

Table S1. Real-time antibiogram-specific Epic appended comments

Organism	Conditional Rule	Antibiotic Comment (auto-appended)
<p><i>E. coli</i> <i>Klebsiella pneumoniae</i> <i>Klebsiella oxytoca</i> <i>Proteus mirabilis</i> <i>Proteus vulgaris</i> group</p>	<p>When isolate is susceptible to ciprofloxacin, TMP-SMX, and ceftriaxone.</p>	<p>If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po ciprofloxacin. On a case-by-case basis, po TMP-SMX may be considered.</p> <p>If patient is on broad-spectrum antibiotic (carbapenem, piperacillin-tazobactam or cefepime) and not considered eligible to switch to oral therapy, Antimicrobial Stewardship Committee recommends to consider switching to IV ceftriaxone given this isolate is susceptible.</p>
	<p>When isolate is susceptible to ciprofloxacin and ceftriaxone but I or R to TMP-SMX</p>	<p>If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po ciprofloxacin.</p> <p>If patient is on broad-spectrum antibiotic (carbapenem, piperacillin-tazobactam or cefepime) and not considered eligible to switch to oral therapy, Antimicrobial Stewardship Committee recommends to consider switching to IV ceftriaxone given this isolate is susceptible.</p>

	<p>When isolate is susceptible to TMP-SMX and Ceftriaxone but I or R to ciprofloxacin</p>	<p>If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po TMP-SMX.</p> <p>If patient is on broad-spectrum antibiotic (carbapenem, piperacillin-tazobactam or cefepime) and not considered eligible to switch to oral therapy, Antimicrobial Stewardship Committee recommends to consider switching to IV ceftriaxone given this isolate is susceptible.</p>
	<p>When isolate is susceptible to ceftriaxone but I or R to ciprofloxacin and TMP-SMX</p>	<p>If patient is on broad-spectrum antibiotic (carbapenem, piperacillin-tazobactam or cefepime) and not considered eligible to switch to oral therapy, Antimicrobial Stewardship Committee recommends to consider switching to IV ceftriaxone given this isolate is susceptible.</p>
	<p>When isolate is susceptible to ciprofloxacin but I or R to TMP-SMX and ceftriaxone</p>	<p>If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po ciprofloxacin.</p>

	When isolate is susceptible to TMP-SMX but I or R to ciprofloxacin and ceftriaxone	If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po TMP-SMX.
	When isolate is susceptible to ciprofloxacin and TMP-SMX but I or R to ceftriaxone	If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po ciprofloxacin. On a case-by-case basis, po TMP-SMX may be considered.
AmpC organisms: <i>Serratia marcescens</i> <i>Providencia</i> <i>Citrobacter</i>	When isolate is susceptible to ciprofloxacin but I or R to TMP-SMX	If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po ciprofloxacin.

<i>Enterobacter Morganella morganii</i>	When isolate is susceptible to TMP-SMX but I or R to ciprofloxacin	If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po TMP-SMX.
	When isolate is susceptible to ciprofloxacin and TMP-SMX	If patient considered eligible to switch to oral therapy (clinically improving and tolerating oral medications), consider switch to po ciprofloxacin. On a case-by-case basis, po option TMP-SMX may be considered.
<i>Pseudomonas aeruginosa</i>	When at least one of the following antibiotics is susceptible: meropenem, piperacillin-tazobactam, cefepime or ciprofloxacin	Antimicrobial Stewardship Committee recommends that a single antibiotic to which the isolate is susceptible be used in clinically stable patients instead of combination antibiotic therapy.

Table S2. Study features for the pre-intervention and intervention groups

	Pre-intervention	Intervention
Time period	02/09/2018 - 10/9/2018	11/1/2018 - 7/15/2019
Procedure	Blood culture positive Gram stain showed GNR Subculture (4-8hrs) AST on Microscan (18hrs)	Blood culture positive Gram stain showed GNR Rapid lysis-centrifugation method (10min) AST on VITEK®2 (<i>Enterobacterales</i> 9hrs, <i>P. aeruginosa</i> 12hrs)
Epic comments	None	Automated, isolate antibiogram-specific, templated de-escalation comment
ASP intervention	None	ASP review +/- intervention during daytime hours on weekdays

ASP: Antibiotic stewardship program; AST: antimicrobial susceptibility testing; GNR: Gram-negative rod; hrs: hours; min: minutes.

Table S3. Definition of antibiotic de-escalation and escalation

First antibiotic (first column)	Second antibiotic												
	cefaz	CTX	cefaz	cefepime	erta	mero	TMP-SMX	cipro	levo	moxi	amox-clav	amp-subactam	pip-tazo
cefaz	-	E	E	E	E	E	E	E	E	E	E	E	E
CTX	D	-	E	E	E	E	E	E	E	E	E	E	E
ceftaz	D	D	-	same	E	E	E	E	E	E	D	D	D
cefepime	D	D	same	-	E	E	E	E	E	E	D	D	D
amox-clav	D	D	E	E	E	E	E	E	E	E	-	same	E
amp-sulbactam	D	D	E	E	E	E	E	E	E	E	same	-	E
pip-tazo	D	D	D	D	E	E	D	D	D	D	D	D	-
erta	D	D	D	D	-	E	D	D	D	D	D	D	D
mero	D	D	D	D	D	-	D	D	D	D	D	D	D
TMP-SMX	D	D	D	D	E	E	-	E	E	E	D	D	E
cipro	D	D	D	D	E	E	D	-	same	D	D	D	E
levo	D	D	D	D	E	E	D	same	-	D	D	D	E
moxi	D	D	D	D	E	E	D	E	E	-	D	D	E

Amox-clav: amoxicillin-clavulanic acid; amp-sulbactam: ampicillin-sulbactam; cefaz: cefazolin; ceftaz: ceftazidime; cipro: ciprofloxacin; CTX: ceftriaxone; D: de-escalation; erta: ertapenem; E: escalation; levo: levofloxacin; mero: meropenem; moxi: moxifloxacin; pip-tazo: piperacillin-tazobactam; TMP-SMX: trimethoprim-sulfamethoxazole.