Antimicrobial Steward Call
April 18, 2023

Tennessee Department of Health
Healthcare Associated Infections and Antimicrobial Resistance Program

Welcome

Announcements

Registration Open!

7th Annual Middle Tennessee Antimicrobial Stewardship Symposium

Friday, May 19, 2023
8:00am-4:00pm (CDT)
Janet Ayers Academic Center
Belmont University, Nashville, TN

Target Audiences: Antimicrobial Stewardship Nurses, Pharmacists, Physicians, and Infection Preventionists

Up to 5.25 contact hours of Live CE Available
for nurses*, pharmacists, and physicians
from AAFP, ANCC, ACPE for these Knowledge-based CE Activities
*Nurses can receive up to 4.5 pharmacotherapeutic contact hours

Deadline to Register: May 7, 2023 (11:59pm CDT)

Registration is limited to the first 175 registrants
$100 - General & Belmont Faculty/Preceptors/Alumni
$50 - Students & Residents (No CE Credit Awarded)

Keynote Lecture

Selling Stewie: Optimizing Social Sciences to Influence Antibiotic Prescribing

Jillian E. Hayes, PharmD, BCIDP Clinical Pharmacist, Infectious Diseases and Antimicrobial Stewardship Duke Center for Antimicrobial Stewardship and Infection Prevention, Duke University Hospital

Disclosures: Individual speaker disclosures are noted in the individual presentation details. Montgomery Green, planner for this event, was a consultant speaker for bioMerieux (formerly BioFire Diagnostics) in the past 24 months; this relationship has ended. Athena Hobbs, planner for this event, is a contracted worker for Cardinal Health. All relevant financial relationships have been mitigated. No other planners or content reviewers have relevant financial relationships with ineligible companies to disclose.

Sponsors & Exhibitors: AbbVie, bioMerieux, Cepheid, Karius, Melinta Therapeutics, Merck, Option Care Health Home Infusion, Shionogi, T2 Biosystems

Symposium Learning Objectives

At the end of this symposium, learners should be able to:

- Discuss how to appropriately utilize current information and diagnostics technology to maximize stewardship impact in your facilities
- Identify resources available to assist in the development of antimicrobial stewardship programs including in the outpatient setting.
- Discuss optimization of antimicrobial therapy for certain infections based on evidence-based medicine and your community's and region's antibiogram
- Discuss vacine developments and updates to immunization recommendations including COVID-19 vaccines.

AU Reports

- Upcoming Q1 Reports – Mid May
  - TDH AU Point Prevalence
  - AU Quality Report
  - First ever Quarterly SAAR Report

- Follow up for non-reporters from small and critical access hospitals in May

AUR Updates

- Issue with Jan 2023 AU data uploads resolved
- AUR Module Submission Required for the CMS Promoting Interoperability Program
- 2022 Annual Facility Survey results complete
  - Will be used to risk adjust 2022 and 2023 SAARs
  - May note a change in SAAR values

CMS 2023 IPPS Final Rule

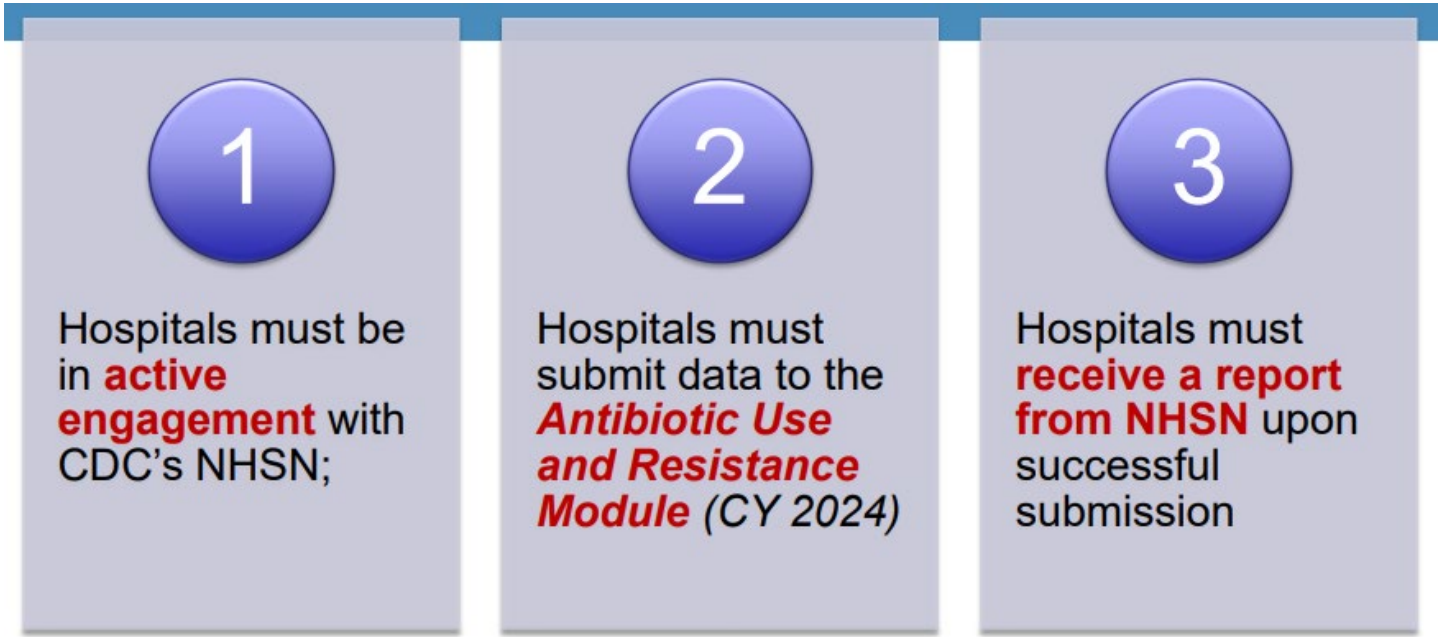
- Beginning in CY 2024, CMS finalized changes to the Medicare Promoting Interoperability Program for eligible hospitals and critical access hospitals that include a new AUR Surveillance measure under the Public Health and Clinical Data Exchange Objective.

- NHSN Antimicrobial Use (AU) and Antimicrobial Resistance (AR) (AUR) Module reporting is one option to meet the Public Health Registry reporting element within the Promoting Interoperability (PI) Program.

- To obtain credit for calendar year 2024, eligible hospitals and CAHs must attest to being in active engagement with CDC's NHSN to submit AUR data for the EHR reporting period, or else claim an applicable exclusion.

https://www.cdc.gov/nhsn/cdaportal/datainteroperability.html

What does this all mean?



- Hospitals must report into 5 public health registries in order to obtain all points for this objective

NHSN AU Quality Reports

NHSN AU Data Quality Reports

- Previously discussed:
  - Antimicrobial Days Reported for any Drug when Days Present Reported as Zero
  - Sum of Routes Less than Reported Total Days of Therapy
  - Reported Antimicrobial Days for a Single Drug Greater Than Days Present
  - Ceftriaxone IM not used in the ED
  - Cefazolin not used in the OR
  - Sum of Routes Greater than Reported Total Days of Therapy for Drugs Given Once Daily
  - Drug Route Mismatch
- Flags to Discuss Today:
  - Location Level Days Present GREATER than and LESS than Outlying Boundaries
  - Location Level AU Rate GREATER than and LESS than Outlying Boundaries
  - Drug Level AU Rate Below ABOVE and BELOW Outlying Boundaries

Historical Reference

- For historical comparison, metrics compared to median of the same quarter from the previous calendar year.

- If the metric for this quarter falls greater than or less than 2x the IQR for the previous quarter this will flag.

- Not reported if we don't have a full year's worth of data.
  - "Not Enough Historical Data Available"

Metrics Analyzed

- Drug Level AU Rate
  - Flags for a specific drug if that drug's quarterly FACWIDEIN AU rate is significantly different from the historical comparison
  - Only statewide top 20 antimicrobials analyzed
- Location Level Days Present
  - Flags for a particular unit if that unit's quarterly Days Present is significantly different from the historical comparison
- Location Level AU Rate
  - Flags for a particular unit if that unit's overall AU rate is significantly different from the historical comparison

Legitimate Reasons for these Flags

- Changes to NHSN unit mapping
- Changes to unit's patient population
- Changes to antibiotic formulary
- Drug Shortages
- Other known changes in antimicrobial use

- Potential Solutions Otherwise
  - check with vendor to ensure surveillance software is accurately pulling and reporting ADT data and check to ensure surveillance software is accurately pulling eMAR/BCMA data and attributing it to the correct location
  - consider targeted stewardship interventions to discover rationale and improve antibiotic use for the unit, if necessary, as determined by the ASP

Example – Location Level AU Rate

Location	Month	AU Rate	Outliers Upper Bound
612	2021M01	961.7	955.1
612	2021M02	1032	955.1
612	2021M03	967.0	955.1
SD Surg	2021M01	247.5	206.9
ED	2021M01	300.7	259.9
ED	2021M02	295.9	259.9

SHEA Spring in Review

Please do not reproduce

- Disclosure: Much of these slides are adapted or copied from the SHEA Spring 2023 Antimicrobial Stewardship Track Sessions
- Please do not reproduce
- No slides with requests from the author to not do so are included

Antimicrobial Stewardship Training Course

SHEA Antibiotic Stewardship Training Course*

Eligible for CME, CNE & CPE Credit

Chair: Nathan Shively, MD
Vice-Chair: Christopher Evans, PharmD, BCPS

We are very excited to continue this course for three days at the SHEA Spring Conference. This course is designed for pediatric and adult infectious diseases physicians, healthcare epidemiologists, microbiologists, pharmacists, and other healthcare providers who are involved with creating, implementing, or improving an antibiotic stewardship program for their healthcare institution. Healthcare professionals representing all sizes of institutions will find the content relevant to their needs.

At the conclusion of this activity, participants should be able to:

- Develop comprehensive antimicrobial stewardship programs for teams within your healthcare institution.
- Incorporate effective strategies for partnering with key stakeholders and others to champion stewardship.
- Apply effective antimicrobial stewardship programs within a variety of healthcare settings, including low resource settings.
- Develop both process and outcome measures to quantify the impact of stewardship programs.
- Effectively network with and learn from antimicrobial stewardship colleagues from other institutions.

**As a Training Course attendee, you will receive an emailed 'Certificate of Attendance' in addition to your Credit Certificate.*

TN

Next Year's Meeting

Social Determinants of Antibiotic Prescribing

Relationships between clinicians

Relationships between clinicians and patients

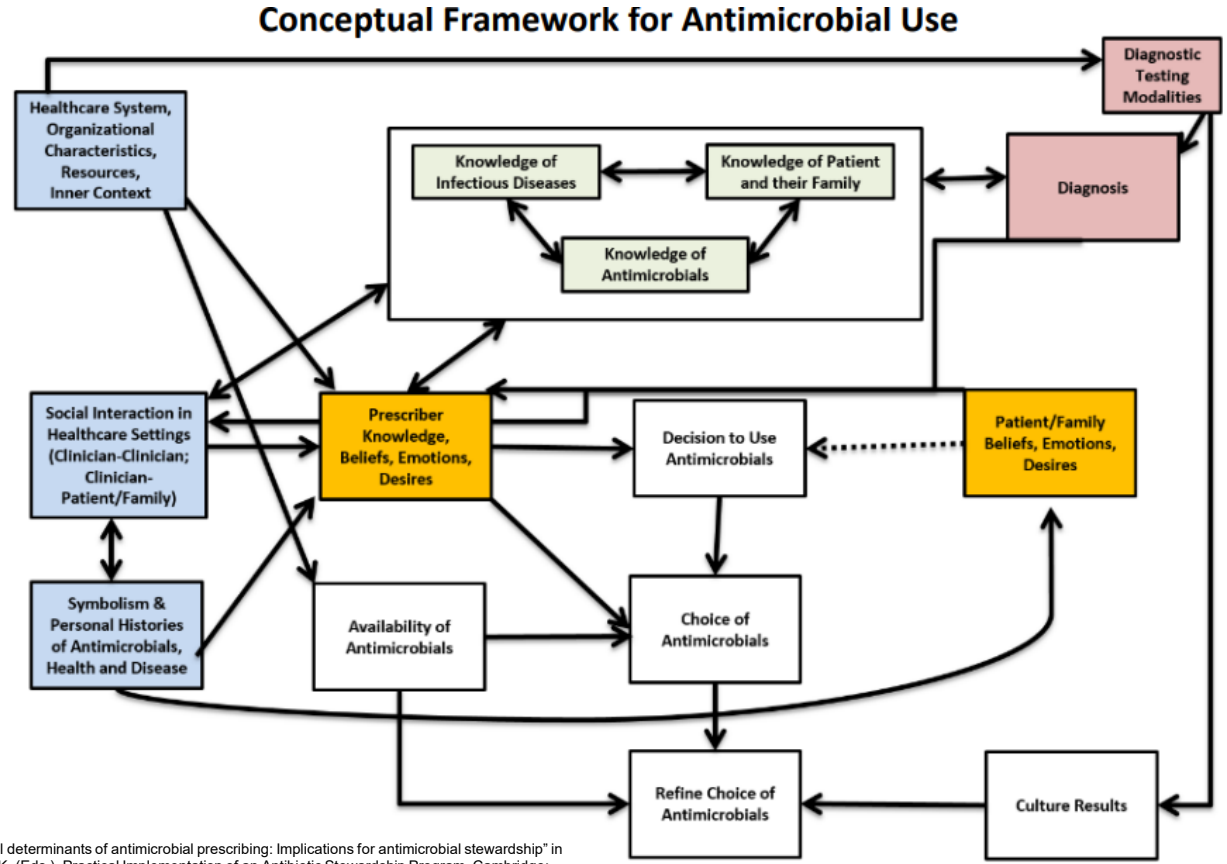
Risk, fear, anxiety and emotion

(Mis)perception of the problem

Contextual and environmental factors

Szymczak, J.E. and J. Newland (2018). "The social determinants of antimicrobial prescribing: Implications for antimicrobial stewardship" in Barlam, T., Neuhauser, M., Tamma, P., & Trivedi, K. (Eds.). Practical Implementation of an Antibiotic Stewardship Program. Cambridge: Cambridge University Press.

Conceptual Framework for AU



Szymczak, J.E. and J. Newland (2018). "The social determinants of antimicrobial prescribing: Implications for antimicrobial stewardship" in Barlam, T., Neuhauser, M., Tamma, P., & Trivedi, K. (Eds.). Practical Implementation of an Antibiotic Stewardship Program. Cambridge: Cambridge University Press.

About Changing Hearts and Minds…

- "…So, yes, our work is about microbiology, epidemiology, infectious diseases, and applying the best scientific evidence to control the spread of infection. But it is also about managing, cajoling, and sometimes, nagging people to do the right thing every day when they come to work.

- Infection Preventionist

Szymczak (2013). *The Complexity of Simple Things: An Ethnographic Study of Efforts to Prevent Healthcare Associated Infections.*

3Ps/3Ds/3Cs Framework for Antimicrobial Stewardship

Table 1. The 3Ps/3Ds/3Cs Framework for Antimicrobial Stewardship

*P*lace	• What is/are the infection(s) or potential infection(s)? • From what possible places is/are infection(s) coming (eg, skin, gastrointestinal tract, oropharynx, health care environment)? • Are there tests that need to be performed to determine location?
*P*athogen	• What organism(s) could be or is/are causing the infection? • If the organism(s) is/are not known yet, which organisms tend to live in the potential locations (eg, skin = *Streptococcus* and *Staphylococcus*) • Are there tests that should be performed to identify the organism(s)?
*P*atient	• Is the patient sick or not sick? • Are there risks for resistance (eg, health care exposure, recent antibiotics)? • Does the patient have characteristics that affect antibiotic choice (eg, renal insufficiency, prolonged QTc interval, antibiotic allergies)?
*D*rug	• What antibiotic(s) is/are patient on? What do you want them to be on? • What sort of monitoring is needed for antibiotics (eg, drug levels, labs, electrocardiograms)? • Are there drug characteristics that affect antibiotic choice (eg, cost, efficacy data, drug–drug interactions, spectrum of activity)?
*D*ose	• What is the dosing frequency of the antibiotic(s)? • Does the dose need to be adjusted for renal function/liver function? • Does the antibiotic need to be dosed by weight? Which weight (ideal body weight, adjusted body weight, actual body weight)?
*D*uration	• Is there an evidence-based duration for the indication(s) being treated? • Is there an evidence-based duration for the antibiotic(s) being used? • If the duration cannot yet be determined, is there additional testing or follow-up that needs to be done to determine duration?
*C*ontext	• What professional or cultural factors may be motivating the provider or team in making antibiotic decisions? • What questions need to be asked to better determine the motivations and context of the provider or team?
*C*ommunication	• How should the recommendations be framed to the provider or team considering the context of antibiotic prescribing? • What team member should be contacted to have effective discussion (eg, intern, resident, advanced practice provider, attending, consultant)?
*C*ollaboration	• How can you work together with the provider or team to increase trust and decrease future conflict? • Is follow-up with the team needed? • Should an infectious disease or other consultation be suggested?

Wang R, et al. Open Forum Infect Dis. 2021 May 8;8(6):ofab231.

Stewardship and Infection Prevention Staffing

- National surveys of IP and AS programs

Program	Recommended ratio	Notes	Source
IP	**1:100 beds -->1:69 beds**	"Actual labor needs…31%-66% above current benchmarks of 0.5-1.0 IP per 100 occupied beds…results yielded a new benchmark of 1.0 infection prevention full-time equivalent per 69 beds if ambulatory, long-term care, or home care are included."	Bartles, et al. AJIC. 2018. https://doi.org/10.1016/j.ajic.2017.11.006.
AS	**1.4 FTE (1 pharmacist, 0.4 physician) per 100-300 beds**; 1:3 physician to pharmacist ratio	"Each 0.50 increase in pharmacist and physician full-time equivalent (FTE) support predicted a 1.48-fold increase in the odds of effectiveness…ability to perform prospective audit and feedback."	Greene et al. 2020. ICHE. doi:10.1017/ice.2019.294 Doernberg, 2018. CID. https://doi.org/10.1093/cid/ciy255

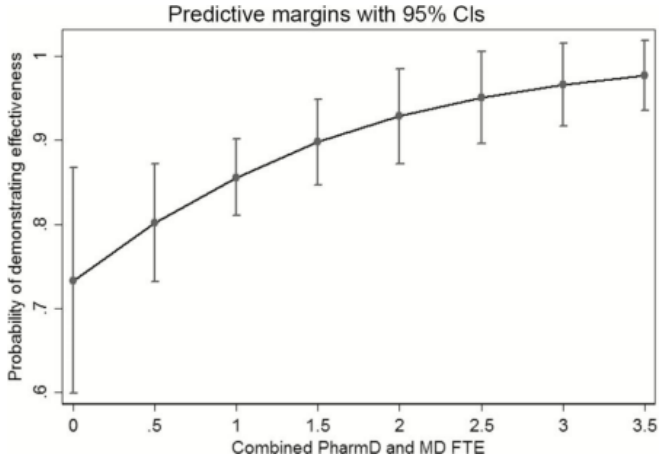


Table 6.
Minimal Full-time Equivalent Support Recommended by Bed Size

Variable	Bed Size			
	100–300	301–500	501–1000	>1000
Pharmacist	1.0	1.2	2.0	3.0
Physician	0.4	0.4	0.6	1.0
Total	1.4	1.6	2.6	4.0

For hospitals with <100 beds, there were limited data to make recommendations.

Doernberg, et al. Essential Resources and Strategies for Antibiotic Stewardship Programs in the Acute Care Setting, Clinical Infectious Diseases, Volume 67, Issue 8, 15 October 2018, Pages 1168–1174, https://doi.org/10.1093/cid/ciy255

Dogmas of Antibiotic Stewardship

- More/Bigger Disease needs More/Bigger/Longer Drug?

Observations on Spiraling Empiricism: Its Causes, Allure, and Perils, with Particular Reference to Antibiotic Therapy

JEROME H. KIM, M.D., HARRY A. GALLIS, M.D.

August 1989 The American Journal of Medicine Volume 87 201

Fallacies in Antibiotic Therapy

I. Broader is better
II. Failure to respond is failure to cover
III. When in doubt, change drugs, or add another
→ IV. More disease(s), more drugs
V. Sickness requires immediate treatment
VI. Response implies diagnosis
→ VII. Bigger disease, bigger drugs
VIII. Bigger disease, newer drugs
→ IX. Antibiotics are non-toxic

Dogmas of Antibiotic Stewardship

- Short Course Therapy

Shorter Is Better

Diagnosis	Short (d)	Long (d)	Result	#RCT
CAP	3-5	5-14	Equal	14
Atypical CAP	1	3	Equal	1
Possible PNA in ICU	3	14-21	Equal	1*
VAP	8	15	Equal	2
cUTI/Pyelonephritis	5 or 7	10 or 14	Equal	9**
Intra-abd Infection	4	10	Equal	2
Complex Appendicitis	2	5	Equal	1
GNB Bacteremia	7	14	Equal	3†
Cellulitis/Wound/Abscess	5-6	10	Equal	4‡
Osteomyelitis	42	84	Equal	2
Osteo Removed Implant	28	42	Equal	1
Debrided Diabetic Osteo	10-21	42-90	Equal	2φ
Septic Arthritis	14	28	Equal	1
AECB & Sinusitis	≤5	≥7	Equal	>25
Variceal Bleeding	3	7	Equal	1
Neutropenic Fever	AFx72h/3 d	+ANC>500/9 d	Equal	2
Post Op Prophylaxis	0-1	1-5	Equal	55Ψ
Erythema Migrans (Lyme)	7	14	Equal	1
P. vivax Malaria	7	14	Equal	1
Total: 19 Conditions				>125 RCTs

*Infiltrate on CXR but low CPIS score (≤6), both ventilated and non ventilated, likely CAP, HAP, and VAP combined; **2 RCT included males, the smaller one found lower 10-18 d f/up cure in males with 7 days of therapy but no difference at longer follow-up, larger exclusive male study found no diff in cure; †GNB bacteremia also in UTI/cIAI RCTs; ‡3 RCTs equal, 1 (low dose oral flucox) ↑relapses 2° endpoint; φall patients debrided, in 1 study total bone resection (clean margins); ΨIncludes meta-analysis of 52 RCTs; refs at https://www.bradspellberg.com/shorter-is-better

Shorter Is Better Exceptions

Diagnosis	Short (d)	Long (d)	Result	#RCT
Prosthetic Joint Infection	6 wk	12 wk	Inferior	1*
Early Pros. Joint Infect.	8 wk	12-26 wk	Equal	1*
Febrile cUTI in men	1 wk	2 wk	Inferior?	1**
Otitis Media < 2 yr old	5	10	Inferior	1
Otitis Media >2 yr old	<10	10	Equal	49Φ
Strep Throat: Nml PCN	3-5	7-10	Inferior	5†
Strep Throat: Other Abx	3-5	7-10	Equal	>20†
Strep Throat: QID PCN	5	10	Equal	1
Chronic Pulm Aspergillus	6 mo	12 mo	Inferior	1
Total: 4 Diseases				>25 RCTs

* 6 vs. 12 week inferior for all-comers in largest trial, driven primarily but not entirely by DAIR cohort, but other RCT from Shorter Is Better table demonstrated 4-6 weeks may be non inferior, and small RCT of PJI within 1 month of implant showed non-inferiority of 8 vs. 12-26 wks;
**Clinical cure 96% with 7 days, micro failure rate higher, but not more relapses, note oflox dose much lower than normal daily levoflox dose
Φmeta-analysis of 49 trials; 3% increased short term failure, but by 1 month of follow up, no difference;
†meta-analysis of >25 trials.
refs at https://www.bradspellberg.com/shorter-is-better

Dogmas of Antibiotic Stewardship

- TMP/SMX for beta-hemolytic strep
  - "The activity of doxycycline and SMX-TMP against β-hemolytic streptococci is not known"

Design / Context	Treatments	Results	Notes
• RCT, open label • Pediatric (3 months – 13 years) • Purulent or crusted non-bullous impetigo	1) TMP/SMX QDay x 5 days or TMP/SMX BID x 3 days 2) Penicillin IM x 1	Healed / improved @ day 7: TMP/SMX: 241/283 **(85%)** PCN: 113/133 **(85%)**	Day 0: 90% of patients had *S. pyogenes* isolated in lesions Day 7: < 7% of patients had *S. pyogenes* (both groups, no difference)

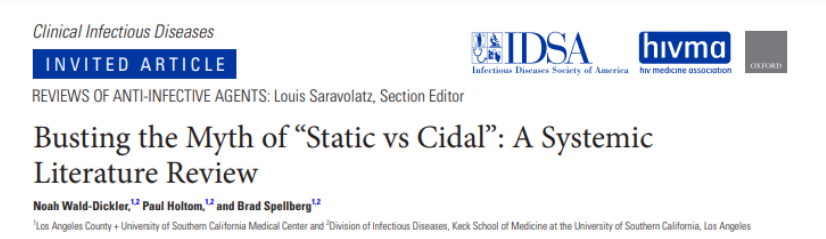
• RCT, blinded, multicenter
• Adults & pediatrics
• Uncomplicated skin & soft tissue infections
  • Abscess (30%)
  • Cellulitis (53%)
  • Both (16%)
	1) TMP/SMX 2 DS BID
	2) Clindamycin
	Both treatments oral & x 10 days
		Cure 7 – 10 days after treatment (cellulitis ± abscess subgroup, n = 362):
		TMP-SMX: **77%%**
		Clindamycin: **81%**
		Difference **-4.3% (-13.5% to 4.8%)**
			"Our study was not powered …. in the subgroup of patients with cellulitis, but the data suggest that if there is a difference in outcome it is probably small."

Clin Infect Dis 2014;59(2):e10-e52
Bowen AC, et al. Lancet 2014;384: 2132
Miller LG et al. N Engl J Med 2015; 372:1093

Dogmas of Antibiotic Stewardship

- "The Magic isn't in the IV – It's in the PK"
  - Can you get enough drug into the blood
  - Challenges of oral beta-lactams
  - Are the PK-PD targets hit?
  - IV linezolid = Oral linezolid
  - Other options:
    - Moxifloxacin – Resistance concerns?
    - Delafloxacin – New drug, limited data/experience
    - Clindamycin – Extensive experience in pediatrics
    - TMP/SMX – Concerning data?
    - Mino/Doxycycline – PK/PD concerns

- Static vs Cidal Therapy:


Clinical Infectious Diseases

INVITED ARTICLE

IDSA Infectious Diseases Society of America hivma hiv medicine association OXFORD

REVIEWS OF ANTI-INFECTIVE AGENTS: Louis Saravolatz, Section Editor

Busting the Myth of "Static vs Cidal": A Systemic Literature Review

Noah Wald-Dickler,[1,2] Paul Holtom,[1,2] and Brad Spellberg[1,2]

[1]Los Angeles County + University of Southern California Medical Center and [2]Division of Infectious Diseases, Keck School of Medicine at the University of Southern California, Los Angeles

  - "Test tube" phenomenon
  - 56 trials since 1985 comparing "cidal" vs. "static"
  - 49 trials show no difference
  - In 6, the static agent looked better
  - In 1, the cidal looked better
    - Imipenem vs. **tigecycline**

N Engl J Med 2019; 380:425-436
N Engl J Med 2019; 380:415-424
Clin Infect Dis. 2018 Apr 17;66(9):1470-1474

Bundles

- AS Strategies Don't Occur in Isolation

	Hospitals Responding "Yes"
Median # of UTI-Directed Antibiotic Stewardship Interventions	**4.5 (3-5)**
Antibiotic Timeout at 48-72 Hours	13 (31%)
All fluoroquinolones restricted	13 (31%)
Institutional treatment guideline for UTI, updated within the last year	20 (48%)
Indications of obtaining urine culture	18/20 (90%)
Recommendations for not treating ASB	17/20 (85%)
Antibiotic regimens that are concordant with national guidelines	20/20 (100%)
Recommend against fluoroquinolone as first line agent for cystitis	19/20 (95%)
Clinicians educated on UTI and ASB	37 (88%)
Audit and feedback for UTI	25 (60%)
Audit and feedback for ASB	28 (67%)
CPOE for UTI	28 (67%)
CPOE for ASB	10 (24%)

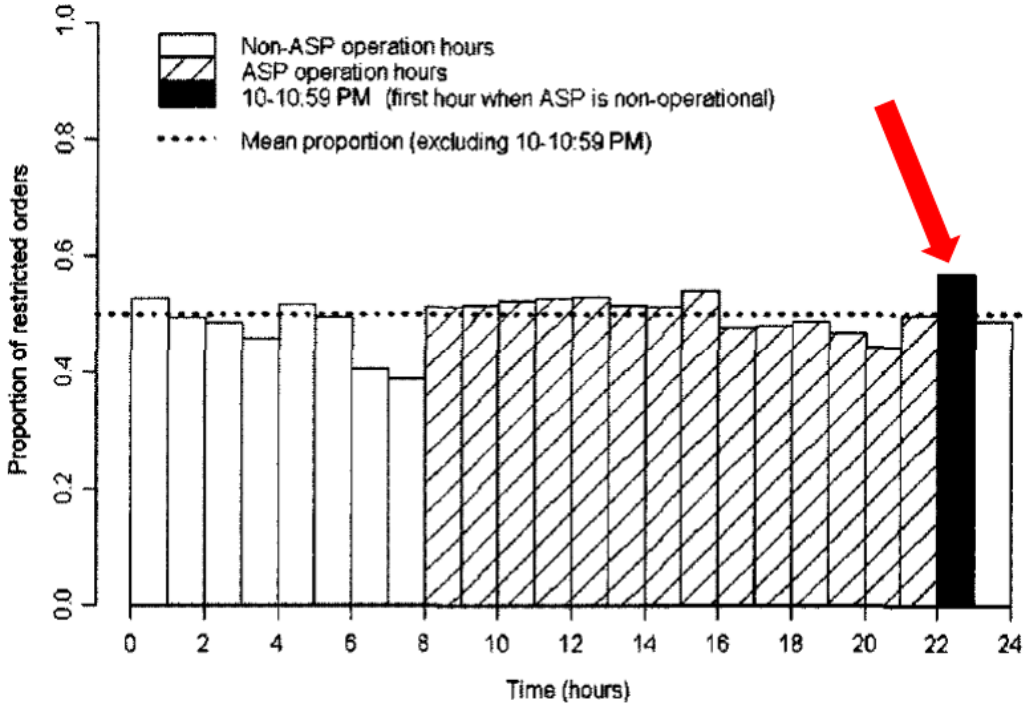
Vaughn et al., JAMA Internal Medicine, In press

Common Stewardship Bundle Elements

- Tools to teach/standardize/create a common practice
  - Guidelines/Education
    - Necessary but insufficient to change practice
- A thing to check/interrupt at point of prescribing
  - Action Elements
    - Audit and Feedback, Restriction, Handshake Stewardship, Time-outs
  - Nudges
    - Ordersets with decision support, microbiology interventions, automatic elements
- Data to Monitor

Restriction vs. Audit and Feedback

What Happens After Hours?



LaRosa LA. ICHE. 2007.

What Happens At Discharge

- Restricting Inpatient Fluoroquinolone Use…

11%

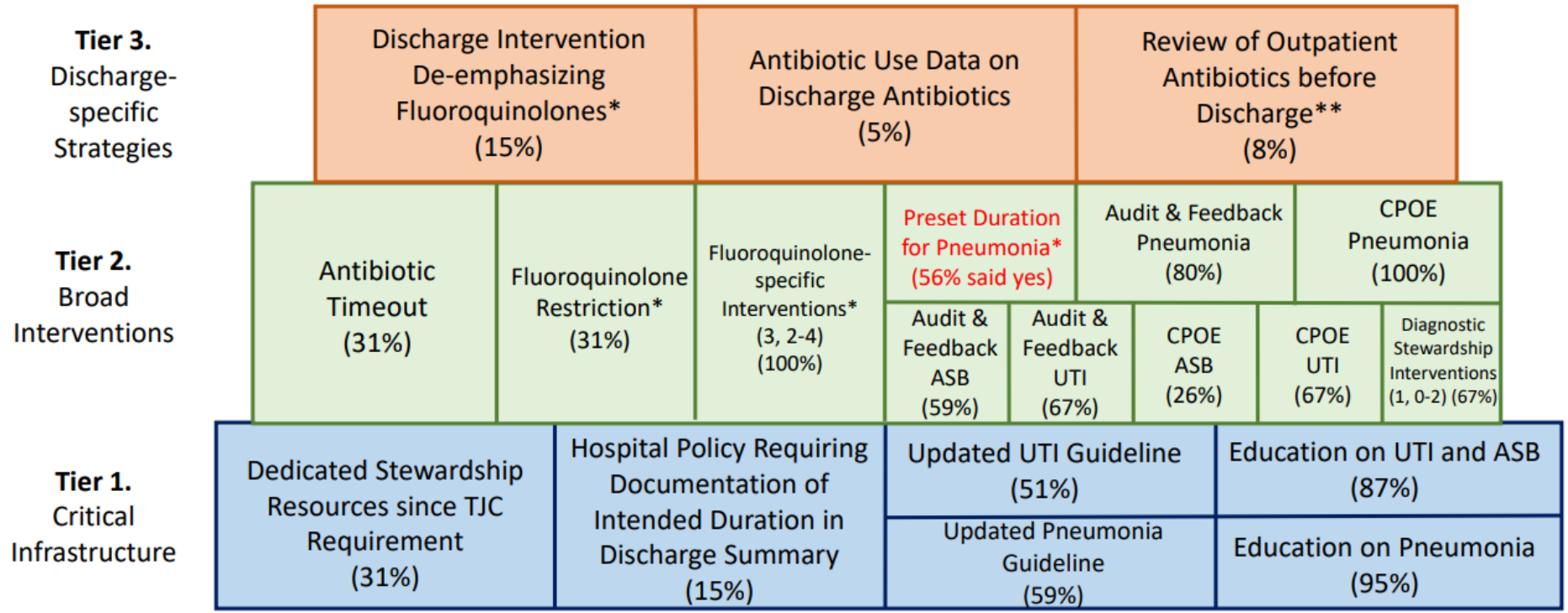
fewer patients received a fluoroquinolone in hospitals targeting **inpatient** fluoroquinolone use

Double

the number of patients were **newly started** on a fluoroquinolone **at discharge**

Vaughn VM. Clinical Infectious Diseases. 2019.

Ex: Discharge Stewardship Bundle Elements

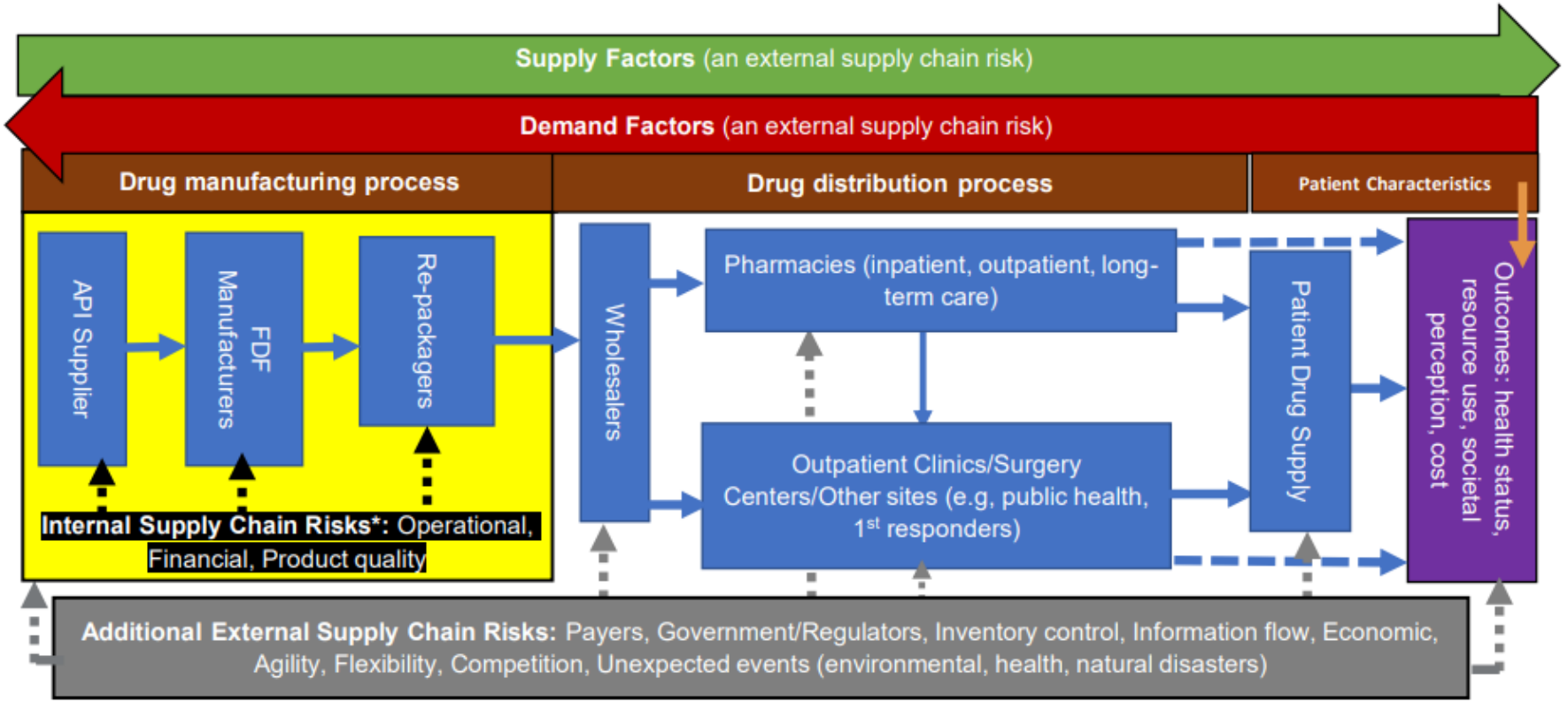


Vaughn et al., Clin Infect Dis, 2022.

Drug Shortages/Supply Chain Issues

- Drug shortages reached a five-year peak in 2022, impacting almost 300 pharmaceuticals (IV saline, antipyretics, and antibiotics)
- Most pronounced during 2022-2023 pediatric “multi-demic” of influenza, RSV, COVID, and GAS (impacting acetaminophen, amoxicillin, oseltamivir, etc.)
- FDA lacks end-to-end visibility into supply chain; efforts to map supply chains are not well-coordinated
- Forthcoming ASHE commentary by Drs. Alan Gross, Sarah Kabbani & Jenna Blumenthal, “The perfect storm: respiratory viral surges and anti-infective shortages”

Drug Shortages/Supply Chain Issues



Infect Control Hosp Epidemiol. 2021;42:598-599

Drug Shortages/Supply Chain Issues

- Over half of antibacterials had supply chain issues in the U.S., 2017–2021

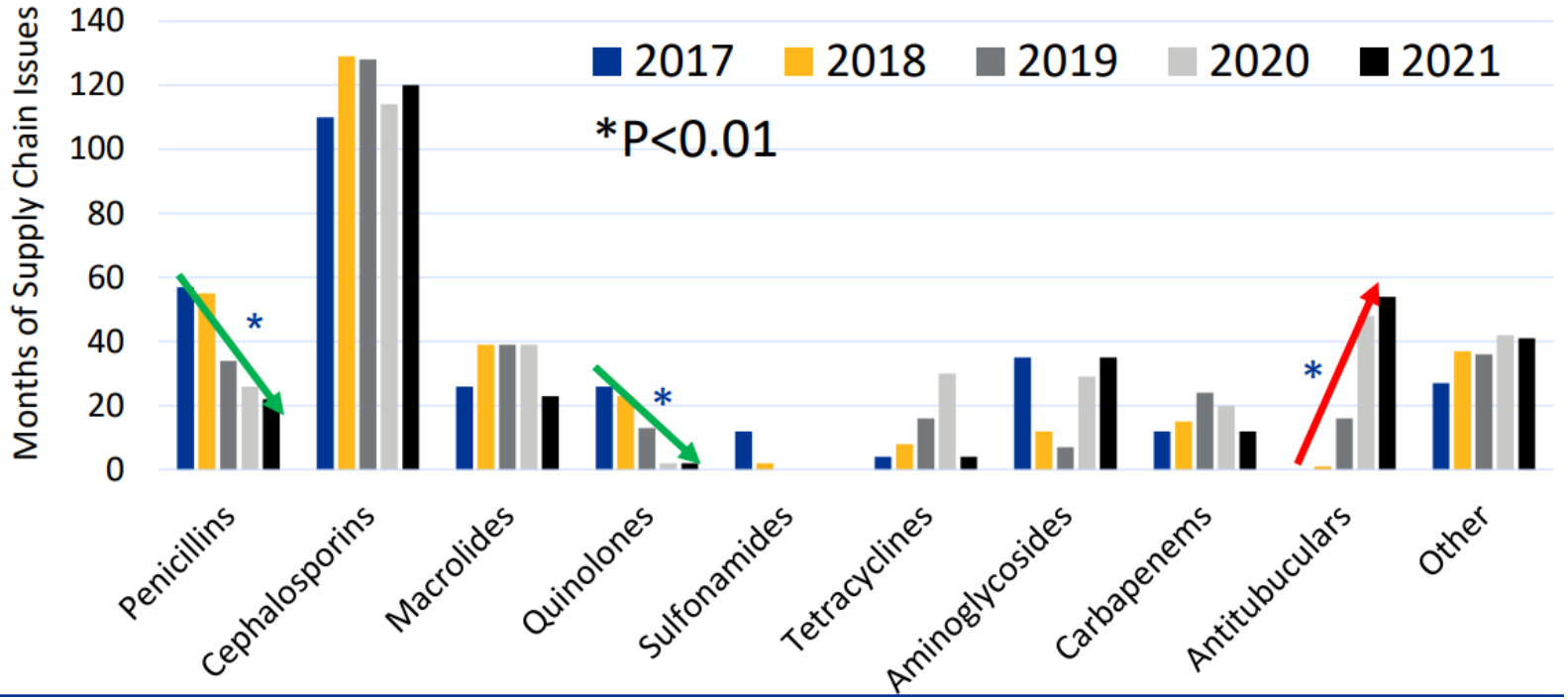
# of systemic antibacterials purchased in the U.S.	114
% with supply chain issue for ≥1 month	58% (66/114)
% of oral agents with supply chain issues	50% (26/52)
% of parenteral agents with supply chain issues	67% (40/60)
# of episodes of drug supply chain issues	102
# of total months of supply chain issues	1611 months (median=14)

- 24 agents experienced supply chain issues for ≥ half of the study period
  - 11 agents for 100%: Ampicillin/sulbactam, azithromycin, cefazolin, cefepime, cefotaxime, cefotetan, cefpodoxime, ceftazidime, clindamycin, imipenem, vancomycin

Trends and duration of antibacterial drug supply chain issues in the U.S., January 2017 – December 2021. Oral Abstract Session. SHEA Spring 2023. Seattle, WA.

Drug Shortages/Supply Chain Issues

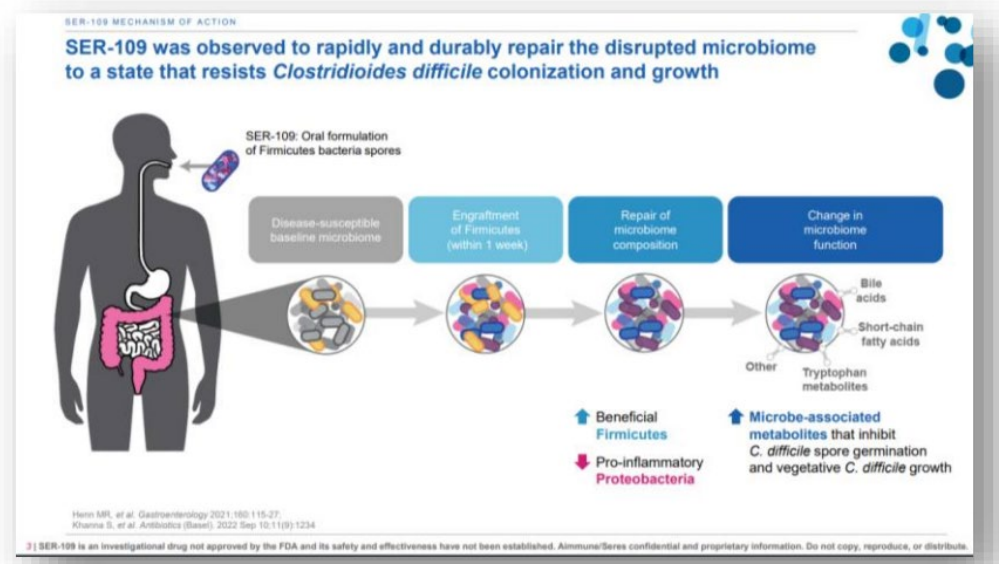
- Supply Chain Issues by class



Trends and duration of antibacterial drug supply chain issues in the U.S., January 2017 – December 2021. Oral Abstract Session. SHEA Spring 2023. Seattle, WA.

SER-109

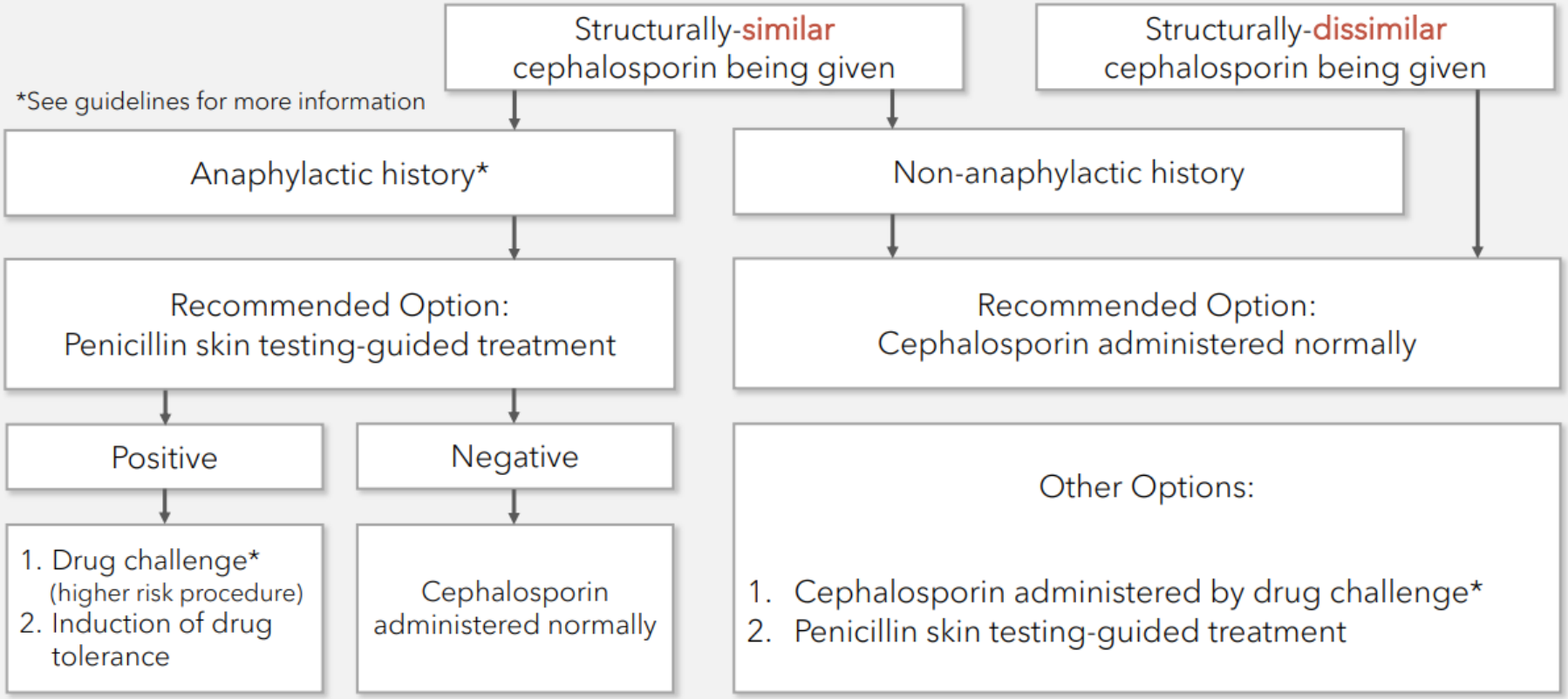
- Investigational, spore-based (Firmicutes bacteria), oral microbiome therapeutic designed to break the cycle of Clostridioides difficile Infection (CDI) recurrence
- FDA breakthrough therapy/orphan drug status
- Rapidly and durably repairs disrupted microbiome to a state that resists colonization and growth in Phase 3 studies
- Formulated for oral delivery (4 capsules for 3 days)
- Taken after symptomatic resolution with standard of care antibiotics
- ECOSPOR IV: 86.3% of subjects had a sustained clinical response at 24 weeks
- Expanded access program ongoing in the US



Straub T, Diao L, Ford C, et al. SER-109, An Investigational Microbiome Therapeutic, Reduces Abundance of Antimicrobial Resistance Genes in Patients with Recurrent Clostridioides difficile Infection (rCDI) After Standard-of-Care Antibiotics. Presented at: IDWeek2021

Cephalosporin Administration in a Patient with Penicillin Hypersensitivity

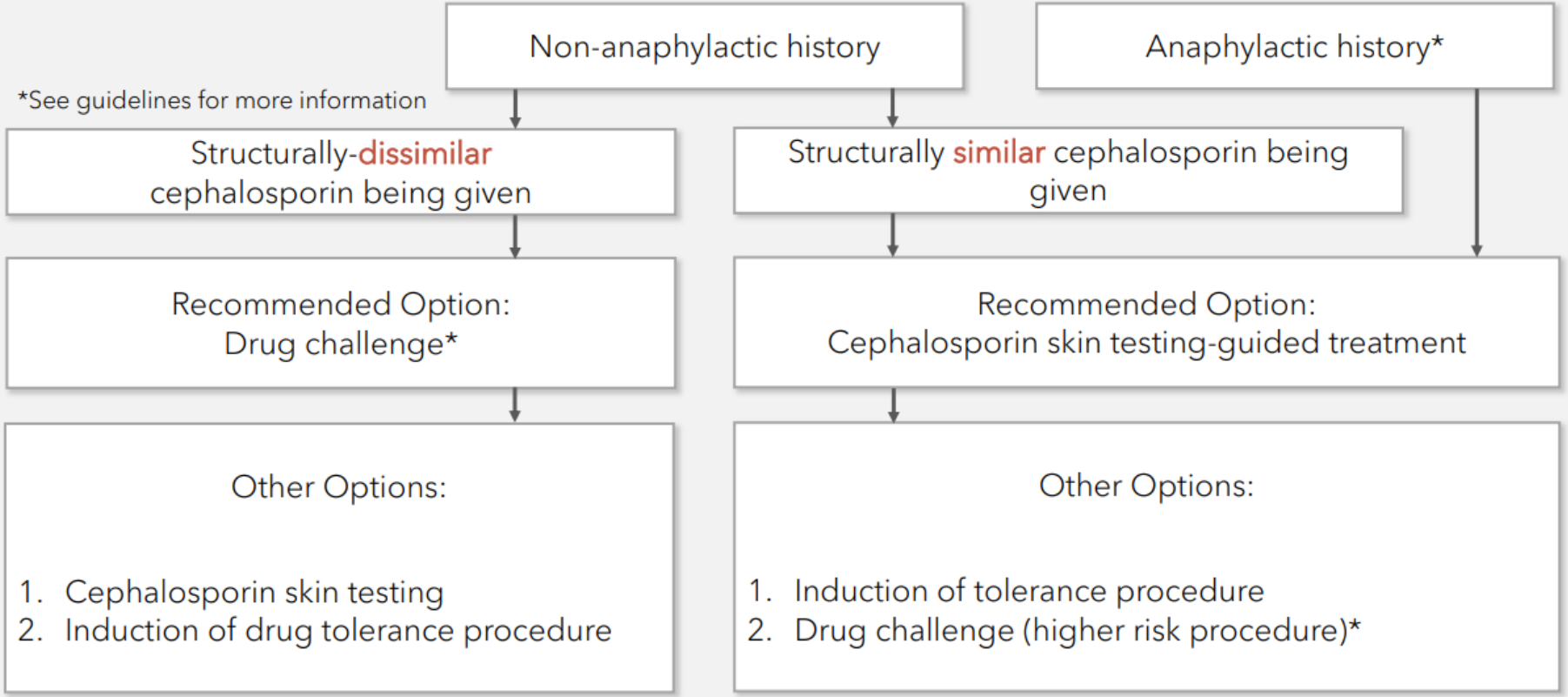
(excludes patients with history of severe delayed immunologic reactions or organ-specific reactions to β-lactams)



DA Khan, et al. J Allergy Clin Immunol. 2022; 150:1333.

Cephalosporin Administration in a Patient with Cephalosporin Hypersensitivity

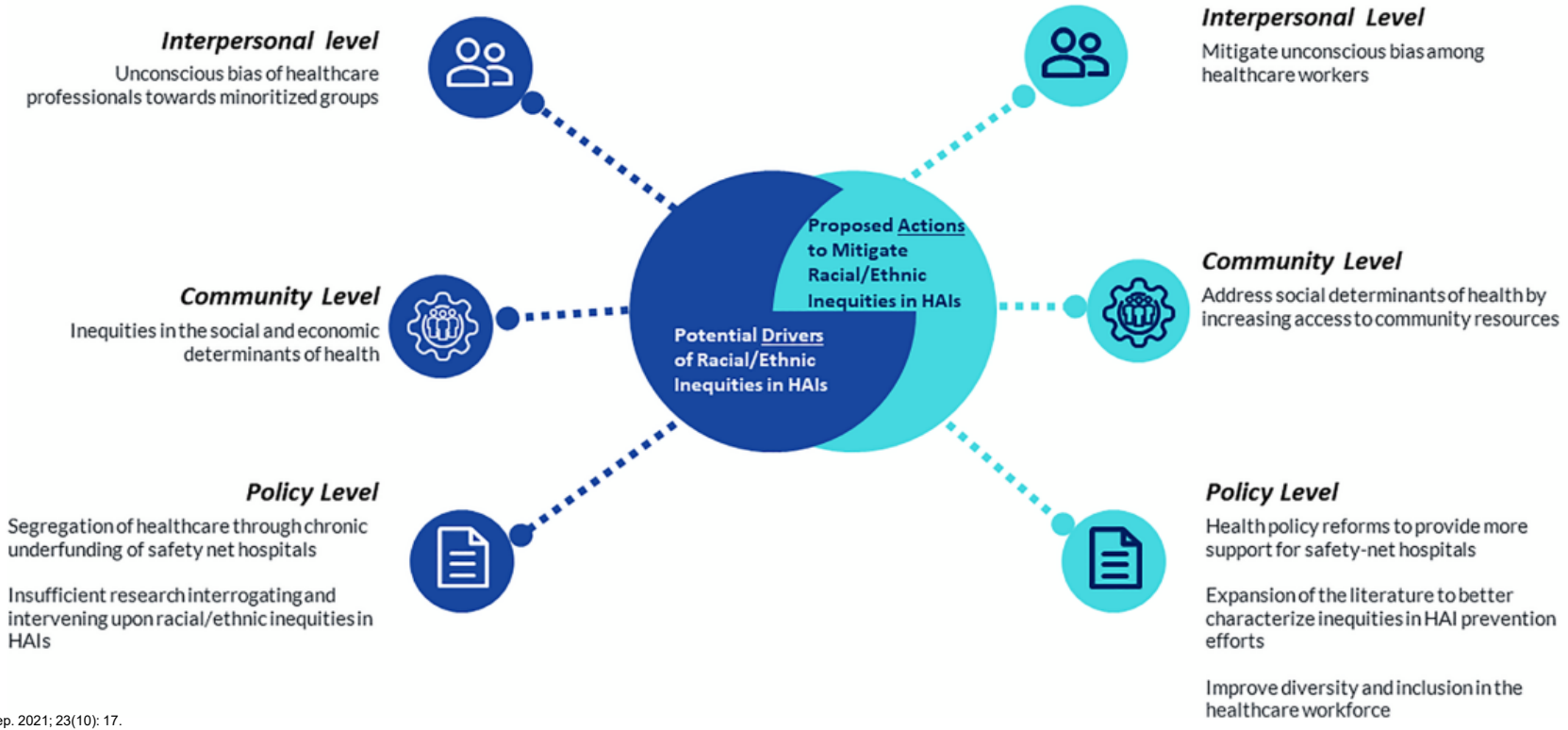
(excludes patients with history of severe delayed immunologic reactions or organ-specific reactions to β-lactams)



DA Khan, et al. J Allergy Clin Immunol. 2022; 150:1333.

Racial/Ethnic Inequities in HAIs

Potential Drivers of Racial/Ethnic Inequities in Healthcare-associated Infections, and Proposed Actions to Mitigate Them



Curr Infect Dis Rep. 2021; 23(10): 17.

Project Firstline

Next Steps

- **Next Call**
  - **June 13at 2pm Eastern/1pm Central Time**
  - **Endocarditis Survey**

- **Feedback always appreciated**
  - **Christopher.evans@tn.gov**