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Stephen M. Pastores and Neil A. Halpern

Admission Criteria and Prognostication in Patients with Cancer Admitted to the Intensive Care Unit

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Brenda K. Shelton

Critical care for patients with cancer was once considered inappropriate because of a perceived poor prognosis for their long-term survival. Three decades of research has yielded evidence to support the use of critical care resources for many patients with cancer. A methodical approach to triage and evaluation of critically ill patients regardless of baseline medical diagnosis, coupled with an appreciation for the likely prognosis of their current cancer, is most likely to yield the fairest and most accurate appropriation of care. No clinical scoring system has emerged that accurately defines the severity of illness and likelihood for survival in patients with cancer. This article reviews the studies that have attempted to apply mortality prediction scales or scoring systems to these patients. Clinical judgment with incorporation of consensus opinions from the literature should be used to develop admission or restriction criteria for intensive care of patients with cancer.

Acute Respiratory Failure in the Patient with Cancer: Diagnostic and Management Strategies

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Stephen M. Pastores and Louis P. Voigt

Acute respiratory failure (ARF) remains the major reason for admission to the intensive care unit (ICU) in patients with cancer and is often associated with high mortality, especially in those who require mechanical ventilation. The diagnosis and management of ARF in patients who have cancer pose unique challenges to the intensivist. This article reviews the most common causes of ARF in patients with cancer and discusses recent advances in the diagnostic and management approaches of these disorders. Timely diagnosis and treatment of reversible causes of respiratory failure, including earlier use of noninvasive ventilation and judicious ventilator and fluid management in patients with acute lung injury, are essential to achieve an optimal outcome. Close collaboration between oncologists and intensivists helps ensure that clear goals, including direction of treatment and quality of life, are established for every patient with cancer who requires mechanical ventilation for ARF.

Mechanical Ventilation in Cancer Patients: Clinical Characteristics and Outcomes

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Márcio Soares, Pieter O. Depuydt, and Jorge I.F. Salluh

Acute respiratory failure with the need for mechanical ventilation is a severe and frequent complication, and a leading reason for admission to the intensive care unit (ICU) in patients with malignancies. Nevertheless,

improvements in patient survival have been observed over the last decade. This article reviews the epidemiology of adult patients with malignancies requiring ventilatory support. Criteria used to assist decisions to admit a patient to the ICU and to select the initial ventilatory strategy are discussed.

Diagnosis and Management of Infectious Complications in Critically Ill Patients with Cancer

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Raghukumar Thirumala, Madhusudanan Ramaswamy,
and Sanjay Chawla

Cancer and its treatments lead to profound suppression of innate and acquired immune function. In this population, bacterial infections are common and may rapidly lead to overwhelming sepsis and death. Furthermore, infections caused by viral and fungal pathogens should be considered in patients who have specific immune defects. As cancer therapies have become more aggressive the risk for infection has increased and many patients require intensive care support. Despite improvements in long-term survival, infections remain a common complication of cancer therapy and accounts for the majority of chemotherapy-associated deaths. By understanding the host defense impairments and likely pathogens clinicians will be better able to guide diagnosis and management of this unique population.

Critical Care Issues in Oncological Surgery Patients

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Sanam Ahmed and John M. Oropello

As life expectancy increases and advances in cancer treatment more often convert deadly conditions into more chronic diseases, the surgical intensivist can expect to be faced with greater numbers of oncology patients undergoing aggressive surgical treatments for curative intent, prolonging survival, or primarily palliation by alleviating obstruction, infection, bleeding, or pain. Cytoreductive surgery (CRS) and heated intraperitoneal chemotherapy (HIPEC) are a paradigm for the emerging field of multimodal aggressive oncological surgery. This article describes the CRS/HIPEC technique, and discusses the most common postoperative complications and critical care issues in these patients, including anastomotic leaks, intestinal perforation, abscesses, and intra-abdominal bleeding. The leading cause of mortality is sepsis leading to multiple organ failure, and such patients are at particularly higher risk due to the extensive CRS and HIPEC. The intensivist must be vigilant to ensure that source control is not overlooked. This process is a very difficult one, made even more challenging by the blunting of physiologic responses and the frequent absence of the classic acute abdomen.

Hematological Issues in Critically Ill Patients with Cancer

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Karen S. Carlson and Maria T. DeSancho

Patients with solid and hematologic malignancies presenting with major bleeding or thrombotic complications, potentially life-ending events in a cancer patient's clinical course, usually require admission to an intensive care unit (ICU), making their diagnosis and management even more important for the intensivist. Given the significant advances in the diagnosis and

treatment of almost all types of cancers in recent years, the intensivist is likely to encounter an ever-increasing number of cancer patients in the ICU setting with these complications. Abnormal hemostasis can occur as a consequence of both the pathology and treatment of cancer. Because cancer can have multiple effects on hemostatic equilibrium, treatment of these complications can be more complex than in the general population. This article reviews the physiology of coagulation and fibrinolysis, with special attention to those aspects that are most frequently altered in the setting of malignancy. The pathophysiology of bleeding and thrombotic complications specific to critically ill cancer patients are then detailed, and the diagnostic and therapeutic strategies are discussed. Special emphasis is placed on new cancer medications that have an effect on hemostasis, and on novel clotting and anticoagulant agents that are available to the intensivist for the management of these patients.

Critical Care of the Hematopoietic Stem Cell Transplant Recipient

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Bekele Afessa and Elie Azoulay

An estimated 50,000 to 60,000 patients undergo hematopoietic stem cell transplantation (HSCT) worldwide annually, of which 15.7% are admitted to the intensive care unit (ICU). The most common reason for ICU admission is respiratory failure and almost all develop single or multiorgan failure. Most HSCT recipients admitted to ICU receive invasive mechanical ventilation (MV). The overall short-term mortality rate of HSCT recipients admitted to ICU is 65%, and 86.4% for those receiving MV. Patient outcome has improved over time. Poor prognostic indicators include advanced age, poor functional status, active disease at transplant, allogeneic transplant, the severity of acute illness, and the development of multiorgan failure. ICU resource limitations often lead to triage decisions for admission. For HSCT recipients, the authors recommend (1) ICU admission for full support during their pre-engraftment period and when there is no evidence of disease recurrence; (2) no ICU admission for patients who refuse it and those who are bedridden with disease recurrence and without treatment options except palliation; (3) a trial ICU admission for patients with unknown status of disease recurrence with available treatment options.

Acute Kidney Injury in Critically Ill Patients with Cancer

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Dominique D. Benoit and Eric A. Hoste

Critically ill cancer patients have a higher incidence of acute kidney injury treated with renal replacement therapy than critically ill patients without cancer. Acute kidney injury may occur as a direct or indirect consequence of the cancer itself, its treatment, or associated complications. Several recent studies have shown that the presence of an underlying cancer alone can no longer be considered a contraindication to initiate renal replacement therapy or other advanced life-supportive measures in critically ill patients. However, these relatively good results should not be used to justify unrealistic therapeutic perseverance or to withhold palliative care in cancer patients who are in a desperate situation. Similar to that for any other critically ill patient, the decision to initiate advanced life-supportive therapy as

well as its duration should be in proportion with the patient's expected long-term prognosis and quality of life.

Oncologic Emergencies

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Deepti Behl, Andrea Wahner Hendrickson, and Timothy J. Moynihan

Oncologic emergencies represent a wide variety of conditions that can occur at any time during the course of a malignancy, from an initial presenting manifestation in someone with an undiagnosed cancer, to end-stage incurable metastatic disease. Emergent conditions can also arise after a malignancy has been in remission for many years, even decades, so clinicians must be aware of any prior history of cancer in patients. Oncologic emergencies include conditions caused by the cancer itself or side effects of therapy. Emergent conditions include metabolic, cardiac, neurologic, or infectious disorders. Many of these emergencies are imminently life-threatening, and can occur in patients with curable disease (such as lymphomas or leukemias); however, many also present in patients with incurable advanced disease. Prompt recognition and treatment of these conditions can lead to markedly improved quality and quantity of life.

Acute Care Nurse Practitioners in Oncologic Critical Care: The Memorial Sloan-Kettering Cancer Center Experience

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Rhonda D'Agostino and Neil A. Halpern

Nurse practitioners (NPs) are increasingly being used to fill the physician-staffing void in intensive care units. This article describes the initiation and role development of our collaborative physician-NP critical care medicine (CCM) program at the Memorial Sloan-Kettering Cancer Center. The challenges that our program encountered with recruiting, training, transitioning, collaborating, communicating, and addressing end-of-life issues are detailed in this article. Finally, we delve into the emotional impact NPs have on this new role and propose future directions to strengthen the CCM NP model. We hope that this descriptive article of the development of our CCM NP group will allow others who are seeking to cultivate their own CCM NP teams to benefit from our experience.

End-of-Life Issues in Critically Ill Cancer Patients

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Susan Gaeta and Kristen J. Price

This article discusses end-of-life issues in critically ill cancer patients. Since the majority of deaths will occur after limiting or withdrawing life support, focus should be given to ensuring that multidisciplinary family meetings are convened to discuss end-of-life decision making. Throughout the process of transitioning from cure to comfort care, it is essential to support the patient and the patient's family cultural beliefs and spiritual values, and to ensure good pain and symptom management. The use of protocols facilitates a smooth transition and potentially reduces variability between health care providers. Integrating measures into the ICU routine that will help health care providers cope with the care of a dying patient is recommended to avoid moral distress or emotional burnout.