Salisbury NHS
NHS Foundation Trust

PAEDIATRIC FEBRILE NEUTROPENIA CARE PATHWAY

Purpose: This document is intended as a guide to the investigation and management of children presenting in Salisbury District Hospital with suspected neutropenic sepsis. For further information please look at the "Management of Febrile Neutropenia" guideline on:

http://www.uhs.nhs.uk/Media/SUHTExtranet/Services/PaediatricOncology/Febrile-neutropenia.pdf

Background: Children with cancer are particularly susceptible to life-threatening infections. Chemotherapy affects the body's normal defences against infection by causing marrow depression and in some cases disrupts mucous membranes in the gut & mouth. Central lines and bone marrow sites are a potential focus of infection. The term febrile neutropenia includes patients who are haemodynamically stable with no obvious focus of infection, to those in septic shock.

Neutropenic Sepsis is a Medical Emergency, which can be life threatening. Intravenous antibiotics MUST be administered within 60 minutes of arrival to hospital or within 60 minutes of the signs and symptoms developing if the patient is an in patient. It requires prompt assessment and appropriate investigations and commencement of empirical treatment if neutropenia is suspected i.e. – do not wait for the low neutrophil count to be confirmed

Definition of Febrile Neutropenia

Neutrophil count is 0.5 or lower and either
Temperature 38C and above on a single occasion **or**
Signs and symptoms consistent with clinically significant infection

- Fever is usually the first (and may be the only) sign of neutropenic sepsis, but neutropenic sepsis can occur in the absence of fever, especially in patients on corticosteroids or following administration of paracetamol
- Children with leukaemia are usually neutropenic at presentation
- Children receiving treatment for ALL are likely to be neutropenic during delayed intensification and consolidation blocks
- Suspect neutropenia 7-10 days post chemotherapy in children with solid tumours

- Other symptoms and signs include: Influenza-like symptoms
  Drowsiness or confusion
  Hypotension
  Tachycardia
  Vomiting
  Obvious focus of infection (e.g. mouth, chest, urine, diarrhoea)

Children who are neutropenic and unwell, even if normothermic, should be assumed to have infection and be treated appropriately.

Step 1: History

- Ask about pain around line site, cough, dyspnoea, abdominal pain, diarrhoea, fluid intake, line flushing.
- Onset of temperature or rigors and tachycardia within a few hours of having a central line flushed should be considered to be a line infection until proven otherwise.
- Children receiving chemotherapy that induces mucositis are at risk of Gram negative infections.

Step 2: Examination

- Check line entry & exit site & any recent bone marrow or lumbar puncture sites in addition to normal examination including ENT and perianal area
- Measure peripheral perfusion, blood pressure, respiratory rate, oxygen saturation if indicated, ongoing fluid losses & urinary output.
- Hypotension is not necessary for the diagnosis of septic shock

Step 3: Investigations

Immediate investigations should include

- Blood cultures
  Cultures should be taken from each lumen of the central line and appropriately labelled. Peripheral cultures are not routinely done, but there may be specific instances where this is appropriate.
  (If clinically concerned about anaerobic infection, e.g. with severe mucositis remember to take anaerobic blood cultures.)
- FBC, U&Es, CRP, LFT, Lactate and blood gas

These can be taken from the central line immediately on arrival to hospital, by a trained member of Nursing Staff or Doctor. Antibiotic therapy can then be instigated.

Other investigations should include

- MSU - if under 5 yrs old or urinary symptoms present but - Bacteriology and mycology
- Swab
  From skin lesions/central line sites if applicable (look for areas of redness and tenderness: pus not present when neutropenic)

Investigations to consider if clinically indicated

- Stool - MC&S, mycology and virology if diarrhoea
- CXR
- LP
- NPA/sputum/viral throat swab
- Swabs from sites of clinical infection – NB – pus usually absent when neutropenic

All culture specimens should ideally be done before antibiotics are given but **do not delay unnecessarily in giving antibiotics** (for example in collecting a urine sample).

<u>Management of Pyrexia/Infection</u>

Antipyretics can mask fever and should not be used in patients who might be neutropenic. Once there is a clear decision to start antibiotics (e.g. child is on their way to hospital with a fever) then paracetamol may be given. Pain can be managed with oramorph. Ibuprofen should be used with caution in thrombocytopenia as it affects platelet function and must be avoided in patients receiving iv Methotrexate and mifamurtide.

For more detailed information please refer to the Wessex Paediatric Oncology Regional Supportive Care Guidelines.

Step 4: Treatment
The mainstay of treatment of febrile neutropenia is early use of empiric antibiotics, appropriate supportive care and regular review. Most children with febrile neutropenia will appear very well, but still need early treatment with antibiotics as infection could progress rapidly.

We no longer determine risk groups to assess antibiotic usage

Empirical antibiotic treatment of Febrile Neutropenia in patients who are relatively well

Single agent Piperacillin/Tazobactam*

Child 1 month-18 years 90 mg/kg (max. 4.5 g) 6 hourly
< 1 month 90 mg/kg 8 hourly

*unless patient specific or local microbiological indications

Empirical antibiotic treatment of febrile neutropenic patients with signs of severe sepsis

e.g. poor peripheral perfusion, rigors, altered mental status or hypotension

Dual agent Piperacillin/Tazobactam & Gentamicin*

Age	Piperacillin/Tazobactam	Age	Gentamicin
< 1 month	90 mg/kg 8 hourly	**> 7days – 1month**	5 mg/kg od*
child 1 month-18 years	90 mg/kg (max 4.5g) 6 hourly	**child 1 month-18 years**	7 mg/kg od* *Trough level before 2nd dose (do not delay administration of 2nd dose by waiting for result unless known renal dysfunction)

Specific considerations:
Children known to be colonised with resistant bacteria should be started on patient specific antibiotic regimen
Penicillin allergy – treat with meropenem +/- gentamicin
Receiving high does methotrexate – Penicillins contraindicated – use meropenem
Bone tumours with endoprosthesis – consider adding teicoplanin if focal signs
Patient on cisplatin – avoid gentamicin but do not withhold initial dose if septic/unwell
Abdominal/perianal infection – consider adding metronidazole – not usually needed for mucositis
See Guideline for further considerations/advice

Step 5: Risk Assessment – medical team to fill in

	Are any of these risk factors present?	**Initial assessment on admission**	**48 hour assessment**
History	Inpatient at onset of FN Down Syndrome PICU during past FN episode		
Age	<1 year		
Diagnosis/treatment	ALL (except maintenance Infant ALL AML Intensive B-NHL protocols Anaplastic lymphomas Stage 4 neuroblastoma PBSCT pre engraftment Ewing's sarcoma Aplastic Anaemia		
Clinical features	Shock or compensated shock Haemorrhage Dehydration Metabolic instability Altered mental state Pneumonitis Significant mucositis Respiratory distress/compromise Perirectal infection Soft tissue abscess/infection (other than minimal redness around central line site) Rigors Irritability/meningism Organ failure		
Compliance with outpatient treatment	Inability to take oral meds Poor compliance Social/family concerns		
48 hours assessment	Neuts<0.1 Positive blood cultures Not clinically well		

If none of the above features are present then patient may be considered "Low Risk" for conversion to oral antibiotics at 48 hours or stopping antibiotics all together

If any risk factors are present at 48 hours the patient is treated as "Standard Risk"

See Wessex Paediatric Oncology Supportive Care Guideline – Management of Febrile Neutropenia for further guidance

Patient Clerking- Nursing

Integrated Care Pathway for the Paediatric Neutropenic Patient, Salisbury NHS Foundation Trust

Attach Patient Label Here Name Address   Hospital Number D of B

Consultant………………………………………………….

Date…………………………….

Date and time of admission:

____

<u>Nursing observations:</u> <u>(please complete each area)</u>

Temperature: _____°C O$_2$ saturation: _________% on air Weight _________ Kg

Pulse rate: _____/min Respiratory rate: _____/min BP: _____

- **CALL DOCTOR**

Doctor **MUST** be aware that an **URGENT** response is required- should be seen within 30 minutes

Time doctor called: ______________________

<u>Initial Nursing Assessment</u>

____
____
____
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____
____
____
____
____
____
____
____
____

Signature______________________

Patient Clerking- Nursing

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Attach Patient Label Here Name Address   Hospital Number D of B

Date…………………………….

<u>Intravenous Access:</u>

- If patient has a central venous catheter/portacath a trained member of staff, if available, should take bloods from the line as indicated below.
  Available: Yes ☐ No ☐

<u>Bloods taken:</u>

Blood Cultures from each lumen	Yes ☐	No ☐	
FBC	Yes ☐	No ☐	
U&E/LFT	Yes ☐	No ☐	
CRP	Yes ☐	No ☐	
G&S	Yes ☐	No ☐	N/A ☐
Coagulation Screen	Yes ☐	No ☐	N/A ☐
Lactate	Yes ☐	No ☐	

<u>Other Investigations:</u>

MSU ☐	Line swab ☐	Stool culture (mc&s/virology) ☐	Throat swab ☐

If patient not seen by Doctor within 30 minutes of admission, please contact on call Registrar/ Consultant.

If any oncology patient is admitted please phone 02381 205778 Leave details of your name, patient name, Salisbury hospital, date of admission and reason for admission Please note this is not for advice. If advice is required phone the Piam Brown clinical team Phone call completed by ______________________

Patient Clerking –Medical

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Date…………………………….

Attach Patient Label Here Name Address   Hospital Number D of B

Time of medical assessment: ______________________________

History: (please complete each area)

Presenting symptoms:

____
____
____
____
____

Underlying condition:

____
____

Stage of Treatment and Recent Treatment:

____
____
____

Medications:

____
____
____

Allergies: (including concerns regarding use of Gentamicin or Cisplatin)

____
____
____

Previous reaction to Blood products**:** Yes ☐ No ☐
if so, which:

____

Most recent blood count:
Date: ______________________________
Result: ______________________________

Patient Clerking –Medical

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Attach Patient Label Here Name Address   Hospital Number D of B

Date…………………………….

Clinical Examination: (please complete each area)

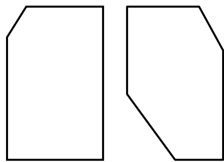
Conscious Level:

Mouth:	Clean ☐	Mucositis ☐	Ulcerated ☐	Candida ☐
Line Site**:**	Clean ☐	Inflamed ☐	Purulent ☐	Tracking ☐

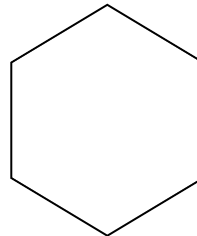
CVS**:**
Blood Pressure: Pulse: CRT:

Heart Sounds:

Respiratory:
Respiratory rate:
Oxygen Saturations:



Abdominal:



Perineum:	Clean ☐	Inflamed ☐	Ulcerated ☐
LP or bone marrow sites	Normal ☐	Abnormal ☐	Not applicable ☐

Other:

Patient Clerking –Medical

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Attach Patient Label Here
Name

Address

Hospital Number D of B

Date…………………………….

Investigations:

Note: Bloods may have already been taken by nursing staff.

FBC	Yes ☐	No ☐	
U&E/LFT	Yes ☐	No ☐	
CRP	Yes ☐	No ☐	
G&S	Yes ☐	No ☐	N/A ☐
Coagulation Screen	Yes ☐	No ☐	N/A ☐
Lactate	Yes ☐	No ☐	

Blood Cultures
Central ☐ Peripheral (if no central access) ☐

Consider

MSU ☐ Line swab ☐ Stool culture (MC&S/virology) ☐ CXR ☐ Throat swab ☐

Doctor's Signature ___________________

Integrated Care Pathway for the Paediatric Neutropenic Patient, Salisbury NHS Foundation Trust

Date…………………………….

Attach Patient Label Here Name Address   Hospital Number D of B

<u>Management:</u>

Details of Emergency Resuscitation if required:

____

____

____

____

Antibiotic Therapy (please tick chosen therapy):

Tazocin …./kg ☐
(Piperacillin and Tazobactam)

Gentamicin …/kg ☐
If signs of severe sepsis – see page 3

Penicillin allergy or receiving high dose methotrexate Yes ☐ No ☐

If yes to either of the above treat with **Meropenem** (20mg/kg 8 hourly) +/- Gentamicin if required

Be aware **Gentamicin** is contraindicated if

- patient is about to receive **Cisplatin,**
- patient has had **Cisplatin** in the last 6 weeks, or during high dose Methotrexate treatment & rescue.
- Caution in renal impairment or if significant risk there of e.g. tumour lysis.

Continue Co-trimoxazole prophylaxis if taking.

Please record time of antibiotics given:

Antibiotic 1: ________________________ Antibiotic 2 (if applicable) ________________________

Time first dose administered: ____
(should be within 60 minutes of arrival)

Integrated Care Pathway for the Paediatric Neutropenic Patient, Salisbury NHS Foundation Trust

Date…………………………….

Attach Patient Label Here	
Name	
Address	
Hospital Number	D of B

Management:

Additional Therapy required:

Analgesia:	Yes ☐	No ☐
Maintenance fluids:	Yes ☐	No ☐
Blood Products:	Yes ☐	No ☐
Nutrition:	Yes ☐	No ☐

Please inform Middle Grade/ Consultant of admission at appropriate time.

Date and Time informed: ______________________________

Senior Review:

Signature ____________________

Patient Clerking –Medical

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Date…………………………….

Attach Patient Label Here Name Address   Hospital Number D of B

Results

Date							
Hb							
WCC							
Plt							
Neutrophils							
Na							
K							
Urea							
Creatinine							
CRP							
Alb							
Protein							
ALP							
ALT							
Bilirubin							
Ca							
PO4							
Mg							

Microbiological Results

Date sent	Culture site	Result – Organism, Sensitivities and Date Reported

Patient Clerking –Medical

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Date…………………………….

Attach Patient Label Here Name Address   Hospital Number   D of B

Discharge Check List:

Standard Discharge letter with TTO's completed:	Yes ☐	No ☐
Piam Brown Discharge (page 15) form completed and faxed:	Yes ☐	No ☐
Date of next blood test arranged:	Yes ☐	No ☐
Date of next Hospital appointment arranged:	Yes ☐	No ☐
Community Nurses informed of admission/discharge:	Yes ☐	No ☐
Dr Staples/Dr Ridley aware of admission/discharge:	Yes ☐	No ☐

Intentionally left blank

Paediatric Oncology Patients - Summary of treatment received at POSCU

Information that will be useful to us: reason for admission & other problems e.g. febrile neutropenia (inc duration of antibiotics & culture results), nausea, vomiting, need for iv fluids, mucositis & severity, duration of TPN (if applicable) & blood results. Toxicity chart may help with grading (tick appropriate box)

Name ______________________ DOB______________________________

Date of admission______________ Date of discharge____________________

Weight O/A __________________ Weight at discharge__________________

Blood counts & transfusions: ensure parent held record up to date with blood counts & dates of transfusions

Main Issues (febrile neutropenia, vomiting etc) please list or code as below: -

1.
2.
3.
4.

Toxicity	**0**	**1**	**2**	**3**	**4**
Oral	None	Soreness	Ulcers/able to eat solids	Unable to eat solids	TPN due to stomatitis
Vomiting (no. episodes/24 h)	0	1	2-5	6-10	>10 or TPN necessary
Diarrhoea	None	Transient 1-2 days	Tolerable > 2 days	Intolerable	Bloody diarrhoea or TPN needed
Constipation	None	Mild	Moderate	Abdominal distension	Distension & vomiting
Infection	None	Minor: oral antibiotics	Moderate: well IV antibiotics	Major: unwell	Unwell & hypotension
Fever (° C)	None	37.1 – 38	38.1 – 40	> 40 for < 24 hr	> 40 for > 24 hr
Other					

In addition for febrile neutropenia dates of starting/changing antibiotics & any positive culture results

Antibiotic e.g.	Date started	Date stopped	Reason for change
Tazocin			

Microbiology

Date	Culture results	Sensitivities

Other issues TPN etc:

Drugs on discharge: