

A Retrospective Comparison of Mortality in Hematological versus Non-Hematological Malignancies in Cancer Intensive Care Unit

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Abstract

Objective: The objective of this study was to study the demographic data and clinical outcome of cancer patient admitted in intensive care unit (ICU).

Materials and Methods: Data of cancer patients admitted in ICU of tertiary care hospital between August 2017 and September 2018 were reviewed retrospectively.

Results: During the study period, 441 cancer patients were admitted in ICU. Majority of patients were male (58.27%). The most common reason for ICU referral was respiratory problem (31.75%) followed by cardiovascular (26%). Lung carcinoma was the most common among solid malignancy, whereas lymphoma was the most common hematological malignancy. Patients with hematological malignancy were relatively younger (55 years vs. 63 years). Patients who required inotropes/vasopressors or mechanical ventilation had poor prognosis than the others. The mortality rate was higher in patient with hematological malignancy than solid malignancy patients.

Conclusion: The demand for intensive care for critically ill cancer is increasing, and considering the improvement in prognosis cancer patients should not be denied ICU care merely on the basis of a patient suffering from cancer. Data suggest that admitting selected patient with cancer to ICU is justifiable, but mere admitting patents for end of life care is not recommended.

Key words: Eastern cooperative oncology group, Hematological malignancy, Intensive care unit, Outcome, Solid malignancy

INTRODUCTION

The number of individual living with cancer has increased steadily in the recent past. Advances in the diagnosis and treatment have led to improvement in long-term survival and quality of life.^[1,2] These improvements have led to growing demand for intensive care unit (ICU) management.^[3] Considering the disappointing outcome of critically ill cancer patient in studies published between 1980 and 1990, some physician was reluctant for ICU admission to cancer patients.^[4]

Fortunately, investigation over the past two decades has demonstrated that, with advances in ICU management, the mortality rate of critically ill cancer patients admitted in ICU has decreased, and hence, critically ill cancer patients should not be excluded from ICU management.^[5] This decrease in mortality has been attributed to a better understanding of the pathophysiology of certain cancer-related complication, refinement of triage for ICU admission, and development of potentially lifesaving strategies for the treatment of cancer related complications.^[6,7] Currently, it is estimated that critically ill cancer patients account for 15–18% of all ICU admission and this is expected to increase in the future.^[8] During the treatment of cancer in a consistent manner, usually a standard criterion is followed for measuring how the disease affects a patient's daily living abilities (known to physicians and researchers as a patient's performance status). The ECOG scale of performance status is one such measurement. It describes a patient's level of functioning in terms of their ability to care for themselves and daily physical ability (walking and working).^[9] It is also a way for

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physicians to track changes in a patient's level of functioning due to treatment during the trial.

MATERIALS AND METHODS

The study was conducted at the ICU of SMH Cancer Centre unit, a 200-bed tertiary care referral hospital. All patients with solid and hematological malignancy admitted in ICU from August 2017 to July 2018 were eligible. Hospital files of the eligible patients were retrospectively reviewed. Data on demographics, treatment given, and outcome were, respectively, collected from the patient treatment record on prepared forms and analyzed. Cancer patients who were admitted for post-operative recovery after surgery were excluded from the study. Patients were divided into two groups: Patient with hematological malignancy and those with solid tumors.

Severity of illness on the 1st day ICU admission was assessed using Sequential organ failure assessment (SOFA) scoring system. Respiratory support was defined as the need for non-invasive/invasive mechanical ventilation. Inotropic support included the case of any inotropic support or vasopressin therapy. A total WBC count $<1.0/L \times 109/L$ was used as cutoff for the definition of neutropenia. The SOFA score is composed of 6 items that are individually score-respiratory function, cardiovascular, hepatic, coagulation, renal, and neurological function. Each item score ranges from 1 (normal organ) to 4 (severely impaired function); scores are added up resulting in SOFA scores ranging from 6 (no organ failure) to 24 (most sick) points.

ECOG performance status for treatment outcome was graded as follows:

- Grade 0: Fully active, able to carry on all pre-disease performance.
- Grade 1: Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, for example, routine house or office work.
- Grade 2: Ambulatory and capable of all self-care but unable to carry out any work activities; up and about $>50\%$ of waking hours.
- Grade 3: Capable of only limited self-care; confined to bed or chair $>50\%$ of waking hours.
- Grade 4: Completely disabled; totally confined to bed or chair.
- Grade 5: Dead.

RESULTS

A total of 441 cancer patients (range 9–84 years and median age - 56.5 years) were admitted to the ICU during

Table 1: Baseline characteristics of cancer patients admitted to the ICU

Characteristics	Value
Age (year)	56.5 (9–84)
Male sex	257 (58.27)
ECOG performance status	
0–1	116 (26.3)
2–4	325 (73.7)
Comorbidity	
Hypertension	116 (26.3)
Diabetes	97 (22)
Congestive heart failure	18 (4.1)
Stroke	20 (4.53)
Chronic lung disease	35 (7.93)
Liver cirrhosis	51 (13.15)
Chronic renal failure	14 (3.17)
Severity of illness	
SOFA	9 (5–12)
Treatment history before admission in ICU	
Chemotherapy	269 (61)
Radiotherapy	119 (26.98)
Reason for admission	
Cardiovascular	115 (26)
Respiratory	140 (31.75)
Neurological	78 (17.69)
Hepatic	19 (4.30)
Digestive	17 (3.85)
Renal	20 (4.53)
Metabolic	6 (2.04)
Hematological	25 (5.67)
Severe sepsis/septic shock	242 (54.87)
Others	2 (0.5)

ICU: Intensive care unit, SOFA: Sequential organ failure assessment

the predefined 12 months' period. Of these, 257 were males and 184 were females [Table 1]. Patients with ECOG performance status (0–1) were 116 and with ECOG (2–4) were 325 [Table 2]. The most common comorbidities were hypertension (116, 26.3%) and diabetes (97, 22%). The SOFA score was 5–12. Majority of the patients had a history of treatment with either chemotherapy or radiotherapy. The most common reason for referral to the ICU was respiratory disease followed by cardiovascular and digestive diseases. More than half of the patients had an acute infection at the time of admission.

Of the 441 patients, 331 suffered from solid and 110 from hematological malignancies. Lung carcinoma was the most common among solid malignancies ($n = 63$, 19%), whereas lymphoma ($n = 44$, 40%) was the most prevalent among hematological malignancies [Table 3]. The patients with hematological malignancies were younger as compared to solid malignancies. The performance status and comorbidities were similar between the two groups. Patients with hematological malignancies had higher SOFA score than patients with solid malignancies. The proportion of patients who had received radiation was higher in solid malignancies, while patients who had underwent chemotherapy were high in hematological malignancies.

Table 2: Baseline and treatment characteristics according to type of malignancy

Variable	Solid tumor (n=331)	Hematologic malignancies (n=110)
Age (year)	63 (41–84)	55 (9–67)
Male sex	180 (70.03)	77 (29.97)
ECOG performance status		
0–1	130 (39.27)	42 (38.18)
2–4	201 (60.72)	68 (61.82)
Comorbidity (overlapped)		
Hypertension	93 (28.09)	23 (20.90)
Diabetes	72 (21.75)	25 (22.72)
Congestive heart failure	12 (3.62)	6 (5.4)
Stroke	15 (4.53)	5 (4.54)
Chronic lung disease	29 (8.76)	6 (5.45)
Liver cirrhosis	56 (16.91)	2 (1.81)
Chronic renal failure	11 (3.32)	3 (2.72)
Severity of illness		
SOFA	8 (4–12)	12 (8–15)
Treatment history before ICU admission		
Chemotherapy	194 (58.61)	75 (68.18)
Radiotherapy	95 (28.7)	8 (7.27)
Reason for ICU admission		
Cardiovascular	79 (23.66)	36 (32.72)
Digestive	17	0
Hematological	15	10
Hepatic failure	19	0
Metabolic	6	0
Neurological	30	8
Renal	7	2
Respiratory	99	41
Other	2	0
Acute infection at ICU admission	298 (45.3)	129 (73.7)
Severe sepsis/septic shock	115	68
Treatment		
Inotrope/vasopressor within 24 h	293 (44.7)	96 (54.8)
Mechanical ventilation	219 (33.3)	82 (46.9)

ICU: Intensive care unit, SOFA: Sequential organ failure assessment

Table 3: Characteristics of malignancies

Types of malignancy	Patients n (%)
Malignancy (solid)	
Lung	63 (19)
Gastrointestinal	52 (15.7)
Head and neck	46 (13.9)
Breast	29 (8.7)
Gynecological	23 (6.9)
Hepatobiliary	33 (9.9)
Urogenital	46 (13.9)
Others	39 (11.8)
Malignancy (hematological)	
Lymphoma	44 (40)
Leukemia	35 (31.8)
Myeloma	21 (19)
Others	10 (9)

Respiratory and cardiovascular problem was common in both the groups. The rate of severe sepsis/septic shock was higher in patient with hematological as compared to solid malignancies. More number of patients required inotropes/vasopressor and mechanical ventilation in hematological malignancy group. Complications during ICU stay were comparable in both the groups except for

more cases of ventilator-associated pneumonia in patients with hematologic malignancy.

A total of 117 patients died in ICU. The mortality rate was higher in patients with hematological malignancy versus solid malignancy. Length of stay in ICU was longer in hematological malignancy.

DISCUSSION

The incidence and prevalence of cancer patient are increasing day by day. With advances in therapeutic option in oncology, the survival and quality of life for many patients with malignancies have significantly improved, but it can also cause complications requiring intensive care treatment. As a result, the demand for intensive care treatment is increasing. Several studies have shown that the presence of cancer is no longer an independent risk factor for death in the context of critical care.^[10,11] Acute respiratory failure was identified as one of the most common medical conditions for cancer patients for admission in ICU in our study as well as some previous studies.^[12-14] The risk of respiratory failure

was higher in patients with hematological malignancies as compared to solid malignancies.^[15,16] In our study, the proportion of patients who received chemotherapy and had acute infection and severe sepsis/septic shock was more in hematological malignancies than in patients with solid malignancies. The use of vasopressor and mechanical ventilation was more frequent in hematological malignancies. These findings are consistent with previous studies where vasopressor and mechanical ventilation with mortality were the final outcome.^[15,16] The mortality rate in solid and hematological malignancy in our study was 19.6% and 47%, respectively. Patients with solid tumor have a global hospitality rate of 25%–40%, and some studies have shown that the mortality in cancer patients is similar to patients admitted in ICU without cancer.^[17] In our study, patients with higher SOFA score and vasopressor use or mechanical ventilation use were associated with poor prognosis both in solid and hematological malignancies. SOFA score, multiorgan failure, and the use of vasopressor and mechanical ventilation are known to be a predictor of mortality in patients with cancer.^[18,19]

CONCLUSION

The demand for intensive care for critically ill cancer is increasing, considering the improvement in prognosis cancer patients should not be denied ICU care merely on the basis of a patient suffering from cancer. Data suggest that admitting selected patient with cancer to ICU is justifiable and mere admitting patients for the end of life care is not recommended. The most common reason for ICU admission in our study was respiratory problems. The uses of vasopressor and mechanical ventilation were associated with poor prognosis. Further studies should be conducted to study the demographic characteristics of cancer patients in ICU and the outcome of the treatment in ICU.

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