



health

Department:
Health
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INTERNAL MEMO

Date:	08 June 2020		
To:	Minister ZL Mkhize, Honorable Minister of Health	From:	Ministerial Advisory Committee (MAC) on COVID-19

POOLING OF SPECIMEN TESTING

Problem Statement

Establishment of large-scale testing programmes in many countries, including South Africa, has led to increased demand of test kits and reagents, which has led to severe shortages as manufacturers try to keep up with the sudden large demand.

The shortage and unavailability of test kits and reagents has highlighted the need to identify and explore alternative high-throughput, cost-effective processing methods for identification of SARS-CoV-2.

Task to Committee

The adaptation of currently available RT-PCR assays for testing pooled samples has been proposed as an alternative approach to increase throughput and offset the need for large amounts of test kits and reagents, and associated costs.

Evidence review

- In pooled PCR testing, samples from multiple patients are pooled and tested concurrently as one specimen; if the pooled specimen tests positive, then testing is conducted on individual specimens in the pool in a process referred to as pool deconvolution.
- All specimens in a negative pool are regarded as negative and, therefore, no further testing is required. This may result in substantial savings in terms of test kits, reagents, staffing and associated costs, especially when high proportion of pools tests negative.
- The pooled RT-PCR approach does have limitations. In high prevalence/incidence settings, the approach may not result in significant savings, as a high proportion of pools would test positive, requiring deconvolution and individual testing.
- Hanel *et al.* used a theoretical model to estimate optimal pool sizes for different SARS-CoV-2 infection prevalence scenarios (1). They estimated an optimal pool size of 11 and testing efficiency gain of 5.1 for an infection level of 1%; while the estimated optimal pool size for an infection level of 10% was 4, translating to an almost two-fold efficiency gain.

- The performance of the pooled approach appears to be affected by the number of specimens included in each pool, and specifically viral genome concentrations, in the pooled specimens (2,3).
- Maximum savings are likely to be realised in low prevalence settings, particularly large community-based or occupational-based screening of asymptomatic or mildly symptomatic individuals.
- The pooling approach will have little utility in settings where the positive predictive value is expected to be high, such as healthcare workers, clusters of cases, or contacts of known cases.

References:

1. Hanel R, Thurner S. Boosting test-efficiency by pooled testing strategies for SARS-CoV-2 2020 [Available from: <http://arxiv.org/abs/2003.09944>.
2. van Schalkwyk C, Maritz J, van Zyl GU, Preiser W, Welte A. Pooled PCR testing of dried blood spots for infant HIV diagnosis is cost efficient and accurate. BMC infectious diseases. 2019;19(1):136.
3. Castle PE, Schiffman M, Herrero R, Hildesheim A, Rodriguez AC, Bratti MC, et al. PCR testing of pooled longitudinally collected cervical specimens of women to increase the efficiency of studying human papillomavirus infection. Cancer Epidemiol Biomarkers Prev. 2005;14(1):256-60.

Recommendation

It is recommended that the NHLS virology laboratories in provinces with low test positivity rates conduct pilot programmes using the pooling strategy for community-based testing. The data from the pilot programme will then determine how implementing such a strategy will impact the laboratory specimen flow and whether it is appropriate to implement in specific labs.

Rationale for recommendations

Pooled PCR has been shown to be an effective method for diagnosis of viral infections, with specificity and sensitivity comparable to individual specimen PCR testing. The resource and cost savings associated with the pooled PCR testing algorithm make it an attractive approach for the current COVID-19 outbreak that requires large-scale testing of individuals in a resource-constrained context. Maximum savings are likely to be realised in low prevalence settings, particularly large community-based screening programmes.

Thank you for consideration of this request.

Kind regards,



PROFESSOR SALIM S. ABDOOL KARIM

OVERARCHING CHAIRPERSON: MINISTERIAL ADVISORY COMMITTEE ON COVID-19

DATE: 08 June 2020

CC:

- » **Dr S Buthelezi (Director-General: Health)**
- » **Dr T Pillay (Deputy Director-General: National Health Insurance)**
- » **Dr S Zungu (Project Lead: Sectoral Response to Covid-19)**
- » **Implementation Management Team**