Great Western Hospitals NHS
NHS Foundation Trust

Assessment and Treatment Guidelines for
MANAGEMENT OF ADULT PATIENTS WITH NEUTROPENIC SEPSIS

This document should be used in conjunction with the AAU Pathway for management of neutropenic sepsis, the suspected neutropenic sepsis initial antibiotic sheet and nursing pathway

EMERGENCY ASSESSMENT AND TREATMENT

WHEN TO SUSPECT NEUTROPENIC SEPSIS

(even if they are subsequently found to have a neutrophil count above 0.5 x 10^9/litre)

- *Unwell patients with cancer who have had chemotherapy in the last six weeks*
- *Unwell stem cell transplant recipients and patients with myelodysplastic syndrome will also require urgent management of their sepsis.*

Neutrophils < 1 x 10^9/litre AND expected to fall

Clinical features may include:

- **Tachycardia**
- **Hypotension**
- **History of rigors/sweats**
- **Temperature ≥37.5 °C**

REMEMBER patients may present:

Without fever, with hypothermia or with mild fever but still require assessment
With rigors without pyrexia.
With deterioration in general condition and non-specific symptoms e.g.confusion or diarrhoea in the elderly
Medication taken may mask fever e.g. Paracetamol, NSAIDs, steroids

NEUTROPENIC SEPSIS

- **Neutropenic sepsis is medical emergency which can occur in any patient who has received chemotherapy within the last 4 weeks or has neutropenia secondary to bone marrow failure.**
- **Infection may progress within hours to shock and death, especially when due to Gram negative bacilli.**
- **Depending on the chemotherapy regimen administered the risk of Neutropenic Sepsis can range from 1% to 78%.**

It is an indication for immediate assessment and prompt empirical treatment with antibiotics within ONE HOUR of presentation which may be given before a full history is taken.

NICE GUIDANCE DEFINES CONFIRMED NEUTROPENIC SEPSIS AS:

Neutrophils ≤0.5 × 10^9/ litre

AND have either:

- **Temperature higher than 38°C or**
- **Other signs or symptoms consistent with clinically significant sepsis eg unexplained abdominal pain or generally unwell.**

ASSESSING THE PATIENT'S RISK OF SEPTIC COMPLICATIONS

The MASCC scoring system is a clinical prediction rule for the identification of patients with neutropenic sepsis at low-risk of serious medical complication development. (See Appendix 1 for MASCC scoring)

LOW RISK patients:

- **MASCC score BETWEEN 21 and 26**
- **If not already on oral treatment and able to take oral medication; patients may be treated as outpatients with oral antibiotics taking into account the patient's social and clinical circumstances. Emphasise to the patient the need to return to hospital promptly if a problem develops.**
- **Patients whose risk of developing septic complications is reassessed as low.**

HIGH RISK patients:

- **MASCC score LESS THAN 21 OR Any patient with Acute leukaemia, Burkett's lymphoma or previous stem cell transplant.**

DO NOT DELAY - TREAT WITH INTRAVENOUS ANTIBIOTICS IMMEDIATELY

These may be given before a full history is taken

If clinically shocked: DO NOT WAIT FOR NEUTROPHIL COUNT.

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IMMEDIATE EXAMINATION

Remember basic ABC, in addition the following are specific to assess:

- Temperature. (**NB fever may be suppressed if patient on steroids, paracetamol or ibuprofen**). **PATIENTS MAY BE CRITICALLY ILL WITHOUT PYREXIA.**
- Signs of shock can be subtle: Observe for fast pulse, low blood pressure, tachypnoea, cool / clammy / blue peripheries.
- Search for a focus of infection, e.g. central venous access line / cannula sites (pus may be absent in patients without neutrophils), throat, chest, abdomen, perianal area, skin lesions.
- **Review GCS and SOS score (this is a useful marker of severity; a score of 2 or more reflects severe illness and requires review by the medical registrar)**

TAKE A FULL HISTORY AFTER PRESCRIBING AND ADMINISTERING ANTIBIOTICS

- Diagnosis, disease status, date and type of most recent chemotherapy.
- Note any symptoms of infection: rigors, cough, sore throat, diarrhoea, dysuria, skin lesions, central venous access device soreness or discharge, cannula site, perianal pain, chest, abdomen
- **List all drugs** (especially prophylactic antibiotics taken) and any drug allergies. Many patients carry a written record of their chemotherapy drug regimen.

After completing the initial clinical assessment try to identify the underlying cause of the sepsis by carrying out:

- Additional peripheral blood cultures in patients with a central venous access device if clinically feasible
- Do not perform a chest X-ray unless clinically indicated.

INVESTIGATIONS

N.B. Only those qualified to do so may handle central lines. Cannulate if not trained to use central line.

- FBC
- LFT's (including albumin)
- CRP
- Clotting if indicated.
- Creatinine and electrolytes.
- Lactate
- Culture any local lesion AND
    - Urine
    - Throat swabs – MC&S and viral (only if coryzal symptoms- green top)
    - Sputum if available
    - Stool cultures if diarrhoea (M C and S and *C.difficile*)
- Blood cultures x 2: take fresh peripheral cultures and cultures from any existing venous line,
- Viral serology sampling all lumens and label accordingly. Take additional peripheral blood culture in patients with a CVC if clinically feasible.
- **INFORM HAEMATOLOGY AND BIOCHEMISTRY OF URGENT SAMPLE; ASK LAB TO RING RESULT TO MEDICAL REGISTAR Bleep 3333.**
- Chest x-ray urgently if any signs in chest or hypoxaemia.
- Oxygen saturation (Avoid arterial blood gases in thrombocytopenic patients if possible)

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TREATMENT

First line therapy should always be commenced for all patients IMMEDIATELY and within ONE HOUR of presentation. NEVER delay antibiotics if the patient is seriously unwell.

WRITE ON PRESCRIPTION 'FEBRILE NEUTROPENIA' REVIEW EVERY 48 HOURS

Please prescribe antibiotics using the Suspected Neutropenic sepsis in Adults Initial Antibiotic Sheet.
First dose – sign as appropriate for initial therapy, prescribe ongoing treatment inside chart

DOSING SCHEDULE in LOW RISK (**MASCC Score ≥ 21**)	
IMMEDIATELY Continue treatment for at least FIVE days.	**CIPROFLOXACIN 500mg PO every 12 hours** **AND** **CO-AMOXICLAV 625mg PO every 8 hours**
If history of severe or non severe penicillin allergy	**CIPROFLOXACIN 500mg PO every 12 hours** **AND** **DOXYCYCLINE 200MG PO STAT, then 100mg once daily**
DOSING SCHEDULE in HIGH RISK (**MASCC Score < 21** or unable to take oral therapy)	
IMMEDIATELY	**PIPERACILLIN /TAZOBACTAM 4.5g STAT then every SIX hours** (adjust frequency if necessary in renal impairment)
If high risk of gram negative sepsis/ hypotensive (SBP <90)	**ADD GENTAMICIN** - adult dose dosing (if known renal impairment or risk of renal impairment give 3mg/kg)
If history of non severe penicillin allergy (see below) *or,* Proven history of Extended Spectrum Beta-Lactamase (ESBL) coliform infecion/colonisation	**MEROPENEM 1g IV STAT then every 8 hours** (adjust subsequent dose/frequency if necessary in renal impairment)
In history of severe penicillin allergy /anaphylaxis (see below):	**CIPROFLOXACIN 750mg BD orally** (consider IV if patient vomiting or has diarrhoea – if taking ciprofloxacin prophylaxis consult microbiology) **AND** **VANCOMYCIN IV** - adult dose with appropriate checks of renal function Adjust doses according to plasma level monitoring
Antibiotic treatment in Penicllin Allergy (see penicillin allergy for more information):	

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Severe penicillin allergy /anaphylaxis (Type 1 reaction - IgE mediated) is clinically recognisable by features of urticaria, laryngeal oedema, bronchospasm, hypotension or local swelling within 72 hours of administration. **Patients should NOT receive a penicillin**. Discuss treatment options with microbiologist	**Delayed or non severe reaction** (Type 2 reaction - non-IgE mediated) with a DEFINITE history of NON-URTICARIAL RASH patients **PatientsSHOULD NOT** receive a penicillin but the likelihood of serious cross sensitivity with Cephalosporins or Carbapenems is very low, .	**Minor reaction** has occurred such as rash (i.e. non-confluent, non-pruritic rash restricted to a small area of the body) or a rash that occurs more than 72 hours after penicillin administration are probably not allergic to penicillin. A penicillin should not be withheld unnecessarily for serious infections; the possibility of an allergic reaction should, however, be borne in mind. Antibiotics (including Cephalosporins) can be used in these patients.
PROBABLE PICC/CVC LINE INFECTIONS: If patient has coagulase negative *staphylococcus* isolated from blood culture and /or clinical evidence of skin or CVC exit or tunnel infection. **Some infections are difficult to treat without removal of the line. Consider line removal after discussion with the clinical team. See section at end of policy.**		
Adults:	***ADD** into first line therapy* **VANCOMYCIN IV infusion** Review after 48 hours/ 72 hours and decide whether appropriate to switch to **TEICOPLANIN IV infusion**	
If diarrhoea, perineal sepsis, abdominal pain, dental or sinus infection	***CONSIDER ADDING** into first line* **METRONIDAZOLE IV infusion** **500mg IV every 8 hours**	
IMPROVING AT 48 HOURS		
Blood cultures negative AND afebrile ≥ 24hours Obvious focus OR patient's risk of developing septic complications has been reassessed as low using the *MASCC* score.	**STOP ANTIBIOTICS** **Review IV antibiotics and de-escalate to oral antibiotics if appropriate.** **Consider discharge for low risk patients.**	

Intravenous Fluids: Intravenous fluids should be given to maintain circulating volume. In hypotensive patients rapid IV intravenous infusion 500mls normal saline STAT, then maintain circulating volume as assessed by BP, urine output and SOS score. Do not use conventional plasma expanders.**Oxygen:** Prescribe oxygen if appropriate 15l/min by non rebreathe mask should be used in all severely ill patients. **Monitor**: Temperature, BP, O_2, pulse and respiratory rates, urine output ½ -1 hourly until clinically stable.

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CONTINUING CARE

- Treating / supervising team must be notified of patient's admission. Patients should be reviewed by an oncology/haematology consultant or Intermediate grade staff within 24 hours of admission Monday to Friday. At weekends and public holidays out of hours procedures should be followed.
- If patient is on GCSF continue on current dose. (GCSF Guidelines)
  If patient NEUTROPHILS < 1 x 10^9/L start GCSF (<60kg 30 million-units daily, >60kg 48 million- units daily).
- Full blood count monitoring until Neutrophil count is above 0.75 x10^9/L
- Maintain fluid balance chart. Weigh daily.
- Monitor conscious state, temperature, BP, pulse, respiratory rate, O_2 saturation 4 hourly or more frequently if required. Consider blood gases to assess degree of acidosis and quality of tissue perfusion.
- Examine patient **daily** reassessing the patient's risk of complications as the situation can change rapidly, especially clinical and radiological signs in the chest. Repeated chest X-rays may be required if new/clinical signs of progression.
- Consider taking daily blood cultures if pyrexia persists or clinical condition deteriorates.
- Discuss unresolving or clinically deteriorating cases with the consultant in charge of the patient and the consultant microbiologist

Second line antibiotic therapy with *positive* cultures	
Change in light of positive cultures/sensitivities (discuss with Microbiology).	
Second line antibiotic therapy with *negative* cultures	
If patient is still febrile and stable at 48 hrs on first line therapy	Repeat line cultures but **DO NOT CHANGE ANTIBIOTICS.** Change to second-line empirical antibiotics:
If patient is showing signs of clinical deterioration or is haemodynamically unstable	**MEROPENEM IV AND GENTAMICIN IV** Or discuss with microbiology for alternatives if already on these antibiotics or in severe penicillin allergy.

If at 96 hours patient is still febrile, repeat all cultures and if high risk:

- Consider addition of systemic antifungal after discussion with the consultant microbiologist and the consultant responsible for the patient or their senior deputy. **NB All triazole antifungals should be avoided where there is serious risk of drug interactions. Seek further advice on potential interactions from the Specialist Antibiotic pharmacists (BI 1337 or 2145) or Medicines information on ....**
- Seek positive evidence of infection (chest CT and abdominal US) and mycological testing for fungal wall components (in blood or BAL). If non-confirmatory, empirical therapy may be unnecessary.
- Consider atypical chest infection
- Consider antiviral status

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ANTIFUNGAL TREATMENT

Treatment option	Antifungal	Dose	Comments
First line treatment	**LIPOSOMAL AMPHOTERICIN** (AMBISOME™) *(Note: can lower serum K+ levels. Consider prescribing low dose Amiloride as potassium sparing agent)*	Initial test dose **1mg** over 10 minutes then **3mg/kg once daily** (round up to 50mg) increase to **5mg/kg once daily** if proven fungal infection.	In renal impairment use only if no alternative.Those on ciclosporin or high dose methotrexate consider use of Caspofungin. Caution in hepatic impairment **50mg vial £105**
If patient >50kg **or lack of response / deterioration after 48 hours or patient intolerant**	**CASPOFUNGIN**	**70mg IV DAILY for one dose** then **50mg IV DAILY** (continue with **70mg IV** if >80kg).	Caution in hepatic impairment , dose reduction to 35mg OD may be necessary. No dosing information available in severe liver impairment. **70mg vial £440** **50mg vial £350**
If CNS involvement suspected	**VORICONAZOLE**	**6mg/kg IV every 12 hours for TWO doses** then **4mg/kg every 12 hours** (reduced to **3mg/kg** if not tolerated).	Caution in hepatic impairment dose halved in mild/moderate cirrhosis. Ciclosporin doses will usually need to be reduced – monitor blood levels. Monitor renal function. Accumulation of IV vehicle SBECD can occur if CrCl< 50. Use oral if possible. **200mg vial £80**
Oral switch *Only after discussion with consultant and microbiology.*	**VORICONAZOLE**	If > 40kg: **400mg every 12 hours for TWO doses** then **200mg every 12 hours**, (increased to **300mg** if necessary.) If < 40kg: **200mg every 12 hours for TWO doses** then **100mg every 12 hours** (increased to **150mg** if necessary.)	If not tolerated use of Posaconazole as alternative **MUST** be discussed with the consultant haematologist and approval must be sort from the consultant microbiologist. **200mg tab £53**

Please refer to individual product SPC for details of dosing in renal or liver impairment.

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CONTINUATION OF TREATMENT

- Discontinue empiric antibiotic therapy after 5 – 7 days in patients whose neutropenic sepsis has responded to treatment, irrespective of neutrophil count. **This MUST be confirmed with a consultant or senior registrar.**
- Following a positive blood culture, the length of treatment will depend on the causative organism and extent of disease (seek advice from consultant microbiologist before stopping). If the neutrophil count has recovered but patients remains febrile, antibiotics may need to continue beyond 7 days. Restart oral prophylactic antifungals in high risk patients.
- Length of any antifungal treatment should be discussed with a consultant microbiologist.

ADVICE ON MANAGEMENT MAY BE OBTAINED 24 HOURS A DAY:

Adults:

Haematology : Mon- Fri 9am – 5pm: Haem SpR bleep 2162 or 1285
Out of Hours: via Switchboard.

Oncology: Mon- Fri 9am – 5pm: Speciality Doctor bleep 1744

Oxford SpR on call Tel: 01865 741841 or short dial code: #7166

References:

1.NICE guidelines CG151

2. Adult Guidelines TVCN and Oxford University Hospitals NHS trust.

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Prophylactic antimicrobial treatment to prevent the complications of anti–cancer therapy

Patient Type	Prophylaxis	Comments
ANTIBIOTIC PROPHYLAXIS Do not routinely offer G-CSF for the prevention of neutropenic sepsis in adults receiving chemotherapy unless they are receiving G-CSF as an integral part of the chemotherapy regimen or in order to maintain dose intensity.		
Haematology patients: High risk patients with acute leukaemias or stem cell transplants in whom significant neutropenia (neutrophil count 0.5×10^9 per litre or lower) is an anticipated consequence of chemotherapy **Oncology patients:** Previous episode of neutropenic sepsis OR Small cell lung cancer	**Ciprofloxacin 250mg po every twelve hours**	**ONLY** *during expected period of neutropenia.* **From Day 8 - 15 of treatment**
ANTIVIRAL PROPHYLAXIS		
HSV seropositive patients undergoing allogenic or autologous HSCT or leukaemia induction or reinduction therapy.	**Aciclovir 200mg po every eight hours**	*Continue until recovery of white blood cell count or resolution of mucositis whichever is later.*
All patients with cancer who have received chemotherapy If exposed to to influenza regardless of vaccination status.	**influenza vaccine** annually use inactivated if chemotherapy in last 6 months. Post exposure treatment with **Oseltamivir or Zanamivir**	*Household contacts should be vaccinated against influenza annually.*

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ANTIFUNGAL PROPHYLAXIS		
Patients at high risk of fungal infection during period of neutropenia. Anticipated to have prolonged neutropenia, haematology patients taking additional steroids or those suffering from Diabetes Mellitis (DM)	**Fluconazole orally at least 50mg daily**	*Higher doses may be required in some cases to avoid selection of resistant species eg C.glabrata or C. krusei)*
Allogeneic stem cell transplant **Intensive chemotherapy for leukaemia, those with primary CNS lymphoma** **Steroid negative Burketts** **If receiving Alemtuzumab (Campath)** **Probable IFI during previous intensive chemotherapy**	**Itraconazole oral liquid 200mg every twelve hours**	***Start before transplantation or chemotherapy and continue until neutrophil count is >1 x 10^9/L*** ***Take care to avoid interactions with cytotoxic drugs. Itraconazole must not be given until 24 hrs after cylophosphamide conditioning has been administered. Itraconazole must not be used AT ALL in patients receiving vincristine.*** *There is patient variability in bioavailability. Plasma level monitoring is recommended if maintaining bioavailability is critical in high risk patients (sample requires to be sent to Bristol Reference Laboratories)*
If intolerant of fluconazole or itraconazole	**Ambisome 1mg/kg 3 x a week (£105/vial)** **Posaconazole Liquid 5mg/kg bd - 200mg/5ml every eight hours (5ml = £23/ £69 per day)**	*Use of Posaconazole **MUST** be discussed with the consultant haematologist and prior approval for use must be sort from the consultant microbiologist.* *Generally not initiated at GWH.*
Secondary prophylaxis following proven IFI during subsequent neutropenia or GVHD	If previously documented and fully resolved IFI **PLUS** a new episode of prolonged neutropenia or severe immunosuppression. Choice should be based on causative fungal pathogen of the previous IFI and response to antifungal agents during that episode	

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NOTES:

- Commence treatment before anticipated onset of neutropenia and continue for 7 days after neutrophil count recovered to > 0.5 x 10^9/L with no evidence of fungal infection. Duration of therapy is as advocated by is stated by the relevant protocol.
- For patients receiving prophylaxis for chemotherapy-induced neutropenia, continue therapy until neutrophils >0.5 x10^{-9}/L. Allogeneic stem cell transplant patients should continue therapy while they remain at high risk of fungal infection.
- **NB**: **All Triazole antifungals should be avoided when there is a risk of serious drug interaction**. They interact with a number of chemotherapy drugs including vinca alkaloids and other medications eg Vincristine levels are increased by Itraconazole. Check the latest BNF for interactions, for further advice contact consultant haematologist/ microbiologist or antibiotic/oncology pharmacist.
- Azoles need not be stopped when starting IV liposomal amphotericin B or any other systemic antifungal.
- Use with caution with other hepatotoxic drugs. Avoid use or use with caution in active liver disease or history of drug induced hepatotoxicity. Monitor liver function during therapy. See individual product SPC for more details including dosing in renal impairment.

References:

1. British Committee for standards in Haematology (BCSH) 2008. Guidelines for the management of invasive fungal infection during therapy for haematological malignancy. Accessed on 31/1/10 http://www.bcshguidelines.com/4_HAEMATOLOGY_GUIDELINES.htm l
2. BNF 60, September 2010. bnf.org
3. European leukaemia.net.org Conference 2009
4. Freifeld et al. IDSA Guidelines: Clinical Practice guideline for use of antimicrobial agents in neutropenic patients with cancer:2010 Update by the Infectious diseases society of America.CID 2011: 52 ppe56 – e93.
5. National Institure for Health and Clinical Excellence (NICE) Clinical guideline 151. September 2012. Available @guidance.nice.org.uk/cg151

APPENDIX 1: MASCC Index

The Multinational Association for Supportive Care in Cancer Risk Index: A multinational scoring system for identifying low-risk febrile Neutropenic cancer patients. (Journal of Clinical Oncology 18: 3038-3051, 2000)

Characteristic		Score
Age	≥ 60	0
	< 60	2
Dehydrated requiring IV fluids	Yes	0
	No	3
Hypotension	SBP < 90 mmHg	0
	SBP ≥ 90 mmHg	5
COPD *(formal diagnosis of COPD (including chronic bronchitis or emphysema, OR requires regular bronchodilators or long term oxygen)*	Yes	0
	No	4
Solid tumour OR lymphoma with no history of invasive fungal infection	Yes	4
	No	0
Symptoms related to this episode Neutropenic Sepsis i.e. fever, altered mental status, haemodynamic instability, focus of infection. *(None, mild – easily tolerated; moderate – requiring treatment for symptoms, severe – incapacitating)*	None or mild	5
	Moderate	3
	Severe	0
Inpatient at the time of fever onset	Yes	0
	No	3
TOTAL SCORE (<21 High risk, ≥ 21 Low risk)		

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APPENDIX 2: ANTIBIOTIC DOSING INFORMATION

For other antibiotics or further dosing/antibiotic monitoring advice for patients on dialysis: consult the ITU guidelines on the intranet LINK, the product SPC for treatment in renal inpairment or contact the Specialist Antibiotic Pharmacists on Bleep 2145/1337)

Drug	Renal function		Dose/frequency
PIPERACILLIN /TAZOBACTAM	Normal or Mild	Normal or CrCl 20 - 50ml/min	**Give 4.5gm 6 hourly**
	Moderate	CrCl 10 - 20 ml/min	**Give 4.5gm 8 - 12 hourly**
	Severe	CrCl <10 ml/min	**Give 4.5gm 12 hourly**
METRONIDAZOLE	Refer to renal dosing pages on intranet Metronidazole dosing		
MEROPENEM	Normal or Mild/ moderate	Normal or Cr Cl > 20ml/min	**Give 1gm every 8 hours**
	Moderate	CrCl 10 – 20ml/min	**Give 1gm every 12 hours**
	Severe	Cr Cl < 10ml/min	**Give 1gm every 24 hours**
GENTAMICIN	Initial dose 2mg/kg (CBW)		Adjust dose according to plasma levels
TEICOPLANIN			if < 85kg **400mg IV every 12 hours for 3 doses, then daily** if > 85kg **600mg IV every 12 hours for 3 doses, then daily**
VANCOMYCIN			**FOLLOW TRUST GUIDANCE**

CBW = Corrected weight = IBW + [0.4 x (actual body weight – IBW)]

IBW: Men 50kg + 2.3kg per inch over 5 feet

Women 45.5kg + 2.3kg per inch over 5 feet

BSA online calculator

Calculating Creatinine clearance:

Wright Formula

SCr measured using Jaffe assay (commonly used by most biochemistry labs).

$$\text{GFR (ml/min)} = \frac{6580 - (38.8 \times \text{Age in years}) \times \text{BSA} \times 0.832 \text{ if female only}}{\text{SCr (µmol/min)}}$$

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Key: Age in years; BSA = DuBois BSA **Ref.** Estimation of glomerular filtration rate in cancer patients; JG Wright, AV Boddy, M Highley, J Fenwick, A McGill and AH Calvert; British Journal of Cancer(2001) 84(4) 452-459.

APPENDIX 3: EMPIRICAL TREATMENT OF NEUTROPENIC SEPSIS

Assessment of patient
Suspected or confirmed neutropenic sepsis

IMMEDIATE EXAMINATION
as per guideline

Low risk MASCC score ≥ 21
START IMMEDIATELY
Oral Coamoxiclav /Ciprofloxacin
Oral Ciprofloxacin/Doxycycline
(Penicillin allergy)

Consider outpatient therapy taking into account patient's social and clinical circumstances and ensuring they return to hospital promptly if a problem develops

High risk MASCC score <21
START IMMEDIATELY
PIPTAZO IV
(Avoid if patient on methotrexate)
MEROPENEM IV
(non severe penicillin allergy)
TAZOCIN/ VANCOMYCIN IV
(If line sepsis suspected)
CIPROFLOXACIN/VANCOMYCIN IV
(severe penicillin allergy/or if patient on methotrexate)

- **Daily** review of clinical status
- Reassess patients risk of septic complications using the MASCC score.

Unresponsive fever
- Continue empiric therapy in those with unless another cause is likely.
- Do not switch initial empiric therapy unless there is clinical deterioration or on microbiological indication

AT 48 HOURS

Switch from IV to oral therapy
If reassessment using the MASCC score of patient's risk of septic complications is LOW (≥ 21).

Discontinue empiric therapy in patient who have responded to treatment for neutropenic sepsis irrespective of neutrophil count.

Offer discharge to patients having empiric therapy after:
- The patient's risk of developing septic complications is low using the MASCC score (≥ 21)

AND
- Taking into account the patients social and clinical circumstances and ensuring they return to hospital promptly if a problem develops.

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Management of Intravascular Catheter related bloodstream Infection

Link to IDSA guidelines

General Management

Long term catheters should be removed in following clinical conditions:

- Severe sepsis
- Suppurative thrombophlebitis
- Endocarditis
- Bloodstream infection that persists for >72 hours of appropriate antibiotic therapy (to which infecting organism is sensitive)

Or if following Organisms Cultured:

- Line infections due to *Staph aureus, Pseudomonas aeruginosa* and fungi

Short term catheters should be removed if line infection due to:

- *Staph aureus,* Gram negative bacilli, enterococci and fungi

Note, some organisms such as *Bacillus spp.* are common environmental organisms and hence can be contaminants in blood cultures. We would recommend two sets of positive cultures are required before saying that the organism is definitely significant. However, as this organism is difficult to eradicate from lines, once confirmed that not a contaminant, the line will need removal.

If “salvage therapy” (ie treating the line with antibiotics) is attempted then the line must be removed if there are positive blood cultures (2 sets) after 72 hours of appropriate antibiotic treatment.

ECHO should be performed if:

- Prosthetic valve present
- Pacemaker present
- Persistant bacteraemia more than 3 days

Microbiology Investigations

Blood cultures should be taken via the central line and peripherally. If there is evidence of exit site infection send wound swab for culture.

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Duration of Treatment for Long term Catheters for specific organisms

This should be discussed with the Consultant Microbiologist. When positive blood cultures are available these will be phoned. Treatment duration will depend on whether the line is removed (longer course required if line not removed), and the type of organism grown from the cultures.

For certain organisms (e.g. *Candida spp., Staph. Aureus, Pseudomonas spp*.) it is ESSENTIAL that the line is removed.

Organism	Treatment with Line Removed	Treatment with Line in
Coagulase negative *staphyloccus*	**5-7 days**	**10-14 days**
Staphylococcus aureus	**4-6 weeks** (min 2 weeks if NOT diabetic, imunosuppressed and cultures negative at 72 hours)	**Line should be removed**
Enterococcus spp	**7-14 day course**	**7-14 day course** **Removal of long term vascular catheter** if: • insertation site infection • Suppurative thrombophlebitis • Sepsis • Endocarditis • Persistant bacteraemia or metastatic infection Check cultures at 72 hours
Gram negative bacteria	**7- 14 days**	**7- 14 days** Line removal if persisting sepsis **Pseudomonas – line should be removed**
Bacillus spp		**Once confirmed that not a contaminant; needs line removed**
Candida spp	Antifungals	**Line should be removed**