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Research Article

FACTORS AFFECTING INTENSIVE CARE REQUIREMENTS FOR CEREBROVASCULAR DISEASES

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ABSTRACT

Objective: Cerebrovascular diseases are among neurological diseases causing severe death and disability in the whole world and in Turkey. Intensive care requirements may be determined during monitoring and treatment of these diseases. Defining factors leading to intensive care requirements is important for accurate and rapid treatment approach. As a result, in this study we aimed to research the risk factors for admission to intensive care and factors affecting prognosis in intensive care.
Methods: The study included 240 patients with cerebrovascular disease diagnosis.
Results: In 53 of these patients (13%) intensive care was required. Risk factors for intensive care requirements were determined as advanced age, female gender, smoking habit, hypertension, ischemic and hemorrhagic stroke and sinus vein thrombosis. When the mortality rates in intensive care were investigated, factors affecting mortality rates were determined as sepsis, multiorgan failure, respiratory failure, mechanical ventilation requirement, intubation and hemorrhagic stroke diagnosis. However, none of these factors were independent risk factors.
Conclusion: The majority of patients with CVD diagnosis may require intensive care. Accurate and sufficient intensive care support has life-saving quality for these patients. Knowing the factors affecting mortality rates in intensive care is very important in terms of patient prognosis.

INTRODUCTION

During monitoring and treatment processes for these diseases, intensive care requirements commonly occur. Especially for ischemic or hemorrhagic cases with broad arterial distribution, intensive care support may be life-saving.

The prognosis of patients admitted to intensive care is determined by degree of the primary neurological disease, duration of intensive care admission, invasive procedures performed and complications developing (2). One of the main problems in patients admitted to intensive care is hospital-sourced infections. Neurology intensive care patients carry additional risk of hospital infection development due to advanced age, invasive interventions like intubation, mechanical ventilation and urinary catheterization and being immobile (2,3). Nearly 80% of intensive care patients are known to develop hospital-sourced infections within 48 to 72 hours (4). Studies in Turkey have identified that the use of mechanical ventilators, especially, increases infection risk by a significant degree (5,6). Additionally, urinary catheterization and central venous catheterization increase the risk of hospital infection (6).

Compression wounds are another problem significantly increasing the mortality and disability rates in patients admitted to intensive care. In intensive care patients, compression wounds occur at rates of 0.4-38%, with mean incidence reported to be 7%. Many factors are blamed for the development of compression wounds. Some of these include immobility, malnutrition, circulation disorders, hypoalbuminemia, infection, advanced age and sensory disorders (7). A study found the complications that may develop in intensive care patients of multiorgan failure (MOF), acute renal failure (ARF), disseminated intravascular coagulation (DIC), hypoxia-related cerebrovascular events, compression wounds, hospital-sourced pneumonia, urinary tract infections, diarrhea and cardiac arrest increased the mortality rates. As the stay in intensive care lengthens, there was a significant degree of increase identified for development of complications (8).

For patients with CVD diagnosis, it is very important to know the factors determining which patients may require intensive care during hospital admission, in addition to those affecting prognosis during intensive care monitoring. As a result, in our study we aimed to research the factors affecting intensive care requirements of patients admitted for treatment with CVD diagnosis and factors affecting prognosis during intensive care monitoring.

METHODS

The study retrospectively investigated patients older than 18 years with diagnosis of ischemic or hemorrhagic stroke, transient ischemic attack, vascular dementia, or sinus vein thrombosis in the neurology ward and neurology intensive care unit in a university hospital. The study received local ethics committee approval.

Patients with subarachnoid hemorrhage and cerebral hemorrhage linked to arteriovenous malformation in the CVD

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group, and those with cerebral hemorrhage developing secondary to trauma were excluded from the study as they were mainly patients monitored by neurosurgery.

All patients had neurologic and systemic examination at admission and later. Anamnesis, history, family history, risk factors, admission complaints, neurological examinations, methods used for diagnosis and differential diagnosis, imaging results, diagnosis, intensive care requirements and discharge examination were recorded.

Patients were divided into two groups as those requiring intensive care and those not requiring it.
The following criteria were used for patients admitted to intensive care (9).

Patients with acute stroke diagnosis causing impairment of consciousness or with herniation risk
Patients with unstable vital signs
Heart rate <40 or >150 beats/min
Systolic blood pressure <80 mmHg
Mean blood pressure <60 mmHg
Diastolic blood pressure >120 mmHg
Respiratory rate >35 /min
Patients requiring intubation or ventilator
PaO2 <50 mmHg
pH <7.1 or >7.7

Groups were compared in terms of factors leading to admission to intensive care. Additionally, patients admitted to intensive care were divided into two groups as dead and survivors. Factors affecting mortality rates in both groups were compared.

Statistical Analysis

When assessing the results obtained in the study, the SPSS (Statistical Package for Social Sciences) for Windows 16.0 program was used for statistical analysis. When evaluating the study data, descriptive statistical methods (mean, standard deviation) and Mann Whitney U test was used. For comparison of qualitative data the χ 2 test was used. Variables found to be significant on univariate tests had stepwise logistic regression analysis completed. The results were assessed in the 95% confidence interval with significance $p<0.05$.

RESULTS

The study included 240 patients (115 male, 125 female) with diagnosis of CVD. In the total of 240 patients, 53 (13%) required intensive care. Of patients requiring intensive care, 33 (62%) were patients with diagnosis of ischemic CVD. The other diagnoses and intensive care requirements are shown in Table 1.

Table 1 Intensive Care Unit Requriment According to Diagnosis

Diagnosis	Case	%
İschemic CVD	34	64,1
Hemorrhagic CVD	10	18,8
CVT	6	11,3
VD	2	3,7
TIA	1	1,8

CVD: Cerebrovascular diseases, **CVT:** Cerebral Vein Thrombosis, **TIA:** Transient Ischemic Attack,**VD:** Vascular demantia.

Of the 53 patients requiring intensive care, 17 (32.1%) were male and 36 (67.9%) were female. In terms of intensive care requirements, there was a statistically significant difference between males and females (p=0.002). Of cases, 66% (35 patients) were above the age of 60 years. Mean age was 62.79±18.357 (20-93) for those requiring intensive care and 53.95 ±18.89 (18-93) for those not requiring intensive care. There was a significant difference between patients in terms of mean age for admission to intensive care (p=0.002).

Table 2 presents the potential risk factors for admission to intensive care assessed with univariate analysis.

Table 2 The potential risk factors for admission to intensive care assessed with univariate analysis

Risk Factors		Patients requiring intensive care	Patients not requiring intensive care	p
Sex	Erkek	17 (%32,1)	192 (%55,3)	0,002
	Kadın	36 (%67,9)	155 (%44,7)	
Age	20-40	5 (%9,4)	93 (%26,8)	0,007
	40-60	13 (%24,5)	97 (%28,0)	
	60≥	35 (%66,0)	157 (% 45,2)	
Smoking		12 (%22,6)	154 (%44,4)	0,003
HT		29 (%81,5)	128 (%81,5)	0,014
DM		10 (%16,4)	51 (%83,6)	0,432
CAD		11 (%21,6)	40 (%78,4)	0,061
Old CVD		6 (%19,4)	25 (%80,6)	0,277
Obesity		34 (%64,2)	214 (%61,7)	0,729
Family Story		24 (%17,6)	112 (%82,4)	0,063
Diagnosis	Ischemic CVD	34 (%22,8)	111 (%77,2)	0,001
	Hemorrhagic CVD	10 (%55,6)	8 (%44,4)	0,001
	CVT	6 (%54,5)	5 (%45,5)	0,009
	VD	2 (%15,4)	11(%84,6)	0,686
	TIA	1 (%1,9)	52 (%98,1)	0,168

HT: Hypertension, **DM:** Diabetes mellitus, C**AD:** Coronary artery disease, **CVD:** Cerebrovascular disease, C**VT:** Cerebral vein thrombosis, **TIA:** Transient Ischemic Attack, **VD:** Vascular Dementia

Variables found to be significant according to the univariate analysis results had logistic regression analysis performed. Independent risk factors increasing the CVD intensive care requirements were hemorrhagic CVD, ischemic CVD and cerebral vein thrombosis (CVT). The logistic regression analysis results in Table 3 show the independent risk factors identified for intensive care requirements. Ischemic CVD diagnosis increased the risk of intensive care admission by 8.475 times. Similarly, hemorrhagic CVD diagnosis increased the risk of intensive care admission by 27.496 times, while CVT diagnosis increased it by 28.952 times (Table 3).

Table 3 Independent risk factors increasing the CVD intensive care requirements

Risk factors	OR	CI(%95)	P
Ischemic CVD	8,475	3,734-19,235	0,0001
Hemorrhagic CVD	27,496	7,984-94,692	0,0001
CVT	28,952	4,638-180,721	0,0001

CVD: Cerebrovascular diseases, CVT: Cerebral Vein Thrombosis, CI: Confidence interval

Of 53 patients admitted to intensive care, 20 (37.7%) died. Of the dead patients, 11 (55%) were male and 9 (45%) were female. Mean age was 64.50±17.551 (30-93). Potential risk factors affecting mortality rates in intensive care were determined as age, gender, intensive care admission diagnosis, duration of stay in intensive care, underlying chronic diseases, smoking habit, and complications developing during intensive care admission (urinary tract infections, pneumonia, sepsis, acute renal failure, respiratory failure, multiorgan failure, mechanical ventilation requirements, intubation, urinary catheterization and decubitus ulcers). Potential risk factors for mortality with significance identified using univariate analysis are shown in Table 4.

Table 4 Potential risk factors for mortality

Risk factors		Sağ kalan hastalar	Ölen hastalar	p
Sex	male	6 (%35,3)	11 (%64,7)	<0,005
	female	27 (%75,0)	9 (%25,0)	
Sepsis		0 (%0)	3 (%100)	<0,005
MOF		0 (%0)	3 (%100)	<0,005
Respiratuvar yetm.		2 (%14,3)	12 (%85,7)	<0,005
MV gereksinimi		4 (%16,7)	20 (%83,3)	<0,005
Entübasyon		4 (%17,4)	19 (%82,6)	<0,005
Hemorajik SVH		2 (%25)	6 (%75)	<0,005

MOY: Multiorgan failure, **MV:** Mechanical ventilator, **CVD:** Cerebrovascular disease

The risk factors accepted as significant for mortality with univariate analysis were assessed with logistic regression analysis. However, no independent risk factors for death were identified.

DISCUSSION

Of 240 patients, 53 (13%) required intensive care. Mostly patients with ischemic CVD diagnosis were admitted to intensive care. In Turkey studies by Çetin *et al*. (6) and Cevik *et al*. (10) determined that patients with ischemic CVD diagnosis most frequently required neurology intensive care. This situation may be due to the slightly higher rates of ischemic CVD diagnosis compared to other diseases. Of patients 67.9% were female and 32.1% were male. Patients requiring intensive care were older compared to patients who did not require it. Potential risk factors for admission to intensive care were determined. There was a significant correlation identified between female gender, advanced age, smoking habit and HT with intensive care needs (p=0.014). Additionally, diagnoses of ischemic CVD, hemorrhagic CVD and CVT significantly increased the requirements for intensive care. Risk factors found to be significant were assessed with multivariate logistic regression analysis. Ischemic CVD, hemorrhagic CVD and CVT diagnoses were determined to be independent risk factors for needing intensive care. Patients requiring intensive care were divided into two groups as dead and surviving patients and assessed in terms of factors that may affect mortality rates.

In our study, the mortality rate for patients admitted to intensive care was identified as 37.7%. Two studies in our country reported the mortality rates in intensive care were 24.5% and 61.5% (11,12). In terms of gender of dead patients, there was a dominance of the male gender. A study by Çevik *et al*. (10) identified that the mortality rates were higher in males, similar to our study. However, gender was not a factor affecting the difference. In our study, there was a significant difference in terms of gender; however gender was not an independent risk factor for mortality rates. The mean age of dead patients was higher compared to survivors. The study by Çevik *et al*. (10) identified the mortality rate for patients aged above 70 years was 68.1%, while this was 55.1% for patients under the age of 70. Similarly, studies completed outside of Turkey have reported that advanced age is a significant risk factor affecting mortality rates (13,14).

One of the factors that may affect mortality rates is the diagnosis on admission to intensive care. In our study, there was a significant difference identified in terms of mortality rates between those with hemorrhagic CVD diagnosis and those without this diagnosis. There was no difference in terms of other diagnoses. However, when assessed with logistic regression analysis, admission diagnosis was not identified to be an independent risk factor for mortality rates. The "European Prevalence of Infection in Intensive Care (EPIC)" study of intensive care units in Europe did not identify admission diagnosis as a risk factor, similar to our study (13).

Another factor known to significantly increase the mortality rates among patients monitored in intensive care is hospital-sourced infections (2,3). A study by Craven *et al*. (15) reported that the mortality rate risk increased for patients with infection during admission to intensive care in both univariate and logistic regression analysis results. In our study, patients were assessed for urinary tract infections, pneumonia and sepsis determined to be sourced in the hospital. There was a significant difference in mortality rates between patients developing sepsis and those who did not develop sepsis (p=0.022). In the EPIC study, after univariate analysis, there was a significant difference identified in terms of mortality rates between patients who developed sepsis and those who did not (13).

Organ failure is another factor affecting mortality rates (8). Patients were assessed in terms of acute renal failure, respiratory failure and multiorgan failure. There was a significant correlation determined between patients with respiratory failure and multiorgan failure with mortality rates. However, these were not independent factors increasing mortality rate.

Invasive interventions (urinary, arteriovenous catheters, intubation) affect mortality rates especially via the route of hospital infections (5,6). A previous study (16) reported that mechanical ventilation requirements increased mortality risk, while another study (10) reported intubation increased mortality risk. In our study, there was a significant difference between patients requiring intubation and those who did not require it; however intubation requirement was not determined to be an independent risk factor increasing mortality rates.

Compression wounds develop with multifactorial etiology in intensive care and are identified at mean rates of 7%. They are another risk factor increasing mortality rates and disability (7). In our study there was no significant correlation identified between compression wounds and mortality rates.

The duration of intensive care stay, underlying chronic diseases (HT, DM, CAD, dyslipidemia) and smoking were determined to be potential risk factors. However, there was no significant correlation identified with mortality rates.

CONCLUSION

The majority of patients with CVD diagnosis may require intensive care. Accurate and sufficient intensive care support has life-saving quality for these patients. Knowing the factors affecting mortality rates in intensive care is very important in terms of patient prognosis.

Note: This manuscript was produced from a specialization thesis.

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