

Oncologic Emergencies in the Hospitalized Setting

Oncologic emergencies are life-threatening complications of cancer or its treatment, requiring rapid recognition and management in the hospital setting. This pamphlet provides students with a detailed guide to evaluate, diagnose, and treat these emergencies, with case scenarios to apply the knowledge.

Evaluation

- **Overview:** Oncologic emergencies can be metabolic, hematologic, or structural, often presenting with acute symptoms in cancer patients or as the initial presentation of malignancy.
- **History:**
 - Symptoms:
 - Confusion (hypercalcemia, tumor lysis syndrome), fever (neutropenic fever), back pain (spinal cord compression), dyspnea (SVC syndrome), bleeding (DIC).
 - Risk Factors:
 - Known malignancy (type, stage, treatment history), recent chemotherapy, radiation, or immunotherapy, history of infection, or rapid tumor growth.
 - Systemic Symptoms:
 - Weight loss, night sweats, fatigue (malignancy progression).
- **Physical Exam:**
 - Neurologic:
 - Focal deficits, altered mental status (spinal cord compression, hypercalcemia, TTP).
 - Cardiopulmonary:
 - Facial edema, jugular venous distension (SVC syndrome), hypoxia (malignant pleural effusion).
 - Infectious Signs:
 - Fever, tachycardia, hypotension (neutropenic fever).
 - Hematologic:
 - Petechiae, purpura (DIC, TTP), pallor (anemia).

- **Initial Labs:**

- CBC:
 - Neutropenia (ANC <500/ μ L), thrombocytopenia (DIC, TTP), anemia (marrow infiltration).
- Metabolic Panel:
 - Calcium (hypercalcemia), potassium/phosphate/uric acid (tumor lysis syndrome), creatinine (renal impairment).
- Coagulation:
 - PT/INR, PTT, D-dimer, fibrinogen (DIC).
- Peripheral Smear:
 - Schistocytes (TTP), blasts (leukemia).

Causes and Presentations

- **Hypercalcemia of Malignancy:**

- Causes:
 - Parathyroid hormone-related protein (PTHrP) secretion (squamous cell carcinoma, renal cell carcinoma), osteolytic metastases (multiple myeloma, breast cancer), 1,25-dihydroxyvitamin D production (lymphoma).
- Presentation:
 - Calcium >10.5 mg/dL (severe >14 mg/dL), confusion, lethargy, constipation, polyuria, dehydration, EKG changes (short QT, arrhythmias).

- **Tumor Lysis Syndrome (TLS):**

- Causes:
 - Rapid tumor cell turnover (ALL, Burkitt lymphoma, AML), often post-chemotherapy (e.g., cyclophosphamide, rituximab), leading to release of intracellular contents.
- Presentation:
 - Hyperkalemia (>6 mEq/L), hyperphosphatemia (>4.5 mg/dL), hyperuricemia (>8 mg/dL), hypocalcemia (<7 mg/dL), renal failure (Cr >1.5x baseline), arrhythmias, seizures.

- **Neutropenic Fever:**

- Causes:
 - Chemotherapy-induced myelosuppression (e.g., cyclophosphamide, doxorubicin), bone marrow infiltration (leukemia, lymphoma), infection in ANC $<500/\mu\text{L}$.
- Presentation:
 - Fever ($T >38.3^{\circ}\text{C}$ or $>38^{\circ}\text{C}$ for 1h), ANC $<500/\mu\text{L}$, signs of infection (pneumonia, cellulitis, line infection), hypotension (sepsis).

- **Spinal Cord Compression (SCC):**

- Causes:
 - Metastatic disease (breast, lung, prostate cancer), epidural mass (lymphoma), vertebral collapse (multiple myeloma).
- Presentation:
 - Back pain (worse at night, radicular), motor/sensory deficits (weakness, numbness), bowel/bladder dysfunction, hyperreflexia, positive Babinski sign.

- **Superior Vena Cava (SVC) Syndrome:**

- Causes:
 - External compression (lung cancer, lymphoma), thrombosis (central venous catheter, hypercoagulable state in malignancy).
- Presentation:
 - Facial/arm edema, dyspnea, jugular venous distension, collateral veins on chest, cyanosis, headache (increased ICP).

- **Disseminated Intravascular Coagulation (DIC):**

- Causes:
 - Acute leukemia (AML M3, APL), mucin-producing adenocarcinomas (pancreatic, gastric), sepsis in cancer patients.
- Presentation:
 - Thrombocytopenia ($<50,000/\mu\text{L}$), schistocytes, high D-dimer, low fibrinogen, prolonged PT/PTT, bleeding (petechiae, hematuria), thrombosis (DVT, stroke).

- **Thrombotic Thrombocytopenic Purpura (TTP) in Cancer:**

- Causes:
 - Chemotherapy (mitomycin C, gemcitabine), bone marrow transplant, paraneoplastic (adenocarcinomas), ADAMTS13 deficiency.
- Presentation:
 - Pentad (MAHA, thrombocytopenia, renal failure, neurologic symptoms, fever), schistocytes, high LDH, ADAMTS13 <10%.

- **Malignant Pericardial Effusion/Tamponade:**

- Causes:
 - Metastatic disease (lung, breast cancer, lymphoma), primary cardiac tumors (angiosarcoma).
- Presentation:
 - Dyspnea, chest pain, hypotension, muffled heart sounds, pulsus paradoxus, EKG (low voltage, electrical alternans), echo (pericardial effusion, RV collapse).

- **Hyperviscosity Syndrome:**

- Causes:
 - Multiple myeloma (IgM, Waldenström macroglobulinemia), leukemia (WBC >100,000/ μ L, AML/ALL).
- Presentation:
 - Neurologic symptoms (headache, vision changes, seizures), mucosal bleeding, retinopathy (sausage-shaped veins), CHF (plasma volume expansion).

Diagnostic Workup

- **Step 1: Identify the Emergency:**

- **Hypercalcemia:**
 - Calcium >10.5 mg/dL, EKG (short QT).
- **TLS:**
 - Hyperkalemia, hyperuricemia, renal failure post-chemotherapy.
- **Neutropenic Fever:**
 - ANC <500/ μ L, fever >38.3°C.
- **SCC:**
 - Back pain, neurologic deficits, MRI spine (gold standard).

- **SVC Syndrome:**
 - Facial edema, CT chest (mass/thrombosis).
- **DIC:**
 - High D-dimer, low fibrinogen, schistocytes.
- **TTP:**
 - Schistocytes, ADAMTS13 <10%, pentad.
- **Pericardial Effusion:**
 - Echo (effusion, tamponade signs), EKG (low voltage).
- **Hyperviscosity:**
 - Serum viscosity >5 cP, SPEP (monoclonal spike).

• **Step 2: Labs/Imaging:**

- **Hypercalcemia:**
 - PTH, PTHrP, 25-OH vitamin D, 1,25-OH vitamin D, SPEP (myeloma).
- **TLS:**
 - Potassium, phosphate, uric acid, Cr, LDH, urine output.
- **Neutropenic Fever:**
 - Blood cultures (aerobic/anaerobic), urine culture, chest X-ray, procalcitonin.
- **SCC:**
 - MRI spine (T1/T2-weighted), CT if MRI contraindicated.
- **SVC Syndrome:**
 - CT chest with contrast, Doppler (thrombosis), biopsy (if mass).
- **DIC:**
 - Peripheral smear (schistocytes), D-dimer, fibrinogen, PT/PTT, underlying cause (e.g., blood cultures for sepsis).
- **TTP:**
 - LDH, haptoglobin, ADAMTS13 activity, renal function, peripheral smear.
- **Pericardial Effusion:**
 - Echocardiogram (RV collapse), chest X-ray (enlarged cardiac silhouette), CT chest (metastases).
- **Hyperviscosity:**
 - Serum viscosity, SPEP/UPEP, CBC (leukocytosis in leukemia), fundoscopic exam.

• **Step 3: Additional Tests:**

- **Bone Marrow Biopsy:**
 - Leukemia, lymphoma (if suspected cause).

- Tumor Markers:
 - CEA, CA 19-9 (mucin-producing tumors in DIC), PSA (prostate cancer in SCC).
- Infectious Workup:
 - Viral PCR (CMV, EBV in neutropenic fever), fungal cultures (Aspergillus).

Diagnosis

• Hypercalcemia of Malignancy:

Calcium >14 mg/dL, high PTHrP (squamous cell), lytic lesions (myeloma), or high 1,25-OH vitamin D (lymphoma).

• TLS:

Cairo-Bishop criteria (2+ lab changes: uric acid >8 mg/dL, potassium >6 mEq/L, phosphate >4.5 mg/dL, calcium <7 mg/dL), clinical complications (renal failure, arrhythmia).

• Neutropenic Fever:

ANC <500/ μ L, fever >38.3°C, culture-negative (60-70% of cases).

• SCC:

MRI spine showing epidural mass, cord compression, or vertebral collapse.

• SVC Syndrome:

CT chest showing mass (lung cancer, lymphoma) or thrombosis, clinical symptoms (facial edema).

• DIC:

ISTH score ≥ 5 (platelet count, D-dimer, fibrinogen, PT), underlying malignancy (AML, adenocarcinoma).

• TTP:

Pentad, ADAMTS13 <10%, schistocytes, often chemotherapy-related in cancer patients.

- **Pericardial Effusion/Tamponade:**

Echo (RV collapse, >20 mmHg inspiratory drop in BP), EKG (electrical alternans).

- **Hyperviscosity:**

Serum viscosity >5 cP, IgM spike (Waldenström), or WBC >100,000/μL (leukemia).

Diagnostic Approach Table

| Emergency | Key Labs/Imaging | Diagnosis | Notes |
|-------------------|----------------------------------|----------------------------------|--|
| Hypercalcemia | Calcium, PTHrP, SPEP | Calcium >14 mg/dL, high PTHrP | Check EKG (short QT); rule out myeloma. |
| TLS | Potassium, uric acid, Cr | Hyperkalemia, hyperuricemia, AKI | Monitor urine output; EKG for arrhythmias. |
| Neutropenic Fever | ANC, blood cultures, chest X-ray | ANC <500/μL, fever >38.3°C | Start antibiotics within 1h; check for fungal infection. |
| SCC | MRI spine, neurologic exam | Epidural mass, cord compression | Urgent MRI; start steroids immediately. |

Treatment

- **General Principles:**

- Stabilize:
 - Address airway, breathing, circulation (ABCs); treat life-threatening symptoms (e.g., hyperkalemia, tamponade).
- Consult:
 - Oncology, hematology, radiation oncology, or surgery as needed.
- Specific Treatments:
 - Hypercalcemia of Malignancy:
 - Hydration: Normal saline 200-300 mL/h IV (aim urine output 100-150 mL/h).
 - Bisphosphonates: Zoledronic acid 4 mg IV over 15 min (onset 24-48h).
 - Calcitonin: 4 IU/kg IM/SC q12h (if severe, rapid onset but tachyphylaxis).
 - Denosumab: 120 mg SC (if refractory, renal failure).
 - Tumor Lysis Syndrome (TLS):
 - Prophylaxis: Allopurinol 300 mg PO daily (start 1-2 days pre-chemo); hydration (NS 2-3 L/day).

■ Treatment:

- Rasburicase 0.2 mg/kg IV x 1 (if uric acid >8 mg/dL); treat hyperkalemia (insulin/dextrose, calcium gluconate 1 g IV); dialysis (if AKI, refractory hyperkalemia).
- Neutropenic Fever:
 - Empiric Antibiotics: Piperacillin-tazobactam 4.5 g IV q6h or cefepime 2 g IV q8h (start within 1h); add vancomycin 15 mg/kg IV q12h (if line infection, MRSA risk).
 - Antifungal: Micafungin 100 mg IV daily (if fever persists >4-7 days).
 - G-CSF: Filgrastim 5 mcg/kg/day SC (if ANC <100/ μ L, high-risk).
- Spinal Cord Compression (SCC):
 - Steroids: Dexamethasone 10 mg IV bolus, then 4 mg IV q6h (reduce edema).
 - Radiation: 30 Gy in 10 fractions (if radiosensitive tumor, e.g., lymphoma).
 - Surgery: Decompression/stabilization (if unstable spine, rapid progression).
- SVC Syndrome:
 - Supportive: Elevate head of bed, oxygen (if hypoxic), diuretics (furosemide 40 mg IV, short-term).
 - Definitive: Stenting (if thrombosis), radiation (if mass, e.g., lung cancer), chemotherapy (lymphoma).
- DIC: Treat Underlying Cause:
 - **Chemotherapy (APL: ATRA 45 mg/m² PO daily)**, antibiotics (sepsis: piperacillin-tazobactam 4.5 g IV q6h).
 - Supportive:
 - FFP 15 mL/kg IV (if bleeding), cryoprecipitate (if fibrinogen <100 mg/dL), platelet transfusion (if <20,000/ μ L and bleeding).
- TTP:
 - Plasma Exchange (PLEX):
 - Daily until platelets >150,000/ μ L; steroids (prednisone 1 mg/kg/day).
 - Caplacizumab: 10 mg IV/SC daily (if ADAMTS13 <10%).
 - Avoid Platelet Transfusion: Unless life-threatening bleeding.
- Malignant Pericardial Effusion/Tamponade:
 - Pericardiocentesis: Urgent (if tamponade, >20 mmHg pulsus paradoxus), send fluid for cytology.
 - Pericardial Window: If recurrent effusion (surgical or catheter-based).
 - Chemotherapy:
 - **If chemosensitive tumor (e.g., lymphoma: CHOP regimen).**

- Hyperviscosity Syndrome:
 - Plasmapheresis: Urgent (1-2 plasma volumes daily until viscosity <4 cP).
 - Chemotherapy: Multiple myeloma (lenalidomide 25 mg PO daily + dexamethasone 40 mg weekly); leukemia (hydroxyurea 1-2 g PO daily).
 - Hydration: NS 100 mL/h IV (avoid overhydration in CHF).

• Key Tips:

- Monitor:
 - Frequent labs (electrolytes, CBC, coagulation), vital signs, urine output.
- Avoid Delays:
 - Rapid intervention (e.g., PLEX in TTP, antibiotics in neutropenic fever) improves outcomes.

Treatment Guidelines Table

| Emergency | Treatment Agent/Dose | Notes |
|-------------------|--|---|
| Hypercalcemia | Hydration, NS 200-300 mL/h IV Zoledronic acid 4 mg IV | Monitor for hypocalcemia post-treatment. |
| TLS | Rasburicase, Rasburicase 0.2 mg/kg IV x 1 NS 2-3 L/day | Dialysis if AKI; EKG for hyperkalemia. |
| Neutropenic Fever | Empiric antibiotics, Cefepime 2 g IV q8h G-CSF Filgrastim 5 mcg/kg/day SC | Add antifungals if fever persists >4 days. |
| TTP | Plasma exchange, Daily PLEX Steroids Prednisone 1 mg/kg/day | Avoid platelet transfusion unless bleeding. |

Complications

• Acute:

- Arrhythmias:
 - Hyperkalemia (TLS), hypercalcemia (short QT, VT).
- Sepsis:
 - Neutropenic fever (mortality 10-20% if untreated), DIC (multi-organ failure).
- Neurologic:
 - Permanent deficits (SCC if untreated >24h), seizures (hyperviscosity, TLS).

- **Chronic:**

- Renal Failure:
 - TLS (uric acid nephropathy), hypercalcemia (nephrocalcinosis).
- Recurrence:
 - SVC syndrome (if mass untreated), pericardial effusion (without definitive therapy).

- **Underlying Disease:**

- Progression:
 - AML (DIC in APL), lymphoma (SVC syndrome, hyperviscosity).
- Infection:
 - Chemotherapy-related immunosuppression (neutropenic fever).

Key Pearls

- **Hypercalcemia:**

Suspect in confusion, polyuria; hydrate first, then bisphosphonates.

- **TLS:**

Prophylaxis (allopurinol, hydration) in high-risk tumors (Burkitt lymphoma, ALL).

- **Neutropenic Fever:**

Antibiotics within 1h; ANC <100/ μ L is high-risk.

- **SCC:**

MRI spine urgently; start dexamethasone before imaging if neurologic symptoms.

- **SVC Syndrome:**

Stenting for rapid relief; biopsy mass for definitive treatment.

- **DIC/TTP:**

Schistocytes on smear; PLEX for TTP, treat underlying cause in DIC.

- **Pericardial Effusion:**

Echo for tamponade; pericardiocentesis if RV collapse.

- **Hyperviscosity:**

Plasmapheresis for acute symptoms; treat underlying malignancy.

References

- **UpToDate:**

“**Oncologic Emergencies:** Diagnosis and Management” (2025).

- **NEJM:**

“**Tumor Lysis Syndrome:** Pathophysiology and Treatment” (2023).

- **AAFP:**

“Neutropenic Fever in Cancer Patients” (2024).

- **Blood:**

“Spinal Cord Compression in Metastatic Cancer” (2024).

Case Scenarios

Case 1: A 60-Year-Old Male with Confusion

- **Presentation:** A 60-year-old male with a history of squamous cell lung cancer presents with confusion, lethargy, and constipation for 3 days. Exam shows dry mucous membranes, no focal deficits. EKG: Short QT interval.
- **Labs:** Calcium 15.2 mg/dL, Cr 1.8 mg/dL, PTHrP elevated, PTH low, normal 25-OH vitamin D.
- **Diagnosis:** Hypercalcemia of Malignancy → Calcium >14 mg/dL, high PTHrP (squamous cell carcinoma).
- **Management:** Start IV hydration with NS 300 mL/h (monitor urine output). Give zoledronic acid 4 mg IV over 15 min. Calcitonin 4 IU/kg IM if no improvement in 6-12h. Monitor calcium, EKG, and mental status. Consult oncology for cancer management.

Case 2: A 35-Year-Old Female with Fever Post-Chemotherapy

- **Presentation:** A 35-year-old female with ALL, 5 days post-chemotherapy (cyclophosphamide), presents with fever (T 38.5°C), chills, and fatigue. Exam shows tachycardia (HR 110 bpm), no obvious infection source.

- Labs: ANC 300/ μ L, WBC 1,000/ μ L, Hgb 9 g/dL, platelets 50,000/ μ L. Blood cultures pending, chest X-ray normal.
- Diagnosis: Neutropenic Fever \rightarrow ANC <500/ μ L, fever >38.3°C, post-chemotherapy.
- Management: Start cefepime 2 g IV q8h within 1h. Blood cultures x2, urine culture, and monitor for hypotension. Add vancomycin 15 mg/kg IV q12h if no response in 48h (suspect line infection). Filgrastim 5 mcg/kg/day SC to boost ANC. Consult infectious disease if fever persists >4 days (consider antifungals).

Case 3: A 50-Year-Old Male with Back Pain and Weakness

- Presentation: A 50-year-old male with metastatic prostate cancer presents with severe back pain (worse at night) and leg weakness for 2 days. Exam shows 4/5 strength in lower extremities, hyperreflexia, positive Babinski sign.
- Imaging: **MRI spine:** T10 epidural mass with cord compression.
- Diagnosis: Spinal Cord Compression (SCC) \rightarrow Epidural mass, neurologic deficits, metastatic prostate cancer.
- Management: Start dexamethasone 10 mg IV bolus, then 4 mg IV q6h. Urgent radiation oncology consult for radiotherapy (30 Gy in 10 fractions). Consider surgical decompression if unstable spine. Monitor neurologic status q4h; consult neurosurgery if worsening.

Visit: medcheatsheets.com for more education, fun resources and 10 category 1 AAPA CME credit!

© Hospital Medicine Cheat Sheets (medcheatsheets.com). For educational purposes only. Do not redistribute or sell. Neither the author nor the company is liable for realworld implications. AI was used in development