World Health Organization
REGIONAL OFFICE FOR Europe

Rapid communication on the role of the GeneXpert® platform for rapid molecular testing for SARS-CoV-2 in the WHO European Region

European Laboratory Initiative on TB, HIV and Viral Hepatitis

Address requests about publications of the WHO Regional Office for Europe to:
Publications
WHO Regional Office for Europe
UN City, Marmorvej 51
DK-2100 Copenhagen Ø, Denmark
Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office website (http://www.euro.who.int/pubrequest).

Rapid communication on the role of the GeneXpert® platform for rapid molecular testing for SARS-CoV-2 in the WHO European Region

Suggested citation. Rapid communication on the role of the GeneXpert® platform for rapid molecular testing for SARS-CoV-2 in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2020. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

On 30 January 2020 WHO declared coronavirus disease 2019 (COVID-19) a public health emergency of international concern, and on 11 March declared it as a global pandemic. From the onset of this public health crisis, the need for rapid and accurate laboratory testing was highlighted, and laboratory scientists responded by developing the first diagnostic tests for COVID-19 within days of the release of the viral genome sequence.

The WHO European Region is currently the epicentre of the COVID-19 outbreak, with the disease reportedly most prevalent in the western part of the Region; however, this information needs to be carefully interpreted because countries are in different stages of disease transmission and the lower numbers reported in some eastern European countries may be due to the lack of available diagnostic services. All countries need to plan ahead to ensure sufficient diagnostic capacity, as outlined in the WHO guidance document, Laboratory testing strategy recommendations for COVID-19.[1]

In this context, one of the key questions faced by countries is which diagnostic assay(s) to adopt to meet the demand for the four transmission scenarios identified by WHO.[1,2] Serological or rapid antigen tests are currently not recommended by WHO for COVID-19 case detection: nucleic acid amplification tests should be used. However, this guidance may change based on the availability of new serological tests.[1] An overview of tests under development can be found on the FIND website.[3] Some have already received emergency approval by the United States Food and Drug Administration (FDA) and/or are CE-IVD marked[4] for diagnostic use in the European Union. WHO is continuously updating technical guidance for COVID-19, including recommendations on laboratory testing.[2] No comprehensive comparison of the performance of rapid diagnostic has been performed to date, although several evaluations are ongoing or planned.[5] For the time being, the following logistic and financial factors, among other factors, can be weighed to inform the choice of nucleic acid amplification test: turnaround time, throughput (i.e. number of tests that can be run simultaneously in one round), degree of automation, supply considerations and cost (list not exhaustive).

In view of FDA approval of the Xpert® Xpress SARS-CoV-2 cartridge (Cepheid, Sunnyvale, United States of America)[6] on 20 March 2020, one option for COVID-19 testing may be to leverage the spare capacity of existing GeneXpert® machines. Possible advantages of this approach are that the assay is fully automated and provides results within 45 minutes. Laboratory staff may be already familiar with the GeneXpert® platform, given that the Xpert® MTB/RIF assay serves as the primary diagnostic assay for tuberculosis (TB) and its drug-resistant forms in eastern and central European countries in accordance with WHO recommendations.[7] Therefore, the possibility of applying GeneXpert® platforms can be considered providing cartridge production capacity and cost are optimal. Furthermore, it is important to note that according to WHO guidelines and recommendations GeneXpert®-based COVID-19 testing

---

[1] For the latest update, please check the following version of the document: Laboratory testing strategy recommendations for COVID-19. Interim guidance: 22 March 2020. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/bitstream/handle/10665/331509/WHO-COVID-19-lab_testing-2020.1-eng.pdf, accessed 31 March 2020).

[2] Coronavirus disease (COVID-19) technical guidance: Laboratory testing for 2019-nCoV in humans. Geneva: World Health Organization; 2020 (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/laboratory-guidance, accessed 31 March 2020).

[3] SARS-CoV-2 diagnostic pipeline. In: FIND. Geneva: Foundation for Innovative New Diagnostics; 2020 (https://www.finddx.org/covid-19/pipeline, accessed 31 March 2020).

[4] CE marking is required for all in vitro diagnostic (IVD) devices sold in Europe. CE marking indicates that an IVD device complies with the European In-Vitro Diagnostic Devices Directive (98/79/EC) and that the device may be legally commercialized in the EU.
Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998 on in vitro diagnostic medical devices (https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31998L0079, accessed 31 March 2020).

[5] FIND evaluation update: SARS-CoV-2 molecular diagnostics. In: FIND. Geneva: Foundation for Innovative New Diagnostics; 2020 (https://www.finddx.org/covid-19/sarscov2-eval-molecular, accessed 31 March 2020).

[6] Xpert® Xpress SARS-CoV-2: instructions for use. Sunnyvale (CA): Cepheid; 2020 (https://www.fda.gov/media/136314/download, accessed 31 March 2020).

[7] Automated real-time nucleic acid amplification technology for rapid and simultaneous detection of tuberculosis and rifampicin resistance: Xpert MTB/RIF assay for the diagnosis of pulmonary and extrapulmonary TB in adults and children. Geneva: World Health Organization; 2020 (Policy update; https://apps.who.int/iris/bitstream/handle/10665/112472/9789241506335_eng.pdf?sequence=1, accessed 31 March 2020).

should not be used outside of laboratories with adequate containment practices, which may diminish the value of the rapid turnaround time in the absence of efficient sample transport/logistics.[8] Moreover, the throughput of Xpert® Xpress SARS-CoV-2 is limited (e.g. in a machine with four modules, only four tests can be done with a turnaround time of 45 minutes). Assuming one test is performed per module per hour and a 24-hour working pattern, the total theoretical capacity of 10 GeneXpert® machines with four modules would be approximately 960 samples per day. Crucially, however, the spare testing capacity is likely to be considerably lower.

Taken together, this means that although Xpert® Xpress SARS-CoV-2 is a potentially promising option for testing a limited number of samples (e.g. from patients in intensive care units or from health-care workers with the highest public health priority), it is probably not the optimal solution for the vast majority of samples, particularly in settings with large outbreaks. The Xpert® Xpress SARS-CoV-2 cartridge is probably best suited to complement a wider testing strategy that primarily relies on one or more higher throughput assays. Indeed, the latter strategy has been adopted by all countries that have or are currently experiencing large-scale disease transmission. In this context, it should be noted that no single high-throughput assay is considered optimal. Countries must assess the capacity of existing platforms, taking into account the aforementioned considerations for Xpert® Xpress SARS-CoV-2, to decide which assay(s) to select.

The WHO Global TB Programme's headquarters recently circulated an information note on TB and the COVID-19 response.[9] This document states that, on a programmatic level, countries would need to develop targeted strategies for COVID-19 testing in TB patients, including those with previous disease. It also points out that testing for TB in individuals presenting for COVID-19 testing is becoming necessary, as is COVID-19 testing among individuals presenting to TB services with respiratory signs and symptoms. In the absence of current evidence to inform policy guidance, the WHO Global TB Programme and WHO headquarters are working on a global WHO position statement on TB testing in COVID-19 settings and COVID-19 testing in TB settings. Given the diversity among countries and the different phases of the COVID-19 pandemic, this global strategy will require further refinement to address region-specific and/or country- and setting-specific needs.

While awaiting additional regional and national approval for Xpert® Xpress SARS-CoV-2, as well as production of the first cartridges, core group members of the European Laboratory Initiative on TB, HIV and Viral Hepatitis will focus on the following major areas to provide further clarification and to support the WHO European Region with materials to be ready once this test becomes available in countries (in order of priority):

- identify and share the list of supplies that will be needed to run the test (e.g. viral transport tube, swabs);
- provide standard operating procedures in English and Russian;
- develop technical support materials to help countries rationalize their laboratory network and use the existing GeneXpert® machines for the maximal COVID-19 response without compromising their use for TB, HIV and viral hepatitis;
- provide remote or in-country support:
  - on necessary biosafety measures and considerations;
  - on workflow organization for GeneXpert® machines that will be used for several diseases (i.e. TB, HIV/viral hepatitis and COVID-19);
  - for sample transportation;
  - on data management tools (e.g. GxAlert) and laboratory record and report forms; and
  - for integration of rapid diagnostic tests into the overall diagnostic algorithms and testing strategies.

---

[8] Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19). Interim guidance: 12 February 2020. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/bitstream/handle/10665/331138/WHO-WPE-GIH-2020.1-eng.pdf?sequence=1&isAllowed=y, accessed 31 March 2020).

[9] World Health Organization (WHO) information note tuberculosis and COVID-19. Date: 20th March 2020. Geneva: World Health Organization; 2020 (https://www.who.int/tb/COVID_19considerations_tuberculosis_services.pdf, accessed 31 March 2020).

The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands
North Macedonia
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
Turkey
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization
Regional Office for Europe

UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00 Fax: +45 45 33 70 01
Email: eurocontact@who.int
Website: www.euro.who.int