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Research Article

Life Expectancy of Intensive Care Patients After Admittance to Hospital

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Abstract

Objectives: This study was carried out with the aim of investigating whether differences exist with respect to 2-year life expectancy and mortality in patients admitted to intensive care unit (ICU) according to age, gender, and diagnosis.

Methods: The patient population was divided into 2 groups: those aged ≤62 years and those aged >62 years at admittance to the ICU. The data of age and gender were acquired from the electronic medical record system and examined retrospectively.

Results: A total of 482 patients were included in the study and the mortality of those patients was tracked for 2 years following the admission of the last patient to the ICU. In all, 124 patients died before being discharged from the ICU. The surviving patients were retrospectively investigated through the state Death Notification System. The ratio of the deceased aged >62 years was 82.8%, while those aged ≤62 was determined to be 17.2%. The ratio of males among those who died was statistically significant (male/female: 56.3%/43.7%). Though the ratio of patients included in the chest diseases department of the ICU was 36.5%, their mortality ratio constituted 49.4% of all patients at the conclusion of 2 years.

Conclusion: The results of this study indicate a 2-year life expectancy for male ICU patients aged over 62 years in the chest diseases category may be lower ratio than other groups.

Keywords: Intensive care unit, life expectancy, mortality

Hospitalization of patients with bad general condition, single or multiple organ failure, whose vital follows need to be monitored closely, who should make use of technical equipment of intensive care (IC) and requiring additional treatment were admitted to ICU. The increase in average of age in the general population contribute to an increase in number of patients needing to ICU. Regarding description of elderly, those aged 65 years and over have been considered elderly by World Health Organization (WHO) and it has been reported that elderly population will reach 800 million in 2025, constituting 10% of the world population and life expectancy will be 73 years in 2025.[1] The ratio of those aged 65 and over was reported as 7.8% in the year 2010 according to the Turkey Statistical Institute data.[2] The prevalence of chronic diseases and functional disorders have increased with increasing of age. Increase of sensitivity for many diseases and rise in the death ratio has been resulted from the physiology caused by aging and chronic diseases; accordingly, primary diseases and coexisting diseases of old patients can lead to increase of the ratio of mortality in ICU. Mortality rate of the young has been identified higher than that of the old.[3] According to these data, increase of average age can contribute to increase in number of patients admitted to ICU and increase in mortality rate.

The realisation of mortality ratio above or below of expected rate in an ICU, doesn't denote that ICU is better or worse

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than others. Patient populations and diagnoses, treatments a and procedures applied, available technological opportunities, number of nurses and physicians per bed, qualified and equipped employees can change the results.

Using the scoring systems in IC patients provides numerical rating of severity of disease and possibility of IC mortality. However, mortality rates after being discharged from ICU can not be estimated numerically.[4]

The objective of this study is to investigate whether differences exist for age, gender and diagnosis or not with respect to 2 years' expected life in patients admitted to intensive care unit (ICU) and with respect to mortality rates in patients hospitalized.

Methods

A total of 501 patients admitted to the ICU were retrospectively scanned through an electronic registration system in our study. Every 3 beds were being followed up and treated by one nurse and every 9 beds were being followed up and treated by an internal medicine specialist, in the ICU with 9 beds capacity between these dates. 19 patients were excluded from the study since their records couldn't be gotten and 482 patients were retrospectively included in the study. 124 of the patients died in ICU. 358 patients discharged from ICU were retrospectively scanned through recods of DNS on the date 04.01.2016. 137 of these patients scanned were determined as died by this date. Pneumonia, chronic lung disease(CLH) and/or pneumonia, rarely asthma patients were included under the name of chest diseases group in the study. Oncology patients, acute kidney failure (AKF), chronic lung disease(CLH) patients, gastrointestinal (GIS) bleedings, complicated liver cirrhosis (L-C) patients, suicides and scorpion stings were included in the internal diseases group in the study. Acute-developed ischemic and hemorrhagic cerebrovascular event (CVE) patients were generally included in the neurology group in the study. Trauma, gunshot wounds and postop complications-developed patients were generally included in surgical diseases group in the study. Congestive heart failure (CHF) patients being co existed by mentioned diseases were included in the existing groups. However, because of that only patients with cardiac problem were followed in coronary intensive care unit, they weren't included in this study. Since study was retrospective and electronic records of scoring systems weren't maintained, scores pointing out severity of the disease couldn't be denoted.

Statistical Method

SPSS 22.0 (IBM Corporation, Armonk, New York, United States) and MEDCALC 14 (Acacialaan 22, B-8400 Ostend, Belgium) programs were used in the analysis of data. The compliance of data for normal distribution was investigated with Shapiro-Wilk test and their homogeneity of variance was investigated with Levene. In comparison of two independent groups; independent samples t test was used together with bootstrap results. In comparison of categorical data with each other; Pearson chi-square ve Fisher exact tests were tested with Monte Carlo simulation technique. Odds ratio values were used with confidence intervals for determination of the most important risk factor among categorically significant risk factors. Kaplan-meier(product limit method)-Log Rank (Mantel-Cox) analysis were used in order to investigate the effects of risk factors on lifetime and mortality and Kaplan-Meier (product limit method) analysis was used in order to investigate the effects of factors, which yielded as significant in this analyse, on lifetime and mortality through a model. The relation between the classification specified with cut-off value of mortality calculated on the basis of variables and actual classification, was investigated with analysis of ROC (Receiver Operating Curve) and findings were expressed. Quantitative datawere expressed with mean±std. (standard deviation) values in tables. Categorical data were expressed with n (number) and the percentages (%). Data were examined at the 95% confidence level and p values, lower than 0.05 were considered significant.

Results

Records of DNS were retrospectively reviewed after 2 years as of admittance of last patient to ICU for hospitalisation in the study. The factors that could be effective on mortality after patient get discharged from ICU were investigated in the study. A total of 482 patients were included in our study and their average of age was calculated 60.42±22.82 years. 50.8% of the patients (n=245) were males, 49.2% of the patients (n=237) were females. Despite the lack of difference between the patients with regard to gender for ICU admittance, there was a significant difference between their mortality rates. The mortality rate was found as 56.3% (n:147) in males while it was found as 43.7 (n=114) in females. Regarding the rate of patients survived for gender; it was identified as F/M (n=123/98), (55.7%/44.3 (Table 1, Fig. 1). When 62 years age was taken as a reference odds ratio for the age limit of patients died, while a total of 207 (42.9%) patients aged ≤62 years were admitted to intensive care unit, a total of 275 (57.1%) patients aged >62 years were admitted. While the number of surviving patients aged ≤62 years was 162 (73.3%) (with high specificity), this number was found as 59 (26.7%) in patients aged >62 years. While the number of patients died aged ≤62 years was 45 (17.2%), this number was found as 216 (82.8%) (with high sensitivity %) in patients aged >62 years (Table 1, Fig.

Table 1. Mortality rates of the patients admitted to the ICU for hospitalization, by age, gender and diagnosis groups

	Mortality			Odss Ratio (%95 G.A)	P
	Lives (n=221)	Deceased (n=261)	Total (N=482)		
	Mean±SD/Max-Min	Mean±SD/Max-Min	Mean±SD/Max-Min		0.001
Age	45.30±22.68/94-15	73.22±13.00/112-27	60.42±22.82/112-15		
Cut off					
Age	162 (73.3)**	45 (17.2)	207 (42.9)	13.1 (8.5-20.4)	<0.001
	>62* 59 (26.7)	216 (82.8)*	275 (57.1)	0.839±0.018[a]	
	n(%)	n(%)	n(%)		
Gender					
Female	123 (55.7)	114 (43.7)	237 (49.2)	1.6 (1.1-2.3)	0.010
Male	98 (44.3)	147 (56.3)	245 (50.8)		
Disease Diagnosis Groups					
Surgical	22 (10.0)	17 (6.5)	39 (8.1)	Ns	<0.001
internal diseases º	132 (59.7)	64 (24.5)	196 (40.7)	0.2 (0.14-0.32)	
Chest º	47 (21.3)	129 (49.4)	176 (36.5)	3.6 (2.4-5.4)	
Neurology º	20 (9.0)	51 (19.5)	71 (14.7)	2.4 (1.4-4.2)	
Place of Death					
Home	0 (0.0)	62 (39.7)	62 (39.7)	-	-
Hospital	0 (0.0)	94 (60.3)	94 (60.3)	-	-

Independent T test (Bootstrap) Pearson Chi-Square test (Monte Carlo) - Fisher Exact (Exact) - Roc (Receiver Operating Curve) Analysis (Honley&Mc Nell - Youden index J) - Odss Ratio.
Sensitivity*; Specificity**; [a]UC±SH; ºtook as references for Odss Ratio.
AUC: Area under the ROC curve; SH: Standard Error; G.A: Confidence Interval.

Table 2. 2 years' life expactancy by gender and diagnostic groups

	Deceased n(%)	Lives n(%)	Life Expectancy Mean±SH.	2 years' expected survival rate (SH)	P	
Age						
≤62	45 (21.7)	162 (78.3)	897.5±27.77	78.6 (2.9)	<0.001	
>62	216 (78.8)	58 (21.2)	298.0±25.88	21.1 (2.5)		
Gender						
Woman	114 (48.3)	122 (51.7)	629.5±33.05	52.7 (3.3)	0.008	
Man	147 (60.0)	98 (40.0)	492.6±32.53	39.9 (3.2)		
Disease Diagnostic Groups						
Surgical	17 (43.6)	22 (56.4)	699.8±74.77	57.9 (8)	(C-G)<0.001)	(C-D)=0.305
Internal Diseases	64 (32.7)	132 (67.3)	773.6±34.43	67.6 (3.4)	(C-N)<0.001)	(G-N)=0.877
Chest	129 (73.7)	46 (26.3)	365.8±34.73	26 (3.4)	(DG)<0.001)	
Neurology	51 (71.8)	20 (28.2)	344.7±53.60	27.3 (5.6)	(D-N<0.001)	
Total	261 (54.3)	220 (45.7)	560.7±23.43	46.2	-	

Kaplan Meier Test Log Rank (Mantel-Cox); - SH: Standard Error

2). Regarding disease groups; total of 39 patients were admitted to the surgical branch, while 17 of them died, 22 patients are still living. While 64 of 196 patients admitted to the internal diseases were died, 132 patients are still living. While 129 of 176 patients admitted to the chest diseases group were died, 47 patients are still living. While 51 of 71 patient admitted to the neurology diseases group were died, 20 patients are still living (Table 1, Fig. 3).

The average of age of patients died after being included in the study was determined as 73.22±13.00 years; that of pa-

Table 3. Independent variables by which age, gender and diagnostic groups were examined

Independent Variables	B±Sh	P	Odds Ratio (95%G.A)
Gender	-0.18±0.13	0.145	0.83 (0.65-1.07)
Age (>62)	-1.66±0.18	<0.001	5.24 (3.68-7.46)
Disease diagnostic groups (Internal disease)	-0.45±0.20	0.023	0.64 (0.43-0.94)
2 years' survival rate (%)±Sh:	(50.2±2.7)		Base Line Hazard: 0.068

Cox Regression - Enter Method; B: Regression coefficients; SH: Standard Error; GA: Confidence Interval.

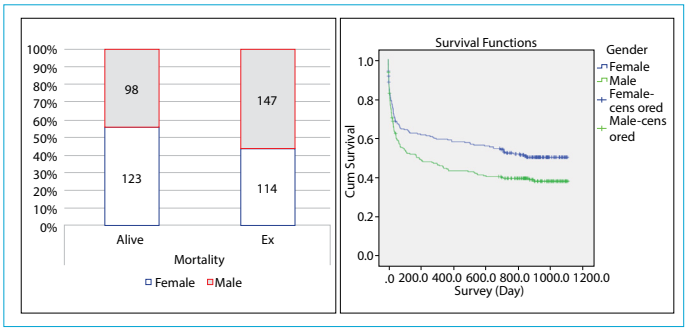

Figure 1. Mortality rates of gender.

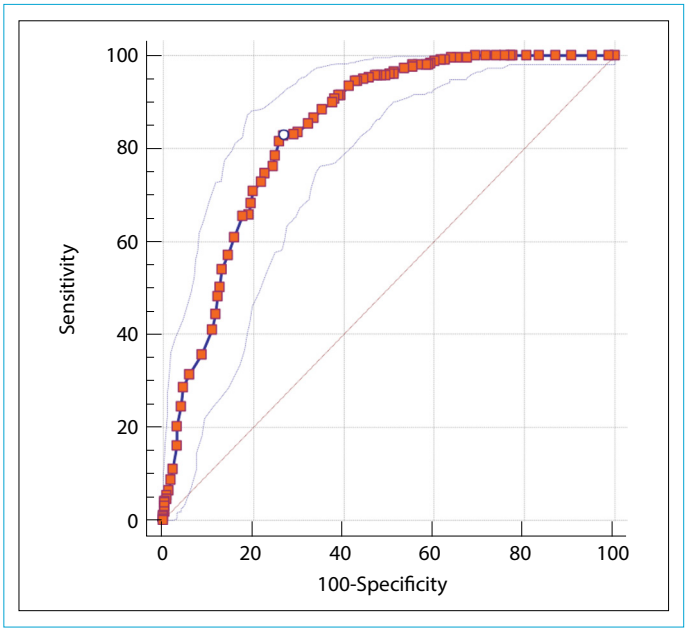

Figure 2. The specificity and sensitivity of age upon mortality.

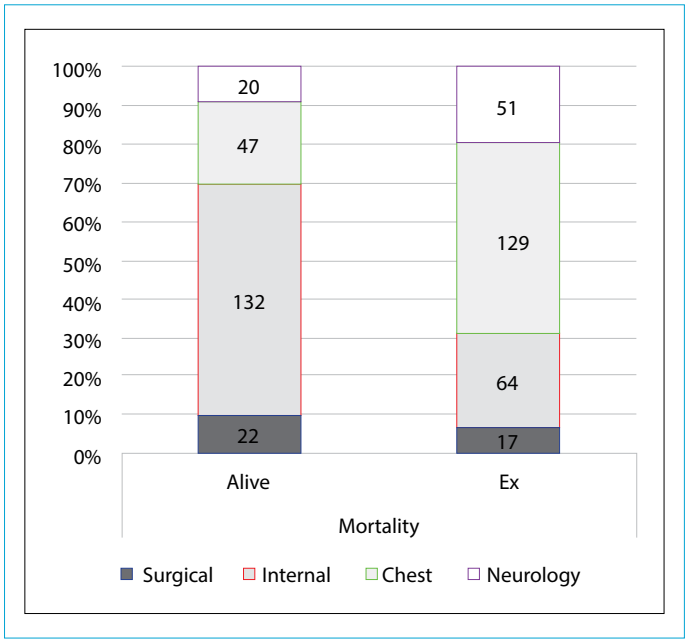

Figure 3. Mortality rates of diseases diagnostic groups.

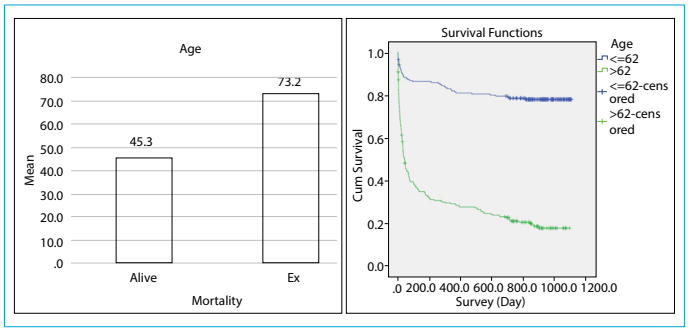

Figure 4. Averages of age of alive and deceased patients.

tients surviving was determined as 45.30±22.68 years (Table 1, Fig. 4). 2 years' life expectancy of patients as of their admittence to ICU, was determined for the patients aged ≤62 years as 78.6% (2 years' life expectancy: 897.5 days); for the patients aged >62 years as 21.1%(2 years' life expectancy: 298 days) (Table 2). A significant difference was found between lifetime and survivability in patients aged ≤62 years and >62 years in Kaplan-Meier graph (Fig. 4). A significant difference was found between genders of both male and female and lifetime and survivability in Kaplan-Meier graph (Fig. 1). Regarding evaluation of independent variables; age group with >(62 years), (p<0.001), internal diseases group patients among diagnostic groups, p value (p=0.023) as independent value was found significant (Table 3).

Discussion

Hospitalization of patients with bad general condition, single or multiple organ failure, whose vital follows need to be monitored closely, who will make use of technical equipment of ICU and requiring care, follow-up and support of

doctors and nurses were admitted to ICU. Purpose of ICU is to discharge patients in a short time as soon as possible in minimum morbidity and mortality rates. Various studies were performed regarding long-term mortality rates or life expectancy of patients after being discharged from ICU.[5, 6] Life expectancy of patients as of admittance to ICU was investigated in our study. The mortality rate in ICUs in the world ranges between14-44%.[5-8] The rate of patients, died after being hospitalized to ICU was 25.72 % of all patients(124 of 482 patients were recorded as deceased before being discharged from ICU), which denotes that our mortality rates are within normal range.

As well as increase of coexisting diseases in elderly patients group in ICU affects treatment method; it also leads to increase in mortality, morbidity and duration of hospital stay. Regarding the population aged over 65 years; one chronic disease in 90% of those, two chronic diseases in 35 % of those; three chronic diseases in 23% of those; four chronic diseases in 15% of those were determined to coexist.[9] The increase in the average of age in the general population also reflects to the patient population needing for ICU. It was reported in a study performed in United States that 60% of patients are at the age of 65 and over; primarily cardiac diseases and respiratory system diseases were admitted to ICU; acute respiratory failure progressively increased with age and occured in the ratio of 1/1000 in patients aged between 45 and 55, in the ratio of 5/1000 in patients aged between 65 and 75, in the ratio of 9/1000 in patients aged 85 and over.[10] The patients' average age ratio in our ICU was 60.42; patients ratio applied to the ICU for respiratory problems was 36.5%. ICU mortality ratio was identified higher in elderly patients as compared to young patients in Boumendil et al.'s study.[11] Similarly, the ICU mortality ratio was identified higher (82.8%) in patients aged >62 years in our study. Besides, publications are also available stating that age does not constitute a risk factor for morbidity and mortality.[12, 13] Therefore, it should be taken into consideration that seriousness of triggering disease is more powerful determinant on mortality and morbidity, which may explain the lower mortality rate of the patients in internal diseases group although patients' average of age was normal level in our study (%24.5).

Although there wasn't a significant difference in gender rates of patients admitted to ICU; mortality rate was higher and 2 years' life expectancy was lower in males in comparision with females. According to the 2014 year-related data announced by Turkish Statistical Institute in April 2015; the male death ratio was 54.7% and the female death ratio was 45.3% in all deceased people. The results of our study was considered as compatible with the average of our country. Why mortality has been resulted higher in the male patients is likely because of that male patients are more vulnarable to sepsis genetically,[14] COLD and its complications, coronary artery disease (CAD), alcohol and cigarette consumption are more common in male patients in general. According to World health organization (WHO) data alcohol has mostly been consumed in Moldova; and alcohol may be considered to have a significant effect on why average life expectancy of women is 75 years in females while that is 67 years in males. According to WHO data; males are major victims of alcohol-related deaths in the world. The rate of alcohol-related deaths is 6.2% in males, 1.1% in females. Alcohol plays a role in increase of male deaths because of being a risk factor for occurance of acute and chronic diseases in general.[15] Publications are also available pointing out that mortality increases in males patients who smoke, having poor diet habits, ischemic heart diseases.[16] Furthermore, working at more difficult, dangerous and hard works, having high stres, attempting suicides more in unemployment periods[17] are among the reasons contributing to males to be shortlived. Although publications are available, suggesting that occupational differences contribute males to live longer than females do; findings in some in recent publications suggest that occupation doesn't play a main role in this respect as well.[18]

A high level relation was found between the diagnosis of breast group and rate of hospitalization in our ICU. Why these rates are high may be because of that vaccination rate of elderly people against haemophilus influenzae and streptococcus pneumonia is low level as 0.9% in our country.[19] COLD has a significant impact on mortality and morbidity in general population. There are several contradictions about the effects of gender on the development of COLD. Although it was reported that prevalence and mortality of COLD were higher in males in the past,[20] mortality rates of COLD were found equal for males and females, in some studies performed in developed countries. This is because females were reported to be more susceptible against the harmful effects of smoking than males in recent studies.[21] It was reported in many studies that mortality and morbidity of COLD are higher in low socio-economic level group (people with low education and income level) and the number of people applying to hospitals with COLD diagnosis are 3 times more in this category.[22] Moreover, It was revealed that lung functions of males and females in low socio-economic group are worse than those of males and females in high socio-economic group.[23] The general patient profile of our study group consists of the people from rural areas of Adiyaman, having low socio-economic level, less smoking and alcohol habit, less working in industrial environments, all of which supports that deaths are mostly occured in males and chest diseases patient group.

The mortality rate in chest diseases patient group was found as 49.4% in our study. Diseases of majority of these patient groups were accompanied by sepsis. Vasilyev et al reported that the lowest survival rate (46%) was seen in the patient group with sepsis, in consideration of respiratory failure-induced conditions and survival rate significantly decreased when respiratory failure was accompanied by other organ failures.[24] Mortality rates in the patient group with severe pneumonia including sepsis were reported respectively 52% and 35.7% in two studies conducted in our country.[25, 26] Mortality rates are expected to be high in chest diseases group in general according to the result of our study and other studies.

Level of testosterone yields lower in elderly people than in young people.[27] Low testosterone level is a risk factor for many components of the metabolic syndrome (obesity, dyslipidemia, diabetes and insulin resistance) and cardiovascular diseases.[28, 29] It is known that testosterone have beneficial effects on lipid profile, erythropoietin decreases with age and is stimulated with replacement of testosterone in males.[30, 31] In consideration of all these, increase of risk of development of various diseases related to hormone changes in elderly patients and secondarily to these, high mortality rates are expected. This results support mortality rates of patients aged >62 years in our study group to yield high.

While 60% of ICU patients was reported ≥65 years old in some international publications ,[32] this ratio was expressed as 46% according to the Topel et al's data.[33] In our study, the patients group aged >62 years constitutes 57.1% of the ICU.

An important issue regarding elderly patients was that their mortality rates stil remained high as compared to same age group even after having left ICU. While the mortality rates of patients in age groups of 75-79 years, 80-84 years and 85 years and over, three months later after being discharged, having been monitored in ICU, were found respectively 21.6%, 26.7% and 28.9%; three-months' mortality rates of individuals in the same age group who never hospitalized, living in the country where the study was performed, were reported respectively 0.9%, 1.6% and 3.7%. After subtracting the patients deceased in the first three months from the study's one year's data; mortality rates were determined respectively 14.9%, 16.9% and 19.4%;similarly, mortality rates of individuals in the same age group in general population were determined respectively 3.6%, 6.3% and 14.8%.[34] In consideration of these findings, it is possible to say that even elderly patients' mortality rates who have monitored in ICU, being discharged from ICU, are higher as compared to the general population because of the underlying chronic diseases and these rates increase with increasing of age. Since we couldn't acquire a study's database performed with the same age and gender group in our region, we couldn't make a comparison in our study.

Consequently, even male patients aged >62 years in chest diseases group, admitted to ICU could be discharged from ICU; their mortality rates are expected to be high. Besides, mortality rates of patients being discharged from ICU can be estimated to be higher than those of individuals in the same age and gender group who never hospitalized, because of the underlying chronic diseases.

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