Epidemiologic Study of Patients with Cancer Admitted to Intensive Care

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A B S T R A C T

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Background: Cancer is the second leading cause of death in the world and the third cause of death in Iran. Evidence suggests that some cancer patients are admitted to intensive care units at their own request. The need for hospitalization in this ward can vary based on different factors such as gender, age, type of disease, etc. Therefore, this study has been designed in order to investigate the epidemiology of cancer patients admitted to intensive care units.

Methods: This is a descriptive cross-sectional study. The study population includes all cancer patients admitted to the intensive care units of Mazandaran University of Medical Sciences in the years 2013-2016. The records of all patients were included in the study through census and the necessary information was extracted. Data was analyzed using SPSS software version 24 in terms of percentage, mean, standard deviation through Chi-square test.

Results: 12273 patients were admitted to intensive care units during the study period, among which 380 (3.6%) were cancer patients. The age range of patients with cancer was between 16 and 96 years old, with a mean value of 60.11 years and a standard deviation of 17.49, and the majority of patients (52.4%) were mal. The frequency of patients in terms of cancer type were as follows; 40% gastrointestinal cancer, 20% brain cancer, 9.2% lung cancer, 6.6% kidney cancer, 6.6% breast cancer, 5.5%blood cancer, and 11.8% other cancers. The mortality rate of cancer patients admitted to ICUs was 36.1%. The frequency of patients with gastrointestinal, lung, blood, kidney and brain cancers admitted to the intensive care units in males was significantly higher than females (p <0.001).

Conclusion: The results of this study indicate that, despite the need for intensive care in cancer patients, the lack of beds in these wards may lead to cancer patients being admitted less frequently than necessary. Therefore these wards may need to take practical measures in this respect, such as the establishment of intensive care units specifically for cancer patients.

Keywords: Cancer, Neoplasms, Hospital, Epidemiology

INTRODUCTION:

Cancer is one of the five leading causes of death in the world. Cancer (after heart disease) is the second leading cause of death in the United States, and the third leading cause of death in Iran[1]. With an increase in population and in environmental risks, we are faced with an increase in the incidence of cancer, despite the general improvement in health conditions, and in some societies malignant diseases have become the nation's top health priority. Increase in the incidence of cancer may be due to changes in lifestyle, the aging of the population and increased environmental risks[2]. It is likely that this disease will be the major health issue of the next decade[3] therefore, accurate registration of prevention and treatment programs and timely treatment are required[4]. In Iran, cancer claims over 30000 lives annually, and the incidence rate is expected to double in the next two decades[5]. According to the International Agency for Research on Cancer, the mortality rate caused by cancer in 2007 was estimated to be over 1.8 million people, and is estimated to reach 10 million deaths in 2030, with rates being highest in developing countries[6]. In 2012, about 14 million and in 2015 about 8.5 million cancer-related deaths were reported worldwide[4].

The intensive care unit is a well-equipped medical and nursing department and has been recognized as one of the most sensitive parts of the hospital and the best place for delivering patient care[7]. Patients with different diagnoses are admitted in this ward[8] and these wards are well suited for heart and respiratory monitoring of patients[9]. Admission to ICUs affects the success and failure of treatment[10], and studies have shown that observing standards and admission to the intensive care unit increases the probability of survival[11].

It is noteworthy that intensive care units in many developing countries face many challenges[12]. The number of beds in these wards are limited[13], posing a challenge for health care providers worldwide. In the study conducted by Aksoy et al. in Turkey[14] and Monique et al. in the Netherlands over the past four years, 21.33% and 13.5% of patients admitted to ICUs were cancer patients, respectively[15].

Considering the mentioned issues that indicate the role of intensive care in increasing the survival rate of cancer patients and improving the quality of care provided to these patients, in the future, it is expected to see an increase in demand and acceptance of these patients. This approach will create serious challenges due to the lack of resources and facilities needed to equip the intensive care units. For this purpose, it is necessary to plan and adopt an appropriate strategy for supplying and equipping intensive care units. In this regard, studying the status quo and the benefit gained among cancer patients from these wards is a priority. Our search of available sources and available databases, yielded no evidence regarding the status of hospitalization of patients with cancer in ICUs in Iran, and especially in northern Iran. The present study was designed and conducted to evaluate the epidemiology of cancer patients admitted to intensive care units, which can be used in future planning.

METHODS:

This study is a descriptive cross-sectional study. The study population consisted of all patients with cancer admitted to the intensive care units of educational hospitals affiliated to Mazandaran University of Medical Sciences between the years 2013-2016. Inclusion criteria were age greater than 16 years, cancer diagnosis based on pathological results and ICU admission. The source of data collection were patient hospital files. Sampling method was census, since the records of all patients with cancer admitted to the intensive care units of the educational hospitals affiliated to Mazandaran

University of Medical Sciences were investigated during the research period.

After approval of the project by the Research Council and the Ethics Committee in the Medical Biology Research Department of the university and after obtaining a license from the Deputy of Research and Technology of Mazandaran University of Medical Sciences, permission was obtained from the hospital authorities, and one of the members of the research team visited the medical records sectors of selected hospitals (Imam Sari, Bouali Sari and Razi Ghaemshahr) in order to collect the data. A checklist was developed by the research team using documentation, scientific literature and the opinions of medical and nursing experts in order to record and collect data. Afterwards, content validity was assessed and verified by 10 professors of nursing and intensive care. Data analysis was done in SPSS version 24. After refining the data and removing possible defects, according to the type of study, frequency percentage, mean, standard deviation, median, minimum and maximum were used to describe the variables. Also, Chi-square test was used for comparison. The criterion for judgment was a significance level less than 0.05.

RESULTS:

The results of this study showed that of the 12273 patients hospitalized in intensive care units during the years 2013 to 2016, 380 (3.09%) of the patients were diagnosed with cancer. Of these 380 patients, 47.6% were female and 52.4% were male. The age range of patients was 16 to 96 years old with an average age of 60.11 years and a standard deviation of 17.49. The frequency of patients aged less than 70 years was 68.2% and older than 70 years was 31.8%.

Table 1 shows that the frequency of patients with gastrointestinal, brain, lung, kidney, breast, blood and other cancers were respectively 40%, 20%, 9.2%, 6.6%, 6.6%, 5.5% and 11.8%. The gender ratio of males to females in patients with gastrointestinal, brain, lung, kidney, breast, blood and other cancers admitted to intensive care units was 1.26, 1.16, 1.69, 1.33, 2.24, 0.04 and 0.79 respectively (P <0.001). Also, as is shown in **Table 2**, type of cancer was significantly related to metastasis, place of living, result of admission, history of smoking, history of admission, reason for admission

Table 1. Comparison of the frequency of cancer type in terms of gender in the intensive care unit

Type of cancer	Total number (%)	Gender –n (%)		Ratio male/female	P
		Male	Female		
Digestive	152 (40)	85 (55.9)	67 (44.1)	1.26	
Brain	20) 76)	41 (53.9)	35 (19.3)	1.16	
Lung	35 (9.2)	22 (62.9)	13 (37.1)	1.69	
Blood	21 (5.5)	12 (57.1)	9 (42.9)	1.33	
Renal	26 (6.8)	18 (69.2)	8 (30.8)	2.24	<0.001
Breast	25 (6.6)	1 (4)	24 (96)	0.041	
Other	45 (11.8)	20 (44.4)	25 (55.6)	0.79	
Total	380 (100)	199 (52.4)	181 (47.6)	1.09	

Table 2. Comparison of the status of patients with cancer at the time of admission to the intensive care unit based on different variables

Variable		Digestive number	(%)	Lung number	(%)	Blood number	(%)	Breast number	(%)	Renal number	(%)	Brain number	(%)	Other number	(%)	P
Metastasis	Yes	37	24.5	10	29.4	2	9.5	18	72	11	42.3	11	14.9	14	31.1	0.00
	No	114	75.5	24	70.6	19	90.5	7	28	15	57.7	63	85.1	31	68.9	
Reason for admission	Monitoring	142	93.4	28	80	17	81	24	96	24	92.3	71	93.4	36	80	0.038
	Complications of metastasis	2	1.3	0	0	0	0	1	4	0	0	0	0	0	0	
	Complication medicine	0	0	0	0	0	0	0	0	0	0	1	1.3	0	0	
	Resuscation	8	5.3	7	20	4	19	0	0	2	7.7	4	5.3	9	20	
History of smoking	Yes	46	31.7	18	51.4	5	23.8	2	8	10	38.5	14	18.9	11	25.6	0.003
	No	99	68.3	17	48.6	16	76.2	23	92	16	61.5	60	.81.1	32	74.4	
Feeding method at time of admission	Oral	2	1.3	5	14.3	2	9.5	3	12	2	7.7	3	3.9	3	6.7	0.00
	Gavagh	2	1.3	0	0	0	0	3	12	0	0	0	0	0	0	
	Venous	147	96.7	29	82.9	18	85.7	19	76	24	92.3	72	94.7	41	91.1	
	Oral venous	1	0.7	1	2.9	0	0	0	0	0	0	1	1.3	0	0	
	Vevousgavagh	0	0	0	0	1	4.8	0	0	0	0	0	0	1	2.2	
Result of admission	Death	53	34.9	20	57.1	12	57.1	13	52	8	30.8	16	21.1	15	33.3	0.00
	Move to unite	96	63.2	14	40	7	33.3	12	48	17	65.4	60	78.9	29	64.4	
	Personal satisfaction	3	2	1	2.9	0	0	0	0	1	3.8	0	0	1	2.2	
	Another hospital	0	0	0	0	2	9.5	0	0	0	0	0	0	0	0	
History of admission	Yes	50	33.6	21	65.6	5	26.3	8	32	11	45.8	26	34.2	13	29.5	0.018
	No	99	66.4	11	34.4	14	73.7	17	68	13	54.2	50	65.8	31	70.5	
Place of living	City	80	52.6	18	51.4	14	66.7	18	72	12	46.2	28	36.8	26	57.8	0.032
	Roly	72	47.4	17	48.6	7	33.3	7	28	14	53.8	48	63.2	19	42.2	

and feeding method at the time of admission of the patient to the intensive care unit (P <0.05).

Also, the results of this study showed that among patients with cancer who were hospitalized in intensive care units, 35.3% had a previous history of admission to these wards and 66.1% of them received drugs during admission. Results also showed that 9.2% had a familial history of cancer and 1.8% had a history of CPR before hospitalization.

The results of this study indicate that 54.7% of patients had a previous history of surgery and 34.5% of them had been afflicted with bedsores while hospitalized in intensive care units. Patients with gastrointestinal cancer had the highest percentage of bedsores during hospitalization in intensive care units. Findings also showed that 49.2% of patients used mechanical ventilation during hospitalization and 90% of these patients were admitted to these wards due to their need for appropriate monitoring of vital signs. At the time of entry of cancer patients into the intensive care unit, intravenous feeding among patients with gastrointestinal, kidney, lung, blood, breast, brain cancers was respectively, 96.7%, 92.3%, 82.9%, 85%, 76%, 49.7%. The outcome of hospitalization of these patients in the intensive care units included 61.6% being transferred to wards, 36.1% mortality, 1.6% being discharges with personal consent and 0.5% being transferred to other hospitals. Also, the findings showed that in terms of level of consciousness and Glasgow Coma Scale, most patients had a GCS in the range of[13-15].

The results of this study also indicated that surgery (64.4%) and palliative care (27.4%) were the most commonly used treatments in these patients, and the most common underlying diseases in these patients were pulmonary disease, anemia, and diabetes, in that order. The results of the study also indicated that factors affecting the mortality of patients with cancer admitted in intensive care units using single-variable and multiple variables of logistic regression include, mechanical ventilation, type of cancer, type of treatment, family history, smoking, underlying diseases and age of the patient, and that probability of death was lower among patients receiving mechanical ventilation.

DISCUSSION:

The results of this study showed that 3.9% of patients admitted to intensive care units were patients with various types of cancers. Whereas in the studies conducted by Aksoy et al. (2016) in Turkey, lasting two years [14], Monique et al. (2012) in the Netherlands lasting four years[15], Jonge and Bos (2009) in Europe[16], Xia and Wang (2016) in China over a period of 3 years[17], and in the study of Hawari et al. (2016) in Jordan over five years[18], respectively 21.03%, 13.5%, 15%, 17% and 22.6% of patients admitted to intensive care units had cancer. The results of the aforementioned studies are different from the results gathered in this study. Concerning this difference, it can be said that in Iran, unfortunately, due to the lack of intensive care beds, less cancer patients are admitted to the intensive care unit, while in other countries it is possible to take care of these patients in intensive care units and more patients will benefit from intensive care services. According to the findings of this study, the most common cancer among both genders was gastrointestinal cance with a frequency of 44.1% in females and 55.9% in males. These findings are consistent with the results obtained by Aksoy et al.[14] and Xia and Wang[17] And also with the results of the registry in the two northern provinces of our country[19,20].

The study also found that admitted cancer patients were more commonly male, which is similar to the results obtained by Aksoy et al.[14] and Xia and Wang[17]. Therefore, the results of other studies and the current study confirm that, general male cancer patients are more frequently admitted to ICUs than female.

In this study, as in the study by Aksoy et al.[14], Bird et al.[21] and Xia A and Wang[17], it was indicated that, the

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majority of patients with cancer hospitalized in intensive care units were approximately 70 years old. The reason for this can be that, with new advances in the treatment and diagnosis of cancer, this disease is diagnosed at an earlier age[14].

Also, according to the results of this study 61.8% of cancer patients were transferred to public wards following treatment in intensive care units. In the study by Aksoy et al.[14], and Zafra et al.[22], respectively 53.3% and 68 % of these patients were transferred to the general ward. It seems that this difference may be associated with hospital rules and regulations in different countries.

The findings of the recent study also show that, surgery was the most commonly used treatment method in patients in the intensive care units, a finding which is consistent with the results obtained by Aksoy et al.[14] and Xia and Wang[17] and Soares et al.[23]. Given that today most cancers are diagnosed in a timely manner and surgery is used for treatment, therefore, surgery is the most commonly used treatment in all stages of cancer and it is done in a variety of different ways and depends on the discretion of doctors[24].

While assessing the mortality rate of cancer patients admitted to the intensive care unit, the results of this study showed that 36.1% died, and that probability of death was lower among patients with mechanical ventilation. These results are consistent with the study conducted by Monique et al.[15] and Hawari et al.[18]. But in the findings of Xia and Wang[17], the mortality rate of cancer patients in the intensive care units was 14.9%. It seems that the use of new therapeutic interventions, including medical treatments, mechanical ventilation and alternative renal treatments, and also timely admission of these patients to intensive care units can reduce the mortality rate of these patients.

According to the results of our study, the highest mortality rate in cancer patients in these wards was related to blood and lung cancer, respectively, which is consistent with the results obtained by Hawari et al. at a cancer center in Jordan over a period of 5 years[18].

In this study, 49.2% of cancer patients admitted to intensive care units required mechanical ventilation which is similar to the results of Bird et al. (2012) who found that 51.9% of patients were subjected to mechanical ventilation[21]. This type of treatment is used to support the respiratory system. In recent decades, significant survival has been reported in cancer patients undergoing mechanical ventilation in intensive care units[25].

CONCLUSION:

Considering that in this study, the admission rate of cancer patients in ICUs was lower than in other countries, and that the intensive care provided in these wards increases the survival rate of these patients, and also considering the fact that there is a severe shortage of intensive care beds in Iran, (which is probably due to the fact that the admission percentage of cancer patients in these ward is lower, while these patients need intensive care for treatment and recovery), therefore, it is necessary to take certain measures for admission of these patients to intensive care units and allocate a suitable percentage of intensive care beds for these patients. This can be achiieved by establishing intensive care units specifically for cancer patients. One of the strengths of this study is the review of a 4-year period of hospitalization of patients with cancer admitted to intensive care units, which has not previously been done in Iran. The use of a retrospective approach is one of the research constraints which prohibits accurate data assessment and follow-up. Therefore, we suggest that in the future long-term studies or prospective studies be carried out in relation to this research.

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