Antimicrobial Therapy for Intra-Abdominal Infections

(NB Provincial Health Authorities Anti-Infective Stewardship Committee, September 2018

Origin/Severity of Intra-Abdominal Infection	Probable Pathogens	Preferred Empiric Regimens	Alternative Empiric Regimens	Comments
Community Acquired Infection, Mild to Moderate severity: • i.e. gastroduodenal perforation, cholangitis[a], cholecystitis[a], appendicitis, diverticulitis[b], primary (spontaneous) bacterial peritonitis • With no evidence of systemic toxicity (APACHE II score less than 15)	**Core:** Enterobacteriaceae (i.e. *E.coli, Klebsiella spp, Proteus spp, Enterobacter spp.*) Anaerobes (i.e. *B. fragilis*, *Clostridium spp.* etc…), *Streptococcus spp, ± Enterococcus* spp (see below if isolated)	cefuroxime 1.5 g IV q8h [f,*] + metroNIDAZOLE 500 mg IV/PO q12h[a,b] **<u>Intravenous-to-Oral Conversion[c]:</u>** amoxicillin/clavulanate 875/125 mg po q12h[g,*] **OR** cefuroxime axetil 500 mg PO q8h[f,*] + metroNIDAZOLE 500 mg PO q12h	ciprofloxacin 400 mg IV **OR** 500 mg PO q12h* + metroNIDAZOLE 500 mg IV/PO q12h **OR** aminoglycoside (tobramycin OR gentamicin) 5 – 7 mg/kg IV q24h* + metroNIDAZOLE 500 mg IV/PO q12h **OR** cefOXitin 2 g IV q6h[g,*]	**Duration of Therapy:** • 5 – 7 days if optimal source control obtained • Day of source control intervention (drainage, surgery, etc.) considered as day 1 of therapy • If intra-abdominal abscess not resolved after optimal drainage, or if drainage not feasible: antimicrobial therapy may be prolonged, with duration dependant on radiological resolution (up to 4 to 6 weeks) **<u>Stop antimicrobial within 24 hours if</u>**: • acute stomach, duodenum &/or proximal jejunum perforation, if no acid-reducing therapy or malignancy; and source control achieved **OR** • penetrating bowel trauma repaired within 12 hours **OR** • intraoperative contamination of a surgical field from enteric contents **OR** • acute appendicitis without perforation, abscess or local peritonitis **OR** • patients undergoing cholecystectomy for acute cholecystitis unless evidence of infection outside wall of the gallbladder (ex. perforation)
Community Acquired Infection, Severe: • As above with APACHE II score greater than or equal to 15, signs of systemic toxicity, greater than 70 years old, immunocompromised, secondary peritonitis, cancer, poor nutritional status or incomplete or delayed source control	**Core (see above)**	cefTRIAXone 2 g IV q24h[f] + metroNIDAZOLE 500 mg IV/PO q12h **<u>Intravenous-to-Oral Conversion[c]:</u>** As for mild to moderate above	piperacillin/tazobactam 3.375 g IV q6h[d,e,g,*] **OR** levoFLOXacin 750 mg IV q24h* + metroNIDAZOLE 500 mg IV q12h **OR** ampicillin 2 g IV q6h[g,*] + aminoglycoside (tobramycin OR gentamicin) 5 – 7 mg/kg IV q24h* + metroNIDAZOLE 500 mg IV q12h	
Healthcare Associated • Hospitalized greater than 48 hours at time of onset, recent prolonged hospitalization, post-operative infection, long term care, rehab, dialysis, nursing home, **recent antibiotics**	**Core Plus:** Pseudomonas, Multidrug Resistant (MDR) Gram negative bacteria, *S aureus*	piperacillin/tazobactam 4.5 g IV q6h[d,e,g,*]	meropenem 500 mg IV q6h[e,f,*] (preferred if suspected MDR Gram-negative) **OR** ciprofloxacin 400 mg IV q8h* + metroNIDAZOLE 500 mg IV q12h + vancomycin 15 mg /kg IV q12h[f,*]	

Origin/Severity of Intra-Abdominal Infection	Probable Pathogens	Preferred Directed Regimens	Alternative Directed Regimens	Comments
If MRSA suspected or isolated (colonized or history of MRSA infection)		Add vancomycin 15 mg/kg IV q8-12h* (for target trough of 10 – 15 mg/L)		
If Candida isolated		Add fluconazole 800 mg IV/PO then 400 mg IV/PO q24h*	micafungin 100 mg IV q24h	• micafungin preferred if *Candida krusei* or *Candida glabrata* isolated
If Enterococci isolated		If *Enterococcus faecalis* isolated: Add ampicillin 2 g IV q6h[g,*] (not required if on piperacillin/tazobactam or imipenem-cilastatin) If *Enterococcus faecium* isolated: Add vancomycin 15 mg/kg IV q12h* (for target trough of 10 – 15 mg/L)	**Immediate (IgE-mediated) penicillin allergy or penicillin resistant:** vancomycin 15 mg/kg IV q12h* (for target trough of 10 – 15 mg/L)	• Enterococcal coverage only necessary if: ➢ isolated as predominant organism in culture **OR** ➢ healthcare associated infection **OR** ➢ patient is immunocompromised **OR** ➢ Blood culture positive • If vancomycin resistant *Entrococcus* (VRE) is isolated, treatment options include linezolid[h] or DAPTOmycin[h].

Clinical Pearls:

- Antimicrobial therapy does not preclude source control (ex. percutaneous drainage or surgery)
- Patients with recent prolonged hospitalization (5 or more days) or recent antimicrobials (2 or more days) within the previous 3 months pose risk for resistance and treatment failure, treat as healthcare associated
- Empiric Enterococci coverage is not recommended for mild-moderate severity community-acquired intra-abdominal infections. It should be reserved for patients in whom this pathogen is more frequently found (healthcare-associated infections, particularly those with postoperative infection, presence of severe immunosuppression, recurrent infection, patients who receive long-term cephalosporin treatment, and those with valvular heart disease or prosthetic intravascular materials)
- CAUTION: Significant *E.coli* resistance (greater than 20%) to fluoroquinolones and amoxicillin exist in some areas of the province; check local antibiogram and confirm C&S results when available
- Pathogen directed therapy should be used when culture and susceptibility results are available

Workup:

- Recommend blood, intraoperative and/or abscess fluid cultures in patients with post-operative or healthcare-associated infections; those with treatment failure and/or requiring re-operation; or recently on antimicrobial therapy
- Blood cultures recommended if patient has sepsis syndrome
- Reassess initial empiric therapy based on clinical state & results of microbiological analysis

[a] Anaerobic coverage not indicated for cholecystitis & cholangitis unless biliary-enteric anastomosis is present or aggravating factors (advanced age, immunosuppression or metabolic instability)

[b] Most cases of diverticulitis can be managed with oral antibiotic therapy

[c] Intravenous-to-Oral conversion: consider if infection well controlled, afebrile x 24 hrs., hemodynamically stable, tolerating oral intake and no clinical, radiographic or surgical sign of intra-abdominal collection from non-optimal drainage

[d] For *Pseudomonas aeruginosa* infection, piperacillin/tazobactam dosage may be increased to 4.5 gm IV q6h

[e] Anaerobic coverage adequate, addition of metroNIDAZOLE or clindamycin to piperacillin/tazobactam or meropenem not necessary

[f] Appropriate therapy option for patients with an immediate Type-1 (IgE-mediated) hypersensitivity reaction to penicillin (i.e. anaphylaxis, angioedema, laryngeal edema, urticaria)

[g] Avoid in patients with immediate Type-1 (IgE-mediated) hypsensitivity reaction to penicillin, significant risk of cross-reactivity exists.

[h] Discussion with an Infectious Disease or Microbiology specialist or Internal Medicine Specialist with expertise in infectious disease is required.

* Dose adjustment required in renal impairment

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