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Evaluation of Glaskow-Blatchford, Rockall Scores and Shock Index of Patients Admitted from the Emergency Department with A Diagnosis of Upper Gastrointestinal System Bleeding

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Abstract

Background: Risk scores and shock index used in upper gastrointestinal system (GSB) bleeding have an important place in determining the treatment and clinical course of the patient. The aim of this study is to evaluate the predicted success in mortality by analyzing shock indices together with Glasgow Blatchford Scoring (GBS) and Rockall Scoring (RS), whichare used in upper GI bleeding.

Methods: This study was conducted with a retrospective analysis of patients who were hospitalized with a diagnosis of upper GI bleeding from the emergency department of a single-center secondary care health institution. For each patient, age, gender, treatment procedures performed in the emergency department or clinic, and endoscopy results were evaluated. Mortality and discharge status of the patients were compared with the scoring values.

Result: 86 patients were evaluated in the study. The average age was 69.09±19.07 and the most applications were in the 61-79 age range (48.8%). The most common presenting complaints of the patients were bloody vomiting and black stools. On physical examination, melena was positive in 64% of the patients. 89.5% of the patients were treated in intensive care. The mortality rate was 10.5%. In patients with death, the shock index value was ≥0.75 in all patients and the average was 1.07. As a result of the study, it was seen that GBS, RS and shock index were successful in predicting mortality.

Conclusion: Current scoring systems need to be developed in order to manage patients with upper GI bleeding, which is frequently seen in emergency departments today, more quickly and to reduce patient costsKeywords: Glasgow Coma Scale, Head Trauma, Acute Brain Injuries, FOUR score.

Keywords: Glaskow Blatchford Score, Rockall Score, Shock Index, Upper Gastrointestinal Tract Bleeding

Introduction

Anatomically, bleeding occurring between the upper part of the esophagus and the ligament of Treitz constitutes upper gastrointestinal (GI) tract bleeding. These bleedings account for approximately 90% of all GI bleedings and have an important place in emergency department admissions.[1,2]

The most common causes of upper GI bleeding in our country and worldwide have been reported as peptic ulcer, gastritis, gastroesophageal variceal bleeding, esophagitis, malignancy and malloryweis syndromes.[3,4] Acetylsalicylic acid (ASA), antiaggregant drugs, oral anticoagulants (OAC), non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroid use are the most common causes of bleeding.[5]

With the aim of reducing the burden of patient admissions due to upper GI bleeding in the emergency department and decreasing patient costs, many risk scoring methods have been developed to predict rebleeding and mortality in patients by analyzing clinical findings, laboratory findings, comorbid conditions and endoscopy findings. The two most widely used scoring systems world wide are the Glasgow-Blatchford Scoring (GBS) system, which identifies low-risk patients with clinical findings and laboratory data and the Rockall Score (RS) system, which aims to predict mortality with the addition of endoscopy findings.[6,7] Shock index also has an important place in clinical follow-up in addition to scoring. The normal range of the shock index is 0.5-0.7 and it is an effective guide in determining early hemorrhagic shock in patients with GI bleeding. It is more useful in following the changes in the clinical follow-up of the disease instantaneously.[8,9] The shock index is obtained by the ratio of the patient's heart beat per minute to systolic blood pressure.[10]

In this study, we aimed to perform a large-scale analysis of patients with upper GI bleeding who were hospitalized from the emergency department within a one-year period and to evaluate the prediction of GBS, Pre-RS (before endoscopy) and RS systems and shock index on mortality in patients. Although there are similar studies on the subject in the literature, we found that the studies were generally focused on epidemiology, single scoring system and endoscopy results. In this study, we wanted to conduct a comprehensive study by analyzing many data at the same

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time. The limitation of the study was the lack of a specialist of the relevant branch in the center where the study was conducted in the previous years and the fact that endoscopy was not performed regularly, which led to a small number of patients included in the study.

Materials and Methods

This study was conducted as a single-center retrospective analysis of patients hospitalized with upper GI bleeding from the emergency department of a state hospital serving as a secondary care. The ethics committee approval of *** University Rectorate Non-Interventional Clinical Research Publication Ethics Committee numbered 2023/01 and dated 16/10/2023 was obtained for the study and the rules of the Declaration of Helsinki were followed.

The date range of the study was determined as 01.01.2022-31.12.2022. Data collection was performed electronically through the 'SISOFT' hospital software system. For each patient, age, gender, time of admission, presenting complaint, vital signs, laboratory data, comorbidities, medication use, treatment procedures performed in the emergency department or in the hospitalized clinic, blood product replacement, length of hospitalization, and endoscopy results were evaluated. GBS, RS values before and after endoscopy were analyzed with the data obtained. In hospital mortality and discharge status of the patients were compared with the scoring values. In the study period, 97 patients were hospitalized due to upper GI bleeding. However, 11 patients were excluded from the study due to missing data in the data system and archival records.

Statistical Package for Social Sciences for Windows 21.0 (SPSS 21.0) program was used to analyze the data. Descriptive statistics and frequency analysis (frequency, percentage distribution) were used to analyze the data. Results were expressed as mean ± SD or frequency (percentage). ROC analysis was used to investigate the predictive value of GBS, Pre-RS, RS and shock index for survival. Areas under the ROC curve were calculated with 95% confidence intervals.

Results

In this study, 86 patients were included and the distribution of male and female patients was equal (50%). The mean age of the patients was 69.09±19.07 (22-102) years. According to the time of admission, the highest number of admissions was between 08.00-15.59 hours (38.4%) (n=33), followed by 16.00-23.59 hours (37.2%) (n=32) and finally 24.00-07.59 (n=21) hours (21%). In terms of months, the lowest number of visits was in February (1.2%) (n=1) and the highest number of visits was in October (15.1%) (n=13).

The most common reasons for presentation to the emergency department were bloody vomiting (54.7%) (n=47) and black stools (31.4%) (n=27). The most common physical examination finding was positive melena (64%) (n=55) (Table 1). The mean vital values and laboratory values of the patients at admission and are given in table 1.

When the comorbidities seen in the patients were evaluated, hypertension (53.5%) (n=46) and coronary artery disease (39.5%) (n=34) were the most common. Regarding drug use, ASA (25.6%) (n=22), NSAIDs (14.3%) (n=18) and apixaban (7.1%) (n=9) were the most common drugs used in patients with bleeding, respectively (Table 1).

When the treatments given to the patients were analyzed, it was observed that all of the patients were administered 80 mg intravenous injection and intravenous infusion proton pump inhibitor (PPI) treatment at a rate of 8 mg/h as maintenance treatment in the emergency department. The total number of patients who received blood product replacement in the emergency department or in the hospitalization clinic was 49. Five of these patients received erythrocyte suspension (ES) replacement and fresh frozen plasma together, while 44 patients received only ES replacement. Erythrocyte replacement was performed with a hemoglobin level of <7 g/dL in patients with stable vital signs and no comorbidities, a hemoglobin level of <9 g/dL in patients with advanced age and comorbid factors, and a hemoglobin level of >10 and hematocrit level of >25.

89.5% (n=77) of hospitalizations were made to intensive care unit. The mean length of hospitalization was 6.74 days (1-60).

The number of patients who underwent endoscopy was 79. When the endoscopy reports of these patients were analyzed, it was seen that erosive gastritis (40.7%) (n=35) and gastroduodenal ulcer (31.4%) (n=27) were most common (Table 1). Active bleeding was observed in 3 patients during endoscopy.

Risk scoring and mean shock index values of the patients are given in table 1. Detailed analysis of 9 patients who died in the hospital is given in table 2. Endoscopic examination was not performed in 3 of these patients due to lack of hemodynamic stability and infections and other comorbidities that developed in the intensive care unit.

Of the patients who died, 66.6% (n=57) were female and 77.7% (n=66) were aged ≥80 years. Laboratory data revealed that 66.6% of the patients who died had a hemoglobin value ≤10 g/dL at the time of presentation to the emergency department. On the other hand, the blood urea value was ≥25 mg/dL in all of these patients. In our study, the in-hospital mortality rate was 10.5% and when the mortality prediction of risk scores was analyzed by ROC analysis, the area under the curve was calculated as 0.56 (0.32-0.80; 95% CI) for GBS, 0.81 (0.64-0.97; 95% CI) for Pre-RS, 0.85 (0.68-1.00; 95% CI) for RS and 0.73 (0.59-0.88; 95% CI) for shock index (Figure 1). According to these results, RS was the most successful scoring system in predicting mortality.

Table 1: General analysis of the data obtained in the study

Demographic Data	**Number (n) / Ratio (%) / Mean ±SD**		
Gender	**All Patients**	**Discharged Patients**	**Deceased Patients**
Female	43 (50)	37 (48.1)	6 (66.3)
Male	43 (50)	40 (51.9)	3 (33.3)
Age Average	**69.09±19.07**	**67.20±17.83**	**85.22±11.14**
Complaint			
Bloody vomiting	47 (54.7)	40 (51.9)	7 (77.8)
Black stools	27 (31.4)	25 (32.5)	2 (22.2)
Fatigue	7 (8.1)	7 (9.1)	0 (0)
Fainting / Syncope	4 (4.7)	4 (5.2)	0 (0)
Dizziness	1 (1.2)	1(1.3)	0 (0)
Physical Examination Finding			
Melena positive	55 (64)	49 (64.9)	6 (66.3)
Signs of shock (Pallor.,sweating., shortness of breath. etc.)	9 (10.5)	9 (11.7)	0 (0)
Bloody Vomiting / Blood in the nasogastric catheter	7 (8.1)	4 (5.1)	3 (33.3)
No findings	15 (17.4)	15 (18.3)	0 (0)
Systolic Blood Pressure (mm/Hg)	**108.37±18.01**	**109.87±17.88**	**95.55±14.24**
Diastolic Blood Pressure (mm/Hg)	**70.93±12.04**	**71.81±11.77**	**63.33±12.24**
Pulse rate (/minute)	**94.18±13.29**	**93.50±13.21**	**100±13.22**
Laboratory Results			
White Blood Cell (10^3U/L)	10.20±3.95	10.22±4.03	15.29±10.01
Hemoglobin (g/dL)	10.04±2.83	10.16±2.79	9.05±3.18
Trombosit (10^3U/L)	262.39±131.41	262.07±127.78	265.10±168.36
INR*	1.60±1.28	1.63±1.35	1.43±0.31
Ürea(mg/dL)	85.27±51.51	82.46±43.30	109.33±98.24
Creatinine (mg/dL)	1.35 ± 1.15		1.42±0.68
Comorbidity Diseases			
Hypertension	46 (53.5)	42 (54.5)	4 (44)
Coronary Artery Disease	34 (39.5)	27 (35.1)	7 (77.8)
Diabetes Mellitus	24 (27.9)	24 (31.2)	0 (0)
Chronic Renal Failure	9 (10.5)	8 (10.4)	1 (11.1)
Malignancy	8 (9.3)	7 (9.1)	1 (11.1)
Heart failure	8 (9.3)	6 (7.8)	2 (22.2)
Liver failure	5 (5.8)	5 (6.5)	0 (0)
Medication Use			
No use	21 (24.4)	21 (27.3)	0 (0)
Acetyl Salicylic Acid	22 (25.6)	19 (24.7)	3 (33.3)
Non Steroidal Anti-inflammatory Drug	18 (14.3)	16 (19.5)	2 (22.2)
Apixaban	9 (7.1)	7 (9.1)	2 (22.2)
Warfarin Sodium	8 (9.3)	8 (10.4)	0 (0)
Clopidogrel	8 (9.3)	6 (9)	2 (22.2)
Rivaroxaban	4 (4.6)	3 (3.9)	1 (11.1)
Dabigatran	2 (2.3)	2 (1.3)	0 (0)
Corticosteroid	2 (2.3)	0 (0)	2 (22.2)
Patients Given Blood Products			
Erythrocyte Suspension	44 (51.2)	38 (49.4)	6 (66.6)
Fresh Frozen Plasma	5 (5.8)	5 (6.5)	0 (0)
Hospitalization			
Intensive Care Unit	77 (89.5)	68 (88.3)	9 (100)
Service	9 (10.5)	9 (11.7)	0 (0)
Average length of stay (days)	6.74±7.71	6.44±6.89	9.33±13.15
Endoscopy Result**			
Erosive Gastritis	35 (40.7)	33 (42.9)	2 (22.2)
Gastroduodenal Ulcer	27 (31.4)	25 (32.4)	2 (22.2)
Esophageal Varicose Veins	7 (8.1)	6 (77.9)	1 (11.1)
Malignancy	6 (7)	5 (6.4)	1 (11.1)
Esophagitis	3 (3.5)	3 (3.9)	0 (0)
Normal	1 (1.2)	1 (1.3)	0 (0)
Patient without endoscopy	7 (8.1)	4 (5.2)	3 (33.3)
Scoring			
Glasgow Blatchford Score	10.88±4.36	10.71±4.15	12.33±5.97
Pre-Endoscopic Rockall Score	3.38±2.44	3.07±2.25	6±2.54
Rockall Score	4.36±2.46	4.01±2.25	7.33±2.91
Shock Index	0.90±0.27	0.88±0.27	1.07±0.24
Mortality	9 (10.5)	0 (0)	100 (100)

*SD: Standard Deviation. INR: International normalized ratio, **Endoscopy evaluation predominantly focuses on the lesion seen.

Table 2: Detailed evaluation of the data of deceased patients

Patients/Data	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8	Patient 9
Gender	Female	Male	Female	Female	Male	Female	Male	Female	Female
Age	80	66	87	102	71	90	91	92	88
Complaint	Bloody Vomiting	Bloody Vomiting	Bloody Vomiting	Bloody Vomiting	Bloody Vomiting	Bloody Vomiting	Bloody Vomiting	Black stools	Black stools
Physical Examination Finding	Melena	Melena	Melena	Bloody Vomiting	Melena	Melena	Melena	Bloody Vomiting	Bloody Vomiting
Systolic Blood Pressure (mm/Hg)	100	120	80	100	80	90	80	100	110
Diastolic Blood Pressure (mm/Hg)	70	70	50	80	50	50	60	60	80
Pulse rate (/minute)	120	90	110	80	90	110	110	100	90
Laboratory Results**									
White Blood Cell (10^3U/L)	12.5	6.59	12	11.1	4.66	15.3	7.38	11.5	9.1
Hemoglobin (g/dL)	10.9	13.8	4.2	8.9	8.7	4.1	9.7	9.7	11.5
Trombosit (10^3U/L)	214	260	14.9	337	195	329	146	630	260
INR*	1.02	1.39	1.6	1	1.2	1.81	1.6	1.37	1.88
Ürea(mg/dL)	308	48	234	45	41	119	107	31	51
Creatinine (mg/dL)	2.54	0.92	2.4	0.93	1.58	1.3	1.64	1.01	1.04
Comorbidity Diseases*	CAD, CRF	No	HT,CAD	HT,CAD	Malignity	HT,CAD, CHF	CAD,CHF	CAD	HT,CAD
Medication Use*	NSAID Klopidogrel	NSAID Cortikosteroid	ASA	ASA	Cortikosteroid	Apixaban	ASA	Apixaban	Rivaroksaban
Patients Given Blood Products									
Erythrocyte Suspension	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Fresh Frozen Plasma	No	No	No	No	No	No	No	No	No
Endoscopy Result	Erosiv Gastrit	Erosiv Gastrit	Duodenal Ulcer	Malignity	Not available	Not available	Not available	Esophageal Varices	Peptic Ulcer
Hospitalization*	ICU	ICU	ICU	ICU	ICU	ICU	ICU	ICU	ICU
Length of hospitalization (day)	5	4	5	43	1	6	4	2	14
Scoring									
GlasgowBlatchford Score	10	5	19	11	10	19	21	11	5
Pre-Endoscopic Rockall Score	8	1	6	6	6	9	9	5	4
Rockall Score	9	2	9	7	6	9	9	8	7
Shock Index	1.2	0.75	1.37	0.8	1.12	1.22	1.37	1	0.81

*CAD: Coronary Artery Diseaes, CRF: Chronic Renal Failure, HT: Hypertension, CHF: Chronic Heart Failure, NSAID: Non-Steroid Anti-Enflamatuar Drug, ASA: Asetil Salisilik Asit, ICU: Intensive Care Unit

**Laboratory results evaluated in the first examination in the emergency department

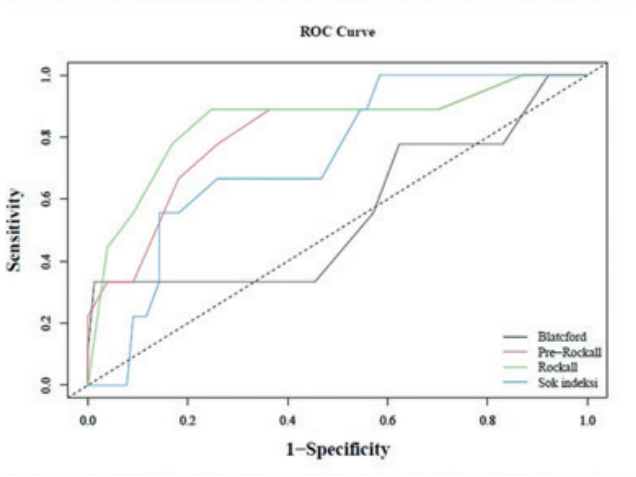

Figure 1: ROC analysis curves of the accuracy of the Glaskow Blatchford score, Pre-endoscopic Rockall score, Rockall score, and shock index in predicting mortality

Discussion

In our study, we analyzed the data of 86 patients hospitalized with upper GI bleeding over a one-year period. We analyzed the prediction of mortality by risk scores and shock index in patients with upper GI bleeding and found that RS was the most successful scoring system.

In the literature, comparisons have been made with GBS, RS and shock index in determining mortality and clinical prognosis. Accordingly, Rassameehiran et al. stated that the shock index was the best indicator of the need for transfusion and endoscopic treatment among the scoring tools.[8] In the study by Gökcek et al. shock index was found to be less successful than GBS and RS in identifying high-risk patients, although it was found to be significant in the need for transfusion.[11] In another study comparing the shock index with the GBS and RS, the GBS was found to be the most successful scoring system in predicting the need for major transfusion and the need for endoscopic treatment.[9] Saffuri and Gökcek found the shock index to be less successful in predicting mortality than GBS and RS in similar studies.[11,12] In contrast to these studies, Dogru et al. reported that shock index was statistically more successful than GBS and RS in predicting 30-day mortality.9 Budimir et al. emphasized that scoring systems alone do not give good results and that more accurate results would be obtained with more than one scoring system.[13]

Advanced age, shock status, presence of comorbidities, low hemoglobin level at admission, need for transfusion, presence of fresh blood on rectal touch or gastric lavage and hematemesis are the most important markers in predicting mortality in patients with upper GI bleeding.[14]

We found that the patients were equally distributed in male and female gender. Similar studies in the literature have shown that upper GI bleeding is more common in the male gender.[5,9,11-15] The mean age of the patients was 69.09±19.07 years. The mean ages were reported to be 61.12±17.14 in the study by Yalcın et al.,4 and 63.7±15.7 in the study by Gökcek et al.11 In our study, we observed that patients most frequently presented to the emergency department with bloody vomiting (54.7%) and black stools (31.4%). Okutur et al. found that 17% of the patients presented with hematemesis, 37.8% with hematemesis and melena, and 45.2% with melena.16 In the study by Yenigün et al. 37.9% of the patients presented with only melena, 8.7% with only hematemesis, and the remaining 53.3% with hematemesis and melena.17 In one study, it was reported that 12% of patients presented with syncope and fainting.11 In our study, the rate of patients presenting with syncope and fainting was 4.7%. In another study, the rate of patients presenting with dizziness was 2%.18 In general, hematemesis and melena are recognized earlier because they are visible findings. Findings such as dizziness and weakness may not initially suggest that the patient may have GI bleeding. Therefore, we would like to emphasize that the possibility of GI bleeding should definitely be considered at the diagnostic stage in such patients.

Laboratory data at the time of admission are instructive in determining the clinical course and mortality in patients with upper GI bleeding. In our study, the mean hemoglobin was 10.04±2.83 g/dL, blood urea was 85.27±51.51 mg/dL and creatinine was 1.35±1.15 mg/dL. In a similar study, the mean hemoglobin was 9.15±2.65 g/dL, and blood urea was 89.27±60.14 mg/dL.11 In our study, the rate of patients with a hemoglobin value ≤10 g/dL was 52.3%. In the study by Sagiroglu et al, the hemoglobin value at admission was 9.4±2.5 g/dL.18 In another study, the rate of patients with a hemoglobin value ≤10 g/dL at presentation was 25%.19 In a study conducted by Restellini et al. in Canada, it was reported that the mean hemoglobin value of the patients at presentation was 9.68±2.72 g/dL.20 In the comparisons, similar to our study, hemoglobin levels were low and blood urea levels were high at admission. Based on the analysis of the data in the literature and the data in our study, we can say that hemoglobin levels of patients with upper GI bleeding at admission are generally below the normal range and blood urea levels are above the normal range.

Comorbid diseases are among the most important factors affecting the clinical course and mortality in upper GI bleeding. The GBS and RS systems include the evaluation of comorbidities including heart failure, hepatic failure, renal failure, ischemic heart disease and malignancy.6,7 According to our analysis, hypertension (53.5%), coronary artery disease (39.5%) and diabetes mellitus (27.9%) were the most common comorbidities in patients with upper GI bleeding, respectively. Similarly, Gökcek et al. found that the most common diseases were coronary artery disease (19.9%), malignancy (14.7%) and liver failure (13%),11 Okutur et al. reported hypertension (46.2%), diabetes mellitus (22%) and ischemic heart disease (16.5%),16

Yalcın et al. reported hypertension (18.3%), coronary artery disease (17.3%) and diabetes mellitus (14.3%).[4] In a study conducted in Egypt, it was reported that nearly 60% of the patients had comorbidities, with ischemic heart disease being the most common (11%).[21] Yılmaz recently investigated the factors affecting mortality in patients with upper GI bleeding and reported hypertension as the most common comorbid disease.[22] As a result, comorbidities observed in patients in the literature are similar.

According to the analysis of the medications used by the patients, 74.6% of the patients were taking at least one medication that could pose a risk for bleeding. ASA (25.6%), NSAIDs (14.3%) and apixaban (7.1%) were the most commonly used drugs. Yenigün et al. found that NSAIDs (19.5%), ASA (18%) and OAC (3.6%) were used the most in their study.17 In one study, ASA use was 32.9%, NSAIDs use was 27.7% and warfarin sodium use was 10.1%.15 In similar studies conducted in the literature, ASA, NSAIDs, OAC and corticosteroid use was observed in the majority of patients.[4,16,18]

The rate of ES replacement was 51.2%. In the study by Sahin et al. the rate of patients who underwent ES replacement was 58.4%.15 In another study, ES replacement was performed in 82.3% of patients.[18] In the study by Cimen et al, ES replacement was performed in 20.5% of the patients.19 According to the GBS, a hemoglobin value <10 g/dL at presentation increases the risk of mortality. In our study, the rate of patients with a hemoglobin value <10 g/dL at presentation was 52.3%.

In our study, 91.9% of the patients underwent endoscopic procedure. According to the results, erosive gastritis (40.7%) and gastroduodenal ulcer (31.4%) were most common. In a recent study by Gökcek et al. 53% of patients had peptic ulcer, 12.8% had esophageal varices, 10.4% had malignancy and 6.1% had erosive gastritis.11 In a similar recent study, Ekmen et al. observed that 46.7% of patients had gastritis and 43.7% had gastroduodenal ulcer.23 In similar studies in the literature, it was observed that gastroduodenal ulcer and gastritis were the most common findings in patients.[4,15-17,19, 21-23]

In our study, 89.5% of the patients were initially treated in the intensive care unit. The mean duration of hospitalization was 6.74 days. In a similar study, Sahin et al. reported that 65% of the patients were hospitalized in the intensive care unit and the mean hospitalization period was 4.7 days.15 In another study, the mean duration of hospitalization was reported to be 4 days.[18]

The mortality rate was 10.5% in our study. The mortality rate was reported as 4.5% in Yalcın et al.,4 5.7% in Gökcek et al.[11] and 10.3% in Yenigün et al.[17] The mortality rate observed in our study is close to the literature data. Since we evaluated the mortality rate based on hospitalized patients in this study, we can say that a higher mortality rate compared to some studies is an expected situation. In addition, mortality rate can be reduced with early endocopic treatment methods according to the centers where the studies were conducted. As a matter of fact, we think that inadequacies in endoscopic treatment procedures and the number of physicians in the hospital where our study was conducted increased mortality.

Study Limitations

The retrospective design of the study is a limitation in terms of data access.

Conclusion

In conclusion, from the data obtained in this study, we found that RS was more successful in predicting mortality in patients with upper GI bleeding. However, we think that it would be more successful to evaluate more than one system instead of a single scoring system in the diagnosis and treatment process of patients. As a result of our study, we obtained similar results to the literature data. We observed that the development of gastroduodenal ulcer due to drug use was high in patients. We would like to suggest that PPI use should be included in the prophylactic treatment of ASA, NSAIDs and OAC use in the risky patient group. In addition, according to the literature and the data of our study, we observed that the rates of hypertension and diabetes mellitus as comorbidities were high in patients with upper GI bleeding.

In our study, a comprehensive evaluation was made with demographic data, risk factors and endoscopy results in patients with upper GI bleeding from the time of presentation to the emergency department until the final outcome, and more than one risk scoring was evaluated and compared simultaneously. We think that our study will contribute to the literature in this respect. However, the most limited aspect of our study was the lack of a specialist of the relevant branch in the center where the study was conducted in the previous years and the fact that endoscopy was not performed regularly caused the small number of patients included in the study. We believe that further studies with a larger scale and with a larger number of patients will be useful.

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Original Article
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Investigation of Burnout Levels and Their Relationship with Serum S100B Levels in Emergency Department Staff

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Abstract

Background: Burnout syndrome is characterized by physical, emotional, and mental symptoms. This study aims to investigate the relationship between S100B protein levels and burnout syndrome and depression in emergency department staff.

Material and Methods: The study included nurses and paramedics working in the emergency department of our university hospital. Depression levels and burnout severity were assessed using the Beck Depression Inventory (BDI) and the Maslach Burnout Inventory (MBI) before shifts. Blood samples were collected before and after shifts to measure S100B levels. Results were compared with S100B levels, and data were analyzed using SPSS.

Results: The study included 29 nurses (65.9%) and 15 paramedics (34.1%). Participants had an average emotional exhaustion score of 27.2 ± 7.4 (median (IQ) = 28 (22.3-33.0)), depersonalization score of 11.3 ± 4.1 (median (IQ) = 11 (9.0-13.8)), and personal accomplishment deficiency score of 30.0 ± 6.4 (median (IQ) = 28.5 (25.0-35.8)). The average BDI score was 34.4 ± 8.0 (median (IQ) = 33.5 (29.0-36.8)). Pre-shift S100B levels were 77.0 ± 21.8 (median (IQ) = 72.4 (66.4-80.6)), while post-shift S100B levels were 113.0 ± 129.6 (median (IQ) = 72.5 (65.7-87.8)). A statistically significant increase in S100B levels was observed between pre- and post-shift ($p = 0.046$). However, there was no significant correlation between post-shift serum S100B levels and emotional exhaustion, depersonalization, personal accomplishment deficiency, or BDI scores ($p > 0.05$).

Conclusion: Although there is a significant change in S100B levels before and after shifts, S100B levels are not correlated with BDI scores and MBI dimensions. These findings suggest that while S100B may not be a long-term predictor of burnout and depression in emergency staff, it could be used to determine shift durations for effective management.

Keywords: Burnout, S100B, Emergency

Introduction

Burnout syndrome is a state of physical, emotional, and mental exhaustion caused by prolonged stress and overwork. It manifests through a range of symptoms, including chronic fatigue, decreased motivation, and emotional detachment from work and personal life (1) Key signs include persistent feelings of exhaustion, irritability, cynicism, and a sense of reduced personal accomplishment. Over time, individuals may experience difficulties in concentration, increased absenteeism, and strained relationships at work and home (1). To combat burnout, strategies such as stress management, fostering supportive work environments, and promoting work-life balance are essential. Prevention requires recognizing early signs and taking proactive steps to address stressors (1,3).

Beck to assess the severity of depression. Each item is scored on a scale of 0-3, with the total score indicating the level of depressive symptoms. The BDI is based on the cognitive approach, which posits that depression arises from cognitive distortions rather than external factors, evaluating both emotional (e.g., pessimism, guilt) and somatic (e.g., fatigue, sleep disturbances) symptoms. The scale was first published in 1961, with subsequent revisions in 1978 (BDI-1A) and 1996 (BDI-2). The inventory is designed to capture two key aspects of depression: emotional and physical symptoms. The BDI has been translated into multiple languages and is widely used globally for both screening and rapid diagnosis purposes (4).

S100B protein is a growth and differentiation factor secreted by astrocytes and oligodendrocytes. This protein can be easily detected as a parameter in human serum in cases of glial activation or injury (5). Some studies have shown that serum levels of S100B protein, a glial marker, are elevated in the depressive phase of patients with bipolar disorder. Successful depression treatments have been associated with a decrease in serum S100B protein levels (6,7).

The aim of this study is to determine the levels of burnout among non-emergency medicine resident emergency department staff and to investigate the relationship between

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these levels and serum S100B protein levels. The findings of this study may assist in the early identification and intervention of burnout syndrome in healthcare workers

Materials and Methods

The study received ethical approval from the Bezmialem Vakıf University Ethics Committee. A list of emergency department staff was compiled, and the study's purpose was explained to potential participants. Those who agreed to participate formed the study group. The research was conducted from March to May 2016.

Inclusion Criteria: Volunteers willing to participate. Exclusion Criteria: Individuals who experienced significant psychological or physical trauma in the past month or had chronic illnesses were excluded.

The emergency department had two shift periods: 08:00-18:00 and 18:00-08:00. Non-physician emergency staff working the 18:00-08:00 shift were included. Blood samples were collected from volunteers before and after shifts to measure S100B protein levels. Samples were centrifuged and stored at -80°C until analysis. S100B levels were measured, and data were analyzed using SPSS 20.0 to investigate the correlation between burnout levels and protein levels.

Maslach Burnout Inventory (MBI): Developed by Maslach and Jackson (1981), this 22-item scale assesses burnout in three dimensions: emotional exhaustion (9 items), personal achievement (8 items), and depersonalization (5 items). Responses are rated on a 7-point scale from "Never" to "Always." The scale was adapted to a 5-point scale in Turkish by Ergin (1992).

Beck Depression Inventory (BDI): Developed by Beck (1961), this 21-item self-assessment scale measures depression severity across emotional, cognitive, and motivational dimensions. Responses are rated on a 4-point Likert scale, with scores ranging from 0 to 63. Validity and reliability in Turkish were established by Teğin (1980) and Hisli (1988, 1989), with a cutoff score of 17.

4Serum S100B Levels: Blood samples were collected from the antecubital vein using vacutainers. Samples were centrifuged at 3000 xg for 10 minutes, and the serum was stored at -30°C. On the day of analysis, serum samples were thawed to room temperature and analyzed using the Human S100B Elisa Kit (Biovendor) following the manufacturer's protocol. S100B levels were measured by ELISA and reported in pg/ml.

Statistical Methods: Descriptive statistics included mean, standard deviation, median, minimum, maximum, frequency, and percentage values. The Kolmogorov-Smirnov test assessed data distribution. Quantitative data were analyzed using Kruskal-Wallis and Mann-Whitney U tests, while the Wilcoxon test was used for repeated measures. Spearman correlation analysis was employed for correlation studies. SPSS 22.0 was used for all analyses.

Results

Emergency service workers (nurses and paramedics) participated in the study between March 1 and April 30, 2016 at the Emergency Department of Bezmialem Vakıf University Hospital. According to our hospital records, 33 nurses and 17 paramedics were actively working during the study period. 29 (% 65.9) nurses and 15 (% 34.1) paramedics participated in the study. The mean age of the emergency workers participating in the study was 27.8±7.9, and the median age was 25 (minimum 19, maximum 54). 31 (% 70.5) of the participants were female, and 13 (% 29.5) were male. The number of participating nurses was 29 (% 65.9), and the number of paramedics was 15 (% 34.1). The mean working hours in the emergency department was 3.7±3.1, and the median time was 3 (minimum 1, maximum 16). The marital status of the emergency service workers participating in the study was 18 (48.9%) married, 25 (54.8%) single. 1 (2.3%) widowed. 16 (36.4%) had recently taken annual leave and 28 (63.6%) had received a medical report. 10 (22.7%) of the workers had been exposed to both verbal and physical violence. 29 (65.9%) had only been exposed to verbal violence and 5 (11.4%) had not encountered any violence (Table 2). When asked how many more years they could work in the emergency service, 26 (59.1%) answered 5 years, 9 (20.5%) answered 10 years, 6 (13.6%) answered 20 years and 3 (6.8%) answered 15 years. Out-of-hospital activity was present in 22 (50%) and absent in 22 (50%) (Table 2). 17 (38.6%) of the participants were smoking. 24 (54.5%) did not use it regularly, 1 (2.3%) used antidepressants, 1 (2.3%) used cigarettes and alcohol, and 1 (2.3%) used cigarettes and anxiolytics together.

The participants had an average emotional exhaustion level of 27.2±7.4, depersonalization of 11.3±4.1, and a lack of personal accomplishment score of 30.0±6.4. According to the Beck Depression Inventory, 29.5% of the participants were moderately depressed, while 70.5% were found to be severely depressed (Table 1). In our study, serum S100B

Table 1: Burnout levels and Beck Depression levels

	Mean±s.s./n-%			Median	IQR		
Burnout							
Emotional Exhaustion	27.2	±	7.4	28.0	22.3	-	33.0
Lack of Personal Achievement	11.3	±	4.1	11.0	9.0	-	13.8
Depersonalization	30.0	±	6.4	28.5	25.0	-	35.8
Beck Depression Score	34.4	±	8.0	33.5	29.0	-	36.8
BDI 22-29	13		29.5%				
BDI ≥ 30	31		70.5%				

Abbreviations IQR=Interquartile range

Table 2: S100B levels before and after seizure

	Mean ± s.s.	Median	IQR	p
S100 B				
Before Watch	77.0 ± 21.8	72.4	66.4 -80.6	
After Seizure	113.0 ± 129.6	72.5	65.7 -87.8	0.046

Wilcoxon test *Abbreviations: IQR=Interquartile range*

levels of emergency department workers were measured before and after their shifts. The post-shift S100B level was significantly higher compared to the pre-shift level (p=0.046) (Table 2). There was no significant correlation between pre-shift serum S100B levels and emotional exhaustion, depersonalization, lack of personal accomplishment, or BDI score (p=0.624, p=0.827, p=0.946, p=0.833). Similarly, no significant correlation was found between post-shift serum S100B levels and these factors (p=0.633, p=0.218, p=0.694, p=0.538) (Table 3).

Table 3: Correlation of Participants' BDI and Burnout Levels with S100B Levels before and after Seizure

		Burnout			
		Emotional Exhaustion	Lack of Personal Achievement	Depersonalization	Beck Depression Score
S100 B					
Before Watch	r	0.076	0.034	-0.010	-0.033
	p	0.624	0.827	0.946	0.833
After Seizure	r	-0.074	-0.189	0.061	-0.095
	p	0.633	0.218	0.694	0.538

Spearman Correlation

There was no significant correlation between emotional exhaustion scores and age, professional experience, or length of service (p=0.555, p=0.811, p=0.907). However, a significant negative correlation was found between the lack of personal accomplishment scores and age, professional experience, and length of service (p=0.018, p=0.022, p=0.026). Depersonalization scores were not correlated with age or length of service, but there was a significant positive correlation with professional experience (p=0.010).

Discussion

Burnout syndrome is a condition commonly seen in professions that involve frequent face-to-face interactions, where individuals feel emotionally drained, become desensitized to the people they interact with as part of their job, and experience a diminished sense of personal achievement (8,9). In its 1998 World Health Report, the World Health Organization (WHO) defined burnout as a state of extreme emotional exhaustion caused by overwork, leading to an inability to fulfill work and responsibilities. Over time, individuals may experience chronic fatigue, disengagement from their job, withdrawal, and an increasing sense of inadequacy.

Burnout is not listed in the International Classification of Diseases (ICD-10), and therefore, it is not officially recognized as a disease. Consequently, there is no specific diagnostic marker that definitively identifies burnout. In reality, nurses working in emergency departments and intensive care units have significantly higher average burnout levels compared to nurses working in other departments (9). If burnout is not recognized early, it can lead to a loss of productive labor, a decrease in quality of life, and potentially progress toward depression.

Research into the use of biological markers for detecting major depression has been ongoing for a long time. In the early 1990s, the dexamethasone suppression test emerged as the first significant breakthrough in this area. Although it was later found that this test could also be related to other conditions besides depression and that not all patients with depression showed suppression on the test, it remained an important marker. Subsequently, studies on BDNF (Brain-Derived Neurotrophic Factor) demonstrated that this marker could be useful for assessing both depression and response to treatment. Recently, the S100B protein has emerged as a promising biomarker for both depression and treatment response (10).

In a previous study conducted with emergency medicine residents at three separate university emergency departments, a strong correlation was found between S100B levels and Beck Depression Inventory (BDI) scores (11). However, in our study with emergency nurses and paramedics, no such correlation was observed. This may be attributed to the emergency medicine residents being concurrently involved in their education process, with a more intense workload and higher levels of responsibility.

Recent literature has seen an increasing number of studies discussing the potential use of S100B as a biomarker for acute depression in patients with major depressive disorder (12,13). S100B, a glial marker protein, has been found to increase during acute episodes of major depression and decrease with depression treatment (14). Therefore, fluctuations in serum S100B levels have been interpreted as an indicator of acute depressive episodes (15). Gulen et al. also demonstrated a correlation between serum S100B levels and depression. However, there are also studies reporting no relationship between S100B levels and the severity of depression (16). In our study, a weak significance was found between pre- and post-shift serum S100B levels, with levels rising after the shift. This result suggests that the long and intense 16-hour night shift did not have an acute effect on serum S100B levels.

Conclusion

Despite significant changes in S100B levels before and after shifts, these levels are not correlated with depression scores or burnout. These findings suggest that while S100B may not predict burnout and depression in emergency workers in the long term, it could potentially be used to determine the duration of night shifts for effective work.

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Original Article
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Serum Paraoxonase Activity and Phenotype Distribution in Turkish Covid-19 Patients

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Abstract

Background: For the phenotype classification, it is important to determine the relationship between enzyme activity and the severity of the COVID-19 disease. Reaching significant differences between healthy and infected individuals in terms of genotype and allele distributions may be a guide in the fight against the COVID-19 pandemic. This study, it was aimed to investigate the relationship between serum arylesterase PON1 enzyme activity and disease severity in COVID-19 patients.

Materials and Methods: Patients over the age of 18 who applied to the Emergency Service between 01-30 April 2020 and were examined with a preliminary diagnosis of COVID-19 were included in the study. In the study, serum PON1 activity was measured in the venous blood of 56 patients diagnosed with Covid-19 disease by either CT or RT-PCR and who have not received any systemic treatment yet.

Results: The Arylesterase (AREase) and Paraoxonase (POase) activity levels of the study and control groups were 131.49 ± 52.75 kU/L 142.29 ± 38.82 kU/L, 276.48 ± 220.4 U/L 505.30 ± 301.4 U/L, respectively. It was found that 64.3 % of those infected with Covid-19 had the low-activity PON1 phenotype (p= 0.007)

Conclusion: Genetic variability in PON1 may be associated with exposure to or risk of developing the disease. As a result, vaccination of individuals with low activity phenotype can be given priority at the vaccination stage in order to reduce the mortality rate in the fight against the pandemic. Awareness and protection measures of societies with low activity phenotypes can be increased.

Keywords: Phenotype, COVİD-19, Paraoxonase

Introduction

The World Health Organization (WHO) declared on March 10, 2020 that a new coronavirus caused a global epidemic (1). The clearest known clinical information about the COVID-19 disease is that the disease is transmitted by droplets. Although intense information and warning efforts continue by the authorities to prevent the spread through droplets, asymptomatic cases increase the rate of spread. The average incubation period of SARS-CoV-2 is estimated to be 2-14 days, which is quite long (2). In addition, asymptomatic patients can be contagious during the incubation period, which is the cause of supercontamination. All members of the society are susceptible to SARS-CoV-2. However, the data show that the elderly and individuals with comorbidities or those receiving immunosuppressive therapy have the disease more severely (3). There is no gender difference in the incidence of COVID-19, but it is stated that the mortality risk is 2 times higher in men depending on their chromosomal differences and lifestyle (4). Although it has been reported that the causative factors in the course of the disease are age, gender and comorbid diseases, the relationship between phenotypic features and COVID-19 should be investigated. Serum paraoxonase (PON1) is a calcium-dependent antioxidant enzyme associated with high density lipoprotein (HDL), found in the bloodstream, and synthesized in the liver (5). Studies have shown that the lipid peroxidation effect of low density lipoprotein (LDL) is neutralized by the antioxidant activity of HDL-dependent PON1. Therefore, it can be said that PON1 is a protective factor against atherosclerosis (6). It has been shown in different studies that some viruses and bacteria may be effective in the inflammatory mechanism of atherosclerosis (7). Disease courses ranging from ARDS (acute respiratory distress syndrome) to sepsis are observed in the deterioration of the oxidant/antioxidant balance against the host in the pathogenesis of viral, liambacterial, parasitic infective agents. Oxidative stress occurs due to the overproduction of reactive oxygen species (ROS), which causes related cell damage and lipid peroxidation (4-7). Lipid peroxidation is a well-known mechanism of cell membrane in humans, used as an indicator of oxidative stress in cells and tissues. PON1 is known as an antioxidant

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enzyme because it hydrolyzes lipid peroxides in oxidized lipoproteins. Because of the genetic polymorphism PON1 activity varies between individuals and populations (8). As a result of paraoxone hydrolysis, individuals are included in one of three possible phenotypes. First, QQ (homozygous low activity) low activity phenotype, second genotype QR (heterozygous medium activity) and third type RR (homozygous high activity) showed the highest level of enzyme activity. For the phenotype classification, it is important to determine the relationship between enzyme activity and the severity of the COVID-19 disease. So far, no specific research has been conducted on the relationship between the novel coronavirus and the different phenotype activities of PON1. Reaching significant differences between healthy and infected individuals in terms of genotype and allele distributions may be a guide in the fight against the COVID-19 pandemic. Identifying people at risk, treatment plans, vaccination studies can provide clues about the course of the disease. In this study, it was aimed to investigate the relationship between serum arylesterase PON1 enzyme activity and disease severity in COVID-19 patients.

Materials and Methods

***Study design*:** This prospective cross-sectional study was performed in the Medical Biochemistry Laboratory of Bezmialem Foundation University Hospital between April and September 2020. The study was carried out with the permission no 54022451-050.05.04- obtained from Bezmialem Vakif University Non-Interventional Research Ethics Committee. Inform consent was obtained from each study patient.

***Selection of participant and data collection process*:** Patients over the age of 18 who applied to the Emergency Service of Bezmialem Vakıf University Medical Faculty Hospital between 01-30 April 2020 and were examined with a preliminary diagnosis of COVID-19 were included in the study. As part of the COVID-19 pandemic management, preliminary triage was created in front of the hospital emergency department. In the preliminary triage, possible COVID-19 patients were differentiated from other emergency patients and taken to the isolation area. Potential COVID-19 patients evaluated in an isolated area in the emergency department according to the guide published by WHO and the Scientific Committee of the Ministry of Health of the Republic of Turkey, possible COVID-19 patients were identified by a senior emergency medicine assistant/ emergency medicine specialist. As part of the fight against the pandemic, the patients were recorded in the patient notification data system with no exception. Informed consent was obtained from each of the patients, and laboratory blood tests (hemogram, kidney function tests, liver function tests, troponin), blood gas and computerized thorax tomography (CT) if necessary, were performed. In order to confirm the presence of COVID-19 nasal and throat swab were taken from all patients for the Real Time Polymerase Chain Reaction (RT-PCR) test. According to the isolation rules, patients were promptly referred to the appropriate services. Before administering any medication, at least 2 cc of study blood was taken into a gel-free biochemistry tube from patients with informed consent. The tubes were centrifuged at 3000/min for 10 minutes and the serums were separated and stored in eppendorf tubes at -80 degrees Celsius until the operating time. Clinical data (age, gender, symptoms, comorbidities, laboratory findings, treatments, and outcomes) were collected by two researchers and recorded for statistical analysis in the electronic data system. Clinical results were updated after patient follow-up. During the study period, 56 patients with positive CT findings and RT-PCR test were recruited from COVID-19 outpatient and emergency department admissions (Table 1). The data of the COVID-19 patients included in the study were compared with the control group. The control group consisted of 60 healthy individuals without any known chronic or recurrent disease. Each of them was selected from volunteers who did not show COVID-19 symptoms for at least 14 days during the pandemic process and did not have a history of contact with COVID-19 patient.

Sample collection and measurement of the rate of paraoxonase and arylesterase activities: Paraoxonase and arylesterase activities were measured with the commercially available Rel Assay Diagnostics kits[9] that are equipped with an auto analyzer (AerosetR, AbbottR, Illinois, USA). Measurements to determine the rate of paraoxonase activity were performed in the alternating absence (basal activity) by using the paraoxon substrate. The rate of the paraoxon

Table 1: Demographic, clinical and laboratory findings

Parameters	COVID 19 + (N=56)	CONTROL (N=60)	*p*
Age	49,53 ± 10,93	44,21 ± 14,34	ns
BMI (kg/m^2)	22,3 ± 1,1	21,5 ± 0,9	ns
Glucose (mg/dL)	109,74 ± 9,06 [a]	90,91 ± 4,46 [b]	< 0.01
HbA1c (%)	5,46 ± 0,28 [a]	5,23 ± 0,24 [b]	< 0.05
Insulin (µIU/mL)	5,82 ± 2,47 [b]	6,28 ± 3,04 [b]	< 0.05
LDL (mg/dL)	133,82 ± 39,46 [a]	105,61 ± 36,84 [b]	< 0.05
Triglyceride (mg/dL)	128,71 ± 48,64 [b]	120,92 ± 66,62 [b]	< 0.05
HDL (mg/dL)	51,17 ± 11,3 [a]	56,68 ±16,61 [b]	< 0.05
Total Cholesterol (mg/dL)	205,15 ± 53,83 [a]	169,22 ± 42,99 [b]	< 0.05
Paraoxonase activity (U/L)	276,48 ± 220,4 [a]	505,30 ± 301,4 [c]	< 0.01
Arylesterase activity (kU/L)	131,49 ± 52,75 [a]	142,29 ± 38,82 [b]	< 0.05

a, b, c: Within rows, means followed by the same letter are not significantly different according to ($p<0.05$)
$p > 0.05$ shown as ns (not significant).

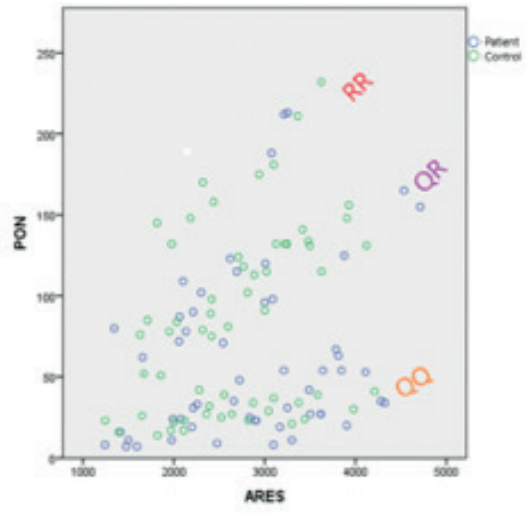

Figure 1: Paroxanase and arylesterase activities of groups. QQ (homozygous low activity), QR (heterozygous medium activity), RR (homozygous high activity).

hydrolysis (diethyl-p-nitrophenyl phosphate) was measured by monitoring the increase in the rate of absorbance at 412 nm. The amount of generated p-nitrophenyl was calculated from the molar absorptivity coeffi cient at a pH value of 8, which was 17.000 M−1 cm−1. The rate of activity was measured briefly at 37 °C by adding 20 µL of the stored serum to 200 µL of the Tris buffer (0.1 M, pH: 8.0), which contained 2 mM of CaCl2 and 7 mM of paraoxon. The rate of paraoxonase activity was expressed as the unit U/L serum. [9-12] Next, in order to measure the rate of the arylesterase activity, phenylacetate was employed as a substrate. The required reaction was initiated by adding the stored serum to the substrate and then reading the increase in the degree of absorbance at 270 nm. The blank readings were included in the evaluations to correct the value obtained for the spontaneous process of phenylacetate hydrolysis. The rate of enzymatic activity was calculated from the molar absorptivity coefficient of the produced phenol, 1310 M−1 cm−1. For the evaluations conducted here one unit of the degree of arylesterase activity was defined as 1 µmol of phenol generated/min under the above conditions and expressed by the unit U/L serum. The phenotype distribution of PON1 was determined by calculating ratio of the paraoxonase activity to the degree of arylesterase activity [Figure 1]. The ratio was used to allocate the subjects to one of 3 possible phenotypes (9-12). The subjects were assigned to 1 of the following 3 phenotypes: QQ (homozygous low activity), QR (heterozygous medium activity), or RR (homozygous high activity).

Real-Time Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR): The diagnosis of COVID-19 was made by reverse transcriptase coupled with quantitative polymerase chain reaction assay (RT-qPCR) as described earlier (13). Briefly, the primer probe sets for the RNA-dependent RNA polymerase gene of Wuhan strain of SARS-CoV-2 was utilized in the assay as published by World Health Organization (World Health Organization 2020, Laboratory Testing for Coronavirus Disease 2019 (COVID-19) in Suspected Human Cases: Interim Guidance. World Health Organization, Geneva, Switzerland). A commercial test kit (Bio-Speedy SARS-COV2-2019-nCoV-qPCR Detection Kit; Bioeksen R&D Technologies, Istanbul, Turkey) for RT-qPCR was used for the testing and the tests were performed at Clinical Microbiology Laboratories of Bezmialem Vakif University. The assay was originally validated by the Public Health Central Laboratories of Turkish Health Ministry.

Computed Tomography Protocol: Depending on the severity of the disease, SARS-COV-2 causes interstitial damage in the lung and then pathologies at different levels in the parenchyma. The literature also strongly supports the use of CT in the initial diagnosis and follow-up of the disease [7]. CT with 98% accuracy was also used in COVID-19 patients with false negative RT-PCR results (14). All CT examinations were performed using a multi-detector CT scanner with 64 channels (Somatom Definition, Siemens Healthineers, Erlangen, Germany). The detailed parameters for CT acquisition were as follows: tube voltage, 120 kVp; tube current, standard (reference mAs, 60–300) with automatic exposure control; slice thickness, 1.0 mm; reconstruction interval, 1.0–3.0 mm; and a sharp reconstruction kernel. CT images were obtained with the patient in the supine position at the end of inhalation and without contrast medium.The CT images were evaluated with both lung (width, 1500 HU; level, −600 HU) and mediastinal (width, 400 HU; level, 40 HU) window settings.

Statistical Analysis: The collected data was expressed as the mean ± standard deviation (X ± SD). The student t test was employed to compare the parameters of both these groups. The chi-square test was used to test the distribution of the phenotype. In addition, the correlations existing between the parameters in both groups were determined through Pearson's correlation analysis. A linear regression analysis was used to determine the exact relationships that existed between the parameters of age and gender among the evaluated subjects; the serum TG, TC, HDL-C, and LDL-C levels; and the degree of PON1 activities. P-values < 0.05 were accepted as significant. The data was analyzed by using a computer program.

Results

Demographic data of the Covid-19 patients and control group participating in our study are given as in (Table 1). The Arylesterase (AREase) and Paraoxonase (POase) activity levels of the study and control groups were 131.49 ± 52.75 kU/L 142.29 ± 38.82 kU/L, 276.48 ± 220.4 U/L 505.30 ±

Table 2: Phenotypes Group Crosstabulation

		Group		
		Patient	Control	Total
UcPhenotype	QQ	36	24	60
	QR	17	27	44
	RR	3	9	12
Total		56	60	116

301.4 U/L, respectively. PON1 phenotype distribution was analyzed in two groups. The ratio obtained was used for the phenotype distributions of those who were infected and those who did not. Accordingly, 64.3 % (n=36) of those with COVID-19 disease had the QQ homozygous low activity phenotype, while this rate was 40% (n= 24) in the control group (Table 2). It was determined that individuals with low activity of the PON1 enzyme were more likely to get Covid-19 disease (Figure 1). By calculating Cramer's Value, a statistically significant difference was found between the groups in terms of all three phenotypes (p=0.023, Table 3-4).

Discussion

Until the day this article was written, approximately 4.5 million patient deaths have been reported worldwide due to Covid-19. The disease progresses at different levels from asymptomatic to fatal. ARDS, which develops with hyperinflammation due to cytokine storm, is the most important cause of mortality. The causative pathogen SARS-CoV-2 causes high oxidative stress, lipid peroxidation, protein oxidation and ultimately cell death (15). As stated in the literature, PON1 activity is a determinant of the oxidative stress and inflammation response of the disease. PON1 phenotype status as determined by activity analysis of two substrates reveals the functional Q192R genotype and activity levels of an individual (16). Serum PON1 activity varies depending on lipids and lipoproteins in plasma (17). PON1 activity has been widely used to determine phenotype distributions in previous studies (18-19). It has been suggested that genetic variability in PON1 may be associated with exposure or risk of developing the disease (20). In this study, serum PON1 activity and phenotype distribution in Covid-19 patients were investigated. We think that the difference in PON1 activity between individuals and societies may also be a factor in the transmission and course of Covid-19 disease. In the study, serum PON1 activity was measured in the venous blood of 56 patients who were diagnosed with Covid-19 disease by either CT or RT-PCR and have not received any systemic treatment yet. Accordingly, it was found that 64.3 % of those infected with Covid-19 had the low-activity PON1 phenotype (p= 0.007). It has been emphasized in the literature that PON1 activity differs according to the individual and race in direct proportion to the antioxidant capacity (21). Advanced age and concomitant diseases are not effective factors on phenotype difference. As a result, vaccination of individuals with low activity phenotype can be given priority at the vaccination stage in order to reduce the mortality rate in the fight against the pandemic. Awareness and protection measures of societies with low activity phenotype can be increased.

Table 3: Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	,255	,023	,024
	Cramer's V	,255	,023	,024
	Contingency Coefficient	,247	,023	,024
Number of Valid Cases		116		

Table 4: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7,544[a]	2	,023	,024		
Likelihood Ratio	7,711	2	,021	,024		
Fisher-Freeman-Halton Exact Test	7,409			,024		
Linear-by-Linear Association	7,355[b]	1	,007	,008	,005	,003
N of Valid Cases	116					

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Original Article
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The Calls to 112 Command and Control Center and Evaluation of Use of The Emergency Ambulance Service in Denizli

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Abstract

Background: In this study we studied the calls to 112 command and control center in 2012-2013 years in our province and we aimed the evaluation of use of the emergency ambulance service in our province.

Material and Method: By evaluating emergency call forms that is taken 112 command and control center head physician's office, a descriptive study was done retrospectively. SPSS 17 program is used for the statistical analysis in this study.

Result: It is identified that 51.8% of 1176126 emergency service applicants was male in 2012, 52.3% of 1185019 emergency service applicants was female in 2013. Ambulance service utilization was highest in summer (27%) and the peak value was in august. It is detected that 94% of the calls was unnecessary. The ambulance service utilization by the patients aged 65 and over was 30% in 2012 and 2013. It is also identified that the mean ambulance arrival time to the patients was 8.6 min. in 2012 and 9.1 min. in 2013. As we determined, most of the reasons of emergency calls were medical diseases (72%) and traffic accidents (12%). In the patient's classification according to their pre-diagnosis, the biggest patient group was trauma cases. In 2012 the trauma cases have had 23,3% rate among the pre-diagnosis reasons and in 2013 the value was 22,2%. In our study, the highest rate of ambulance exists is hospital transfer (64.2% in 2012, 63.1% in 2013). Most of the cases which are transported with ambulance have been gone to Denizli State Hospital (32.4%).

Conclusion: The high rate of unnecessary calls to command-and-control center (95,5%) is a serious problem for the quality of service. Because of the fact that these kinds of calls make 112 KKM busy unnecessarily; patients, which must have a priority to access to emergency services because of their severe illnesses, don't arrive on time. So education programs or public spotlights should be performed to improve the public's knowledge. The purpose of this study was to look at the seasonal distribution, age and gender distribution, and eosinophil, lymphocyte, and monocyte values according to age and gender in cases of insect bites that were brought to the emergency room over the course of a year.

Keywords: Emergency, 112 control center, Ambulance

Introduction

We live in a country where emergency diseases, accidents and injuries are common, disasters such as earthquakes and floods, and terrorist incidents are intense. For these reasons, the organizational structure and practices of emergency health services at the country level are important (1). Developments in the provision of ambulance services in Turkey started in the late 1980s. In 1986, ambulance services were started to be provided in the form of patient transportation in three metropolitan cities (Ankara, Istanbul, Izmir) under the name of "Hızır Emergency Service", and in 1994, a new system was put into operation under the name of "112 Emergency Aid and Rescue". As of this year, for the first time, a team consisting of general practitioners, nurses and drivers has started to work in ambulances. Today, health professionals trained in emergency interventions, such as paramedics and emergency medical technicians, have been added to this team (2). The Command-and-Control Center (CCC) works under the chief physician of the provincial ambulance service (3). Centers are established in appropriate physical structures with enough personnel, technical equipment and software infrastructure according to the population of the province, the number of emergency health calls, the number of stations and the characteristics of the province (4). The ability of the CCC to manage all ambulances must have all kinds of communication with other centers, emergency departments of hospitals and intensive care units. The aim of this study is to investigate the calls made to 112 CCC and the use of Emergency Health Services (ASH) in our province, and to obtain information about the functioning of emergency health services.

Materials and Method

First of all, written approval was obtained from the XXX Provincial Health Directorate for the study. Study data were obtained from 112 CCC chief physicians. A retrospective descriptive study was conducted by evaluating the

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records of a total of 2,361,145 applications of 112 ASHs for the years 2012-2013. The variables of the study were determined according to the data available in the records. These variables are mentioned below.

Age, gender, reason for emergency call (medical diseases, traffic accident, work accident, other accidents, trauma, suicide, fire, health measures, protocol and other reasons), non-medical calls, ambulance exit rates to calls, ambulance transportation times to the scene, preliminary diagnoses of cases (cardiovascular system diseases, respiratory system, neurological, gastrointestinal system, psychiatric, genitourinary system, gynecology and obstetrics, metabolic, infectious diseases, newborn, poisonings, trauma and other causes), the results of the cases (on-site intervention, transfer to the hospital, transfer between hospitals, transfer for medical examination, transfer to home, ex, refusal of transfer, other arrivals, cancellation of duty, transfer by another vehicle, waiting at the scene, other), distribution according to the hospital they were taken to (xxx State Hospital (DDH), Servergazi State Hospital, xxxx University Medical Faculty Hospital (XXXTF), Private Hospitals, District Hospitals, Out-of-province hospitals).

During the study, the numerical proportions of 112 applications for assistance from emergency health services in 2012-2013 in XXX province, as well as the numerical proportions of unnecessary calls made to 112 health services during the study period were examined. The following data were found in the searches related to the actual disease in the admissions:

1. Ambulance exit rates to calls
2. Distribution of cases by gender
3. Distribution of cases by age
4. Transit times analysis
5. Analysis of diseases according to their preliminary diagnosis
6. Distribution of cases according to the reasons for the call
7. Distribution of cases by results
8. Distribution of hospitals visited

In the data prepared using the SPSS 17 statistical system, the T Test was used to determine the transportation rates in the urban. The Mann Whitney U Test was used to determine rural and general transportation rates. The Pearson chi-square test was used to determine the distribution of cases by age and gender, analysis by seasons, analysis by reasons for calling, distribution of cases according to results, and distribution of cases according to the hospital where they were taken

Result

During the two-year study, it was determined that there were a total of 2,361,145 applications by phone (1,176,126 calls in 2012, 1,185,019 calls in 2013) from the 112 ASH records of the Provincial Health Directorate. The distribution of medical calls to CCC by month and the rate of ambulance assignment to these calls are given in Table 1. When the seasonal distribution of the calls made during the study period was examined, it was determined that it was more in the summer months (spring 23.5%, summer 27.4%, autumn 24.9%, winter 24.2%). In 2012, the rate of non-medical unnecessary calls was 94.3% (n=1,110,020) and in 2013 it was 94.2% (n=1,116,652). It was determined that there was no difference in the distribution of patients who received medical calls according to gender (p<0.001). Men (51.9%) in 2012 and women (52.3%) in 2013 were in the majority. When the distribution of patients by age was examined, it was determined that 112 ambulance systems frequently served patients between the ages of 18-64 (58.2%), while the percentage rates of pediatric and over-65 patient groups were 11.3% and 30.5%, respectively.

Table 1: Distribution of cases with and without ambulance exit by month.

	Entire Medical Calls n (%)	Those with ambulance exit n (%)	Those who do not have an ambulance exit n (%)
January	10564 (7,85)	9244 (7,84)	1330 (8,02)
February	10345 (7,69)	9045 (7,67)	1300 (7,84)
March	10778 (8,01)	9473 (8,03)	1305 (7,87)
April	10821 (8,04)	9129 (7,74)	1581 (9,53)
May	11221 (8,34)	9884 (8,38)	1337 (8,06)
June	10845 (8,06)	9465 (8,02)	1380 (8,32)
July	11826 (8,79)	10524 (8,92)	1302 (7,85)
August	12238 (9,10)	10918 (9,26)	1420 (8,56)
September	11307 (8,40)	10038 (8,51)	1269 (7,65)
October	10918 (8,11)	9581 (8,12)	1337 (8,06)
November	11753 (8,74)	10273 (8,71)	1480 (8,92)
December	11857 (8,81)	10317 (8,75)	1670 (10,07)
Sum	134473	117881	16581

In 2012, the average transportation time of 112 ambulances to cases was 8.6 minutes, while in 2013 this time increased to 9.2 minutes. During the study, the distribution of transportation times by ambulance to the patients by months is given in Table 2. In 2012, 112 ambulances reached the cases in an average of 6.5 minutes in urban areas, while in 2013 this period was determined as 6.9 minutes. A statistically significant difference was found when the urban transportation rates of 2012 and 2013 were compared (p<0.001). In 2013, it was determined that this period was longer. In 2012, 112 ambulances reached an average of 15.2 minutes in rural areas, while in 2013 this period was determined as 15.5 minutes. A statistically significant difference was found when the transportation rates in rural areas in 2012 and 2013 were compared (p=0.022). During the study period, medical cases were found to be the most common reason for calls (71% in 2012 and 73% in 2013).

Table 2: Distribution of non-medical junk calls by month

PERIOD	URBAN TRANSPORTATION RATE %	URBAN TRANSPORTATION TIME MIN	TRANSPORTATION RATE IN RURAL AREAS %	TRANSPORTATION TIME IN THE COUNTRYSIDE MIN	TRANSPORTATION TIME MIN (GENERAL)
JANUARY	88,36	6,95	93,1	16,3	9,15
FEBRUARY	88,43	6,85	92,81	16,05	8,95
MARCH	90,03	6,6	94,49	15,15	8,5
APRIL	89,17	6,6	95,92	14,7	8,6
MAY	87,92	6,7	94,91	15,5	8,85
JUNE	89,28	6,6	95,11	15,3	8,85
JULY	88,07	6,75	94,82	15,4	9,05
AUGUST	89,68	6,65	94,52	15	9,25
SEPTEMBER	88,98	6,75	95,2	15,6	9
OCTOBER	88,92	6,75	95,58	15,25	8,9
NOVEMBER	89,75	6,65	95,24	14,95	8,55
DECEMBER	86,9	7	93,28	15,7	8,8
ANNUAL AVERAGE	88,79	6,7375	94,58166667	15,40833333	8,870833333

When the analysis of the patients with ambulance exit according to the preliminary diagnoses was examined, it was determined that trauma cases (23.3% in 2012, 22.2% in 2013) constituted the largest patient group. This was followed by cardiovascular system diseases and psychiatric diseases, respectively. It constitutes the most important part of the During the study, the distribution of cases according to reasons for calls and preliminary diagnoses is presented in Table 3. The distribution of cases according to the results is given in Table 4. It was determined that most of the cases resulted in transfer to a hospital (63.6%). Finally, it was investigated to which hospitals 112 ambulances transported patients throughout the province. In 2012 and 2013, the percentage of patients transplanted by year... increase (32910 in 2012, 35171 in the following year). The two largest public hospitals across the province were the hospitals with the highest number of cases (32% and 19%, respectively). This

Table 3: COVID-19 articles in journals

Journal	*Total Articles*	*Total COVID-19 Articles*	*Total COVID-19 Articles/Total Articles*
Ulus Travma Acil Cerrahi Derg	511	33	0,06
TJEM	112	10	0,08
EAJEM	130	16	0,12
J Emerg Med Case Rep	109	11	0,1
Anatolian J Emerg Medicine	82	8	0,09
Eurasian J Crit Care	77	9	0,11
Eurasian J Tox	48	0	0
Glob Emerg Crit Care	12	4	0,33

Ulus Travma Acil Cerrahi Derg: Turkish Journal of trauma and Emergency Surgery **TJEM:** Turkish Journal of Emergency Medicine, **EAJEM:** Eurasian Journal of Emergency Medicine, **J Emerg Med Case Rep:** Journal of Emergency Medicine Case Reports, **Anatolian J Emerg Medicine:** Anatolian Journal of Emergency Medicine, **Eurasian J Crit Care:** Eurasian Journal of Critical Care, **Eurasian J Tox:** Eurasian Journal of Toxicology, **Glob Emerg Crit Care:** Global Emergency and Critical Care

Table 3: Distribution of cases according to reasons for calls and preliminary diagnoses during the study period

Reasons for the call	**N: 89028**	**%**
MEDICAL	64219	72%
TRAFFIC ACCIDENT	11096	12%
WORK ACCIDENT	998	1%
OTHER ACCIDENTS	7693	9%
INJURY	2247	3%
SUICİDE	1789	2,00%
FIRE	339	0%
HEALTH PRECAUTIONS	445	0%
PROTOCOL	70	0%
OTHER	132	0%
Preliminary diagnoses	N:85030	%
KVS	16189	%19,03
RESPIRATORY SYSTEM	5799	%6,81
NEUROLOGICAL	2944	%3,46
GIS	1284	%1,51
PSYCHIATRIC	9936	%11,68
NYD	1910	%2,24
OBSTETRICS	1189	%1,39
METABOLİC	1915	%2,25
INFECTIOUS DISEASES	465	%0,54
NEWBORN	177	%0,2
POISONINGS	2064	%2,42
TRAUMA	19336	%22,74
OTHER	21822	%25,66

Table 4: Distribution of cases according to reasons for calls and preliminary diagnoses during the study period

	n (%)	%
TRANSFER TO THE HOSPITAL	56655	63,6
TRANSFER BETWEEN HOSPITALS	11447	12,8
REJECTION OF TRANSPORT	8456	9,5
ON-SITE INTERVENTION	3849	4,3
OTHER ACHIEVEMENTS	2983	3,4
EX (LEFT AT THE SCENE)	1636	1,8
TASK CANCELLATION	1461	1,6
TRANSPORT BY ANOTHER VEHICLE	862	1
WAITING AT THE SCENE	504	0,6
HOME TRANSFER	99	0,1
TRANSPLANT FOR MEDICAL EXAMINATION	30	0,03
OTHER	1046	1,2
SUM	89028	

was followed by university hospital and private hospitals (16% and 9%, respectively). When the years 2012-2013 were compared, there was a significant difference between the hospitals where the cases were taken ($p<0.001$). This difference was especially observed in Denizli State Hospital and Private Hospitals. While patient transfers to Denizli State Hospital decreased during the study period, patient transfers to private hospitals increased (Table 5).

Discussion

In recent years, positive developments have been observed in ambulance services in major cities in Turkey, including Denizli, but there has been a significant increase in the use of emergency call services by patients of all age groups. During the study period, the total number of calls for Denizli Provincial Health Directorate 112 Emergency Services is close to 2.5 million. The number of calls per year averages over one million. When non-medical calls are excluded, the total number of medical calls in 2012 is 66 thousand, and the total number of medical calls in 2013 is around 68 thousand. When this number is proportional to the population, it is around 7% of the total population. In the study of Benli et al. covering the year 2013 in Karabük province, the total number of applications was determined as approximately 22 thousand (14, 15). In the study of Zenginol et al. examining the operation of 112 emergency ambulances in Gaziantep between 2006 and 2008, it was determined that the number of ambulance exits increased every year (16, 17). In our study, it was determined that the number of calls increased over the years. In addition to the increase in the population of Denizli, the increase in the public's knowledge about the use of 112 emergency health services may have been effective in these results. In Europe, the use of emergency health services has gradually increased over the years. In a study conducted in England in 2006, it was observed that the number of ambulance calls between 1997 and 2002 was compared and the number increased every year (18).

Table 4: Distribution of cases by hospitals during the study period

HOSPITAL NAME	NUMBER OF CASES TAKEN TO HOSPITALS IN 2012	NUMBER OF CASES TAKEN TO HOSPITALS IN 2013
DENIZLI STATE HOSPITAL	10969	11079
SERVERGAZI STATE HOSPITAL	6103	6542
PAUTF	5116	5551
PRIVATE HOSPITALS	2889	3441
DISTRICT HOSPITALS	7623	8309
OUT-OF-PROVINCE HOSPITALS	210	249
SUM	32910	35171

In the study conducted by Demirkan et al. in 2013, 330 patients diagnosed with ACS were analyzed and it was determined that only 29% of these patients were brought by ambulance (19). In the study of Türkdoğan et al. in Isparta province covering the year 2011, the ambulance usage rate was 3% (20). In the study of Önge et al. in Adana province covering the dates of December 1, 2009-December 31, 2010, the annual ambulance usage rate was found to be 0.5%. (21,22). In a 2003 national survey conducted in the USA (6), it was found that 14% of the 114 million people admitted to emergency services for various reasons used an ambulance. The ambulance utilization rate in London was reported to be 14% in 2002 (7, 8). The rate of ambulance usage is very low in our country. In the use of the ambulance service; The education level of the people, their expectations, the level of national income, the economic status of the patients and whether they have health insurance or not are the determining factors. Although there have been quantitative and qualitative improvements in ambulance services in recent years, especially in provinces with metropolitan municipalities, the use of ambulance services in Turkey lags behind developed countries.

All these data support that 112 health services are frequently used in the summer months in our country. However, very different results have been found in similar studies conducted in our country. In the study conducted by Benli et al. in 2013, it was determined that the use of emergency health services was highest in the winter months (14). In their study, Nur N. et al. found that there was no difference between the seasons and months of ASH use in geriatric patients, but they pointed out that the use of ASH increased in the winter months (23). In the study of Dündar et al., which investigated the use of emergency services

by geriatric patients, it was determined that the highest ambulance call rate was in the winter months (24).

In our study, the rate of non-medical (unnecessary) calls was 97% among all calls made to 112 CCCs in 2012 and 94% in 2013. It has been determined that these unnecessary searches often increase during the summer months. It was reported that approximately 70% of the calls received by 112 CCCs in Afyon province were unnecessary calls (25-29). These results show that most of the calls made to CCC in our country are made for non-health reasons.

During our study, it was determined that 88% of the medical calls made to Denizli 112 CCC were ambulance exits. This rate is higher than we anticipated. For comparative purposes, no data on this subject could be found in our country. How many of these ambulance exits are for real emergencies should be uncovered by wider research.

In our study, no significant difference was found when the patients using emergency health services were examined according to gender. However, studies conducted in our country often determine that the male gender uses 112 health services. In the study of Kapçı et al. covering the first half of 2013, it was determined that 55% of the cases coming to the emergency department by ambulance were male (15). In the study conducted by Benli et al. in Karabük province in 2013, it was determined that 56% of the searches were made by men (14). In a one-month study by Karakuş et al. covering January 2013, it was determined that 51% of the patients admitted to the emergency department with 112 were male (30). In the study conducted by Önge et al., it was determined that 53.5% of the patients were male (21). In the study conducted by Yurteri et al. in Bursa, it was determined that 63% of the calls were made by men (31). Yildiz M. et al. In the study he conducted in Elazığ province, 60.5% of them, Çetinoğlu EC. et al. In the study conducted in Samsun province, 66% of them were men (32-33). In a three-year study conducted by Zenginol et al., it was determined that male cases were more common (17). In overseas studies, it has been determined that the rate of use of emergency health services by the male gender is high. In an eight-month study conducted by Olia et al. in Italy, in which they examined cases transported to the emergency department by ambulance, it was determined that 53.5% of the calls were male cases (34). In the study conducted by Kawakami et al., it was determined that male cases tended to call ambulances more than women (28).

There are also studies in the literature reporting that the female gender is dominant in the use of 112 emergency health services.

In our study, when the distribution of cases by age was examined, age groups; It is divided into 0-17 years old, 18-64 years old, 65 years and over. 112 The age group that uses emergency health services the most is 18-64 (58%). The rate of cases aged 65 and over has been determined as 30%. In our study, there was no statistically significant difference in the age group distribution in both years. In the study conducted by Kawakami et al., it was reported that one of the most important factors affecting ambulance use is age. It was revealed that the decision to call an ambulance was made more easily in the elderly (28). In the study conducted by Victor et al., it was stated that 40% of all ambulance calls in London were made by people aged 60 and over (35). In the study conducted by Kıdak et al., it was stated that approximately one-fourth (26.7%) of the total applications in 2004-2005 were elderly people aged 65 and over (2). In the study conducted by Zenginol et al., when the number of cases by age groups was examined, it was determined that the case group over the age of 65 was the highest (17.9%) in three years (17,31,36).

In pre-hospital care, the time to reach the area where the intervention will be made is very important. This time has been reported by the American Heart Association as eight minutes for advanced cardiac life support ambulances (17). Experts reported that at least 20% of those who lost their lives could be saved with conscious, high-quality, accurate and fast emergency aid services (37). In our study, when the transportation times were examined by years, it was determined that 89% of the cases in 2012 reached the scene in 6.5 minutes, and 87% of the cases in 2013 reached the scene in 6.9 minutes. Altintas KH. et al. In the study conducted in Ankara, they found that the transportation time of ambulances to the case was 15% under 5 minutes, 35.5% in 5-9 minutes, 26% in 10-14 minutes and 24% in over 15 minutes (38). In the study of Karakuş et al. covering January 2013, the rate of cases reached in 10 minutes or less was 68.3% and 80% of the cases could be reached in the first 13 minutes (30). In the study conducted by Önge et al., the time elapsed during the transfer of patients from the scene by ambulance to the hospital was determined and it was determined that 45.5% of them were brought to the hospital in 20-29 minutes (21). As a result, the ambulance transportation rates we obtained in our study are at acceptable levels for our country.

Studies on average ambulance arrival times in the literature vary greatly according to the country. Ong ME. et al. In his study in Singapore, the average arrival time was found to be 8 minutes (39). Campbell et al. reported the response time in the United States as 8.2 minutes (40, 41). In the study of Stoykova et al., while the response time was 8 minutes for 50% of emergency calls in 1996, this rate was found to be 75% in 2001 (42,43). In the study conducted by Zenginol et al. in Gaziantep, the first three reasons for calls were medical cases with 54.6%, traffic accidents with 16.3% and transport cases with 11.9% (17). In the one-month study conducted by Karakuş et al., it was seen that the most common reasons for admission were multiple trauma (18.2%), chest pain (10.6%), pulmonary diseases (9.4%) and neurological diseases (8%) (30,34,44).

When the cases were analyzed according to their preliminary diagnoses, it was determined that trauma

cases constituted the largest patient group in our study. In 2012, trauma cases accounted for 23.3% of the total number of cases, and in 2013, 22.2%. This was followed by cardiovascular system diseases and psychiatric diseases, respectively. According to the 2006 data of the General Directorate of Primary Health Services, trauma ranks first with 25.7% of emergency case pre-diagnoses in Turkey, while CVS diseases rank second with 19.5% (43). In the same yearbook, trauma (24.3%), cardiovascular system diseases (20.6%) and neurological diseases (10.7%) were the most common causes among the preliminary diagnoses in Izmir (T.R. Ministry of Health General Directorate, Primary Health Service, 2007). When we look at most of the studies conducted in our country, it is seen that trauma is in the first place in preliminary diagnoses. Oktay I. et al. In the study conducted in Tekirdağ province, when the preliminary diagnoses of the cases were examined, trauma (33%) ranked 1st, CVS diseases ranked 2nd (18.5%), neurological diseases ranked 3rd (14%), and 4th place were examined by trauma (33%), 2nd place were CVS diseases (18.5%), 3rd place neurological diseases (14%). They found that psychiatric disorders were next (14.5%) (16). In the study conducted by Önge T. et al. in Adana, when the preliminary diagnoses of ambulance teams were examined, they found that trauma calls were in the first place (28%), neurological diseases in the 2nd place (16%) and CVS (14%) in the 3rd place (21,44).

Some studies conducted in 112 health services in our country have shown that non-traumatic causes are more common in preliminary diagnoses. In the study conducted by Dündar et al. in Samsun, when the cases were examined according to their preliminary diagnoses, cardiac diseases (40.5%), neurological diseases (17%) ranked 2nd, respiratory diseases ranked 3rd (10.5%), and trauma (7%) ranked 4th (24,31).

In our study, most of the cases resulted in transfer to the hospital in both years. In 2012, this rate was 64%, while in 2013 it was 63%. Looking at the results of the study conducted by Oktay et al. in Tekirdağ, it is seen that the number of transfers to hospitals has decreased (from 74.4% to 68.4%) and there has been an increase in on-site interventions (from 9.1% to 18.4%) (16). Many studies have reported that the majority of cases result in hospitalization (15, 44, 45). In the three-year study of Zenginol et al. in Gaziantep, it was stated that 62.5% of the cases resulted in hospital transfer and 13.5% resulted in on-site intervention. (17). In the study conducted by Kıdak et al. in Izmir, it was determined that 52% of the cases resulted in transfer to the hospital, and 19% of the cases were intervened on site (2). In the study conducted by Dündar et al. in Samsun, 73.7% of the cases resulted in hospitalization, while 18.4% of them were treated on-site (24). In the study conducted by Yurteri et al. in Bursa, most of the cases were taken to the hospital (31). In the study conducted by Hipskind et al., 30% of ambulance responses in the USA resulted in refusal of transport, and these patients were mostly asymptomatic patients between the ages of 11 and 40 who had been involved in motor vehicle accidents (46). In England and Wales, 17% of patients were not transported to hospital after an emergency ambulance call (45). In a study in the USA, it was reported that 7 out of every 10 patients resulted in a transfer to a hospital (47). When we evaluate the results of all these studies, it is suggestive that the fact that most of the cases result in hospitalization and that most of the patients brought to the hospital are discharged from the emergency departments is a global problem. Large-scale studies should be carried out to reduce the unnecessary use of ambulances in our country and health policies should be developed according to the results.

Limitations: Since the ages of the patients were divided into pediatric (0-17 years), geriatric (over 65 years old) and others, the age groups were classified in this way.

Conclusion

The study's results are promising for the development of 112 emergency health services in our province. However, the high rate of unnecessary calls to the CCC (95.5%) is a significant issue that affects service quality. These calls delay responses to urgent cases, so public awareness campaigns and education are needed. The study found that ambulance response times in urban and rural areas were acceptable, but future population and traffic growth could impact these times. Emphasis should be placed on educating drivers about ambulance priority and on enhancing trauma care training for 112 personnel.

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Original Article
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Mortality Risk Factors at Time on ED Admission in Elderly Patients with Infectious Diseases

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Abstract

Background: As elderly individuals often exhibit heightened vulnerability to infections due to factors such as compromised immune systems, chronic illnesses, and age-related physiological changes, understanding the characteristics and risk factors associated with infectious diseases in this population is crucial. The aim of the present study was to evaluate the characteristics of elderly patients with infectious disease in ED admission and to identify risk factors that influence in-hospital mortality.

Material and Method: In this study, we enrolled 448 adult patients diagnosed with infectious diseases such as pneumonia, urinary tract infection, gastroenteritis, meningitis, and cellulitis. The participants were directly admitted to our Emergency Department (ED) from their homes or their relatives' residences between November 1, 2014, and May 31, 2015. We investigated patient's vital signs, disease signs, source of infection, length of staying at hospital, length of staying at emergency service, mortality related scores, laboratory data, treatment and prognosis.

Results and Conclusion: The rate of emergency care admissions with an infectious etiology was found as 17%. Average age of patients was 76±8 with 180 (40%) of them being female and 268 (60%) of them being male. Mortality rate was found as 23%. Cox regression analysis concluded that for 65 years or older patients, risk factors that effected mortality were; septic shock, cardiac disease and presence of malignancy, absence of COPD/Asthma, higher pCO2 and lower HCO3 at the time of admission to the emergency service. Calculating MEDS score and APACHE 2 score at admission to the emergency department and intensive care unit can facilitate early intervention, improving recovery prospects. Further research and clinical strategies may benefit from these identified predictors to improve the management and outcomes of elderly patients with infectious diseases in the ED.

Keywords: Mortality, Infectious Diseases, Elderly patients

Introduction

The elderly population is proportionally increasing worldwide due to the increasing life expectancy and decreasing birth rate (1) . In line with this increase, the rate of admission of elderly patients to emergency departments (EDs) for a number of diseases such as infectious disease, cardiovascular disease, cerebovascular event, and other their chronic illness is also gradually increasing (2,3). Infectious diseases are the most frequent cause of hospitalization in this population. Elder persons generally are more vulnerable to infections than younger adults because of numerous reasons such as altered host resistance, chronic illnesses and comorbid conditions, age-related lower physiologic reserve and physiological changes, living in a nursing home or in the community, polypharmacy, medical devices surgical wounds, immunsuppressive medications, and malnutrition (4). Also, managing infections in the elderly is challenging and complicated for a number of reasons. Elderly patients frequently present with non-spesific symptomes such as functional impairment, changes in cognition, delirium, anorexia, or generalised weakness that makes infectious disease more difficult to identify (5, 6). The aim of the present study was to evaluate the characteristics of elderly patients with infectious disease in ED admission and to identify risk factors that influence in-hospital mortality.

Material and Method

The investigation was conducted in the ED of xxxxx University hospital. The University's Institutional Review Board approved the study design and participants and/or their relatives provided written consent. The participants were 448 adult patients with infectious disease such as pneumonia, urinary tract infection, gastroenteritis, menengitis, and sellutis etc. who had been directly admitted to our ED from their or relatives's house between November 1, 2014 and May 31, 2015. Inclusion criteria were ≥65

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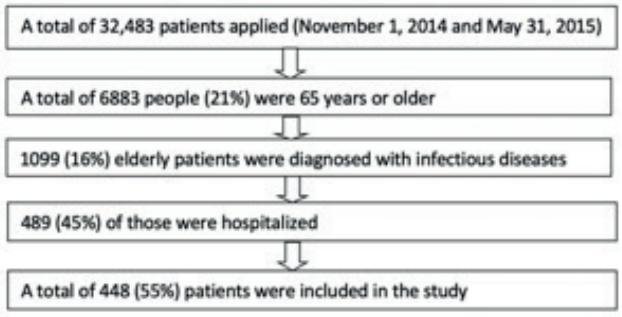

Figure 1: Patient flow chart

years of age, hospitalization, and lived in relative's or their house. Patients were excluded if they were diagnosed except infectious disease, or if they were transferred to our hospital while they were hospitalized in another hospital, or if they died or discharged during ED management. All patients were followed up until hospital discharge or in-hospital death (Figure 1). Standart study forms were prepared for recording to data of the patients during ED admission. When the patient was admmitted to the ED, each patients were monitored and the pulse rate, arterial blood pressure, fever, respiratory rate and oxygen saturations were recorded on the study form. Patients were examined and Glasgow Coma Scales (GCS) was determined (7). While intravenous line was placed, the blood samples were drawn to measure hemoglobin, hematocrit, platelet count, activated partial thromboplastin time (aPTT), international normalized ratio (INR), glucose, lactate, renal function indicators, liver enzymes, arterial blood gases, C-rective protein, procalcitonin, and electrolytes. Also, blood (a minimum of two samples), urine, and other relevant culture specimens were ordered in the ED according to infectious source before antibiotics were administered. The documentation for each patient included detailed information on demographics (age, sex, underlying diaease), presence and source of infection, duration of emegency department, hospital stay, ICU stay, time of initiation of antibiotics, duration of symptoms, main complaints, vital signs and laboratory findings on admission, and outcome. Diagnosis of infection disease was made according to main complaints, physical examination, laboratory findings, and imaging studies. Infections were classified according to origin, provided with the following listings: respiratory system infection (RSI), urinary system infection (USI), gastrointestinal system infection (GSI), hepatobiliary system infection (HBI), intraabdominal infection, soft tissue infection (STI), central nervous system infections (CNSI), and other infections. If any occurrences of organ failure were detected during ED evaluation in the patient with or without sepsis/septic shock, it was recorded to this patient's study form. In each case with or without sepsis/septic shock, MEDS was determined during ED admission (8). Antibiotics in ED were initiated based on consultation with the attending infectious disease specialist.

Statistical analysis

Findings were analyzed with patients categorized in survivor and non-survivor groups. The software package PAWS (Predictive Analytics SoftWare) for Windows version 18.0 (SPSS, Inc., Chicago, IL, USA) was used for statistical analysis. Descriptive statistics were reported, including frequency, mean, standard deviation, median, and interquertile range. Categorical data were analyzed using the chi-square or Fisher's exact test. Continuous data were analyzed using the unpaired *t* test or Mann-Whitney *U* test, depending on whether the data were normally distributed. Multivariate cox-regression analysis was used to assess the independent effect of elderly patient with enfectious disease on occurrence of death. Assumptions of model adaptation and periodic risky were assessed using residual (Schoenfeld and Martingale) analyzes. A p value of ≤ 0.05 was considered statistically significant. Estimated odds ratios (ORs) and their corresponding 95% confidence intervals (CIs) were reported.

Results

During the study period, of total 448 (55%) patients were included to the present study. Table 1 presents patient characteristics, other case details, and results of univariate analysis. The patients were 268 (60%) males and 180 (40%) females of the median age 75 years (range, 65 to 111 years). During the study period, 102 (22%) of the patients died in hospital. While 32 (31%) of those died within 3 days of hospitalization and remaining deaths occurred within 28 or more days of hospitalization. Total 403 (90%) patient had one or more co-existing illness. The non-surviving group had significantly higher median values for MEDS score and lower median values for GCS than surviving goup ($p<0.001$ for both). Median time of antibiotic initiation was significantly lower in the non-survivors than in the survivors ($p=0.001$). The non-surviving group had a shorter mean duration of ED admission and a longer mean duration of ICU stay than surviving group ($p=0.001$ for both). Table 2 presents main complaints of all patients during ED admission. The most common complaints were shortnes of breath in (177 patients, 40%). The results for source of infections, sepsis, septic shock, and organ failure during ED evaluation are shown in Table 3. The most common diagnosis of all patients was respiratory system infections ($n=229$, 51%), urinary tract infections ($n=171$, 38%), hepatobiliary system infections ($n=48$, 11%), and skin/soft tissue infections ($n=21$, 5%). Table 4 summarizes the group results for vital signs and laboratory findings. Table 5 showed the bacterial culture results for the survivors, non-survivors, and all patients together during ED admission. Of 448 patients total, 141 (32%) had one or more positive cultures for blood, urinary, lower respiratory tract, cerebrospinal fluid or skin/soft tissue samples, and the rates of overall culture positivity in surviving and non-surviving groups were not

Table 1: Characteristics of patients diagnosed with infectious disease admitted to ED and the results of univariate analysis

	Survivors (n=346, 77%)	Non-survivors (n=102, 23%)	All patients (n=448)	p
Age (mean±SD)	76±7	77±9	76±8	0.951
65-75 years (no.[%])	164 (48%)	48 (47%)	212 (47%)	0.531
76-85 years (no.[%])	139 (40%)	36 (35%)	175 (39%)	0.221
>85 years (no.[%])	43 (12%)	18 (18%)	61 (14%)	0.119
Sex (no.[%])				0.184
Female	130 (38%)	44 (43%)	174 (39%)	
Male	216 (62%)	58 (57%)	274 (61%)	
Co-existing illness (no.[%])	307 (89%)	96 (94%)	403 (90%)	0.075
Hypertension	138 (40%)	35 (34%)	173 (39%)	0.184
Cardiovascular disease	129 (37%)	33 (32%)	162 (36%)	0.214
Diabetes Mellitus	91 (26%)	26 (26%)	117 (26%)	0.490
Oncologic or hematologic malignancy	80 (23%)	31 (30%)	111 (25%)	0.088
COPD/ Asthma/ interstitial pulmonary disease	79 (23%)	12 (12%)	91 (20%)	**0.009**
Neurologic disorders	63 (18%)	19 (19%)	82 (18%)	0.593
Chronic renal failure	34 (10%)	19 (19%)	53 (12%)	**0.015**
Chronic liver failure	10 (3%)	5 (5%)	15 (3%)	0.240
Others	6 (2%)	3 (3%)	9 (2%)	0.592
MEDS score				0.001
Median	9	14.5	10	
Interquartile range	3 to 23	5 to 25	3 to 25	
GCS				0.001
Median	15	14.5	15	
Interquartile range	4 to 15	5 to 15	3 to 15	
Health care associated infections	90 (26%)	46 (45%)	136 (30%)	**0.001**
Community acquired infections	256 (74%)	56 (55%)	311 (70%)	**0.001**
Duration of symptoms (days)	4±6	4±4	4±5	0.069
Time of antibiotic initiation (h)				0.001
Median	4	2	4	
Interquartile range	1 to 12	1 to 14	1 to14	
ICU admission	107 (31%)	89 (%87)	196 (44%)	**0.001**
Duration of the ED stay (min)	251±125	216±130	243±127	**0.004**
Duration of ICU stay (days)	7±6	12±15	9±11	**0.001**
Duration of hospital stay (days)	12±10	14±16	12±11	0.092

Table 2: Main complaints

	Survivors (n=346)	Non-survivors (n=102)	All patients (n=448)	*p*
Shortness of breath	127 (37%)	50 (49%)	177 (40%)	**0.017**
Generalized weakness	101 (29%)	56 (55%)	157 (35%)	**0.001**
Fever	120 (35%)	28 (27%)	148 (33%)	0.106
Anorexia	93 (27%)	50 (49%)	143 (32%)	0.001
Cough, sputum and hemoptysis	100 (30%)	27 (27%)	127 (28%)	0.288
Nausea and vomiting	80 (23%)	20 (20%)	100 (22%)	0.273
Deterioration in general health status	47 (14%)	50 (49%)	97 (22%)	**0.001**
Abdominal pain	76 (22 %)	16 (16%)	92 (21%)	0.106
Dysuria, hematuria, oliguria or anuria	66 (19%)	14 (14%)	80 (18%)	0.136
Altered level of consciousness	38 (11%)	33 (31%)	71 (16%)	**0.001**
Delirium	45 (13%)	24 (24%)	69 (15%)	**0.009**
Chill	55 (16%)	11 (11%)	66 (15%)	0.130
Chest pain	40 (12%)	6 (6%)	46 (10%)	0.065
Diarrhea	20 (6%)	5 (5%)	25 (6%)	0.479
Flank pain	13 (4%)	2 (2%)	15 (3%)	0.298
Others*	34 (10%)	5 (5%)	39 (9%)	0.083

*Pain (headache, neck pain, back pain, knee pain, whole body pain, etc), vertigo or dizziness, fall, jaundice, itchy, pruritus, rigor, pain, edema or induration, rash, redness, swelling, petechiae or ecchymosis or necrosis; erythema, myalgia, arthralgia, skin ulcer, etc.

statistically different (p>0.05). The cox regression results for the mortality risk factors identified and their influences on death are listed in Table 6.

Discussion

In the elderly population, infections frequently coincide with an array of other health issues, leading to a consistent rise in hospitalization and emergency department admissions due to infectious diseases. This study, consistent with previous research, revealed that 16% of elderly patients admitted to the emergency department were diagnosed with infectious diseases, with nearly half of them requiring hospitalization (9,10). The escalating rates of infectious diseases among the elderly are not only a concern locally but also on a global scale. Swift and accurate diagnosis is paramount to initiate timely treatment and prevent the escalation of infections, especially in a setting where elderly patients may present with atypical symptoms or masked manifestations of illnesses (10,11). Pneumonia emerged as the predominant

Table 3: Source of infections, sepsis, septic shock, and organ failure for all patients during ED admission

Diagnosis	Survivors (n=346)	Non-survivors (n=102)	All patients (n=448)	P
Respiratory system infection (pneumonia)	163 (47%)	66 (65%)	229 (51%)	**0.001**
Urinary tract infection	136 (39%)	35 (34%)	171 (38%)	0.214
Hepatobiliary system infection*	42 (12%)	6 (6%)	48 (11%)	**0.048**
Skin and soft tissue***	16 (5%)	5 (5%)	21 (5%)	0.542
Gastrointestinal system infection**	12 (3%)	4 (4%)	16 (4%)	0.513
Intraabdominal infection****	8 (2%)	6 (6%)	14 (3%)	0.073
Central nervous system infections	3 (1%)	1 (1%)	4 (1%)	0.646
Others*****	15 (4%)	6 (6%)	21 (5%)	0.337
Patients with sepsis and septic shock during ED management				
Sepsis	67 (19%)	49 (48%)	116 (26%)	**0.001**
Septic shock	10 (3%)	25 (25%)	35 (8%)	**0.001**
Organ failure in patients with/without sepsis and septic shock during ED admission				
Organ failure (no.[%])				
Renal failure	81 (23%)	41 (40%)	122 (25%)	0.001
Respiratory failure	38 (11%)	70 (67%)	108 (24%)	**0.001**
Hematologic	46 (13%)	30 (29%)	76 (17%)	**0.001**
Neurologic	32 (9%)	38 (37%)	70 (16%)	**0.001**
Metabolic	22 (6%)	36 (35%)	58 (13%)	0.001
Liver failure	30 (9%)	16 (16%)	46 (10%)	0.035
Cardiovascular failure	13 (4%)	30 (29%)	43 (10%)	**0.001**
Two or more organ failure	64 (18%)	69 (68%)	133 (30%)	**0.001**
No organ failure	176 (51%)	14 (14%)	190 (42%)	0.001

* Cholangitis/cholecystitis/pancreatitis, **Gastroenteritis, diverticulitis, ***Cellulitis, diabetic foot infection, pressure ulcers, necrotizan faciitis, ; ****Intraabdominal abscess, liver abscess, pancreatic abscess, renal abscess, peritonitis etc.; ****Influenza, persistent central venous catheter-related infection, septic arthritis, unknown source, brucellosis, infective endocarditis.

Table 4: Patients' vital signs and laboratory findings during ED admission.

	Survivors (n=346)	**Non-survivors** (n=102)	**All patients** (n=448)	***p****
Vital signs				
Body temperature (°C)	37.1±1	36.9±0.8	37.1±1	**0.023**
<36 °C	12 (3%)	9 (9%)	21 (5%)	**0.029**
36-37.1 °C	191 (55%)	57 (56%)	248 (55%)	0.498
37.2-37.8 °C	49 (14%)	24 (24%)	73 (16%)	**0.020**
≥37.9°C	92 (27%)	12 (12%)	104 (23%)	**0.001**
Mean arterial pressure (mmHg)	93±17	87±25	92±19	0.061
Heart rate (beat/min)	86±22	91±25	87±22	0.034
Respiratory rate (breaths/min)	22±5	26±8	23±6	**0.001**
Laboratory findings				
White blood cell count (10^3 cells/mm3)	14±14	20±28	15±17	**0.024**
Hemoglobin (g/dL)	12.1±2.3	11.3±2.6	12±2.4	0.005
Platelet count (10^3 cells/mm3)	244±142	214±142	240±126	**0.038**
Activated partial thromboplastin time (sec)	33±19	38±31	34±25	**0.031**
International normalized ratio	1.3±0.6	1.4±0.8	1.3±0.6	**0.003**
Serum glucose level (mg/dL)	156±83	163±96	155±90	0.430
Blood urea nitrogen (mg/dL)	32±24	54±36	37±28	**0.001**
Serum creatinine level (mg/dL)	1.5±1.3	2.2±2	1.6±1.5	**0.001**
Serum alanine aminotransferase (IU)	72±207	106±263	78±211	0.532
Serum aspartate aminotransferase (IU)	58±147	74±187	60±150	0.676
Bilirubin (mg/dL)	1.2±1.4	1.6±2.4	1.4±1.8	0.147
C-reactive protein (mg/dL)	10±8	13±11	10±9	**0.002**
Procalcitonin (ng/mL)	2±5	6±13	2.8±8	**0.001**
Lactate (mg/dL)	16±12	27±26	18±17	**0.001**
pH	7.41±0.08	7.35±0.1	7.40±0.1	**0.001**
pCO_2 (mmHg)	34±11	34±12	35±11	0.431
pO_2 (mmHg)	67±12	64±11	67±12	**0.009**
HCO_3 (mEq)	23±5	20±6	22±5	**0.001**
O_2 saturation (%)	92±7	89±7	91±7	**0.001**

*p values for comparisons between the surviving and non-surviving groups.

Table 5: Culture results for all patients which was took during ED evaluation

	Survivors (n=345)	Non-survivors (n=103)	All patients (n=448)	*p**
Lower respiratory tract culture	**17 (5%)**	**11 (11%)**	**28 (6%)**	0.120
Pseudomonas aeruginosa	10 (3%)	3 (3%)	13 (3%)	
Klebsiella pneumonia	5 (2%)	4 (4%)	9 (2%)	
Staphylococcus aureus	1 (0.3%)	1 (1%)	2 (0.4%)	
MRSA	1 (0.3%)	1 (1%)	2 (0.4%)	
E. coli	0 (0%)	2 (2%)	2 (0.4%)	
Urinay culture	**70 (20%)**	**23 (22%)**	**93 (21%)**	0.374
E. coli	47 (14%)	7 (7%)	54 (12%)	
K. pneumonia	11 (%3)	7 (6%)	18 (4%)	
Candida albicans	1 (0.3%)	3 (3%)	4 (1%)	
P. aeruginosa	4 (1%)	2 (2%)	6 (1%)	
E. coli (ESBL +)	4 (1%)	2 (2%)	6 (1%)	
Proteus mirabilis	2 (0.6%)	2 (2%)	4 (1%)	
Enterobacter species	1 (0.3%)	0 (0%)	1 (0.2%)	
Blood culture	**29 (8%)**	**6 (5%)**	**34 (8%)**	0.398
E. coli	18 (5%)	2 (1%)	20 (4%)	
E. coli (ESBL +)	2 (0.6%)	1 (1%)	3 (0.6%)	
K. pneumonia	3 (1%)	1 (1%)	4 (1%)	
MRSA	1 (0.3%)	1 (1%)	2 (0.4%)	
P. aeruginosa	1 (0.3%)	0 (0%)	1 (0.2%)	
S. aureus	2 (0.6%)	1 (1%)	3 (0.6%)	
S. pneumonia	1 (0.3%)	0 (0%)	1 (0.2%)	
Salmonella spp.	1 (0.3%)	0 (0%)	1 (0.2%)	
Skin/soft tissue	**5 (1%)**	**5 (5%)**	**10 (2%)**	0.055
MRSA	0 (%0)	1 (1%)	1 (0.2%)	
P. aeruginosa	3 (1%)	2 (2%)	5 (1%)	
S. aureus	1 (0.3%)	1 (1%)	2 (0.4%)	
S. pyogenes	1 (0.3%)	1 (1%)	2 (0.4%)	
Cerebrospinal fluid culture	**2 (0.6%)**	**1 (1%)**	**3 (0.6%)**	0.544
N. menengiditis	1 (0.3%)	0 (0%)	1 (0.2%)	
S. pneumonia	1 (0.3%)	1 (1%)	2 (0.4%)	

MRSA: Methicillin-resistant Staphylococcus Aureus; ESBL: Extended-spectrum beta-lactamase

infectious disease in our study, followed by urinary tract infections (USI) and hospital-based infections (HBI), aligning with trends observed in long-term care facilities and home health settings (12). Our analysis uncovered an association between mortality and healthcare-associated infections, particularly pneumonia. Diagnosing infectious diseases in the elderly poses a challenge for emergency physicians due to atypical signs, limited patient articulation of concerns, and diminished comprehension levels, compounded by the exacerbation of underlying conditions.

Table 6: Results of multivariate cox-regression analysis

	p	HR	95% CI
Lactate (mg/dL)	0.001	1.03	1.01-1.04
Blood urea nitrogen (mg/dL)	0.001	1.02	1.01-1.03
Serum creatinine level (mg/dL)	0.001	1.47	1.18-1.84
Deterioration in general health status	0.012	1.79	1.13-2.83
Sepsis	0.044	1.65	1.01-2.67
Septic shock	<0.001	3.48	1.65-7.31
Respiratory failure	<0.001	4.10	2.26-7.45
Renal failure	0.005	2.59	1.34-5.03
Cardiovascular failure	<0.001	3.29	2.19-6.74
Multiple organ failure	0.005	2.22	1.27-3.89
MEDS score	0.001	1.11	1.05-1.17

CI: Confidence Interval; HR: Hazard Ratio

Subtle changes resulting from infections in the elderly, coupled with non-specific symptoms, further complicate the diagnostic process. Common symptoms identified in this study included shortness of breath, generalized weakness, fever, and anorexia. Notably, fever, a vital sign in infectious disease diagnosis, may be absent in up to one-third of infected elderly patients. Studies suggest redefining fever criteria for frail older adults to capture subtle temperature changes as a potential indicator of infection (13). Despite fever complaints being prevalent on admission, a significant proportion of patients, especially in the survivor group, did not exhibit fever in the emergency department, potentially delaying diagnosis and treatment. Multiple chronic diseases, multidrug therapy, and a history of hospitalization and antibiotic use emerged as critical factors complicating infections in the elderly (14,15). The aging process, coupled with chronic diseases, heightens susceptibility to infections, making them a leading cause of hospitalization and mortality in the elderly (16,17). Emergency services utilization is higher among the elderly, and they are prone to adverse outcomes post-emergency visits. Infections rank among the top causes of death and hospitalization in individuals aged 65 and older (18). Given the unique characteristics of the geriatric patient population, emergency physicians must tailor their approach, recognizing non-specific symptoms, severe disease presentations, and the presence of resistant microorganisms.

Conclusion

Upon initial presentation to the emergency department, factors such as inadequate control of pCO2, low HCO3 levels, septic shock symptoms, and comorbidities (heart

disease, malignancy, COPD/Asthma) were identified as risk factors contributing to mortality. Timely intervention following the onset of sepsis and septic shock, along with organ immunity, significantly influences hospitalization duration and mortality. Calculating MEDS score and APACHE 2 score at admission to the emergency department and intensive care unit can facilitate early intervention, improving recovery prospects. Further research and clinical strategies may benefit from these identified predictors to improve the management and outcomes of elderly patients with infectious diseases in the ED.

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Case Report
Eurasian Journal of Critical Care

Incidental pulmonary embolism: A Case Report

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Abstract

Pulmonary embolism (PE) is a common clinical condition that generally presents with acute dyspnea, pleuritic chest pain, cough, hemoptysis, tachypnea, tachycardia and hypoxia. Incidental pulmonary embolism (IPE) is defined as an unsuspected filling defect in the pulmonary arteries identified on CT imaging performed for another indication. This report describes a case of Incidental pulmonary embolism (IPE) detected by CT imaging during the follow-up of a 34-year-old male patient who applied to the internal medicine outpatient clinic with weight loss and gastrointestinal system complaints.

Keywords: Pulmonary embolism, incidental pulmonary embolism, emergency medicine

Introduction

Pulmonary embolism (PE) is a common clinical condition observed in an emergency department (1). It generally presents with acute dyspnea and pleuritic chest pain (1,2). Cough, hemoptysis, signs of deep venous thrombosis (DVT) ,tachypnoea, tachycardia and hypoxia are other clinical symptoms. Surgery, acute and chronic medical illness, malignancy, pregnancy, oral contraceptive pill, hormone replacement therapy, thrombophilia, body mass index >30 kg/m2, venous stasis/varicose veins, past history of deep venous thrombosis or pulmonary embolism, prolonged immobilization/travel are the risk factors of PE (2). The Wells Score is an universal guideline to determine the probability of PE (1). Computed tomography (CT) pulmonary angiography (PA) are the most commonly used definitive imaging techniques in PE (2). Incidental pulmonary embolism (IPE) is described as a filling defect in pulmonary arteries identified on CT scans performed for another indication (3,4). The exact prevalence of IPE is uncertain and it varies among different patient groups. However, the prevalence was significantly higher in patients with high-risk VTE factors such as cancer (3.1%).

Case Report

A 34-year-old male patient applied to the internal medicine outpatient clinic with complaints of weight loss and going to the toilet immediately after a meal. The patient has lost 15 kilos in the last 6 months. After CT, the patient was admitted to the emergency department with the diagnosis of incidental pulmonary embolism. In his family history, her mother has diabetes and cirrhosis, her father has hypertension and liver cyst. Her grandfather has pancreatic cancer and her uncle has lung cancer. There was no distinctive feature in his medical history except smoking 10 packs/year. His body temperature was 37, blood pressure was 120/70 mmHg, heart rate was 106 beats/min, respiratory rate was 19/min, SpO2 was 99%, Glasgow Coma Scale was 15 points.

On physical examination, the respiratory sounds were bronchovesicular, he had hepatomegaly, he had varicose veins on his ankle. Other system examinations were normal.

In the venous gas examination of the patient, pH was 7.421, pCo2 was 46.7 and pO2 was 39.2. In the laboratory; the white blood cell count was 6,94 10*3 /uL, the hemoglobin value was 14.5 g/dl, and the platelet count was 376 10*3 / uL. Angiotensin converting enzyme in serum was 46 U/L. In the imagings of the patient, in the computed tomography of the thorax performed on March 24, contrast filling defect areas compatible with embolism were observed in the right main pulmonary artery and its branches. There are subpleural diffuse reticular densities around the majo fissure in the upper lobe apical parts of both lungs and in the lower lobe superior segment localizations, and paraseptal emphysematous changes and subpleural bulla formation in the apical parts. Clexane 0.6 2*1 was started as medical

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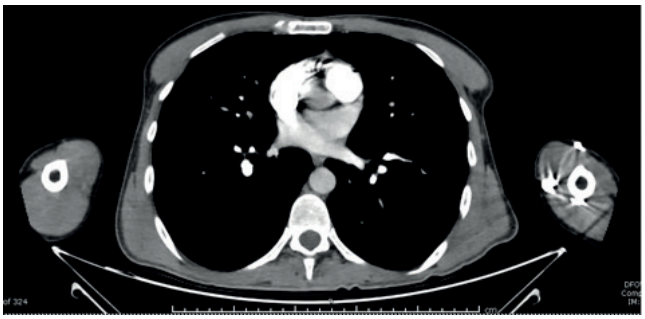

Figure 1: Pulmonary embolism

treatment. The patient was admitted to the internal medicine service from the emergency service for follow-up (Figure 1)

Discussion

Incidental pulmonary embolism (PE) is a frequent finding on routine computed tomography (CT) scans of the chest, occurring in 1.1% of coronary CT scans and 3.6% of oncological CT scans (5). Despite these CT scans having substandard contrast enhancement and have not performed with committed PE protocol Incidental pulmonary emboly was diagnosed accurately. The rate of incidental pulmonary embolism has increased as access to more advanced computerized tomography becomes easier.

Embolic load in incidental PE is lower than symptomatic PE but according to observational studies, the risk of recurrent venous thrombotic disease and mortality are similar to symptomatic PE.

Although the term IPE is defined as silent PE, in an updated analysis with 70 patients and 137 controls, shortness of breath and fatigue remained significantly more prevalent among the IPE cases than among controls. IPE is a compelling clinical condition and there is inadequate data on how to treat these patients (3).

There is a general opinion-based recommendation is to use the same treatment strategy for patients with IPE and symptomatic PE because of the similar prognosis. However, the 2016 American College of Chest Physicians guideline advocate no treatment for low-risk patients with isolated subsegmental PE, in cases of normal bilateral ultrasonography of the legs (5)The major altercation for this suggestion is that a diagnosis of subsegmental PE is more likely to be a false-positive finding than PE located in segmental or more proximal pulmonary arteries, and presumably, DVT is the cause of 'true' subsegmental PE.

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Letter to Editor
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Use of Fresh Frozen Plasma in a Dramatic Case of ACE-Inhibitor Associated Angioedema

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To the Editor,

Angioedema describes a non-dependent, non-pitting and transient edema caused by the accumulation of vasoactive substances in the circulation. These vasoactive substances increase vascular permeability, causing swelling of the deep dermal, submucosal or subcutaneous tissues of the face, lips, neck, extremities or gastrointestinal tract. Urticaria may or may not accompany this condition.1 Angioedema is generally mediated through two pathways: histamine-mediated and bradykinin-mediated. Histamine-mediated angioedema generally responds to standard therapeutic measures (such as antihistamines, steroids and epinephrine), whereas bradykinin-mediated angioedema can be more difficult to manage in emergency departments (ED).2

Angiotensin-converting enzyme inhibitors (ACE-I) are widely prescribed drugs for the treatment of hypertension and heart failure. ACE-I-associated angioedema is one of the well-known side effects of this group of drugs and may sometimes be dramatic and life-threatening. The incidence of angioedema during treatment is 0.1-0.2% and usually occurs in the first week after initiation of the drug.3 Approximately one-third of all cases of angioedema presenting to the ED are ACE-I-related.1,4

Here, we present a patient who presented to our ED with bradykinin-mediated ACE-I-associated dramatic angioedema clinic, did not respond to standard treatments, rapidly improved with fresh frozen plasma (FFP) administration and was discharged after 6 days of follow-up in the emergency critical intensive care unit.

A 65-year-old male patient presented to the ED with swelling of the tongue that developed within hours **(Figure 1a and 1b)**. At presentation, vital signs were stable and consciousness was clear. He had no comorbidities other than hypertension. The patient had no history of any other drug, substance, smoking or alcohol use. The patient was started on a combination of perindopril arginine 10 mg and amlodipine 5 mg for hypertension treatment two weeks ago. The patient had no previous history of angioedema or family history of angioedema. IV fluids, chlorpheniramine and methylprednisolone and intramuscular epinephrine were started in the ED. Despite this treatment, the patient's complaints did not improve and he was hospitalized in the emergency critical intensive care unit. The patient did not respond to additional methylprednisolone and epinephrine treatments was also given IV tranexamic acid and C1-esterase inhibitor treatment. The patient whose complaints did not improve with these treatments for 24 hours was given 3 units of FFP. Then complaints of the patient improved dramatically after treatment was given 2 units of FFP for 2 consecutive days. No intubation or surgical airway procedure was required during hospitalization. The patient was discharged on the 6th day of hospitalization with resolved complaints, good oral intake, normal speech and swallowing, changed antihypertensive medication and recommended dermatology and allergy outpatient follow-up **(Figure 2a and 2b)**.

ACE-I-associated angioedema is more common in blacks, smokers, women, the elderly, patients with

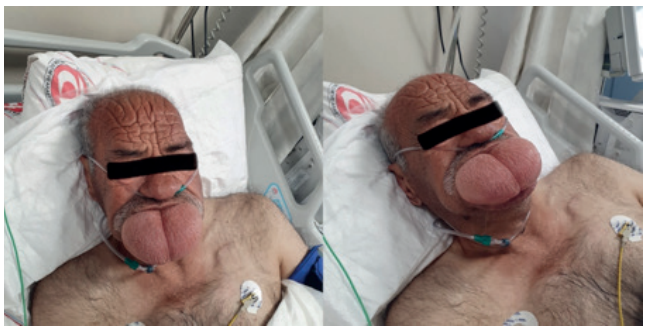

Figure 1a and 1b: Dramatic angioedema of the tongue at the patient's presentation

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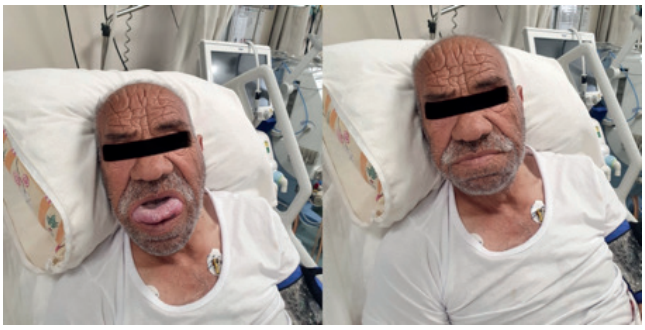

Figure 2a and 2b: Final condition of the patient before discharge after FFP treatment

drug and seasonal allergies, and individuals receiving immunosuppressive therapy.4 Our patient had no history of drug or food allergy and was not receiving any treatment other than antihypertensive therapy. ACE-I therapy may cause an increase in bradykinin and other inflammatory vasoactive peptides, which in turn leads to angioedema due to the development of vasodilation in blood vessels.2 Bradykinin is thought to play a major mediator role in both ACE-I-associated angioedema and hereditary angioedema.3 The ACE enzyme is a primary peptidase that degrades bradykinin under normal conditions, and when the activity of this enzyme is blocked by ACE-I, a very strong vasodilator effect occurs and capillary permeability increases.2 Here, FFP contains Kininase-II, which has similar activity to the ACE enzyme, and this enzyme also degrades bradykinin.2 Because of this feature, it is thought to be effective in cases of refractory angioedema. Although there are studies reporting no statistically significant difference in the duration of hospital or intensive care unit stay and the need for advanced airway interventions in ACE-I-associated angioedema patients with and without FFP therapy5, we believe that FFP therapy may improve patient outcomes in patients with refractory ACE-I-associated angioedema.

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Letter to Editor
Eurasian Journal of Critical Care

The Role of Platelet Levels in Emergency Department Assessment

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To the Editor,

I read the article titled "The Effect of White Blood Cell and Platelet Values on Mortality in Patients with Abdominal Aortic Aneurysm" published in the fifth volume and second issue of your journal with great interest (1). Platelet level is a parameter that is often overlooked in the emergency department (ED). I congratulate the authors for the article investigating the usability of platelet level, an important hematological parameter, in abdominal aortic aneurysm cases who underwent open or endovascular repair. To emphasize the importance of platelet level in the emergency department, I would like to talk about its use in critically ill patients. Platelet levels serve as crucial indicators in the management of patients presenting to the ED. As frontline healthcare providers assess and triage patients in the ED, rapid evaluation of platelet counts aids in the timely identification of individuals at risk of bleeding or coagulation disorders. Thrombocytopenia, defined as a platelet count below the normal range of 150 × 109/L, can signal underlying pathologies such as sepsis, trauma, or medication-related adverse effects, all of which may necessitate urgent medical intervention. Additionally, monitoring platelet levels during the patient's ED stay enables clinicians to gauge the severity of thrombocytopenia and tailor treatment strategies accordingly (2,3). In cases of severe thrombocytopenia or active bleeding, platelet transfusions may be considered to mitigate the risk of hemorrhage and restore hemostasis. However, the decision to transfuse platelets should be based on clinical judgment, considering the patient's overall condition, bleeding risk, and underlying etiology of thrombocytopenia (4,5). Serial monitoring of platelet counts throughout the patient's ED course is essential for assessing treatment response and guiding further management decisions. By integrating platelet levels into the diagnostic and therapeutic algorithms of the ED, healthcare providers can optimize patient care and improve outcomes in a timely and effective manner (6,7). Platelet levels are of paramount importance in the assessment and management of trauma patients, given their pivotal role in hemostasis and coagulation. When a patient sustains traumatic injuries, the body initiates a complex cascade of physiological responses to staunch bleeding and restore hemostasis. Platelets are the primary cellular component responsible for forming blood clots and sealing off damaged blood vessels, thus preventing excessive blood loss. Consequently, upon admission to the emergency department, evaluating the patient's platelet count is crucial in identifying individuals at risk of hemorrhage or coagulopathy. Thrombocytopenia, characterized by a platelet count below the normal range of 150 × 10^9/L, may signify underlying coagulopathies or ongoing bleeding, necessitating prompt intervention to mitigate potential complications (8,9). Moreover, serial monitoring of platelet counts throughout the patient's hospitalization is indispensable for assessing the efficacy of hemostatic interventions and predicting clinical outcomes. Changes in platelet levels over time can provide valuable insights into the patient's response to treatment and help clinicians make informed decisions regarding transfusion therapy, surgical interventions, or adjustments to pharmacological management (9,10). Elevated or declining platelet levels may serve as early indicators of evolving clinical conditions, such as persistent hemorrhage, sepsis-related coagulopathies, or disseminated intravascular coagulation (DIC), prompting timely intervention to optimize patient care and improve outcomes. In summary, platelet levels serve as a critical biomarker in the comprehensive evaluation and ongoing management of trauma patients, underscoring the importance of vigilant monitoring and timely intervention in ensuring favorable clinical outcomes (11). Sepsis is a life-threatening condition characterized by a dysregulated host response to infection, leading to organ

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dysfunction. Thrombocytopenia is a common hematological abnormality observed in patients with sepsis and plays a significant role in the pathophysiology and clinical course of the disease. Thrombocytopenia in sepsis can result from multiple mechanisms, including increased platelet consumption, impaired platelet production, and enhanced platelet destruction (12). The pathogenesis of thrombocytopenia in sepsis is multifactorial and complex. Endothelial activation and damage, systemic inflammation, and dysregulation of the coagulation cascade contribute to the development of thrombocytopenia by promoting platelet aggregation, sequestration, and clearance. Additionally, the release of pro-inflammatory cytokines, such as tumor necrosis factor-alpha and interleukin-6, can directly suppress megakaryocyte function and impair platelet production in the bone marrow (13,14). Thrombocytopenia in sepsis is associated with adverse clinical outcomes, including increased mortality, longer hospital stays, and higher rates of organ dysfunction. The severity of thrombocytopenia often correlates with the severity of sepsis and serves as a prognostic marker for disease progression and outcome (15-17). Patients with severe thrombocytopenia are at greater risk of developing complications such as bleeding diathesis, DIC, and multi-organ failure (18). Management of thrombocytopenia in sepsis focuses on addressing the underlying infection, controlling systemic inflammation, and supporting hemostasis. Platelet transfusion may be considered in patients with severe thrombocytopenia and active bleeding or in those undergoing invasive procedures with a high risk of bleeding. However, the decision to transfuse platelets should be individualized based on the patient's clinical status, bleeding risk, and platelet count trend (19,20). Lastly, thrombocytopenia is a common hematological manifestation of sepsis, reflecting the complex interplay between inflammation, coagulation, and endothelial dysfunction. Understanding the underlying mechanisms of thrombocytopenia in sepsis is crucial for guiding clinical management and improving patient outcomes in this high-risk population. Thrombotic Thrombocytopenic Purpura (TTP) is characterized by thrombocytopenia, microangiopathic hemolytic anemia, and microvascular thrombosis, which can lead to organ damage and systemic complications. Platelet levels play a critical role in the diagnosis and monitoring of TTP. Measurement of platelet counts is essential in the initial evaluation of suspected TTP, as thrombocytopenia is a hallmark feature of the disease. A rapid decline in platelet counts, often accompanied by schistocytes on peripheral blood smear, raises suspicion for TTP and warrants further investigation (21-23). Additionally, monitoring platelet levels during treatment is crucial for assessing disease response and guiding therapeutic interventions. Platelet counts serve as an important marker of disease activity, with an increase indicating treatment efficacy and a decrease suggesting disease exacerbation or relapse (24). Therefore, serial monitoring of platelet levels is integral in the management of TTP, allowing clinicians to optimize treatment strategies and monitor patient outcomes effectively. Hemolytic Uremic Syndrome (HUS) is characterized by microangiopathic hemolytic anemia, thrombocytopenia, and acute renal failure, often triggered by infection with Shiga toxin-producing Escherichia coli or other pathogens. Platelet levels play a crucial role in the diagnosis and management of HUS (25,26). Thrombocytopenia is a hallmark feature of HUS, reflecting the widespread microvascular thrombosis and platelet consumption observed in the disease. Measurement of platelet counts is essential in the initial evaluation of suspected HUS, as a rapid decline in platelet levels, along with other clinical and laboratory findings such as hemolytic anemia and renal impairment, raises suspicion for the diagnosis. Monitoring platelet levels during the disease is critical for assessing response to treatment and predicting clinical outcomes. Serial monitoring of platelet counts allows clinicians to adjust therapeutic interventions as needed and monitor for complications such as hemorrhage or thrombosis (27). Therefore, platelet levels serve as a valuable marker in the diagnosis, monitoring, and management of HUS, guiding clinical decision-making and optimizing patient care. In conclusion, the assessment and management of platelet levels play a vital role in emergency medicine, particularly in the diagnosis and monitoring of various critical conditions such as trauma, sepsis, TTP, and HUS. Thrombocytopenia serves as a crucial indicator for identifying patients at risk of bleeding or coagulation disorders, guiding treatment decisions, and predicting clinical outcomes. By integrating platelet monitoring into the diagnostic and therapeutic algorithms of emergency care, healthcare providers can optimize patient management, improve outcomes, and enhance the overall quality of emergency medical services.

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Letter to Editor
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Electrocardiographic Criteria for Diagnosis of Acute Myocardial Infarction in Patients with Left Bundle Branch Block

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Abstract

In patients with normal heart and normal conduction system, the initial depolarized segment is interventricular septum which start with septal fascicle of the left bundle branch from left side and direction to right side, after that depolarization of the right and left ventricles free wall at the same time developed so that result of a narrow QRS complex(the duration of QRS less than 120 milliseconds).

In patients with left bundle branch is blocked, the initial septal activation is changing direction and become from right to left then the left ventricular activation is delayed becuase of the right ventricle will depolarize first and the left ventricle will depolarize after the right ventricle depolarization and resuts a wide QRS. Additionally, ST segment and T wave abnormalities occur, and septal Q waves indicative of an MI are absent in this condition. About 0.5 percent of patients with acute myocardial infarction had left bundle-branch block.

Because this changes the patients with left bundle branch block (LBBB) and acute myocardial infarction (MI) is challenge to the clinician. The diagnosis of MI with electrocardiogram (ECG) is so difficult in the setting of LBBB because of the characteristic ECG changes caused by altered interventricular septal and left ventricle free wall depolarization. Here we review the ECG diagnostic criteria included all criteria until now and short summary of patient with acute MI and LBBB condition.

Keywords: AMI, LBBB, ECG

Definition of Left bundle branch block (LBBB);

New criteria of LBBB suggested measurement a time to notch more than 75 milliseconds in lead I. additionally to the modern American College of Cardiology (ACC)/American Heart Association (AHA)/Heart Rhythm Society (HRS) ECG criteria for LBBB (1)

- QRS duration ≥120 milliseconds
- A broad notched or slurred R wave in leads I, avl, V5, and V6
- Absence of Q waves in leads I, V5, and V6
- R-wave peak time >60 milliseconds in leads V5 and V6
- ST and T waves usually opposite in direction to the QRS complex).
- A QS or rs pattern in leads V1 and V2
- Mid-QRS notching or slurring in ≥2 of leads I, avl, V1, V2, V5, and V6
- ***The measurement a time to notch more than 75 milliseconds in lead I****. Time to notch is measured as the time from QRS onset to the nadir of the notch or midpoint of a slur. If multiple notches or slurs are present in the QRS complex, the latest one is used. Figure 1*

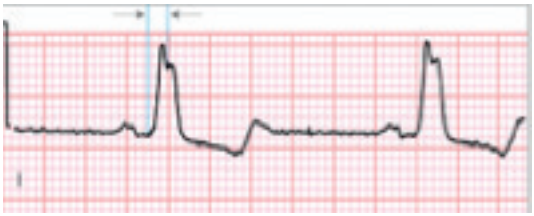

Figure 1: The measurement shown demonstrates a time to notch of approximately 90 milliseconds in lead I.

Diagnostic criteria of myocardial infarction in patient with LBBB.

The Sgarbossa criteria (2)

The Sgarbossa criteria is the most oldest criteria for the diagnosis of MI in the presence of LBBB. The Sgarbossa criteria were first introduced in 1996 to improve the diagnostic accuracy for acute MI in the presence of LBBB. The confirm diagnosis of MI must be need at least 3 or more points from the following criteria. Figure 2

1. ST-elevation of ≥1 mm and concordant with the QRS complex (5 points)

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2. ST-segment depression ≥1 mm in lead V1-3 (3 points)
3. ST elevation ≥5 mm and discordant with the QRS complex (2 points)

The specificity of 98%, but poorer sensitivity of 20%. The third criteria have only 2 point so that no add any significant value as it alone does not confirm diagnosis of acute myocardial infarction.

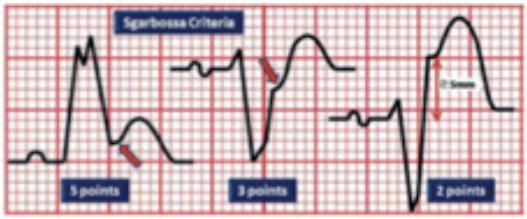

Figure 2: Sgarbossa criteria for myocardial infarction

Modified Sgarbossa (Smith-Sgarbossa) Criteria (3)

Because of the third criteria of Sagarbossa have only 2 point and does not confirm diagnosis of acute myocardial infarction. The modified Sgarbossa criteria was used to modified and support the third criteria by calculation the ratio of ST segment elevation to the depth S wave. The discordant ST/S ratio ≥ 0.25 mm in any lead suggested acute MI. Figure 3

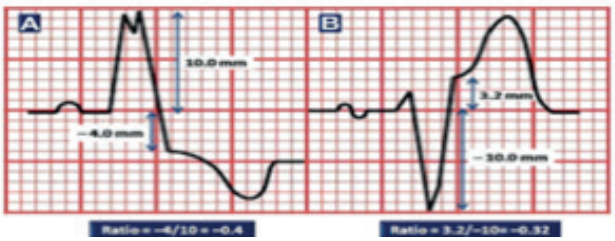

Figure 3: Modified Sgarbossa Criteria for myocardial infarction

The Barcelona Criteria (4)

Barcelona Criteria contains of 3 criteria, As with the prior Sgarbossa criteria , criteria 1 is the same. Criteria 2 is expanded to all leads (but in Sgarbossa just in V1-3). Criteria 3 is specific for the Barcelona criteria and suggested that discordance deviation of ≥ 1mm in any lead with a dominant R or S wave ≤ 6 mm.

A. ST deviation ≥1 mm concordant with QRS complex in any lead;

1. Concordant with QRS complex and ST depression ≥1 mm
2. Concordant with QRS complex and ST elevation ≥1 mm

B. Discordant ST deviation ≥ 1mm with QRS complex in any lead where the R or S is ≤ 6 mm.

For example, III AND aVL leads ST depression ≥1 mm discordant with QRS complex, and (S) wave voltage ≤ 6 mm. And aVR ST elevation ≥1 mm discordant with QRS complex, and (R) wave voltage ≤ 6 mm. figure 4

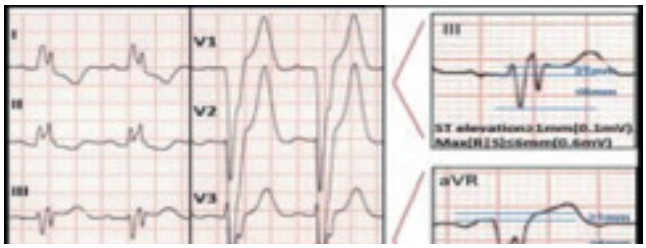

Figure 4: III AND aVL leads ST depression ≥1 mm discordant with QRS complex, and (S) wave voltage ≤ 6 mm. And aVR ST elevation ≥1 mm discordant with QRS complex, and (R) wave voltage ≤ 6 mm.

Summary of electrocardiographic criteria;

This is simple 6 steps for diagnosis patient with LBBB and suspected acute MI. Figure 4

1. Confirm diagnosis of LBBB. If yes go to 2nd step
2. Calculate ST segment deviation ≥ 1 mm in any lead If yes go to 3nd step
3. Concordant or Discordant with QRS complex?
4. If concordant and ≥ 1 mm ST segment deviation in any lead; **Acute MI**
5. If discordant in any lead with R or S is ≤ 6 mm; **Acute MI**
6. If discordant in any lead with R or S is ≥ 6 mm; calculate the ratio of ST segment elevation to the depth S wave. If ≥ 25%; **Acute MI**

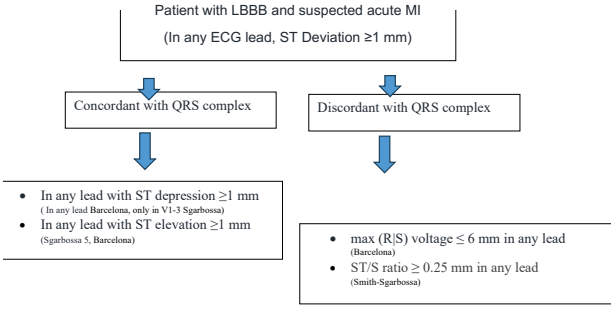

Figure 5: Summary of electrocardiographic criteria; ECG; Electrocardiogram, MI; myocardial infraction

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Letter to Editor
Eurasian Journal of Critical Care

The Impact of Hype on Emergency Department Research

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To the Editor,

Hype, characterized by the exaggerated promotion of a subject or finding beyond its actual significance, is a pervasive issue in medical and scientific research. It can arise for various reasons, including media sensationalism, funding pressures, or misinterpretation of preliminary data. While hype may capture attention and generate interest, it also presents several potential problems. This paper explores the implications of hype in the context of emergency department (ED) research, where the need for accurate and reliable information is critical due to the high-stakes nature of emergency care (1).

The Nature of Hype in Medical Research

Hype in medical research refers to the dissemination of overly optimistic or exaggerated claims about the potential benefits of a new treatment, technology, or scientific finding. This phenomenon can create unrealistic expectations among the public and within the scientific community, leading to various adverse effects (2).

Unrealistic Expectations

Hype can foster unrealistic expectations about the efficacy and applicability of new interventions. When healthcare providers and patients are exposed to exaggerated claims, they may expect immediate and universally positive outcomes. In emergency medicine, where rapid decision-making is crucial, such misconceptions can lead to disappointment and a potential erosion of trust in medical interventions (3).

Scientific Credibility

The credibility of the scientific community is grounded in rigorous, evidence-based research. Overstated claims can undermine this credibility, making it difficult for healthcare professionals and the public to discern reliable information from hype (4). This is particularly problematic in emergency medicine, where the timely application of accurate knowledge can be lifesaving.

Resource Allocation

Research funding and resources are finite, and hype can divert these limited assets towards projects that may not have substantial evidence supporting their efficacy. This misallocation can hinder the advancement of more promising, yet less sensationalized, areas of research. In the ED, where resources are often already stretched thin, this diversion can have significant repercussions.

The Impact of Hype on Emergency Department Research

The implications of hype in ED research are multifaceted, affecting various aspects of patient care and scientific inquiry.

Patient Care

Emergency departments operate under intense pressure, with healthcare providers needing to make swift, evidence-based decisions. Hype can distort clinical priorities, leading to the premature adoption of unproven technologies or treatments (5). This can compromise patient safety and care quality, as interventions that are not thoroughly vetted might introduce unforeseen risks.

Scientific Rigor

Emergency medicine research demands a high level of scientific rigor due to its direct impact on patient outcomes. Hype can compromise this rigor by prioritizing rapid publication and media coverage over meticulous study and validation. This can result in a proliferation of low-quality studies that fail to withstand subsequent scrutiny, ultimately hindering the advancement of the field (6).

Public Perception

The media plays a significant role in shaping public perception of medical research. Hype can lead to the widespread dissemination of misinformation, creating false hope or unwarranted fear. For instance, exaggerated reports about the effectiveness of a new treatment for a common ED condition can lead patients to demand specific interventions, regardless of their suitability (7).

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Long-Term Research Impact

While hype might generate short-term interest, it can be detrimental to long-term research efforts. Emergency medicine research often involves prolonged and rigorous studies to establish reliable evidence (8). Hype can overshadow these essential studies, shifting focus towards more sensational, but less substantiated, research.

Promoting Accurate Reporting

Researchers and clinicians must prioritize accurate and balanced reporting of their findings. This involves presenting data with appropriate context and acknowledging the limitations and uncertainties inherent in scientific research (9). By avoiding sensationalism, the scientific community can maintain its credibility and provide reliable information to healthcare providers and the public.

Critical Media Engagement

The media plays a pivotal role in communicating scientific findings to the broader public (10). Misinformation spread via social media and traditional media has eroded public trust in the healthcare system during pandemic period (11,12). Journalists and media outlets should be encouraged to engage critically with research, seeking expert opinions and providing balanced coverage that highlights both the potential benefits and limitations of new findings. Training programs for journalists on scientific literacy and ethics can be instrumental in achieving this goal.

Evidence-Based Decision Making

Healthcare providers in the ED should rely on evidence-based guidelines and consensus statements when making clinical decisions. By adhering to established protocols and integrating new findings cautiously, clinicians can minimize the influence of hype on patient care. Continuous education and training in evidence-based practices can further reinforce this approach (13).

Transparent Research Practices

Transparency in research practices, including the publication of negative results and the replication of studies, is essential to counteract hype. Journals and funding agencies should incentivize transparency and reproducibility, fostering a research environment that values thoroughness over sensationalism. As stated in literature, highlighting negative results will improve science (14) we thank the editorial board for their courage in publishing this negative article that is informative and successful manuscript (15,16).

Conclusion

Hype presents a significant challenge in the realm of emergency department research, where the stakes are particularly high. By fostering unrealistic expectations, undermining scientific credibility, misallocating resources, and distorting public perception, hype can have far-reaching consequences. To safeguard the integrity of emergency medicine research and ensure optimal patient care, it is imperative that researchers, clinicians, and the media adopt strategies that prioritize accuracy, transparency, and evidence-based decision-making. Through these efforts, the detrimental effects of hype can be mitigated, fostering a more reliable and trustworthy scientific landscape.

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