Case Study

C5: [Sepsis - Diagnosis and treatment](https://www.mayoclinic.org/diseases-conditions/sepsis/diagnosis-treatment/drc-20351219)

Description

Sepsis [[1]](#footnote-1)is a life-threatening condition in which an unregulated host response to infection can cause tissue damage and multi-organ dysfunction. In septic shock, there is a critical reduction in tissue perfusion that can lead to a state of multi-organ failure involving lungs, kidneys and liver. The impact of sepsis on certain patient populations, such as pediatric, neonatal, and geriatric patients can vary, making timely and appropriate treatment even more important.

Symptoms include fever, hypotension, oliguria and confusional state. Diagnosis is made by combining clinical findings with microbiological data showing the presence of an infection; early recognition and treatment are crucial. Treatment is based on intensive fluid infusion, early administration of antibiotics, surgical removal of infected or necrotic tissue, drainage of pus and supportive therapies.

No current clinical measures reflect the concept of an unregulated host response to infection. However, many bedside examination findings and routine laboratory test results are indicative of inflammation or organ dysfunction. Early treatment of sepsis improves survival, but early diagnosis of hospital-acquired sepsis, especially in critically ill patients, is challenging.

Several scores have been developed to enable early diagnosis and assess prognosis: some of them require a minimum of technological sophistication (blood gas analysis, assessment of cardiac output and peripheral Resistance), particularly useful in low-income countries. Among them, some easy-to-detect indices that can be carried out in any peripheral laboratory are:

* Fever.
* A WBC counts of less than 4,000/μl or more than 12,000/μl.
* LacticAcid levels > 2.0 µg/L indicate a high probability of systemic bacterial infection and a risk of progression to sepsis or septic shock. LacticAcid levels < 0.5 µg/L indicate a low probability of systemic bacterial infection and a low risk of progression to sepsis or septic shock.
* A plasma CRP of 50 mg/l or more was highly suggestive of sepsis. The risk of sepsis-related mortality appears to be increased when the 3rd day CRP value is greater than 100 mg/dL.

After having defined these scores, the hospital wants to verify if the treatment conducted in the clinic is:

* correctly adopted, i.e., the number of cases deviating from the protocol is limited;
* effective, i.e., it rarely brings to complications for the patient;
* optimal, i.e., we don’t know alternative ways of conducting the treatment that could improve its effectiveness.

# Assignment

For each goal, describe the Knowledge Uplift Trail that allows you to provide answers.

In particular, define:

* Filtering steps to remove noise.
* Filtering steps to remove irrelevant data.
* Segments of the log describing normal behavior.
* Segments of the log describing anomalous behavior.
* Compare the segments to verify their significant correlations with properties that may be connected to effectiveness (case size, case duration, loops)

1. https://jamanetwork.com/journals/jama/fullarticle/2492881 [↑](#footnote-ref-1)