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ED Decision Support for Discharging Suspected COVID-19 Patients

University of Minnesota Medical School researchers recently evaluated the performance of a prognostic clinical decision-making tool to facilitate emergency department discharges of suspected COVID-19 patients. The University of Minnesota developed this logistic regression tool to alleviate some of the stress that the COVID-19 pandemic has placed on healthcare systems by reducing undue decision-making variations and optimising resource utilisation.

To develop the algorithm, it was initially trained on a data set of 1,469 patients testing positive for COVID-19 by PCR within 14 days of an acute care hospital visit between 4 March to 21 August 2020 at 12 emergency department sites in the M Health Fairview health system. The tool was trained to predict severe COVID-19, which was defined as leading to ICU admission, ventilation, or death. Risk factors for severe COVID-19 that logistic regression selected included age, sex, race, English language-speaking, obesity, home medications prescribed three months before, and chronic comorbidities. Physiological features included vital signs (maximum heart rate, respiratory rate, temperature, minimal peripheral arterial oxygen saturation, and systolic blood pressure within the first 24 hours).

These factors were used to calculate a risk score which was subsequently validated. Temporal validation occurred in 414 COVID-19 PCR-positive patients to simulate real-time performance had the system been available between 22 August and 11 October 2020. The algorithm was further validated in a data set consisting of 13,271 patients under investigation with COVID-19 symptoms during an acute care visit between 4 May and 11 October 2020. About 26.8% (3,561) of these patients did test positive for COVID-19 by PCR. It was last validated real-time among 2,174 patients, of which 61.2% (1,331) tested PCR-positive.The model could accurately predict severe COVID-19 85% of the time (AUROC: 0.85).

According to the study authors, the machine learning model can be developed, validated, and implemented for clinical decision support across multiple hospitals. Its implementation would 'reduce reducing undue decision-making variations and optimise resource utilisation.'

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