Antibiotic Stewardship

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BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

Objectives

1. Discuss the implementation of priority examples from the **Hospital Core Elements of Antibiotic Stewardship**.

2. Review antibiotic stewardship implementation resources.

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

Five core strategies to combat the threat of antibiotic resistant infections

Antibiotic use and access: ensure **appropriate** use and reduce **unnecessary** use of antibiotics, and ensure improved access to antibiotics

Infection prevention and control: Prevent infections and reduce the spread of germs

Tracking and data: Share data and improve data collection

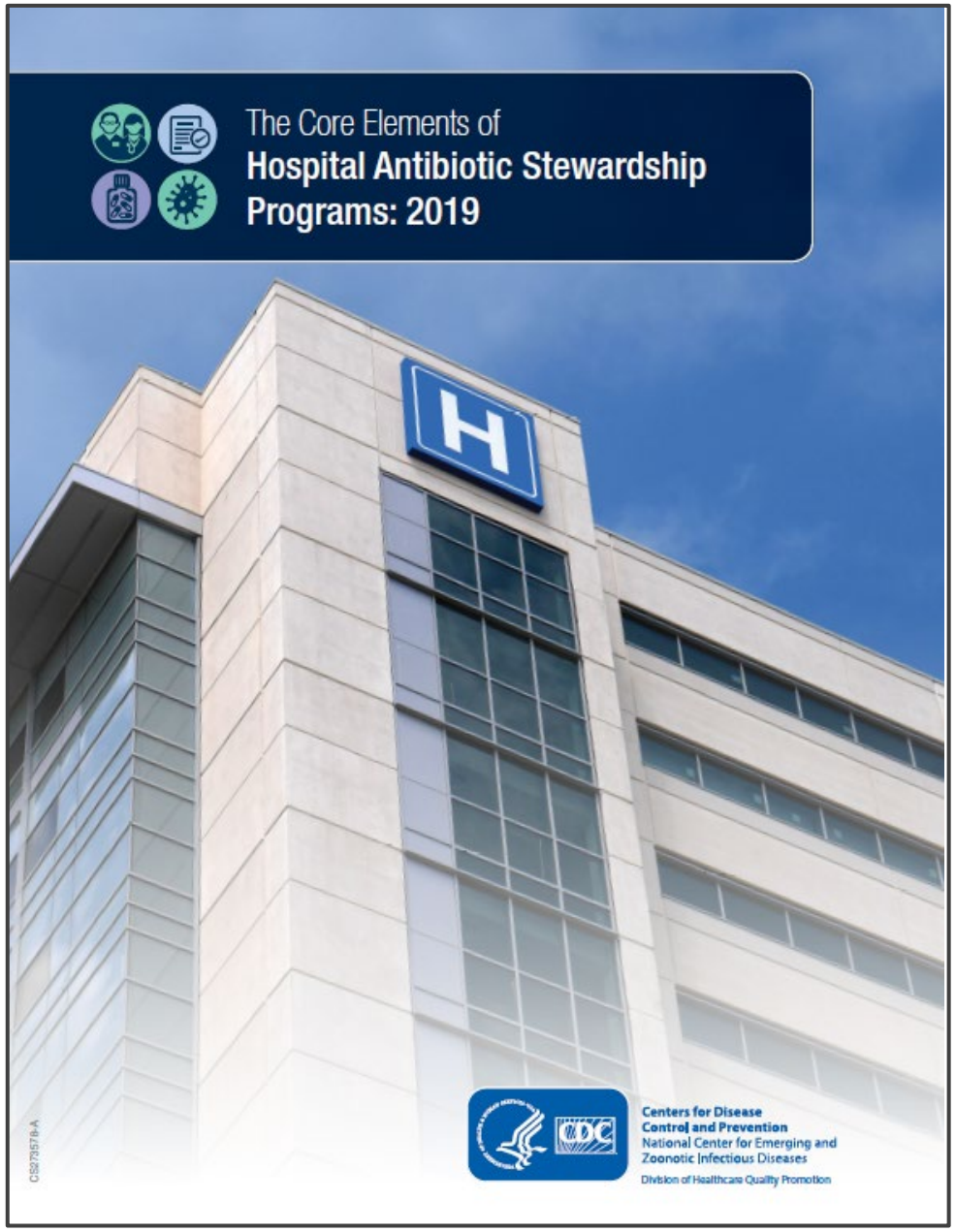
Environment and sanitation: Keep antibiotics and antibiotic-resistant threats from entering the environment through actions like improving sanitation and improving access to safe water

Vaccines, therapeutics, and diagnostics: Invest in development and improved access to vaccines, therapeutics, and diagnostics for better prevention, treatment, and detection

https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf

Antibiotic stewardship is about patient safety and delivering high-quality healthcare

Antibiotic stewardship is a set of commitments and actions designed to **optimize** the treatment of infections while **reducing** the adverse events associated with antibiotic use.



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.

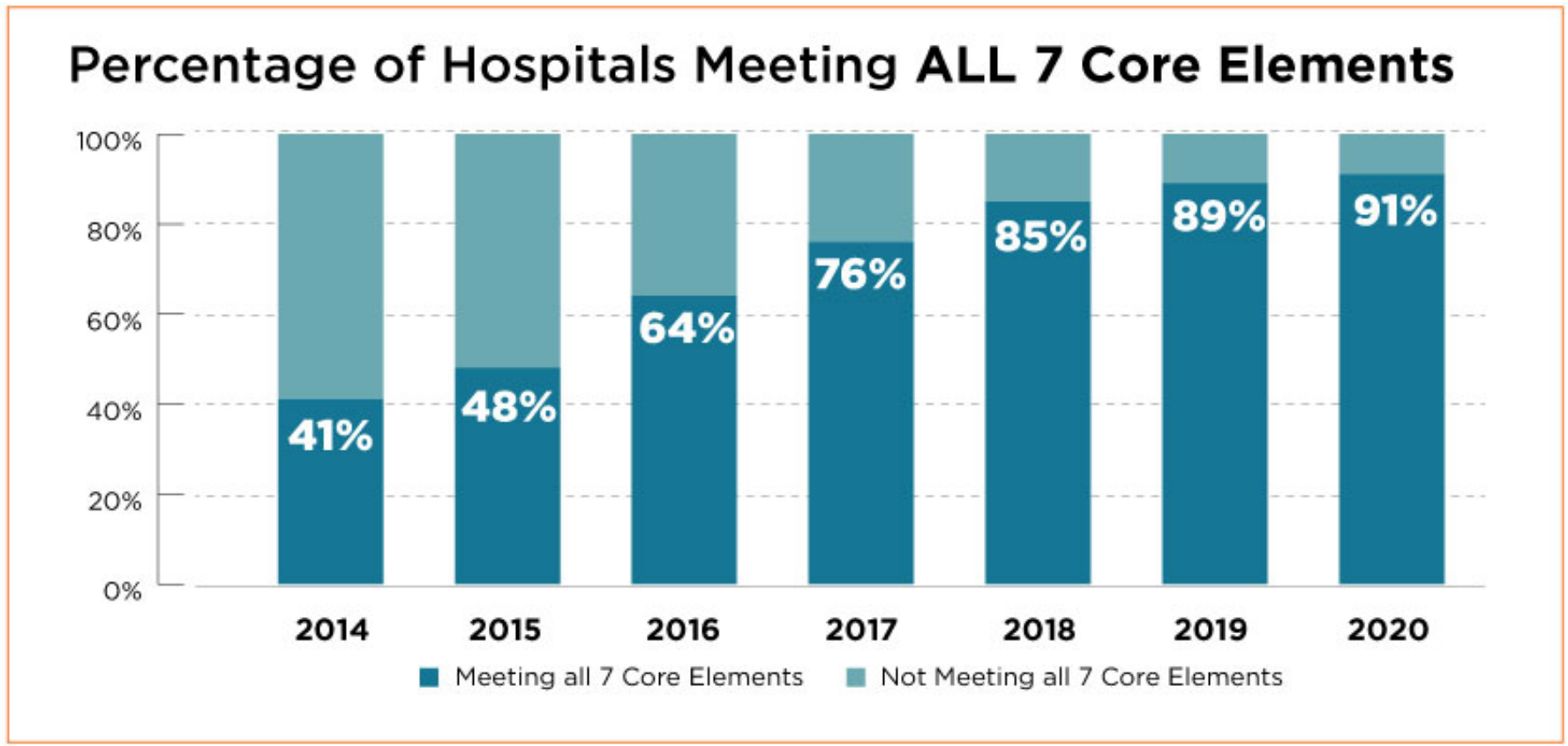
Education
Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.

U.S. Hospitals Are Antibiotics Aware

SINCE 2014,
THE PERCENTAGE OF
HOSPITALS WITH
ANTIBIOTIC STEWARDSHIP
PROGRAMS MEETING
THE CORE ELEMENTS
MORE THAN

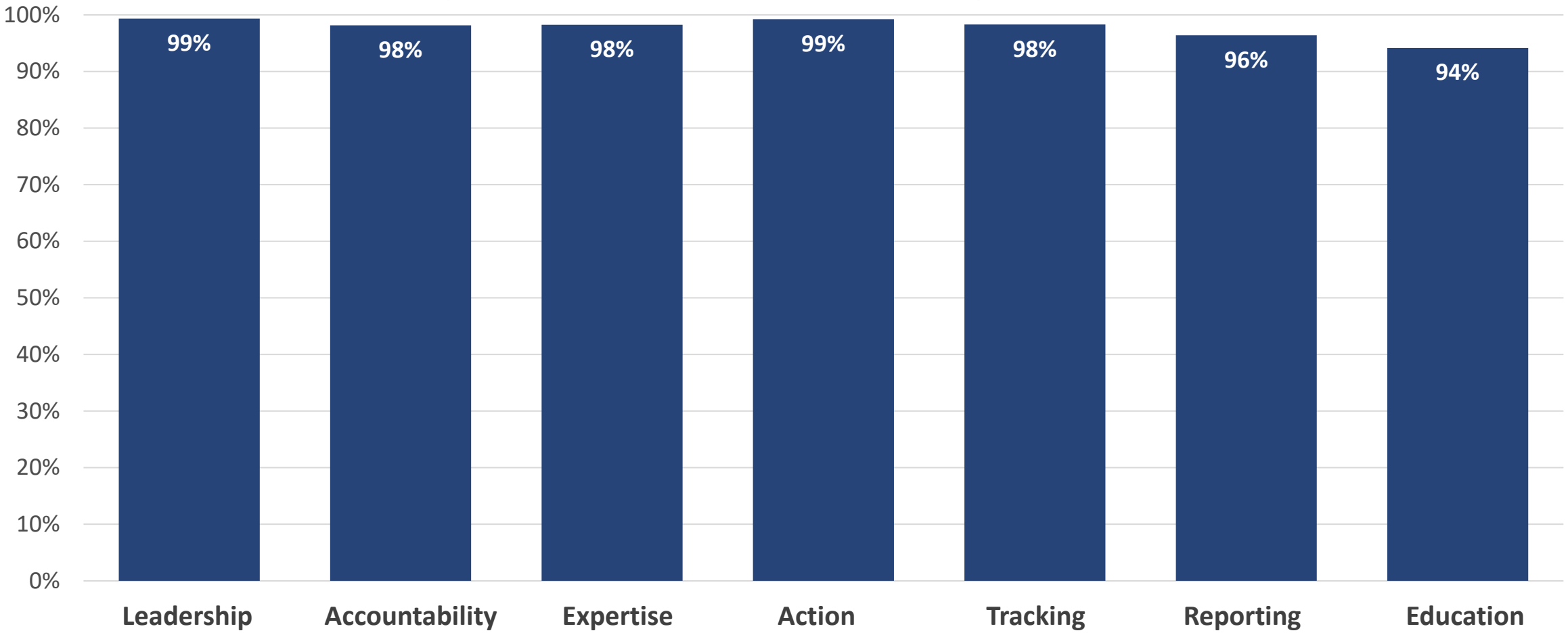
DOUBLED

2X



To learn more about hospital antibiotic stewardship, visit
https://arpsp.cdc.gov/profile/stewardship

2020 NHSN Annual Hospital Survey: Percentage of hospitals meeting each Core Element



Priority Examples in 2019 Hospital Core Elements

Hospital Leadership Commitment
Dedicate necessary human, financial, and information technology resources.

Dedicated stewardship staffing and resources

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

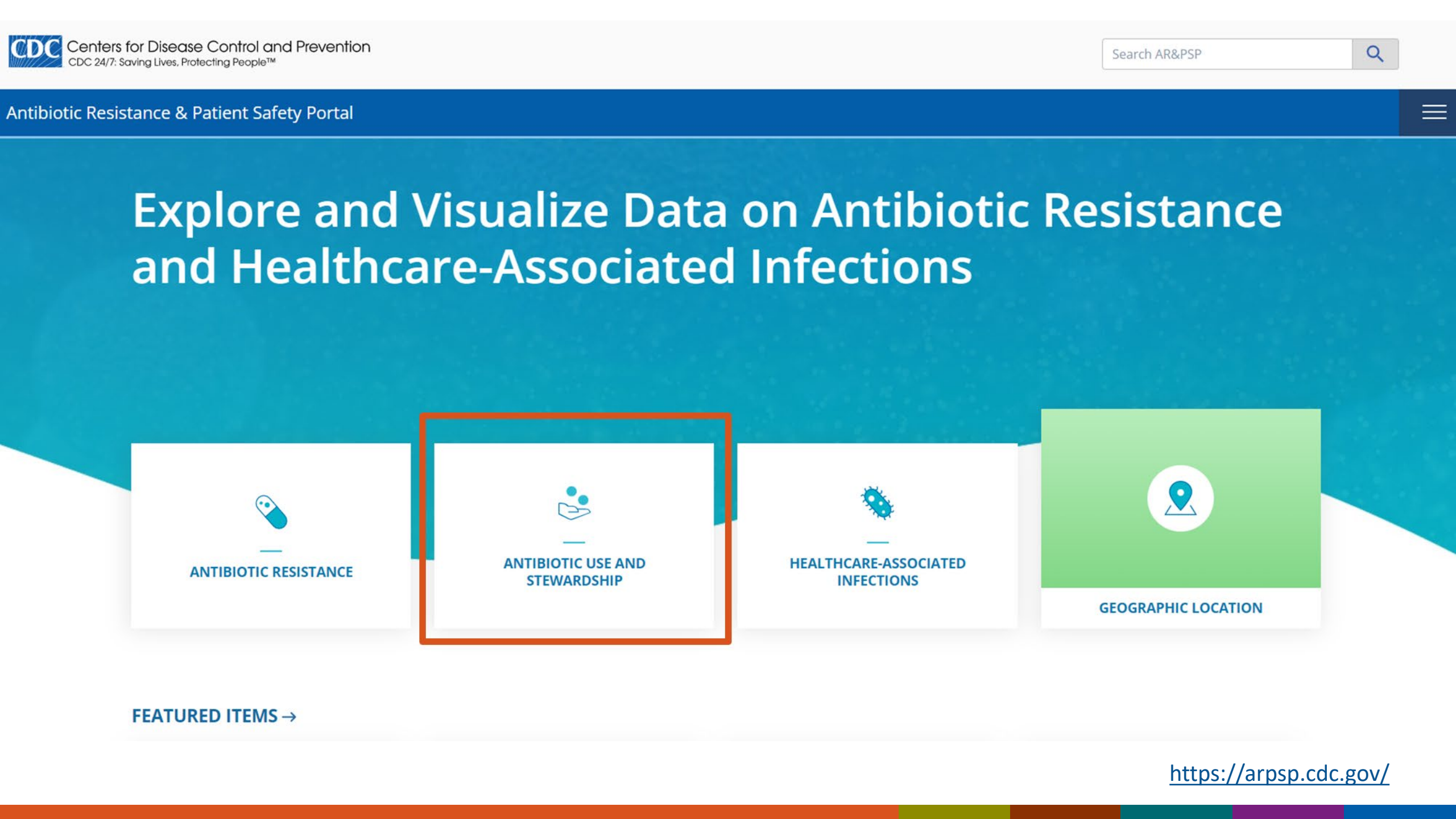
Co-leadership model with physician and pharmacist

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

Prospective Audit & Feedback, Preauthorization, and Facility-Specific Treatment Guidelines

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

Submission to NHSN AU Option



https://arpsp.cdc.gov/

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Search AR&PSP

Antibiotic Resistance & Patient Safety Portal

Home > Antibiotic Use & Stewardship

Antibiotic Use & Stewardship

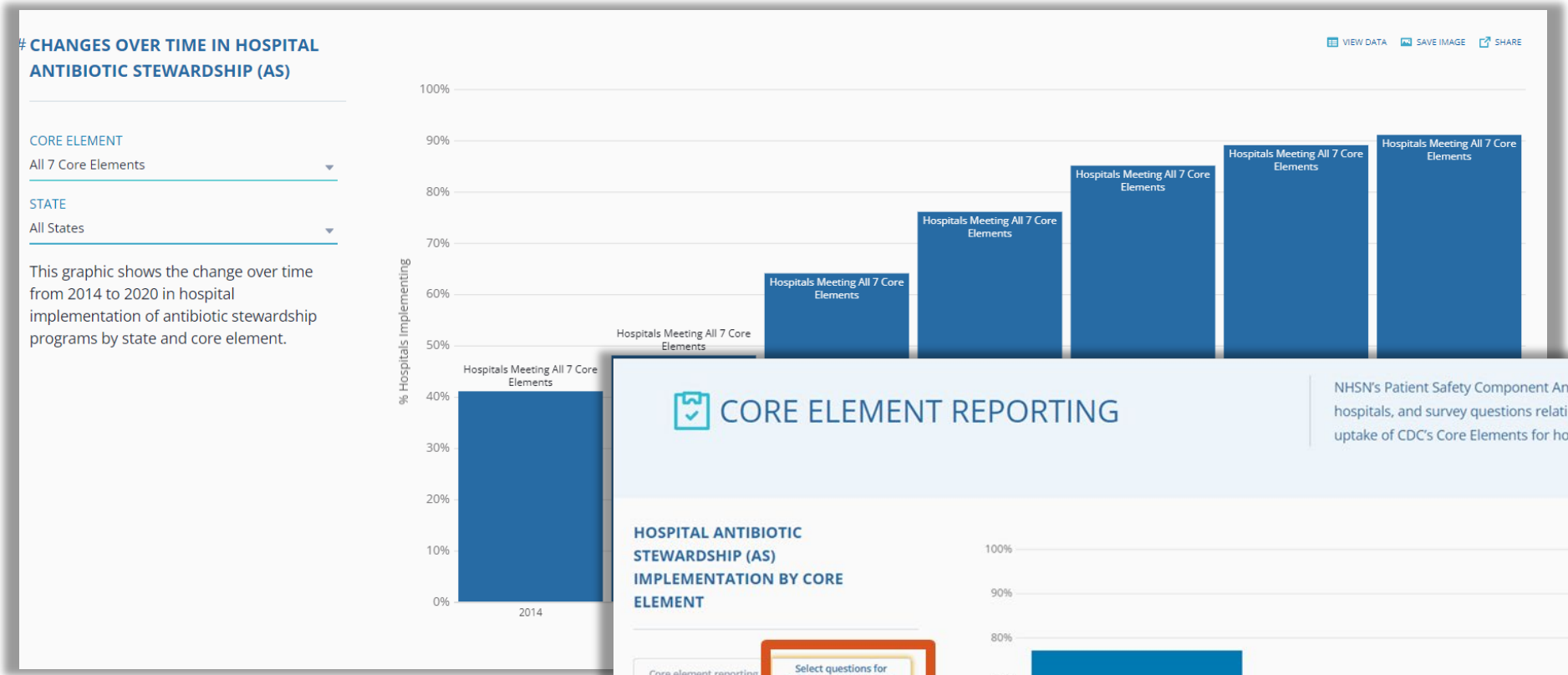
Outpatient Antibiotic Use

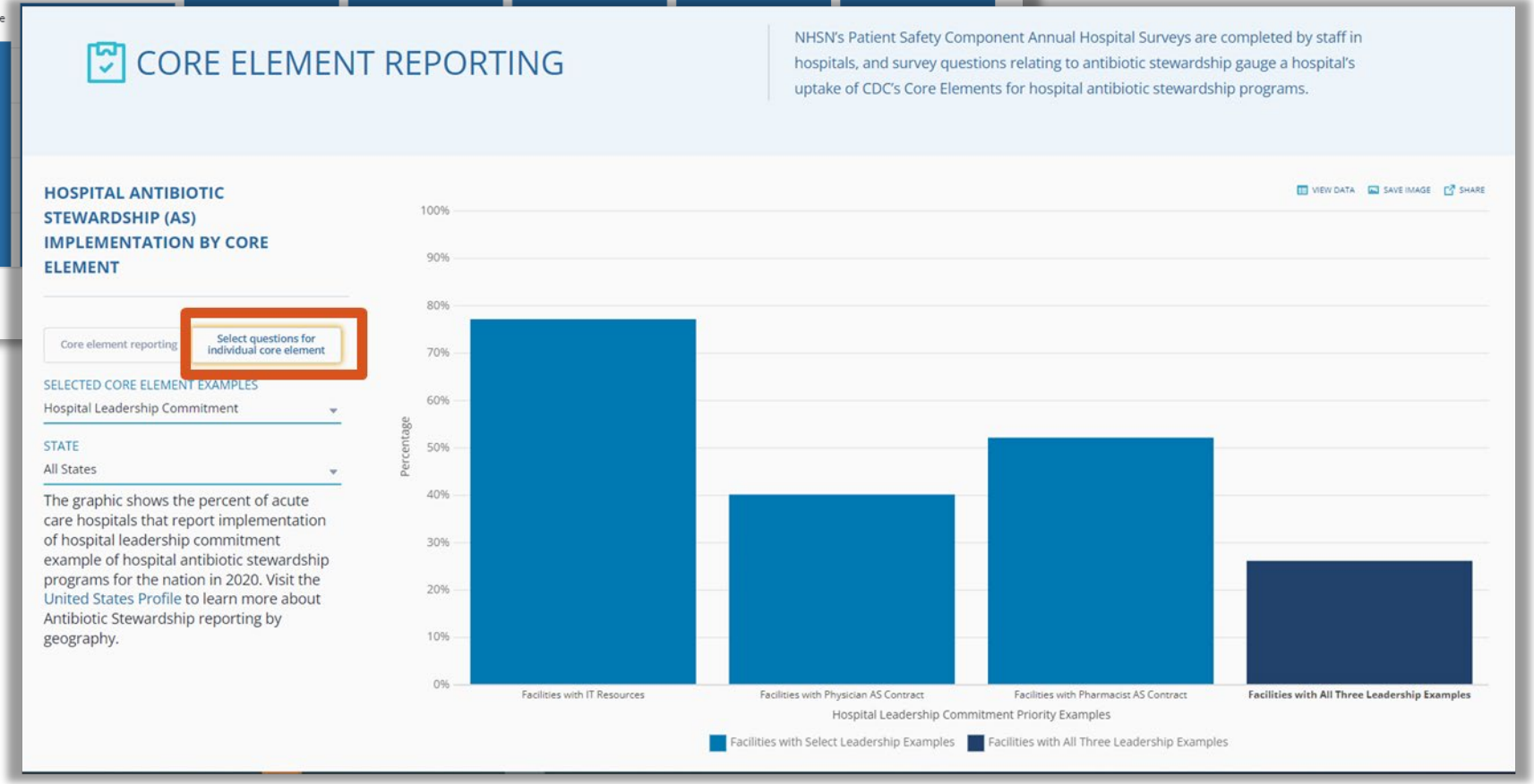
Hospital Antibiotic Stewardship

Hospital antibiotic stewardship is an initiative that aims to improve patient safety by promoting programs, protocols, and best practices that improve the way we manage and use antibiotics. Hospital antibiotic stewardship promotes using the right antibiotic, at the right time, at the right dose and for the right duration. Hospital antibiotic stewardship has a number of proven benefits that include: protecting patients from unintended consequences of antibiotics, improving treatment of infections, and helping combat antibiotic resistance. These data reflect programs exclusively for inpatient hospital settings.

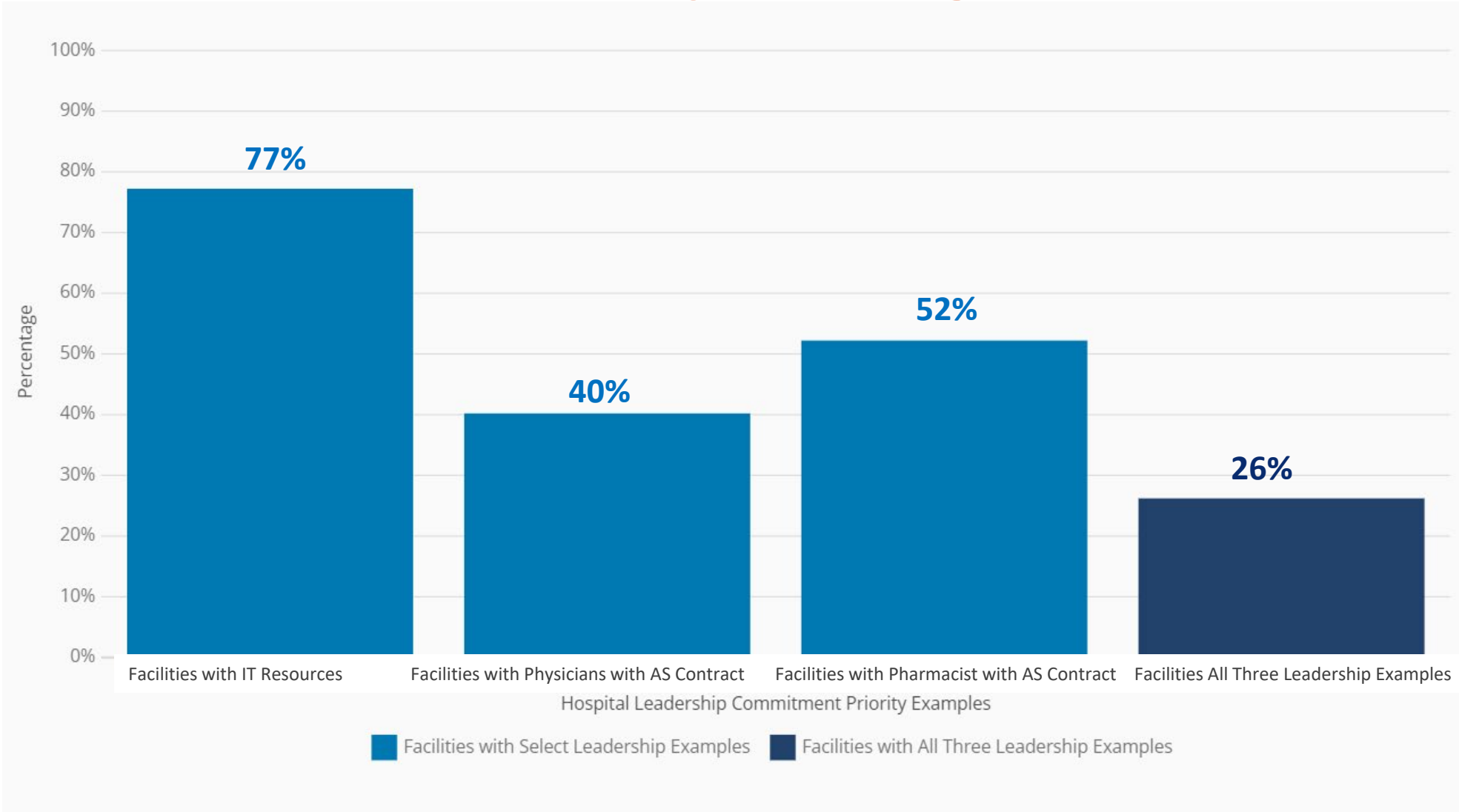
Hospital Antibiotic Stewardship

https://arpsp.cdc.gov/profile/antibiotic-use?tab=hospital-stewardship


CHANGES OVER TIME IN HOSPITAL ANTIBIOTIC STEWARDSHIP (AS)
CORE ELEMENT
All 7 Core Elements
STATE
All States
This graphic shows the change over time from 2014 to 2020 in hospital implementation of antibiotic stewardship programs by state and core element.
VIEW DATA
SAVE IMAGE
SHARE
% Hospitals Implementing
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Hospitals Meeting All 7 Core Elements
2014


CORE ELEMENT REPORTING
NHSN's Patient Safety Component Annual Hospital Surveys are completed by staff in hospitals, and survey questions relating to antibiotic stewardship gauge a hospital's uptake of CDC's Core Elements for hospital antibiotic stewardship programs.
HOSPITAL ANTIBIOTIC STEWARDSHIP (AS) IMPLEMENTATION BY CORE ELEMENT
Core element reporting
Select questions for individual core element
SELECTED CORE ELEMENT EXAMPLES
Hospital Leadership Commitment
STATE
All States
The graphic shows the percent of acute care hospitals that report implementation of hospital leadership commitment example of hospital antibiotic stewardship programs for the nation in 2020. Visit the United States Profile to learn more about Antibiotic Stewardship reporting by geography.
VIEW DATA
SAVE IMAGE
SHARE
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Facilities with IT Resources
Facilities with Physician AS Contract
Facilities with Pharmacist AS Contract
Facilities with All Three Leadership Examples
Hospital Leadership Commitment Priority Examples
Facilities with Select Leadership Examples
Facilities with All Three Leadership Examples

Hospital Leadership Commitment: Dedicated Stewardship Staffing and Resources



https://arpsp.cdc.gov/profile/stewardship?tabsection-44=1

Hospital Leadership Commitment: Dedicated Stewardship Staffing and Resources

Core Element	NHSN Hospital Survey Questions	NHSN Hospital Survey Instructions
Hospital Leadership Commitment	40b. If **Physician** or Co-led is selected, which of the following describes your antibiotic stewardship physician leader? □ Has antibiotic stewardship responsibilities in their contract or job description	Select 'Has antibiotic stewardship responsibilities in their contract or job description' if the **physician** stewardship leader has stewardship responsibilities stated in their contract or job description. This can be evidenced by the **physician** stewardship leader receiving salary support (any amount) for stewardship activities or being assessed on stewardship involvement during performance review.
	OR	**OR**
	40e. If **Pharmacist** or Co-led is selected, which of the following describes your antibiotic stewardship pharmacist leader? □ Has antibiotic stewardship responsibilities in their contract or job description	Select 'Has antibiotic stewardship responsibilities in their contract or job description' if the **pharmacist** stewardship leader has stewardship responsibilities stated in their contract or job description. This can be evidenced by the pharmacist stewardship leader receiving salary support (any amount) for stewardship activities or being assessed on stewardship involvement during performance review.

Accountability:
Co-leadership Model with Physician and Pharmacist

CORE ELEMENT REPORTING

NHSN's Patient Safety Component Annual Hospital Surveys are completed by staff in hospitals, and survey questions relating to antibiotic stewardship gauge a hospital's uptake of CDC's Core Elements for hospital antibiotic stewardship programs.

HOSPITAL ANTIBIOTIC STEWARDSHIP (AS) IMPLEMENTATION BY CORE ELEMENT

Core element reporting | Select questions for individual core element

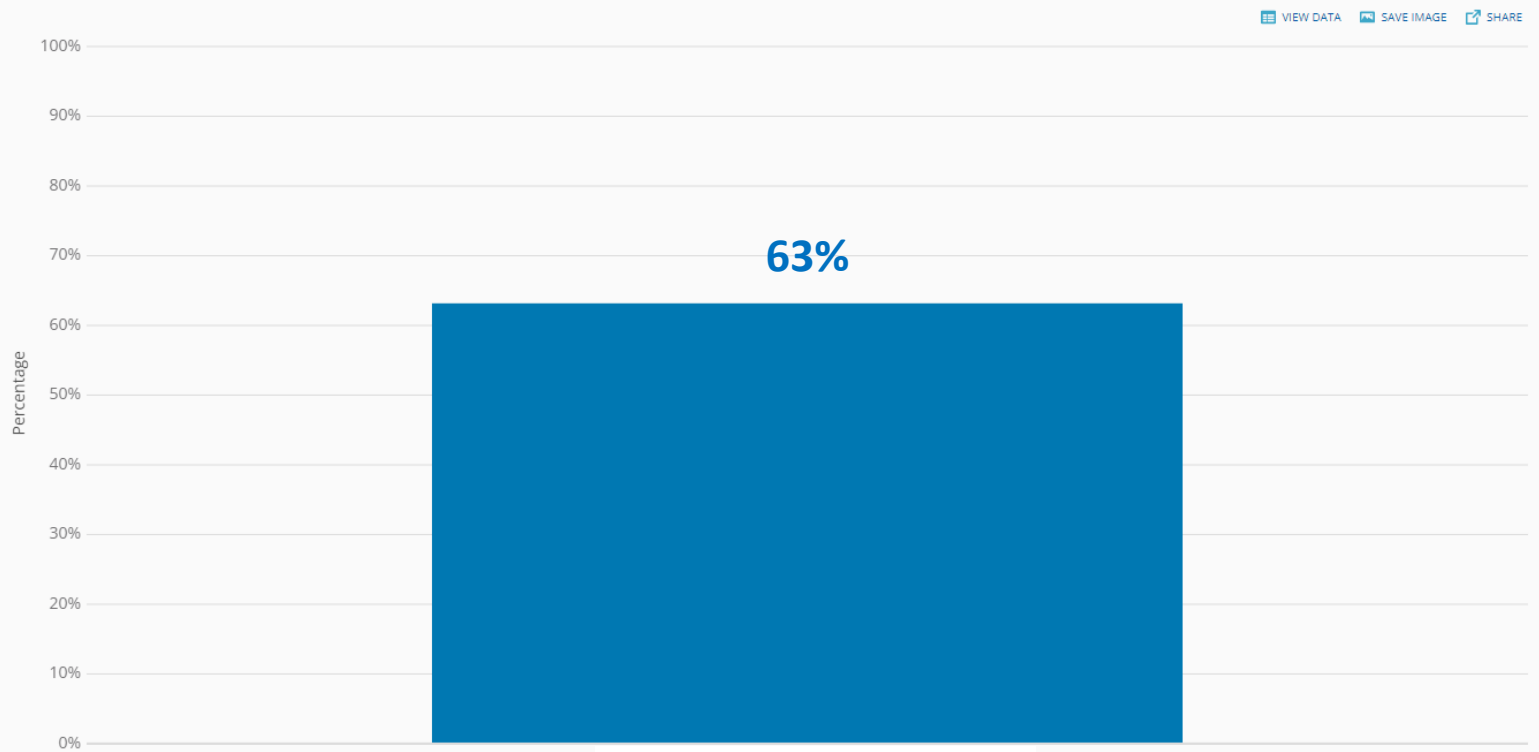
SELECTED CORE ELEMENT EXAMPLES

Accountability

STATE

All States

The graphic shows the percent of acute care hospitals that report implementation of accountability example of hospital antibiotic stewardship programs for the nation in 2020. Visit the United States Profile to learn more about Antibiotic Stewardship reporting by geography.

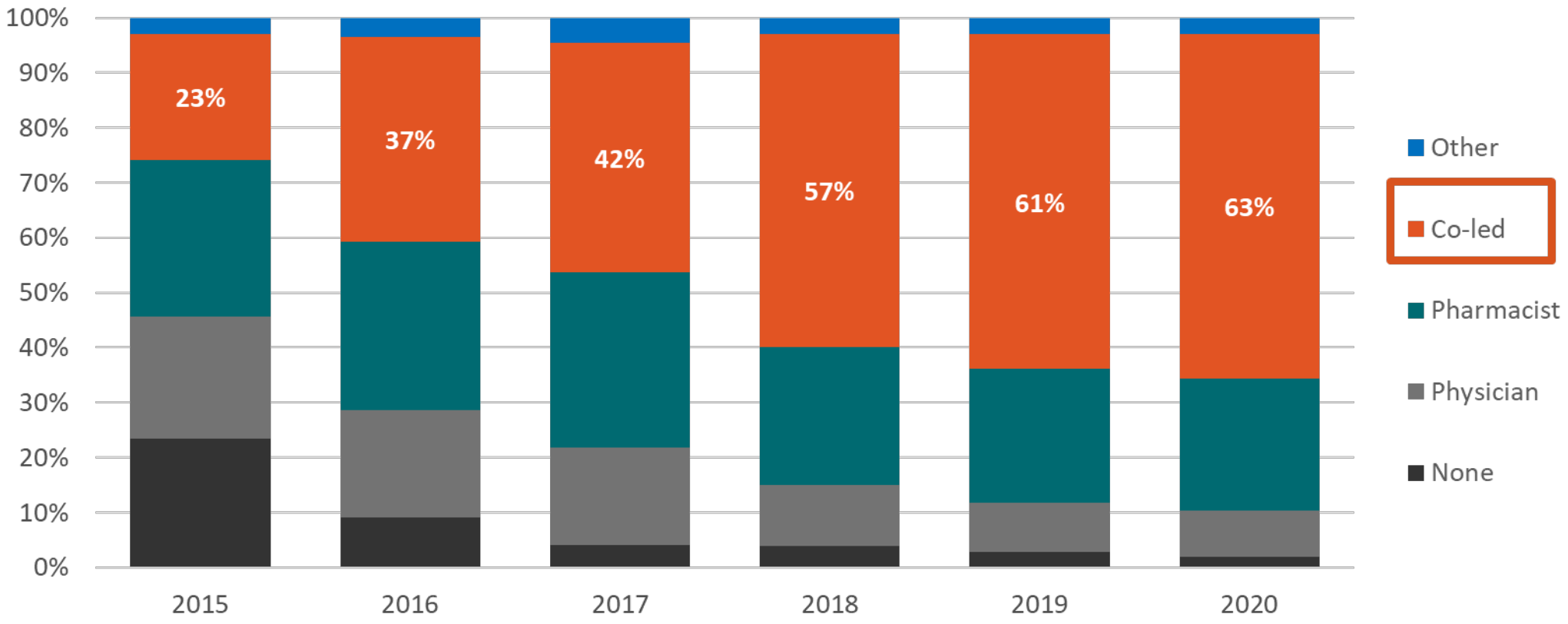


Facilities with co-led Program

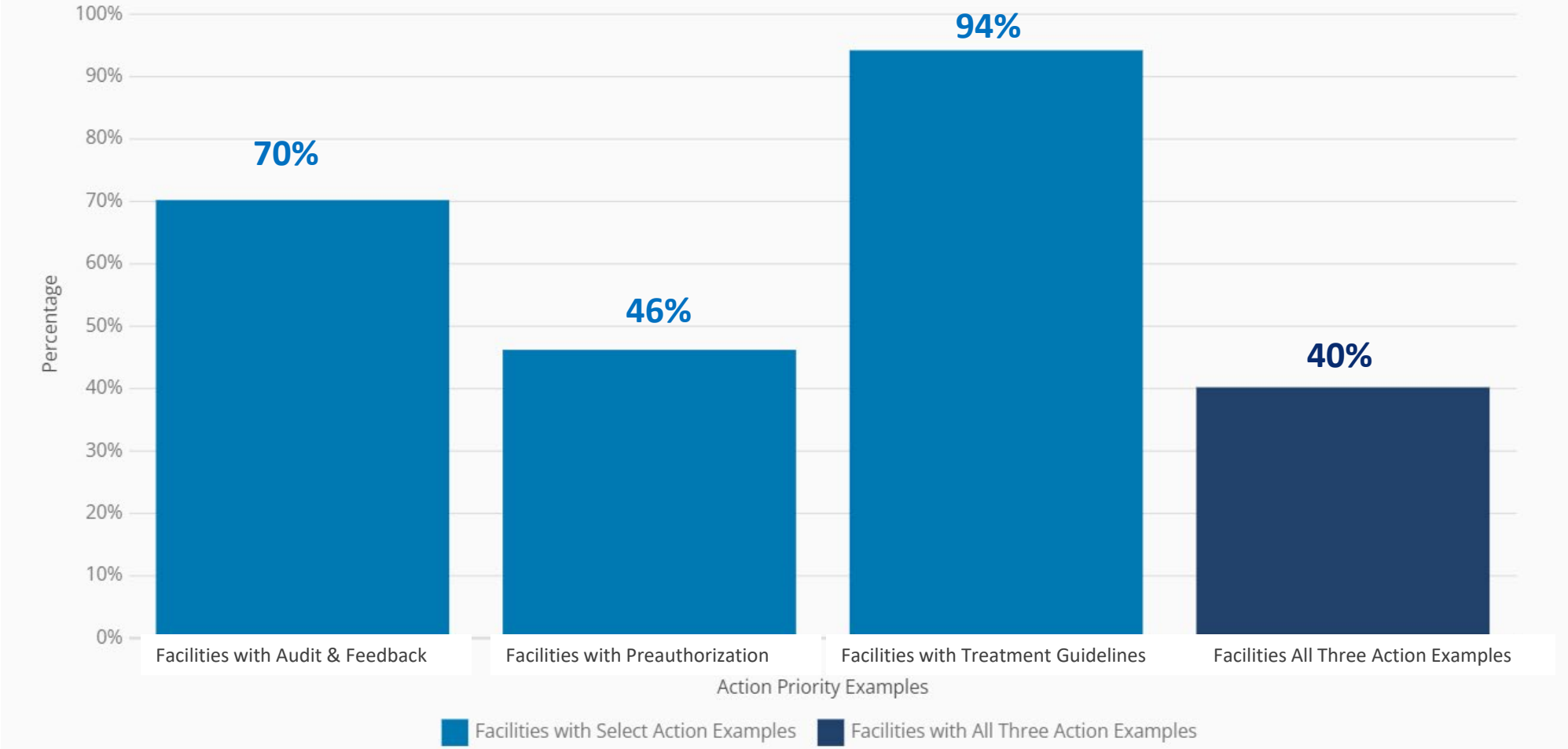
https://arpsp.cdc.gov/profile/stewardship?tabsection-44=1

Accountability: Co-leadership Model with Physician and Pharmacist

- Co-led ASPs are becoming more common: **23%** in 2015 vs. **63%** in 2020

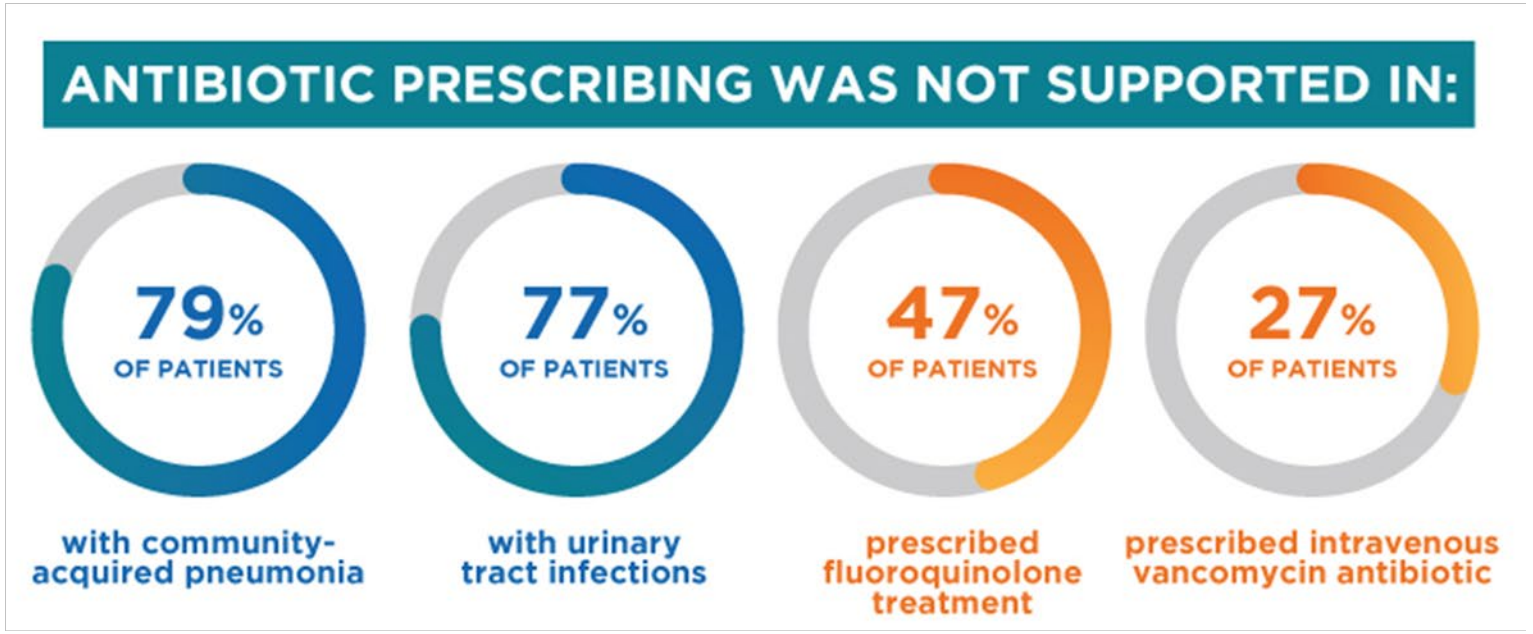


Action: Prospective Audit & Feedback, Preauthorization, and Facility-Specific Treatment Guidelines



https://arpsp.cdc.gov/profile/stewardship?tabsection-44=1

Many opportunities to optimize antibiotic prescribing



https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

Key opportunities to improve antibiotic use in hospitals

INFECTIONS	DIAGNOSTIC CONSIDERATIONS	EMPIRIC THERAPY	DEFINITIVE THERAPY Tailor to culture results and define duration, including discharge prescription.
Community-acquired pneumonia[54]	Review cases after initiation of therapy to confirm pneumonia diagnosis versus non-infectious etiology.	Avoid empiric use of antipseudomonal beta-lactams and/or MRSA agents unless clinically indicated.	Guidelines suggest that in adults, most cases of uncomplicated pneumonia can be treated for 5 days when a patient has a timely clinical response [55, 56]. Data also suggest that negative results of MRSA nasal colonization testing can help guide decisions to discontinue empiric therapy for MRSA pneumonia [57]
Urinary tract infection (UTI)	Implement criteria for ordering urine cultures to ensure that positive cultures are more likely to represent infection than bladder colonization [58].	Establish criteria to distinguish between asymptomatic and symptomatic bacteriuria. Avoid antibiotic therapy for	Use the shortest duration of antibiotic therapy that is clinically appropriate.
Skin and soft tissue infection	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. Use of therapy specific for MRSA may not be necessary in uncomplicated non-purulent cellulitis [59].	Guidelines suggest that most cases of uncomplicated bacterial cellulitis can be treated for 5 days if the patient has a timely clinical response [59].

https://www.cdc.gov/antibiotic-use/healthcare/pdfs/hospital-core-elements-H.pdf

Tracking:
Submission to NHSN AU Option

CORE ELEMENT REPORTING

NHSN's Patient Safety Component Annual Hospital Surveys are completed by staff in hospitals, and survey questions relating to antibiotic stewardship gauge a hospital's uptake of CDC's Core Elements for hospital antibiotic stewardship programs.

HOSPITAL ANTIBIOTIC STEWARDSHIP (AS) IMPLEMENTATION BY CORE ELEMENT

Core element reporting | Select questions for individual core element

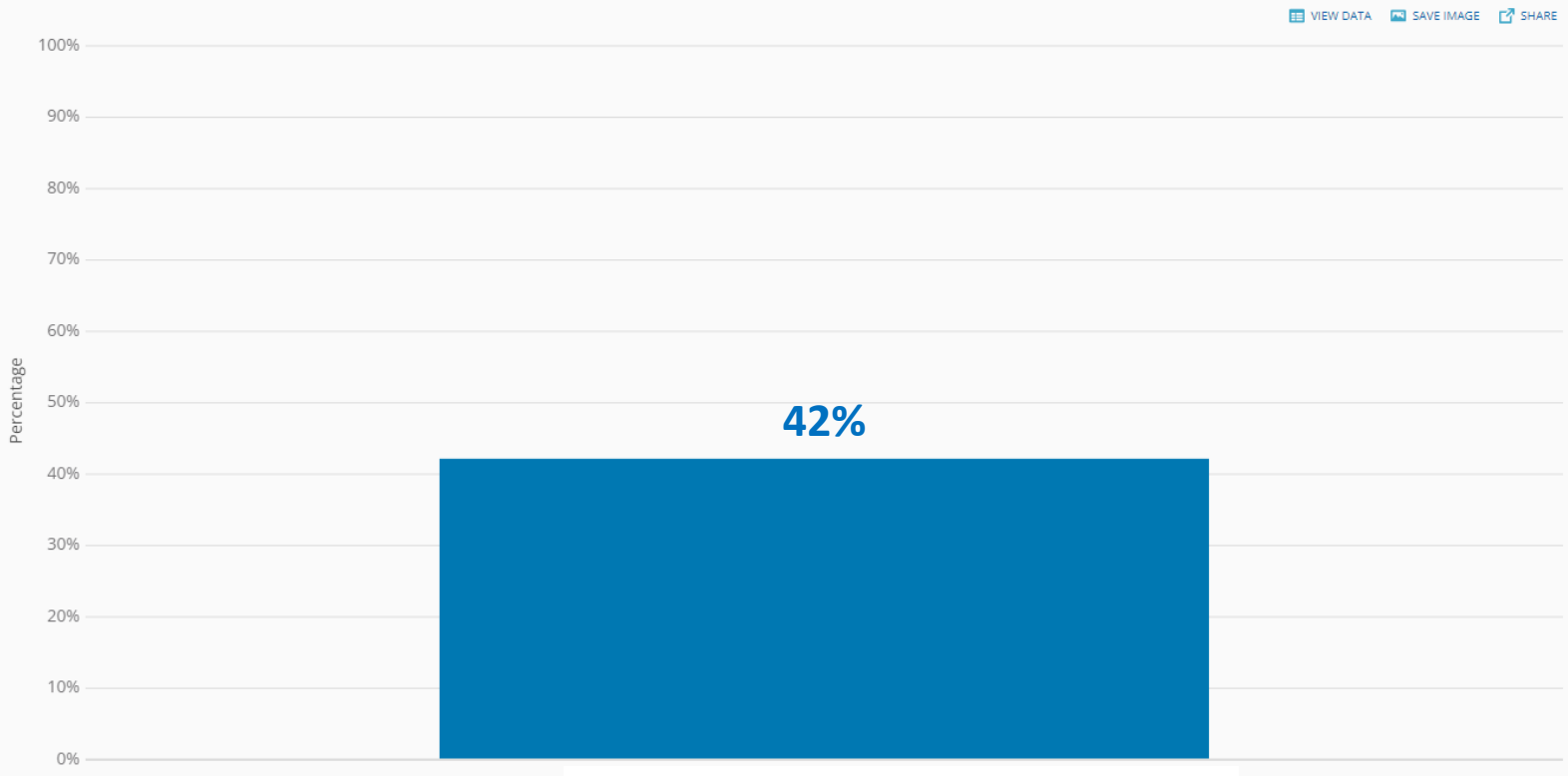
SELECTED CORE ELEMENT EXAMPLES

Tracking

STATE

All States

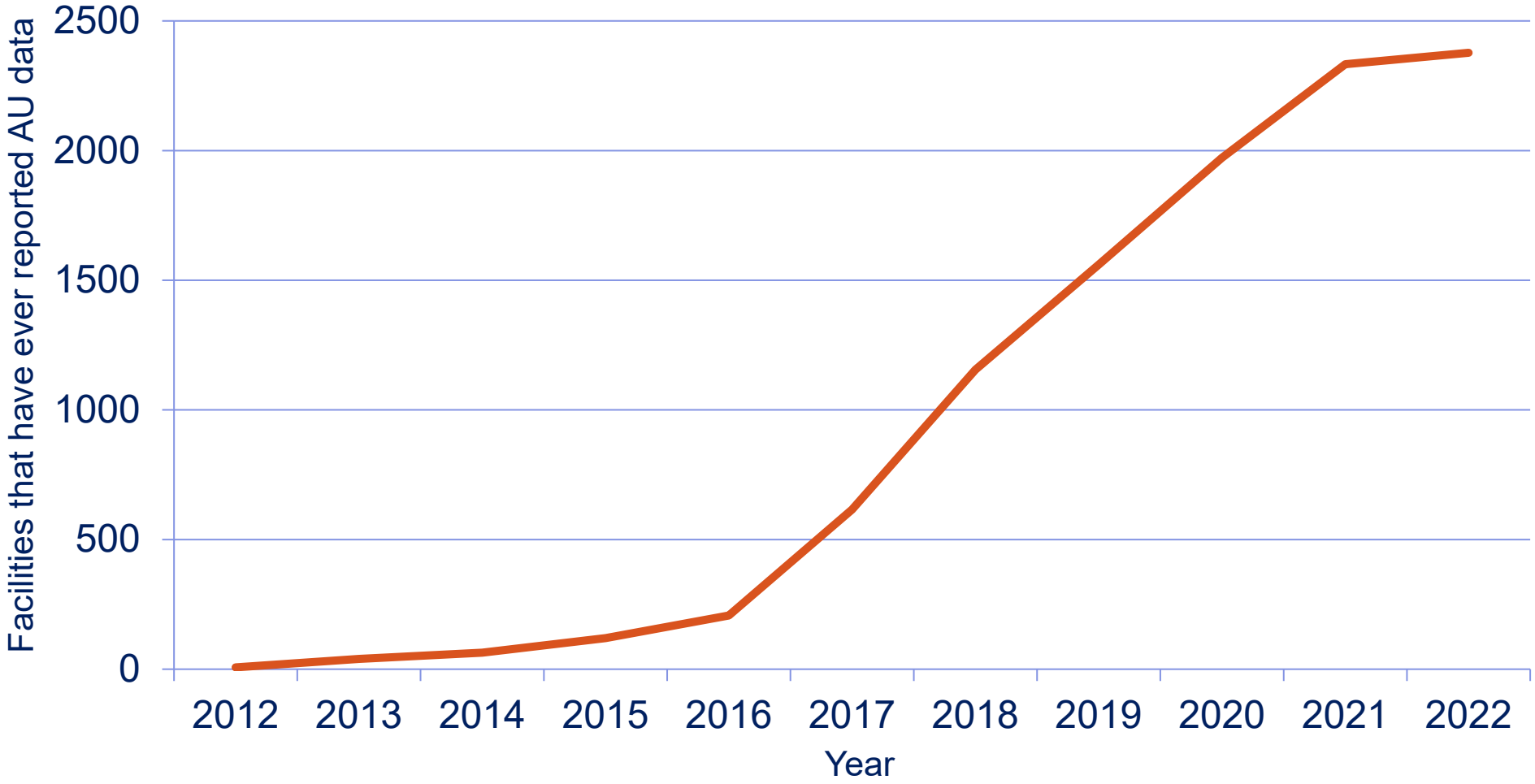
The graphic shows the percent of acute care hospitals that report implementation of tracking example to the NHSN Antimicrobial Use (AU) Option of hospital antibiotic stewardship programs for the nation in 2020. Visit the United States Profile to learn more about Antibiotic Stewardship reporting by geography.



Facilities Reporting NHSN AU Option

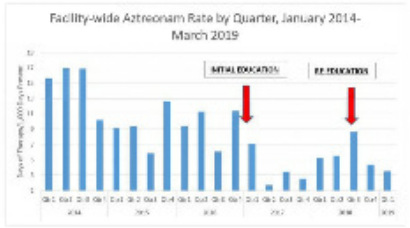
https://arpsp.cdc.gov/profile/stewardship?tabsection-44=1

Tracking:
Yearly AU Option Data Submission*



*As of March 1, 2022

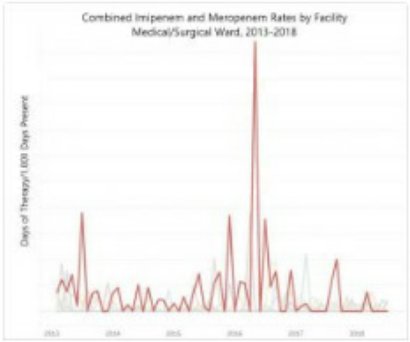
AU Option Case Examples



Decreasing Aztreonam Use in a Veterans Affairs Hospital

Jesse Brown VA Medical Center has submitted data to the National Healthcare Safety Network (NHSN) Antimicrobial Use (AU) Option since January 2013. In response to high aztreonam use, the facility developed training and educational materials to evaluate the risk of an adverse reaction from beta-lactam administration in a patient whose recorded medical history included a penicillin allergy. Read More.

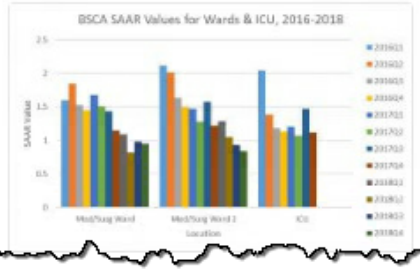
Posted On: June 18, 2019



Using Telehealth to Decrease Carbapenem Use in a Critical Access Hospital

Using NHSN Antimicrobial Use (AU) Option data submitted from 2013-2018, Intermountain Healthcare system compared carbapenem use among its facilities and identified an outlier. After meeting with the local stewardship physician and pharmacist champions, an active prospective audit and feedback approach was initiated using telehealth. Read More.

Posted On: April 16, 2019

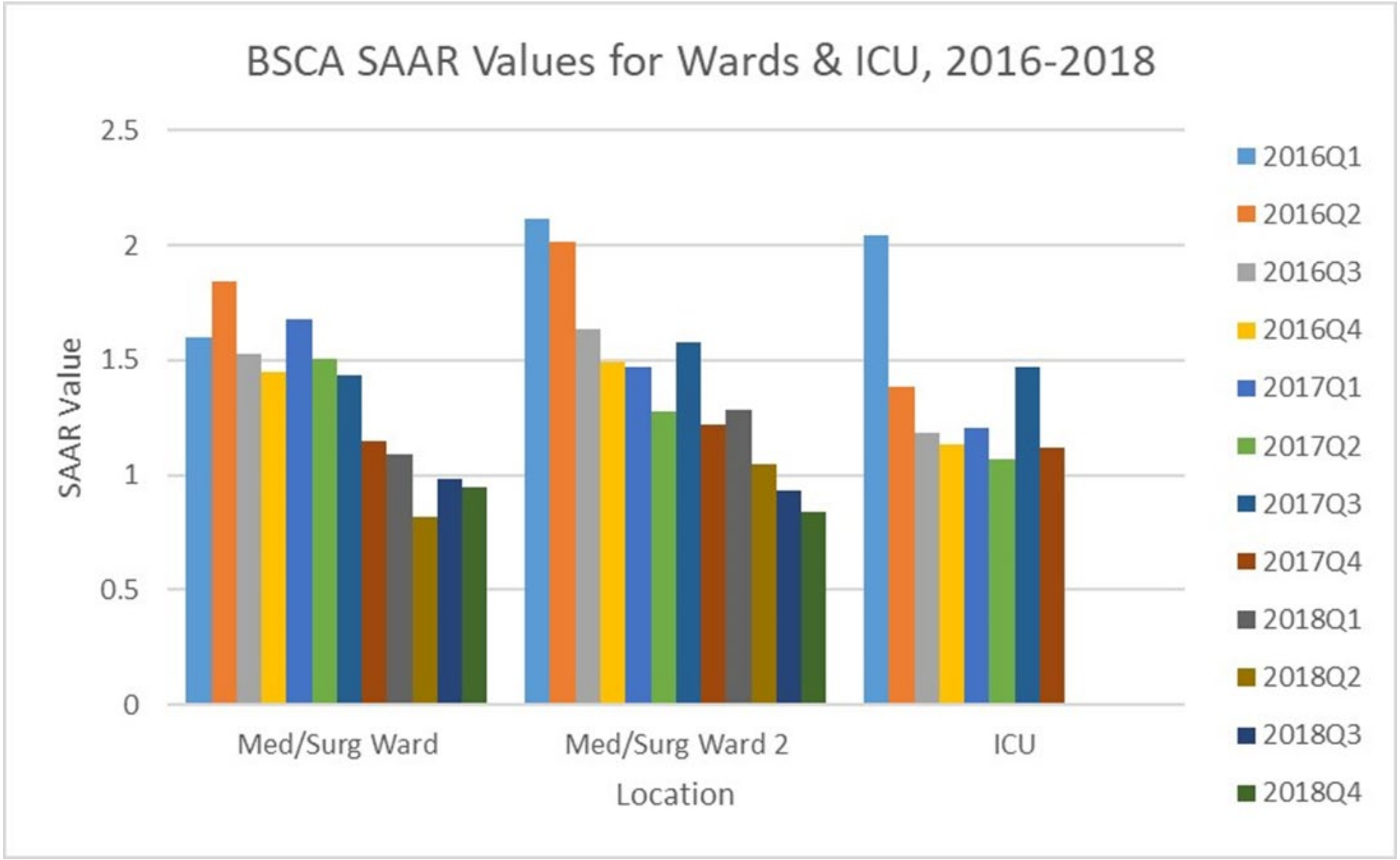


Targeting a Reduction in Fluoroquinolone Use within a Community Hospital

Submitting data into the NHSN Antimicrobial Use (AU Option) since 2016, Wilson Medical Center, a community hospital in North Carolina, used AU Option data to identify an area

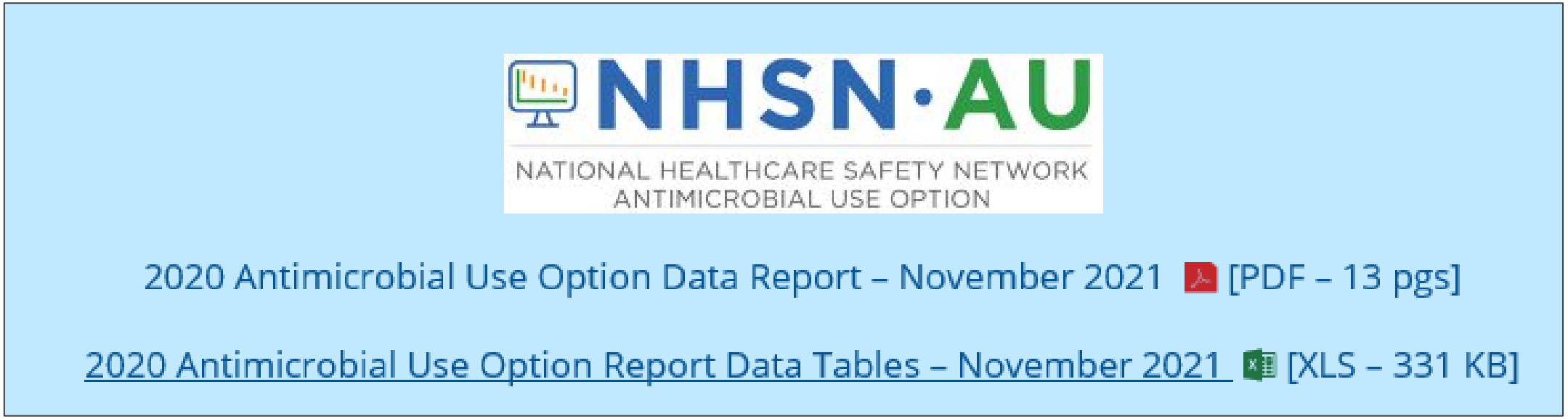
https://www.cdc.gov/nhsn/au-case-examples/index.html

Targeting a Reduction in Fluoroquinolone Use within a Community Hospital

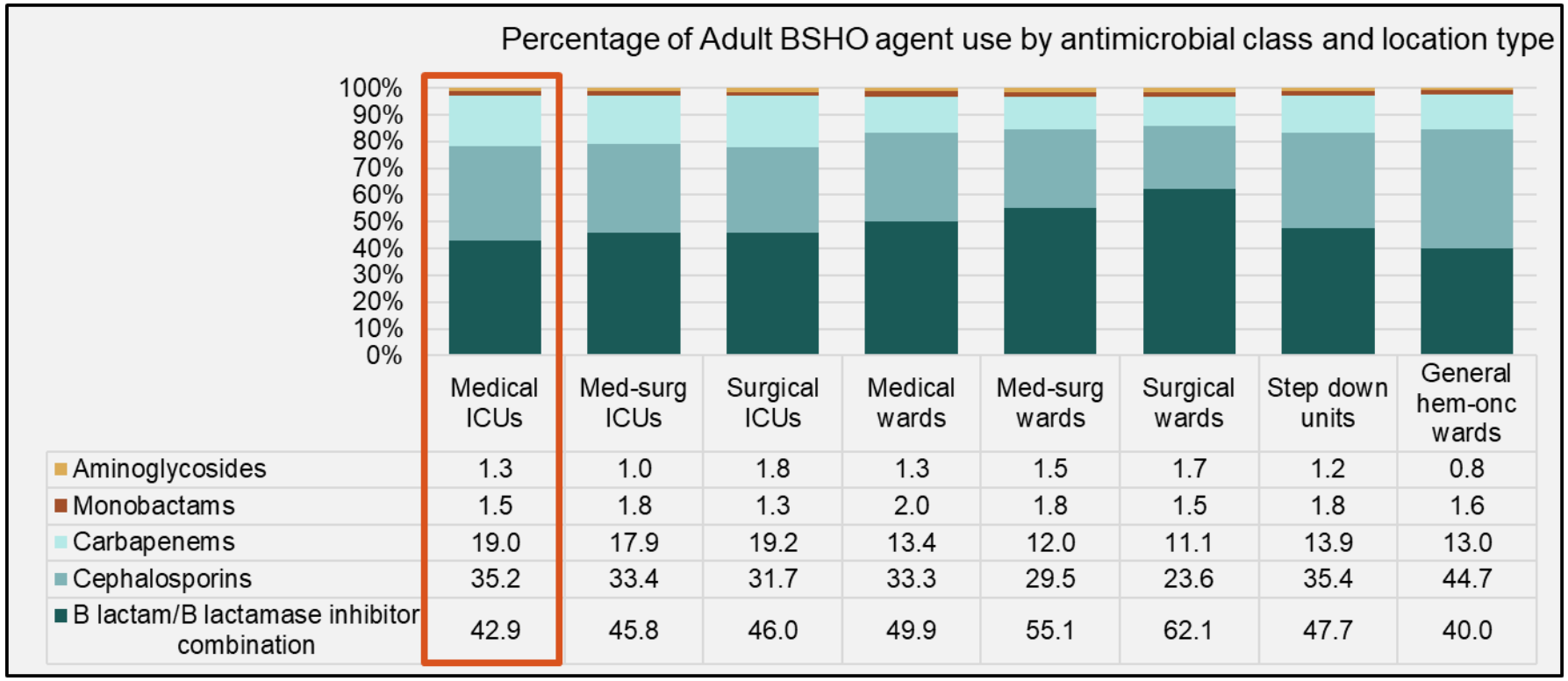


2020 NHSN AU Option Data Report

- Summary of SAAR distributions and percentages of use within SAAR antimicrobial agent categories in adult, pediatric, and neonatal patient care locations



https://www.cdc.gov/antibiotic-use/core-elements/hospital.html



Adult SAAR location type (n)[1]	Antimicrobial[2]	Antimicrobial Class	Antimicrobial Subclass	Pooled antimicrobial days	Percentage of antimicrobial days
Medical ICUs (n=366)	Piperacillin/Tazobactam	B-lactam/B-lactamase inhibitor combination		263,107	42.9
	Cefepime	Cephalosporins	Cephalosporin 4th generation	209,269	34.2
	Meropenem	Carbapenems		115,601	18.9
	Aztreonam (IV)	Monobactams		9,162	1.5
	Ceftazidime	Cephalosporins	Cephalosporin 3rd generation	6,509	1.1
	Gentamicin (IV)	Aminoglycosides		3,103	0.5
	Tobramycin (IV)	Aminoglycosides		2,842	0.5
	Amikacin (IV)	Aminoglycosides		2,007	0.3
	Imipenem/Cilastatin	Carbapenems		1,078	0.2
	Doripenem	Carbapenems		0	0.0

Best practices for using AU data for action

- Submit monthly hospital AU data to the NHSN AU Option to guide tracking and reporting for ASPs.
- Review NHSN AU data at least quarterly to track SAAR/AU data over time to both inform and assess stewardship interventions.
- Report SAAR/AU data on a regular basis to senior leadership, hospital board, hospital committees and providers.
- Establish facility-specific SAAR target goals for quality improvement.
- Create and/or participate in the NHSN AU Option Group Function as part of a healthcare system, health department and/or collaborative.

https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

Implementation Resources for Hospitals

Pharmacy Expertise

- 5 Ways Hospital Pharmacists can Be Antibiotics Aware

Action

- Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America [PDF – 27 pages]
- Urine Culture Stewardship in Hospitalized Patients
- NEW Healthcare Professionals: Be Antibiotic Aware – At Hospital Discharge *(Print Only)* [PDF – 1 page]
- NEW Antimicrobial Stewardship Transition of Care (Henry Ford Health System)
- Toolkit to Enhance Nursing and Antibiotic Stewardship Partnership (The Johns Hopkins Hospital Department of Antimicrobial Stewardship)
- Redefining the Antibiotic Stewardship Team: Recommendations from the American Nurses Association/Centers for Disease Control and Prevention Workgroup on the Role of Registered Nurses in Hospital Antibiotic Stewardship Practices [PDF – 14 pages]
- AHRQ Safety Program for Improving Antibiotic Use

Optimizing duration of antibiotic therapy

HOSPITAL PHARMACISTS:
BE ANTIBIOTICS AWARE

Use the Shortest Effective Antibiotic Duration

SCENARIO

You are performing medication reconciliation and reviewing discharge antibiotic orders for a patient.

Antibiotic stewardship programs are targeting interventions to reduce unnecessarily long durations of antibiotic treatment. In adult patients who have a timely clinical response, guidelines suggest the following durations for uncomplicated cases of these infections:

- **Community-Acquired Pneumonia:** Five days[1]
- **Hospital-Acquired Pneumonia:** Seven days[2]
- **Non-purulent Cellulitis:** Five days[3]

Pharmacists can help optimize antibiotic duration by:

1. Adding the total number of days of uninterrupted inpatient antibiotic therapy to planned post-discharge antibiotic duration.
2. Alerting the provider if the total duration of inpatient and post-discharge antibiotic therapy exceeds the recommended duration according to treatment guidelines.
3. Discussing optimizing the duration of post-discharge antibiotic therapy with the provider if the patient had an uncomplicated clinical course and has responded appropriately to treatment.

The scenarios and recommendations discussed 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.

Improving antibiotic use at **hospital discharge** through a pharmacist-led transition-of-care intervention

Pre-Intervention Handout for Physicians and Nurses

Antimicrobial Stewardship Transitions of Care Overview

OPPORTUNITY

Within HFHS, about 400 patients per week are treated on medicine wards for common respiratory, skin, urinary, and intra-abdominal infections

40% receive an excess duration, **25%** develop antibiotic-side effects, **5%** develop multi-drug resistant infections

RESOURCES

To help manage this transition, over the years HFHS developed

- Accessible local guidelines
- Progressive rounds
- Antimicrobial stewardship
- Transitions of care services
- Prescription coverage check

Collaboration can distribute workload!

PROCESS

- Patients eligible to receive PO antibiotics at discharge
- Pharmacist will discuss antibiotic selection/duration with primary team on clinical/ progressive rounds
- Inpatient/discharge order placed with dose/ duration for specific infection, antibiotic, and renal function
- Pharmacist leaves note in chart, and provider signs order at discharge

Included	Excluded
Respiratory tract: • CAP • HAP • Acute COPD exacerbation • Influenza **Urinary tract:** • Cystitis • Complicated UTI • Pyelonephritis **Skin/soft tissue** • Cellulitis • Cutaneous abscess **Intra-abdominal** • SBP • Complicated peritonitis w/ adequate source control	• Solid organ transplant/ neutropenia • OPAT patients • Age <18 years • Endocarditis/endovascular infections • Bone/joint infection • Meningitis • Bacteremia due to: *S. aureus, Enterococci,* fungi • Necrotizing fasciitis • Abscess/fluid collection without removal of foci • Prostatitis • Pneumocystis pneumonia • Mycobacterial infections

What to expect:

- Pharmacist will routinely conduct surveillance on patients expected to be discharged on oral antibiotics: anticipate questions regarding discharge status
- When the plan for oral antibiotics has been determined with the team, a note will be placed in the chart for selection and duration based on patient-specific attributes
- The pharmacists' Transitions of Care note can be used for patient education and to communicate where the medication will be sent

Go Live Date for Your Unit: _____

Contact for questions: _____

Henry Ford Health System

https://www.cdc.gov/antibiotic-use/core-elements/implementation.html

Improving antibiotic use at hospital discharge

https://www.cdc.gov/antibiotic-use/pdfs/BAA-Hospital-Discharge-Flowchart-P.pdf

Engaging front-line nurses in stewardship activities

JOHNS HOPKINS MEDICINE

SEARCH

Department of Antimicrobial Stewardship

Department of Antimicrobial Stewardship
> Toolkit to Enhance Partnership Between Nursing and the Antibiotic Stewardship Program

Toolkit to Enhance Nursing and Antibiotic Stewardship Partnership

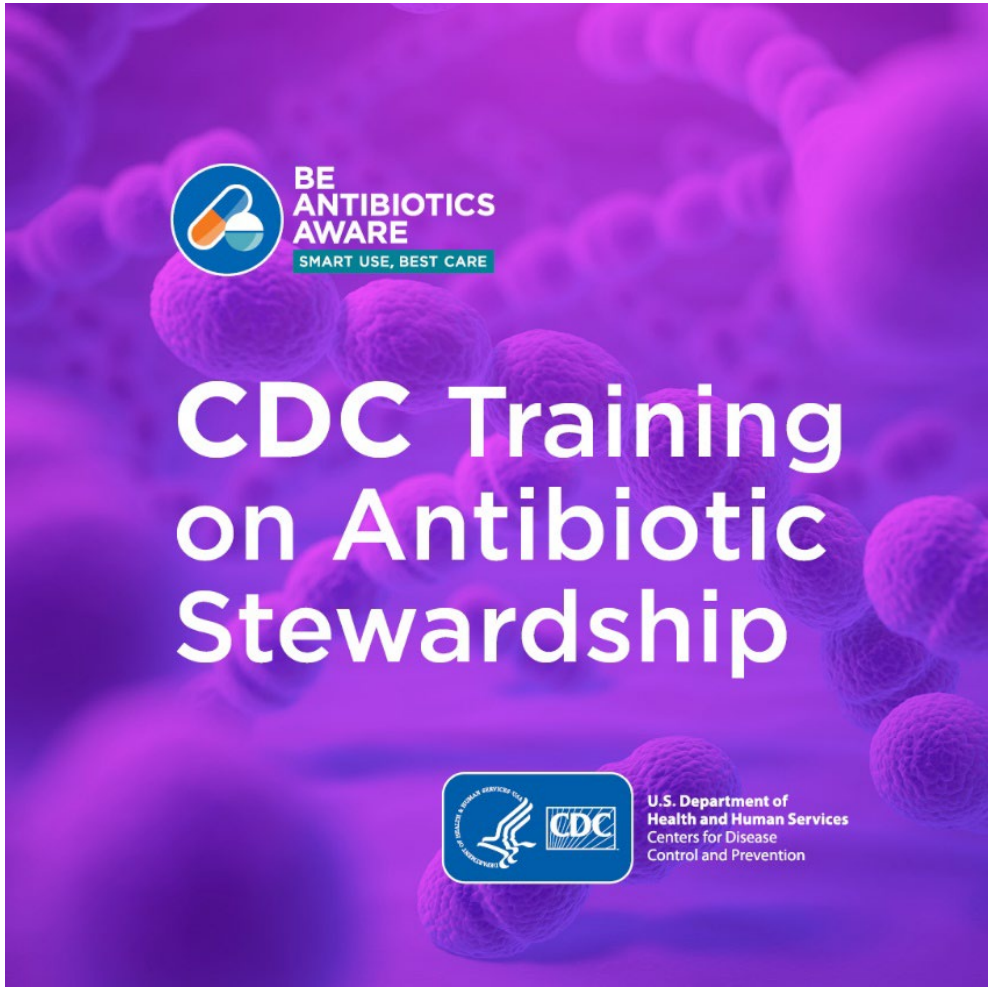
Despite discussions at the national level about the need to integrate nurses into antibiotic stewardship (AS) activities, there are limited tools and resources for Antimicrobial Stewardship Programs, nursing and/or hospital leadership to facilitate implementation of nurse-based AS interventions in acute care hospitals.

This **toolkit and comprehensive user guide** aims to bridge the gap, and provides materials and resources to: (a) engage front-line nurses in AS, (b) obtain leadership support to implement nurse-driven AS activities, and (c) implement a nurse-driven diagnostic stewardship intervention to improve urine and respiratory culturing practices and a penicillin allergy algorithm to improve

CDC training with over 10 hours of free CE credits on antibiotic stewardship

Course include educational content on:

- Antibiotic resistance threats in the United States
- Benefits of antibiotic stewardship
- Risks and benefits of antibiotics
- Epidemiology of outpatient antibiotic use in the U.S. and opportunities for improvement
- Communication training for clinicians to improve outpatient antibiotic prescribing and use
- Antibiotic stewardship considerations for the management of common outpatient conditions
- Antibiotic stewardship in the outpatient setting, dentistry, emergency departments, hospitals, and nursing homes



https://www.train.org/cdctrain/training_plan/3697

Take Home Messages

- Antibiotic stewardship is important for patient safety.
- There are many opportunities to improve antibiotic use in hospitals.
- Tracking and reporting of antibiotic use is critical to identify, implement and assess stewardship interventions.

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

www.cdc.gov/antibiotic-use

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.