Intitulé de l'étude	Covid-19 Pandemic Triage Score (STC-19)
Sponsor	Groupe Hospitalier de la Rochelle Ré Aunis
NCT number	NCT04371471
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Organisation responsible for the analysis (if different)	NUMAHEALTH INTERNATIONAL
Responsible for analysis (if different)	Dr. Kamyar Hedayat
Methodology of reference (in France)	☒ MR-004 ☐ MR-005 ☐ MR-006
Data sources	☒ Medical records ☐ Survey / Cohort / Register including data from the national health data system ☐ Medicalization Program of Information Systems ☐ Other source of Data
Background	The aim of the health system is to prevent the occurrence of COVID-19 pneumonia and its progression to acute respiratory distress syndrome (ARDS), which has a high mortality rate. There is currently no known method of predicting which cases will progress to ARDS. In ARDS, inflammation of the lungs renders mechanical ventilation ineffective due to the occurrence of alveolar edema.
Context of the study	Inflammation is the common denominator in the mechanisms resulting in death, be it acute respiratory distress syndrome (ARDS), sepsis or end-organ failure[1]. Many studies have already associated inflammatory burden with mortality. It remains unclear which markers of inflammation are most strongly correlated and at what point of hospitalization. C-Reactive Protein (CRP) is a well-studied marker of acute inflammatory reactant in patients with COVID-19[2]. However, there are other indicators or actors in acute inflammation. For example, the neutrophil-to-lymphocyte ratio (NLR)[3-9] is associated with mortality on admission for patients with COVID-19[4]. It is has been referred to as the genito-thyroid index(GTi)[10]. Another marker is serum cortisol. High serum cortisol at admission to the hospital was associated with higher mortality in one study[11], but the opposite has also been observed[12]. Tissue levels have not consistently been associated with severity of illness[13,14]. Our group (KMH, JCL) has demonstrated that the effective tissue-level activity of cortisol can be modeled using a complete blood count with differential

	(CBC)[15] in chronic heart failure and acute myocardial infarction (AMI)[16,17] and that the model of admission cortisol activity was superior to serum cortisol in predicting mortality in AMI[8]. All current solutions focus on targeted treatment of the virus in an attempt to neutralize its epidemic spread and correct its downstream effects on the infected patient's body. We propose a radically different orientation which consists of starting from the patient, rather than the viral aggressor, by analyzing the state of his or her current adaptive response to the viral aggression.
Objective(s)	To evaluate changes in biomarkers associated with inflammation to determine : 1) at what point in the first 5 days of hospitalization would factors associated with deterioration or death be present, 2) which biomarker or indexes related to inflammation best predicted this deterioration or death.
Design	Single center retrospective study
Study population	Patient with clinical signs of CoV-2-SARS infection and signs of severity (polypnea, saturation < 90% room air, dyspnea, systolic blood pressure < 90 mmHg, altered consciousness, somnolence, confusion) and/or co-morbidities (> 70 years of age, Respiratory pathology at risk of decompensation, Chronic renal failure on dialysis, Heart failure or IV, Cirrhosis ≥ B, Cardiovascular history, Diabetes with poor balance or co-morbidities, Immunosuppression, Dementia)
Ethics committee	Study approved by the local ethics committee on 7 May 2020
Method	From medical records patients' information, codded, anonymized data will be entered regarding age, sex, blood pressure, oxygen saturation, survival status, CRP, and a CBC with differential from the time of admission, days 2-3 and 3-5.
Statistical analysis plan	Demographic and biologic data will be used to describe the study population and to calculate the STC-19 score. Patient status (deceased or alive within 28 days after hospital admission) will be recorded. Categorical data will be collected for inclusion/exclusion criteria, gender, and patient living status. Continuous data will be collected for the complete blood count test. Means and standard deviations, numbers, percentages and confidence intervals will be used to describe quantitative and qualitative variables, respectively. Association between factors (age, creatinine, CRP, cortisol, genito-thyroid index) and death will be studied. The STC-19 score will be calculated by the NumaHealth International statistician according to their proprietary calculation.

Justification of the public interest character of the study	If this score is validated, it will provide care recommendations determined by the number of factors in the severe or moderately severe pathophysiology zones. It will allow an immediate reduction in access to hospital resources and a reduction in the over-servicing of emergency and intensive care units when the patient's clinical condition permits without secondary risk to the patient.
Timetable for the study and provisional schedule for communicating the results	Data collection of patients hospitalized between March and May 2020 : from June to July 2020 Analysis and communication of results : From August to October 2020
References	1.Wendel Garcia PD, Fumeaux T, Guerci P, et al. Prognostic factors associated with mortality risk and disease progression in 639 critically ill patients with COVID-19 in Europe: Initial report of the international RISC-19-ICU prospective observational cohort. EClinicalMedicine. 2020;25:100449. 2.Liu C, Liu X, Mao Z, et al. Interpretable Machine Learning Model for Early Prediction of Mortality in ICU Patients with Rhabdomyolysis. Med Sci Sports Exerc. 2021;53(9):1826-1834. 3.Hedayat K, Schuff BM, Lapraz JC, et al. Genito-Thyroid index: a global systems approach to the neutrophil-to-lymphocyte ratio according to the theory of Endobigoeny applied to ambulatory patients with chronic heart failure. Journal of Cardiology and Clinical Research. 2017;5(1):1091-1097. 4.Li X, Liu C, Mao Z, et al. Predictive values of neutrophil-to-lymphocyte ratio on disease severity and mortality in COVID-19 patients: a systematic review and meta-analysis. Critical care. 2020;24(1):647. 5.Ma A, Cheng J, Yang J, Dong M, Liao X, Kang Y. Neutrophil-to-lymphocyte ratio as a predictive biomarker for moderate-severe ARDS in severe COVID-19 patients. Critical care. 2020;24(1):288. 6.Zeng ZY, Feng SD, Chen GP, Wu JN. Predictive value of the neutrophil to lymphocyte ratio for disease deterioration and serious adverse outcomes in patients with COVID-19: a prospective cohort study. BMC Infect Dis. 2021;21(1):80. 7.de Jager CP, Wever PC, Gemen EF, et al. The neutrophil-lymphocyte count ratio in patients with community-acquired pneumonia. PloS one. 2012;7(10):e46561. 8.de Jager CP, van Wijk PT, Mathoera RB, de Jongh-Leuvenink J, van der Poll T, Wever PC. Lymphocytopenia and neutrophil-lymphocyte count ratio predict bacteremia better than conventional infection markers in an emergency care unit. Crit Care. 2010;14(5):R192.

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