

I Feel It In My Gut: Intra-abdominal Infections

Brendan Woods and Will Shum
LMPs Pharmacy Residents
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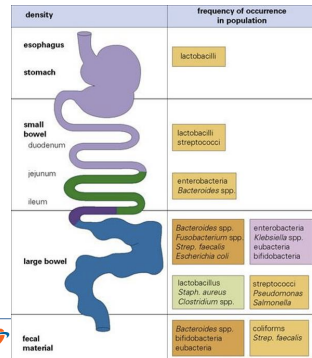
Outline

- Overview of Bacteria in the GI Tract
- Overview of Antibiotics Commonly Used in Surgical Patients
- Antibiotic Treatment Considerations

What is an intra-abdominal infection?

Intra-abdominal infections usually arise after a breach in the normal mucosal defense barrier that allows **normal bowel flora** to inoculate the abdominal cavity.

Bacteria in the GI Tract



- Colonic flora is especially common in intra-abdominal infections.
- Predominant bacteria involved are coliforms (mainly *Escherichia coli*, *Klebsiella* spp., *Proteus* spp., and *Enterobacter* spp) streptococci, enterococci, and anaerobic bacteria.



Bacteria of interest

Gram +		Gram -		Anaerobes
Staphylococcus Aureus (MSSA)	Methicillin-resistant S. Aureus (MRSA)	Escherichia coli	Pseudomonas aeruginosa	Peptostreptococcus spp
Streptococci spp		Klebsiella spp		Bacteroides fragilis
Enterococci spp		Proteus spp		
		Enterobacter spp		

Piperacillin/Tazobactam

Gram +	Gram -	Anaerobes
Staphylococcus Aureus (MSSA)	Methicillin-resistant S. Aureus (MRSA)	Escherichia coli
Streptococci spp		Klebsiella spp
Enterococci faecalis		Pseudomonas aeruginosa
	Proteus spp	
	Enterobacter spp	
		Peptostreptococcus spp
		Bacteroides fragilis

- Beta-lactam / beta-lactamase inhibitor
- Broad spectrum IV antibiotic including pseudomonas
- Available dose: 2.25g, **3.375g**, and 4.5g

Piperacillin/Tazobactam

Renal dosing adjustment	Yes: CrCl <40 ml/min
Side effects	Diarrhea, constipation, nausea/vomiting, dyspepsia, stool changes, abdominal pain, headache, insomnia, agitation, dizziness, anxiety, skin rash, seizures (very high doses)
Important implications	<ul style="list-style-type: none"> Allergic reaction (rash, hives, anaphylaxis) (<1%) Platelet-inhibiting actions: observe for signs of bruising, petechiae, purpura, or frank bleeding

Amoxicillin/Clavulanate

Gram +	Gram -	Anaerobes
Staphylococcus Aureus (MSSA)	Escherichia coli	Peptostreptococcus spp
Streptococci spp	Klebsiella spp	Bacteroides fragilis
Enterococci faecalis	Proteus spp	
	Enterobacter spp	
	Pseudomonas aeruginosa	

- Beta-lactam / beta-lactamase inhibitor
- Broad spectrum PO antibiotic
- Available dose: 250/125mg, 500/125mg and 875/125mg tablets (also available as suspension)

Amoxicillin/Clavulanate

Renal dosing adjustment	Yes: CrCl <30 ml/min (Do not use 875mg tablets)
Side effects	Diarrhea or loose stools, nausea, vomiting, skin rash, urticaria, candidiasis, cholestasis
Important implications	<ul style="list-style-type: none"> Products may not be interchangeable Give with food to minimize GI upset Observe for signs of cholestatic hepatitis (jaundice, pruritus, nausea, fatigue)

Vancomycin

Gram +	Gram -	Anaerobes
Staphylococcus Aureus (MSSA)	Escherichia coli	Peptostreptococcus spp
Streptococci spp	Klebsiella spp	Bacteroides fragilis
Enterococci spp	Proteus spp	
	Enterobacter spp	
	Pseudomonas aeruginosa	

- IV Vancomycin covers for MRSA
- PO Vancomycin is poorly absorbed: ineffective for systemic infections | used for C. difficile infection

Vancomycin

Renal dosing adjustment	Yes: Dose adjust based on trough levels
Side effects	Hypotension, cochlear toxicity (tinnitus and/or hearing loss), ototoxicity, vestibular toxicity (ataxia, vertigo, nausea/vomiting, nystagmus), nephrotoxicity, anaphylactoid reactions, pruritus, leukopenia, thrombocytopenia
Important implications	<ul style="list-style-type: none"> Administer over at least 60 minutes Rapid IV administration can lead to "red man" syndrome

Ceftriaxone

Gram +	Gram -	Anaerobes
Staphylococcus Aureus (MSSA)	Escherichia coli	Peptostreptococcus spp
Streptococci spp	Klebsiella spp	Bacteroides fragilis
Enterococci spp	Proteus spp	
	Enterobacter spp	
	Pseudomonas aeruginosa	

- Broad spectrum IV antibiotic
- Generally given as 1g or 2g IV q24h
- No Pseudomonas or Enterococcus coverage

Ceftriaxone

Renal dosing adjustment	None (Dose should not exceed 2 grams in patients with concurrent renal and hepatic impairment)
Side effects	Diarrhea, rash, pain on injection, reversible leukopenia, elevated liver enzymes
Important Implications	<ul style="list-style-type: none"> Interacts with IV calcium, cannot be used with TPN for this reason

Ciprofloxacin

Gram +		Gram -		Anaerobes
Staphylococcus Aureus (MSSA)	Methicillin-resistant S. Aureus (MRSA)	Escherichia coli	Pseudomonas aeruginosa	Peptostreptococcus spp
- Streptococci spp		Klebsiella spp		Bacteroides-fragilis
Enterococci spp		Proteus spp		
		Enterobacter spp		

- Covers gram negative bacteria
- Available PO or IV
- Usually given 400 mg IV bid or 500mg PO bid

Ciprofloxacin

Renal dosing adjustment	Yes: CrCl <50 ml/min
Side effects	QT Prolongation, seizure, increased chance of C. Diff., phototoxicity, GI upset, Caution in age 18 or under / pregnancy due to cartilage damage
Important Implications	<ul style="list-style-type: none"> Many drug interactions due to enzyme elimination and QTc prolongation Can bind to minerals such as Iron or Calcium

Metronidazole

Gram +		Gram -		Anaerobes
Staphylococcus Aureus (MSSA)	Methicillin-resistant S. Aureus (MRSA)	Escherichia coli	Pseudomonas aeruginosa	Peptostreptococcus spp
- Streptococci spp		Klebsiella spp		Bacteroides fragilis
Enterococci spp		Proteus spp5		
		Enterobacter spp		

- Used for anaerobic coverage
- Available PO or IV
- Usually given as 500mg PO/IV q12h

Metronidazole

Renal dosing adjustment	None
Side effects	Diarrhea, GI upset, abdominal pain, nausea, vomiting, poor taste if given orally
Important Implications	Significant disulfiram-like reaction with alcohol; important to counsel patient on discharge

When do we step down to PO?

Intravenous regimen can be transitioned to an oral regimen when:

- Able to eat and **tolerate oral medications**
- Relevant organisms are **not resistant** to oral agents
- Once the patient has demonstrated **clinical improvement**.
 - WBC count trending down
 - Neutrophil count trending down
 - Patient is afebrile
 - Patient is clinically improving, and the site of infection, if visible, is improving

How long do we treat for?

When adequate source control has been achieved and the contaminated material cleared from the intra-abdominal space, we **generally limit antimicrobial therapy to four to five days**.



19

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20