

Intensive Care for Cancer Patients

SILVIO ANTONIO ÑAMENDYS-SILVA^{1,2*}, ABELARDO MENESES-GARCÍA¹ AND ÁNGEL HERRERA-GÓMEZ¹

¹Department of Critical Care Medicine, National Cancer Institute, Mexico City, Mexico; ²Departement of Critical Care Medicine, Salvador Zubirán National Institute of Medical Sciences and Nutrition, Mexico City, Mexico

ABSTRACT

The introduction of new treatments for cancer and advances in intensive care for critically ill patients with cancer have improved prognosis and survival. This article reviews the main reasons for admission to the intensive care unit, the criteria for admission, the role played by early intensive care unit admission and predictors of mortality in critically ill patients with cancer. The primary reasons for admission of cancer patients to the intensive care unit are medical/surgical problems that arise or are exacerbated during antineoplastic treatments such as acute respiratory failure, sepsis, multiple organ failure, and oncologic emergencies. As the main prognostic factor in critically ill patients with cancer is the number and severity of organ failures, early admission to the intensive care unit with the lowest possible number of organ failures is recommended. Survival rates for cancer patients who are admitted to the intensive care unit have improved, so admission should not be denied to patients only on the basis that the patient has cancer. At present, treatment of these patients represents a challenge for the oncologist, hematologist, surgical oncologist, and critical care specialist. Our working group recommends early admission to the intensive care unit for cancer patients who have the lowest possible number of failing organs. (J CANCEROL. 2014;1:4-8)

Corresponding author: Silvio Antonio Ñamendys-Silva, snamendys@incan.edu.mx

Key words: Intensive care. Critical care medicine. Cancer. Prognosis.

Correspondence to:

*Silvio Antonio Ñamendys-Silva
Unidad de Terapia Intensiva
Instituto Nacional de Cancerología (INCan)
Av. San Fernando, 22
Col. Sección XVI, Del. Tlalpan
14080 México, D.F., México
E-mail: snamendys@incan.edu.mx

Received for publication: 5-8-2014
Accepted for publication: 1-9-2014

INTRODUCTION

The introduction of new treatments for cancer and advances in the intensive care of critically ill cancer patients have improved prognosis and survival¹. This group of patients may require admission to an Intensive Care Unit (ICU) for various reasons, such as postoperative critical care, management of acute illnesses, cancer-related complications, or treatment-related adverse events². Mortality rates among patients with cancer have declined, probably due to the development of better treatment strategies and better criteria for ICU admission³. In the period from 2007 to 2011, 1,418 patients were admitted to the ICU at the National Cancer Institute in Mexico (INCan) and the mortality rate was 17.5%⁴. At present, there is enough evidence to show that treatment of cancer patients in the ICU is not futile. Various studies have established that prognosis is related to the number of organ system failures⁵⁻⁷, which is why ICUs everywhere should not deny access to critical care only on the basis that a patient has cancer.

Up until about 10 years ago, admission of cancer patients to ICUs was considered futile. Patients with hematologic malignancies or solid tumors with evidence of metastasis were classified as low priority for admission to the ICU⁸, although this guideline has changed. About 15% of the patients in European ICUs have cancer⁶. Recently, Vincent, et al.⁹ reported that 14.2% of patients in severe condition in ICUs around the world have a hemato-oncological disease. The hospital mortality rate in critically ill patients with cancer is similar to that in patients with other comorbidities such as heart failure and liver cirrhosis¹⁰. Patients with solid tumors have ICU (20 vs. 18%) and hospital mortality rates (27 vs. 23%), similar to those of patients without cancer⁶. Cancer is not a homogeneous disease as solid tumors have a lower impact on mortality than hematological diseases (27.1 vs. 30.4%, respectively)¹¹. At the ICU of the INCan, the mortality in patients with solid tumors and hematologic malignancies is 21.4¹² and 46.1%⁵, respectively.

REASONS FOR ADMISSION OF PATIENTS WITH CANCER TO AN INTENSIVE CARE UNIT

The primary reasons for admission of cancer patients to an ICU are medical/surgical problems that arise or are exacerbated during antineoplastic treatments such as acute respiratory failure, sepsis, multiple organ failure, and oncologic emergencies (leukostasis, tumor lysis syndrome, disseminated intravascular coagulation, and chemotherapy induced hypersensitivity reactions). Other indications for ICU management of cancer patients include intensive postoperative care following complex procedures¹³.

The decision on whether or not to admit a critically ill patient with cancer to the ICU should be based on already established criteria⁸. Nevertheless, the clinician should keep in mind that the decision to admit a patient to the ICU is complex¹⁴. Admission policies for ICUs should take into account improvements in the prognosis of critically ill patients with cancer over the last decade.

Full ICU treatment should be provided to cancer patients in the following groups:

- Recent diagnosis of hemato-oncological disease¹⁴;
- Treatment of medical emergencies related to cancer or its treatment; tumor lysis syndrome, pulmonary infiltrates in patients with leukemia or leukostasis as the initial manifestation of leukemia¹⁴;
- The likelihood of a cure or probable disease control¹;
- Performance status (Eastern Cooperative Oncology Group scale) between 0 and 2^{14,15};
- Less than three organ system failures or SOFA score between 7 and 10^{16,17};
- Postoperative intensive care for patients undergoing complex surgical procedures¹³ who

require hemodynamic monitoring and/or mechanical ventilation⁸.

When the potential benefit of admitting a patient to the ICU cannot be assured, admission to receive intensive treatment (mechanical ventilation, vasopressors, inotropes, renal replacement therapy) is recommended in order to ensure that the patient is given a chance to recover from the acute¹⁴ complications. If the patient has been admitted, re-evaluation should be undertaken between days 3 and 5^{14,15} of the ICU stay as patients who show no improvement of organ dysfunction during this period are less likely to survive an acute event. Limiting intensive care before the fifth day of stay in the ICU is not recommended¹⁵. Finally, patients who are receiving palliative care as the only treatment option¹⁵ and patients who refuse admission to an ICU should not be admitted^{14,15}.

EARLY ADMISSION TO AN INTENSIVE CARE UNIT

To date, no studies describing the impact of early admission to an ICU has on cancer patients have been reported. However, delayed ICU admission is associated with increased mortality¹⁸. Although the SOFA score (Sequential Organ Failure Assessment)^{19,20} was designed to evaluate the incidence and severity of organ failure in critically ill patients admitted to the ICU, we recommend using SOFA scores¹⁹, or MEXSOFA²¹ when the SOFA score cannot be calculated, as part of the evaluation of cancer patients who are hospitalized in non-critical care setting, for the purpose of early identification of the presence of organ failure and to facilitate early admission to the ICU. We found that a SOFA score of > 7 at the time of admission in cancer patients who were admitted to the ICU of the INCan predicted a 68.1% mortality rate, with cardiovascular, respiratory, and renal failures being associated with a greater risk of death¹⁶. As the main prognostic factor in critically ill patients with cancer is the number and severity of organ

failures^{7,16,22}, early admission to the ICU with the lowest possible number of organ failures is recommended.

PROGNOSTIC PREDICTORS

Between 1990 and 1999 the reported ICU mortality rate was 55-67%²³⁻²⁷, but in recent years it has trended downwards (17.5-55%)^{5-7,28-32}.

The scoring systems used in ICUs for predicting prognosis and monitoring organ failure, such as APACHE II (Acute Physiology and Chronic Health Evaluation), SAPS II (Simplified Acute Physiology Score) and SOFA, are useful tools that adequately discriminate prognosis for critically ill patients³.

Different prognostic or organ failure assessment scores for cancer patients with hematologic diseases and solid tumors have been reported on. The main independent risk factors for death in the ICU among patients with solid tumors are the need for vasopressors and the APACHE II score¹². Patients with cancer are at increased risk for infection and of developing severe sepsis and septic shock, probably related to immunosuppression caused by cancer or cancer treatment. In this group of patients, predictors of poor prognosis that have been described include: performance status ≥ 2 in the four weeks prior to ICU admission, organ failure at the time of admission to the ICU assessed with SOFA score before admission¹⁷. Independent risk factors for hospital mortality in cancer patients admitted to the ICU with septic shock associated with pneumonia are age > 60 years, time between the onset of symptoms and admission to the ICU (for each day of delay, OR = 1.2; $p = 0.017$), need for invasive mechanical ventilation after use of noninvasive mechanical ventilation, and coma³³. Patients with cancer had higher mortality from acute respiratory distress syndrome (ARDS) compared with patients without cancer (55.2 vs. 24.3%)²⁹, with reported mortality rates ranging between 55.2²⁹ and 67.4%^{34,35}. Survival of patients

needing mechanical ventilation has improved in the last two decades¹³; nevertheless, the need for conventional mechanical ventilation or initiating it after use of noninvasive mechanical ventilation are factors associated with increased mortality.

Similar to seriously ill non-cancer patients, the critically ill patient with cancer who presents with acute renal failure has a hospital mortality of 64%³⁶; the factors that are associated with increased six-month mortality are age > 60 years, more than two associated organ failures, performance status between 2 and 4, and uncontrolled cancer despite treatment³⁶. In the critically ill hematological patient, neutropenia, which in most cases is associated with chemotherapy, is an independent risk factor for mortality at admission to the ICU^{13,37}. Lastly, the survival rate of cancer patients who need cardiopulmonary resuscitation (CPR) is 34.6%, and the survival to discharge rate of those patients who receive CPR is approximately 6%³⁸, the need for CPR being an independent predictor of poor prognosis mainly when cardiac arrest is associated with metabolic changes³⁹.

CONCLUSION

Survival rates for patients with cancer who are admitted to the ICU have improved, so admission should not be denied to patients only on the basis that they have cancer. At present, treatment of these patients represents a challenge for the oncologist, hematologist, surgical oncologist, and critical care specialist. As the main prognostic factor in critically ill patients with cancer is the number and severity of organ failures, we recommend early admission to the ICU with the lowest possible number of organ failures.

REFERENCES

1. Staudinger T, Stoiser B, Maxlner M, et al. Outcome and prognostic factors in critically ill cancer patients admitted to the intensive care unit. *Crit Care Med.* 2000;28:1322-8.
2. den Boer S, de Keizer NF, de Jonge E. Performance of prognostic models in critically ill cancer patients – a review. *Crit Care.* 2005;9:R458-63.
3. Kopterides P, Liberopoulos P, Ilias I, et al. General prognostic scores in outcome prediction for cancer patients admitted to the intensive care unit. *Am J Crit Care.* 2011;20:56-66.
4. Namendys-Silva SA, Gonzalez-Herrera MO, Herrera-Gomez A. Mortality of patients with cancer admitted to intensive care unit. *Am J Hosp Palliat Care.* 2013;30:214-5.
5. Namendys-Silva SA, González-Herrera MO, García-Guillén FJ, Texcocano-Becerra J, Herrera-Gómez A. Outcome of critically ill patients with hematological malignancies. *Ann Hematol.* 2013;92:699-705.
6. Taccone FS, Artigas AA, Sprung CL, Moreno R, Sakr Y, Vincent JL. Characteristics and outcomes of cancer patients in European ICUs. *Crit Care.* 2009;13:R15.
7. Vandijck DM, Depuydt PO, Offner FC, et al. Impact of organ dysfunction on mortality in ICU patients with hematologic malignancies. *Intensive Care Med.* 2010;36:1744-50.
8. Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine: Guidelines for intensive care unit admission, discharge, and triage. *Crit Care Med.* 1999;27:633-8.
9. Vincent JL, Marshall JC, Namendys-Silva SA, et al. Assessment of the worldwide burden of critical illness: the Intensive Care Over Nations (ICON) audit. *Lancet Respir Med.* 2014;2:380-6.
10. Tanvetyanon T, Leighton JC. Life-sustaining treatments in patients who died of chronic congestive heart failure compared with metastatic cancer. *Crit Care Med.* 2003;31:60-4.
11. McGrath S, Chatterjee F, Whiteley C, Ostermann M. ICU and 6-month outcome of oncology patients in the intensive care unit. *QJM.* 2010;103:397-403.
12. Namendys-Silva SA, Texcocano-Becerra J, Herrera-Gómez A. Prognostic factors in critically ill patients with solid tumours admitted to an oncological intensive care unit. *Anaesth Intensive Care.* 2010;38:317-24.
13. Shelton BK. Admission criteria and prognostication in patients with cancer admitted to the intensive care unit. *Crit Care Clin.* 2010;26:1-20.
14. Thiéry G, Azoulay E, Darmon M, et al. Outcome of cancer patients considered for intensive care unit admission: a hospital-wide prospective study. *J Clin Oncol.* 2005;23:4406-13.
15. Lecuyer L, Chevret S, Thiéry G, et al. The ICU trial: a new admission policy for cancer patients requiring mechanical ventilation. *Crit Care Med.* 2007;35:808-14.
16. Namendys-Silva SA, Texcocano-Becerra J, Herrera-Gómez A. Application of the Sequential Organ Failure Assessment (SOFA) score to patients with cancer admitted to the intensive care unit. *Am J Hosp Palliat Care.* 2009;26:341-6.
17. Namendys-Silva SA, González-Herrera MO, Texcocano-Becerra J, Herrera-Gómez A. Clinical characteristics and outcomes of critically ill cancer patients with septic shock. *QJM.* 2011;104:505-11.
18. Sprung CL, Geber D, Eidelman LA, et al. Evaluation of triage decisions for intensive care admission. *Crit Care Med.* 1999;27:1073-9.
19. Vincent JL, Moreno R, Takala J, et al. The SOFA (Sepsis-related Organ Failure Assessment) score to describe organ dysfunction/failure. *Intensive Care Med.* 1996;22:707-10.
20. Vincent JL, de Mendonca A, Cantraine F, et al. Use of the SOFA score to assess the incidence of organ dysfunction/failure in intensive care units: results of a multicenter, prospective study. Working group on "sepsis-related problems" of the European society of intensive care medicine. *Crit Care Med.* 1998;26:1793-800.
21. Namendys-Silva SA, Silva-Medina MA, Vásquez-Barahona GM, et al. Application of a modified sequential organ failure assessment score to critically ill patients. *Braz J Med Biol Res.* 2013;46:186-93.
22. Pène F, Percheron S, Lemiale V, et al. Temporal changes in management and outcome of septic shock in patients with malignancies in the intensive care unit. *Crit Care Med.* 2008;36:690-6.
23. Azoulay E, Recher C, Alberti C, et al. Changing use of intensive care for hematological patients: the example of multiple myeloma. *Intensive Care Med.* 1999 ;25:1395-401.
24. Kress JP, Christenson J, Pohlman AS, et al. Outcomes of critically ill cancer patients in a university hospital setting. *Am J Respir Crit Care Med.* 1999;160:1957-61.
25. Ewig S, Torres A, Riquelme R, et al. Pulmonary complications in patients with haematological malignancies treated at a respiratory ICU. *Eur Respir J.* 1998;12:116-22.

26. Blot F, Guiguet M, Nitenberg G, et al. Prognostic factors for neutropenic patients in an intensive care unit: respective roles of underlying malignancies and acute organ failures. *Eur J Cancer*. 1997;33:1031-7.
27. Dees A, Ligthart JL, van Putten WL, et al. Mechanical ventilation in cancer patients. Analysis of clinical data and outcome. *Neth J Med*. 1990;37:183-8.
28. Aygencel G, Turkoglu M, Turkoz Sucak G, et al. Prognostic factors in critically ill cancer patients admitted to the intensive care unit. *J Crit Care*. 2014;29:618-26.
29. Soubani AO, Shehada E, Chen W, et al. The outcome of cancer patients with acute respiratory distress syndrome. *J Crit Care*. 2014;29:183.e7-e12.
30. Wohlfarth P, Staudinger T, Sperr WR, et al. Prognostic factors, long-term survival, and outcome of cancer patients receiving chemotherapy in the intensive care unit. *Ann Hematol*. 2014;93:1629-36.
31. Azevedo LC, Caruso P, Silva UV, et al. Outcomes for Patients with Cancer Admitted to the ICU Requiring Ventilatory Support: Results from a Prospective Multicenter Study. *Chest*. 2014;146:257-66.
32. Azoulay E, Mokart D, Pène F, et al. Outcomes of critically ill patients with hematologic malignancies: prospective multicenter data from France and Belgium--a groupe de recherche respiratoire en réanimation onco-hématologique study. *J Clin Oncol*. 2013;31:2810-18.
33. de Montmollin E, Tandjaoui-Lambiotte Y, Legrand M, et al. Outcomes in critically ill cancer patients with septic shock of pulmonary origin. *Shock*. 2013;39:250-4.
34. Schmidt M, Zogheib E, Roze H, et al. The PRESERVE mortality risk score and analysis of long-term outcomes after extracorporeal membrane oxygenation for severe acute respiratory distress syndrome. *Intensive Care Med*. 2013;39:1704-13.
35. Azoulay E, Lemiale V, Mokart D, et al. Acute respiratory distress syndrome in patients with malignancies. *Intensive Care Med*. 2014;40:1106-14.
36. Soares M, Salluh JI, Carvalho M, et al. Prognosis of critically ill patients with cancer and acute renal dysfunction. *J Clin Oncol*. 2006;24:4003-10.
37. Benoit DD, Vandewoude KH, Decruyenaere JM, et al. Outcome and early prognostic indicators in patients with a hematologic malignancy admitted to the intensive care unit for a life-threatening complication. *Crit Care Med*. 2003;31:104-12.
38. Khasawneh FA, Kamel MT, Abu-Zaid MI. Predictors of cardiopulmonary arrest outcome in a comprehensive cancer center intensive care unit. *Scand J Trauma Resusc Emerg Med*. 2013;21:18.
39. Ewer MS, Kish SK, Martin CG, et al. Characteristics of cardiac arrest in cancer patients as a predictor of survival after cardiopulmonary resuscitation. *Cancer*. 2001;92:1905-12.