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Associated Trust Documents:	Antimicrobial Prescribing Guidelines for Adult Patients, Infection Control Manual, Policy for the use of medicines, Medical Emergency guidelines, Trust Sepsis Guidelines

Contents

MANAGEMENT OF NEUTROPENIC SEPSIS IN ADULT PATIENTS

1. Introduction

Suspected or proven infection in a neutropenic patient is a medical emergency and is an indication for immediate assessment and prompt treatment with intravenous (IV) antibiotics **within 1 hour of presentation** to anywhere within the hospital.

These guidelines are intended to aid the management of adult oncology/haematology patients who are suspected of neutropenia and confirmed:

These guidelines should be read in conjunction with:

- Antimicrobial Prescribing Guidelines for Adult Patients
- Infection Control Manual
- Policy for the use of medicines
- Medical Emergency guidelines

2. Background

Systemic infection in neutropenic patients is a potentially life threatening condition. Left unchecked and untreated it can rapidly prove fatal. Simple and timely intervention can be life saving.

Experience suggests that the risk of infection by bacteria and fungi increases as the neutrophil count decreases, with the risk sharply increasing at neutrophil counts $<0.5x10^9$/l.

Systemic anti-cancer therapy (SACT) increases the risk to the patient of serious infection due to effects on the gut mucosa as well as by inducing severe neutropenia. Most infections in neutropenic patients are a result of endogenous micro-organisms either from the gut or skin getting into the patient. Previously, gram negative organisms were the main cause of infection and death, but with increasing use of antimicrobial prophylaxis and central venous access, gram positive organisms such as coagulase negative staphylococci are more common. Prolonged periods of neutropenia carry a risk of invasive fungal infections from air-borne organisms such as Aspergillus.

All patients within 6 weeks of SACT presenting as an emergency must be assumed to have neutropenic sepsis until proven otherwise. In the early stages those presenting with neutropenic sepsis may not have abnormal vital signs or be perceived to have a life threatening condition.

Note: Any leukaemia patient presenting with pyrexia should be regarded as neutropenic irrespective of their count as the neutrophils function abnormally.

Treatment with first line antibiotics should be started immediately in less than 1 hour since initial presentation (ideally still within ED or location of first presentation).

This treatment can later be modified after discussion with the on call haematologist and/or microbiologist according to the clinical situation.

3. Definitions

3.1 Definition of neutropenia

Neutropenia is defined as:

Neutrophil count < 1.0 x 10^9/litre and expected to fall (for example after chemotherapy)

OR

< 0.5 X 10^9/litre

3.2 Definition of febrile neutropenia

One oral temperature reading ≥ 38 degrees centigrade in a potentially neutropenic patient.

Patients in septic shock (i.e. unwell, tachycardic +/- hypotension) may not be pyrexial but will require intravenous antibiotics and supportive management for shock (see Appendix 1).

4. General principles

All patients within 6 weeks of SACT presenting as an emergency must be assumed to have neutropenic sepsis until proven otherwise. Patients should be educated to inform triage and triage Nurses should have a high index of suspicion even in apparently well ambulatory patients presenting with perceived minor complaints.
Cancer Sepsis Bundle should be triggered immediately in this patient group.

- All patients who are receiving cytotoxic chemotherapy should be given a patient held record card with specific contact details for advice and an alert card giving details of what to do in the event of pyrexia or feeling generally unwell.

- The medical registrar on call, the relevant Cancer Site Specific Clinical Nurse Specialist should be informed of patients admission.

- Overwhelming sepsis can develop very quickly, rapid assessment and treatment is vital.

- In these patients first line neutropenic sepsis antibiotics must be administered within 1 hour of presentation to ED/EAU/location of first presentation.

- Examine patient, including oropharynx, chest, Hickman/PICC line exit site and general condition (pulse & blood pressure etc).

- DO NOT perform a rectal examination in a patient suspected to have neutropenia. The risk of bacterial translocation through the mucosa is a significant problem in neutropenic patients leading to sepsis.

- Some neutropenic patients do not develop significant pyrexia. Signs of sepsis may be exhibited in other ways e.g. tachycardia, hypotension, malaise, altered mental state.

- First line antibiotics should be immediately accessible in any area where patients are received.

- Laboratory confirmation of neutropenia cannot usually be guaranteed within the necessary timescale. A full blood count/differential along with baseline bloods and blood cultures should be requested at the earliest opportunity but treatment with antibiotics should not be delayed if results are not available. Chest X ray may be considered.

- Patients who have had first dose of first line antibiotics for clinical signs of early sepsis should have their absolute neutrophil count result reviewed. If neutropenia is confirmed they should be treated according to this guideline. If neutropenia is excluded an alternative sepsis management plan can be made.

- Neutropenic patients (< $0.5x10^9$/litre) should be isolated in a side room. However, initial management of any patient with severe sepsis or septic shock should be vigorous and must be in a resuscitation area with full monitoring facilities. The haemodynamic status and oxygen delivery should be optimized and early HDU/ICU admission considered.

- Neutropenic patients who do not meet sepsis definition criteria but have low grade pyrexia may require admission for monitoring as they may deteriorate.

- Further management in cooperation with consultant haematologist and consultant microbiologist.

- Discuss the indication for granulocyte colony stimulating factor (GCSF) with the consultant Haematologist. **Do not use GCSF if a patient has received pegylated GCSF within last 3 weeks, has Hodgkin's lymphoma or has been treated with bleomycin.**

- Review previous microbiological results (e.g. previous pseudomonal sepsis). Febrile Neutropenia can be caused by a wide range of microbiological agents but is commonly caused by *Pseudomonas aeruginosa*, other Gram negative organisms, *Staphylococcus aureus* (including MRSA) and other Gram positive organisms. After admission, antibiotics may be modified according to likely focus (e.g. Central line, mucositis, perianal infection, diarrhoea).

- Careful attention to the patient's personal and dental hygiene are Important

- Careful attention to hand washing and decontamination (for example of stethoscopes) before touching the patient is mandatory for all health workers and visitors

- Dietary information can be found on the intranet under cancer and palliative care, alternative advice can be sought from the chemotherapy nurses.

5. First line investigations:

- FBC, renal function tests, liver function tests, creatinine, group and save, CRP, lactate, albumin, calcium and magnesium.

- Take blood cultures – peripherally and from all lumens of any central venous access. Please ensure that the bottles are accurately labelled (e.g. – PICC line, all separate lumen of Hickman line, peripheral etc…)

- Take swabs from the throat and any wounds for culture if clinically suspected.

- Mid-stream urine sample

- Send stool for microbiology culture & sensitivity and clostridium difficile toxin if patient has diarrhoea.

- Organise chest x-ray

6. Initial treatment of febrile neutropenia/neutropenic sepsis

Start intravenous fluids at a rate of 1 litre every 8 hours and monitor urine output (fluid balance chart). Patients in septic shock will require more vigorous fluid replacement, frequent monitoring and may need a urinary catheter.
Antibiotic regimes vary depending on:

- Type of cancer
- Chemotherapy received
- Renal function
- Drug allergies

6.1. Within 1 hour "Door to needle time":

- Piperacillin/Tazobactam 4.5g IV plus
- Gentamicin 7mg/kg IV (up to 560mg maximum dose based on ideal body weight)

Patients with myeloma, sarcoma, neuroblastoma or a creatinine clearance (CrCl) ≤ 20 mL/min:

- Piperacillin/Tazobactam 4.5g IV plus
- Ciprofloxacin 400mg IV
- **NOT Gentamicin**

In non-severe penicillin allergy:

- Meropenem 1g IV

In severe penicillin allergy:

- Ciprofloxacin 400mg IV
- Aztreonam 2g IV

6.2. If neutropenia is confirmed:

The patients are divided into 3 treatment groups as follows:

	Treatment groups	Antibiotic treatment
Group 1	• All haematology patients except those with myeloma • All patients who have had a stem cell transplant (autograft/allograft) • All oncology patients **excluding** neuroblastoma, sarcoma and those treated with cisplatin, high dose methotrexate or ifosfamide in past 7 days	Piperacillin/tazobactam IV 4.5g QDS + Gentamicin 7mg/kg based on ideal body weight OD (560mg maximum dose) *Adjust doses for renal impairment* (Review at 48 hours)
Group 2	• Myeloma, Sarcoma and neuroblastoma patients • Patients with CrCl <20ml/min • Patients treated with reno-toxic chemotherapy regimens (i.e. cisplatin, ifosfamide or high dose methotrexate) in past 7 days.	Piperacillin/tazobactam IV 4.5g BD + oral Ciprofloxacin PO 750mg BD (Give PO Ciprofloxacin unless poor absorption) *Adjust doses for renal impairment*
Group 3	• All patients with non-severe penicillin allergy	Meropenem 1g IV TDS
Group 4	• All patients with a severe penicillin allergy	• Ciprofloxacin IV 400mg BD • Aztreonam 2g IV STAT then 1g BD

For patients at high risk of Coagulase Negative Staph Infection:	
• If suspected IV catheter related infection e.g. signs of inflammation around the catheter insertion point or along catheter track • Endoprosthesis • Previous history of colonised line • Previous MRSA • Severe mucositis	Add Vancomycin 1g 12 hourly • Consider line removal if tunnel infection confirmed Decrease dose if patient ≥75years and those with impaired renal function (see vancomycin protocol)

Stop Gentamicin (group 1) / Ciprofloxacin (group 2) / Aztreonam (group 4) after 48 hours if cultures are negative. Continue with monotherapy antibiotic.

Stop Piperacillin/Tazobactam/ /Meropenem/ Ciprofloxacin/ Vancomycin after 5 days if patient is afebrile and negative cultures.

If chemotherapy history unknown: please check the cancer services section of Evolve for the most recent oncology information and Clinical Services for the most recent haematology information. If the patient is not known to this Trust please contact the treating hospital for further information.

6. 3 If obvious Herpes infection

Add

- Aciclovir 10mg/kg intravenously every 8 hours in normal renal function
    - In obese patients use ideal body weight,
    - Reduce dose if over 75 years or impaired renal function

6.4 For patients with oropharyngeal candidiasis / colonised with candida /otherwise at high risk of invasive fungal infection

Add or continue

- Fluconazole 100mg orally once daily for 7-14 days

Please discuss duration of antimicrobials with microbiologist if cultures are positive.

7. Treatment for patients who remain febrile after 48 hours

Review microbiology result and modify antibiotics accordingly

7.1. If cultures remain negative

Stop current antibiotics and contact microbiology on-call

7.2. Consider possibility of viral infection

- Send EDTA bloods for viral serology e.g. HSV, CMV and EBV
- Then discuss with a consultant microbiologist

7.3. If cultures positive discuss duration of antimicrobials with a consultant microbiologist

8. Treatment for patients who remain febrile after 72 hours

8.1. Suspect fungal infection

- Discuss all cases with a consultant microbiologist
- Stop Fluconazole.
- Consider starting liposomal amphotericin (AmBisome) after discussion with microbiology.
- AmBisome must be prescribed as “liposomal amphotericin (AmBisome)”
  - The patient’s weight and dose calculation must be clearly written on the drug chart/ePMA.
  - A test dose of 1mg AmBisome intravenously over 10 minutes should be administered before a new course of treatment and the patient observed for a further 30 minutes before continuing with the rest of the prescribed dose (observe for anaphylaxis).
  - Start at 3mg/kg intravenously.
  - Reconstitute each 50mg vial with 12ml water for injection and shake vigorously for at least 15 seconds resulting in a 4mg/ml solution (50mg in 12.5ml).
  - Dilute the required dosage, via the supplied filter, in **5% glucose** and infuse intravenously over 60 minutes. *(please note: the final concentration of AmBisome should be within the range 0.2mg/ml to 2mg/ml. Seek advice for fluid restricted and obese patients*).

- Can be increased to a maximum dose of 5mg/kg (unlicensed). Seek Microbiologist advice for guidance.
- Any infusion-related reactions (chills, rigors, headache, myalgia, arthralgia) should be treated with chlorphenamine IV 10mg.
- In the case of severe rigors consider an infusion of pethidine 50mg in 50ml of sodium chloride 0.9% alongside liposomal amphotericin AmBisome infusion.
- Monitor urea, electrolytes and creatinine daily, especially for hypokalaemia.

- If AmBisome is contraindicated, not tolerated or the patient is unresponsive to maximal dosing
    - Discuss with Consultant Microbiologist
    - Consider Voriconazole (See appendix 2)

8.2. If CMV infection suspected

- Ganciclovir may be indicated- please see protocol
- DISCUSS WITH MICROBIOLOGIST.

8.3. If mycobacterium infection suspected

- Discuss with consultant microbiologist

9. Use of granulocyte colony stimulating factors

Granulocyte colony stimulating factors may hasten the recovery of neutrophils following cytotoxic chemotherapy, or ameliorate the severity of neutropenia.

9.1 Oncology Patients-

- If confirmed neutropenic sepsis (Neutrophil count <1.0)- Give filgrastim 300mcg (filgrastim 480mcg if patient ≥85kg) until Neutrophil count is >1.0 for 2 consecutive days or Neutrophil count >10.0 for 1 day.

9.2. Haematology Patients-

- If confirmed neutropenic sepsis (Neutrophil Count <1.0) - Discuss use of GCSF with on-call Haematologist prior to prescription as GCSF may be contraindicated.

10. Prophylaxis in afebrile neutropenic patients

Commence when neutrophils <1.0x10^9/L and falling, and continue until neutrophils >1.0x10^9/L

- **Chlorhexidine** digluconate mouthwash, 10ml every 6 hours (Not to be swallowed)
- **Nystatin** oral suspension 100,000 units per mL, 1ml every 6 hours.
    - Rinse around the mouth for 1 minute and then swallow

    - Administer after using chlorhexidine mouthwash
- In patients at high risk of fungal infection (see appendix 2)
    - Itraconazole oral solution 2.5mg/kg twice daily
- **Aciclovir** 200mg orally every 8 hours in patients with a history of shingles or recurrent cold sores
- **Ciprofloxacin** 250mg orally twice daily may be considered following induction chemotherapy for:
    - Acute leukaemias
    - Severe aplastic anaemia
    - Stem cell transplant

11. Audit

Audits of patients who present acutely with potential neutropenic sepsis will be completed on a 6 monthly basis, assessing compliance with the one hour door to needle target, and reported to the East of England (Appendix 4).

12. Education

The pathway will be monitored through the Acute Oncology Service (AOS) who will have initial contact with all acutely admitted cancer patients. If the AOS team see that the pathway is not being followed they will educate and audit. Education will be delivered by the AOS team.

References

1) Joint Formulary Committee (2018) British National Formulary. Available at: http://www.medicinescomplete.com (Accessed: 01 July 2019).

2) NICE Clinical Guideline 151, Neutropenic Sepsis: prevention and management of neutropenic sepsis in cancer patients. Sept 2012. Available: www.guidance.nice.org.uk/cg151

3) Pipercillin/Tazobactam monograph available at: https://medusa.wales.nhs.uk/IVGuideDisplay.asp

4) Filgrastime monograph available at: https://medusa.wales.nhs.uk/IVGuideDisplay.asp

Appendix 1

Management of septic shock (See Trust Sepsis Guidelines)

- Cardiovascular shock +/- respiratory embarrassment with tachycardia, hypotension and tachypnoea.
- Rapidly assess patient
- Immediate rapid infusion of 1- 2 x 500mls Gelatin 4% to restore blood pressure
- Start appropriate observations
    - Pulse
    - Blood pressure
    - O_2 sats by pulse oximetry
    - Urine output (may need catheter)
- Give oxygen by face mask if saturation <95%
- Involve Outreach team **early** (bleep 666)**.** A severely ill reversibly neutropenic patient should be transferred to intensive care / high dependency unit if condition warrants intensive monitoring or treatment above that which can reasonably be provided on a general ward (discuss with on-call Anaesthetic Specialist Registrar bleep 700).
- Collect blood sample for culture.
- Ensure first dose broad-spectrum antibiotics are given.
- Standard infection control procedures are mandatory.
- Measure central venous pressure if possible.

Appendix 2

Antifungal treatment

Invasive fungal infections are a significant problem for patients with haematological malignancy, related to immunosuppression and/or prolonged neutropenia caused by their disease or its treatment. *Candida & Aspergillus* are the major fungal pathogens. However, there are changes in the epidemiology of fungal infections with the emergence of azole-resistant species such as *Candida glabrata* & *Candida krusei*, and increasing mould infections particularly with aspergillus but also with other moulds such as *Fusarium spp*.

Management of invasive fungal infections includes standard infection control measures, primary prevention strategies, which can be risk-adjusted, treatment of patients with a probable or definite infection and secondary prophylaxis during subsequent courses of myelo- or immunosuppressive treatment.

Primary Prophylaxis

Patients may receive antifungal prophylaxis according to the degree of risk of invasive fungal infection posed by the treatment received and the underlying haematological disorder.

Lymphoma and myeloma chemotherapy	Low
Childhood acute lymphoid leukaemia chemotherapy	Low
Adult acute lymphoid leukaemia chemotherapy	Intermediate – high
Acute myeloid leukaemia chemotherapy	Intermediate – high

The following additional risk factors may add to this:

- neutropenic >5 weeks
- graft versus host disease
- high dose steroid therapy >1 week
- fungal colonisation at more than one site

Patients with an intermediate to high risk of invasive fungal infection may be treated with nystatin suspension 1ml every 6 hours and itraconazole oral solution 2.5mg/kg bd

Secondary Prophylaxis
Patients with previously documented fungal infection (proven or probable) should receive prophylaxis during subsequent episodes of neutropenia. Discuss with Consultant Microbiologist or Haematologist as the choice of agent will depend on previous treatment with antifungals.

The duration of therapy should be from just before chemotherapy until resolution of neutropenia.

Empirical Therapy

If a neutropenic patient is still pyrexial after 72-96 hours treatment with broad spectrum antibiotics, and has no obvious focus for infection, systemic fungal infection should be considered.
A high-resolution CT scan of the thorax and a Galactomannan test should be performed. In high-risk patients, the Galactomannan test should be performed twice weekly.
Repeat blood cultures and sputum, nose or bronchoalveolar lavage cultures may be helpful.
Serological testing may become viable in the near future.

If the CT scan shows lesions consistent with fungal infection see Targeted Antifungal Therapy below.

If the CT is not consistent with fungal infection, please consult with the Consultant Microbiologist or Haematologist.

Targeted Antifungal Therapy

If the patient has proven or probable invasive aspergillosis manifested by:

- histological evidence of fungal infection from lung biopsy or other sterile site

- CT scan compatible with invasive aspergillosis plus one of the following:

    a) culture positive respiratory tract sample
    b) clinical evidence e.g. lower respiratory tract symptoms, pleuralrub, pleural effusion, upper respiratory tract symptoms, nose ulceration/eschar, periorbital swelling, maxillary tenderness,necrotic lesions on or perforation of hard palate,

first line antifungal treatment should be initiated with Voriconazole
See below for Voriconazole dosage & warnings about interactions.

Patients intolerant or refractory to this can be considered for Voriconazole- see protocol.

If other fungal species are identified, management should be discussed with a microbiologist.

Continue until resolution of immunosuppression or neutropenia and until 3 days of consecutive apyrexia

Note:

Itraconazole is licensed for treatment and prophylaxis of fungal infections (including *candida & aspergillus*). Voriconazole is licensed for the treatment of invasive *aspergillus* and fluconazole resistant candidiasis.

Itraconazole oral solution should be used in preference to capsules as it has much better and more predictable bioavailability.

Both Itraconazole and Voriconazole have a list of potential side effects, including hypokalaemia though they are generally well-tolerated. Significant hepatotoxicity is unusual. Voriconazole is associated with transient visual disturbances.

Both itraconazole and voriconazole are metabolised by cytochrome P450 enzymes and multiple drug interactions can occur.

Of particular note:

- Voriconazole may increase vinca alkaloid concentrations e.g. vincristine and vinblastine which may result in neurotoxicity.
- Voriconazole and Itraconazole may increase serum calcineurin inhibitor concentrations. Therefore, doses of Ciclosporin and Tacrolimus would need to be reduced.
- Other drugs such as rifampicin may increase the metabolism of Itraconazole and Voriconazole.
- The anti-coagulant effect of coumarins e.g. warfarin can be significantly enhanced by Fluconazole, Itraconazole and Voriconazole.

Further information on dosing and interactions can be obtained from Appendix 5 or your ward pharmacist.

Appendix 3

Summary of antifungal use in neutropenic sepsis patients

Primary prophylaxis in afebrile neutropenic patients

- ***Nystatin*** oral suspension 1ml every 6 hours (all patients)
- In high risk patients, add ***itraconazole*** oral solution 2.5mg/kg bd.

Secondary prophylaxis (patients with previously documented fungal infections)

- Discuss with Consultant Microbiologist or Haematologist

Treatment of febrile neutropenic patients:

For patients with oropharyngeal candidiasis / colonised with candida / otherwise at high risk of invasive fungal infection

- ***Fluconazole*** 100mg orally once daily for 7-14 days

If fever persists after 72-96 hours treatment with broad-spectrum antibiotics, and has no obvious focus for infection, suspect fungal infection:

- ***Stop fluconazole*** and add:
- ***Liposomal amphotericin (AmBisome)***
- Or alternatively, ***Voroconazole*** may be considered.
- Discuss with Consultant Microbiologist

A high-resolution CT scan of the thorax should be performed. (Repeat blood cultures and sputum, nose or bronchoalveolar lavage cultures may be helpful).

If there is histological evidence of fungal infection from lung biopsy or other sterile site or The CT scan is compatible with invasive aspergillosis (IA) and:

- **culture positive respiratory tract sample or**
- **clinical evidence**
    - First line antifungal treatment should be initiated with ***voriconazole.***
    - Patients intolerant or refractory to this can be considered for ***caspofungin*** 70mg intravenously on the first day and 50mg intravenously once daily thereafter (70mg once a day for obese patients >80kg). A reduction of the daily dose to 35mg is recommended in moderate hepatic impairment.

If the CT is not consistent with fungal infection, then contact Consultant Microbiologist or Consultant Haematologist.

There is little evidence to guide decisions on duration of therapy, which should be continued until complete response or resolution of immunosuppression and neutropenia.

Appendix 4

Neutropenic Sepsis Audit Criteria

This is a cancer peer review audit and is mandatory to comply with peer review standards.

Standard: as agreed by East of England Acute Oncology Group

All patients diagnosed as likely to have a neutropenic sepsis should receive their antibiotics within one hour of them being triaged.

Further field have been added to the initial pathway to help to gain insight into this patient group's pathway.
This is an ongoing audit but will collate at least 6 months of continuous data.

Inclusion Criteria:

Area

All areas that deal with the assessment and initial management of patients with neutropenic sepsis.

Patients'

All known cancer patient admitted through the acute services, who are within 6 weeks of chemotherapy or known neutropenia.

How patients are identified:

Through cancer services daily alert admission, ICE alert which identifies all bloods taken in the hospital with Neutrophils of less than <1.0 which are then cross referenced with IPM to see if patient is an inpatient.

Data collection fields:

See data collection tool available from Acute Oncology CNS

This audit will be presentMonthly to the lead cancer nurse, ED team and escalated as required, at least to the the Network Acute Oncology group.

Appendix 5

Initial management of patients with suspected Neutropenic Sepsis (NS) following SACT- Chemotherapy

Patient Presents to ED

Has had systemic anti-cancer therapy (SACT) – **Chemotherapy** within the past 6 weeks- Follow these guidelines

Has had single agent systemic anti-cancer therapy (SACT)- **Immunotherapy** Within the past 12 months- End Pathway

If triggering for sepsis- follow Trust Sepsis Guidelines NOT Neutropenic Sepsis

Please assess for Immunotherapy related adverse events- follow Immunotherapy Guidelines on Intranet

To be assessed at streaming as per active cancer sepsis sticker and either:
- Transferred to ACC (see separate pathway)
- Kept in ED for triage and treatment

Has **ONE** of the following:

Pyrexia, temp >38 °C	Tachycardia	Malaise	Mucositis	Generally unwell
Flu-like symptoms	Hypotension	Unexplained rigor	Diarrhoea	Altered mental state

SUSPECT NEUTROPENIC SEPSIS: GIVE IV ANTIBIOTICS WITHIN 1 HOUR OF ADMISSION TO ED (DOOR TO NEEDLE TIME) DO NOT WAIT FOR BLOOD RESULTS
Take blood cultures prior to giving antibiotics unless this will cause delay

1. Pipercillin/Tazobactam 4.5g IV & Gentamicin 7mg/kg IV (+Teicoplanin 400mg if mucositis present)

2. **FOR SEVERE RENAL IMPAIRMENT** (cr cl <20 ml/min **MYELOMA/SARCOMA/NEUROBLASTOMA:** Pipercillin/Tazobactam 4.5g IV & Ciprofloxacin 400mg IV (+ Teicoplanin 400mg if mucositis present)

3. Non-severe Penicillin allergy: Meropenem 1g

4. In penicillin allergy and renal impairment Ciprofloxacin 400mg IV & Aztronam 1g IV (+ Teicoplanin 400mg if mucositis present)

5. **Add Vancomycin 1g IV if line sepsis is suspected except if already on Teicoplanin**

Urgent Investigations:
- FBC
- LFT's/RFT's
- Blood cultures - peripheral and all lumens of CVADS

- CRP
- Lactate
- Blood Group and Save
- Chest X-ray if appropriate

- Samples for culture: -Swab throat/wounds - Flu - MSU

When FBC results available: Check Neutrophils

Neutropenic - (Neutrophil count <1.0x10^9/L)

Not Neutropenic - (Neutrophil count >1.0x10^9/L)

Continue antibiotics as per full guidelines

If patient unwell and likely to become neutropenic, eg SACT in last 7 days

If patient unwell, but unlikely to become neutropenic, eg If no SACT in last 7 days

If patient is/has: Normal CRP/WBC Physiologically observations are within acceptable limits

Stop NS antibiotics and treat infection as per Abx guidelines/seek alternative diagnosis. Inform CNS

Discharge patient with oral Abx and refr to CNS via ICE: **ICE → New Req → Service providers → C+P → select site → complete referral**

Management of Neutropenic Sepsis in Adults.- Dr Vinayan, Dr Che , N
August 2019

Discuss ongoing management including prophylaxis of opportunistic infections with Microbiologist/Haematologist

For Confirmed Neutropenic Sepsis- Oncology patients
Please contact: Acute Oncology bleep 011/Oncology referral on ICE

Appendix 6

Patient presents to ED Streaming Nurse- Active Cancer Sepsis Bundle Sticker used to mini triage

Patient triggers ?Neutropenic Sepsis but appears 'visibly unwell'/+ - admitted via ambulance/outside ACC hours = Patient to stay in ED and be treated as per Suspected Neutropenic Sepsis Guidelines

Patient triggers ?Neutropenic Sepsis but appears 'well'- Patient to be referred **directly to ACC without triage** (9am-7pm Monday-Friday, 9am-3pm Saturday-Sunday)

At ACC

Commence Direct treatment as per Suspected Neutropenic Sepsis Guidelines IV cannulation/use CVAD, bloods and urine culture

Neutropenic Sepsis Confirmed
Continue to follow full guideline

Transfer to side room
Continue treatment as per policy
(On the Intranet)

Unstable Patients
If patient assessed in ACC to be haemodynamically unstable-
To initiate treatment/investigations for ? Neutropenic Sepsis and for DR-DR referral back to ED/Resus

Not Neutropenic but likely Sepsis/infection -
Admit and treat as per Sepsis Guidelines

Not Neutropenic
Continue to follow the guideline if no other causes found
Review and if the patient is stable consider discharge on PO antibiotics give pt advice and discharge letter

DO NOT WAIT FOR BLOOD RESULTS

Commence treatment as per neutropenic sepsis guideline
Administer IV antibiotics within 60minutes of arrival to L&D

Take Blood Cultures before giving antibiotics unless causes any undue delay

Oncology Contact details for support and advice
Acute Oncology Consultant and CNS In hours
- Bleep 011
- Phone 07917553350
- ICE referral Acute Oncology
- ICE referral Oncology
- **OOH MVCC Oncology SpR 02038262020**