PROCEDURE: ANTIBIOTIC BATTERIES

The laboratory reviews CLSI M100 annually to update procedure for relevant organism/antimicrobial changes to ensure appropriateness of reporting. A Director actively participates with the Antimicrobial Stewardship Committee to address the needs of the patient population.

Non-standard susceptibility testing should not be performed. Always refer to CLSI M100 for standards.

All providers requesting recommendations on antimicrobial therapy should be directed to the Antimicrobial Stewardship Pharmacist at: 350-2205.

- *Haemophilus* species – perform cefinase only and report as the appropriate isolate comment: ***&HBLN*** *(Beta Lactamase Negative. Haemophilus isolates negative for beta-lactamase are likely to be susceptible to Amoxicillin, Macrolides and Cephalosporin antibiotics.)* or ***&HBLP*** *(Beta-Lactamase positive. Haemophilus Isolates producing beta lactamase are resistant to Amoxicillin.)*

- *Moraxella catarrhalis* – include isolate comment: ***&BCAT*** *(All isolates should be considered Beta-Lactamase positive.)*

- *Bacteroides fragilis* group – include isolate comment: ***&BCAT*** *(All isolates should be considered Beta-Lactamase positive.)*

- Antibiotics for MDR *Acinetobacter* screens are not routinely reported. The provider is looking for the presence or absence of the resistant organism. Refer to *Acinetobacter Screen Procedure* for guidance.

- Additional antimicrobial requests – check CLSI standards for appropriateness (Table 1 & Table 2) & bring up on ROUNDS
  ARUP is the reference laboratory for send-out testing.
  Document all requests in worksheet.
  (Reference laboratories require organisms to be submitted growing on an agar slant)

- Send isolate to RIDOH if the following reported result is: Ertapenem resistant *Enterobacterales;* Meropenem/Imipenem resistant *Enterobacterales*, non-mucoid *P. aeruginosa,* or *Acinetobacter baumannii* complex; Vancomycin confirmed as non-susceptible (MIC is 4) *Staphylococcus aureus*; pan-resistant organisms

KIRBY BAUER: GRAM NEGATIVE RODS (Non-CSF SOURCES)

Routine method			**Alternative method**
Pseudomonas aeruginosa **(PA-ACI Battery)**	***Acinetobacter sp.*** **(PA-ACI Battery)**	***Salmonella/Shigella***[c] **(NEG Battery)**	***Enterobacterales sp.*** **(NEG Battery)**
Amikacin (AN)[a]	Amikacin (AN)	Ampicillin (AMP)	Amoxicillin/Clavulanic acid (AmC)
Aztreonam (ATM)	Ampicillin/Sulbactam (SAM)	Ceftriaxone (CRO)	Ampicillin (AMP)[b]
Cefepime (FEP)	Cefepime (FEP)	Ciprofloxacin (CIP)	Cefazolin (CZ)[d]
Ceftazidime (CAZ)	Ciprofloxacin (CIP)	Ertapenem (ETP)	Ceftriaxone (CRO)[e]
Ciprofloxacin (CIP)	Gentamicin (GM)	Levofloxacin (LVX)	Cefepime (FEP)
Levofloxacin (LVX)	Levofloxacin (LVX)	Meropenem (MEM)	Ciprofloxacin (CIP)
Meropenem (MEM)	Meropenem (MEM)	Trimethoprim/Sulfamethoxazole (SXT)	Ertapenem (ETP)
Piperacillin/Tazobactam (TZP)	Minocycline (MI)		Gentamicin (GM)
Tobramycin (NN)	Tobramycin (NN)		Meropenem (MEM)
	Piperacillin/Tazobactam (TZP)		Nitrofurantoin (F/M)[a]
			Piperacillin/Tazobactam (TZP)
			Trimethoprim/Sulfamethoxazole (SXT)

a – Reported on urines cultures only
b – Remove from battery and replace with Nitrofurantoin on urine cultures only
c – Performed on isolates recovered from extra-intestinal sites only
d – 2 result lines available for Cefazolin due to different breakpoints based on source – enter same measurement in both lines, LIS rules in place to report appropriate interpretation based on source
e - If ceftriaxone = R and spot indole was used for identification of *E. coli*, confirmation of the identification must be performed by Vitek MS/Vitek GN card

KIRBY BAUER: GRAM POSITIVE COCCI (Non-CSF SOURCES)

Routine method		**Alternative method**	
β-*hemolytic Streptococcus*[g,h]	**VIRIDANS STREP[b,g]**	***Enterococcus sp.***	***Staphylococcus sp.*[e,h,i]**
URINES[c]	**URINES**	**URINES**	**URINES**
Ampicillin (AM)	**Ceftriaxone (CRO)**	Nitrofurantoin (F/M)	Gentamicin (GM)
Levofloxacin (LVX)	**Penicillin (ETEST)**	Penicillin (P)	Levofloxacin (LVX)
Ceftriaxone (CRO)		Tetracycline (TE)	Trimeth/Sulfa (SXT)
	NON-URINE SOURCES	Vancomycin (VA)	Cefoxitin (FOX for Oxacillin)[e]
NON-URINE SOURCES	Clindamycin (CC)[b]	Levofloxacin (LVX)	Vancomycin (ETest)
Ampicillin (AM)	Erythromycin (E)[b]		
Clindamycin (CC)[b]	Ceftriaxone (CRO)	**NON-URINE SOURCES**	**NON-URINE SOURCES**
Erythromycin (E)[b]	**Penicillin (ETest)**	Penicillin (P)	Clindamycin (CC)[b]
Levofloxacin (LVX)	Vancomycin (VA)	Vancomycin (VA)	Erythromycin (E)[b]
Ceftriaxone (CRO)		Gent-500 (QUAD PLATE)	Gentamicin (GM)
Vancomycin (VA)		Linezolid (ETest)[a]	Levofloxacin (LVX)[d]
			Trimeth/Sulfa (SXT)
SCREENS[c]			Cefoxitin (FOX for Oxacillin)
Clindamycin (CC)			Vancomycin (ETest)
Dtest reported if positive[f]			

a – Release if organism is resistant to all antibiotics reported from a sterile site
b – DTEST performed only upon special request
c – When requested by provider, otherwise report isolate comment: *&GBS*
d – Quinolones are not reported for *Staphylococcus aureus* in blood cultures
e – *Staphylococcus lugdunensis* and *Staphylococcus pseudointermedius* have special reporting criteria. Refer to CLSI Standards (Table 2C)
f – Ceftriaxone and Vancomycin can be released if DTEST is positive
g – *Streptococcus anginosus* group and Group D non-enterococcus are treated as viridans streptococcus
h – Daptomycin Etest is appropriate to add for non-respiratory sources
i – Ceftaroline is appropriate to skin/soft tissue/blood sources

Routine method		Alternative method		
Viridans strep	***Pseudomonas aeruginosa***	***Staphylococcus sp.***[b]	**Gram Negative Rods***	***Strep. pneumoniae***
Ceftriaxone (CRO)[a]	Aztreonam (ATM)	Gentamicin (GM)	Amikacin (AN)	Ceftriaxone (CRO)[a]
Meropenem (MEM)	Cefepime (FEP)	Vancomycin (ETEST)	Ampicillin (AMP)	Meropenem (MEM)
Penicillin (ETEST)	Ceftazidime (CAZ)	Cefoxitin (FOX for Oxacillin)[b]	Amp/Sulbactam (SAM)	Penicillin (ETest)
Vancomycin (VA)	Meropenem (MEM)		Cefepime (FEP)	Vancomycin (VA)
	Pip/Tazobactam (TZP)		Ceftriaxone (CRO)	
	Tobramycin (NN)		Gentamicin (GM)	
			Meropenem (MEM)	
			Pip/Tazobactam (TZP)	
			Tobramycin (NN)	

KIRBY BAUER: CSF ONLY

a – Streptococcus pneumoniae that are resistant to ceftriaxone by disk diffusion need to have an MIC performed. If no MIC is available, the isolate must be sent to the RIDOH

b – *Staphylococcus lugdunensis* and *Staphylococcus pseudointermedius* have special reporting criteria. Refer to CLSI Standards (Table 2C).

VITEK PANELS[l]

Routine method		
AST-N812	**GP-67**	**GP-67**
Enterobacterales sp.	***Staphylococcus sp.***[h, j]	***Enterococcus sp.***
Amoxicillin/Clavulanic Acid	Ciprofloxacin[c]	**NON-URINE SOURCES**
Ampicillin	Clindamycin[m]	Penicillin
Cefazolin	Erythromycin[m]	Vancomycin
Cefepime[p]	Gentamicin	Gentamicin High Level
Cefoxitin	Inducible Clindamycin Resistance	Streptomycin High Level
Ceftriaxone[q]	Levofloxacin[c]	Linezolid[f]
Ciprofloxacin[o]	Moxifloxacin[c,d]	Nitrofurantoin[a]
Ertapenem[k, n]	(Cefoxitin) Oxacillin[g,h, i]	
Gentamicin	Tetracycline	**URINES**
Levofloxacin	Trimethoprim/Sulfamethoxazole	Nitrofurantoin
Meropenem[k]	Vancomycin [e]	Penicillin
Nitrofurantoin[a]		Tetracycline
Piperacillin/tazobactam[b]		Vancomycin
Tetracycline		
Tobramycin		
Trimethoprim/Sulfamethoxazole		

a – Reported on urine cultures only
b – Add TZP disk if Vitek TZP is not performed (Inpatients)
c – Quinolones are not reported for *Staphylococcus aureus* in blood cultures or for MRSA isolates in wound cultures
d – Moxifloxacin only reported for MSSA
e – Vancomycin results of ≥ 2µg/ml must be confirmed by GPN3F; ≥4µg/ml sent to CDC through RIDOH.
f – Release if organism is resistant to all antibiotics reported from a sterile site
g) 1– If Cefoxitin screen is negative and switches oxacillin result of 0.5 µg/ml resistant setup a PBP2a test. If PBP2A is positive report out isolate as MRSA, if result is negative result just as SA. Bring up both cases on rounds.
2. If Cefoxitin screen is negative and oxacillin is 1µg/ml or 2µg/ml, perform a PBP2a test. If positive, report as MRSA and bring up on rounds. If result in negative, report out as just a SA.
h – When Staph lugdunensis and Staph pseudointermedius results for oxacillin and cefoxitin are discrepant repeat the vitek and perform a KB. If the 2nd vitek result matches the KB, report the vitek result. If the vitek and the KB disagree, bring up on rounds.
l – *Staphylococcus lugdunensis* and *Staphylococcus pseudointermedius* have special reporting criteria. Refer to CLSI Standards (Table 2C).
j – Acceptable to release Rifampin for ID provider
k – Ertapenem and Meropenem results that are Resistant should be confirmed with a KB disk prior to reporting
l – Reported antimicrobials vary based on organism identification and product limitations
m – Not routinely reported on urine cultures
n – Alternative testing must be performed if no result available due to product limitations
o – Perform alternative testing if MIC 0.25-0.5 µg/mL for *P.rettgeri* or 0.5 µg/mL for *S. marcescens* and *K. pneumoniae*
p – Suppressed from reporting from instrument until further verification testing is complete. Set up KB disk if requested.
q – If ceftriaxone ≥ 4/R and spot indole was used for identification of *E. coli*, confirmation of the identification must be performed by Vitek MS/Vitek GN card

TREK SENSITITRE PANEL

Routine method			Alternative method
GNX2F[a,g]	**GNX2F[a,g]**	**STP6F[b]**	**GPN3F[c]**
Non-fermenting Gram-negative Rods	***Burkholderia cepacia***	***STREPTOCOCCUS PNEUMONIAE[f]***	***Staphylococcus aureus***
Amikacin[h]	Ceftazidime	Ceftriaxone (meningitis)	Vancomycin[d]
Aztreonam	Levofloxacin	Ceftriaxone (non-meningitis)	
Cefepime	Meropenem	Chloramphenicol	
Cefotaxime	Minocycline	Clindamycin[e]	
Ceftazidime	Trimeth/Sulfa	Erythromycin	
Ciprofloxacin		Levofloxacin	
Doxycycline	***Stenotrophomonas maltophilia***	Meropenem	
Gentamicin	Levofloxacin[d]	Penicillin (oral)	
Levofloxacin	Minocycline	Penicillin (meningitis)	
Meropenem	Trimethoprim/Sulfamethoxazole	Penicillin (non-meningitis)	
Minocycline		Vancomycin	
Piperacillin/Tazobactam			
Tobramycin			
Trimethoprim/Sulfamethoxazole			

a – Never release tigecycline from this panel
b – Available upon request: amoxicillin/clav, azithromycin, cefepime, cefotaxime, cefuroxime, daptomycin, ertapenem, linezolid, moxifloxacin & trimethoprim/sulfamethoxazole
c – For confirmation of possible VISA/VRSA isolates
d – Suppressed if non-susceptible
e – Not reported if erythromycin is non-susceptible & clindamycin is susceptible
f – Only report: ceftriaxone, meropenem, penicillin & vancomycin for *Strep. pneumoniae* isolates from CSF sources.
g – Reported antimicrobials vary based on organism identification and product limitations
h – For *P. aeruginosa*, only reported in urine sources

REVISIONS:

4/30/2020 Added Levofloxacin to *P. aeruginosa* and suppression of Quinolones for MRSA isolates in wound cultures
03/22/2023 Updated RIDOH submission guidelines and confirmatory testing requirements for *Enterobacterales* with Pip/Tazo resistance
04/27/2023 Updated reported guidelines for Amikacin and *P. aeruginosa*
02/03/2025 Updated testing and reporting guidelines for *Enterobacterales sp.*, *Salmonella/Shigella sp., and Acinetobacter sp.* due to implementation of Vitek AST-N812 card