

INTRODUCTION

There is no single disease entity known as “cancer”, but rather a group of heterogeneous diseases that share common pathologic properties. Commonalities include uncontrolled cellular growth and invasiveness. Other terms commonly referred to when discussing cancer include: benign, malignant, metastatic/metastases (‘mets’), tumour, and/or neoplasm. Thus, due to the various terms used and different associated pathologies, the more general term ‘oncologic emergencies’ is used in this guideline.

Emergencies may arise in this patient population as a result of the underlying disease process itself, due to secondary complications (e.g. pulmonary embolus), or alternatively as a complication of the actual treatment provided.

Over the course of the past century mortality due to trauma and infection has been eclipsed by death due to chronic disease in the developed world. Cancer is a leading cause of death in Canada as well as worldwide. Pre-hospital clinicians regularly encounter oncologic emergencies which pose unique challenges to the system and provider. Adequate attention must be given to reviewing advance directives. Palliative care is also finding a role in the pre-hospital setting.

SAFETY

These patients may be immunocompromised and are often being managed with cytotoxic therapies. As well, oncologic emergencies are often associated with discharge of bodily fluids. Therefore it is important that clinicians follow routine practices which will help protect both the provider and the patient. It is important to note that there is no evidence supporting reverse isolation in this patient population.

These calls may also have a psychosocial impact on the provider therefore it is important that clinicians follow-up with the appropriate support systems as required.

ASSESSMENT

The clinical presentation of oncologic emergencies can vary drastically. Tumours (whether solid or hematologic) can affect any body system and may affect more than one at any given time. Furthermore, treatment of malignant neoplasms is aggressive and often systemic and may cause symptoms in seemingly unrelated body regions/systems. A detailed history and thorough physical assessment is of the utmost importance to develop a differential diagnosis and subsequent treatment plan.

Oncologic emergencies may manifest quickly (over hours), and can cause rapid deterioration potentially leading to paralysis, coma or death. As such, early identification, treatment, and transport to appropriate definitive care can improve survival and prolong/maintain quality of life substantially.

It is important to be mindful of the fact that not all emergencies experienced by cancer patients are necessarily of an oncologic origin. Maintain a broad differential diagnosis during the assessment.

The patient and their family are often very knowledgeable regarding the patient’s condition, medical history and treatments provided. Clinicians should seek their input and guidance when obtaining a history, performing an assessment and providing management.

As a side note, all active chemotherapy patients in Nova Scotia are issued a “yellow card” with instructions for patients and emergency department staff for cancer patients presenting with fever (see Figure 1). Some patients with cancer may also be enrolled in the EHS Special Patient Program.

History

It is important to obtain details regarding the cancer diagnosis, the most recent course of treatment, and prognosis. It is also important to ask about the primary tumour site, if known, and whether the malignancy has metastasized to the lymphatic system or distally to other tissues or organs.

Many oncologic emergencies are directly related to the treatment of the cancer and as such it is useful to inquire about the most recent course of treatment be it surgical, a chemotherapeutic agent, radiation

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therapy, adjuvant treatment or a combination of the aforementioned. It is important to determine how many days post-treatment the patient is as well as what cycle of treatment they are in. See Figure 2 for common oncologic emergencies associated with specific tumour types/sites, as well as their associated signs and symptoms.

In addition to a focused history based upon the chief complaint, it is important to conduct a broader “SAMPLE” history as well.

Physical Assessment

This should always begin with an assessment of the level of consciousness, vital signs where appropriate, and abnormalities pertaining to the “ABCs”. Specific physical assessment findings that suggest an acute, life or limb threatening oncologic emergency include the following:

- Neurologic/cognitive abnormalities (ALOC, seizures, headache, etc.)
- Paralysis/paresthesias
- Dyspnea
- Signs of fluid overload
- Chest pain
- Arrhythmia
- Active bleeding (hematemesis, hematuria, hemoptysis, PV bleeding, etc.)
- Fever and/or chills/rigors
- Skin signs (petechiae, purpura, ecchymosis, cyanosis, pallor)
- SIRS criteria or suspected sepsis
- Pain (diffuse or localized)
- Neck pain, back pain or motor impairment
- Nausea or vomiting
- Oliguria

MANAGEMENT

General management: Cancer patients who present with emergent conditions are complex. The pre-hospital clinician should focus on early identification of an oncologic emergency, supportive care of the ABCs, symptom management and rapid transport to an appropriate facility. These principles of stabilization and symptom control may also be found in other EHS Clinical Practice Guidelines.

Goals of care must also be considered, and when appropriate, the Palliative Care Clinical Practice Guideline may be followed. Empathetic, family oriented care is important, as there is a large burden of psychosocial stress at play for patients with active cancer. There are a number of possible presentations that pre-hospital clinicians can positively impact with early interventions.

Malignant airway obstruction: Rare in malignancies which are not thoracic in nature, 20-30% of lung cancer patients will experience either airway compromise or full obstruction. Many patients (45%) with a malignant obstruction will present with hemoptysis. Stridor is common and typically inspiratory. Surgical cricothyrotomy may be indicated if the patient cannot be oxygenated and ventilated by other means. Airway anatomy is often distorted when there is a head or neck cancer, or radiation has been given in this area. This can make airway management, including cricothyrotomy difficult. For more information on managing airway obstructions or a difficult airway, see the Adult Airway Management Clinical Practice Guideline.

Superior Vena Cava Obstruction (SVCO): SVCO most commonly occurs in lung cancer patients and those with non-Hodgkin's Lymphoma, and consists of a partial or complete obstruction of the SVC and subsequent blood flow to the right atrium. SVCO can occur secondary to thrombosis of central venous catheters. SVCO is rarely a rapidly occurring presentation however is a life-threatening emergency as it can lead to a fatal increase in ICP. Facial or neck swelling may be present along with dilated chest vessels and stridor due to laryngeal edema. These patients require rapid transport. Pre-hospital management is symptom dependent. If IV access is required, the left arm is preferred.

Hemorrhage: Approximately 10% of active chemotherapy patients will experience one or more significant episodes of hemorrhage. Bleeding is the second most frequent cause of mortality in hematological cancer patients and third amongst those with metastatic disease. Goals of treatment may include early identification of the need for airway management, fluid resuscitation, and initiation of the massive transfusion protocol. Disseminated intravascular coagulation is also common in patients

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with certain types of cancer, as well as with those patients experiencing a transfusion reaction or who are septic. For more information on management of hemorrhage see the Shock Clinical Practice Guideline.

Increased ICP/seizures: Metastases to the brain are the most common cause of solid tumors in the brain occurring in a large number of adult oncology patients (20-40%). Common primary sites which metastasize to brain are lung, breast and melanoma, however, any primary tumor is capable of metastasizing to distal secondary sites such as the brain. Those with brain lesions may experience a number of neurological symptoms. When ICP increases these patients will classically present with a headache, nausea and vomiting (most severe in the morning or when laying supine). Seizures or status epilepticus may also occur. For more information on managing increased ICP/seizures see the Altered Level of Consciousness Clinical Practice Guideline.

Malignancy-associated hypercalcemia (MAH): MAH occurs in approximately 30% of cancer patients with a 30 day mortality rate of up to 50%. MAH patients may present with a variety of neurological symptoms, confusion, skeletal and abdominal pain, as well as cardiovascular manifestations. Shortened QTc intervals may be seen early in the disease process with ST segment elevation, hypotension, and bradyarrhythmias leading to cardiac arrest in the late stages. The pre-hospital clinician should focus on symptom control as required and management of any arrhythmia. For more information on managing arrhythmias see the Arrhythmia Clinical Practice Guideline.

Syndrome of inappropriate antidiuretic hormone secretion (SIADH): SIADH results from the inappropriate production of ADH and subsequent hyponatremia due to water retention. SIADH is most often associated with small cell lung cancer but may be associated with many other malignancies as well as chemotherapeutic agents. Early symptoms vary and are non-descript while late signs may include confusion, seizures, decerebrate posturing, coma and potential respiratory arrest. Prehospital management is supportive, refer to the appropriate presentation specific Clinical Practice Guideline as required.

Spinal cord compression (SCC): Malignant Epidural SCC occurs in approximately 5% of adult cancer patients, most often in those with metastatic disease around the spine. Any oncology patient complaining of new onset neck or back pain of any severity should raise concern for the possibility of SCC, which is a time sensitive emergency. Motor weakness and paresthesias are common. Treat pain as indicated. Definitive management may include rapid infusion of corticosteroids and emergency surgery or radiation therapy. Transport to a facility capable of these interventions if possible. For more information on treating pain see the Pain Management Clinical Practice Guideline.

Febrile neutropenia: The risk of adult chemotherapy patients developing febrile neutropenia is approximately 25-40%, with a mortality rate of approximately 5-20%. Any febrile chemotherapy patient or stem cell recipient who is actively receiving treatment, or has recently received treatment, should be treated as though they have febrile neutropenia. Neutropenia refers to a dramatically low neutrophil count (class of white blood cell). These individuals are at risk for rapidly becoming septic and require empiric antibiotic therapy within 60 minutes of ED arrival. These patients are to be treated as septic with early notification and a CTAS which reflects this (e.g. at least CTAS 2). It is important to note that a patient's "yellow card" will state that the patient is not to self-administer antipyretics. This is because it is critical that a healthcare provider obtain and document a temperature (as it may be the only sign of febrile neutropenia present). Once a temperature is obtained by the prehospital clinician and documented on the PCR, antipyretics can be given if appropriate. For more information on managing sepsis refer to the Sepsis Clinical Practice Guideline.

Tumor lysis syndrome (TLS): TLS is common in hematologic malignancies and rarely occurs in solid tumors. It is a complication of cellular breakdown of tumors and the release of the intracellular contents into the blood stream resulting in hemodynamic dysfunction. TLS should be suspected by the pre-hospital clinician in any cancer patient presenting with fluid overload, oliguria, lethargy, muscle cramping, seizures or arrhythmias. Hyperkalemia and hypocalcemia secondary to TLS often results in arrhythmias and hypotension. Prehospital

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Hyperviscosity syndrome: Hyperviscosity syndrome is due to an increase in blood viscosity and is common in patients with hematological malignancies. Symptoms may be vague but can also include bleeding from mucosal sites, visual disturbances and in rare cases congestive heart failure, stroke and coma, followed by multisystem organ failure. Pre-hospital management is symptom dependent.

Other complications secondary to cancer: Cancer patients are also at an increased risk for other complications not unique to cancer patients, such as bowel obstruction, venous thromboembolism, and pericardial tamponade. Manage symptoms as per the appropriate Clinical Practice Guideline.

Psychosocial burden and goals of care: A diagnosis of cancer carries with it a great deal of psychosocial burden (distress in this regard is considered one of the vital signs of cancer) for both the patient and those close to the patient. Providing compassionate patient and family-centered care is key in the pre-hospital environment. Clinicians will often encounter oncologic emergencies in patients whose goals of care reflect comfort measures only or palliation. No matter what the patient presentation, comfort measures should be provided. It is essential to address the goals of care for all patients in extremis, and when appropriate refer to the Palliative Care CPG.

Transport considerations: Follow normal trip destination policy for transporting patients with oncologic emergencies. If the pre-hospital clinician feels the patient would benefit from transport to an alternate emergency health care facility (e.g. Cancer Centre or Regional Hospital), contact CSP/MCCP as required.

TRANSFER OF CARE

Early notification to the Emergency Department should be considered to allow for preparation for patient arrival and early consult to oncology and/or hematology if required. Verbal reports should include

pertinent history, important physical exam findings, medications, precipitating factors, and medication(s) administered.

CHARTING

In addition to the mandatory fields it is important to document the following in the ePCR text fields:

- Previous cancer history
- Specific clinical impression (oncologic emergency) if discernable
- Details regarding surgery, chemotherapy, radiation therapy or stem cell transplant
- Cardiovascular exam findings (including ECG)
- Neurological exam findings
- Fever at any point during patient contact
- Interventions provided during care
- Advance directives/goals of care

Key Points – Oncologic Emergencies

Rapid transport and early notification to the appropriate facility

Focus on supportive care (ABCs), symptom management and compassionate care

Fever may indicate febrile neutropenia, ask patient for yellow card, and manage as possible sepsis

New onset neck or back pain may indicate a time sensitive emergency

Consider patient's goals of care

KNOWLEDGE GAPS

Identifying appropriate management best suited for treating oncologic emergencies in the EMS setting requires further research and development.

EDUCATION

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Current EMS education requires development to include further information on the recognition and management of oncologic emergencies.

QUALITY IMPROVEMENT

It is important for the clinician to document all interventions as well as the response to interventions during the time the patient is under your care. This is especially important as EHS works with the hospital system of care to determine the clinical quality, safety and satisfaction of the patient.

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5. Canadian Cancer Society (2015) *Cancer Statistics at a Glance*. Available at: <http://www.cancer.ca/en/cancer-information/cancer-101/cancer-statistics-at-a-glance/?region=on> (Accessed: 3 March 2015).
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Figure 1: Sample “Yellow Card” for patients receiving chemotherapy

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Fever in a Cancer Patient Solid Tumour, Hematology, Stem Cell Transplant

Instructions for Patients:

- This card is **ONLY** to be used when you have a fever.
- If your temperature is 38°C (100.4 F) or higher:
 - Do not take any medications to lower your fever, like acetaminophen or ibuprofen.
 - Go to your local Emergency Department right away and give this card to the Emergency staff.
 - This card alerts Emergency Department staff that you are a solid tumour, hematology or stem cell transplant patient with a fever, and needing treatment within 60 minutes.
 - Although your care is a priority, you may still have to wait while other patients, with more urgent concerns, are treated.
- During the next business day, call your cancer doctor/nurse and tell them you have been seen in the Emergency Department.

Instructions for Emergency Department Staff:

- This patient has cancer and is febrile. Febrile Neutropenia¹ is a medical emergency (CTAS Level II). Patient is to be assessed and receive their first dose of antibiotics within 60 minutes of presentation.
- The patient does not need to be isolated
- At Triage: CBC (to be drawn within 10 minutes and sent as STAT).
- Blood Cultures: 2 sets (1 set = aerobic + anaerobic).
 - If the patient has a central line: 1 peripheral set and 1 central set.
 - If patient does not have a central line: 2 peripheral sets from different sites.
- Obtain electrolytes, BUN, Cr, urinalysis and urine C&S, chest x-ray.
- Other investigations as clinically indicated.

¹ Febrile Neutropenia is defined as a single oral temperature $\geq 38.3^{\circ}\text{C}$ (101F) or $>38^{\circ}\text{C}$ (100.4F) for more than 1 hour, and an absolute neutrophil count $<0.5 \times 10^9/\text{L}$ (500 cells/microlitre), or expected to fall below $0.5 \times 10^9/\text{L}$ (500 cells/microlitre).

Instructions for Emergency Department Staff: Management of Febrile Neutropenia

If the patient's temperature is $<38^{\circ}\text{C}$ when they present to Emergency Department, but they have recorded temperatures at home $>38^{\circ}\text{C}$, they should still be considered febrile.

1. If patient is febrile and neutropenic, initiate broad spectrum antibiotics within 60 minutes, Piperacillin-Tazobactam 3.375g IV q6h.
Or, if the patient has a penicillin allergy: Ciprofloxacin 400 mg IV q12h and Vancomycin 1g IV q12h.
2. If the patient appears unwell (e.g: rigors, hypotension, etc), or lab results are delayed, give the first dose of antibiotic(s) before the blood work results are back.
3. High-risk febrile neutropenia patients require admission. After the physician has completed the assessment and administered the first dose of antibiotics, admit the patient to the appropriate service.
4. Low-risk febrile neutropenia patients may be treated as outpatients (refer to the NSCCP Oncologic Emergencies Guidelines to review low risk criteria and treatment guidelines).
5. The patient's Medical Oncologist/Hematologist and treating cancer clinic should be advised of the patients visit to the Emergency Department and their current status.

Updated by the Nova Scotia Cancer Care Program, Jan 2019

For more information, refer to the NSCCP Oncologic Emergencies Guidelines www.nshelath.ca/cancer-care

Figure 2: Common oncologic emergencies and symptoms associated with primary sites

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Oncologic Emergency	Primary Site	Signs & Symptoms
Malignant airway obstruction	Mediastinum, head and neck cancers, metastatic disease	Inspiratory stridor Dyspnea Wheezes Hoarseness Difficulty clearing secretions Cough Hemoptysis
Superior vena cava obstruction (SVCO)	Lung, non-Hodgkin's lymphoma	Facial or neck swelling Dilated chest vessels Stridor
Hemorrhage	All sites; increased incidence in hematologic cancers and metastatic disease	Shortness of breath Tachycardia Hypotension Syncope Abdominal pain/discomfort Hematemesis Melena Hemoptysis
Disseminated intravascular coagulation (DIC)	All sites; can be tumour-initiated or secondary to treatment	Dyspnea Cardiovascular compromise Oliguria Hematuria Hemoptysis Ecchymosis Purpura Petechiae Pallor
Increased intracranial pressure	Primary brain malignancies and metastatic disease	Altered level of consciousness Abnormal neurological findings Seizures Headache Nausea and vomiting
Malignancy-associated hypercalcemia (MAH)	Breast, lung, head/neck tumours and hematologic cancers	Neurologic symptoms Shortened QT ST elevation Bradyarrhythmias Nausea and vomiting Polyuria/nocturia Oliguria (late sign)
Syndrome of inappropriate antidiuretic hormone secretion (SIADH)	Small cell lung cancer or secondary to treatment	Delirium Seizures Decerebrate posturing Coma Respiratory arrest
Spinal cord compression (SCC)	Breast, prostate, lung, renal, hematologic and metastatic disease	Motor weakness Paresthesias Autonomic dysfunction Neck or back pain

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6705.02 ONCOLOGIC EMERGENCIES

Febrile neutropenia	Common with all solid tumours, hematological malignancies and stem cell transplant recipients	Fever Chills Rigors
Tumour lysis syndrome (TLS)	All sites	Fluid overload Arrhythmias Seizures Oliguria Lethargy Muscle cramps
Hyperviscosity syndrome	Hematological malignancies	Bleeding from mucosal sites Visual disturbances Neurological manifestations Unexplained respiratory symptoms

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PEP 3x3 TABLES for Oncologic Emergencies

NO EVIDENCE APPRAISED FOR ONCOLOGIC EMERGENCIES.

Throughout the EHS Guidelines, you will see notations after clinical interventions (e.g.: **PEP 2 neutral**). PEP stands for: the Canadian **P**rehospital **E**vidence-based **P**rotocols Project.

The number indicates the Strength of cumulative evidence for the intervention:

1 = strong evidence exists, usually from randomized controlled trials;

2 = fair evidence exists, usually from non-randomized studies with a comparison group; and

3 = weak evidence exists, usually from studies without a comparison group, or from simulation or animal studies.

The coloured word indicates the direction of the evidence for the intervention:

Green = the evidence is supportive for the use of the intervention;

Yellow = the evidence is neutral;

Red = the evidence opposes use of the intervention;


White = there is no evidence available for the intervention, or located evidence is currently under review.


PEP Recommendations for Oncologic Emergencies Interventions, as of 2022/09/27. PEP is continuously updated. See: <https://emspep.cdha.nshealth.ca/TOC.aspx> for latest recommendations, and for individual appraised articles.

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