CARILION CLINIC
Antimicrobial Stewardship

Adult Guideline for the Treatment of Intra-Abdominal Infections

Updated: May 2021

Disclaimer: Adequate **source control** is necessary for almost all patients with a complicated intra-abdominal infection (IAI). Only highly select patients with minimal physiological abnormalities and well-defined foci of infection may be treated with antimicrobial therapy alone (and with very close follow-up). An Infectious Disease consultation is recommended for patients with known colonization by multidrug-resistant organisms (MDROs).

1. Acute Management

Antibiotics recommendations listed below by site and severity of intra-abdominal infection (IAI).

> An appropriate source control procedure to drain infected foci, control ongoing peritoneal contamination, and restore function is recommended for nearly all patients with IAI.

2. Assessment of Severity

"High risk" patients are those with comorbidities or clinical factors that are associated with increased infection severity and decreased likelihood of treatment success.

"High Risk": Clinical Features Predicting Failure of Source Control	
Delay in source control intervention (>24h)	Low albumin
Degree of organ dysfunction	Poor nutritional status
Severe illness (APACHE >15)	Diffuse peritonitis/ peritoneal involvement
Advanced age	Presence of malignancy
Significant comorbidities	Inadequate debridement or drainage control

3. Microbiology

	***Enterobacterales* (*E. coli*, *K. pneumoniae*, *Enterobacter spp.*, *Proteus spp.*)**	**Anaerobes (including *B. fragilis*)**	***Streptococcus spp.***	***Enterococcus spp.****	**Yeast***
Infection Site					
Biliary Tract	++	+	-	-	±
Diverticulitis	+++	+++	-	+++	-
Primary Peritonitis, SBP	+++	-	++	+++	-
Secondary Peritonitis, GI Perforation, Appendicitis	+++	+++	-	±	±
Expected Coverage					
Ceftriaxone					*An echinocandin is recommended for empiric coverage and requires ID Approval. Fluconazole should be used for susceptible Candida spp..
Cefepime					
Piperacillin/tazobactam					
Ertapenem[ID]					
Meropenem[ID]					
Aztreonam[ID]					
Ciprofloxacin[ID]					
Vancomycin					
Metronidazole					

***Empiric coverage for Enterococcus spp. and/or yeast is not usually indicated.** Consider coverage for critically ill or immunocompromised patients with evidence of secondary peritonitis, gastrointestinal perforation, or appendicitis.

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4. Key Points for Antibiotic Selection

- High rates of *E. coli* resistance to ampicillin/sulbactam and fluoroquinolones preclude empiric use
- Moxifloxacin and clindamycin are not recommended due to increasing resistance of the *B. fragilis* group

Community-Acquired IAI	Healthcare-Associated IAI
Empiric antibiotics should be active against **Gram-negative enterics** and **streptococci**	Empiric antibiotics should include **broad spectrum agents** selected based on **local microbiological data**
Coverage for Enterococcus spp. is **not always indicated**	Coverage for Enterococcus spp. is recommended in the **post-operative setting** and **in select patient populations***
Empiric antifungal coverage is **not recommended**	Antifungal treatment can be considered for **immunocompromised or critically ill** patients or **when fungi are isolated** in culture
Escalation of therapy based on culture results is **not required** if a satisfactory clinical response is achieved with source control and empiric treatment	Utilization of culture results should include **assessment of pathogenicity and density of identified organisms**

*recent cephalosporin or other broad-spectrum antibiotic selecting for Enterococcus spp., valvular heart disease or prosthetic intravascular materials, and patients who are immunocompromised or critically ill

5. Recommended Antimicrobial Regimens by Infection Site and Severity

Please refer to the Carilion Clinic: Antibiotic Dosing Optimization Recommendations for dosing guidelines.

ID: Denotes Restricted Antimicrobial Agent Requiring Approval at CRMH

Biliary Tract: Cholecystitis and Cholangitis	Recommended	Alternative	Duration of Therapy
Community-acquired, No previous biliary procedures, Mild-to-moderate severity	Ceftriaxone	Ertapenem[ID] OR Ciprofloxacin[ID]	Until obstruction is relieved Post-procedure antibiotics are **NOT NECESSARY**
Hospital-acquired, Multiple biliary manipulations, Presence of anastomosis, Severe illness	Cefepime + Metronidazole	**No PCN allergy** Piperacillin/tazobactam **PCN allergy** Meropenem[ID] OR Aztreonam[ID] + Metronidazole ± Vancomycin	Unless adequate source control not achieved: Complicated cholecystitis: **24-48 hours** Biliary sepsis: **4-7 days** *Antibiotics unlikely to penetrate to bile in severe illness/obstruction

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Diverticulitis		Recommended	Alternative	Duration of Therapy
Mild-to-Moderate	Uncomplicated*	**No antibiotics recommended**		
	Complicated	**PO:** Cefdinir + Metronidazole OR **IV:** Ceftriaxone + Metronidazole	Ertapenem[ID] OR Ciprofloxacin[ID] + Metronidazole	**4 days**; unless adequate source control is not achieved
Severe		Cefepime + Metronidazole	**No PCN allergy** Piperacillin/tazobactam	**4 days**; unless adequate source control is not achieved
			PCN allergy Meropenem[ID] OR Aztreonam[ID] + Metronidazole	

*Uncomplicated: left-sided disease without abscess, free air or fistula

**Diverticulosis: formation of pouches within wall of the colon; Diverticulitis: infection within the pouches

Pancreatitis	Recommended	Alternative	Duration of Therapy
Empiric coverage for suspected abdominal sepsis Treatment of infected pancreatic necrosis should be culture-directed	Cefepime + Metronidazole	**No PCN allergy** Piperacillin/tazobactam	Infected pancreatic necrosis: **14 days** after source control obtained
		PCN allergy Meropenem[ID] OR Aztreonam[ID] + Metronidazole	

* **Antibiotics are not indicated in patients with severe acute pancreatitis or sterile pancreatic necrosis**

** Antibiotic prophylaxis does not improve morbidity or mortality and selects for Gram-positive organisms and fungi

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Appendicitis	Recommended	Alternative	Duration of Therapy
Adjunct to source control	Ceftriaxone + Metronidazole	**No PCN allergy** Piperacillin/tazobactam **PCN allergy** Ertapenem[ID] OR Ciprofloxacin[ID] Metronidazole	Non-necrotic: **24 hours** Necrotic/gangrenous: **4 days** ***Postoperative antibiotics are NOT INDICATED unless peritonitis, abscess, or gangrene present**
Nonoperative management**	**PO:** Cefdinir + Metronidazole OR **IV:** Ceftriaxone + Metronidazole	Ertapenem[ID] OR Ciprofloxacin[ID] + Metronidazole	**5-7 days**

**Nonoperative management may be appropriate for select patients with rapid clinical improvement and nonperforated appendicitis, or a periappendiceal phlegmon/abscess not amenable to drainage

Peritonitis	Recommended	Alternative	Duration of Therapy
Spontaneous bacterial peritonitis (SPB) Prophylaxis	Ciprofloxacin[ID]	Ceftriaxone OR TMP/SMX (if no GI bleeding)	Cirrhosis with upper GI bleed: **7 days** History of SBP: **Lifelong prophylaxis**
Primary peritonitis, Spontaneous bacterial peritonitis	Ceftriaxone	Ciprofloxacin[ID] *Consider ID Consult for patients taking fluoroquinolones for prophylaxis prior to admission	**5 days**
Secondary peritonitis*, GI perforation*	Ceftriaxone + Metronidazole	**No PCN allergy** Piperacillin/tazobactam **PCN allergy** Ertapenem[ID] OR Aztreonam[ID] + Metronidazole + Vancomycin OR Ciprofloxacin[ID] + Metronidazole + Vancomycin	Uncomplicated: **24-48 hours** *Early operation: small bowel or colon (within 12 hours), stomach (within 24 hours) Complicated: **4 days** unless source control not achieved *Late or no operation

*Empiric antifungal coverage indicated **ONLY** in esophageal perforation, immunosuppression, prolonged antacid or antibiotic therapy, prolonged hospitalization, and/or persistent GI leak

6. References:

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