Background: For many years, hospital emergency departments (ED) around the world have been struggling with increasing numbers of patients. Inappropriate qualification in prehospital care, easy access to hospital emergency departments, bypassing the general practitioner, or long waiting queues to specialists are only a few reasons leading to the overcrowding of hospital ED year after year.

To prevent this phenomenon, many hospitals have been using different systems of medical segregation for patients arriving to ED to assess the condition of the patient effectively and determine the cases requiring immediate help such as in life – threatening situations and those where the help may be postponed. Patient's medical urgency conditions may vary so it is important for healthcare professionals to use an appropriate and effective medical system to provide the right care in the right time.

Aim: The purpose of my project is an evaluation of the significance of the critical parameter analyser and ECG in the process of medical triage in emergency department.

Method: The study involves a retrospective analysis of 101 patients, as a control group, hospitalized in the hospital emergency department of the Regional Specialist Hospital in Olsztyn and the study group of 100 patients admitted to the hospital emergency department. Both the study and control groups consisted of patients over 18 years of age. The study, for which approval was obtained from the bioethics committee (resolution no. 45/2019) and the hospital management, was conducted in 2019-2020. Information on each patient included in the study included demographic data (age and gender), but no identifying data such as name, surname, personal identification number were used. All patient data were obtained from accessing to paper and electronic records in the AMMS system. Medical, physician, paramedic, and nursing observation data were used, including patient characteristics, complaints with which the patient presented to the emergency department, baseline vital signs, mode of emergency department admission, time of admission, waiting time for medical examination, triage category, NRS pain scale, past medical history, medications taken, and allergies, as well as ECG and critical parameter analyzer results.

The study includes two groups of patients admitted to the hospital emergency department. The first group consists of patients who underwent the basic medical segregation procedure, i.e., history, physical examination, assessment of vital signs

(such as blood pressure, heart rate, oxygen blood saturation, temperature), assessment of pain levels on the NRS scale. The study group consists of patients who underwent the standard medical segregation procedure as above extended to the results of tests performed using a critical parameters analyzer and ECG.

Result: In the presented results, a significant statistical difference in categorization according to the system $p<0.001$ was noted in both the study and control groups. Based on the prepared medical segregation procedure functioning in the hospital clinical emergency department the control group revealed that most patients were assigned to the green group 15.84% (n=16) and blue group 58.41% (n=59) not requiring urgent medical intervention and non-life-threatening condition. The waiting time for medical examination was between four - six hours. Only 0.99% (n=1) and 1.98% (n=2) were classified as urgent conditions, which can wait to 60 minutes. Extending the procedure in the study group to include the results of the critical parameter analyzer and electrocardiogram resulted in a higher percentage of patients who were in the orange group - 12% (n=12), yellow group - 33% (n=33) and green group - 28% (n=28), while the number of patients decreased in the blue group - 27% (n=27).

In both groups, a large number of patients - 84.58% (n=170) - left the hospital emergency department with the therapeutic process completed, 15.42% of patients (n=31) required further inpatient treatment in a specialist department, 0.5% (n=1) discharged on their own request, while 1% (n=2) left the emergency department arbitrarily. There is a significant difference in the mode of patients' discharge ($p<0.001$): in the control group, 95.05% of patients (n=96) were discharged home after completion of the therapeutic process in the hospital emergency department, and only 2.97% (n=3) of patients required further hospitalization in specialized departments of the hospital. In the study group a higher number of patient 25.03% (n=25) as compared to the control group were transferred for further hospitalization in the hospital. In the study group the percentage of discharges to home was 70% (n=70) and was significantly lower as compared to the control group.

Among all patients, the mean waiting time for medical examination from the time of medical segregation was 44 minutes. The shortest time was 3 minutes (reason for hospitalization headache and loss of consciousness - discharged for outpatient treatment) and the longest time was 420 minutes (patient presenting to the emergency department for dizziness - discharged for outpatient treatment). Statistical

significance was between time from medical segregation to medical examination. The mean waiting time for medical examination in the study group was 35 minutes, while in the control group it was twice as long at 71 minutes.

Conclusions:

1. Adding basic blood parameters tests with the use of the critical parameter analyser and ECG to the medical segregation procedure improves treatment and prognosis of patients.
2. Use of the critical parameter analyser and ECG reduces the risk of incorrect classification of patients presenting to the hospital emergency department.
3. Twice the higher percentage of patients admitted without indications to hospital emergency department increases the risk of misclassification error.
4. Use of the critical parameters analyser and ECG examination shortened the waiting time for medical examination by at least 50%.
5. The use of the critical parameter analyser at the stage of initial medical segregation of patients in the hospital emergency department improved patient treatment in the specialist department.
6. The use of the critical parameter analyser and ECG among patients presenting to the hospital emergency department allows to select patients in life threatening condition from a large group of patients without qualification to hospitalization in the emergency department.
7. Non-referred patients presenting to the emergency department constitute a group of special attention due to the lack of information about the patient and his/her complaints.
8. Patients with a history of chronic disease are an indication for the critical parameter analyser testing due to the high likelihood of abnormal test results during emergency department admission.
9. Performing electrocardiograms immediately after admission to the emergency department allows for rapid treatment of patients with life-threatening arrhythmias.