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Original Research Article

Indications of admitting patients in internal ICU and the rate of mortality in Emam Khomeini hospital in 2013

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ABSTRACT

Background: ICU is the costly part of the hospital that has functional approach for patients who have reversible conditions so it needs mechanical ventilation and other special services. Some patients are not really in need of special care only the continuous monitoring of vital signs needs of the public sector. Patients with good condition or End-Stage were not candidate to admitting in ICU. The aim of this study was to evaluate indications of admitting patients in internal ICU and the rate of mortality in Emam Khomeini hospital in 2013.
Methods: The study was conducted retrospectively evaluated the records of patients hospitalized in ICU and disease prognosis and treatment of disease and APACHE2 criteria was analyses.
Results: The mean age of patients in the study was 61.05±19.81. Of 118 patients, 70 (59.3%) survived and 48 (40.7%) patients died. APACHE2 mean in the study was 21.46±7.5. GCS average was 9.83±4.27. There was correlation between mortality of patients and type of disease. In this study in APACHE2 score between 25-29 and >35 in mortality rate we are higher than standard average and in 10-14 and 20-24 we are lower than standard average.
Conclusions: This study shows that GCS is not a good measure for the evaluation of patients hospitalized in internal ICU. In the present study, patients with higher APACHE2 score of 35 died. That show hospitalization that patient in ICU has no difference in the prognosis of them. As regards mortality rate in ICU patients in this study has no significant difference with predicted APACHE values, indications of ICU admition in Emam Khomeini hospital observed exactly.

Keywords: Indication, Intensive care unit, Mortality

INTRODUCTION

Intensive care unit (ICU) is a section in which the most ill people are taken care of because of its facilities. Curing, using new techniques without having intensive care unit is not complete.[1] In This unit medical personnel and medical equipment are used to cure very ill people.[2-4] If these facilities don't be used at proper time it may cause serious problems as organ loss, increase in hospitalization period and cost, and even death.[5-7] Studies have illustrated that not all patients necessarily need intensive care but they need a better attendance than normal units or their life signals need to be monitored more often.[5,8-10] For example, According to a study made on 706 patients

in ICU, it was revealed that nearly 22% of beds in ICU are occupied by patients who didn't really need Intensive care.[8] The ideal is to hospitalize patients who are in danger of death and they are hospitalized to reduce death chance.[11] Patients with overall well condition or patients with certain death cannot be hospitalised in ICU. Unfortunately, indication of admission to ICU is defined too general which makes it difficult to decide (diagnose) whether it is useful for patient or not. This leads to inappropriate use of equipment and ICU beds.[12,13] Number of demanded beds in ICU depends on hospitalization standards (criteria), triage, discharge, and hospitalization period. Researches have been done to define these standards but suggestions are hardly administered.[14,17] As these patients are in critical condition and large number of them are in a long waiting list; therefore, an immediate solution must be arranged.[18] As patients in critical condition demand an immediate intensive care, they shouldn't be waiting so long.[19] Accidents and cardiac diseases are 2 most common reasons of hospitalization in ICU. Recent studies have been done to define indications of hospitalization and death rate in general intensive care unit in Ardabil Emam Khomeini hospital in 2013 to improve ICU capacity.

METHODS

Spoken research was sectional. It was studied on all hospitalized patients in Emam Khomeini hospital in 2013. ICU patients' documents were studied and information was gathered through APACE2 survey. Gathered data from survey was analysed by program called SPSS-20 and statically tests called K2, One way ANOVA, and Correlation. Entrance criteria were patients who were received in hospital. Patients who had incomplete documents were excluded from the survey. All gathered data was classified and no name was mentioned.

RESULTS

According to outcome data of 118 subjects, 70 (59.3%) patients were men and 48 patients (40.7%) were women. 23 (19.5%) patients weren't married and 95 patients (80.5%) were married. According to results 1 person was diabetic with lowest amplitude and 33 patients (28%) had pulmonary disease which had the highest amplitude. 65 patients (55.1%) were transferred to different units and 5 patients (4.2%) were discharged from ICU and 48 (40.7%) persons passed away. According to results average patient age was 61.05, average hospitalization period was 14.71, average GCS was 9.83, and average result of APACHE2 test was 21.46. According to APACHE2 standards anal temperature of 102 (86.4%) patients were 35-38.4, 11(9.3%) patients' were 38.5-38.9, 5 (4.2%) patients' were 39-40.9. Average arterial pressure of patients according to APACHE2 was: 1 (0.8%) patient's pressure with lowest amplitude was 49 and less and 1 (0.8%) patients' pressure was 180 and more. 68 (57.6%) patients with the highest amplitude had arterial pressure of 70-109. Cardiac output according to APACHE2 of 6 (5.1%) patients was 140-179 with lowest amplitude, of 84 patients (71.2%) with highest amplitude was 70-109. Number of breaths according to APACHE2 was 6-9 for 1 (0.8%) patient with the lowest amplitude and for 83 (70.3%) patients was 12-24 which had the highest amplitude.

Oxygen input of 7 (5.9%) patients was 61-70 with lowest amplitude and of 52 (44.1%) patients was above 70 with the highest amplitude according to APACHE2 results. Arterial pH of 1(0.8%) patient with lowest amplitude was 7.60-7.69 and of 65 (55.1%) patients with highest amplitude was 7.33-7.49.

Sodium amount of serums according to APACHE2 for 3 (2.5%) patients was 120-129 with lowest amplitude and for 113 (95.8%) patients was 130-149 with highest amplitude. Potassium amount of serums according to APACHE2 for 1 (0.8%) patient with lowest amplitude was 2.5 and for 87 (73.7%) patients was 3.5-5.4 with highest amplitude. Haematocrit balance of patients according to APACHE2 for 4 (3.4%) patients with lowest amplitude was 20-29.9 and for 87 (73.7%) patients was 30-45.9 with highest amplitude. According to APACHE2, white blood cells number for 4 (3.4%) patients with lowest amplitude was 1-2.9 and for 74 patients (62.7) with highest amplitude was 3-14.9. According to APACHE2 Creatinine level for 1 (0.8%) patient with lowest amplitude was 3.5 and more and for 75 (63.3%) patients with highest amplitude was 0.6-1.4.

Results have illustrated that there is an equation between illness and indication which has a reasonable error (Table 1).

Table 2 explains that mortality rate of patients according to APACHE test was arranged and average death rate of patients and global standards has been compared.

According to the table above there is no illness with grade 4 or lower in on-going research. In APACHE grade of 5-9 there were 7 patients whom all survived. However, defined average of this span is 92%. In on-going study in 10-14 spans, 10.5% of 19 patients passed away and standard is 15%. In 15-19 span 26.4% of 19 patients passed away while the average standard is 24%. In 20-24 span 36% of 25 patients passed away while the average standard is 40%. In 25-29 span 63.3% of 30 patients passed away while the average standard is 55%. In 30-34 span 64.3% of 14 patients passed away while the average standard is 63%. Finally, in span of 35 and more 100% of 4 patients passed away while the average standard is 85%.

According to Table 3, 33 patients with pulmonary disease had the highest amplitude and a diabetic patient had the lowest amplitude. Patients who had strokes had the highest mortality of 100% and then cancer had the mortality of 77%. Alcoholic liver disease and hepatic accidents had the lowest mortality of 0% then acute and chronic kidney injury is at the second place with mortality of 8.3%.

Table 1: Mortality rate depending on the type of disease.

Mortality rate		Poisoning	Pulmonary disease	Infectious disease	Acute and chronic renal failure	Blood disease	Cirrhosis of the liver	Trauma	Gastrointestinal disease	Gastrointestinal bleeding	Stroke	Heart failure	Cancer	Diabetes
Live	Frequency	13	17	4	11	6	2	2	1	10	0	1	2	1
	Percentage	86.7%	51.5%	36.4%	91.7%	75%	100%	100%	25%	62.5%	0%	50%	22.2%	100%
Death	Frequency	2	16	7	1	2	0	0	3	6	3	1	7	0
	Percentage	13.3%	48.5%	63.6%	8.3%	25%	0%	0%	75%	37.5%	100%	50%	77.8%	0%
Total	Frequency	15	33	11	12	8	2	2	4	16	3	2	9	1
	Percentage	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Chi-squared coefficient						Degrees of freedom						Significance level of error		
28.930						12						0.004		

Table 2: Degree of clearance from department and mortality based on APACHE2 score and comparison with predefined standards.

APACHE2 score	Number of patients	Move to section (%)	Discharge from hospital (%)	Death (%)	Percentage of death based on prediction APACHE2
5-9	7	100	0	0	8
10-14	19	89.5	0	10.5	15
15-19	19	57.8	15.8	26.4	24
20-24	25	56	8	36	40
25-29	30	36.7	0	63.3	55
30-34	14	35.7	0	64.3	73
35<	4	0	0	100	85

Table 3: The relationship between mortality rate of each type of disease and APACHE2 mean score in the patients in that group.

Type of disease	Freq	Mortality rate	Average score APACHE2
Pulmonary disease	33	48.5	23.18
Gastrointestinal bleeding	16	37.5	19.75
Poisoning	15	13.3	18.73
Acute and chronic renal failure	12	8.3	25.5
Infectious disease	11	63.6	24.90
Cancer	9	77	19.77
Blood disease	8	25	16.75
Gastrointestinal disease	4	75	19.25
stroke	3	100	29.33
Heart failure	2	50	22
Cirrhosis of the liver	2	0	15.5
trauma	2	0	18
Diabetes	1	0	14

DISCUSSION

In this study 118 patients were hospitalised during 2013 of which 59.3% were men and 40.7% were women which means there were more female patients in comparison to Mohammadi's research in which 66.5% were men.[20]

In this study average patient age was 61 and average hospitalization period was 14.7 days. Patient's average GCS level was 9.8 and final score of APACHE2 was 21.46±7.5. Minimum score was 5 while maximum was 36.

In this study mortality rate based on APACHE test score was organized and average patient deaths were compared to global standards.

In this study there was no illness with grade 4 or lower in on-going research. In APACHE grade of 5-9 there were 7 patients whom all survived. However defined average of this span is 92%. This average indicates patients with this score could be hospitalized in general units of hospital with better nursery service and necessary equipment for life signals in order to increase number of available beds in ICU.

In on-going study in 10-14 spans, 10.5% of 19 patients passed away and standard is 15%. In 15-19 span 26.4% of 19 patients passed away while the average standard is 24%. In 20-24 span 36% of 25 patients passed away while the average standard is 40%. In 25-29 span 63.3% of 30 patients passed away while the average standard is 55%. In 30-34 span 64.3% of 14 patients passed away while the average standard is 73%. The average didn't differ much from the global standards for patients in Emam Khomeini hospital in mentioned span. In span of 35 and more 100% of 4 patients passed away while the average standard is 85%. The data indicates the tragic condition of patients as all patients in this span has passed away. Therefore, hospitalization of these patients does not make a change.

Prognosis organizing patients based on illness and mortality, pulmonary disease had the highest amplitude with 33 patients in this hospital which indicates these patients have a longer life span owing to better care system. They need to spend last stages of the illness in ICU with strict medication process; therefore, Respiratory system specialists must be active in ICU in order to serve a better service. Lowest patient numbers belongs to a diabetic patient. Diabetic ketoacidosis with respiratory failure, diabetic patients who have sepsis and need mechanical ventilation are the most common diabetic patients in hospital, who can be cured in general units.

In this study two patients with heart failure who need respiratory support with mechanical respiration are hospitalized in ICU because most of patients were hospitalized in CCU. Stroke is the most mortal with 100% casualties after that cancer has the second most casualties with 77%. This fact indicates that hospitalization of these patients does not have an influence on the death rate; therefore, excess expenses could be limited by defining new indications.

Alcoholic liver, accidents and diabetes have the lowest mortality rate of 0% while acute and chronic kidney injury are at the second place with mortality of 8.3%.

In Van Berkel et al death reasons of patients hospitalized in ICU called research which was done with low APACHE score, following data was found: 73% of patients with hemodynamic problems, 22% of cancer patients, 22% of respiratory problems, 19% neurological problems, 12% of renal disease, 6.5% for consuming immune system suppressor medication, 6.5% diabetes, 5.5% for obesity were hospitalised.[21] Outbreak of hemodynamic problems, respiratory failures, infection and neurological problems respectively were propounded as death reasons.

86.4% of patients have anal temperature of 35-38.4 while 3.9% have 38.5-38.9 and 4.2% have 39-40.9. 0.8% of patients have average arterial pressure of 49 and less and 0.8% of patients have 180 and more. 57.6% of patients with the highest amplitude had arterial pressure of 70-109. Heart rate of 1.5% of patients with lowest amplitude was 140-179 and 71.2% of patients had 70-109 heart beats per minute with highest amplitude. Number of breaths of 0.8% of patients was 6-9 with the lowest amplitude and for 70.3% of patients was 12-24 which had the highest amplitude.

Oxygen input of 5.9% of patients was 61-70 with lowest amplitude and of 44.1% of patients was above 70 with the highest amplitude. Arterial pH of 0.8% of patients with lowest amplitude was 7.60-7.69 and of 55.1% of patients with highest amplitude was 7.33-7.49.

Sodium amount of serums for 2.5% of patients was 120-129 with lowest amplitude and for 95.8% of patients was 130-149 with highest amplitude. Potassium amount of serums for 0.8% of patients with lowest amplitude was 2.5 and for 73.7% of patients was 3.5-5.4 with highest amplitude. Haematocrit balance of patients of 3.4% of patients with lowest amplitude was 20-29.9 and of 73.7% of patients was 30-45.9 with highest amplitude. White blood cells number of 3.4% of patients with lowest amplitude was 1-2.9 and for 62.7% of patients was 3-14.9 with highest amplitude. Creatinine level for 0.8% of patient with lowest amplitude was 3.5 and more and for 63.3% of patients were 0.6-1.4 with highest amplitude.

Average Glasgow Coma Scale (GCS) of patients in this study was 9.84±4.27. In 5-9 spans of APACHE score of 7 patients, average GCS score was 12.57 while 100% of patients survived and one patient's score was 5 meaning how critical the situation was according to GCS scale. 19 patients' average GCS score was 14.37 in 10-14 span. 10.5% of patients passed away which means patients' GCS score could not predict their death, also 2 patients' score were 14 and 15. Important point is although death rate had increased significantly, GCS score was increased reasonably.

19 patients' average GCS score was 11.57 in 15-19 spans. 27% of patients passed away while 4 patients with 13,14,15,15 score passed away and a patient with score of 5 survived. In contrast, according to APACHE prediction, death rate is 24% in 15-19 spans.

Average GCS score of 25 patients was 10.08 in 20-24 span of APACHE score and 44% of patients passed away while 2 patients with 14 and 15 scores passed away. In contrast, predicted death rate of APACHE scale in 20-24 spans is 40%.

Average GCS score of 30 patients was 6.9 in 25-29 span of APACHE score and 63% of patients passed away while 1 patient passed away with score of 15 and 5 patients survived with GCS score less than 5. In contrast, predicted death rate of APACHE scale 25-29 span is 55%.
Average GCS score of 14 patients was 7.07 in 30-34 spans of APACHE score and 65% of patients passed away while predicted death rate of APACHE scale in 30-34 spans is 73%. In range of 35 and more score in APACHE scale, 4 patients' GCS score was 5.5 and all of them passed away.

According to explanations made above, GCS of patients is not a proper scale to define patients' state in ICU and APACHE scale is more proper to predict death. This research is amicable with Molavi's research.[22] In Molavi et al research of comparing Physiological function and Glasgow coma scale of predicting fatality in ICU, it was revealed that APCHE2 scale was more valuable than GCS in fatality prediction.[22]

In this research 55.1% of patients were transferred to other units, 4.2% of patients were discharged, and 40.7% of patients passed away. While in Soleimani's research 72.1% of patients survived and 27.9% of patients passed away which in comparison to this study had less deaths.[23]

In Yasemi's research 31.3% of patients, In Mohammadi's research death count was the least amongst others and was 22%.[24,21] Considering less death count demonstrates higher hospitalization quality and better indication in the centre. This data demonstrates that in this research not coping with indications has lead transferring patients to ICU whose illness were in End-Stage (like CVA patients) and not only didn't benefit ICU but also increased mortality rate. Therefore, considering limited bed count of ICU transferring patients who don't benefit from ICU to ICU must be prohibited in order to patients in waiting who can benefit from ICU can be hospitalized in ICU. In Soleimani's research, patients who were not in great need of transferring to ICU were hospitalised in ICU showing ICU hospitalization standards were not paid attention.[23] Some patients with incomplete documents lacking necessary test results to determine APACHE2 score and patients, who were transferred to ICU because of bed lack in CCU, were excluded from the research.

CONCLUSION

It is illustrated that there is a reasonable correlation between type of illness and indication condition of patients during hospitalization. Considering mortality rate of patients in ICU does not vary much from APACHE standards, it can be concluded that ICU transferring standards of Ardabil Emam Khomeini hospital is proportionally.

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