability of antibiotic use, reduce unintended harms, and improve the safety of care.
- Munigala et al. [Impact of order set design on urine culturing practices at an academic medical center emergency department.](#) *BMJ Qual Saf* 2017.
 - Removing all urine culture orders except “urinalysis with reflex to microscopy” from frequently ordered list of tests for the ED resulting in decreasing daily urine culture rate by about half
- Petty LA et al. [Risk Factors and Outcomes Associated with Treatment of Asymptomatic Bacteriuria in Hospitalized Patients.](#) *JAMA IM* 2019.
 - Cohort study of ~2700 ASB patients revealed that ~83% received inappropriate antibiotic treatment, which was associated with longer lengths of hospital stays without improvements in outcomes.

- Petty LA et al. [Assessment of Testing and Treatment of Asymptomatic Bacteriuria Initiated in the Emergency Department](#). *Open Forum Infect Dis* 2020.
 - Cohort study of ~2400 ASB patients who received antibiotics which found that ED physicians commonly initiated urine testing and antibiotic treatment, with most antibiotics continued by inpatient providers. Antibiotic treatment in these patients was not associated with an improvement in clinical outcomes; however, it was associated with a longer length of inpatient stay and C. diff infections.
- Salazar J.G. et al. [Association of Screening and Treatment for Preoperative Asymptomatic Bacteriuria with Postoperative Outcomes Among US Veterans](#). *JAMA Surg* 2018.
 - A national study of ~68,000 Veterans showing that screening patient urine cultures for ASB prior to major surgical procedures, and subsequently treating with antibiotics, did not reduce the incidence of post-op infections and, thus, should not be continued as part of routine practice
- Schulz L et al. [Top Ten Myths Regarding the Diagnosis and Treatment of Urinary Tract Infections](#). *J Emerg Med* 2016.
 - Asymptomatic bacteriuria is common in all age groups and is frequently over-treated. A UTI diagnosis should be based on a combination of clinical symptoms and supportive laboratory information. This review will assist providers in navigating common pitfalls in the diagnosis of UTI.
- Stagg A et al. [Impact of two-step urine culture ordering in the emergency department: a time series analysis](#). *BMJ Qual Saf* 2017.
 - In the ED, urine samples collected by nurses, then saved for 48 hours, and not processed without additional physician order
 - Resulted in a decrease of urine cultures processed, decreased need for patient callbacks for positive cultures, and decrease in antibiotics prescribed for a urinary indication for those admitted
- Trautner B et al. [Effectiveness of an Antimicrobial Stewardship Approach for Urinary Catheter-Associated Asymptomatic Bacteriuria](#). *JAMA* 2015.
 - A multifaceted educational implementation strategy in the VA to reduce urine culture ordering and inappropriate antibiotic prescribing in catheterized patients
 - See Supplement- *CAUTI Diagnostic Algorithm and Audit and Feedback Script*
- Vaughn V, et al. [Revisiting the panculture](#). *BMJ Qual Saf* 2016
 - Pan culturing for fever is costly and contributes to unnecessary cultures and inappropriate antibiotic use

- Vaughn V, et al. [Addressing the Overuse of Cultures to Optimize Patient Care](#). *Annals of Int Med* 2019.
 - Exploration of the mental models and social contexts that influence overuse of microbiological testing in order to help reduce overdiagnosis and overtreatment of infections.
 - Vaughn V, et al. [SHEA Featured Oral Abstract: Reducing Unnecessary Antibiotic Treatment for Asymptomatic Bacteriuria: A Statewide Collaborative Quality Initiative](#). *Open Forum Inf Dis* 2022.
 - Across 46 hospitals within the HMS Collaborative, there was a decrease over time in unnecessary treatment for ASB with independent hospitals improving most. Diagnostic stewardship appeared responsible for nearly all improvement.
 - Vaughn V, et al. [A Statewide Quality Initiative to Reduce Unnecessary Antibiotic Treatment of Asymptomatic Bacteriuria](#). *JAMA IM* 2023.
 - Hospitalized patients with asymptomatic bacteriuria (ASB) often receive unnecessary antibiotic treatment, which increases antibiotic resistance and adverse events. This quality improvement study showed that over 3 years, ASB-related antibiotic use decreased and was associated with a decline in unnecessary urine cultures. Hospitals should prioritize diagnostic stewardship to reduce antibiotic treatment related to ASB.
-
-

6. Reduce Unnecessary Use of Broad-Spectrum Agents for UTI and Pneumonia

Background, Rationale, and Suggested Implementation Strategies

General:

- Reduce unnecessarily broad empiric coverage for CAP and UTI
- Utilize safer antibiotic alternatives to Fluoroquinolones for the treatment of CAP and UTI

- Require documentation of dose and indication of antibiotics prescribed in the antibiotic order.
- Encourage documentation of dose, indication, and duration of antibiotics in the progress note.
- Utilize antibiotic time outs after starting antibiotics, including:
 - Assess indication(s) for antibiotics
 - Review culture results
 - Adjust drug selection (de-escalate) and doses
 - Consider switching to oral route
 - Decide and document treatment duration
- Utilize pharmacists to review cultures, and if positive, ensure that the narrowest, most appropriate antibiotic coverage is chosen for the diagnosis.
- Incorporate the effective duration of therapy into de-escalation protocols (count all days of active therapy including IV).
- When reporting microbiology lab results consider:
 - Selective reporting of antibiotic susceptibility results: (i.e. suppressing broad spectrum antibiotic susceptibility results when a narrow spectrum antibiotic is effective)

Pneumonia:

- Utilize HMS data to provide audit and feedback directly to providers regarding:
 - Coverage of methicillin-resistant *Staphylococcus aureus* (MRSA) with negative MRSA nasal swabs and/or respiratory cultures
 - Coverage of *Pseudomonas* with negative respiratory cultures
- Encourage de-escalation of vancomycin for pneumonia with negative respiratory cultures and/or nasal swabs for MRSA.
- Educate providers about elimination of HCAP and new broader CAP definition per 2019 ATS/IDSA CAP guidelines
- Educate providers regarding risk factors for multi-drug resistant organisms:
 - MRSA Coverage appropriate: respiratory culture in year prior positive for MRSA, blood culture in year prior positive for MRSA, or positive MRSA nasal swan in year prior
 - Pseudomonal Gram-negative coverage appropriate: respiratory culture in year prior positive for pseudomonas or other Gram-negative organisms, or blood culture in year prior positive for other Gram-negative organisms
 - MRSA Coverage and Pseudomonal Gram-negative coverage appropriate: meets Severe CAP criteria AND previous hospitalization in 90 days prior to

hospital encounter AND received IV antibiotics, oral fluoroquinolones, or oral linezolid within 90 days prior to hospital encounter

UTI:

- When reporting microbiology lab results consider:
- Providing recommendations on likely contaminants (e.g., ≥ 3 organisms in a urine culture)

Resources & Tools

- Review HMS site reports (hard copy distributed at collaborative wide meetings and live reports available daily via the HMS data entry system) for the following:
 - Antibiotic treatment regimens for UTI and CAP
 - Discharge antibiotics
 - Median duration of inappropriate broad-spectrum empiric therapy
 - Ordering provider of first dose of inappropriate broad-spectrum empiric therapy
 - Patients with negative culture for MRSA and on MRSA coverage
 - Patients with negative culture for *Pseudomonas* or another resistant Gram-negative pathogen and on Anti-pseudomonal coverage
- Examples from Intermountain Health for Pharmacist-driven tools to aid in de-escalation
 - [De-escalation quick reference guide for pharmacists](#)
 - [Antibiotic indications for pharmacists](#)
- [Antibiotic Time Out Checklist](#)
- [Who Needs Broad Empiric Antibiotic Coverage in CAP?](#)
- CDC Poster: [Pharmacists- Reassess Antibiotic Therapy](#)
- Provider Education Video: [Thinking of a Fluoroquinolone? Think Again.](#)

References

- Chotiprasitsakul D et al. [The Role of Negative Methicillin-Resistant Staphylococcus aureus Nasal Surveillance Swabs in Predicting the Need for Empiric Vancomycin Therapy](#). *Open Forum Infect Dis* 2017.

- Among 11,441 ICU patients, a negative nasal MRSA surveillance swab had an NPV of 99.4%
- Jones BE, et al. [Empirical Anti-MRSA vs Standard Antibiotic Therapy and Risk of 30-Day Mortality in Patients Hospitalized for Pneumonia](#). *JAMA IM* 2020.
 - National cohort study of ~89,000 hospitalizations for pneumonia which concluded that, in the studied population, there was no benefit on mortality in the setting of empiric anti-MRSA therapy versus standard antibiotic treatment, including for those who had risk factors for MRSA.
- Magill SS, et al. [Assessment of the Appropriateness of Antimicrobial Use in US Hospitals](#). *JAMA Netw Open* 2021.
 - A cross-sectional study that aimed to evaluate appropriateness of antibiotic use for inpatients treated for CAP or UTI, or with fluoroquinolones or vancomycin. The study concluded that 55.9% of patients had unsupported treatment, with common reasons for this being excessive duration and lack of documentation of signs/symptoms of infection.
- Musgrove MA, et al [Microbiology Comment Nudge Improves Pneumonia Prescribing](#) *Open Forum Infect Dis* 2018.
 - A simple, behavioral nudge in microbiology reporting increased de-escalation and discontinuation of unnecessary broad-spectrum antibiotics. This highlights the importance of clear, persuasive communication of diagnostic testing in improving antibiotic prescribing behaviors.
- The Pew Charitable Trusts. [Health Experts Establish Targets to Improve Hospital Antibiotic Prescribing](#). *Pew Trusts* 2021.
 - This report shows the findings from a 3-year partnership between The Pew Charitable Trusts and the CDC/other public health/medical experts to analyze hospital antibiotic usage and set national targets aimed at improving prescribing. One key finding noted that approximately 56% of antibiotic prescriptions were inappropriate (for choice, duration, or illness treated). It was concluded that an appropriate way to meet new national targets for antibiotic prescribing was the adoption of an antibiotic stewardship program.
- Rhee C, et al. [Prevalence of Antibiotic-Resistant Pathogens in Culture-Proven Sepsis and Outcomes Associated with Inadequate and Broad-Spectrum Empiric Antibiotic Use](#). *JAMA Netw Open* 2020.
 - Cohort study of 17,430 adults with culture-positive sepsis which shows that broad-spectrum antibiotics were frequently administered to patients. These patients often did not have resistant pathogens and the administration of unnecessarily broad antibiotics was associated with worse outcomes.

- Seddon MM, et al. [Role of Early De-escalation of Antimicrobial Therapy on Risk of Clostridioides difficile Infection Following Enterobacteriaceae Bloodstream Infections](#). *Clin Infect Dis* 2019.
 - The empirical use of antipseudomonal beta-lactam (APBL) therapy for >48 hours was an independent risk factor for C. diff infection. Early de-escalation of APBL using clinical risk assessment tools or rapid diagnostic testing may reduce the incidence of CDI in hospitalized adults with Enterobacteriaceae BSIs.
- Vaughn V, et al. [Inpatient and Discharge Fluoroquinolone Prescribing in Veterans Affairs Hospitals Between 2014 and 2017](#). *Open Forum Infect Dis* 2020.
 - Retrospective cohort study at 125 VA hospitals which showed that, over the 3 years studied, fluoroquinolone use had declined following the implementation of a mandatory antibiotic stewardship program in 2014. However, it is noted that there is still work to be done in relation to prescription of fluoroquinolones at discharge.
- Vaughn V, et al. [The Association of Antibiotic Stewardship with Fluoroquinolone Prescribing in Michigan Hospitals: A Multi-Hospital Cohort Study](#). *Clin Inf Dis* 2019.
 - Hospital-based stewardship interventions targeting fluoroquinolone prescribing were associated with less fluoroquinolone prescribing during hospitalization, but not at discharge. To limit aggregate fluoroquinolone exposure, stewardship programs should target both inpatient and discharge prescribing.
- Webb B, et al. [Broad-Spectrum Antibiotic Use and Poor Outcomes in Community-Onset Pneumonia: A Cohort Study](#). *Euro Resp Journ* 2019.
 - Observational cohort study of 1,995 adults with community-onset pneumonia where 39.7% of patients received broad-spectrum antibiotics, but only 3% had MDRO. The receipt of broad-spectrum antibiotics was associated with increased mortality, longer hospital stays, greater cost, and increased C. difficile rates.