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ORIGINAL RESEARCH

Reasons for Emergency Department Visit, Outcomes, and Associated Factors of Oncologic Patients at Emergency Department of Jimma University Medical Centre

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Introduction: The number of oncologic patients visiting the emergency department (ED) is increasing and represent a challenge for the emergency team owing to they might have acute sign and symptoms of a still undiagnosed malignancy, management of treatment-related side effects, co-morbidities, and palliative care. Thus, this study was aimed to identify reasons for ED visits, management outcomes, and associated factors of oncologic patients.

Patients and Methods: A prospective cross-sectional study was conducted from March 11, 2021 to August 25, 2021 at the ED of Jimma University Medical Center on a total of 338 oncologic patients. Data were collected from the patient and the patient's medical record using a questionnaire developed from up-to-date similar literatures. The questionnaire was started filled out upon diagnosis of cancer and completed during discharge from the ED. The outcomes of the patients were dichotomized into died and survived then, it was analyzed using frequency and bivariate logistic regression.

Results: The most common reasons for oncologic patients ED visit were neutropenic fever 79 (23.4%) followed by vomiting 38 (11.2%) and electrolyte abnormality 37 (10.9%) respectively. Among oncologic patients visited ED, 137 (40.5%) of them were admitted to ward and 126 (37.3%) of them were discharged with improvement while 64 (18.9%) of them were died. Based on multivariate logistic regression, those patients who had distant metastasis cancer (AOR 1.85; 95% CI 1.03–7.21), comorbidity (AOR 2.56; 95% CI 1.20, 6.96), and ECOG >3 (AOR 2.40; 95% CI 1.25,13.43) were more likely to die than their counterparts.

Conclusion: Most of the oncologic patients visited ED due to neutropenic fever, nausea and or vomiting, and electrolyte disorder. Amongst oncologic patients who were visited ED, most of them were admitted to ward while around one-fifth of them were died. Having distant metastasis cancer, comorbidity and ECOG >3 were independent predictors of an oncologic patient's outcome at the ED.

Keywords: cancer, oncology, emergency department, metastasis, ED

Introduction

Although there is a development of surgical and medical cancer management modalities, it is a major public health concern worldwide.[1–5] It is estimated that cancer kills over 7.9 million people globally each year constituting about 13% of total deaths worldwide.[5] The overall burden of cancer in the world is projected to continue to rise, particularly in developing countries. It is anticipated that an estimated 21 million people will be diagnosed, and 13 million will die of cancer in the year 2030 unless treatment intervention takes place.[5–7]

Among patients with cancer, 6.8% of them visited the emergency department (ED). Of whom, more than half of the patients were admitted to inpatient service for further management.[8] Cancer patients visit EDs due to management of treatment-related side effects, oncologic emergencies, co-morbidities, and end-of-life care.[9,10] These oncologic emergencies are occurring in 30–50% of cancer patients presenting to EDs. It comprises malignant spinal cord compression,

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increased intracranial pressure (ICP), metabolic and endocrine emergencies, cardiac emergencies, airway and pulmonary emergencies like pneumothorax, pleural effusion, radiation-induced lung injury, aspiration pneumonia, malignant airways disease, pulmonary vascular disease, diaphragmatic dysfunction; gastrointestinal (GI) emergencies like nausea and vomiting, constipation, diarrhea, ascites, hepatic encephalopathy, malignant gastroparesis, GI bleeding, nephro-urologic emergencies that take in acute kidney injury, tumor lysis syndrome, obstructive uropathy, infectious emergencies like neutropenic fever, sepsis are complications that result in an ED visit.[2,8,9,11,12]

Mortality due to oncologic emergency in low-income countries can range from 19.7% to 37.6%, and in the USA 13% of cancer patients who visited the ED died even though care was provided, and early recognition of the conditions at triage have a significant impact in the quality of life and mortality rate of patients.[13,14] The outcome of cancer patients who visited the EDcan be predicted by region of cancer, stage of cancer, associated comorbidity, and measures taken to control cancer.[4–6]

Even though some studies were conducted related to ED visits of cancer patients and its outcome, there is no data in Ethiopia. Thus, this study helps to identify the reasons for oncologic patients ED visit, outcomes and related factors which will be used for further appropriate preparedness and to improve quality of healthcare provided for the patients. Furthermore, this study finding can be used as a baseline finding, especially in resource limited countries like Ethiopia.

Methods and Materials

Study Design and Setting

A prospective cross-sectional study was conducted from March 11, 2021 to August 25, 2021 at the ED of Jimma University Medical Center. Jimma University Medical Center (JUMC) was located in south-west Ethiopia and provides teaching and research services in addition to medical services. It is the only teaching and referral hospital in the south-western part of the country. The medical center provides services for more than 20 million patients with 800 beds from south-west Ethiopia. The institution is providing services for around 15,000 inpatients, 160,000 outpatient attendants, 11,000 emergency cases, and 4500 deliveries per year.[16,17]

Study Population

All oncologic patients who were visited the adult ED of JUMC from March 11, 2021 to August 25, 2021.

Eligibility Criteria

Cancer patients aged ≥ 14 years old who visited the ED due to cancer related cause were included in the study. Oncologic patients who seek care for another disease other than cancer, such as cancer patients who presented to the ED due to trauma or poisoning, were excluded from the study.

Sample Size Determination and Sampling Procedure

Patients presenting to the ED with a cancer-related complaint from March 11, 2021 to August 25, 2021 were triaged using South Africa triaging system. Then, after patients were diagnosed for cancer based International Classification of Disease 10th Revision Clinical Modification (ICD-10-CM) diagnoses codes, they were sequentially enrolled in the study until the expected sample size, 340, was reached.

Data Collection Tool and Procedure

A questionnaire was developed from up-to-date similar literatures which contain socio-demographic characteristics, clinical profile (chief complaint, comorbidity, primary tumor site, prior ED presentation treatment and tumor status), reasons for ED visit and outcome of the patient.[6,11,15,18–21] The variables like prior cancer treatment, ED complaints, educational status, occupation, marital status and comorbidity were collected from the patient and status of cancer, oncologic complications, primary tumor location, and region of metastasis were collected from patient's medical record. Comorbidities are those included in the Charlson comorbidity score and cancer diagnosis was categorized based on International Classification of Disease 10th Revision Clinical Modification (ICD-10-CM) diagnoses codes. The data was

collected 24 hours during the data collection period and the patient was followed from histological diagnosis to discharge from the ED. The data was collected by 4 BSc nurses working at the ED of JUMC.

Data Quality Assurance

The questionnaire was pilot-tested at the study site on 26 oncologic patients three days prior to the actual data collection. The questionnaire was started upon diagnosis of cancer and completed during discharge from the ED. Data collectors were trained on the contents of the tool and the supervisor provided onsite close supervision, and technical support, and checked all filled questionnaires for completeness, accuracy, and consistency.

Data Processing and Analysis

Ethical Considerations

The ethical approval and clearance were obtained from Jimma University Institutional Review Board (IRB) and a cooperation letter was written to the CEO of the Jimma University Medical Centre to conduct the study. The adult emergency ward staff were informed and permission was obtained from them. Written informed consent was obtained from the study participants. Confidentiality of all the study participants was highly maintained throughout the data collection of the research process. For those patients under 18 years of age, parental informed consent was obtained. This study complies with the Declaration of Helsinki.

Result

Socio-Demographic Characteristics of Cancer Patients

A total of 338 oncologic patients were included in the study, out of which 202 (59.8%) were females. The mean age of the patients is 43.0±14.9SD. Regarding the educational status of the participants, 114 (33.7%), of them had learned up to high/preparatory school whereas around one-fifth, 53 (15.7%), of them had completed a diploma or above. Most of the patients were referred from other government hospitals (113; 33.4%), followed by 96 (28.4%), who were transferred from OPD of JUMC. Concerning the time of ED arrival, more than half (224; 66.3%), of them visited the ED during day time (from 6:00 AM to 6:00PM) while the rest were during the night (from 6:00 PM to 6:00 AM) (Table 1).

Table 1 Socio-Demographic Characteristics of Patients with Cancer at the ED of JUMC, Jimma, Ethiopia, 2021

Variables (n=338)		Frequency	Percent
Sex	Male	136	40.2
	Female	202	59.8
Age	≤18	39	11.5
	19–64	254	75.1
	≥65	45	13.3
Address	Urban	135	39.9
	Rural	203	60.1
Marital status	Married	208	61.5
	Single	66	19.5
	Divorced	23	6.8
	Widowed	41	12.1

(*Continued*)

Table 1 (Continued).

Variables (n=338)		Frequency	Percent
Occupation	Farmer	137	40.5
	Merchant	89	26.3
	Government employee	73	21.6
	Other*	39	11.5
Educational status	Illiterate	77	22.8
	Primary school	94	27.8
	High/preparatory school	114	33.7
	Diploma or above	53	15.7
Sources of referral	OPD of JUMC	96	28.4
	Other government hospitals	113	33.4
	Health center	52	15.4
	Private clinic	30	8.9
	Self-referral	47	13.9
Arrival time at the ED	Day	224	66.3
	Night	114	33.7

Note: *Pension, jobless and student.

Clinical Profile of Oncologic Patients Who Visited ED

The most major complaint of the oncologic patients was easy fatigability (50; 14.8%) followed by shortness of breath (5; 19.2%) and vomiting (39; 11.5%) respectively. Almost around one-third (144; 42.6%), of the oncologic patients had comorbidity, out of which 45 (13.3%), 32 (9.5%) and 29 (8.6%) had a retroviral infection, diabetes mellitus and hypertension, respectively. Concerning primary cancer sites, one-third (117; 34.6%), accounted for blood cancer followed by cervical cancer (53; 15.7%) and breast cancer (39; 11.5%) respectively. Amongst the patients who visited ED, more than half (193; 57.1%), of them had locally advanced cancer while the rest had distant metastases (Table 2).

Reasons for ED Visit, and Outcome of Oncologic Patients Who Visited ED

The most common reason for oncologic ED visits was neutropenic fever (79; 23.4%) followed by nausea/and vomiting (38; 11.2%) and electrolyte abnormality (37; 10.9%). Among the study participants, around one-third (105; 31.1%) of them were categorized under eastern cooperative oncology group (ECOG) category one whereas, 62 (18.3%) of them were categorized under ECOG4. Regarding the outcomes of patients at the ED, 137 (40.5%) of them were admitted to ward and 126 (37.3%) of them were discharged with improve while 64 (18.9%) of the oncologic patients died (Table 3).

Factors Associated with the Outcome of Oncologic Patients

Outcomes of oncologic patients at the ED were dichotomized into died and survived to compute bivariate logistic regression. Those predictor variables having p-value <0.25 were transferred into multivariate logistic regression to overcome the effect of cofounding variable. In the multivariate logistic regression variables having p-value <0.05 were considered statistically significant associations.

Table 2 Clinical Characteristics of Oncologic Patients Who Visited ED of JUMC, Jimma, Ethiopia, 2021

Variables (n=338)		Frequency	Percent
ED chief complaint	Fever	24	7.1
	Change in mental status	38	11.2
	Fatigue	50	14.8
	Shortness of breath	65	19.2
	Vomiting	39	11.5
	Pain	32	9.5
	Body weakness	12	3.6
	Bleeding, ulcer	15	4.4
	Body swelling	17	5.0
	Difficulty of swallowing	22	6.5
	Decreased urine output	15	4.4
	Other*	9	2.7
Comorbidity and its types	Retroviral infection	45	13.3
	Diabetes mellitus	32	9.5
	Hypertension	29	8.6
	Asthma	19	5.6
	Cardiac illness	19	5.6
	None	194	57.4
Primary tumor location	Blood	117	34.6
	Lung and pleura	30	8.9
	Breast	39	11.5
	Cervical	53	15.7
	Oesophagus	23	6.8
	Stomach	18	5.3
	Intestine	11	3.3
	Rectum	6	1.8
	Brain	11	3.3
	Prostate	6	1.8
	Neck	9	2.7
	Other**	15	4.4
Treatment prior to ED presentation	Chemotherapy	88	26.0
	Radiotherapy	67	19.8
	Surgery	54	16.0

(*Continued*)

Table 2 (Continued).

Variables (n=338)		Frequency	Percent
	More than none treatment	6	1.8
	None	123	36.4
Status of cancer	Locally advanced cancer	193	57.1
	Distant metastases	145	42.9
Regions of metastasis (n=145)	Urinary system	56	38.6
	Lung and pleura	47	32.4
	Liver and pleura	42	29.0

Note: **Skin, bone, muscle, kidney, and bladder; *Loss of appetite, diarrhea and constipation.

Table 3 Oncologic Complications (Reason for ED Visit) and Outcome of Oncologic Patients at the ED of JUMC, Jimma, Ethiopia, 2021

Variables		Frequency	Percentage
Oncologic complication/ reason for ED visit (n=360) NB: multiple answers are possible	Upper airway obstruction	21	6.2
	Tumor lysis syndrome	20	5.9
	Neutropenic fever	79	23.4
	Electrolyte abnormality	37	10.9
	Anemia	26	7.7
	Nausea and vomiting	38	11.2
	Venous thromboembolism	22	6.5
	Hyper leucocytosis	24	7.1
	Malignant pleural effusion	18	5.3
	Urinary tract obstruction	29	8.6
	Bleeding	16	4.7
	Increased ICP and seizure	12	3.6
	Pericardial effusion and tamponade	5	1.5
	Malignant spinal cord compression and pathological fracture	7	2.1
	Other*	6	1.8
Eastern Cooperative Oncology Group (ECOG) category	ECOG1	105	31.1
	ECOG2	73	21.6
	ECOG3	98	29.0
	ECOG4	62	18.3

(*Continued*)

Table 3 (Continued).

Variables		Frequency	Percentage
The outcome of the patient at the ED	Admitted to ward	137	40.5
	Discharged	126	37.3
	Left hospital against medical advice	11	3.3
	Died	64	18.9

Note: * Hypersensitivity reactions, Insulinoma and Biliary tract obstruction

In bivariate logistic regression, those patients aged ≤18 years (COR 1.82; 95% CI, 0.64–5.19) and ≥65 years (COR 22.42; 95% CI, 8.11–31.07) were more likely to die than those aged 18 to 64 years old patients. Furthermore, predictor variables night time ED arrival (COR 3.81; 95% CI, 2.17–6.70), distant metastasis of cancer (COR 2.91; 95% CI, 1.66–5.13), having comorbidity (COR 4.19(); 95% CI, 2.32, 7.55), Poor ECOG (COR 5.93; 95% CI, 3.08, 11.44), and primary tumor site were the factors which predict the outcomes of oncologic patients at the ED (Table 4).

Based on multivariate logistic regression, those patients with distant metastasis cancer were 1.85 times more likely to die than locally advanced cancer types (AOR 1.85; 95% CI 1.03–7.21, P=0.0010). Additionally, having comorbidity (AOR 2.56; 95% CI 1.20, 6.96), and ECOG >3 (AOR 2.40; 95% CI 1.25,13.43) were independent predictors of patient outcomes (Table 4).

Table 4 Bivariate and Multivariate Logistic Regression Analysis of Oncologic Patients' Outcome Who Visited ED of JUMC, Jimma, Ethiopia, 2021

Variables		Outcome		COR (95%, CI)	AOR [95%, CI]	p-value
		Dead	Alive			
Age (in yrs.)	≤18	5	34	1.82(0.64–5.19)		0.13178
	18–64	19	235	1.00		
	≥65	29	16	22.42(8.11–31.07)		
Time ED of arrival	Day	26	198	1.00		0.0021
	Night	38	76	3.81(2.17–6.70)		
Status of cancer	Locally advanced Cancer	23	170	1.00	1.00	0.0010*
	Distant metastases	41	104	2.91(1.66–5.13)	1.85(1.03,7.21)	
Primary location tumor	Blood	11	106	1.00	1.00	0.0008*
	Lung and pleura	10	20	4.82(1.96,17.3)	0.6(0.02, 0.94)	
	Breast	12	27	4.28(1.71, 10.75)	0.6(0. 08, 0.99)	
	Cervical	7	46	1.47(0.54, 4.02)	0.5(0.12,0.98)	
	Brain	4	7	5.51(1.39, 21.81)	0.6(0.20,0.99)	
	Gastrointestinal	6	12	4.82(1.51, 15.37)	0.39(0.05,0.91)	
Comorbidity	Yes	45	99	4.19(2.32, 7.55)	2.56(1.20, 6.96)	0.0001*
	No	19	175	1.00	1.00	

(*Continued*)

Table 4 (Continued).

Variables		Outcome		COR (95%, CI)	AOR [95%, CI]	p-value
		Dead	Alive			
Types of comorbidities	Retroviral infection	10	35	1.00	1.00	0.0438*
	Diabetes mellitus	14	18	2.72(1.01, 7.33)	3.53(1.97,12.88)	
	Hypertension	6	23	0.91(0.29, 2.86)	0.26(0.11,0.72)	
	Asthma	7	12	2.04(0.64, 6.56)	0.35(0.01, 0.89)	
	Cardiac illness	8	11	2.55(0.81, 8.04)	1.51(1.04,7.22)	
ECOG	Good ECOG (ECOG≤2)	13	165	1.00	1.00	0.001*
	Poor ECOG (ECOG >3)	51	109	5.93(3.08, 11.44)	2.40(1.25,13.43)	

Note: *P value of <0.05 was considered statistically significant in multivariate logistic regression.

Discussion

Due to the increasing prevalence of cancer alongside cancer survival rates, the number of oncologic patients visiting ED may increase.[22] These oncologic patients may visit the ED because of signs and symptoms of the disease itself, treatment complications and palliative care services. The increasing burden of ED visits of oncologic patients might be considered as poor quality of cancer.[1,11,18,23] Therefore, this study aimed to identify the reasons for oncologic patients ED visits, their treatment outcomes and associated factors.

This study showed that the most common reason for oncologic ED visit was neutropenic fever (79; 23.4%) followed by nausea and or vomiting (38; 11.2%) and electrolyte abnormality (37 10.9%) respectively. This study finding was consistent with the study conducted at Asan medical centre which revealed, that among cancer patients visited emergency room infection (22.8%) of them had neutropenic fever.[19] Furthermore, this study findings were consistent with studies in conducted Turkey, Japan, USA and Korea which elucidated, the main reason for ED visit were, nausea and vomiting (40; 16.5%) and fever (29; 11.9%), febrile neutropenia is the most common cause of ED visit, vomiting (13.8%), is commonest reason of ED visit and one of primary reasons of ED visit was febrile neutropenia respectively.[2,3,22,23]

On the other hand, our study finding was in contrast with study conducted in California, Ohio, Jordan and India which elucidated the most common ED diagnoses among cancer patient were pain (10.4%), sepsis (5.7%) and nausea/vomiting (2.3%), the most common patients visited the ED due to pain 62.1%, pain is the most common reason for cancer-related ED visits and the main reason for ED visits was mental confusion (24%), respectively.[1,5,24,25] The reasons for this inconsistency might be that some of the studies even included suspected cancer cases and included cancer patients even the patients visited ED due to other causes like trauma whereas our study did not it. Besides, the ED presentation of oncologic patients may be differed significantly by cancer type.

Regarding the outcomes of patients at the ED, 137 (40.5%) of them were admitted to ward and 126 (37.3%) of them were discharged with improve while 64 (18.9%) of the oncologic patients were died. This study finding was relatively consistent with study conducted in South Korea which was explicated, 16.1% of cancer patients who visited the ED died.[8] Moreover, this study finding was consistent with the study conducted in Turkey and Korea which showed 39% (40) of oncologic patients were hospitalized and 54.8% of cancer-related ED visits were hospitalized.[9,22]

However, our study finding was inconsistent with study conducted in the USA showed that among cancer patients who visited the ED, 13% of them died.[14] This variance might be due to the quality of patient care gap among developing and developed countries. Conversely, our study finding in terms of oncologic patients' death at the ED was lower relative to study conducted at Chapel Hill, USA which revealed that 81 (28.6%) patients died.[12] The possible explanation for this variability was the study conducted at Chapel Hill included death on arrival while our study only included confirmed oncologic cases who visited the ED. Additionally, this study finding is incomparable with the study conducted in Japan

that explained that 67% of oncologic patients were admitted to hospital.[2] The possible reason for this inconsistency might be that this study included only 45 patients, unlike our study which may cause bias.

Based on multivariate logistic regression, those patients who had distant metastasis cancer (AOR 1.85; 95% CI 1.03–7.21), comorbidity (AOR 2.56; 95% CI 1.20, 6.96), and ECOG >3 (AOR 2.40; 95% CI 1.25,13.43) were more likely to die than their counterparts while, age of patient and time of ED arrival were not associated with outcomes oncologic patients at the ED. This study's finding was consistent with the study conducted in Hungarian which revealed that the presence of comorbidity (AOR: 7.14) was associated with outcomes of emergency cancer outcomes. However, this finding was in contrast to the other side that showed age of patients affects treatment outcomes.[26] Besides, our finding was comparable with other studies that explicated cancer metastasis (AOR 1.64, CI 1.41–1.92), and having diabetes (AOR 1.11, CI 1.00–1.24) were predictors of patient outcome at the ED and the highest mortality was recorded among patients with distant metastasis (AOR 2.227; 95% CI, 2.124–2.335; $P < 0.001$), respectively.[6,8]

Nevertheless, this study's finding was not consistent with other studies.[4,27] This dissimilarity might be due to patients may present ED with varied types of signs and symptoms' severity.

Limitations of the Study

The limitation of this study were; the management outcome of patients was followed until discharge from the ED. Thus, following ED discharge more patients might die. Moreover, the confidence intervals in bivariate and multivariate logistic regression was very wide and the results were interpreted in light of this limitation.

Conclusion

Most oncologic patients visited ED due to febrile neutropenia, nausea and or vomiting, and electrolyte disorder. Amongst oncologic patients who visited ED, most of them were admitted to ward while around one-fifth of them died. Therefore, improve quality of care at the ED is a fundamental to improve outcome of oncologic patients. Having distant metastasis cancer, comorbidity and ECOG >3 were independent predictors of oncologic patient's outcome at the ED. Even though, this study finding can be used as baseline especially from low income countries, further multicenter study is needed.

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Disclosure

The authors declare no competing interest in this research work.

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