

BioFire Blood Culture Identification (BCID) Empiric Treatment Pathway for Adults

Empiric antibiotic recommendations are intended to provide general guidance for therapy and to minimize unintended consequences. See BCID General Education document for background information, antibiogram data used to make agent selections below, and FAQs. Questions? **Page 970-GERM** or the **ASET Pharmacist at 970-6666**.

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Table 1. Gram Positive Blood Culture Empiric Treatment Pathway

Gram Stain Result	BCID group target	BCID Pathogen target	BCID Gene Target	Molecular Targets Reported as “DETECTED” in Epic	1 st Line Empiric Antibiotic	2 nd Line Empiric Antibiotic	Notes
Gram positive cocci clusters OR Gram positive cocci pairs and chains	Staphylococcus	Staphylococcus epidermidis	none	Staphylococcus Staphylococcus epidermidis	Cefazolin	Vancomycin [†]	-Evaluate clinically to determine if true pathogen -Daptomycin is inactivated by lung surfactant
			mecA/C	Staphylococcus Staphylococcus epidermidis mecA/C	Vancomycin	Daptomycin*	
		Staphylococcus lugdunensis	none	Staphylococcus Staphylococcus lugdunensis	Cefazolin	Vancomycin [†]	- <i>S. lugdenensis</i> has clinical disease similar to <i>S. aureus</i> -ID consult required. -Daptomycin is inactivated by lung surfactant
			mecA/C	Staphylococcus Staphylococcus lugdunensis mecA/C	Vancomycin	Daptomycin*	
		Staphylococcus aureus	none	Staphylococcus Staphylococcus aureus	Cefazolin	Vancomycin [†]	-Indicates Methicillin-susceptible <i>S. aureus</i> (MSSA) -Nafcillin should be considered if CNS penetration is indicated -ID consult required
			mecA/C and MREJ	Staphylococcus Staphylococcus aureus mecA/C and MREJ	Vancomycin	Daptomycin*	
		none	none	Staphylococcus	Vancomycin	Daptomycin*	-Evaluate clinically to determine if true pathogen -Indicates species of coagulase negative staphylococci other than <i>S. epidermidis</i> and <i>S. lugdunensis</i>
			none	Staphylococcus	Vancomycin	Daptomycin*	

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							-See Table 2 , Column 1 for coagulase negative Staphylococcus sp. without a pathogen target identified. The species name may be updated in the chart after further testing. -Daptomycin is inactivated by lung surfactant
	<i>Streptococcus</i>	<i>Streptococcus agalactiae</i>	----	Streptococcus Streptococcus agalactiae	Penicillin	Ceftriaxone or vancomycin [†]	-Group B streptococci
		<i>Streptococcus pneumoniae</i>	----	Streptococcus Streptococcus pneumoniae	Ceftriaxone	Vancomycin	-Add Vancomycin to ceftriaxone if meningitis suspected
		<i>Streptococcus pyogenes</i>	----	Streptococcus Streptococcus pyogenes	Penicillin	Ceftriaxone or vancomycin [†]	-Group A streptococci
		none	----	Streptococcus	Ceftriaxone	Vancomycin [†]	- Indicates streptococci other than <i>S. pyogenes</i> and <i>S. pneumoniae</i> such as viridans group -See Table 2 , Column 2 for possible streptococci sp. without a pathogen target identified
	none	<i>Enterococcus faecalis</i>	none	Enterococcus faecalis	Ampicillin	Vancomycin [†]	
			vanA/B	Enterococcus faecalis vanA/B	Ampicillin	Daptomycin*	-Daptomycin is inactivated by lung surfactant
	none	<i>Enterococcus faecium</i>	none	Enterococcus faecium	Vancomycin [†]	Daptomycin*	-Daptomycin is inactivated by lung surfactant
			vanA/B	Enterococcus faecium vanA/B	Daptomycin*	Linezolid	
	none	none	----	none	Vancomycin	Linezolid* or daptomycin*	-No molecular targets identified indicate Gram-positive cocci other than staphylococci or streptococci. -Consider the possibility of an anaerobic organism -See Table 2 , Columns 4 and 5 for possible Gram-positive pathogens -Daptomycin is inactivated by lung surfactant
Gram positive rod	none	<i>Listeria monocytogenes</i>	----	Listeria monocytogenes	Ampicillin	TMP/SMX	
	none	none	----	none	Vancomycin -If high suspicion for Nocardia (e.g. immunosuppressed host), consult ID		-No molecular targets identified indicates Gram-positive rod other than <i>Listeria monocytogenes</i> -Evaluate clinically to determine if true pathogen (e.g. Diphtheroid skin contaminant)

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					for empiric treatment recommendation	-Consider the possibility of an anaerobic organism -See Table 2 , Columns 3 and 4 for possible pathogens
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Note: obtain surveillance blood cultures every 24-48 hours to assess for documented clearance

* ID consult required for approval

† only considered if severe B-lactam allergy present. Assess allergy and consider oral amoxicillin challenge or [penicillin skin](#) testing.

Table 2. Gram-positive organisms NOT detected by BCID2 species-specific targets (not all inclusive)

1. Coagulase negative Staphylococcus spp. (CoNS)	2. Streptococcus spp.	3. Gram positive rod	4. Gram positive anaerobes	5. Other gram positives
Group Target: Staphylococcus DETECTED	Group Target: Streptococcus DETECTED	<i>Gram stain only, no BCID targets</i>	<i>Gram stain only, no BCID targets</i>	<i>Gram stain only, no BCID targets</i>
<i>Staphylococcus haemolyticus</i> <i>Staphylococcus hominis</i> <i>Staphylococcus caprae</i> <i>Staphylococcus saprophyticus</i> <i>Staphylococcus capitis</i>	<i>Streptococcus anginosus</i> <i>Streptococcus bovis</i> <i>Streptococcus mitis</i> <i>Streptococcus dysgalactiae</i> <i>Streptococcus intermedius</i>	<i>Actinobacteria sp.</i> <i>Bacillus sp.</i> <i>Corynebacterium sp.</i> <i>Erysipelothrix sp.</i> <i>Nocardia sp.</i>	<i>Actinomyces</i> <i>Bifidobacterium sp.</i> <i>Clostridium sp.</i> <i>Lactobacillus</i> <i>Peptostreptococcus sp.</i> <i>Propionibacterium sp.</i>	<i>Gardnerella sp.</i> <i>Micrococcus sp.</i> <i>Enterococcus species</i> <i>Rothia sp.</i> <i>Granulicatella sp</i> <i>Cutibacterium acnes</i>

Table 3. Gram-negative Blood Culture Treatment Pathway:

Gram Stain Result	BCID Group target	BCID Pathogen target	BCID Gene Target	Molecular Targets Reported as "DETECTED" in Epic	1 st Line Empiric Antibiotic	2 nd Line Empiric Antibiotic	Notes
Gram Negative Rod	None	<i>Acinetobacter calcoaceticus-baumannii complex</i>	none	Acinetobacter calcoaceticus-baumannii complex	Ampicillin-sulbactam	Meropenem*	-Meropenem: 3h infusion, higher doses
			CTX-M	Acinetobacter calcoaceticus-baumannii complex CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem - Meropenem: 3h infusion, higher doses

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			KPC NDM-1 IMP VIM	Acinetobacter calcoaceticus-baumannii complex KPC or NDM-1 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID- restricted agent will be indicated
	None	<i>Bacteroides fragilis</i>	--	Bacteroides fragilis	Piperacillin- tazobactam	Cefepime AND Metronidazole	-This likely represents a polymicrobial infection or bowel leak. Maintain broad coverage and pursue source control.
	Enteric Gram Negative bacteria (Enterobacterales)	<i>Enterobacter cloacae complex</i>	none	Enteric Gram Negative bacteria Enterobacter cloacae complex	Cefepime	Ciprofloxacin	-AmpC producer, avoid ceftriaxone or pip-tazo even if susceptible
			CTX-M	Enteric Gram Negative bacteria Enterobacter cloacae complex CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria Enterobacter cloacae complex KPC or NDM-1 or OXA- 48-like or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID- restricted agent will be indicated
		<i>Escherichia coli</i>	none	Enteric Gram Negative bacteria Escherichia coli	Ceftriaxone	Piperacillin- tazobactam	
			CTX-M	Enteric Gram Negative bacteria Escherichia coli CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria Escherichia coli KPC or NDM-1 or OXA- 48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID- restricted agent will be indicated

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		<i>Klebsiella oxytoca</i>	none	Enteric Gram Negative bacteria <i>Klebsiella oxytoca</i>	Cefepime	Ciprofloxacin	
			CTX-M	Enteric Gram Negative bacteria <i>Klebsiella oxytoca</i> CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria <i>Klebsiella oxytoca</i> KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
		<i>Klebsiella aerogenes</i>	none	Enteric Gram Negative bacteria <i>Klebsiella aerogenes</i>	Cefepime	Ciprofloxacin	-Amp C producer, avoid ceftriaxone or pip-tazo even if susceptible
			CTX-M	Enteric Gram Negative bacteria <i>Klebsiella aerogenes</i> CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria <i>Klebsiella aerogenes</i> KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
		<i>Klebsiella pneumoniae</i>	none	Enteric Gram Negative bacteria <i>Klebsiella pneumoniae</i>	Ceftriaxone	Ciprofloxacin	
			CTX-M	Enteric Gram Negative bacteria <i>Klebsiella pneumoniae</i> CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria <i>Klebsiella pneumoniae</i> KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
		Proteus spp.	none	Enteric Gram Negative bacteria	Ceftriaxone	Ciprofloxacin	

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				Proteus spp.			
			CTX-M	Enteric Gram Negative bacteria Proteus spp. CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria Proteus spp. KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
		<i>Salmonella</i> ssp.	none	Enteric Gram Negative bacteria Salmonella spp.	Ceftriaxone	Ciprofloxacin	
			CTX-M	Enteric Gram Negative bacteria Salmonella spp. CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria Salmonella spp. KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
		<i>Serratia marcescens</i>	none	Enteric Gram Negative bacteria Serratia marcescens	Ceftriaxone	Ciprofloxacin	
			CTX-M	Enteric Gram Negative bacteria Serratia marcescens CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria Serratia marcescens KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
		None	None	Enteric Gram Negative bacteria	Cefepime	Piperacillin-tazobactam	-Identifies Enteric Gram-negative pathogens other than <i>E. coli</i> , <i>E. cloacae</i> complex, <i>K. aerogenes</i> , <i>K.</i>

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							<i>oxytoca</i> , <i>K. pneumoniae</i> group, <i>Proteus spp.</i> , <i>Salmonella spp.</i> , <i>Serratia marcescens</i> -See Table 4 , Column 1 for possible pathogens
			CTX-M	Enteric Gram Negative bacteria CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem
			KPC NDM-1 OXA-48-like IMP VIM	Enteric Gram Negative bacteria KPC or NDM-1 or OXA-48 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
None	<i>Haemophilus influenzae</i>	----		<i>Haemophilus influenzae</i>	Ceftriaxone	Ciprofloxacin	
None	<i>Neisseria meningitidis</i>	----		<i>Neisseria meningitidis</i>	Ceftriaxone		
None	<i>Pseudomonas aeruginosa</i>	none		<i>Pseudomonas aeruginosa</i>	Cefepime	Meropenem*	-Meropenem: 3h infusion, higher doses
		CTX-M		<i>Pseudomonas aeruginosa</i> CTX-M	Meropenem*		-ESBL gene detected, standard treatment for BSI is carbapenem -Meropenem: 3h infusion, higher doses
		KPC NDM-1 IMP VIM		<i>Pseudomonas aeruginosa</i> KPC or NDM-1 or IMP or VIM	Consult ID and See MDRO Guidance		-CRE gene detected, ID-restricted agent will be indicated
None	<i>Stenotrophomonas maltophilia</i>	----		<i>Stenotrophomonas maltophilia</i>	Consult ID and See MDRO Guidance		Recommend ID consultation, combination therapy should be considered in invasive disease.
None	None	None	None	None	Consider ID Consult -If high suspicion for Burkholderia: Meropenem*		-Identifies Gram-negative pathogens NOT in the Enterobacterales group and other than P.

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						<i>aeruginosa</i> , <i>S. maltophilia</i> , <i>A. baumannii</i> , <i>H. influenzae</i> , <i>N. meningitidis</i> . -Consider the possibility of an anaerobe -See Table 4 , Columns 2 and 3 for possible pathogens.
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* ID consult required for approval

Table 4. Gram-negative species NOT detected by BioFire BCID (not all inclusive)

1. Enteric Gram Negative bacteria (Enterobacterales)	2. Non-Enterobacterales Gram-Negatives	3. Gram-Negative Anaerobes (also Non-Enterobacterales)
Group Target: Enteric Gram Negative bacteria DETECTED <i>Morganella morganii</i> <i>Providencia sp.</i> <i>Serratia liquefaciens</i> <i>Citrobacter freundii</i> <i>Yersina sp.</i> <i>Citrobacter koserii</i>	Gram stain only, No BCID targets <i>Aeromonas sp.</i> <i>Burkholderia sp.</i> <i>Kingella sp.</i> <i>Vibrio sp.</i> <i>Haemophilus sp.</i> <i>Achromobacter sp.</i>	Gram stain only, No BCID targets <i>Bacteroides sp.</i> <i>Fusobacterium sp.</i> <i>Pasteurella sp.</i> <i>Prevotella sp.</i> <i>Campylobacter sp.</i>

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Table 5. Yeast Blood Culture Empiric Treatment Pathway

Gram-stain	BCID Species target	1 st Line Empiric Antibiotic	2 nd Line Empiric Antibiotic	Notes
Yeast*	<i>Candida albicans</i>	Micafungin*		-ID consult required
	<i>Candida auris</i>	Micafungin*		-ID consult required
	<i>Candida tropicalis</i>	Micafungin*		-ID consult required
	<i>Candida parapsilosis</i>	Micafungin*		-ID consult required
	<i>Candida glabrata</i>	Micafungin*		-ID consult required
	<i>Candida krusei</i>	Micafungin*	Amphotericin B (Ambisome)*	-ID consult required
	Cryptococcus neoformans/gattii	Amphotericin B (Ambisome)* + Flucytosine		-ID consult required
	none	Micafungin*	Voriconazole*	-Contact lab for fungal stain results. Pathogen may be Malassezia or other Candida sp. ID consult required.

Note: Obtain follow up, surveillance blood cultures every 48 hours to assess for documented clearance

*ID consult required for candidemia and approval of designated agents