



Nursing Management of the Neutropenic ADULT Haematology and Oncology Patient Procedure

1. Guiding Principles ^{1, 2, 3}

Neutropenic fever is defined as:

Temperature of 38°C or greater and neutrophil count of less than 0.5×10^9 cells/L, or less than 1.0×10^9 cells/L and predicted to fall to lower than 0.5×10^9 cells/L.

Fever or signs of sepsis in a neutropenic patient is a medical emergency.

Any delay in the commencement of antibiotics may cause increased morbidity and mortality.

Neutropenic patients with infection may occasionally present with without fever or other classic signs of infection.

The administration of empiric antibiotics is not to be delayed awaiting confirmation of blood culture results or absolute neutrophil count for patients at risk of neutropenia with a fever or signs of infection.

**Administration of Appropriate Empiric Antibiotics is to take place within:
30 minutes if haemodynamically unstable
60 Minutes if haemodynamically stable**

Nurses have an important role in recognising neutropenic fever and sepsis and providing nursing care, education and support to patients with these side effects.

The WA Country Health Service (WACHS) has endorsed the [Cancer Institute of NSW eviQ guidelines](#), [Electronic Therapeutic guidelines eTG Complete](#), and the [Australian Guidelines for the Prevention and Control of Infection in Healthcare](#).

Information on the [Immediate Management of Neutropenic Fever](#) can be found at [eviQ Cancer Treatments Online](#).

For paediatric patients please refer to Perth Children's Hospital (PCH) [Neutropenia Management](#) and [Children's Antimicrobial Management Program \(ChAMP\) – Febrile Neutropenia](#).

Early identification of neutropenic fever and administration of antibiotics improves survival

2. Procedure

Step 1 - Recognise ^{1, 3, 4}

Is this patient at risk of neutropenic fever?

Patients at risk of neutropenia include those who:

- received chemotherapy in the past 7 - 14 days
- received a bone marrow transplant in the past 6 months
- have known bone marrow depression or neutrophils that are predicted to fall below $0.5 \times 10^9/L$

Patients who have taken paracetamol or non-steroidal anti-inflammatory drugs to manage their fever or pain at home may present without a fever.

Patients with a central venous access device are at high risk of infection.

Immunosuppressed patients may appear deceptively well.

Always consider other causes of deterioration.

Unplanned presentations

When a patient at risk of neutropenic fever presents to the ED with a fever $38^{\circ}C$ or greater or any other signs of physiological compromise:

1. ATS Category 1 or 2 is to be allocated - neutropenic fever.
2. Patients are to be managed according to [Assessment and Management in the Emergency Department – Clinical Practice Standard; WACHS Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#) and local escalation procedures.

Admitted patients

When an oncology/haematology patient is an inpatient, and has a fever $38^{\circ}C$ or greater or any other signs of physiological compromise, care is to be escalated as per the [WACHS Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#) and local procedures.

Other signs and symptoms to be alert for include:

- altered level of consciousness or new onset confusion
- signs and symptoms specific to an infectious source e.g. rash, pain, exudate, dysuria
- rigors
- cough

- dyspnoea
- abdominal pain, distention, peritonism
- aching muscles
- diarrhoea
- diaphoresis
- cool peripheries
- decreased capillary refill, cyanosis or mottling
- decreased urinary output.

Step 2 - Resuscitation, stabilisation of patient, septic work up and commencement of antibiotics ^{5 - 10}

Fluids, oxygen and antibiotics are to be prescribed by a credentialed prescriber on the MR176 WACHS Intravenous Fluid Treatment and MR170A WA Hospital Medication Chart – Adult Short Stay / MR171 WA Hospital Medication Chart – Adult Long Stay). Verbal orders may need to be obtained.

1. Assess and maintain the airway and administer oxygen if required: aim SpO₂ \geq 95% (or 88-92% for COPD).
2. Obtain large bore intravenous access.
3. Take two blood culture sets (aerobic and anaerobic) from separate peripheral sites.

Blood cultures: at least two (2) sets and other relevant cultures are to be collected PRIOR to antibiotic administration whenever possible. However, if it is difficult to obtain blood cultures **do not delay the administration of broad-spectrum antibiotics in patients with neutropenic fever, severe sepsis or septic shock.**

4. For patients with a CVAD take one set peripheral and one set from each lumen of CVAD. **When taking blood cultures from CVAD do not discard first 5ml.**
5. Measure serum lactate (> 2 mmol/L is significant).
6. Collect FBP, EUC, LFT's, CRP, magnesium, calcium and blood glucose level.
7. If systolic Blood Pressure < 100 mmHg commence intravenous fluid resuscitation. Caution if history of cardiac dysfunction and in the elderly. Monitor for signs of fluid overload.
8. Check and document the patient's allergy status.
9. **Commence Empiric Intravenous Antibiotics within 30 minutes if systemically compromised or within 60 minutes if clinically stable.**
10. Monitor and document fluid input and output. Avoid catheterisation unless clinically indicated.

Empirical intravenous antibiotic therapy for immediate management of febrile neutropenia - See [Appendix 1](#).

Step 3 - Refer

Escalate the patient's care according to the documented local escalation procedure; this may be different at each site and may include:

- contacting appropriate regional medical officer
- early Emergency Telehealth Service consultation
- contacting the treating oncologist or haematologist
- referral to clinical microbiologist or infectious diseases physician for additional antibiotic considerations
- arranging retrieval/ transfers as per regional/local policy
- discussion with patient and family.

Step 4 - Continued monitoring and care ^{5 - 10}

The next 6 hours

Patients with neutropenic fever are at high risk of deterioration despite initial resuscitation.

- Confirm neutrophil count fits definition of neutropenic fever. If patient not neutropenic, review management plan with treating medical oncologist/haematologist.
- Agree on and document a management plan including antibiotics, resuscitation, monitoring and level of care (e.g. admission or transfer).
- Continue frequent observations according to MR140A Adult Observation and Response Chart (A-ORC) or more frequent if the treating team determine this is necessary.
- Monitor fluid balance.
- Repeat serum lactate within 4 hours if initial level > 2mmol/L. An increasing level may indicate the need for further resuscitation and escalation of care.
- Ensure follow up medical review in the first 6 hours after initial empiric antibiotics and resuscitation. This review should include confirmation of neutrophil level, review for possible site of infection and need for ongoing antibiotics.
- Continue investigating for site of infection
 - chest x-ray
 - mid-stream urine (MSU)
 - stool sample for Clostridium difficile and micro culture and sensitivity (MC&S) if diarrhoea
 - sputum
 - swab of CVAD exit site
 - swab of wounds (note - pus not always evident with neutropenia)
 - re-examine patient for other possible sources of infection and other causes of deterioration
 - examine skin, perianal area, oral mucosa
 - examine for any pain or tenderness
 - Other diagnostic imaging as requested by medical officer.

First 48 hours ^{2 - 10}

- Ongoing review of investigations and clinical evaluation for possible source of infection.
- Treating doctor is to discuss ongoing antibiotic treatment with clinical microbiologist or infectious diseases physician within first 24 hours. Antibiotics may be able to be ceased or de-escalated in low risk patients (refer to [Appendix 4L Risk Assessment / Stratification](#)) and minimising unnecessary antibiotic exposure is critical to reduce morbidity and mortality in this high risk patient group.
- Seek expert advice (Oncologist, Haematologist and Infectious Diseases Physician or Clinical Microbiologist) if failure to improve or re-occurrence of fever after 48 hours.
- Consider other causes of deterioration.

Step 5 - Principles of nursing care for the neutropenic patient ^{9 - 14}

Note: sections referred to below are from the NHMRC [Australian Guidelines for the Prevention and Control of Infection in Healthcare](#).

When a patient is to be admitted with neutropenic fever the appropriate senior nursing position is to allocate a room. The Regional Infection Control Coordinator and Regional Clinical Nurse Consultant - Oncology Coordinator are available during office hours to support clinical care and care coordination.

Continue to apply these principles of nursing care until fever has resolved and recovery of absolute neutrophil count to $>1.0 \times 10^9/L$.

- Strict Standard Precautions ([section 3.1](#)) are to be maintained. Personal Protective Equipment (PPE) is to be used when touching the patient's blood, body fluids or mucous membranes.
- Educate the patient and carer regarding their role in maintaining Standard Precautions.
- A single room with ensuite is required for:
 - neutropenic patients with a neutrophil count of $< 0.5 \times 10^9 /L$ or expected to fall below $0.5 \times 10^9/L$
 - autologous stem cell transplant recipients up to 3 months post-transplant
 - allogeneic stem cell transplants up to 6 months post-transplant
 - acute graft versus host disease
 - chronic graft versus host disease.
- Patients with acute myeloid leukaemia (AML) and those who have undergone allogeneic bone marrow transplant in the past 100 days are to be nursed in a HEPA-filtered room until neutrophil recovery. These patients routinely remain in the metropolitan area during this time frame however may present to a WACHS health service site.
 - If HEPA filtered rooms are available on site they are to be used for these patients.
 - These patients are to wear a N95 mask when transferring between areas.

- If a HEPA filtered room is not available allocate a single room with ensuite, initiate Standard Precautions plus Transmission Based Precautions as appropriate and consider transfer of patient to higher level facility.
- Initiate Transmission based precautions [TBP] ([section 3.2](#)) when clinically indicated e.g. If the patient has or develops:
 - diarrhoea / vomiting - Standard plus Contact precautions ([section 3.2.2](#))
 - influenza like illness - Standard plus Droplet precautions ([section 3.2.3](#))
 - respiratory colonisation - Standard plus Airborne precautions ([section 3.2.4](#))
 - door signs can be found here for [Standard](#), [Contact](#), [Droplet](#), [Airborne](#) precautions.
- Identify and manage the risks ([section 3.1](#)) each shift and before invasive procedures to determine if TBP are required.
- Patient transfer and transport within the health care facility is to be minimised.
- Adhere to the 5 moments of hand hygiene.
- Use Aseptic Technique principles when performing all procedures.
- Use only single use or patient dedicated equipment.
- Health Care Workers caring for neutropenic patients are to take steps to be aware of their past infectious disease and current vaccination status.
- Health care workers, carers and visitors are to be free of transmissible illness.
- Fresh or dried flowers, potted plants and fresh fruit are not permitted in any rooms where neutropenic patients are cared for.
- Assist the patient to maintain hygiene - minimum daily wash or shower and linen change.
- Assist the patient with mouth care - minimum of four times a day.
- Antipyretics may mask fever and are only to be prescribed after discussion with the treating oncologist or haematologist.
- Rectal medications are not to be given due to the risk of mucosal tears and infection.
- Per rectum examinations are not recommended.
- Vaginal tampons and menstrual cups are not to be used.
- No shaving with a razor blade.
- Ensure high risk cleaning of the environment as per WACHS Environmental Cleaning Policy:
 - room is to be cleaned before admission
 - room is to be cleaned daily and before other ward areas
 - floor is to be mopped daily with a disposable mop head
 - toilet or commode is to be cleaned prior to each use with hot soapy water or toilet sanitiser
 - shower and toilet are not to be shared with other patients
 - shower is to be cleaned with a disinfectant prior to patient use.

If a single room is not available, patients are to be cohorted as per the Australian Guidelines for the Prevention and Control of Infection in Healthcare¹¹

Patients with a neutrophil count of $< 0.5 \times 10^9/L$ are to be on a [low listeria risk diet](#)¹⁵ and filtered water.

Patient Assessment ^{1, 4 - 10}

- Immediately escalate changes in vital signs, new symptoms or any other issue that you, the patient or a family member are concerned about. Be alert for neck stiffness, new or increasing pain, cough, sore throat, altered mental state and rigors.
- Monitor and document fluid intake and output. Report decreasing urine output < 30 ml / hour.
- Daily skin assessment to monitor for signs of infection.
- Daily weight
- Daily urinalysis
- Bowel actions are to be monitored and recorded
- Full blood count is to be obtained daily
- An [Oral Mucositis Assessment](#) is to be done at least once per shift
- Complete the MR111 WACHS Nursing Admission, Screen and Assessment Tool – Adults
- Ensure a Venous Thromboembolism Risk Assessment and prophylaxis plan is documented on MR170A WA Hospital Medication Chart – Adult Short Stay or MR171 WA Hospital Medication Chart – Adult Long Stay (refer to [WACHS Venous Thromboembolism Prevention Clinical Practice Standard](#))
- Initiate and document additional assessments as clinically indicated including but not limited to pain chart, bowel chart, wound care assessment, diabetic chart
- Does this patient have an Advanced Care Directive - if yes, consider how this may impact ongoing management.

Venous access

- Peripheral intravenous cannula (PIVC) management including assessment and document standards as per [WACHS Peripheral Intravenous Cannulae \(PIVC\) Management Clinical Practice Standard](#).
- CVAD dressing and positive pressure valves are to be changed weekly in accordance with [WACHS Central Venous Access Device \(CVAD\) and Long Peripheral Venous Catheter \(PVC\) Management Clinical Practice Standard](#) or more frequently if needed e.g. dressing integrity compromised, wet and or visibly soiled.
- For recording and monitoring of insertion sites -use MR179 WACHS Peripheral IV Cannula Observation Record / MR179A WACHS Central Venous Access Device (CVAD) Insertion and Assessment Record – as appropriate.
- Assessment and documentation of all peripheral and CVAD's are to be completed every 8 hours for signs of infection such as redness, tenderness and swelling. Any concerns are to be escalated promptly.

Discharge information for neutropenic patients ^{3, 4, 15}

Ensure the patient has their Chemotherapy Neutropenic Fever Risk Card ([Appendix 3](#)) and advise the patient to report any signs of infection immediately.

The patient should monitor their temperature regularly at home and represent to hospital if they have any of the following:

- temperature $\geq 38^{\circ}$

- chills and shaking
- frequency, urgency or burning when urinating
- persistent diarrhoea
- shortness of breath
- flu like symptoms
- headache or stiff neck
- soreness, swelling or discharge from wounds or CVADs.

Provide the patient with written information: eviQ patient information [Infection During Cancer Treatment](#), and the Patient First Resource [Going home after a stay in hospital](#).

Ensure patient has a follow up appointment with treating consultant.

Provide infection prevention education

- Educate patient and family on the importance of hand hygiene
- Encourage the patient to carry and use a hand sanitiser
- Advise the patient to minimise contact with people who have infections
- Advise patient not to received live vaccinations
- Close contacts are encouraged to be immunised according to recommendations. Transmission of live vaccination organisms is possible (e.g. rotavirus, varicella, zoster, typhoid). Careful hand hygiene, disposal of soiled nappies and covering rashes is recommended
- Female patients are to avoid the use of tampons and menstrual cups
- Vaginal and anal intercourse is to be avoided during periods of anticipated neutropenia
- Advise the patient to avoid work in the garden or with soil or mulch
- If the patient has a pet animal/bird/reptile, they are to try to spend minimal time in close contact and ensure hands are washed immediately afterwards
- There is to be no contact with animal faeces (e.g. cat litter trays)
- The patient is to avoid contact with any birds, tank fish, rodents, farm animals or reptiles whenever possible and wear personal protective equipment when avoidance is not possible.

Dietary education

- Patient is to maintain a low listeria risk diet during period of expected neutropenia
- This is a short term therapeutic diet for the duration of expected neutropenia only, If further dietary support is required a referral to a dietician is to be initiated
- The Food Standards Australia New Zealand [Listeria and food - advice for people at risk handout](#) is to be provided to patients.

Dental Care

- Encourage the patient to perform regular oral hygiene using a soft toothbrush
- Advise the patient not to schedule any dental procedures without speaking to their consultant and obtaining their approval.

Step 6 - Minimising the risk

Education of patient and carer

Patients who are to receive myelosuppressive chemotherapy are to receive education before the commencement of treatment using the MR59B WACHS My Education Checklist.

The patient is to be provided with the WACHS Chemotherapy Neutropenic Fever Risk Card and My Cancer Treatment Diary

The eviQ patient information resource [Infection During Cancer Treatment](#) is to be provided in writing and verbally explained to the patient and carer.

Medical Alerts

In accordance with the WA Clinical Alert (MedAlert) Policy, an alert is to be placed on the patient records. [Medical Alert Cancer Treatment](#)

Drug /dietary reaction category - **D12.01 Neutropenia related to chemotherapy**, is to be used and the treatment period is to be specified.

3. Definitions

Neutropenia	A decrease in the number of circulating neutrophils in the blood evidenced by an absolute neutrophil count < 1.0 (x10 ⁹ /L).
Neutropenic Fever	Temperature of at least 38°C (or at least 38°C on two occasions) and neutrophil count of less than 0.5 x 10 ⁹ cells/L or less than 1.0 x 10 ⁹ cells/L and predicted to fall to lower than 0.5 x 10 ⁹ cells/L.
Neutropenic Sepsis	A systemic inflammatory response to infection, in which there is fever or hypothermia, tachycardia, tachypnoea and evidence of inadequate blood flow to internal organs when the patient has neutropenia.
Myelosuppression	A condition in which bone marrow activity is decreased, resulting in fewer red blood cells, white blood cells, and platelets.
Immunosuppression	State in which the immune system's ability to fight infection is compromised or entirely absent. Most cases of immunodeficiency are acquired (secondary) but some people are born with defects in the immune system (primary Immunodeficiency).
Neutropenic Precautions	Additional nursing and general care practices that can be implemented to reduce the risk of infection in the neutropenic patient.
HEPA	High Efficiency Particulate Air (HEPA) filters have superior filtering properties and are used to prevent spread of airborne bacterial and viral organisms.

4. Roles and Responsibilities

Nurse Managers

- The Clinical Nurse Managers are to implement this procedure in their areas of responsibility.

Registered Nurses/Midwives

- Triage and assessment of patients at risk of neutropenic sepsis.
- Escalate and respond as per AORC or if concerns are expressed by staff, patients or carers.
- Ensure [standard precautions +/- transmission based precautions](#) are in place and are communicated in handover.
- Collection of blood cultures and other specimens for the sepsis screen.
- Antibiotic administration as prescribed
- All documentation must comply with the WACHS Documentation Clinical Practice Standard.

All Staff are required to work within policies and guidelines to make sure that WACHS is a safe, equitable and positive place to be.

5. Compliance

Failure to comply with this policy document may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the [Integrity Policy Framework](#) issued pursuant to section 26 of the [Health Services Act 2016](#) (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

6. Evaluation

Monitoring of compliance with this document is to be carried out by Regional Cancer Governance Groups.

Adverse events and clinical incidents relating to recognising and responding to the febrile neutropenic patient will be notified and managed in accordance with the WA Clinical Incident Management Policy (2015)

7. Standards

- [National Safety and Quality Healthcare Standards](#)
Clinical Governance Standard: 1.7a, 1.7b, 1.15b
Recognising and Responding to Acute Deterioration Standard: 8.4b, 8.6a, 8.6e, 8.8, 8.9, 8.10

- Australian Commission on Safety and Quality in Health Care (ACSQHC) [National Standard for User-applied Labelling of Injectable Medicines, Fluids and Lines](#)

8. Legislation

[Health Practitioner Regulation National Law \(WA\) Act 2010](#)

[Medicines and Poisons Act 2014](#)

[Medicines and Poisons Regulations 2016\)](#)

[Occupational Health and Safety Act 1984](#) (and [Occupational Safety and Health Regulations 1996](#))

[State Records Act 2000](#)

[Health Services Act 2016](#)

[Carers Recognition Act 2014](#)

[Guardianship and Administration Act 1990](#)

9. References

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<http://www.foodstandards.gov.au/consumer/safety/listeria/documents/listeria-1.pdf> [Accessed: 20 April 2020]

10. Related Forms

Alert Cancer: [WACHS Cancer Services - Medical Alert Cancer Treatment](#)
[MR111 WACHS Nursing Admission, Screening and Assessment Tools – Adults](#)
[MR140A WACHS Adult Observation and Response Chart \(A-ORC\)](#)
[MR170A WA Hospital Medication Chart – Adult Short Stay](#)
[MR171 WA Hospital Medication Chart – Adult Long Stay](#)
[MR176 WACHS Intravenous Fluid Treatment Chart](#)
[MR179 WACHS Peripheral IV Cannula Observation Record](#)
[MR179A WACHS Central Venous Access Device \(CVAD\) Insertion and Assessment Record](#)
[MR179B WACHS Central Venous Access Device \(CVAD\) Insertion Site Assessment Continuation Sheet](#)
[MR179C WACHS CVAD Access/Dressing Continuation Sheet](#)
[MR29 WACHS Referral Record and Leaving Hospital Check list – Adults](#)

[MR59B WACHS Cancer My Education Checklist](#)

11. Related Policy Documents

WACHS [Antimicrobial Stewardship Policy](#)

WACHS [Assessment and Management in the Emergency Department - Clinical Practice Standard](#)

WACHS [Central Venous Access Device \(CVAD\) and Long Peripheral Venous Catheter \(Long PVC\) Management Clinical Practice Standard](#)

WACHS [Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#)

WACHS [Documentation Clinical Practice Standard](#)

WACHS [Environmental Cleaning Policy](#)

WACHS [Infection Prevention and Control Policy](#)

WACHS [Inter-hospital Clinical Handover Form Procedure](#)

WACHS [Medication Prescribing and Administration Policy](#)

WACHS [Peripheral Intravenous Cannulae \(PIVC\) Management Clinical Practice Standard](#).

WACHS [Specialised Medication - Intravenous Vancomycin for Adults Guideline](#)

WACHS [Venous Thromboembolism Prevention Clinical Practice Standard](#)

12. Related WA Health System Policies

MP0095/18 [Clinical Handover Policy](#)

MP0122/19 [Clinical Incident Management Policy](#)

OD0388/12 [Health Care Worker Immunisation Policy](#)

MP0131/20 [High Risk Medication Policy](#)

MP0104/19 [Medication Review Policy](#)

MP0086/18 [Recognising and Responding to Acute Deterioration Policy](#)

MP 0077/18 [Statewide Medicines Formulary Policy](#)

OD0657/16 [WA Health Consent to Treatment Policy](#)

MP0053/17 [WA Clinical Alert \(Med Alert\) Policy](#)

MP0051/17 [WA Health System Language Services Policy](#)

[Guidelines for Managing Specific High Risk Medications Relevant to the Organisation](#)

13. WA Health Policy Framework

[Clinical Governance, Safety and Quality](#)

14. Appendices

Appendix 1 - [Empirical intravenous antibiotic therapy](#)

Appendix 2 - [Sepsis Screen](#)

Appendix 3 - [Patient Neutropenic Alert Card](#)

Appendix 4 - [Risk Assessment / Stratification](#)

Appendix 5 - [Clinical Suspicion of Neutropenic Fever Flow Chart](#)

**This document can be made available in alternative formats
on request for a person with a disability**

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Appendix 1

Empirical intravenous antibiotic therapy ^{1, 2}

Empirical intravenous antibiotic therapy for immediate management of febrile neutropenia

Table 1 has been prepared using information from [Cancer Institute of NSW eviQ guidelines](#) and [Electronic Therapeutic Guidelines eTG Complete](#). It is a guide to assist the health service sites to obtain and prepare the appropriate antibiotics and support timely administration. It does not replace a prescription, expert advice or local protocols.

All antibiotic therapy is to be prescribed by credentialed prescribers within the scope of their practice, policy and legislative requirements and consistent with the [WA Formulary](#) (as per WACHS [Antimicrobial Stewardship Policy](#) and WA Health [MP 007/18 Statewide Medicines Formulary Policy](#))

Refer to [WA Formulary](#) for dose adjustments and detailed information.

Seek clinical microbiologist or infectious disease physician advice for patients with life threatening penicillin allergy, for patients who are critically ill and for patients who fail to respond to empiric therapy.

Patient Group	Empiric Antibiotic Recommendations
No systemic compromise Within 1 hour	No penicillin allergy piperacillin / tazobactam 4 + 0.5 g IV 6 hourly OR cefepime 2 g IV 8 hourly
	Non - life threatening penicillin allergy (rash) cefepime 2 g IV 8 hourly
	Life threatening penicillin allergy Discuss with clinical microbiologist / Infectious Disease physician
Systemic compromise Within 30 minutes	Piperacillin / tazobactam 4 + 0.5 g IV 6 hourly OR cefepime 2 g IV 8 hourly as above PLUS gentamicin 5 to 7 mg/kg <u>ideal</u> body weight IV stat PLUS vancomycin 1.5 g IV 12 hourly (if CrCl >90 ml/min) OR 1 g IV 12 Hourly (if CrCl 60-90 ml/min)
Cellulitis, obviously infected vascular access devices, or MRSA carriers with extensive skin breaks / desquamation	Piperacillin / tazobactam 4 + 0.5 g IV 6 hourly OR cefepime 2 g IV 8 hourly as above PLUS vancomycin 1.5 g IV 12 hourly (if CrCl >90 ml/min) OR 1 g IV 12 Hourly (if CrCl 60-90 ml/min)
Patients with features of intra- abdominal or perineal infection	As for patient without systemic compromise PLUS metronidazole 500 mg IV or PO 12 hourly if receiving cefepime, ceftazadine or ciprofloxacin as first line antibiotic

Appendix 2

Sepsis Screen 1, 6, 10

Sepsis Screen

- Two (2) sets (aerobic and anaerobic bottles) from two (2) separate peripheral sites
- For patients with a CVAD, take one (1) set (aerobic and anaerobic bottles) from each lumen of CVAD and one (1) set from peripheral blood
- Serum lactate
- Full blood count with differential white cell count
- Electrolytes, urea and serum creatinine
- Liver function
- C Reactive Protein
- Coagulation profile
- Blood sugar level
- Mid-stream urine or catheter specimen urine
- Sputum (if productive) micro culture and sensitivity for bacteria, fungi, nocardia, mycobacteria; PRC for viruses, atypical bacteria and PJP
- Nasopharyngeal swab for polymerase chain reaction (PCR) if viral illness suspected
- Faeces (if clinically indicated) for Clostridium difficile, viral PRC
- Swab of central venous catheter exit site
- Swab of any other suspicious wounds/focal lesions
- Chest x-ray (if unavailable, proceed to IV empiric antibiotics and ensure arrangements for CXR have been made).


**ADMINISTER ANTIBIOTICS
DO NOT WAIT FOR RESULTS**

Note:

Blood cultures: at least two (2) sets and other relevant cultures are to be collected PRIOR to antibiotic administration whenever possible. However, in patients with neutropenic fever, severe sepsis or septic shock if it is difficult to obtain blood cultures **do not delay the administration of broad-spectrum antibiotics.**


Appendix 3

WACHS Cancer Services Medical Alert Cards

 Government of Western Australia
WA Country Health Service

WACHS Cancer Services
MEDIC ALERT: CHEMOTHERAPY - NEUTROPENIC FEVER RISK
Name: _____
Date of Birth: _____
UNMR: _____
Treating Hospital: _____ Phone: _____
Consultant: _____

NEUTROPENIC FEVER
If you feel unwell or have a fever > 38C, present to your nearest Emergency Department or call Health Direct on 1800 022 222.
You are receiving chemotherapy and are at greater risk from infection than most people.
ED: ATS 1 or 2, administer empiric antibiotic therapy within 30 minutes if systemic compromise / 60 minutes if fever with no other systemic compromise.
Commence a sepsis workup and contact specialist physician, medical oncology / haematology service for advice.

 Government of Western Australia
WA Country Health Service

WACHS Cancer Services
MEDIC ALERT: COMBINATION CHEMOTHERAPY / IMMUNOTHERAPY
NEUTROPENIC FEVER and IMMUNE RELATED ADVERSE EVENT RISK
Name: _____
Date of Birth: _____
UNMR: _____
Treating Hospital: _____ Phone: _____
Consultant: _____

Neutropenic FEVER and Immune Related Adverse Event Risk.
If you feel unwell or have a fever > 38C, present to your nearest Emergency Department or call Health Direct on 1800 022 222.
You are receiving chemotherapy and immunotherapy and are at greater risk from infection and immune reactions than most people.
ED: ATS 1 or 2, administer empiric antibiotic therapy within 30 minutes if systemic compromise / 60 minutes if fever with no other systemic compromise. Commence a sepsis workup and contact specialist physician, medical oncology, haematology services for advice.



Alert Cards.pdf

Appendix 4

Risk Assessment / Stratification ^{3, 13}

Do not delay the administration of antibiotics to perform a risk assessment

Not all patients with cancer and neutropenic fever are at equal risk of severe infection and medical complications.

High risk patients always require hospital admission and intravenous antibiotics.

The risk of a patient developing medical complications should be assessed using the Multinational Association of Supportive Care in Cancer (MASCC) [Risk Index Score](#).

High risk patients

A MASCC score of less than 21 indicates patients are not at low risk (high risk) and these patients are always to be admitted to hospital for intravenous antibiotics and monitored closely for complications and sepsis.

The following unique clinical and social circumstances also impact on management:

- Expected to be neutropenic for greater than 7 days
- Inpatient status
- Comorbidities or evidence of hepatic or renal impairment
- Haemodynamic compromise
- Oral or gastrointestinal mucositis
- Documented infection at presentation
- History of previous episode of neutropenic fever
- Altered mental status
- Intravascular catheter
- Pulmonary infiltration
- Chronic pulmonary disease
- Progressive or uncontrolled malignancy.

Low risk patients

Low risk patients may be suitable for early discharge, oral antibiotics and close supervision as an outpatient if organisational resources and supportive care is available.

A MASCC score of greater than 21 indicates patients are at low risk for serious medical complications and that management in the ambulatory setting using oral antibiotics may be safe and effective.

In addition to this risk assessment score the patients unique social and clinical factors impact on which patients may be considered suitable for this.

To be considered suitable for early discharge with oral antibiotic treatment after a period of observation and intravenous antibiotics a patient must satisfy the following criteria:

- MASCC score greater than 21
- Solid tumour or lymphoma
- Not on Antibiotic prophylaxis
- No antibiotics during the previous 7 days
- Ability to swallow
- Less than grade 2 mucositis
- Documented education has been provided
- Have a responsible carer
- Have a telephone
- Availability of 24 hour telephone advice - Health Direct
- Live within 20 minutes of a health service facility
- Have access to transport
- Be agreeable to return for follow up
- Patient and carer agree to the plan
- Medical oncologist or haematologist has been consulted and agrees to the plan
- No documented allergies to the oral antibiotics
- No psychosocial or cognitive distress
- No previous history of non-compliance

Patients specifically excluded from early discharge are:

- confirmed focus of infection at presentation
- indwelling catheters
- high risk chemotherapy patients
- patient with chemotherapy refractory disease
- multi-resistant organism colonization (MRSA, VRE)
when concern is expressed by the patient, carer or staff.

Appendix 5 Flow Chart ^{1-11, 13}

