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## TRIAGE ON THE DISPATCH CENTER IN THE EMERGENCY MEDICAL SERVICE NIŠ

### TRIJAŽA NA PRIJEMU POZIVA U ZAVODU ZA HITNU MEDICINSKU POMOĆ NIŠ

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**Summary:** The dispatch center is the first link in the chain of emergency medical care. Triage is a medical procedure in which injured or sick people are classified into triage categories according to the degree of urgency, for the reason of the most efficient approach and adequate help. Emergency calls can be of first, second or third degree. The first-degree emergency call refers to the patients who are vitally endangered and who need professional medical help as soon as possible. The second-degree call indicates patients whose symptoms consider a health disorder that may indirectly be life-threatening. The third degree call of urgency indicates patients who suffer from chronic diseases, who complain of the problems related to the underlying disease and who are already taking certain medications and currently cannot go to their doctor. All these lines of urgency are conditional. The aim of this paper is to analyze the work of triage efficiency on dispatch center, in order to improve it. A random sample of medical calls was analyzed, from which a 1000 calls in the year 2015, were taken. The degree of urgency, which was completed by the doctor at the dispatch center, was compared with the actual condition of the patient, based on an objective examination by the doctor in the field. Out of a 1000 calls, 104 calls were received as the first line of urgency (10.4%), 254 (25.4%) as the second line of emergency and 642 (64.2%) as the third line. The distribution of patients who were incorrectly triaged as the first degree of urgency according to the objective finding, age and difficulties, was analyzed. Of the calls received as a second emergency degree (254), 111 (43.7%) were correctly assessed, and an emergency degree error was made in 143 patients (56.3%). Of the calls received as a third-degree emergency (642), the assessment of the physician at the dispatch center coincided with the objective situation in the field in 606 cases (94.4%) and did not match in 36 patients (5.6%). From the examined sample of 1000 calls, the doctor at the dispatch center correctly assessed the degree of urgency in 766 patients (76.6%), while in 234 patients (23.4%), the degree of urgency was not correctly assessed. In patients who were incorrectly triaged, in 193 cases (82.48%) it was related to over triage, and in 41 (17.52%) it was related to under triage. The causes of incorrect determination of the degree of urgency are numerous, and the consequences are direct and indirect. At the dispatch center, our doctors successfully and in a high percentage (76.6%) perform triage. At the same time, 23.4% of incorrectly triaged patients represent a significant problem, which could be mitigated by the education of patients, additional physician training, introduction of call acceptance protocols and other legislations.

**Keywords:** dispatch center, triage, degree of emergency, assessment.

## INTRODUCTION

Priority dispatch accuracy is a key issue in optimizing the match between patients' medical needs and pre-hospital resources [1]. The dispatch center is the first link in the chain of the emergency medical care. In order for help to be provided in a timely manner to those who really need it, at the dispatch center is a doctor, who, based on the anamnesis or hetero-anamnesis, performs the triage. Triage is a medical procedure by which injured or sick people are classified into triage categories according to the degree of urgency, for the sake of the most efficient approach and adequate help. At the Emergency Medical Service (EMS) Nis, the most experienced doctors of various specialties work at the dispatch center. Calls can be of first, second or third emergency. The first degree emergency call means that patients are vitally endangered and need professional medical help as soon as possible.

The first line of urgency includes:

- Non-breathing patient
- Cardiac arrest
- Loss of consciousness
- Drowning
- Hanging
- Electric shock and lightning
- Strangulation by a foreign object
- Burns involving a large area of the body
- Snake bite
- Wounds inflicted by firearms and cold steel
- Limb cuts with heavy bleeding
- Open fracture of long bones
- Traumatic limb amputations
- Car crash
- Falls from a height
- Massive external bleeding
- Allergy without consciousness
- Unconscious poisoning
- Coma, unknown cause
- The first epi attack
- Convulsions and suffocation in children
- Delivery in progress (contractions with repetition every 5 minutes)
- Other conditions that can be vital to the patient

At the emergency call of the first degree, the team starts in first minutes. The second degree emergency call refers to patients whose symptoms indicate a health disorder that can indirectly be life-threatening. The second order of urgency includes:

- Sudden and severe chest pain
- Sudden and severe abdominal pain
- Acute complication of diabetes
- Stroke
- Allergy (skin changes) in a conscious patient who is breathing normally
- Epi seizure in patients with epilepsy
- Severe asthma attack (with signs of worsening of the disease, sweating, confused)
- Suspected pulmonary edema
- Hypertensive crisis
- Severe and sudden headache accompanied by vomiting
- Minor non-bleeding injuries (skin injuries)
- Minor cuts on a stable patient (conscious and oriented)
- Feeling of suffocation without disturbance of consciousness when the patient is sweaty, blue, has rapid breathing or takes a forced position
- Delivery in progress (contractions for 10 minutes or more)
- Other

At the call of the second degree of urgency, the team leaves immediately, if it is not busy, or with the dispatcher's decision to wait 10 minutes for the release of another team.

The call of the third degree of urgency refers to patients who suffer from chronic diseases, complain of problems related to the underlying disease and who are already taking certain medications and currently cannot go to their doctor (night, lack of means of transport, difficulty moving).

- The third degree of urgency includes:
- Hypertension without signs of complication
- Abdominal pain of known etiology (renal colic, biliary colic)

- Chest pain without the characteristics of ischemic heart disease
- High temperature
- Choking in a conscious patient without objective signs of deterioration
- A cough
- Vomiting and diarrhea
- Malignant diseases
- Sciatica and rheumatic disorders
- Setting I.V. line
- Continuation of therapy (if this is not possible by other health care institutions)
- Therapy indicated by a dentist from our institution
- Other

In the case of a third-degree emergency call, the dispatcher can wait the allowed 30 minutes or more until the team is released.

All these emergency degrees are conditional and the doctor at the dispatch center can, depending on his professional assessment and the data he received, make changes in the emergency order. Also, the doctor at the dispatch center can, after a new conversation with the caller, change the order of urgency of the already received call.

Upon receiving the call, the doctor, based on the anamnesis or heteroanamnesis, assesses whether, and in what order of urgency the team will be referred to the given call. Considering that EMS Nis has seven teams at all times, and covers the area of the city of Nis and 68 villages, with approximately 300, 000 inhabitants and area of 597 km<sup>2</sup>, it is clear that triage decisions of doctors at the dispatch center can be complex and difficult. By asking specific questions, the doctor at the dispatch center has the task to find out the type, character and duration of the patient's current problems, to be informed about the patient's previous illnesses, type of therapy and time when it was taken, as well as whether it is a mobile or immobile patient and what are his current possibilities to visit his family doctor, etc. Also, in addition to all of this above, the doctor at the dispatch center must think about the patient's place of living, time of day, whether the next day is a working day and assess whether the patient who is not vitally

endangered at the time of calling an ambulance, has the opportunity to contact the doctor and if there is a possibility that the patient's health condition will significantly worsen. At the time of receiving the call, the doctor must carefully and thoroughly consider all the information received, and if necessary, start a chain of medical help. In addition, the doctor at dispatch center must, in cooperation with the dispatcher, have insight into the number and current position of free teams, as well as an approximate estimate of the time for which a team will be free, to be able to inform the person who called the EMS about the approximate arrival time, and to instruct him on how to help himself or another until help arrives. The responsibility of the doctor who receives the call is great, because he must orient himself about the condition of the sick or injured person in a short period of time, often having only scant information, and the interlocutor who does not cooperate, does not know what they themselves or someone is suffering from, which drugs he takes and is dissatisfied with the interrogation, demands that the team comes immediately and see for themselves what is wrong, or he panics, insults and even threatens.

#### OBJECTIVE

The aim of this paper is to analyze the work of the efficiency of triage on receiving calls, in order to improve it.

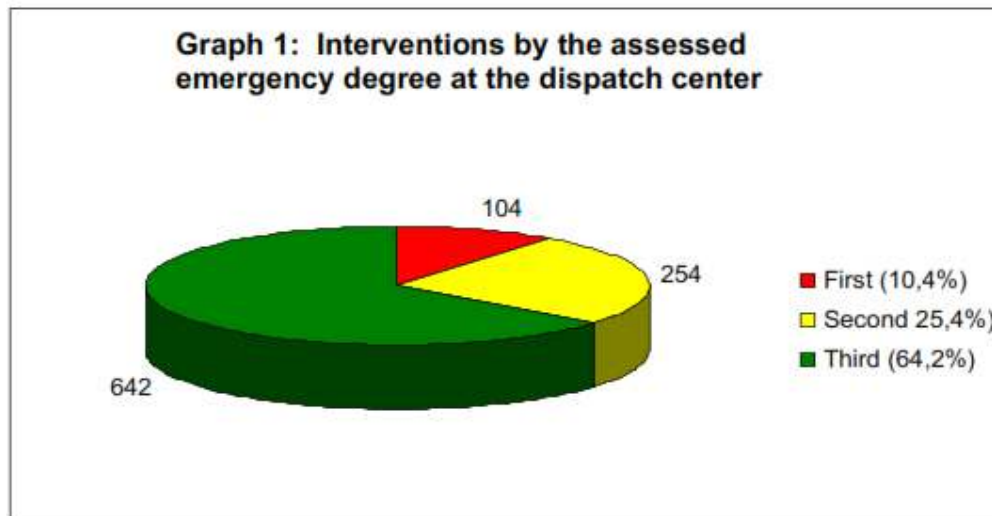
#### MATERIAL AND METHODS

A random sample of EMS interventions from 2015. was analyzed, from which a 1000 were extracted. Interventions related to accidental situations and calls from public places were omitted from the random sample, due to the lack of valid data, as a rule, a higher degree of urgency is completed. The degree of urgency, which was completed by the doctor at the dispatch center, was compared with the actual condition of the patient, based on an objective examination by the doctor in the field. The field physician, with a detailed history / heteroanamnesis and insight into the patient's

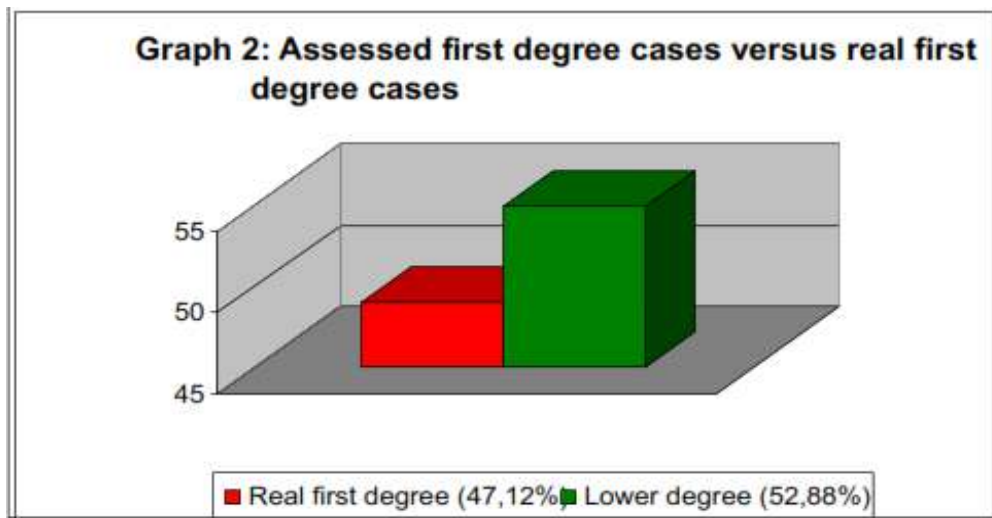
medical records, had the opportunity to measure the patient's blood pressure, blood sugar levels, O<sub>2</sub> saturation, perform a 12-channel ECG, perform a physical examination of the systems, monitor the patient and if necessary, bring it to the observation for further monitoring, basic laboratory analyzes or ultrasound examination. Patients were divided into four groups according to age: up to 30 years, 31-50 years, 51-65 years and over 65 years. The authors divided the distribution of incorrectly triaged patients by sex, age and problems.

From the 1000 interventions, 104 calls were received as the first degree of emergency (10.4%), 254 as the second degree of emergency (25.4%) and 642 as the third degree of emergency (64.2%). The distribution of patients who were incorrectly triaged as the first order of urgency according to the objective finding, age and difficulties was analyzed. Of the calls received as a first degree of emergency (104), 49 (47.12%) were correctly assessed, while 55 cases (52.88%) were minor illnesses or conditions.

## RESULTS



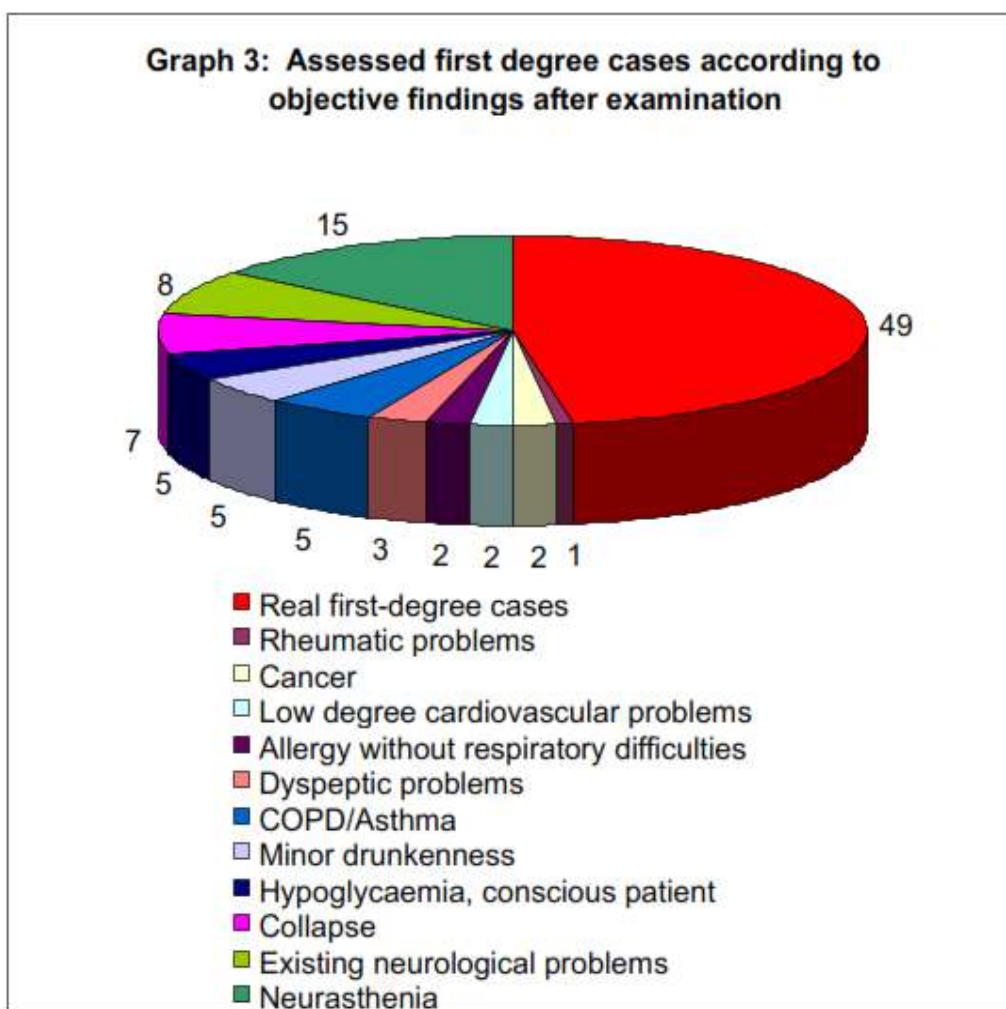
Graph. 1: Interventions by the assessed Emergency degree at the dispatch center



Graph. 2: Assessed first degree cases versus real first degree cases

Among the first degree assessed cases, one patient was with rheumatic problems, 2 patients with malignant disease who were not vitally endangered at that time, 2 patients with cardiac problems that did not require further follow-up, 2 patients with allergy without suffocation, 3 patients with dyspeptic problems were admitted as a first priority, 5 patients with mild respiratory distress due to chronic obstructive pulmonary disease

(COPD) or asthma, 5 patients under the influence of alcohol who were conscious and self-active, 5 mild hypoglycaemia in patients with diabetes and who did not have a disorder of consciousness, 7 patients who collapsed due to a known cause and whose follow-up was not required, 8 patients with neurological problems which they had previously and 15 patients with various neurasthenic problems.



Graph 3. Assesed first degree cases according to objective findings after examination

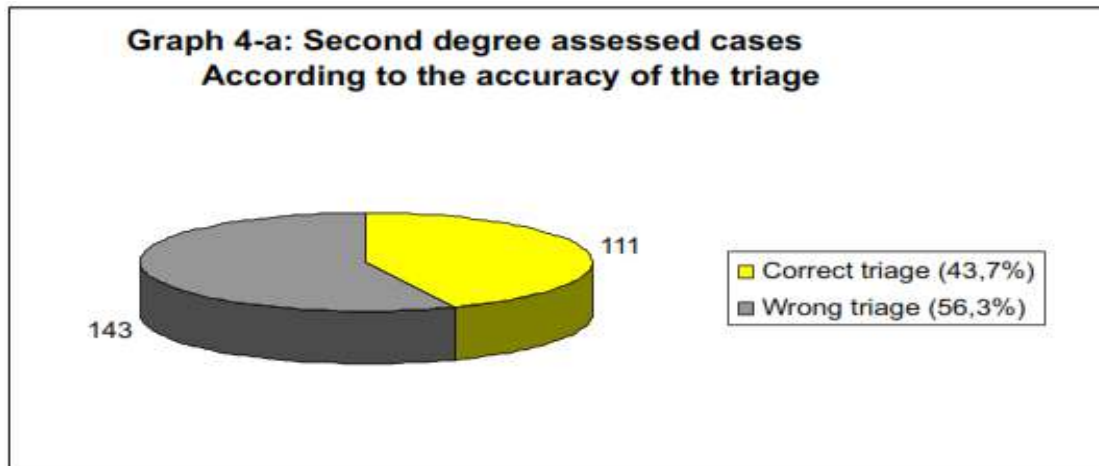
Of the 55 patients who were incorrectly triaged as a first degree of emergency, 29 were women and 26 were men. The largest number of incorrectly triaged patients belonged to the group older than 65 years. Of the calls received as a second degree of emergency (254), 111 (43.7%) were correctly assessed, and an

emergency order error was made in 143 patients (56.3%).

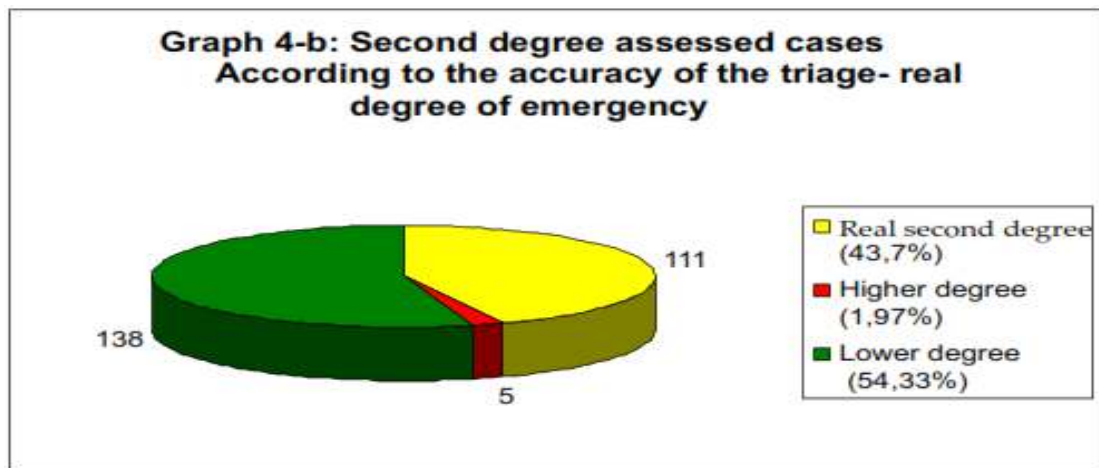
In 5 cases (1.97%), these were vitally endangered patients who could not wait: 2 patients exited until the arrival of the team, 2 patients had a myocardial infarction, and 1 patient had pulmonary oedema.

Age	Man	Women	Total
Under 30	2	4	6
30-50	5	6	11
51-65	5	9	14
Above 65	14	10	24

Table 1: Overview of the patients who were incorrectly triaged as a first degree of emergency by age and sex



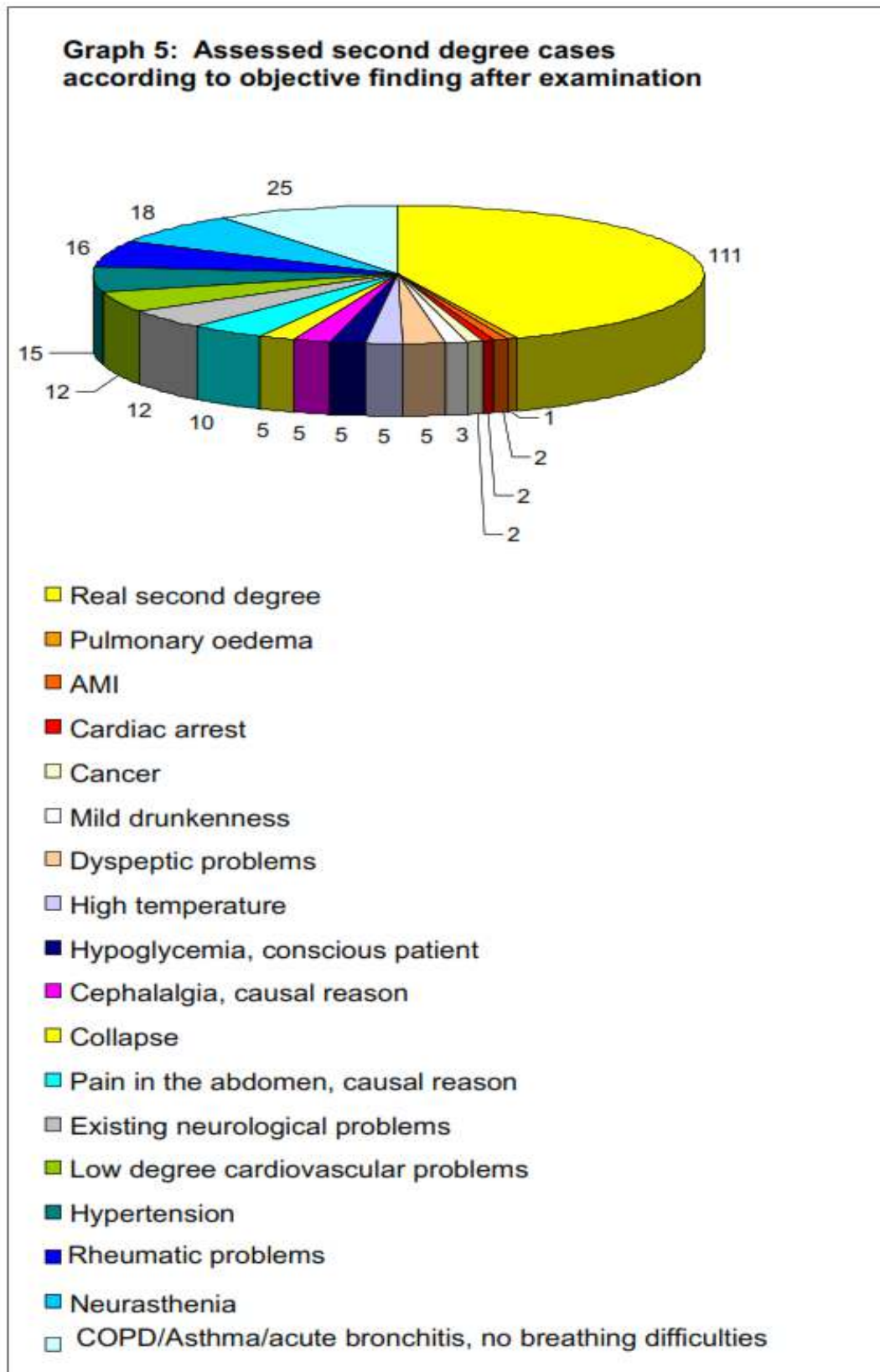
Graph 4-a: Second degree assessed cases according to the accuracy of the triage



Graph 4-b: Second degree assessed cases according to the accuracy of the triage – real degree of emergency

In 138 cases (54.33%) patients had milder symptoms: 2 due to malignant disease, 3 patients had a mild degree of alcoholism, 5 dyspeptic symptoms, 5 fever, 5 due to milder hypoglycemia, 5 patients had a headache of known etiology, 5 had a collapse condition of known cause, 10 had abdominal pain of known etiology, 12 ailments due to a known

neurological disease or condition, 12 heart ailments that otherwise have regularly or daily, and did not require further monitoring, 15 hypertension, 16 patients had rheumatic problems, 18 had neurasthenic problems, and 25 of them had mild breathing problems due to asthma, chronic or acute bronchitis.



Graph 5: Assessed second degree cases according to objective finding after examination

Age	Man	Women	Total
Under 30	4	2	6
30-50	19	23	42
51-65	17	21	38
Above 65	17	35	52

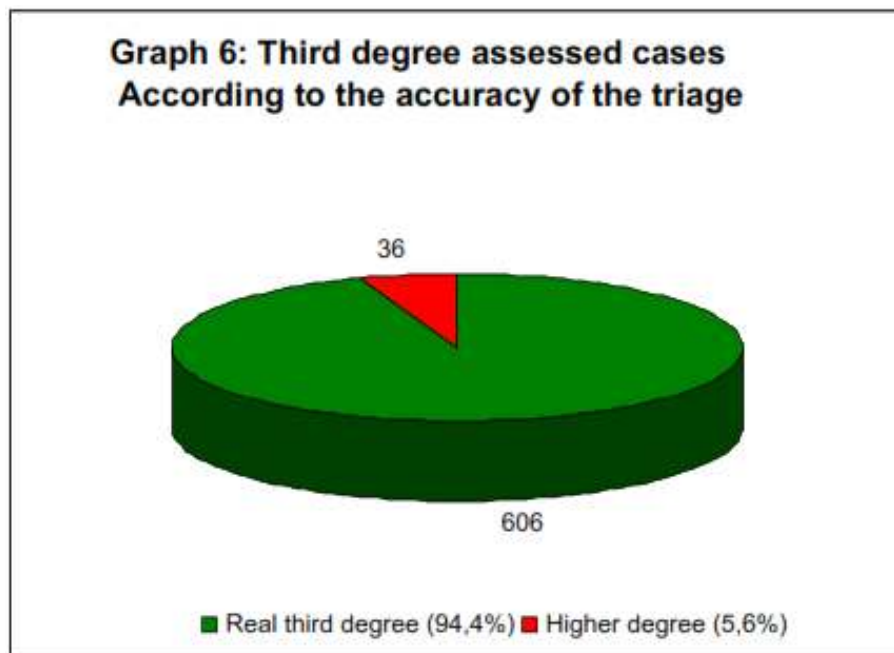
Table 2: Overview of the patients who were incorrectly triaged as a second degree of urgency by age and sex

Of the patients who were incorrectly triaged as a lower emergency, there were 3 men and 2 women. In both cases, women exited. One patient belonged to the group of 51-65 years, and four were older than 65 years.

Of the patients who were incorrectly triaged as a second degree of emergency, and were of a lower degree of urgency, 81 were women and 57 were men. The largest number of patients,

who were unjustifiably assigned a higher degree of urgency were women older than 65 years.

Of the calls received as a third-degree emergency (642), the assessment of the physician at the reception coincided with the objective situation in the field in 606 cases (94.4%), and did not match in 36 patients (5.6%).



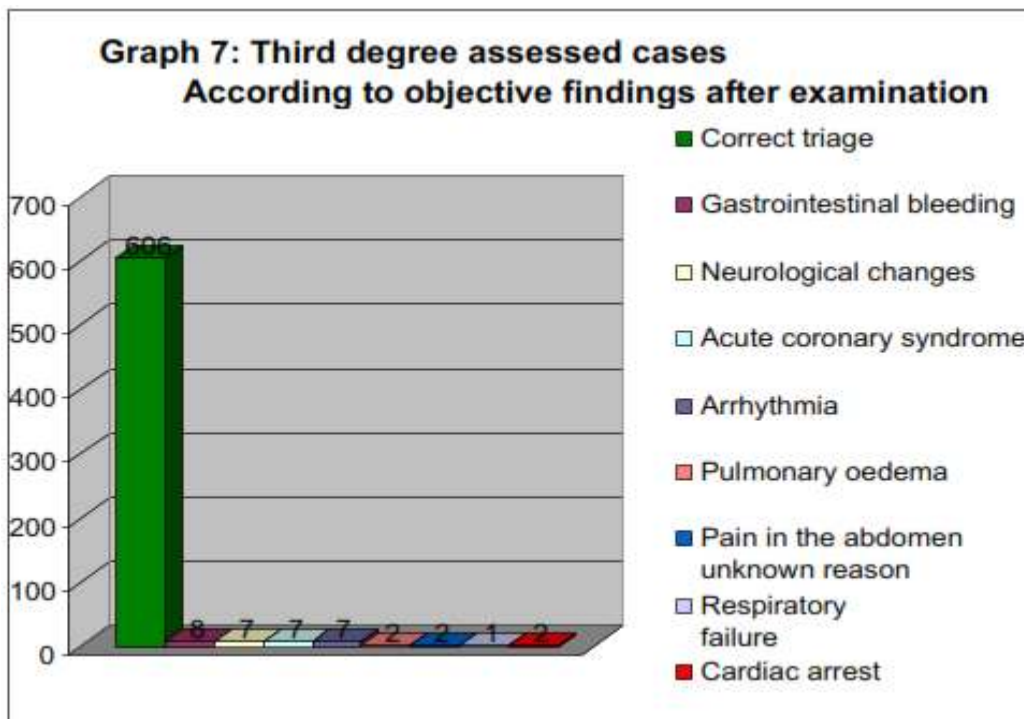
Graph. 6. Third degree assessed cases according to the accuracy of the triage

In 34 cases (5.29%) there were patients whose condition required intensive therapy and hospitalization: 8 patients had severe bleeding from the digestive tract, 7 patients had symptoms and / or signs of acute coronary syndrome, 7 had a heart rhythm disorder that had to be monitored and resolved by parenteral therapy, 7 new neurological problems, 2 patients had pulmonary oedema, 2

had abdominal pain of unknown etiology that required urgent diagnosis, 1 patient was in respiratory failure due to worsening COPD, while in 2 cases (0.31%) patients were found without vital signs.

Of the 36 incorrectly triaged patients, 16 were women and 20 were men. The patients who survived were women and belonged to the group older than 65 years.

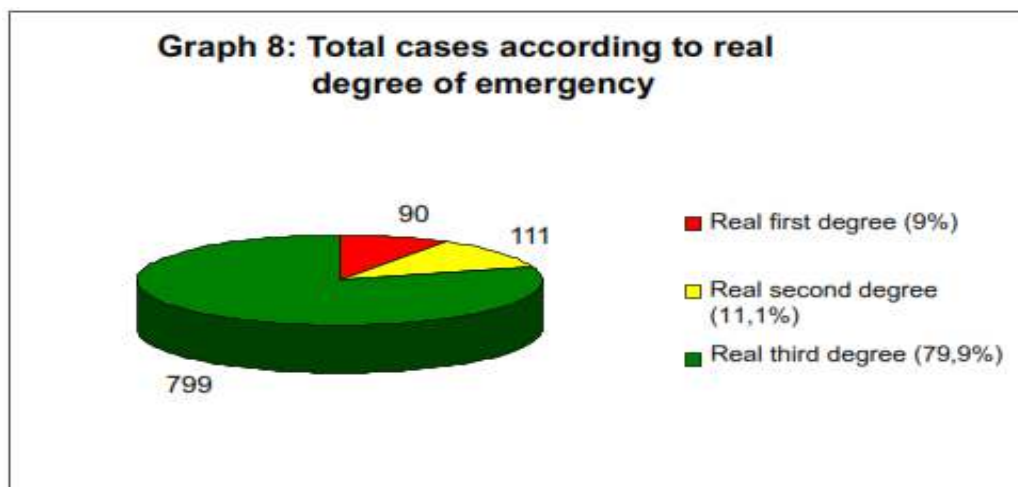




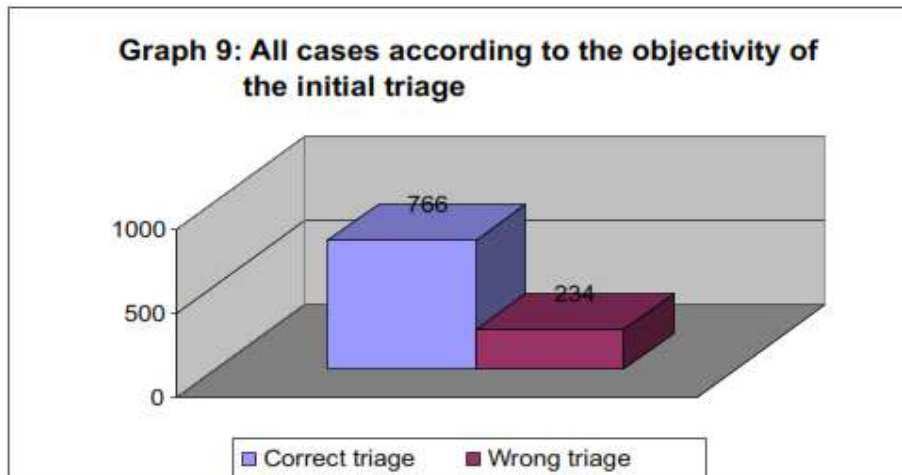
Graph. 7. Third degree assessed cases according to the accuracy of the triage

Age	Man	Women	Total
Under 30	1	0	1
31-50	1	0	1
51-65	5	7	12
Above 65	13	9	22

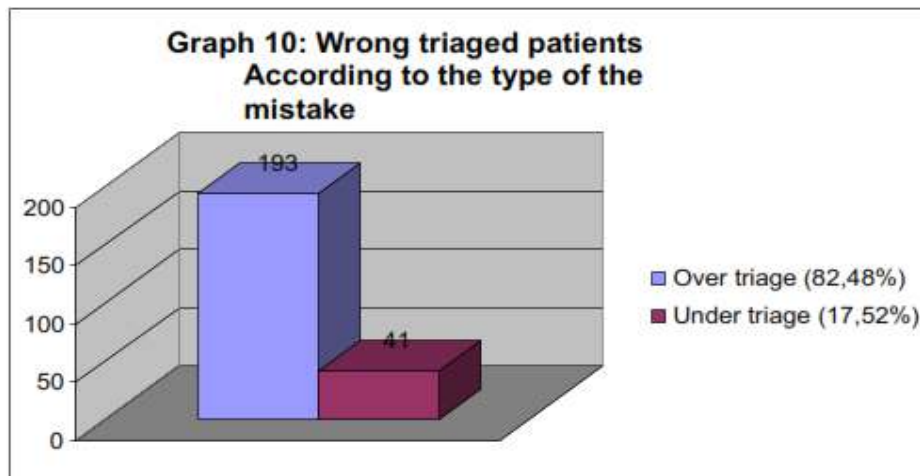
Table 3: Overview of the patients who were incorrectly triaged as a third degree of emergency by age and sex



Graph 8. Total cases according to real degree of emergency



Graph. 9. All cases according to the objectivity of the initial triage



Graph. 10. Wrong triaged patients according to the type of the mistake

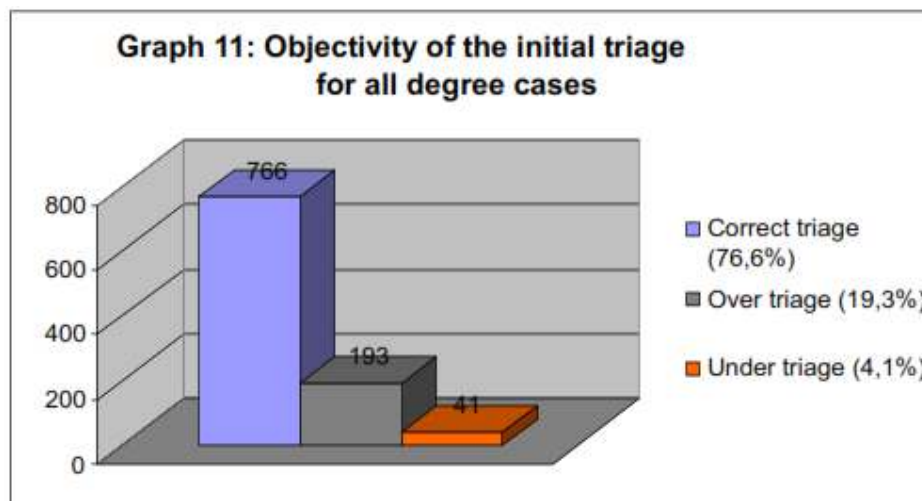
Among patients who were incorrectly triaged, in 193 cases (82.48%) there was over triage, and in 41 (17.52%) there was under triage

The causes of incorrect determination of the degree of urgency are most often unintentional or intentional misinterpretation of problems by patients or their families, patients' ignorance of the nature of their disease and method of treatment, as well as the lack of an official protocol for receiving calls, which would be a guide and a reminder. Also, there is no way for the person who reports the call to be obliged to cooperate with the doctor at the dispatch center, nor to be sanctioned if he does not do so.

The damage suffered by patients who were mistakenly triaged as a lower emergency

degree than they really were, is evident and is reflected in the delay in medical care.

At first glance, the damage due to incorrect triage of patients to a higher degree of urgency, than they really are, is not so noticeable. However, it exists, and is reflected first in the waiting of patients who have been properly triaged, regardless of the degree of urgency, for the teams to be released. This damage is not easy to assess, because it is not recorded. We can indirectly sense it by analyzing the calls of the really first and really second degree of urgency that were waiting and by tracking the time when such a call was received and when it was handed over to the team that was previously busy on the intervention from the group of over triage.



Graph. 11. Objectivity of the initial triage for all degree cases

Also, the damage due to incorrect triage of patients in a higher degree of urgency is reflected in the unnecessary engagement of teams, exhaustion of teams by unnecessary removal of heavy equipment (defibrillators, oxygen bottles, aspirators), with standard equipment that must be worn on the intervention (field bags - medical and nursing, ECG), often on the top floor, without an elevator. In addition, no matter how accustomed to otherwise stressful working conditions, the teams had additional stress expecting to go to a vitally endangered patient. Last but not least, some teams later had inconveniences when meeting patients who were unjustifiably waiting for them or their relatives. Unfortunately, this type of damage cannot be accurately expressed either.

Over triage from the dispatch centers represents an immediate response with lights and sirens (L&S) for a low-acuity case. It consumes limited resources, may increase costs and causes a shortage of ambulances for high-acuity emergencies; it could also endanger EMS workers and the general population, with ambulances running hot [2] with no or little benefit to the patient [3]. On the other hand, under triage from dispatch centers represents an inappropriately low response without priority signs in the presence of an acute case. Although this has not been

documented at the dispatch level, it may place the patients at risk of transient unmet medical needs and delayed access to the appropriate level of care as it is for trauma patients from field triage [4]. Overloading ED and inappropriate use of ambulances reduce such functionality [5,6].

#### CONCLUSION

Given the objective circumstances listed above, we believe that our doctors at the dispatch center responsibly and successfully perform triage in a high percentage (76.6%).

Having in mind the specific conditions in which our service works, we also believe that 23.4% of incorrectly triaged patients is a significant problem, which could be mitigated by educating patients and their families, additional training of physicians at the dispatch center, introduction of dispatch center protocol on the basis of which the degree of urgency would be determined, introducing an information system through which the doctor would have access to data from the patient's medical history, as well as from our field and ambulance patient protocols and instituting a legislation that would oblige callers to cooperate with the doctor at the dispatch center and sanctioning non-cooperation and threats.

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## TRIJAZA NA PRIJEMU POZIVA U ZAVODU ZA HITNU MEDICINSKU POMOĆ NIŠ

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**Sažetak:** Dispečerski centar predstavlja prvu kariku u lancu pružanja hitne medicinske pomoći. Trijaža je medicinski postupak kojim se povređeni ili oboleli svrstavaju u trijažne kategorije prema stepenu hitnosti, radi što efikasnijeg pristupa i adekvatne pomoći. Pozivi mogu biti prvog, drugog ili trećeg reda hitnosti. Poziv prvog reda hitnosti označava pacijente koji su vitalno ugroženi i kojima je neophodna stručna medicinska pomoć u najkraćem mogućem roku. Pozivom drugog reda označeni su pacijenti čiji simptomi ukazuju na poremećaj zdravstvenog stanja koji posredno može da dovede do ugrožavanja života. Pozivom trećeg reda hitnosti označeni su pacijenti koji boluju od hroničnih bolesti i koji se žale na tegobe vezane za osnovnu bolest, koji uzimaju već određene lekove i trenutno ne mogu da odu kod svog lekara. Svi ovi redovi hitnosti su uslovni. Cilj rada je analiza rada efikasnosti trijaže na prijemu poziva, radi poboljšanja iste. Analiziran je slučajni uzorak lekarskih poziva, iz koga je izdvojeno 1000 poziva u 2015godini. Upoređivan je red hitnosti koji je zaokružio lekar na prijemu poziva sa stvarnim stanjem pacijenta, na osnovu objektivnog pregleda lekara na terenu. Od 1000 poziva, kao prvi red hitnosti primljeno je 104 poziva (10,4%), kao drugi red hitnosti 254 (25,4%) i kao treći red 642 (64,2%). Analizirana je raspodela pacijenata koji su pogrešno trijažirani kao prvi red hitnosti prema objektivnom nalazu, životnom dobu i tegobama. Od poziva koji su primljeni kao drugi red hitnosti (254), pravilno je procenjeno 111 (43,7%), a greška u redu hitnosti napravljena je kod 143 pacijenta (56,3%). Od poziva koji su primljeni kao treći red hitnosti (642), procena lekara na prijemu se poklapa sa objektivnim stanjem na terenu u 606 slučajeva (94,4%), a ne podudara se kod 36 pacijenata (5,6%). Od ispitivanog uzorka od 1000 poziva, lekar na prijemu pravilno je procenio red hitnosti kod 766 pacijenata (76,6%), dok kod 234 pacijenta (23,4%), red hitnosti nije bio ispravno procenjen. Kod pacijenata koji su pogrešno trijažirani, u 193 slučaja (82,48%) radilo o nadtrijaži, a u 41(17,52%) o podtrijaži. Uzroci netačnog određivanja reda hitnosti su brojni, a posledice direktne i indirektne. Naši lekari na prijemu poziva odgovorno i u visokom procentu (76,6%) uspešno vrše trijažu. U isto vreme, 23,4% pogrešno trijažiranih pacijenata predstavlja značajan problem, koji bi se mogao ublažiti edukacijom pacijenata, dodatnim treningom lekara, uvođenjem protokola za prijem poziva i drugom zakonskom regulativom..

**Ključne reči:** prijem poziva, trijaža, red hitnosti, procena.

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