Pakistan Journal of Intensive Care Medicine
eISSN: 2708-2261; pISSN: 2958-4728
www.pjicm.com
DOI: https://doi.org/10.54112/pjicm.v3i02.18
Pak. J. Inten. Care Med., volume 2023: 18
Original Research Article

ASSESSMENT OF OUTCOMES OF MALIGNANCY PATIENTS ADMITTED IN INTENSIVE CARE UNITS

PERVAIZ R[1], ARIF B[1], SARWAR T[1], RIZVI AZ[2], MUNAWAR MU[2], KANDEEL H[3], AWAD AHA[4]

[1]*Department of Critical Care Medicine, Bahria International Hospital, Lahore, Pakistan*
[2]*Department of Medicine, Bahria International Hospital, Lahore, Pakistan*
[3]*Department of Critical Care Medicine, Hatta Hospital, Dubai Health, Dubai, UAE*
[4]*Department of Medical Intensive Care Unit, Rashid Hospital, Dubai Health, Dubai, UAE*
**Corresponding author's email address:* drrizwanpervaiz@gmail.com

(Received, 05th April 2023, Revised 19th July 2023, Accepted 1st August, Published 14th August 2023)

ABSTRACT

Background: *The decision to admit advanced cancer patients to the intensive care unit (ICU) is multifaceted, considering factors such as prognosis and quality of life.* ***Objectives:*** *The objective of this study was to identify mortality risk factors in critically ill advanced cancer patients admitted to the ICU.* ***Study Design:*** *This was an observational study.* ***Setting:*** *The study was conducted at Bahria International Hospital, Lahore.* ***Duration of Study:*** *The study was conducted between March 2022 and March 2023.****Material and Methods:*** *A total of 65 adult cancer patients admitted non-electively to the ICU were enrolled in the study. Data on demographics, clinical conditions, and outcomes were collected. Independent medical decisions were collected by ICU staff.* ***Results:*** *The ICU mortality rate was 34.6%, increased to 59.4% within thirty days post-discharge. Patients spent an average of 15.2 days in the ICU. Common admission reasons included respiratory failure (36.2%) and sepsis/septic shock (59.2%). Cox regression analysis revealed six significant indicators of poor outcomes: acute kidney injury (AKI), sepsis with multiple organ failure (MOF), acute respiratory distress syndrome (ARDS), uncontrolled malignancy, mechanical ventilation, and vasopressor use.* ***Conclusion:*** *Our findings highlight AKI, sepsis, MOF, ARDS, and uncontrolled malignancy as prognostic predictors of early death in critically ill cancer patients admitted to the ICU. Additionally, mechanical ventilation and vasopressor use are associated with increased mortality risk. These insights can aid clinicians in optimizing care strategies for cancer patients.*

Keywords: Intensive Care Unit, Risk Factors, Malignancy, Mortality

INTRODUCTION

Over the past several years, there has been a steady increase in the number of people with malignancies. In actuality, the World Health Organization (WHO) reports that there have been 18.1 million new cases of cancer and 9.6 million deaths from cancer, with a forecast of 29.4 million new cases by 2040 (1). The death rate within this patient population has decreased globally due to recent advancements in cancer screening, diagnosis, and therapy, and overall survival has been considerably improving (2). The likelihood that a cancer patient may require critical care is rising due to the increased number of cancer patients who are still living (3). The number of cancer patients being admitted to intensive care units (ICUs) has been steadily rising, either on an elective basis or a non-elective basis(2).

Most people believe that treating cancer patients in intensive and critical care is pointless since most of them won't survive and will burden intensive care units, patients, and their families (3). Because of their poor prognoses, patients with advanced cancer were traditionally prohibited from being admitted to the intensive care unit(4). Actually, according to recommendations developed by the Society of Critical Care Medicine, patients who have metastatic disease or who do not respond to chemotherapy or radiation therapy should not be admitted. For patients with metastatic cancer who were hospitalized due to specific problems such as infections or respiratory failure, the recommendations suggested minimal treatment (5). Additionally, research has indicated that the primary patient-related factor contributing to the rejection of ICU admission was the presence of metastatic cancer(6). Nonetheless, research indicates that a growing proportion of cancer patients are making it out of the intensive care unit and are leading quite everyday lives. These are primarily associated with enhanced diagnostic instruments, appropriate patient screening for critical care, and a decline in cancer-related mortality(7). Therefore, it is crucial to research and assess the variables linked to both short- and long-term mortality in cancer patients who are critically unwell and are hospitalized in the intensive care unit (ICU). This would support both the choice to admit a cancer patient to the intensive care unit and our understanding of critical care for cancer patients.

In this paper, we aim to characterize survival, clinical, and demographic data as well as to discover characteristics linked to short- and long-term mortality in patients with advanced cancer who are critically sick and non-electively admitted for medical ICU admission.

METHODOLOGY

This cohort study was conducted at Bahria International Hospital, focusing on critically ill cancer patients admitted to the intensive care units (ICUs) between March 2022 and March 2023. The study utilized a retrospective cohort design, with clinical decisions made by attending physicians and intensivists. Ethical approval for the study was obtained from the institutional review board.

The study included critically ill adult cancer patients (aged 18 years and above) who required non-selective admission to the hospital's ICUs and had a confirmed diagnosis of hematological or solid cancer. Patients admitted to the ICU for post-surgical observation were excluded from the study. Additionally, patients who had been in complete remission from cancer for more than five years were

disqualified from participation. Patients were monitored from the first day of ICU admission until 30 days following ICU discharge or until death, whichever occurred earlier. Eligible patients were identified by the lead researcher and colleagues on a daily basis, based on admission to the ICU. Data on demographic characteristics (age, sex), hospital location before ICU admission, and primary reasons for ICU admission, ventilator support requirement, and use of inotropes were collected. Information regarding comorbidities, cancer diagnosis, and treatment modalities was retrieved from hospital records and patient charts.

Statistical analysis involved descriptive statistics to summarize demographic and clinical characteristics, with continuous variables presented as mean ± standard deviation and categorical variables as frequencies and percentages. Univariate analysis compared clinical traits and patient outcomes using Chi-squared tests or Fisher's exact tests, with mortality rates calculated for different ICU complications and patient characteristics. Multivariate analysis utilized Cox regression to identify predictors of mortality, reporting hazard ratios (HRs) with 95% confidence intervals (CIs). A p-value < 0.05 was considered significant. All analyses were conducted using SPSS, and results were presented in tables and figures for clarity.

RESULTS

The research included 65 cancer patients enrolled between August 2021 and March 2023. the mean age of the study population was 65.21 years. Lung cancer was present in 15% while 18.46% had leukemia, lymphoma 13.84%. Solid and hematologic tumors other than leukemia were 78.46% most common reason for ICU admission was sepsis at 59.23%; next, it was respiratory failure with 36% prevalence. The most common ICU complication was sepsis in 82.3% of people. Other details of patient characteristics are shown in table 1.

Univariate comparisons were made between the clinical traits and patient outcomes. The study population's mortality was not found to be significantly predicted by the reason for ICU admission, the time of admission, chemotherapy or radiotherapy administered within 30 days of ICU admission, anemia, leukopenia, leukocytosis, thrombocytopenia, creatinine concentration before admission, code status, or curative versus palliative medical treatment. A higher fatality rate upon discharge from the intensive care unit was linked to the development of sepsis, AKI, MOF, or ARDS ($p < 0.05$) during the patient's ICU stay, with rates of 24.7, 16.5, 11.5, and 15.8%, respectively (Table 2). At the time of ICU stay, the death rate for patients with uncontrolled malignancy status was 33.2%. These patients had poorer outcomes. Additionally, patients with solid malignancy had a mortality rate of 39.7%.

In the study population, six predictors of death were found using multivariate analysis. During the ICU stay, sepsis (HR, 5.25, 95% CI, 2.74–16.52, $p = 0.01$) was linked to the highest risk of death, whereas the use of vasopressors (HR, 2.29; 95% CI, 0.87–5.21; $p = 0.04$) was linked to the lowest risk. Table 3.

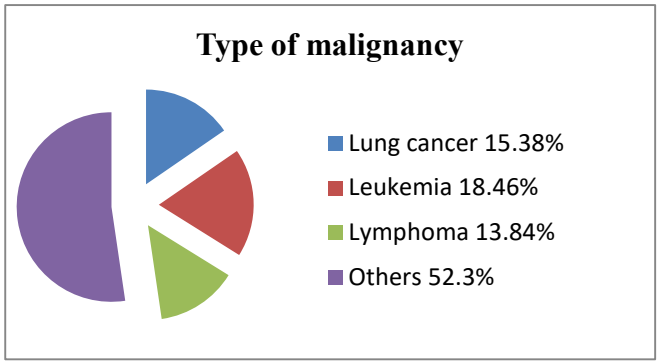

Figure 1: Types of Malignancies admitted in the ICU

Table 1: ICU stays and patient demographics

Variable	N	Percentage %
Number of patients,	65	100
Age, yr. Mean	65.21	---
Type of malignancy		
Lung cancer	10	15.38
Leukemia	12	18.46
Lymphoma	9	13.84
Others	34	52.3
Stage		
Solid and hematologic tumors other than leukemia	51	78.46
Leukemia	14	21.54
Malignancy status		
Controlled	49	74.61
Uncontrolled	16	25.39
Aim of treatment		
Curative	44	66.9
Palliative	21	33.1
Reason for ICU admission		
Sepsis	39	59.23
Respiratory failure	23	36
Altered general status	9	13
Hemorrhagic shock	10	16.15
ICU complications,		
Sepsis (bacterial)	54	83.0
Invasive fungal infection	4	6.15
ARDS	4	6.15
AKI	2	3.09
MOF	1	1.53
ICU care		
Mechanical ventilation	37	56.9
Vasopressor use	44	67
Antibiotic use	64	97.69
Dialysis	17	26.9
ICU length of stay, day Mean	15.2	------

Table 2: Univariate analysis of ICU outcome.

Variable	Mortality rate	P value
Sepsis	24.7	0.041
AKI	16.5	0.021
ARDS	15.8	0.012
Multiorgan failure	11.5	0.012
Uncontrolled malignancy	33.2	0.015
Solid malignancy	39.7	0.014

Table 3: Multivariate analysis of ICU outcome

Cox regression variable	HR	95% CI	p-value
Sepsis	5.25	2.74–16.52	0.01
ARDS	3.48	1.53–8.81	0.02
Uncontrolled malignancy	2.36	1.68–7.25	0.01
Multiorgan failure	4.89	1.79–12.83	0.032
Use of vasopressors	2.29	0.87–5.21	0.04
Use of mechanical ventilation	2.32	1.322–7.235	0.007

[Citation: Pervaiz, R., Arif, B., Hafeez, T., Sarwar, T., Munawar, M.U., Kandeel, H., Hasan, M., Awad, A.H.A. (2023). Assessment of outcomes of malignancy patients admitted in intensive care units. *Pak. J. Inten. Care Med.* ***2023****: 18*. doi: https://doi.org/10.54112/pjicmv3i02.18]

DISCUSSION

In our study population, leukemia and lung cancer accounted for 15.3% and 18.4% of all cancer cases, respectively. As the most common cause of cancer-related deaths, lung cancer has a significant morbidity and mortality rate, which is reflected in the noteworthy number of ICU admissions for the disease (8, 9). Some research found that the most prevalent cancers were leukemia and non-Hodgkin's lymphoma, while other studies found that gastrointestinal tumors and non-Hodgkin's lymphoma were also common cancers (3, 10, 11). Lung cancer was among the most prevalent cancers in particular research that focused only on solid tumors, while breast, colon, and gastrointestinal cancers were highlighted in a few other studies (2, 12). This, together with the fact that our cohort is comparable to those from earlier research, further supports the validity of our results.

In our investigation, respiratory failure and sepsis/septic shock were the leading causes of ICU admission. This result has been consistent across all investigations, with the most frequent cause of admission being sepsis or septic shock. Several other researchers have reported the same findings, including Auclin et al. and Aygencel et al. (2, 3, 13). Studies on lung cancer patients have indicated that respiratory failure and pneumonia account for the majority of ICU admissions (14). According to Heo et al., the most frequent reasons for ICU admission are respiratory failure and neurologic deterioration (15).

The ICU death rate in our research was 34.6%; 30 days after ICU release, the rate increased to 59.4%. Additionally, the research revealed a total survival rate of 21 days from the day of ICU admission. Among the studies that disclose death rates, Ygencel et al. (2014) reported a rate of 55%, Anisoglou et al. (2013) reported an ICU mortality rate of 47.4% in their study population, and Oeyen et al. (2013) reported a rate of 38% (3, 10, 16). Our results align with other research regarding the average length of stay, which is 15.2 days. The average length of stay in the intensive care unit has been observed to vary in other research (17-20), with a mean range of 4 to 12.8 days. In their multivariate study, Gupta et al. discovered that SOFA scores, hypotension, and septic shock were predictors of death (21). Multivariate research by Horster et al. revealed that high SAPS II scores, acute respiratory failure, and large doses of catecholamines, renal replacement therapy, and sepsis were predictive of death (12, 22).

According to our research, the presence or absence of a malignancy was proven to be a predictor of death, with uncontrolled cancer being associated with worse outcomes. Heo et al. similarly reported this, finding that in their research population, having an uncontrolled malignancy status is a predictor of death (15). Numerous studies have demonstrated and reported the occurrence of multiorgan failure as a predictor of death. Hwang et al. discovered that the emergence of multiorgan failure was an independent variable linked to death in lung cancer patients (23). Parakh et al. also discovered that in patients with any cancer, the presence of multiorgan failure and the total number of failing organs are predictive factors of death (24). This was also demonstrated by Soares et al., aligning with the population research results (11). Thus, it would appear that a large body of research supports the idea that one of the main reasons cancer patients are sent to the intensive care unit (ICU) is the development of multiorgan failure, either during the hospital stay or before.

Lastly, our findings indicated that a greater death rate was linked to being admitted straight from the emergency department (ED). Numerous research, like those by Aygencel et al. and Soares et al., show evidence that late ICU admittance from the wards is linked to more significant mortality (3, 11).

However, several limitations should be kept in mind, and caution should be used when interpreting the results of our study. First, the trial was restricted to 30-day mortality as a short-term endpoint. Second, it could not get objective data since specific sickness ratings, such as APACHE and SOFA, were not utilized upon admission to the intensive care unit. Finally, it was challenging to interpret the inconsistent results due to the variety of different tumors.

CONCLUSION

Our study findings underscore the critical importance of recognizing specific risk factors associated with short-term mortality among critically ill cancer patients admitted non-electively to the ICU. Notably, the development of AKI, sepsis, MOF, and ARDS, along with the presence of an uncontrolled malignancy, emerged as significant predictors of adverse outcomes. Additionally, the utilization of mechanical ventilation and vasopressors was indicative of heightened mortality risk. These insights emphasize the imperative for prompt identification and aggressive management of these factors in this vulnerable patient population to optimize clinical outcomes and enhance survival rates.

DECLARATIONS

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declared absence of conflict of interest.

AUTHOR CONTRIBUTION

RIZWAN PERVAIZ
Study Design, Review of Literature.
Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
BUSHRA ARIF
Conception of Study, Final approval of manuscript.
Manuscript revisions, critical input.
TAYYABA SARWAR
Manuscript drafting.
Data entry and Data analysis, drafting article.
AZKA ZAHRA RIZVI
Coordination of collaborative efforts.
Data acquisition, analysis.
MUHAMMAD USMAN MUNAWAR
Data acquisition, analysis.
Coordination of collaborative efforts.
HUSSEIN KANDEEL (Senior Specialist)
Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
AHMED HOSSAMELDIN AHMED AWAD (Senior Specialist)
Manuscript revisions, critical input.
Coordination of collaborative efforts.

REFERENCES

1. Organization WH. WHO report on cancer: setting priorities, investing wisely and providing care for all. 2020.

2. Auclin E, Charles-Nelson A, Abbar B, Guérot E, Oudard S, Hauw-Berlemont C, et al. Outcomes in elderly patients admitted to the intensive care unit with solid tumors. Annals of Intensive Care. 2017;7:1-8.
3. Aygencel G, Turkoglu M, Sucak GT, Benekli M. Prognostic factors in critically ill cancer patients admitted to the intensive care unit. Journal of critical care. 2014;29(4):618-26.
4. Hawari FI, Nazer LH, Addassi A, Rimawi D, Jamal K. Predictors of ICU admission in patients with cancer and the related characteristics and outcomes: a 5-year registry-based study. Critical care medicine. 2016;44(3):548-53.
5. Reddy DRS, Botz GH. Triage and prognostication of cancer patients admitted to the intensive care unit. Critical Care Clinics. 2021;37(1):1-18.
6. Sridharan G, Fleury Y, Hergafi L, Doll S, Ksouri H. Triage of Critically Ill Patients: Characteristics and Outcomes of Patients Refused as Too Well for Intensive Care. Journal of Clinical Medicine. 2023;12(17):5513.
7. Patel VN, Stone SD. Patients with advanced cancer requiring intensive care: reasons for ICU admission, mortality outcomes, and the role of palliative care. AACN Advanced Critical Care. 2021;32(3):324-31.
8. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2018;68(6):394-424.
9. Torre LA, Sauer AMG, Chen Jr MS, Kagawa-Singer M, Jemal A, Siegel RL. Cancer statistics for Asian Americans, Native Hawaiians, and Pacific Islanders, 2016: Converging incidence in males and females. CA: a cancer journal for clinicians. 2016;66(3):182-202.
10. Oeyen S, Benoit D, Annemans L, Depuydt P, Van Belle S, Troisi R, et al. Long-term outcomes and quality of life in critically ill patients with hematological or solid malignancies: a single center study. Intensive care medicine. 2013;39:889-98.
11. Soares M, Caruso P, Silva E, Teles JM, Lobo SM, Friedman G, et al. Characteristics and outcomes of patients with cancer requiring admission to intensive care units: a prospective multicenter study. Critical care medicine. 2010;38(1):9-15.
12. Borcoman E, Dupont A, Mariotte E, Doucet L, Joseph A, Chermak A, et al. One-year survival in patients with solid tumours discharged alive from the intensive care unit after unplanned admission: a retrospective study. Journal of Critical Care. 2020;57:36-41.
13. Vijenthira A, Chiu N, Jacobson D, Freedman Z, Cheung MC, Goddard S, et al. Predictors of intensive care unit admission in patients with hematologic malignancy. Scientific Reports. 2020;10(1):21145.
14. Chang Y, Huh J-W, Hong S-B, Lee DH, Suh C, Kim S-W, et al. Outcomes and prognostic factors of patients with lung cancer and pneumonia-induced respiratory failure in a medical intensive care unit: a single-center study. Journal of critical care. 2014;29(3):414-9.
15. Heo SJ, Kim G, Lee C-k, Chung KS, Choi HJ, Sohn J, et al. Prediction of short-and long-term survival for advanced cancer patients after ICU admission. Supportive Care in Cancer. 2015;23:1647-55.
16. Anisoglou S, Asteriou C, Barbetakis N, Kakolyris S, Anastasiadou G, Pnevmatikos I. Outcome of lung cancer patients admitted to the intensive care unit with acute respiratory failure. Hippokratia. 2013;17(1):60.
17. BIKMAZ ŞGA, Gökçe O, Haşimoğlu MM, BOYACI N, Türkoğlu M, Yegin ZA, et al. Risk factors for ICU mortality in patients with hematological malignancies: a singlecenter, retrospective cohort study from Turkey. Turkish Journal of Medical Sciences. 2023;53(1):340-51.
18. Xia R, Wang D. Intensive care unit prognostic factors in critically ill patients with advanced solid tumors: a 3-year retrospective study. BMC cancer. 2016;16(1):1-7.
19. Vigneron C, Charpentier J, Valade S, Alexandre J, Chelabi S, Palmieri L-J, et al. Patterns of ICU admissions and outcomes in patients with solid malignancies over the revolution of cancer treatment. Annals of Intensive Care. 2021;11(1):1-10.
20. Assi HI, Halim NA, Alameh I, Khoury J, Nahra V, Sukhon F, et al. Outcomes of patients with malignancy admitted to the intensive care units: a prospective study. Critical Care Research and Practice. 2021;2021.
21. Gupta R, Heshami N, Jay C, Ramesh N, Song J, Lei X, et al. Predictors of survival in patients with sarcoma admitted to the intensive care unit. Clinical sarcoma research. 2016;6(1):1-12.
22. Horster S, Stemmler HJ, Mandel PC, Mück A, Tischer J, Hausmann A, et al. Mortality of patients with hematological malignancy after admission to the intensive care unit. Onkologie. 2012;35(10):556-61.
23. Hwang KE, Seol CH, Hwang YR, Jo HG, Park SH, Yoon KH, et al. The prognosis of patients with lung cancer admitted to the medical intensive care unit. Asia-Pacific Journal of Clinical Oncology. 2016;12(1):e118-e24.
24. Parakh S, Piggin A, Neeman T, Mitchell I, Crispin P, Davis A. Outcomes of haematology/oncology patients admitted to intensive care unit at T he C anberra H ospital. Internal medicine journal. 2014;44(11):1087-94.