Antigen detection rapid diagnostic tests for coronavirus disease 2019 (COVID-19): master protocol for monitored implementation

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| The COVID-19 pandemic has created a need to rapidly scale-up testing services and provide diagnoses to implement test-trace-isolate strategies which are essential to effectively treat, and care for patients and to control the spread of the virus. Hundreds of diagnostic products are now available on the market, targeting detection of viral RNA, viral antigens and host antibodies against SARS-CoV-2. Tests vary in their complexity and speed and countries have faced challenges in selection and effective deployment of the reference standard, nucleic acid amplification testing (NAAT) ). Services for SARS-CoV-2 NAAT testing have often been unavailable, especially outside of metropolitan areas in low- and middle- income countries (LMICs) or backlogged for several days to weeks, precluding the clinical utility of the results. Lateral flow antigen-detecting rapid diagnostic tests (Ag-RDTs) which are easy to perform and provide results within 15-30 minutes have recently been commercialized and have the potential to fill at least a portion of the ‘testing gap’. Under certain conditions Ag-RDTs that meet minimum performance requirements are recommended for use and some have WHO Emergency Use Listing authorization (1, 2). These simple-to-use tests offer the possibility of rapid case detection, especially of the most infectious patients, at or near the point of care. National norms and policies are being adapted in many countries to allow and encourage targeted use of these Ag-RDTs.It will be important to learn by observing the inclusion of Ag-RDTs into COVID-19 case management and surveillance activities at different levels of the health system. WHO plans to work with Ministries of Health, NGOs and academic groups to gather information on the impact of this diagnostic/surveillance intervention on health care delivery and on COVID control in diverse settings. This protocol for monitored implementation of SARS-CoV-2 Ag-RDT is designed to allow for the rapid and systematic collection and sharing of data in a format that facilitates aggregation, tabulation and analysis across different settings. The proposed conditions and settings for Ag-RDT use are aligned with [WHO interim guidance on the use of antigen detection for COVID-19 using rapid immunoassays](https://www.who.int/publications/i/item/antigen-detection-in-the-diagnosis-of-sars-cov-2infection-using-rapid-immunoassays) (3). Data collected using this protocol will be crucial for optimizing the delivery and use of Ag-RDTs and maximizing public health impact in programmatic settings. **For any questions, please contact:** **WHElab@who.int** **– attention: SARS-CoV-2 Ag RDT Implementation Projects** |

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# Summary

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| **Antigen detection rapid diagnostic tests (RDTs) for coronavirus disease 2019 (COVID-19): protocol for monitored implementation**  |
| **Target population** | Individuals meeting a COVID-19 suspected case definition, asymptomatic contacts of confirmed COVID-19 cases and health workers involved in the use of Ag-RDTs. |
| **Approach**  | International multi-centre monitored implementation of Ag-RDTs to further understand their field performance and operational characteristics (acceptability, feasibility, cost) and impact in settings where WHO has recommended their use. Ag-RDTs will be authorized for use based on the national regulatory requirements and policy in place at the time of protocol implementation. Data collection will be aligned with routine monitoring and evaluation practices for introduction of new diagnostics and any experimental practices will require informed consent.  |
| **Potential outputs and analysis** | The field performance, feasibility, acceptability, ease of use and impact of Ag-RDTs for the diagnosis of SARS-CoV-2 infection.  |
| **Minimum information and specimens to be obtained from participants** | **Data collection****Patients:** Routine demographic, clinical and contact history, and laboratory test results information. *Optional (non-routine): Patient direct and indirect costs of health encounter and illness; patient attitude towards Ag-RDT* **Health workers:** Adherence torecommended practice – testing and case managementCompetency assessment: pre and post training (knowledge, procedure)*Optional (non-routine): ease of use assessment; attitudes towards Ag-RDT* **Specimens*** 1 or more upper respiratory tract sample including nasopharyngeal and/or oropharyngeal swabs according to Ag-RDT instructions for use and country policy
* Optional (non-routine) – saliva/oral fluid ; device vs self-collection
 |
| **Exclusion criteria**  | Any contraindications to nasopharyngeal sample collection : recent nasal trauma or surgery, markedly deviated nasal septum, or a history of chronically blocked nasal passages or severe coagulopathy |

# Background

## Introduction

The COVID-19 pandemic has created a need to rapidly scale-up testing services and provide diagnoses to implement test-trace-isolate strategies which are essential to effectively treat andcare for patients and to control the spread of the virus. Hundreds of diagnostic products are now available on the market, targeting detection of viral RNA, viral antigens and host antibodies against SARS-CoV-2.

Services for SARS-CoV-2 NAAT assays have often been unavailable, especially outside of metropolitan areas in low- and middle- income countries (LMICs), or backlogged for several days to weeks, precluding the clinical utility of the results. Lateral flow antigen-detecting rapid diagnostic tests (Ag-RDTs) which are easy to perform and provide results within 15-30 minutes have recently been commercialized and have the potential to fill at least a portion of the ‘testing gap’. Under certain conditions Ag-RDTs that meet minimum performance requirements are recommended for use and some have WHO Emergency Use Listing authorization (2, 3). These simple-to-use tests offer the possibility of rapid case detection, especially of the most infectious patients in the first week of illness, at or near the point of care. National norms and policies are being adapted in many countries to allow and encourage targeted use of these Ag-RDTs.

It will be important to learn by observing the inclusion of Ag-RDTs into COVID-19 case management and surveillance activities at different levels of the health system. WHO plans to work with Ministries of Health, NGOs and academic groups to gather information on the impact of this diagnostic/surveillance intervention on health care delivery and on COVID-19 control in diverse settings. This protocol for monitored implementation of SARS-CoV-2 Ag-RDT is designed to allow for the rapid and systematic collection and sharing of data in a format that facilitates aggregation, tabulation and analysis across different settings. The proposed conditions and settings for Ag-RDT use are aligned with [WHO interim guidance on the use of antigen detection for COVID-19 using rapid immunoassays](https://www.who.int/publications/i/item/antigen-detection-in-the-diagnosis-of-sars-cov-2infection-using-rapid-immunoassays) (3).

Ag-RDT performance is not equivalent to NAAT and is highly variable based on the test characteristics, quality of sample collection and the population tested e.g. days since onset of symptoms. The RDTs are most sensitive for the detection of SARS-CoV-2 infected patients with a high viral RNA load, e.g. RT-PCR cycle threshold (Ct) values ≤25-30, or with more than ≈10E6 genomic copies/mL. WHO, working with key stakeholders, has defined minimum performance specifications for point of care Ag-RDTs in a published Target Product Profile (1, 2). Although WHO has released interim guidance on use of Ag-RDTs for SARS-CoV-2 featuring important considerations for implementation, there is limited experience with these tests in routine settings and specific implementation guidance for use of these new tests is entirely lacking. Therefore, a multi-country, multi-site approach to monitor the implementation of Ag-RDTs for COVID-19 will be carried out to assess field performance, acceptability, feasibility and/or impact and to inform and optimize settings for most effective utilization.

## Objectives

The **primary objective** of this study is:

* To assess the **field performance, feasibility, acceptability and impact** of antigen detecting SARS-CoV-2 rapid diagnostic tests as part of algorithms in various use settings[[1]](#footnote-2) in low- and middle-income countries through monitored implementation.

The **secondary objectives** of the study are:

* To assess the cost and cost effectiveness of implementing antigen detecting SARS-CoV-2 rapid diagnostic tests in low- and middle-income countries.

# Methods

## Design and duration

Thisprotocol outlines a monitored implementation plan for SARS-CoV-2 Ag-RDTs aimed at assessing the field performance of the test in routine conditions, as well as the acceptability, feasibility and impact on case detection, cluster detection, quarantine measures, and potentially hospitalizations, and transmission. Implementing sites must employ Ag-RDTs according to WHO interim guidance and the relevant national regulations and policy. Only [WHO-Emergency Use Listing (EUL)](https://extranet.who.int/pqweb/vitro-diagnostics/coronavirus-disease-covid-19-pandemic-%E2%80%94-emergency-use-listing-procedure-eul-open) listed SARS-CoV-2 Ag RDTs will be used in project sites and they must also be authorized for use in the implementing country. Projects in up to five geographically diverse countries will be selected through a request for proposal process. The monitored implementation phase is expected to last for 6-9 months.

Any proposed investigations that deviate from routine procedures or practices associated with implementation of Ag-RDTs will require participant informed consent and local as well as WHO ethics clearance.

### Sites

Funding is available for this project in up to five countries globally. Funded sites will be selected based on the eligibility criteria (see below). Each country is expected to enrol multiple health facilities across various levels of the health system depending on the NAAT testing capacity and SARS-CoV-2 epidemiology. Facilities run by national health authorities or supported by not-for-profit non-governmental or faith-based organizations will be eligible. Private for-profit organizations and facilities are not eligible.

### Scenarios

SARS-CoV-2 Ag-RDTs are likely to be used in situations where there is limited or no access to NAAT testing and where laboratory professionals are in very short supply. This includes primary health care facilities reliant on shipment/transport of samples to a central laboratory, humanitarian settings or for rapid response outbreak investigation. Ag-RDTs may also be particularly useful in settings where molecular testing is available but there are significant delays in obtaining test results, due to a high demand for testing or irregular transport of samples to the laboratory. The following scenarios reflect WHO recommendations for use of Ag-RDTs and will be approved for use in the implementing country. Each scenario will be supported by the standardized training of health workers in performance of the Ag- RDT including sample collection, biosafety precautions and waste management and in case management as relevant and as per national guidelines.

**Scenario 1: Point of care Ag-RDT use for case management in settings with access to delayed confirmatory NAAT testing.** Health facility that sends samples to an external lab for NAAT, often with delayed result reporting. These delays in turnaround time may occur due to centralization of NAAT facilities or when capacity of NAAT facilities is overwhelmed due to high demand for testing and/or insufficient trained personnel or reagents to perform the testing. Ag-RDTs would be first-line test to allow for early case detection and rapid implementation of isolation procedures amongst positives and prioritization of negatives for either repeat Ag-RDT testing or confirmatory testing by NAAT at a designated laboratory facility.

**Scenario 2: Point of care Ag-RDT use for case management in settings with no access to confirmatory NAAT testing.** The target location for this scenario would be at a health facility with no access to NAAT and no secure means for safe and timely transport of samples to centralized facilities – settings where Ag-RDTs are the only feasible tool to aid in diagnosis of SARS-CoV-2 infection. Health facilities may include primary care centers, health centers in remote or hard to access areas, or those located within humanitarian settings such as an internally displaced persons (IDP) camp.

**Scenario 3: Point of care Ag-RDT use for surveillance or primary investigation of outbreaks or clusters in settings with access to delayed confirmatory NAAT testing.** This scenario could address surveillance in different risk groups (e.g. health-care workers, long term care residents, etc.) to efficiently monitor incidence and for investigation of suspected outbreaks or new clusters.

### Eligibility criteria for site participation

The criteria for participation in the international multi-centre monitored implementation project to be coordinated by WHO are based upon the need to ensure acceptable data quality and completeness. Each site must have a designated Project Coordinator (PC), who will be responsible for all communication with WHO. Sites will be selected based on their ability to meet the following criteria:

1. SARS-CoV-2 Ag-RDTs are included in the national testing strategy/policy and use cases are aligned with those outlined in this protocol and in the WHO interim guidance;
2. At least one [WHO EUL approval SARS-CoV-2 Ag-RDT](https://extranet.who.int/pqweb/sites/default/files/documents/201002_eul_sars_cov2_product_list.pdf) registered according to national requirements in effect at the time of the application;
3. Capacity to train and supervise health workers and/or lay persons in safe and accurate performance and reporting of SARS-CoV-2 Ag-RDT;
4. The capacity to perform data entry into a database developed by WHO and to keep personal data confidential, noting that:
	1. One or more members of staff will be needed to dedicate time to project implementation and data quality management;
	2. Experience using DHIS-2 is highly desirable;
5. Expertise in implementation research and informing evidence-based policy development at national and/or global level;
6. Previous experience with enhanced program monitoring and evaluation is an asset, particularly with the implementation and scale-up of new technologies.
7. If any proposed activities constitute research, applicants must be able to seek and feasibly obtain ethics approvals within the proposed timeline for the project (6-9 months)
8. For sites with access to NAAT, the following will also be required:
	1. Staff competent in specimen packaging, transport (for example, cold chain logistics) and storage;
	2. Access to a laboratory with the following:
		1. Adequate infrastructure and trained personnel for performing NAAT for SARS-CoV-2 infection (for example, using real-time reverse transcription polymerase chain reaction (rRT-PCR));
		2. Demonstrated quality system[[2]](#footnote-3);
		3. Participation in proficiency testing scheme for SARS-CoV2 is desirable.
9. Permission to export samples to international reference laboratories is an advantage;
10. Agree to the terms and conditions laid out in the Grant Letter of Agreement WHO in Annex 1.

All health workers involved in the use of Ag-RDTs for COVID-19 at sites selected to participate in this study will be given training on utilization and safety concerning these devices. Training materials will be provided by WHO for this purpose and some elements may be adapted to suit local context.

The following issues are key to minimizing error and maximizing the value of Ag-RDT implementation:

* The PC will be responsible for training the laboratory staff on the protocol and in the performance of the Ag-RDT test;
* Only those health workers who have received specific training will be involved in the project;
* Accurate record keeping is crucial to the success of the intervention and the PC will be responsible for ensuring that all data required for the evaluation are recorded on the agreed data collection tools, and that they are accurate and up to date;
* It is important to plan work in advance and follow standard operating procedures;
* To reduce the risk of adding an incorrect specimen to a test device/well, before starting the test run, the operator will prepare worksheets and label all tubes, dilution vessels, test devices or plates with the specimen’s unique number;
* Because objective, machine-generated, permanent results are not feasible, it is essential that the PC emphasizes to the operator performing the tests the need for accurate recording of results according to standard colour charts and record keeping;
* To minimize the risk of error, it is recommended that the results are read and recorded independently by two trained staff members wherever feasible and within manufacturers recommended reading time;  a third reader should be available for interpretation of discordant results;
* To allow for correction of erroneous recording of results (rather than differences in visual interpretation), the PC or designee should assess the results as soon as possible or at least daily to allow him/her to investigate reasons fordiscordant readings;
* For the Ag-RDTs performed, at least one representative result from test positive specimens and test negative specimens will also be recorded by taking electronic images. Unexpected test results such as broken test lines, failure to migrate, invalid test (no control line) will also be digitally recorded by operators .
* The PC will be responsible for monitoring the progress. He/She should alert relevant WHO contact points for resolving foreseeable hurdles

### Endpoints

The endpoints relevant for use in each use setting are indicated in the table below. Each implementing country team will select the relevant endpoints as per the needs, priorities and capabilities of the implementation site. Baseline data (corresponding to impact endpoints) will be collected in the 2-3-week period preceding Ag-RDT implementation from routine data sources for comparison, where possible or alternatively estimated based on similar non-participating sites. End points are described in Table 1 below.

Table 1 End points to be consideredaccording to scenario implemented, including epidemiology, performance, feasibility, acceptability and impact. Project teams should select endpoints of greatest interest, relevance and according to their capacity.

|  |  |
| --- | --- |
| **End points** | **Scenarios for implementation** |
| **Epidemiology** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Positivity rate** | Percentage of suspected COVID-19 cases and contacts of cases positive by Ag-RDT | Y | Y | Y |
|  | Percentage of suspected COVID-19 cases and contacts of cases positive by both Ag-RDT and by NAAT | Y | N | Y |
|  | Percentage of negative Ag-RDTs that are positive on repeat testing by Ag-RDT  | Y | Y | Y |
| **Field Performance** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Sensitivity & specificity** | Number of Ag-RDT positive tests | Y | Y | Y |
| Number of Ag-RDT negative tests | Y | Y | Y |
| Number of true positives according to reference NAAT assay  | Y | N | Y |
| Number of true negatives according to reference NAAT assay  | Y | N | Y |
|  | Viral load (Ct threshold value or copies/mL) | Y | N | Y |
|  | Sample type (nasopharyngeal, anterior nares etc)  | Y | Y | Y |
|  | Days since onset of symptoms  | Y | Y | Y |
|  | Days since known contact with positive case | Y | Y | Y |
|  |  Symptomatic vs pre or asymptomatic suspects (contacts) | Y | Y | Y |
| **Positive predictive value** | Number of true positives  | Y | N | Y |
| Number of false positives | Y | N | Y |
| **Negative predictive value** | Number of true negatives  | Y | N | Y |
| Number of false negatives | Y | N | Y |
| **Test line characteristics** | Band strength (0 to 4) of test line based on standard colour charts | Y | Y | Y |
|  | Inter-reader variability by test band strength and positive/negative result | Y | Y | Y |
|  | Number of invalid tests | Y | Y | Y |
|  | Stability of test lines over time | Y | Y | Y |
|  | Number of anomalies according to standard chart (ghost lines, failure to migrate, etc.) | Y | Y | Y |
| **Feasibility** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Supplies, storage conditions, testing capacity and quality control**  | Number of days with temperature recordings that exceed manufacturers storage conditions | Y | Y | Y |
| Number of days tests stored onsite | Y | Y | Y |
| Number of days of stock-outs of tests  | Y | Y | Y |
| Number of days of stock outs of essential test kit components e.g. swabs or personal protective equipment required to perform the test | Y | Y | Y |
| Number of days reader instrument out of service  | Y | Y | Y |
| Maintenance and customer support needs  | Y | Y | Y |
| Number of failed quality control checks  | Y | Y | Y |
| Frequency quality controls checks performed | Y | Y | Y |
|  | Maximum number of test (RDT and/or NAAT) that can be performed per day per person | Y (RDT) | Y | Y |
| **Competency** | Health worker competency after e.g. 0.5-1 days training based on standard checklist  | Y | Y | Y |
| Health worker competency based on standard checklist after 3 months (paired results). | Y | Y | Y |
| **Acceptability** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Adherence** | Proportion of tests done on patients or surveillance participants that meet recommended suspect case definitions or other criteria defined by the MOH  | Y | Y | Y |
| Proportion of tests done on patients or surveillance participants that do not meet recommended suspect case definitions or other criteria defined by the MOH  | Y | Y | Y |
| Proportion of negative test results for which health workers followed the recommended protocol for case management[[3]](#footnote-4)  | Y | Y |  |
| Proportion of positive test results for which health workers followed the recommended protocol for case management[[4]](#footnote-5) | Y | Y |  |
| **Impact[[5]](#footnote-6)** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Impact on early diagnosis[[6]](#footnote-7)** | Number of suspected cases (meeting MOH definition) seen per day  | Y | Y | Y |
| Number of Ag-RDT for SARS-CoV-2 performed per day | Y | Y | Y |
| Number of NAAT for SARS-CoV-2 requested per day  | Y | N | Y |
| Number of patients or surveillance participants tested[[7]](#footnote-8) | Y | Y | N |
| Number of cases detected by Ag-RDT per day  | Y | Y | Y |
| Number of cases detected by NAAT per day  | Y | N | Y |
| Days since symptom onset prior to testing  | Y | Y | Y |
| Turnaround time for results of Ag-RDT (hrs) | Y | Y | Y |
| Turnaround time for NAAT as first line and second line test (hrs) | Y | N | Y |
| Number of contacts screened  | Y | Y | Y |
| Number of contacts with virologic confirmed (RDT or NAAT) disease  | Y | Y | Y |
| **Impact on quarantine procedures** | Days suspects spent out of isolation potentially transmitting while waiting for a positive PCR result | Y | Y | Y |
|  | Days suspects spent in unrequired isolation waiting for a negative PCR result | Y | Y | Y |
|  | Days close contacts of suspects spent in unnecessary quarantine | Y | Y | Y |
|  | Time to return to work or school compared to routine for suspects | Y | Y | Y |
|  | Time to return to work or school compared to routine for contacts of cases | Y | Y | Y |
| **Impact on outbreak response** | Time from alert received by response team to detection | N | N | Y |
| Time to implementation of targeted countermeasures | N | N | Y |
| **Cost-effectiveness** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Cost** | Cost per test result | Y | Y | Y |
| Cost per patient compared to routine – can include both direct and indirect costs  | Y | Y | Y |
| Cost per day of quarantine | N | N | Y |
| **Ease of use** | **Scenario 1** | **Scenario 2** | **Scenario 3** |
| **Users appraisal** | Assess user appraisal through standard ease of use assessment  | Y | Y |  |

## Case definition

WHO has developed case definitions for suspected, probable and confirmed cases of COVID-19 as part of the interim guidance on public health surveillance for COVID-19 (4). These have been updated to include Ag-RDT and the new version will be published in November 2020 as per description below.



## Participant exclusion criteria

## Patients or surveillance participants with contraindications to nasopharyngeal sample collection will be excluded. Contraindications include: recent nasal trauma or surgery, markedly deviated nasal septum,and/ or a history of chronically blocked nasal passages or severe coagulopathy.

## Safety

SARS-CoV-2 and other viruses such as influenza and respiratory syncytial virus are easily transmissible by respiratory droplets and in some cases by aerosols. Therefore, strict standard precautions should be taken including working in the appropriate biosafety level and use of appropriate personal protective equipment (PPE) and all relevant study personnel should be appropriately trained in the use of PPE and sample collection techniques.. All specimens collected from individuals must be handled as potentially infectious. Appropriate precautions to minimize infectious hazards must be taken at all stages from collection of specimens to disposal of used materials from the laboratory, following national and WHO guidance (6).. Point of care tests such as Ag-RDTs are considered low risk for the generation of aerosols and can therefore be carried out on the bench in a well-ventilated area if the local risk assessment so dictates, without necessitating the use of a biosafety cabinet (BSC), providing that the test operator is properly trained, wearing appropriate PPE(6).

Both the regulations for the Transport of Infectious Substances and relevant national regulations should be implemented in the event specimens are transported from the sample collection site to another site for storage or testing (5). For transport and handling of specimens for NAAT, The WHO interim guidance on biosafety considerations for COVID-19 should be considered (6).

## Storage of assays

All test kits and reagents should bestored as indicated in the instructions for use and temperature records of all storage areas kept. The lot numbers of the test kits received, and their expiry dates should be recorded in a way that allows linkage of each lot with individual test results.

## Recruitment of participants

All patients or contacts or surveillance participants living in or accessing care in the areas where SARS-CoV-2 Ag RDTs are being implemented will eligible for inclusion . For routine practices and procedures patients presenting to health care facilities or COVID-19 testing centers implementing Ag-RDTs will be registered consecutively. Any unique identifying information will be removed or not included in clinical or laboratory records used for determining endpoints. Health workers linked to these Ag-RDT implementing facilities will undergo training and competency assessments at the time of introduction of testing and again after 3-4 months. Informed consent will be obtained only from patients, contacts or health workers participating in non-routine procedures or practices. This may include patients who will undergo any changes to the diagnostic algorithm i.e. collection of alternative sample types and/or patients or health workers who will be administered questionnaires with content other than that that would be routinely collected i.e. attitudes towards testing, information on direct and indirect costs of the health encounter and illness or ease of use assessments. Such participants will provide written consent before participating in non-routine procedures. Informed consents will follow WHO templates (Annex 3).

## Data collection

Data will be collected on project specific reporting forms (annex 2-8). These will include COVID-19 testing registries, laboratory report forms, patient history and case management forms, contact history forms, competency assessments, and Ag-RDT ease of use assessment. A summary of the completion schedule for all of the above data-collection forms is shown in Table 2 below.

Table 2 Summary of data collection forms for use throughout monitored implementation (forms are found in Annex 2, Section 8.2).

|  |  |  |  |
| --- | --- | --- | --- |
| **Form #** | **Purpose of form** | **When should it be collected?** | **Form description** |
| **Laboratory** |
| **Form 1** | Patient history form | During consultation with health worker | Clinical history, demographics… |
| **Form 2** | Ag-RDT results | During preparation and performance of Ag-RDT. | Brand name, date and time of testing, date and time of results reporting; results |
| **Form 3** | NAAT results | During preparation and performance of NAAT. | Brand name, date and time of testing, date and time of results reporting; results  |
| **Health workers** |
| **Form 4** | User experience assessment | Following 3 to 6 weeks of regular Ag-RDT use. | Standard ease of use assessment form  |
| **Form 5** | Competency assessment | As soon as possible following training in the implementation of Ag-RDTs. | Practical assessment based on standard checklist of required pre-test, testing and post test actions; knowledge assessment  |
|  | Competency assessment & knowledge retention | At 3 to 4-month intervals following training in the implementation of Ag-RDTs. | Practical assessment based on standard checklist of required pre-test, testing and post test actions; knowledge assessment |
| **Health facility** |
| **Form 6** | Health care facility information | Completedonce for every health care facility involved in the study. | Includes testing registry |
| **Form 7**  | Outbreak response | Upon receipt of an alert to investigate possible outbreak or cluster of cases | Dates, nature of response and SARs-CoV-2 Ag RDT results  |

## Testing procedures

All staffinvolved in the collection, transportation and analysis of specimens will be trained in safe handling practices and spill-decontamination procedures according to standardized methods and WHO and/or national guidance. For details regarding the transport of samples collected and infection control advice, please refer to the case management algorithm and laboratory guidance for the country or to the WHO laboratory guidance (7).

### Use of Ag-RDTs

All Ag-RDTs will be used according to the manufacturers’instructions for use (IFU) and according to the national policy. Results based on deviations from the IFU will not be used to guide patient management and any deviation from routine testing procedures affecting patients will require informed consent.

### Specimen collection

Specimens to be collected include upper respiratory tract samples, such as nasal (anterior nares or midturbinate), nasopharyngeal and oropharyngeal samples. Additional samples and/or saliva may be collected for research purposes. Long term storage and/or use of leftover diagnostic material may require informed consent and shall be determined based on national rules and regulations of the implementing country.

### Specimen transport and storage

For each biological specimen collected, the time of collection, the conditions for transportation and, if applicable, the time of arrival at the study laboratory will be recorded. Specimens should reach the laboratory as soon as possible after collection.

The transport of specimens within national borders willcomply with applicable national regulations. The international transport of specimens willfollow applicable international regulations as described in the WHO Guidance on regulations for the transport of infectious substances 2019–2020 (5, 8).

### Confirmatory NAAT

For sites with access to NAAT confirmatory molecular testing, additional or remaining specimens may be transported to a laboratory for NAAT. This may be a domestic or exceptionally an international reference laboratory. This may apply to all specimens collected, or a proportion of specimens collected. In some sites, only the Ag-RDT negative specimens may be referred for NAAT, in accordance with national or local authority guidelines.

## Ethics considerations

### Informed consent

Informed consent will  be obtained from all patients, surveillance participants and health workers involved in any non-routine practices or procedures associated with implementation of SARS-CoV-2 Ag-RDTs. These individuals will be informed of the purpose of the study and that participation is voluntary. Examples include collection of additional or alternative specimens, possible long-term storage of biological specimens for other research purposes, completion of questionnaires about attitudes toward testing and/or participation in ease of use assessments.

Participants will be free to withdraw at any time, without reason and without any effect on their care (patients) or professional responsibilities (health workers). The supplementary non-routine procedures envisioned pose minimal risks to the participants, such as collection of additional upper respiratory tract specimen or administration of questionnaires regarding health worker attitudes towards testing. Participants will not benefit directly from these activities but they may benefit indirectly  from the data collected as it should lead to better understanding of antigen detection in the diagnosis of COVID-19 and therefore to improved care and control . Any research conducted in the context of this monitored implementation project will be conducted in compliance with, good clinical practice and the applicable regulatory requirements. Ethics approval will be sought from the WHO internal Ethical Review Board and in accordance with national requirements.

### Treatment of patients

All patients will be treated clinically according to national guidelines requirements and policies.

### Data handling and record keeping

WHO will provide DHIS 2 templates for data collection. Collaborators participating in this international multi-centre project coordinated by WHO will provide anonymized data through the DHIS-2 data-collection tool provided by WHO. DHIS2 is the world's largest health management information system (HMIS) platform, in use by 100 low and middle-income countries (https://www.dhis2.org/about).

Routinely collected data will be entered by health facility staff directly in to the electronic data-capture system or on hard copy at the time of contact with the participants and health workers.

Any  non-routine information collected on consenting participants will have a number assigned to it instead of their name. Quality control checking, tracking and cleaning of the data will be conducted every week. All original paper documents containing identifying data related to research (for example, the Informed Consent Form) will be stored in a locked cabinet. All personal data will be kept confidential.

Original paper documents related to any research activity will be destroyed 3 years after the end of the project (or after the nationally or institutionally mandated period for the project collaborators, whichever is longer). None of the subjects’ personal information will be revealed in any subsequent research output.

### Publication policy

In any publication by the implementing country institution or their collaborators relating to the results of the work, the responsibility for the direction of the work shall not be ascribed to WHO. Any personal identifiers or proprietary information in the data/results of the work shall be safeguarded and not made public. Unless WHO advises otherwise, all publications shall include a notice indicating that the underlying investigation received financial support from WHO. In this regard, all publications resulting from work supported under this Agreement shall include a footnote stating: “This investigation received financial support from the Health Emergencies Department of the World Health Organization. The author(s) alone is/are responsible for the views expressed in this publication and they do not necessarily represent the views, decisions or policies of WHO”. Two off-prints or copies shall be sent to WHO unless another number is stipulated. WHO funds may not be used for publication costs unless specifically authorized.

The implementing country institution and their collaborators agrees to follow International Committee of Medical Journal Editors (ICMJE) Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals and WHO’s policy on open-access, available at the following link: htpp:/www.who.int/about/policy/eng. If any open-access fee is payable with respect to publication of the manuscript in the relevant journal, the contractor shall be responsible for paying the applicable fee, and no responsibility shall attach to WHO in that regard.”

# Statistical analysis

## Sample size

Each site should nominate their anticipated sample sizes based on site specific data, and/or on the information below. There are three specific sample sizes which need to be considered: the required number of COVID-19 suspects (patients or surveillance participants) prior to Ag-RDT implementation (baseline), the required number of post-implementation COVID-19 suspects (patients or surveillance participants), and the number of health workers trained and using Ag-RDTs. Each of these is relevant for different study endpoints.

### Endpoints related to Ag-RDT performance

Each site will have a sufficient sample size to allow, at a minimum, estimation of 1) the Ag-RDT sensitivity and specificity with a 95% confidence interval no larger than +/- 5% (for Scenarios 1 and 3 with NAAT testing), or 2) the Ag-RDT positivity rate among suspected COVID-19 cases with a 95% confidence interval no larger than +/- 5%. The overall sample size required to achieve this dependson the anticipated sensitivity/specificity/positivity rate and the prevalence of COVID-19 among suspected COVID-19 cases and contacts. In the absence of site-specific data for sensitivity, specificity and positivity, the following sample sizes have been determined using a value of 50% for each estimate as this produces the maximum confidence interval. To achieve the required level of accuracy on estimates of performance the required sample sizes are 1,537 confirmed COVID-19 cases (by NAAT) plus 1,537 COVID-19 negative cases (by NAAT) for Scenarios 1 and 3, and 1,537 Ag-RDT positive cases for Scenario 2.

### Endpoints related to health worker competency and adherence

To estimate the proportion of health workers meeting minimum competency or adherencelevels with an accuracy of 10%, it is anticipated that up to 97 health workers will need to be trained in the use of Ag-RDTs. Where this is not possible for an individual site, data can be pooled across sites for analysis.

### Endpoints related to impact

Impact will be assessed by comparing baseline data to post-implementation data. The amount of baseline data required for a statistically meaningful comparison with the post-implementation data is determined by the expected change in the endpoint. This is likely to be site specific and therefore each site should nominate their anticipated sample size in their application. Table 3 below shows selected examples of sample size calculations to provide a sense of the amount of baseline data required.

Table 3 Selected examples of sample size calculations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Endpoint** | **Expected change from baseline** | **Minimum required sample size to detect expected change** | **Statistical details** |
| Odds of COVID-19 suspect patient being tested | Increase of 50% from baseline | Baseline: 215 suspect COVID-19 patientsPost-implementation: 3,074 (as per section 4.1.1) | 80% power, 5% significance, baseline rate of testing assumed to be 50% |
| Change in days since symptom onset prior to testing | Reduction of 0.5 days in mean days since symptom onset from baseline | Baseline: 210 suspect COVID-19 patientsPost-implementation: 3,001 (as per section 4.1.1) | 80% power, 5% significance, days since symptom onset assumed to be normally distributed with standard deviation of 2.5 days |
| Number of contacts screened | Five additional contacts screened on average per COVID-19 patient  | Baseline: 151 contacts of COVID-19 patientsPost-implementation: 755 contacts of COVID-19 patients | 80% power, 5% significance, number of contacts screened assumed to be normally distributed with standard deviation of 20 |

### Cost effectiveness

Sites wishing to include end points related to cost effectiveness will need to collect relevant cost data from patient surveys. These surveys will be additional to the routine implementation of the Ag-RDT and will thus require ethics approval. Sites wishing to include this endpoint will need to include relevant sample size justification within their application.

## Statistical considerations

**Descriptive analysis:** A comprehensive description of the endpoints will be produced using a combination of appropriate numerical and graphical outputs. All estimates will be accompanied by 95% confidence intervals. In addition, some endpoints may be stratified. Examples include stratifying 1) Ag-RDT performance endpoints by viral load or days of symptoms, and 2) acceptability and impact endpoints by months post-implementation. The DHIS2 package will contain functionality for real-time reporting of selected endpoints allowing sites and WHO to monitor progress.

**Advanced analysis:** Some endpoints related to feasibility and impact will require formal statistical testing. Changes in health worker competency immediately following training and 3 months after Ag-RDT training will be assessed using either McNemars’s test or a paired t-test, dependent on the competency measure. Impact will be assessed by comparing the baseline data to the post-implementation data using statistical tests such as Chi-square test for independence, t-test and/or general linear models.

# Financing

WHO will fund monitored implementation projects up to a maximum of $199,999 USD and additionally will provide up to 200,000 WHO EUL approved Ag-RDTs for each participating country.

# Acknowledgments

This document was developed by Lisa Carter, Jane Cunningham and Mark Perkins (World Health Organization),  with contributions from Prof Michelle Gatton, QUT, Australia and scientific review by Leo Poon (School of Public Health, University of Hong Kong), Heidi Hopkins (LSHTM), Bill Rodriguez (DRK Foundation), Arlene Chua (MSF), Cheryl Johnson (WHO).

# References

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7. World Health Organization. Diagnostic testing for SARS-CoV-2: interim guidance, 11 September 2020. Geneva: World Health Organization; 2020 2020. Contract No.: WHO/2019-nCoV/laboratory/2020.6.

8. World Health Organization. Guidance for laboratories shipping specimens to WHO reference laboratories that provide confirmatory testing for COVID-19 virus 2020 [Available from: <https://apps.who.int/iris/bitstream/handle/10665/331639/WHO-2019-nCoV-laboratory_shipment-2020.3-eng.pdf>.

# Annexes

## Annex 1

Grant Letter of Agreement Template.

NB. Annex 1 will be the response to the Request for Proposals application

|  |  |
| --- | --- |
| Tel. direct:      Fax direct:      E-mail :      In reply please refer to:      Your reference:       | *Name and address of Grantee* *..........................................................**..........................................................**.........................................................**..........................................................* |

**Grant Letter of Agreement**

Dear ……………………………………,

We are pleased to inform you that the World Health Organization (WHO) agrees to provide financial support to …………………….… (the “Grantee”)towards the implementation of the project entitled “………………………………………………..………” (the “Project”), in the maximum amount of USD .................. ( .............................................. United States dollars)[[8]](#footnote-9).

The Project is outlined in Annex 1 attached hereto, which forms an integral part of this Agreement.

(WHO and the Grantee are each hereinafter referred to as a “party” and, collectively as “the parties”).

WHO will provide the financial contribution on the terms and conditions set forth below.

Payment Schedule

1. The above mentioned amount (the “Grant”) shall be paid in ....... instalments as follows:

|  |  |
| --- | --- |
| **Deliverables** | **Instalment amount** |
| 1.Receipt by WHO of the original countersigned Letter of Agreement | USD **Full amount by 31 December, 2020**  |
| 2.Receipt by WHO of the interim technical report and financial statement within………months following the implementation start date. | USD $0.00 |
| 3.Receipt by WHO of the interim technical report and financial statement within………months following the implementation start date. | USD $0.00 |
| 4.Receipt by WHO of the final technical report and financial certification (FACE form) | USD $0.00 |

1. The Grant funds shall be transferred to the following account of the Grantee:

Account Title:

Bank Name:

Branch Name:

Account No.:

Swift code:

ABA No:

Administration and use of the Grant funds

1. The Grant shall be used by the Granteeexclusively for the purposes indicated in Annex 1 and in accordance with the detailed budget contained therein. The Granteeshall administer the Grant funds in accordance with its financial rules and regulations, administrative rules and practices. Income and expenditure recorded in respect of the Grant funds shall be identified and kept separately by the Grantee in a separate ledger account established for that purpose.
2. The Grantee assumes full programmatic and financial accountability for the funds disbursed to it.
3. To the extent the Grantee is required to purchase any goods and/or services in connection with the implementation of the activities funded under this Agreement, the Grantee shall ensure that such goods and/or services shall be procured in accordance with the principle of best value for money. “Best value for money” means the responsive offer that is the best combination of technical specifications, quality and price.
4. Any balance of the Grant funds that is outstanding at the time of completion of the Project or earlier termination of this Agreement shall be returned to WHO after all obligations incurred by the Grantee prior to such completion or termination have been settled, unless otherwise agreed by the parties in writing.
5. The Grantee will implement the Project during the period specified in Annex 1, from ............................(implementation date) to ........................................(end date).

Reporting

1. The Grantee shall keep WHO regularly informed of the progress made in the activities financed by the Grant. [***OPTIONAL:***  The Granteeshall in any event provide WHO with:
	1. An interim technical report and financial statement within………months following the implementation start date.……………………; and
	2. ……………………... .]

1. The Granteeshall, within ninety (90) days after the completion of the Project or earlier termination of this Agreement, submit a final “Grant Letter of Agreement report” comprising the following documents:

- a technical report specifying the activities undertaken and outcomes achieved, compared to the terms of reference and budget set forth in this Agreement and its Annex 1, and

- a financial certification using the Funding Authorization and Certification of Expenditure (FACE) form attached hereto as Annex 2.

1. The final financial certification shall be signed by the Comptroller or Chief of Finance of the Grantee.
2. WHO may request the Grantee to provide complementary information about the implementation of the activities financed by the Grant that is reasonably available, including the findings and results of an audit (internal or external) conducted by the Grantee and related to the Project and/or related activities.

Review; Audit

1. WHO may request a financial and operational review or audit of the Project and related activities, to be conducted by WHO and/or parties authorized by WHO, and the Grantee undertakes to facilitate such review or audit. This review or audit may be carried out at any time during the implementation of the Project and related activities, or within five (5) years of completion thereof. In order to facilitate such financial and operational review or audit,the Grantee shall keep accurate and systematic accounts and records in respect of the Project and related activities.
2. The Grantee shall make available, without restriction, to WHO and/or parties authorized by WHO:
	1. the Grantee’s books, records and systems (including all relevant financial and operational information) relating to the Project and related activities; and
	2. reasonable access to the Grantee’s premises and personnel.

The Grantee shall provide satisfactory explanations to all queries arising in connection with the aforementioned audit and access rights.

Responsibility; Relationship of the Parties

1. The Grantee shall be solely responsible for the manner in which the activities supported by WHO under this Agreement are carried out, and accordingly the Grantee shall assume full responsibility for any claims and liabilities arising from such activities. Thus, WHO shall not be responsible for any loss, accident, injury or damage suffered by the Grantee or persons claiming under the Grantee, arising during or as a result of the Project activities, or in any manner whatsoever, including travel.
2. The Grantee shall be solely responsible for complying with all applicable national laws and requirements, including but not limited to ethical clearances, in the implementation of the activities funded under this Agreement.
3. It is understood that nothing in this Agreement shall be construed as creating a relationship of joint venturers, partners, employer/employee or agent. Neither party has the authority to create any obligation for the other.

Compliance with WHO Codes and Policies

1. By entering into this Agreement, the Grantee acknowledges that it has read, and hereby accepts and agrees to comply with, the WHO Policies (as defined below). In connection with the foregoing, the Grantee shall take appropriate measures to prevent and respond to any violations of the standards of conduct, as described in the WHO Policies, by its employees and any other persons engaged by the Grantee to perform any services under the Agreement. Without limiting the foregoing, the Grantee shall promptly report to WHO, in accordance with the terms of the applicable WHO Policies, any actual or suspected violations of any WHO Policies of which the Grantee becomes aware. For purposes of this Agreement, the term “WHO Policies” means collectively: (i) the WHO Code of Ethics and Professional Conduct; (ii) the WHO Policy on Sexual Exploitation and Abuse Prevention and Response; (iii) the WHO Code of Conduct for responsible Research; (iv) the WHO Policy on Whistleblowing and Protection Against Retaliation; and (v) the UN Supplier Code of Conduct, in each case, as amended from time to time and which are publicly available on the WHO website at the following links: <http://www.who.int/about/finances-accountability/procurement/en/> for the UN Supplier Code of Conduct and at <http://www.who.int/about/ethics/en/> for the other WHO Policies.

Zero tolerance for Sexual Exploitation and Abuse

1. WHO has zero tolerance towards sexual exploitation and abuse. In this regard, and without limiting any other provisions contained herein, the Grantee warrants that it will: (i) take all reasonable and appropriate measures to prevent sexual exploitation or abuse as described in the WHO Policy on Sexual Exploitation and Abuse Prevention and Response by any of its employees and any other persons engaged by it to perform any services under the Agreement; and (ii) promptly report to WHO and respond to, in accordance with the terms of the Policy, any actual or suspected violations of the Policy of which the Grantee becomes aware.

Tobacco / Arms Related Disclosure Statement

1. The Grantee is required to disclose relationships it may have with the tobacco and/or arms industry through completion of the WHO Tobacco / Arms Disclosure Statement. The Grantee undertakes not to commence implementation of the Project until WHO has assessed the disclosed information and confirmed to the Grantee in writing that the work can commence.

Anti-Terrorism and UN Sanctions; Fraud and Corruption

1. The Grantee warrants for the entire duration of the Agreement that:
	1. it is not and will not be involved in, or associated with, any person or entity associated with terrorism, as designated by any UN Security Council sanctions regime, that it will not make any payment or provide any other support to any such person or entity and that it will not enter into any employment or subcontracting relationship with any such person or entity;
	2. it shall not engage in any illegal, corrupt, fraudulent, collusive or coercive practices (including bribery, theft and other misuse of funds) in connection with the implementation of the Project; and
	3. the Grantee shall take all necessary precautions to prevent the financing of terrorism and/or any illegal corrupt, fraudulent, collusive or coercive practices (including bribery, theft and other misuse of funds) in connection with the implementation of the Project.

Any payments used by the Grantee for the promotion of any terrorist activity or any illegal, corrupt, fraudulent, collusive or coercive practice shall be repaid to WHO without delay.

Breach of essential terms

1. The Grantee acknowledges and agrees that each of the provisions of Articles 17, 18, 19 and 20 hereof constitutes an essential term of this Agreement, and that in case of breach of any of these provisions, WHO may, in its sole discretion, decide to:
	1. terminate this Agreement, and/or any other contract concluded by WHO with the Grantee, immediately upon written notice to the Grantee, without any liability for termination charges or any other liability of any kind; and/or
	2. exclude the Grantee from participating in any ongoing or future grant applications or tenders and/or entering into any future contractual or collaborative relationships with WHO.

WHO shall be entitled to report any violation of such provisions to WHO’s governing bodies, other UN agencies, and/or donors.

Confidentiality

1. Each party may in the context of this Agreement disclose to the other party information which it considers confidential and proprietary to it or parties collaborating with it. When providing such information in the context of this Agreement to the other party (as the receiving party), the party providing the information (as the disclosing party) shall clearly mark it as confidential, and the receiving party shall take all reasonable measures to keep the information confidential and shall only use and disclose the information for the purpose for which it was provided. The receiving party shall ensure that any persons having access to such information shall be made aware of and be bound by the obligations of the receiving party hereunder. However, there shall be no obligation of confidentiality or restriction on use where:

(i) the information is publicly available, or becomes publicly available otherwise than by action of the receiving party; or

(ii) the information was already known to the receiving party (as evidenced by its written records) prior to its receipt; or

 (iii) the information was received from a third party not in breach of an obligation of confidentiality.

Results

1. All data, information and other materials resulting from the Project shall be owned by the Grantee. The Grantee hereby grants WHO a perpetual and irrevocable, non-exclusive, world-wide, royalty-free, sub-licensable license to use such data, information and other materials, or parts thereof, in any manner, any form and format, and for any purpose WHO may deem appropriate (including, but not limited to, the right to use -or not to use-, reproduce, revise, adapt, distribute, abstract, analyze, publish, display on-line, transmit, license and translate world-wide), without any obligation on WHO's part to make any additional payments to the Grantee or to any other party whatsoever.

Publications

1. Subject to any proprietary rights of WHO and/or third parties collaborating with WHO, the work supported by WHO under this Agreement may be published by the Grantee. In order to avoid prejudicing proprietary rights, the Grantee shall transmit to WHO for its review the material intended to be published at least 60 working days before a proposed publication is submitted to any editor, publisher, referee or meeting organizer. In the absence of an objection by WHO within that 60 working day period concerning prejudice to its proprietary rights, the publication may proceed.

Any publication by the Granteeof the work supported by WHO under this Agreement shall be published in accordance with the WHO policy on open access, which is available at the following link: <http://www.who.int/about/policy/en/>.

Notices

1. Any notices required under this Agreement shall be in writing and shall be delivered personally or sent by registered or certified mail or facsimile to the following addresses:

 **To WHO**:

World Health Organization

*[name of RO/Department-WCO or HQ/Department/Unit]*

*[address]*

Tel no.: …..

Fax no.: …..

Email: …..

With copies to:

*[name of responsible officer]*

**To the Grantee**:

*[full name and address of Grantee, with name of responsible administrative authority]*

 Tel no: …..

 Fax no: …..

 Email: …..

With copies to:

*[name of responsible technical focal point]*

or such other addresses as either party shall have notified the other party.

Any such communication shall be deemed to have been given or made on the date such letter was hand-delivered, registered or transmitted from the sender's facsimile operator, but any assumption of actual notice shall be subject to rebuttal to show that it has not actually been received.

Term; Termination

1. This Agreement will enter into effect on the date of its last signature and will expire when all Project activities have been completed and all reporting obligations have been met, unless terminated earlier in accordance with its terms.
2. In the eventthat the Grantee fails to use the Grant funds in accordance with Annex 1, or otherwise breaches any material term of this Agreement and fails to cure such breach within thirty (30) days after receipt of a written notice from WHO, WHO shall (in addition to other remedies) be entitled to terminate this Agreement prior to its term by written notice, with immediate effect, and demand reimbursement of any payments made under this Agreement to date.
3. Either party may give the other notice of termination of this Agreement. Such termination shall enter into effect three (3) months after notice has been received, subject to the orderly conclusion of any ongoing activities and the settlement of any outstanding obligations.
4. Those provisions of this Agreement that are intended by their nature to survive its expiration or earlier termination shall continue to apply.

Force majeure

1. In the event the implementation of any activity funded by WHO under this Agreement is delayed, suspended or curtailed for any reason, due to circumstances beyond the Grantee’sreasonable control, the Grantee shall immediately so notify WHO in writing, and the parties shall consult and negotiate in good faith with a view to agreeing on appropriate and reasonable amendments to this Agreement.

Use of WHO Name and Emblem

1. Without the prior written approval of WHO,the Granteeshall not, in any statement or material of an advertising or promotional nature, refer to this Agreement or the Grantee’s relationship with WHO, or otherwise use the name (or any abbreviation thereof) and/or emblem of the World Health Organization.

Publication of Agreement

1. Subject to considerations of confidentiality, WHO may acknowledge the existence of this Agreement to the public and publish and/or otherwise publicly disclose the Grantee’s name and country of incorporation, general information with respect to the activities funded under this Agreement and the Grant amount. Such disclosure will be made in accordance with WHO’s Information Disclosure Policy and shall be consistent with the terms of this Agreement.

Settlement of Disputes

1. Any matter relating to the interpretation or application of this Agreement which is not covered by its terms shall be resolved by reference to Swiss law. Any dispute relating to the interpretation or application of this Agreement shall, unless amicably settled, be subject to conciliation. In the event of failure of the latter, the dispute shall be settled by arbitration. The arbitration shall be conducted in accordance with the modalities to be agreed upon by the parties or, in the absence of agreement, with the UNCITRAL Arbitration Rules. The parties shall accept the arbitral award as final.

Privileges and Immunities of WHO

1. Nothing contained herein shall be construed as a waiver of any of the privileges and immunities enjoyed by WHO under national or international law, and/or as submitting WHO to any national court jurisdiction.

If you agree to the above, it would be appreciated if you could arrange for both originals of this Letter of Agreement to be signed and dated by a duly authorized representative of the Grantee. One original should be returned to us. Payment of the first instalment shall be effected upon receipt by WHO of the countersigned original Letter of Agreement.

Yours sincerely,

[Name, title of WHO signatory]

Agreed and accepted on behalf of the Grantee:

Signature:

Name:

Title:

Date:

## Annex 2 Forms

### Form 1 Patient History

|  |
| --- |
| **1. Identifier and basic information** |
| Health facility |  |
| Date of visit (dd/mm/yyyy) | \_\_/\_\_\_/\_\_\_ |
| Patient ID |  |
| First name[[9]](#footnote-10) |  |
| Surname1 |  |
| Sex | 🞏 Male 🞏 Female 🞏 Other 🞏 No information |
| Date of birth (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Age (years, months) |  |
| Area of residence |  |
| Do you have any of the following risk factors for COVID-19?NK: not known | SmokingPregnancyObesity (BMI >30)Severe obesity (BMI >40)HypertensionCancerChronic ObstructivePulmonary Disease (COPD)Heart conditionImmunocompromisedSickle cell diseaseType 2 diabetes mellitus | 🞏 Yes🞏 Yes🞏 Yes🞏 Yes🞏 Yes🞏 Yes🞏 Yes🞏 Yes🞏 Yes🞏 Yes 🞏 Yes | 🞏 No🞏 No🞏 No🞏 No🞏 No🞏 No🞏 No🞏 No🞏 No🞏 No🞏 No | 🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK🞏 NK |
| Do you live or work in an area with high risk of transmission of virus? | 🞏 Yes 🞏 No 🞏 Not known |
| Do you live or have you travelled to an area with community transmission anytime within the last 14 days? | 🞏 Yes 🞏 No 🞏 Not known |
| Have you worked in any health care setting, including within health facilities or within the community within the past 14 days? | 🞏 Yes 🞏 No 🞏 Not known |
| What is the reason for the visit today? (tick all that apply) | 🞏 COVID-19 symptoms🞏 Follow-up COVID-19 test🞏 Contact of a confirmed or probable case of COVID-19 What was the date of last known contact? \_\_\_/\_\_\_/\_\_\_🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Have you been in quarantine? | 🞏 No 🞏 Yes (Specify number of days): \_\_\_\_\_\_\_\_\_\_\_\_ |
| What symptoms do you have? (tick all that apply) | 🞏 None🞏 Fever (<38⁰C)🞏 Cough🞏 General weakness/fatigue🞏 Headache🞏 Myalgia🞏 Sore throat🞏 Coryza🞏 Dyspnoea🞏 Anorexia/nausea/vomiting🞏 Diarrhoea🞏 Anosmia🞏 Ageusia🞏 Breathlessness🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date of symptom onset (if applicable) | \_\_\_/\_\_\_/\_\_\_ |
| Have you previously sought care for these symptoms?  | 🞏 Yes 🞏 No 🞏 Not known 🞏 Not applicable |
| If yes, did you undergo testing for COVID-19? | 🞏 Yes 🞏 No 🞏 Not known |
|  If yes, how many days ago?  |  \_\_\_\_\_\_\_ days |
|  What were the test results?  | 🞏 Positive 🞏 Negative 🞏 No information |
|  How many days did you wait for results?  | 🞏 < 1 day 🞏 <3 days 🞏 > 3 days 🞏 Not known |
| What COVID-19 tests are proposed for today’s visit  | 🞏 None🞏 Ag-RDT🞏 NAAT🞏 Both (Ag-RDT and NAAT) 🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| If no COVID-19 test is being performed, what is the reason?  | 🞏 Not clinically warranted🞏 No sample collection tools available🞏 No Ag-RDTs available🞏 No personal protective equipment available🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| What have you been told to do following your visit today? | 🞏 Return home and wait for test result🞏 Return home and quarantine  Specify number of days of quarantine: \_\_\_\_\_\_\_\_\_\_\_🞏 Stay at health facility for treatment🞏 Attend a different health facility for treatment🞏 Undertake my normal activities (eg school or work) |
| Sample ID number (Ag-RDT) |  |
| Sample type (Ag-RDT) | 🞏 Nasopharyngeal swab🞏 Nasal swab🞏 Oropharyngeal swab🞏 Other (specify): |
| Sample ID number (NAAT) |  |
| Sample type (NAAT) | 🞏 Nasopharyngeal swab🞏 Nasal swab🞏 Oropharyngeal swab🞏 Other (other): |
| Date of sample collection (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Time of sample collection (hh:mm) | \_\_\_:\_\_\_ |

### Form 2 SARS-CoV-2 Antigen RDT Results

|  |
| --- |
| **1. Sample Information** |
| Patient ID number |  |
| Sample ID number |  |
| Sample type | 🞏 Nasopharyngeal swab🞏 Nasal swab🞏 Oropharyngeal swab🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date sample received (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Brand of Ag-RDT | 🞏 SD Biosensor Standard™ Q COVID-19 Ag (09COV30D)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (NP) (41FK10)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (nasal) (41FK19🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date test performed (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Time test started (hh:mm) | \_\_\_:\_\_\_ |

|  |
| --- |
| **2. Reader 1 Patient test results** |
| Time test read (hh:mm) | \_\_\_:\_\_\_ |
| Control line band strength – according to standard colour chart  | 🞏 0 🞏 1 🞏 2 🞏 3 🞏 4 |
| Characteristics of control line (if applicable) | 🞏 Normal🞏 Thin line🞏 Incomplete line🞏 Incorrect placement in result window🞏 Ghost line🞏 Bleaching of test line into test strip🞏 Other anomaly (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Test line band strength – according to standard colour chart  | 🞏 0 🞏 1 🞏 2 🞏 3 🞏 4 |
| Characteristics of test line (if applicable) | 🞏 Normal🞏 Thin line🞏 Incomplete line🞏 Incorrect placement in result window🞏 Ghost line🞏 Bleaching of test line into test strip🞏 Other anomaly (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Test result | 🞏 Positive 🞏 Negative 🞏 Invalid 🞏 unknown |

|  |
| --- |
| **3. Reader 2 Patient test results (if applicable)** |
| Time test read (hh:mm) | \_\_\_:\_\_\_ |
| Reason for Reader 2 | 🞏 Standard procedure🞏 Training🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Test result | 🞏 Positive 🞏 Negative 🞏 Invalid 🞏 unknown |
| Control line band strength – according to standard colour chart  | 🞏 0 🞏 1 🞏 2 🞏 3 🞏 4 |
| Test line band strength – according to standard colour chart  | 🞏 0 🞏 1 🞏 2 🞏 3 🞏 4 |

|  |
| --- |
| **4. Reader 3 Patient test results (if applicable)** |
| Time test read (hh:mm) | \_\_\_:\_\_\_ |
| Reason for Reader 3 | 🞏 Standard procedure🞏 Discordant result between Reader 1 & Reader 2🞏 Training🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Test result | 🞏 Positive 🞏 Negative 🞏 Invalid 🞏 unknown |
| Control line band strength – according to standard colour chart  | 🞏 0 🞏 1 🞏 2 🞏 3 🞏 4 |
| Test line band strength – according to standard colour chart  | 🞏 0 🞏 1 🞏 2 🞏 3 🞏 4 |

|  |
| --- |
| **5. Final Ag-RDT results** |
| Consensus test result | 🞏 Positive 🞏 Negative 🞏 Invalid 🞏 unknown |
| Date patient advised of result (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Time patient advised of result (hh:mm)  | \_\_\_:\_\_\_ |
| Name of Reader 1 |  |
| Name of Reader 2 (if applicable) |  |
| Name of Reader 3 (if applicable) |  |

### Form 3 SARS-CoV-2 NAAT results

|  |
| --- |
| **1. Test Information** |
| Brand of NAAT | 🞏 In-house assay🞏 ThermoFisher🞏 BGI🞏 Other [***specify***]: |
| Lot number |  |
| Expiry date (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Last onsite kit verification for this lot | Date: \_\_\_/\_\_\_/\_\_\_🞏 Not done 🞏 Fail 🞏 Pass - Ct value: \_\_\_\_  |

|  |
| --- |
| **2. Patient test results** |
| Patient ID number |  |
| Sample ID number |  |
| Sample type | 🞏 Nasopharyngeal swab🞏 Oropharyngeal swab🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date sample received (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Time sample received (hh:mm) | \_\_\_:\_\_\_ |
| Date test performed (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Time test started (hh:mm) | \_\_\_:\_\_\_ |
| Test result | 🞏 Positive 🞏 Negative 🞏 Indeterminate |
| Ct value target 1 (if applicable) |  |
| Ct value target 2 (if applicable) |  |
| Validation (dd/mm/yyyy) (hh:mm) Name of Technician | \_\_\_/\_\_\_/\_\_\_ \_\_\_:\_\_\_ |
| Validation (dd/mm/yyyy) (hh:mm) Name of Technician | \_\_\_/\_\_\_/\_\_\_ \_\_\_:\_\_\_ |
| Was patient advised of result? | 🞏 No🞏 Yes (specify date & time): \_\_\_/\_\_\_/\_\_\_ \_\_\_:\_\_\_🞏 Unknown |
| Comments (if any) |  |

### Form 4 SARS-CoV-2 Ag RDT User experience

|  |
| --- |
| **1. Identifier and basic information** |
| User ID |  |
| Date questionnaire filled in (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Country |  |
| Site/facility |  |
| Occupation in health care facility | 🞏 Medical doctor🞏 Registered nurse (or equivalent)🞏 Assistant nurse, nurse technician (or equivalent)🞏 Radiology/x-ray technician🞏 Phlebotomist🞏 Physical therapist🞏 Nutritionist/dietician***Other health provider***:🞏 Laboratory personnel🞏 Admission/reception clerk🞏 Patient transporter🞏 Catering staff🞏 Cleaner🞏 Administration/clerk🞏 Other [***specify***]: |
| Educational level | 🞏 None🞏 Primary🞏 Secondary🞏 Tertiary/University🞏 Prefer not to answer |
| Years of relevant experience | 🞏 Less than 1🞏 1 to 3🞏 3 to 5🞏 5 to 10🞏 More than 10 |

|  |
| --- |
| **2. Test information** |
| Brand of Ag-RDT | 🞏 SD Biosensor Standard™ Q COVID-19 Ag (09COV30D)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (NP) (41FK10)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (nasal) (41FK19🞏 Other [***specify***]: |
| How many times did you perform this test? | 🞏 None🞏 0 to 10🞏 11 to 50🞏 51 to 100🞏 > 100 |
| Overall, how satisfied are you with the test? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |

|  |
| --- |
| **3. Review of kit components** |
| Brand of Ag-RDT | 🞏 SD Biosensor Standard™ Q COVID-19 Ag (09COV30D)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (NP) (41FK10)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (nasal) (41FK19🞏 Other [***specify***]: |
| How many times did you perform this test? | 🞏 None🞏 0 to 10🞏 11 to 50🞏 51 to 100🞏 > 100 |
| Overall, how satisfied are you with the kit components? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| How satisfied are you with each of the kit components? | External paper box of kitExtraction tubeFilter cap (if applicable)Extraction tube cap (if applicable)Buffer bottle (if applicable)Swab for specimen collectionTest cartridge / deviceTest cartridge packing / pouchReader (if applicable)Positive/negative control swabs (if applicable) | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏 |
| How useful do you find the inclusion of a positive and negative control? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| Please comment on the positive and negative controls |  |
| Which kit components do you think could be improved? | 🞏 External paper box of kit🞏 Extraction tube🞏 Filter cap (if applicable)🞏 Extraction tube cap (if applicable)🞏 Buffer bottle (if applicable)🞏 Swab for specimen collection🞏 Test cartridge / device🞏 Test cartridge packing / pouch🞏 Reader (if applicable)🞏 Positive/negative control swabs (if applicable) |

|  |
| --- |
| **4. Review of device design** |
| Overall, how satisfied are you with the design of the device? |  1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| How satisfied are you with the design of the following features? | Size of cartridgeSpace for labelling on the frontSize of the well to add sample mixSize of reading windowLogical sequence of steps |  1 2 3 4 5 🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏 |
| Which design features do you think could be improved? | 🞏 Size of cartridge🞏 Space for labelling on the front🞏 Size of the well to add sample mix🞏 Size of reading window🞏 Logical sequence of steps |
| Any other comments on the device design? |  |

|  |
| --- |
| **5. Review of storage conditions and quality controls** |
| Overall, how satisfied are you with the test storage conditions? |  1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| Please assess the kit’s storage conditions | Stability in months of: Test Control materials Storage temperature |  <3 3 to 6 6 to 12 >12 🞏 🞏 🞏 🞏  🞏 🞏 🞏 🞏 2 to 30°C 15 to 35°C 15 to 30°C 20 to 25°C 🞏 🞏 🞏 🞏  |
| On a scale of 1 to 5, how difficult were the following steps | Check expiry date Remove the test cartridge from the pouch Label the test cartridge with patient identifierLabel the assay diluent tube with patient identifier Open the assay diluent tube by removing the seal Transfer of buffer into diluent tubeInsert the swab into the tubeEase of swab extraction procedureAbility to perform swab extraction procedure consistentlyAbility to maintain cleanliness of ancillary devices (e.g. pipette) in order to avoid cross contaminationEase of transferring sample onto deviceEase of transferring exact quantity into the sample wellTrouble shooting |  1 2 3 4 5 🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏 |
| How satisfied were you with the logical sequence of steps? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| Overall, how difficult did you find the steps? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| Any other comments on the storage conditions and quality controls? |  |

|  |
| --- |
| **6. Review of time relevant components of kit** |
| Overall, how satisfied were you with the time relevant components? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| Please assess the time relevant components of the test | Pre-analytic timeAnalytic time  | <2 min 3 to 5 min 6 to 10 min >10 min 🞏 🞏 🞏 🞏  🞏 🞏 🞏 🞏  |
| In your opinion, how many patients could be tested with this test in one 8 hour day? | 🞏 Less than 10🞏 10 to 25🞏 26 to 50🞏 51 to 75🞏 75 to 100🞏 More than 100 |
| Any other comments on the time relevant components of the test? |  |

|  |
| --- |
| **7. Review of read out of test results** |
| Overall, how satisfied were you with the read out of test results? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| On a scale of 1 to 5, how difficult did you find the following? | Visibility of the control (C) and in contrast with the background Visibility of the test (T) band in contrast with the backgroundRead-out from Reader Interpretation of the test result |  1 2 3 4 5 🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏🞏 🞏 🞏 🞏 🞏 |
| Do you foresee any issues with reading these results considering the lighting conditions in the settings you currently work or have experience with? | 🞏 Yes 🞏 No 🞏 Not known If yes, please specify here: |
| For visual readout, Was there any color on the background of the test result (T) or control band (C) that made the interpretation of the bands difficult? | 🞏 Yes 🞏 No 🞏 Not known If yes, please specify which colour here: |
| Any other comments on the read out of test results? |  |

|  |
| --- |
| **8. Settings of use** |
| Do you see this test being used in its current form in your country or setting? | 🞏 Yes 🞏 No 🞏 Not known  |
| If yes, where do you foresee this test being used? | 🞏 Family doctor/General physician 🞏 Peripheral hospital/ ab🞏 Reference hospital/lab 🞏 At a testing site operated by traines staff without specific laboratory expertise 🞏 Other [***specify*** |
| If you don't see this test being used in its current form, which aspects should be changed to make it suitable for use in your setting in your country? |  |
| Any other comments on settings of use for this test? |  |

|  |
| --- |
| **9. Overall assessment** |
| Overall, how satisfied were you with this rapid diagnostic test for COVID-19? | 1 2 3 4 5 🞏 🞏 🞏 🞏 🞏 |
| Which options do you think are feasible for use in your setting? | 🞏 Sequential testing (run tests one by one) ONLY🞏 Sequential testing AND batch testing (run multiple tests at the time) |
| Which aspects of this test do you think might cause difficulties in its day to day use? *Tick all that apply*  | 🞏 Hands-on time🞏 Total assay time to result 🞏 Batch processing🞏 Throughput🞏 Test results interpretation🞏 Overall number of steps🞏 Time sensitive steps🞏 Cartridge design🞏 Quality of material🞏 Training requirements🞏 Storage conditions and stability🞏 Waste management requirements🞏 I don’t know🞏 None, I see no barriers for implementation |
| Do you foresee any other difficulties when implementing this test? | 🞏 Yes 🞏 No 🞏 Not known If yes, please specify here: |
| Any other comments on this rapid diagnostic test for COVID-19? |  |

### Form 5 Competency assessment & knowledge retention

|  |
| --- |
| 1. **Tester information**
 |
| Name of person being tested |  |
| Country |  |
| Site/facility |  |
| Indicate type of assessment  | 🞏 initial assessment🞏 follow up assessment after 🞏 months  |
| Occupation in health care facility | 🞏 Medical doctor🞏 Registered nurse (or equivalent)🞏 Assistant nurse, nurse technician (or equivalent)🞏 Radiology/x-ray technician🞏 Phlebotomist🞏 Physical therapist🞏 Nutritionist/dietician***Other health provider***:🞏 Laboratory personnel🞏 Admission/reception clerk🞏 Patient transporter🞏 Catering staff🞏 Cleaner🞏 Administration/clerk🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Educational level | 🞏 None🞏 Primary🞏 Secondary🞏 Tertiary/University🞏 Prefer not to answer |
| Date when SAR-CoV-2 Ag RDT training was received (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Date of initial competency assessment (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Date of follow-up competency assessment (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |

This assessment consists of 4 parts covering theoretical and practical reading of RDT images, sample collection and test procedure.

## Part A – SARS-CoV-2 Antigen RDT knowledge

**Instructions:**

* The moderator will provide the tester with this sheet.
* The tester will be required to answer fifteen multiple-choice questions on the content presented in the workshop.
* The tester will obtain 1 point when the whole question is answered correctly.

Instruction: Tick all the correct answers for each question. (There may be one, or more than one, correct answer for each question

|  |  |  |
| --- | --- | --- |
| **SARS-CoV-2 Antigen RDT Questions** | **Answered correctly** | **If NO, add comment** |
| 1. **SARS-CoV-2 diagnostic testing (using NAAT or antigen RDTs) can be used to:​**

 Confirm infection in patients who fulfil the COVID-19 clinical criteria​ Rapidly screen suspected cases Screen for infection in asymptomatic contacts of confirmed COVID-19 cases​ All of the above | YES | NO |  |
| 1. **What does an antigen RDT detect?**

 Viral antigens Viral RNA Viral DNA None of the above | YES | NO |  |
| 1. **What are the advantages of testing for SARS-CoV-2 infections with antigen RDTs?**

 Tests can be performed outside a formal laboratory (e.g., in a clinical facility) Results are rapidly available Antigen RDTs are more sensitive than NAAT None of the above | YES | NO |  |
| 1. **In which of the following cases does WHO currently recommend NOT using SARS-CoV-2 Antigen RDTs?**

 When testing individuals without symptoms (unless the person is a contact of a confirmed case)When testing individuals with symptoms in areas where SARS-CoV-2 transmission is very highWhere appropriate biosafety and infection prevention and control measures are lackingFor airport or border screening at points of entry | YES | NO |  |
| 1. **When can testing errors occur?**

 Before testing During testing After testing All of the above | YES | NO |  |
| 1. **Which of the following are not good practice and could lead to testing errors?**

Testing according to the manufacturer’s Instructions for Use (IFU) Testing several days after specimen collection Using kits past their expiry date Systematically cross-checking the labels of the sample request form and the sample container  | YES | NO |  |
| 1. **Which of the following is key to minimizing risk when performing SARS-CoV-2 testing with RDTs?**

Ensuring good ventilationUsing PPEFollowing standardized procedures and good practicesAll of the above | YES | NO |  |
| 1. **Which PPE should personnel be wearing when performing RDTs?**

GlovesLong-sleeved gownEye protectionRespiratory protection, adapted to procedure (specimen collection and/or testing)All of the above | YES | NO |  |
| 1. **Which of the following statements is NOT correct?**

Currently, only nasopharyngeal swabs should be tested using RDTs If collecting a specimen for NAAT confirmation, this should be done immediately after collecting the specimen for antigen RDT testingSpecimens should be triple packaged for shippingIt is not necessary to wear a respirator (e.g., N95 or FFP2) when collecting a nasopharyngeal specimen | YES | NO |  |
| 1. **Which of the following are good practices for supply management?**

Performing regular stock counts (e.g., weekly)Identifying personnel in charge of stock counts and record management Checking the integrity of supplies when they are delivered to the facilityPlacing new kit orders based on kit usage before running out of tests, accounting for the time it may take to receive the order All of the above | YES | NO |  |
| 1. **Which of the following statements areFALSE?**

A SARS-CoV-2 Antigen RDT that is negative can be re-used for another test/patientIf the pouch or seal of the test is damaged, that test should not be usedIt is fine to use the extraction buffer tube from another kit if a tube is missingTest results can be read several hours after the specified period of time | YES | NO |  |
| 1. **What type(s) of records should be kept at the testing site?**

Test requisition formsSpecimen transfer logsSARS-CoV-2 Antigen RDT LogbookTemperature logs (e.g., monitoring of storage fridge)Inventory recordsAll of the above | YES | NO |  |
| 1. **Which of the following are examples of Quality Indicators (QIs) that must be collected to monitor SARS-CoV-2 Antigen RDT testing?**

Temperature of the storage fridge Number and proportion of specimens tested, by specimen type, by batch/lot, by testerNumber of days where testing services were interruptedNumber and proportion of spoilt testsAverage turnaround time | YES | NO |  |
| 1. **Which of the following are components of quality assurance?**

Quality control testingSupervisory visitsNew lot testingProficiency testingAll of the above | YES | NO |  |
| 1. **Which of the following statements about quality control (QC) are correct?**

Quality controls are materials with known positive and negative resultsIf QC results differ from what is expected, patient test results cannot be releasedNew lot testing can be conducted with QC materialsAll of the above | YES | NO |  |
| **SECTION C: Score / Number of correct answers** |  **/ 15** | …………… %  |

**Moderator’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date (dd/mm/yy): \_\_ \_\_/\_\_ \_\_/\_\_ \_\_**

## Part B - Practical Result Reading Test

**Instructions:**

* The tester has to select the option (positive, negative, invalid) for each of the result examples.
* The tester must describe the management of the patient, contact, or surveillance participant based on the result.
* For each correct item, the tester will obtain 1 point.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Test result example** | **Result interpretation** | **Comment** |
| 1. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 2. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 3. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 4. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 5. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Test result example** | **Result interpretation** | **Comment** |
| 6. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 7. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 8. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 9. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| 10. | A close up of a door  Description automatically generated | Positive | Negative | Invalid |  |
| **SECTION D: Score / Number of correct answers** |  **/ 10** | …………… %  |

**Moderator’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date (dd/mm/yy): \_\_ \_\_/\_\_ \_\_/\_\_ \_\_**

## Part C - Practical Test: Nasopharyngeal sample collection

**Instructions:**

* Don PPE.
* Prepare the workspace.
* Collect one nasopharyngeal sample.
* The tester has to perform the tasks outlined in the checklist correctly. If not, the answer should be “NO” and an explanation should be provided in the last column.
* For each correctly performed item, the tester will obtain 1 point.

| **Number** | **Question** | **Yes** | **No** | **Partial** | **Comment** |
| --- | --- | --- | --- | --- | --- |
| 1 | Did the tester select the appropriate PPE for testing?  |  |  |  |  |
| 2 | Was procedure for doning PPE correct – sequence, no risk contamination? |  |  |  |  |
| 3 | Did the tester collect all the necessary supplies to perform nasopharyngeal sample collection?  |  |  |  |  |
| 4 | Did the tester insert a sterile swab into the nostril of the patient, reaching the surface of the posterior nasopharynx? |  |  |  |  |
| 5 | Did the tester swab over the surface of the posterior nasopharynx? |  |  |  |  |
| 6 | Did the tester withdraw the sterile swab from the nasal cavity? |  |  |  |  |
| **SECTION A: Score / Number of correct answers** | **/ 6 = %** |  | …………… % |

**Moderator’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date (dd/mm/yy): \_\_ \_\_/\_\_ \_\_/\_\_ \_\_**

## Part D - Practical Test: SARS-CoV-2 Antigen RDT[[10]](#footnote-11)

**Instructions:**

* Don PPE.
* Prepare the workspace.
* Process two samples in parallel according to the SARS-CoV-2 Antigen RDT Quick Reference Guide/Instructions for Use.
* Doff PPE.
* The tester has to perform the tasks outlined in the checklist for **BOTH** samples correctly. If not, the answer should be “NO” and an explanation should be provided in the last column.
* For each correctly performed item, the tester will obtain 1 point.

| **Number** | **Question** | **Yes** | **No** | **Partial**  | **Comment** |
| --- | --- | --- | --- | --- | --- |
| 1 | Did the tester select the appropriate PPE for testing?  |  |  |  |  |
| 2 | Was procedure for doning PPE correct – sequence, no risk contamination? |  |  |  |  |
| 3 | Did the tester carefully read the instructions for using the SARS-CoV-2 Antigen RDT? |  |  |  |  |
| 4 | Did the tester collect all the necessary supplies to perform the SARS-CoV-2 Antigen RDT procedure? |  |  |  |  |
| 5 | Did the tester set up the workstation correctly? |  |  |  |  |
| 6 | Did the tester check the expiry date of the SARS-CoV-2 Antigen RDT? |  |  |  |  |
| 7 | Did the tester check that the test device and the desiccant pack in the foil pouch were not damaged or invalid? |  |  |  |  |
| 8 | Did the tester insert the swab into an extraction buﬀer tube and, while squeezing the buﬀer tube, stir the swab? |  |  |  |  |
| 9 | Did the tester remove the swab while squeezing the sides of the tube to extract the liquid from the swab? |  |  |  |  |
| 10 | Did the tester press the nozzle cap tightly onto the tube? |  |  |  |  |
| 11 | Did the tester apply the required number of drops of extracted specimen to the specimen well of the test device? |  |  |  |  |
| 12 | Did the tester read the SARS-CoV-2 Antigen RDT result after the required amount of time? |  |  |  |  |
| 13 | Did the tester interpret the SARS-CoV-2 Antigen RDT result correctly? |  |  |  |  |
| 14 | Did the tester record the test result in the SARS-CoV-2 Antigen RDT Logbook? |  |  |  |  |
| 15 | Did the tester dispose of all waste (e.g., used test kit, extraction buffer tube, swab and paper stand) in the biohazard bag? |  |  |  |  |
| 16 | Did the tester remove their gown and gloves in a way that avoids risk of contamination before leaving the workstation? |  |  |  |  |
| 17 | Did the tester practice proper hand hygiene after completing the SARS-CoV-2 Antigen RDT procedure? |  |  |  |  |
| **SECTION B: Score / Number of correct answers** | **/ 17 = %** |  | …………… % |

**Moderator’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date (dd/mm/yy): \_\_ \_\_/\_\_ \_\_/\_\_ \_\_**

## Conclusion

|  |  |  |  |
| --- | --- | --- | --- |
| **Performance targets met?** |  |  | **If NO, add comment** |
| Score Part A: ≥80%?  | YES | NO |  |
| Score Part B: ≥80%?  | YES | NO |  |
| Score Part C: ≥80%?  | YES | NO |  |
| Score Part D: ≥80%?  | YES | NO |  |
| **Conclusion: Tester passed competency assessment** | **YES**# | **NO** |  |

#Tester can only pass the competency test if the scores for individual Parts A, B, C and D are ALL met.

**Moderator’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date (dd/mm/yy): \_\_ \_\_/\_\_ \_\_/\_\_ \_\_**

### Form 6 Health Facility Information – SARS-CoV-2 Ag RDT Operator

|  |
| --- |
| **1. Identifier and basic information** |
| Facility ID number |  |
| Facility name |  |
| Country |  |
| State/district/region |  |
| Name of city/town/village |  |
| GPS coordinates |  |
| Type of facility | 🞏 Community health post 🞏 Family doctor/General physician 🞏 Peripheral hospital/ ab🞏 Reference hospital/lab 🞏 Testing site operated by trained staff without specific laboratory expertise 🞏 Other [***specify***]: |
| Level of facility | 🞏 Primary care🞏 Secondary care🞏 Tertiary care🞏 Other [***specify***]: |
| Population coverage |  |
| Approximate number of patients seen daily |  |
| Approximate number of suspected COVID-19 patients seen daily |  |
| Approximate number of staff interacting with patients |  |

|  |
| --- |
| **2. Test Information** |
| Brand of Ag-RDT | 🞏 SD Biosensor Standard™ Q COVID-19 Ag (09COV30D)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (NP) (41FK10)🞏 Abbott Panbio™ COVID-19 Ag Rapid Test Device (nasal) (41FK19🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Lot number |  |
| Date of arrival of test kits (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_ |
| Expiry date (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Is onsite quality control (QC) check performed? | 🞏 Yes 🞏 No 🞏 Not known |
| If yes, how often are QC checks performed? | 🞏 When every new box is opened🞏 When there is a suspicious result🞏 At least once a week🞏 Monthly🞏 Not known |
| If no, why not? | 🞏 No protocol in place🞏 No QC materials available🞏 No trained staff available🞏 Not known |
| Were there any QC check failures? | 🞏 No🞏 Yes – single failure🞏 Yes – multiple failures Approximately how many failures? \_\_\_\_\_\_\_\_\_\_\_\_ |
| What action was taken when there were QC failures? (if applicable) (tick all that apply) | 🞏 All testing suspended🞏 New box of Ag-RDTs used🞏 Alert to supervisor🞏 No change in testing 🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Was the cause of any QC check failures determined? | 🞏 No🞏 Yes🞏 Not known |
| If yes, what was the cause? | 🞏 Operator error🞏 Defective test🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

|  |
| --- |
| **3. Facility Storage conditions** |
| Does facility monitor temperature where Ag-RDTs are stored? | 🞏 Yes 🞏 No 🞏 Not known |
| How many days in the last month has the storage temperature has exceeded the manufacturers’ storage conditions? | 🞏 Not known 🞏 0 days 🞏 1-2 days 🞏 2-5 days 🞏 5-10 days 🞏 10+ days |

|  |
| --- |
| **3. NAAT testing capability** |
| Does facility have access to NAAT testing? | 🞏 Yes 🞏 No 🞏 Not known |
|  If yes, where is this testing conducted? | 🞏 At health facility laboratory 🞏 At nearby laboratory (within same town/city) 🞏 At laboratory in different town/city/country  |

### Form 7 Surveillance and outbreak response

This form is designed to determine whether field use of Ag-RDT has an impact on individual-level or community-level COVID-19 control interventions. Fill out a new form for each alert received for suspected COVID-19 outbreak or cluster of cases.

|  |
| --- |
| **1. Alert information** |
| Name of rapid response team focal point |  |
| Location |  |
| Country |  |
| How was the alert of a suspected COVID-19 cluster/outbreak first detected | 🞏 Reported by health facility🞏 Reported by surveillance staff🞏 Reported by community (e.g. community health volunteer, community leader)🞏 Identified in Media🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date team was notified (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_ |

|  |
| --- |
| **2. Rapid response team response** |
| When did the rapid response team arrive on site (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| How did rapid response team investigate the cluster? (tick all that apply) | 🞏 Assess clinical symptoms and signs of patients 🞏 Conduct Ag-RDT onsite 🞏 Collect samples for later Ag-RDT and/or NAAT testing 🞏 Assist with introduction of infection control measures🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |
| How were individuals selected for testing by Ag-RDT and/or NAAT (if applicable) (tick all that apply) | 🞏 All with symptoms🞏 Random or systematic subset of persons with symptoms🞏 Asymptomatic individuals in contact with Ag-RDT-positive individuals🞏 All Ag-RDT positive individuals (for NAAT testing)🞏 A subset of Ag-RDT positive individuals (for NAAT testing)🞏 Other asymptomatic individuals (if so, how selected:\_\_\_\_\_\_\_\_\_\_)🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Approximately how many Ag-RDTs and NAAT tests were conducted? | Ag-RDT: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_NAAT: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Were any Ag-RDTs positive in the field (if applicable) | 🞏 No🞏 Yes – single patient🞏 Yes – multiple patients Approximately how many patients? \_\_\_\_\_\_\_\_\_\_\_\_ |
| What countermeasures were implemented in response to the alert? (check all that apply) | 🞏 No additional countermeasures🞏 Isolation of all symptomatic individuals🞏 Isolation of Ag-RDT-positive symptomatic individuals only🞏 Quarantine of contacts of all symptomatic individuals 🞏 Quarantine of contacts of Ag-RDT-positive symptomatic individuals only🞏 Health promotion communication about COVID-19🞏 Increased social distancing🞏 Suspension of non-essential services🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date countermeasures were put in place (dd/mm/yyyy) | \_\_\_/\_\_\_/\_\_\_ |
| Were the countermeasures affected in any way by having access to Ag-RDTs? | 🞏 No🞏 Yes - The type of countermeasure did not change but it could be implemented sooner🞏 Yes – Additional countermeasures were implemented Specify these additional countermeasures: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_🞏 Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

## Annex 3 Informed consent templates

WHO template informed consent and assent forms should be adapted according to the procedures plan to address specific research questions.







1. 1Use settings include: symptomatic suspected COVID-19 cases attending health facilities and asymptomatic contacts of COVID-19 cases with i) no access to NAAT for diagnosis or ii) limited access with prolonged turnaround times precluding clinical utility of results and surveillance amongst high risk populations and/or sentinel sites in areas without NAAT capacity and where shipment of samples is infeasible. [↑](#footnote-ref-2)
2. ISO 15189 ideal but other demonstrated quality systems would also be accepted. [↑](#footnote-ref-3)
3. Protocol for management of negative and positive results as per national guidelines [↑](#footnote-ref-4)
4. Protocol for management of negative and positive results as per national guidelines [↑](#footnote-ref-5)
5. As compared to baseline either measured or estimated [↑](#footnote-ref-6)
6. Prior to and after implementation of local testing capacity with Ag-RDTs [↑](#footnote-ref-7)
7. This is any presenting patient, regardless of clinical history or symptoms, who gets tested [↑](#footnote-ref-8)
8. If the financial support to be provided under this Agreement is a sub-grant under a principal grant to WHO, this Agreement shall be subject to WHO receiving the full amount of the principal grant. In the event WHO does not receive the full amount of the principal grant, WHO shall be entitled to either cancel this Agreement or adjust the amount to be provided hereunder (at WHO’s sole discretion and without incurring any liability towards the Grantee). [↑](#footnote-ref-9)
9. All of these variables will be anonymized. [↑](#footnote-ref-10)
10. This procedure must be adapted to the specificities of the SARS-CoV-2 Antigen RDT being performed. [↑](#footnote-ref-11)