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# Epidemiological Study of Mortality in the First Twenty-Four Hours of Emergency Admission

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**Abstract:** *Introduction:* Epidemiological investigation of Mortality is essential for health policy control of risk factors and disease. Obtaining this information is the essential basis for planning, management and evaluation, and accountability in countries' health sector. Studying Mortality and its etiologic factors are the most appropriate strategies to reduce Mortality. *Objective:* The study aimed to investigate the causes of death and prognostic factor of death in patients referred to the emergency department. *Method:* this was a cross-sectional study from 2016 to 2018 at Tohid Teaching Hospital in Sanandaj. All history and clinical examination data and Para clinical study of the patients who had expired in the first 24 hours after emergency department admission were collected in questionnaire sheets. The data was interred into spss software and analyzed using descriptive statistics frequency and percentage. *Result:* 73 patients, 43.8% female, and 41% male with a mean age of 63.6 years old 20-90 evaluated in our study. The first common chief complaint of the patients was chest pain 24.7%, and the most common past medical disease in the patients was hypertension 28.8% also the first common reason of death was ischemic heart disease 31.5%. 43.8% of patients had abnormal electrocardiograms, 19.2% had dysrhythmias, and 24.6% had ischemic changes. Laboratory results also showed that the prevalence of sodium imbalance was 53.5%, and potassium and calcium imbalance were 37.9% & 80.8%. Also, 80.8% of patients had PH abnormalities, 30.1% acidosis, and 50.7% alkalosis. *Conclusion:* According to the results, it can be concluded that patients with cardiac problems or a history of cardiovascular disease are the highest risk patients and should be considered more serious. Also, electrolyte and blood gas imbalance were prevalent in these patients.

**Keywords:** Epidemiology, Mortality, Emergency

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## 1. Introduction

Death resulted from the cessation of the body organs function [1] and may occur when patients have severe illness that is hard to be stabilized, and the Emergency Department ED care may not be sufficient [2].

The raw mortality rate varies based on epidemiology,

type of hospital, and social conditions; for example, the raw mortality rate in 2018 was 5.3% in Iran, 9.4% in France, 11.8% in Germany, 7.3% in India, and 10.5 in Italy [3, 4]. Many of this death occurs in the emergency department of hospitals. Factors like Intubation, low systolic blood

pressure on presentation, increased age, and comorbidity can increase emergency department mortality rate, an epidemiologic study in Tehran, Iran, resulted in the mortality rate of patients who referred to the emergency department was 0.9% and the mortality rate in UMHAT – Plevel emergency department was 2.4/100000 [4-6].

Many studies have evaluated the most common causes of mortality in the emergency department; many recent studies showed Cardiovascular diseases like myocardial infarction, Pulmonary embolism, severe traumas, and cerebrovascular accidents, and Oncological Pathology Were the common causes of death in the Emergency Department [6-8]. Also, a lab index like serum venous lactate level in Patients with Infection can predict mortality rate in the emergency department [9].

This descriptive-cross sectional study has been created to check epidemiological factors of mortality rate in admitted patients in the emergency department of Tohid hospital in Sanandaj and make decisions and improve facilities to reduce the mortality rate of the patients.

## 2. Method

### 2.1. Study Design and Period

This cross-sectional study was performed on all patients who died at Tohid emergency department hospital in Sanandaj from 2016 to 2018.

### 2.2. Study Area

This cross-sectional study was performed on all of the patients who died at Tohid emergency department hospital in Sanandaj from 2016 to 2018.

### 2.3. Inclusion Criteria

Inclusion criteria included all of the patients who died within the first 24 hours of hospitalization.

### 2.4. Exclusion Criteria

Exclusion criteria included patients who died with an incomplete document of hospitalization.

### 2.5. Data Collection

The records of all patients died in the first 24 hours after admission at Tohid Hospital in Sanandaj from 2016 to 2018

was collected and evaluated, Data collected by an emergency doctor using a pre-tested data collection form.

Patient information includes ECG, Primary Oxygen Saturation, Patient Clinical symptoms, Vital signs on Arrival, consciousness level upon Arrival to the Emergency Department, Primary Patient Tests Including CBC diff, Na, K, Ca, Cr, ABG entered the relevant questionnaire sheet. The cause of death recorded and The data entered into SPSS statistical software and descriptive statistics for quantitative variables with central and dispersion indices and qualitative variables with frequency and percentage. Chi-square and Fisher exact tests performed.

## 3. Result

In this study 73 patients, 43.8% female and 41% male with a mean age of 63.6 years old 20-90 was evaluated [table 1]. First common chief complaint of the patients was chest pain with 24.7%, the second ones were dyspnea 15.1%, and weakness 15.1% and the third most common was decreased level of consciousness with the prevalence of 11%; also the least common chief complaint of patients was alcohol abuse, burning, and gunshot [table 2].

The first common reason of death was ischemic heart disease 31.5%, and renal failure 11% and the least common was pulmonary thromboembolic 1.4%. The cause of death was undiagnosed in 1.4% of patients [table 3].

Among the patients who died in Tohid hospital ED 64.4% had a past medical history for a known disease; That the most common was HTN 28.8% and the second most common was diabetes mellitus type 2 19.2% and also the least common was congestive heart failure and gastrointestinal bleeding and chronic obstructive pulmonary disease and chronic renal disease [table 4].

At the initial physical examination, 8.2% had low, and 37% had a high heart rate, 43.8% of patients had abnormal electrocardiograms 19.2% had dysrhythmias, and 24.6% had ischemic changes. Also, 4.1% had low, and 74% had a high respiratory rate.

Also, the electrolytic imbalance was common in patients; for example, sodium imbalance prevalence was 53.5%, potassium and calcium imbalance was 37.9%, & 80.8%. Also, 80.8% had PH abnormalities 30.1% acidosis and 50.7% alkalosis, and 67.1% of patients had a high Cr level for age and gender [table 5].

The range of the laboratory results and physical examination indexes were following the [table 6].

*Table 1. Demographic table.*

		Frequency	Percent%
sex	male	41	56.2
	female	32	43.8
maturity	single	6	8.2
	married	67	91.8

*Table 2. Chief complaint.*

	Frequency	Percent%
Abdominal pain	3	4.1
apnea	1	1.4

	Frequency	Percent%
Cardiac arrest	1	1.4
burn	1	1.4
Chest pain	18	24.7
dyspnea	11	15.1
edema	1	1.4
Focal neurological deficient	2	2.7
Gastrointestinal bleeding	6	8.2
GUN-shut	1	1.4
loss of consciousness	8	11.0
Pancytopenia	1	1.4
suicide	7	9.6
weakness	11	15.1
Total	73	100.0

Table 3. Cause of death.

	Frequency	Percent%
Acute heart failure	2	2.7
BURN	2	2.7
CHF	6	8.2
Cardio-pulmonary arrest	6	8.2
CVA	3	4.1
DIC	2	2.7
GIB	4	5.4
IHD	23	31.5
Aluminum phosphide poisoning	3	4.1
clonazepam	1	1.4
toxicity	1	1.4
cyanide	1	1.4
organophosphorait	1	1.4
methanol	1	1.4
Pneumonia	3	4.1
PTE	1	1.4
Renal Failure	8	11.0
SEPSIS	5	6.8
Total	72	98.6
Missing	1	1.4
Total	73	100.0

CHF: Congestive heart failure, GIB: Gastrointestinal (GI) bleeding

CVA: Cerebrovascular accident, IHD: ischemic heart disease

DIC: Disseminated intravascular coagulation, PTE: pulmonary thromboembolism

Table 4. Past medical history.

	Frequency	Percent%
DM	14	19.2
CHF	1	1.4
IHD	9	12.3
HTN	21	28.8
GIB	1	1.4
cancer	7	9.6
COPD	1	1.4
Hyperlipidemia	0	0
CVA	4	5.5
CRD	1	1.4
Psychosis	0	0
Multiple myeloma	4	5.5
HBV	1	1.4
Rheumatoid arthritis	1	1.4
ESRD	1	1.4

CHF: Congestive heart failure, GIB: Gastrointestinal (GI) bleeding

CVA: Cerebrovascular accident, IHD: ischemic heart disease

DIC: Disseminated intravascular coagulation, PTE: pulmonary thromboembolism

DM: Diabetes mellitus, HTN: Hypertension

COPD: Chronic obstructive pulmonary disease, CRD: Chronic Respiratory Disease

HBV: Hepatitis B, ESRD: End-Stage Renal Disease

**Table 5.** Laboratory results.

		Frequency	Percent%
Serum Na level	normal	34	46.6
	hyponatremia	18	24.7
	hypernatremia	21	28.8
Serum Ca level	Normal	14	19.2
	hypocalcemia	9	12.3
	hypercalcemia	50	68.5
Serum k level	normal k	44	60.3
	hypokalemia	4	5.5
	hyperkalemia	25	34.2
pH	Normal ph	14	19.2
	acidosis	22	30.1
	alkalosis	37	50.7
PTT	normal	34	46.6
	low PTT	1	1.4
	High PTT	38	52.1
PT	normal	20	27.4
	high	53	72.6
WBC	normal	25	34.2
	low	6	8.2
	high	42	57.5
HB	normal	21	28.8
	low	21	28.8
	high	31	42.5
PLT	normal	29	39.7
	low	25	34.2
	high	19	26.0
Cr	normal	24	32.9
	high	49	67.1
BUN	normal	20	27.4
	high	53	72.6
BS	normal	9	12.3
	low	1	1.4
	high	63	86.3

PTT: partial thromboplastin time

WBC: White Blood Cell

HB: hemoglobin

Plt: platelet

BUN: Blood urea nitrogen

Cr: Creatinine

BS: Blood sugar

PT: Prothrombin time

**Table 6.** Descriptive Statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
year	72	20	90	63.61	17.400
Systolic blood pressure	73	10	999	182.59	248.027
Diastolic blood pressure	73	30	999	160.40	275.576
Na	54	96.00	158.00	137.2037	8.77256
K	53	2.30	7.40	4.4509	.87456
SO <sub>2</sub> %	61	10.00	99.00	87.6230	14.89873
PMN%0	43	48.00	95.00	78.1860	13.63164
Plt	55	1.60	638.00	169.6764	112.17366
BS	50	1.70	754.00	199.3740	128.34284
BUN	54	10.00	175.00	38.3519	30.85092
LYM%	42	5.00	52.00	20.9524	13.35071
PT	54	12.00	74.00	18.6981	10.71980
RR	64	7.00	54.00	21.0156	7.84471
Cr	54	.73	9.70	2.2202	1.79334
Ca	24	.30	10.50	8.5083	2.60316
PTT	54	18.00	120.00	38.4463	20.44541
HR	66	1.20	150.00	90.3061	27.30857
Hb	55	5.30	19.60	12.2909	3.32634
WBC	54	1.20	69.30	12.5720	10.79058
HCT%	55	17.20	60.00	37.7000	9.58465

	N	Minimum	Maximum	Mean	Std. Deviation
INR	54	1.00	6.00	1.7420	.91774
PCO <sub>2</sub>	38	7.00	83.20	37.0605	14.94882
HCO <sub>3</sub>	37	4.00	37.60	17.8000	7.19027

PTT: partial thromboplastin time

WBC: White Blood Cell

HB: hemoglobin

Plt: platelet

Na: sodium

K: potassium

SO<sub>2</sub>: Oxygen saturation

PMN: polymorph nuclear leukocytes

LYM: Lymphocytosis

PT: Prothrombin time

RR: respiratory rate

Ca: calcium

HR: heart rate

HCT: hematocrit

BUN: Blood urea nitrogen

Cr: Creatinine

BS: Blood sugar

INR: international normalized ratio

## 4. Discussion

According to our study results, it can be concluded that the mortality in patients referring to the emergency department with patients with cardiac complaints, chest pain, or history of cardiovascular disease hypertension is higher than others, so it should be considered more dangerous. Alimohammadi [8] et al. showed that patients referring to ED with cardiovascular complaints have a higher mortality rate higher versus. Also, in the study of Vanbrabant [10] et al.; the mean cause of mortality at the emergency department was cardiac, and in the study of Stefanovski et al. [6], acute myocardial infarction was the leading cause of mortality in the emergency department.

Cannon et al. [11] found that the essential action in patients with cardiac symptoms, especially in patients with myocardial infarction, in the early management of these patients in the emergency room because most deaths due to myocardial infarction occur within the first few hours after the onset of symptoms.

Patrick J. Shao et al. illustrated that morbidity and mortality in patients could be affected by the hypertensive crisis; they showed that the mortality rate in patients with emergency and urgency hypertension was 26.8 and 3.1% [12].

In Taiwan, a retrospective study performed on patients who died within the first 24 hours after emergency after admission; from 210 cases that were involved in this study, 25.8% were preventable deaths, and the causes of them included inappropriate medical management, delayed diagnosis, and misdiagnosis [13]. Also, our results showed that electrolyte and blood gas imbalance were prevalent in these patients. According to the study of Balci et al., hyponatremia is the most common electrolyte imbalance, and the least common was hypomagnesemia in the emergency department [14].

Tazmini et al. [15]. Illustrated that electrolytic imbalances like hyponatremia, hypokalemia, hypercalcemia can increase mortality in hospitals [15]. Also, Hypernatremia and acidosis

can increase mortality rates in traumatic brain injury patients in the first 24 hours [16]. On the other hand, Jiachang et al. explained that hypo and hyperuricemia, acidosis, Hypernatremia, and AKI during hospitalization increase the hospital mortality rate [17].

Dyspnea, fever, and systemic deterioration are the most common symptoms, and confusion, edema, and rales are the most common sign in patients with electrolyte imbalance, and tachycardia is the most frequent pathological findings their ECG 15, so in patients with these sign and symptoms we should consider electrolyte imbalance, and we recommend to check electrolytes.

## 5. Conclusion

According to the results, it can be concluded that patients with cardiac problems or a history of cardiovascular disease are the highest risk patients and should be considered more serious. Also, electrolyte and blood gas imbalance were prevalent in these patients. So we recommend checking atrial blood gas and serum electrolytes in patients who refer to the emergency department and paying more attention to the patients with cardiovascular complaints to reduce patient mortality in emergency departments by controlling these factors.

## Ethics Approval and Consent to Participate

This manuscript has been ethical approved by the ethics committee of Kurdistan University of Medical Sciences, Sanandaj, Iran.

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