

Leukemia – Lymphoma and Myeloma

Audit of In-Hospital Mortality from a Medical Oncology and Hemato-Oncology Center with the Emphasis on Best Supportive Care

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Abstract



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Background and Objectives The newly established medical oncology and hemato-oncology center at the All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand, India, provided us an opportunity to audit in-hospital mortalities with a vision that the audit will serve as a standard for ceaseless improvement. Aim of the study was to initiate a vigorous process for the evaluation of all-cause mortality in patients suffering from cancer.

Methods An audit of all in-hospital deaths that occurred during the year 2019 was performed, and comprehensive scrutiny of various parameters (demographic, clinico-pathological, therapeutic, causes of death) was done. Reviews from two independent observers sharpened the infallibility of the audit. The lacunae in the existing practices and the scope for further improvement were noted.

Results Forty-five in-hospital deaths were registered during the study period (January–December 2019). The majority of the deaths occurred in patients with advanced stage of malignancy ($n = 31$) 68.8%. Most common causes of death were progressive disease, neutropenic, and non-neutropenic sepsis. Chemotherapeutic agents, growth factors, blood components, and antibiotics were found to be used judiciously as per institutional policy. The reviewers emphasized on the use of comorbidity indexes in the treatment planning and avoiding intensive care unit referrals for patients receiving best supportive care (BSC). Emphasis was put on providing only BSC to the patients with a very limited life expectancy. Emphasis was also laid down on record of out of the hospital deaths.

Interpretation and Conclusion The audit disclosed areas of care which require further improvement. The mortality audit exercise should become a regular part of evaluation and training for the ongoing and future quality commitment. This should impact the clinical decision making in an oncology center providing quality care to the terminally ill patients.

Keywords

- ▶ best supportive care
- ▶ in-hospital deaths
- ▶ mortality audit
- ▶ neutropenic sepsis
- ▶ non-neutropenic sepsis
- ▶ progressive disease

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Introduction

Cancer is the second leading cause of death worldwide. Low- and middle-income countries account for approximately 70% of cancer-related deaths.¹ The advent of newer drugs and therapies in oncological practice has led to increased cure rates and overall survival in cancer patients. However, advanced-stage cancer is seldom curable, and cancer-related death becomes an inevitable phenomenon. There can be various causes of death in a cancer patient. Death can be (1) disease-related, like progressive disease and primary organ failure, (2) those related to treatment or intervention like neutropenia and sepsis, and (3) due to causes unrelated to cancer, for example, comorbidities. A health care provider should be astute enough to anticipate the causes and possibility of death in cancer patients. Mortality audit is an exercise to critically appraise the causes and circumstances leading to the death of the patients and the remedial steps which might have prevented the unexpected death. Aim of the mortality audit in an oncological setting should be to identify the preventable causes of death, to avoid treatment and interventions which are unlikely to provide a palliation or survival benefit in last few days of life, and to identify the modifiable factors and interventions likely to improve the quality of care and outcomes. The data regarding death of cancer patients outside the jurisdiction of clinical trials is scarce, especially in the developing countries including India.

A judicious mortality audit should serve as a benchmark for future improvement; this led to the inception of this study.

A newly established medical oncology and hemato-oncology center in a resource-constrained geographical area has the challenge to provide optimum cancer care, and it has to improve progressively.

All India Institute of Medical Sciences (AIIMS) at Rishikesh, Uttarakhand, India, is a tertiary care center under the Ministry of Health and Family Welfare. We started hemato-oncology services in 2016 and medical oncology services in 2018. We have a teaching unit, including a 26-bed inpatient department and a 20-bed day care, serving nearby, rural and remote population in a radius of almost 300 km. We present our first audit of in-hospital deaths in cancer patients.

Material and Methods

We performed an audit of all in-hospital deaths in the department of medical oncology and hemato-oncology between January and December 2019. All in-hospital deaths that occurred during this period were identified from the computerized patient records, and case files were retrieved from the medical records department. An audit design was prepared for compiling the data. Parameters for assessment included were age, gender, residence, Eastern Cooperative Oncology Group-Performance Status (PS), type of cancer, stage of cancer, comorbidities, the intent of treatment or intervention (palliative, curative, or best supportive), type of last treatment or intervention received (chemotherapy or procedure), any improvement in PS due to last intervention, period of hospital stay prior to death, and the cause of death. Permission from the medical superintendent was obtained

for carrying out the audit. The audit was approved by the institutional ethics committee.

The audit was reviewed by two independent observers. The final report was submitted to the Dean, research advisory committee of the institute. A fidelity statement was generated to perform audits at regular intervals to identify areas for improvement.

Results

We registered 45 in-hospital deaths in the year 2019. These included 28 patients of solid organ malignancies and 17 of hematological malignancies. The mean duration of hospital stay before death was 9 (range 1–33) days. The median age of the patients at the time of death was 47 (range 2–82) years. Seventeen cases were outside Uttarakhand state. Seven patients had one or more comorbid illnesses (–Table 1).

Table 1 Patient's characteristics

Parameters	Numbers
Median age	47 (2–82) y
Males	31
Females	14
Residence	
Uttarakhand	28
Outside Uttarakhand	17
Patients with one or more comorbidities (n = 7)	
Type 2 diabetes mellitus	1
Chronic kidney disease	1
Chronic liver disease (hepatitis B related)	1
Chronic liver disease (hepatitis C related)	1
Dilated cardiomyopathy	1
Hepatitis B infection	1
Coronary artery disease	1
Stage (solid organ cancers)	
3	5
4	23
Performance status (ECOG) at the time of last intervention received	
0	0
1	3
2	11
3	16
4	12
Primary diagnosis	
Acute leukemia	12
Lung cancer	5
Genitourinary cancer	5
Head and neck cancer	4

(Continued)

Table 1 (Continued)

Parameters	Numbers
Pancreaticobiliary cancer	3
Ovarian cancer	3
Cancer of unknown primary	3
Gastrointestinal cancer	2
Neuroendocrine cancer	1
Breast cancer	1
Plasma cell leukemia	1
Multiple myeloma	1
Chronic myeloid leukemia	1
Myelodysplastic syndrome	1
Sarcoma	1
Non-Hodgkin lymphoma	1
Intent of the treatment (solid organ cancer, <i>n</i> = 28)	
Curative	4
Palliative including chemotherapy	8
Best supportive care	15
Intent of the treatment (hematological cancer, <i>n</i> = 17)	
Curative	9
Palliative including chemotherapy	1
Best supportive care	7
Causes of death	
Progressive disease	21
Neutropenic sepsis	9
Non-neutropenic sepsis	4
Pulmonary embolism and respiratory failure	3
Perforation peritonitis	2
Sudden cardiac death	2
Ventricular tachycardia	1
Myocardial infarction	1
Hypovolemic shock	1
Coagulopathy-associated bleed	1
Mean duration of hospital stay in the last admission (d)	9 (range 1–33)

Abbreviations: ECOG, Eastern Cooperative Oncology Network, PS, Performance Status.

Note: Three patients of pediatric age group had a Lansky PS of 10, 10, and 70 each.

Among solid organ malignancy patients, 23 (82.14%) patients had metastatic disease and the intent of the treatment was palliation, including palliative chemotherapy in 15 patients and limited to best supportive care (BSC) in 8 patients. Five patients (17.8%) received chemotherapy with curative intent. Eight patients with palliative intent chemotherapy had prior received one or more lines of chemotherapy. Twenty-four

deaths were unrelated to chemotherapy/intervention received during the last 4 weeks of life in patients with solid organ malignancies. The various causes included thromboembolism and respiratory failure, non-neutropenic sepsis, progressive disease, multiorgan failure, coagulopathy-associated bleeding, myocardial infarction, ventricular tachycardia leading to cardiogenic shock, and perforation peritonitis.

Causes of death related to chemotherapy/intervention included neutropenic sepsis in three patients, and hypovolemic shock after peritoneocentesis in one patient of refractory mucinous ovarian adenocarcinoma. Five deaths occurred in patients receiving treatment with curative intent. Causes included pulmonary embolism, neutropenic sepsis, non-neutropenic sepsis and progressive disease, sudden cardiac death, and non-neutropenic sepsis with acute respiratory distress syndrome.

Among hematological malignancies, 9 patients were treated with curative intent, 1 with palliative, and 7 received BSC. Nine deaths were unrelated to chemotherapy, and the causes included progressive disease with encephalopathy, stroke, and multiorgan failure. Eight deaths were attributed to chemotherapy-related neutropenic sepsis.

Treatment/intervention received in the last 4 weeks of life included chemotherapy in 30 patients, radiotherapy in 1 patient, and therapeutic procedure in 6 patients. Procedures included peritoneal catheter insertion and peritoneocentesis in 3 patients, percutaneous transluminal biliary drainage, pericardiocentesis, and thoracocentesis each in 1 patient. Three patients received more than one treatment/intervention. BSC, including palliative procedure, was provided to 11 patients.

Chemotherapy doses were found to be appropriate and as per protocol. Judicious use of growth factors and blood component therapy was done wherever needed. Institutional policy for the use of antibiotics was followed religiously.

In the cohort of death of patients receiving palliative chemotherapy (*n* = 15) in solid organ cancers, it was observed that chemotherapy could have been avoided in 8 patients as they had poor prognostic factors namely PS 3 or 4, multiple comorbidities, receiving second or subsequent lines of chemotherapy, or a combination of more than one factor. Although deaths were due to progressive disease in all of these patients, adding chemotherapy in these patients did not lead to improvement in PS or symptoms. Referrals to the intensive care unit in three patients receiving BSC were also considered as nonessential.

Discussion

This is a single-institution study of in-hospital deaths in a medical oncology, hemato-oncology set up. A large proportion of deaths (37.7%) were observed in patients outside Uttarakhand state as many patients travel to our institute from adjoining states of Uttar Pradesh, Haryana, and Himachal Pradesh for oncology services. Our audit report suggests that optimum care was delivered to prevent mortality and morbidity in patients receiving definite anticancer therapy in the form of appropriate antibiotics, anticoagulation, blood

components transfusion, growth factors support, and intensive care support if required. No attempts were made to unnecessarily prolong the survival in patients receiving exclusive BSC.

Eight patients who were receiving second and subsequent lines of therapy demonstrated no improvement in PS or symptom improvement after the last cycle of systemic anticancer therapy. Discontinuation of systemic anticancer therapy can be considered for these patients after considering other clinical and demographic parameters like life expectancy, comorbidities, patient's goal of care, financial toxicities, and travel from a remote area as chemotherapy-related complications can be fatal for them. Deciding the appropriate role of chemotherapy near the end of life can be difficult. Various studies have indicated that chemotherapy was used frequently in the last 3 months of life. The use of chemotherapy toward the end of life should only be done when some realistic benefit is expected. Emphasis should be on BSC for those patients who have multiple comorbidities, poor PS, and progressed on first line chemotherapy.^{2,3}

Most of the younger patient's deaths were seen in the hematological malignancies group. These were usually treatment-related and occurred within a year of starting systemic therapy. Most of these deaths were due to febrile neutropenia and sepsis. Similar results have been seen in other studies. Various factors like the type of malignancy, comorbidities, and infectious complications, are associated with increased mortality in patients who develop febrile neutropenia and sepsis. These factors serve as useful parameters for recognizing patients at heightened risk of grave morbidities and mortality, prompting aggressive approach.^{4,5}

It has been seen that there is a poor acceptance for BSC among attendants of a terminally ill cancer patient. This may be due to various reasons like lack of social support at home, poor communication from the treating team, poor understanding of the disease and prognosis on the part of attendants, nonacceptance of a terminal illness due to emotional impact, and not considering BSC as a form of treatment. Every effort should be made from the treating team to educate the patient's attendants regarding the terminal and nonresponding nature of the cancer. They should be made aware that quality of life should be a priority instead of chasing an invisible foe and BSC is a comprehensive accompaniment taking care of optimal physical and psychosocial needs of the patient. The decision to shift a patient on BSC either at home or in a specialized hospice center should be a collective one among the treating team and the usual attendants of the patient.⁶

Conclusion

Mortality audits give us an opportunity to review the practices and services being delivered. They create a window for subsequent improvement as each audit serves as a benchmark for prospective audit. BSC should be strongly considered instead of systemic anticancer therapy in patients with poor PS, terminal illness, progression on subsequent lines of chemotherapy, multiple comorbidities, or a combination of one or more of these factors. This study invigorates the idea of performing death audits from other cancer institutes of India and rest of the world.

Authors' Contributions

D.S., A.S., and U.K.N. contributed to the study conception and design. Data collection and analysis were performed by D.S., P.K., S.V.N., A.B., D.C., R.C., and A.S. The original draft was prepared by D.S., D.J., S.G., S.V., and U.K.N. Manuscript review was done by D.S. and G.D. All authors read and approved the final manuscript.

Ethics Approval

Approved by Institutional Ethics Committee (letter No-AIIMS/IEC/20/345).

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Conflict of Interest

The authors state that they do not have any conflict of interests.

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