INFECTION AND SEPSIS ASSESSMENT AND MANAGEMENT

for the ADULT in HOSPITAL PATIENT

South Tees Hospitals NHS
NHS Foundation Trust

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Antibiotic Working Group
Sepsis Action Group

HAS PATIENT GOT SUSPECTED OR PROVEN INFECTION?

Use clinical history, examination and investigations to look for signs and symptoms of infection

- Pneumonia / Respiratory tract infection
- Urinary tract infection
- CNS infection
- Biliary tract infection
- Intraperitoneal infection
- Endocarditis
- Skin or soft tissue infection (incl. wound)
- Female reproductive tract infection
- ENT / maxillofacial infection
- Bone or joint infection
- Foreign body / implanted device infection
- Intravascular catheter infection
- Unknown source

IS PATIENT UNWELL, DETERIORATING OR A HIGH-RISK PATIENT?

- NEWS2 ≥5 (aggregate score) or a single parameter trigger of 3
- Or any 2 of following sepsis risk criteria:
  - Respiratory rate ≥ 22 breaths/minute
  - Altered Mental Status (new or deteriorating if chronic confusion)
  - Systolic Blood Pressure ≤ 100 mmHg
- Or any of the below high-risk patient criteria:
  - History of chemotherapy (6 weeks)
  - Bone marrow transplant within last year
  - Any other immunosuppression risk factors
  - Recent trauma/surgery/intervention (6 weeks)
  - Non-blanching rash or mottled/ashen skin
  - Lactate > 2 mmol/L
  - Acute Kidney Injury

NO

PATIENT HAS SUSPECTED or PROVEN **CLINICAL INFECTION** BUT PATIENT DOES NOT MEET SEPSIS CRITERIA

Use INFECTION First-Line Empirical Antimicrobial Guidelines

See reverse

Observe and re-assess patient regularly

If condition changes and patient deteriorates, consider patient could be developing sepsis ⇒ proceed to SEPSIS Care Bundle

YES

PATIENT HAS SEPSIS

Proceed to SEPSIS care bundle

Use SEPSIS First-Line Empirical Antimicrobial Guidelines

Turn over

SEPSIS 1st HOUR CARE BUNDLE

Inform Senior Ward Doctor

1. **Oxygen** Keep SpO_2 between **94-98%** (**88-92%,** if risk of hypercapnic respiratory failure).
2. **Blood cultures (even if temperature is in normal range).** At least one set plus all other relevant blood tests, i.e., FBC, U&Es, LFT, clotting, glucose, lactate. Consider other specimen cultures as appropriate.
3. **IV antibiotics** (follow antimicrobial guidelines on intranet or app) and **source control.**

   Consider imaging investigations and surgical referral if appropriate.
4. **Fluid resuscitate:** Use crystalloid as per **Trust Intravenous Fluid Guidelines:** if $BP_{systolic} \leq 100$ mmHg or MAP ≤ 65 mmHg give 250 mL crystalloid boluses, assessing response after each bolus. **Ask for help** if patient requiring more than **20 mL/Kg/hour**.
5. **Check Lactate:** Ensure fluid resuscitation is ongoing. **Repeat Lactate 2 hourly**. If lactate > 2 mmol/L give 250 - 500 mL crystalloid boluses. Re-assess patient after each fluid bolus.
6. **Commence Fluid Balance Chart** and record accurate fluid input/output. Consider urinary catheterisation.

In all cases of acutely ill patient, please complete a STEP form

If despite adequate fluid resuscitation

- MAP **≤ 65 mmHg** or $BP_{systolic}$ **< 100 mmHg**
- Lactate **> 2 mmol/L**

PATIENT HAS SEPTIC SHOCK

Contact CCO / Critical Care

(unless patient is not for escalation)

SEPSIS

Empirical Antimicrobial Guidelines

Guidance for adult patients with normal renal function

RED antibiotics: NOT suitable for patients with penicillin allergy

ORANGE antibiotics: NOT suitable for severe (Type 1) penicillin allergy

BEFORE YOU PRESCRIBE

Check previous samples for antimicrobial resistance AND take new diagnostic samples

CNS INFECTION

Meningitis

First line: Ceftriaxone 2g IV BD
AND Dexamethasone 10mg IV QDS
(Start with first dose or shortly before)
→ ADD Amoxicillin 2g IV 4 hourly if >60 years or immunocompromised

Non-severe penicillin allergy:
Ceftriaxone 2g IV BD
AND Dexamethasone 10mg IV QDS
(Start with first dose or shortly before)
→ ADD Co-trimoxazole 120mg/kg IBW IV per day in 3-4 divided doses if >60 years or immunocompromised

Severe (type 1) penicillin allergy:
Chloramphenicol 25mg/kg IV QDS (reduce to 12.5 mg/kg QDS after 48 hours)
AND Dexamethasone 10mg IV QDS
(start with first dose or shortly before)
→ ADD Co-trimoxazole 120mg/kg IBW IV per day in 3-4 divided doses if >60 years or immunocompromised

Encephalitis
Aciclovir 10mg/kg (use IBW) iv tds

GASTROINTESTINAL

Intra-abdominal infection and SEPSIS

First line: Piperacillin-tazobactam 4.5g IV TDS
AND Gentamicin¥ 5mg/kg (IBW) IV STAT

If Creatinine Clearance ≤30 ml/min:
Amoxicillin 1g IV TDS
AND Temocillin 1g IV OD (based on CrCl ≤ 30)
AND *Metronidazole 500mg IV TDS

Penicillin allergy:
Teicoplanin 400mg (or 6mg/kg if >70kg) IV BD for 3 doses, then OD
AND *Ciprofloxacin 400mg IV BD
AND *Metronidazole 500mg IV TDS

C. difficile infection
First line: Vancomycin 125mg PO QDS 10 days
Prioritise naso-gastric or intra-colonic therapy
If no oral route: Metronidazole 500mg IV TDS

SKIN AND SOFT TISSUE INFECTION

Cellulitis or non-GI/non-GU wound infection
First line: Flucloxacillin 2g IV QDS
Penicillin allergy or if recent MRSA:
Teicoplanin 400mg (or 6mg/kg if >70kg) IV BD for 3 doses then OD
If recent IVDU: ADD Clindamycin 1.2g IV QDS

Post op GI/GU wound infection
First line: Piperacillin-tazobactam 4.5g IV TDS
If recent MRSA: ADD Teicoplanin 400mg (or 6mg/kg if >70kg) IV BD for 3 doses, then OD
Penicillin allergy: Teicoplanin 400mg (or 6mg/kg if >70kg) IV BD for 3 doses then OD
AND *Ciprofloxacin 400mg IV BD
AND *Metronidazole 500mg IV TDS

Necrotising fasciitis
Refer all patients for urgent surgical intervention
First line: Meropenem 1g IV TDS
AND Clindamycin 1.2g IV QDS
Penicillin allergy: Call microbiology or ID for advice

SEPSIS OF UNKNOWN ORIGIN

First line: Piperacillin-tazobactam 4.5g IV TDS (QDS if neutropenic)
AND Gentamicin¥ 5mg/kg (IBW) IV STAT

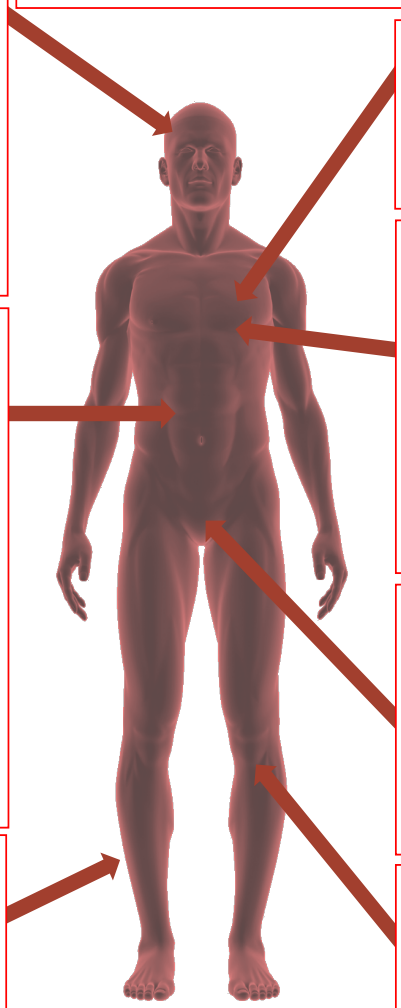
If recent MRSA:
ADD Teicoplanin 400mg (or 6mg/kg If >70kg) IV BD for 3 doses, then OD

If Creatinine Clearance ≤30 ml/min (and no neutropenia and no evidence Pseudomonas aeruginosa infection:
Temocillin 1g IV OD (CrCl ≤ 30)
AND Teicoplanin IV BD for 3 doses then OD
AND *Metronidazole 500mg IV TDS

Penicillin allergy: Teicoplanin 400mg (or 6mg/kg If >70kg) IV BD for 3 doses, then OD
AND *Ciprofloxacin 400mg IVBD
AND *Metronidazole 500mg IV TDS

Neutropenic sepsis: As above but if septic shock, recent piperacillin-tazobactam or *non-severe penicillin allergy:*
Meropenem 1g IV TDS

If recent MRSA/suspected IV catheter -related infection:
ADD Teicoplanin 400mg (or 6mg/kg If >70kg) IV BD for 3 doses, then OD



COMMUNITY-ACQUIRED PNEUMONIA

CURB ≥ 3 or if CURB < 3 and triggering for sepsis
First line: Co-amoxiclav 1.2g IV TDS
AND Clarithromycin 500mg IV BD
Penicillin allergy: *Levofloxacin 500mg IV BD

HOSPITAL-ACQUIRED PNEUMONIA

First line: Co-amoxiclav 1.2g IV TDS
Recent Pseudomonas sp., co-amoxiclav treatment OR *co-amoxiclav-resistant organism in sputum culture*:
Piperacillin-tazobactam 4.5g IV TDS
(or agent tailored to sputum culture results)
Penicillin allergy (+/- Pseudomonas aeruginosa):
*Ciprofloxacin 400mg IV BD
If recent MRSA:
ADD Linezolid 600mg PO/IV BD to any regime
(See BNF for cautions, contra-indications and monitoring)

URINARY TRACT INFECTION WITH SEPSIS

First line: Piperacillin-tazobactam 4.5g IV TDS
AND Gentamicin¥ 5mg/kg IBW IV STAT
If Creatinine Clearance <30 ml/min:
Temocillin 1g IV OD (based on CrCl <30 ml/min)
AND Teicoplanin 400mg (or 6mg/kg If >70kg) IV BD for 3 doses, then OD
Penicillin allergy: *Ciprofloxacin 400mg IV BD

BONE AND JOINT INFECTIONS

Native joint septic arthritis
First line: Flucloxacillin 2g IV QDS
Non-severe penicillin allergy OR Gram negative in culture: Ceftriaxone 2g IV OD
Severe (type 1) penicillin allergy OR history of MRSA:
Teicoplanin 12mg/kg IV BD for 3 doses, then OD

Diabetic foot infection and sepsis
First line: Piperacillin-tazobactam 4.5g IV TDS
Recent MRSA: ADD Teicoplanin 12mg/kg IV BD for 3 doses, then OD
Penicillin allergy: Call microbiology or ID for advice

*These agents have excellent bioavailability; oral switch is recommended once patient is haemodynamically stable

¥ Please note: Gentamicin mg/Kg IBW (Ideal Body Weight) calculated doses should NOT exceed 400mg

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For latest updates check the antimicrobial guide on the intranet or via the app

INFECTION
NOT SEPSIS

Empirical Antimicrobial Guidelines
Guidance for adult patients with normal renal function

RED antibiotics: NOT suitable for patients with penicillin allergy

ORANGE antibiotics: NOT suitable for severe (Type 1) penicillin allergy

BEFORE YOU PRESCRIBE
Check previous samples for antimicrobial resistance AND take new diagnostic samples

If there are clinical features of sepsis, please refer to the SEPSIS guidelines

PATIENT HAS SUSPECTED or PROVEN CLINICAL INFECTION but NOT sepsis

Observe and re-assess patient regularly

GASTROINTESTINAL

Biliary infection
- *First line*: Co-trimoxazole* 960mg PO BD AND Metronidazole 400mg PO TDS
- *Not suitable in trimethoprim or "Septrin" allergy.
- *Alternative*: Treat as for diverticulitis /appendicitis

Diverticulitis/Appendicitis
- *First line*: Co-amoxiclav 1.2g IV TDS
- If ESBL/AmpC producing organism, ADD Gentamicin 5mg/kg (IBW) IV STAT
- *Penicillin allergy*: Ciprofloxacin 500mg PO BD AND Metronidazole 400mg PO TDS

Acute pancreatitis - non-severe
- Antibiotics are not indicated unless there is associated biliary infection

Spontaneous bacterial peritonitis
- First line: Co-amoxiclav 1.2g IV TDS
- Penicillin allergy: Ciprofloxacin 500mg PO BD AND Metronidazole 400mg PO TDS

C. difficile infection
- *First line:* Vancomycin 125mg PO QDS 10 days
- *If no oral route:* Metronidazole 500mg IV TDS

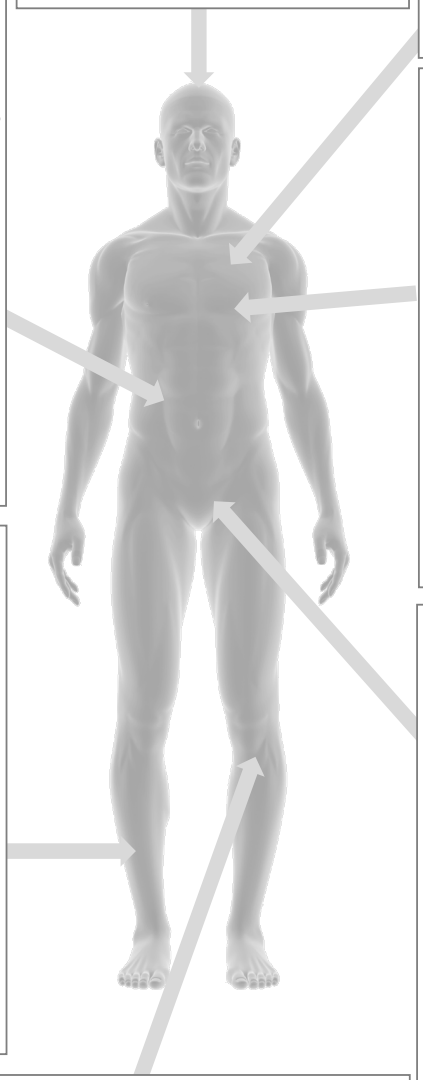
SKIN AND SOFT TISSUE INFECTION

Cellulitis or non-GI/non-GU wound infection
- *First line:* Flucloxacillin 1g PO QDS
- OR *if severe infection* Flucloxacillin 2g IV QDS
- *If recent IVDU:* ADD Clindamycin 450mg PO QDS
- *If recent MRSA*: Treat as for penicillin allergy
- *Penicillin allergy:* Doxycycline 100mg PO BD
- *OR if severe infection:* Teicoplanin 400mg (or 6mg/kg if >70kg) IV BD for 3 doses then OD

Post op GI/GU wound infection
- *First line:* Co-amoxiclav 625mg PO TDS
- *If recent MRSA:* Treat as for penicillin allergy
- *Penicillin allergy:* Doxycycline 100mg PO BD AND Metronidazole 400mg PO TDS

CNS INFECTION

Brain abscess
- *First line:* Ceftriaxone 2g IV BD AND Metronidazole 500mg IV TDS
- *Penicillin allergy:* Chloramphenicol 25mg/kg IV QDS (reduce to 12.5 mg/kg QDS after 48 hours)



COMMUNITY-ACQUIRED PNEUMONIA

CURB 0-1
- *First line:* Amoxicillin 500mg PO TDS
- *Penicillin allergy:* Doxycycline 100mg PO BD

CURB 2 (AND does not trigger for sepsis)
- *First line:* Amoxicillin 500 mg PO TDS AND Clarithromycin 500mg PO BD
- *Penicillin allergy:* Doxycycline 100mg PO BD OR Clarithromycin 500mg PO BD

HOSPITAL-ACQUIRED PNEUMONIA

Non-severe HAP
- *First line*: Doxycycline 100mg PO BD

Severe HAP
- *First line:* Co-amoxiclav 1.2g IV TDS

If recent *Pseudomonas aeruginosa*, recent co-amoxiclav treatment OR co-amoxiclav-resistant organism in sputum
- *First line:* Piperacillin-tazobactam 4.5g IV TDS (or agent tailored to sputum culture results)
- *Penicillin allergy*: Ciprofloxacin 500mg PO BD

If recent MRSA
- ADD Linezolid 600mg PO BD (to any regime above)
- See BNF for drug-interactions, contra-indications

URINARY TRACT INFECTION

Positive urine culture on asymptomatic patient
- Treatment NOT indicated unless pregnant (see separate obstetric guidance)

Lower UTI/cystitis (no SEPSIS)
- Nitrofurantoin 50mg PO QDS
- OR Trimethoprim 200mg PO BD
- OR Pivmecillinam 400mg PO STAT then 200mg PO TDS

Upper UTI/pyelonephritis (no SEPSIS)
- *First line:* Cefalexin 500mg PO TDS
- *Severe penicillin allergy or cephalexin resistance:* Ciprofloxacin 500mg PO BD

Prostatitis
- *First line:* Ciprofloxacin 500mg PO BD

BONE AND JOINT INFECTIONS

Native joint septic arthritis
- *First line:* Flucloxacillin 2g IV QDS
- *Non-severe penicillin allergy OR Gram negative in culture:* Ceftriaxone 2g IV OD
- *Severe (Type 1) penicillin allergy OR recent MRSA:* Teicoplanin 12 mg/kg IV BD for 3 doses then OD

Diabetic foot infection non-severe

Please refer to DM foot team for urgent sampling and advice, infection can progress rapidly.
- *First line:* Co-amoxiclav 625mg PO TDS
- *Penicillin allergy:* Doxycycline 100 mg PO BD AND Trimethoprim 200mg PO BD

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