



**North Carolina
Clinical Antibiotic
Stewardship Partners**

INPATIENT ANTIMICROBIAL STEWARDSHIP SESSION #1

March 8, 2023

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 U.S. 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. Kistler served as a consultant for Base10, Inc on their UTI embedded clinical support tool and received funding from Pfizer to study pneumococcal carriage.
 - ▶ 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)
 - ▶ Ms. Doughton owns individual Gilead stock.
- ▶ 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, Drs. Philip Sloane and David Weber, as well as the CDC, WHO, AHRQ, etc.

INTRODUCTION TO NC CLASP TEAM PARTNERS

- ▶ Danielle Doughman, MSPH- project manager
- ▶ Evelyn C. Cook, RN, CIC- Associate Director of the North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE)
- ▶ Amy Powell, MPH- Program Manager, NC SPICE
- ▶ Chrissy Kistler, MD, MASc- Geriatrics researcher and LTC expert
- ▶ Jim Johnson, PharmD- pharmacist with antibiotic stewardship expertise
- ▶ Zach Willis, MD, MPH- Infectious disease clinician and HAI/AR expert
- ▶ Marian B Johnson, MPH- Senior Research Associate and QI advisor for IHI
- ▶ Saif Khairat, PhD, MPH- informatics and clinical decision support expert

INTRODUCTIONS

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

OUTLINE OF TODAY'S SESSION

- ▶ Introductions
- ▶ CE/CME
- ▶ NC CLASP refresher
- ▶ Series Learning Objectives
- ▶ CDC Core Elements 1 and 2
- ▶ Discussion and "Homework"

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
- ▶ Establish a MyAHEC account
- ▶ Complete surveys as requested

SETTING YOURSELF UP FOR LEARNING

- ▶ This time is for you and your learning.
- ▶ One-screen agreement
- ▶ Hearing and seeing each other
 - ▶ Cameras on
 - ▶ Stay muted unless speaking
- ▶ Use the chat
- ▶ Let's use and share our learning, but not in a way that identifies another facility's pain points.
- ▶ What would you add?



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/>



NC CLASP OVERVIEW

- **NC CLASP is a new initiative created to support acute care, outpatient, and nursing home settings to improve antibiotic stewardship and the health of our patients.**
- **NC CLASP is funded by NC DHHS. There is no cost to participate.**

SERIES LEARNING OBJECTIVES

1. Discuss CDC Core Elements of Antibiotic Stewardship.
2. Review the benefits of the NHSN Antimicrobial Use (AU) module.
3. Identify barriers to improving antimicrobial utilization.
4. Discuss the significance and roles of pharmacists as part of a multidisciplinary team in promoting antimicrobial stewardship and optimizing antimicrobial use in inpatient settings.
5. Engage with other team members at their facility to implement antimicrobial stewardship efforts.
6. Describe commonly used antimicrobial stewardship implementation strategies.
7. Review the National Healthcare Safety Network (NHSN) hospital annual surveys specific to antibiotic stewardship preparedness.

ANTIMICROBIAL STEWARDSHIP LANDSCAPE

- ▶ ASPs began in large hospitals
 - ▶ Antimicrobial resistance problems; access to experts and data
 - ▶ Joint Commission Standard went into effect 2017
- ▶ How to do stewardship in:
 - ▶ Smaller community hospitals?
 - ▶ Long-term care facilities?
 - ▶ Outpatient setting?
- ▶ How can larger hospitals continue to improve?



**2022
SPECIAL
REPORT**

COVID-19

U.S. IMPACT ON ANTIMICROBIAL RESISTANCE



Available data show an alarming increase in resistant infections starting during hospitalization, growing at least 15% from 2019 to 2020.

- Carbapenem-resistant *Acinetobacter* (+78%)
- Antifungal-resistant *Candida auris* (+60%)*
- Carbapenem-resistant Enterobacterales (+35%)
- Antifungal-resistant *Candida* (+26%)
- ESBL-producing Enterobacterales (+32%)
- Vancomycin-resistant Enterococcus (+14%)
- Multidrug-resistant *P. aeruginosa* (+32%)
- Methicillin-resistant *Staphylococcus aureus* (+13%)

DEFINITION: ANTIMICROBIAL STEWARDSHIP

***Stewardship** describes the careful and responsible management of something entrusted to one's care.*

*In 1996, John McGowan and Dale Gerding first applied the term **antimicrobial stewardship**, suggesting a causal association between antimicrobial agent use and resistance.*

*Antimicrobial Stewardship: the **optimal selection, dosing, and duration of antimicrobial treatment** resulting in the **best clinical outcome with minimal side effects to the patients and minimal impact on subsequent resistance.***

Shrestha J, Zahra F, Cannady P. Antimicrobial Stewardship In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan. PMID: 34283434

CORE ELEMENTS OVERVIEW

CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. Available at <https://www.cdc.gov/antibiotic-use/core-elements/hospital.html>.

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.

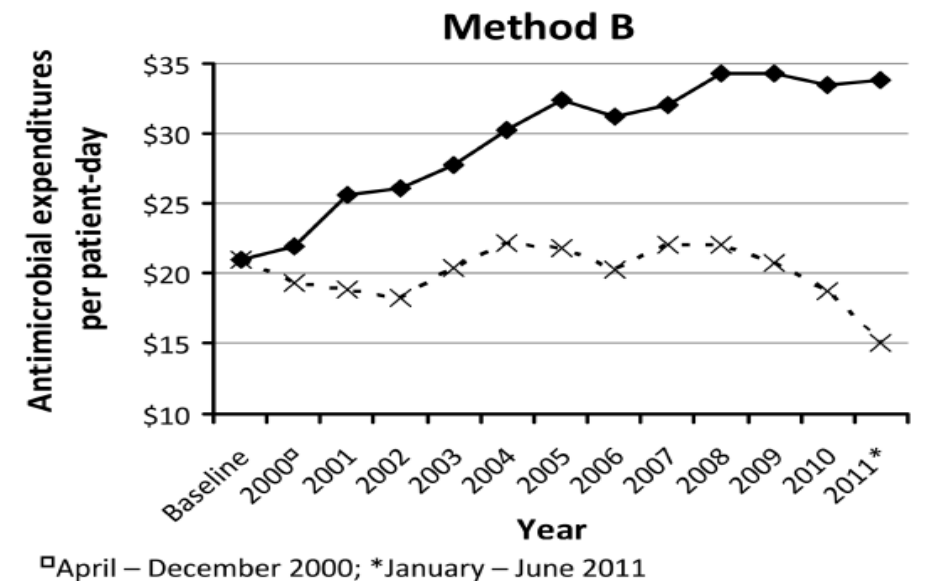
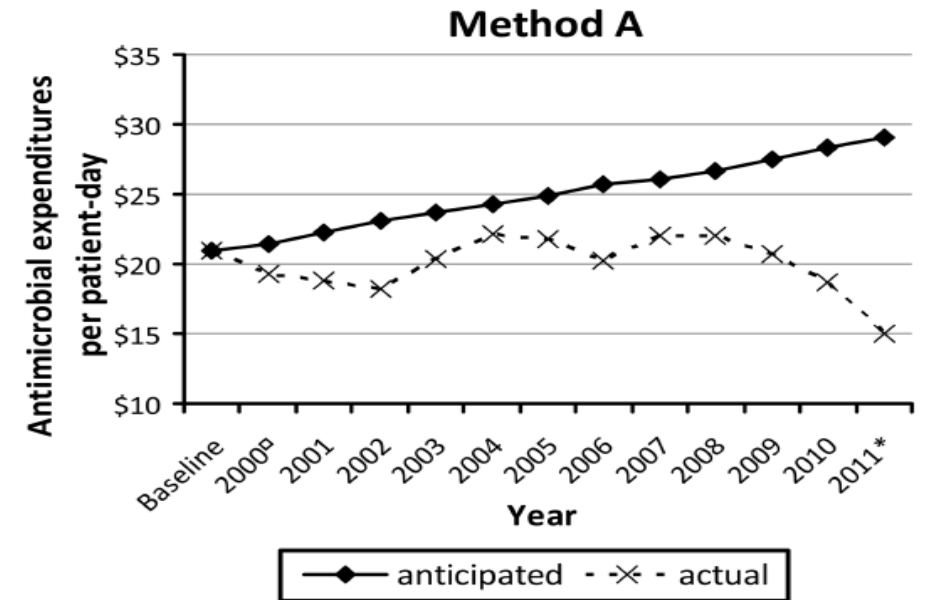
CORE ELEMENT #1

HOSPITAL LEADERSHIP COMMITMENT

- ▶ Dedicate necessary human, financial and information technology resources.
- ▶ Priority examples of hospital leadership commitment emphasize the necessity of antibiotic stewardship programs leadership having dedicated time and resources to operate the program effectively, along with ensuring that program leadership has regularly scheduled opportunities to report stewardship activities, resources and outcomes to senior executives and hospital board.
- ▶ Some “promoters” of commitment
 - ▶ Financial impact
 - ▶ Safety
 - ▶ Length of stay
 - ▶ Resistance, *C. difficile*

“...AS PROGRAMS... WILL PAY FOR THEMSELVES...”

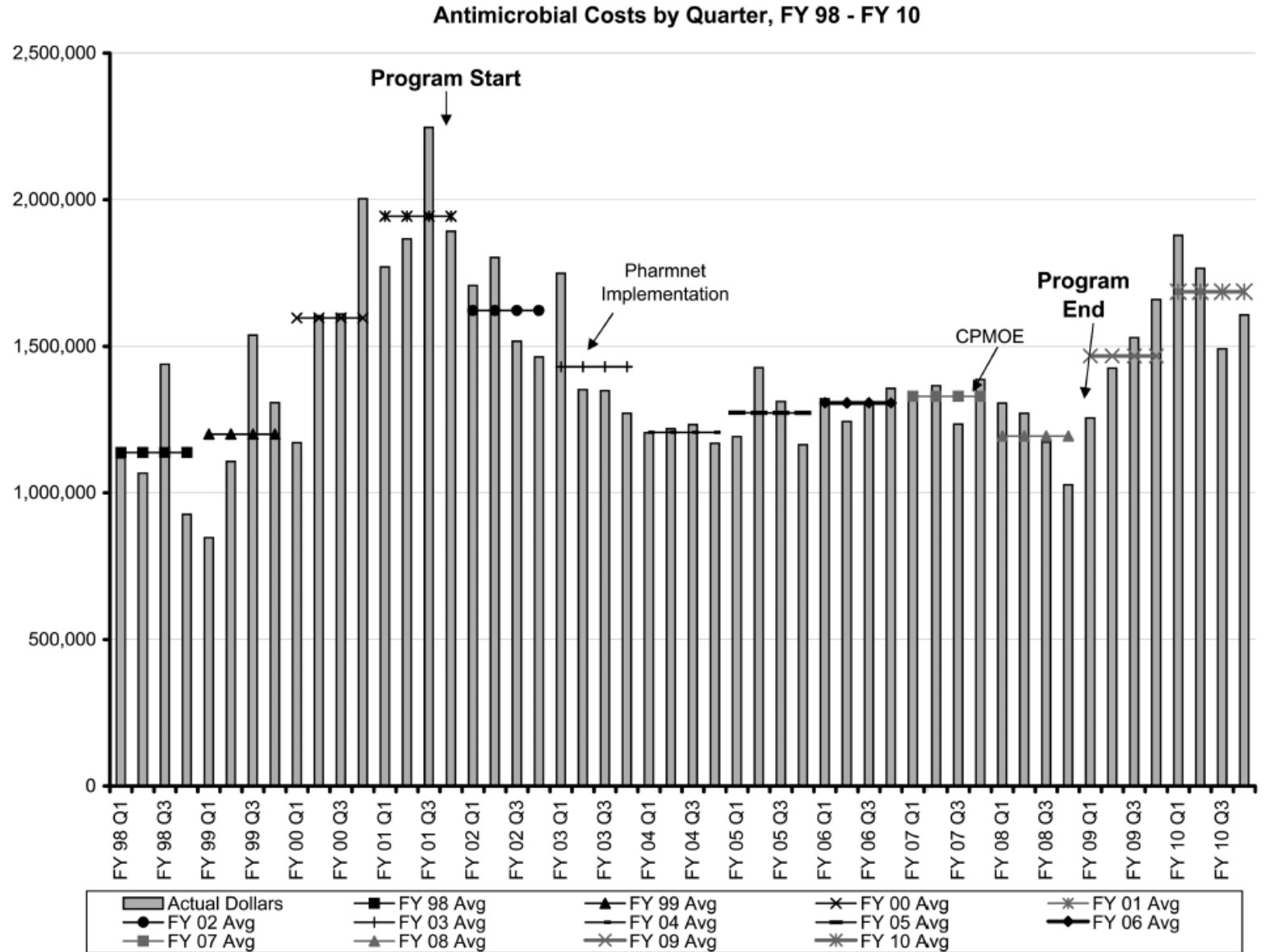
FIGURE 1. Comparison of anticipated versus actual antimicrobial expenditures per patient-day since the implementation of an antimicrobial stewardship program titled the Center for Antimicrobial Utilization Stewardship and Epidemiology, determined using an inflation rate based on the US consumer price index for medical care commodities (method A) and an anti-infective-specific index (method B).




^aApril – December 2000; *January – June 2011

CDC. Core Elements of Hospital Antibiotic Stewardship Programs. 2019
 Beardsley, Williamson, Johnson, Luther, Wrenn, Ohl. **Show me the money:** long-term financial impact of an antimicrobial stewardship program. Infection control and hospital epidemiology 2012 Apr;33(4):398-400.


Large Academic
 Medical Center
 7 year AS program
 Comprehensive
 program in its day





EXPLODING LITERATURE OF ANTIMICROBIAL STEWARDSHIP

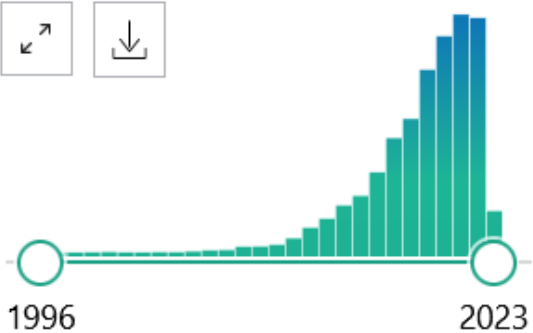
 [Advanced](#) [Create alert](#) [Create RSS](#)

Sorted by: Best match

MY NCBI FILTERS  11,260 results Page 1

RESULTS BY YEAR



Year	Number of Publications
1996	0
1997	0
1998	0
1999	0
2000	0
2001	0
2002	0
2003	0
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	1
2011	2
2012	3
2013	4
2014	5
2015	6
2016	8
2017	10
2018	15
2019	20
2020	25
2021	30
2022	35
2023	40

Principles and Practice of **Antibiotic Stewardship in the ICU.**
1 Pickens CI, Wunderink RG.
Cite Chest. 2019 Jul;156(1):163-171. doi: 10.1016/j.chest.2019.01.013. Epub 2019 Jan 2
PMID: 30689983 [Free PMC article.](#) [Review.](#)
Share In the face of emerging drug-resistant pathogens and a decrease in the develop
antimicrobial agents, **antibiotic stewardship** should be practiced in all critical c
stewardship should be a core competency of all crit ...

IMPACT OF AS PROGRAMS ON SAFETY: *C DIFFICILE*

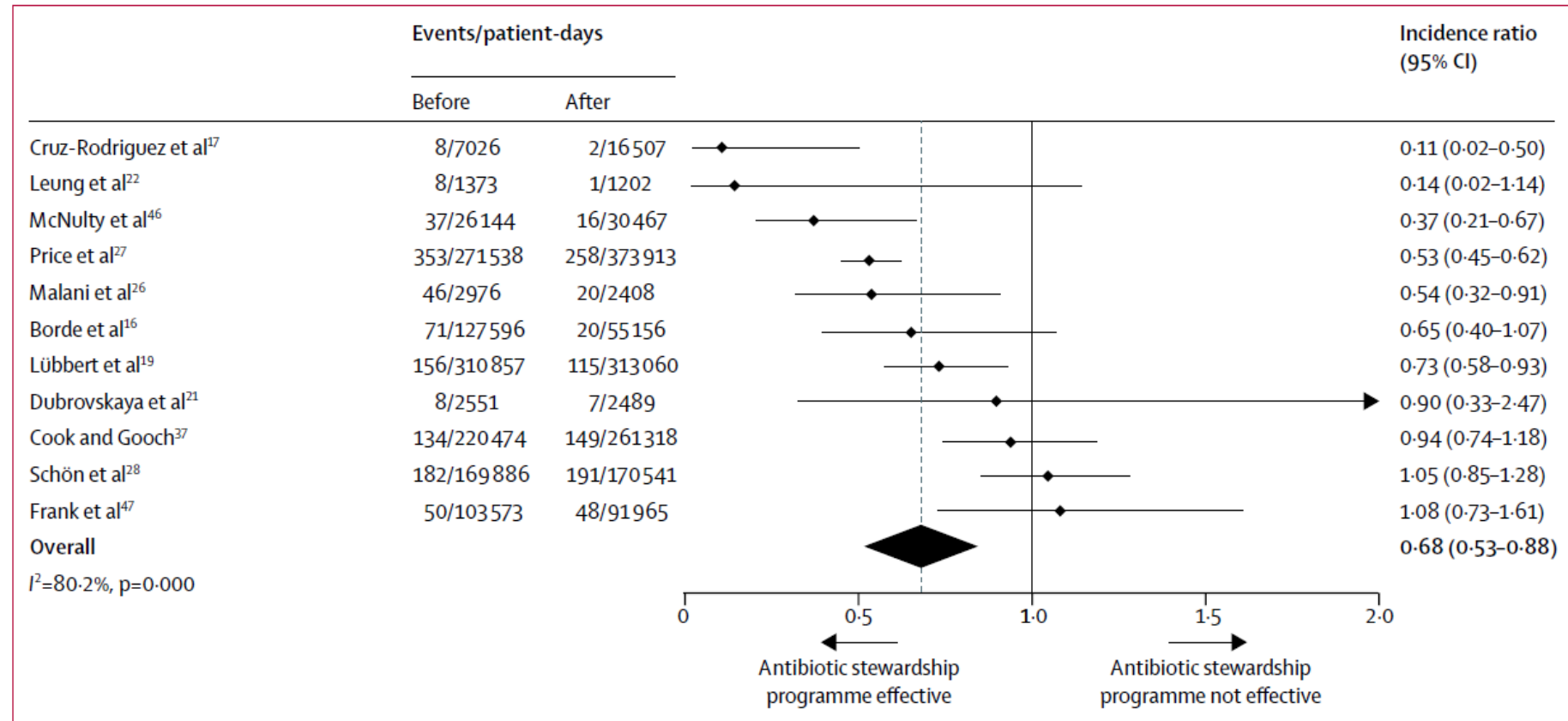


Figure 4: Forest plot of the incidence ratios for studies of the effect of antibiotic stewardship on the incidence of *Clostridium difficile* infections

Baur, Gladstone, Burkert, et al. Lancet Infectious Diseases; 17:9:990-1001, 2017

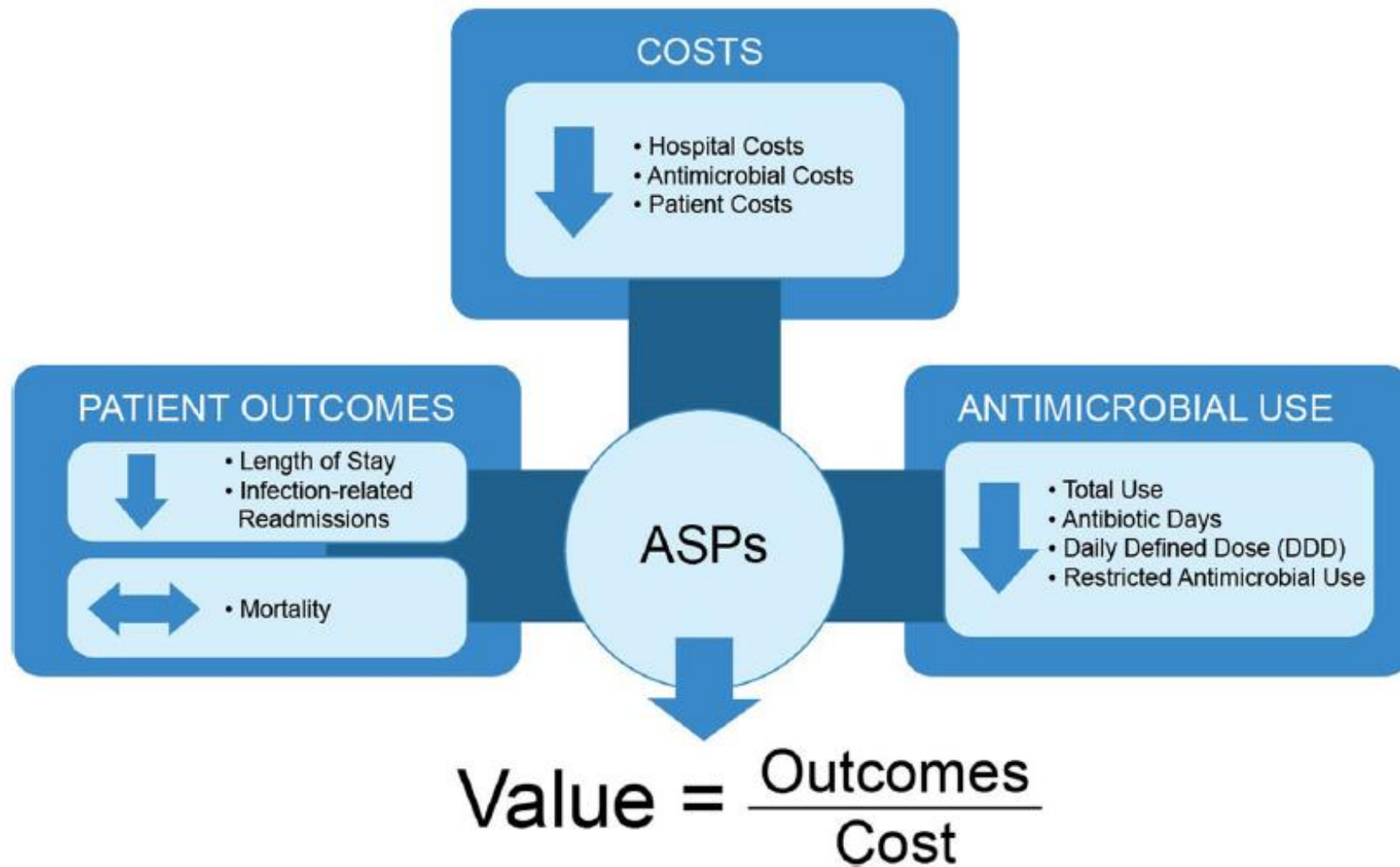


Fig. 3 Conceptual value framework for implementation

Nathwani, et al. Value of Hospital Antimicrobial Stewardship Programs: a systematic review. *Antimicrobial Resistance and Infection Control* 2019

Table 3 Literature synthesis of key outcomes: results and ranges

	# Studies Reporting Reductions or No Change	Range	# Studies Reporting Increases	Range
Patient Outcomes				
LOS	58	-21.9 to 0 days	10	0.1 to 5 days
All-cause mortality rate	41	-18.1 to 0%	13	0.02 to 11%
Infection-related mortality rate ^a	9	-12.0 to 0%	3	1 to 2.9%
All-cause readmission rate	13	-12 to 0%	8	0.2 to 8.6%
o 28/30-day	9	-10.86 to 0%	5	0.2 to 8.6%
Infection-related readmission rate	8	-2.94% to -0.8%	2	0.3 to 0.65%
o 28/30-day	7	-2.94% to -0.7%	1	0.65%
Cost Outcomes				
Implementation costs	0	N/A	9	\$2.5 k to \$39.9 k
Annual operational costs ^a	11	-72.4% to -12.9%	5	7.9 to 243%
Antibiotic costs	80	-80.1% to -0.06%	7	4.1 to 51.5%
LOS costs ^b	2	-\$18.3 k to -\$1.95 M	0	N/A
Overall hospital costs ^b	32	-\$9.11 k to -\$2.06 M	0	N/A

^aIn these rows, the studies in the 2 columns are not mutually exclusive since more than 1 outcome was evaluated

^bOnly included studies measuring cost outcomes in USD/N/A = Not Applicable

Nathwani, et al. Value of Hospital Antimicrobial Stewardship Programs: a systematic review. Antimicrobial Resistance and Infection Control 2019

CORE ELEMENT #2

ACCOUNTABILITY

- ▶ The antibiotic stewardship program must have a designated leader or co-leaders who are accountable for program management and outcomes.
- ▶ Most hospitals have found a co-leadership model to be effective, for example: a physician and pharmacist.

Strengthening leadership and accountability:

- ▶ Written policies and expectations
- ▶ Ready availability of physician leaders to non-physician leaders
- ▶ Stewardship “rounds”
- ▶ Engaging prescribers in AS rounds (“handshake stewardship”)

Baker DW, Hyun D, Neuhauser MM, Bhatt J, Srinivasan A. *Leading Practices in Antimicrobial Stewardship: Conference Summary*. Joint Commission journal on quality and patient safety. 2019 Jul;45(7):517-23.

Hurst AL, Child J, Pearce K, Palmer C, Todd JK, Parker SK. *Handshake Stewardship*:

A Highly Effective Rounding-based Antimicrobial Optimization Service. *Pediatr Inf Dis J* 2016;35(10):1104-10.

BREAKOUT SESSION

LEADERSHIP COMMITMENT & ACCOUNTABILITY

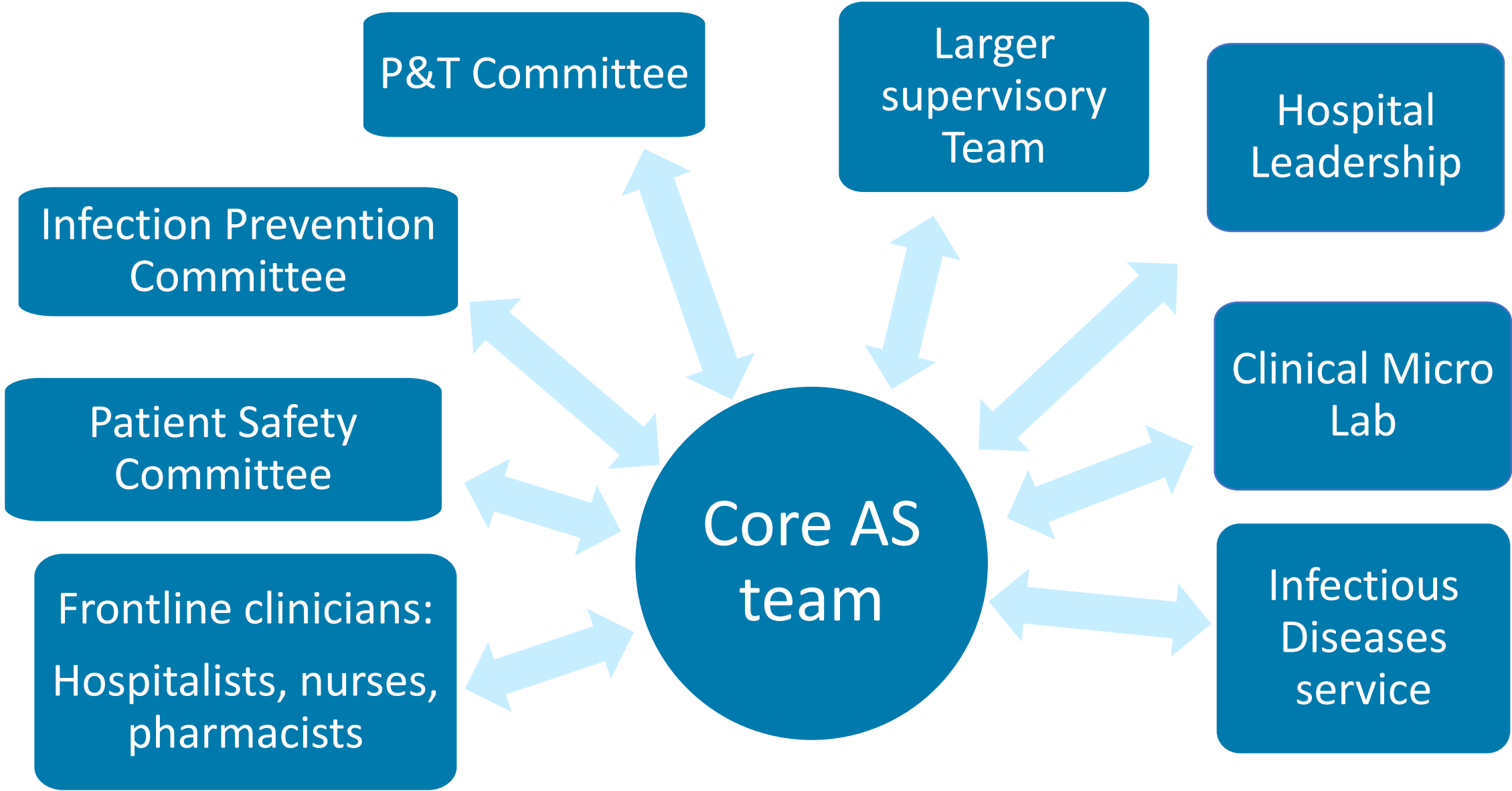
- ▶ What strategies have you found helpful in strengthening the hospital leadership commitment for your stewardship program?
- ▶ How are the leaders of the ASP held accountable? How does the ASP demonstrate value to upper management?

STEWARDSHIP: A MULTIDISCIPLINARY ENDEAVOR

**Essential,
"Core-Team"
Personnel**

- Lead Physician
- Lead Pharmacist
- Clinical Microbiologist
- Infection Preventionist
- Information Technologist

ONE POSSIBLE A.S. TEAM STRUCTURE



ANTIMICROBIAL STEWARDSHIP: A MULTIDISCIPLINARY ENDEAVOR

How is your AS effort structured?

How do you engage these different groups?

What challenges to involvement of key stakeholders have you faced?

“HOMEWORK”

- ▶ List the members of your ASP and their roles. Compare that to recommended “essential personnel” in slide 24.
 - ▶ Which members have explicit effort? Do other critical personnel, such as microbiologists, have formal ASP expectations?
- ▶ What other stakeholders in slide 25 do you engage with regularly? Which ones are potentially missing? Can engagement with stakeholders be improved without significant additional financial resources?
- ▶ What does your program need the most to have the greatest impact? For example, more pharmacy FTE? Physician FTE? Data analytics? What would your program be able to accomplish by filling that need?

RESOURCES

- ▶ CDC Core Elements of Hospital Antibiotic Stewardship Programs:
<https://www.cdc.gov/antibiotic-use/core-elements/hospital.html>
- ▶ [Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America - PubMed \(nih.gov\)](#)
- ▶ [Value of hospital antimicrobial stewardship programs \[ASPs\]: a systematic review - PubMed \(nih.gov\)](#)