### Outcomes/Goals

1. Rapid identification/treatment of pediatric patients with neutropenia and fever
2. Create an efficient team-oriented approach in conjunction with Peds Hem/Onc (PHO service)
3. **Antibiotic administration within 60 minutes of arrival**
4. Ensure stability of patient after antibiotic administration prior to admission to the floor.

### NURSE Documentation


### INTERVENTIONS

**Initiate on arrival**

- ESI Triage level II
- Mask patient and place immediately in room
- LMX to Port (if not done prior to arrival) – Do not delay access if unstable
- bedside vitals and weight, complete triage in room. No Rectal temps.
- Central line access
- Cardiac/respiratory monitoring with minimum Q30 minutes vitals
- 20 mg/kg NS bolus – initiate with antibiotic infusion

### DIAGNOSTICS

Blood Cultures (central draw – each lumen, peripheral only w/specific order)
Consider bedside CBG
CBC with Manual Diff
CMS – hold. Send if indicated/LIP order
Type and cross – hold in anticipation of blood, platelets or FFP
UA/Mandatory culture – Do Not Cath for specimen – Do not delay antibiotics for urine collection
Localized signs of infection may be appropriate for culture
Chest x-ray if indicated (URI sxs, abnormal lung exam, hypoxia, tachypnea)

### PHYSICIAN (LIP)

**Documentation**

Onset of fever, date of most recent chemo, type of chemo, last blood counts

**Fluids**

Normal Saline bolus 20 ml/kg if indicated for hypotension or poor perfusion
May repeat as indicated by abnormal vitals/poor perfusion

**Medication**

**Antipyretics**

Acetaminophen 12.5 mg/kg PO

**Antibiotics (Administer within 60 minutes of arrival)**

Cefepime 50 mg/kg IVPB

*High risk (ill appearing, ANC<500, history of MRSA, hypotension)*

Add Vancomycin 10-15 mg/kg/dose IV - upon direction of peds hem/one fellow

### ADMISSION

Call Peds Hem/Onc Fellow with results and develop follow-up/admission plan
Prepare family/patient for admission as appropriate
Ensure stability of vital signs prior to admission to floor

### *High Risk versus Low Risk Considerations*

Factors that favor **low risk** for severe infection:

1. ANC > 500
2. Nearly normal results of hepatic and renal function tests
3. Resolution of Neutropenia expected in <10 days
4. No intravenous catheter site infection
5. Early evidence of bone marrow recovery
6. Non-toxic presentation

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**Clinical Pathway**

**Neutropenic Fever** *(Temp >38.3, or Temp 38 for > 1 hour and ANC ≤500)*

Updated: March 2011
Clinical Pathway Decision Making Process
Neutropenic Fever
Temp >38.3, or Temp 38 and ANC ≤500
Updated: March 2011

Immediate Action
1. Mask patient and place immediately in room
2. Bedside triage/registration
3. Central line access
4. Blood cultures
5. CBC with manual diff
6. Draw/hold CMS
7. UA/mandatory cx (do not delay antibiotics for UA)
8. Administer Cefepime within 60 minutes of arrival

Toxic Appearance?

yes
Resuscitate as appropriate
Notify Hem/Onc fellow and PICU

no

Hypoxemia
Respiratory symptoms?

yes
Oxygen
Obtain chest x-ray as part of initial evaluation

no

Determine High Risk vs Low Risk
(consult PHO fellow)

Low Risk
(ANC > 500 and non-toxic)
Home with Follow-up

High Risk
Admission
Consider Vancomycin
Consult with hem/onc fellow

Administer Cefepime 50 mg/kg IV. Do not wait for lab results before antibiotic administration
NS Bolus 20 mg/kg

Monitor vital signs during and post antibiotic infusion for hypotension (minimum q 30 minutes)
Neutropenic Fever Rationale and Data

Goals of Clinical Pathway

1. Rapid identification and treatment of the pediatric patient with neutropenia and fever
2. Create a team-oriented approach to efficient and timely evaluation and work-up in conjunction with Peds Hem/Onc
3. Antibiotic administration within 60 minutes of arrival

<table>
<thead>
<tr>
<th>Data Considerations</th>
<th>Interventions</th>
<th>Rationale</th>
</tr>
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<tbody>
<tr>
<td>Neutropenia</td>
<td>Documented ANC level</td>
<td>The absolute neutrophil count (ANC) number defines Neutropenia. The ANC is calculated by multiplying the percentage of bands and neutrophils (segmented neutrophils or granulocytes) on a CBC differential times the total white WBC count. The risk of bacterial infection is related to both the severity and duration of neutropenia. In prolonged severe neutropenia, life-threatening gastrointestinal and pulmonary infections occur, as does sepsis. However, patients with neutropenia are not at increased risk for parasitic and viral infections. (Godwin 2006).</td>
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<tr>
<td>Urine collection</td>
<td>Urine specimen collection</td>
<td>Urine analysis and culture indicated if no focal point for infection. Due to compromised immune response urine should not be obtained via catheterization. Note: Bag collection sample has an increased risk of contamination, false-positive rate ranging from 12-83%.</td>
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<tr>
<td>Blood Culture</td>
<td>Pseudomonas spp., Escherichia coli, Streptococcus spp., Staphylococcus aureus, and Klebsiella spp. were the most common bacteria identified in the cultures (Courtney 2004). The majority of patients with fever and bacteremia rapidly respond to antibiotics, however 10% will develop toxic shock-like syndrome with fever, hypotension, diffuse rash with subsequent desquamation and ARDS with mortality rates of 6-30% (Donowitz 2005).</td>
<td></td>
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Risk Stratification

- Intravenous monotherapy can be given if neutropenia is anticipated to be of short duration; it is also acceptable if neutropenia is expected to be more prolonged but the patients is stable and do not have an infectious focus. All other patients should receive combination therapy with an aminoglycoside, if infection with a gram-negative pathogen is suspected, or a glycopeptide, if a gram-positive organism is suspected. However, antimicrobial therapy with coverage against gram-negative organisms should always be provided because of the significant mortality associated with these infections (Klastersky, 2006).

Low Risk Criteria

- Outpatient treatment of low-risk febrile neutropenic cancer patients utilizing standard treatment pathways is associated with minimal morbidity and mortality and should be considered an acceptable standard of care with appropriate infrastructure available to provide strict and careful follow-up while on treatment. Certain factors are associated with higher risk of hospitalization and should be further examined in eligible patients with low-risk febrile neutropenia.

Bacterial Pathogen Consideration

Gram-positive cocci and bacilli accounts for 60-70% of isolates

- Staphylococcus
- Streptococcus
- Enterococcus
- Corynebacterium

Gram-negative cocci and bacilli

- Escherichia coli
- Klebsiella pneumoniae
- Pseudomonas aeruginosa

Anaerobes

- Bacteroides
- Clostridium
- Fusobacterium
- Peptococcus/peptostreptococcus
- Veillonella

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