

Epidemiology of elderly patients hospitalized in intensive care unit for severe medical illnesses

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Abstract: Objectives: This study was made to identify the epidemiological data of elderly patients (over 65 years of age) vs. younger patients (< 65 years) requiring admission to the intensive care unit for severe medical illnesses. Design and patients: We conducted an analysis of a prospective observational study of 106 adults admitted to the intensive care unit for severe medical illnesses, from January 2010 to January 2012. Patients admitted to the intensive care unit for surgical illnesses were excluded. Setting: A 6-bed polyvalent intensive care unit in a regional hospital. Results: The study group included 31 (29%) elderly patients (≥ 65 years of age) and 75 (71%) young patients (<65 years of age) (n=106). Elderly patients tended to have a higher simplified acute physiology score version II in admission (36 vs 21, $p < 0,001$). There were several epidemiological differences between the two groups: Chronic diseases were more frequent in elderly patients than in younger one (diabetes (55% vs 20%; $p < 0,001$), high blood pressure (45% vs 13%; $p < 0,001$) and heart diseases (48% vs 19%; $p = 0,002$). Elderly patients were significantly more hospitalized for delirium comparing to younger one (87% vs 64%; $p = 0,017$), but dyspnea was less perceived by elderly patients 29% vs 55% for younger patients, $p = 0,016$. Acute respiratory distress syndrome, acute heart failure, acute kidney injury, were all more frequent in elderly patients respectively ($p = 0,006$, $p = 0,014$, $p = 0,005$). The incidence of death was 37% for all patients and it was similar between the two groups ($p = 0,251$). Conclusion: The identification of epidemiology of older patients hospitalized in intensive care unit for severe medical illnesses will help to develop qualified practice. Further studies are needed to better characterize those elderly individuals who may be at the highest risk of complications.

Keywords: Intensive Care Unit, Elderly, Epidemiology

1. Introduction

Older patients tend to have complex clinical presentations, and their care can be resource-intensive [1]. Due to demographic change and progress in medicine, the percentage of geriatric patients treated in intensive care is continuously increasing [2]. In addition to acute diseases, many of those patients may also have chronic illnesses, multimorbidity, and cognitive limitations [2]. Mortality among old patients is high, but functionality and

comorbidity have a great effect on patient outcome [3]. Structural and functional organ changes have an additional impact on the treatment of geriatric patients in intensive care [3]. There are no studies directly investigating epidemiology of hospitalized elderly patients for severe medical illnesses in intensive care unit (ICU) in our hospital. The objective of our study was to evaluate the epidemiologic profile of those patients and to compare our results with international findings.

2. Materials and Methods

We conducted a 2-year prospective observational study to evaluate elderly patients admitted in ICU of Idrissi's hospital, Kenitra, Morocco, for severs medical illnesses. Two groups were compared according to age (<65 years and ≥ 65 years). Collected data included socio-demographic and medical baseline data, the Simplified Acute Physiology Score version II (SAPS II) was calculated based on the worst variables recorded during the first 24 hours of ICU admission [4], reason of hospitalization, antecedents, diagnostics, length of stay, discharge disposition and death. We used universally accepted definitions in order to validate comparisons across multiple studies. The participating center is a regional hospital having access to a polyvalent intensive care unit with 6 beds. During the two years of the study, every newly elderly patient admitted to ICU for medical illness was registered and was followed up until intensive care discharge or death in ICU. We were asked to complete the data entry. Upon arrival, all data were screened in detail by a dedicated intensive care specialist. Any queries planned resolution within 48 h. Categorical variables were

expressed as percentages and continuous variables as the median and interquartile range (25th-75th IQR). Categorical variables were compared between older patients and younger patients using the chi-square or Fisher's exact test, and continuous variables using the nonparametric Mann-Whitney test as appropriate. P value ≤ 0.05 was considered statistically significant. All analysis was performed by the SPSS statistical software package 13.0.

3. Results

106 patients were included; 75(71%) young and 31(29%) old. Information was collected for each patient. Elderly patients tended to have a higher SAPS II in admission than younger patients (36 vs 21, $p<0,001$). Concerning reasons of intensive care admissions, delirium was more frequent in elderly comparing to younger patients (87% vs. 64%, $p=0,017$). Twenty nine percent of elderly patients percept dyspnea vs 55% of younger one, $p=0,016$. Characteristics of patients during ICU staying and reasons of ICU admission are summarized in table 1.

Table 1. Characteristics of patients during ICU staying and reason of ICU admission.

Parameters	All patient n=106	Young n=75	Old n=31	P
Patient number, n (%)	106 (100)	75(71)	31(29)	
Age (years), median (IQR)	53 [28 - 69]	45[24-56]	72[70-80]	<0,001
SAPS II. Score, median (IQR)	29[19-41]	21[16-37]	36[33-50]	< 0,001
Female, n (%)	51(48)	39(52)	12(39)	0,213
Male, n (%)	55(52)	36(48)	19(61)	
Mechanical ventilation	30(28)	22(29)	8(26)	0,714
Reason of ICU admission				
Delirium, n (%)	75(71)	48(64)	27(87)	0,017
Shock, n (%)	20(19)	15(20)	5(16)	0,643
Dyspnea, n (%)	50(47)	41(55)	9(29)	0,016
One vital distress, n (%)	78(74)	54(72)	24(77)	
Two vital distresses, n (%)	18(17)	14(19)	4(13)	
Tree vital distresses, n (%)	10(9)	7(9)	3(10)	0,771

n: number

IQR: interquartile range

SAPSII Score: Simplified Acute Physiology Score version II

ICU: intensive care unit

There were several epidemiological differences between the two groups: the incidence of diabetes was higher in elderly 55% vs 20% in younger patients ($p<0,001$), high blood pressure was significantly more registered in elderly

45% vs 13% for younger patients ($p<0,001$), such as antecedents of heart diseases 48% vs 19% ($p=0,002$) (table 2).

Table 2. Antecedents of patients.

Parameters	All patients n=106	Young n=75	Old n=31	P
Smoking; n (%)	16(15)	13(17)	3(10)	0,247
High Blood Pressure ; n (%)	24(23)	10(13)	14(45)	<0,001
Diabetes; n (%)	32(30)	15(20)	17(55)	<0,001
Heart diseases; n (%)	29(27)	14(19)	15(48)	0,002
Tuberculosis; n (%)	9(8,5)	8(11)	1(3)	0,278
COPD; n (%)	11(10)	9(12)	2(6)	0,503
Asthma n (%)	4(4)	4(5)	0(0)	0,319
Chronic kidney injury; n (%)	9(8,5)	6(8)	3(10)	0,719
Malignancy; n (%)	4(4)	3(4)	1(3)	1
Epilepsy; n (%)	5(5)	3(4)	2(6)	0,628
Surgery; n (%)	6(6)	2(3)	4(13)	0,059

COPD: chronic obstructive pulmonary disease

Acute respiratory distress syndrome (ARDS), acute heart failure, acute kidney injury (AKI), were all more frequent in elderly patients (table 3).

Table 3. Diagnostics.

Parameters	All patients n=106	Young n=75	Old n=31	P
Cerebral stroke	19(18)	11(15)	8(26)	0,174
Shock	36(34)	24(32)	12(39)	0,507
Sever sepsis	79(74,5)	53(71)	26(84)	0,156
Acute heart diseases	50(47)	29(39)	21(68)	0,006
Epilepsy	22(21)	17(23)	5(16)	0,450
Hyperosmolar hyperglycemic state	16(15)	8(11)	8(26)	0,071
Acute respiratory distress syndrome	59(56)	36(48)	23(74)	0,014
Asthma	4(4)	4(5)	0(0)	0,319
Chronic obstructive pulmonary disease	12(11)	10(13)	2(6)	0,502
Poisoning	10(9)	9(12)	1(3)	0,275
Hepatic dysfunction	31(29)	18(24)	13(42)	0,065
Acute Kidney injury	46(43)	26(35)	20(64,5)	0,005
Thrombocytopenia; n (%)	30(28)	20(27)	10(32)	0,561
Anemia; n (%)	44(41,5)	30(40)	14(45)	0,624

The incidence of death was 37% for all patients. In our population, the incidence of mortality, and the median of ICU stay were similar between the two groups (table 4).

Table 4. Length of stay and mortality.

Parameters	All patients n=106	Young n=75	Old n=31	P
Length of stay in hospital before ICU admission (days); median (IQR)	1 [1-2]	1 [1-2]	1 [1-2]	0,235
ICU stay (days); median (IQR)	4 [1-7]	4 [2-7]	4 [1-7]	0,552
ICU mortality; n (%)	39(37)	25(33)	14(45)	0,251

n: number

IQR: interquartile range

ICU: intensive care unit

4. Discussion

The aging of the population has increased the demand for healthcare resources. With advancing age, the proportion of various preexisting comorbidities and the primary reasons for ICU admission change. In our study, 87% of elderly were hospitalized in ICU for delirium. Acute confusional state is common, serious, costly, and often fatal particularly in the elderly [5, 6]. It is responsible for up to 56% of hospital admissions in the elderly [7]. Delirium can be precipitated by almost any medical condition or pharmacological treatment and may be the only symptom of illness [6, 7]. Epileptic activities occur in a significant proportion of delirium, and possibly have a role in the prognosis. In our study it occurred in 16% of elderly patients. Acute symptomatic seizures are very frequent most often due to metabolic abnormalities; infections or medications [8]. Electroencephalography should be carried out in all older patients with delirium [7]. The incidence of stroke was 26% in our elderly patients. Stroke incidence typically increases with age and, due to the ageing of the population, stroke incidence rates are expected to rise [9].

Dyspnea is an alarming symptom responsible for millions of patient visits each year [10]. In our study, older patients had significantly lower perception of dyspnea compared to younger ones. The blunted perception of dyspnea might be reasonably attributed to an inappropriately low level of fear and inadequate earlier medical treatment for both patients and physicians, resulting in subsequent intensive care [10]. It is related to hospitalization, high medical costs, and all-cause mortality in community-dwelling elderly people [10].

The incidence of diabetes was significantly higher in elderly (55%) than in younger patients (20%) ($p < 0,001$). In developed countries, 12-25 % of the aged population (>65 years old) have diabetes [11]. It is universally acknowledged that diabetes mellitus is a common cause of morbidity in the elderly population and it's a significant contributor to mortality and reduced life expectancy in elderly subjects [12, 13].

Blood pressure was measured in the sitting position and also with the patient standing (when possible) to exclude orthostatic hypotension, a frequent problem in elderly patients [14]. Pseudo-hypertension, a source of inadequate measurements in elderly patients was recognized [14]. High blood pressure was significantly more frequent in elderly patients than in younger ones. Hypertension is very common and inadequately controlled among the elderly [15]. Antecedents of heart diseases were significantly more frequent in elderly. Elderly patients are particularly susceptible to chronic heart failure and pulmonary diseases, which are classical causes of respiratory failure needing ICU admission [16, 17].

Acute heart failure was significantly more frequent in elderly. Acute coronary syndrome is more frequent in the elderly than in the general population and is associated with

very high morbidity and mortality [18, 19]. Prevention of cardiovascular diseases was probably underused in our elderly patients, even if it is efficient, and that could explain also complications and hospitalization in ICU [20].

ARDS was significantly more frequent in elderly. The aged patients are susceptible to respiratory failure, especially acute lung injury (ALI) or ARDS [21]. The mortality rate for ARDS ranges from 40-70% despite of a correct resuscitation [21]. Careful hemodynamic monitoring and resuscitation combined with other strategies to ameliorate non pulmonary organ dysfunction achieved good outcomes in high-risk patients and could contribute in the future to further improved outcomes of elderly patients with ARDS [22].

The incidence of anemia in our geriatric patients was high (45%). With some variations in different patient cohorts, prevalence of anemia can reach 40% [23]. Anemia is not an age-related disease on its own, but is a symptom with multifactorial genesis and high risk potential [23]. It directly influences mortality, morbidity, and the rate of hospitalization, particularly in older patients suffering from chronic heart failure or chronic kidney disease [23].

The sepsis and septic shock represent the most frequent causes of morbidity and mortality in the ICU [24]. In our study, severe sepsis was the leading etiologic factor of hospitalization in ICU. Eighty four percent of older patients presented severe sepsis. Elderly patients are at particular risk for bacteremia and sepsis [24]. Atypical presentation may complicate the diagnosis [25]. Sepsis is a disease of elderly people. Indeed, 60% of all sepsis events and 80% of septic deaths occur in individuals over 65 years-old [26]. The incidence increases exponentially with age and older age is an independent risk factor for mortality among adults hospitalized with sepsis [26]. Elderly patients are particularly exposed to the risk of nosocomial infections [27]. Advanced age and multiple comorbidities compromise their immunity and hence they may be more prone to succumbing to severe infection and have poorer outcome [28]. Only prevention may reduce the impact of infections on this frail population [29-31]. It is believed that continued research will result in a decrease in infection morbidity and mortality in elderly.

The incidence of AKI (during hospital admission) ranges from 3 to 25% depending on criteria applied [32]. The variety of definitions used in clinical studies may be partially responsible for the large variations in the reported incidence and the associated mortality (19-83%) of AKI [33-35]. AKI is a common complication of critical illness [36]. The increased incidence of AKI is most likely due to a trend of admitting older, more severely and more chronically ill patients to hospitals [37-39]. In our study, AKI patients were significantly older. In the aging population, there is heightened susceptibility to drug toxicity, partially owing to altered drug pharmacokinetics and pharmacodynamics. Furthermore, elderly people consume twice as many medications overall, including

nephrotoxic agents, than younger patients [39, 40]. Sepsis, diabetes, hypovolemia, nephrotoxic drugs and cardiovascular diseases are among the common causes of AKI in elderly patients [41, 42].

There was no difference concerning hepatic dysfunction between old and young patients. Hepatic dysfunction is a common finding in critically ill patients on the ICU and directly influences survival [43]. Hypoxic hepatitis may be induced by hemodynamic instability or arterial hypoxemia in critically ill patients [44]. In other way patients with cirrhosis are prone to infection which is a frequent precipitant of hepatic encephalopathy [45]. Finally, patients in the ICU have multiorgan dysfunction as well as altered pharmacokinetic parameters. Hence they are susceptible to adverse drug reactions like hepatic dysfunction [46].

The incidence of thrombocytopenia was 28% for all patients. Thrombocytopenia, which is one of the most commonly observed laboratory abnormalities in the ICU population, has an incidence ranging from 13.0% to 44.1%, depending on the study population, the timing and frequency of platelet monitoring, and the definition of thrombocytopenia [47].

In our study, the incidence of death was 37% for all patients. Our work found out also that age was not a risk factor of mortality. Death is common place in the ICU [48]. It is estimated that one in five Americans and 50% of hospitalized patients die using intensive care [48]. Elsewhere and in India, depending on the case mix 10-36% of patients admitted to ICU die [48]. Many investigations have shown that age alone is not associated with poor prognosis in the ICU [49-51]. Other factors, including patient selection criteria, primary disease, co-morbidity, severity of illness and complications, significantly influence outcome [49, 52].

5. Conclusion

The identification of epidemiology of elderly patients hospitalized in medical intensive care will help develop qualified practice. Basic geriatric knowledge should be part of the curricula of intensive care. Further studies are necessary to support the hypothesis that quality gains may be achieved by creating a geriatric unit at the hospital.

Limits of the Study

Our results are limited by the number of patients. It was often very difficult to clinically determine the cause of dyspnea, especially in the elderly. Our study protocol did not require an invasive hemodynamic monitoring; we could not assess exactly the volume-status of patients on ICU-admission. The diagnosis of hypovolemia was based mainly on basic hemodynamic data and clinical impressions. We did not detail the treatment, second adverse neither long-term outcome. Future studies are needed to evaluate more points about elderly in our region.

Abbreviations

ICU: intensive care unit; SAPS II: simplified acute physiology score; AKI: acute kidney injury; ARDS: acute respiratory distress syndrome. COPD: chronic obstructive pulmonary disease.

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