Summary of ID-restricted and Non-formulary Agents for Multidrug-Resistant Gram-negative Pathogens

Table 1. Pharmacy Information

Drug name (Brand name)	Status	Formulary niche description	Cost/day
Ceftolozane/Tazobactam (Zerbaxa)	Formulary ID-restricted	MDR P. aeruginosa (preferred empiric agent)	$983.88
Ceftazidime/Avibactam (Avycaz)	Formulary ID-restricted	CRE (preferred empiric agent) MDR P. aeruginosa second line	$1113.36
Meropenem/Vaborbactam (Vabomere)	Formulary ID-restricted	CRE, confirmed KPC-producer	$1195.02
Polymyxin B	Formulary ID-restricted	MDR P. aeruginosa in combination MDR Acinetobacter in combination CRE in combination	~$1
Colistin -- Intravenous	Formulary ID-restricted	MDR P. aeruginosa in combination MDR Acinetobacter in combination CRE in combination	~$1
Tigecycline	Formulary ID-restricted	MDR Acinetobacter in combination CRE in combination	$150
Minocycline	Formulary	MDR Acinetobacter	$334
Imipenem/Relebactam (Recarbrio)	Non-formulary	CRE MDR P. aeruginosa	$1189
Cefiderocol (Fetroja)	Formulary ID-restricted	Not established	$1314
Plazomicin (Zemdri)	Non-formulary	Urinary CRE pathogens when aminoglycoside is considered safe	$756
Eravacycline (Xerava)	Non-formulary	MDR Acinetobacter CRE in combination	$140
Aztreonam/Avibactam (Emblaveo)	Formulary ID-restricted	MDR Stenotrophomonas maltophilia Class-B (NDM-1) producing pathogens	$1230.16
Fosfomycin -- Intravenous	Non-formulary	Not established	Not established
Sulbactam/Durlobactam (Xacduro)	Non-formulary	MDR Acinetobacter	$1985.24

ID-restricted = ID Consult Required

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Table 2. Pathogen Activity

Color codes indicate expected activity based on in vitro activity. Susceptibility estimates based on DUH CY2022-2023 review of carbapenem non-susceptible (carb-NS) Gram-negative pathogens are presented as Number susceptible/Number tested (% susceptible) in the cells below when available. Always confirm expected activity with susceptibility testing.

Red=inactive; yellow= may be active; green=active; white = unknown

Drug name	*Carb-NS Enterobacterales**				*Acinetobacter spp.*	*P. aeruginosa*	*S. maltophilia*
	Non-CP CRE	Carba-R**					
		KPC (17)	IMP/VIM /NDM (2)	OXA-48 (0)	MDR including OXA-23/24/58	Carb-NS	
Ceftolozane/Tazobactam						45/59 (76)	
Ceftazidime/Avibactam						44/59 (75)	Same as ceftaz
Meropenem/Vaborbactam (Vabomere)	Same as mero						
Tigecycline							
Minocycline							
Polymyxin B							
Colistin -- Intravenous							
Cefiderocol						43/48 (90)	
Plazomicin							
Eravacycline							
Imipenem/Relebactam							
Aztreonam/Avibactam							
Fosfomycin -- Intravenous							
Sulbactam/Durlobactam							

*CRE as defined here includes Klebsiella, E. coli, Enterobacter, and Citrobacter species. Number in parenthesis are the number of tests positive for this gene in 2022-2023.

** Genotypic testing for carbapenemases using the Carba-R will be done on E. coli, Klebsiella spp, Enterobacter spp and Citrobacter spp when ertapenem is I/R from non-CSF sources or when meropenem is I/R from CSF.

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Table 3. Antibiotic Susceptibility Testing (AST)

Drug name	Pathogen-AST Method	Cascade vs. By Request	In-House vs. Send Out	Logistical considerations in obtaining test including TAT
Ceftolozane/Tazobactam	P. aeruginosa- MIC	Cascade	In-House	TAT: initial testing.
Ceftazidime/Avibactam	Enteric GNR and P. aeruginosa- MIC	Cascade	In-House	TAT: initial testing.
Meropenem/Vaborbactam	Enteric GNR- MIC	Cascade	In-House	TAT: initial testing.
Polymyxin B	P. aeruginosa-MIC A. baumanii-MIC	Request	Send Out	TAT: 7-10 days. Colistin MICs predict polymyxin B MICs.
Colistin	P. aeruginosa -MIC A. baumanii -MIC	Request	Send Out	TAT: 7-10 days. Colistin MICs predict polymyxin B MICs.
Tigecycline	Enteric GNR- MIC	Request	In-House	Enteric GNR MIC TAT: 2 days.
Minocycline	A. baumanii, Burkholderia sp., S. maltophilia-MIC	Cascade	In-House	TAT: 2 days.
Cefiderocol	Enteric GNR, P. aeruginosa, A. baumanii, S. maltophilia-Disk diffusion	PA, SM: Cascade Others: Request	In-House	TAT: 2 days.
Plazomicin	P. aeruginosa, S. maltophilia, A. baumanii, Enteric GNR-MIC	Request	Send Out	TAT: 7-10 days.
Eravacycline	Enteric GNR - MIC	Request	Send Out	TAT: 7-10 days.
Omadacycline	Enteric GNR- MIC	Request	Send Out	TAT: 7-10 days.
Imipenem/Relebactam	P. aeruginosa - MIC	Cascade	Send Out	TAT: 7-10 days.
Aztreonam/Avibactam	CR Enteric GNR by class B enzyme-Disk diffusion.	Request	Send Out*	TAT: 7-10 business days, requires prior authorization. No CLSI testing method for *S.maltophilia*.
Fosfomycin	E. coli-Disk diffusion	Request	In-House	TAT: 2 days. CLSI Interpretation ONLY for *E. coli*. Results for other species are unreliable.
Sulbactam/Durlobactam	Acinetobacter species	Request	Send Out	TAT: 7-10 days.

GNR=Gram negative rod; CR= carbapenem resistant; *https://health.maryland.gov/laboratories/Pages/ARLNhome.aspx

Detailed description of reporting cascade logic is available on the DUHS Labs Website: https://clinlabs.duke.edu/clinical-microbiology

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