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Comparison of Pre-Hospital Preliminary Diagnosis and Definitive Diagnosis in Emergency Department

Hastane Öncesi Konulan Ön Tanı ile Acil Serviste Konulan Kesin Tanıların Karşılaştırılması

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ABSTRACT

Aim: In this study, it was examined whether the anamnesis taken by pre-hospital paramedics and the physical examination performed in a limited time were effective as intended in non-trauma patients brought to a secondary level district state hospital by ambulance. In addition, it was evaluated whether appropriate preliminary diagnoses were made during the evaluations and these preliminary diagnoses were compared with the definitive diagnoses made after the examinations performed in the emergency room.
Methods: Between 01.01.2023 and 30.06.2023, patients brought to a State Hospital by ambulance were retrospectively analyzed. All age groups brought from the field for non-traumatic reasons were included in the study. Patients referred from another hospital, admitted to another ward for hospitalization and brought to the emergency department with cardiopulmonary arrest were not included in the study.
Results: During the study period, all patients brought to our emergency department by ambulance were examined. The mean age of the patients was 66. More than half of the cases were female (57.7%). When we compared which system in the body the symptoms and preliminary diagnoses considered by the paramedics belonged to and which system the definitive diagnoses made in the emergency department belonged to, it was observed that there was a statistically moderate level of agreement between the pathologies considered by the 112 teams and the pathologies considered by the emergency department physicians in all body systems except genitourinary system **pathologies (Kappa 0.558).**
Conclusion: It was observed that the preliminary diagnosis or symptom stated in the case form by ambulance workers working in prehospital emergency health services was similar to the definitive diagnostic systems in the emergency department. However, it was determined that 74.9% of the case forms stated symptoms instead of preliminary diagnosis. This may be due to paramedics not wanting to take responsibility by stating a more general approach to patient handover.

Keywords: Definitive diagnosis, Emergency department, Preliminary diagnosis

ÖZ

Amaç: Bu çalışmada ambulansla ikinci basamak bir ilçe devlet hastanesine getirilen travma dışı hastalarda hastane öncesi paramediklerin aldığı anemnez ve kısıtlı sürede yaptığı fizik muayenenin hedeflenen etkinliği gösterip göstermediği incelenmiştir. Ayrıca yapılan değerlendirmelerde uygun ön tanıların konulup konulmadığı değerlendirilmiş ve bu ön tanılar acil serviste yapılan muayeneler **sonrası konulan kesin tanılarla karşılaştırılmıştır.**
Yöntemler: 01.01.2023 ile 30.06.2023 tarihleri arasında bir Devlet Hastanesine ambulans ile getirilen hastalar retrospektif olarak incelendi. Travma dışı nedenlerle sahadan getirilen tüm yaş grupları çalışmaya dahil edildi. Başka bir hastaneden sevk edilen ve kardiyopulmoner arrest ile acil servise getirilen hastalar çalışmaya dahil edilmedi.
Bulgular: Çalışma süresi boyunca acil servisimize ambulans ile getirilen tüm hastalar incelendi. Hastaların yaş ortalaması 66 idi. Olguların yarısından fazlası kadındı (%57,7). Paramedikler tarafından düşünülen semptom ve ön tanıların vücuttaki hangi sisteme dahil oldukları ile acil serviste konulan kesin tanıların hangi sisteme dahil oldukları karşılaştırıldığında, 112 ekipleri tarafından düşünülen patolojiler ile acil servis hekimleri tarafından düşünülen patolojiler arasında genitoüriner sistem patolojileri hariç tüm vücut sistemlerinde istatistiksel olarak orta düzeyde bir uyum olduğu görüldü (Kappa 0.558).
Sonuç: Hastane öncesi acil sağlık hizmetlerinde görev yapan ambulans çalışanlarının vaka formunda belirttikleri ön tanı veya semptomun acil servisteki kesin tanı sistemleri ile benzer olduğu görülmüştür. Ancak vaka formlarının %74,9'unda ön tanı yerine semptom belirtildiği tespit edilmiştir. Bu durum, paramediklerin hasta tesliminde daha genel bir yaklaşım belirterek sorumluluk almak istememelerinden kaynaklanmış olabilir.

Anahtar Kelimeler: Acil tıp, Kesin tanı, Ön tanı

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Introduction

Emergency medicine is a branch of science established to urgently detect life-threatening clinical conditions of patients, to provide the necessary examinations and treatments in a short time and to contribute to the well-being of people [1]. Another task of emergency medicine is to identify pre-hospital vital situations in the field, to start the necessary treatment at the scene or to transfer the case to an appropriate health institution [2]. The main purpose of pre-hospital emergency health services is to provide the necessary intervention in disasters, major traumatic events or emergencies due to chronic diseases and to contribute to the reduction of morbidity and mortality rates by transporting the patient. For this purpose, air, land and sea ambulances are used and ambulances are staffed by physicians, emergency medical technicians or paramedics [3]. Personnel who have medical intervention authority in teams without a doctor and who perform drug applications are called paramedics [4]. Paramedic training was first started in 2000, and as the years progressed, the number of schools, the number of graduates and the number of public employment increased, and then the quality and standardization of education started to be discussed [5]. In this context, the protocol defining the definition of profession, powers and responsibilities was published in 2009, but the lack of updates afterwards has led to various issues [6]. It is expected from the ambulance team working before the hospital to keep records about the patient intervened. These records are very important in order to be accessed by the health personnel who evaluate the patient later or to be applied in case of a legal problem, and this issue is also supported by institutions providing international quality and accreditation services [7].

In this study, it was evaluated whether the anamnesis taken by paramedics before the hospital and the physical examination performed by paramedics in a limited time in non-traumatic patients brought to a second-level district state hospital by ambulance showed targeted effectiveness and whether the appropriate preliminary diagnosis was made in the evaluations made, and these preliminary diagnoses were compared with the definitive diagnoses made after the examinations in the emergency department.

Methods

Between 01.01.2023 and 30.06.2023, patients brought to Akçaabat Haçkalıbaba State Hospital by ambulance were retrospectively analyzed. Male and female patients of all age groups brought from the field for non-traumatic reasons were included in the study. Patients referred from another hospital, admitted to another ward for hospitalization and brought to the emergency department with cardiopulmonary arrest were not included in the study. Approval for our study was obtained from the ethics committee of Karadeniz Technical University Faculty of Medicine (Ethics Committee Decision Date: 08.11.2023 and No: 2023/199). The data were recorded on pre-prepared data forms with the information obtained from the transport forms filled out by 112 ambulance teams and the patient application registration system. Cases with missing data were not included in the study. The age, gender, chronic diseases, the body system to which the symptom or preliminary diagnosis belonged at the first evaluation by 112 teams and thefinal definitive diagnosis of the patient in the emergency department were recorded on the data collection forms. Conditions such as general condition disorder, hyperglycemia, hypoglycemia, high fever, anemia were grouped under the title of other systems. Accordingly, a comparison was made between the preliminary diagnosis considered by prehospital paramedics and the definitive diagnoses made in the emergency department. The study included 808 patients.

The conformity of the data to normal distribution was evaluated by histogram, Q-Q graphs and Shapiro-Wilk test. Kappa statistics were used to evaluate the concordance of pre-hospital preliminary diagnostic systems with hospital definitive diagnostic systems. Sensitivity, selectivity, positive and negative predictive values are given with 95% confidence intervals. Data were analyzed using R 4.3.2 (www.r-project.org) software. Significance level was accepted as $p<0.05$.

Results

During the study period, all patients brought to

our emergency department by ambulance for non-traumatic reasons were examined. The mean age of the patients was 66 years. More than half of the cases were female (57.7%). When the case forms were analyzed, it was found that 9.7% of the 112 teams wrote "general condition disorder" in the section of the form where the symptom or preliminary diagnosis should be specified (Table 1).

Table 1. Demographic characteristics and vital signs of the patients and data of patients evaluated as general status disorder

Female	466 (57.7)
Male	342 (42.3)
Average Age	66.05±21.15
Vital Signs	
Body temperature (°C)	36.35±1.12
Pulse rate (/min)	89.77±20.08
Systolic blood pressure (mmHg)	128.29±30.89
Diastolic blood pressure (mmHg)	76.82±16.54
Content of the information written on the case form	
Symptom	605(74.9)
Preliminary diagnosis	125(15.5)
General Condition Disorder	78(9.7)
Patients assessed as having a general condition disorder (n=78)	
Average Age	80.15±14.24
Definitive diagnostic system	
Respiratory	25(32.1)
Genitourinary	21(26.9)
Neurological	10(12.8)
Cardiovascular	7(9.0)
Musculoskeletal	7(9.0)
Gastrointestinal	2(2.6)
Other	6(7.7)
Ending in the Emergency Department	
Discharged	42(53.8)
Service hospitalization	22(28.2)
Intensive Care Unit hospitalization	9(11.5)
Referred	5(6.4)

Data are expressed as mean±standard deviation and n(%)

Analyzing the patients who were brought to the emergency department by ambulance and whose general condition disorder was written on the case form, it was observed that the mean age was 80 years, respiratory diseases were detected most frequently and more than half of them were discharged from the emergency department (Table 1). Of the 56 patients with a history of Alzheimer's disease, 24 (42.9%) had a prediagnosis of general condition disorder written on the case submission form.

Evaluation of the medical history of the patients included in the study revealed that 52.7% of the patients did not indicate whether they had any disease in their medical history on the 112 case form. Hypertension was the most common disease (22.5%) among the cases with a specified history (Table 2).

Table 2. Diseases in the medical history of the cases and systems in which symptoms or prediagnoses are associated according to vital signs

History of disease	n(%)	
Hypertension	182 (22.5)	
Diabetus Mellitus	103 (12.7)	
Coronary Artery Disease	100 (12.4)	
Alzheimer's	56 (6.9)	
Chronic Obstructive Pulmonary Disease	49 (6.1)	
Cerebrovascular Disease	47 (5.8)	
Malignancy	37 (4.6)	
Chronic Renal Failure	11 (1.4)	
Epilepsy	9 (1.1)	
Benign Prostatic Hyperplasia	2 (0.2)	
Amyotrophic Lateral Sclerosis	2 (0.2)	
Schizophrenia	2 (0.2)	
Parkinson	1 (0.1)	
Unspecified	426 (52.7)	
Systems to which the symptoms or prediagnoses considered by paramedics belong	Cases with systolic blood pressure of 140 mmHg and above (n:313)	Cases with fever of 38 °C and above (n:30)
Cardiovascular	73(23.3)	5(16.7)
Neurological	61(19.5)	2(6.7)
Gastrointestinal	55(17.6)	5(16.7)
Respiratory	47(15.0)	8(26.7)
Musculoskeletal	19(6.1)	-
Genitourinary	8(2.6)	-
Obstetric gynecological	1(0.3)	-
Psychiatric	9(2.9)	1(3.3)
Other	40(12.8)	9(30.0)

Data are expressed as n (%)

On the case submission form, the most frequently marked symptom or prediagnostic system was the cardiovascular system in patients whose systolic blood pressure was measured at 140 mmHg and above (23.3%), while this was found to be "other" systems in patients whose fever was measured at

38 °C and above (30%) (Table 2).

Comparison of the body systems belonging to the symptoms and preliminary diagnoses considered by the paramedics with the body systems belonging to the definitive diagnoses made in the emergency department showed a statistically moderate level of agreement between the pathologies considered by the 112 teams and the pathologies considered by the emergency department physicians in all body systems except the pathologies of the genitourinary system (Kappa 0.558). The diseases with the highest rates of compliance were obstetric and gynecological and psychiatric diseases (Table 3).

Discussion

The emergency medicine system is a system that covers the entire period between the notification of a disease or suspected disease and the treatment of that condition. The hospital part of this system is composed of emergency services and the pre-hospital part of this system is composed of teams working in ambulances [8]. The personnel working in the pre-hospital health system in our country are mostly emergency medical technicians and paramedics [9]. Ambulance crew members are expected to record patient information on standardized forms for each patient they transport. This information can be used later by health professionals and lawyers as both medical and legal records [7].

In our study, it was observed that there was a moderate level of agreement between the symptoms and preliminary diagnoses considered by ambulance workers responsible for prehospital health services and the definitive diagnoses made by emergency department physicians in patients transported from the field to the emergency department.

In the study by Sarı et al. 54.1% of the patients arriving by ambulance were male and 45.9% were female. In the study conducted by Bozatlı et al. in our country, 52.9% of the patients were male and 47.1% were female. In the study conducted by Yıldız et al. the male rate was 60.5% and the female rate was 39.5% [10,11]. In our study, the female to male ratio was 57.7% female and 42.3% male, which is different from the studies conducted in our country, but similar to the studies conducted in other countries [12,13]. The reason for the data in our study may be thought to be due to the fact that the center where the study was conducted serves a certain region and the demographic distribution of the people living in this region.

While the mean age in our study was similar to the study by Bozatlı et al. [1], In other studies conducted in our country, the average age was found to be 47 years [11,14]. The high mean age may be attributed to the fact that pediatric patients were not transported to this hospital by 112 since there was no pediatric emergency department as a separate unit in the hospital where the study was conducted and trauma patients were not included in the study.

In a study conducted by Sarı et al. in a tertiary emergency department, the most frequently mentioned systems among the preliminary diagnoses considered by paramedics in patients admitted with 112 were gastrointestinal system, cardiovascular system and neurological system. In our study, these systems were ranked in the top three and are similar in this respect. In the same study, respiratory causes were not in the top three among the definitive diagnoses made in the emergency department [10], in our study, respiratory system was the most frequently diagnosed system. In the study conducted by Yılmaz et al. in our country, cardiovascular, respiratory and neurologic systems were in the first three ranks among the preliminary diagnoses of the ambulance team, respectively [15]. This study is not similar to our study. Similar to our study, in the study of Önge et al. the most frequently mentioned systems by the ambulance crew were neurological, cardiac and gastrointestinal systems [16]. It is thought that the patients in the region where our study was conducted have a different sociocultural structure compared to the patient groups in other studies.

Although discharge rates from the emergency department are lower than our study in some studies [17,18], it is similar to the study of Önge et al [16]. The high rate of discharge of patients arriving by ambulance from the emergency department is one of the indicators of inappropriate use of ambulances according to a meta-analysis

Table 3. Concordance rates of prehospital and hospital diagnoses

Systems to which the symptom or precipitant considered by 112 belongs n(%)	Systems to which the definitive diagnoses made in the emergency department belong n(%)										
	Cardio vascular eurological	Neurological	Gastro intestinal	Respiratory	Musculo skeletal	Genito urinary	Obstetric gynecological	Psychiatric	Other	Kappa	p
Cardiovascular	82(66.7)	13(9.0)	8(6.7)	17(9.1)	3(6.0)	12(11.0)	0(0.0)	2(5.7)	5(14.3)	0.588	<0.001
Neurological	7(5.7)	110(76.4)	6(5.0)	6(3.2)	7(14.0)	2(2.8)	0(0.0)	3(8.6)	2(5.7)		
Gastrointestinal	7(5.7)	3(2.1)	94(79.0)	9(4.8)	1(2.0)	32(29.4)	1(16.7)	1(2.9)	0(0.0)		
Respiratory	8(6.5)	3(2.1)	2(1.7)	116(62.0)	1(2.0)	5(4.6)	0(0.0)	0(0.0)	1(2.9)		
Musculoskeletal	7(5.0)	0(0.0)	4(3.4)	6(3.2)	31(62.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)		
Genitourinary	0(0.0)	0(0.0)	0(0.0)	1(0.5)	0(0.0)	29(26.6)	0(0.0)	0(0.0)	1(2.9)		
Obstetric gynecological	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	5(83.3)	0(0.0)	0(0.0)		
Psychiatric	3(2.4)	2(1.4)	1(0.8)	1(0.5)	0(0.0)	0(0.0)	0(0.0)	29(82.9)	0(0.0)		
Other	9(7.3)	13(9.0)	4(3.4)	31(16.6)	7(14.0)	28(25.7)	0(0.0)	0(0.0)	26(74.3)		
Total	123 (100)	144 (100)	119 (100)	187 (100)	50 (100)	109 (100)	6 (100)	35 (100)	35 (100)		

by Snooks et al [19]. Evaluation of hospitalization and referral rates, the study of Atilla et al. shows similar rates with our study [17]. The reason why the exitus rates in our study were considerably lower compared to other studies in the literature may be due to the fact that patients brought to the emergency department with cardiopulmonary arrest were not included in the study and that critically ill patients were referred because the hospital where the study was conducted was a district state hospital.

In our study, some patients transported by paramedics did not have any symptoms or prediagnosis of any body system and were delivered to the emergency department on the grounds of general condition disorder. When these cases were analyzed, it was observed that the average age was 80 years and 42.9% of the patients with a history of Alzheimer's disease presented with this complaint. Based on these data, it can be concluded that 112 teams have difficulty in taking anamnesis from geriatric patients, they cannot fully understand the complaints of patients with difficulties in expressing themselves such as Alzheimer's disease, and as a result, they use an expression such as general condition disorder instead of trying to determine the real complaint or preliminary diagnosis of the patients.

On the case submission form, the most frequently marked symptom or prediagnostic system was the cardiovascular system in patients whose systolic blood pressure was measured at 140 mmHg and above (23.3%), while this was found to be "other" systems in patients whose fever was measured at 38 °C and above (30%). This may be due to paramedics writing "hypertension" or "high fever" in the preliminary diagnosis section of the case form, regardless of the patient's complaint or examination. In other words, while the ambulance team can make a preliminary diagnosis of an existing infection by asking a few more questions to a patient with high fever while evaluating the case, patients delivered to the emergency department with only "high fever" may cause both deficiencies in pre-hospital care and delays in hospital functioning. Similarly, the same problems can be seen when a patient with high blood pressure is admitted to the emergency room with a "complaint of hypertension" instead of trying to determine which system this abnormality belongs to.

When the preliminary diagnoses considered by the paramedics before the hospital were compared with the definitive diagnoses made in the hospital, it was observed that the highest rate of similarity was observed in obstetric and gynecological diseases and psychiatric diseases. This may be due to the small number of patients in the obstetric

diseases category and the fact that these patients are pregnant patients. On the other hand, although the correct decision was made in the majority of patients in the psychiatric complaints category, it was observed that 13.8% of the patients who were evaluated as psychiatric cases by the ambulance teams had a definitive diagnosis of cardiovascular and neurological systems.

Conclusion

As a result, it was observed that the preliminary diagnosis or symptom stated in the case form by ambulance workers working in prehospital emergency health services was similar to the definitive diagnostic systems in the emergency department. However, it was found that 74.9% of the case forms indicated symptoms instead of preliminary diagnosis. This may have been due to the fact that the paramedics did not want to take responsibility by taking a more general approach in handing over the patient.

With special trainings to be given to paramedics and emergency medical technicians, their ability to take anamnesis in a limited time and to perform effective and targeted physical examinations can be improved, and in this way, both pre-hospital triage and referral of patients to appropriate centers and pre-hospital medical treatment can be provided without delay.

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