Research Protocol

THE RELATIONSHIP BETWEEN CLINICAL SCORE IN CRITICAL PATIENTS, LEECOCYTE TYPE RATIO, AND SERUM ALBUMIN LEVEL WITH LENGTH OF HOSPITARY AND MORTALITY OF SEPSIS PATIENTS IN THE INTENSIVE CARE UNIT

Principal investigator:

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Background

Sepsis is still a global problem. The estimated incidence of sepsis worldwide is 31.5 million cases per year and causes 5.3 million deaths. Most of the epidemiological data is obtained from data from countries with upper middle income. In low-middle-income countries, the incidence is difficult to predict and may be much higher (1,2).

Systemic inflammatory reactions in the early phase of sepsis can increase the rate of cell metabolism and the need for ATP (adenosine triphosphate). Hypermetabolic conditions result in disruption of the Glutathione cycle resulting in a buildup of Hydrogen peroxide. Hydrogen peroxide is a substrate in the formation of free radicals which in turn can trigger various pathological processes (eg endothelial dysfunction, coagulopathy, and apoptosis). Clinically there will be multi-organ failure which aggravates the patient's condition (3). This shows that sepsis is an emergency condition. The sooner the condition is detected and treated, the better the clinical outcome is expected (4). Inadequate fluid resuscitation and delayed hourly administration of antibiotics (bundle sepsis) are associated with an increased risk of mortality (5–7).

Currently, the Quick Sequential Organ Functional Assessment (qSOFA) parameter is used for early detection of sepsis patients replacing the SIRS criteria compiled in 1992 (1,8). However, there are no definite parameters to predict patient outcomes (morbidity and mortality). The combination of various simple clinical and laboratory parameters is expected to be able to provide an overview of the patient's severity and predict patient outcomes. In addition, these parameters can be used in limited health facilities.

Study goals and objectives

The objectives of this research are:

1. To analyze the relationship between the clinical score of critical patients (National Early Warning Score/NEWS-2, qSOFA, ROX index) during the first 24 hours of hospitalization and mortality of sepsis patients at UPI.

2. Analyzing the relationship between Neutrophil-Lymphocyte Ratio (RNL) and Lymphocyte-Monocyte (RLM) in the first 24 hours when patients were hospitalized with length of stay and mortality of sepsis patients at UPI.
3. Analyzing the relationship between Albumin levels and Percentage Ratio of Neutrophil-Albumin (RPNA) in the first 24 hours when patients are treated with length of stay and mortality of sepsis patients at UPI.
4. Analyzing the combined association of critical patient clinical scores, RNL, RLM, albumin levels and RPNA within the first 24 hours of hospitalization with length of stay and mortality of sepsis patients at UPI.

A combination of simple clinical and laboratory parameters is still not widely used to assess the relationship with length of stay and mortality of sepsis patients at UPI. The results of this study are expected to be able to provide information for clinicians (general practitioners and related specialists) regarding the degree of patient severity and its relationship to patient outcomes. More attention to patients with poor parameter results is expected to reduce the risk of morbidity and mortality in sepsis patients at UPI.

Study design

This is an observational analytic study with a retrospective cohort research design. This study was conducted at Mohammad Soewandhie General Hospital Surabaya. The study was conducted in August 2022 – August 2023. The study population was critically ill patients who were treated at Mohammad Soewandhie General Hospital Surabaya for the period September 2021 – August 2022. The research subjects were critically ill patients undergoing treatment at ICU Mohammad Soewandhie General Hospital Surabaya period September 2021 – August 2022.

Inclusion criteria:

1. Age 18 – 80 years
2. Patients admitted to the hospital from the Emergency Unit or Outpatient Unit.
3. Patients with a diagnosis of Sepsis (by DPJP) as evidenced by a SOFA score > 2.

Exclusion criteria:

1. The patient died at UPI within < 24 hours of hospitalization.
2. Pregnancy or post-partum patients.
3. Malignant disease.
4. Autoimmune disease.
5. Infectious Disease COVID-19.

Drop out criteria: Incomplete data

Sampling technique: total sampling

Methodology

Patients who diagnosed with sepsis and admitted to the ICU from September 2021 – August 2022 were reviewed. Duplication data were drop out. We extracted independent variable data, which were:

1. NEWS-2 first 24 hours of care in emergency department (the worst vital sign);
2. qSOFA first 24 hours of care in emergency department (the worst vital sign);
3. ROX Index (SpO2/FiO2/Respiration rate) first 24 hours of care in emergency department (the worst vital sign), with FiO2 predicted from the oxygen supplementation which is given to the patient (Nasal canula 30 – 40%, Simple Mask 40 – 60 %, Mask and reservoir 60 – 90%, Jackson Reese 100%);
4. Neutrophil and lymphocyte ratio (NLR) first 24 hours of care in emergency department;
5. Lymphocyte and Monocyte ratio (LMR) first 24 hours of care in emergency department;
6. Albumin serum levels first 24 hours of care in emergency department.

The dependent variables were:

1. Length of stay in the ICU (days) – which was counted from the first day of care in the ICU until the patient was discharged from the ICU by the doctor in charge or death;
2. In-hospital mortality (yes/no) – from the death certificate in medical records.

Safety consideration

There are no safety issue in this study, because we use medical record data. Patient information are kept in lock cabinets which can be accessed by principal investigator.

Follow-up

Not available in this study.

Data management and statistical analysis

Patient demographic data were analyzed using descriptive statistical methods. Data from independent and dependent variables were subjected to a bivariate test (using a different test according to the type of data). All independent variables which had significant differences were analyzed using multivariate analysis (using logistic regression test). For significant variables, statistical analysis was continued using the ROC curve to determine the sensitivity and specificity values. The conclusion is statistically significant if $p < 0.05$. All statistical tests used SPSS software version 26.

Quality assurance

Principal investigator of this study has a GCP certificate.

Expected outcomes of the study

Combination of the clinical score and laboratory parameter has a better performance to predict length of stay and in-hospital mortality than the single parameter alone.

Dissemination of results and publication policy

The results of this study will publish in the reputation journal (in Indonesia – Sinta accreditation journal). The results will be taught to medical student. We also plan to give the information to the community about first sign and symptoms in critically ill patient. We hope this knowledge can be used to early detection for their family members and immediately go to hospital for help.

Duration of the project

	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23
Proposal														
Ethical Clearance														
Data extraction														
Data analysis														
Report														
Publication														

Problems anticipated

Incomplete data was drop out from this study.

Project management

Name	Role	Responsibility
Erik Jaya Gunawan	Principal investigator	Coordinator of the course of the study, data confidentiality, proposal drafting, data analysis, report and publication.
Areta Idarto	Investigator	proposal drafting, data analysis, report and publication.
Salmon Charles P T Siahaan	Investigator	proposal drafting, data analysis, report and publication.
Ronald Torang Marsahala Panggabean	Investigator	data analysis, report and publication.
Olivia Tantana	Investigator	data analysis, report and publication.
Aura Dhiya Ulhaq	Data taker	Data extraction from medical records
Fransisca Suyanto Pangemanan	Data taker	Data extraction from medical records

Ethics

Ethical clearance of this study was issued by Ethical committee Mohammad Soewandhie General Hospital Surabaya (013/KE/KEPK/2022).

Informed consent forms

Not available in this study

Research protocol: part 2

Budget

This is the budget management plan in this study.

Item	Budget plan
Stationary	Rp 50,000
Data extraction process (coordination meeting, data taker fee)	Rp 2,800,000
Data analysis and publication	Rp 7,500,000
Total	Rp 10,350,000

Other support for the project

This study is funded by the Universitas Ciputra Surabaya by the approval from the Dean of School of Medicine and Head of the Research Unit and Community Development.

Curriculum Vitae

Principal Investigator

Full Name : Erik Jaya Gunawan, dr., M.Ked.Klin., Sp.An.
Profession : Anesthesiologist
Birth date : 10 Agustus 1990

Education:

2008 – 2013 : Medical doctor at Universitas Airlangga Surabaya, East Java, Indonesia

2016 – 2021 : Combined degree Master of Clinical Medicine and Residency in Anesthesiology and Intensive Therapy at Universitas Airlangga Surabaya, East Java Indonesia

Working experience:

2014 – 2015 : Internship at RSUD Koesnadi Bondowoso, East Java, Indonesia

2015 – 2016 : General Practitioner at Mitra Keluarga Hospital Surabaya, East Java Indonesia

2016 – 2021 : Residency in Anesthesiology and Intensive Therapy at Universitas Airlangga – RSUD Dr. Soetomo Surabaya, East Java, Indonesia

2022 – present : Anesthesiologist at dr. Oepomo Marine Hospital Surabaya, East Java, Indonesia and Fatma Eye Hospital Sidoarjo, East Java, Indonesia.

2022 – present : Medical lecturer at Universitas Ciputra Surabaya, East Java, Indonesia.

Publication:

1. Antikolinesterase untuk Gigitan Ular dengan Bisa Neurotoksik
   Cermin Dunia Kedokteran (CDK) 236, Vol. 43, No. 1, 2016
2. Relationship of Depression, Anxiety, and Stress (DASS-21), Salivary Cortisol Levels, Platelet-Lymphocyte Ratio with Severity in COVID-19
   International Journal of Research Publications (IJRP), Vol. 89, Issue 1, 2021
3. Program Peningkatan Kesehatan Reproduksi Anak dan Remaja Laki-Laki di Kecamatan Sambikerep Surabaya
   Jurnal Pengabdian Masyarakat Bumi Raflesia, Agustus 2022, Vol. 5, No. 2