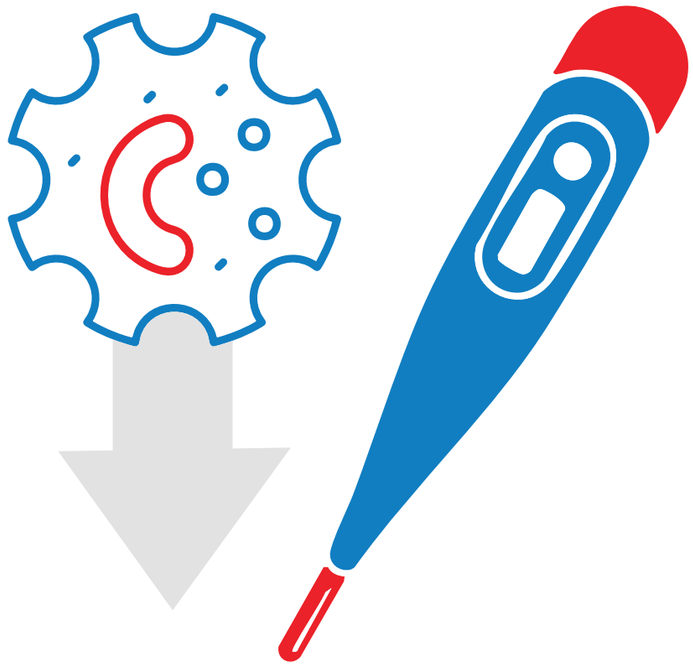
MANAGEMENT STRATEGIES FOR FEBRILE NEUTROPENIA

SECTION 1:

OVERVIEW OF FEBRILE NEUTROPENIA

DEFINITION OF FEBRILE NEUTROPENIA



DEFINITION[1]

FN is described by clinical practice guidelines as neutropenia with a single oral or tympanic temperature ≥ 101°F (38.3°C) or ≥ 100.4°F (38°C) for at least one hour.

SIGNIFICANCE IN PATIENTS WITH CANCER[2,3]

FN, a common complication of cancer chemotherapy leads to:

- Delays and dose reductions in chemotherapy
- Compromised efficacy of treatment
- Prolonged hospitalization
- Increased healthcare utilization and costs

FN: Febrile Neutropenia.

References: 1. Taplitz RA, et al. J Clin Oncol. 2018;36(14):1443-1453. 2. Mohindra R, et al. Am J Emerg Med. 2020;38(11):2259-2263. 3. Meena JP, et al. Pediatr Hematol Oncol. 2019;36(6):330-343.

BURDEN OF FEBRILE NEUTROPENIA

Incidence in Asia:

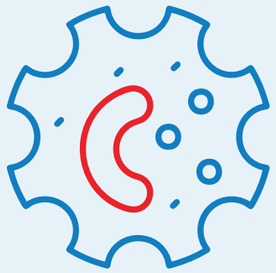
10-20%,

depending on the type of cancer, chemotherapy regimen, and patient risk factors[1]

Indians are at a

higher risk

of developing FN (OR = 1.88), as compared to the Chinese[1]



Indians are more likely to develop

multiple episodes

of FN during treatment[1]

Prevalence of FN in India:

2-21%[2]

FN: Febrile Neutropenia; OR: Odds Ratio.

References: 1. Lim ZL, et al. Cancers (Basel). 2023;15:3590. 2. Talukdar A, et al. Asian Pac J Cancer Care. 2023;8(4):691-695.

EPIDEMIOLOGY OF GRAM-NEGATIVE INFECTIONS ASSOCIATED WITH FEBRILE NEUTROPENIA

Mumbai, Maharashtra

Prevalence of Gram-negative bacteria in blood cultures: **72%**

Most prevalent organism: *E. coli*[1]

Bengaluru, Karnataka

Prevalence of Gram-negative bacteria in blood cultures: **58%**

Most prevalent organism: *E. coli*[2]

New Delhi

Prevalence of Gram-negative bacteria in blood cultures: **93%**

Most prevalent organism: *Klebsiella pneumoniae*[3]

Kolkata, West Bengal

Prevalence of Gram-negative bacteria in blood cultures: **67.8%**

Most prevalent organism: *Klebsiella oxytoca*[4]

Gram-negative infections continue to be the predominant cause of FN in Indian patients.[1]

E. coli: Escherichia coli; FN: Febrile Neutropenia.

References: 1. Noronha V, et al. Indian J Cancer. 2014;51(4):470-4. 2. K GB, et al. Indian J Surg Oncol. 2024;15(Suppl 2):315-321. 3. Kokkayil P, et al. J Infect Dev Ctries. 2018;12(6):442-447. 4. Mondal PK, et al. J Lab Physicians. 2023;15(1):42-47.

ETIOPATHOGENESIS OF CANCER-RELATED FEBRILE NEUTROPENIA

DISEASE-ASSOCIATED FACTORS[1]

Cancer’s direct interference with hematopoiesis as in leukemia or metastatic replacement of the bone marrow → Decline in patient's ANC

TREATMENT-ASSOCIATED FACTORS

Outpatient chemotherapy regimens: The highest reduction in ANC occurs 5-10 days after the last dose[1]

Inpatient chemotherapy regimens (especially for the treatment of hematologic malignancies): Produce a neutropenia of greater depth and duration, both of which amplifythe risk[1]

Risk related to the intensity of the chemotherapy regimen:[2]

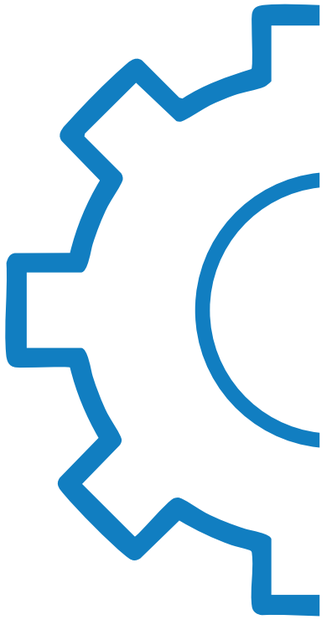
High-risk FN → Risk > 20%

Intermediate-risk FN → Risk 10-20%

Low-risk FN → Risk < 10%

ANC: Absolute Neutrophil Count; FN: Febrile Neutropenia.
References: 1. Lewis MA, et al. CA Cancer J Clin. 2011;61(5):287-314. 2. Ba Y, et al. Cancer Biol Med. 2020;17(4):896-909.

FEBRILE NEUTROPENIA: RISK FACTORS AND PREDISPOSING CONDITIONS



Age > 65 years	**01**	Older age increases the risk[1]
Low performance status	**02**	Low Karnofsky index, high ECOG score[1,2*]
Comorbidities	**03**	COPD, heart failure, HIV infection, autoimmune disease, and marked renal impairment[1]
Tumor disease	**04**	Symptomatic and significantly advanced[1]
Prior chemotherapy	**05**	Can cause chemotherapy-induced neutropenia[1]
Laboratory parameters	**06**	Anemia, lymphocytopenia, hyperalbuminuria, and hyperbilirubinemia[1]

COPD: Chronic Obstructive Pulmonary Disease; ECOG: Eastern Cooperative Oncology Group; HIV: Human Immunodeficiency Virus.
*Karnofsky index is the first performance status scale. Using this scale, each patient is allocated a score on a linear scale between 0 (dead) and 100 (normally active), without evidence of disease, summarizing their ability to perform daily activities and the level of assistance they require to do so. An ECOG scale has only six points, ranging from 0 (fully active) to 5 (dead).
References: 1. Aapro M, et al. Support Care Cancer. 2017;25(11):3295-3304. 2. Kelly CM, et al. J Oncol. 2016;2016:6186543.

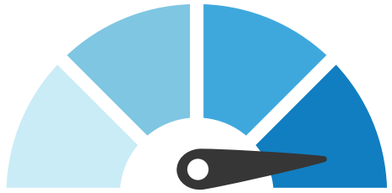
RISK ASSESSMENT OF PATIENTS WITH FEBRILE NEUTROPENIA

LOW RISK (no high-risk factors and most of the following)

- MASCC risk index score of ≥ 21
- Outpatient status at the time of development of fever
- No concomitant acute comorbid illness
- Anticipated short duration of severe neutropenia

(≤ 100 cells/μL for fewer than seven days)

- Good performance status (ECOG 0-1)
- No hepatic or renal insufficiency



HIGH RISK (any factor listed below)

- MASCC risk index score < 21
- Inpatient status at fever onset
- Clinically unstable or significant comorbidities
- Allogeneic HSCT
- Prolonged severe neutropenia (ANC ≤ 100 for ≥ 7 days)
- Hepatic insufficiency (5 × ULN for aminotransferases)
- Renal insufficiency (CrCl < 30 mL/min)
- Uncontrolled or progressive cancer
- Pneumonia or other complex infections
- Treatment with Alemtuzumab
- Mucositis grades 3-4

ANC: Absolute Neutrophil Count; CrCl: Creatinine Clearance; ECOG: Eastern Cooperative Oncology Group; HSCT: Hematopoietic Stem Cell Transplantation; MASCC: The Multinational Association of Supportive Care in Cancer; ULN: Upper Limit of Normal.

Reference: 1. Lucas AJ, et al. P T. 2018;43(4):228-232.

Cefoperazone/Sulbactam (2:1) Vials IV/IM q12h
MAGNEX FORTE 1.5g/3g

DIAGNOSIS OF FEBRILE NEUTROPENIA

Prompt diagnosis is crucial—empirical antibiotic therapy should be initiated within 1 hour of presentation.[1]

RISK STRATIFICATION TOOLS:[2]

Assessment of risk for complications of severe infection

MASCC-score index:
≥ 21 → Low risk → Candidates for oral and/or outpatient therapy
< 21 → High risk → Patient should be admitted to the hospital

LABORATORY TESTS:[2]

CBC with differential leukocyte count and platelet count; measurement of serum levels of creatinine and blood urea nitrogen; and measurement of electrolytes, hepatic transaminase enzymes, and total bilirubin

ANC of < 500 cells/mm^3 or an ANC that is expected to decrease to < 500 cells/mm^3 during the next 48 hours.

BLOOD CULTURES:[2]

At least 2 sets of blood cultures are recommended, with a set collected simultaneously from each lumen of an existing CVC, if present, and from a peripheral vein site

CULTURE SPECIMENS:[2]

From other sites of suspected infection

CHEST RADIOGRAPH:[2]

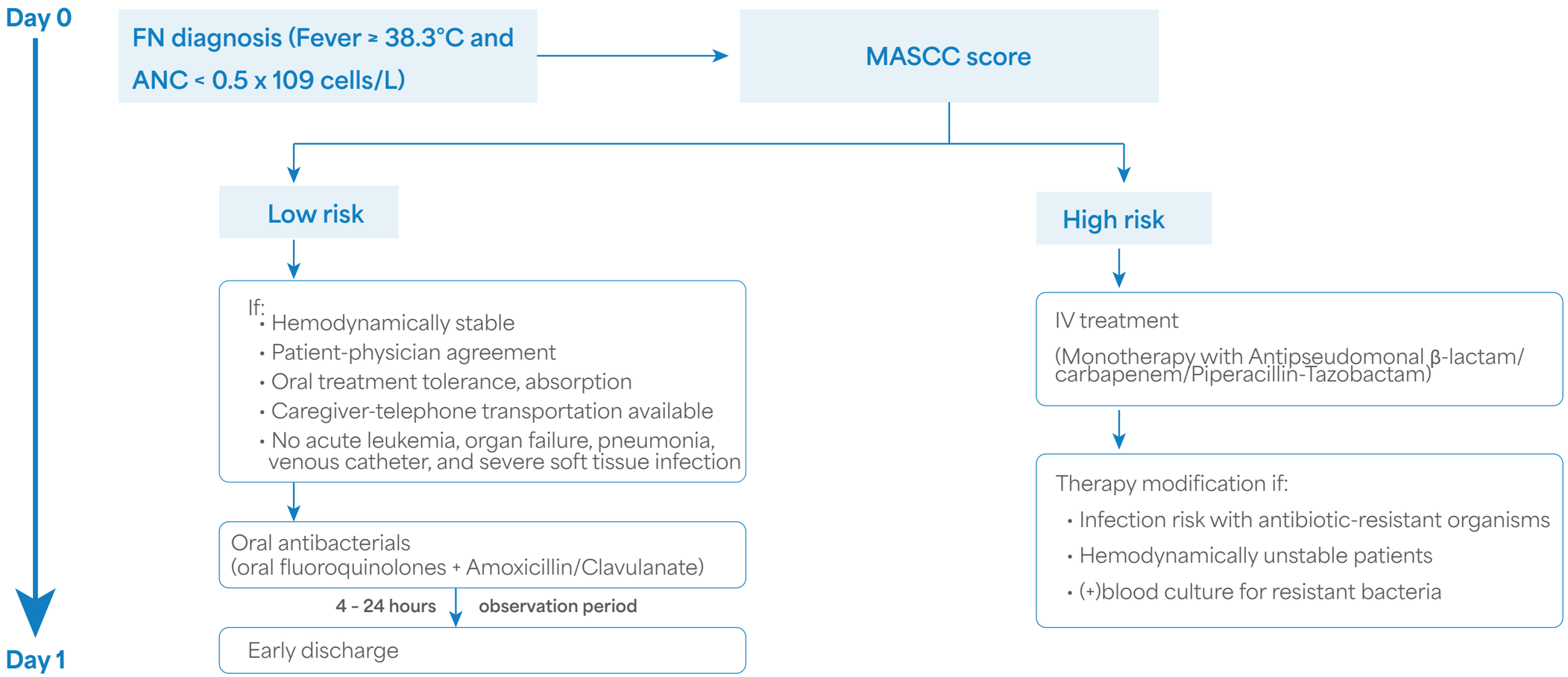
Is indicated for patients with respiratory signs or symptoms

ANC: Absolute Neutrophil Count; CBC: Complete Blood Count; CVC: Central Venous Catheter; MASCC: The Multinational Association of Supportive Care in Cancer.
References: 1. Hansen BA, et al. Mediterr J Hematol Infect Dis. 2019;12(1):e2020009. 2. Freifeld AG, et al. Clin Infect Dis. 2011;52(4):e56-93.

SECTION 2:

MANAGEMENT OF FEBRILE NEUTROPENIA

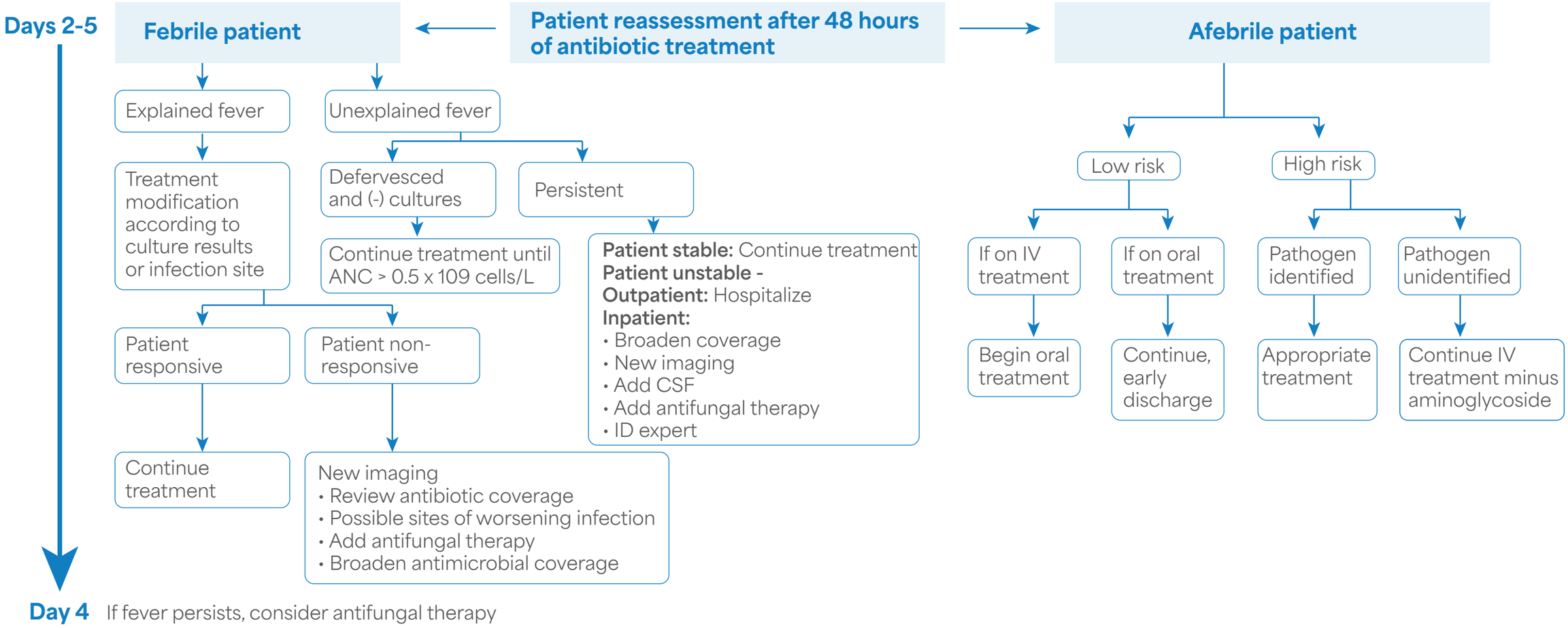
INITIAL ASSESSMENT AND WORKUP FOR CHEMOTHERAPY -INDUCED FEBRILE NEUTROPENIA: EXPERT OPINION



ANC: Absolute Neutrophil Count; FN: Febrile Neutropenia; IV: Intravenous; MASCC: The Multinational Association of Supportive Care in Cancer.

Reference: 1. Koinis F, et al. Expert Opin Pharmacother. 2015;16(10):1505-19.

INITIAL ASSESSMENT AND WORKUP FOR CHEMOTHERAPY -INDUCED FEBRILE NEUTROPENIA: EXPERT OPINION



ANC: Absolute Neutrophil Count; CSF: Colony-Stimulating Factor; ID: Infectious Disease; IV: Intravenous.

Reference: 1. Koinis F, et al. Expert Opin Pharmacother. 2015;16(10):1505-19.

RISK-BASED RECOMMENDATIONS FOR FEBRILE NEUTROPENIA

FN risk ≥ 20%

- Start Pegfilgrastim or short-acting G-CSF from cycle 1
- Continue through all chemo cycles

Evidence level I, 100% consensus

FN risk 10–20% & FN risk <10%

- Presence of additional risk factors raises overall FN risk to ≥ 20% → give G-CSF

Evidence level V, 100% consensus

- G-CSF use should be a shared decision between the patient and the physician.
- Once initiated, G-CSF should be continued throughout all chemotherapy cycles.
- Consider patient-, disease-, and treatment-related factors when deciding on G-CSF use.
- Do not withhold G-CSF solely based on a low risk of treatment-related FN.

FN: Febrile Neutropenia; G-CSF: Granulocyte Colony-Stimulating Factor.

Reference: 1. Aapro M, et al. Support Care Cancer. 2017;25(11):3295-3304.

ROLE AND TIMING OF ANTIBIOTICS

Initiate antibiotics immediately after obtaining blood cultures and before completion of other investigations.[1]
Antimicrobial therapy should be administered within 60 minutes of presentation.[1]

LOW-RISK PATIENTS[2]

- Maybe given oral antibiotics
- Can be considered for outpatient antibiotics if:
  Closely monitored and live near a hospital for quick access

If fever persists beyond 48 hours, broaden antibiotics and admit the patient to the hospital.

First-line options include: Moxifloxacin or Ciprofloxacin in combination with Amoxicillin/Clavulanic acid OR Clindamycin in place of Amoxicillin/Clavulanic acid in patients allergic to Penicillin.

HIGH-RISK PATIENTS[2]

- Inpatient admission and IV antibiotics are indicated
- Institutional susceptibility patterns should be considered when selecting therapy.

If no response to initial therapy, broaden antimicrobial coverage to include resistant pathogens, anaerobes, and fungi.

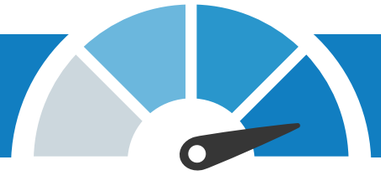
High-risk patients will need to receive an antipseudomonal β-lactam agent such as:
→ Cefepime
→ Piperacillin-Tazobactam
→ Meropenem
→ Imipenem/Cilastatin

In all cases, continue treatment until the ANC is≥ 500 cells/mm^3 and the patient is afebrile for at least 48 hours.

ANC: Absolute Neutrophil Count; IV: Intravenous.
References: 1. Villafuerte-Gutierrez P, et al. Adv Hematol. 2014;2014:986938. 2. Lucas AJ, et al. P T. 2018;43(4):228-232.

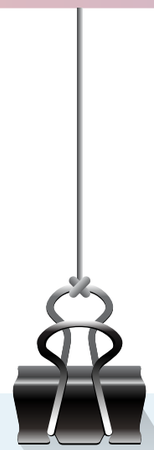
ANTIBIOTIC DECISION TREE: HIGH-RISK FEBRILE NEUTROPENIA

High-risk patients



- Need to be hospitalized
- Institutional susceptibility patterns should be considered
- *Pseudomonas* is the main target during initial empiric therapy
- Antipseudomonal β-lactam agent required

Vancomycin is recommended as an empiric treatment for specific indications, including skin/soft tissue infections, pneumonia, catheter-related infections, or patients who are hemodynamically unstable.



Treatment options for resistant pathogens:

MRSA: Vancomycin, Linezolid, and Daptomycin

VRSA: Linezolid and Daptomycin

ESBL: Carbapenems (Meropenem)

KPC: Colistin, Tigecycline

ESBL: Extended-Spectrum β-Lactamase; MRSA: Methicillin-Resistant *Staphylococcus aureus;* KPC: *Klebsiella pneumoniae* carbapenemase; VRSA: Vancomycin-Resistant *Staphylococcus aureus.*

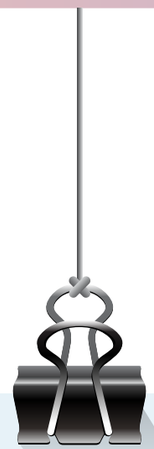
Reference: 1. Lucas AJ, et al. P T. 2018;43(4):228-232.

ANTIBIOTIC DECISION TREE: LOW-RISK FEBRILE NEUTROPENIA

Low-risk patients

- Carefully selected for outpatient antibiotics, BUT
- Monitor closely for clinical deterioration
- Must be located within a reasonable distance to a hospital

If a patient remains febrile for 48 hours, antibiotic coverage should be broadened, and the patient will need to be admitted to the hospital.



First-line options →

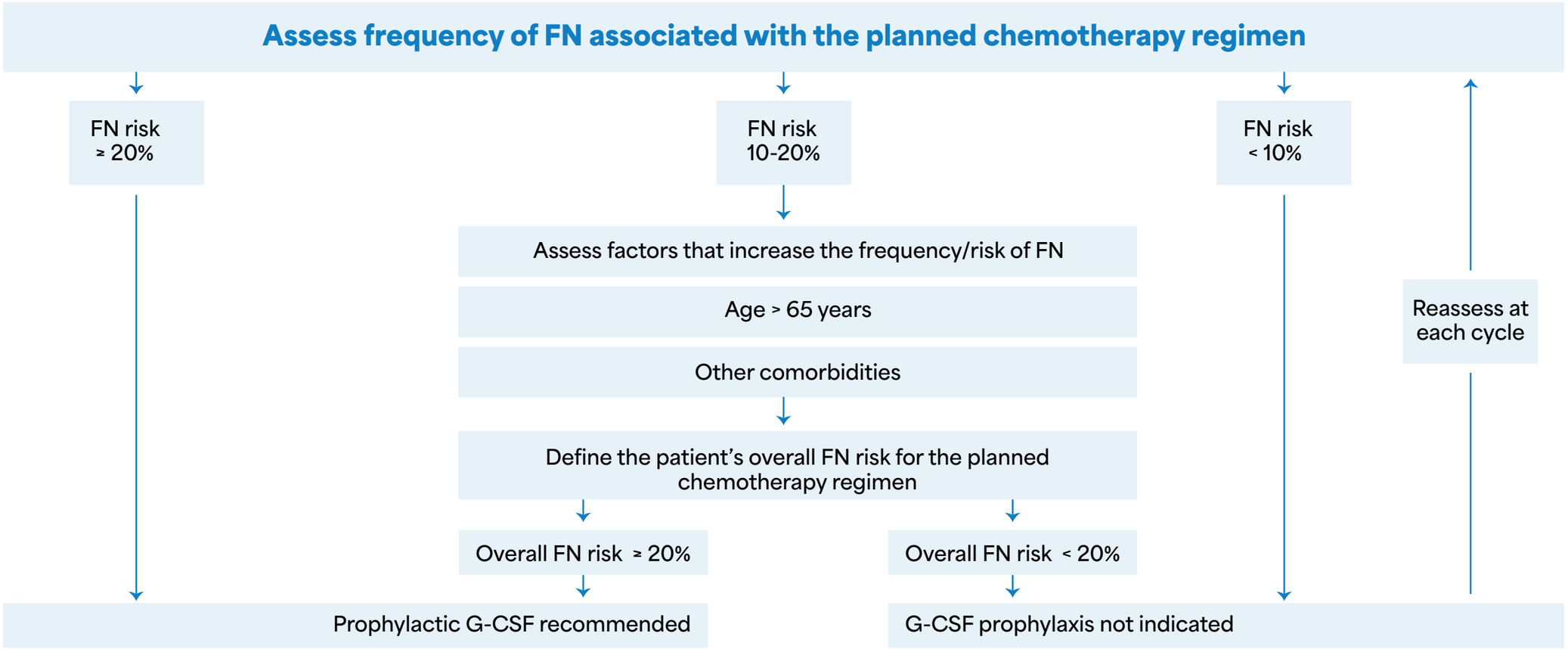
Fluoroquinolone monotherapy (Moxifloxacin or Ciprofloxacin + Amoxicillin/Clavulanic acid)

Patients with penicillin allergies →

Use Clindamycin

Reference: 1. Lucas AJ, et al. P T. 2018;43(4):228-232.

ALGORITHM TO DECIDE PRIMARY PROPHYLACTIC G-CSF USAGE



FN: Febrile Neutropenia; G-CSF: Granulocyte Colony-Stimulating Factor.

Reference: 1. Klastersky J, et al . World J Clin Infect Dis. 2016;6(3):37-60.

MANAGEMENT OF FEBRILE NEUTROPENIA: ICMR 2022 GUIDELINES

Clinical Condition	Empirical Antimicrobial Agents	Alternate Antimicrobial Agents
FN	Piperacillin-Tazobactam + Amikacin	• **First-line:** Piperacillin-Tazobactam + Amikacin • **Second-line:** Meropenem ± Teicoplanin/Vancomycin • **Third-line or if patient is in septic shock:** Meropenem + Colistin/Polymyxin B ± Teicoplanin/Vancomycin + Caspofungin ± Fosfomycin/Tigecycline

FN: Febrile Neutropenia; ICMR: Indian Council of Medical Research.

Reference: 1. Bhopal Memorial Hospital and Research Centre, Bhopal and Indian Council of Medical Research. Treatment Guidelines for Antimicrobial Use in Common Syndromes, 2022.

OUTPATIENT EMPIRIC THERAPY IN FEBRILE NEUTROPENIA: IDSA GUIDELINES

What antimicrobials are recommended for outpatient empirical therapy in patients with FN?

01

RECOMMENDATION FOR ORAL EMPIRICAL THERAPY:
Fluoroquinolone (Ciprofloxacin or Levofloxacin) plus Amoxicillin/Clavulanate (or Clindamycin for patients allergic to Penicillin)

02

In a high prevalence setting of **ESBL-PRODUCING GRAM-NEGATIVE BACILLI OR FLUOROQUINOLONE RESISTANCE:**
Hospital admission and consider initial empirical antibacterial treatment with a carbapenem

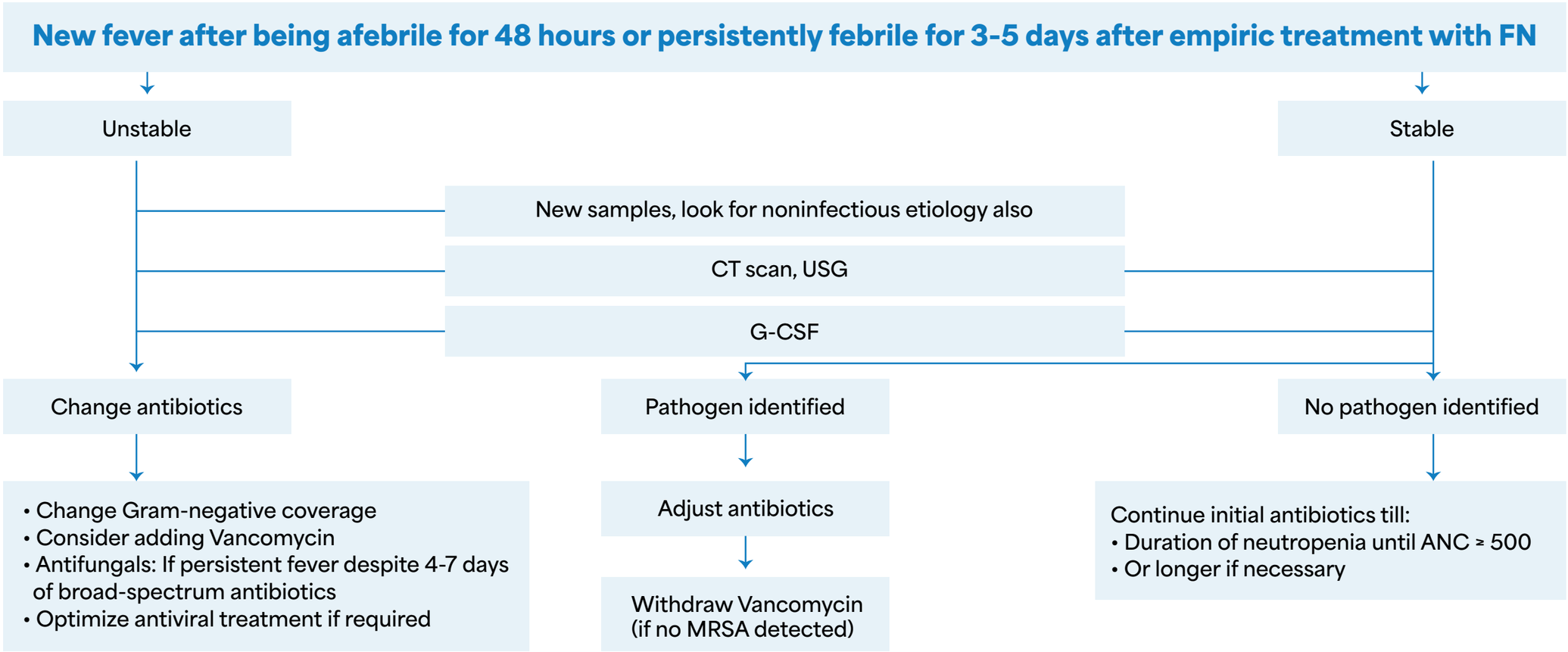
03

MRSA, VRE, concern for specific active infection or CRBSI:
Hospital admission and consider targeted therapy

CRBSI: Catheter-Related Bloodstream Infection; ESBL: Extended-Spectrum β-Lactamase; FN: Febrile Neutropenia; IDSA: The Infectious Diseases Society of America; MRSA: Methicillin-Resistant *Staphylococcus aureus;* VRE: Vancomycin-Resistant Enterococci.

Reference: 1. Taplitz RA, et al. J Clin Oncol. 2018;36(14):1443-1453.

APPROACH TO NEW-ONSET FEVER AFTER 48 HOURS OR PERSISTENT FEVER IN FEBRILE NEUTROPENIA



ANC: Absolute Neutrophil Count; CT: Computed Tomography; FN: Febrile Neutropenia; G-CSF: Granulocyte Colony-Stimulating Factor; MRSA: Methicillin-Resistant *Staphylococcus aureus;* USG: Ultrasonography.

Reference: 1. Siddiqui SS, et al. Case-Based Review in Critical Care Medicine. 2019;109.

SECTION 3:

ROLE OF BL/BLIs IN FEBRILE NEUTROPENIA

BL/BLIs: β-Lactam/β-Lactamase Inhibitors.

ROLE OF BL/BLIs AS EMPIRIC THERAPY IN FEBRILE NEUTROPENIA

01

ECIL-10 RECOMMENDATIONS (2024):

- Piperacillin-Tazobactam (a BL/BLI) is listed as a first-line empiric antibiotic option for patients with FN.
- Other BL/BLIs such as Ticarcillin-Clavulanate and Cefoperazone-Sulbactam are also mentioned as possible empiric options.

02

GUIDELINES EMPHASIZE USING BL/BLIs IN:

- Uncomplicated presentation
- No known colonization with resistant bacteria
- No previous infection with resistant bacteria
- In centers where infections due to resistant pathogens are rarely seen at the onset of FN

These findings favor the use of BL/BLIs in the empiric treatment of FN.

BL/BLIs: β-Lactam/β-Lactamase Inhibitors; ECIL: European Conference on Infections in Leukaemia; FN: Febrile Neutropenia.

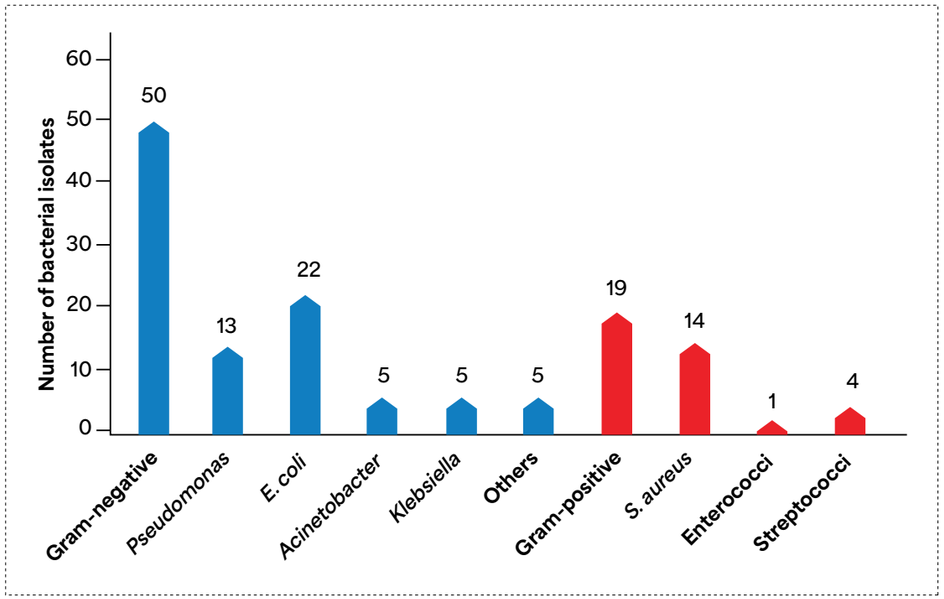
Reference: 1. Averbuch D, et al. Bacterial: febrile neutropenia - duration of therapy - new drugs (10th European Conference on Infections in Leukaemia).

LOCAL ANTIBIOGRAM DATA SUPPORTING BL/BLI USE

Retrospective analysis of patients presenting with FN to a tertiary care oncology hospital in India

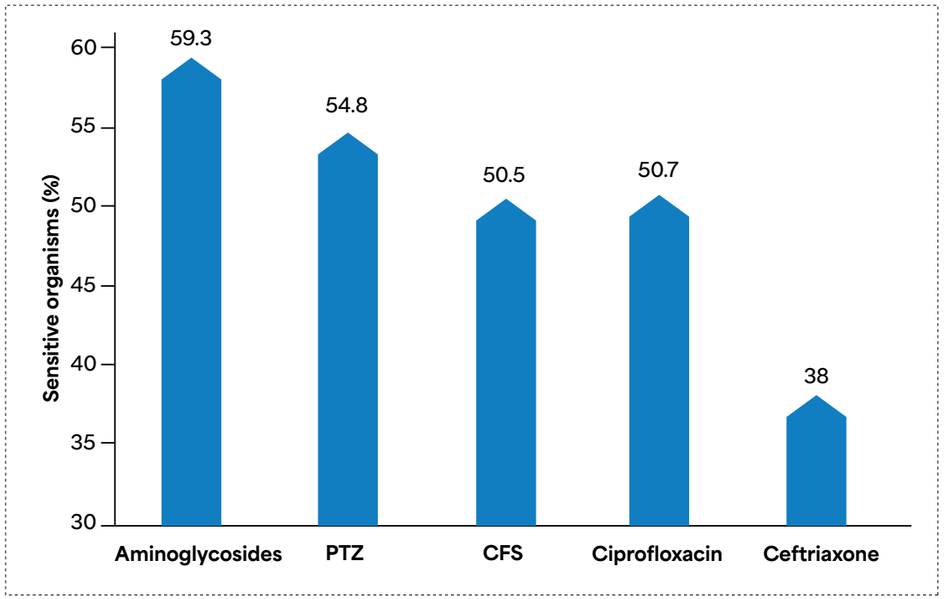
93% of patients treated with third-generation cephalosporin/BLI, with aminoglycoside or fluoroquinolone.

Bacterial isolates identified in blood



Predominant cause of FN: **Gram-negative bacteremia**

Antibiotic sensitivity of isolates



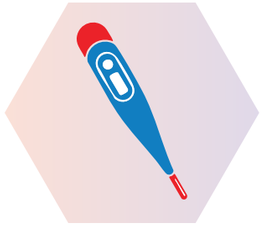
Most commonly used antibiotic combination: **CFS**

BL/BLI: β-Lactam/β-Lactamase Inhibitor; CFS: Cefoperazone-Sulbactam; FN: Febrile Neutropenia; PTZ: Piperacillin-Tazobactam.

Reference: 1. Noronha V, et al. Indian J Cancer. 2014;51(4):470-4.

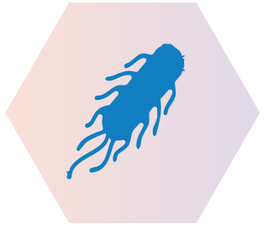
AN INDIAN STUDY ON THE PREVALENCE OF CARBEPENEM-RESISTANT INFECTIONS IN PATIENTS WITH FEBRILE NEUTROPENIA

The bacterial spectrum and prevalence of antimicrobial resistance in bloodstream infections in adult patients with FN having hematolymphoid malignancies in a tertiary oncology center in India.



307 out of 1670 patients with hematolymphoid malignancies had FN

Microbiologically confirmed bloodstream infections: **24.1%**



Most common organism: *E. coli* **(36.4%)**

Carbapenem-resistant Gram-negative bloodstream infections: **38.2%**

Mortality rate: 32.6%

Use of BL/BLIs as carbapenem-sparing alternatives may be useful to avoid the spread of CRE. This strategy may prove useful in limiting the spread of carbapenem resistance.

BL/BLIs: β-Lactam/β-Lactamase Inhibitors; CRE: Carbapenem-Resistant *Enterobacteriaceae; E. coli: Escherichia coli*; FN: Febrile Neutropenia.

Reference: 1. Bajpai V, et al. Cancer Res Stat Treat. 2023;6(1):5-12.

EMPIRIC USE OF CEFOPERAZONE-SULBACTAM IN FEBRILE NEUTROPENIA

A meta-analysis assessed the clinical efficacy and safety of Cefoperazone-Sulbactam for treating FN.

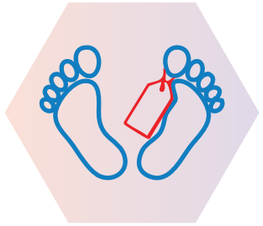
Treatment success rate:

57.9%

Similar to comparators*

Similar treatment success rate →

Piperacillin-Tazobactam and carbapenems



All-cause mortality:

6% Similar to comparators*

Most common adverse events:

Rash and nausea/vomiting

Similar to comparators*

The clinical efficacy and tolerability of Cefoperazone-Sulbactam are comparable to comparator drugs in the treatment of FN.

FN: Febrile Neutropenia.
*Four studies used Piperacillin-Tazobactam as the comparator and 4 used carbapenems. One study each used Cefepime, Cefoperazone plus Mezlocillin, and Ceftazidime as the comparator.
Reference: 1. Lan SH, et al. Medicine (Baltimore). 2020;99(8):e19321.

PIPERACILLIN-TAZOBACTAM VS. CEFOPERAZONE-SULBACTAM IN FEBRILE NEUTROPENIA

A study compared the efficacy of PTZ and CFS in adult patients with hematological malignancies in FN

Study design -

Sample size:

157 patients, 200 episodes of FN

Patient characteristics:

- > 18 years old
- ANC < 500/mm^3
- Oral body temperature ≥ 38.3°C at a single measurement or 38°C after 1-h monitoring

Results

44.5%	Microbiologically documented infections
61%	Overall success rate with CFS → Similar to PTZ (41%)
26.8%	Success rate without modification (CFS) → Similar to PTZ (22.9%); similar trend observed with success rate with modification
14%	Mortality rate with CFS → Similar to PTZ (16.9%)

PTZ and CFS are equally effective and safe for the empirical treatment of patients with FN.

ANC: Absolute Neutrophil Count; CFS: Cefoperazone-Sulbactam; FN: Febrile Neutropenia; PTZ: Piperacillin-Tazobactam.

Reference: 1. Aynioglu A, et al. Rev Esp Quimioter. 2016;29(2):69-75.

REAL-WORLD EVIDENCE

Objective: To compare the effectiveness of β-lactam empiric therapy in patients with FN.

Study details -

Study design:

Systematic review and meta-analysis

Patients:

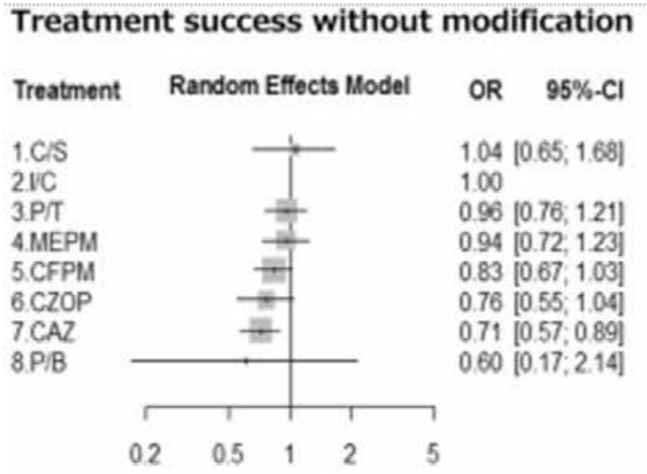
Adult and pediatric patients with FN undergoing chemotherapy for either solid tumors or hematological malignancies

Analysis:

1275 articles, 50 studies, 10872 patients

Results

Cefoperazone-Sulbactam:
Highest odds for treatment success followed by Imipenem/Cilastatin and Piperacillin-Tazobactam



Cefoperazone-Sulbactam: An effective alternative in the empiric treatment of FN.

CAZ: Ceftazidime; CI: Confidence Interval; CFPM: Cefepime; C/S: Cefoperazone-Sulbactam; CZOP: Cefozopran; I/C: Imipenem/Cilastatin; MEPM: Meropenem; OR: Odds Ratio; P/B: Panipenem/Betamipron; P/T: Piperacillin-Tazobactam.

Reference: 1. Horita N, et al. Clin Microbiol Infect. 2017;23(10):723-729.

SECTION 4:

CASE DISCUSSION

CASE 1: FEBRILE NEUTROPENIA IN A PEDIATRIC CANCER PATIENT

Patient profile

- Age: 20-year-old male
- Chief complaint: Episodic fevers
- Medical history:

→ Burkitt leukemia

→ Previously hospitalized (3 weeks prior to current presentation) for similar symptoms, reduced ANC, which recovered with supportive care

→ After discharge: Normal complete blood counts (taken weekly)

History of present illness

- Regular episodic fevers for the past 6 months
- Frequency of episodic fevers: 4-6 weeks (but has been increasing in frequency in the past 2 months)
- Duration of episodic fevers: 3 days
- Temperature: 103°F
- Additional symptoms: Muscle pain and occasionally sore throat, chills, night sweats, decreased appetite, and unintended weight loss of 5-10 kg

How to proceed with the medical management of this patient?

Points for discussion: 1. Choice of antibiotic 2. Role of BL/BLI - dosage, duration of therapy 3. Escalation/de-escalation of antibiotics

ANC: Absolute Neutrophil Count; BL/BLI: β-Lactam/β-Lactamase Inhibitor.
Hypothetical case.

CASE 2: FEBRILE NEUTROPENIA IN AN IMMUNOCOMPROMISED ADULT PATIENT

Patient profile

Age: 68-year-old male

Chief complaint: Persistent daily fever

Medical history: Stage IVB diffuse large B-cell lymphoma (DLBCL)

Clinical examination:

- 9 × 3 cm sized hematoma on the left upper extremity at the site of IV infiltration from a previous hospitalization
- Healing Stage II decubitus ulcer
- Temperature: 102.9°F

Investigations

- Hemoglobin: 7.4 g/dL
- Leukocyte count: 0.4×10^9/L
- Platelet count: 12×10^9/L
- Alkaline phosphatase: 275 U/L
- Creatinine: 0.6 mg/dL
- Lactate dehydrogenase: 229 U/L
- Normal levels of:
  - Aspartate aminotransferase
  - Alanine aminotransferase
  - Total bilirubin

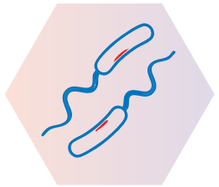
How to proceed with the medical management of this patient?

Points for discussion: 1. Choice of antibiotic 2. Role of BL/BLI – dosage, duration of therapy 3. Escalation/de-escalation of antibiotics

BL/BLI: β-Lactam/β-Lactamase Inhibitor.
Hypothetical case.

SUMMARY AND KEY TAKEAWAYS

KEY TAKEAWAYS



Gram-negative infections predominantly cause FN in Indian patients.

Prompt diagnosis is essential and risk assessment tools are critical for guiding appropriate treatment decisions.

Timely administration of antibiotics– ideally within 1 hour of presentation –is vital in the management of FN.

The growing threat of carbapenem resistance highlights the role of **BL/BLIs as an effective alternative.**

Cefoperazone-Sulbactam offers comparable effectiveness and tolerability to standard treatments for FN.

BL/BLIs: β-Lactam/β-Lactamase Inhibitors; FN: Febrile Neutropenia.

THANK YOU!