Oncologic Emergencies for the Non-Oncologist

Jason Bischof, MD, FACEP
Assistant Professor
Department of Emergency Medicine
The Ohio State University Wexner Medical Center

Disclosures

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  • The Ohio Attorney General’s Office

Objectives

1. Explain the state of acute oncology for the emergency medicine clinician.
2. Describe common acute complications experienced by oncology patients.
3. Discuss current deficits seen by emergency medicine clinicians in the acute care of oncology patients.
4. Describe the care coordination for oncology patients across medical specialties.
Current state of unscheduled acute care

Trends in Adult Cancer-Related Emergency Department Utilization: An Analysis of Data From the Nationwide Emergency Department Sample


Overview
Established in March 2015, the Comprehensive Oncologic Emergencies Research Network (CONCERN) is an open scientific forum for oncology and emergency medicine researchers. Its goal is to accelerate knowledge generation, synthesis, and translation of oncologic emergency medicine research through multi-center collaborations.

Table 2. Most Common ED Diagnoses Among 1075 Patients With Active Cancer

<table>
<thead>
<tr>
<th>ICD-10-CM Code</th>
<th>ICD-10-CM Category</th>
<th>Frequency, No. (%) [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>R10</td>
<td>Abdominal and pelvic pain</td>
<td>100 [95] (9.3) [7.6 - 11.2]</td>
</tr>
<tr>
<td>R05</td>
<td>Fever of unknown origin</td>
<td>87 [81] (7.9) [6.5 - 9.6]</td>
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<tr>
<td>R06</td>
<td>Nausea and vomiting</td>
<td>77 [72] (7.2) [6.3 - 8.2]</td>
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<tr>
<td>R07</td>
<td>Pain in head and neck</td>
<td>51 [47] (4.7) [3.8 - 5.8]</td>
</tr>
<tr>
<td>R14</td>
<td>Other digestive system disorders</td>
<td>47 [44] (4.4) [3.6 - 5.3]</td>
</tr>
<tr>
<td>R35</td>
<td>Malaise and fatigue</td>
<td>45 [42] (4.2) [3.5 - 5.2]</td>
</tr>
<tr>
<td>R36</td>
<td>Volume depletion</td>
<td>43 [40] (4.0) [3.3 - 4.8]</td>
</tr>
<tr>
<td>I26</td>
<td>Pulmonary embolism</td>
<td>39 [35] (3.6) [2.9 - 4.9]</td>
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<tr>
<td>J18</td>
<td>Pneumonia, unspecified organism</td>
<td>39 [35] (3.6) [2.9 - 4.6]</td>
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<tr>
<td>L40</td>
<td>Neoplasm of the oral cavity</td>
<td>37 [34] (3.4) [2.7 - 4.4]</td>
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<tr>
<td>N33</td>
<td>Other disorders of the esophagus</td>
<td>36 [33] (3.4) [2.8 - 5.0]</td>
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<tr>
<td>R39</td>
<td>Other symptoms and signs involving the digestive system</td>
<td>36 [33] (3.4) [2.8 - 5.0]</td>
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<tr>
<td>L79</td>
<td>Secondary malignant neoplasm of other and unspecified sites</td>
<td>35 [31] (3.3) [2.5 - 4.1]</td>
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<tr>
<td>M51</td>
<td>Other symptoms and signs involving the digestive system and abdomen</td>
<td>33 [30] (3.0) [2.3 - 4.1]</td>
</tr>
<tr>
<td>M94</td>
<td>Other symptoms and signs involving the digestive system and abdomen</td>
<td>33 [30] (3.0) [2.3 - 4.1]</td>
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<tr>
<td>M79</td>
<td>Other and unspecified soft tissue and connective tissue disorders, not elsewhere classified</td>
<td>28 [26] (2.6) [1.9 - 3.5]</td>
</tr>
<tr>
<td>L46</td>
<td>Other and unspecified soft tissue and connective tissue disorders, not elsewhere classified</td>
<td>28 [26] (2.6) [1.9 - 3.5]</td>
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</table>

What do the rest of us know?

ABFM In-Training Examination Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Content %</th>
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<tbody>
<tr>
<td>Cardiovascular</td>
<td>12</td>
<td>Nonspecific</td>
<td>9</td>
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<tr>
<td>Endocrine</td>
<td>8</td>
<td>Psychogenic</td>
<td>7</td>
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<tr>
<td>Gastrointestinal</td>
<td>7</td>
<td>Reproductive – Female</td>
<td>4</td>
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<tr>
<td>Hematologic/Immune</td>
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<td>Reproductive – Male</td>
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<tr>
<td>Integumentary</td>
<td>6</td>
<td>Respiratory</td>
<td>13</td>
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<tr>
<td>Musculoskeletal</td>
<td>12</td>
<td>Special Sensory</td>
<td>2</td>
</tr>
<tr>
<td>Nephrologic</td>
<td>3</td>
<td>Population-based Care</td>
<td>5</td>
</tr>
<tr>
<td>Neurologic</td>
<td>3</td>
<td>Patient-based Systems</td>
<td>5</td>
</tr>
</tbody>
</table>

The 2019 Model of the Clinical Practice of Emergency Medicine

The 2019 revision of the EM Model resulted in significant changes and clarifications, including the addition of an oncology section within Category 8, Hematologic and Oncologic Disorders

- Febrile Neutropenia
- Hypercalcemia of Malignancy
- Hyperviscosity Syndrome
- Malignant Pericardial Effusion
- Spinal Cord Compression
- Superior Vena Cava Syndrome
- Tumor Hemorrhage
- Tumor Lysis Syndrome

EM Education – How are we doing?

Rajha et al. surveyed EM program directors. (The American Journal of Emergency Medicine, 2020)

- Oncology topics are critical in the preparation of EM trained physicians?
  - Disagree: 4%
  - Neither Agree or Disagree: 6%
  - Agree: 75%
  - Strongly Agree: 16%

- Our EM residency program’s didactic curriculum fully prepares residents for the recognition and management of oncologic emergencies.
  - Disagree: 14%
  - Neither Agree or Disagree: 22%
  - Agree: 59%
  - Strongly Agree: 6%
Febrile Neutropenia

- Single oral temperature measurement of ≥38.3°C (101°F) or a temperature of ≥38.0°C (100.4°F) sustained over a 1 hour period
- Severe neutropenia that is defined as an absolute neutrophil count (ANC) of <500 cells/mm³ or expected during the next 48 hours
- Multiple etiologies including myelosuppression secondary to chemotherapy

Hypercalcemia

- Presentation:
  - GI symptoms, Neurologic changes, renal failure
- Severity:
  - Degree and rate of onset
- Causes:
  - Humoral: parathyroid hormone-related protein (PTHrP) secretion (80%)
  - Osteolytic (20%)
  - Vitamin D secretion
  - Ectopic PTH
- Treatment: Fluids, bisphosphonates, calcitonin, monoclonal antibody (Denosumab), avoid loop diuretics (volume dependent)

Hyperviscosity Syndrome

- Pathological increase in serum proteins, red blood cells (RBC), white blood cells (WBC), or platelets
- Triad: Neurologic deficits, bleeding, and visual changes (low flow state and platelet dysfunction)
- Waldenstrom Macroglobulinemia (10-30%), Myeloma (3-6%)
- Treatment: Plasmapheresis, Avoid dehydration (1-2L fluids), Treat etiology (Chemotherapy)

Malignant Pericardial Effusion

- Most often caused by lung cancer, breast cancer, melanoma, lymphoma, and leukemia.
- Chemotherapeutic agents (e.g., cyclophosphamide, cytarabine, dasatinib, doxorubicin, gemcitabine).
- Beck’s triad (hypotension, jugular venous distention, and muffled heart sounds) less likely due to slow accumulation.
- Intervention dependent of clinical stability.

Malignant Spinal Cord Compression

- Etiology: Primary invasion, Metastatic lesions, Pathologic fracture
- Back pain, focal neurologic deficits
- Associated with breast, lung, prostate, and kidney cancer, lymphoma and multiple myeloma
- Acute neurologic findings requires urgent MRI evaluation
- Multiple grading systems, symptom (Frankel) and imaging based (ESCC)
- Treatment: Dexamethasone 10-16mg IV, Chemotherapy/Radiation/Surgery depending on tumor type

Superior Vena Cava (SVC) Syndrome

- Blockage of thin walled SVC
- Generally malignancy: Lung Cancer, Non-Hodgkin’s Lymphoma
- Other causes: Catheter associated thrombosis, infection, thymoma, autoimmune disorders
- Swelling of the face, neck, arms, neck (edema including pleural and cerebral)
- Grading based on symptoms/involvement of azygous vein.
- Treatment dependent on etiology: Head of bed elevated, Airway management, Steroids, Chemotherapy, Radiation therapy, Stenting, bypass, Thrombolysis
Tumor Hemorrhage
- Management dependent on location and severity
- Due to malignancy or treatment adverse effects
- Assess for anticoagulation and reverse as appropriate
- Co-management with appropriate consulting service

- In a sample of 555 patients on Immune Checkpoint Inhibitors:
  Clinically significant bleeding and thrombocytopenia at 3 months of treatment were identified in 21% and 7%.

Tumor Lysis Syndrome
- Tends to occur in rapidly dividing tumors.
- Rapid release of potassium, phosphorous, nucleic acids, and cytokines.
- Laboratory definition: ≥2 abnormal serum values or a 25% change in value of uric acid, potassium, phosphorous, and calcium.
- Treatment: fluids, allopurinol, rasburicase, serial electrolyte monitoring, dialysis
  - no role for urine alkalization

Current Deficits

<table>
<thead>
<tr>
<th>Gaps in Current Curriculum</th>
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<tbody>
<tr>
<td>Immunotherapy Treatments and Associated Side Effects</td>
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<tr>
<td>Symptom and side effect management in Cancer Patients</td>
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<tr>
<td>Surgical Procedures and Complications in Patients with Cancer</td>
</tr>
<tr>
<td>Effects of Oncology treatment on Common Emergency Presentations</td>
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<tr>
<td>Need for Emergent Oncological Treatment for the Newly Diagnosed Cancer Patient with Cancer</td>
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<td>Care Utilization Across the Age Continuum and Rural/Urban Divide</td>
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<tr>
<td>Risk Stratification</td>
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<td>Diagnostic Pathways</td>
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<tr>
<td>Implementation Science Barriers to Oncology Evidence-Based Medicine</td>
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<tr>
<td>Social Determinant of Health Affecting Acute Presentation</td>
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Immunotherapy

Chemotherapy
Other Major Classes of Immunotherapy:
- Oncologic Vaccines
- Cytokines
- Viral Therapy

Chimeric Antigen Receptor T-cell Therapy (CAR-T)

Immune Checkpoint Inhibitors (ICI)

Proportion of US patients with cancer were eligible for immune checkpoint inhibitor therapy
1.5% (2011) → 36% (2019)

Immune Related Adverse Events (irAEs)
- All organ systems are potentially affected.
- Presentation is often delayed weeks, months and even years later.
- Eyes: Uveitis, Conjunctivitis
- Endocrine: Hypo/hyperthyroidism, hypopituitarism, hypophysitis, adrenal insufficiency
- Cardiovascular: Myocarditis, Pericarditis, Vasculitis
- Gastrointestinal: Colitis
- Musculoskeletal: Arthritis, Dermatomyositis
- Neurologic: Neuropathy, Myelopathy, Encephalitis, Myasthenia
- Respiratory: Pneumonitis, Pleuritis
- Liver: Hepatitis
- Renal: Nephritis
- Dermatologic: Rash, Vitiligo, Rash
Common Terminology for Adverse Events (CTCAE)

Cytokine Release Syndrome (CRS)
- Presents from mild to severe symptoms
  - fatigue → hypotensive shock and respiratory failure.
- Treatment: Supportive care as necessary
- Grading based on need for supportive measures

Immune Effector Cell-Associated Neurotoxicity syndrome (ICANS)
- Symptoms range from non specific neurologic symptoms (Fatigue) to Seizures, Coma and Death
  - 2/2 cerebral edema
- Graded by alterations to mental status
- Onset typically 3-10 days after treatment
- Evaluation: Altered Mental Status evaluation + LP + MRI
- Treatment: Supportive care seizure prophylaxis ± tocilizumab ± steroids
Care Coordination – Wrap Around Care

• irAE diagnosis is a diagnosis of exclusion dependent on obtaining an accurate history (integration of medical record)
• Clear communication/coordination with the primary oncologist
• Immunotherapy Wallet Cards
• Emergency Physician is part of the Oncology Team
• Need for adoption/endorsement of Oncology Guidelines by Non-Oncology Organizations

Joint Models of Acute Care

• Nurse Navigation extending from the Oncology Clinic/Ward to the ED
  • When surveyed, 91% of participants at an oncology navigation conference reported that navigation services in the ED would be either moderately or very helpful.
  • Hybrid Care Sites
    • Nurse Triage Line for acute care in Cancer Hospital Infusion Center versus Emergency Department
    • The James Immediate Care Center
    • Integrated Oncology Pods
    • Clear Referral Patterns – Diagnostic Center

https://cancer.osu.edu/blog/patients—finding—fast—relief—at—the—the–james—immediate—care—center

Abstract
Emergency evaluation of the cancer patient.

“Emergencies unrelated to the primary oncologic diagnosis,..., may occur. For this reason routine emergency protocols and diagnostic procedures should be followed in the treatment of oncology patients.”