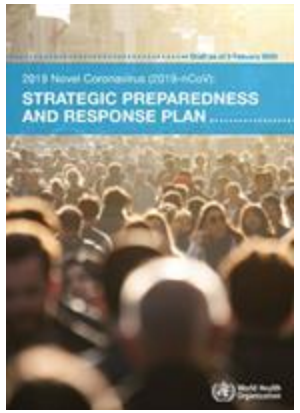
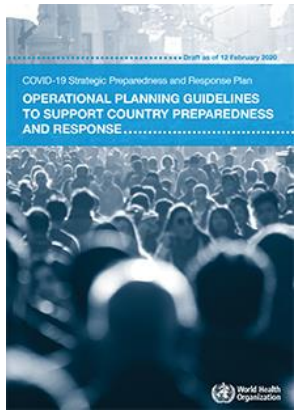
PROCUREMENT AND SUPPLY CHAIN FOR COVID-19

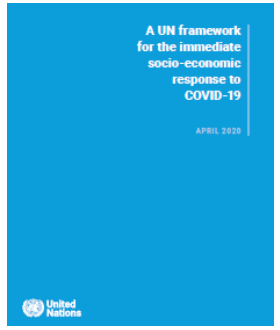
World Health Organization

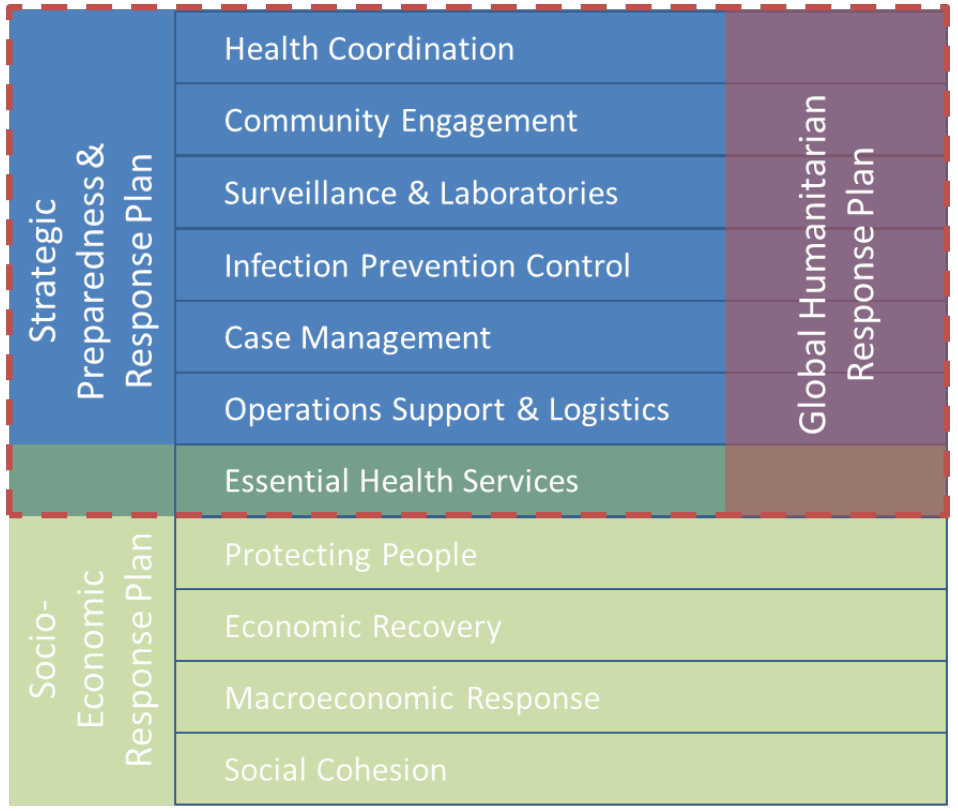
HEALTH EMERGENCIES programme

WHO support to COVID-19 preparedness and response









WHO support includes:

- All pillars of the public health response in the Strategic Preparedness & Response Plan

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- Maintaining essential health services as outlined in the "Health First" section of the Socio-Economic Response Plan

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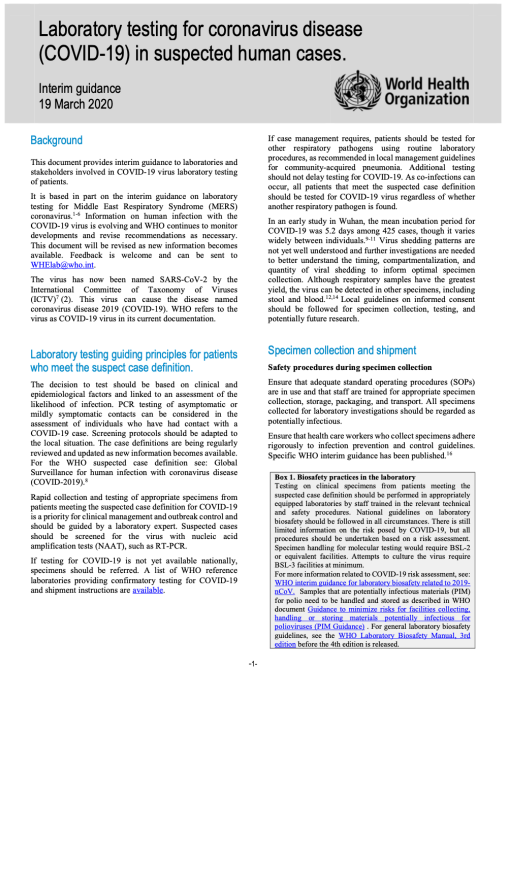
- Health needs under the Global Humanitarian Response Plan

Diagnostics guidance documents



Laboratory testing for coronavirus disease (COVID-19) in suspected human cases.

Interim guidance
19 March 2020

World Health Organization

Background

This document provides interim guidance to laboratories and stakeholders involved in COVID-19 virus laboratory testing of patients.

It is based in part on the interim guidance on laboratory testing for Middle East Respiratory Syndrome (MERS) coronavirus.[1-4] Information on human infection with the COVID-19 virus is evolving and WHO continues to monitor developments and revise recommendations as necessary. This document will be revised as new information becomes available. Feedback is welcome and can be sent to WHElab@who.int.

The virus has now been named SARS-CoV-2 by the International Committee of Taxonomy of Viruses (ICTV)[5] (2). This virus can cause the disease named coronavirus disease 2019 (COVID-19). WHO refers to the virus as COVID-19 virus in its current documentation.

Laboratory testing guiding principles for patients who meet the suspect case definition.

The decision to test should be based on clinical and epidemiological factors and linked to an assessment of the likelihood of infection. PCR testing of asymptomatic or mildly symptomatic contacts can be considered in the assessment of individuals who have had contact with a COVID-19 case. Screening protocols should be adapted to the local situation. The case definitions are being regularly reviewed and updated as new information becomes available. For the WHO suspected case definition see: Global Surveillance for human infection with coronavirus disease (COVID-2019).[6]

Rapid collection and testing of appropriate specimens from patients meeting the suspected case definition for COVID-19 is a priority for clinical management and outbreak control and should be guided by a laboratory expert. Suspected cases should be screened for the virus with nucleic acid amplification tests (NAAT), such as RT-PCR.

If testing for COVID-19 is not yet available nationally, specimens should be referred. A list of WHO reference laboratories providing confirmatory testing for COVID-19 and shipment instructions are available.

If case management requires, patients should be tested for other respiratory pathogens using routine laboratory procedures, as recommended in local management guidelines for community-acquired pneumonia. Additional testing should not delay testing for COVID-19. As co-infections can occur, all patients that meet the suspected case definition should be tested for COVID-19 virus regardless of whether another respiratory pathogen is found.

In an early study in Wuhan, the mean incubation period for COVID-19 was 5.2 days among 425 cases, though it varies widely between individuals.[9-11] Virus shedding patterns are not yet well understood and further investigations are needed to better understand the timing, compartmentalization, and quantity of viral shedding to inform optimal specimen collection. Although respiratory samples have the greatest yield, the virus can be detected in other specimens, including stool and blood.[12-14] Local guidelines on informed consent should be followed for specimen collection, testing, and potentially future research.

Specimen collection and shipment

Safety procedures during specimen collection

Ensure that adequate standard operating procedures (SOPs) are in use and that staff are trained for appropriate specimen collection, storage, packaging, and transport. All specimens collected for laboratory investigations should be regarded as potentially infectious.

Ensure that health care workers who collect specimens adhere rigorously to infection prevention and control guidelines. Specific WHO interim guidance has been published.[16]

Box 1. Biosafety practices in the laboratory

Testing on clinical specimens from patients meeting the suspected case definition should be performed in appropriately equipped laboratories by staff trained in the relevant technical and safety procedures. National guidelines on laboratory biosafety should be followed in all circumstances. There is still limited information on the risk posed by COVID-19, but all procedures should be undertaken based on a risk assessment. Specimen handling for molecular testing would require BSL-2 or equivalent facilities. Attempts to culture the virus require BSL-3 facilities at minimum.

For more information related to COVID-19 risk assessment, see: WHO interim guidance for laboratory biosafety related to 2019-nCoV. Samples that are potentially infectious materials (PIM) for polio need to be handled and stored as described in WHO document Guidance to minimize risks for facilities collecting, handling or storing materials potentially infectious for poliovirinaes (PIM Guidance) . For general laboratory biosafety guidelines, see the WHO Laboratory Biosafety Manual, 3rd edition before the 4th edition is released.

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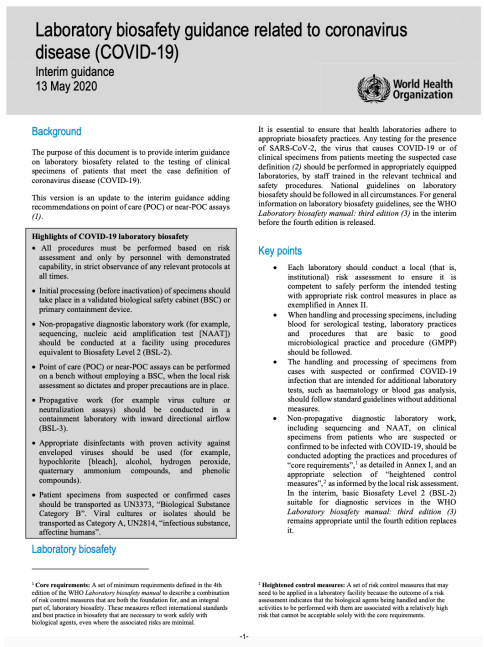

Laboratory biosafety guidance related to coronavirus disease (COVID-19)

Interim guidance
13 May 2020

World Health Organization

Background

The purpose of this document is to provide interim guidance on laboratory biosafety related to the testing of clinical specimens of patients that meet the case definition of coronavirus disease (COVID-19).

This version is an update to the interim guidance adding recommendations on point of care (POC) or near-POC assays *(1)*.

Highlights of COVID-19 laboratory biosafety

- All procedures must be performed based on risk assessment and only by personnel with demonstrated capability, in strict observance of any relevant protocols at all times.
- Initial processing (before inactivation) of specimens should take place in a validated biological safety cabinet (BSC) or primary containment device.
- Non-propagative diagnostic laboratory work (for example, sequencing, nucleic acid amplification test [NAAT]) should be conducted at a facility using procedures equivalent to Biosafety Level 2 (BSL-2).
- Point of care (POC) or near-POC assays can be performed on a bench without employing a BSC, when the local risk assessment so dictates and proper precautions are in place.
- Propagative work (for example virus culture or neutralization assays) should be conducted in a containment laboratory with inward directional airflow (BSL-3).
- Appropriate disinfectants with proven activity against enveloped viruses should be used (for example, hypochlorite [bleach], alcohol, hydrogen peroxide, quaternary ammonium compounds, and phenolic compounds).
- Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A, UN2814, "infectious substance, affecting humans".

Laboratory biosafety

It is essential to ensure that health laboratories adhere to appropriate biosafety practices. Any testing for the presence of SARS-CoV-2, the virus that causes COVID-19 or of clinical specimens from patients meeting the suspected case definition *(2)* should be performed in appropriately equipped laboratories, by staff trained in the relevant technical and safety procedures. National guidelines on laboratory biosafety should be followed in all circumstances. For general information on laboratory biosafety guidelines, see the WHO *Laboratory biosafety manual: third edition (3)* in the interim before the fourth edition is released.

Key points

- Each laboratory should conduct a local (that is, institutional) risk assessment to ensure it is competent to safely perform the intended testing with appropriate risk control measures in place as exemplified in Annex II.
- When handling and processing specimens, including blood for serological testing, laboratory practices and procedures that are basic to good microbiological practice and procedure (GMPP) should be followed.
- The handling and processing of specimens from cases with suspected or confirmed COVID-19 infection that are intended for additional laboratory tests, such as haematology or blood gas analysis, should follow standard guidelines without additional measures.
- Non-propagative diagnostic laboratory work, including sequencing and NAAT, on clinical specimens from patients who are suspected or confirmed to be infected with COVID-19, should be conducted adopting the practices and procedures of "core requirements",[1] as detailed in Annex I, and an appropriate selection of "heightened control measures",[2] as informed by the local risk assessment. In the interim, basic Biosafety Level 2 (BSL-2) suitable for diagnostic services in the WHO *Laboratory biosafety manual: third edition (3)* remains appropriate until the fourth edition replaces it.

[1] **Core requirements:** A set of minimum requirements defined in the 4th edition of the WHO *Laboratory biosafety manual* to describe a combination of risk control measures that are both the foundation for, and an integral part of, laboratory biosafety. These measures reflect international standards and best practice in biosafety that are necessary to work safely with biological agents, even where the associated risks are minimal.

[2] **Heightened control measures:** A set of risk control measures that may need to be applied in a laboratory facility because the outcome of a risk assessment indicates that the biological agents being handled and/or the activities to be performed with them are associated with a relatively high risk that cannot be acceptable solely with the core requirements.

-1-

Advice on the use of point-of-care immunodiagnostic tests for COVID-19

Scientific brief
8 April 2020

World Health Organization

In response to the growing COVID-19 pandemic and shortages of laboratory-based molecular testing capacity and reagents, multiple diagnostic test manufacturers have developed and begun selling rapid and easy-to-use devices to facilitate testing outside of laboratory settings. These simple test kits are based either on detection of proteins from the COVID-19 virus in respiratory samples (e.g. sputum, throat swab) or detection, in blood or serum, of human antibodies generated in response to infection.

WHO applauds the efforts of test developers to innovate and respond to the needs of the population.

However, before these tests can be recommended, they must be validated in the appropriate populations and settings. Inadequate tests may miss patients with active infection or falsely categorize patients as having the disease when they do not, further hampering disease control efforts. **At present, based on current evidence, WHO recommends the use of these new point-of-care immunodiagnostic tests only in research settings. They should not be used in any other setting, including for clinical decision-making, until evidence supporting use for specific indications is available.**

WHO continues to evaluate available immunodiagnostics tests for COVID-19 and will update this scientific brief when necessary.

Rapid diagnostic tests based on antigen detection

One type of rapid diagnostic test (RDT) detects the presence of viral proteins (antigens) expressed by the COVID-19 virus in a sample from the respiratory tract of a person. If the target antigen is present in sufficient concentrations in the sample, it will bind to specific antibodies fixed to a paper strip enclosed in a plastic casing and generate a visually detectable signal, typically within 30 minutes. The antigen(s) detected are expressed only when the virus is actively replicating; therefore, such tests are best used to identify acute or early infection.

How well the tests work depends on several factors, including the time from onset of illness, the concentration of virus in the specimen, the quality of the specimen collected from a person and how it is processed, and the precise formulation of the reagents in the test kits. Based on experience with antigen-based RDTs for other respiratory diseases such as influenza, in which affected patients have comparable concentrations of influenza virus in respiratory samples as seen in COVID-19, the sensitivity of these tests might be expected to vary from 34% to 80%.[1]

Based on this information, half or more of COVID-19 infected patients might be missed by such tests, depending on the group of patients tested. These assumptions urgently require further study to understand whether they are accurate. Additionally, false-positive results – that is, a test showing that a person is infected when they are not – could occur if the antibodies on the test strip also recognize antigens of viruses other than COVID-19, such as from human coronaviruses that cause the common cold. If any of the antigen detection tests that are under development or commercialized demonstrate adequate performance, they could potentially be used as triage tests to rapidly identify patients who are very likely to have COVID-19, reducing or eliminating the need for expensive molecular confirmatory testing.

With the limited data now available, **WHO does not currently recommend the use of antigen-detecting rapid diagnostic tests for patient care, although research into their performance and potential diagnostic utility is highly encouraged.**

Rapid diagnostic tests based on host antibody detection

There is another, more common type of rapid diagnostic test marketed for COVID-19; a test that detects the presence of antibodies in the blood of people believed to have been infected with COVID-19.[2-5] Antibodies are produced over days to weeks after infection with the virus. The strength of antibody response depends on several factors, including age, nutritional status, severity of disease, and certain medications or infections like HIV that suppress the immune system.[6-8] In some people with COVID-19, disease confirmed by molecular testing (e.g. reverse transcription polymerase chain reaction: RT-PCR), weak, late or absent antibody responses have been reported.[4,5,7] Studies suggest that the majority of patients develop antibody response only in the second week after onset of symptoms.[1,4,7,10-14] This means that a diagnosis of COVID-19 infection based on antibody response will often only be possible in the recovery phase, when many of the opportunities for clinical intervention or interruption of disease transmission have already passed. Antibody detection tests targeting COVID-19 may also cross-react with other pathogens, including other human

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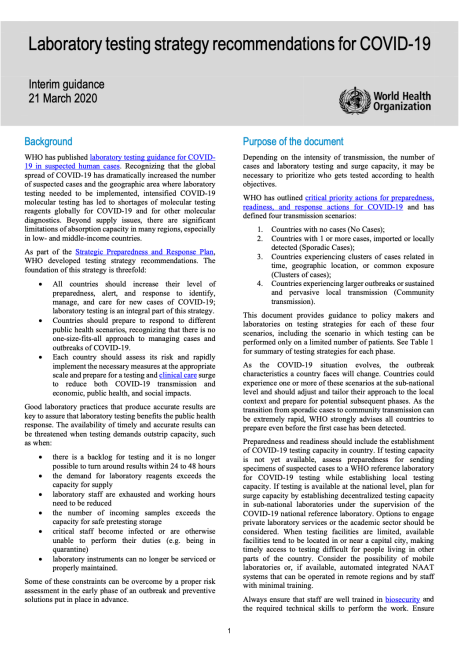

Laboratory testing strategy recommendations for COVID-19

Interim guidance
21 March 2020

World Health Organization

Background

WHO has published laboratory testing guidance for COVID-19 in suspected human cases. Recognizing that the global spread of COVID-19 has dramatically increased the number of suspected cases and the geographic area where laboratory testing needed to be implemented, intensified COVID-19 molecular testing has led to shortages of molecular testing reagents globally for COVID-19 and for other molecular diagnostics. Beyond supply issues, there are significant limitations of absorption capacity in many regions, especially in low- and middle-income countries.

As part of the Strategic Preparedness and Response Plan, WHO developed testing strategy recommendations. The foundation of this strategy is threefold:

- All countries should increase their level of preparedness, alert, and response to identify, manage, and care for new cases of COVID-19; laboratory testing is an integral part of this strategy.
- Countries should prepare to respond to different public health scenarios, recognizing that there is no one-size-fits-all approach to managing cases and outbreaks of COVID-19.
- Each country should assess its risk and rapidly implement the necessary measures at the appropriate scale and prepare for a testing and clinical care surge to reduce both COVID-19 transmission and economic, public health, and social impacts.

Good laboratory practices that produce accurate results are key to assure that laboratory testing benefits the public health response. The availability of timely and accurate results can be threatened when testing demands outstrip capacity, such as when:

- there is a backlog for testing and it is no longer possible to turn around results within 24 to 48 hours
- the demand for laboratory reagents exceeds the capacity for supply
- laboratory staff are exhausted and working hours need to be reduced
- the number of incoming samples exceeds the capacity for safe pretesting storage
- critical staff become infected or are otherwise unable to perform their duties (e.g. being in quarantine)
- laboratory instruments can no longer be serviced or properly maintained.

Some of these constraints can be overcome by a proper risk assessment in the early phase of an outbreak and preventive solutions put in place in advance.

Purpose of the document

Depending on the intensity of transmission, the number of cases and laboratory testing and surge capacity, it may be necessary to prioritize who gets tested according to health objectives.

WHO has outlined critical priority actions for preparedness, readiness, and response actions for COVID-19 and has defined four transmission scenarios:

1. Countries with no cases (No Cases);
2. Countries with 1 or more cases, imported or locally detected (Sporadic Cases);
3. Countries experiencing clusters of cases related in time, geographic location, or common exposure (Clusters of cases);
4. Countries experiencing larger outbreaks or sustained and pervasive local transmission (Community transmission).

This document provides guidance to policy makers and laboratories on testing strategies for each of these four scenarios, including the scenario in which testing can be performed only on a limited number of patients. See Table 1 for summary of testing strategies for each phase.

As the COVID-19 situation evolves, the outbreak characteristics a country faces will change. Countries could experience one or more of these scenarios at the sub-national level and should adjust and tailor their approach to the local context and prepare for potential subsequent phases. As the transition from sporadic cases to community transmission can be extremely rapid, WHO strongly advises all countries to prepare even before the first case has been detected.

Preparedness and readiness should include the establishment of COVID-19 testing capacity in country. If testing capacity is not yet available, assess preparedness for sending specimens of suspected cases to a WHO reference laboratory for COVID-19 testing while establishing local testing capacity. If testing is available at the national level, plan for surge capacity by establishing decentralized testing capacity in sub-national laboratories under the supervision of the COVID-19 national reference laboratory. Options to engage private laboratory services or the academic sector should be considered. When testing facilities are limited, available facilities tend to be located in or near a capital city, making timely access to testing difficult for people living in other parts of the country. Consider the possibility of mobile laboratories or, if available, automated integrated NAAT systems that can be operated in remote regions and by staff with minimal training.

Always ensure that staff are well trained in biosecurity and the required technical skills to perform the work. Ensure

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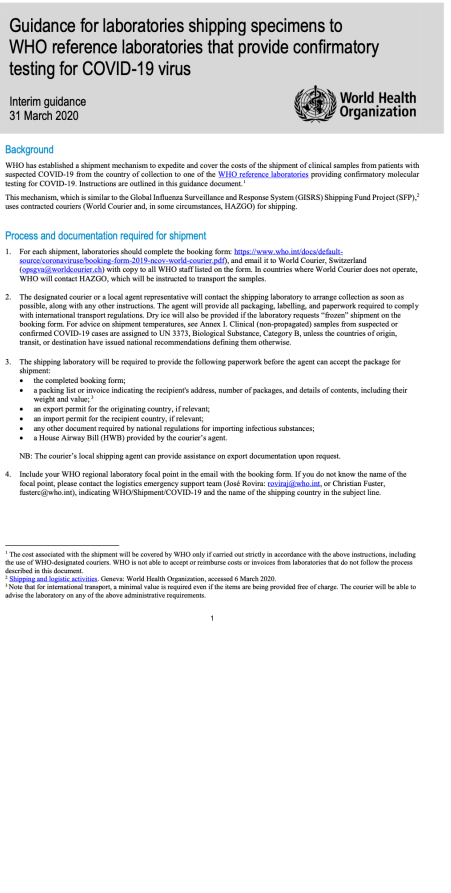


Guidance for laboratories shipping specimens to WHO reference laboratories that provide confirmatory testing for COVID-19 virus

Interim guidance
31 March 2020

World Health Organization

Background

WHO has established a shipment mechanism to expedite and cover the costs of the shipment of clinical samples from patients with suspected COVID-19 from the country of collection to one of the WHO reference laboratories providing confirmatory molecular testing for COVID-19. Instructions are outlined in this guidance document.[1]

This mechanism, which is similar to the Global Influenza Surveillance and Response System (GISRS) Shipping Fund Project (SFP),[2] uses contracted couriers (World Courier and, in some circumstances, HAZGO) for shipping.

Process and documentation required for shipment

1. For each shipment, laboratories should complete the booking form: https://www.who.int/docs/default-source/coronaviruse/booking-form-2019-ncov-world-courier.pdf), and email it to World Courier, Switzerland (ongeva@worldcourier.ch) with copy to all WHO staff listed on the form. In countries where World Courier does not operate, WHO will contact HAZGO, which will be instructed to transport the samples.
2. The designated courier or a local agent representative will contact the shipping laboratory to arrange collection as soon as possible, along with any other instructions. The agent will provide all packaging, labelling, and paperwork required to comply with international transport regulations. Dry ice will also be provided if the laboratory requests "frozen" shipment on the booking form. For advice on shipment temperatures, see Annex 1. Clinical (non-propagated) samples from suspected or confirmed COVID-19 cases are assigned to UN 3373, Biological Substance, Category B, unless the countries of origin, transit, or destination have issued national recommendations defining them otherwise.
3. The shipping laboratory will be required to provide the following paperwork before the agent can accept the package for shipment:
   - the completed booking form;
   - a packing list or invoice indicating the recipient's address, number of packages, and details of contents, including their weight and value;[3]
   - an export permit for the originating country, if relevant;
   - an import permit for the recipient country, if relevant;
   - any other document required by national regulations for importing infectious substances;
   - a House Airway Bill (HWB) provided by the courier's agent.

   NB: The courier's local shipping agent can provide assistance on export documentation upon request.
4. Include your WHO regional laboratory focal point in the email with the booking form. If you do not know the name of the focal point, please contact the logistics emergency support team (José Rovira: royiraj@who.int, or Christian Fuster, fusterc@who.int), indicating WHO/Shipment/COVID-19 and the name of the shipping country in the subject line.

[1] The cost associated with the shipment will be covered by WHO only if carried out strictly in accordance with the above instructions, including the use of WHO-designated couriers. WHO is not able to accept or reimburse costs or invoices from laboratories that do not follow the process described in this document.
[2] Shipping and logistic activities. Geneva: World Health Organization, accessed 6 March 2020.
[3] Note that for international transport, a minimal value is required even if the items are being provided free of charge. The courier will be able to advise the laboratory on any of the above administrative requirements.

1

https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance-publications

World Health Organization

HEALTH EMERGENCIES programme

Emergency Use Listing

World Health Organization

WHO Emergency Use Listing for In vitro diagnostics (IVDs) Detecting SARS-CoV-2 Nucleic Acid

Last update: 14 May 2020

Date Listed	Product name	Product code(s)	Manufacturer
03 April 2020	cobas SARS-CoV-2 Qualitative assay for use on the cobas 6800/8800 Systems	09175431190 and 09175440190	Roche Molecular Systems, Inc.
07 April 2020	Primerdesign Ltd COVID-19 genesig Real-Time PCR assay	Z-Path-COVID-19-CE	Primerdesign Ltd.
09 April 2020	Abbott Realtime SARS-CoV-2	09N77-090 and 09N77-080	Abbott Molecular Inc.
24 April 2020	PerkinElmer® SARS-CoV-2 Real-time RT-PCR Assay	SY580	PerkinElmer Inc.
07 May 2020	Real-time fluorescent RT-PCR kit for detecting 2019-nCoV	MFG030011	BGI Europe A/S
14 May 2020	Detection Kit for 2019 Novel Coronavirus (2019-nCoV) RNA (PCR- Fluorescence Probing)	DA0930, DA0931 and DA0932	Da An Gene Co., Ltd. Of Sun Yat-sen University

Final Public Reports to be posted on the website once completed

Source: https://www.who.int/diagnostics_laboratory/EUL/en/

Current diagnostic recommendations

WHO currently recommends the use of nucleic acid (also called 'molecular') testing to identify patients with COVID-19

- Several automated platforms exist: sample in, result out
- More manual, open platforms also exist: allow for greater access to test reagents and flexibility
- Testing biosafety standards being revised
- Necessary specimen handling and transportation should be considered

Current diagnostic recommendations

- WHO **does not currently recommend the use of antigen-detecting rapid diagnostic tests for patient care**, although research into their performance and potential diagnostic utility is highly encouraged
- WHO **does not recommend the use of antibody-detecting rapid diagnostic tests for patient care,** but encourages the continuation of work to establish their usefulness in disease surveillance and epidemiologic research
  - Do antibodies confer immunity?
  - What are the rates of seroconversion?
  - Key interpretation challenges if used in diagnosis:
    - Inability to discriminate active from past infection
    - False negatives: early and late in infection
    - Over-reliance on test result rather than clinical acumen
    - Performance

Supply chain system – overview

Consolidated Demand

Country Planning & Financing
- Technical & planning guidance
- National authorities
- Implementing partners & Donors

Essential Supplies Catalogue
- PPE
- Diagnostics
- Therapeutics
- Vaccines
- Oxygen
- Clinical Care

Equitable Access

Demand Management
- Demand & supply forecasting
- Consolidation & validation of country requests
- Allocation principles by SC Task Force

Control tower

Allocation & request

Warehousing & Distribution

WFP unicef

Coordinated Procurement

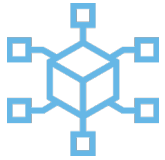
Purchasing and virtual stockpiles

World Health Organization · unicef · The Global Fund · Gavi · Unitaid · ++

Suppliers and Manufacturers
- Global sourcing
- Price & volume negotiation
- Quality assurance & testing
- Finance & Innovation to increase production

Country Implementation
- Receipt & local distribution
- Training & capacity building
- Operations support

Supply chain system – requesting and receiving



1 Consolidated demand

a **Consolidate supply needs under National Action Plans and identify requestors**

[National authorities with RC/HC and responding partners]

b **Identify funding source and submit supply request through Supply Portal**

[Requestor]

c **Validate submitted requests**

[Supplies Portal Coordinator]

2 Coordinated purchasing

a **Review requests against availability and identify supplying agencies**

[Technical consortia working groups]

b **Confirm order and funding source with requestor**

[Purchaser]

c **Commit supplies for distribution**

[Purchaser]

3 Streamlined distribution

a **Schedule shipments and move supplies to distribution hubs**

[WFP]

b **Arrange transport to port of entry and inform requestor**

[WFP]

c **Receive and clear supplies for in-country implementation**

[Requestor]

Coordinated purchasing – Diagnostics Consortium for COVID-19

A Diagnostics Consortium for COVID-19 has been developed that includes WHO, Global Fund, Unicef, Gates Foundation, ACDC, CHAI, FIND, GDF, MSF, PAHO, UNDP, Unitaid, and World Bank

- Gathering information and data on tests in development
- Working with suppliers to negotiate access to tests as well as lower prices
- Developing an equitable allocation plan for distribution to all LMICs and small island states
- Additional technologies will be brought into the consortium as available

Supply pipeline – diagnostics and testing

Product	Unit Cost	Available Pipeline ('000)				Total Value
	(US$)	May	June	July	Total	(US$ million)
Automated test - Abbott	19.00	320	400	400	1,120	21.28
Automated test - Cepheid	19.80	83	65	145	293	5.79
Automated test - Roche	15.20	27	83	83	192	2.92
Automated test - Thermofisher	12.00	260	550	1,000	1,810	21.72
Manual test - BGI (incl sample collection)	12.70	2,000	2,000	2,000	6,000	76.20
Manual test - Thermofisher	12.00	2,000	2,000	2,000	6,000	72.00
Sample collection kit	1.60	3,050	3,050	3,050	9,150	14.64
Grand Totals		**4,690**	**5,098**	**5,628**	**15,415**	**214.56**

Thank you!