

# CDC- Hospital Antibiotic Stewardship Updates

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# AUR Module data are required in CY 2024

- Beginning in **CY 2024**, AUR Module data are required under the Public Health and Clinical Data Exchange Objective of the CMS PI Program
- Applies to eligible hospitals and critical access hospitals that participate in the CMS PI Program
- **Measure includes submission of both AU and AR Option data**
- For CY 2024 facilities attest to either:
  - Being in active engagement with NHSN to submit AUR data or,
  - Claim an applicable exclusion



# Two ways to be in active engagement with NHSN

- Option 1 – Pre-production and validation
  - Registration within NHSN
  - Testing & validation of the CDA files
- Option 2 – Validated data production
  - Submitting production AU & AR files to NHSN
    - CY 2023 – 90 continuous days of AUR data submission
    - CY 2024 – 180 continuous days of AUR data submission
- **Note:** Beginning in CY 2024, facilities can only spend one calendar year in Option 1 (pre-production and validation)

## Three exclusions currently

1. Does not have any **patients** in any patient care location for which data are collected by NHSN during the EHR reporting period; or
2. Does not have **electronic medication administration records (eMAR)/barcoded medication administration (BCMA)** records or an **electronic admission discharge transfer (ADT)** system during the EHR reporting period; or
3. Does not have an **electronic laboratory information system (LIS)** or **electronic ADT** system during the EHR reporting period.

# AUR Data Are NOT Shared With CMS

- CDC/NHSN does not provide any data to CMS for this reporting measure
  - Goal of CMS PI Program is to increase interoperable healthcare data exchange
- Reimbursement is not impacted by SAAR values or AR data.
- Facilities must attest to CMS that they are in active engagement with NHSN
  - Attest within the CMS Hospital Quality Reporting (HQR) system:  
<https://hqr.cms.gov/hqrng/login>
- **NHSN provides documentation to facilities to use as proof**

# Using NHSN Antibiotic Use Data for Action, Not Just Counting

- Comparative benchmarking is arguably more useful for antibiotic stewardship than almost any other area of quality measurement.
- Not to show which hospital is “better”.
- But to actually help us figure out where there might be opportunities to improve use.
- Unlike most of the things we measure in healthcare, the goal of antibiotic use is not zero.
- In general, we know that use is often higher than it should be, but by how much? And in what parts of the hospital? And of which agents?

# Comparison is the Thief of Joy And Essential for Antibiotic Stewardship

- The Antibiotic Use option was designed in collaboration with antibiotic stewards to try and address their needs.
- Their top ask: “We need comparative benchmarks”
- Would you explore carbapenem use in an ICU that dropped by 5% last year?
- Would you explore carbapenem use in an ICU that dropped by 5% last year, but that was twice as high as other ICUs?

Perspective

# Application of Standardized Antimicrobial Administration Ratio as a Motivational Tool within a Multi-Hospital Healthcare System

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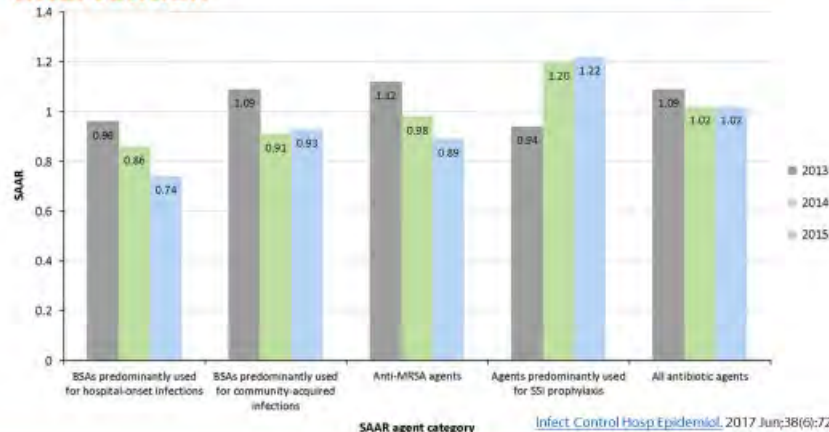
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## SAAR Values Before And After A Stewardship Intervention



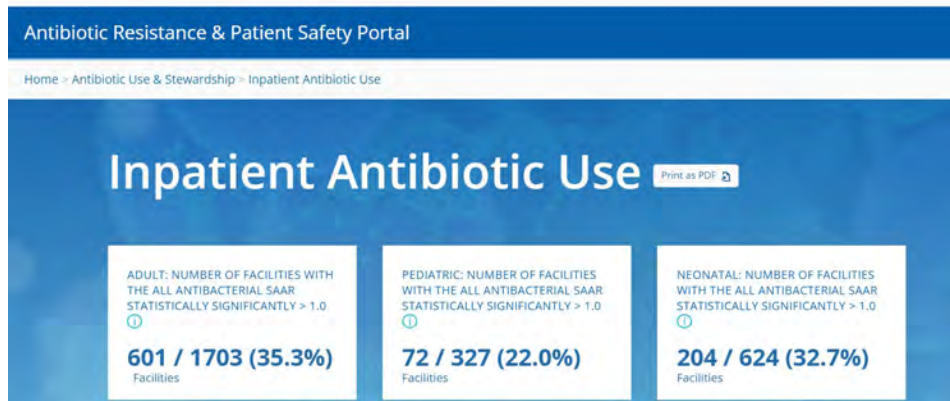
Infect Control Hosp Epidemiol. 2017 Jun;38(6):721-723.



# Other Resources You Might Find Useful

## Antibiotic Resistance and Patient Safety Portal

- <https://arpsp.cdc.gov/>
- Summary information on:
- Core elements uptake (including priority elements)
- SAAR data





## National Healthcare Safety Network (NHSN)

[CDC](#) > [NHSN Home](#) > [NHSN Reports](#)

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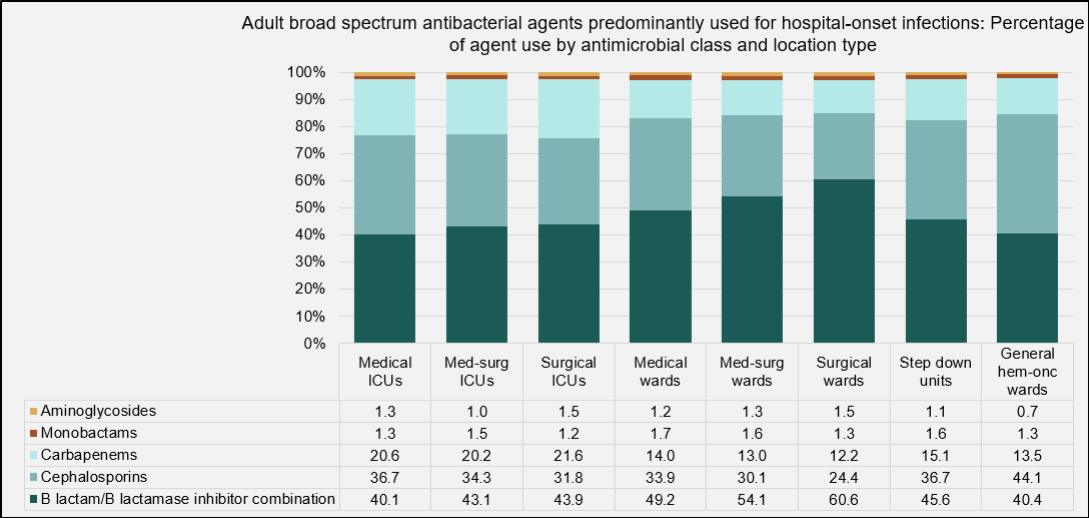


# Antimicrobial Use and Resistance (AUR) Module Reports

[Print](#)

- 2022 Coming soon!
- <https://www.cdc.gov/nhsn/datastat/aur-reports.html>

Percentile distribution of location-specific SAARs																				
No. of locations with ≥1 predicted antimicrobial day <sup>2</sup>	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	
507	0.597	0.683	0.724	0.761	0.802	0.835	0.864	0.897	0.934	0.963	0.985	1.013	1.047	1.072	1.102	1.141	1.190	1.236	1.363	
1,190	0.613	0.698	0.748	0.781	0.814	0.845	0.872	0.897	0.925	0.952	0.982	1.006	1.031	1.062	1.095	1.127	1.170	1.213	1.321	
229	0.633	0.705	0.746	0.790	0.816	0.839	0.873	0.894	0.918	0.945	0.961	0.991	1.023	1.059	1.088	1.153	1.209	1.273	1.417	
1,748	0.476	0.606	0.669	0.711	0.755	0.792	0.826	0.855	0.885	0.912	0.938	0.968	0.998	1.026	1.067	1.107	1.158	1.234	1.348	
2,482	0.465	0.633	0.704	0.754	0.799	0.839	0.870	0.898	0.927	0.957	0.986	1.014	1.048	1.084	1.116	1.152	1.210	1.274	1.376	
805	0.591	0.703	0.762	0.802	0.838	0.861	0.894	0.915	0.941	0.966	0.995	1.018	1.045	1.077	1.112	1.150	1.197	1.244	1.313	
1,026	0.493	0.577	0.648	0.695	0.746	0.792	0.838	0.868	0.901	0.937	0.969	1.005	1.044	1.076	1.118	1.159	1.226	1.295	1.419	
285	0.664	0.737	0.777	0.835	0.855	0.881	0.909	0.925	0.949	0.976	1.003	1.032	1.081	1.121	1.153	1.226	1.297	1.357	1.516	



# Now Available in NHSU AU- Targeted Assessment for Stewardship

AU Users have been asking us for NHSN analytic support in helping meet their facility-identified SAAR targets

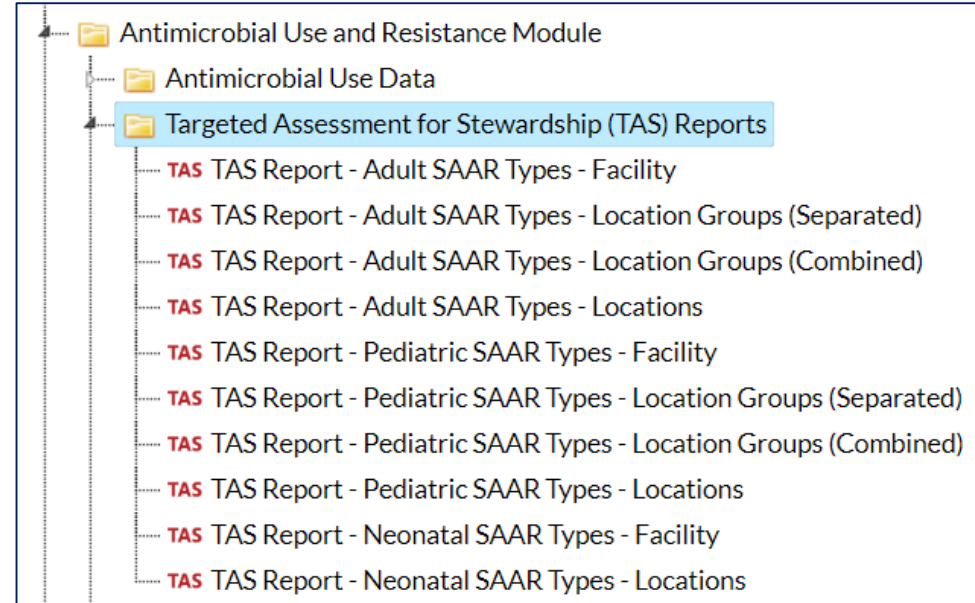
“We came up with a SAAR goal of 0.9, how many days of therapy do we need to eliminate to get there?”

1. **Target:** Run TAS Reports to identify facilities, location groups and locations for further assessment using the ranked **AU cumulative attributable difference (AU-CAD)**.
2. **Assess:** Utilize assessment tools to identify gaps and opportunities to improve antibiotic use.
3. **Steward:** Implement antibiotic stewardship activities to address gaps and opportunities.



# TAS Reports

- 18 TAS reports within NHSN
  - Available for NHSN Facilities and NHSN Groups
  - Separated by population (adult, pediatric, neonatal) & level of aggregation (group, facility, location group, location)





# What is the AU-cumulative attributable difference (AU-CAD)?

- The AU-CAD value translates the SAAR target into a tangible number of antimicrobial days to reduce or add to achieve a SAAR target.

$$\text{AU-CAD} = \text{Observed antimicrobial days} - (\text{Predicted antimicrobial days} \times \text{SAAR target})$$

**SAAR target:** SAAR target chosen by AU users for each antimicrobial agent category

# More Help Coming Soon- From Your Work!

- CDC issued a funding opportunity to collect and make available “use cases” for NHSN AU data.
- You all (DASON) got that award and Libby is leading an effort to summarize a variety of adult and pediatric examples of ways that people have used NHSN AU data.
- These will be available soon.
- Lots of practical tips on how to analyze and explore the data.
- Advice on other data sources that can help if available.



# Newly Available- Standardized Ratios for Resistant Infections

- We developed two new AR benchmark metrics in 2021/2022 using 2019 as the baseline year
  - SRIR: Standardized Resistant Infection Ratio
  - pSIR: pathogen-specific Standardized Infection Ratio
- Both are observed-to-predicted ratios (like SAARs, SIRs, SURs)
- Both are now available in NHSN AUR module





# Standardized Ratios of Resistant Infections

- **Standardized Resistant Infections Ratio (SRIRs)** allow facilities to compare their number of observed hospital-onset (HO) resistant infections for eligible phenotypes, to the number predicted, based on 2019 baseline risk-adjusted AR models
- **Pathogen specific Standardized Infection Ratios (pSIRs)** allow facilities to compare their number of observed HO infections for eligible organisms, to the number predicted, based on 2019 baseline risk-adjusted AR models



# Antimicrobial Resistant Phenotypes

- **SRIR pathogens (aggregate of these)**

- Carbapenem-resistant *Enterobacterales*
- Extended-spectrum cephalosporin-resistant *Enterobacterales*
- Fluoroquinolone-resistant *Enterobacterales*
- Vancomycin-resistant *Enterococcus*
- Fluoroquinolone-resistant *P. aeruginosa*
- Multi-drug-resistant *P. aeruginosa*
- Methicillin-resistant *S. aureus*

- **pSIR pathogens**

- Enterobacterales
- Enterococcus
- *Pseudomonas aeruginosa*
- *Staphylococcus aureus*

\*Phenotype definitions can be found in the AUR Module Protocol: <https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>



## How were phenotypes/organisms selected?

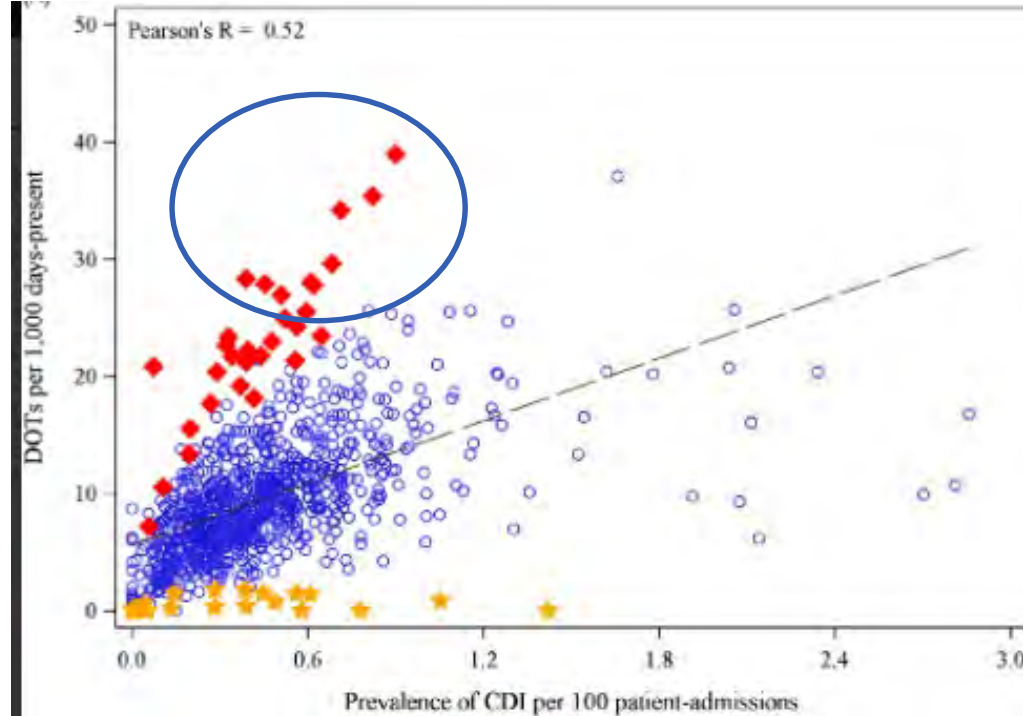
- Selected by a group of internal subject matter experts
- Target phenotypes were relatively common AR threats that could spread widely in hospital settings
  - Of interest to hospital infection prevention and antimicrobial stewardship programs
  - Benchmarking metrics for selected phenotypes can enable inter-facility comparisons
  - Rare AR phenotypes were not prioritized for benchmarking but worth investigating if seen in other NHSN reports

# Assessing Correlation of Antibiotic Use and Resistance

- Correlations between antibiotic use and resistance can be informative for potential opportunities to improve use.
- Are there hospitals where use of some agents is much higher than what we would expect given resistance patterns?
  - E.g. a hospital using a lot of ceftazidime-avibactam, but with very little CRE
- Are there hospitals where use of some agents is much lower than what we would expect given resistance patterns?

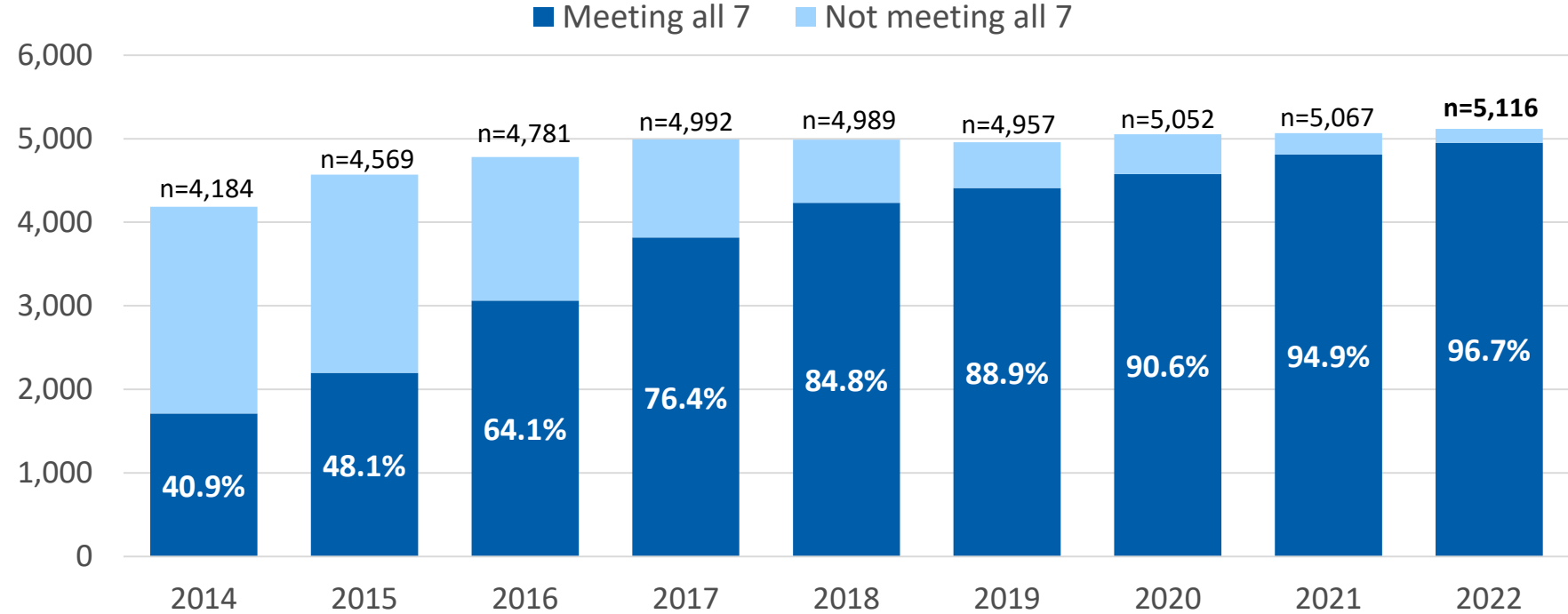
# Association between prevalence of laboratory-identified *Clostridioides difficile* infection (CDI) and antibiotic treatment for CDI in US acute-care hospitals, 2019

Red diamonds are hospitals with more CDI treatment than predicted





# NHSN Annual Hospital Surveys 2014-2022: Number and percentage of hospitals meeting all 7 Core Elements





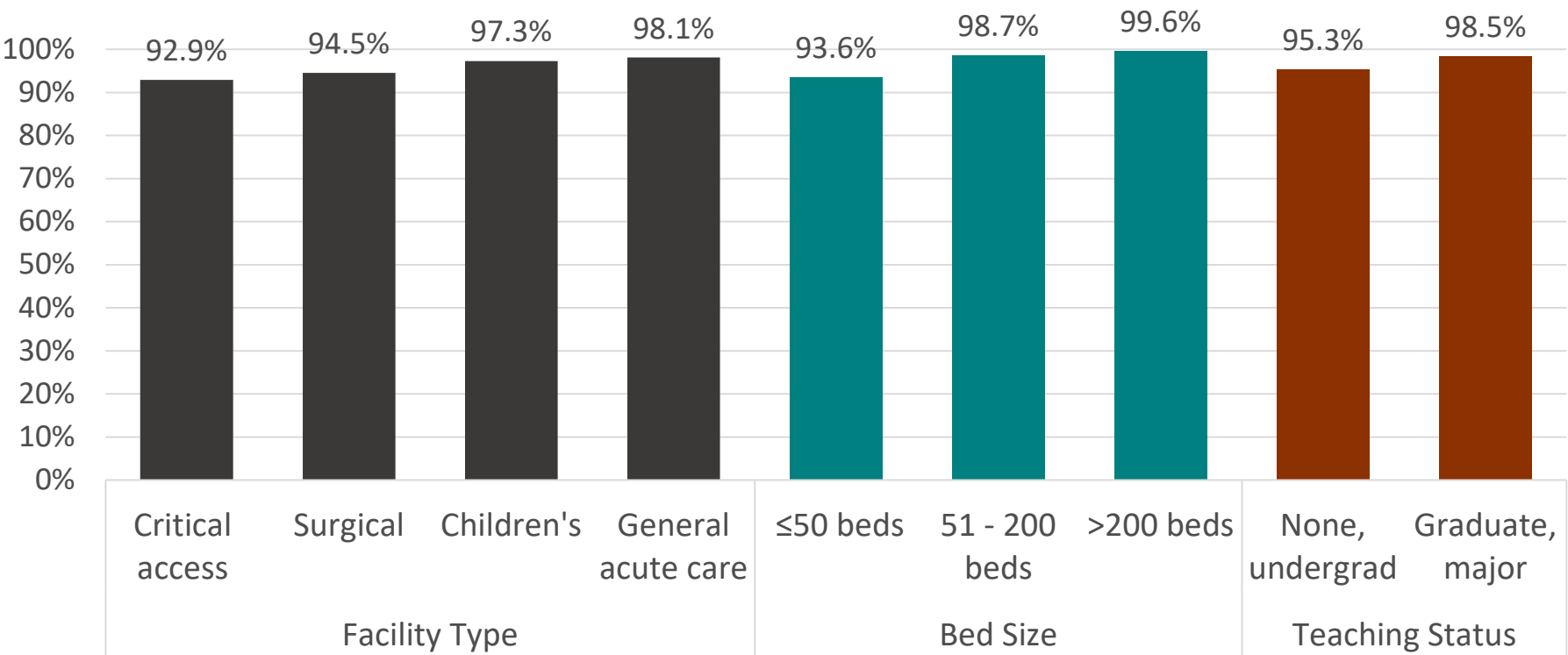
# Total number of Core Elements met, 2014-2022

- Only **26** (0.5%) facilities met  $\leq 4$  Core Elements in 2022, compared to **46** in 2021

Number of core elements met	2014	2015	2016	2017	2018	2019	2020	2021	2022	
<b>0</b>	2.6%	2.1%	0.9%	0.4%	0.4%	0.2%	0.2%	0.1%	<b>1</b>	<b>0.02%</b>
<b>1</b>	3.0%	2.3%	0.9%	0.3%	0.6%	0.3%	0.2%	0.1%	<b>3</b>	<b>0.06%</b>
<b>2</b>	4.9%	4.2%	1.9%	0.8%	0.5%	0.3%	0.3%	0.1%	<b>3</b>	<b>0.06%</b>
<b>3</b>	7.4%	6.0%	2.8%	1.5%	0.7%	0.5%	0.3%	0.2%	<b>8</b>	<b>0.16%</b>
<b>4</b>	10.4%	9.0%	4.5%	2.3%	1.2%	0.8%	0.4%	0.4%	<b>11</b>	<b>0.21%</b>
5	10.9%	9.5%	8.5%	5.2%	2.8%	2.0%	1.6%	0.9%	34	0.66%
6	20.0%	18.7%	16.4%	12.9%	9.0%	6.9%	6.3%	3.2%	107	2.09%
7	40.9%	48.1%	64.1%	76.4%	84.9%	88.9%	90.6%	94.9%	4,950	96.74%



# Percentage of hospitals meeting all 7 Core Elements, by hospital characteristic, 2022







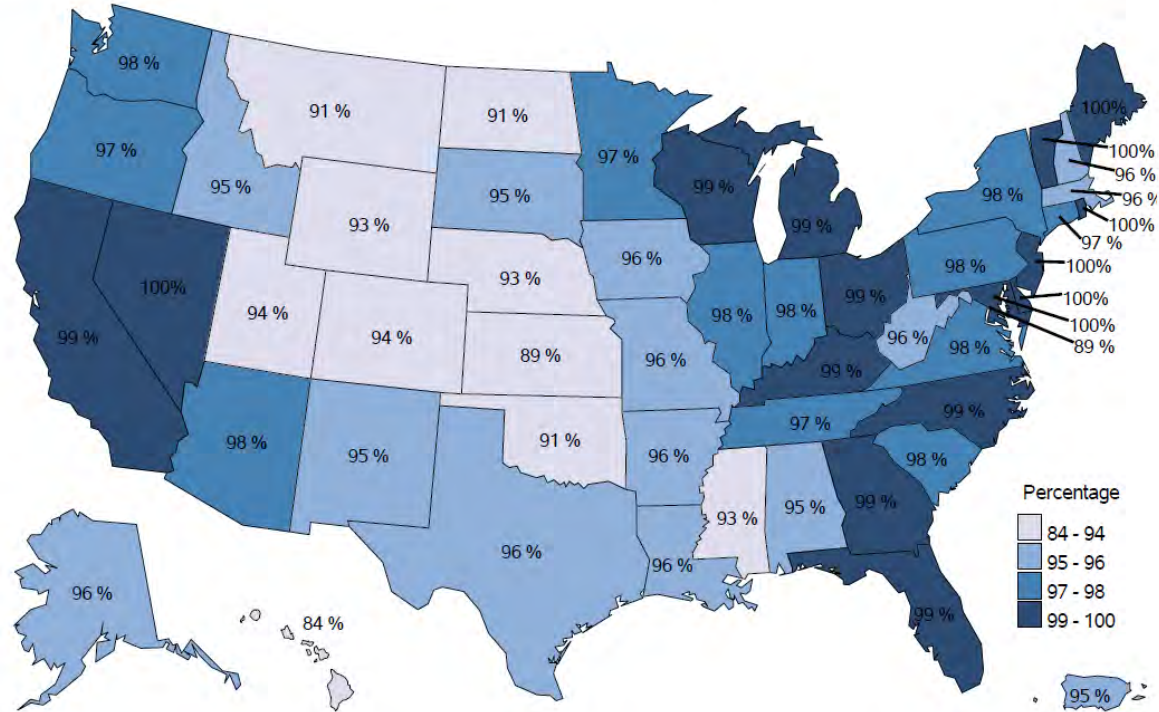
# Percentage of hospitals meeting all 7 Core Elements, 2014-2022, by hospital characteristic

Characteristic	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Overall</b>	40.9%	48.1%	64.1%	76.4%	84.8%	88.9%	90.6%	94.9%	96.7%
<b>Facility Type</b>									
Children's hospital	50.0%	53.2%	73.9%	86.0%	91.9%	90.5%	92.2%	98.0%	97.3%
General acute care hospital	44.6%	53.1%	69.5%	81.9%	88.5%	92.0%	93.2%	97.0%	98.1%
Surgical hospital	33.6%	45.4%	58.1%	77.3%	79.9%	87.7%	87.2%	91.7%	94.5%
Critical access hospital	19.6%	26.3%	43.0%	57.8%	73.2%	79.5%	82.7%	88.9%	92.9%
<b>Bed Size</b>									
≤50 beds	23.6%	31.1%	46.0%	61.4%	75.4%	81.8%	84.9%	90.4%	93.6%
51 - 200 beds	40.4%	49.6%	69.0%	82.5%	88.6%	91.6%	92.5%	97.1%	98.7%
>200 beds	58.4%	66.1%	81.5%	90.7%	93.9%	96.2%	97.1%	99.5%	99.6%
<b>Teaching Status</b>									
Major teaching	55.4%	63.4%	76.3%	86.4%	91.0%	93.8%	95.0%	97.7%	98.5%
Non-teaching/undergrad	35.6%	42.4%	58.5%	71.4%	81.1%	85.7%	87.6%	92.9%	95.3%



# Percentage of hospitals meeting all 7 Core Elements, by state, 2022

Percentage of Acute Care Hospitals, Per State, Meeting all 7 Core Elements, 2022



# Priorities for Hospital Core Element Implementation



## Hospital Leadership Commitment

Antibiotic stewardship physician and/or pharmacist leader(s) have antibiotic stewardship responsibilities in their contract, job description, or performance review.



## Accountability

Antibiotic stewardship program is co-led by a physician and pharmacist.\*



## Stewardship/Pharmacy Expertise

Antibiotic stewardship physician and/or pharmacist leader(s) have completed infectious diseases specialty training, a certificate program, or other training on antibiotic stewardship.



## Action

Antibiotic stewardship program has facility-specific treatment recommendations for common clinical condition(s) and performs prospective audit/feedback or preauthorization.



## Tracking

Hospital submits antibiotic use data to the NHSN Antimicrobial Use Option.



## Reporting

Antibiotic use reports are provided at least annually to target feedback to prescribers. In addition, the ASP monitors adherence to facility-specific treatment recommendations for at least one common clinical condition.



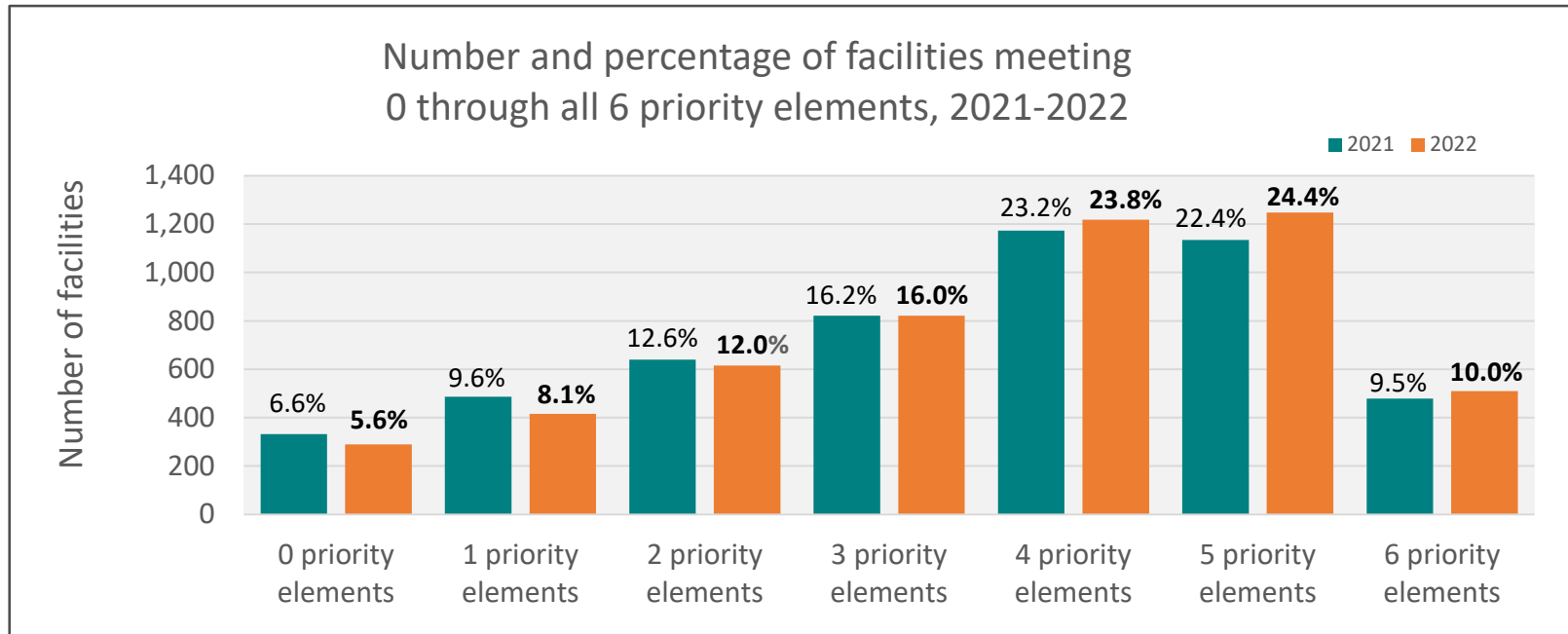
## Education

No implementation priority identified.



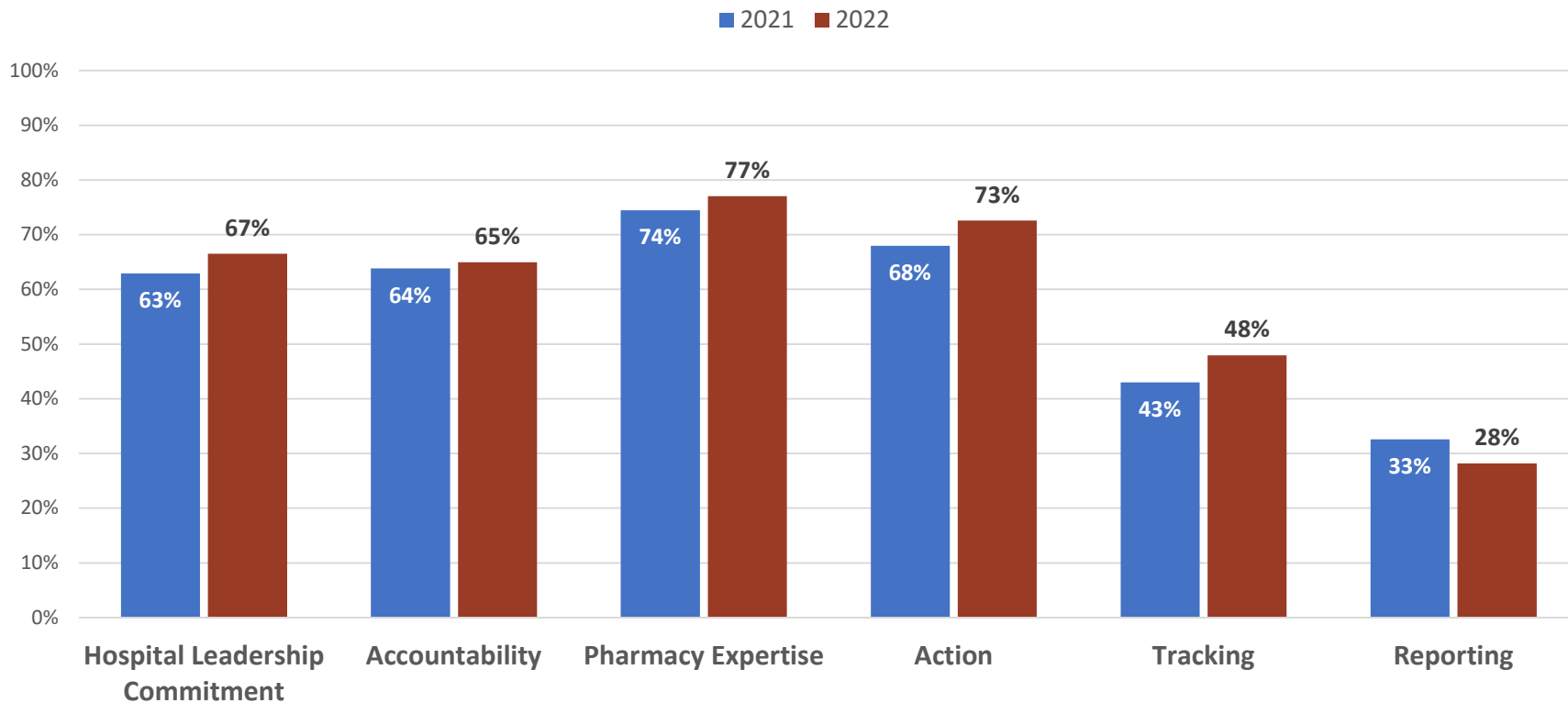
# Priorities for Hospital Core Element Implementation

- **510** (10.0%) hospitals met all 6 priority elements in 2022
- **2,466** (48.2%) hospitals met 4 or 5 of the priority elements in 2022



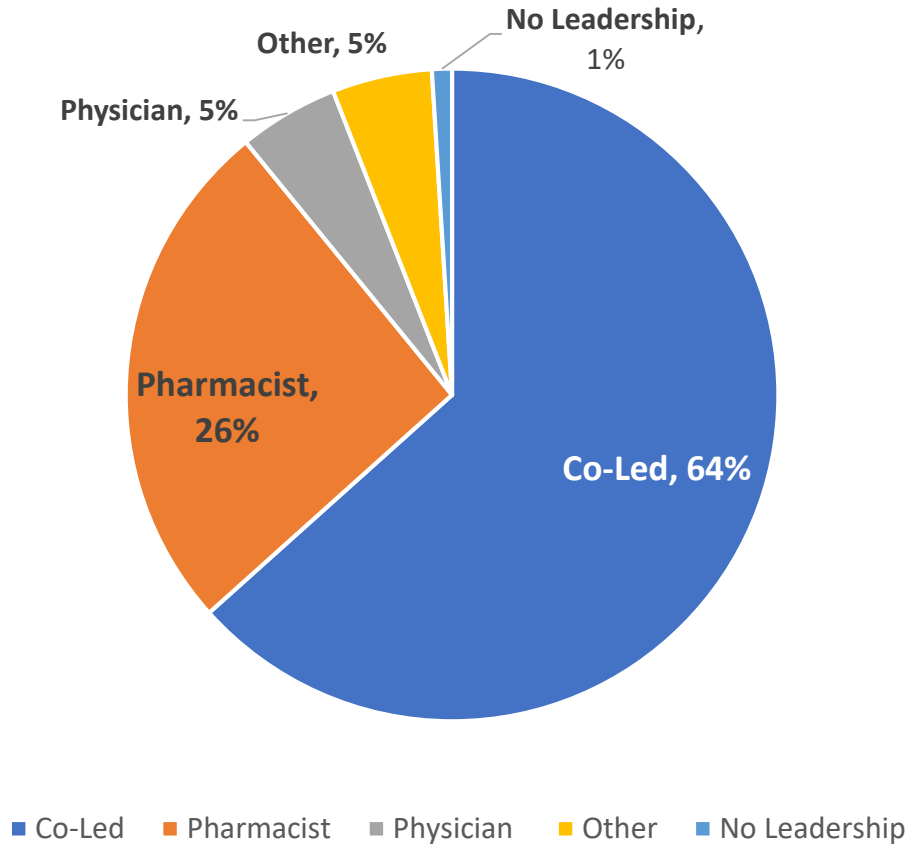


# Percentage of facilities meeting each Priority for Hospital Core Element Implementation, 2021-2022



# Leadership position

- 64% of programs are Co-Led by physician and pharmacist (3269/5116)
- 26% Pharmacist-led (1306/5116)
- 5% Physician Led (262/5116)



# Reporting Priority



## Reporting

Antibiotic use reports are provided at least annually to target feedback to prescribers. In addition, the ASP monitors adherence to facility-specific treatment recommendations for at least one common clinical condition.

- In **41%** of hospitals, AU reports are provided at least annually to target feedback to providers
  - Limiting factor; improve provider feedback → increase reporting priority uptake
- In 2022, **58%** of hospital monitored adherence to facility-specific treatment recommendations for at least 1 common clinical
  - Joint Commission requirement

# Time Performing Antibiotic Stewardship Activities

- 1. How much time do** physicians and/or pharmacists have designated for antibiotic stewardship in their contract?

NHSN Survey: What percent time for antibiotic stewardship activities is specified in the [physician/pharmacist] (co) leader's contract or job description?

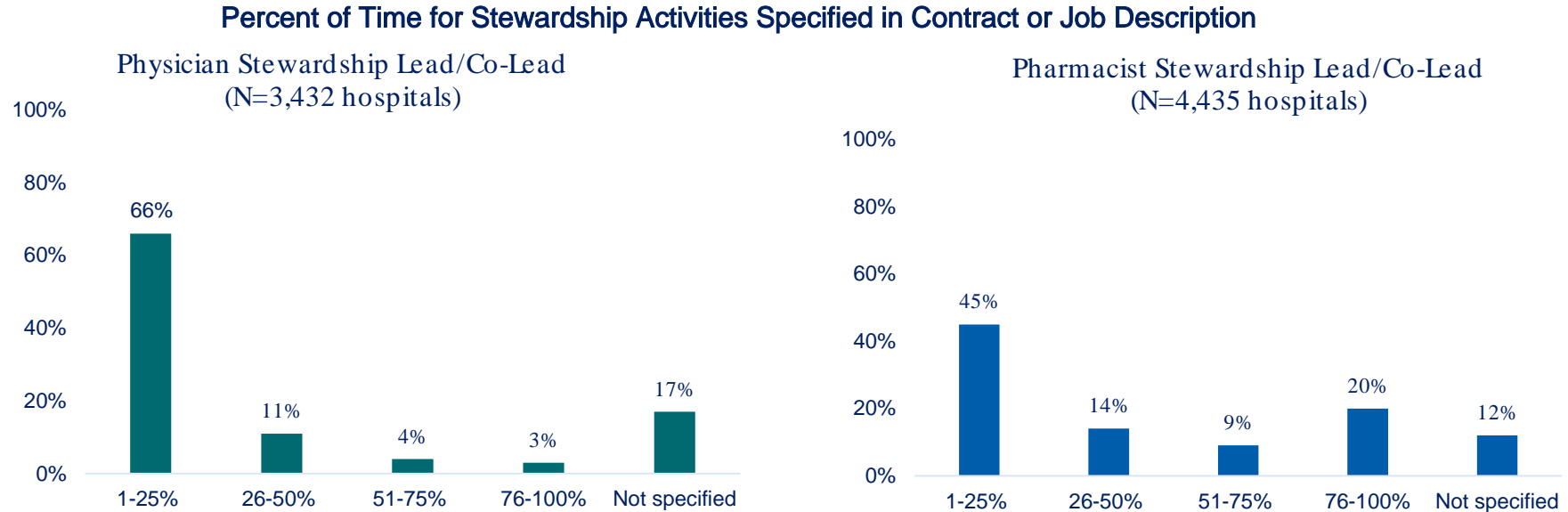
- 2. How much time do physicians and/or pharmacists actually dedicate to antibiotic stewardship activities?**

NHSN Survey: In an average week, what percent time does the [physician/pharmacist] (co) leader spend on antibiotic stewardship activities in your facility?



# Physician vs. Pharmacist: Time Specified in Contract

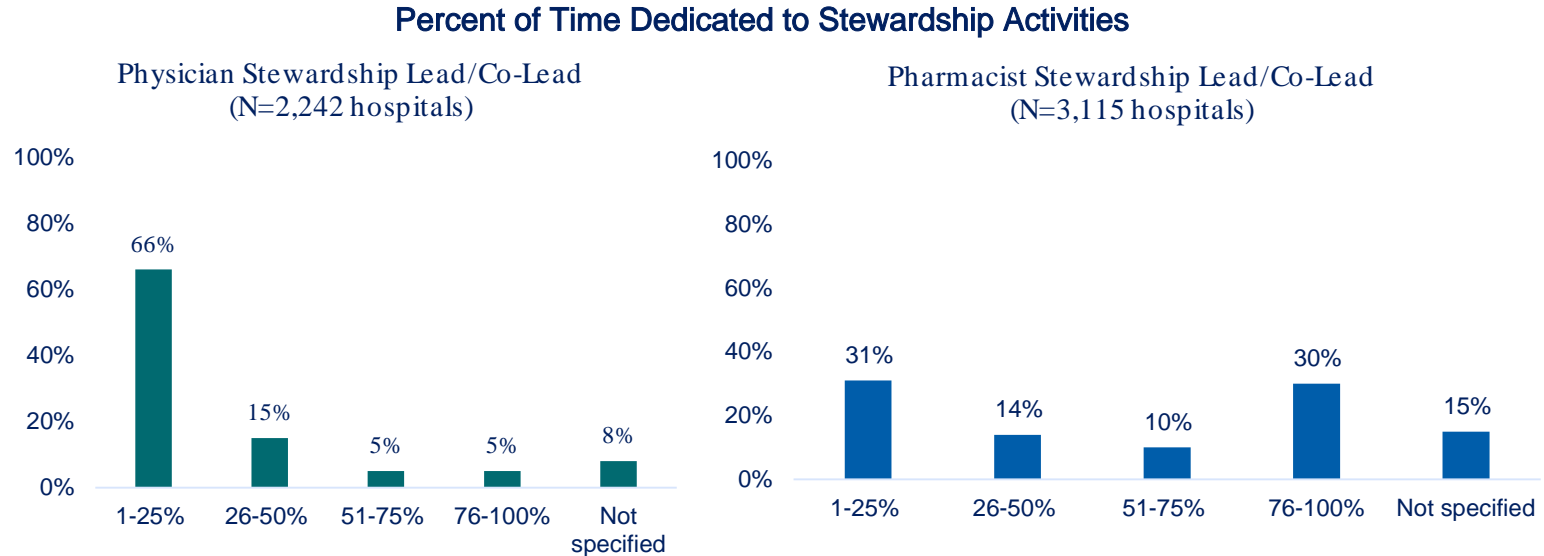
- Two-thirds of hospitals specify 1-25% of physician lead/co-leads time for stewardship activities in contracts and job descriptions
- Pharmacists leads/co-leads were more likely to contribute 76-100% of time for stewardship activities in contracts and job descriptions



Note: Use caution when making comparisons; different facilities reported on these two survey questions

# Physician vs. Pharmacist: Actual Time Dedicated

- In two-thirds of hospitals, physician leads/co-leads dedicated 1-25% of time on stewardship activities
- In one-third of hospitals, pharmacist leads/co-leads dedicated 1-25% of time on stewardship activities



Note: Use caution when making comparisons; different facilities reported on these two survey questions

# Most physicians and pharmacists dedicated the same amount of time to stewardship that was specified in contract

	Physician (N=1,392)	Pharmacist (N=1,973)
	Frequency	Percent
Same Amount of Time Dedicated as Specified in Contract	1,135 (82%)	1,708 (87%)
Less Time Dedicated than Specified in Contract or Job Description	130 (9%)	137 (7%)
More Time Dedicated than Specified in Contract or Job Description	127 (9%)	128 (6%)

# Potential Opportunities for Stewardship

- We should continue to survey the landscape to see what's "hot" to see if there are opportunities where we can strategically position ourselves to be part of the focus.
  - How can other rising tides lift the steward-"ship".
- Sepsis
- Diagnostic excellence/stewardship

## C.D.C. Sets New Standards for Hospitals to Combat Sepsis

The agency outlined “core elements” needed to detect and treat the condition, a factor in 1.7 million hospitalizations in the U.S. each year.

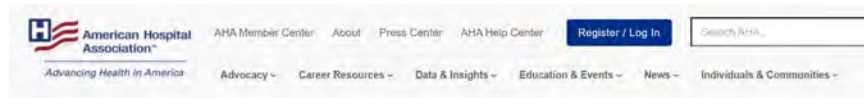
YouTube  
<https://www.youtube.com/watch>

### CDC's New Hospital Sepsis Program Core Elements - YouTube



Dr. Cohen discusses **sepsis** and **CDC's** first-ever Hospital **Sepsis** Program **Core Elements**. These **core elements** will help improve hospitals' ...

YouTube · Centers for Disease Control and Prevention (CDC) · 1 week ago



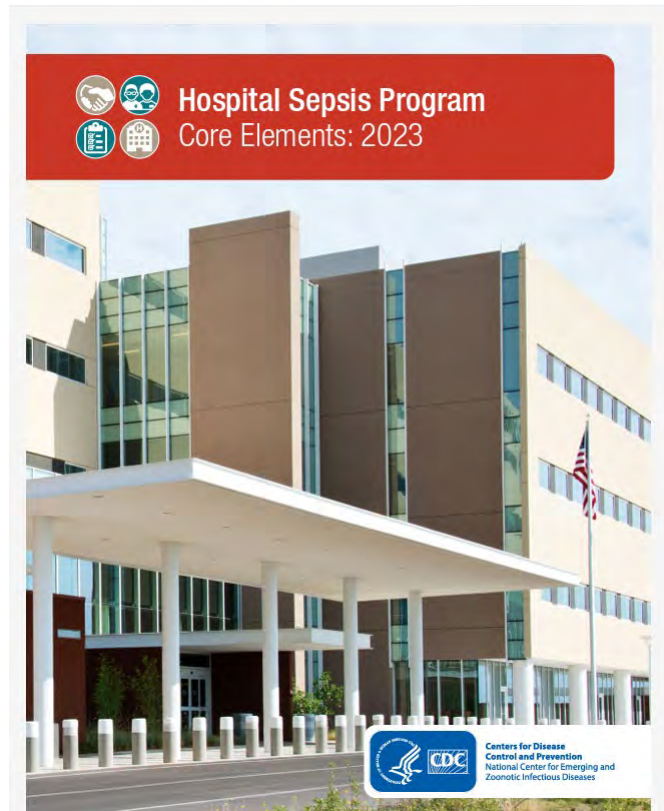
### CDC launches sepsis program for hospitals, with AHA support



Hillary Clinton's portrait unveiled at State Department

ADMINISTRATION · 6M 50S AGO

### CDC launches new sepsis initiative for US hospitals



<https://www.cdc.gov/sepsis/core-elements>.

### Hospital Sepsis Program Core Elements

- **Hospital Leadership Commitment**  
Dedicating the necessary human, financial, and information technology resources.
- **Accountability**  
Appointing a leader or co-leaders responsible for program goals and outcomes.
- **Multi-Professional Expertise**  
Engaging key partners throughout the hospital and healthcare system.
- **Action**  
Implementing structures and processes to improve the identification of, management of, and recovery from sepsis.
- **Tracking**  
Measuring sepsis epidemiology, management, and outcomes to assess the impact of sepsis initiatives and progress toward program goals.
- **Reporting**  
Providing information on sepsis management and outcomes to relevant partners.
- **Education**  
Providing sepsis education to healthcare professionals, patients, and family/caregivers.

## NEW CDC DATA

In a typical year, 1 in 3 people who dies in a hospital had sepsis during that hospitalization.

**But half of U.S. hospitals provide dedicated time for sepsis program leaders.\***

*\*2022 survey of 5,000+ hospitals*



## U.S. HOSPITAL SEPSIS PROGRAM DATA, 2022



of hospitals have a sepsis committee



of hospitals provide dedicated time for sepsis program leaders



of sepsis committees involve Antibiotic Stewardship Programs

Find resources on how to optimize sepsis programs:  
<https://bit.ly/SepsisCoreElements>

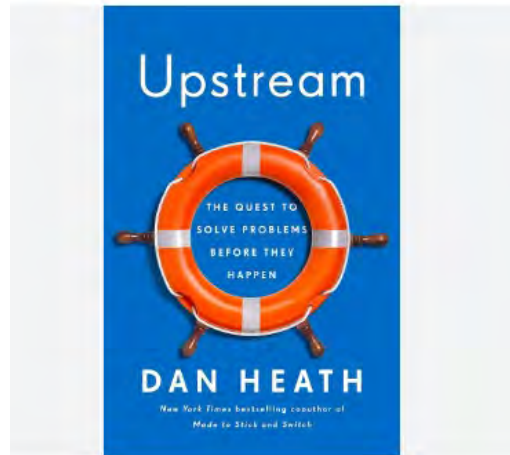
# Antibiotic Stewardship and Sepsis- Better Together

- We need to advocate for sepsis efforts to connect with stewardship programs.
- We can help each other optimize therapy to ensure that patients with sepsis get the right antibiotics quickly and that they don't get exposed to antibiotics they don't need.
- Unnecessary antibiotic exposure can worsen outcomes in patients with sepsis- increased risks for C. diff, renal toxicity etc.
- 100% of sepsis committees should involve antibiotic stewardship programs!



# Diagnostic Excellence and Antibiotic Stewardship

- There is huge enthusiasm and support right now to focus on diagnoses (“diagnostic stewardship”, “diagnostic excellence”).
- We should take advantage of that- and help people see that we’ve already been doing it in our antibiotic stewardship work!



# Better Diagnoses=Better Antibiotic Use

- Several studies demonstrate this for urinary tract infections.
- The following strategies were recommended to optimize ordering urine cultures: requiring documentation of symptoms, sending alerts to discourage ordering in the absence of symptoms, and cancelling repeat cultures.
- For urine culture processing, conditional urine cultures and urine white blood cell count as criteria were supported.
- For urine culture reporting, appropriate practices included nudges to discourage treatment under specific conditions and selective reporting of antibiotics to guide therapy decisions.
- Interventions show decreases in antibiotic use (and improvements in patient safety).
- Clin Infect Dis. 2022 Aug 31;75(3):382-389

# Better Diagnoses=Better Antibiotic Use

- It also holds true for pneumonia.
- Valerie Vaughn and colleagues have led a multi-year, multi-hospital project to improve adherence to standard diagnostic criteria for community acquired pneumonia and encouraging providers not to treat when the criteria are not met.
- They have turned this into a quality measure

## Hospital Medicine Society Definition of Pneumonia



### ≥2 Clinical Signs/Symptoms

### Radiographic Criteria

#### Signs (documented in notes, vitals, or labs)

- Hypoxemia
- Auscultatory Findings
- Abnormal Temperature
- Leukocytosis/Leukopenia

#### Symptoms (documented in notes)

- Cough (new, increasing)
- Sputum (change, purulent)
- Dyspnea (new or increased)

#### Radiologist interpretation

- CT Scan (Chest or Abdominal)
- Chest X-ray
- Lung CT findings prioritized over Chest X-rays

Patients not meeting these criteria are considered inappropriately-diagnosed



# Quarterly Percentage Over Time: Patients Inappropriately diagnosed with Pneumonia



# Better Diagnoses=Better Antibiotic Use

- Blood culture contamination is also an important opportunity to focus on improving diagnosis as it leads to unnecessary antibiotic use and other patient safety issues (e.g. unnecessary device removal).
- CDC has developed a guide to help stewardship programs, infection control programs and clinical labs collaborate on addressing blood culture contamination:
- [Blood Culture Contamination: An Overview for Infection Control and Antibiotic Stewardship Programs Working with the Clinical Laboratory \(cdc.gov\)](#)

# Better Diagnoses=Better Antibiotic Use

- Sruti Gohil and Susan Huang led a multi-center study of a “smart prompt” that used a patient’s data from the electronic health record to calculate a risk of an infection with a resistant pathogen.
- The intervention led to a significant decrease in the use of broad-spectrum agents.
- “Personalized stewardship” now seems much more possible with data analytic technologies like machine learning and artificial intelligence.
- What are other ways we can leverage data and electronic health systems and AI for stewardship?

# Leveraging Electronic Health Records to Expand Stewardship Reach

- Novel expansion of a well-established antimicrobial stewardship program: Enhancing program efficiency and reach
- The team created a novel, daily review and documentation process utilizing the Cerner PowerChart Multi-Patient Task List (MPTL).
- Overall antibiotic DOT per 1,000 patient days significantly decreased between the preimplementation and postimplementation periods (457.9 vs 427.9;  $P < .0001$ ).
- ASP documented 128 “nonantibiotic interventions” in the postimplementation period (e.g. additional testing, immunizations)
- Could AI start to find those potential improvement opportunities for us?

# Does Reducing a Day of Therapy Matter? Only if You Care About Improving Patient Outcomes!

- Implications of reducing antibiotic treatment duration for antimicrobial resistance in hospital settings: A modelling study and meta-analysis
- Both the mathematical modelling and meta-analysis suggested modest reductions in resistance carriage could be achieved by reducing antibiotic treatment duration.
- The meta-analysis determined that a single additional antibiotic treatment day is associated with a 7% absolute increase in risk of resistance carriage (80% credible interval 3% to 11%).

<https://doi.org/10.1371/journal.pmed.1004013>



# What Does it Mean to “Lead From Where You Are”?

- Leadership does not require a title.
- And titles certainly do not confer leadership skills!
- All of you are leaders. Irrespective of your title or where you are located on an org chart.
- Every day, you work improve patient care and make our healthcare system better able to deliver high quality care.
- If that's not leadership in healthcare, I don't know what is.

# Good Leaders Are Opportunistic!

- Take advantage of the opportunities that present themselves- sepsis, diagnostic interest.
  - Show how you can help other people accomplish their goals
- Take advantage of requirements- AUR reporting.
  - Can you use the requirement to get leadership to actually look at the data?
  - Can you use the data to get support for stewardship work?

# What My Kids' School Teaches About Leading From Where You Are

- Start with questions
- Help me see what you see
- Be brave to try and try again
- Have fun