Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Risk stratification of patients with COVID-19 in the community

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At the start of the COVID-19 pandemic, little was known about the disease. A monumental effort was made to understand the evolving data and develop prediction tools that patients, health-care workers, and policy makers could use to optimise care. The unfortunate result was a tidal wave of poorly conceptualised prediction models, often using small convenience samples, incorporating little or no validation, and including no substantive plan for implementation.[1] As a result, most of the prediction tools developed were never meaningfully applied in clinical care.

Examples of good practice exist, including two collaborative projects QCOVID (estimating risk of being hospitalised or dying due to catching COVID-19)[2] and the ISARIC 4C models (estimating risk of dying or deteriorating after hospital admission with COVID-19).[3,4] However, an obvious gap existed in the assessment of symptomatic patients in the community. As the profile of COVID-19 has changed and the focus of care shifts to supporting diagnosis, treatment, and monitoring outside hospitals, the assessment of patients has become increasingly important.

In the *Lancet Digital Health*, we welcome the study by Ana Espinosa-Gonzalez and colleagues[5] on the derivation and validation of two much-needed risk stratification tools for use in a community setting. The two pragmatic decision aids support the assessment of patients with symptoms of COVID-19, seeking to identify those who will probably require further monitoring (Remote COVID-19 assessment in primary care–General Practice, without peripheral oxygen saturation [RECAP-GP]) and those in whom treatment escalation is warranted (RECAP-oxygen [RECAP-O2]). The models were developed according to a prepublished protocol and used linked primary and hospital health-care records, together with data from the WhatsApp-based patient monitoring platform, Doctaly Assist.[6]

What do these data tell us and how well do the models work? It is important to reflect on what the models actually capture. The patients included in the cohorts had symptoms of COVID-19, but they did not necessarily have COVID-19. This is pragmatic and appropriate because a COVID-19 diagnostic test might not be available at the time of assessment. But as COVID-19 prevalence decreases in the community, how patients are selected to use this tool will significantly affect its performance.

An additional point of reflection is around a concept termed incorporation bias. Espinosa-Gonzalez and colleagues[5] are testing to see if symptoms predict admission, but the same symptoms have probably been used to determine the need for the actual hospital admission. Therefore, the prediction tool can become a self-fulfilling prophecy, and this circularity can artificially increase sensitivity and specificity. The authors mitigate against this by requiring an admission to be at least one night (and by implication require clinical management rather than simply assessment), but the effects of this bias might persist.

The RECAP-GP model performs well in the first external cohort of patients from northwest London, but the discrimination is poorer in the second (COVID Clinical Assessment Service; area under the receiver operator characteristic curve [AUROC] 0·66). A similar result was seen for RECAP-O2 (Doctaly-2; AUROC 0·68). Compared with the derivation and first external validation cohorts, the Doctaly-1 cohort was recruited later in the pandemic and differences in population (younger age with fewer comorbidities), virus variants, and vaccination status might partly explain this.[7] Calibration (the performance of the model across the range of risk) is important;[8] although good to see calibration data reported for the development dataset, it would have been useful for the external validation too. Similarly, while good to see model performance presented by age and sex, it is important to ensure that it performs as well across different ethnic groups.

As presented the models might confuse users. The risk of hospital readmission for patients who were breathless after moderate exertion is lower than for those with breathlessness after mild exertion, which is not what we would expect to see (RECAP-GP; similar finding in RECAP-O2). For instance, a 45-year-old man with hypertension and a fever complaining of moderate breathlessness after exertion will be graded as being at amber risk (8·1% risk of hospital admission) while

the same patient describing mild breathlessness after exertion will be graded as being at red risk (11·5% risk of hospital admission). This could be explained by the incorporation of non-significant factor levels, but the resulting biological implausibility might reduce face validity.

Applicability in low-income and middle-income countries must also be considered. Continued reduced access to vaccination, varied public health policy implementation and higher death rates[9,10] suggest research should be relevant and generalisable to such settings. The widespread absence of peripheral oxygen monitors means the RECAP-O2 model is currently unlikely have relevance beyond a select few countries. However, RECAP-GP has the potential for global clinical use and validation in low-income and middle-income countries is an urgent priority.

We declare no competing interests.

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