North Carolina SPICE
Statewide Program for Infection Control & Epidemiology

North Carolina Clinical Antibiotic Stewardship Partners

LESS CAN BE MORE EVEN WHEN SMALL: ENHANCING STEWARDSHIP IN SMALL HOSPITALS

December 13, 2023

NC CLASP Hospital Stewardship

INTRODUCTIONS

Please put your name, hospital, and location in the chat!
Include hospital size:

- <200 Beds
- 201-400 beds
- >400 beds

CONFLICT OF INTEREST DISCLOSURES

- The views and opinions expressed in this series are those of the speakers and do not reflect the official policy or position of any agency of the US or NC government or UNC.
- Our speakers have the following financial relationships with the manufacturer(s) and/or provider(s) of commercial services discussed in this activity:
  - Dr. Willis has performed contracted research with: Pfizer (pediatric nirmatrelvir-ritonavir and maternal RSV vaccine), Novavax (pediatric COVID-19 vaccine), and Merck (monoclonal antibody for RSV prevention)
- The speakers do not intend to discuss an unapproved/investigative use of a commercial product/device in this series, and all COI have been mitigated.
- These slides contain materials from a variety of colleagues, as well as the CDC, WHO, AHRQ, etc.

CME AND CE CREDIT

- CME & CE for participants
  - Attendance and active participation per learning session
  - Click the link in the chat during the session to document your attendance
  - Complete surveys as requested

NC CLASP: YEAR TWO

6 hour-long learning sessions

September 2023-May/June 2024

CE included: CME, RN, Pharmacist (ACPE)

Two in-person conferences

- **<u>In-depth discussion topics include:</u>**

- De-escalation skills
- NHSN reporting
- Handling antibiotic allergies
- Collaborating with the Clinical Microbiology lab / diagnostic stewardship/
- Impacting empiric therapy decisions
- Optimizing duration of therapy
- Stewardship in skin/skin structure infections
- Stewardship in transitions of care to and from the Emergency Department

? Is there another topic you'd like to learn about or discuss in these sessions?

BREAKOUT DISCUSSION

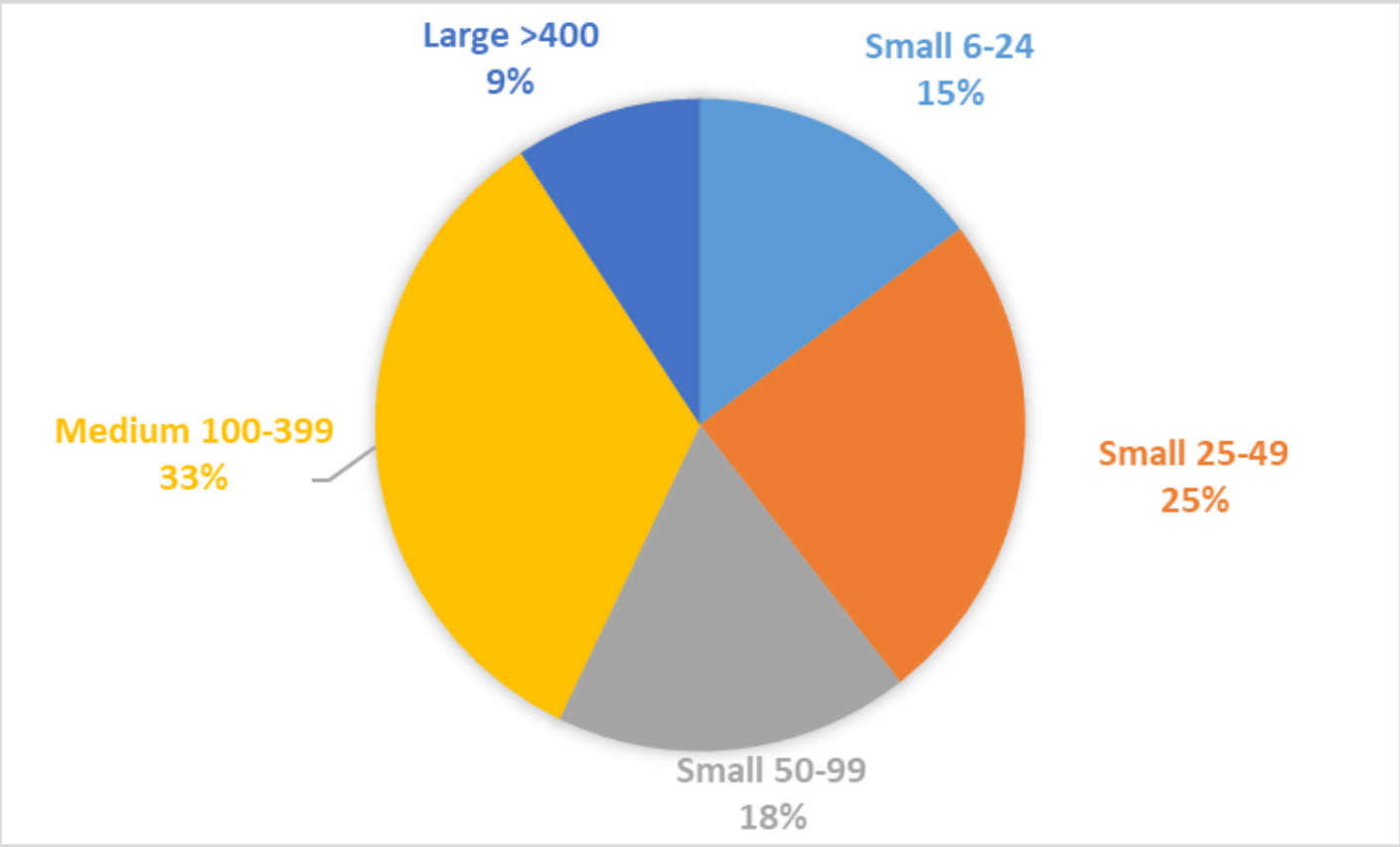
- You are the antibiotic stewardship practitioner at a 49-bed acute care hospital. Upon pulling up a list of patients started on antibiotics in the last 48 hours, you find the following case:
- 78-year-old male admitted from ED overnight by a locums hospitalist for pneumonia. Admitted to a floor bed.
- On admission: temp 101.1^{o}F, BP 115/63,HR 95bpm, RR=29, O_2 sat on room air: 92%. Oriented to person but not time or situation. RLL infiltrate on CXR. CMP normal. WBC 19.5, 79% PMNs, 6% bands.
- Medical history: GERD, hypertension, angina -> CAD/ stent 10 yrs ago, BMI:29. No recent antimicrobials. Quit Smoking 10 years ago. NKA.
- **Therapy started:** cefepime 2gm q12h, Azithromycin 500mg IV q24h, Vancomycin 1gm q24h; all entered to continue 10days.
- This morning: Temp 99.9^{o}F, O_2 sat 97% on 4 LPM by NC.
- Blood Cultures 1/2 pos for GPCs, sputum culture not collected yet. Influenza, COVID (-), RVP not available at your hospital.

- What questions would you like to ask?
- What would you do today and why?
- What stewardship steps would you plan for the next couple of days?
- How (and when in his course) would your AS team have found this patient?

CHARACTERISTICS OF SMALL HOSPITALS THAT IMPACT STEWARDSHIP

US HOSPITALS BY BED SIZE 2021

TOTAL: 5151



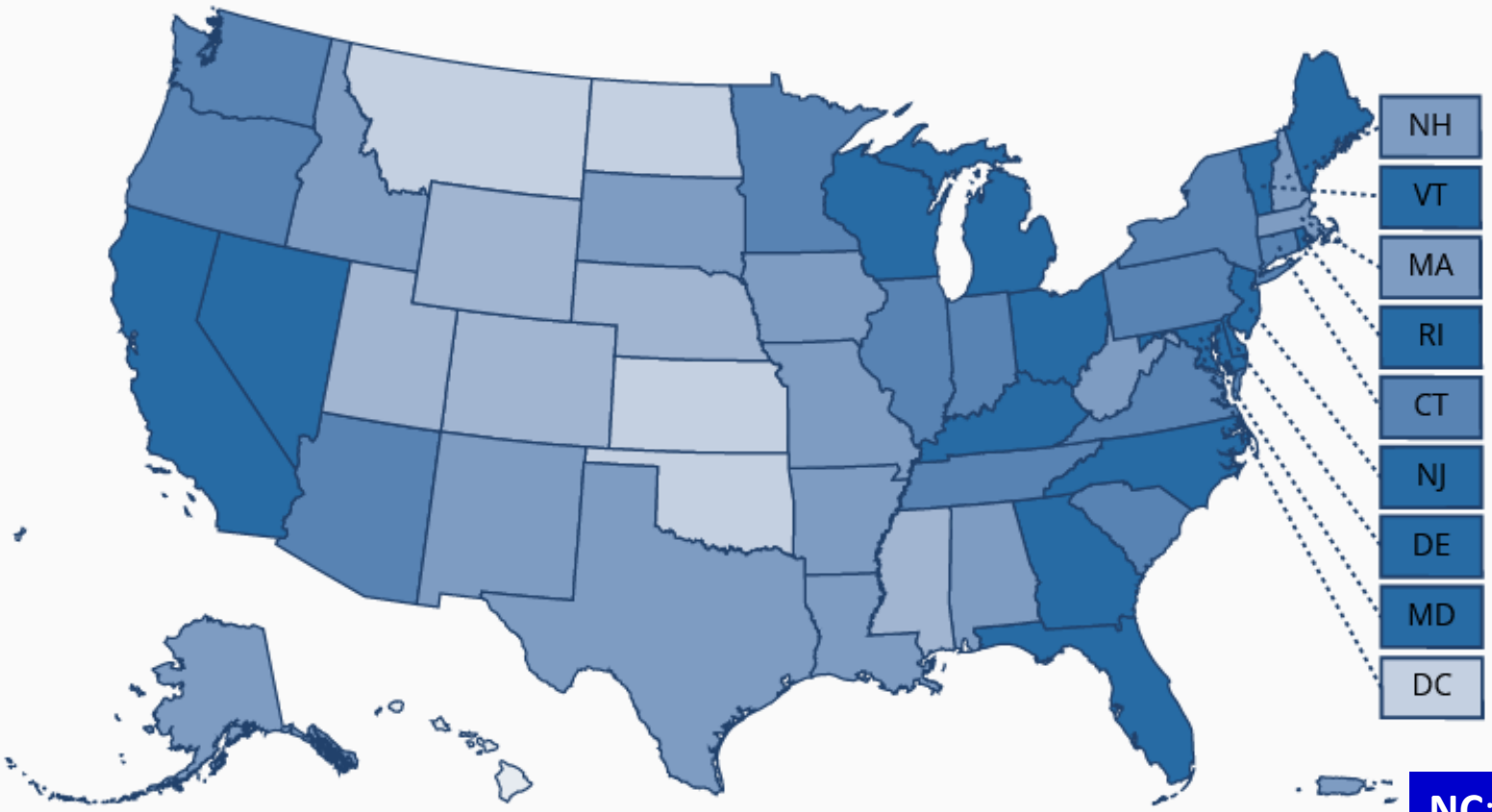
Small Hospitals (<100beds) ~58%
<200 beds: 75%

Patient days: Small:15.1%
<200 beds: 36%

American Hospital Association
https://guide.prod.iam.aha.org/stats/total-us

HOSPITALS IMPLEMENTING ALL 7 CORE ELEMENTS IN 2022

VIEW DATA SAVE IMAGE SHARE



Percentage of hospitals meeting All 7 Core Elements

84% - 88% 89% - 92% 93% - 94% 95% - 96%

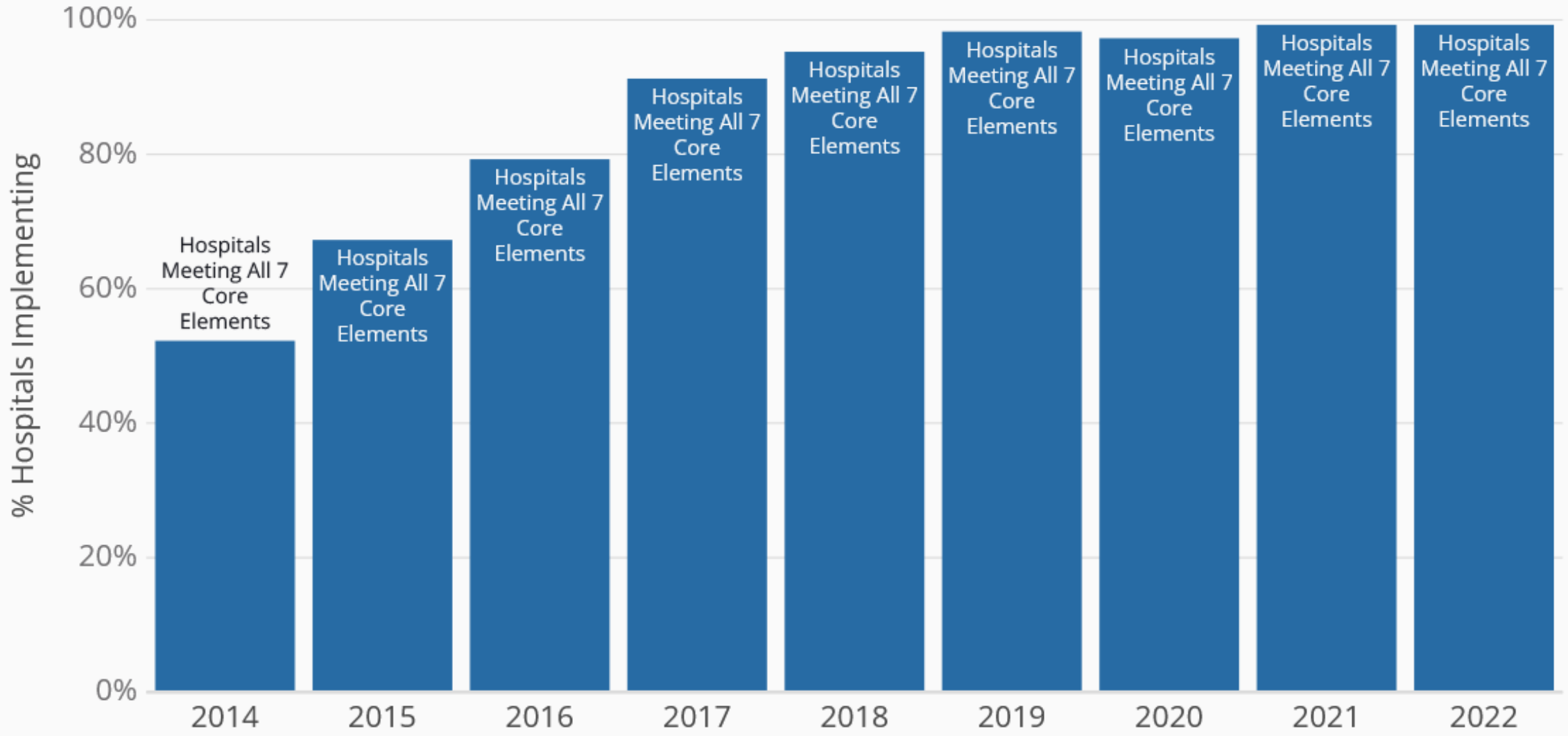
97% - 98% 99%+

NC: 116/117 hospitals reporting

CDC Antimicrobial Resistance and Patient Safety Portal

HOSPITALS IMPLEMENTING ALL 7 CORE ELEMENTS IN NORTH CAROLINA OVER TIME

VIEW DATA SAVE IMAGE SHARE



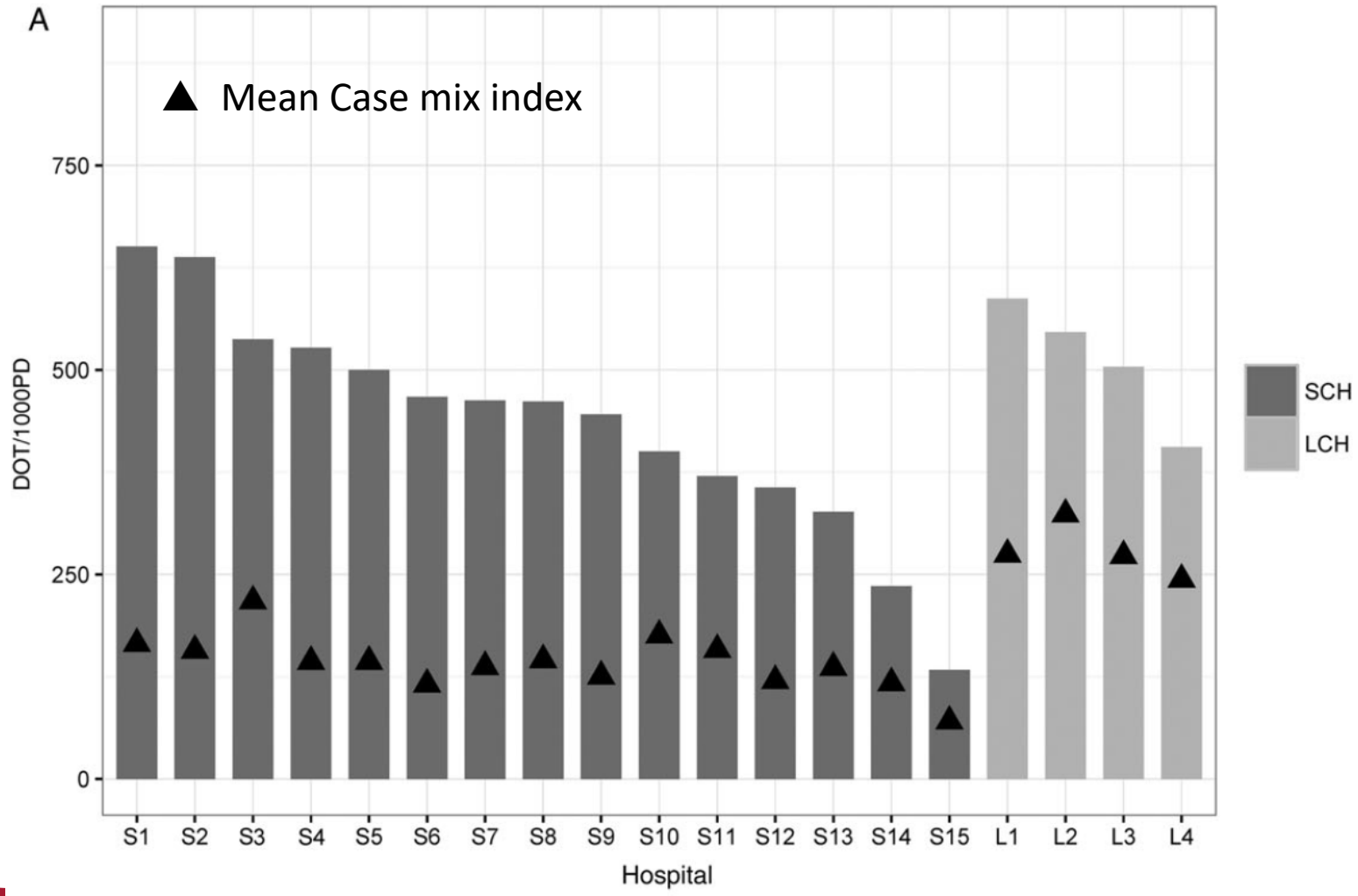
CDC Antimicrobial Resistance and Patient Safety Portal

North Carolina Clinical Antibiotic Stewardship Partners

SPICE

SMALL HOSPITAL ANTIMICROBIAL USE:

VARIABLE BUT SIMILAR TO LARGER FACILITIES



Clinical Infectious Diseases 2016;63:1273–80

Implementing the Core Elements in Smaller Hospitals

LEADERSHIP/ACCOUNTABILITY

LOOK WITHOUT, LOOK WITHIN

- Creatively seek to share resources
  - ID physician/AS trained pharmacist expertise
  - Network health systems and hospitals (~90% of NC hospitals are part of a health system)
    - tracking technology
    - disease state treatment algorithms based on local microbiology and standards of care
    - clinical microbiology: diagnostic stewardship, guidelines, antibiogram, result reporting conventions
  - IT support for EMR interface, tracking, reporting
  - Tele/remote consultation/EMR review ($$$)
- Leverage the tight-knit, relationship-based collaboration often seen in smaller hospitals
  - Small is agile, agile is strong

Stenehjem, et al. Clin Infect Dis 2017;65:691
Sexton DJ, Moehring RW. CID 2017;65:697
Bhatt, et al Acad Med 2019;94:1419-21

Implementing the Core Elements in Smaller Hospitals

PHARMACY EXPERTISE/ACTION

SEE PROGRAM IMPROVEMENT REQUESTS THROUGH THE EYES OF THE C-SUITE

- Barriers to acquiring support
- Misconceptions regarding cost-efficacy measures
- Six components of a successful “pitch”
  - Be clear about national regulatory standards for AS programs
  - Write a plan that addresses both cost and revenue implications
  - Structured, specific job descriptions for personnel added or changed
  - Include several levels of intensity
  - Emphasize clinical importance of optimal antibiotic use
  - Establish credibility with C-suite leaders

ACTION: INTERVENTIONS IN SMALL HOSPITALS

- Help providers be their own stewards ("Point of prescription" interventions)
  - Local Guidelines for commonly encountered infectious syndromes (CAP, SSTI, UTI)
  - Time outs: Structured, guided
  - Restriction/Prior Approval can be difficult to implement, but can facilitate ad-hoc consultation and 1:1 educational opportunities
  - Real-time or near real-time access to expertise (even if remote or off-site) can greatly catalyze a program
  - EMR decision support and prompts
- Direct assistance by the AS team to help providers move through the antibiotic use process in individual patients
  - Prospective Audit & Feedback can be challenging if resources are not sufficient for *regular* implementation
    - but can be very effective given good relationships. "Handshake" stewardship
  - Use existing clinical personnel: Nurses, pharmacists, IP professionals can enable discussion on a given patient's therapy*

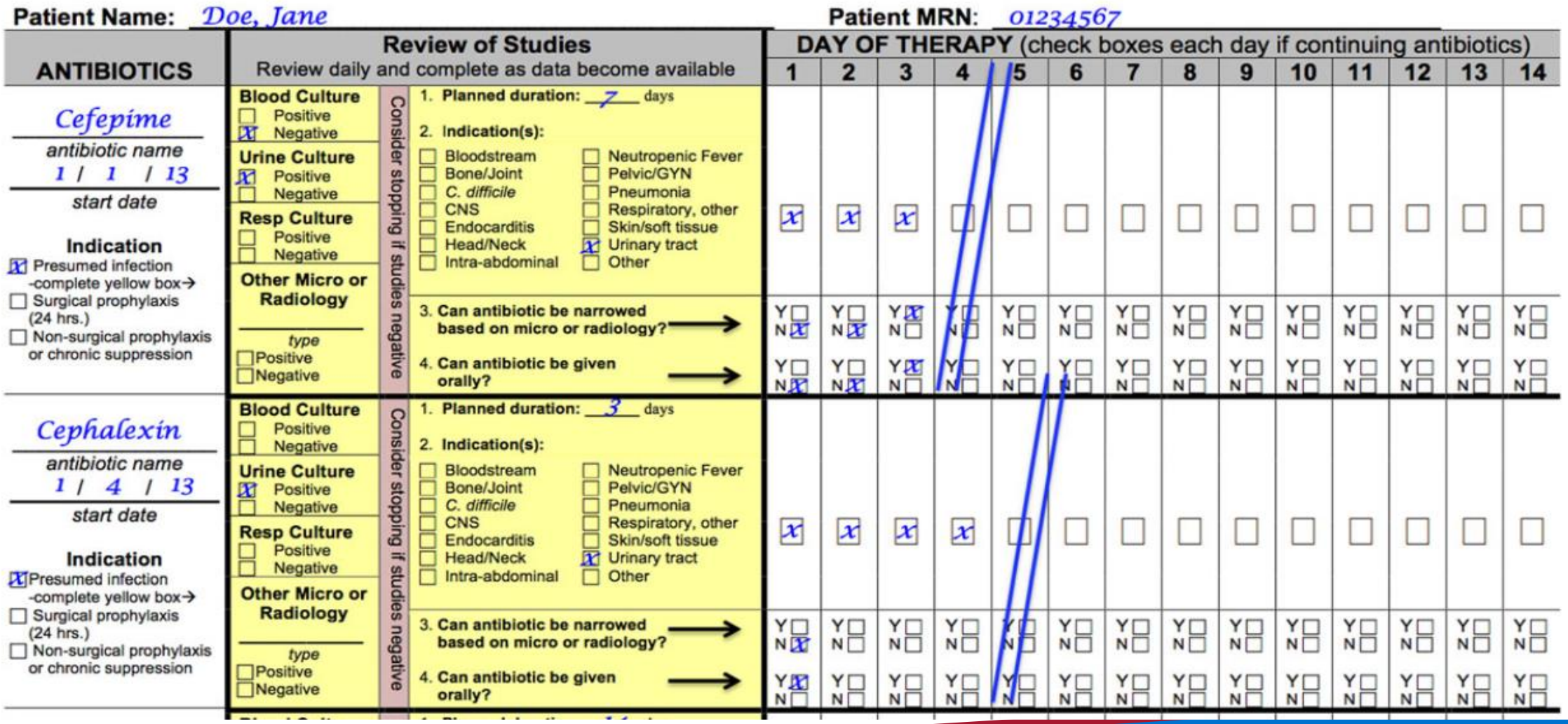
CREATIVE APPROACH TO PROSPECTIVE AUDIT & FEEDBACK

- 151 bed community hospital in Illinois
- Sought to implement AS program using existing resources
- PA & F as part of a broader AS program
- Analyzed their pharmacy workflow: separated Audit & Feedback tasks
- Assigned the audit piece to pharmacy Night Shift
  - Daily Antibiotic Report from EMR
  - Usage compared to guidelines
  - Simple prospective audit tool completed for all antibiotic courses
  - Email to physician AS collaborating physician for "restricted" agents
- Feedback communication performed on Day Shift in collaboration with AS physician

- Outcome: decreased antibiotic use, costs, increased us of oral options.

ANTIBIOTIC PROCESS FLOWSHEET

HAMILTON K. ET AL. CLIN INFECT DIS. 2015;60(8):1252-8.



Patient Name: Doe, Jane **Patient MRN:** 01234567

ANTIBIOTICS	Review of Studies (Review daily and complete as data become available)	DAY OF THERAPY (check boxes each day if continuing antibiotics) 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cefepime antibiotic name 1 / 1 / 13 start date **Indication** [X] Presumed infection -complete yellow box→ [ ] Surgical prophylaxis (24 hrs.) [ ] Non-surgical prophylaxis or chronic suppression	**Blood Culture** [ ] Positive [X] Negative **Urine Culture** [X] Positive [ ] Negative **Resp Culture** [ ] Positive [ ] Negative **Other Micro or Radiology** type [ ] Positive [ ] Negative Consider stopping if studies negative 1. **Planned duration:** 7 days 2. **Indication(s):** [ ] Bloodstream [ ] Bone/Joint [ ] *C. difficile* [ ] CNS [ ] Endocarditis [ ] Head/Neck [ ] Intra-abdominal [ ] Neutropenic Fever [ ] Pelvic/GYN [ ] Pneumonia [ ] Respiratory, other [ ] Skin/soft tissue [X] Urinary tract [ ] Other	[X]	[X]	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
	3. **Can antibiotic be narrowed based on micro or radiology?** →	Y [ ] N [X]	Y [ ] N [X]	Y [X] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]
	4. **Can antibiotic be given orally?** →	Y [ ] N [X]	Y [ ] N [X]	Y [X] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]
Cephalexin antibiotic name 1 / 4 / 13 start date **Indication** [X] Presumed infection -complete yellow box→ [ ] Surgical prophylaxis (24 hrs.) [ ] Non-surgical prophylaxis or chronic suppression	**Blood Culture** [ ] Positive [ ] Negative **Urine Culture** [X] Positive [ ] Negative **Resp Culture** [ ] Positive [ ] Negative **Other Micro or Radiology** type [ ] Positive [ ] Negative Consider stopping if studies negative 1. **Planned duration:** 3 days 2. **Indication(s):** [ ] Bloodstream [ ] Bone/Joint [ ] *C. difficile* [ ] CNS [ ] Endocarditis [ ] Head/Neck [ ] Intra-abdominal [ ] Neutropenic Fever [ ] Pelvic/GYN [ ] Pneumonia [ ] Respiratory, other [ ] Skin/soft tissue [X] Urinary tract [ ] Other	[X]	[X]	[X]	[X]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
	3. **Can antibiotic be narrowed based on micro or radiology?** →	Y [ ] N [X]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]
	4. **Can antibiotic be given orally?** →	Y [X] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]	Y [ ] N [ ]

SPICE

PROSPECTIVE AUDIT & FEEDBACK IN A SMALL HOSPITAL

- 100 bed hospital
- Twice weekly, 1 hour sessions (RPh/MD).
- Recommendations in 313/367 cases audited over 16 months (implemented in ~75%)
- Institutional antibiotic use and costs were affected favorably

- Principles
  - successful prospective audit & feedback needs to be performed regularly
  - not necessarily daily
  - Just a few successful interventions per session can be impactful

Storey, et al Antimicrob Resist Infect Control 2012;1:32

Table 3 Characteristics of 313 AST audits with one or more recommendations

Recommendation category	Number of audits	Implemented recommendations	Implementation rate (%)
All	313	234	75
Discontinue all agent(s)	115	85	74
De-escalate[a]	65	53	82
Limit duration[b]	21	13	62
Consult infectious diseases	19	16	84
Optimize dose	14	7	50
Broaden [c]	5	3	60
Convert parenteral to oral[d]	3	3	100
More than 1 category	71	54	76

NOTE:
[a] - Discontinuation of one or more agent(s) and/or substitution of alternate agent(s) with decreased spectrum of activity.
[b] - Limit duration for same agent(s) at same dose, route and schedule.
[c] - Addition of one or more agent(s) and/or substitution of alternate agent(s) with increased spectrum of activity.
[d] - Parenteral to oral conversion(s) of same agent(s) at same dose and schedule.

Can the Future of ID Escape the Inertial Dogma of Its Past? The Exemplars of Shorter Is Better and Oral Is the New IV

Kusha Davar,[1] Devin Clark,[1] Robert M. Centor,[2] Fernando Dominguez,[1] Bassam Ghanem,[3] Rachael Lee,[4] Todd C. Lee,[5] Emily G. McDonald,[6] Matthew C. Phillips,[7,8] Parham Sendi,[9] and Brad Spellberg[1]

- Urgent, real-time involvement by AS practitioners in *empiric* antibiotic therapy decisions can be difficult
- "Details" of drug therapy are often delegated or deferred (e.g. dose, route, duration)
- AS clinician assistance here can help establish a stewardship voice

Duration and route: bread 'n' butter of AS?

1. Davar, et al. Open Forum Inf Dis 2022

Image: Microsoft 365

TRACKING AND REPORTING

SMALL HOSPITAL TRACKING/REPORTING

- **Tracking to learn interventional foci**
- Point-prevalence study
  - Manual
  - EMR-based
- Indications on all antimicrobial orders
  - EMR support for drop-down selection
- Safety events, measures

- **Reporting**
- Begin with the data available, report candidly, regularly

REPORTING: SELECT MEASURES THAT ARE IMPORTANT TO STAKEHOLDERS

Table 3. Respondents' Opinion of Most Important Antimicrobial Stewardship Program Outcomes Based on Audience and Those Collected as Metrics (n = 41)

Outcome[a]	Collected by Respondents as ASP Metric	Most Important	Hospital Administrator Perceived Most Important[b]	Pharmacy Director Perceived Most Important[b]	P&T Committee Perceived Most Important[b]	ID Physician Perceived Most Important[b]
Antimicrobial use	30 (73)	6 (15)	1 (2)	9 (22)	13 (32)	1 (2)
Antimicrobial cost	30 (73)	4 (10)	17 (41.5)	23 (56)	6 (15)	0 (0)
Appropriateness of antimicrobial use	21 (51)	23 (56)	2 (4.9)	2 (5)	6 (15)	11 (27)
Infection-related mortality rate	3 (7)	14 (34)	1 (2)	2 (5)	1 (2)	15 (37)
Infection or antibiotic-associated length of stay	5 (12)	9 (22)	2 (4.9)	0 (0)	1 (2)	3 (7)

Abbreviations: ASP, antimicrobial stewardship program; ID, infectious disease; P&T, pharmacy and therapeutics.

[a] Respondents could select >1 outcome.

[b] Respondents selected outcomes that they perceived to be the most important to this audience.

46% community hospitals, 21% < 500 beds

Implementing the Core Elements in Smaller Hospitals

EDUCATION

CORE ELEMENT: EDUCATION

- Clinicians' groups
- 1:1
- Clinician training: Priority topics
  - Guidelines and principles for empiric treatment common diseases
    - CAP, UTI, SSTI
  - Local susceptibility patterns
  - Antibiotic allergy
  - Recommended duration of treatment
- Emphasize *process* in antimicrobial use
- Small doses (of education) more often

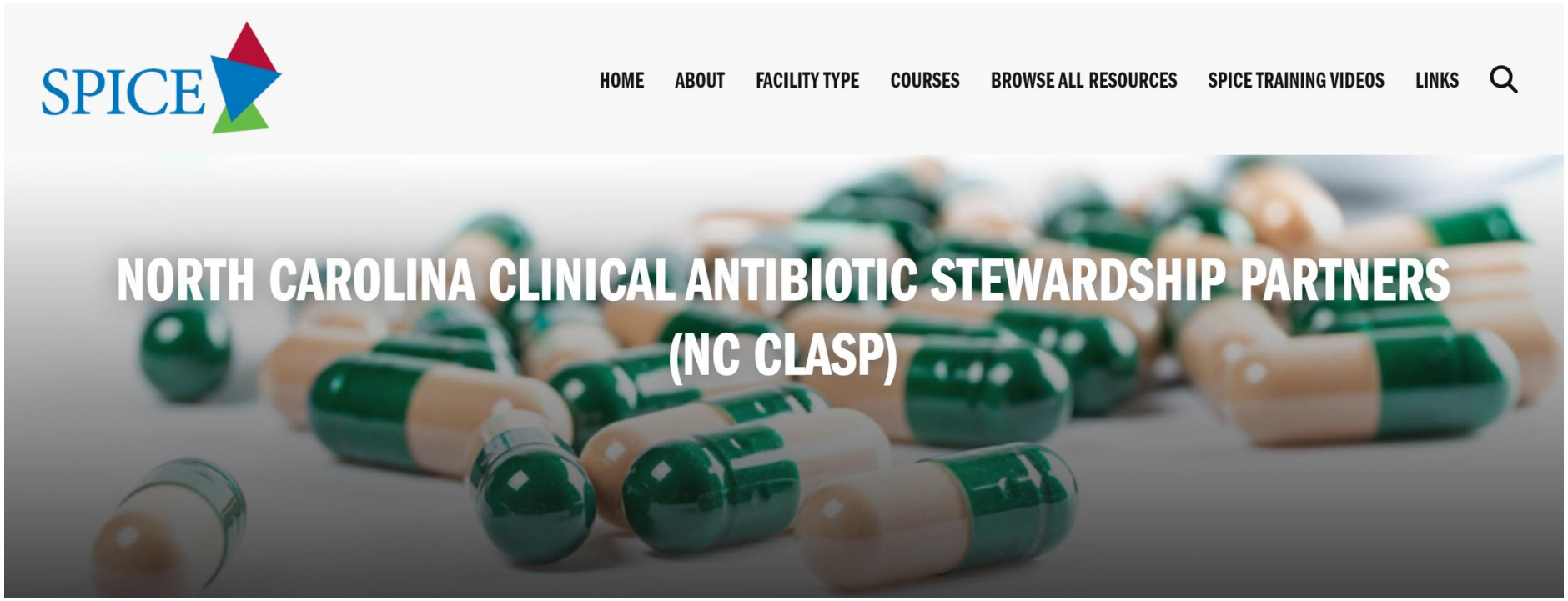
Image: Microsoft 365

- Questions?
- Comments?
- Discussion?

- Next hospital session: January 10, 2024

THE NORTH CAROLINA CLINICAL ANTIBIOTIC STEWARDSHIP PARTNERS (NC CLASP)

- All the information from today's session will be on our website https://spice.unc.edu/ncclasp/



RESOURCES

- Implementing CDC AS Core Elements in Small Hospitals

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

- Jay Bhatt, DO, et al. Collaborative Solutions to Antibiotic Stewardship in Small Community and Critical Access Hospitals Acad Med. 2019;94:1419–1421.
- Philosophy of metrics. Clinical Infectious Diseases 2014;59(S3):S112–21
- Cluster-randomized intervention of various levels of AS programs in 15 small hospitals. Clinical Infectious Diseases 2018;67:525-32 see supplemental slide

SUPPLEMENTAL CONTENT

NHSN AU OPTION: PRIMARY ANALYSIS INDEX

- SAAR: Standardized Antimicrobial Administration Ratio (SAAR): a metric developed by CDC to analyze and report antimicrobial use data in summary form.
- ***Predicted Antimicrobial Use*** is a benchmark statistical index generated by NHSN.
- Predicted use: based on 2017 adult and pediatric datasets specific for antimicrobial class and patient-care unit type
- No patient-level data were used.

$$SAAR = \frac{Observed\ Antimicrobial\ Use}{Predicted\ Antimicrobial\ Use}$$

Units: Days of Therapy/1000 days present

Factors **not** significant in final predictive model	Factors predictive of antimicrobial use
Hospital bed size Unit bed size ICU bed count	Patient care unit type: ICU, ward, step down, HemeOnc Other factors proved significant in certain antimicrobial groups

van Santen KL, Edwards JR, Webb AK, et al. The Standardized Antimicrobial Administration Ratio: A new metric for measuring and comparing antibiotic use. CID 2018; 67:179-85

CDC CORE ELEMENT PRIORITIES FOR HOSPITALS THAT HAVE ASP IN PLACE

Hospital Core Elements	Priorities for Hospital Core Element Implementation
Hospital Leadership Commitment	
Dedicate necessary human, financial, and information technology resources.	Antibiotic stewardship physician and/or pharmacist leader(s) have antibiotic stewardship responsibilities in their contract, job description, or performance review.
Accountability	
Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.	Antibiotic stewardship program is co-led by a physician and pharmacist.*
Pharmacy/Stewardship Expertise	
Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.	Antibiotic stewardship physician and/or pharmacist leader(s) have completed infectious diseases specialty training, a certificate program, or other training on antibiotic stewardship.
Action	
Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.	Antibiotic stewardship program has facility-specific treatment recommendations for common clinical condition(s) and performs prospective audit/feedback or preauthorization.
Tracking	
Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.	Hospital submits antibiotic use data to the NHSN Antimicrobial Use Option.
Reporting	
Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.	Antibiotic use reports are provided at least annually to target feedback to prescribers. In addition, the antibiotic stewardship program monitors adherence to facility-specific treatment recommendations for at least one common clinical condition.
Education	
Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.	No implementation priority identified.

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

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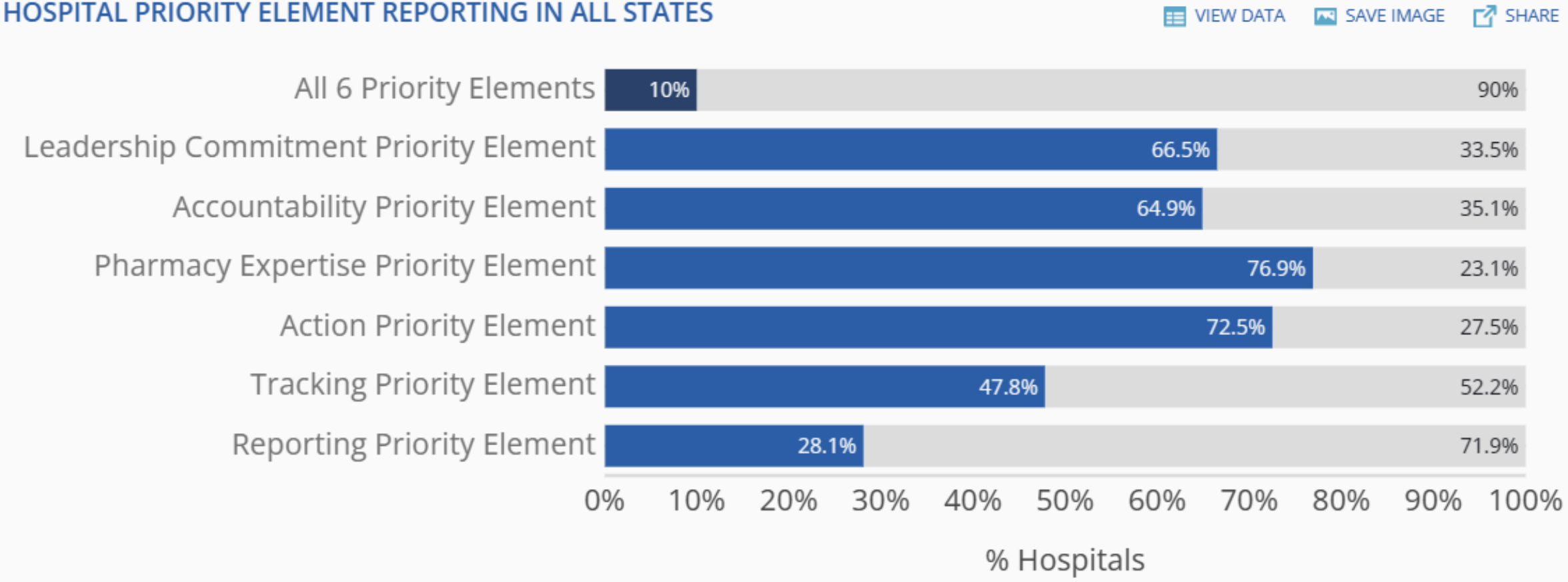
HOSPITAL PRIORITY ELEMENT REPORTING IN ALL STATES



CLUSTER-RANDOMIZED CONTROLLED TRIAL INVESTIGATING THE IMPACT OF ANTIBIOTIC STEWARDSHIP IN 15 SMALL, COMMUNITY HOSPITALS

Table: ASPs in the SCORE Study

Program 1	Program 2	Program 3
	Antibiotic utilization report 48-hour antibiotic timeout IV to PO conversion Antibiotic indications Access to ID phone consultation	
	Limited prospective audit and feedback Antibiotic restrictions - local approval	Expanded prospective audit and feedback Antibiotic restrictions - ID approval ID physician review of culture results

1.Little effect 2. Improved broad ABX only 3. Improved all ABX

Clin Infect Dis 2018;67:525-32

Open Forum Infectious Diseases 2016;1(S1):S1–68

Methods

- 15 network small hospitals randomized to three levels of intervention
- Antibiotic use monitored using NHSN AU
- 31-month baseline, 15-month post implementation.

Implications

- Effects of these fixed program varied between hospitals
- Expertise important
- With stewardship program advancement, optimal effects may take time
- Network support is important