2025 Updates to MLH Antibiotic Stewardship Program

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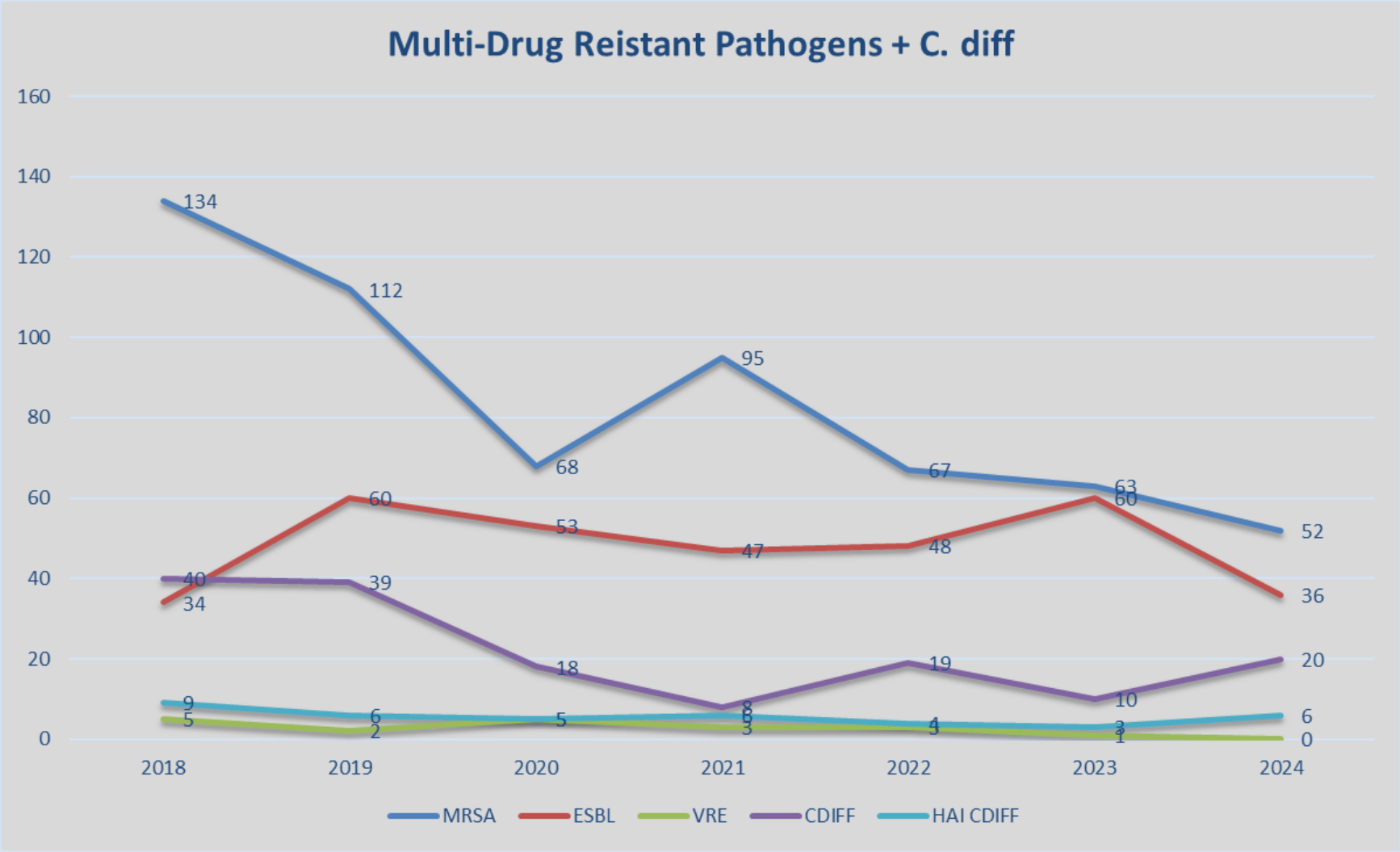
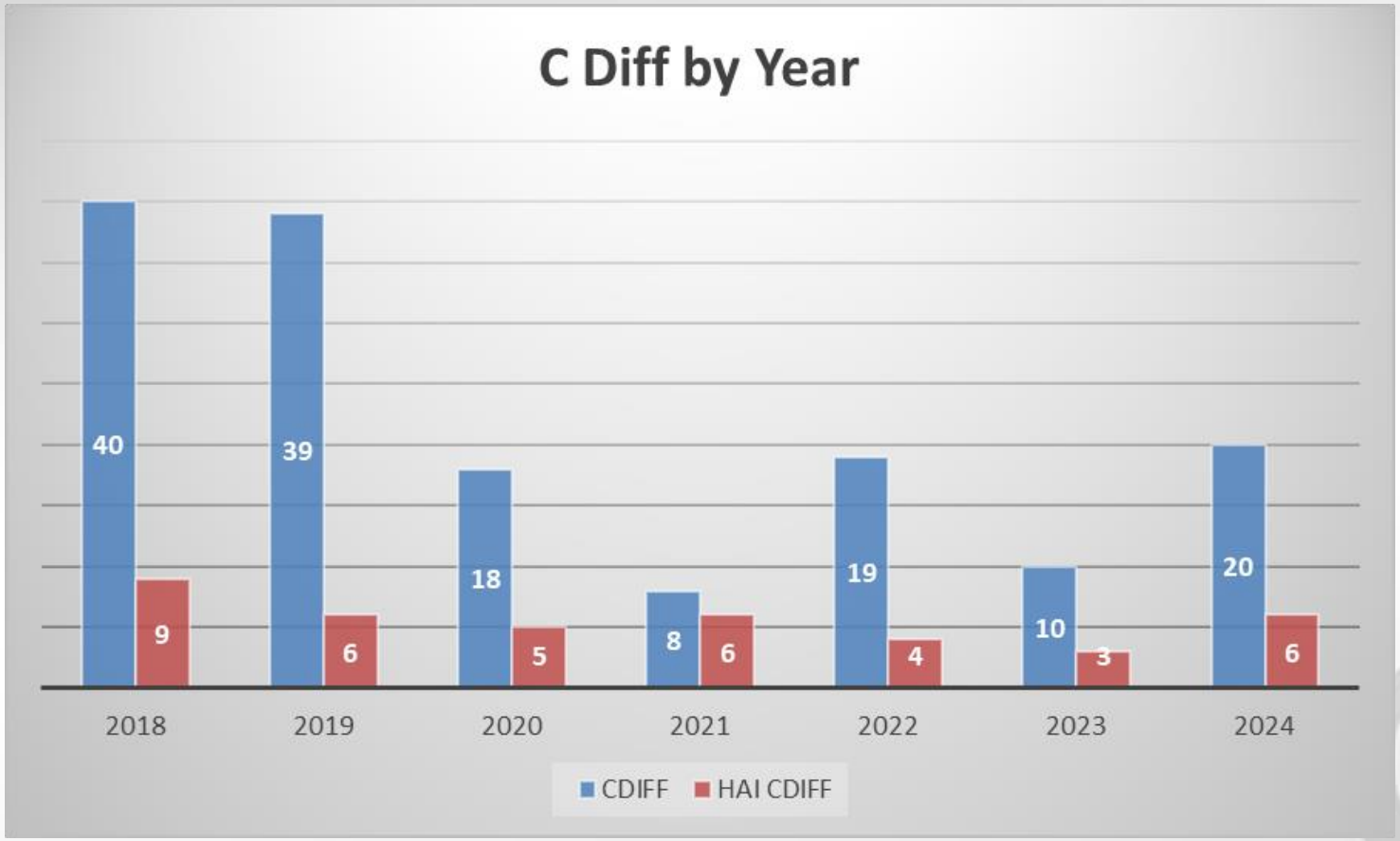
Objectives

- Identify changes in multi-drug resistant organisms, antimicrobial utilization, and the yearly antibiogram at MLH
- Discuss antimicrobial order set updates/changes for inpatients
- C diff testing algorithm and testing parameters
- Updates to Susceptibility panels
- Discussion on new Sepsis overtreatment data and our antibiotic usage



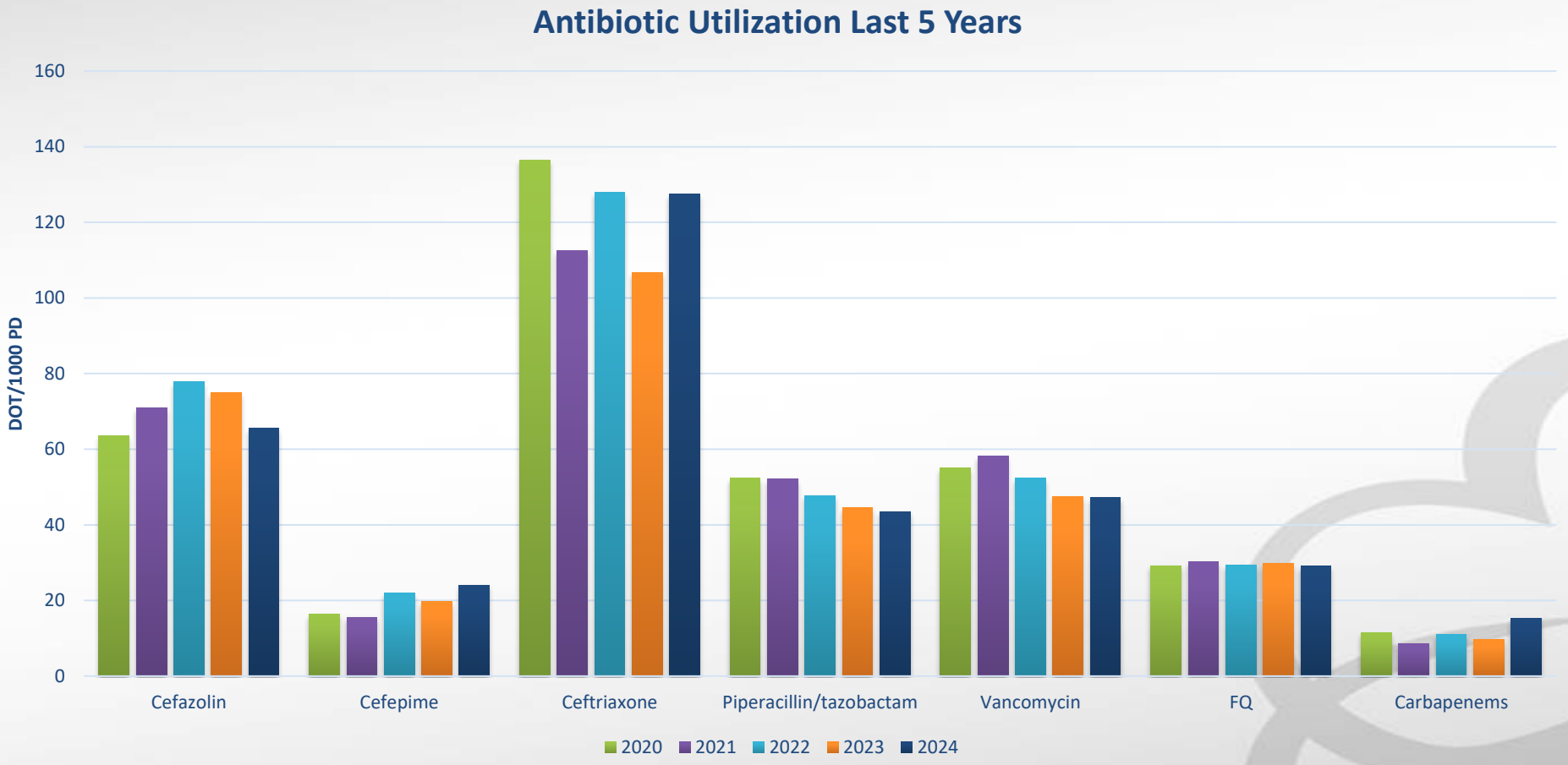
- ESBL trending back down to normal for us year to year
- C. Diff and Hospital acquired C. Diff both have increased. Will need to follow trend and have continual education on testing criteria on admission and during hospitalization to avoid accumulating increased hospital acquired C. Diff
- Also, we are working with IT, Infection preventionist and the AMS team to help build out better messaging and ordering in EPIC for testing of C. Diff



- Of the hospital acquired c diff patients, toxin was negative for 3 of the 6 patients who we had to claim as Hospital acquired C Diff
- Two of the hospital acquired C. Diff patients did not have their test drawn on day of ordering causing it to become a Hospital acquired event

(ex- Ordered on day 2 of admission but drawn on day 3 of admission)

Last 5 Years Antimicrobial Utilization
(Inpatient/ER Data, *excludes* OIC)



- Vancomycin use has continued to trend down from 2021
- Slight Increase in Carbapenems usage will need to monitor this on year-by-year basis
- Cefazolin use has decreased as well but would need to look at surgery output to determine this, as most surgical patients receive cefazolin by my monitoring

SAAR Values – Antibiotic Benchmarking

2024 Totals

SAAR	ICU
0.94	Antibacterial agents predominantly used for resistant Gram-positive infections (e.g., MRSA)
0.97	Broad spectrum antibacterial agents predominantly used for hospital-onset infections
1.05	Broad spectrum antibacterial agents predominantly used for community-acquired infections
0.29	Antifungal agents predominantly used for invasive candidiasis
1.21	Antibacterial agents posing the highest risk for CDI
0.54	Narrow spectrum beta-lactam agents

SAAR	PCU
0.80	Antibacterial agents predominantly used for resistant Gram-positive infections (e.g., MRSA)
0.81	Broad spectrum antibacterial agents predominantly used for hospital-onset infections
0.73	Broad spectrum antibacterial agents predominantly used for community-acquired infections
0.18	Antifungal agents predominantly used for invasive candidiasis
0.76	Antibacterial agents posing the highest risk for CDI
0.87	Narrow spectrum beta-lactam agents

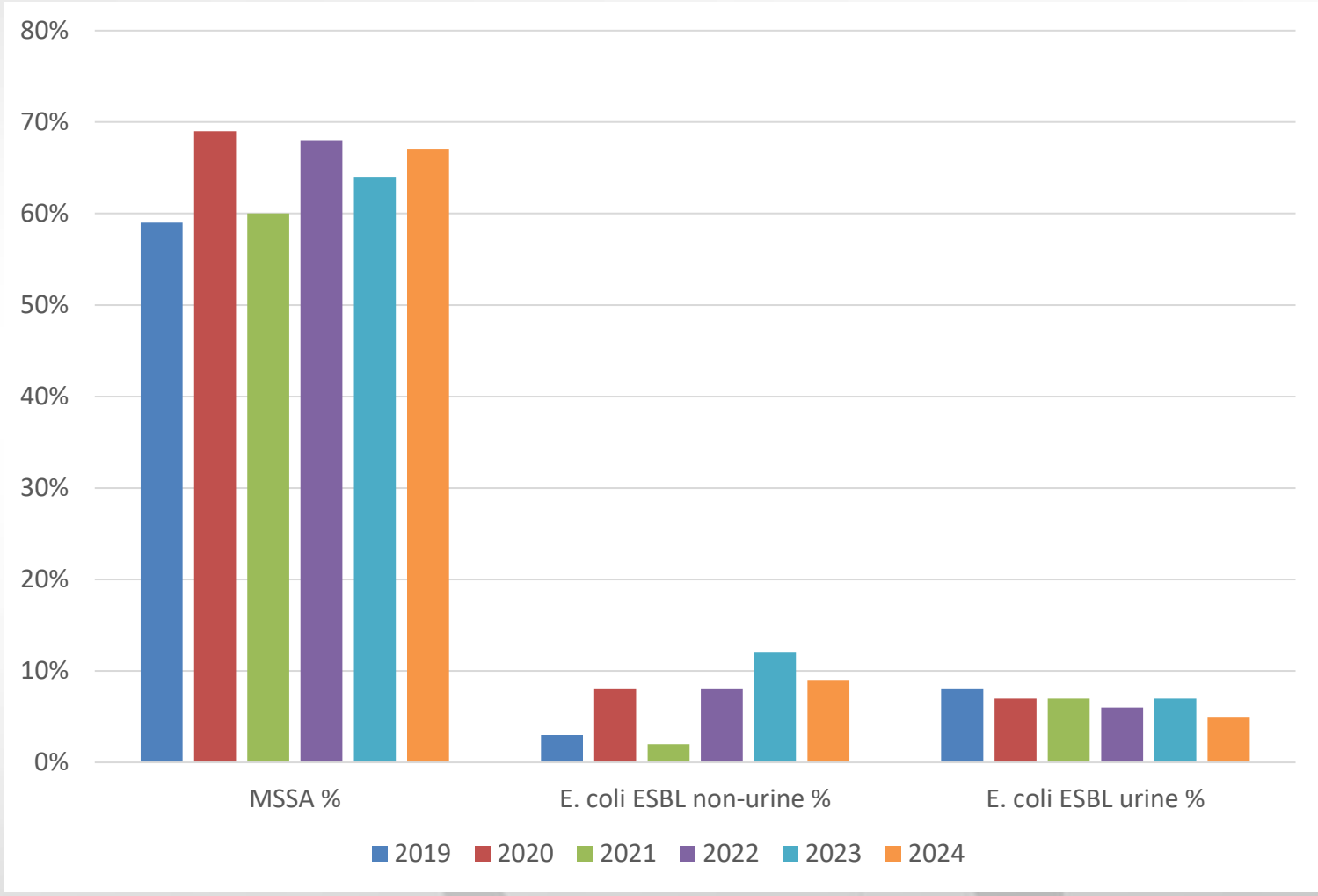
SAAR	MSO
0.79	Antibacterial agents predominantly used for resistant Gram-positive infections (e.g., MRSA)
0.88	Broad spectrum antibacterial agents predominantly used for hospital-onset infections
0.87	Broad spectrum antibacterial agents predominantly used for community-acquired infections
0.05	Antifungal agents predominantly used for invasive candidiasis
1.03	Antibacterial agents posing the highest risk for CDI
0.76	Narrow spectrum beta-lactam agents

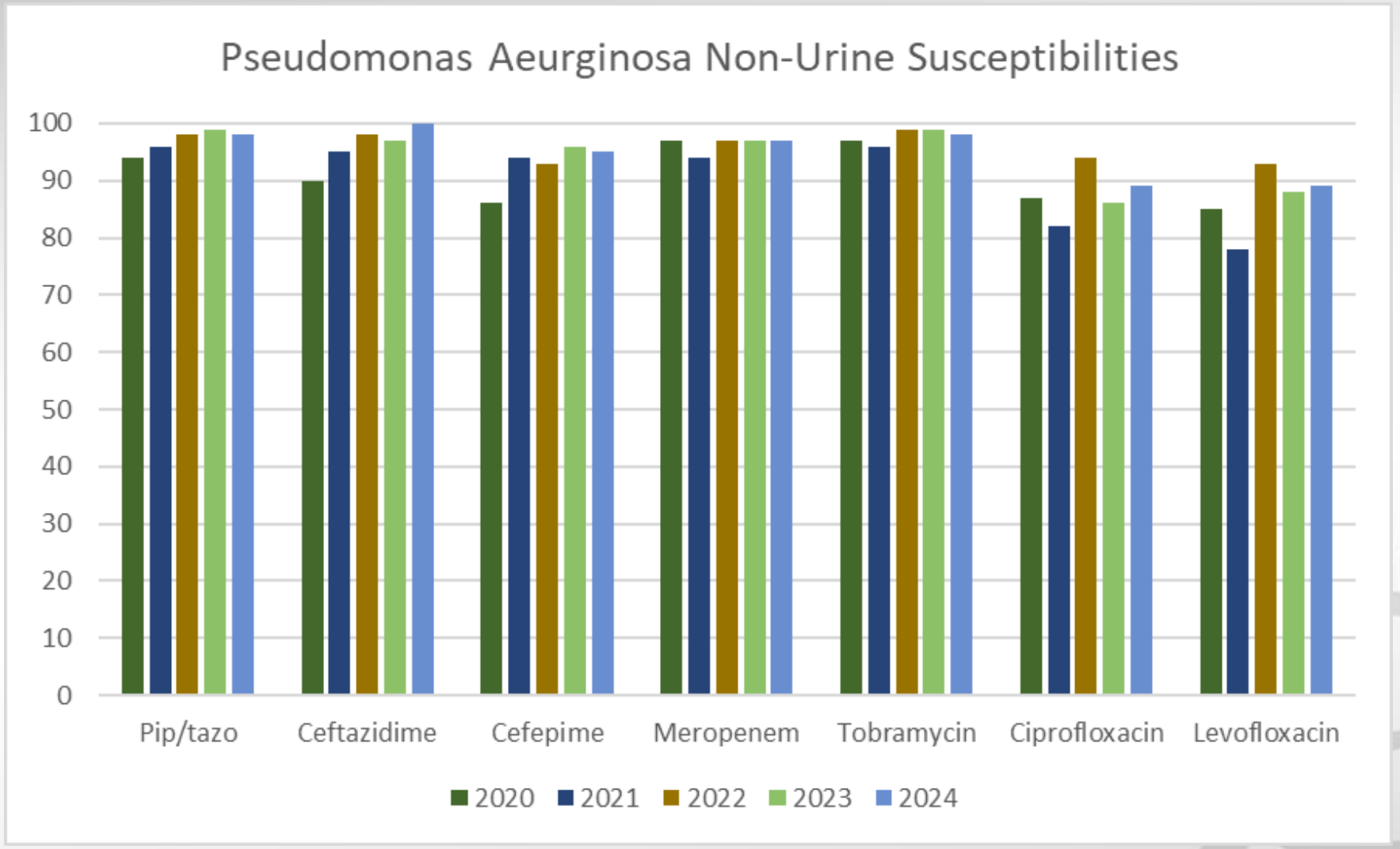
- Most categories showing below predicted SAAR antibiotic usage of less than 1
- Only Antibacterial agents posing the highest risk for CDI is significantly above 1.

  Two theories:
- Could be example of our increased use of carbapenems?
- Could also explain why we had an increase in C. Diff patients as well?

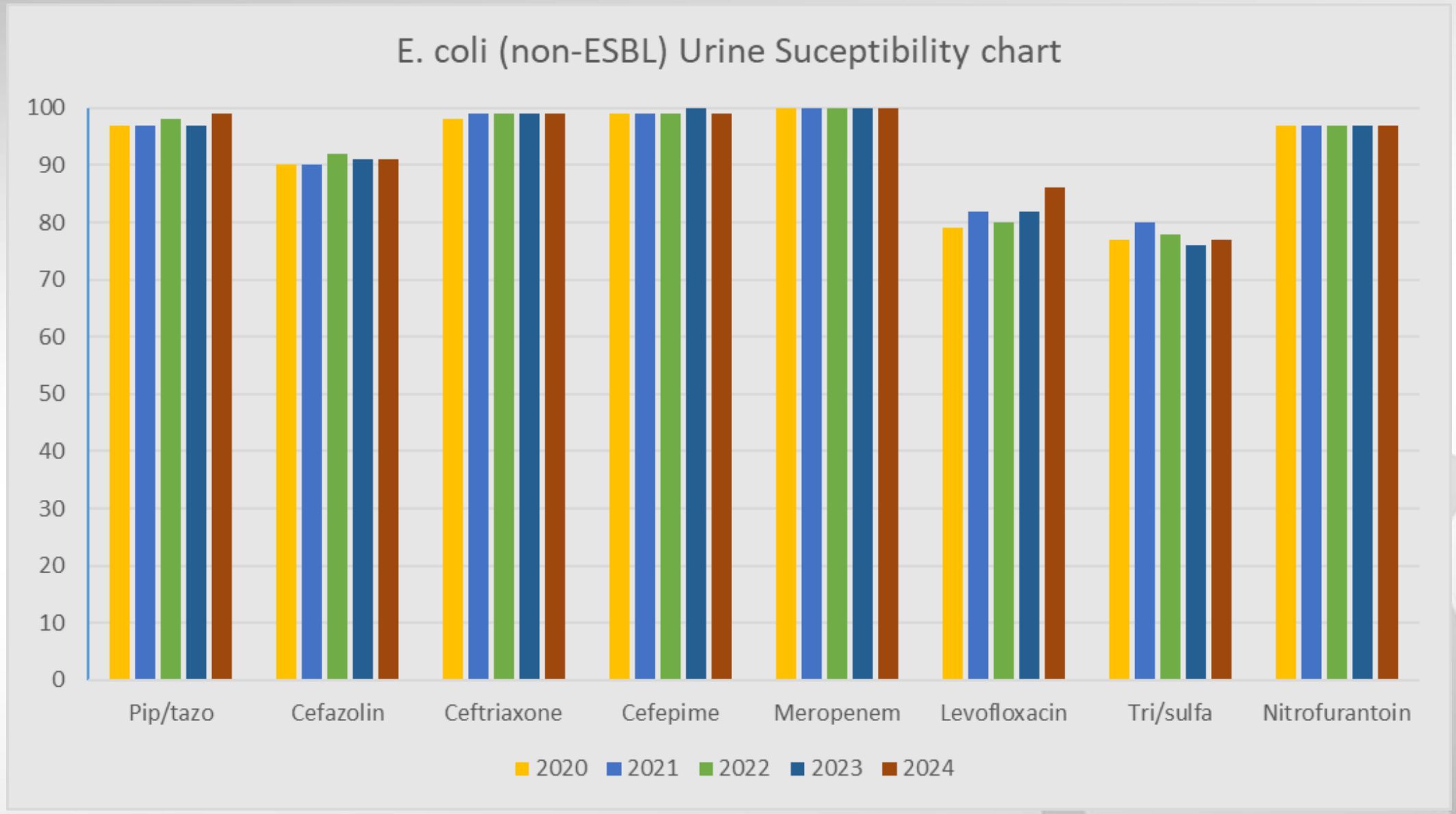
Key Antibiogram Statistics

- MSSA (non-urine source) %
  - 2018: 53%
  - 2019: 59%
  - 2020: 69%
  - 2021: 60%
  - 2022: 68%
  - 2023: 64%
  - 2024: 67%
- *E. coli* ESBL (non-urine source) %
  - 2018: 4%
  - 2019: 3%
  - 2020: 8%
  - 2021: 2%
  - 2022: 8%
  - 2023: 12%
  - 2024: 9%
- *E. coli* ESBL (urine source) %
  - 2018: 5%
  - 2019: 8%
  - 2020: 7%
  - 2021: 7%
  - 2022: 6%
  - 2023: 7%
  - 2024: 5%





- Consistent susceptibilities from previous years
- Of note FQs are still below 90% susceptibility so still not the best empiric option



- Consistent susceptibility profile year over year
- Oral agent wise nitrofurantoin is still best option although not indicated for pyelonephritis treatment just uncomplicated cysistis

Gram-negative Urinary Source

These can be found on internet shortcuts under Antibiograms and Antimicrobial Stewardship

MARY LANNING HEALTHCARE

Urine Gram Negative Rod Antibiogram

January 2024-December 2024

Organism	# Isolates	Amox/Clav	Amp/sulbactam	Ampicillin	Pip/Tazo	Cefazolin	Ceftriaxone	Ceftazidime	Cefepime	Ertapenem	Meropenem	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Tri/Sulfa	Nitrofurantoin
Citrobacter freundii	13	-	-	-	92	-	85	77	100	100	100	77	85	77	77	62	100
Enterobacter cloacae	21	-	-	-	76	-	57	71	86	-	100	100	95	95	100	86	19
Escherichia coli	706	88	65	60	99	91	99	99	99	-	100	94	95	83	86	77	97
Escherichia coli ESBL*	43	63	28	-	93	-	-	-	-	100	100	81	67	30	33	58	93
Klebsiella (Enterobacter) aerogenes	18	-	-	-	94	-	78	83	100	-	100	100	100	89	94	94	22
Klebsiella oxytoca	31	97	68	0	97	32	97	100	100	-	100	100	97	94	97	90	94
Klebsiella oxytoca ESBL*	2	0	0	-	50	-	-	-	-	100	100	50	50	50	50	50	100
Klebsiella pneumoniae	119	97	89	0	99	96	98	99	100	-	100	100	100	92	96	92	55
Klebsiella pneumoniae ESBL*	4	0	0	-	100	-	-	-	-	100	100	0	0	0	25	0	50
Morganella morganii	5	0	0	0	100	0	80	60	100	-	100	100	100	60	60	60	0
Proteus mirabilis	76	99	88	87	100	87	100	100	100	-	100	87	89	76	80	82	0
Proteus mirabilis ESBL*	4	100	75	-	100	-	-	-	-	100	100	50	75	25	25	0	0
Pseudomonas aeruginosa	66	-	-	-	100	-	-	98	97	-	95	0**	100	89	88	-	-
Serratia marcescens	7	-	-	-	100	-	86	100	100	-	100	100	71	100	100	100	0
Stenotrophomonas maltophilia	1	-	-	-	-	-	-	100	-	-	-	-	-	-	100	100	-

Susceptibility patterns based on fewer than 30 isolates are less reliable and should be interpreted with caution.

*Antibiotic susceptibility results (excluding Ertapenem and Meropenem) for ESBL isolates should be interpreted with caution as they may not match the clinical activity.

** CSLI M100- Performance Standards for Antimicrobial Susceptibility Testing 34th ed. 2024, Pseudomonas aeruginosa is now considered to be intrinsically resistant to gentamicin.

Gram-negative Non-Urine Sources

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Non-Urine Gram Negative Antibiogram

January 2024-December 2024

Organism	# Isolates	Amox/Clav	Amp/sulbactam	Ampicillin	Pip/Tazo	Cefazolin	Ceftriaxone	Ceftazidime	Cefepime	Ertapenem	Meropenem	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Tri/Sulfa
Acinetobacter baumannii	2	-	100	-	-	-	100	100	100	-	100	100	50	100	100	100
Enterobacter cloacae	23	-	-	-	96	-	78	91	96	-	100	100	96	96	96	96
Escherichia coli	64	89	73	64	100	94	100	100	100	-	100	97	95	81	84	77
Escherichia coli ESBL*	7	57	14	-	100	-	-	-	-	100	100	86	71	57	57	57
Klebsiella (Enterobacter) aerogenes	10	-	-	-	100	-	90	90	90	-	100	90	90	80	90	90
Klebsiella oxytoca	12	100	75	0	100	33	100	100	100	-	100	100	100	100	100	92
Klebsiella pneumoniae	22	100	82	0	100	100	100	100	100	-	100	100	100	95	100	95
Klebsiella pneumoniae ESBL*	3	33	0	-	67	-	-	-	-	100	100	67	67	33	100	33
Morganella morganii	5	0	0	0	100	0	100	100	100	-	100	100	100	100	100	100
Proteus mirabilis	23	91	91	83	100	87	96	100	100	-	100	91	96	78	83	83
Proteus mirabilis ESBL*	1	100	100	-	100	-	-	-	-	100	100	100	100	0	100	100
Pseudomonas aeruginosa	64	-	-	-	98	-	-	100	95	-	97	0**	98	89	89	-
Serratia marcescens	13	-	-	-	100	-	85	69	100	-	92	100	92	92	100	100
Stenotrophomonas maltophilia	10	-	-	-	-	-	-	30	-	-	-	-	-	-	90	100

Susceptibility patterns based on fewer than 30 isolates are less reliable and should be interpreted with caution.

*Antibiotic susceptibility results (excluding Ertapenem and Meropenem) for ESBL isolates should be interpreted with caution as they may not match the clinical activity.

** CSLI M100- Performance Standards for Antimicrobial Susceptibility Testing 34th ed. 2024, Pseudomonas aeruginosa is now considered to be intrinsically resistant to gentamici

Fastidious Gram Negative Bacteria Tested by Disk-Diffusion AST

Organism	# Isolates	Amox/Clav	Ampicillin	Azithromycin	Cefaclor	Ceftriaxone	Levofloxacin
Haemophilus influenzae	35	94	57	94	80	100	100
Haemophilus parainfluenzae	38	92	79	89	89	100	100
Moraxella catarrhalis	23	100	0	96	83	52	100

These can be found on internet shortcuts under Antibiograms and Antimicrobial Stewardship

Gram-positive Urinary Source

MARY LANNING HEALTHCARE

Urine Gram Positive Antibiogram

January 2024-December 2024

Organism	# Isolates	Ampicillin	Ceftaroline	Cefazolin	Ceftriaxone	Daptomycin	Gentamicin	Ciprofloxacin	Levofloxacin	Linezolid	Nitrofurantoin	Oxacillin	Penicillin	Rifampin	Tetracycline	Tri/Sulfa	Vancomycin
Enterococcus faecalis (Non-VRE's)	52	100	-	-	-	100	-	62	71	100	98	-	100	54	25	-	100
Enterococcus species[a]	53	100	-	-	-	100	-	72	83	100	98	-	100	43	32	-	98
Staphylococcus aureus (MRSA)	15	-	100	-	-	100	100	27	27	100	100	-	-	100	93	100	100
Staphylococcus aureus (MSSA)	21	0	100	100	100	100	100	86	86	100	100	100	24	100	81	100	100
Staphylococcus coagulase-negative	66	0	-	41	41	100	97	70	70	100	97	41	21	98	86	74	100
Streptococcus agalactiae (Group B)	34	100	-	-	100	-	-	-	100	-	-	-	100	-	12	-	100
Susceptibility patterns based on fewer than 30 isolates are less reliable and should be interpreted with caution.																	

[a]Enterococcus species may include E. faecalis isolates.

These can be found on internet shortcuts under Antibiograms and Antimicrobial Stewardship

Gram-positive Non-Urine Sources

MARY LANNING HEALTHCARE

Non-Urine Gram Positive Antibiogram

January 2024-December 2024

Organism	# Isolates	Ampicillin	Amox/ Clav	Ceftaroline	Cefazolin	Ceftriaxone	Clindamycin	Daptomycin	Erythromycin	Gentamicin	Ciprofloxacin	Levofloxacin	Linezolid	Oxacillin	Penicillin	Rifampin	Tetracycline	Tri/Sulfa	Vancomycin
Enterococcus faecalis (Non-VRE's)	23	100	-	-	-	-	-	100	17	-	78	87	100	-	100	39	13	-	100
Entercoccus species[a]	17	100	-	-	-	-	-	100	12	-	71	88	100	-	100	53	29	-	100
Staphylococcus aureus (MRSA)	62	-	-	100	-	-	68	100	24	98	48	48	100	-	-	100	85	100	100
Staphylococcus aureus (MSSA)	130	0	-	100	100	100	73	100	68	99	90	92	100	100	28	100	88	100	100
Staphylococcus spp. (Coagulase-negative	41	0	-	-	34	32	51	98	39	83	76	76	100	34	10	100	76	68	100
Streptococcus agalactiae (Group B)	38	100	-	-	-	100	39	-	21	-	-	100	-	-	100	-	21	-	100
Streptococcus spp. (Non-Hemolytic)[b]	30	87	-	-	-	97	87	-	40	-	-	97	-	-	87	-	73	-	100
Streptococcus pneumoniae	30	-	93	-	-	100	83	-	53	-	-	100	-	-	97[c]	-	83	80	100
Streptococcus pyogenes (Group A)	19	100	-	100	-	100	100	-	95	-	-	100	-	-	100	-	74	-	100

Susceptibility patterns based on fewer than 30 isolates are less reliable and should be interpreted with caution.

[a]Enterococcus species may include E. faecalis isolates.

[b]Non-hemolytic Streptococcus species excluding S. pneumoniae.

[c]S. Pneumoniae: 97% Sensitive, 0% Intermediate, 3% Resistant to Penicillin

Antibiotic Related Policy Changes

Cefepime Alternative dosing regimen

-Many different dosing schemes for Cefepime

-Renal dosing caused issues as some providers renally dosed Cefepime on their on while others did not which caused issues in under/over dosing depending on the scenario.

-This dosing policy standardizes dosing uniformly across the board except for neutropenic fever will still have its own dosing regimen.

-This also ddopts similar regimen to Nebraska Medicine as well

I. PURPOSE:

To ensure the proper order evaluation, order entry, reconstitution, and distribution of cefepime (MAXIPIME) by the pharmacy with the implementation of an automatic substitution/dose conversion for orders of cefepime.

II. POLICY:

A. This policy applies to all adults and pediatric patients that weigh 40 kg or more. Children weighing 40 kg or less are excluded from the automatic dosage substitution. Pharmacists will automatically interchange orders for standard doses of cefepime to alternate doses and automatically adjust the dose and frequency of cefepime for renal insufficiency as indicated in the chart below. Cefepime 2 g every 8 hours is allowed only in neutropenic fever patients, and ordering clinicians must use the indication of Febrile Neutropenia. Pharmacists will review laboratory data in patients whom 2 g every 8 hours is ordered and no indication was documented. If Absolute Neutrophil Count (ANC) is ≤ 500 the 2 g every 8 hours dose will be used. All other orders will be changed to cefepime 1 g every 6 hours and dosed based on renal function.

Table 1. Auto-substitution as follows with normal renal function

Medication Ordered	Interchange with
Cefepime 1g q12hr	Cefepime 1g q6hr
Cefepime 2g q12hr	Cefepime 1g q6hr
Cefepime 2 g q8hr	Cefepime 1g q6hr
Cefepime 2g q8hr for Neutropenic Fever	Cefepime 2g q8hr

New Zosyn Policy dose

EXTENDED INFUSION PIPERACILLIN/TAZOBACTAM

Policy: MM-1001, v.3
Category: Medications
Effective: 04/03/2025
Origination Date: 05/20/2014

I. PURPOSE:

To ensure the proper order evaluation, order entry, reconstitution, and distribution of extended infusion piperacillin/tazobactam by implementation of an automatic substitution of extended-infusion IVPB administration of piperacillin/tazobactam (Zosyn) by the pharmacy.

Dosing piperacillin/tazobactam (Zosyn) by extended infusion is more efficient than standard dosing. Piperacillin/tazobactam (Zosyn) (as well as other penicillins and cephalosporins) kill bacteria in a time dependent fashion. Extended infusion (infusing the antibiotic over 4 hours) achieves longer duration of active antibiotic concentrations. The patient is exposed to lower peak concentrations, decreasing the risk of dose related side effects such as volume overload and electrolyte abnormalities. Less total antibiotic exposure may reduce the risk of *Clostridioides difficile* associated colitis and antibiotic resistance. Extended infusion strategies increase pharmacy savings by decreasing drug costs.

II. POLICY:

This policy applies to all adult patients and all pediatric patient that weigh 40 kg or more. Pediatric patients weighing less than 40 kg are not included in this policy and will receive standard piperacillin/tazobactam dosing.

Piperacillin/tazobactam (Zosyn) 4.5 grams IV every 8 hours (infused over 4 hours) will be administered to patients with an estimated creatinine clearance greater than 20 ml/minute or patients receiving continuous renal replacement therapy (CRRT).

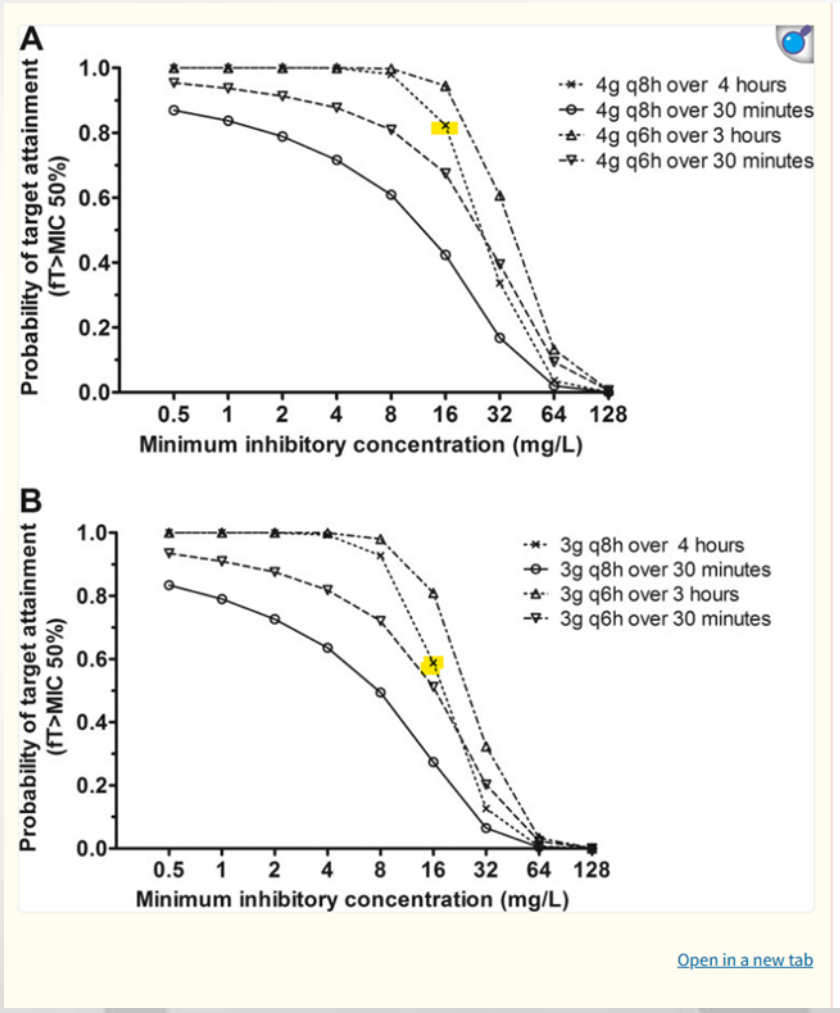
Piperacillin/tazobactam (Zosyn) 4.5 grams IV every 12 hours (infused over 4 hours) will be administered to patients with an estimated creatinine clearance less than or equal to 20 ml/minute and in patients receiving hemodialysis or peritoneal dialysis.

- Changing out Zosyn dose from 3.375g to 4.5g
- Change is based on MIC data for Gram negative organisms
- We will still continue with extended interval dosing so no change to frequency

Changing from Zosyn 3.375 g to 4.5 g data

(iii) Probability of target attainment analyses.

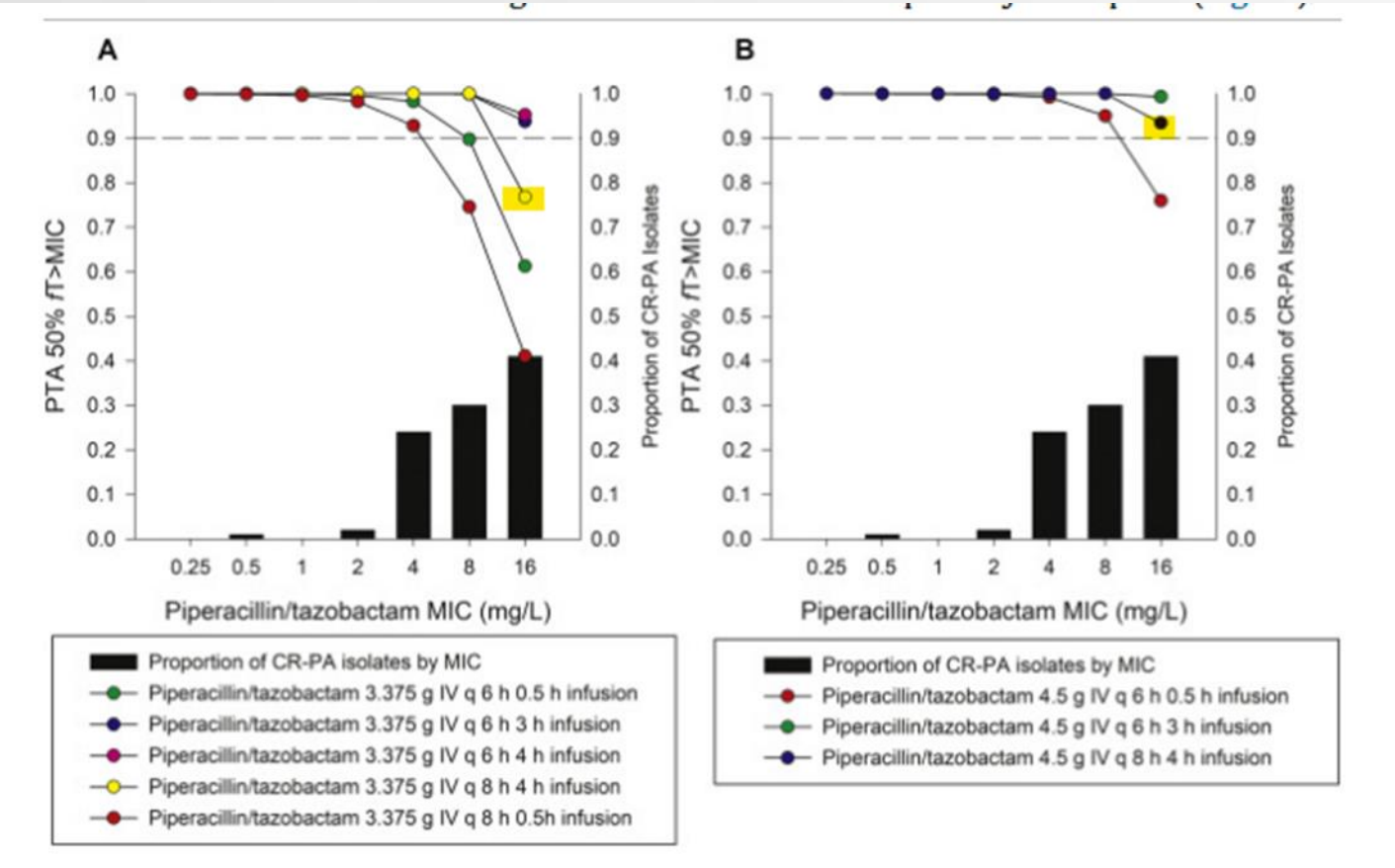
Although there were no significant differences in log-likelihood values and AIC between the MM and parallel linear/MM models, the parallel linear/MM models were used for the PTA analyses based on the results of the observed versus simulated concentration-time profile plots. Also, this model is best supported by the known physiology. The results of the PTA analyses for piperacillin are displayed in Fig. 2. Infusion of 4 g of piperacillin, during 3 or 4 h every 6 or 8 h, results in a PTA of more than 98% for organisms with MICs of ≤8 mg/liter. For pathogens with a MIC of 16 mg/liter, the PTA was 94% when piperacillin was administered for 3 h every 6 h and was 82% when piperacillin was administered for 4 h every 8 h. For MICs of >16 mg/liter, the PTA rapidly plummeted to zero for both regimens. Administration of 4 g of piperacillin for 30 min every 6 or 8 h results in a PTA of 95 and 87%, respectively, for a MIC of 0.5 mg/liter. A gradual decline in target attainment was then observed as the MIC increased, with a PTA of 81 and 61% for the 6- and 8-h regimens, respectively, for a MIC of 8 mg/liter. Administering 3 g of piperacillin for 3 or 4 h every 6 or 8 h results in a PTA of more than 98% for organisms with MICs of ≤8 mg/liter. For organisms with a MIC of 16 mg/liter, the PTAs were 81 and 59% for 3 g piperacillin administered for 3 or 4 h every 6 or 8 h, respectively, and 51 and 27% for 3 g piperacillin administered for 30 min every 6 or 8 h, respectively.



-MIC of 8 mg/liter is about the same PTA (probability of target attainment)
-Major difference seen when MIC is 16 mg/liter then PTA is 82% for 4.5g while only 59% for 3.375g

https://pmc.ncbi.nlm.nih.gov/articles/PMC3421565/

Changing from Zosyn 3.375 g to 4.5 g data



- Another study showing that at MIC of 16, the 4.5 g Zosyn achieves target attainment well above the 3.375g Zosyn

https://www.sciencedirect.com/science/article/pii/S0149291822004106

C diff testing algorithm and testing parameters

Criteria for CDI testing:

- Patients should meet one of the three criteria before being tested for CDI. These criteria are built into the CDI test order and clinicians should document which of the criteria are met before testing.
  - **Significant diarrhea:** >3 watery bowel movements in <24 hours AND at least one feature suggestive of CDI including:
    - Unexplained elevation in WBC count or fever
      - Isolated leukocytosis without diarrhea is NOT an indication for CDI testing
    - New onset abdominal pain and/or distention with diarrhea
  - **Severe diarrhea**: >7 bowel movements or >1.5L of stool over 24 hours
  - **Persistent diarrhea**: >3 watery bowel movements per day without CDI features for >24 hours which has not resolved with conservative treatment and does not have another explanation

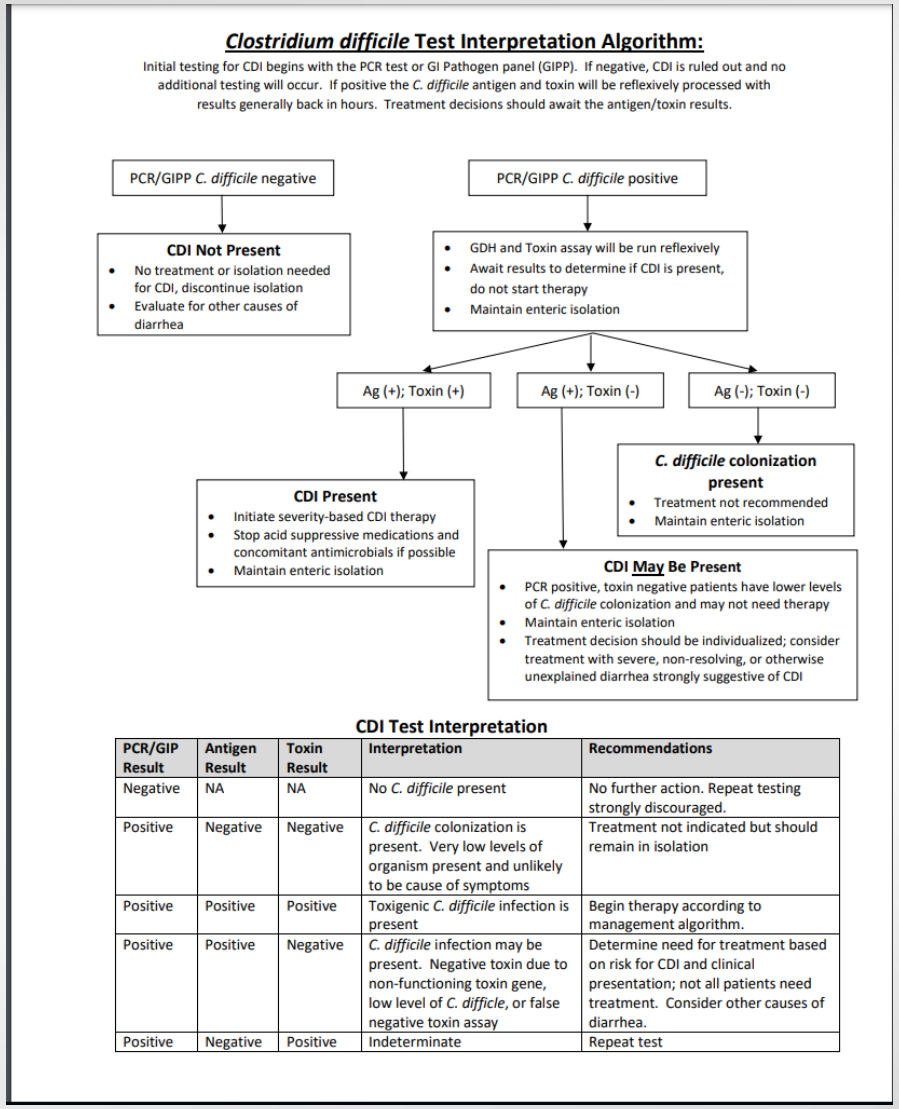
- This is a good breakdown from Nebraska Medicine on criteria for testing for C diff on inpatients.
- Just one example, in the past year we have utilized a C diff test due to isolated leukocytosis without diarrhea so a fresher of these general testing rules can help avoid hospital acquired C diff patients.

C diff testing algorithm and testing parameters

General Testing Recommendations:

- **Do not test all patients with loose or watery stools for CDI**
  - CDI is responsible for <10% of nosocomial diarrhea
  - Consider other causes of diarrhea first (e.g. tube feeds, oral contrast, bowel regimens, antibiotic side effects, etc.) unless symptoms strongly suggest CDI
  - Utilize clinical criteria below to direct testing
- Patients with mild-moderate nosocomial diarrhea without CDI features (see below) should have non-CDI causes treated (stop inciting meds especially laxatives, add fiber to tube feeds, etc.) and be monitored for resolution before CDI testing is considered
- Infants <12 mo. are often colonized with *C. difficile* and should not be tested as it does not produce clinically significant disease
- **Patients who are admitted with diarrhea should be tested in the first 2 days of their hospital stay**
- **Never** test formed stool, asymptomatic patients, or perform a "test of cure"
- Unformed stool is the only acceptable specimen (i.e., stool conforms to the shape of the container)
  - Non-liquid stool will not be processed by the microbiology lab
    - Order only one CDI test and await results before initiating therapy (exception: If severe disease with typical symptoms, reasonable to initiate therapy before results)

C diff testing algorithm and testing parameters



***Clostridium difficile* Test Interpretation Algorithm:**

Initial testing for CDI begins with the PCR test or GI Pathogen panel (GIPP). If negative, CDI is ruled out and no additional testing will occur. If positive the *C. difficile* antigen and toxin will be reflexively processed with results generally back in hours. Treatment decisions should await the antigen/toxin results.

PCR/GIPP *C. difficile* negative

CDI Not Present
- No treatment or isolation needed for CDI, discontinue isolation
- Evaluate for other causes of diarrhea

PCR/GIPP *C. difficile* positive

- GDH and Toxin assay will be run reflexively
- Await results to determine if CDI is present, do not start therapy
- Maintain enteric isolation

Ag (+); Toxin (+)

CDI Present
- Initiate severity-based CDI therapy
- Stop acid suppressive medications and concomitant antimicrobials if possible
- Maintain enteric isolation

Ag (+); Toxin (-)

CDI May Be Present
- PCR positive, toxin negative patients have lower levels of *C. difficile* colonization and may not need therapy
- Maintain enteric isolation
- Treatment decision should be individualized; consider treatment with severe, non-resolving, or otherwise unexplained diarrhea strongly suggestive of CDI

Ag (-); Toxin (-)

***C. difficile* colonization present**
- Treatment not recommended
- Maintain enteric isolation

CDI Test Interpretation

PCR/GIP Result	Antigen Result	Toxin Result	Interpretation	Recommendations
Negative	NA	NA	No *C. difficile* present	No further action. Repeat testing strongly discouraged.
Positive	Negative	Negative	*C. difficile* colonization is present. Very low levels of organism present and unlikely to be cause of symptoms	Treatment not indicated but should remain in isolation
Positive	Positive	Positive	Toxigenic *C. difficile* infection is present	Begin therapy according to management algorithm.
Positive	Positive	Negative	*C. difficile* infection may be present. Negative toxin due to non-functioning toxin gene, low level of *C. difficile*, or false negative toxin assay	Determine need for treatment based on risk for CDI and clinical presentation; not all patients need treatment. Consider other causes of diarrhea.
Positive	Negative	Positive	Indeterminate	Repeat test

Changes made to our C diff process

- Micro will only call if C diff PCR is positive, and Antigen and/or Toxin is positive as well on reflex
- We have added C diff Interpretation under the GI pathogen panel, C diff PCR and the Antigen/Toxin C diff kit for help
- Reminder the GI pathogen panel is under the Micro tab in Chart Review in EPIC
- Reminder the C diff Antigen and Toxin as well as the C diff by PCR test is located under the Labs tab in Chart review in EPIC

New Staphylococcus susceptibility

Draw Site	COLLECTED FROM LEFT ANTECUBITAL
Gram Stain Result	GRAM STAIN: ANAEROBIC BLOOD CULTURE BOTTLE:GRAM POSITIVE COCCI
Culture Result	Staphylococcus aureus !
Resulting Agency	MLH

Susceptibility

	Staphylococcus aureus SUSCEPTIBILITY	
Ceftaroline	<0.5	Susceptible
Ciprofloxacin	2	Intermediate
Clindamycin	<0.25	Susceptible
Erythromycin	<0.25	Susceptible
Gentamicin	<1	Susceptible
Levofloxacin	1	Susceptible
Oxacillin	0.5	Susceptible
Penicillin	>8	Resistant
Rifampin	<1	Susceptible
Trimeth/Sulfa	<0.5/9.5	Susceptible
Vancomycin	1	Susceptible [1]

- Oxacillin is a surrogate marker for Cefazolin
- Added a comment below stating this to help alleviate confusion since cefazolin testing should not be on susceptibility results (CLIA/FDA rule)

Order set usage

- Please utilize when appropriate! They are hopefully very user friendly, helpful with dosing, duration and frequency when used for certain indications.

- Order sets/panels include
  - Skin/soft tissue
  - COPD
  - Pneumonia
  - C. difficile
  - Sepsis

- Please speak up if there are any recommendations for improvements or additions to the order sets you would like to see regarding antibiotics

Sepsis Overtreatment?

JOURNAL ARTICLE CORRECTED PROOF

Frequency of Antibiotic Overtreatment and Associated Harms in Patients Presenting With Suspected Sepsis to the Emergency Department: A Retrospective Cohort Study

Get access >

Claire N Shappell ✉, Tingting Yu, Michael Klompas, Anna A Agan, Laura DelloStritto, Brett A Faine, Michael R Filbin, Nicholas M Mohr, Steven T Park, Kamryn Plechot ...
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Clinical Infectious Diseases, ciaf118, https://doi.org/10.1093/cid/ciaf118
Published: 15 April 2025 **Article history** ▾

Sepsis Overtreatment?

BECKER'S HOSPITAL REVIEW

Leadership | Finance | Health IT | Clinical Care | Specialties

A recent study found that up to 90% of sepsis patients may be overtreated.

The study, published April 15 in *Clinical Infectious Diseases* and led by researchers from Brigham's Women's Hospital and Harvard Medical School, both in Boston, analyzed medical records of 600 randomly selected adults that were treated for suspected sepsis in seven emergency departments between 2019 and 2022.

Here are four findings:

1. Of patients, 68.5% had definite or probable bacterial infections and 31.5% had possible but less likely or definitely no bacterial infections.

2. Among patients with definite or probable infections, 79.1% received overly broad antibiotics.

3. About 17% of patients developed potential antibiotic-associated complications within 90 days, most commonly a new infection or colonization with organisms resistant to first-line agents.

4. Mortality was higher for patients with less likely and definitely no bacterial infection at 9%, compared to 4.9% for those with definite or probable infection.

"Our findings support the concern that in the setting of sepsis policies that require rapid administration of broad-spectrum antibiotics, empiric antibiotics for suspected sepsis are often unnecessary or broader than necessary in retrospect," the study authors wrote. "These findings have important implications for antibiotic stewardship efforts in the face of ongoing quality improvement and policy initiatives that seek to speed delivery of broad-spectrum antibiotics for patients with suspected sepsis."

- This article was cited in Beckers Hospital Review
- 600 adults treated with MRSA and/or antipseudomonal agent across 7 hospitals
- Authers concluded 1 in 3 most likely did not have a bacterial infection
- 4 in 5 of those with bacterial infections were treated with regimens broader than necessary in retrospect
- One of my biggest takeaways is that 1 in 6 developed antibiotic associated complications. (resistance and/or adverse reactions)

Comparing our antibiotic usage across the state

MARY LANNING HEALTHCARE Comparisons to NE Performance

	Comparison Group	
	Medium NE Hospitals	All NE Hospitals
Your Hospital's SAAR Percentile	34th	34th

The SAAR percentile indicates that 66% of medium-sized Nebraska hospitals and 66% of Nebraska hospitals have a higher overall BSHO SAAR value than your facility.

BSHO	Broad spectrum antibacterial agents for hospital-onset infections	AMIKACIN (IV only) AZTREONAM (IV only) CEFEPIME CEFTAZIDIME DORIPENEM GENTAMICIN (IV only) IMIPENEM/CILASTATIN MEROPENEM PIPERACILLIN/TAZOBACTAM TOBRAMYCIN (IV only)

- SAAR value comparing our Broad-Spectrum Hospital-Onset Antibiotics across similar medium sized hospitals (26-150 beds) as well as all NE hospitals
- Identifying patient risk factors for MDROs and utilizing order sets for appropriate antibiotic and duration
- Provider discussion and de-escalation from broad spectrum to narrow spectrum based on indication/culture/clinical picture

Comparing our antibiotic usage across the state

MARY LANNING HEALTHCARE Comparisons to NE Performance

	Comparison Group	
	Medium NE Hospitals	All NE Hospitals
Your Hospital's SAAR Percentile	30th	38th

The SAAR percentile in this category indicates that 70% of medium-sized hospitals and 62% of Nebraska hospitals overall have a higher SAAR value for GramPOS than your facility

Gram-Pos	Antibacterial agents for resistant Gram-positive infections	CEFTAROLINE DALBAVANCIN DAPTOMYCIN LINEZOLID ORITAVANCIN QUINUPRISTIN/DALFOPRISTIN TEDIZOLID TELAVANCIN VANCOMYCIN (IV only)

- SAAR values significantly lower than those across the state
- MRSA nasal PCR has helped in stopping MRSA coverage in suspected pneumonia patients
- Similar to BSHO, de-escalation and discussion with providers

Summary Slide

- No major concerning trends noted in drug resistance
  - ESBL rates normalized
  - Hospital acquired C diff rates increased likely due to testing algorithm, increased testing and not ordering GI panels when diarrhea is present on admission.
  - Susceptibilities to *pseudomonas aeruginosa* remains fairly consistent
    - Likely don't need to double cover pseudomonas in majority of cases with most antibiotics still above 90% susceptibility and guidelines have moved away from double pseudomonas coverage in the majority of cases
    - Of note, FQ is still below 90% susceptibility so empirically not the best option
- Inpatient antibiotic use remains reasonable looking at SAAR data and across similar hospitals
  - Above SAAR value of 1 on a couple of areas in ICU patients
- Utilize order sets and panels when appropriate helps guide dose, duration and best antibiotic selection
- Broad Spectrum usage of antibiotics continues to be reasonable especially when compared to peers

Questions?

- Thank you

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