# THE UNIVERSITY OF TEXAS MDAnderson Cancer Center (Solid Tumors)

Making Cancer History®

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 clinical 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.

Note: For patients receiving immune effector cell (IEC) therapy, please refer to the Neutropenic Fever Inpatient Pediatric Treatment (Hematologic Cancers and Stem Cell Patients) algorithm for management.

# PRESENTATION

## ASSESSMENT



CMP = comprehensive metabolic panel

CVAD = central venous access device

PEWS = Pediatric Early Warning Score

<sup>1</sup>Criteria:

• Absolute neutrophil count (ANC)  $\leq$  0.5 K/microliter <u>and</u> temperature either  $\geq$  38.3°C or equal to 38°C for 1 hour or longer <u>or</u>

• ANC  $\leq 1$  K/microliter and an expected decline to  $\leq 0.5$  K/microliter over 48 hours <u>and</u> temperature either  $\geq 38.3^{\circ}$ C or equal to  $38^{\circ}$ C for 1 hour or longer

<sup>2</sup>See Appendix A for Modified PEWS Tool; full details available in the Detecting Pediatric Patient Deterioration Using PEWS algorithm

<sup>3</sup> Do not delay antibiotic administration for blood cultures; antibiotics should be given within one hour of order

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## ASSESSMENT

#### ANTIBACTERIAL RECOMMENDATIONS See Appendix B for Dosing Information

Gram negative coverage antibiotics should be given first. Antibiotics should be given within 1 hour of patient presentation.



MRSA = methicillin-resistant *staphylococcus aureus* VRE = vancomycin-resistant enterococci

<sup>1</sup>Resistant gram negative organisms include:

- Stenotrophomonas maltophilia
- Any extended spectrum beta-lactamase (ESBL) producing gram negative bacilli
- Any carbapenem resistant gram negative bacilli
- All other gram negative bacilli that are resistant to usual recommended first-line agents
- $^{2}$  Chills, rigors with infusion through catheter, cellulitis or discharge around the catheter line entry site
- <sup>3</sup>Metronidazole is not necessary if meropenem or piperacillin-tazobactam is used
- <sup>4</sup>Consider meropenem if patient has any of the following:
- Non-IgE-mediated allergy to alternative agents
- $\bullet$  Infection with ESBL organism

- Failed treatment with cefepime or piperacillin/tazobactam
- Infection with organism only susceptible to carbapenem

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#### THE UNIVERSITY OF TEXAS MDAnderson Cancer Center (Solid Tumors) Neutropenic Fever Inpatient Pediatric Treatment

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# **SERIOUS DOCUMENTED BETA-LACTAM ALLERGY** (anaphylaxis, hives, or serious non-IgE mediated drug reactions<sup>1</sup>)

ASSESSMENT

## ANTIBACTERIAL RECOMMENDATIONS

See Appendix B for Dosing Information

Gram negative coverage antibiotics should be given first. Antibiotics should be given within 1 hour of patient presentation.

# • Consider the following when selecting antibacterial therapy:

- Recent culture and sensitivity results
- History of resistant gram negative organism<sup>2</sup> infection or colonization
- Suspected line infection<sup>3</sup>
- Recent antibiotic history and prophylaxis
- Source of infection, if identified
- Organ dysfunction
- $\circ$  Mucositis  $\geq$  grade 2

<sup>1</sup>Examples of non-IgE mediated drug reactions include Stevens-Johnson syndrome, toxic epidermal necrolysis, and drug reaction with eosinophilia and systemic symptoms (DRESS)

- <sup>2</sup> Resistant gram negative organisms include:
- Stenotrophomonas maltophilia
- Any extended spectrum beta-lactamase (ESBL) producing gram negative bacilli
- Any carbapenem resistant gram negative bacilli
- All other gram negative bacilli that are resistant to usual recommended first-line agents
- <sup>3</sup>Chills, rigors with infusion through catheter, cellulitis or discharge around the catheter line entry site
- <sup>4</sup> Double gram negative coverage should be considered with complicated tissue-based infections, neutropenic enterocolitis, and perirectal infections
- <sup>5</sup> Confirm use with Pediatric Stem Cell Transplant service prior to starting in transplant patients

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## **RE-ASSESSMENT**

## TREATMENT



<sup>1</sup>Consider narrowing therapy based on cultures and sensitivities (*e.g.*, discontinue anti-MRSA or anti-VRE agents if no gram positive organisms are identified and patient does not have cellulitis)

<sup>2</sup> Has signs of post-nadir granulocyte and phagocyte recovery with an ANC  $\ge 0.1$  K/microliter and/or absolute phagocyte count (APC)  $\ge 0.2$  K/microliter

<sup>3</sup> Consider transition to antimicrobial prophylaxis if continued neutropenia and no clear infectious source of fever is identified

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#### **APPENDIX A: Modified PEWS Tool**

	Score <sup>1</sup>			
	0	1	2	3
Behavior	<ul><li>Playing</li><li>Appropriate</li></ul>	• Irritable, but consolable	• Irritated, but not consolable	<ul><li>Lethargic</li><li>Confused</li><li>Reduced response to pain</li></ul>
Cardiovascular System Rate	• Within normal parameters for age	• Tachycardia < 20 above normal for age	• Tachycardia 20-29 above normal for age	<ul> <li>Tachycardia ≥ 30 above <u>or</u> bradycardia ≥ 10 below normal for age</li> </ul>
Color	• Pink	• Pale <u>or</u> dusky	• Mottled	• Gray
Perfusion	• Capillary refill 1-2 seconds	Capillary refill 3 seconds	• Capillary refill 4 seconds	• Capillary refill $\geq$ 5 seconds
<b>Respiratory System</b>				
Rate	• Within normal parameters for age	• Tachypnea 10-19 above normal parameters for age	<ul> <li>Tachypnea ≥ 20 above normal parameters for age with retractions</li> </ul>	<ul> <li>Bradypnea ≥ 5 below normal parameters for age with retractions</li> </ul>
Effort	• No retractions	• Mild retractions/accessory muscle use	• Moderate retractions/accessory muscle use (including tracheal tugging)	• Severe retractions/accessory muscle use (including tracheal tugging) <u>and</u> grunting
Oxygen	• N/A	<ul> <li>Oxygen required to maintain normal<sup>2</sup> SpO<sub>2</sub></li> <li>FiO<sub>2</sub> 24-40%</li> <li>O<sub>2</sub> 2 L/minute</li> <li>Any assisted ventilation<sup>3</sup> or initiation of O<sub>2</sub></li> </ul>	• Oxygen required to maintain normal <sup>2</sup> SpO <sub>2</sub> $\circ$ FiO <sub>2</sub> 40-49% $\circ$ O <sub>2</sub> $\geq$ 3 L/minute	<ul> <li>Oxygen required to maintain normal<sup>2</sup> SpO<sub>2</sub></li> <li>○ FiO<sub>2</sub> ≥ 50%</li> </ul>

 $FiO_2$  = fraction of inspired oxygen;  $O_2$  = oxygen;  $SpO_2$  = oxygen saturation

<sup>1</sup>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 <sup>2</sup>As defined in patient's orders

<sup>3</sup> Includes home bilevel positive airway pressure (BiPAP)/continuous positive airway pressure (CPAP) or home ventilator at baseline settings Copyright 2024 The University of Texas MD Anderson Cancer Center Department of Clinical Effectiveness V3 Approved by the Executive Committee of the Medical Staff on 11/19/2024

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### **APPENDIX B: Antibacterial Dosing Information**

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

- Amikacin 15 mg/kg IV once and then repeat per pharmacokinetic data
- Aztreonam 30 mg/kg (maximum 2 grams) IV every 8 hours
- Cefepime 50 mg/kg (maximum 2 grams) IV every 8 hours
- Ciprofloxacin 10 mg/kg (maximum 400 mg) IV every 8 hours
- Daptomycin 8 mg/kg IV every 24 hours
- Linezolid
- $\circ$  < 12 years old: 10 mg/kg (maximum 600 mg) IV every 8 hours
- $\circ \ge 12$  years old: 600 mg IV every 12 hours
- Meropenem 20 mg/kg (maximum 1 gram) IV every 8 hours
- Metronidazole 7.5 mg/kg (maximum 500 mg) IV every 6 hours
- Piperacillin and tazobactam 100 mg/kg piperacillin (maximum 4 grams) IV every 8 hours
- Tobramycin 7 mg/kg IV once and then repeat per pharmacokinetic data
- Vancomycin: Initial dosing, adjustments per pharmacokinetic data
- $\circ$  < 6 years old: 20 mg/kg IV every 6 hours
- 6-11 years old: 15 mg/kg IV every 6 hours
- $\circ > 11$  years old: 15 mg/kg IV every 8 hours

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## **DEVELOPMENT CREDITS**

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

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