

# Neutropenic Fever: The Underlying Killer in the Immunocompromised Population

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## Introduction

A neutropenic fever is defined as a temperature of 101 °F once or >100.4 °F sustained over one hour with an Absolute Neutrophil Count (ANC) of <0.5.

- Patients that are immunocompromised are at increased risk of becoming septic.
- Example of immunocompromised populations include: cancer and transplant patients, HIV/AIDS, and patients on certain immunosuppressive medications.

### Etiologies of Neutropenic Fever

- Bacterial
  - Gram Negative - most common and concerning
  - Gram Positive - Staph epidermidis from central line
- Viral - HSV, EBV, CMV, Adenovirus, etc.
- Fungal
  - Persistent, recurrent febrile neutropenia
- Malignancy

## Neutropenic Fever

- Most hospital systems have adopted a “Sepsis Protocol” that identifies abnormal VS/labs and an order set will be created to begin a sepsis work-up.
- Many oncology patients are given instructions “Fever over >100.4 → time to go to the ED”.
- As time progress without treatment for infection, mortality increases
- Crucial that antibiotics be started within **60 minutes** of presenting to the ED

## Case Description

### 62-year-old Caucasian male

#### Past Medical History:

- Acute Myeloid Leukemia - 2020
  - Stem Cell Transplant - 2021
  - Relapsed in January 2022
    - Currently in cycle 2 of chemotherapy
- Aspergillus Pneumonia - September 2022
- No barriers to care, No tobacco/alcohol use

#### Medications:

- Levofloxacin 500 mg PO QD - prophylaxis
- Valtrex 500 mg PO QD - prophylaxis
- Posaconazole 300 mg QD - Invasive Aspergillus

#### Physical Examination:

- **Febrile - Initial of 102.3 °F oral**
  - **Maximum Fever of 103.4 °F oral**
- A&Ox4 in no acute distress
- 97% O2 on RA no increased work of breathing.
- **Day 5: Mild wheezing throughout lung fields**

#### Initial Work-up in Emergency Department:

Blood Cultures x 2	<b>Negative</b>
CBC with differential	Hgb 7 WBC 0.3 <b>ANC 0</b> PLT 30
CMP	All values WNL
Lactic Acid	< 2
Chest X-Ray	No changes compared to previous CXR
Urinalysis with Culture	Negative for Infection

## Results



**Figure 2: Invasive aspergillosis.** Computed tomography (CT) scan of an immunosuppressed patient with fever, hypoxemia, and a non resolving pneumonia. Invasive aspergillosis was ultimately diagnosed

#### Additional Work-up completed during admission:

Respiratory Panel with COVID/Flu	Negative
Serum Aspergillus, Galactomannan, Beta D glucan, Fungitell	Negative
Posaconazole Level	Therapeutic Level
CT ABD Pelvis	No acute infection
CT Sinus	No acute infection
Repeat Chest CT (Day 5)	<b>Worsening Pulmonary Edema</b>
Repeat Chest CT (Day 10)	<b>Worsening GGO near apices</b>

## Treatment and Outcome

#### Treatment:

- IV Vancomycin and Cefepime- initial ABX
- IV Vancomycin and Meropenem
  - Switched for greater coverage
- IV Micafungin
- Bone Marrow Biopsy to monitor disease progression
- Continue Azacitidine/Venetoclax Cycle 2

#### Outcome:

- Patient continue to be febrile on IV ABX
- Patient defervesced after several days of IV Micafungin.
- Bone Marrow Biopsy 5-10% blasts as compared to 40% blasts on last biopsy

## Discussion/Learning points

- Serum fungal studies are not as specific as cultures from bronchoalveolar lavage
- Consider all potential sources of infection
- Empiric antibiotic treatment is imperative as soon as possible to reduce mortality.

## Conclusions

Neutropenic fever is a leading cause of mortality in immunocompromised patients. An immediate sepsis workup followed by IV antibiotics is crucial to improving outcomes. Finding the etiology of the neutropenic fever can further guide medical and tailor antibiotic therapy.

## References/Acknowledgements

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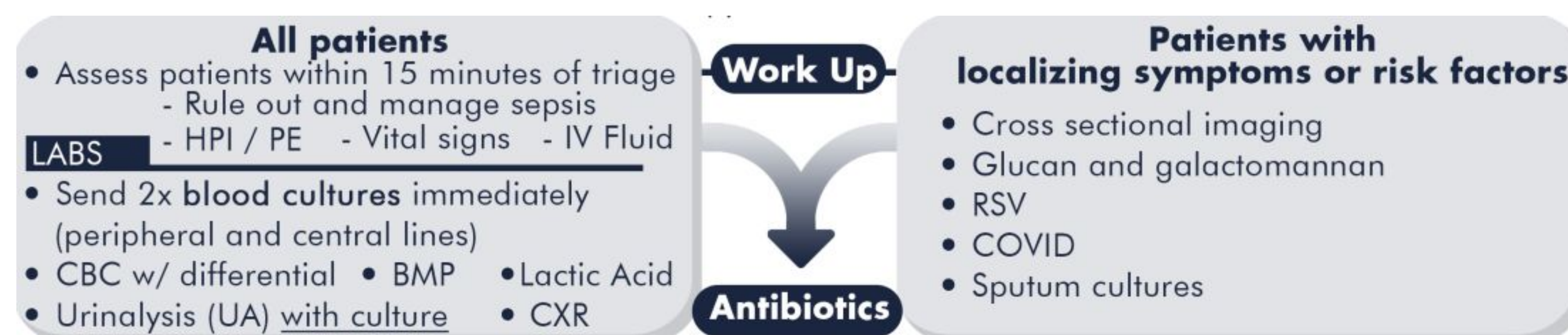


Figure 1: Neutropenic fever initial work-up

