Quick Wins in Antimicrobial Stewardship: A Community Hospital's Perspective

Shivani Patel, PharmD, BCPS

January 25, 2019

2nd Annual Texas Medical Center AMR and Stewardship Conference

MEMORIAL HERMANN

Disclosures

MEMORIAL HERMANN

- None

Presentation Objectives

MEMORIAL HERMANN

- Develop programs that focus on areas of need and provide early successes in order to optimize clinical outcomes
- Review the selection of obtainable targets for antibiotic stewardship versus more complicated projects
- Recognize stewardship activities that are less resource intensive and provide a positive impact on patient care

Antimicrobial Stewardship Never Events

MEMORIAL HERMANN

Antibiotic Never Events
Antibiotic use for a nonsusceptible organism after identification and susceptibility
Antibiotic use that exceeds 2 days after causative organism identified and susceptibility results available when de-escalation is possible (can safely be treated by a narrower agent)
Postsurgical antibiotic prophylaxis exceeds national guidelines
Antibiotic use for viral upper respiratory tract infections
Antibiotic use for asymptomatic bacteriuria

- Any use that is not expected to result in abatement of illness contributes unnecessary and unacceptable risk and violates the well-known medical tenet of “first, do no harm,” and these instances should be termed “antibiotic never events” (ANEs)
- Risk is realized in direct patient harm (i.e., adverse drug events), downstream antibiotic collateral damage (eg, C. difficile infection), and transformation of susceptible organisms into untreatable drug-resistant pathogens
- Antibiotic use is not only clinically unsupported but carries a definable or measurable risk of serious harm

Infection Control & Hospital Epidemiology (2018), 0, 1–2

Who we are?

MEMORIAL HERMANN

- Memorial Hermann Healthcare System (MHHS)
- Network of 14 acute care hospitals
- Memorial Hermann Southwest
  - Community teaching hospital, 594 beds
  - Patient population
    - ED treats approximately 70,000 patients/year
    - Level II trauma center
    - Level II stroke center

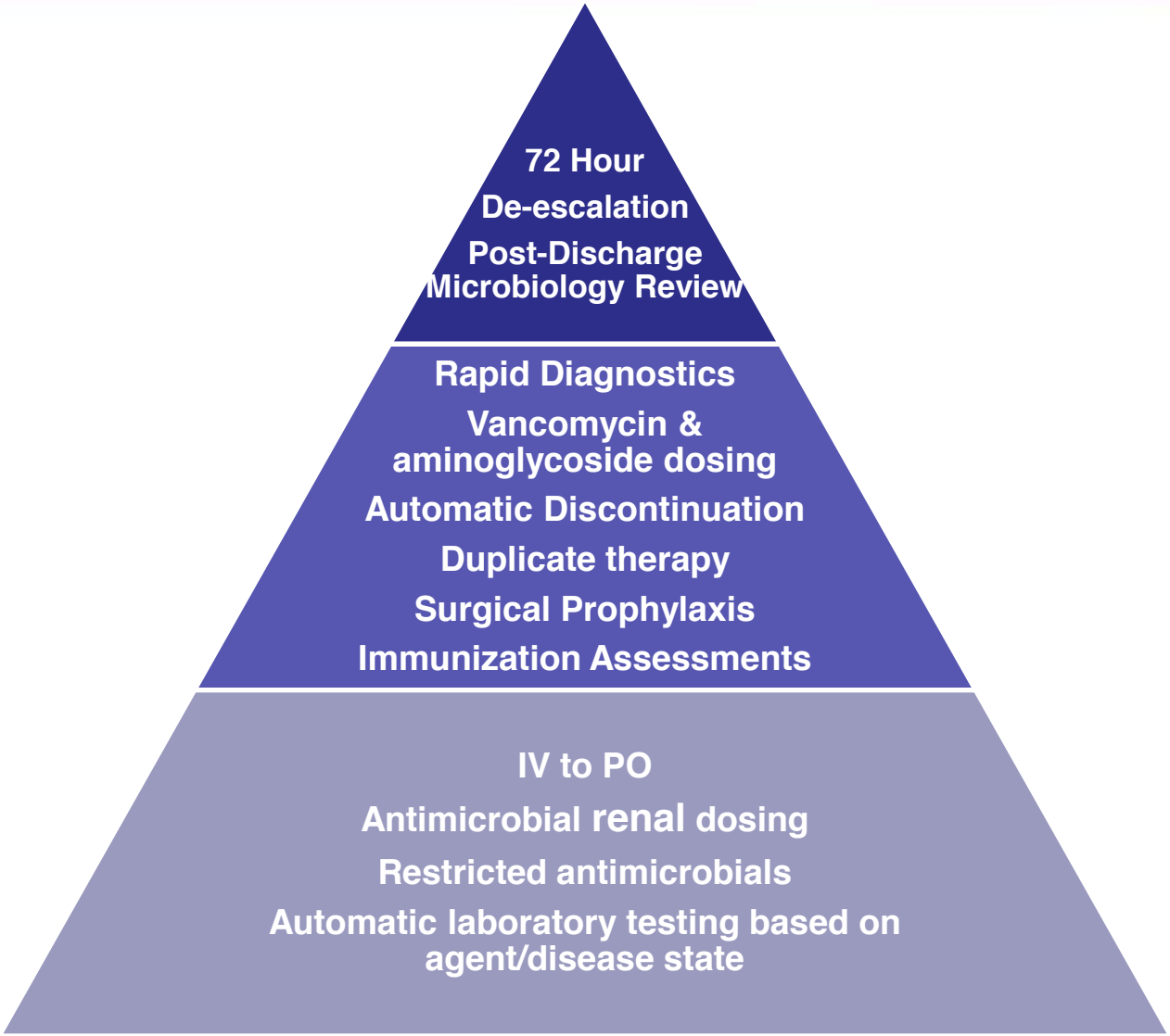
ASP Campus Committee

MEMORIAL HERMANN

- Membership
  - Infectious Disease Medical Directors
  - Infectious Disease Clinical Pharmacist
  - 8 Medical Specialties
  - 3 Ancillary Services
- Medical Service Lines
  - Inpatient hospitalist service
  - Closed ICUs with intensivist coverage
  - Family practice medical residency program

Stewardship Activities Based on Resources

MEMORIAL HERMANN



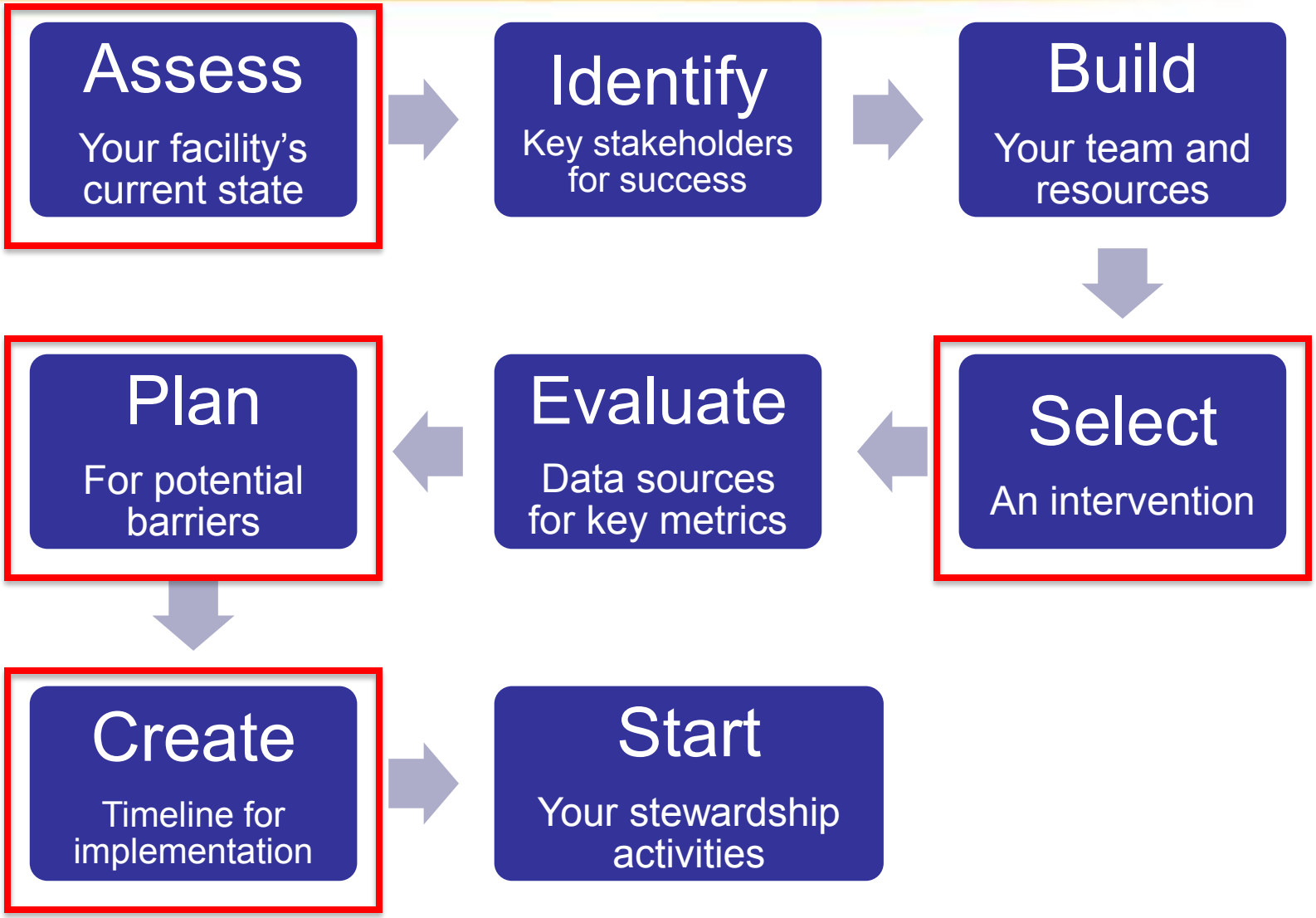
Activities that can be completed by ID clinical specialists

Activities that can be completed integrated pharmacy staff

Activities that can be completed by all pharmacy staff

Roadmap for Action

MEMORIAL HERMANN



Adapted from EQuIP Jump Start Stewardship Training and Professional Development Program. https://echo.unm.edu/wp-content/uploads/2017/09/Jumpstart-Stewardship-Workbook.pdf. Accessed 1/8/2019

Identifying Possible ASP Targets

MEMORIAL HERMANN

- Goals
  - Positive impact on patient care
  - Improve antimicrobial utilization
  - Appropriate use of resources
- Assessing our opportunities
  - Annual strategic plan
  - ASP interventions
  - Utilization trends
  - Quarterly literature review

Annual Strategic Plan

MEMORIAL HERMANN

- Receive input from all members of the ASP committee
- Allow ASP leadership to review needs of the institution
- Choose targets that can be completed within the year
- Engage the ASP team to determine what is important

Memorial Hermann Southwest Antimicrobial Stewardship Committee
2018 Strategic Plan

- Memorial Hermann System ASP goals
  - 5% reduction in antimicrobial expenditures from January to June 2017
  - Designation of at least 1 measurable campus initiative
- Potential measureable ASP initiative goals
  - Appropriate utilization of meropenem
  - Appropriate utilization of vancomycin
  - Appropriate utilization of ceftolozane/tazobactam
  - Appropriate utilization of ceftazidime/avibactam
  - Appropriate utilization of ertapenem
  - Implementation of guidelines surrounding fluoroquinolone use
  - Implementation and impact of MALDI-TOF
  - Medical staff guidance for the appropriate use of procalcitonin for the following pathways:
    - Diagnosis of bacterial infection
    - Duration of therapy
  - ASP in the Intensive Care Units
  - Developing clinical guidelines/pathways for the management of intra-abdominal infections
  - Developing clinical guidelines/pathways for the selection of empiric anti-pseudomonal coverage
  - Appropriate management of urinary tract infections
  - Appropriate management of asymptomatic bacturia
  - Developing clinical guidelines/pathways for key ID related disease states
    - Pneumonia
    - Skin and Soft Tissue Infections
    - Intra-Abdominal Infections
    - Urinary Tract Infections
    - Bacteremia
- Compliance with CMS/JC standards
  - Selection of antibiotic indication for all anti-infectives prescribed
  - Selection of duration of therapy for all anti-infectives prescribed
- Reporting of ASP performance measures quarterly

Analyzing the Data

MEMORIAL HERMANN

- ASP Interventions
  - Targeted areas tracking system
    - Targeted antibiotics
    - 72 hour antimicrobial review
    - All positive cultures
- Utilization Trends
  - DOT/1000 PD
    - Use of clinical surveillance software
  - Antimicrobial resistance patterns
  - Healthcare acquired infection rates

Quarterly Literature Review

MEMORIAL HERMANN

- Created by medical director
- Brief synopsis of recent literature with comment regarding impact
- Divided into 2 categories
  - Should clinical care be reviewed based on this paper?
  - Informational

Literature Review

Fall 2018

Antimicrobial prophylaxis for patients undergoing cardiac surgery: Intraoperative cefazolin concentrations and sternal wound infections.
Antimicrob Agents Chemother 2018 Oct 24; 62: e01360-18

To identify the most important parameters affecting infection risk in patients undergoing cardiac surgery and receiving cefazolin surgical prophylaxis, authors measured total and free cefazolin concentrations in blood samples taken 30 minutes after the preoperative dose, before intraoperative redosing, and within 15 minutes of wound closure. Patients were monitored for surgical site infection (SSI) for 30 days after surgery. Multivariate logistic regression analysis (including relevant clinical data) and classification and regression tree analysis were performed to detect thresholds for SSI among identified continuous variables. Significant thresholds for increased SSI risk were surgery duration >346 minutes (60.0% vs. 14.3% SSI) and total plasma cefazolin concentration <104 mg/L at time of wound closure (30.4% vs. 5.9% SSI).

Comment: This study confirms importance of adequate levels of cefazolin at the time of wound closure. Cefazolin redosing for surgical procedures longer than 3-4 hours will assure adequate levels at time of closure. Weight-based dosing and redosing for prolonged procedures should assure optimal surgical prophylaxis.

Making the Vision a Reality

MEMORIAL HERMANN

- Moving through the planning and creation stages
- Plan
  - Do we need additional data?
  - Do we need “buy in” from key physician groups?
  - Do we need IT support?
- Create
  - Complete literature review
  - Establish guidelines and protocols
  - Define data points for quality metrics
  - Create staff education

Quick Wins…

MEMORIAL HERMANN

- Management of asymptomatic bacteriuria
- Appropriate utilization of daptomycin
- Impact of procalcitonin on antibiotic utilization in COPD exacerbations

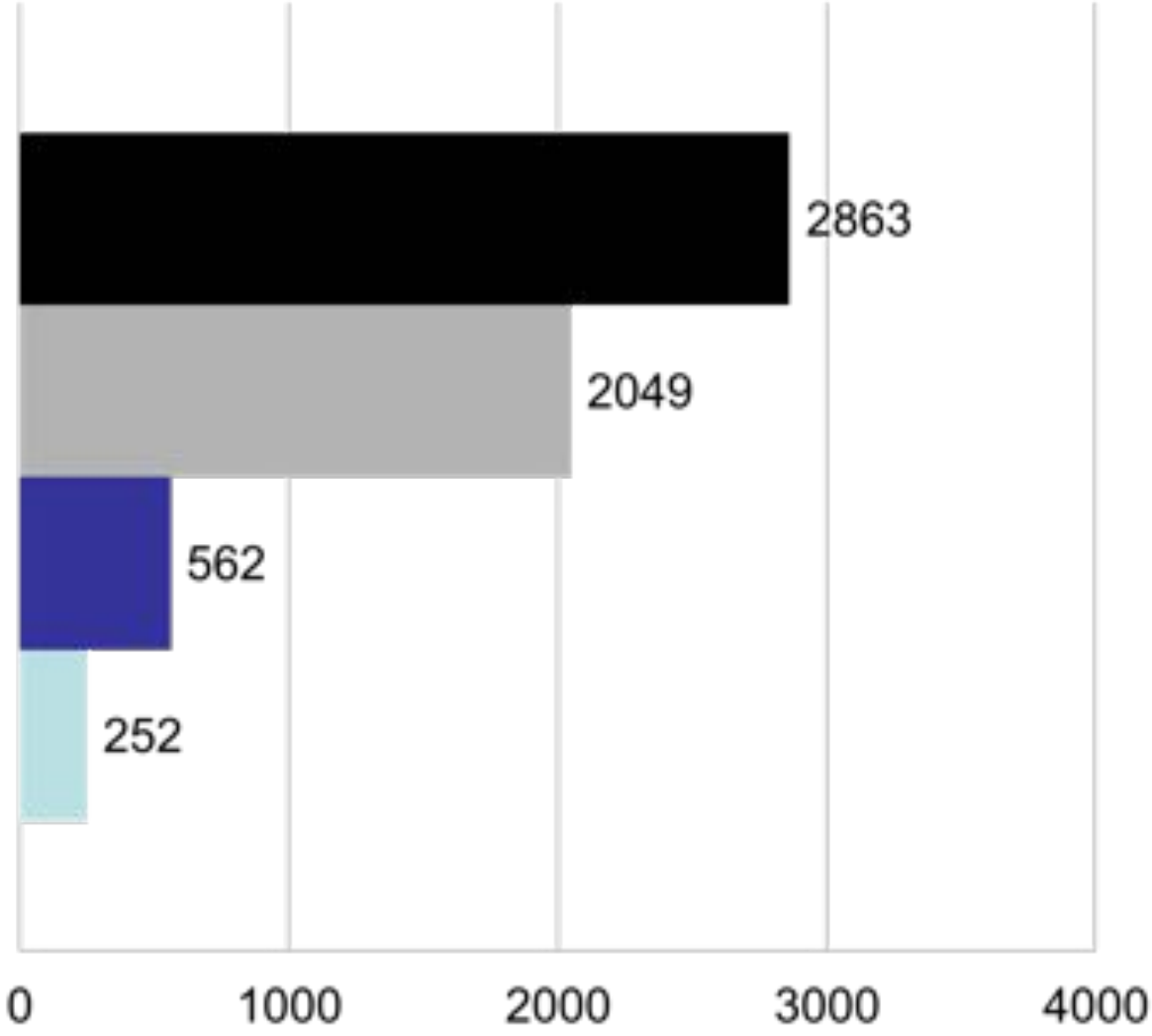
Management of Asymptomatic Bacteriuria

MEMORIAL HERMANN

- Assess
  - High numbers of interventions related to ASB
  - Analysis of current urine culture reflex criteria
- Select
  - How do we combat the treatment of ASB?
  - Begin process with change in urine culture reflex criteria
- Plan
  - How many urine cultures are we performing?
  - What is the impact of changing the reflex criteria?
- Create
  - Establish new guidelines for urine culture reflex criteria
    - Urine reflexed only based on WBC >10
  - Obtain support from key physician groups

MH System Data: Oct 2017

MEMORIAL HERMANN



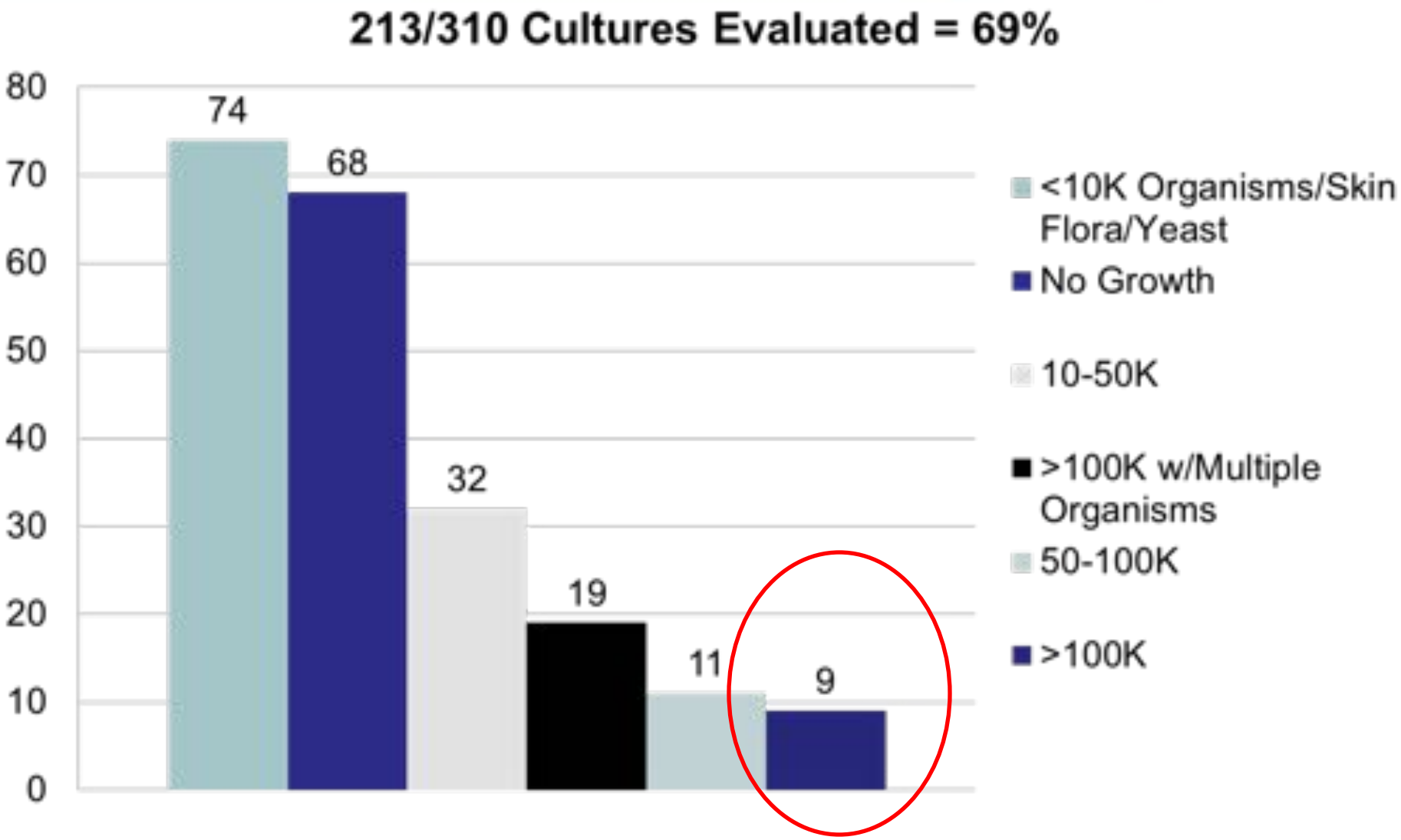
- Total UA with Reflex
- No Reflex
- Positive Reflex with Current Criteria
- Positive Reflex with Proposed Criteria

Change in Urine Cultures

Monthly: 310 cultures
Yearly: 3720 cultures

Urine Cultures Results

MEMORIAL HERMANN



Clinical Assessment of Urine Culture Data

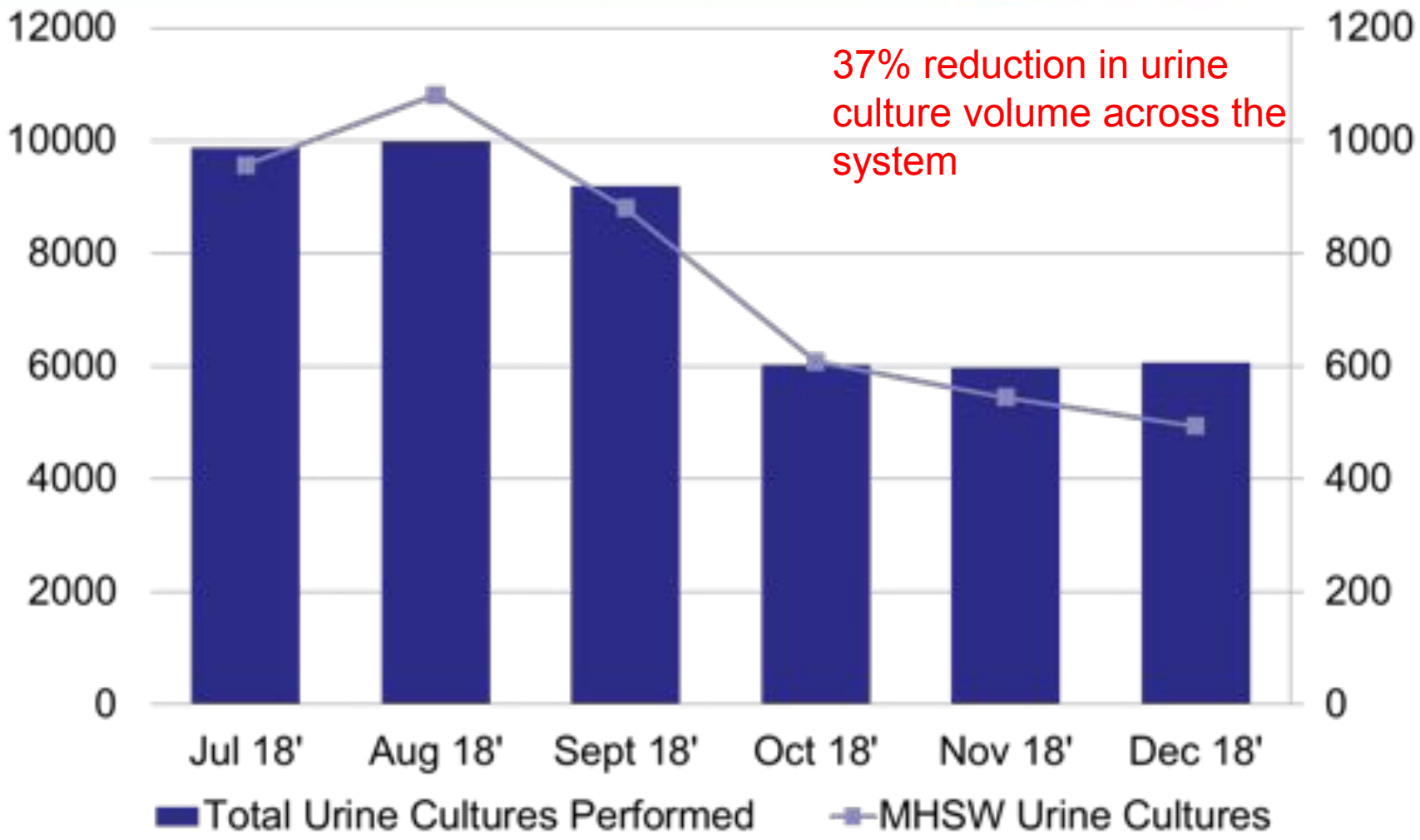
MEMORIAL HERMANN

- Patients evaluated: 4.2% (9/213)
- Patients with s/s of UTI: 0.5% (1/213)
- Patients with ASB: 3.7% (8/213)

Squamous Cell Contamination

- Patients with contaminated samples: 94.8% (55/58)
- Patients with ASB: 5.1% (3/58)

Urine Cultures Volumes



Next Steps in UTI Management

MEMORIAL HERMANN

Daptomycin Utilization

MEMORIAL HERMANN

- Assess
  - Antimicrobial utilization showed increased daptomycin utilization compared to similar institutions
  - High utilization of one time doses
- Select
  - Has daptomycin utilization been appropriate?
  - Does our current antibiogram data support volume of daptomycin use?
- Plan
  - Conduct a medication use evaluation to review indication and duration of daptomycin use
- Create
  - Create guidelines for daptomycin use
  - Require ASP approval for daptomycin

Definitions of Appropriate Daptomycin Use

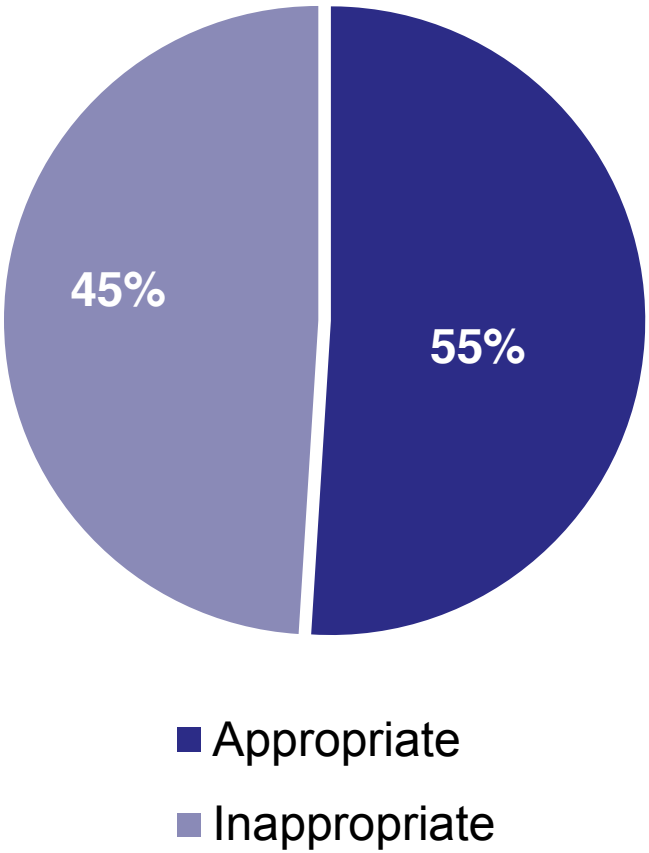
MEMORIAL HERMANN

- Appropriate use defined as:
  - Vancomycin allergy
  - VRE infection
  - MRSA infection with vancomycin MIC >2 mcg/mL
  - History of VRE or MRSA with vancomycin MIC > 2 mcg/mL
  - Vancomycin failure
    - Persistent positive cultures or signs and symptoms of infection >3 days after therapy
- 100 patients evaluated

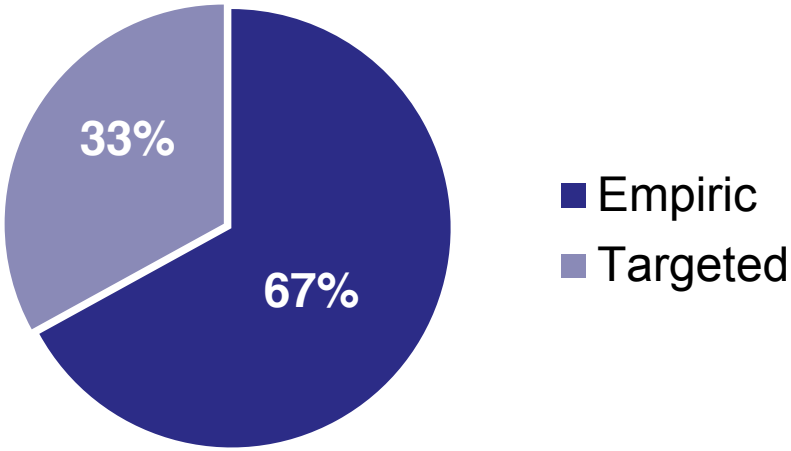
Medication Utilization Evaluation Results

MEMORIAL HERMANN

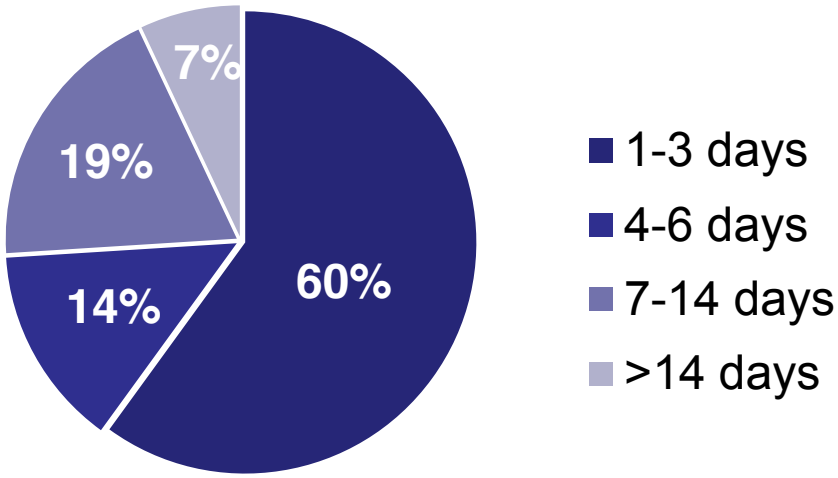
Appropriateness of Daptomycin



Empiric vs. Targeted Therapy



Length of Therapy



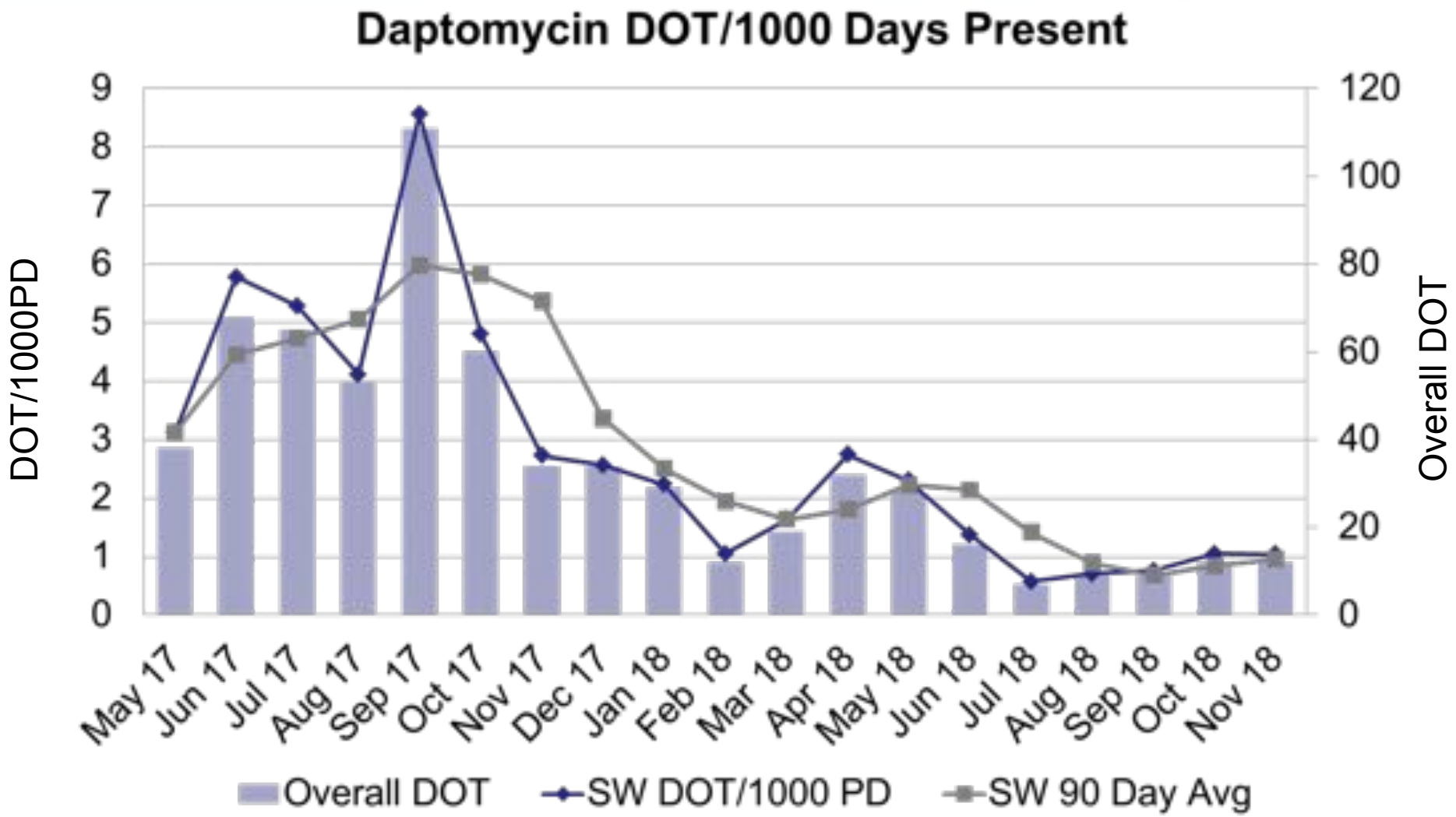
Revised Daptomycin Criteria for Use

MEMORIAL HERMANN

- All previously outlined criteria **PLUS**
- If indication for daptomycin is SSTI or UTI and patient not on SSRI agents or thrombocytopenic, pharmacist will contact prescriber to consider linezolid
- One time doses will not be dispensed outside of the OR
  - Patients in the OR requiring surgical prophylaxis will receive clindamycin or may consider daptomycin if current/history of VRE or MRSA with vancomycin MIC > 2 mcg/mL

SW Daptomycin Utilization

MEMORIAL HERMANN



Procalcitonin and COPD Exacerbations

MEMORIAL HERMANN

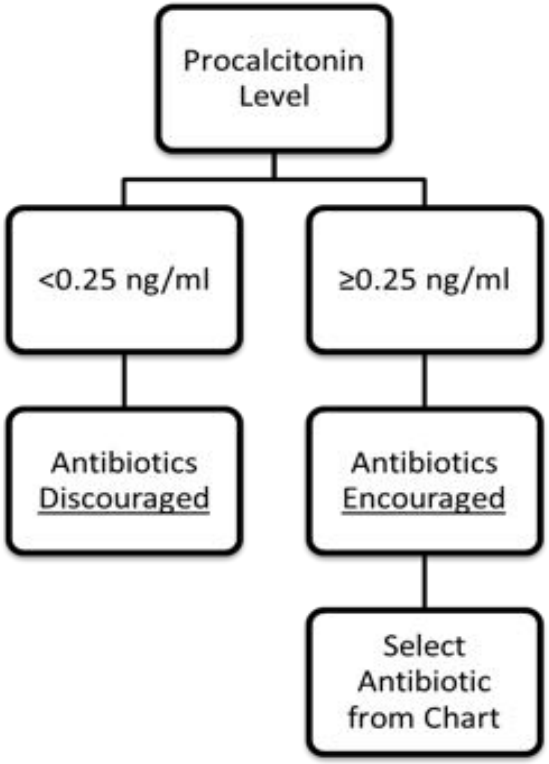
- Assess
  - Increasing body of literature pointing to the utility of using procalcitonin (PCT) use in respiratory tract infections
  - PCT use in pneumonia well established with more limited trials in the COPD population
- Select
  - How can we utilize PCT to differentiate exacerbations from viral versus bacterial etiology?
- Plan
  - In depth literature review
  - Engage key stakeholders
  - How do we identify these patients?
- Create
  - Develop PCT guided algorithm for the management of antimicrobial therapy in patients with COPD exacerbations
  - Evaluate impact on antibiotic utilization and patient outcomes

Lancet Infect Dis. 2018; 18:95-107
Eur Resp Rev. 2017; 26:160073
International Journal of COPD. 2016:11. 1381-1389
2017 GOLD Guidelines

MHSW Protocol

MEMORIAL HERMANN

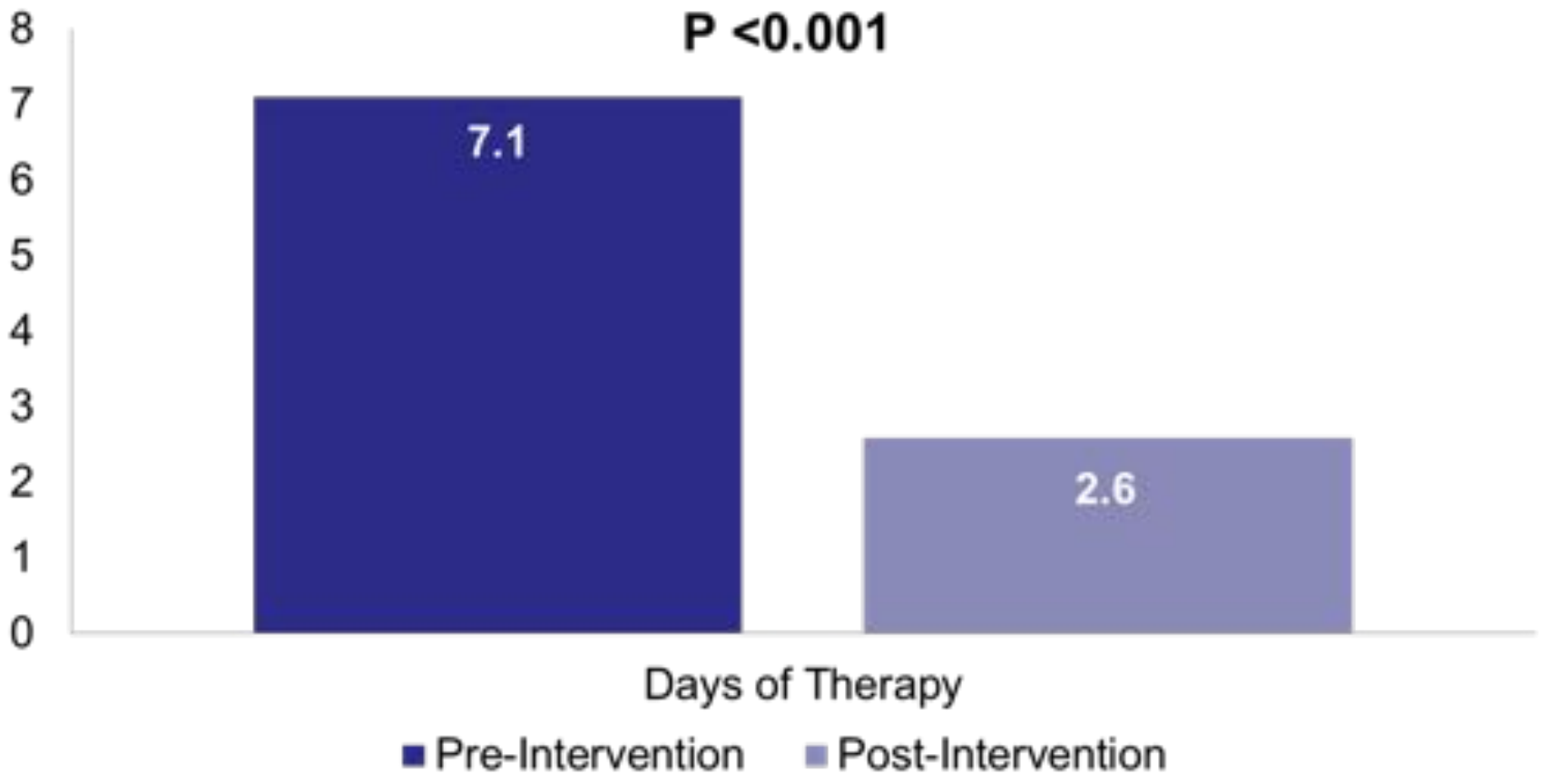
- PCT ordered within 24 hours of admission
- If no initial or follow-up PCT was ordered, pharmacist could automatically order per-protocol for
  - Sound hospitalists
  - Family medicine residents
- For patients who are managed on antibiotics, repeat PCT levels every two days
- If the PCT level does not fall below 0.25 ng/ml during admission, the patient should receive antibiotics for 5 days



ID Week 2018, October 3-7, 2018. Abstract 71990: Evaluating the Impact of Procalcitonin on Antibiotic Utilization in Chronic Obstructive Pulmonary Disease Exacerbations

Primary Outcome – Days of Antimicrobial Therapy

MEMORIAL HERMANN



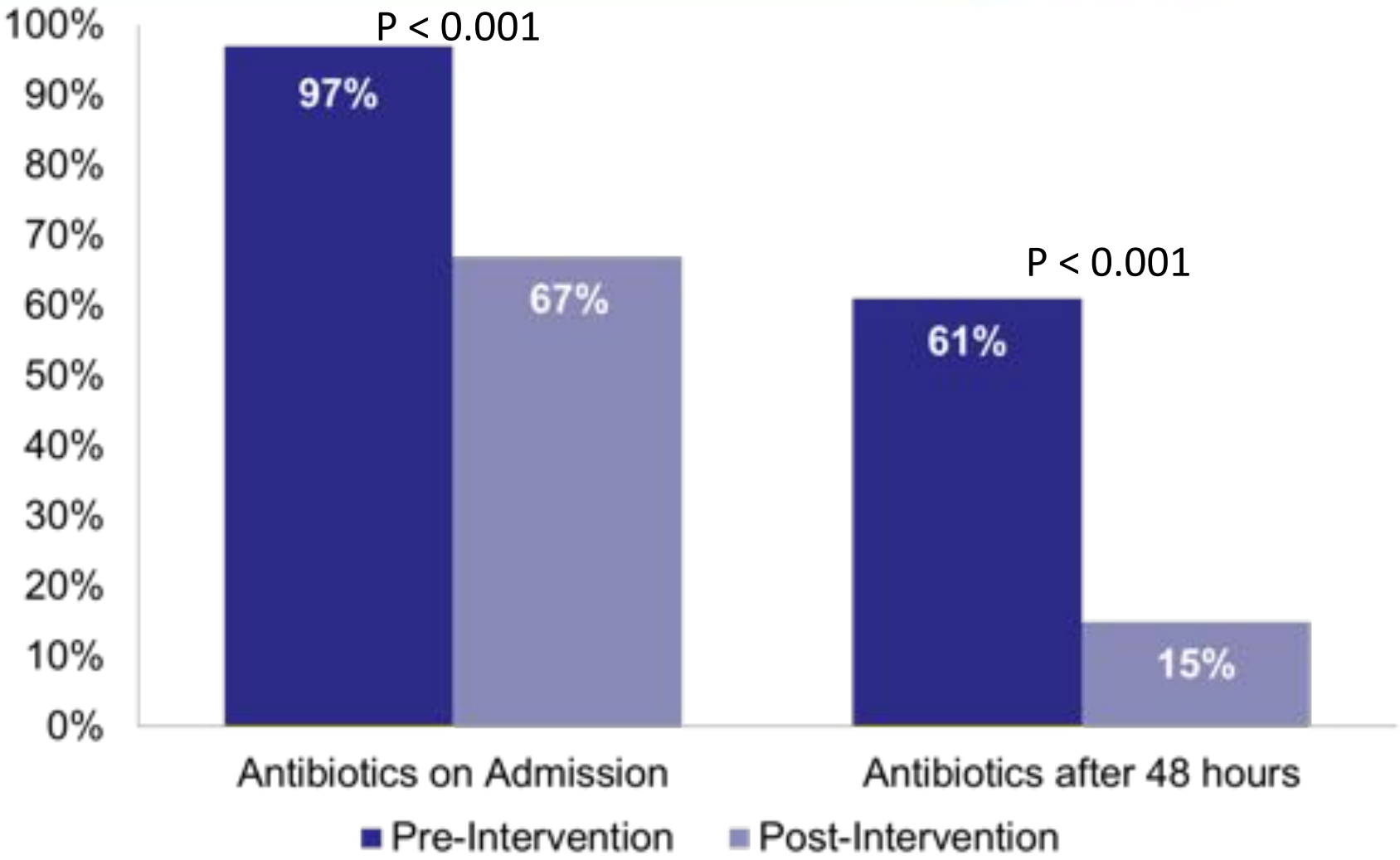
Safety Endpoints

MEMORIAL HERMANN

Secondary Outcomes	Pre-Intervention (n=64)	Post-Intervention (n=75)	P-value
Length of stay mean ± SD, days	5.3 ± 4.2	4.1 ± 3.5	NS
30-day readmission	6 (9.4%)	8 (10.7%)	NS
ICU admission	2 (3.1%)	0 (0%)	NS
Mechanical ventilation	2 (3.1%)	0 (0%)	NS
Death	1 (1.6%)	0 (0%)	NS

Antibiotic Prescribing Trend

MEMORIAL HERMANN



Conclusions

MEMORIAL HERMANN

- The selection of antimicrobial stewardship targets should be based on concrete data or literature and should have clear obtainable goals
- Daily stewardship activities can be the basis for robust performance improvement projects
- Programs should focus on improvement in quality and patient care

MEMORIAL HERMANN

“ANTIMICROBIAL STEWARDSHIP IS A TEAM GAME WITH THE PATIENT AT THE CENTER AND IT’S OUR TEAMWORK THAT MAKES THE DREAM WORK.”

- UNKNOWN

Question 1

MEMORIAL HERMANN

- Which of the following is NOT an antibiotic never event (ANE)?
  1. Antibiotic use for asymptomatic bacteriuria
  2. Antibiotic use for viral upper respiratory tract infections
  3. Therapeutic duplication of antimicrobial therapy
  4. Delayed de-escalation by >48 hours once causative organism and susceptibility results are available

Question 2

MEMORIAL HERMANN

- What is the impact of utilizing a procalcitonin guided algorithm for the antimicrobial management of COPD exacerbations?
  1. Increased length of stay
  2. Increased respiratory related 30 day readmissions
  3. Decreased antimicrobial days of therapy
  4. Increased utilization of anti-pseudomonal antimicrobial agents