

## Hepatic Abscess – Microbiology Full Clinical Guideline

Reference number: CG-  
MICRO/2019/002

### Introduction

- One of the outcomes of:
  - Microbial invasion of the liver parenchyma; and
  - The subsequent hepatic inflammatory responseIs the formation of an encapsulated lesion containing necrotic immune cells and invading pathogens, i.e. a hepatic abscess.
- Hepatic abscesses can be caused by single pathogens (monomicrobial infection) or, more commonly, by multiple pathogens (polymicrobial infectious disease).
- *Klebsiella pneumoniae* and *Escherichia coli* are the most commonly diagnosed microbial causes of hepatic abscess.
- *Bacteroides* species, *Enterococcus* species, and the *Streptococcus anginosus* group (*Streptococcus anginosus/constellatus/intermedius*) are other relatively common bacterial causes.
- Less common causes include *Staphylococcus aureus* and *Streptococcus pyogenes*.
- The pathogens of hepatic abscesses are most commonly inoculated through a contiguous mechanism of transmission. Another focus of infection (e.g. cholangitis, cholecystitis) disseminates locally; the microorganism proliferates in the biliary tract and invades the liver parenchyma.
- Less commonly, inoculation is via a haematogenous mechanism of transmission. Infection of the portal vein 'pylephlebitis' (secondary to pancreatitis, appendicitis, diverticulitis, etc.) or bacteraemia (secondary to infective endocarditis, bowel cancer, etc.) can culminate in hepatic invasion.
- The pathogens of hepatic abscesses can also be inoculated via trauma, either penetrating or blunt.
- The purulent liver mass may manifest with localising symptoms and signs (e.g. abdominal pain, nausea, vomiting) and/or generalised stigmata of infectious disease (e.g. fever, chills, malaise).
- Temperatures  $> 38^{\circ}\text{C}$  or  $< 36^{\circ}\text{C}$ , a respiratory rate  $> 20$  breaths/minute, a heart rate  $> 90$  beats/minute, and hypotension can denote progression of localised infectious disease into sepsis and septic shock.

### Differential diagnosis

- The symptoms and signs of hepatic abscess may overlap with the stigmata of other infective and non-infective pathologies:
  - Infective:
    - Pneumonia, [acute cholecystitis](#), [acute cholangitis](#), viral hepatitis, and amoebic liver abscess.
    - NB Re amoebic liver abscess:
      - Risk factors include past medical/drug history of immunocompromise and social history of travel (e.g. refugee from/travellers to Africa [including South Africa], Asia [including India], North America [including Mexico], and South America).

- If the symptoms, signs, and/or pathology findings raise the differential diagnosis of *Entamoeba histolytica* hepatic abscess, please liaise with the hepatology, microbiology, and radiology teams regarding investigation and treatment.
- Non-infective:
  - Alcoholic hepatitis, drug-induced hepatitis, and liver cancer (primary or secondary).

## Investigation

### Radiology

- First line:
  - Ultrasound (US) of the liver.
- Second line:
  - Collaborate with the radiology consultant.

### Microbiology

- With the range of bacterial pathogens, variations in bacterial resistance and susceptibility profiles, contraindications, side-effects, and with prolonged durations of weeks-months of antimicrobial chemotherapy, microbiological investigation enables best antibiotic practice:
  - Before starting antimicrobials:
    - Blood cultures x 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures.
  - If radiology intervenes:
    - Pus for microscopy, culture, and susceptibilities (MC&S). Please notify the laboratory during the day or the microbiology biomedical scientist on call (via switchboard), if urgent MC&S of the radiological sample is required.

### Blood sciences

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

## Treatment

### Radiological intervention

- Interventional radiology with:
  - Percutaneous drainage via insertion of a pigtail catheter drain; or
  - Percutaneous needle aspirationIs the mainstay of hospital intervention for hepatic abscesses.
- Radiological intervention can be considered for uniloculated purulent liver masses of varying size, and also for multi-loculated hepatic abscesses.
- With regard to radiology:
  - Interventional radiology requires:
    - An electronic request; and
    - Informed consent for the procedure (<https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-detail.pl?biblionumber=774>); and
    - An up-to-date platelet count and clotting (<https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-detail.pl?biblionumber=1577>)  
To be completed by the referring team.
  - Please note, in general, local Trust policy requires omission of antiplatelets (e.g. clopidogrel for 5-7 days) and anticoagulants (e.g.

warfarin for 5 days, apixaban or rivaroxaban for 48 hours) before radiological intervention.

- Possible exceptions – wherein the clinical condition dictates drainage or antiplatelet/anticoagulant omission is contraindicated – require surgical consultant to interventional radiologist consultant discussion, regarding potential benefits and risks of intervention.

### Surgical intervention

- Rarely, surgical intervention can be contemplated. Uncommon scenarios raising the possibility of drainage/resection in theatre – for example, hepatic abscess rupture – require consultation with the senior hepatobiliary surgeon.

### Empiric, intravenous antibiotics

- If the patient is clinically stable **and** for radiological intervention:
  - Await drainage and withhold antimicrobial chemotherapy.
- If the patient has had drainage **or** if the patient is not for radiological intervention:
  - After blood cultures x 2:
    - If there are no clinical concerns regarding sepsis:

First line	Piperacillin tazobactam 4.5 g 8 hourly
Second line, <a href="#">if non-immediate without systemic involvement penicillin allergy</a>	Ceftriaxone 2 g 24 hourly <b>and</b> Metronidazole 500 mg 8 hourly
Third line, <a href="#">if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy</a>	<a href="#">Ciprofloxacin</a> 400 mg 12 hourly <b>and</b> Metronidazole 500 mg 8 hourly

- If there are clinical concerns regarding sepsis (life threatening organ dysfunction caused by a dysregulated host immune response to infection) secondary to hepatic abscess:

First line	Piperacillin tazobactam 4.5 g 6 hourly ± If there are clinical concerns regarding the risk of methicillin resistant <i>Staphylococcus aureus</i> (MRSA), vancomycin or teicoplanin, <a href="#">dose as per hospital guidelines</a> , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l
Second line, <a href="#">if non-immediate without systemic involvement penicillin allergy</a>	Ceftazidime 2 g 8 hourly <b>and</b> Vancomycin or teicoplanin, <a href="#">dose as per hospital guidelines</a> , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l <b>and</b> Metronidazole 500 mg 8 hourly
Third line, <a href="#">if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy</a>	<a href="#">Ciprofloxacin</a> 400 mg 8 hourly <b>and</b> Vancomycin or teicoplanin, <a href="#">dose as per hospital guidelines</a> , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l <b>and</b> Metronidazole 500 mg 8 hourly

### Directed antibiotics (with susceptibilities)

- Intravenous, **according to susceptibilities:**

	First line	Second line, <a href="#">if non-immediate without systemic involvement</a> <a href="#">penicillin allergy</a>	Third line, <a href="#">if immediate rapidly evolving or non-immediate with systemic involvement</a> <a href="#">penicillin allergy</a>
<i>Escherichia coli</i>	Narrowest spectrum of amoxicillin or co-amoxiclav or piperacillin tazobactam <a href="#">standard dosage</a>	Ceftriaxone 2 g 24 hourly	Ciprofloxacin 400 mg 12 hourly (consider per oral [absorption 60-80% and peak concentration in bile/peak concentration in serum 2800-4500%])
<i>Klebsiella pneumoniae</i>	Narrowest spectrum of co-amoxiclav or piperacillin tazobactam <a href="#">standard dosage</a>	Ceftriaxone 2 g 24 hourly	Ciprofloxacin 400 mg 12 hourly (consider per oral [absorption 60-80% and peak concentration in bile/peak concentration in serum 2800-4500%])
<i>Bacteroides</i> , <i>Enterococcus</i> , and <i>Streptococcus</i> species – especially – can be associated with polymicrobial hepatic abscesses. Consideration of broad spectrum antibiotics – encompassing the cultured <i>Bacteroides/Enterococcus/Streptococcus</i> species <b>and</b> also uncultured Gram negatives – is recommended. For example:			
<i>Bacteroides/anaerobe</i>	Co-amoxiclav 1.2 g 8 hourly	Ceftriaxone 2 g 24 hourly <b>and</b> Metronidazole 500 mg 8 hourly	<a href="#">Ciprofloxacin</a> 400 mg 12 hourly <b>and</b> Metronidazole 500 mg 8 hourly
<i>Enterococcus</i> species	Co-amoxiclav 1.2 g 8 hourly	Vancomycin or teicoplanin, <a href="#">dose as per hospital guidelines</a> , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l <b>and</b> Ceftriaxone 2 g 24 hourly <b>and</b> Metronidazole 500 mg 8 hourly	Vancomycin or teicoplanin, <a href="#">dose as per hospital guidelines</a> , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l <b>and</b> <a href="#">Ciprofloxacin</a> 400 mg 12 hourly <b>and</b> Metronidazole 500 mg 8 hourly
<i>Streptococcus anginosus</i> group	Co-amoxiclav 1.2 g 8 hourly	Ceftriaxone 2 g 24 hourly <b>and</b> Metronidazole 500 mg 8 hourly	Vancomycin or teicoplanin, <a href="#">dose as per hospital guidelines</a> , vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l <b>and</b> <a href="#">Ciprofloxacin</a> 400 mg 12 hourly <b>and</b> Metronidazole 500 mg 8 hourly

- After 7-14 days of intravenous antimicrobial chemotherapy, if the patient is afebrile, observations stable, and inflammatory markers downward trending, collaborate with the physician/surgeon regarding their preference for: (1) per oral step down; or (2) outpatient parenteral antimicrobial therapy (OPAT).
- After 7-14 days of intravenous antimicrobial chemotherapy, if the patient is febrile, observations unstable, and/or inflammatory markers upward trending, collaborate with the physician/surgeon and radiologists regarding investigation/intervention, update the microbiologist, and continue intravenous therapy.
- Per oral, **according to susceptibilities:**

	First line	Second line	Third line
<i>Escherichia coli</i>	Narrowest spectrum of amoxicillin 1 g 8 hourly; or co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Ciprofloxacin 500 mg 12 hourly	Co-trimoxazole 960 mg 12 hourly
<i>Klebsiella pneumoniae</i>	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Ciprofloxacin 500 mg 12 hourly	Co-trimoxazole 960 mg 12 hourly
<i>Bacteroides</i> , <i>Enterococcus</i> , and <i>Streptococcus</i> species – especially – can be associated with polymicrobial hepatic abscesses. Consideration of broad spectrum antibiotics – encompassing the cultured <i>Bacteroides/Enterococcus/Streptococcus</i> species <b>and</b> also uncultured Gram negatives – is recommended. For example:			
<i>Bacteroides/anaerobe</i>	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	<a href="#">Ciprofloxacin</a> 500 mg 12 hourly <b>and</b> Metronidazole 400 mg 8 hourly	Co-trimoxazole 960 mg 12 hourly <b>and</b> 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 <b>and</b> <a href="#">Ciprofloxacin</a> 500 mg 12 hourly <b>and</b> Metronidazole 400 mg 8 hourly	Linezolid 600 mg per oral 12 hourly <b>and</b> Co-trimoxazole 960 mg 12 hourly <b>and</b> Metronidazole 400 mg 8 hourly
<i>Streptococcus anginosus</i> group	Co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly	Clindamycin 300 mg 6 hourly <b>and</b> <a href="#">Ciprofloxacin</a> 500 mg 12 hourly	Linezolid 600 mg 12 hourly <b>and</b> <a href="#">Ciprofloxacin</a> 500 mg 12 hourly <b>and</b> Metronidazole 400 mg 8 hourly

### **Directed, outpatient parenteral antimicrobial therapy**

- Collaborate with the OPAT consultant.

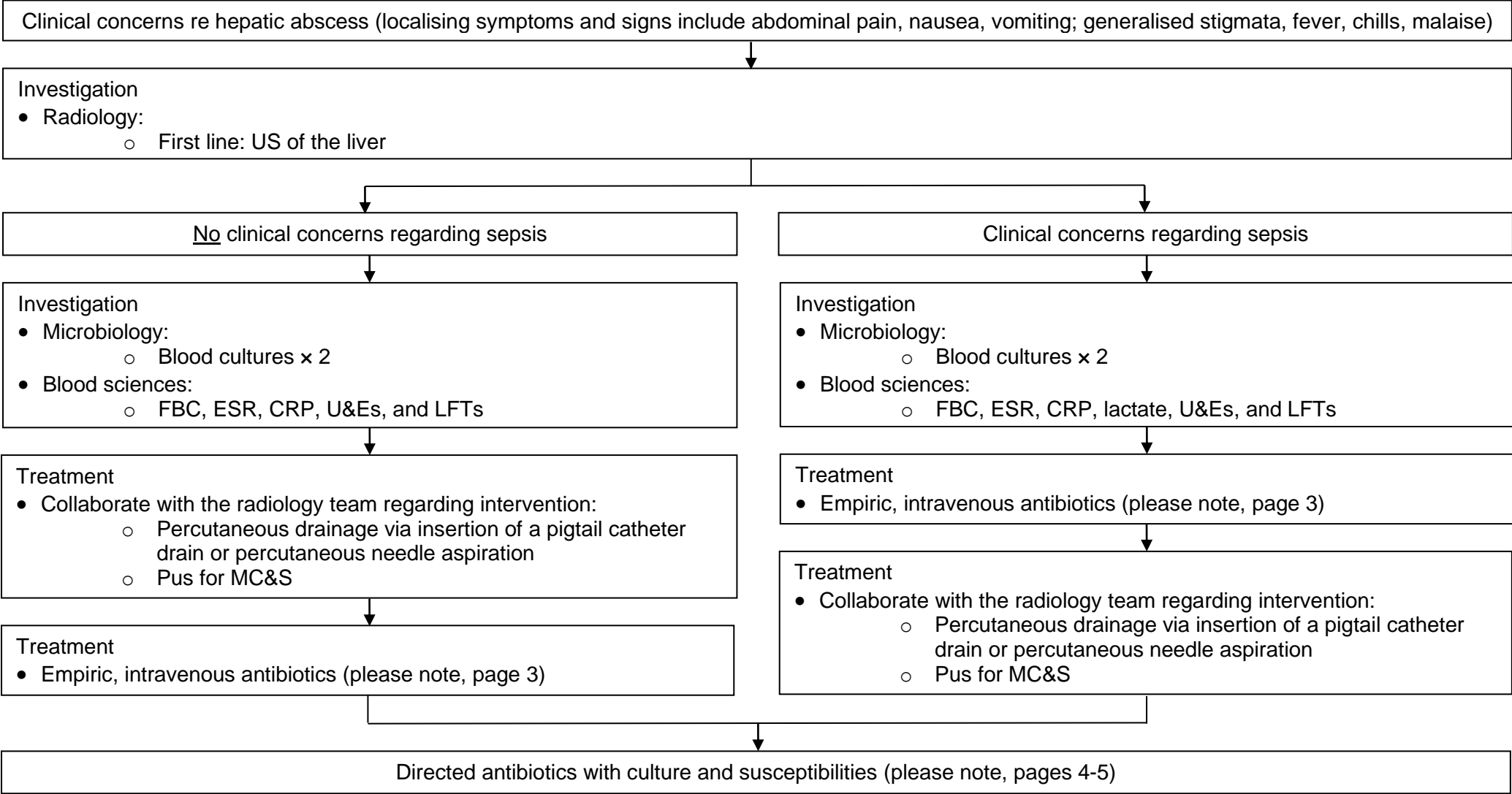
### **Empiric, per oral or outpatient parenteral antimicrobial therapy**

- If there are symptoms, signs, and/or radiological features of hepatic abscess, and the microbiology is negative, collaborate with a microbiologist regarding empiric options.

### **Duration of antibiotics**

- Before discharge to the community, medical/surgical team to collaborate with radiology regarding  $\pm$  re-imaging.
- If for per oral step down or OPAT, monitor bloods (FBC, CRP, U&Es, and LFTs) weekly-fortnightly.
  
- Courses of antibiotics 2-6 weeks.
- If radiology have intervened and if the patient is afebrile, observations stable, and inflammatory markers have resolved:
  - 2-4 weeks.
- If surgery have intervened and if the patient is afebrile, observations stable, and inflammatory markers have resolved:
  - 2 weeks.
- If neither radiology nor surgery intervene:
  - 6 weeks.
  
- Follow up with the medical/surgical team on intravenous or per oral therapy.

Management





## References

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## Document control

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