Triage in the time of COVID-19

Since March 2020, all global health-care institutions have been threatened by the spread of COVID-19 among the population. Emergency departments were confronted with many patients with suspected SARS-CoV-2 infection and the subsequent risk of contaminating other patients and health-care providers. In already fragile or overburdened health-care systems, no hospital was fully prepared to manage such a rapidly spreading disease. A substantial challenge resided in finding the appropriate method to distinguish patients with a potential SARS-CoV-2 infection from others to contain in-hospital contamination, considering the limited availability of appropriate laboratory screening tests, poor sensitivity, high costs, and consequent delays in obtaining adequate results.[1,2] In such a complex decision-making process, physicians needed to use probabilistic thinking methods and assign pretest probabilities to guide further diagnosis and care. Many COVID-19 triage systems have been designed to provide rapid and adequate decision-support tools.[3] Several predictors have been reported, such as clinical data (symptoms and vital signs), laboratory tests, and radiological findings.[4–6] Although the current literature offers different models of COVID-19 triage systems, either based on simple statistical methods or artificial intelligence-driven models, some concerns remain regarding their validity and generalisability.[7,8]

In *The Lancet Digital Health*, Andrew A S Soltan and colleagues present their latest Article regarding a new artificial intelligence-driven COVID-19 triage model,[9] providing an interesting and innovative vision of what could represent a future solution, with an impressive study including 72 223 patients across four validating sites in the UK. The authors report the improvement of their previously described tool, CURIAL-1.0, established on preselected vital signs and blood tests, and introduce two updated models: CURIAL-Lab, developed with use of vital signs and readily available blood tests (full blood count; urea, creatinine, and electrolytes; liver function tests; and C-reactive protein) and CURIAL-Rapide, developed with use of vital signs and full blood count alone.[9] These models were validated externally and prospectively evaluated for emergency admissions to four UK National Health Service trusts. The strength of this study lies in the adequate external validation

and operational assessment of their devices, inferring the potential generalisability of the implementation of CURIAL models in emergency settings.

One fundamental challenge for triage devices is acquiring the ability to provide relevant results in a short time and in a practical way for health-care providers. The consequent delay in diagnosing COVID-19 infection using PCR tests led to organisational difficulties in the timely identification of positive cases.[1] Lateral flow devices (LFDs) tend to optimise time-to-results, but they present poor and heterogeneous sensitivity.[10] Soltan and colleagues provide an engaging response to these concerns. First, the authors definitively enforced the originality of their research by combining the use of CURIAL-Lab with LFDs to significantly improve the sensitivity of COVID-19 detection. Soltan and colleagues reported a sensitivity of 56·9% (95% CI 51·7–62·0) for LFDs alone and an improvement to 85·6% (81·6–88·9) when LFDs are combined with CURIAL-Lab. Second, the authors described the implementation of the CURIAL-Rapide device using OLO rapid haematology analysers. This original laboratory-free approach promises a significantly reduced time-to-result: 16 min (26·3%) sooner than LFDs and 6 h 52 min (90·2%) sooner than PCR. Finally, in the context of a worldwide pandemic, the availability of the device in different countries (low, middle, and high income) constitutes an essential factor.[3] Soltan and colleagues state that their point-of-care model is not only reliable but also affordable. This could represent an alternative screening solution in low-resource settings.

A limitation of this study is the unavailability of data regarding vaccination records. More investigations are required to determine the device's validity in a population with a higher vaccination rate and potentially evolving characteristics. However, some will probably answer that this is the point of an artificial intelligence-driven triage, to learn and adapt.

Through this experiment, Soltan and colleagues described what could represent a major perspective for emergency department managers. The CURIAL-Rapide device could lead to a valuable decision-support aid to triage patients at emergency department admission regarding its availability, usability, and quick time-to-diagnosis. Indeed, in-hospital contamination is not the

only issue health-care providers will face in the coming months. As emergency department overcrowding is striking back, COVID-19 is more than ever a threat to their organisation. Triaging patients with potential COVID-19 infection is crucial in crowded departments where close proximity could promote contamination. The high negative predictive value reported for CURIAL-Rapide, 99·7% (98·2–99·9), could represent an important asset as a front-line triage system to manage the overwhelming inflow of patients with potential COVID-19 infection.

Considering the study presented by Soltan and colleagues, the key message is simple: the time has come for more effective, rapid, and available screening and triage tools. CURIAL devices represent an elegant breakthrough to enhance the clinical decision-making process in the age of artificial intelligence. As we are now facing the COVID-19 fourth wave, we are confident that artificial intelligence-driven triage will meet the challenge of optimising the early detection of patients with COVID-19 infection, reducing the spread of COVID-19 in emergency departments and in-hospital contamination.

We declare no competing interests.

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