

AI test screens for COVID-19 26% faster than lateral flow tests

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An artificial intelligence (AI) test performed by the bedside in 10 minutes quickly and safely triages patients coming to hospital for COVID-19, a University of Oxford-led study has shown.

Results of the CURIAL-Rapide evaluation study show COVID-19 screening results were available 45 minutes after patients arrived in the emergency department—16 minutes, or 26 percent, faster than lateral flow tests (LFTs)—during a three-month evaluation at the John Radcliffe hospital. When compared against results of PCR testing, CURIAL-Rapide was more likely to identify COVID-19 patients than the LFTs, and corrected ruled out the infection 99.7 percent of the time.

Collaborating with University Hospitals Birmingham NHS Foundation Trust, Portsmouth University Hospitals NHS Trust, and Bedfordshire Hospitals NHS Foundation trust, the study found that the AI [test](#) performed consistently across 72,000 admissions to 5 UK hospitals, providing high-confidence negative results for uninfected patients up to 98.8% of the time. The study also found that CURIAL-Rapide was 21 percent more effective at

identifying COVID-19 patients than LFTs between December 2020 and March 2021.

Lead researcher and NIHR Academic Clinical Fellow at the John Radcliffe Hospital Dr. Andrew Soltan said: "Many of our patients coming to the ED are in the most vulnerable groups. CURIAL-Rapide is exciting because it uses new near-patient testing to collect all the data needed for a prediction by the bedside in 10 minutes, cutting out the time for transporting samples to a lab. This means infected patients are identified sooner, while patients being admitted with other conditions can be quickly and safely transferred to wards where they are less likely to be exposed.

"This technology can help hospitals run more smoothly and may make a particularly big difference for smaller hospitals where there isn't a lab on-site. CURIAL is an example of how the collaborative strength of the NHS, bringing together universities with hospital groups across the country, is helping to build an evidence base for safe and responsible use of clinical AI."

The CURIAL-Rapide AI screening test, developed from the technology used in the CURIAL-1.0 model released last year, uses routine tests to screen [emergency department](#) patients for COVID-19. The new version of CURIAL uses only tests that can be performed at the bedside, achieving a 10-minute processing time without needing access to a laboratory.

Other key findings from the study:

- During a three month evaluation period at the John Radcliffe Hospital CURIAL-Rapide results were available 6:52h sooner than PCR results, and correctly ruled-out COVID-19 for 58.5% of negative patients who were triaged by a clinician to "COVID-19-suspected' (amber) areas.
- In a retrospective evaluation of lateral flow

testing for all patients admitted to OUH between December 23 2020 and March 6 2021, LFTs were 56.9 percent effective at identifying patients who had COVID-19, but this improved to 88.2 percent when used in combination with CURIAL-Rapide.

- A different AI model named CURIAL-Lab, which uses routine blood tests performed in a laboratory alongside vital signs, was at least as effective as CURIAL-Rapide when tested at collaborating hospitals. As all the data required for CURIAL-Lab is collected within 1h as part of standard-care, this test can be deployed rapidly at-scale rapidly without additional costs.

Lead consultant for Emergency Medicine Research in Oxford (EMROx) Dr. Alex Novak said: "The CURIAL studies are an exciting demonstration of the potential for AI-led [diagnostic tools](#) in acute clinical settings, with the power to rapidly translate into tangible benefits for patient care and optimize service performance at the frontline."

Emergency medicine consultant at OUH Dr. Ravi Pattanshetty added: "CURIAL has proven to be a very effective tool for both rapid front door diagnosis of COVID-19 and to ease the patient flow through the hospital. This ultimately results in fewer [hospital](#) acquired infections and opens up an exciting prospect for future AI tools to help overburdened emergency departments."

Dr. Soltan, also a researcher at Oxford University's Radcliffe Department of Medicine, added: "Lateral flow tests help identify cases sooner, giving high-confidence positive results. But negative results are more uncertain—in our evaluation LFTs gave negative results for almost half (43 percent) of patients who went on to swab positive. CURIAL-Rapide complements LFDs with high-confidence negative results in minutes. Combining the two rapid tests gives the best performance, and both results are available within one hour."

David Clifton, Professor of Clinical Machine Learning at the University of Oxford, said: "The University has demonstrated that it has risen to the challenge posed to society by the COVID-19 pandemic, and this AI-driven tool being

implemented for use in Emergency Departments is a great example of how we and the NHS can work together to produce something of lasting value to patients.

"With the emphasis moving to "living with COVID-19" every year, research collaborations delivering tools such as CURIAL are the future for our field. Our recently-announced Pandemic Sciences Centre will be a key means of supporting such collaborations in future, with the goal of getting us to a state of advanced preparedness for the arrival of new diseases or variants."

The research team are in the process of applying for funding from the NHSx AI Health and Social Care Award to drive a national rollout as well as widescale decision-support trials.

More information: Andrew AS Soltan et al, Real-world evaluation of AI driven COVID-19 triage for emergency admissions: External validation & operational assessment of lab-free and high-throughput screening solutions, (2021). [DOI: 10.1101/2021.08.24.21262376](https://doi.org/10.1101/2021.08.24.21262376)

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