INPATIENT ANTIMICROBIAL STEWARDSHIP
SESSION #1

March 8, 2023
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
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?
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?
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.

CORE ELEMENTS
OVERVIEW

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).

CDC. Core Elements of Hospital Antibiotic Stewardship Programs. 2019
Large Academic Medical Center
7 year AS program
Comprehensive program in its day
Principles and Practice of Antibiotic Stewardship in the ICU.

Pickens CI, Wunderink RG.


PMID: 30689983  Free PMC article.  Review.

In the face of emerging drug-resistant pathogens and a decrease in the development of antimicrobial agents, antibiotic stewardship should be practiced in all critical care units. Antimicrobial stewardship should be a core competency of all critical care teams.
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

Fig. 3 Conceptual value framework for implementation

### Table 3: Literature synthesis of key outcomes: results and ranges

<table>
<thead>
<tr>
<th>Outcome</th>
<th># Studies Reporting Reductions or No Change</th>
<th>Range</th>
<th># Studies Reporting Increases</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOS</td>
<td>58</td>
<td>-21.9 to 0 days</td>
<td>10</td>
<td>0.1 to 5 days</td>
</tr>
<tr>
<td>All-cause mortality rate</td>
<td>41</td>
<td>-18.1 to 0%</td>
<td>13</td>
<td>0.02 to 11%</td>
</tr>
<tr>
<td>Infection-related mortality rate&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9</td>
<td>-120 to 0%</td>
<td>3</td>
<td>1 to 2.9%</td>
</tr>
<tr>
<td>All-cause readmission rate</td>
<td>13</td>
<td>-12 to 0%</td>
<td>8</td>
<td>0.2 to 8.6%</td>
</tr>
<tr>
<td>o 28/30-day</td>
<td>9</td>
<td>-10.86 to 0%</td>
<td>5</td>
<td>0.2 to 8.6%</td>
</tr>
<tr>
<td>Infection-related readmission rate</td>
<td>8</td>
<td>-2.94% to -0.8%</td>
<td>2</td>
<td>0.3 to 0.65%</td>
</tr>
<tr>
<td>o 28/30-day</td>
<td>7</td>
<td>-2.94% to -0.7%</td>
<td>1</td>
<td>0.65%</td>
</tr>
<tr>
<td><strong>Cost Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation costs</td>
<td>0</td>
<td>N/A</td>
<td>9</td>
<td>$2.5 k to $39.9 k</td>
</tr>
<tr>
<td>Annual operational costs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11</td>
<td>-72.4% to -12.9%</td>
<td>5</td>
<td>7.9 to 243%</td>
</tr>
<tr>
<td>Antibiotic costs</td>
<td>80</td>
<td>-80.1% to -0.06%</td>
<td>7</td>
<td>4.1 to 51.5%</td>
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<tr>
<td>LOS costs&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2</td>
<td>-$18.3 k to -$1.95 M</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Overall hospital costs&lt;sup&gt;b&lt;/sup&gt;</td>
<td>32</td>
<td>-$9.11 k to -$2.06 M</td>
<td>0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<sup>a</sup>In these rows, the studies in the 2 columns are not mutually exclusive since more than 1 outcome was evaluated

<sup>b</sup>Only included studies measuring cost outcomes in USD/N/A = Not Applicable

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”)

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

Core AS team

- P&T Committee
- Larger supervisory Team
- Hospital Leadership
- Clinical Micro Lab
- Infectious Diseases service
- Infection Prevention Committee
- Patient Safety Committee
- Frontline clinicians: hospitalists, nurses, pharmacists
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)