

Antimicrobial Stewardship

Going for Gold *and* TJC/ Regulatory Expectations

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History of Antimicrobial Stewardship

- The first time the term “stewardship” was used in relation to antibiotic use was in an article in *New Horizons* in 1996.
- McGowan and Gerding called for an urgent need to address the then reported growing problem of antimicrobial resistance (AMR) in hospitals and concluded that more evidence in the shape of large-scale trials were required to establish how best to control the problem and “optimize antimicrobial use ‘stewardship’”

McGowan JE, Gerding DN. Does antibiotic restriction prevent resistance? *New Horiz.* 1996;4(3):370–376

The Antibiotic Order Form – 1980's!!!

The Use of an Antibiotic Order Form for Antibiotic Utilization Review: Influence on Physicians' Prescribing Patterns [Get access >](#)

Roger M. Echols, Steven F. Kowalsky

The Journal of Infectious Diseases, Volume 150, Issue 6, December 1984, Pages 803–807,
<https://doi.org/10.1093/infdis/150.6.803>

Published: 01 December 1984 [Article history ▼](#)

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Abstract

An antibiotic order form was implemented for all inpatient antibiotic orders at an 800-bed hospital in April 1981 to provide an ongoing, concurrent audit of antibiotic use. The prescribing physician provided the clinical indication for the antibiotic order, and individual patient treatment courses were identified. During the 25-month study period, cephalosporins, penicillin plus ampicillin, and aminoglycosides accounted for 44%, 22%, and 17% of all treatment

- After the introduction of the antibiotic order form, there was a significant decline in both the number of antibiotic treatment courses ($P = .025$) and the percentage of patients receiving any antibiotic ($P = .007$).
- “We conclude that a specialized antibiotic order form is an effective method for antibiotic utilization review and can have a significant impact on a physician's prescribing patterns”

Guidelines for AMS

- 1997, the Society for Healthcare Epidemiology of America (SHEA) and Infectious Diseases Society of America (IDSA) published guidelines for the prevention of AMR in hospitals .
- Set out for the first time the criteria for applied infection control programs in hospitals. The recommended criteria included:
 - 1) a system for monitoring bacterial resistance and antibiotic usage;
 - 2) developing practice guidelines for the control and use of antibiotics;
 - 3) adopting the Center for Disease Control and Prevention (CDC) Guidelines for Isolation Precautions in Hospitals;
 - 4) utilizing hospital committees to develop local policies;
 - 5) making hospital administration accountable for the implementation and enforcement of policies adopted by the hospital committees; and
 - 6) measuring outcomes to evaluate the effectiveness of policies put in place.

History of Antimicrobial Stewardship Programs (ASP)

YEAR	CALL for ASP
2009	CDC launches first educational effort <ul style="list-style-type: none">• To fight antimicrobial resistance• Awareness of the dwindling antibiotic pipeline
2013	CDC launches first educational effort with 4 key strategies <ul style="list-style-type: none">• CMS and TJC emphasizes need
2016	CA first state to require ASP <ul style="list-style-type: none">• 2006 legislation enacted in order to optimize antibiotic selection, dosing, route and duration of therapy• 2016 hospitals required to have ASP
2017	TJC and CMS require all hospitals to implement ASP
2019	Updated CDC Core Elements v2
2023	Updated CDC Core Elements v3

The Goal of AMS is not about Cost Savings!

- The primary goal of antibiotic stewardship is better patient care. The goal is not reduced antibiotic use or cost savings (although a favorable consequence!).
 - At times using more antibiotics, newer or more broad-spectrum interventions are indicated based on patient status, history, antibiogram
- Focus is on optimizing appropriate use, i.e, promoting the use of the right agent at the correct dosage and for the proper duration.
- Stewardship improves clinical outcomes
- Antibiotic stewardship is important for the individual patient, and to society at large.

Ultimate Goal



Antibiotic Resistance

The use of antibiotics is the single most important factor leading to antibiotic resistance around the world

Antibiotic Resistance Threats in the United States, 2013. Centers for Disease Control and Prevention

This complex block features a blue background. At the top, the title 'Antibiotic Resistance' is written in black. Below it is a cartoon illustration of a doctor in a white coat and glasses sitting at a table with a large, green, multi-eyed bacterium. The table has a sign that reads 'PARTNERS IN ANTIBIOTIC RESISTANCE'. To the right of the illustration, a text box contains the statement: 'The use of antibiotics is the single most important factor leading to antibiotic resistance around the world'. At the bottom right, there is a small caption: 'Antibiotic Resistance Threats in the United States, 2013. Centers for Disease Control and Prevention'.

Antimicrobial Stewardship Affecting Resistance

- Data on decreasing HAI's, especially CDI, has been reported.
- Reducing consumption and days of exposure, in theory, may lead decreased resistance.
- Data on decreasing antimicrobial resistance is complex and difficult to prove given the abundance of confounding variables and limitations to any study.
 - Most studies do not have microbial outcome endpoints
 - Study presented at ID Week for linezolid and associated VRE. Positive association but need more study.

Effect of Antimicrobial Stewardship on Linezolid Use and Resistance in
Enterococcus: a Quasi-Experimental Difference-in-Differences Study

Presenting Author: Edward Kong, MA (he/him/his) – Harvard Medical School &
Harvard University

Co-Author: Erica S. Shenoy, MD, PhD – Massachusetts General Hospital

Co-Author: Alyssa R. Letourneau, MD – Massachusetts General Hospital

How to Get Started in Advancing Program and Getting Recognized

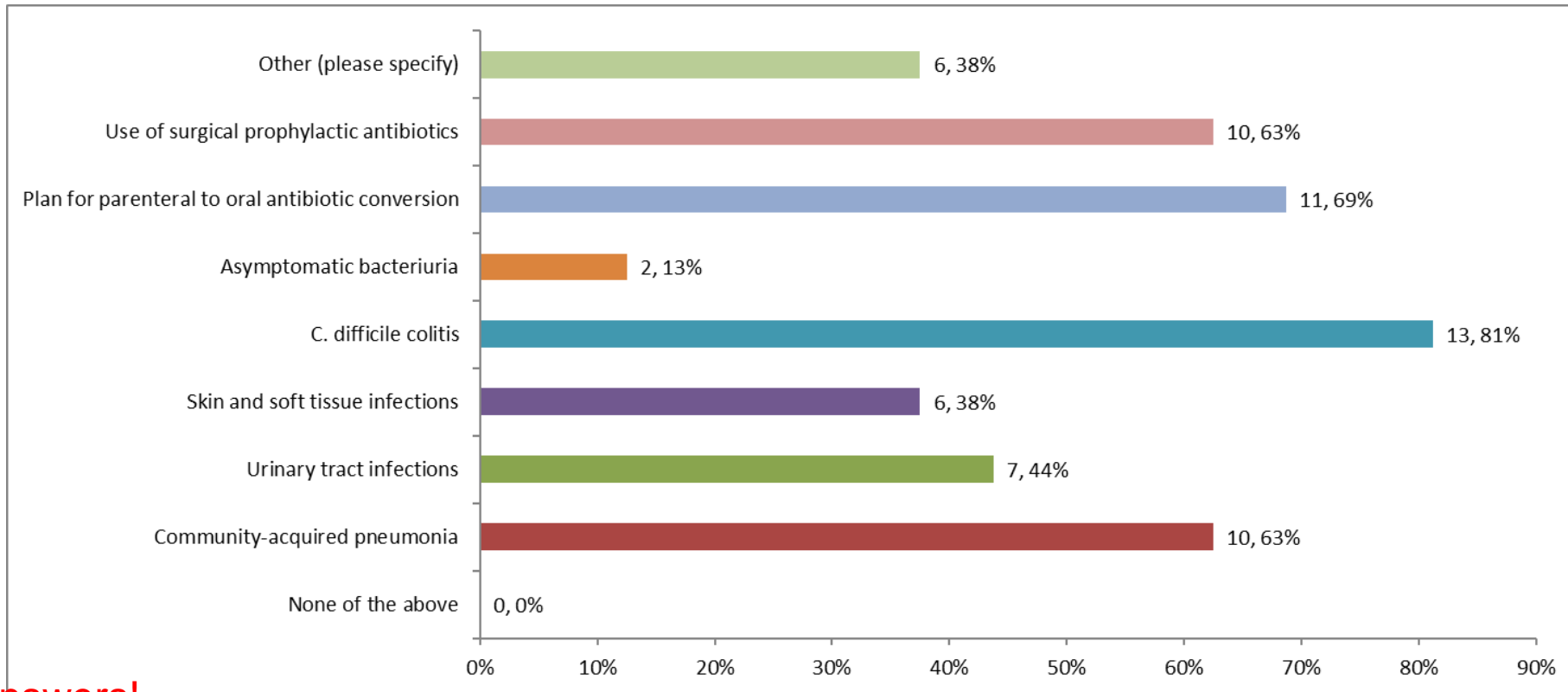
- AMS is Required - When it's required, it gets done!
- In 2022, The Joint Commission (TJC) released New and Revised Requirements for Antibiotic Stewardship ([R³ Report](#))
 - The expectation was to be ready to demonstrate compliance by January 2023
- CMS also Released [Conditions of Participation](#) Updates for Antimicrobial Stewardship Programs in Hospitals and Critical Access Hospitals.
 - TJC and CMS revisions are similar and somewhat aligned. CMS was more specific on what surveyors will look for.
- Gap Analysis
 - At Sutter, after review of the new standards, we conducted a Gap Analysis.
 - Reworked all Elements of Performance into Yes-No questions, or selectable answers

Questions – sent via Survey Monkey

Ep13	Does the hospital have a multidisciplinary committee that oversees the antibiotic stewardship program?	<input type="radio"/> YES <input type="radio"/> NO
EP14	Does your ASP demonstrate coordination among any of these components of the hospital responsible for antibiotic use and resistance?	Select all that apply: <input type="radio"/> infection prevention and control program <input type="radio"/> the quality assessment and performance improvement program, the medical staff, nursing services, <input type="radio"/> pharmacy services <input type="radio"/> Other dept _____
EP15	The antibiotic stewardship program documents the evidence-based use of antibiotics in <i>all</i> departments and services of the hospital.	<input type="radio"/> YES <input type="radio"/> NO COMMENT
EP16	The antibiotic stewardship program monitors the hospital's antibiotic use by analyzing data on days of therapy per 1000 days present or 1000 patient days, <i>(or by reporting antibiotic use data to the National Healthcare Safety Network's Antimicrobial Use Option of the Antimicrobial Use and Resistance Module _ Not currently used within Sutter).</i>	<input type="radio"/> YES <input type="radio"/> NO

Q11: EP18 Does your ASP implement at least two evidence-based guidelines to improve antibiotic use for the most common indications? (If yes, please select guidelines implemented)Note 1: Evidence-based guidelines must be based on national guidelines and also reflect local susceptibilities, formulary options, and the patients served, as needed. System Note: The recent system project for Standardized antimicrobial surgical prophylaxis recommendations applied local clindamycin susceptibilities and would apply.

- Answered: 16 Skipped: 0



Analyze the Answers!

Set Priorities in Order to Advance Stewardship Program

- Core Elements *first and foremost*
- Improve on the Core Elements
 - Support
 - Create a policy
 - Annual education/attestation
 - “Binder” key efforts
- Team Approach
 - Leads (Pharmacy/Physician)
 - Other clinical Rx and MD
 - Shared Lab –
 - Diagnostics, C&S messaging, antibiogram, trends
 - Infection Prevention
 - Nursing, NP, PA's

CDPH HAI ASP Honor Roll: Bronze – Silver - Gold

- The updated criteria are aligned with the revised TJC Elements of Performance
- The goals of the Honor Roll are to promote
 - optimal use of antimicrobials,
 - prevent emergence of antimicrobial resistance and C. difficile infections,
 - and to showcase California healthcare facility ASP that not only follow national guidelines, but also demonstrate outcomes (Silver), and
 - engage their local healthcare community (Gold).

CDPH HAI Antimicrobial Stewardship Program (ASP) Honor Roll



CDPH HAI ASP Honor Roll

- CDPH Honor Roll application has been updated to reflect current Joint Commission and Center for Medicare & Medicaid Services standards.
- The goals of the Honor Roll are to promote
 - optimal use of antimicrobials,
 - prevent emergence of antimicrobial resistance and C. difficile infections,
 - and to showcase California healthcare facility ASP that not only follow national guidelines, but also demonstrate outcomes (Silver), and
 - engage their local healthcare community (Gold).
- Some Benefits
 - Recognition on the CDPH HAI Program website and social media
 - Demonstration to the public that your facility meets and exceeds national ASP guidelines
 - Opportunities to showcase and share best practices
 - Engagement and networking opportunities with the HAI Program ID Pharmacist and other healthcare facilities to improve antimicrobial stewardship in your local community
 - ***Pride for all the hard work!***
- At Sutter, we initially “strongly encouraged” application submissions which then became a Goal for all affiliated hospitals in 2022-2023

Stewardship Projects Planning, Monitoring, Outcomes

FLUOROQUINOLONES – Decreasing Use

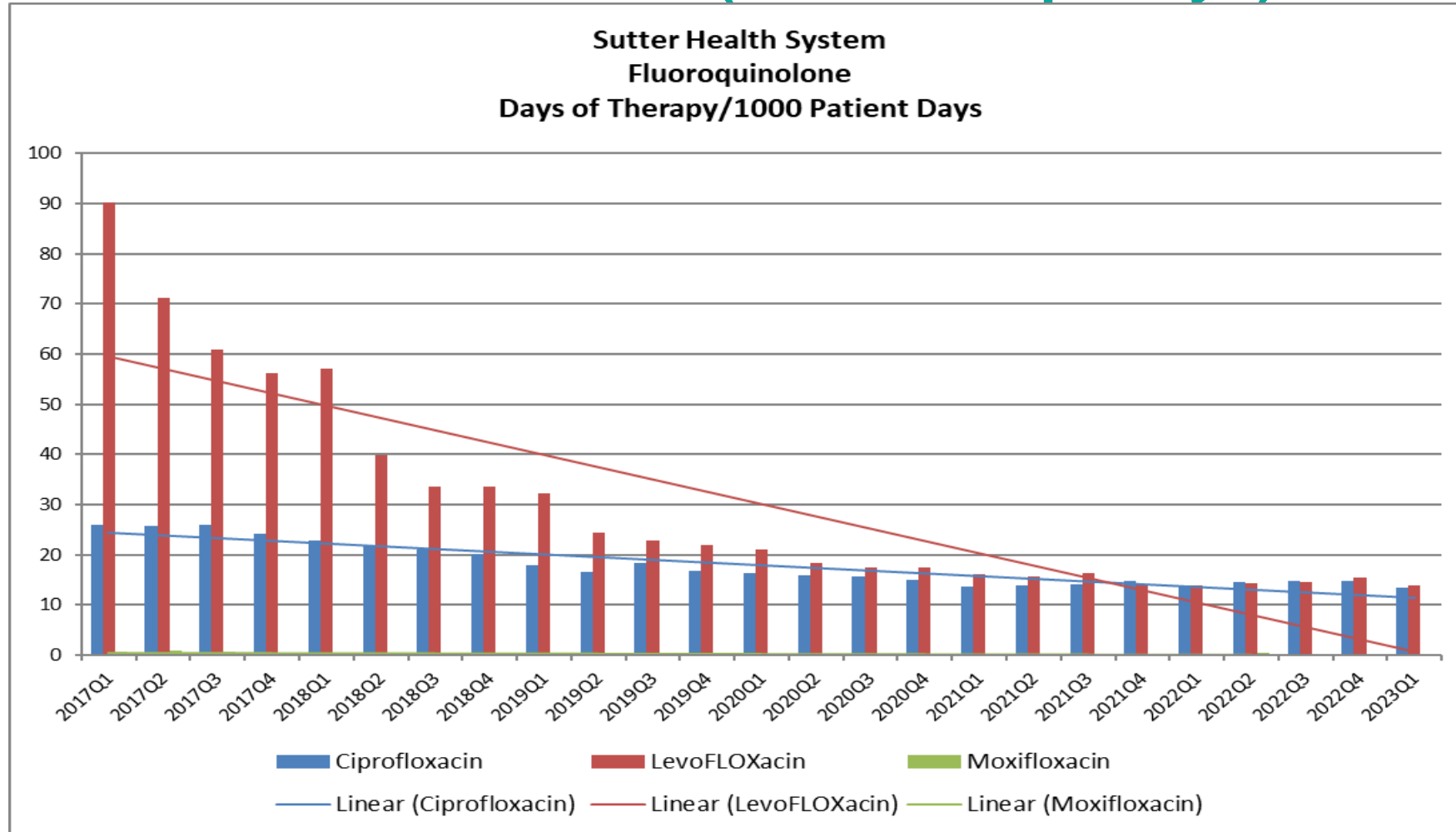
INTRODUCTION AND PURPOSE

- FDA warning on safety of FQN May 2016 [July 2016 – back box warning]
- FQN were commonly prescribed antibiotic, convenient, good activity for variety of infections. Levofloxacin is particularly useful for respiratory tract infections. Availability of both injection and oral formulations with good bioavailability.
- No available benchmarks of what is considered high, low or average utilization. Advantage of large system consisting of large and small hospitals to look at the variation of use to determine high, medium or low use.
- Order sets.
 - Upon examination only served as 10% of all orders. Health providers believed as primary cause for high utilization and crucial to fix order set in order to meet goal of reducing use.
- First Project of the newly formed SH – SAMS committee in 2018.
 - Prior, different level of commitment for ASP existed

SIGNIFICANCE OF PROGRAM TO THE HEALTH SYSTEM

- FQNs high utilization antibiotic, particularly levofloxacin 133 DOT/1000 pt
- Created a task force. Established GOAL: DECREASE use by 20% overall
- ID Committee approved the concept that FQN were area of a concern
 - In January 2018 – a system AMS committee formed. The FQN reduction program first project.
 - Project moved to utilization to more equalization between small and large hospitals with large decreases within the high prescribing hospitals.
- Lack of recognition of adverse events related to FQN, including CDI. Some ADR, may not see or be realized in inpatient settings; neuropathy, myopathy, confusion.
- Associated drop in CDI rates. Relationship of FQN use and CDI was convincing.

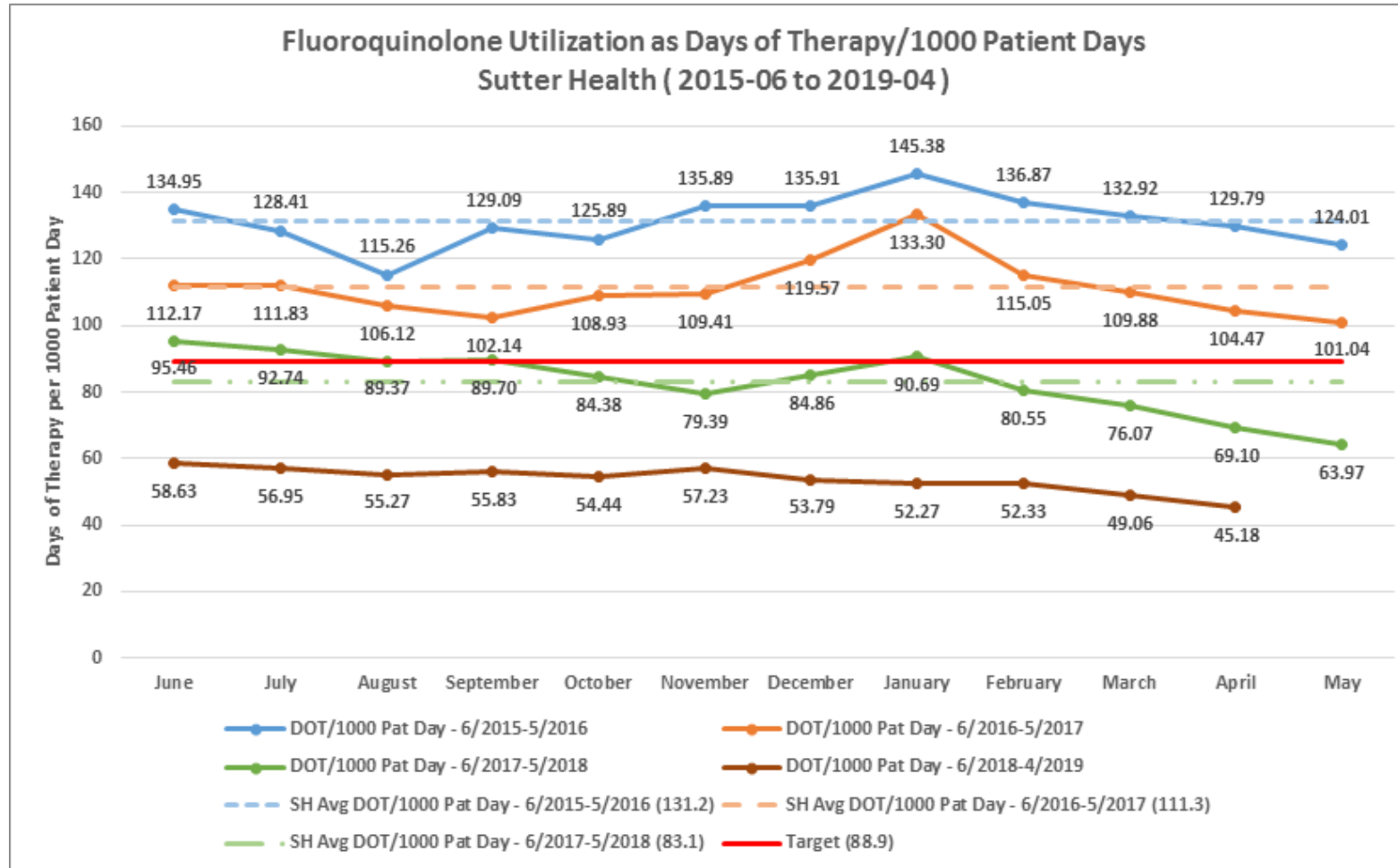
Trend of Ciprofloxacin and Levofloxacin Utilization (DOT/1000 pt days)



*2023Q1 incomplete Jan, Feb only

Fluoroquinolone Use Sutter System Year to Year Comparison

(Year: June - May)



SIGNIFICANCE OF THE AMS PROGRAM and PROJECT

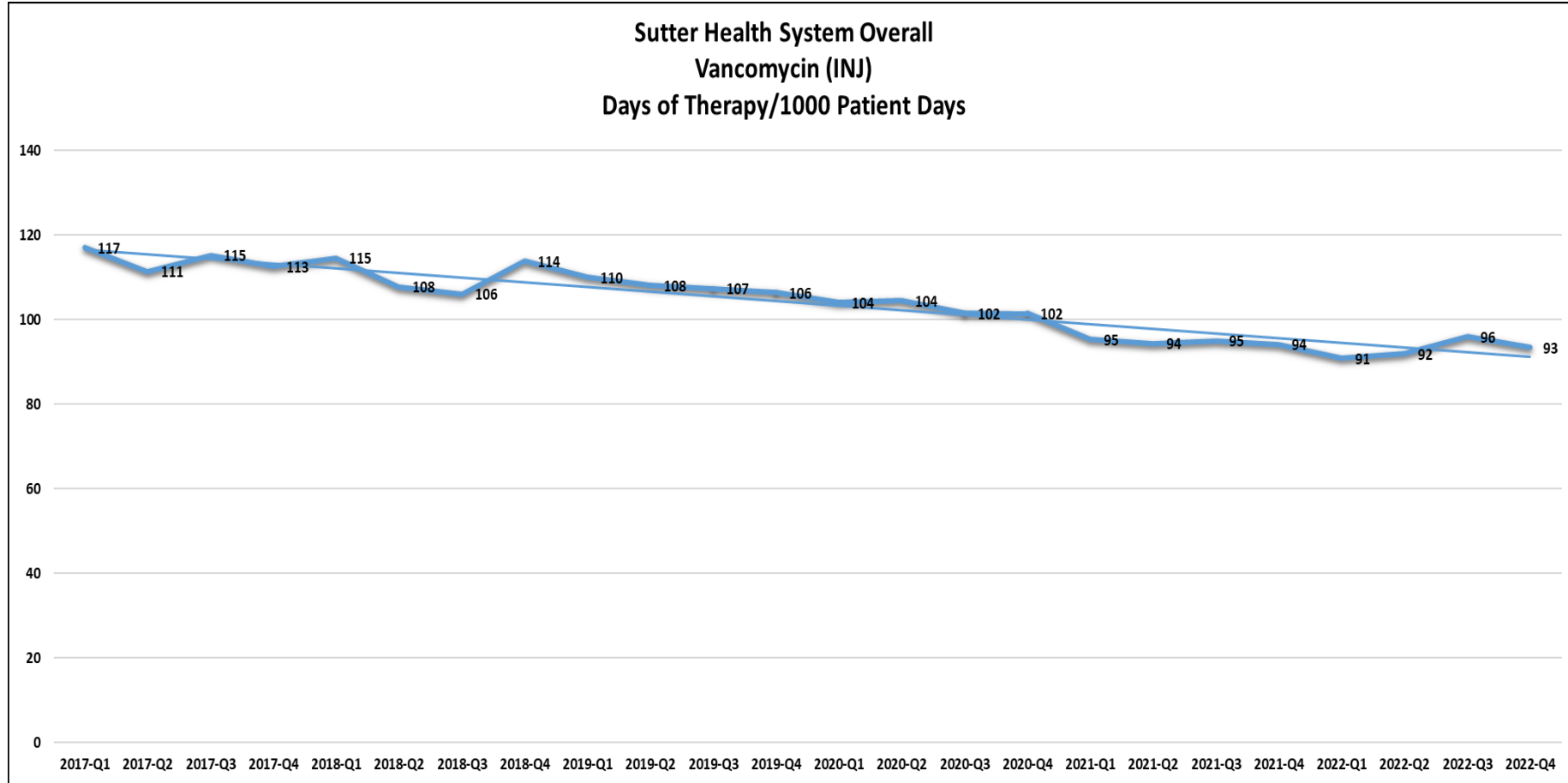
- Buy-in from key stakeholders (ID Specialists, etc) , even if not an active member of ID-CIC or sAMS.
- Shared system antimicrobial stewardship best practices
- Variation reduction – Highlighted the high utilizing hospitals and questioning the variation. Once goal was reached, further efforts occurred with 1:1 discussion with prescriber
- The huge success led to Leadership buy in, active participation and enthusiasm.
- Integration/collaboration.
 - Brought together input from pharmacists, physicians, Infection Prevention, Chiefs of Staff, nursing

Reducing Unnecessary Vancomycin IV Use

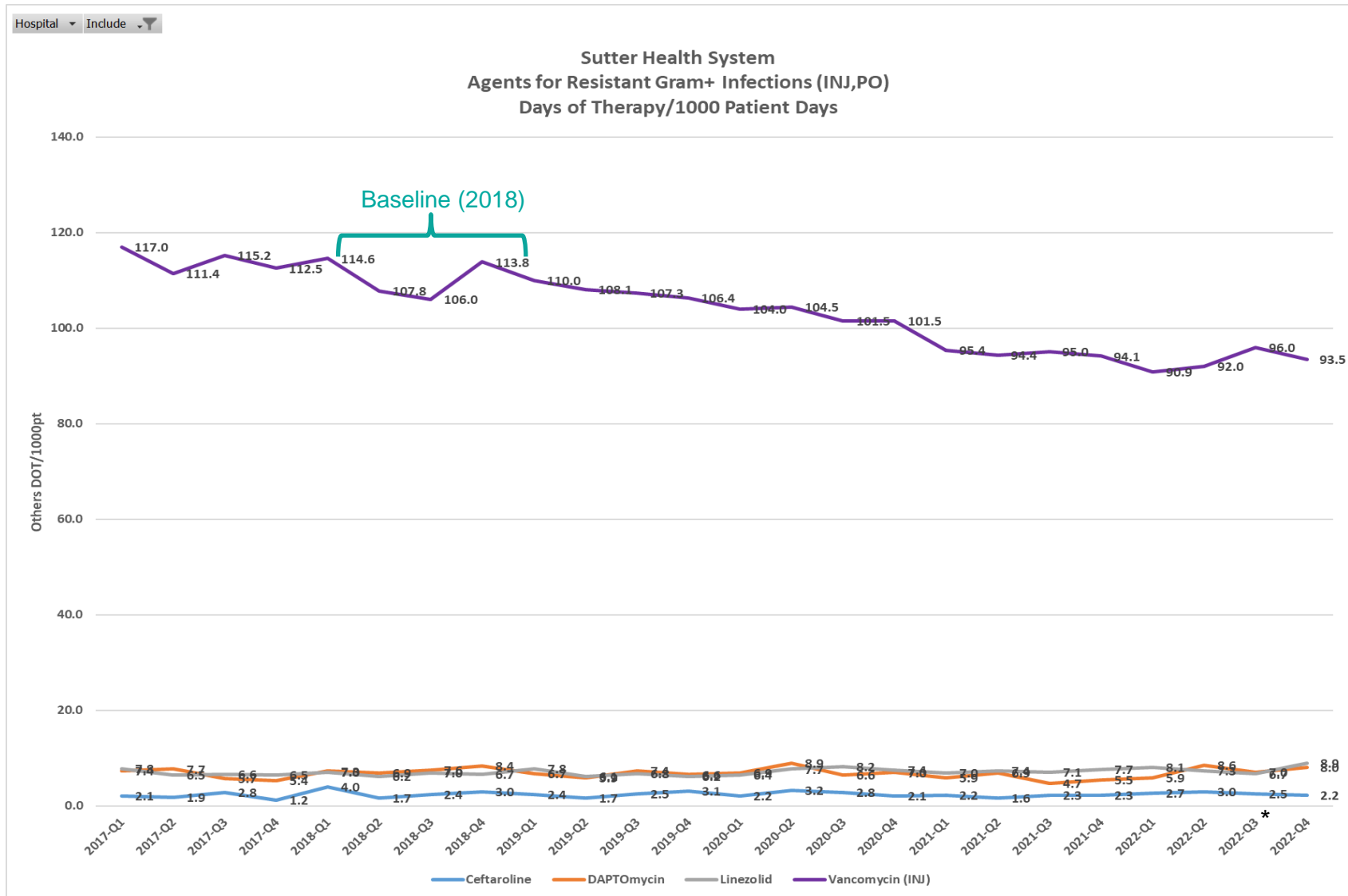
Why Reduce the Use of Vancomycin IV?

- [MMWR](#), Sept 22, 1995 : Recommendations for Preventing the Spread of Vancomycin Resistance Recommendations of the Hospital Infection Control Practices Advisory Committee (HICPAC).
 - **Increase in VRE**
 - Lack of available treatment options
 - Potential to transfer vancomycin-resistant genes to Staph aureus or other gram-positive organisms
 - **Provided recommendations for prudent use**
- Vancomycin is less rapidly bactericidal than beta-lactam agents (if susceptible); requires dosing and monitoring, and has associated adverse events (infusion-rel, AKI).
- High use, estimated to be overprescribed > 20% .

Vancomycin Surveillance



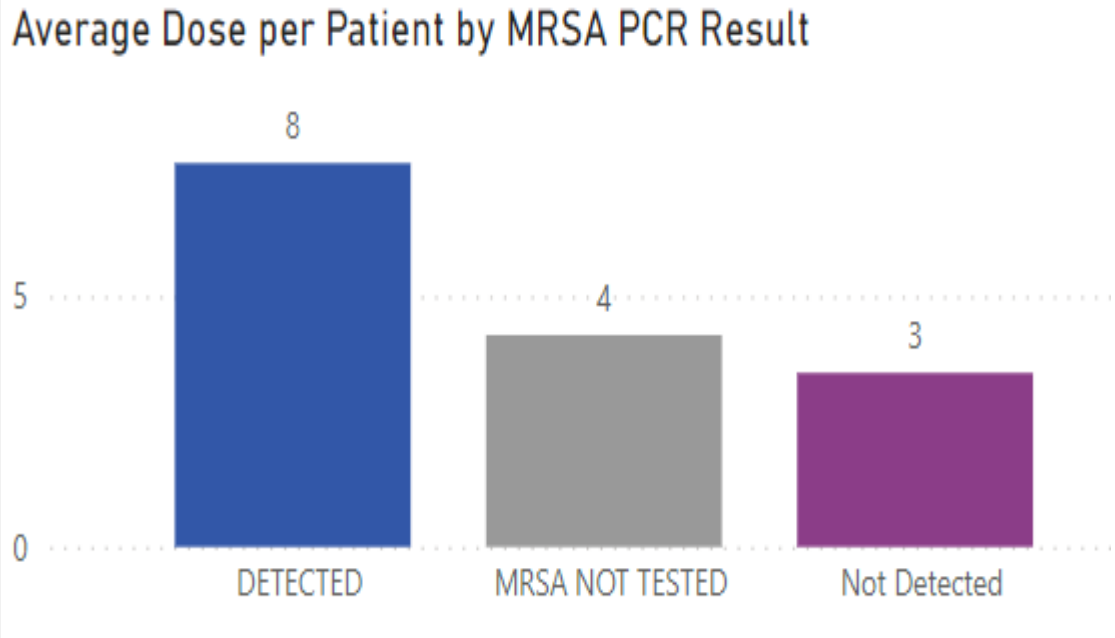
Vancomycin Surveillance: Comparator Data



Key Points – Tying in different Targeted Efforts

1. A Utilization management project
2. Nasal MRSA Screening PCR for PNA patients
 - a) Collaboration with Lab services
 - b) Community acquired pneumonia guidelines
3. Antimicrobial Surgical Prophylaxis Recommendations for Common Procedures
 - a) De-emphasizing vancomycin choice
 - b) Incorporated National Guideline Recommendations with our antibiogram data
 - c) Timing, Selection, number of doses, redosing (long procedures)
 - d) Work with IP in Reducing SSIs
4. Pencillin Allergy Alternatives – ***Ongoing Efforts***

Avg # Vanco Doses Relative to Nasal Swab MRSA PCR Test Results in Pneumonia Patients (mid 2022 to mid 2023)



- Overall range is 3-9 less doses in the patients who had a Nasal PCR with MRSA not detected vs those having MRSA
- Consistent favorable results for nearly 3 consecutive years
- Working on ability for all affiliates to have access and turnaround time

Antibiotic Surgical Prophylaxis/ Peri-operative Administration

- a. Developed a standardized recommendations for Antimicrobial Surgical Prophylaxis
- b. Used SH antibiogram data to revise recommendations
- c. Data analysis on Select Procedure for Orthopedic knee and hip replacements
 - 1) Obtained baseline data on antibiotic selection, number of doses administered
 - 2) Updated data report quarterly – through 2023
 - 3) Report allows drill down of:
 - The number of procedures performed
 - Specific patient information by site
 - Which antibiotics, avg number of doses
- d. Peri – Op Redosing opportunity leveraged within the EMR
 - 1) Timing of re-dosing for longer surgeries (leverage EMR)
- e. Ultimate goal: Reduce Surgical Site Infections – **for 2024**

SELECT ONGOING and FUTURE
PROJECTS SYSTEM ANTIMICROBIAL
STEWARDSHIP

Advancing Stewardship

A. Duration of Therapy

1. Proposed Process

- Create an evidence review, summary of the literature. Shorter is better
- Data focus on inpatient first; then focus on transitions of care; ambulatory care

C. Antimicrobial Surgical Prophylaxis

1. Ortho procedures (knees and hips) quarterly through 2023
2. OB-GYN Procedures Data Report added in 2023
 - a) C-section first
 - b) Hysterectomies

D. STI's Guidance – 2019 Update

1. Ensure therapy/dosing is consistent with updating recommendations
2. Expands activities in clinics/ambulatory care

E. Future – Vaccinations

1. Timing
2. Association with decreased infection/antibiotic use

MDRO Gram-Negative Surveillance

Implementation - 2022

- MDRO Gram negatives to evaluate prevalence report.
- Added patient count to utilization of limited used antibiotics
- Next steps:
 - Trend data within Sutter footprint and by affiliate/geography
 - Evaluate with use of limited use antibiotics

Quarterly Report

AM					
HID	Pt Loc	Coll date	Rslt date	Specimen source	Culture results
AM		12/30/22	1/5/23	Blood	Escherichia coli in only bottle drawn Carbapenemase producing carbap
CP					
HID		Coll date	Rslt date	Specimen source	Culture results
CP		10/24/22	10/29/22	Urine	Greater than 100,000 cfu/ml Carbapenem resistant Acinetobacter sp. ide
CP		11/19/22	11/26/22	Rectal	Carbapenemase producing Escherichia coli (Multidrug Resistant - Carba
CP		10/2/22	10/7/22	Abdominal fluid	1+ Carbapenem Resistant E. coli (Multidrug Resistant - Carbapenemase €
CP		10/6/22	10/20/22	Miscellaneous	Extended spectrum beta-lactamase Kleb. pneumoniae (Multidrug Resista
DV					
HID		Coll date	Rslt date	Specimen source	Culture results
DV		11/5/22	11/9/22	Urine	Greater than 100,000 cfu/ml Carbapenem Resistant Enterobacter Identifi
FR					

Antimicrobial Stewardship Database

AMS Database Updates

- Current database makes available monthly standard surveillance of
 - Antibiotic utilization as DOT/1000 pt days
 - DDD no longer conventional
- CMS posting on submitting antibiotic utilization to NHSN as a requirement for CMS participation in 2024.

<https://www.federalregister.gov/documents/2022/08/10/2022-16472/medicare-program-hospital-inpatient-prospective-payment-systems-for-acute-care-hospitals-and-the>

c. Information Collection Burden Estimate for the Antimicrobial Use and Resistance (AUR) Surveillance Measure Beginning With the CY 2024 EHR Reporting Period

In section IX.H.5.b. of the preamble of this final rule, we are finalizing the requirement to report a new Antimicrobial Use and Resistance (AUR) Surveillance measure for eligible hospitals and CAHs under the Medicare Promoting Interoperability Program's Public Health and Clinical Data Exchange Objective with a modification to delay the beginning of reporting until the EHR reporting period in CY 2024 instead of the EHR reporting period in CY 2023. Eligible hospitals and CAHs will be required to attest to active engagement with CDC's National Healthcare Safety Network (NHSN) to submit AUR data and receive a report from NHSN indicating their successful submission of AUR data for the EHR reporting period.

CDC – NHSN

Standardized Antimicrobial Administration Ratio (SAAR)

- The SAAR can be used to track AU changes over time
- Benchmark metric for comparison of AU in similar patient care locations nationally. While the SAAR is not a measure of appropriateness of AU, it enables ASPs to compare their AU to a national baseline.
 - assess whether using antimicrobials at higher rates than predicted (i.e., SAAR values >1), which can prompt hospitals to further evaluate prescribing practices and ultimately intervene, if necessary, to optimize AU.

$$SAAR = \frac{\textit{Observed antimicrobial days of therapy}}{\textit{Predicted antimicrobial days of therapy}}$$

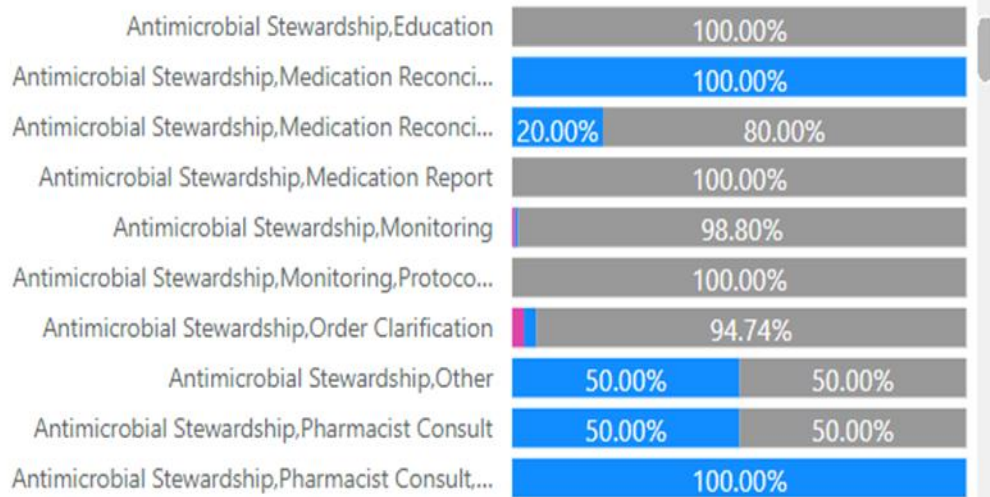
Intervention Tracking – Required!

- Data in results in quality of data out
- If you focus on acceptance, some may not enter the intervention
 - Educate on metrics
 - Data will allow focus on specific type of interventions, or a specific antibiotic that requires more effort, education
 - Identify physicians who don't want to accept advice. Escalate as appropriate
- Instructions for input standardization
- Follow up on closing the intervention. Identify those interventions that don't require and acceptance.

New Dashboard

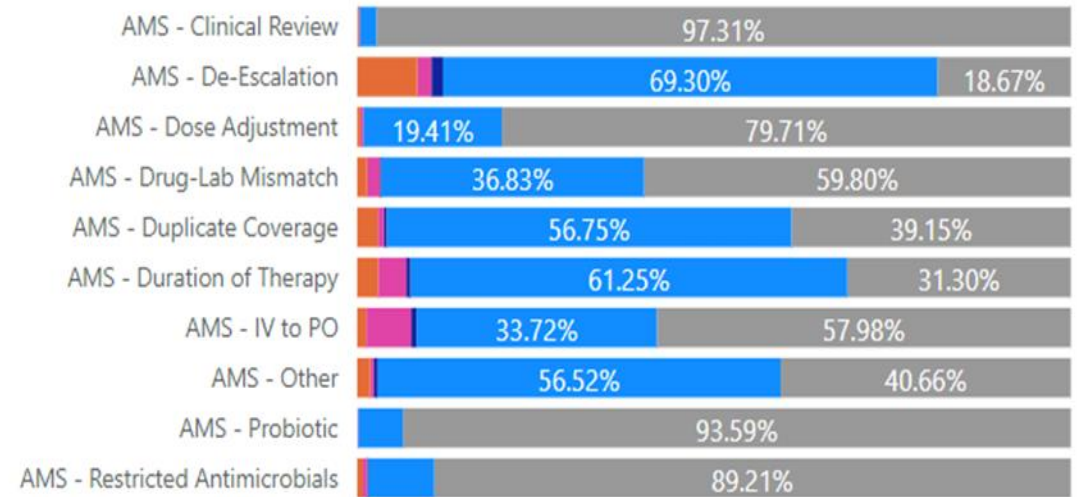
Intervention Count by Type and Response

Intervention Resp... ● *Unknown ● ACCEPTED ● DECLINED ● PENDING ▶



Intervention Count by Subtype and Response

Intervention Response ● *Unknown ● ACCEPTED ● DECLINED ● PENDING ● REJECTED



In Conclusion

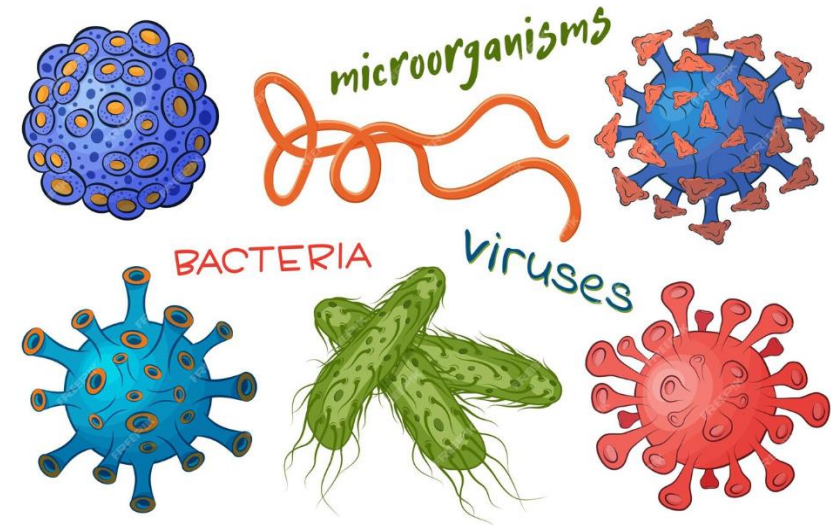
- Antimicrobial Stewardship Program
 - Required
 - Involves commitment from leadership and team members
 - Understanding and belief in the impact
 - Feedback
 - Project results
 - Metrics (own hospital/ variation in prescribing)
 - Meaning/Outcomes
 - Requires continued education intervention to adhere to protocol and change mindset
 - System (hospital or group) AMS initiatives, with tailored local data, group data comparison, and best practices to support a common vision for action for hospital AS providers.

D's of Antimicrobial Stewardship

- **Diagnosis** requiring antibiotic
- **Drug** choice
- **Correct Dose**
- **Suitable Duration**
- **Timely De-escalation**

Add:

- **Document** actions and outcomes
- **Deliver** information and education



Achieving Success and Obtaining CDPH Recognition

- Elements of Performance are considered Standard AMS work ***with documentation.***
- Projects and Goals of interest and enthusiasm
- **Easy** access to databases with
 - Interventions
 - Utilization
 - Benchmarks
 - Variation
 - System to system
 - Hospital to hospital
 - Provider(s) to Provider (s)
- Incorporating Guidelines (national modified to own)
- Reaching out to the Community

