

Intra-Abdominal Peritonitis in Adults, Lower Gastrointestinal Tract Origin – Microbiology Full Clinical Guideline

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Introduction

- The lower gastrointestinal tract consists of the small intestine (distal duodenum, jejunum, and ileum) and large intestine (caecum, colon [ascending, transverse, descending, and sigmoid], rectum, and anal canal).
- Intra-abdominal infection of lower gastrointestinal tract origin can be caused by multiple pathogens, i.e. polymicrobial infectious disease.
- Gram negatives (e.g. *Escherichia coli*, *Klebsiella* spp, and *Proteus* spp), Gram positives (e.g. *Streptococcus* spp and *Enterococcus* spp), and anaerobes (e.g. *Bacteroides fragilis* and *Clostridium* spp) are commonly identified bacterial causes.
- Mechanisms of transmission include mucosal breach, enabling inoculation of gastrointestinal tract flora. Breaches in the mucosa can be secondary to:
 - Perforated viscera.
 - Surgical anastomotic breakdowns.
- Other mechanisms of transmission include contiguous inoculation. Another focus of intra-abdominal viscera infection (e.g. appendicitis or diverticulitis) disseminates locally and invades the abdominal cavity.
- One of the outcomes of:
 - Microbial invasion from the lower gastrointestinal tract into the abdominal cavity; and
 - The subsequent inflammatory responseis peritonitis.
- Manifestations include abdominal pain and tenderness.
- Temperatures > 38°C or < 36°C, a respiratory rate > 20 breaths/minute, a heart rate > 90 beats/minute, and hypotension can denote progression of localised infectious disease into [sepsis](#) or septic shock.

Investigation

Radiology

- First line: in general, computed tomography (CT) abdomen pelvis.
- Second line: discuss with the surgical senior and collaborate with the consultant radiologist.

Microbiology

- With the range of bacterial pathogens, variations in resistance and susceptibility profiles, contraindications, and side-effects, microbiological investigation enables best antibiotic practice:
 - Before starting antibiotics: blood cultures × 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures.
 - If surgery intervenes: fluid, pus, or tissue for microscopy, culture, and susceptibility (MC&S).

Blood sciences

- Full blood count (FBC), C reactive protein (CRP), lactate, urea and electrolytes (U&Es), and liver function tests (LFTs).

Treatment

Surgical opinion ± intervention

- Intra-abdominal peritonitis can progress from localised infectious disease into [sepsis](#) or septic shock.
- Intra-abdominal peritonitis can be secondary to perforated viscera, anastomotic breakdown, or another focus of intra-abdominal infection (e.g. appendicitis or diverticulitis). Therefore, early discussion with the lower gastrointestinal tract registrar/consultant on call is recommended.
- Surgical intervention could enable: (i) elimination of the origin(s) of the infectious episode; (ii) reduction of the microbial inoculum; (iii) identification of the causative agent(s); and, (iv) restoration of host physiological function.

Empiric, intravenous antibiotics

- Community acquired (symptoms, signs, and/or radiological findings of intra-abdominal peritonitis within 48 hours of hospital admission):

	If clinically stable	If clinically unstable (haemodynamic instability, sepsis, or septic shock)
First line	Co-amoxiclav 1.2 g 8 hourly	Piperacillin tazobactam 4.5 g 8 hourly
Second line, if non-immediate without systemic involvement penicillin allergy	Ceftriaxone 2 g 24 hourly and Metronidazole 500 mg 8 hourly	Ceftazidime 1 g 8 hourly and Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Metronidazole 500 mg 8 hourly
Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy	Co-trimoxazole 960 mg 12 hourly and Metronidazole 500 mg 8 hourly	Ciprofloxacin 400 mg 12 hourly and Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Metronidazole 500 mg 8 hourly

- Hospital acquired (symptoms, signs, and/or radiological findings of intra-abdominal peritonitis > 48 hours after hospital admission):

First line	Piperacillin tazobactam 4.5 g 6 hourly
Second line, if non-immediate without systemic involvement penicillin allergy	Ceftazidime 2 g 8 hourly and Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Metronidazole 500 mg 8 hourly
Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy	Ciprofloxacin 400 mg 8 hourly and Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Metronidazole 500 mg 8 hourly

- NB Empiric anti-fungals can be considered in specific patients, including recurrent intra-abdominal peritonitis (for example, post-operative recurrence or after completion of anti-bacterials) or history of immunocompromise. However, in general, anti-fungals are reserved for patients with cultures of *Candida* species from blood or intra-operative fluid, pus, or tissue.

Directed, intravenous antibiotics (with susceptibilities)

- Reflecting the polymicrobial nature of intra-abdominal peritonitis, microbiologists commonly recommend antibiotics (both for empiric and directed antimicrobial chemotherapy) with Gram negative, Gram positive, and anaerobic spectrums:

If the pre-operative blood and/or intra-operative fluid, pus, or tissue cultures:	First line	Second line, if non-immediate without systemic involvement penicillin allergy	Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy
Gram negatives (e.g. <i>Escherichia coli</i> , <i>Klebsiella</i> spp, <i>Proteus</i> spp)	Narrowest spectrum of co-amoxiclav or piperacillin tazobactam standard dosage	Ceftriaxone 2 g 24 hourly and Metronidazole 500 mg 8 hourly	Co-trimoxazole 960 mg 12 hourly and Metronidazole 500 mg 8 hourly
<i>Streptococcus</i> species	Co-amoxiclav 1.2 g 8 hourly	Ceftriaxone 2 g 24 hourly and Metronidazole 500 mg 8 hourly	Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Co-trimoxazole 960 mg 12 hourly and Metronidazole 500 mg 8 hourly
<i>Enterococcus</i> species	Co-amoxiclav 1.2 g 8 hourly	Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Ceftriaxone 2 g 24 hourly and Metronidazole 500 mg 8 hourly	Vancomycin or teicoplanin, dose as per hospital guidelines , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l and Co-trimoxazole 960 mg 12 hourly and Metronidazole 500 mg 8 hourly
Anaerobes (e.g. <i>Bacteroides fragilis</i> , <i>Clostridium</i> spp)	Co-amoxiclav 1.2 g 8 hourly	Ceftriaxone 2 g 24 hourly and Metronidazole 500 mg 8 hourly	Co-trimoxazole 960 mg 12 hourly and Metronidazole 500 mg 8 hourly

- NB Please note, directed antimicrobial chemotherapy relates to pre-operative blood cultures and/or intra-operative fluid, pus, or tissue sterile site MC&S. Post-operative wounds and chronic drains can become colonised with single or multiple microorganisms. With the administration of pre- and post-operative broad spectrum anti-bacterials, non-sterile site investigations may isolate multi-drug resistant, colonising flora only.

Directed, per oral antibiotics (with susceptibilities)

- Reflecting the polymicrobial nature of intra-abdominal peritonitis, microbiologists commonly recommend antibiotics (both for empiric and directed antimicrobial chemotherapy) with Gram negative, Gram positive, and anaerobic spectrums:

If the pre-operative blood and/or intra-operative fluid, pus, or tissue cultures:	First line	Second line	Third line
Gram negatives (e.g. <i>Escherichia coli</i> , <i>Klebsiella</i> spp, <i>Proteus</i> spp)	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Co-trimoxazole 960 mg 12 hourly and Metronidazole 400 mg 8 hourly	Ciprofloxacin 500 mg 12 hourly and Metronidazole 400 mg 8 hourly
<i>Streptococcus</i> species	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Clindamycin 300 mg 6 hourly and Co-trimoxazole 960 mg 12 hourly	Linezolid 600 mg 12 hourly and Co-trimoxazole 960 mg 12 hourly and Metronidazole 400 mg 8 hourly
<i>Enterococcus</i> species	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Linezolid 600 mg per oral 12 hourly and Co-trimoxazole 960 mg 12 hourly and Metronidazole 400 mg 8 hourly	Linezolid 600 mg per oral 12 hourly and Ciprofloxacin 500 mg 12 hourly and Metronidazole 400 mg 8 hourly
Anaerobes (e.g. <i>Bacteroides fragilis</i> , <i>Clostridium</i> spp)	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Co-trimoxazole 960 mg 12 hourly and Metronidazole 400 mg 8 hourly	Ciprofloxacin 500 mg 12 hourly and Metronidazole 400 mg 8 hourly

Duration of antibiotics

- In general, 4 days from surgical intervention and source control.
- NB If the episode of intra-abdominal peritonitis has been complicated (e.g. sub-optimal source control or surgical drain in situ or bloodstream infection), collaborate with the microbiology consultant responsible for sterile site investigations.

Management

Clinical concerns re intra-abdominal peritonitis (manifesting symptoms and signs include abdominal pain and tenderness)

Investigation

- Radiology:
 - First line: in general, CT abdomen pelvis
 - Second line: discuss with the surgical senior and collaborate with the consultant radiologist
- Microbiology:
 - Before starting antibiotics: blood cultures x 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures
- Blood sciences:
 - FBC, CRP, lactate, U&Es, and LFTs

Treatment

- Surgical opinion ± intervention:
 - Consult with the lower gastrointestinal tract registrar/consultant on call
- Empiric, intravenous antibiotics (please note, page 2)
 - NB Empiric anti-fungals can be considered in specific patients, including recurrent intra-abdominal peritonitis (for example, post-operative recurrence or after completion of anti-bacterials) or history of immunocompromise. However, in general, anti-fungals are reserved for patients with cultures of *Candida* species from blood or intra-operative fluid, pus, or tissue

Investigation (if surgery intervenes):

- Microbiology:
 - Fluid, pus, or tissue for MC&S

Treatment

- Directed, intravenous antibiotics (please note, pages 3-4)
 - In general, 4 days from surgical intervention and source control

References

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Document control

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