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Prevalence of Hospital Mortality of Critically Ill Elderly Patients

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ABSTRACT

Introduction: Age is linked to an increase in the incidence of a variety of diseases and disabilities, as well as a loss in the functional reserve of numerous organ systems and a gradual reduction in personal and social resources. A serious shortage of intensivists and ICU beds is expected as a result of existing unitization practices. In 2006, approximately 50% of all admissions to intensive care units were elderly patients, and those patients consumed 60% of all ICU days. Further, during the last 6 months of life, ICU days account for 25% of all Medicare dollars spent.

Aims: This study aimed to predict the risk factors of intensive care unit mortality in critically ill elderly patients ≥65 years old with special emphasis on age as a predictor of poor outcome.

Methodology: This is a retrospective cohort historical study carried out for one year from January 2015 to January 2016 at the intensive care unit of Teaching Hospital, Menoufia Governate. A total of 800 consecutive patients were included over 12 months, 402 (50.2%) were male and 398(49.8%) were female aiming at assessment of risk factors of their in-hospital mortality with special emphasis on age as a predictor of poor outcome.

Results: There were statistically significant differences between survival and mortality among patients regarding cardiac, renal and electrolyte disorders, neurological and gastrointestinal disorders, MPM II predicted death rate, hematological and oncologic disorders except Hematological malignancy and pulmonary disorders except Airway diseases.

Conclusion: Anemia, thrombocytopenia, non-hematological malignancy, systolic blood pressure≤90 at admission, C-reactive protein (CPR) prior to admission, vasopressor infusion, mechanical ventilation were the independent risk factors associated with raised mortality in elderly patients. We should adopt measures to decrease the incidence of these complications to try to reduce mortality. The better comprehension of factors associated with death in the elderly can improve medical care to these patients.

Key Words: Complications, Critically ill elderly patients, Hemodynamic, Hospital mortality, Metabolic risk factors, Prevalence

INTRODUCTION

Multiple diseases and disabilities become more common as people get older. A loss in the functional reserve of several organ systems, as well as a progressive restriction in personal and social resources, are also linked to advancing age. As a result, it is unsurprising that older patients consume a disproportionate number of health-care resources. It is anticipated that by 2030, 55 percent of all health-care expenditures in the United States will be spent on aged care. Clearly, the use of ICUs by the elderly will skyrocket during the next three decades. A serious shortage of intensivists and ICU beds is expected as a result of existing unitization practices. [1]

In the United States in 2010, there were 40 million people older than 65 years, accounting for roughly 13% of the population. By 2050, an estimated 80 million people, approximately 20% of the population, will be age 65 years or older. A smaller percentage of younger workers are predicted even if current immigration rates remain unchanged, thus placing a greater financial strain on funding the health care system. This inevitable strain has implications for planning intensive care facilities, staffing the workforce, and financing the health care system. [2]

In 2006, older patients accounted for over half of all ICU admissions, and they accounted for 60% of all ICU days.

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Furthermore, ICU days account for 25% of all Medicare funds spent during the final six months of life. This financial burden has caused policy makers to focus on end-of-life spending as a target for bringing health care spending under control. This is a difficult task for the clinician, because it is debatable how much cost savings can really be obtained, because the cost of dying is known only in retrospect. With technological advancement, cost containment will continually be revisited while trying to optimize quality care to the critically ill geriatric population.[3] With these considerations, we systematically studied a retrospective cohort historical study of patients admitted to our medical ICU searching for factors contributing to the mortality of elderly (≥65 years old).

PATIENTS AND METHODS

Study Design: This is a retrospective cohort historical study carried out for one year from January 2015 to January 2016 at the intensive care unit of Teaching Hospital, Menoufia Governate. A total of 800 consecutive patients were included over 12 months, 402(50.2%) were male and 398(49.8%) were female aiming at assessment of risk factors of their in-hospital mortality with special emphasis on age as a predictor of poor outcome. Patients were classified as elderly ≥65years old and <65 years old, the end point chosen is in hospital outcome.

Ethical considerations: The study was started after approval of protocol by Ethics Committee of Human Rights, Faculty of Medicine, Cairo University, Department of Critical Care Medicine (on 13/07/2015). The aim and steps of the study were explained to the participants and written informed consent was obtained from all study participants after explanation the nature and scope of the study.

Inclusion criteria: All adult (≥18 years) patients who were admitted to Intensive Care Unit from January 2015 January 2016.**Exclusion criteria:** Age < 18 years, burn patients, coronary care patients, post-operative coronary artery bypass grafting (CABG), organ transplantation and patients who died within four hours of admission to ICU.

Methods

Patient Preparation: Patients were submitted to thorough history taking, clinical, examination, and investigations.

All the patients underwent: History taking included: Basic demographic characteristics e.g.: age, gender, principal diagnosis leading to ICU admission.

Examination: Patients comorbidities as hypertension, diabetes mellitus, anemia, thrombocytopenia, malignancy, air way disease, coronary artery disease, heart failure with reduced ejection fraction, chronic kidney disease, length of stay (LOS). Also, admission readings as well as initial kidney function, sodium, potassium levels were recorded. Events during ICU stay were recorded as mechanical ventilation, ventilation duration, re intubation, use of vasopressor drug infusion, use of renal replacement therapy during ICU stay.

Investigations: Mortality Prediction Model MPM II variables were abstracted from patient medical record with the physiological values in the 24 hours following ICU admission. As a coma or deep stupor at the time of ICU admission, heart rate, systolic blood pressure, chronic renal impairment or insufficiency, cirrhosis, metastatic malignant neoplasm, acute renal failure, cardiac dysrhythmia, cerebrovascular incident, gastrointestinal bleeding, intracranial mass effect, age in years, CPR within 24 hours prior to ICU admission, mechanical ventilation and medical or unscheduled surgery admission.

Sample size: All consecutive admissions from January 2015 to January 2016, first 800 of those 1350 admissions fulfilling the inclusion criteria are included in our study

Statistical Methodology: Results were collected, tabulated and statistically analyzed using both IBM compatible personal computer with Statistical Package for the Social Sciences (SPSS) version 23and EpiCalc 2000 program. The description of data was in the form of mean ($\bar{x}$) SD for quantitively data, and frequency and proportion for qualitative data. The mean is the sum of all observations by the number of observations. Analytical statistics included Chi-Squared ($\chi 2$), Fisher's exact test, and Regression analysis. Results were considered significant if $P \leq 0.05$ and highly significant if $P \leq 0.01$.

The study protocol was approved by Ethics Committee of Human Rights, Faculty of Medicine, Cairo University, Department of Critical Care Medicine on 13/07/2015).

RESULTS

There was a significant difference between patients <65and ≥65years old as regard outcome, length of stay, diabetes mellitus, hypertension, systolic blood pressure < = 90mmHg at admission, hypertension, heart rate≥150 at admission, cardiac dysrhythmias at admission, CPR prior to admission and heart failure with reduced ejection fraction, Vasopressor's infusion and coronary artery disease but there is no significant difference as regard gender, **as shown in Table (1).**

Table 1: Comparison between the elderly ≥65 years old and<65 years old in baseline characteristics and cardiac disorder

Baseline characteristics	Total (N = 800)	Age(years)		P value
		<65 (N =494)	≥65 (N =306)	
		No. (%)		
Gender:				
Female	398(49.8)	256(51.8)	142(46.4)	0.14
Male	402(50.2)	238(48.2)	164(53.6)	
Outcome:				
Survival	581(72.6)	429(86.8)	152(49.7)	<0.001**
Mortality	219(27.4)	65(13.2)	154(50.3)	
Length of stay:				
mean± SD	9.68±5.25	9.90±5.11	9.31±5.44	0.03*
(median)	(9.00)	(9.00)	(8.00)	
Rang	1.0 – 46.0	1.0 – 38.0	1.0 – 46.0	
Diabetes mellitus:	370(46.3)	262(53.0)	108(35.3)	<0.001**
No	430(53.7)	232(47.0)	198(64.7)	
Yes				
Hypertension:				
No	344(43.0)	268(54.3)	76(24.8)	<0.001**
Yes	456(57.0)	226(45.7)	230(75.2)	
Systolic Blood Pressure < =				
90mmHg at admission:	488(61.1)	338(68.6)	150(49.0)	<0.001**
No	312(38.9)	156(31.4)	156(51.0)	
Yes				
Hypertension:				
No	344(43.0)	268(54.3)	76(24.8)	<0.001**
Yes	456(57.0)	226(45.7)	230(75.2)	
Heart rate ≥150 at admission:				
No	745(93.1)	470(95.1)	275(89.9)	0.004*
Yes	55(6.9)	24(4.9)	31(10.1)	
Cardiac dysrhythmias at admission:	649(81.1)	441(89.3)	208(68.0)	<0.001**
No	151(18.9)	53(10.7)	98(32.0)	
Yes				
CPR prior to admission:				
No	726(90.8)	471(95.3)	255(83.3)	<0.001**
Yes	74(9.2)	23(4.7)	51(16.7)	
Heart failure with reduced ejection fraction:				
No	729(91.1)	464(93.9)	265(86.6)	<0.001**
Yes	71(8.9)	30(6.1)	41(13.4)	
Vasopressor's infusion:				
No	510(63.8)	361(73.2)	149(48.7)	<0.001**
Yes	290(36.2)	133(26.8)	157(51.3)	
Coronary artery disease:	693(86.6)	443(89.7)	250(81.7)	
No	107(13.4)	51(10.3)	56(18.3)	0.001*
Yes				

* = Significant ** = highly significant

There was a significant difference between patients <65and ≥65years old as regard (chronic renal insufficiency, acute renal insufficiency, renal replacement therapy, hyponatremia, hypernatremia, hypokalemia, hyperkalemia deep coma (Glasgow 3-5**),** cerebrovascular stroke incidental and liver cirrhosis, but there is no significant difference as regard gastrointestinal bleeding, as **shown in Table (2).**

Table 2: Comparison between the elderly patients ≥65 years old and<65 years old as regard renal, electrolyte disorders, neurologic and gastrointestinal disorders

Renal and electrolyte disorders	Total (N = 800)	Age(years)		P value
		<65 (N =494)	≥65 (N =306)	
		No. (%)		
Chronic renal insufficiency:				
No	513(64.3)	352(71.4)	161(52.8)	<0.001**
Yes	287(35.7)	142(28.6)	145(47.2)	
Acute renal insufficiency:				
No	618(77.2)	405(82.0)	213(69.6)	<0.001**
Yes	182(22.8)	89(18.0)	93(30.4)	
Renal replacement therapy:				
No	622(77.8)	407(82.4)	215(70.3)	<0.001**
Yes	178(22.3)	87(17.6)	91(29.7)	
Sodium:				
Hyponatremia	509(63.2)	320(64.8)	186(60.8)	<0.001**
Hypernatremia	63(7.9)	17(3.4)	46(15.0)	
Normal	231(28.9)	157(31.8)	74(24.2)	
Potassium:				
Hypokalemia	259(32.4)	152(30.8)	107(35.0)	<0.001**
Hyperkalemia	121(15.1)	57(11.5)	64(20.9)	
Normal	420(52.5)	285(57.7)	135(44.1)	
Neurotologic and gastrointestinal disorders				
Deep coma (Glasgow 3-5)				<0.001**
No	560(70.0)	385(77.9)	175(57.2)	
Yes	240(30.0)	109(22.1)	131(42.8)	
Cerebrovascular stroke incident:				
No	581(72.6)	381(77.1)	200(65.4)	<0.001**
Yes	219(27.4)	113(22.9)	106(34.6)	
Liver cirrhosis:				
No	573(71.7)	388(78.7)	185(60.5)	<0.001**
Yes	227(28.3)	106(21.3)	121(39.5)	
Gastrointestinal bleeding:				
No	709(88.6)	442(8.7)	267(87.3)	0.34
Yes	91(11.4)	52(10.3)	39(12.7)	

There was a significant difference between patients <65and ≥65years old as regard (anemia, thrombocytopenia, metastatic neoplasm, non-hematological malignancy, malignancy mechanical ventilation, mechanical ventilation duration and re intubation, but there is no significant difference as regard hematological and air way disease,**as shown in Table (3).**

Table 3: Comparison between the elderly patients ≥65 years old and<65 years old as regard hematologic, oncologic comorbidities and pulmonary disorders

Hematological and oncologic disorders	Total (N = 800)	Age(years)		P value
		<65 (N =494)	≥65 (N =306)	
		No. (%)		
Anemia:				
No	422(52.8)	310(62.9)	112(36.7)	<0.001**
Yes	378(47.2)	184(37.1)	194(63.3)	
Thrombocytopenia:				
No	675(84.4)	438(88.7)	237(77.7)	<0.001**
Yes	125(15.6)	56(11.3)	69(22.3)	
Metastatic neoplasm:				
No	720(90.1)	469(95.1)	251(82.0)	<0.001**
Yes	80(9.9)	25(4.9)	55(18.0)	
Hematological malignancy:				
No	789(98.6)	489(99.0)	300(98.0)	0.35
Yes	11(1.4)	5(1.0)	6(2.0)	
Non-Hematological malignancy:				
No	717(89.6)	471(95.3)	246(80.4)	<0.001**
Yes	83(10.4)	23(4.7)	60(19.6)	
Pulmonary disorders				
Mechanical ventilation:				
No	340(42.5)	252(51.0)	88(28.8)	<0.001**
Yes	460(57.5)	242(49.0)	218(71.2)	
Mechanical ventilation duration:				
mean± SD		3.29±4.51	5.07±5.25	
(median)Rang		(1.00)	(5.00)	<0.001**
		0.0 – 27	0.0 – 45	
Re intubation:				
No	693(86.6)	443(89.7)	250(82.0)	0.001*
Yes	107(13.4)	51(10.3)	56(18.0)	
Airway diseases:				
No	721(90.1)	447(90.5)	274(89.5)	0.66
Yes	79(9.9)	47(9.5)	32(10.5)	

U=Mann Whitney * Significant **highly significant

There was a significant difference between survival and mortality among patients as regard (age, length of stay, diabetes mellitus and hypertension, Systolic Blood Pressure≤ 90mmHg at admission, hypertension, heart rate≥150 at admission , cardiac dysrhythmias at admission, CPR prior to admission and heart failure with reduced ejection fraction ,Vasopressors infusion , coronary artery disease, chronic renal insufficiency, acute renal insufficiency, renal replacement therapy, hyponatremia, hypernatremia, hypokalemia and hyperkalemia but there was no significant difference as regard gender **as shown in Table (4).**

Table 4: Relation between outcome, Baseline, Cardiac disorders, renal and electrolyte disorders characteristics of the studied patients at admission

Baseline Characteristics	Outcome (n= 800)		P value
	Survival (n= 581)	Mortality (n= 219)	
	No. (%)		
Age: <65 ≥65	 429(73.8) 152(26.2)	 65(29.7) 154(70.3)	 <0.001**
Gender: Female Male	 297(51.1) 284(48.9)	 101(46.1) 118(53.9)	 0.21
Length of stay: mean± SD (median) Rang	 9.99±5.20 (9.00) 1.00- 46.0	 8.84±5.29 (7.00) 1.0 – 25.0	 0.001*
Diabetes mellitus: No Yes	 293(50.4) 288(49.6)	 77(35.2) 142(64.8)	 <0.001**
Hypertension: No Yes	 292(50.3) 289(49.7)	 52(23.7) 167(76.3)	 <0.001**
Systolic blood pressure ≤90 at time of admission: No Yes	 416(71.6) 165(28.4)	 72(32.9) 147(67.1)	 <0.001**
Hypertension: No Yes	 292(50.3) 289(49.7)	 52(23.7) 167(76.3)	 <0.001**
Heart rate ≥150 at time of admission: No Yes	 557(95.9) 24(4.1)	 188(85.8) 31(14.2)	 <0.001**
Cardiac dysrhythmias: No Yes	 516(88.8) 65(11.2)	 133(60.7) 86(39.3)	 <0.001**
CPR prior To admission: No Yes	 565(97.2) 16(2.8)	 161(73.5) 58(26.5)	 <0.001**
Heart failure with reduced ejection fraction No Yes	 548(94.3) 33(5.7)	 181(82.6) 38(17.4)	 <0.001**
Coronary artery disease: No Yes	 527(90.7) 54(9.3)	 166(75.8) 53(24.2)	 <0.001**
Chronic renal insufficiency: No Yes	 402(69.2) 179(30.8)	 111(50.7) 108(49.3)	 <0.001**
Acute renal insufficiency: No Yes	 478(82.3) 103(17.7)	 140(63.9) 79(36.1)	 <0.001**
Renal replacement therapy: No Yes	 488(84.0) 93(16.0)	 134(61.2) 85(38.8)	 <0.001**
Sodium: Hyponatremia Hypernatremia Normal	 362(62.3) 26(4.5) 193(33.2)	 144(65.8) 37(16.9) 38(17.4)	 <0.001**
Potassium: Hypokalemia Hyperkalemia Normal	 180(31.0) 53(9.1) 348(59.9)	 79(36.1) 68(31.1) 72(32.9)	 <0.001**

**highly significant

There was a significant difference between survival and mortality among patients as regard, cerebrovascular stroke incident, liver cirrhosis, gastrointestinal bleeding, anemia, thrombocytopenia, metastatic neoplasm, hematological malignancy, mechanical ventilation, mechanical ventilation duration and re intubation but there was no significant difference as regard non hematological malignancy and air way disease, **as shown in Table (5).**

Table 5: Relation between outcome as regard neurological, hematological, pulmonary disorders and gastrointestinal disorders, oncologic disorders and MPM II Predicated death rate among the studied patients

Neurological and gastrointestinal disorders	Outcome (n= 800)		P value
	Survival (n= 581)	Mortality (n= 219)	
	No. (%)		
Deep Coma (Glasgow 3-5): No Yes	 490(84.3) 91(15.7)	 70(32.0) 149(68.0)	 <0.001**
Cerebrovascular stroke incident: No Yes	 443(76.2) 138(23.8)	 138(63.0) 81(37.0)	 <0.001**
Liver cirrhosis: No Yes	 462(79.5) 119(20.5)	 111(50.7) 108(49.3)	 <0.001**
Gastrointestinal bleeding: No Yes	 528(90.9) 53(9.1)	 181(82.6) 38(17.4)	 0.001*

Anemia:			
No	381(65.6)	41(18.7)	<0.001**
Yes	200(34.4)	178(81.3)	
Thrombocytopenia:			
No	522(89.8)	153(69.9)	<0.001**
Yes	59(10.2)	66(30.1)	
Metastatic neoplasm:			
No	568(97.8)	152(69.4)	<0.001**
Yes	13(2.2)	67(30.6)	
Hematological malignancy:			
No	576(99.1)	213(97.3)	0.08
Yes	5(0.9)	6(2.7)	
Non-Hematological malignancy:			
No	558(96.0)	159(72.6)	<0.001**
Yes	23(4.0)	60(27.4)	
Mechanical ventilation:			
No	321(55.2)	19(8.7)	<0.001**
Yes	260(44.8)	200(91.3)	
Mechanical ventilation duration:			
mean± SD	2.91±4.50	6.81±4.71	<0.001**
(median)	(0.00)	(6.00)	
Rang	0.00 – 45.0	0.00 – 25.0	
Re intubation:			
No	536(92.3)	157(71.7)	<0.001**
Yes	45(7.7)	62(28.3)	
Airway diseases:			
No	524(90.2)	197(90.0)	0.92
Yes	57(9.8)	79(9.9)	
MPM II Predicated death rate:			
Mean± SD	21.43±21.63	77.96±24.24	<0.001
(median)	(13.60)	(89.10)	
Rang	0.40 – 97.2	0.90 – 99.90	

**highly significant

There was a significant difference between survival and mortality among patients ≥65 years old as regard (MPM II predicted death rate, anemia, thrombocytopenia, non-hematological malignancy, renal replacement therapy, hyponatremia, systolic blood pressure ≤90 at admission, CPR prior to admission, mechanical ventilation, re-intubation, but there is no significant difference as regard hematological malignancy, **as shown in Table (6).**

Table 6: Relation between different variables with outcome and in-hospital mortality among elderly patient's ≥ 65 years old

Variable	Hospital Mortality in age ≥65(N=306)		P value
	Survival (n=152)	Mortality (n=154)	
	No. (%)		
Anemia:			
No	91(59.9)	21(13.6)	<0.001**
Yes	61(40.1)	133(86.4)	
Thrombocytopenia:			
No	138(90.8)	99(64.3)	<0.001**
Yes	14(9.2)	55(35.7)	
Hematological malignancy:	150(98.7)	150(97.4)	0.68
No	2(1.3)	4(2.6)	
Yes			
Non-Hematological malignancy:	141(92.8)	105(68.2)	<0.001**
No	11(7.2)	49(31.8)	
Yes			
Renal replacement therapy:	121(79.6)	94(61.0)	<0.001**
No	31(20.4)	60(39.0)	
Yes			
Sodium:			
Hyponatremia	89(58.6)	97(63.0)	0.001*
Hypernatremia	14(9.2)	32(20.8)	
Normal	49(32.2)	25(16.2)	
Systolic blood pressure <=90 at admission:	104(68.4)	46(29.9)	<0.001**
No	48(31.6)	108(70.1)	
Yes			
CPR prior to admission:			
No	143(94.1)	112(72.7)	<0.001**
Yes	9(5.9)	42(27.3)	
Heart failure with reduced ejection fraction HrREF:	139(91.4)	126(81.8)	0.01*
No	13(8.6)	28(18.2)	
Yes			
Vasopressor's infusion:			
No	121(79.6)	28(18.2)	<0.001**
Yes	31(20.4)	126(81.8)	
Mechanical ventilation:			
No	78(51.3)	10(6.5)	<0.001**
Yes	74(48.7)	144(93.5)	
Re-intubation:			
No	141(92.8)	109(70.8)	<0.001**
Yes	11(7.2)	45(29.2)	
Outcome (n= 800)			
MPM II Predicated death rate:	21.43±21.63	77.96±24.24	<0.001
mean± SD	(13.60)	(89.10)	
(median)	0.40 – 97.2	0.90 – 99.90	
Rang			

The following independent variables which were significant

in the univariate base analysis in elderly patients≥ 65years old were utilized in the stepwise binary logistic regression analysis (anemia, thrombocytopenia, non-hematological malignancy, renal replacement therapy, hyponatremia , systolic blood pressure ≤90 at admission, CPR prior to admission, HFrEF, vasopressors infusion, mechanical ventilation, re-intubation ,it yielded to (mechanical ventilation, CPR prior to admission, vasopressors, anemia and thrombocytopenia) are significantly associated with the hospital mortality among patient's ≥ 65years old (P values=0.000, 0.023, 0.000, 0.000, 0.039) respectively. But the following variables (non-hematological malignancy, RRT, hyponatremia, systolic blood pressure≤90 at admission, re-intubation and HFrEF) are not significantly associated P< 0.05, **as shown in Table (7).**

Table 7: Stepwise binary logistic regression analysis of the potential risk factors for in hospital mortality among patient's ≥ 65years old.

Variable	P-value	Odds ratio	95% CI	
			Lower	Upper
Mechanical ventilation	<0.001**	22.33	7.615	65.493
CPR prior to admission	0.015*	4.151	1.314	13.110
Vasopressor's infusion	<0.001**	17.644	6.333	49.157
Anemia	<0.001**	4.375	1.931	9.913
Thrombocytopenia	0.033*	3.053	1.091	8.540

*Significant **highly significant

DISCUSSION

Ageing of the population increases the proportion of people with chronic conditions, with corresponding expectations of eventual decline in function. In intensive care unit (ICU) patients, advanced age is linked to increased mortality. Furthermore, even after successful ICU care, the life expectancy of all elderly patients remains limited. The current study evaluates the risk factors of mortality in elderly (≥65 years old) patients admitted to ICU. The actual death rate of 27.3 % compares nearly similar to those of other reports. Previously reported death rates varied from 16.9% in Japan, [4] 18% in NEW Zeeland[5], 19.7% in United States,[6] 24.8% in Canada[7], 36% in Hong Kong, [8]. Although the demographic definition of old age varies considerably, a general cutoff at 65 years is used in the vast majority of studies. [9-11] Applying the same cutoff, we found that 308 patients 38.25% of the admissions to our ICU were Elderly≥65years old. This proportion was consistent with those found in previous reports, such as the databases that generated the Acute Physiology and Chronic Health Evaluation (APACHE) II (24–54% in different centers). [12]

We acknowledge that such a one-dimensional view of ageing ignores the wide range of organ functions and reserves within a given age group, and that others have further categorized the elderly, such as 65–75 years old for the young-old, 75–80 to 85–90 years for the old-old, and more than 85–90 years for the oldest old. [13]Elderly patients (≥65 years) had higher mortality in the ICU than the nonelderly, this is in concordance with **Fuchs et al.[14], Levinsky et al.[15]**reported that advanced age was a significant independent risk factor for mortality. The initial cardiac disorders at the onset of admission were compared between the two age groups, there was a significant difference between patients <65and ≥65years old as regard systolic blood pressure≤90mmHg at admission, hypertension, heart rate≥150 at admission and coronary artery disease. Cardiovascular performance impacts on critical illness in the elderly in two ways. First, age is a major risk factor for cardiovascular disease, Harman et al accounts for over 40% of deaths in those aged 65 years and older. Second, the effect of aging on cardiovascular structure and function has implications for hemodynamic support of the elderly.

A substantial lack of cardiac reserve is noted by the age of 70. This lack of reserve may not affect the daily functioning of a healthy older individual, but when this same older person experiences physiological stress such as blood loss, hypoxia, sepsis, or volume depletion, the lack of reserve becomes apparent through cardiac dysfunction. [16] The risk factors of mortality in elderly patients are systolic blood pressure >90mmHg at admission, CPR prior to admission, heart failure with reduced ejection fraction and the need for vasopressor drug infusion as an independent risk factor of mortality and this was in concordance to **Boumendil et al.[13] as well as Fuchs et al.[14]**

Renal disorders and renal replacement therapy during ICU stay were compared between the two age groups, there was a significant difference between patients<65and ≥65years old as regard (chronic renal insufficiency, acute renal insufficiency, renal replacement therapy. The need for renal replacement therapy during ICU admission is an established independent mortality risk factor in critically ill patients ≥65 years old, and our results was significant 60(39.0%), and this agrees with previous studies.[17]Electrolyte serum levels of sodium and potassium was measured, there was a significant difference between patients <65and ≥65years old as regard, hyponatremia, hypernatremia, hypokalemia and hyperkalemia. Mild forms of chronic hyponatremia have recently been discovered to be connected with clinical symptoms when thoroughly explored.

Several studies have also found that patients with hyponatremia spend longer in the hospital in various clinical settings, resulting in higher expenses. Most importantly, even when serum [Na+] is marginally lowered, this condition has been linked to a greatly higher risk of mortality. On the contrary, there is compelling evidence that as hyponatremia improves, the risk of death decreases. In the current study

among patients ≥65years old there was asignificant difference between survival and mortality as regard hyponatremia and hypernatremia, 97 patients ≥65 years old (63%) of non-survivors' patients had hypernatremia and 32 patients (20.8%) had hypernatremia, thus hyponatremia and hypernatremia on admission was an independent risk factor for ICU mortality in patients ≥65 years old, this is in concordance with **Stelfox et al.**[18]

As regard hematological disorders and oncologic comorbidities there was a significant difference between patients <65and ≥65years old as regard (anemia, thrombocytopenia, metastatic neoplasm and non-hematological malignancy (P≤0.05), but there is no significant difference as regard hematological malignancy. The relation between outcome as regard the same hematological and oncologic comorbidities, there was a significant difference between survival and mortality among patients as regard anemia, thrombocytopenia, metastatic neoplasm, hematological malignancy, but there was no significant difference as regard non hematological malignancy.

Our results were significant as regard anemia as an independent risk factor of ICU mortality in patients≥65 years old, 86.4 % of elderly ICU mortality. We postulate this association may be accounted for by the fact that anemia is an indicator of poor general health and chronic illness. Considering its multifactorial etiopathogenesis, it has an impact on patient morbidity and mortality. The primary etiologies include blood loss due to phlebotomy and bleeding and defective erythropoiesis due to the systemic inflammation. Blood transfusions are associated with various complications, including an increased risk of ARDS and infections increasing both mortality and morbidity. The potential benefits and the risks involved must be carefully evaluated in every elderly patient for whom a blood transfusion is being considered. [19]

Our results were significant as regard thrombocytopenia in patients ≥65 years old 35.7% of mortality in this age group but insignificant as an independent risk factor of mortality in patients >65 years old see. Thrombocytopenia in elderly patients ≥65 years old was an independent risk factor of mortality and this agrees with previous studies. [19] Non hematological malignancy in our study was found as an independent risk factor of mortality (31.8%) of mortality in patients ≥65 years old, but there are no significant results in both age groups as regard hematological malignancies and this agrees with previous studies**.** [20-22] There was a significant difference between patients <65and ≥65years old as regard the initiation of mechanical ventilation, mechanical ventilation duration, re intubation (P≤0.05), but there is no significant difference as regard air way disease. The relation between outcome as regard the same variables, there was a significant difference between survival and mortality among patients as regard mechanical ventilation, mechanical ventilation duration, re intubation but there was no significant difference as regard air way disease. [23]

The current study showed that mechanical ventilation and reintubation were responsible of increased ICU mortality in elderly patients ≥65 years old and two independent risk factors of mortality in our study,144 patients (93.5%) of non survivors ≥65 years old were mechanically ventilated patients and 45 patients of non survivors (29.3%) of non survivors ≥65 years old were reintubated and this was supported by previous studies (86,87).Yang et al suggested that age and use of MV are strongly associated with mortality . If validated, the simple combination of age and MV duration gives predictive information that could be utilized in conjunction with the patient's illness trajectory and values to assist end-of-life talks with patients or their surrogates during a trial of critical care.[24] Mortality Prediction Model MPM II was calculated to each patient for predicted death rate at the onset of admission and there was a significant difference between survival and mortality among patients as regard predicted death rate, mean± SD 21.43±21.63(13.60) in survival vs 77.96±24.24 (89.10) in mortality.

Our study found that elderly patients had a higher in-hospital mortality rate than non-elderly patients. Predictors of mortality rate in critically ill elderly patients includes variables associated with the severity of illness such as the need for intubation and mechanical ventilation, the need for hemodynamic support to patients with hypotension, heart failure with reduced ejection fraction, vasopressor drug infusion and a higher MPM II score. The need for renal replacement therapy and electrolyte imbalance as hyponatremia and hypernatremia considered as an independent risk factor for mortality. The independent risk factors of hematological disorders risk factors for mortality are anemia and thrombocytopenia, also non hematological malignancy considered as an independent risk factor for mortality in critically ill elderly people.

CONCLUSION

Our findings suggest that anemia, thrombocytopenia, non-hematological malignancy, systolic blood pressure<=90 at admission, CPR prior to admission, vasopressor infusion, mechanical ventilation were the independent risk factors associated with raised mortality in elderly patients. we should adopt measures to decrease the incidence of these complications to try to reduce mortality. The better comprehension of factors associated with death in the elderly can improve medical care to these patients.

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