East Lancashire Hospitals NHS Trust
A University Teaching Trust

TRUST WIDE DOCUMENT

	Policy
DOCUMENT TITLE	**Neutropenic Sepsis Policy for adult cancer patients**
DOCUMENT NUMBER	**ELHT/CP27 Version 4.1**
DOCUMENT REPLACES	**Version 4.0**
LEAD EXECUTIVE DIRECTOR DGM:	**Medical Director**
AUTHOR	**Acute Oncology Team**

TARGET AUDIENCE	All Trust Personnel
DOCUMENT PURPOSE	This document is intended to outline the Trust's approach around the management of Neutropenic Sepsis in line with NICE clinical guidance 151. Designed to assist practitioners in the assessment of patients with neutropenic sepsis and ensure appropriate treatment in a timely manner.
TO BE READ IN CONJUNCTION WITH	East Lancashire Hospitals NHS Trust Adult Antimicrobial Guide 2.2
SUPPORTING REFERENCES	1. 2002 IDSA guidelines for the use of antimicrobial agents in neutropenic patients with cancer. 2. UKONS; Oncology/Haematology 24 Hour Triage Rapid Assessment and Access Toolkit 3. UKONS Acute Oncology initial Management guidelines Version 2 March 2018 4. NICE clinical guidance 151 September 2012. Neutropenic Sepsis: prevention and management of neutropenic sepsis in cancer patients 5. East Lancashire Hospitals NHS Trust Adult Antimicrobial Guide 4.5 6. Early Warning Score Bundle ELHT

CONSULTATION		
	Committee/Group	Date
Consultation	Acute Oncology Steering Group	11/08/2022
Approval Committee	Cancer Services Quality Audit Safety Meeting	19/10/2022
Document ratification date	2 February 2023	
NEXT REVIEW DATE	October 2025	
AMENDMENTS	Oral antibiotic advice	

Table of Contents

GUIDELINES FOR THE MANAGEMENT OF NEUTROPENIC SEPSIS IN ADULT PATIENTS

Neutropenic Sepsis is a potentially fatal complication of anticancer treatment (particularly chemotherapy).

Cases of suspected Neutropenic Sepsis must be treated as an acute medical emergency and antibiotic therapy given immediately (within 1 hour).

1. Introduction

A report by the National Confidential Enquiry into Patient Outcome and Death (Systemic anticancer therapy: for better for worse? [2008]) and a follow-up report by the National Chemotherapy Advisory Group (Chemotherapy Services in England: ensuring quality and safety [2010]) highlighted problems in the management of neutropenic sepsis in adults receiving chemotherapy. In response to these concerns the National Institute of Health and Clinical Excellence (NICE) issued clinical guidance 151 : Prevention and treatment of Neutropenic Sepsis in cancer patients (September 2012).

Systemic therapies to treat cancer can suppress the ability of bone marrow to respond to infection. This is particularly the case with systemic chemotherapy, although radiotherapy can also cause such suppression.

Neutropenic sepsis mortality rates ranging between 2% and 21% have been reported in adults. Aggressive use of inpatient intravenous antibiotic therapy has reduced morbidity and mortality rates, and intensive care management is now needed in fewer than 5% of cases in England.

50% to 60% of febrile neutropenic patients prove to have infections and 16-20% of those with a neutrophil count <100/mm3 (0.1X 109/L), have a bacteraemia. Fever is commonly as a result of bacteraemia and usually due to Gram positive cocci (e.g. coagulase negative staphylococci, *Staphylococcus aureus,* viridans streptococci) or Gram negative bacilli (e.g. *Escherichia coli, Klebsiella spp, Pseudomonas aeruginosa* etc). Fungal infections tend to occur after patients have received broad-spectrum antibiotics and have had prolonged periods of neutropenia but may occur as primary infections.

Infections in neutropenic patients typically take 2-7 days to respond to antimicrobial therapy. Acute respiratory viral infections e.g. influenza or respiratory syncytial virus may be associated with severe illness in the immune compromised host.

2. Information and Support for Patients and Carers

Patients having anticancer treatment and their carer's are provided with written and verbal information, both before starting and throughout their anticancer treatment, on:

- neutropenic sepsis
- how and when to contact 24-hour specialist oncology advice
- how and when to seek emergency care

A healthcare professional with competence in managing complications of anticancer treatment should assess the patient's risk of septic complications within 24 hours of presentation to secondary care.

Patients should be referred to the Acute Oncology Team (solid tumours) via EPTS (or on Ext 82782 or the Haematologist on-call via switch (Haematology patients).

Urgent out of hours advice for solid tumour patients is available via Consultant or Registrar on-call for Oncology (via Lancashire Teaching Hospital switchboard).

3. Management of patients with Suspected Neutropenic Sepsis

Where possible patients with suspected Neutropenic Sepsis should be admitted via AECU/AMU A/AMU B rather than ED/BUCC/RUCC to promote timely assessment and treatment.

Oncology patients receiving treatment at ELHT are advised to call the 24 hour chemotherapy helpline should they feel unwell. If Neutropenic Sepsis is suspected, the helpline staff will attempt to facilitate an admission to Blackburn Hospital via AECU or one of the AMUs. If capacity issues prevent this patients will be directed to ED Department at Blackburn Hospital.

Patients with suspected Neutropenic Sepsis should not present to any other ELHT site than Blackburn Hospital, the chemotherapy helpline staff are aware of this, and patients are informed of this by Chemotherapy Unit staff at commencement of their treatment. However should a patient present to any other site with suspected Neutropenic Sepsis the bundle should be implemented immediately as described in this policy.

Neutropenic sepsis should be suspected in patients who have received chemotherapy (intravenously or orally) in the past 30 days who present with any of the following

- Temperature $\geq$ 38 C (at home or on presentation)
- Temperature < 36 C or $\geq$ 37.5 C and feels unwell
- Rigor
- other signs or symptoms consistent with clinically significant sepsis, which include
  - Acutely altered mental state
  - Respiratory rate > 20 breaths/minute
  - Systolic blood pressure <100 mmHg
  - Heart rate >90 beats/minute
  - Temperature <36 C

Fever may not be present in some infected neutropenic patients who are dehydrated, taking steroids, NSAIDs or paracetamol and the possibility of infection must be considered in any neutropenic patient who is unwell.

Fever may also be a complication of transfusion, some drugs e.g. cytarabine, and malignant disease e.g. lymphoma, renal carcinoma.

As soon as Neutropenic Sepsis is suspected the Neutropenic Sepsis Bundle (appendix 5) should be implemented and the following actions taken:

Antibiotics given < 1 hour of arrival (See appendix 3 for antibiotic guidance)
Blood cultures taken from peripheral vein
Blood cultures from Central line e.g. PICC, Hickman, Portacath
First EWS recorded
Oxygen therapy if SaO2 <94%
Bloods (FBC, CRP, U&E, Serum lactate)
Fluid resuscitation if appropriate
Fluid balance (& catheterisation if appropriate)
Sputum sample sent (if productive cough)
Urine sent for culture
Chest x-ray

In cases of extreme difficulty in gaining IV access it is permissible to give a single dose of oral antibiotics (see appendix 3) whilst attempts continue to gain IV access. Oral antibiotics should only be considered if 50 minutes of the 'golden hour' have elapsed and there has been a minimum of 3 attempts at gaining IV access. The rationale for administration of oral antibiotics should be clearly documented in the patient notes, along with the attempts at gaining IV access. Oral antibiotics do not replace the requirement for IV antibiotics. Attempts at gaining IV access should continue and IV antibiotics administered in addition to the oral antibiotics as soon as possible. Please do not delay IV antibiotic administration for any reason.

All patients should be reviewed to ascertain:

- Oncological Diagnosis
- Radical (Curative) or Palliative treatment
- Chemotherapy/Radiotherapy regime
- Date of last chemotherapy
- Symptoms or signs of sepsis and rate of changes
- Whether blood products have been administered within the previous 6-24 hours as this may account for a febrile episode
- If rigors are associated with use or flushing of a central venous line
- Recent anti-pyretics (e.g. paracetamol, NSAIDS etc.)
- History of overseas residence and travel, pets, hobbies, occupation, sexual history and potential environmental exposures to unusual organisms

A standard assessment of a febrile, neutropenic patient ought to include a clinical history and a meticulous physical examination with special attention to potential sites of infection, which include the perineum, the peridontium and the skin, including bone marrow aspiration sites, vascular access sites, and tissue around the nails.

Standard biochemical tests should include full blood count, kidney and liver function tests (including albumin), C-reactive protein and lactate.

Samples of blood and of tissue from any other clinically suspicious site should be taken for culture whenever fever is registered. Despite extensive cultures, only around 30% of all febrile patients will be shown to have microbiologically defined infections.

A chest radiograph or, if clinically indicated, a computed tomography (CT) scan, should be made as early as possible.

Details for further investigations including viral, fungal, *Pneumocystis Jirovecii* (PCP) offered by the Laboratory, types of samples can be found in Appendix 1.

Patients should have an initial assessment of their Early Warning Score (EWS) recorded within an hour, and Suspected Neutropenic Sepsis Care Bundle completed.

Neutropenic sepsis high risk features include:

- abdominal pain
- nausea and vomiting
- diarrhoea
- Bone Marrow Transplant recipients
- pregnancy
- HIV
- recent treatment with antibiotics (within previous 72 hours)
- inability to take oral medications
- neutropenia likely to last for more than 10 days
- recent ludarabine treatment
- signs of organ failure or SIRS (Systemic Inflammatory Response Syndrome)
- patients with teratoma should always be considered/assessed by the critical care outreach team

4. Definition of Neutropenia

Neutropenia is defined as a neutrophil count 0.5×10^{9}per litre or lower

Increased susceptibility to infection is likely when the neutrophil count falls below 1000/mm3 (1.0 X 109/L) with escalating risk at <500/mm3 (0.5 X 109/L) and at <100/mm3 (0.1 X 109/L). The risk of infection is greater the faster the rate of decline of the neutrophil count and the longer the duration of Neutropenia especially if neutropenia lasts for >10 days.

However, Neutropenia alone is not an indication for antibiotics in a stable patient with no new symptoms suggestive of Sepsis.

5. Management of Inpatients with Confirmed Neutropenic Sepsis

All patients with confirmed neutropenic sepsis should have

- Review by a member of the Acute Oncology Team or Haematology Team (as appropriate) within 24 hours of admission
- Any oral chemotherapy drugs discontinued
- Any IV chemotherapy pumps clamped on admission, disconnected, then disposed of as cytotoxic waste.

- Daily FBC and U&E's
- Monitoring of temperature, BP, pulse, respiratory rate, oxygen saturation 4 hourly (or more frequently if required)
- Review at least daily and prompt action taken if the clinical picture deteriorates
- Specific antibiotics guided by sensitivities on any positive microbiology cultures
- Discussion with microbiology if fever is unresponsive after 48 hours switching empiric antibiotics

Where possible, patients with suspected Neutropenic Sepsis should be isolated until blood results available. Patients with confirmed Neutropenic Sepsis should be nursed in protective isolation until their neutrophil count is greater than 1.0. Any decision to move a patient from isolation before their neutrophils are greater than 1.0 should be discussed with Acute Oncology or Haematology Team (as appropriate).

Existing central venous access can be used to administer antibiotics by trained staff, providing it is not a suspected source of infection. If central line is thought to be the source of infection it may need to be removed especially if signs of severe sepsis. (Please discuss with Oncology/Haematology Team first). If left in antibiotics should be given through each lumen of an involved IV catheter on a rotational basis if there is an infection of a multi-lumen catheter.

GCSF may be appropriate in cases of severe sepsis, fungal infections or prolonged neutropenia (discuss with Oncology/Haematology Teams) and refer to Appendix 4.

If the patient is poorly, deteriorating or if there is no improvement within 24 - 48 hours involve the Acute care Team.

For solid tumour patients contact the relevant Oncologist or Acute Oncology Team. Out of hours contact the on-call Oncology Registrar/Consultant for advice via Preston switchboard.

For haematological malignancy contact Consultant Haematologist, out of hours contact the on-call Haematologist via ELHT switchboard.

For antibiotic guidance and for advice on antifungal agents contact Microbiologist on-call.

6. Antibiotic Guidance for Confirmed Neutropenic Sepsis Patients

Continue antibiotics as per Antimicrobial Guidance for first 48 hours then reassess.

If patient is afebrile for 48 hours, blood cultures negative and neutrophil count > 0.5

- Oral antibiotics may be substituted for IV antibiotics at the discretion of the clinician.
- Consider discharge home to continue oral antibiotics as an option if the patient is mentally competent, lives near the hospital (within an hour), has someone at home all the time, has access to transport and a telephone and home conditions are deemed satisfactory.
- For oral step down refer to sensitivities, if none available please see antimicrobial guidance (Appendix 3).

If persistent fever at 48 hours:

- Re-assess daily with repeat of history taking and clinical examination and repeat Laboratory investigations and Radiology as clinically appropriate.
- Continue antibiotics.
- If deteriorating – discuss patient urgently with Consultant Microbiologist.

Total duration of antibiotic therapy is 5 days in patients whose neutropenic sepsis has responded to treatment. Antibiotics may need to be continued for longer duration if complicated sepsis, high risk patient or positive blood cultures.

If still febrile at day 4-6

Consider adding in antifungal treatment (especially if likely to remain neutropenic, clinically unstable, worsening radiology (advise high resolution CT), Laboratory investigations) and review antibiotics as at day 3. Choice of antifungal should be discussed with Microbiology urgently prior to initiation. Perform relevant imaging and fungal antigen detection tests and if possible histology/biopsy of affected site to establish whether proven, probable or possible fungal infection.

If conversion to oral antibiotics is being considered before 48 hours

- The patient's risk of septic complications should be assessed using a validated risk scoring system such as Multi-national Association for Supportive Care in Cancer Score (MASCC) (Appendix 2). This score should be performed by the treating Clinician and documented in the patient's medical notes.
- The case should be discussed with the Acute Oncology Team/Haematology Team.

7. Measuring and Monitoring Compliance with the Procedural Document Process

Measuring and monitoring compliance with the effective implementation of this procedural document is best practice and a key strand of its successful delivery. Hence, the author(s) of this procedural document has/have clearly set out how compliance with its appropriate implementation will be measured or monitored. This also includes the timescale, tool(s)/methodology and frequency as well as the responsible committee/group for monitoring its compliance and gaining assurance.

Aspect of compliance being measured or monitored	Individual responsible for the monitoring	Tool and method of monitoring	Frequency of monitoring	Responsible Group or Committee for monitoring
Door to Needle time for antibiotic administration	Acute Oncology CNS Team	Audit	Monthly	Cancer Team Directorate

Appendix 1 – Relevant laboratory tests

- Cultures of lesions - including culture for fungi – Biopsy specimens for fungal viral or bacterial investigations MUST NOT be sent in formalin. Histology should also be considered (send in formalin or other fixative as after discussion with Pathology).
- Stool microscopy, culture and Cl difficile toxin detection, cryptosporidium if diarrhoea - also consider whether virology would be useful - send faeces in clean plain container for electron microscopy. For gastroenteritis send samples for EM and EIA.
- Urinalysis and culture – for all patients.
- Blood cultures - peripheral and also through iv catheter lumens (should consider taking blood through each lumen of Hickman® line).
- Respiratory secretions for rapid testing for viral antigens by immune-fluorescence, viral cultures, for PCR, e.g. nasal wash, NPA, BAL. Direct viral detection is the preferred method for diagnosing respiratory viral infections.
- A clotted blood sample (7-10ml, plain tube) should be sent for viral serology and a convalescent sample sent 10-14 days later if appropriate).

If varicella zoster is being considered:

- Send an aspirate from lesion for electron microscopy.
- Or a glass slide touched against an opened lesion and allowed to air dry, and transported in a slide carrier.
- Swabs for virus culture and PCR.
- Send serum (clotted blood) for IgG and IgM.

Also in VZ - remember infection control precautions are needed to protect both staff and other patients – discuss with a member of the Infection Control Team.

Patients who are not getting better or are at high risk of a fungal infection should be discussed with the Radiologists regarding appropriateness of additional imaging e.g. ultrasonography, CT (especially useful for diagnosis of pulmonary aspergillosis), MRI, radionuclide imaging.

If invasive fungal infection is being considered:

- Aspergillus galactomannan assay is particularly useful on clotted blood and CSF and BAL (specialised investigation - D/W Consultant Microbiologist).
- Culture sputum, BAL and other material e.g. CSF, skin biopsy.

If CMV is being considered e.g. after bone marrow transplantation: Please phone the laboratory before sending:

- EDTA blood for CMV PCR
- Consider CMV PCR on BAL and GI biopsy
- If Pneumocystis pneumonia is being considered:

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Send bronchial *washings (if these are unobtainable then induced sputum, or EDTA blood)* for Pneumocystis Jirovecii (PCP) PCR**.**

Appendix 2 - MASCC Scoring System

		Yes	No	Score
Does the patient have a solid tumour or lymphoma (except Burkitts)?		4	0	
Is the patient dehydrated or requiring IV fluids?		0	3	
Is the systolic BP <90 mmHg?		0	5	
How sick is the patient now? (select one)	No or mild symptoms (events barely noticeable, not interfering with performance or functioning)	5	0	
	Moderate symptoms (patient uncomfortable or events influence performance of daily activities)	3	0	
	Severe symptoms (severe discomfort and/or performance of daily activities limited)	0	0	
Is the patient <60 years old		2	0	
Does the patient have COPD?		0	4	
Did the patient develop febrile neutropenia while an inpatient?		0	3	
			Total MASCC score:	

Appendix 3 – Antibiotic guidance

Neutropenic/Immunocompromised Patients

Discuss all suspected cases of Neutropenic Sepsis with Haematologists / Oncologists

Contact Microbiology for advice if required / Inform Acute Oncology Team

General Principles

Please refer to individual Trust protocols and procedures for Haematology and Oncology Record Multi-national Association for Supportive Care in Cancer Score daily (MASCC Score – see appendix2)

INTRAVENOUS ANTIBIOTICS MUST BE ADMINISTERED WITHIN ONE HOUR OF ADMISSION TO A&E / HOSPITAL. IF THERE ARE DIFFICULTIES GAINING IV ACCESS, THEN ONE DOSE OF ORAL CIPROFLOXACIN 750MG CAN BE GIVEN TO PROVIDE THE PATIENT WITH SOME COVER WHILE IV ACCESS ATTEMPTS CONTINUE. IV ANTIBIOTICS MUST BE GIVEN AS PER GUIDELINES BELOW AS SOON AS IV ACCESS IS GAINED.

Treatment of fever or sepsis in ALL neutropenic patients with haematological malignancies AND solid tumours

****Clinical deterioration at any time or unresponsive fever at 3 days should be discussed urgently with a microbiologist****

Neutrophil count

≤0.5 x 109/L or
<1.0 X 109/L but are falling rapidly.

AND

Fever of >38°C or 37.5°C on 2 measurements 1 hour apart

OR

Other signs and symptoms consistent with clinically significant sepsis

Never wait for results before starting IV antibiotics

Common Pathogens

Gram positive pathogens

Gram negative pathogens which can lead to shock, multi- organ failure and death

Antibiotic - 1st line

Piperacillin-tazobactam 4.5g IV 6 hourly

ADD if suspected line infection or known to be colonised with MRSA

Teicoplanin IV 800mg 12 hourly for 3 doses then 800mg IV once daily

Review culture and sensitivity results at 48 hours. Oral step down refer to sensitivities

If no sensitivities available:

Co-amoxiclav 625mg orally 8 hourly

****TOTAL duration of therapy (IV and ORAL) 5 days**

2nd line or Penicillin Allergy - NOT Anaphylaxis

Meropenem 1g IV 8 hourly

Review culture and sensitivity results at 48 hours. Oral step down refer to sensitivities
If no sensitivities available:

Ciprofloxacin 750mg orally 12 hourly

EXCEPT in patients who have received **Ciprofloxacin** as prophylaxis during chemotherapy – in these cases discuss with microbiology.

****Total duration of therapy (IV and ORAL) 5 days**

3nd line or Penicillin Allergy – Anaphylaxis

Teicoplanin 800mg IV 12 hourly for 3 doses then 800mg IV once daily

PLUS

Gentamicin (See “Once daily Gentamicin monitoring” for dose calculation/monitoring)

PLUS

Metronidazole 500mg IV 8 hourly

Review culture and sensitivity results at 48 hours. Oral step down refer to sensitivities

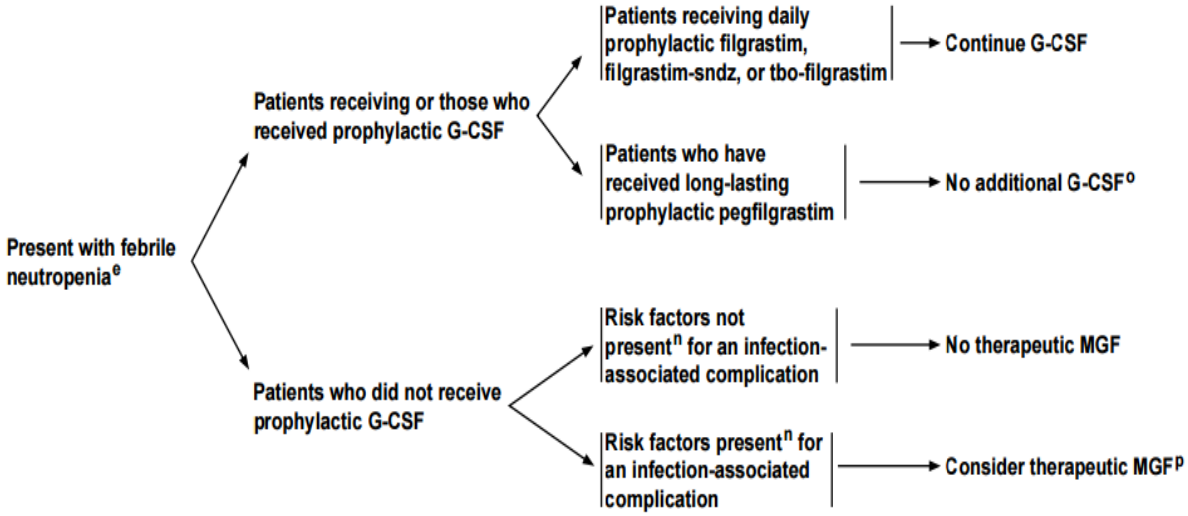
If no sensitivities available:

Ciprofloxacin 750mg orally 12 hourly

EXCEPT in patients who have received **Ciprofloxacin** as prophylaxis during chemotherapy – in these cases discuss with microbiology.

****Total duration of therapy (IV and ORAL) 5 days**

Appendix 4- Recommendations for G-CSF (Filgastrim)



Risk factors

- Sepsis syndrome
- Age ≥ 65 years
- Absolute neutrophil count ≤ 100/mcl (0.1)
- Neutropenia expected to be more 10 days of duration
- Pneumonia or other clinically documented infections
- Invasive fungal infection
- Hospitalization at the time of fever
- Prior episode of febrile neutropenia

Give for 48 hours and review daily, cancel if neutrophils ≥ 0.5.

Recommended dose: Filgastrim 5 mcg/kg SC/Day

Continue with Filgastrim if this was prescribed under chemotherapy protocol, unless this is reviewed by a consultant on Acute Oncology ward round.

Regimens with high risk of neutropenia sepsis (≥ 20%)

- ***This list is not comprehensive***; there are other agents/regimens that have a high risk for the development of febrile neutropenia. Regimens recommended in the NCCN Guidelines for treatment by cancer site are considered when updating this list of examples.
- The type of chemotherapy regimen is only one component of the Risk Assessment. (See Patient Risk Factors for Developing Febrile Neutropenia, MGF-2)
- The exact risk includes agent, dose, and the treatment setting (ie, treatment naive vs. heavily pretreated patients). (See MGF-1)

Acute Lymphoblastic Leukemia (ALL)
- Select ALL regimens as directed by treatment protocol (See NCCN Guidelines for ALL)

Bladder Cancer
- Dose-dense MVAC[b] (methotrexate, vinblastine, doxorubicin, cisplatin)[1]

Breast Cancer
- Dose-dense AC followed by T[b] (doxorubicin, cyclophosphamide, paclitaxel)[2]
- TAC (docetaxel, doxorubicin, cyclophosphamide)[3]
- TC[a,c] (docetaxel, cyclophosphamide)[4]
- TCH[a] (docetaxel, carboplatin, trastuzumab)[5]

Hodgkin Lymphoma
- Escalated BEACOPP (bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, procarbazine, prednisone)[7]

Kidney Cancer
- Doxorubicin/gemcitabine[8]

Non-Hodgkin's Lymphomas
- Dose-adjusted EPOCH[a] (etoposide, prednisone, vincristine, cyclophosphamide, doxorubicin)[9]
- ICE (ifosfamide, carboplatin, etoposide)[a,10,11]
- Dose-dense CHOP-14[a,b] (cyclophosphamide, doxorubicin, vincristine, prednisone)[12,13]
- MINE[a] (mesna, ifosfamide, mitoxantrone, etoposide)[14]
- DHAP[a] (dexamethasone, cisplatin, cytarabine)[15]
- ESHAP[a] (etoposide, methylprednisolone, cisplatin, cytarabine)[16]
- HyperCVAD[a] (cyclophosphamide, vincristine, doxorubicin, dexamethasone)[17,18]

Melanoma
- Dacarbazine-based combination with IL-2, interferon alfa (dacarbazine, cisplatin, vinblastine, IL-2, interferon alfa)[19]

Multiple Myeloma
- DT-PACE (dexamethasone/thalidomide/ cisplatin/doxorubicin/cyclophosphamide/ etoposide)[20] ± bortezomib (VTD-PACE)[21]

Ovarian Cancer
- Topotecan[a,22]
- Docetaxel[23]

Soft Tissue Sarcoma
- MAID (mesna, doxorubicin, ifosfamide, dacarbazine)[24]
- Doxorubicin[a,25]
- Ifosfamide/doxorubicin[26]

Small Cell Lung Cancer
- Topotecan[27]

Testicular Cancer
- VeIP (vinblastine, ifosfamide, cisplatin)[28]
- VIP (etoposide, ifosfamide, cisplatin)
- BEP (bleomycin, etoposide, cisplatin)[29,30]
- TIP (paclitaxel, ifosfamide, cisplatin)[31]

See Disease Settings and Chemotherapy Regimens with an Intermediate Risk for Febrile Neutropenia, MGF-A (2 of 4)

See References, MGF-A (3 of 4)

Regimens with intermediate risk of neutropenia sepsis (10-20%)

- ***This list is not comprehensive***; there are other agents/regimens that have an intermediate risk for the development of febrile neutropenia. Regimens recommended in the NCCN Guidelines for treatment by cancer site are considered when updating this list of examples.
- The type of chemotherapy regimen is only one component of the Risk Assessment. See Patient Risk Factors for Developing Febrile Neutropenia (MGF-2).
- The exact risk includes agent, dose, and the treatment setting (ie, treatment naive vs. heavily pretreated patients). (See MGF-1)

Occult Primary- Adenocarcinoma
- Gemcitabine/docetaxel[32]

Breast Cancer
- Docetaxel[a,33,34]
- CMF classic (cyclophosphamide, methotrexate, fluorouracil)[35]
- AC (doxorubicin, cyclophosphamide) + sequential docetaxel (taxane portion only) [a,36]
- FEC (fluorouracil, epirubicin, cyclophosphamide) + sequential docetaxel[a,37]
- Paclitaxel every 21 days[a,38]

Cervical Cancer
- Cisplatin/topotecan[39,40,41]
- Paclitaxel/cisplatin[a,41]
- Topotecan[42]
- Irinotecan[43]

Colorectal Cancer
- FOLFOX[a] (fluorouracil, leucovorin, oxaliplatin)[44]

Esophageal and Gastric Cancers
- Irinotecan/cisplatin[a,45]
- Epirubicin/cisplatin/5-fluorouracil[46]
- Epirubicin/cisplatin/capecitabine[46]

Non-Hodgkin's Lymphomas
- GDP (gemcitabine, dexamethasone, cisplatin/carboplatin)[a,47]
- CHOP[a] (cyclophosphamide, doxorubicin, vincristine, prednisone)[48,49] including regimens with pegylated liposomal doxorubicin[50,51]

Non-Small Cell Lung Cancer
- Cisplatin/paclitaxel[52]
- Cisplatin/vinorelbine[53]
- Cisplatin/docetaxel[52,54]
- Cisplatin/etoposide[55]
- Carboplatin/paclitaxel [a,d,56]
- Docetaxel[54]

Ovarian Cancer
- Carboplatin/docetaxel[57]

Pancreatic Cancer
- FOLFIRINOX[e]

Prostate Cancer
- Cabazitaxel[f,58]

Small Cell Lung Cancer
- Etoposide/carboplatin[59]

Testicular Cancer
- Etoposide/cisplatin[60]

Uterine Sarcoma
- Docetaxel[61]

See References, MGF-A (4 of 4)

Appendix 5 - Suspected Neutropenic Sepsis Care Bundle

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SUSPECTED NEUTROPENIC SEPSIS CARE BUNDLE

Neutropenic sepsis is a potentially fatal complication of anticancer treatment (particularly chemotherapy). Cases of **suspected neutropenic sepsis** must be treated as an acute medical emergency and antibiotic therapy given within 1 hour (as per Neutropenic Sepsis Policy ELHT/CP27)

(Attach patient label here)

Hospital No: _____ DOB: _____

NHS No: _____

First Name: _____ M / F:

Last name: _____

Date of Admission: _____

Time of Admission: _____

Date Bundle implemented: _____

Time Bundle implemented: _____

Ward/Department: _____

Has the patient had chemotherapy (IV or oral) in the last 28 days?

YES ⬇ **NO** ⬇

If one or more of the following are relevant commence Neutropenic Sepsis Bundle		**Transfer to Adult Sepsis Screening & Action Tool if appropriate (See NICE Guidance NG51)**
Temperature ≥ 38° C (at home or on presentation)	☐	
Temperature < 36° C or ≥ 37.5° C and feels unwell	☐	
Rigor	☐	
Other signs or symptoms consistent with clinically significant sepsis, which include: - Acutely altered mental state - Respiratory rate > 20 breaths/minute - Systolic blood pressure < 100 mmHg - Heart rate > 90 beats/minute - Temperature < 36° C	☐	

Achieve all the following within the first hour of presentation

		Yes	N/A	Date & Time	Initials
Within first hour	**Antibiotics given < 1 hour of arrival** (See reverse for antibiotic guidance)				
	Blood cultures taken from peripheral vein				
	Blood cultures from Central line e.g. PICC, Hickman, Portacath				
	First EWS recorded				
	Oxygen therapy if SaO2 <94%				
	Bloods (FBC, CRP, U&E, Serum lactate)				
	Fluid resuscitation if appropriate				
	Fluid balance (& catheterisation if appropriate)				
	Sputum sample sent (if productive cough)				
	Urine sent for culture				
	Chest x-ray				

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Antibiotic guidance

1st Line	Piperacillin/Tazobactam 4.5g IV 6 hourly **PLUS** if suspected line infection or known to be colonised with MRSA **ADD** Teicoplanin IV 800 mg 12 hourly for 3 doses then 800mg IV once daily
2nd Line or Penicillin Allergy – NOT Anaphylaxis	Meropenem 1g IV 8 hourly
3rd Line or Penicillin Allergy - Anaphylaxis	Teicoplanin IV 800 mg 12 hourly for 3 doses then 800mg IV once daily **AND** Gentamicin (See 'Once daily Gentamicin monitoring' for dose calculation/monitoring) **AND** Metronidazole 500mg IV 8 hourly

In cases of extreme difficulty in gaining IV access it is permissible to give a single dose of oral Ciprofloxacin 750mg whilst attempts continue to gain IV access.
Oral antibiotics should only be considered if 50 minutes of the 'golden hour' have elapsed and there has been a minimum of 3 attempts at gaining IV access. The rationale for administration of oral antibiotics should be clearly documented in the patient notes, along with the attempts at gaining IV access.
Oral antibiotics do not replace the requirement for IV antibiotics. Attempts at gaining IV access should continue and IV antibiotics administered in addition to the oral antibiotics as soon as possible.
Please do not delay IV antibiotic administration for any reason.

If Neutropenic Sepsis confirmed please refer to the Acute Oncology Team via EPTS or telephone Ext 82782 for Oncology input.

To be used in conjunction with:
NEUTROPENIC SEPSIS POLICY FOR ADULT CANCER PATIENTS DOCUMENT NO. ELHT/CP27
Trust Antimicrobial Policy
Trust Once daily Gentamicin Monitoring Policy

Appendix 6 – Equality Impact Assessment Screening Form

Department/Function	Cancer Services			
Lead Assessor	Acute Oncology CNS Team			
What is being assessed?	Treatment of suspected Neutropenic Sepsis in patients receiving chemotherapy			
Date of assessment				
What groups have you consulted with? Include details of involvement in the Equality Impact Assessment process.	Staff Inclusion Network/s	☐	Staff Side Colleagues	☒
	Service Users	☐	Other (Inc. external orgs)	☒
	Please give details: Based on NICE guidance Devised and updated by Acute Oncology steering group and Approved by Cancer directorate quality meeting			

1) What is the impact on the following equality groups?		
Positive: ➢ Advance Equality of opportunity ➢ Foster good relations between different groups ➢ Address explicit needs of Equality target groups	Negative: ➢ Unlawful discrimination, harassment and victimisation ➢ Failure to address explicit needs of Equality target groups	Neutral: ➢ It is quite acceptable for the assessment to come out as Neutral Impact. ➢ Be sure you can justify this decision with clear reasons and evidence if you are challenged

Equality Groups	Impact (Positive / Negative / Neutral)	Comments ➢ Provide brief description of the positive / negative impact identified benefits to the equality group. ➢ Is any impact identified intended or legal?
Race (All ethnic groups)	Neutral	
Disability (Including physical and mental impairments)	Neutral	
Sex	Neutral	
Gender reassignment	Neutral	
Religion or Belief	Neutral	
Sexual orientation	Neutral	
Age	Neutral	These guidelines only apply to adults, there are separate guidelines for children
Marriage and Civil Partnership	Neutral	
Pregnancy and maternity	Neutral	These guidelines do not apply to pregnant women but would apply to post-partum women on chemotherapy
Other (e.g. caring, human rights)	Neutral	
2) In what ways does any impact identified contribute to or hinder promoting equality and diversity across the organisation?	All adult cancer patients on chemotherapy should be treated in accordance with the guidelines without discrimination	

3) If your assessment identifies a negative impact on Equality Groups you must develop an action plan to avoid discrimination and ensure opportunities for promoting equality diversity and inclusion are maximised. ➢ This should include where it has been identified that further work will be undertaken to further explore ➢ the impact on equality groups ➢ This should be reviewed annually.
Action Plan Summary

Action	Lead	Timescale