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## Beyond COVID-19—will self-sampling and testing become the norm?

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In the fight against COVID-19, the general population in many countries has not been empowered to pursue diagnostic testing, but rather has been a subject to often frustrating and inadequate testing capacity. Diagnostics have been a cornerstone of the COVID-19 response globally, because strategies to contain and respond to the pandemic rely primarily on case counts. Although RT-PCR remains the gold standard for detecting SARS-CoV-2, high testing demand has overwhelmed molecular laboratory capacities. This was especially true early in the pandemic, and particularly in low-income and middle-income countries (LMICs). Inadequate diagnostic testing capacity is a primary reason why the impact of COVID-19 has been underestimated globally, and woefully so in LMICs, where diagnostic capacity has been even more scarce than in high-income countries.<sup>1</sup>

When the pandemic spread to Africa in March, 2020, only Senegal and South Africa had laboratories capable of detecting SARS-CoV-2 using RT-PCR. Owing to actions taken by the Africa Centers for Disease Control and Prevention, WHO AFRO, and World Food Program to increase laboratory capacity, the number of African countries with RT-PCR-capable laboratories had increased to 43 by May, 2020.<sup>1</sup> Although most of these laboratories are in major cities, Cameroon implemented 17 RT-PCR testing sites in nine of ten regions to decentralise the COVID-19 national response.<sup>2</sup> Although necessary, establishing molecular laboratories does not solve the challenge of mass testing. Dedicated testing sites increased testing capacity, but also brought people of unknown infection status into proximity and, through their travelling and awaiting sampling and results, increased COVID-19 exposure risk.

The validation of SARS-CoV-2 antigen rapid diagnostic tests (RDTs; eg, SD Biosensor SARS-CoV-2 Rapid Antigen Test [Roche Diagnostics]) has substantially changed testing strategies globally.<sup>3</sup> RDT results are available within 30 min, reducing turnaround time and therefore exposure risk. In Cameroon, the national algorithm recommended RDTs for symptomatic patients, and immediate isolation and medical care for those testing positive. Thus, only individuals with a negative RDT result underwent RT-PCR testing, improving turnaround time and patient flow.

Through this strategy, more than 40% of symptomatic SARS-CoV-2 infections were detected by RDT and managed promptly in Cameroon.<sup>4</sup> However, despite complementing PCR testing, especially with the increased threat presented by emerging variants, RDTs cannot entirely replace SARS-CoV-2 RT-PCR. RT-PCR testing of a proportion of positive samples will remain crucial for the detection of new variants, and often requires in-person sampling at centralised testing facilities.

In their meta-analysis reported in *The Lancet Infectious Diseases*, Nicole Ngai Yung Tsang and colleagues<sup>5</sup> compared the diagnostic performance of different clinical specimens, including nasopharyngeal, nasal, throat, and oropharyngeal swabs and saliva. Using nasopharyngeal swabs as the gold standard, they found that patients' pooled nasal and throat swabs gave the highest sensitivity (97%, 95% CI 93–100) among alternative sampling approaches, whereas moderate sensitivities were achieved by saliva (85%, 75–93) and nasal swabs (86%, 77–93) and a much lower sensitivity by throat swabs (68%, 35–94). The authors thus concluded that saliva and nasal swabs are clinically acceptable alternatives to commonly used nasopharyngeal swabs. More importantly, they also found that pooled self-collected nasal and throat swabs had a diagnostic performance that was comparable to nasopharyngeal swabs. Considering the urgent need to increase testing capacity globally, this validation of self-collection methods could have an impact on testing strategies. Reliable self-collection and self-testing will reduce population movement, reduce COVID-19 exposure risk, decrease the burden on human resources for sampling and testing, and minimise the need for using high-level personal protective equipment. Thus, scaling up the self-collection of samples could lead to efficient control of SARS-CoV-2 in the community, while improving resource use and reducing occupational exposure risks for health-care workers.

Although self-sampling and RDTs could represent the tipping point in the fight against COVID-19, self-sampling and testing could become the norm beyond COVID-19. Self-testing kits for HIV infection are common in the UK and Kenya,<sup>6</sup> similar to at-home pregnancy tests.

However, before self-testing for infectious diseases can become the norm, there is a need to empower patients to understand and manage their self-diagnosis with appropriate resources. This approach requires a clear objective from the patient, transparent and efficient reporting of results, and rapid communication with health professionals using telemedicine or other virtual methods to maximise the advantages of self-testing. Furthermore, psychological support must be readily available to ensure that patients are prepared to receive their results and engage in appropriate management. Beyond COVID-19, the patient should become the centre of infectious diseases management, especially in LMICs.

We declare no competing interests.

\*Yap Boum, Sara Eyangoh, Marie-Claire Okomo  
yap.boum@epicentre.msf.org

Epicentre, Yaoundé BP 12069, Cameroon (YB); Centre Pasteur du Cameroun, Yaoundé, Cameroon (SE); National Public Health Laboratory, Yaoundé, Cameroon (M-CO)

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## Lack of detail in population-level data impedes analysis of SARS-CoV-2 variants of concern and clinical outcomes



The SARS-CoV-2 lineage B.1.1.7 is characterised by a suite of defining mutations in the immunodominant spike protein, including a signature Asp501Tyr substitution in the receptor-binding domain.<sup>1</sup> First reported in December 2020, in the UK, the variant's discovery coincided with a substantial surge in case numbers and fatalities in the UK, raising concerns that this variant was both more infectious and virulent than previous variants. Epidemiological and modelling studies have yielded good evidence that B.1.1.7 is more transmissible than other variants.<sup>1,2</sup> However, conclusions as to the effects of B.1.1.7 on disease severity are less certain. Confounding factors including health-care resource use, demographic changes, and socio-behavioural trends affect clinical outcomes, including mortality, and are difficult to adjust for without detailed, robust, patient-level data.

In *The Lancet Infectious Diseases*, Dan Frampton and colleagues<sup>3</sup> report their findings from such a study. Analysing a cohort of 341 patients, including 198 (58%) with B.1.1.7 infections, the authors correlated outcomes with granular clinical data. Their observation that B.1.1.7 infections were associated with increased viral loads corroborates findings from two other studies<sup>4,5</sup> and provides a mechanistic hypothesis that increased

transmissibility is via increased respiratory shedding. Yet, disease severity and clinical outcomes between patients with B.1.1.7 and non-B.1.1.7 infections were similar after adjusting for differences in age, sex, ethnicity, and comorbidities. Importantly, this study was done from Nov 9, to Dec 20, 2020, before the late-December peak in UK COVID-19 infections, avoiding any confounding effect of the availability of health-care resources on mortality.

This finding is in contrast with three studies that reported increased mortality associated with lineage B.1.1.7 (table).<sup>6–8</sup> Several factors might explain this discordance. Two of these studies were based on a community-based testing dataset, whereas Frampton and colleagues studied a cohort of patients admitted to hospital, which included substantially more older adults than the other studies did. Although the proportion of patients with severe illness was not reported by the other studies, this proportion was probably much lower than that in Frampton and colleagues' study. Hence, although these large community studies found a significant difference in mortality at a population level, the absolute risk increase affecting individual patients is probably minimal.

Furthermore, instead of whole-genome sequencing as used by Frampton and colleagues, these studies

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