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Design of an optimized path for data flow and management of patients characterized by clinical and radiological features compatible with COVID-19 (OPTIMISED)

The recent SARS-CoV-2 epidemic has highlighted some critical issues in the Italian management of COVID-19 patients, mainly due to the complexity of the disease. Many hospitals have found difficulties in managing patients due to the lack of effective tools to predict clinical evolution. Therefore, there is a need to identify and validate early diagnostic tools capable of predicting the clinical outcome of these patients. In fact, the diagnosis, currently based on the detection of viral RNA by real-time PCR, is characterized by high sensitivity, but does not provide information on the severity and possible evolution of the disease. Furthermore, to date there has been a lack of coordinated management between hospitals in neighboring areas as evidenced by the University Hospital of Pisa (AOUP) and the Local Health Authority of the Tuscany Center (AUSL Toscana Centro). In fact, while at the admission to the emergency room, in addition to blood and clinical tests, the AUSL Toscana Centro performed the standard chest radiogram for all patients, the AOUP protocol also includes computed tomography (CT) of the chest and lung ultrasound. At the moment, this different diagnostic approach is a clear limitation due to the lack of uniformity in the collection of clinical data and it requires an interventional study in order to validate the different methodologies. Accordingly, it is essential to perform a retrospective analysis of routine imaging, clinical and blood data, perform new targeted blood tests and validate the results obtained in a prospective cohort. In this complex scenario, OPTIMISED aims to create a path for managing the flow of data resulting from blood and imaging biomarkers using new methods of statistical analysis and artificial intelligence (AI), in particular deep learning. The obtained results will aim to understand advantages and limitations of the different imaging methods in the risk stratification process, and how these techniques can be complemented with information from selected blood parameters available from the patient's diagnostic-prognostic pathway. The knowledge acquired during the project will lead to the creation of a prognostic model of risk stratification in patients with clinical and radiological features compatible with COVID-19; then, "recommendations" for health professionals in taking care of these patients will be also provided. The optimized path for COVID-19 patients will be smart and easily adaptable to other hospitals both in Tuscany and in other regions, with the aim of ensuring better management of the NHS resources in view of possible new peaks of COVID-19, but also in anticipation of other future pandemics.

References: the project was granted by Bando Ricerca COVID-19 Toscana
Keywords: COVID-19, lung ultrasound, artificial intelligence
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