Acyclovir IV

IV acyclovir is used to treat a wide variety of viral infections caused by Herpes simplex virus (HSV) and Varicella-zoster virus (VZV).

Formulation alternative

Oral acyclovir has poor bioavailability and oral valacyclovir should be used instead. Acyclovir is 45-65% bioavailable from a single dose of valacyclovir. High valacyclovir doses may achieve concentrations similar to IV acyclovir, and have been used in patients with viral central nervous system infections; however, safety and efficacy data are limited.[1, 2] As with IV acyclovir, high doses of PO valacyclovir pose greater kidney injury risk and concomitant IV fluids during therapy may be protective.

IV acyclovir		PO VALacyclovir
300 – 600 mg/day	=	1,000 mg daily
600 – 900 mg/day	=	1,500 mg daily OR 500 mg three times daily
900 – 1,200 mg/day	=	1,000 mg two times daily
1,200 – 1,800 mg/day	=	1,000 mg three times daily
>1,800 mg/day	=	1,000 mg four times daily

Therapeutic alternatives

Alternative IV antiviral medications have a higher risk of adverse events and lower quality of efficacy data compared with acyclovir for some indications. Severe HSV or VZV infections including central nervous system, ocular, and disseminated infections, particularly in immunocompromised patients may require IV therapy. Alternative IV options include:

- Ganciclovir
- Foscarnet

References

1. Pouplin T, et al. Valacyclovir for herpes simplex encephalitis AAC 2011:55;3624.
2. Weller S., et al. Pharmacokinetics of the acyclovir pro-drug valacyclovir after escalating single- and multiple-dose administration to normal volunteers. Clin Pharmacol Ther 1993:54;595–605.

Ampicillin-sulbactam IV

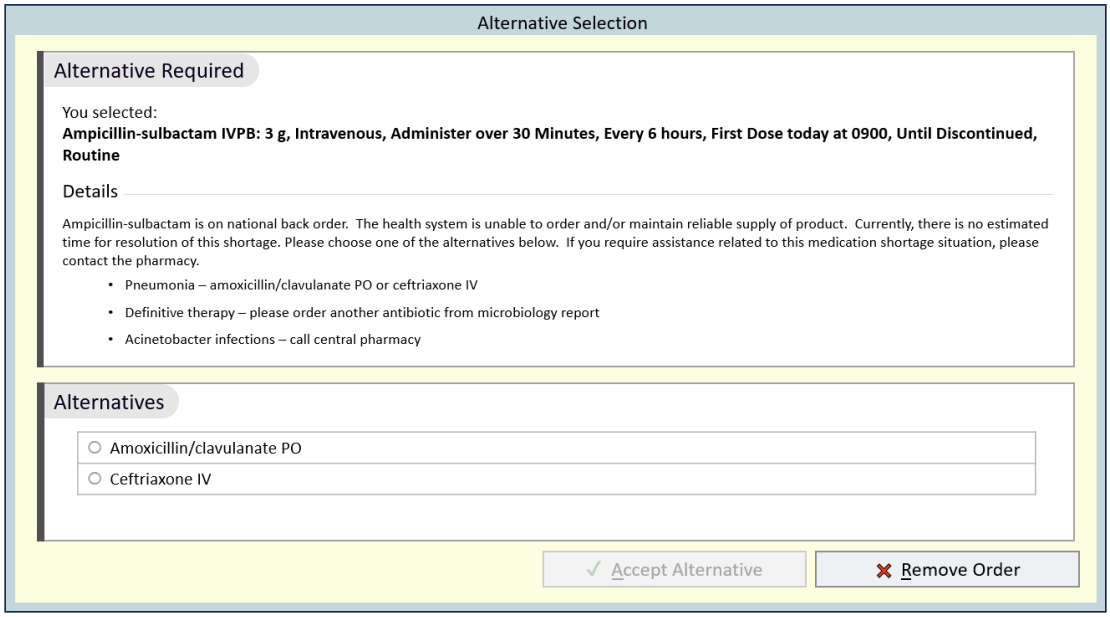
Therapeutic alternatives

Amoxicillin-clavulanate has similar spectrum of activity to ampicillin-sulbactam and can be used as an oral alternative in most situations. Amoxicillin-clavulanate is considered to have good oral bioavailability.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Community acquired pneumonia	*Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis*	Cefotaxime, ceftriaxone, levofloxacin, moxifloxacin
Bite wound infection	*Pasteurella* spp, *Streptococcus* spp, *S. aureus* (MSSA), anaerobes	Second or third generation cephalosporin (e.g. cefuroxime, ceftriaxone) + metronidazole, doxycycline + metronidazole, piperacillin-tazobactam
Head, neck, and odontogenic infections	*Streptococcus* spp (e.g. Viridans group, group A), anaerobes	Second or third generation cephalosporin (e.g. cefuroxime, ceftriaxone) + metronidazole, cefoxitin, clindamycin
Acinetobacter infection	*Acinetobacter* spp	Varies by local resistance patterns, choose alternative on susceptibility report. Do NOT use amoxicillin-clavulanate.

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Azithromycin IV

Formulation alternatives

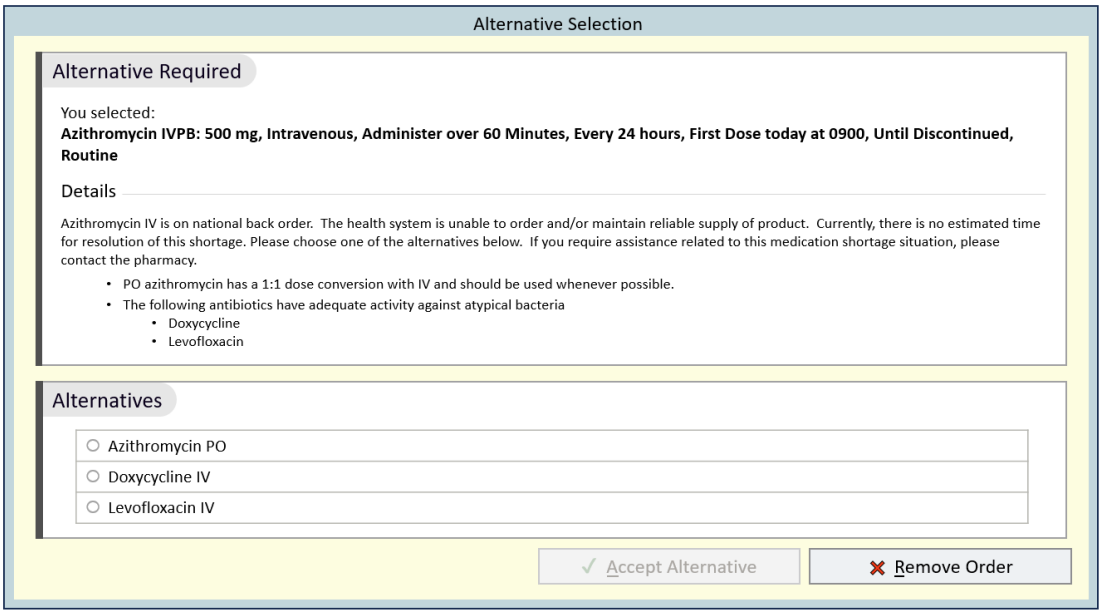
Azithromycin has high bioavailability and the enteral route should be used whenever possible. IV to PO conversion is 1:1.

Therapeutic alternatives

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Community acquired pneumonia	Atypical bacteria (e.g. *Legionella* spp, *Mycoplasma* spp)	Doxycycline, levofloxacin
Exacerbation of chronic obstructive pulmonary disease	Respiratory flora	Doxycycline, ampicillin/sulbactam, cefuroxime, ceftriaxone, levofloxacin
Sexually transmitted infections	*Chlamydia trachomatis*	Doxycycline
Pelvic inflammatory disease	*Chlamydia trachomatis, Mycoplasma* spp	Doxycycline
Traveler's diarrhea	*E. coli, Campylobacter* spp	Ciprofloxacin, levofloxacin

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Cefoxitin

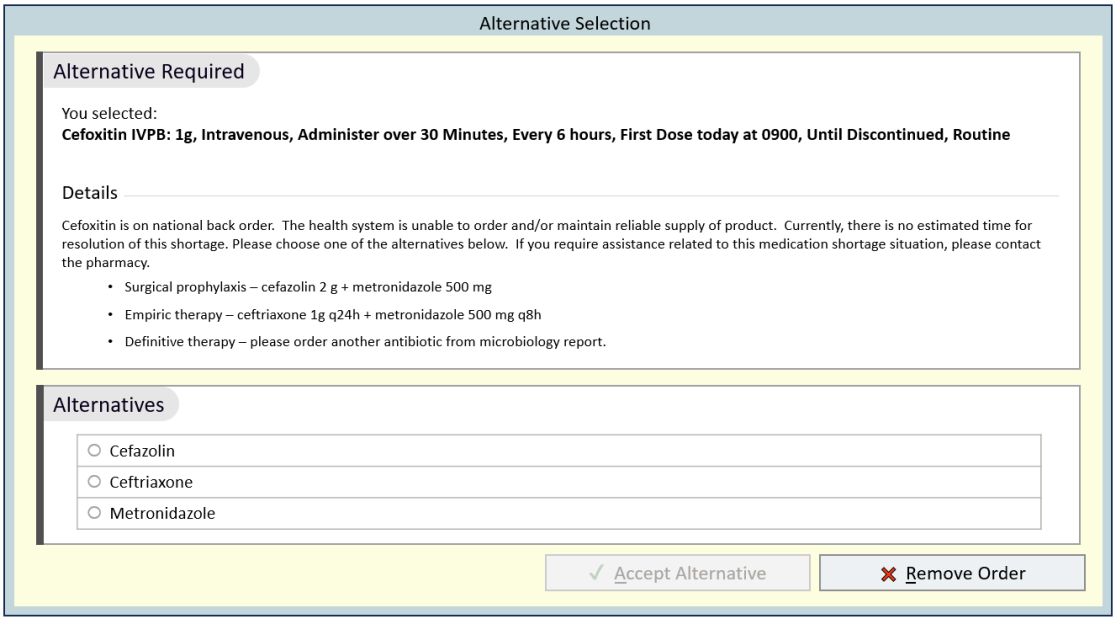
Therapeutic alternatives

In addition to gram-positive and gram-negative bacterial coverage, cefoxitin is the only cephalosporin on the market with activity against anaerobes. Other cephalosporins should be paired with an agent with anaerobic activity (e.g. metronidazole) as needed based on infection type.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Pelvic inflammatory disease	*E. coli, Neisseria gonorrhoeae*, anaerobes	Ceftriaxone + metronidazole, ampicillin-sulbactam
Skin, bone, joint infections	*Streptococcus* spp, *S. aureus* (MSSA), *E. coli,* anaerobes	Second or third generation cephalosporin (e.g. cefuroxime, ceftriaxone) + metronidazole
Surgical prophylaxis	Enterobacterales (e.g. *E. coli*), anaerobes	Cefazolin + metronidazole

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



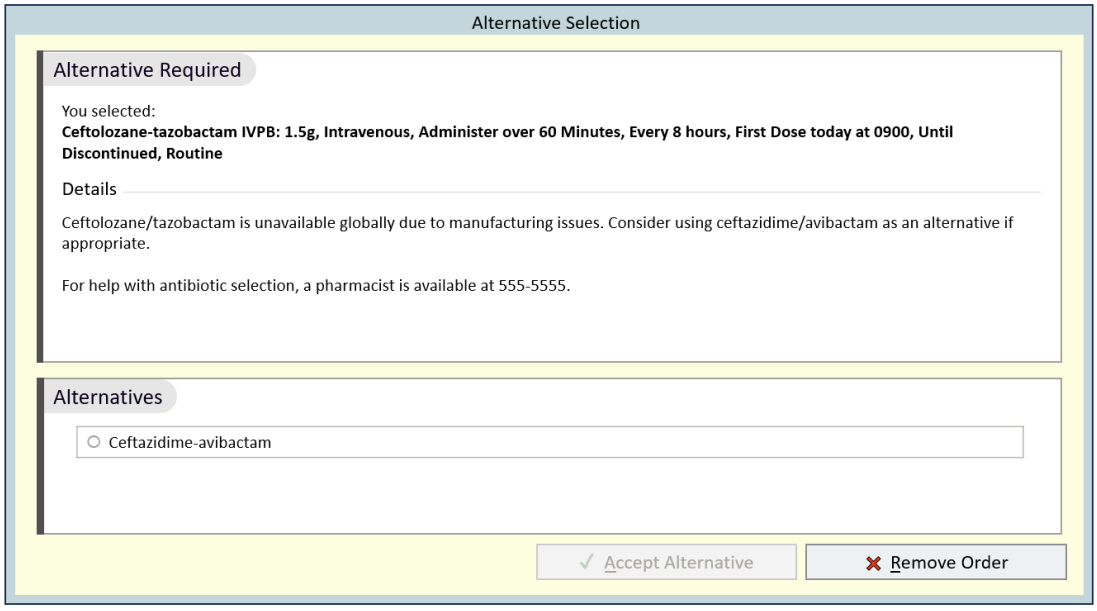
Ceftolozane-tazobactam

Therapeutic alternatives

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Hospital-acquired pneumonia, intra-abdominal infections, skin and soft tissue infections, urinary tract infections	Multi-drug resistant organisms including *Pseudomonas aeruginosa*	Ceftazidime-avibactam, imipenem-cilastatin-relebactam, cefiderocol

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Clindamycin IV

Formulation alternatives

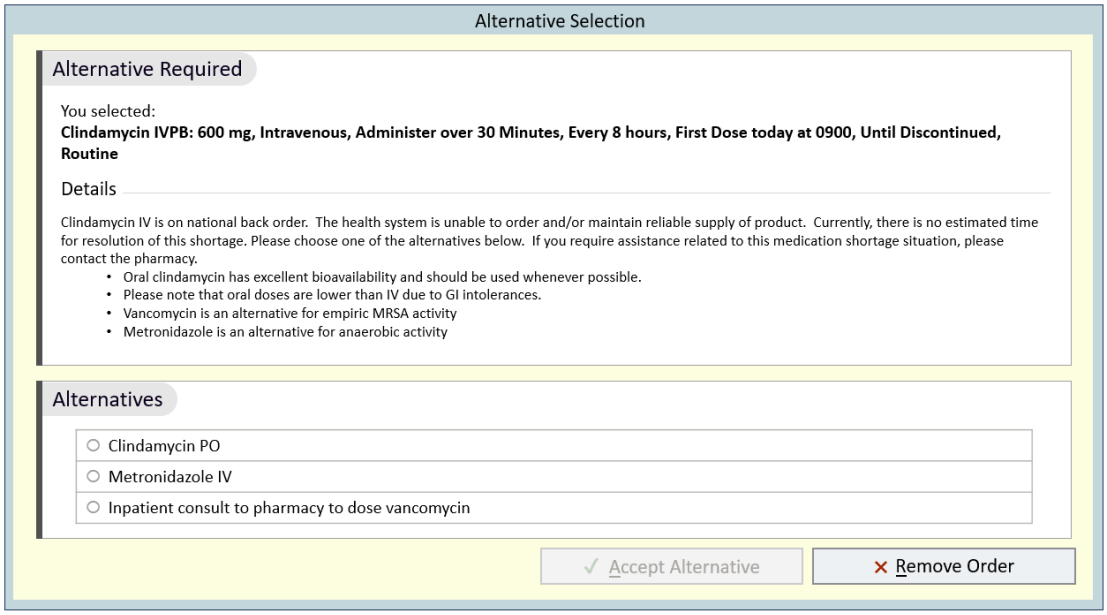
Clindamycin has high bioavailability and the enteral route should be used whenever possible. IV to PO conversion is 1:1. High oral doses may not be tolerated due to GI side effects.

Therapeutic alternatives

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Anaerobic coverage	*Bacteroides* spp, *Clostridium* spp, *Peptostreptococcus* spp, many others	Metronidazole, ampicillin-sulbactam, piperacillin-tazobactam
Head, neck, and odontogenic infections	*Streptococcus* spp (e.g. Viridans group, group A), anaerobes	Ampicillin-sulbactam, cefoxitin, second or third generation cephalosporin (e.g. cefuroxime, ceftriaxone) + metronidazole
Skin and soft tissue infections	*S. aureus* (MRSA and MSSA), *Streptococcus* spp	vancomycin
Toxin suppression (necrotizing soft tissue infections, toxic shock syndrome)	*Streptococcus pyogenes, S. aureus* (MRSA and MSSA)	linezolid

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Doxycycline IV

Formulation alternatives

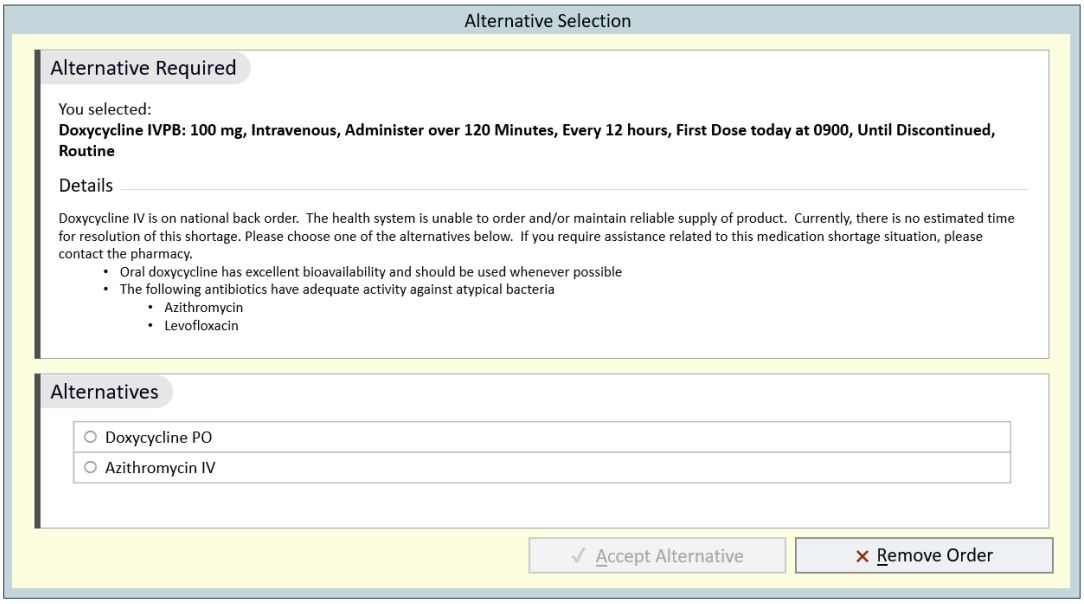
Doxycycline has high bioavailability and the enteral route should be used whenever possible. IV to PO conversion is 1:1.

Therapeutic alternatives

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Community acquired pneumonia	Atypical bacteria (e.g. *Legionella* spp, *Mycoplasma* spp)	Azithromycin, levofloxacin
Exacerbation of chronic obstructive pulmonary disease	Respiratory flora	Azithromycin, ampicillin/sulbactam, cefuroxime, ceftriaxone, levofloxacin
Skin and soft tissue infections	*S. aureus* (MRSA and MSSA)	Vancomycin
Sexually transmitted infections	*Chlamydia trachomatis*	Azithromycin, levofloxacin
Pelvic inflammatory disease	*Chlamydia trachomatis, Mycoplasma* spp	Azithromycin

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Gentamicin

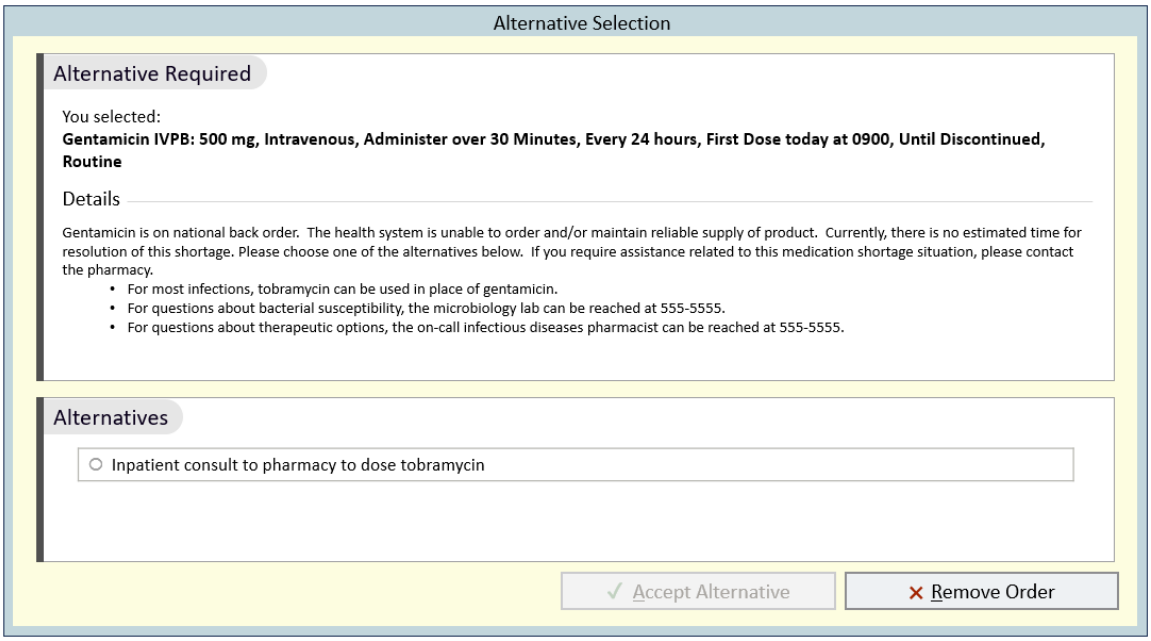
Therapeutic alternatives

Tobramycin has similar spectrum of activity to gentamicin and can be used as an alternative in most situations.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Intra-amniotic infection (chorioamnionitis)	*E. coli*	Ceftriaxone, piperacillin-tazobactam
Endocarditis synergy	*Enterococcus* spp, *Staphylococcus* spp, *Streptococcus* spp	Consult infectious diseases expert
Empiric gram-negative coverage	Enterobacterales (e.g. *E. coli*), *Pseudomonas aeruginosa*, many others	Tobramycin, amikacin

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Metronidazole IV

Formulation alternatives

Metronidazole has high bioavailability and the enteral route should be used whenever possible. IV to PO conversion is 1:1.

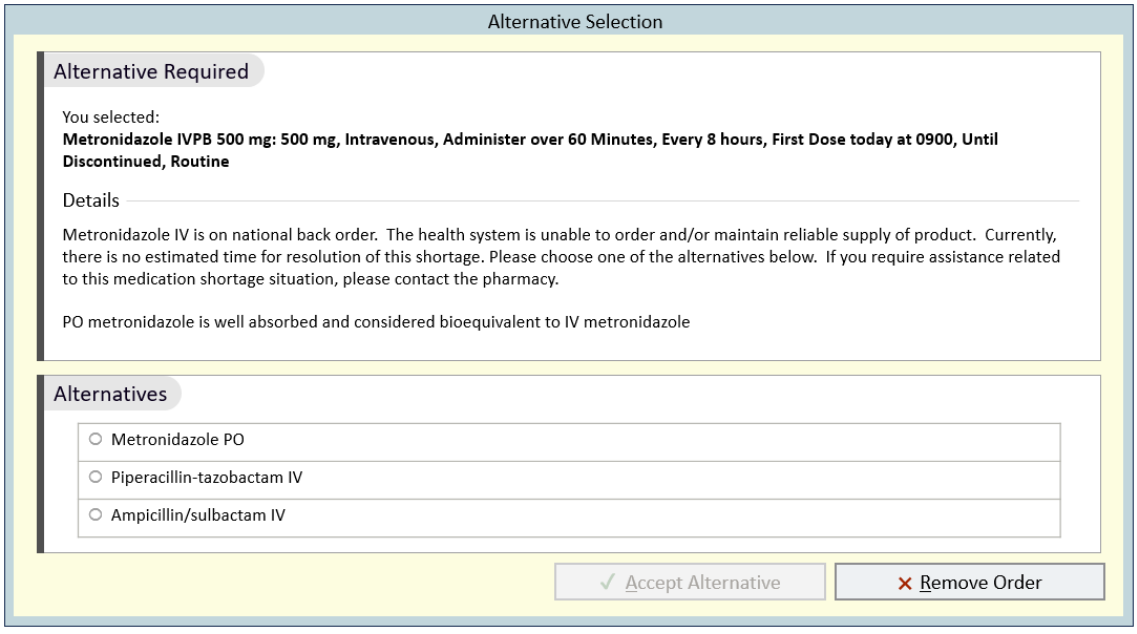
Therapeutic alternatives

Clindamycin used to be an adequate alternative to metronidazole in terms of anaerobic activity, however, increasing resistance has been reported. Other anaerobic agents (listed below) are more reliable and should be favored over clindamycin.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Anaerobic coverage	*Bacteroides* spp, *Clostridium* spp, *Peptostreptococcus* spp, many others	Ampicillin-sulbactam, piperacillin-tazobactam, meropenem

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Meropenem

Therapeutic alternatives

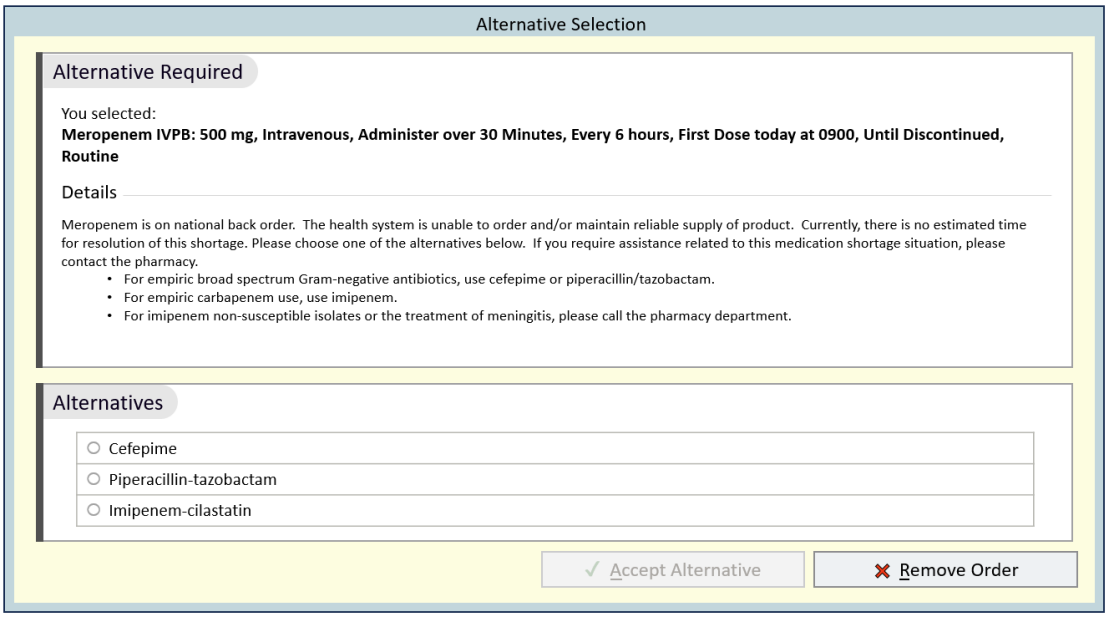
Meropenem is often used for its broad gram-negative activity (alternatives listed below). However, it also has activity against *Streptococcus* spp, *S. aureus* (MSSA), and anaerobes. Multiple agents may be required to achieve desired spectrum of coverage similar to that provided by meropenem.

For example, aztreonam has broad gram-negative activity, but has no appreciable activity against gram-positive or anaerobic organisms. If gram-positive and anaerobic coverage is desired, vancomycin and metronidazole should be added to aztreonam.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Empiric broad gram-negative coverage	Enterobacterales (e.g. *E. coli, Klebsiella* spp), *Pseudomonas aeruginosa*, others	Cefepime, ceftazidime, piperacillin-tazobactam, aztreonam
Gram-negative infection requiring carbapenem therapy	Multidrug-resistant gram-negatives (e.g. ESBL *E. coli*, *Pseudomonas* spp, *Acinetobacter* spp)	Imipenem/cilastatin, ertapenem* *does not cover *Pseudomonas* spp, *Acinetobacter* spp

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Neomycin PO

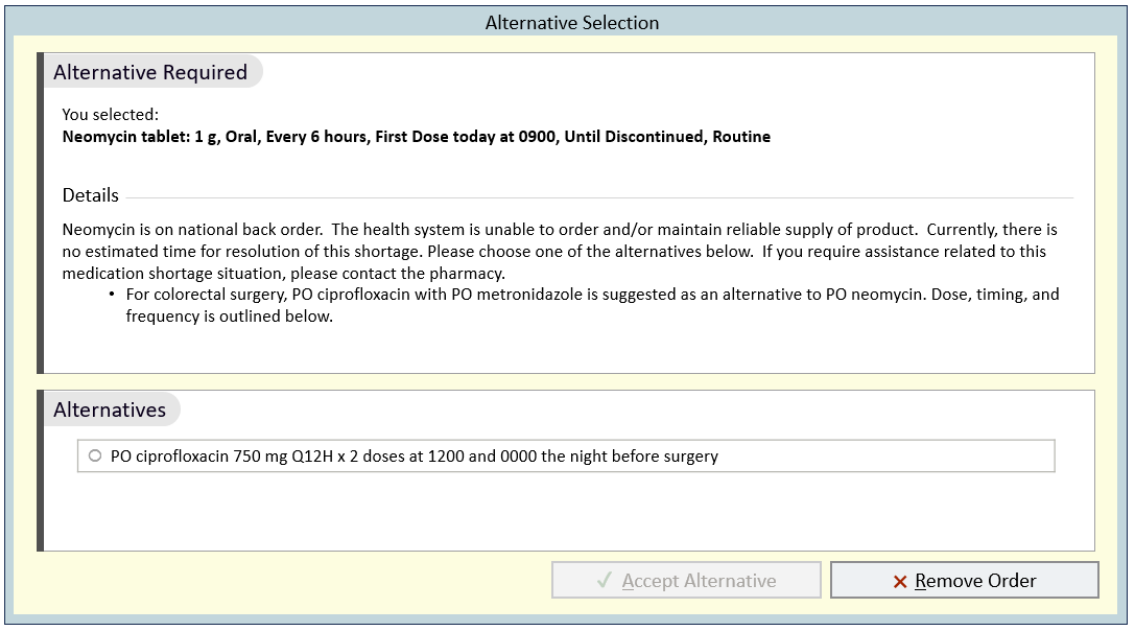
Oral neomycin is used as part of a prophylaxis regimen for colorectal procedures, usually in combination with oral erythromycin or oral metronidazole starting the day before the procedure following a mechanical bowel preparation. The regimen targets enteric bacteria including gram-negatives and anaerobes.

Therapeutic alternatives

The following regimen has been studied as oral prophylaxis for colorectal surgery.[1] It may be used instead of a neomycin-based regimen.

Ciprofloxacin 750 mg PO x2 doses (at 1200, 0000 day before procedure)
+
Metronidazole 250 mg PO x3 doses (at 1200, 1800, 0000 day before procedure)

Example alternative alert for electronic health record



Reference:

1. Basany EE, Solis-Pena A, Pellino G, et al. Preoperative oral antibiotics and surgical-site infections in colon surgery (ORALEV): a multicentre, single-blind, pragmatic, randomised controlled trial. *Lancet Gastroenterol Hepatol*. 2020; 5(8):729-738.

Penicillin G benzathine, long-acting IM

Formulation alternatives

Penicillin may be available in other parenteral formulations (intravenous, intramuscular); however, they are not directly interchangeable with penicillin G benzathine. They differ in dosage and duration and may not be appropriate for certain indications.

Penicillin is available in oral formulation but may not be appropriate for all indications (e.g. should not be used for syphilis). Oral amoxicillin has better bioavailability than oral penicillin and may be an appropriate alternative depending on indication. Dosing conversions are not 1:1 and prescribing information should be used to choose the correct dose of oral product.

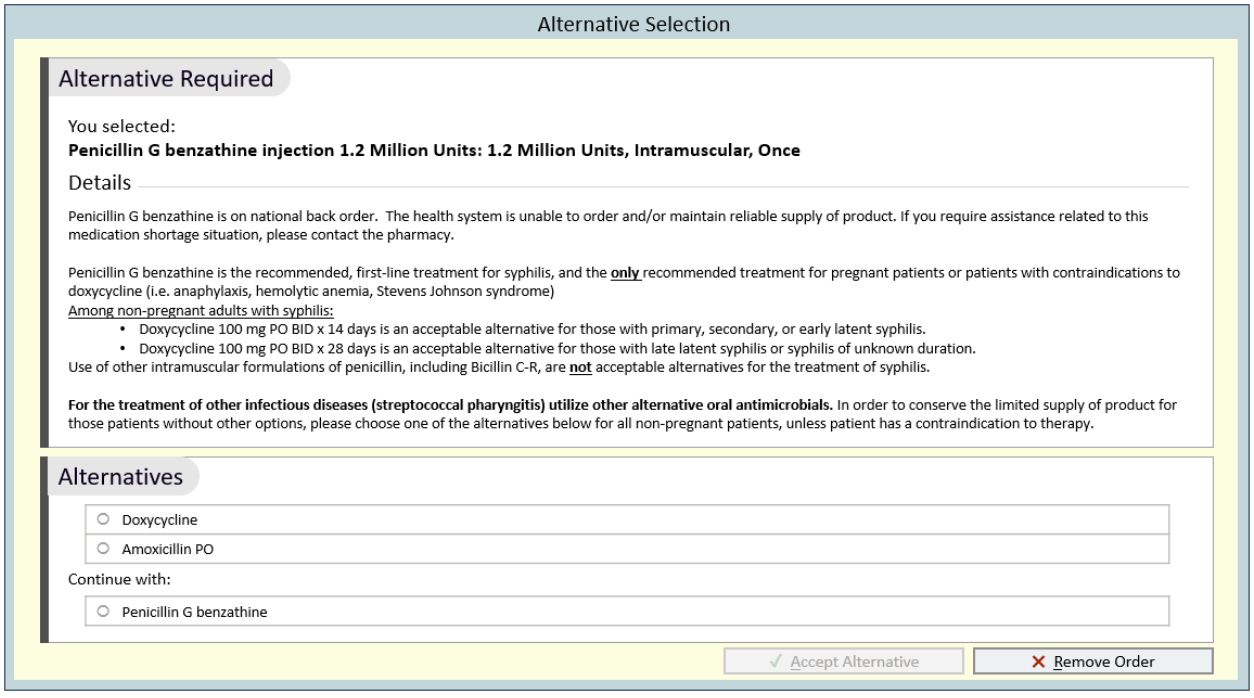
Therapeutic alternatives

There are no therapeutic alternatives to penicillin G benzathine for pregnant patients or neonates with syphilis. If limited supply is available, it should be prioritized for these populations.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Streptococcal pharyngitis	*Streptococcus pyogenes* (group A)	Amoxicillin, penicillin VK (oral)
Syphilis	*Treponema pallidum*	Doxycycline

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.

Example alternative alert for electronic health record



Piperacillin-tazobactam

Therapeutic alternatives

Piperacillin-tazobactam is often used for its broad gram-negative activity. However, it also has activity against *Enterococcus* spp, *Streptococcus* spp, *S. aureus* (MSSA), and anaerobes. Multiple agents may be required to achieve desired spectrum of coverage similar to that provided by piperacillin-tazobactam.

Indication	Organisms covered by the drug on shortage	Therapeutic Alternatives
Most infections: no anti-pseudomonal coverage required (e.g. community-acquired, mild illness severity, immunocompetent)		
Pneumonia	*Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis*	• Cefotaxime • Ceftriaxone • Levofloxacin • Moxifloxacin
Intra-abdominal infection	*Streptococcus* spp, Enterobacterales (e.g. *E. coli*), anaerobes	• Ceftriaxone + metronidazole • Fluoroquinolone (e.g. levofloxacin) + metronidazole
Cellulitis (no abscess)	*Streptococcus* spp (e.g. group A)	• Nafcillin • Cefazolin
Anti-pseudomonal coverage required (e.g. hospital-acquired, critically ill, immunocompromised)		
Pneumonia	*S. aureus* (MSSA), Enterobacterales (e.g. *E. coli*), *Pseudomonas aeruginosa*	• Cefepime • Ceftazidime + vancomycin • Aztreonam + vancomycin • Meropenem
Intra-abdominal infection	*Streptococcus* spp, Enterobacterales (e.g. *E. coli*), *Pseudomonas aeruginosa,* anaerobes	• Cefepime + metronidazole • Ceftazidime + vancomycin + metronidazole • Aztreonam + vancomycin + metronidazole • Meropenem
Diabetic foot infection, necrotizing skin and soft tissue infection	*Streptococcus* spp, *S. aureus* (MSSA), Enterobacterales (e.g. *E. coli*), *Pseudomonas aeruginosa,* anaerobes	• Cefepime + metronidazole • Ceftazidime + vancomycin + metronidazole • Aztreonam + vancomycin + metronidazole • Meropenem

The therapeutic alternatives listed are intended to provide antimicrobial coverage similar to that provided by the drug on shortage. The alternatives do not necessarily represent full treatment regimens for certain indications and additional antimicrobials may be needed. Use therapy based on patient specific isolate susceptibility results when possible.