Complete physical exam and history of recent chemotherapy
Start IV fluids at maintenance rate (or less if clinically indicated)
CBC with differential, complete metabolic panel, and lactic acid
Blood cultures 3 x 2 sets (one set collected from each lumen simultaneously if CVAD present and consider one peripheral site)

See Page 2 for Antimicrobial Therapy Recommendations

Urinalysis with culture
Other site specific cultures (e.g., stool studies, respiratory viral PCR panel) only if clinically indicated
Chest/abdominal x-ray or other tests as clinically indicated

PEWS ≥ 6?
Yes
No

See Pediatric Sepsis Management algorithm for evaluation and treatment of sepsis
See Page 2 for Antimicrobial Therapy Recommendations

CAR = chimeric antigen receptor
CVAD = central venous access device
PEWS = pediatric early warning score

1 ANC < 1 K/microliter and either temperature of at least 38.3°C once or 38°C twice separated by at least 1 hour
2 See Appendix A for Modified PEWS Tool; full details available in the Detecting Pediatric Patient Deterioration Using PEWS algorithm
3 Do not delay antibiotic administration for blood cultures; antibiotics should be given within one hour of order
**Neutropenic Fever Inpatient Pediatric Treatment**
*(Solid Tumors)*

**Disclaimer:** This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson’s specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual circumstances to determine a patient’s care. Local microbiology and susceptibility/resistance patterns should be taken into consideration when selecting antibiotics. This algorithm should not be used to treat pregnant women.

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### MANAGEMENT

Consider the following when selecting antibiotics (antibiotics should be given within 1 hour of order):

- Recent culture and sensitivity results
- History of MDRO infection or colonization
- Suspected line infection
- Antibiotic history and prophylaxis
- Source of infection if identified
- Antibiotic allergies
- Organ dysfunction
- Mucositis

---

### ANTIMICROBIAL THERAPY RECOMMENDATIONS

See Appendix B: Dosing Information

Gram negative coverage antibiotics should be given first

- **Neutropenic fever:**
  - Cefepime

- If clinically suspected line infection, bacteremia, skin/soft tissue infection, or MRSA colonization:
  - Add vancomycin
  - If relative contraindication exists to vancomycin use, consider linezolid instead

- If indicated for double gram negative coverage, add either:
  - Tobramycin or amikacin or ciprofloxacin (only if no quinolone prophylaxis)

- If mucositis (at least Grade 2), suspected intra-abdominal infection, or other indication for anaerobic coverage:
  - Add metronidazole to cefepime

- If history of MDRO infection:
  - Consider Infectious Disease consult

---

**ESBL** = extended spectrum beta-lactamase

**MDRO** = multi-drug resistant organism

**MRSA** = methicillin-resistant *Staphylococcus aureus*

1. Chills, rigors with infusion through catheter, cellulitis or discharge around the line entry site
2. Consider meropenem if patient has any of the following:
   - Non-IgE-mediated allergy to alternative agents
   - Failing treatment with cefepime or piperacillin/tazobactam
   - Infection with ESBL organism
   - Infection with organism only susceptible to carbapenem
3. Double gram negative coverage should be considered with complicated tissue-based infections, neutropenic enterocolitis, and perirectal infections

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**Department of Clinical Effectiveness V2**

Approved by the Executive Committee of the Medical Staff on 03/24/2020

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Neutropenic Fever Inpatient Pediatric Treatment (Solid Tumors)

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RE-ASSESSMENT

Patient afebrile

72-hour evaluation

Identified source of fever?

Yes

No

Patient febrile

FOLLOW-UP

Treat for appropriate duration based on nature of infection (e.g., urinary tract infection, cellulitis)

Complete antibiotic regimen and disposition per Primary Team

DISPOSITION

- Continue treatment for at least 1 day after ANC > 0.2 K/microliter and rising
- Disposition per Primary Team

- Re-evaluate antibiotics
- Repeat cultures
- Imaging as clinically indicated
- Evaluate thoroughly for non-infectious causes of fever (e.g., medications, thrombosis, tumor, necrosis)
- Consult Infectious Disease

Disposition based on Infectious Disease consult recommendations and/or diagnostic test results

1Consider narrowing therapy based on cultures and sensitivities (e.g., discontinue vancomycin if no gram positive organisms are identified and patient does not have cellulitis)
## APPENDIX A: Modified PEWS Tool

<table>
<thead>
<tr>
<th>Score</th>
<th>Behavior</th>
<th>Cardiovascular System</th>
<th>Respiratory System</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>● Playing</td>
<td>● Within normal parameters for age</td>
<td>● Within normal parameters for age</td>
</tr>
<tr>
<td></td>
<td>● Appropriate</td>
<td>● Tachycardia &lt; 20 above normal for age</td>
<td>● Tachycardia 10-19 above normal parameters for age</td>
</tr>
<tr>
<td>1</td>
<td>● Irritable, but consolable</td>
<td>● Pale or dusky</td>
<td>● Tachypnea 10-19 above normal parameters for age</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Capillary refill 1-2 seconds</td>
<td>● Tachycardia ≥ 20 above normal parameters for age with retractions</td>
</tr>
<tr>
<td>2</td>
<td>● Irritated, but not consolable</td>
<td>● Mottled</td>
<td>● Bradypnea ≥ 5 below normal parameters for age with retractions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Capillary refill 3 seconds</td>
<td>● Severe retractions/accessory muscle use (including tracheal tugging) and grunting</td>
</tr>
<tr>
<td>3</td>
<td>● Lethargic</td>
<td>● Capillary refill 4 seconds</td>
<td>● Oxygen required to maintain normal(^2) Sp(_2) ○ Fi(_2) 40-49% ○ O(_2) ≥ 3 L/minute</td>
</tr>
<tr>
<td></td>
<td>● Confused</td>
<td></td>
<td>○ Fi(_2) 40-49% ○ O(_2) ≥ 3 L/minute</td>
</tr>
<tr>
<td></td>
<td>● Reduced response to pain</td>
<td>● Capillary refill ≥ 5 seconds</td>
<td>○ Fi(_2) ≥ 50%</td>
</tr>
</tbody>
</table>

\(^1\) Add 2 extra points if patient requires frequent interventions (e.g., suctioning, positioning, change in O\(_2\) needs, multiple IV attempts required, or every 15-minute or continuous nebulized treatments) or has persistent post-op vomiting

\(^2\) As defined in patient’s orders

\(^3\) Includes home bilevel positive airway pressure (BiPAP)/continuous positive airway pressure (CPAP) or home ventilator at baseline settings

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Neutropenic Fever Inpatient Pediatric Treatment (Solid Tumors)

Department of Clinical Effectiveness V2
Approved by the Executive Committee of the Medical Staff on 03/24/2020
### APPENDIX B: Antibiotic Dosing Information

Note: Adjust dose for patients with renal/hepatic dysfunction. Therapeutic drug monitoring should be performed to ensure safety and efficacy when possible.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Dosage Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>15 mg/kg IV once and then repeat per pharmacokinetic data</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>30 mg/kg (maximum 2 g) IV every 8 hours</td>
</tr>
<tr>
<td>Cefepime</td>
<td>50 mg/kg (maximum 2 g) IV every 8 hours</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>10 mg/kg (maximum 400 mg) IV every 8 hours</td>
</tr>
<tr>
<td>Linezolid</td>
<td>○ &lt; 12 years old: 10 mg/kg (maximum 600 mg) IV every 8 hours</td>
</tr>
<tr>
<td></td>
<td>○ ≥ 12 years old: 600 mg IV every 12 hours</td>
</tr>
<tr>
<td>Meropenem</td>
<td>20 mg/kg (maximum 1 gram) IV every 8 hours</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>7.5 mg/kg (maximum 500 mg) IV every 6 hours</td>
</tr>
<tr>
<td>Piperacillin and tazobactam</td>
<td>100 mg/kg piperacillin (maximum 4 grams) IV every 8 hours</td>
</tr>
<tr>
<td>Sulfamethoxazole and</td>
<td>trimethoprim (TMP) 5 mg/kg TMP IV or oral every 8 hours</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>7 mg/kg IV once and then repeat per pharmacokinetic data</td>
</tr>
<tr>
<td></td>
<td>○ &lt; 6 years old: 20 mg/kg IV every 6 hours</td>
</tr>
<tr>
<td></td>
<td>○ 6-11 years old: 15 mg/kg IV every 6 hours</td>
</tr>
<tr>
<td></td>
<td>○ &gt; 11 years old: 15 mg/kg IV every 8 hours</td>
</tr>
</tbody>
</table>
SUGGESTED READINGS


This practice consensus statement is based on majority opinion of the Pediatric Neutropenic Fever work group at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

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