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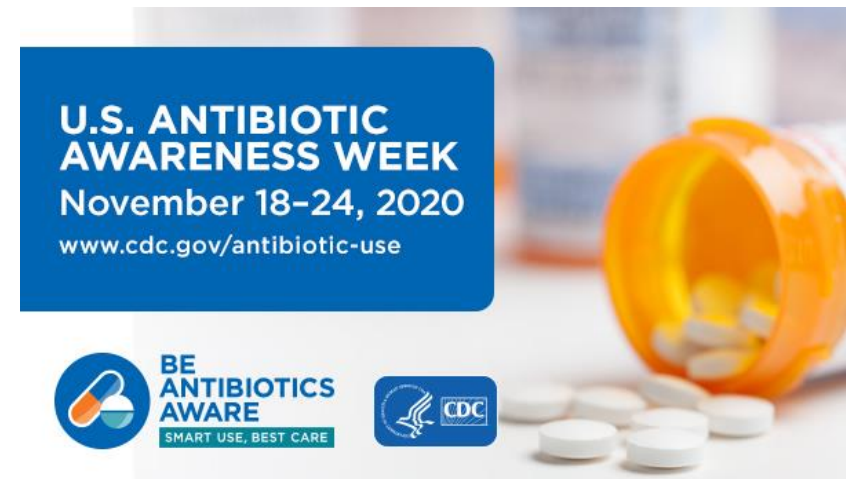
To submit a question:

- Use the "Chat" window, located on the bottom left side of the webinar screen.
- Questions will be addressed at the end of the webinar, as time allows.

The slides for this presentation will be available along with the recorded webinar on CDC's Tune in to Safe Healthcare website. Participants will be notified via e-mail when this information is available.

Implementation of Antibiotic Stewardship Activities in Critical Access Hospitals

November 18, 2020



Welcome



Arjun Srinivasan, MD, FSHEA
Associate Director for Healthcare Associated Infection Prevention
Programs, CDC's Division Quality Healthcare Promotion



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HRSA's Federal Office of Rural Health Policy

The Threat of Antibiotic Resistance in the United States



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

New National Estimate*

Antibiotic-resistant bacteria and fungi cause at least an estimated:

 **2,868,700** infections  **35,900** deaths



Clostridioides difficile is related to antibiotic use and antibiotic resistance: *

 **223,900** cases  **12,800** deaths

New Threats List

Updated urgent, serious, and concerning threats—totaling 18

5 urgent threats

2 new threats

NEW:
Watch List with **3** threats



Antibiotic resistance remains a significant One Health problem, affecting humans, animals, and the environment.

* *C. diff* cases from hospitalized patients in 2017

www.cdc.gov/DrugResistance/Biggest-Threats

CARB National Action Plan (2020 – 2025)



GOAL 1: Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections



GOAL 2: Strengthen National One Health Surveillance Efforts



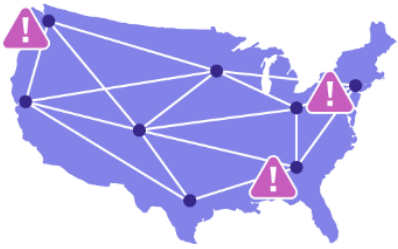
GOAL 3: Advance Development and Use of Rapid and Innovative Diagnostic Tests for Resistant Bacteria



GOAL 4: Accelerate Research, Development for New Antibiotics, Other Therapeutics, and Vaccines



GOAL 5: International Collaboration for AR Prevention, Surveillance, Control and Antibiotic Research and Development



Goal 1

Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections

Big Bet: Double local efforts by awarding an average of \$2.5 million to health departments by 2025.

Examples of other CDC targets:

- 🎯 Decrease healthcare-associated antibiotic-resistant infections by 20% and community-acquired antibiotic-resistant infections by 10% by 2025.
- 🎯 Expand the reach of CDC's Be Antibiotics Aware and Get Ahead of Sepsis campaigns.
- 🎯 Improve antibiotic use across healthcare settings, plants and animals.
- 🎯 Initiate efforts to improve antibiotic or diagnostic guidelines by 2021.



Antibiotic Stewardship in Critical Access Hospitals

CDC/HRSA Webinar

November 18th, 2020

Natalia Vargas, MPH

MBQIP & Quality Lead, Federal Office of Rural Health Policy

Health Resources and Services Administration (HRSA)

Vision: Healthy Communities, Healthy People



National Rural Health Day 2020

- HRSA is hosting a variety of events throughout the week of November 16 to celebrate National Rural Health Day (NRHD) on November 19
- Events are open to the public (registration is required for some events)
- NRHD is HRSA's opportunity to showcase the work and accomplishments across the agency supporting rural health



To register for upcoming events, please visit:

<https://www.hrsa.gov/rural-health/about-us/rural-healthday.html>



Federal Office of Rural Health Policy



Rural Health

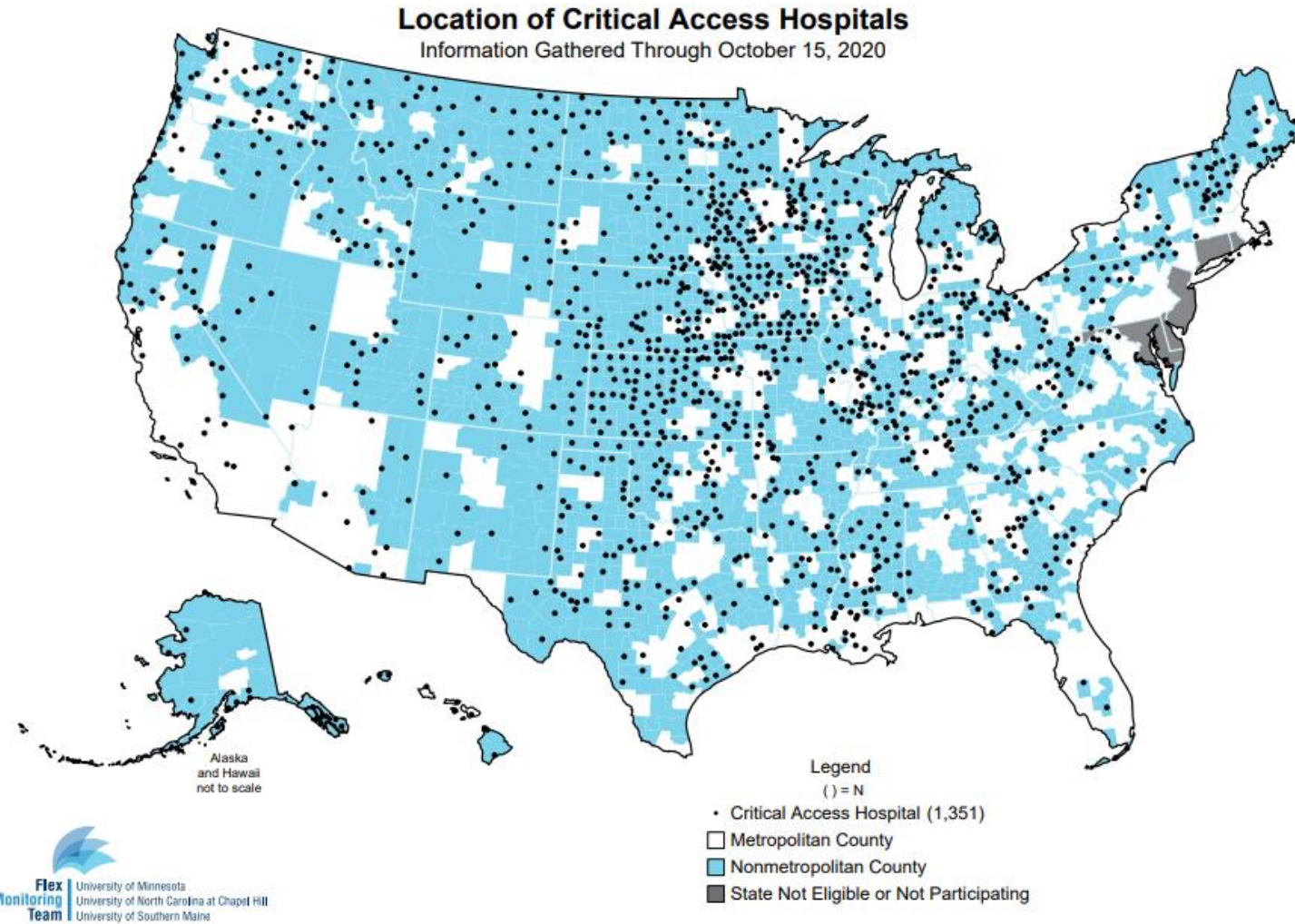
The Federal Office of Rural Health Policy (FORHP) has supported:



The goal of rural community programs is to improve access, expand capacity and improve health outcomes through collaboration among rural health care providers.

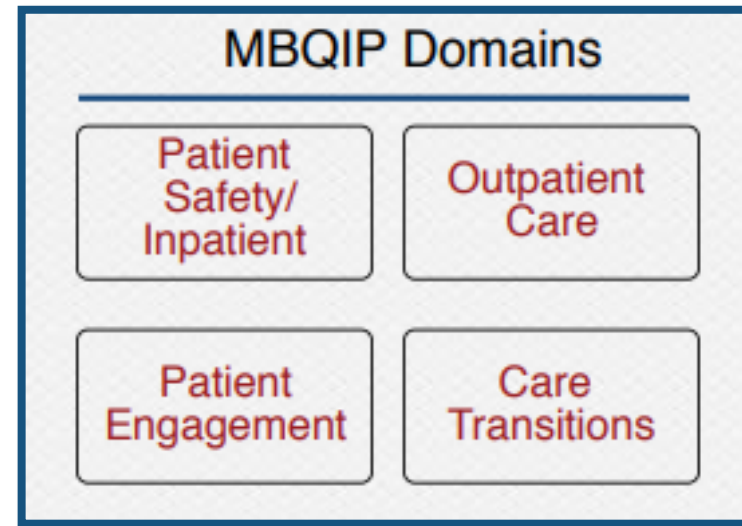


Quality Improvement in Critical Access Hospitals

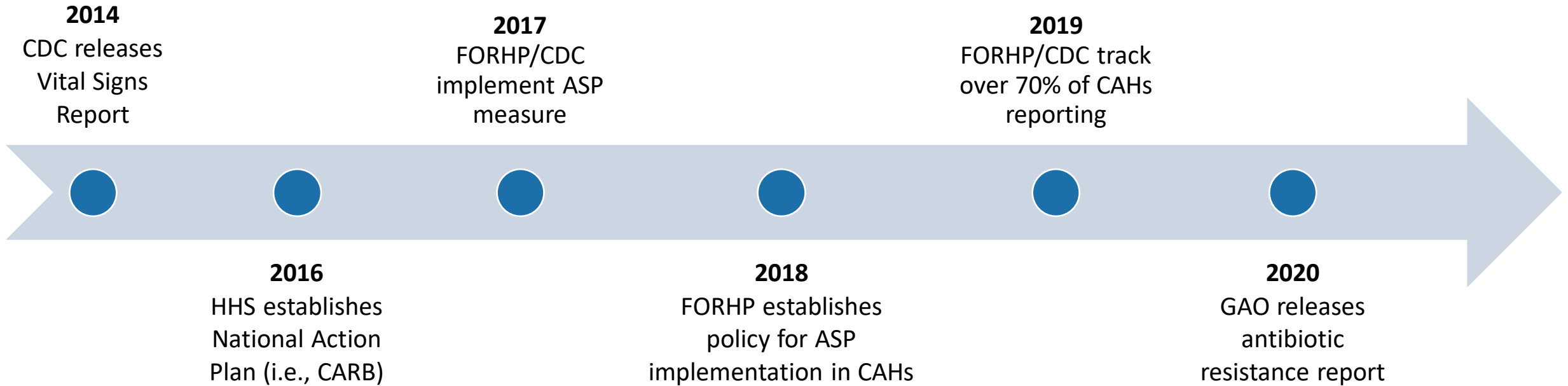


Program Overview

- Medicare Rural Hospital Flexibility (Flex) Grant supports quality improvement (QI) efforts across 45 states through the **Medicare Beneficiaries Quality Improvement Project (MBQIP)**
- FORHP funds the Flex Monitoring Team at the **University of Minnesota** and a Rural Quality Improvement Technical Assistance project at **Stratis Health** to support CAHs in the voluntary reporting of quality measure data
- FORHP requires MBQIP participation and annually recognizes top 10 performing states who achieved the highest reporting rates and improvement levels
- MBQIP's primary aim is to increase reporting of quality data to drive QI based on a common set of rural-relevant hospital metrics within 4 measure domains:



HRSA Collaboration with CDC



MBQIP focuses on strengthening collaborations with HHS/CDC on the judicious use of antibiotics



Current Goals with Antibiotic Stewardship Programs

- Improve state capacity to use quality measure data to demonstrate improvements and opportunities to support ASP implementation
- Improve CAH reporting on NHSN; and identify quality improvement (QI) opportunities based on the 7 Core Elements of Antibiotic Stewardship
- Identify challenges in rural hospitals for reporting and uptake of ASP measure



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Introduction of Speakers



Erin O'Leary, MPH
Data Analyst, Surveillance Branch
CDC's Division Quality Healthcare Promotion
Lantana Consulting Group



Emily Spivak, MD, MHS, FIDSA
Associate Professor of Medicine
Antimicrobial Stewardship Medical Director
University of Utah Health and Salt Lake City VA

Objectives

- Discuss the 2019 NHSN Annual Hospital Survey results for the antibiotic stewardship program Core Element uptake stratified by facility type, bed size, and teaching status.
- Provide practical suggestions for enhancing stewardship activities in critical access hospitals.

Speaker disclosures

The speakers have no financial relationship(s) or disclosures. The conclusions in this talk are the speakers' and do not necessarily represent the Centers for Disease Control and Prevention or the Veterans Health Administration.



The Core Elements of Hospital Antibiotic Stewardship Programs: 2019



Centers for Disease
Control and Prevention
National Center for Emerging and
Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

Core Elements of Hospital Antibiotic Stewardship Programs



Hospital Leadership Commitment

Dedicate necessary human, financial, and information technology resources.



Accountability

Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.



Pharmacy Expertise (previously “Drug Expertise”):

Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.



Action

Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.



Tracking

Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.



Reporting

Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.



Education

Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.

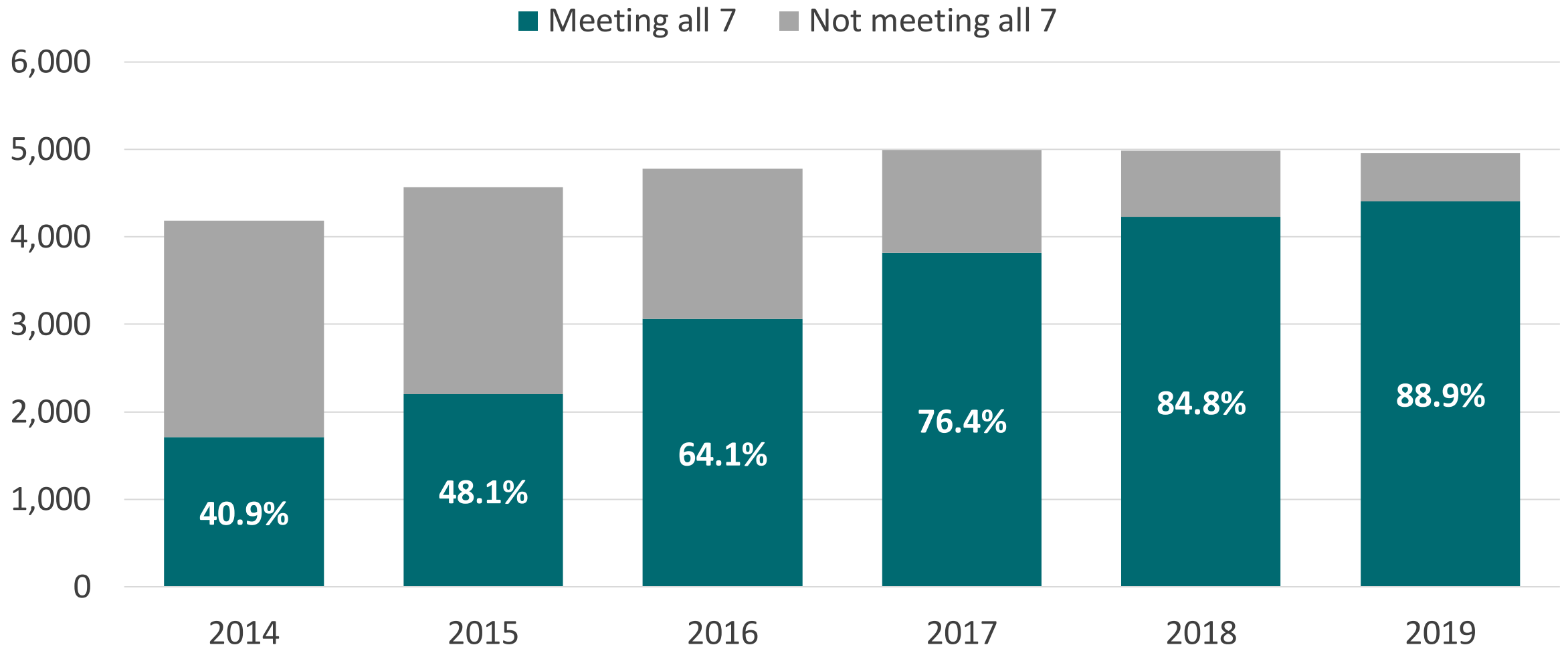
NHSN Annual Hospital Survey

- Hospitals participating in the National Healthcare Safety Network (NHSN) complete an annual online survey, which includes questions on:
 - Facility demographics
 - Laboratory practices
 - Infection control practices
 - As of 2014, questions specific to antibiotic stewardship programs (ASPs)
- Survey typically completed by a hospital's infection preventionist
- Staff who complete ASP questions are encouraged to request assistance from pharmacists and/or physicians who focus on ASPs or infectious diseases, or members of pharmacy & therapeutics committee

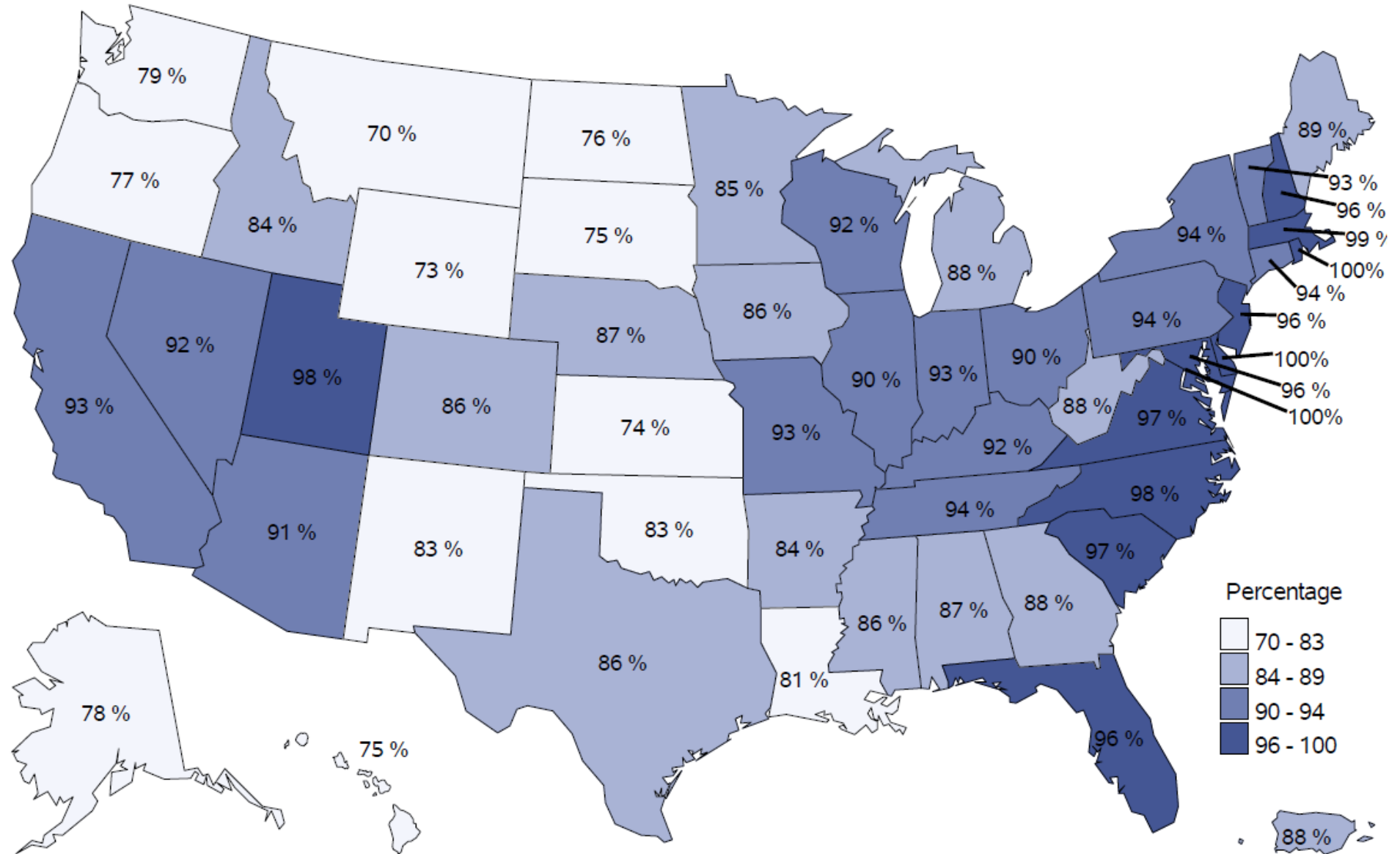
Survey questions and Core Elements

- Annual surveys summarize information and events taking place in hospitals during the previous full calendar year
 - 2019 surveys are completed by facilities early 2020
- ASP portion of the 2019 annual survey is composed of 10 required and 9 optional questions
- CDC uses responses to required questions to assess whether facilities meet criteria for each of the 7 Core Elements
- CDC tracks Core Element uptake by comparing the percentage of facilities meeting each element and all 7 elements each year
 - By facility type, teaching status, hospital bed size, etc.

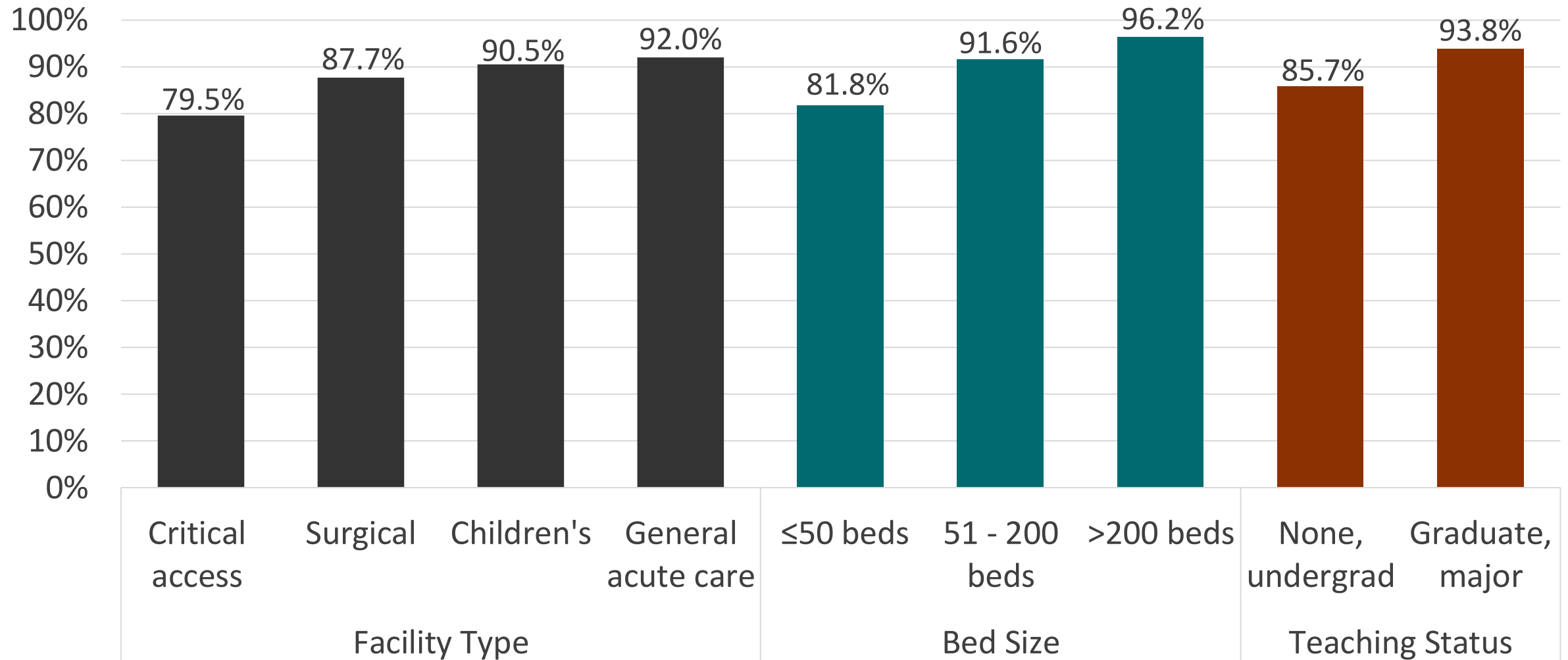
NHSN Annual Hospital Surveys 2014-2019: Number and percentage of hospitals meeting all 7 Core Elements



Core Element uptake, by state



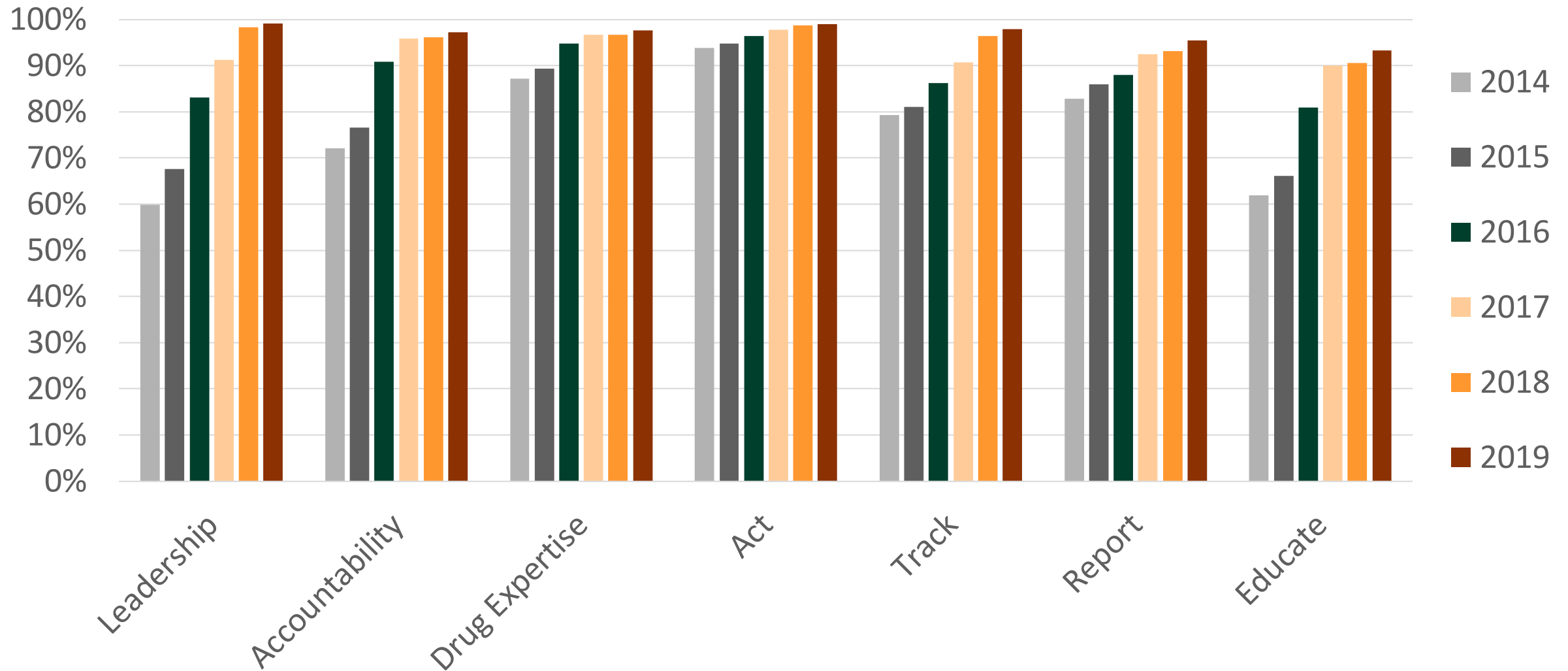
Percentage of hospitals meeting all 7 Core Elements, by hospital characteristic, 2019 survey



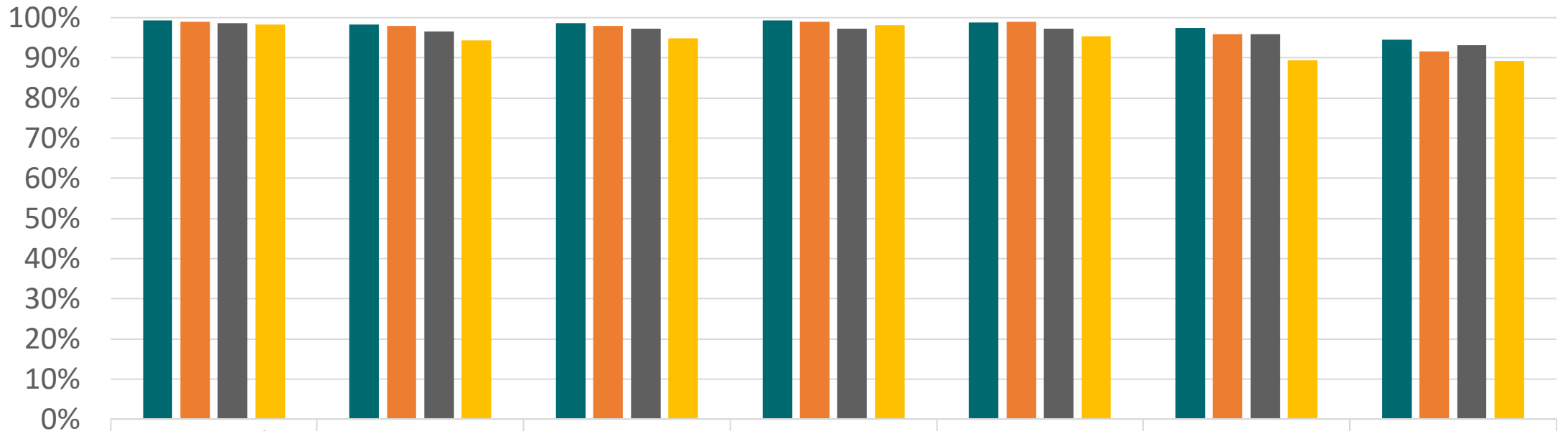
Percentage of hospitals meeting all 7 Core Elements, by hospital characteristic, 2014-2019

Characteristic	2014	2015	2016	2017	2018	2019
Overall	40.9%	48.1%	64.1%	76.4%	84.8%	88.9%
Facility Type						
Children's hospital	50.0%	53.2%	73.9%	86.0%	91.9%	90.5%
General acute care hospital	44.6%	53.1%	69.5%	81.9%	88.5%	92.0%
Surgical hospital	33.6%	45.4%	58.1%	77.3%	79.9%	87.7%
Critical access hospital	19.6%	26.3%	43.0%	57.8%	73.2%	79.5%
Bed Size						
≤50 beds	23.6%	31.1%	46.0%	61.4%	75.4%	81.8%
51 - 200 beds	40.4%	49.6%	69.0%	82.5%	88.6%	91.6%
>200 beds	58.4%	66.1%	81.5%	90.7%	93.9%	96.2%
Teaching Status						
Major teaching	55.4%	63.4%	76.3%	86.4%	91.0%	93.8%
Non-teaching/undergrad	35.6%	42.4%	58.5%	71.4%	81.1%	85.7%

NHSN Annual Hospital Surveys 2014-2019: Percentage of hospitals meeting each Core Element



Percentage of hospitals meeting each Core Element, by facility type, 2019 annual survey



	Hospital Leadership Commitment	Accountability	Pharmacy Expertise	Action	Tracking	Reporting	Education
General acute care	99.4%	98.2%	98.6%	99.4%	98.8%	97.3%	94.6%
Children's	98.9%	97.9%	97.9%	98.9%	98.9%	95.8%	91.6%
Surgical	98.6%	96.6%	97.3%	97.3%	97.3%	95.9%	93.2%
Critical access	98.3%	94.3%	94.8%	98.1%	95.3%	89.3%	89.2%



Hospital Leadership Commitment

- Priority examples:
 - Giving stewardship program leader(s) time to manage the program and conduct daily stewardship interventions.
 - Providing resources, including staffing, to operate the program effectively.
 - Having regular meetings with ASP leaders to assess the resources needed to accomplish the hospital's goals for improving antimicrobial use (AU).
 - Appointing a senior executive leader to serve as a point of contact or “champion” for the stewardship program to help ensure that the program has resources and support to accomplish its mission.
 - Reporting stewardship activities and outcomes (including key success stories) to senior leadership and the hospital board on a regular basis.



Hospital Leadership Commitment

Priority examples, 2019 uptake:

Percentage of hospitals meeting priority examples of LEADERSHIP COMMITMENT	General acute care n=3572	Children's n=95	Surgical n=146	Critical access n=1144
Facility leadership has demonstrated a commitment to ASP by allocating information technology resources to support ASP efforts	78.6%	89.5%	62.3%	66.3%
Our facility's antibiotic stewardship physician leader has antibiotic stewardship responsibilities in their contract or job description	46.8%	66.3%	27.4%	12.9%
Our facility's antibiotic stewardship pharmacist leader has antibiotic stewardship responsibilities in their contract or job description	55.0%	61.1%	37.0%	29.6%
All 3 priority examples of Leadership Commitment	29.7%	45.3%	11.6%	8.1%



Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals



Core Elements 1 and 2: Leadership Commitment/Accountability

Leadership commitment by hospital executives and board trustees in small and critical access hospitals is important to ensuring allocation of the necessary resources to support antibiotic stewardship programs. Obtaining leadership commitment from the chief medical officer (CMO), pharmacy director, and nursing leaders can facilitate physician, pharmacist, infection preventionist, and nurse engagement to implement stewardship initiatives to create a strong and sustainable program.

Examples of implementation strategies:

- Designate a physician (e.g., CMO) in the C-suite or individual that reports to C-suite to be accountable for the outcomes of the antibiotic stewardship program.
- Approve a policy for the creation and/or expansion of the antibiotic stewardship program to include all core elements.
- Integrate stewardship activities into ongoing quality improvement and/or patient safety efforts in the hospital (e.g., efforts to improve sepsis management)
- Create a reporting structure for the stewardship program to ensure that information on stewardship activities and outcomes is shared with facility leadership and the hospital board (e.g., semi-annual stewardship update at the board meeting).
- Issue a formal board-approved statement on the importance of the antibiotic stewardship program and include in the hospital's annual report.
- Issue a statement from the hospital leadership (e.g., medical, pharmacy and nursing) to all providers and patients highlighting the hospital's commitment to improving antibiotic use.
- Support training for hospital stewardship leaders on antibiotic stewardship through on-line or in-person courses.

<https://www.cdc.gov/getsmart/healthcare/implementation/core-elements-small-critical.html>



Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

National Quality Partners Playbook: Antibiotic Stewardship in Acute Care

NATIONAL QUALITY FORUM
NATIONAL QUALITY PARTNERS
ANTIBIOTIC STEWARDSHIP ACTION TEAM



NATIONAL QUALITY PARTNERS PLAYBOOK: Antibiotic Stewardship in Acute Care



THE NATIONAL URGENCY FOR SAFER, MORE EFFECTIVE ANTIBIOTIC USE

Antibiotics are powerful drugs to treat serious infections. However, decades of overprescribing and misuse have resulted in bacteria that are increasingly resistant to these potent drugs, creating a growing threat of new superbugs that are difficult, and sometimes even impossible, to treat. According to the Centers for Disease Control and Prevention (CDC), drug-resistant bacteria cause two million illnesses and 23,000 deaths annually.

In 2014, CDC recommended that all acute-care hospitals in the United States implement an antibiotic stewardship program to guide efforts to improve appropriate and necessary antibiotic use and released the *Core Elements of Hospital Antibiotic Stewardship Programs*. In addition, the Obama Administration has identified antibiotic stewardship as a national priority and issued an executive order calling for the Department of Health and Human Services (HHS) to promote the implementation of antibiotic stewardship programs across all healthcare settings.

According to the CDC, drug-resistant bacteria cause two million illnesses and 23,000 deaths annually.

NQF'S STRATEGIES TO BUILD ON CDC'S CORE ELEMENTS FOR ANTIBIOTIC STEWARDSHIP

National Quality Forum's National Quality Partners (NQP) convened more than 25 experts and national stakeholders from the public and private sectors—including patient advocates, infectious disease physicians and pharmacists, and acute-care providers—to develop *National Quality Partners Playbook: Antibiotic Stewardship in Acute Care*. The goal of this new resource is to help hospitals and health systems strengthen existing antibiotic stewardship initiatives or create antibiotic stewardship programs from the ground up. The *Playbook*, which is based on CDC's *Core Elements*, offers practical

strategies for implementing high-quality antibiotic stewardship programs in hospitals nationwide:

- 1. Leadership Commitment.** Antibiotic stewardship is a team sport in which many hospital staff—including physicians, pharmacists, nurses, and administrators—play an important role.
- 2. Accountability.** Hospitals must appoint a single leader, such as a physician, who is responsible for program outcomes.
- 3. Drug Expertise.** Hospitals must designate a single pharmacist who can lead initiatives to improve antibiotic use among patients.
- 4. Action.** Hospitals must implement a systematic approach to evaluating patients' needs for antibiotics.



Hospital Leadership Commitment

- Stewardship Program Policy
 - Background/Purpose/Goals
 - Scope – what patients you cover (inpatient, outpatient), where you fall in organizational chart
 - Define who the team is and individual responsibilities
 - Describe interventions and tracking
 - Who you report to, what you report and when

Leadership Commitment

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

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

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

DEPARTMENT OF VETERANS AFFAIRS (VA) SALT LAKE CITY HEALTH CARE SYSTEM
Salt Lake City, Utah

MEMORANDUM 119.xx

May 28, 2013

ANTIMICROBIAL STEWARDSHIP PROGRAM

1. PURPOSE: To provide a method to ensure the efficacious, safe and cost-effective use of antimicrobials within the VA Salt Lake City Health Care System (VASLCHCS) through the development of an antimicrobial stewardship program (ASP) which will report to the Pharmacy and Therapeutics Committee (P&T). The overall goals of the program include:

- a. Promoting optimal patient care by assisting clinicians with antimicrobial selection.
- b. Promoting the safe use of antimicrobials by assisting clinicians in prevention and management of adverse effects, drug/drug interactions and appropriate dosing of antimicrobials.
- c. Providing education institution-wide through the development of Clinical Pathways and Guidelines, educational materials, and one on one education to providers to assist in the safe, effective and cost-effective use of antimicrobials within VASLCHCS.

2. POLICY: The Antimicrobial Stewardship program (ASP) will develop methods to monitor the use of antimicrobials throughout VASLCHCS. Particular focus will be given to those agents

ANTIMICROBIAL STEWARDSHIP PROGRAM
(add version number, date, and document owner)

PURPOSE:

- A. Antimicrobial Stewardship is a coordinated group of interventions designed to measure and improve the use of antimicrobial agents by promoting appropriate drug selection, route of administration, dosing, and duration of therapy.
- B. To develop an Antimicrobial Stewardship Program (ASP) that will facilitate the efficacious, safe and cost-effective use of antimicrobials within the University of Utah Hospitals and Clinics. The overall goals of the program include:
 1. Achieve and maintain top quartile performance in The National Healthcare Safety Network (NHSN) Antimicrobial Use and Resistance (AUR) metric.
 2. Promote optimal patient outcomes related to antimicrobial use and infectious diseases.
 3. Minimize unintended consequences of antimicrobial use including adverse effects, *Clostridium difficile* infection (CDI), drug/drug interactions, and antimicrobial resistance.
 4. Minimize unnecessary costs associated with sub-optimal antimicrobial use.
 5. Provide education institution-wide through the development of local clinical pathways and guidelines, provider and patient educational materials, sharing of local antimicrobial use and resistance information, and one on one education to providers to assist in the safe and cost-effective use of antimicrobials.
 6. Monitor and communicate key performance indicators to faculty and staff members throughout the institution.

SCOPE:

- A. The ASP has been assigned the responsibility for measuring and working to



Accountability

- Most hospitals have found a co-leadership model to be effective.
- If a non-physician is the ASP leader, designate a physician who can serve as point of contact and support for the non-physician program leader.
- Regular “stewardship rounds” for the co-leaders, or the non-physician lead and the supporting physician can strengthen program leadership.
- Expand rounds to prescribers (e.g., handshake stewardship).





Accountability

Facility leader(s) accountable for ASP outcomes:

- Co-led ASPs are more likely to meet all 7 Core Elements compared to physician-led, pharmacist-led, and other-led programs

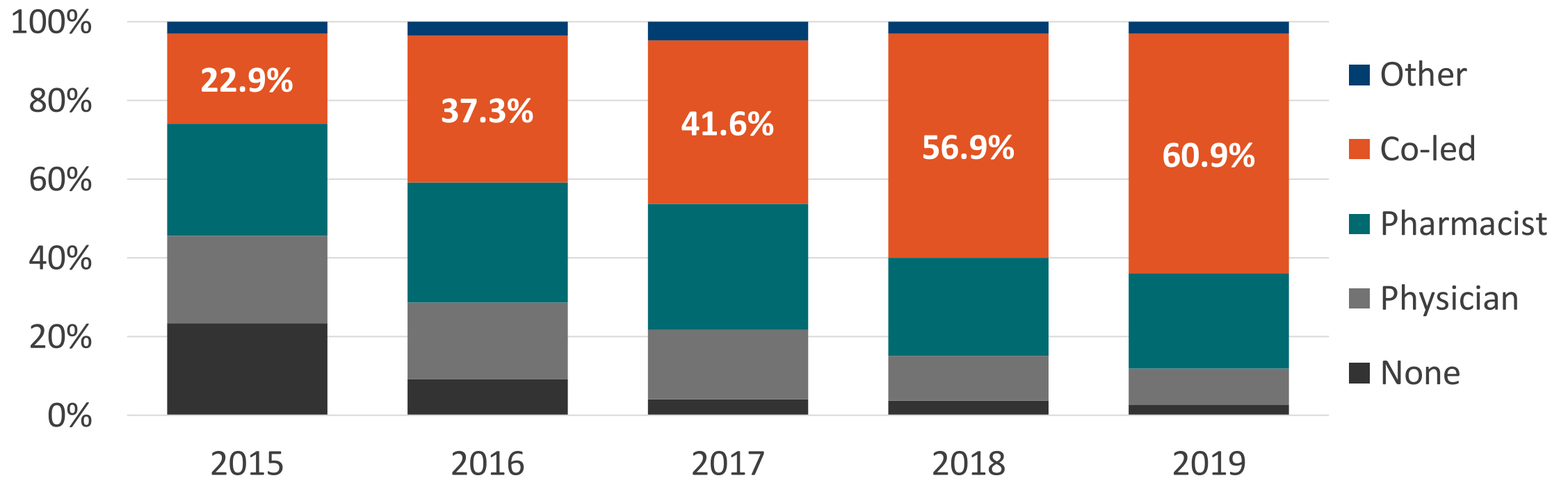
Stewardship Lead(s)	2015	2016	2017	2018	2019
Co-led	70.0%	75.8%	86.0%	91.5%	94.3%
Physician	67.1%	75.1%	83.1%	86.8%	89.1%
Pharmacist	54.7%	63.3%	73.9%	84.1%	86.9%
Other	53.7%	51.5%	50.0%	66.0%	76.4%



Accountability

Facility leader(s) accountable for ASP outcomes

- Co-led ASPs are becoming more common





Accountability

Facility leader(s) accountable for ASP outcomes:

- While 61% of all hospitals reported co-led programs in 2019, results differ by facility type and bed size

Stewardship Lead	General acute care			Critical access	51-200 beds		
	Children's	Surgical	>200 beds		beds	≤50 beds	
None	1.8%	2.1%	3.4%	5.7%	0.2%	1.5%	5.5%
Co-led	68.5%	66.3%	47.9%	38.5%	80.3%	65.8%	43.8%
Physician	9.1%	17.9%	10.3%	8.2%	10.4%	9.1%	8.2%
Pharmacist	19.5%	11.6%	34.2%	38.7%	9.1%	22.6%	35.8%
Other	1.1%	2.1%	4.1%	8.9%	0.0%	1.1%	6.6%



Accountability

- Doesn't have to be ID physician...
- Hospitalist or Nurse Practitioner who is passionate
- Seek out Antimicrobial Stewardship Training
- Involve clinical champions from high impact areas (ICUs, Surgery, Emergency Medicine, etc.)
- Contract with ID groups to provide leadership and expertise (part-time, off site, telemedicine)
- Enroll in Collaborative or ECHO/Mentorship Model

**Still need local leader*

Core Element 2: Accountability

Appointing a leader or co-leaders (one should be a physician, if possible), who are responsible for program outcomes and whose effectiveness is assessed through clear performance standards, provides accountability for antibiotic stewardship.

- The antibiotic stewardship program (ASP) should have a designated leader or co-leaders who are accountable to the hospital leadership for meeting goals and targets. Published studies and guidelines have recommended physicians with training in infectious diseases as effective ASP leaders.
- Criteria for a physician and/or pharmacy leader should include expertise in antibiotic use, training in stewardship, leadership skills, respect from peers, and good team skills.

Need dedicated time and salary support and reporting structure for accountability.



Pharmacy Expertise

- Highly effective hospital antibiotic stewardship programs have strong engagement of pharmacists.
- CDC has several posters for hospital pharmacists highlighting key stewardship interventions for pharmacists.



5 WAYS HOSPITAL PHARMACISTS CAN BE ANTIBIOTICS AWARE



1. Verify Penicillin Allergy

- Although 10% of the population in the United States reports a penicillin allergy, less than 1% of the population is truly penicillin allergic.¹
- When possible, obtain a more detailed history of the penicillin reaction and review previously prescribed antibiotics. Alert the provider of your findings if you think the patient can tolerate a beta-lactam antibiotic, when appropriate.



2. Avoid Duplicative Anaerobic Coverage

- Duplicative anaerobic coverage, such as piperacillin/tazobactam and metronidazole, is unnecessary in most cases.²
- When the pharmacy receives antibiotic orders for two or more agents with anaerobic activity, alert the provider that the antibiotics have overlapping spectra of activity.



3. Reassess Antibiotic Therapy

- Review the patient's microbiology results (e.g., rapid diagnostic tests and clinically relevant cultures).³
- Prompt the provider to consider **stopping** or **tailoring** antibiotic therapy as appropriate.



4. Avoid Treatment of Asymptomatic Bacteriuria

- Patients with asymptomatic bacteriuria should not be treated with antibiotics in most cases.⁴
- Consider the importance of signs and symptoms consistent with urinary tract infection (UTI) when reviewing positive urine cultures and/or making treatment recommendations.



5. Use the Shortest Effective Antibiotic Duration

- Guidelines for treatment duration are available for common infectious diseases such as pneumonia, UTI, and skin and soft tissue infection.^{5,6,7}
- Alert the provider if the total days of inpatient and post-discharge antibiotic therapy exceeds the recommended duration.

The scenarios and recommendations are applicable to most immunocompetent adult patients. Prior to making interventions, always assess the individual patient and use your clinical judgment. Follow your institution's treatment guidelines when applicable.

See references:

1. "Is It Really a Penicillin Allergy?" Centers for Disease Control and Prevention. <https://www.cdc.gov/antibiotic-use/communitymaterialsreferences/print-materials/index.html#antibiotic-use>
2. Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals: Centers for Disease Control and Prevention. <https://www.cdc.gov/antibiotic-use/communitymaterialsreferences/print-materials/index.html#antibiotic-use>
3. Core Elements of Hospital Antibiotic Stewardship Programs: Centers for Disease Control and Prevention. <https://www.cdc.gov/antibiotic-use/communitymaterialsreferences/print-materials/index.html#antibiotic-use>
4. Nicolle L.E., Gupta R., Bradley SS, et al. Clinical Practice Guidelines for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America. Clin Infect Dis. 2019 March 21 [Epub]. <https://doi.org/10.1093/cid/ciy111>
5. Mandell LA, Wunderink RS, Anzueto A, et al. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. Clin Infect Dis. 2007;45 Suppl 2:S27-72. <https://doi.org/10.1093/cid/cil555>
6. Gupta R, Hocon TH, Patel NG, et al. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: A 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. Clin Infect Dis. 2011;52:e103-20. <https://doi.org/10.1093/cid/cir106>
7. Stevens DL, Basso D., Chambers AF, et al. Practice guidelines for the diagnosis and management of skin and soft-tissue infections: 2014 update by the Infectious Diseases Society of America. Clin Infect Dis. 2014;58(2):e1-27. <https://doi.org/10.1093/cid/cit555>



www.cdc.gov/antibiotic-use



Pharmacy Expertise

- High uptake of pharmacy expertise across all facility types (98.6% in general acute care, 94.8% in critical access hospitals)
- Critical access hospitals are less likely to have co-led programs and more likely to have pharmacist-led programs

	General acute care n=3572	Children's n=95	Surgical n=146	Critical access n=1144
Percentage of hospitals meeting PHARMACY EXPERTISE criteria				
Our facility has a pharmacist leader or co-leader responsible for ASP outcomes	88.0%	77.9%	82.2%	77.2%
Our facility has a physician or "other" leader responsible for ASP outcomes but there is at least one pharmacist responsible for improving AU at our facility	9.9%	20.0%	13.7%	14.9%
Our facility does NOT have a leader but does have a committee responsible for antibiotic stewardship and a pharmacist is a member of that committee	0.6%	0.0%	1.4%	2.7%



Pharmacy Expertise

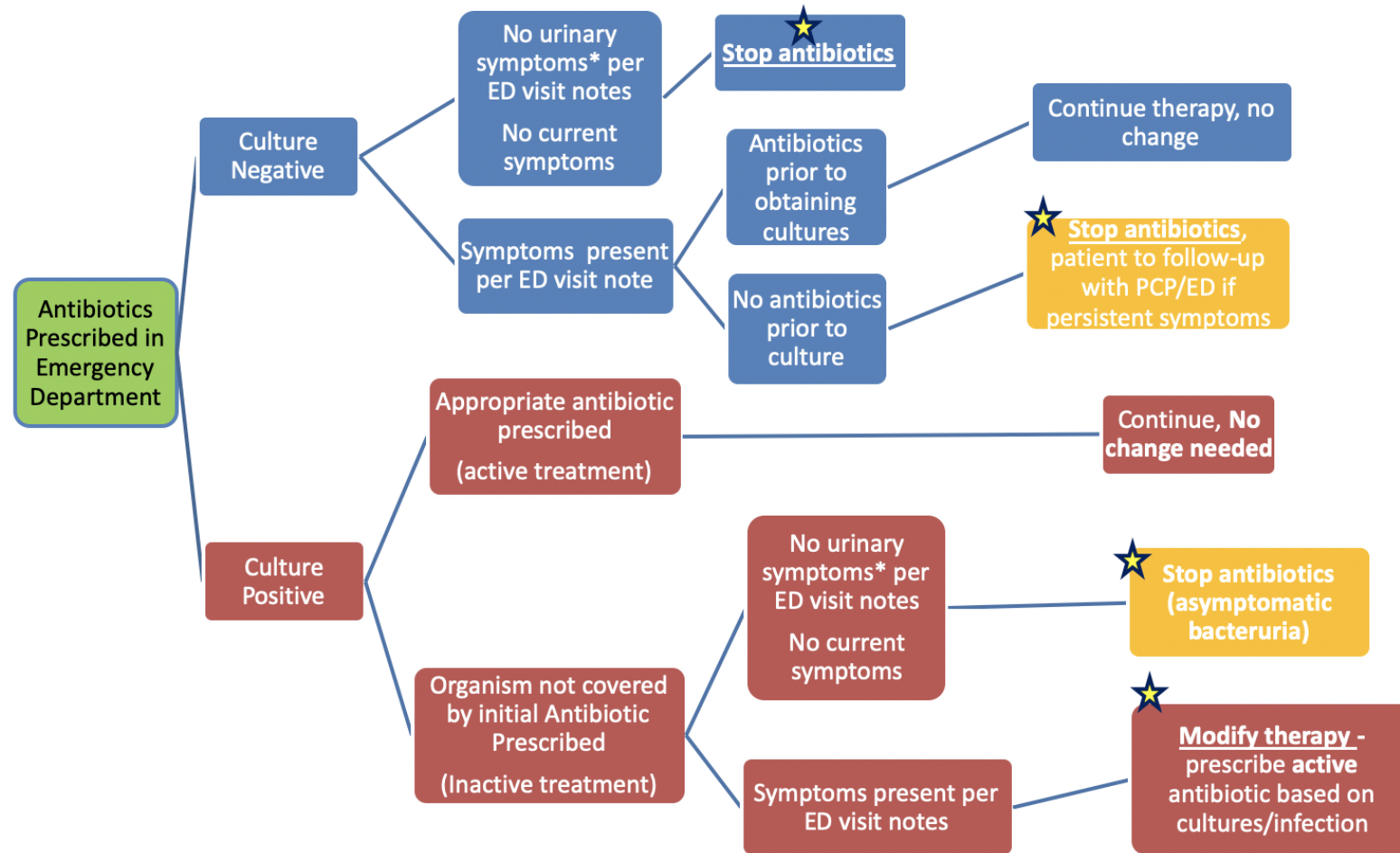
- Doesn't have to be ID trained pharmacist
- Seek out Antimicrobial Stewardship Training
- Pharmacist role is integral...if have passionate pharmacist with leadership skills consider contracting out to ID MD group for expertise and physician accountability

Core Element 3: Drug Expertise

Dedicated staff with demonstrated drug expertise is critical to the success of antibiotic stewardship. Appointing a pharmacist leader to partner with the antibiotic stewardship program leader provides the expertise and accountability needed for a high-quality program.

- A pharmacist leader with expertise in antibiotic use is identified and is responsible for partnering with the antibiotic stewardship physician leader or physician champion to improve antibiotic use. Published studies and guidelines have recommended pharmacists with training in infectious diseases as effective ASP pharmacy leaders.
- Criteria for a pharmacy leader should include expertise in antibiotic use, training in stewardship, leadership skills, respect from peers, and good team skills.

ED Pharmacist Urine Culture Intervention



- Run report Monday – Friday of urine cultures collected in ED
- Review chart based on urine culture result
- Pharmacists leave notes for interventions

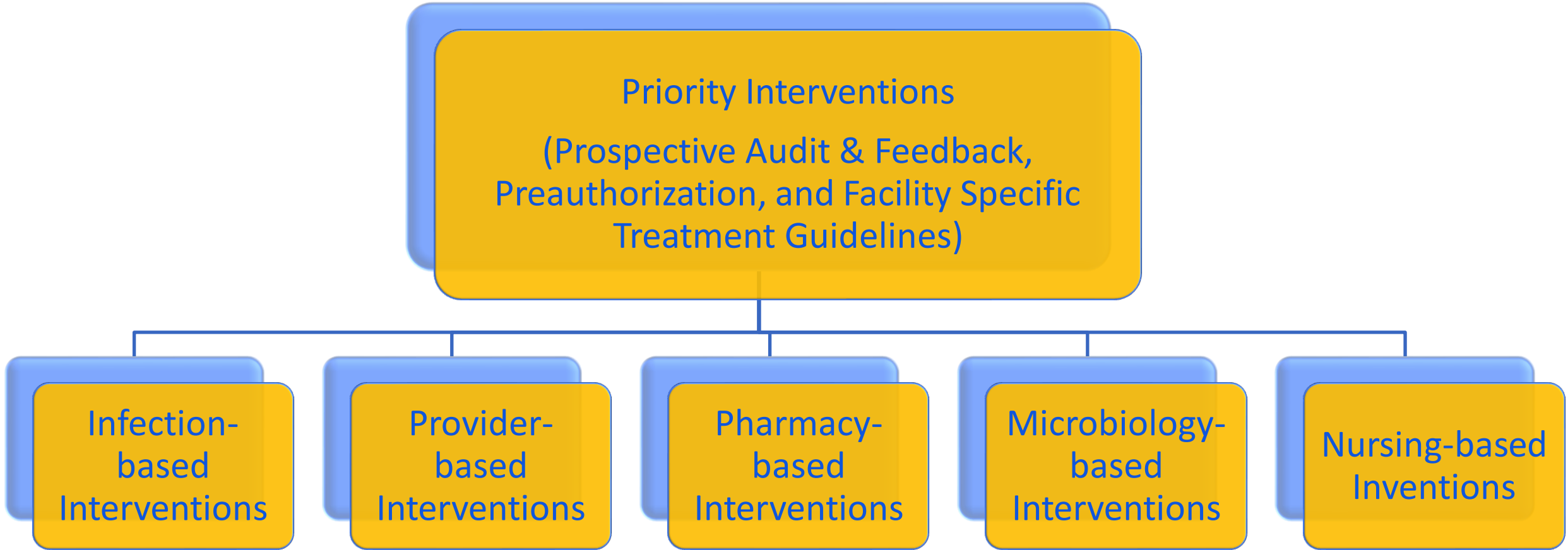
*Specific UTI Symptoms: dysuria, flank pain, urinary urgency, urinary frequency, suprapubic pain or discomfort

**Non-specific UTI signs & symptoms: fever, chills, rigors, acute delirium, acute hematuria

★ Pharmacist action taken (Emergency Department pharmacist will call patient to assess symptoms prior to modification)



Action





Action

Priority interventions to improve antibiotic use

- 92% of CAHs have facility-specific treatment guidelines, similar to other facility types, but CAHs are less likely to have PAF and preauthorization interventions in place

Percentage of hospitals meeting priority ACTION interventions to improve antibiotic use	General acute care n=3572	Children's n=95	Surgical n=146	Critical access n=1144
Prospective audit and feedback (PAF)	74.9%	81.1%	58.2%	47.1%
Preauthorization	52.7%	52.6%	39.0%	20.0%
Facility-specific treatment guidelines	94.2%	93.7%	88.4%	91.7%
PAF and Preauthorization only	1.7%	2.1%	2.1%	0.2%
PAF and Facility-specific treatment guidelines only	25.8%	32.6%	24.0%	28.1%
Preauthorization AND Facility-specific treatment guidelines only	4.8%	3.2%	5.5%	3.2%
All 3 priority interventions	45.9%	46.3%	30.8%	16.5%



Action

Syndrome Specific Stewardship

- Most common infectious syndromes (CAP, UTI, SSTI)
 - >50% of all inpatient antibiotic use
- Significant opportunity for improved antibiotic use
- Guidelines/Best practices
- Doesn't require ID expertise



Action

Common Themes & Opportunities

- Diagnosis (Right patient)
- Drug Selection (Right drug)
- Duration of therapy (Right duration)



Action

CAP Pathway Intervention Objectives

1. Develop and implement single “Best Practice” pathway for CAP
2. Assess impact of Pathway on:
 1. Intravenous antibiotic duration
 2. Length of stay
 3. Costs
 4. Balancing Measures

TABLE 1. KEY OPPORTUNITIES TO IMPROVE ANTIBIOTIC USE

	Diagnostic Considerations	Guide Empiric Therapy	Assess Duration of Therapy including discharge prescription
Community-acquired pneumonia⁸	Review cases at 48 hours to confirm pneumonia diagnosis versus non-infectious etiology.	Avoid empiric use of antipseudomonal beta-lactams and/or methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) agents unless clinically indicated.	Guidelines suggest that in most cases, uncomplicated pneumonia can be treated for 5-7 days in the setting of a timely clinical response.
Urinary tract infections⁹⁻¹¹	Implement criteria for ordering urine cultures to ensure that positive cultures are more likely to represent infection, rather than bladder colonization. Examples include: -Only order a urine culture if the patient has signs and symptoms consistent with UTI such as urgency, frequency, dysuria, suprapubic pain, flank pain, pelvic discomfort and acute hematuria. -For patients with urinary catheters, avoid culturing urine based solely on cloudy appearance or foul smell in the absence of signs and symptoms of UTI. Non-specific signs and symptoms such as delirium, nausea, vomiting should be interpreted with caution as by themselves they have a low specificity for UTI.	Establish criteria to distinguish between asymptomatic and symptomatic bacteriuria. Avoid antibiotic therapy for asymptomatic bacteriuria except in certain clinical situations where treatment is indicated, such as for pregnant women and those undergoing an invasive genitourinary procedure. Fluoroquinolones are often not optimal empiric therapy.	Use the shortest duration of antibiotic therapy that is clinically appropriate.
Skin and soft tissue infections¹²	Develop diagnostic criteria to distinguish purulent and non-purulent infections and severity of illness (i.e., mild, moderate and severe) so that skin and soft tissue infections can be managed appropriately according to guidelines.	Avoid empiric use of antipseudomonal beta-lactams and/or anti-anaerobic agents unless clinically indicated.	Guidelines suggest that most cases of uncomplicated bacterial cellulitis can be treated for 5 days if there is a timely clinical response.



Action

Targets of Intervention

- Do away with Healthcare-associated Pneumonia (HCAP) diagnosis that promotes unnecessary broad-spectrum antibiotic use
- IV to PO conversion (make it happen more quickly)
- Duration of therapy (target 5 days)

How It Works

BestPractice Advisory - Jett,Joan

Care Guidance (1) ⌵

ⓘ If this ABx is for treatment of Pneumonia, click "Open order set" for the appropriate Orderset based on the patient's CURB score. If this antibiotic is not for Pneumonia, click "Dismiss" to continue ordering.

CURB-65 Calculation


Confusion	Yes = 1	No = 0
BUN > 19 mg/dL (> 7 mmol/L)	Yes = 1	No = 0
Respiratory Rate ≥ 30	Yes = 1	No = 0
SBP < 90 mmHg or DBP ≤ 60 mmHg	Yes = 1	No = 0
Age ≥ 65	Yes = 1	No = 0

CURB-65 Total 0 - 1: Consider Outpatient Care

CURB-65 Total 2: Consider Inpatient Admission

CURB-65 Total 3+: Consider Inpatient ICU Admission

Remove the following orders? _____

Remove Keep  **azithromycin (ZITHROMAX) injection**
Intravenous, Starting Today at 1059, Routine

Apply the following? _____

Open Order Set Do Not Open Pneumonia Orderset for Inpatient Care [Preview](#)

Open Order Set Do Not Open Pneumonia Orderset for Outpatient Care [Preview](#)

Accept **Dismiss**

*Fires when chest x-ray and antibiotics both ordered...embedded into workflow

▼ CAP Treatment Options

Floor (CURB 65 score 0-2 / Drip score less than 4) - For most patients (not at an increased risk for drug-resistant pathogens)

Antibiotics

Preferred Antibiotics

azithromycin (ZITHROMAX) 500 mg in sodium chloride 0.9 % 250 mL IVPB
500 mg, Intravenous, at 250 mL/hr, Administer over 60 Minutes, Once, Today at 1000, For 1 dose, STAT

And

cefTRIAxone (ROCEPHIN) 2 g in sodium chloride 0.9% IVPB Mini-bag Plus
2 g, Intravenous, at 200 mL/hr, Once, Today at 1000, For 1 dose, STAT

And

cefuroxime axetil (CEFTIN) tablet 500 mg
500 mg, Oral, 2 times daily, First Dose Tomorrow at 1000, For 8 doses
Routine



Labs

Streptococcus Pneumoniae Antigen,Urine
Once - Routine - Lab First occurrence Today at 0921, Urine, Urine-General
Collection Method Override: Unit Collect

Legionella Pneumophilia Antigen, Urine
Once - Routine - Lab First occurrence Today at 0921, Urine
Collection Method Override: Unit Collect

Procalcitonin
Once - Routine - Lab First occurrence Today at 0921
Do you want to change the specimen collection from what it shows in the banner bar? No

Culture, Blood - 1st of 2 Peripheral Draw
STAT - Lab, 1st of 2 Peripheral Draw. Phleb to determine site

Culture, Blood - 2nd of 2 Peripheral Draw
STAT - Lab, 2nd of 2 Peripheral Draw. Phleb to determine site

Aerobic Respiratory Culture with Gram Stain
Once - Routine - Lab, Sputum, Sputum Induced

***Daily ASP
Prospective Audit
and Feedback**



Tracking and Reporting

- Measurement is critical to identify opportunities for improvement and to assess the impact of interventions.
- Summary information on antibiotic use and resistance along with ASP processes and outcomes should be shared regularly with hospital staff, leadership, and the hospital board.
- Electronic reporting to the NHSN Antimicrobial Use (AU) Option is important for hospitals to monitor and benchmark AU.



Tracking and Reporting

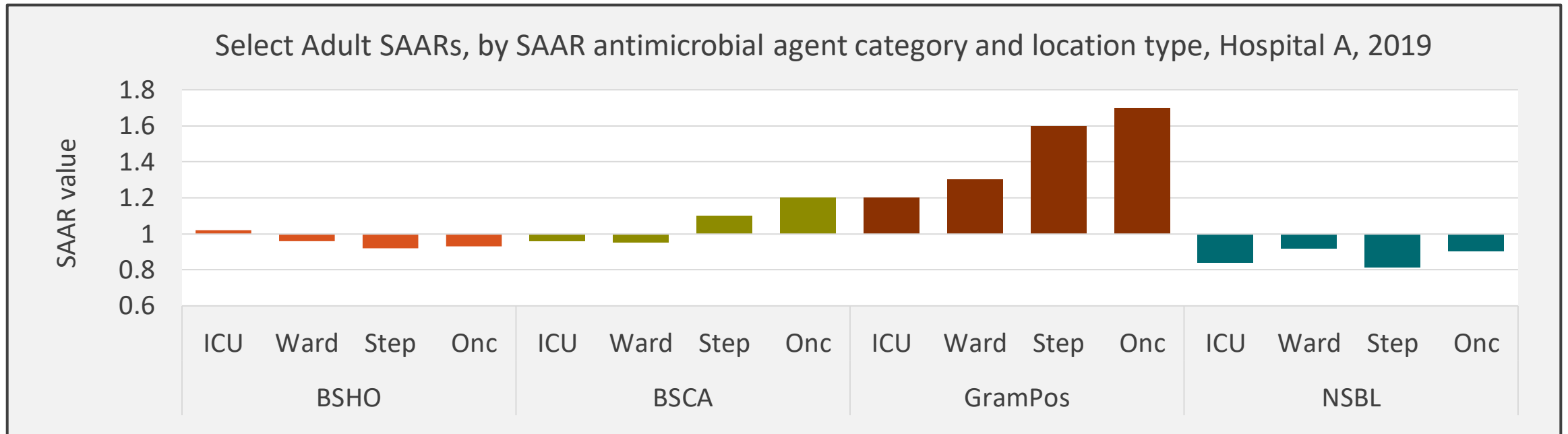
- The AU Option provides a risk-adjusted benchmark of AU called the Standardized Antimicrobial Administration Ratio or “SAAR.”
- Benchmarking has proven to be a powerful tool in hospital quality improvement.
- ASPs are using the NHSN AU Option and the SAAR to both inform and assess interventions.



Tracking and Reporting

NHSN AU Option

- Hospitals can track SAAR data over time and across eligible patient care locations and report findings to back to staff and hospital leadership



Data for example only



Tracking

- Hospitals participating in NHSN’s AU Option report **DOT** and **days present**
- 181 critical access hospitals have reported to the AU Option

Percentage of hospitals meeting select Tracking criteria	General acute care n=3572	Children's n=95	Surgical n=146	Critical access n=1144
Our facility has a policy or formal procedure for required documentation of indication for antibiotic orders and our ASP team monitors adherence to it	61.4%	67.4%	62.3%	55.1%
Providers have access to facility- or region-specific treatment guidelines or recommendations for commonly encountered infections and our ASP team monitors adherence to them	77.0%	75.8%	74.0%	70.0%
Our stewardship team monitors antibiotic resistance patterns (either facility- or region-specific)	92.7%	91.6%	76.0%	79.6%
Our stewardship team monitors antibiotic use in days of therapy (DOT) per 1000 patient days or days present , at least quarterly	75.8%	83.2%	50.7%	59.3%



Reporting

- NHSN provides AU case examples, a SAAR guide, and an AU Data Report
- Hospitals can use these to identify where improvements can be made, see examples of how hospitals have made improvements, assess national AU data to aid in benchmarking, and report these data back to staff & leaders

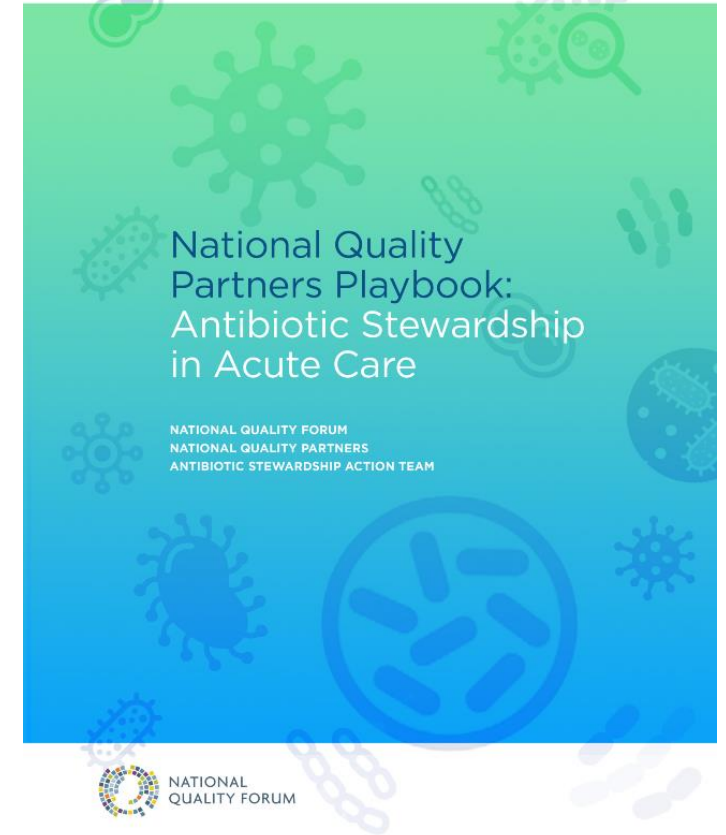
	General acute n=3572	Children's n=95	Surgical n=146	Critical access n=1144
Percentage of hospitals meeting Reporting criteria				
Our facility has a policy or formal procedure to review courses of therapy for specific antibiotic agents and provide real-time feedback and recommendations to the treating team (i.e., PAF)	74.9%	81.1%	58.2%	47.1%
Our facility monitors AU in DOT, DDD, or some other way and provides individual-, unit-, or service-specific reports to prescribers, at least annually	56.5%	60.0%	47.3%	51.4%
Our ASP team provides updates to facility leadership on AU and stewardship efforts at least annually	92.9%	93.7%	91.8%	83.0%
Our stewardship team provides updates to staff on outcomes for antibiotic stewardship interventions at least annually	64.0%	64.2%	48.0%	47.8%



Tracking and Reporting

Measurement

- Basic: Process Measures
 - Specific steps in a process that lead — either positively or negatively — to a particular outcome metric.
- Intermediate: Outcome Measures
 - High-level clinical or financial outcomes that concern healthcare organizations and providers.
- Advanced: Antibiotic Use Measures
 - Can be viewed as either process or outcome measure.



Prospective Audit and Feedback Note

Drug:

- Vancomycin (IV)
- Cefepime
- Piperacillin/Tazobactam
- Ertapenem
- Imipenem
- Meropenem
- Levofloxacin

Start Date: * ...

Documented Indication (select one or more):

- Sepsis
- Pneumonia, Community-acquired
- Pneumonia, Healthcare-acquired
- Pneumonia, Ventilator-associated
- Urinary Tract Infection
- Wound Infection
- Cellulitis

Microbiology Results:

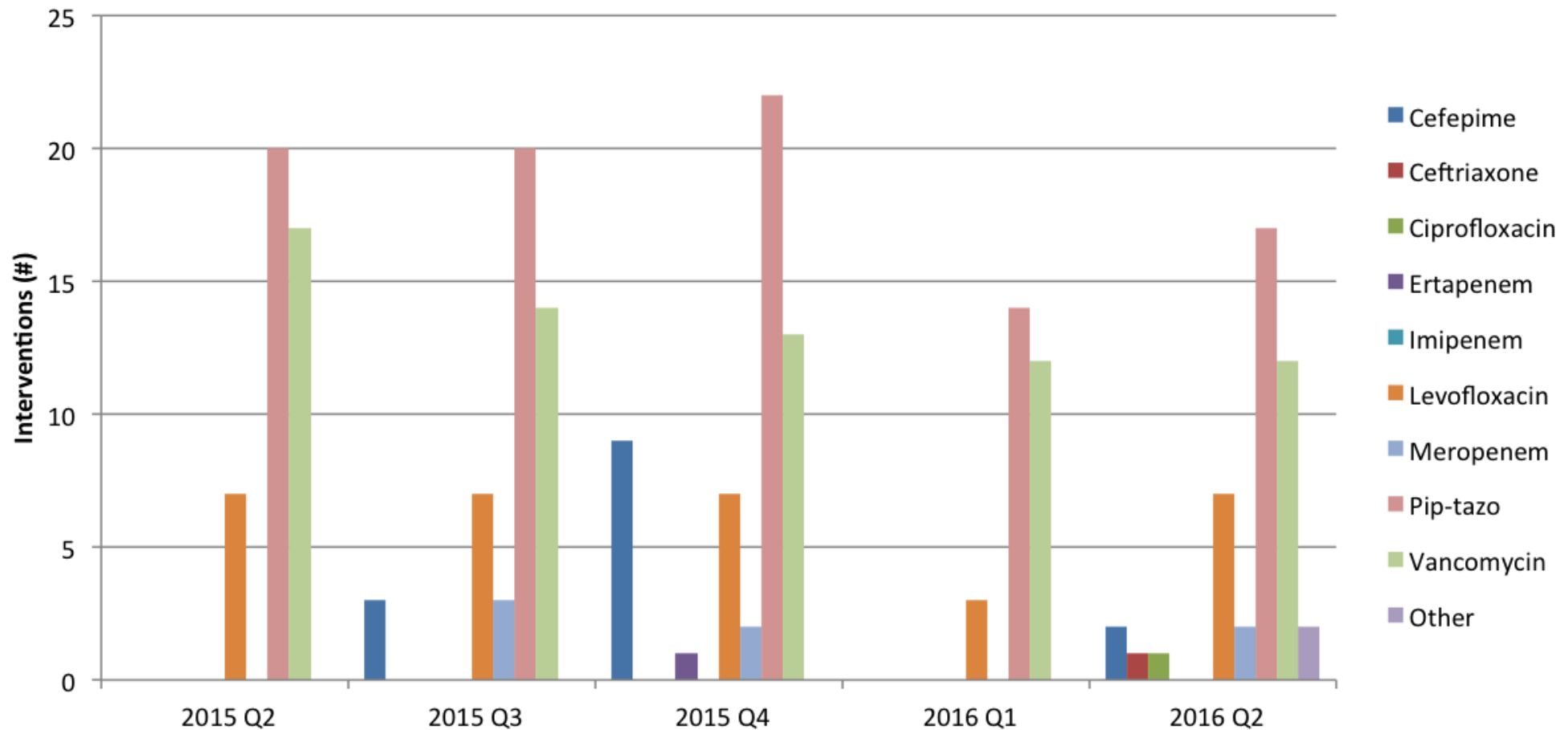
Assessment:

Recommended Intervention (select one or more):

- Narrow spectrum of activity
- Stop antimicrobial (Non-infectious or non-bacterial syndrome)
- Stop antimicrobial (Colonization or Contamination)
- Add appropriate coverage for culture results
- IV to PO conversion
- Change dosing
- Discontinue redundant coverage
- ID consult recommended

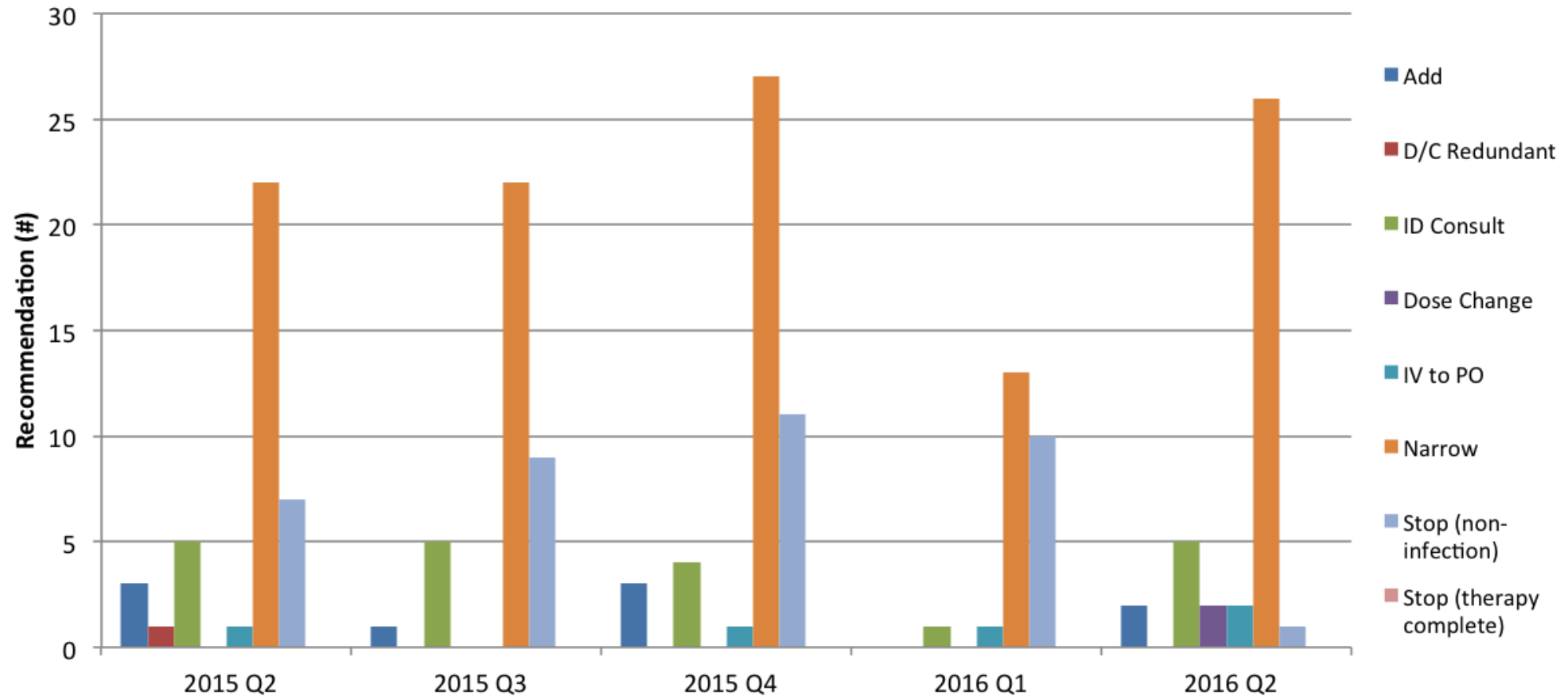
Prospective Audit and Feedback Tracking

PA&F Interventions by Antimicrobial



Prospective Audit and Feedback Tracking

PA&F Interventions by Recommendation





Tracking and Reporting

Outcome Measures

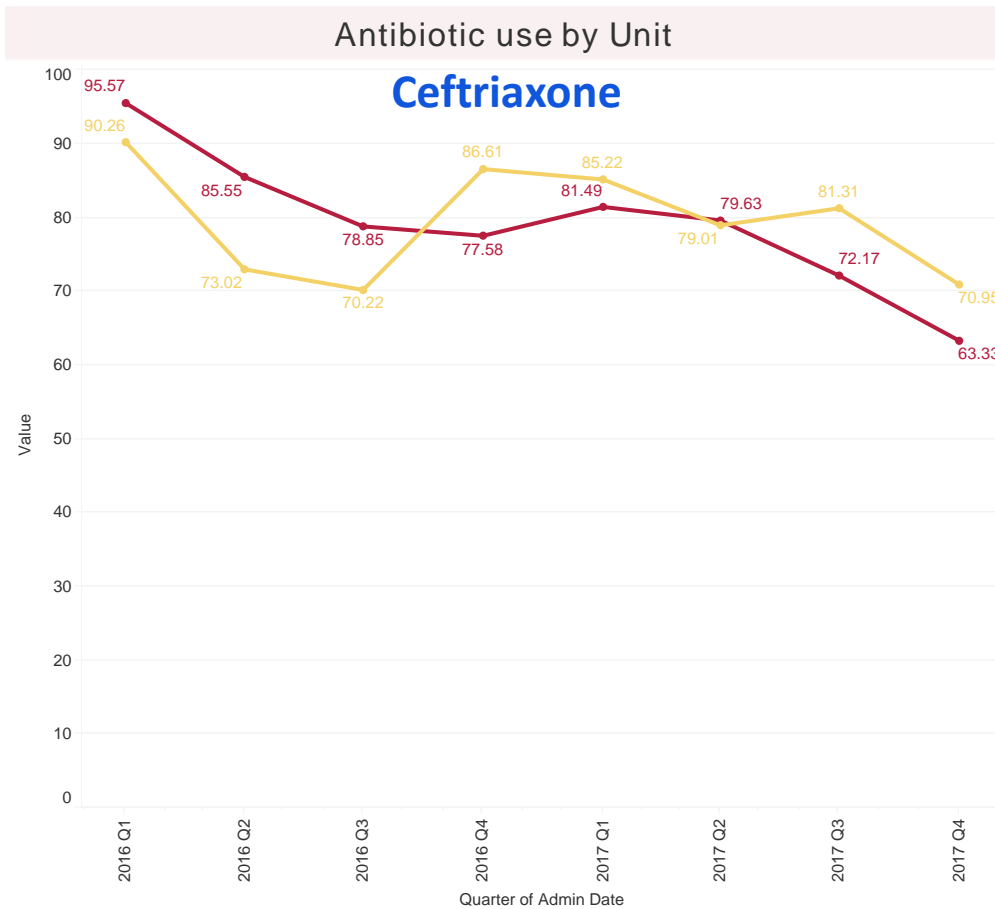
- Tracking antibiotic resistance patterns (e.g. antibiogram)
- *C. difficile* infection (CDI) rates
- 30-day mortality and readmission rates for CDI or common infection (e.g. CAP)
- Length of stay
- Adverse drug events
- \$\$\$

Antibiotic Use Measures from Community-Acquired Pneumonia Intervention



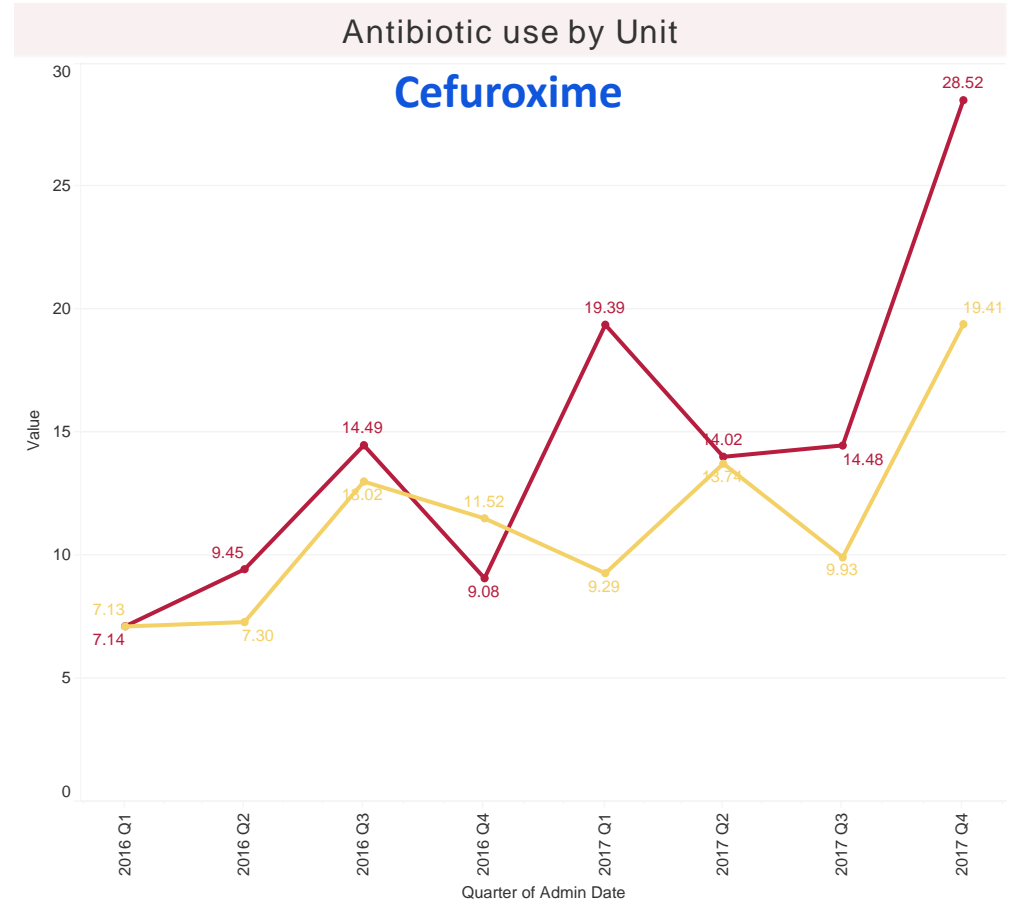
Data source: NHSN (EDW)
Prepared by: Decision Support

- Metrics
- IM Abx Days per 1000 Days Present
 - IV Abx Days per 1000 Days Present
 - PO Abx Days per 1000 Days Present
 - RESP Abx Days per 1000 Days Present
 - Total Abx Days per 1000 Days Present



Data source: NHSN (EDW)
Prepared by: Decision Support

- Metrics
- IM Abx Days per 1000 Days Present
 - IV Abx Days per 1000 Days Present
 - PO Abx Days per 1000 Days Present
 - RESP Abx Days per 1000 Days Present
 - Total Abx Days per 1000 Days Present



Process and Outcome Measures from Community-Acquired Pneumonia Intervention

	Pre-Intervention (9/2016 – 8/2017) N = 411	Post-Intervention (9/2017 – 6/2018) N = 368	^P Value
Procalcitonin Ordered, n (%)	197 (47.9)	274 (74.5)	<0.001
Urine antigens ordered, n (%)	304 (74.0)	305 (82.9)	0.003
IV-ABX duration in days, median (IQR)	3.00 [2.00, 5.00]	2.00 [1.00, 4.00]	<0.001
Median LOS, days (IQR)	3.69 [2.08, 6.58]	3.08 [1.97, 4.99]	0.014
Mortality, n (%)	33 (8.0)	17 (4.6)	0.07
30 Day Readmission, n (%)	18 (9.1)	22 (12.5)	0.37
Relative Mean Cost (CV*)	1.00 (3.06)	0.65 (1.38)	0.02

Example ASP Report

2018 SLC VAMC Antimicrobial Stewardship Report

- The White House's 2015 National Action Plan for Combating Antibiotic-Resistant Bacteria called for 20% reduction in inpatient antimicrobial use.
- Salt Lake City VAMC's coordinated Antimicrobial Stewardship Program (ASP) began in 2013.

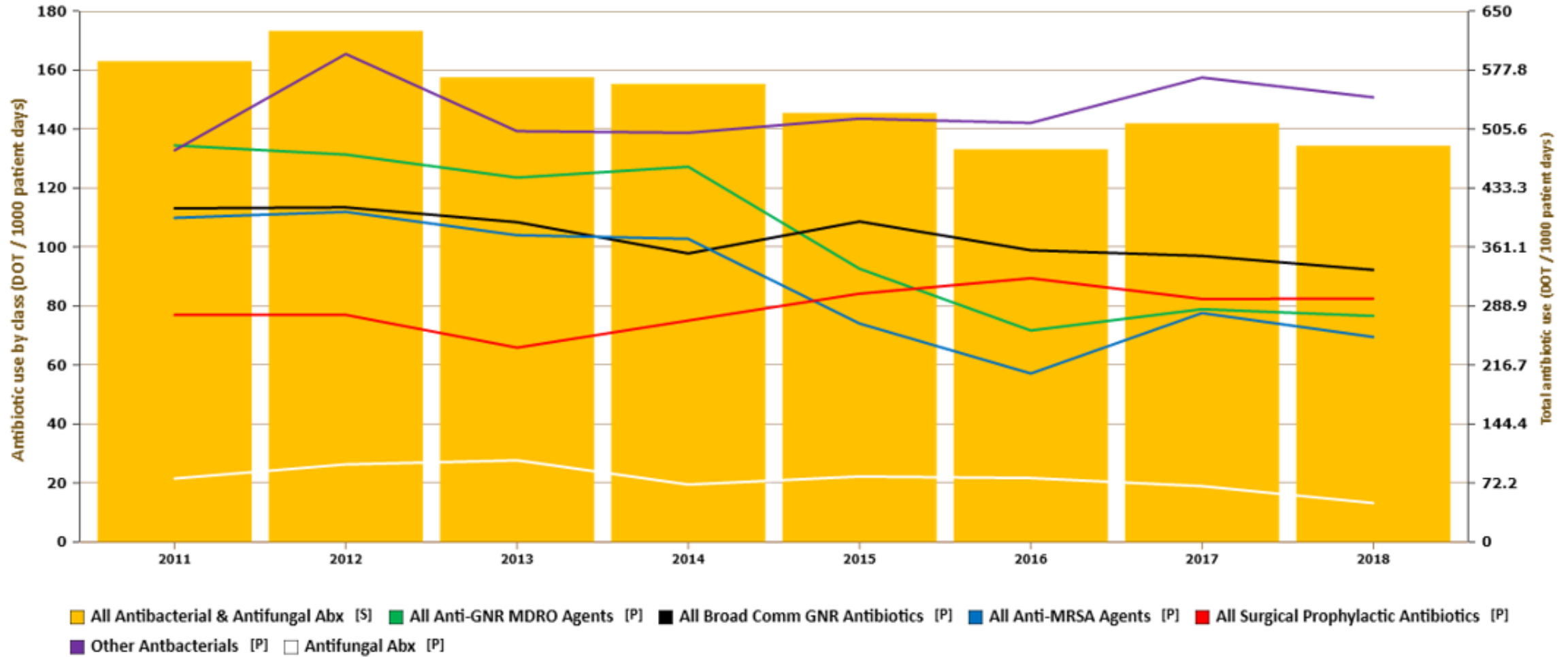
Antibiotic/CDC Antibiotic Class	% Change 2012 → 2015	% Change 2012 → 2016	% Change 2012 → 2017
Total Antibiotic use	-16%	-23%	-18%
Anti-MRSA	-34%	-49%	-31%
Broad-spectrum Gram-negative	-29%	-45%	-40%
Broad-spectrum community-onset infection	-4%	-13%	-15%
Surgical infection prophylaxis drugs	+9%	+16%	+7%
Other narrow spectrum antibiotics	-13%	-14%	-5%

*Percentage change calculated relative to median DOT from 2012 (the year prior to ASP initiation)

Inpatient Antibiotic Use - Combined ICU & Medical-Surgical Wards

CDC Antibiotic Class Breakdown (lines & left y-axis) & Aggregate Antimicrobial Use (bars & right y-axis)

Salt Lake City VAMC (ICU & Medical-Surgical Wards)





Education



- Education is most effective when paired with interventions and measurement of outcomes.
- Case-based education can be especially powerful, so prospective audit with feedback and preauthorization are both good methods to provide AU education.
- This can be especially effective when the feedback is provided in person, for example through handshake stewardship.



Education

- Education is the element with lowest uptake (across all facility types), although nationally reported uptake has increased from 62% in 2014 to 93% in 2019

Percentage of hospitals meeting Education criteria	General acute care n=3572	Children's n=95	Surgical n=146	Critical access n=1144
Prescribers receive education on appropriate AU at least annually	82.9%	84.2%	73.3%	75.3%
Nursing staff receive education on appropriate AU at least annually	57.4%	60.0%	53.4%	52.9%
Pharmacists receive education on appropriate AU at least annually	85.8%	81.1%	84.9%	74.7%



Education

- Presentation to stakeholders and house staff
 - Targeted talk about CAP
- Partnered with hospitalists
- Education through prospective audit and feedback
- 2020 – Started Zoom ASP Grand Rounds with medicine pharmacists

Community Acquired Pneumonia (CAP) Care Pathway

Orders are being started in the ED

- Labs: Strep Ag, legionella Ag, procalcitonin (+/- flu testing)
 - Consider sputum cultures in patients being started on broad-spectrum antibiotics (e.g. high DRIP scores) to help with de-escalation
- Antibiotics for most floor patients with CAP
 - Ceftriaxone 2 grams IV x 1 dose
 - Azithromycin 500 mg IV x 1 dose
 - Then, Cefuroxime 500 mg PO BID x4 days (to start 24 hours after initial antibiotics)
- Most patients DO NOT NEED ongoing IV antibiotics or additional azithromycin
 - No need to continue IV antibiotics because of ongoing fever, leukocytosis or tachycardia. Switch to oral therapy as long as tolerating oral diet and PO meds.

PLEASE DO NOT DISCONTINUE ED ORDERS

- Improves antibiotic stewardship
- Reduces LOS

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



Crosswalk of the hospital Core Elements and antibiotic stewardship mapping from patient safety annual survey

Detailed Guides for Specific Analysis Options

- [Using BSI Events Excluded from the CLABSI Numerator Line List, January 2020](#)  [PDF – 400 KB]
- [How to Determine Procedures Excluded from the SSI SIR: Universal Exclusion Criteria February 2017](#)  [PDF – 366 KB]
- [How to Determine Events Included in the SSI SIR – SSI Event Indicators February 2017](#)  [PDF – 374 KB]
- [Analyzing Procedure Closure Technique March 2014](#)  [PDF – 121 KB]
- [Analyzing MBI-LCBI CLABSI Data](#)  [PDF – 106 KB]
- [Using the “SIR-CAUTI Data for Hospital IQR” Output Option January 2017](#)  [PDF – 210 KB]
- [Using the “SIR – CLABSI Data for Hospital IQR” Output Option. January 2017](#)  [PDF – 211 KB]
- [Using the “SIR – MRSA Blood FacwideIN LabID Data for Hospital IQR” Report April 2018](#)  [PDF – 300 KB]
- [Using the “SIR – FacWideIN CDI LabID Data for Hospital IQR” Report January 2020](#)  [PDF – 300 KB]
- [Using the “SIR- Complex 30-Day SSI Data for Hospital IQR” Output Option January 2017](#)  [PDF – 350 KB]
- [October 2010: Special Edition](#)  [PDF – 557 KB]
- [NHSN Data Quality Output Options](#)  [PDF – 1 MB]
- [Analyzing HAI Data over a Time Period with Different Definitions](#)  [PDF – 146 KB]
- [How to Run the Core Elements Line List within NHSN](#)  [PDF – 250 KB]
- [Crosswalk of the Core Elements of Antibiotic Stewardship Mapping from the Patient Safety Annual Survey](#)  [XLS – 30 KB]
- [Generating and Interpreting the SIR/SUR Percentile Distribution](#)  [PDF – 369 KB]

Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals



- Developed by CDC in collaboration with:
 - Federal Office of Rural Health Policy
 - The American Hospital Association
 - The Pew Charitable Trusts