CORONAVIRUS
UPDATE
62

An update on

Testing strategies for COVID-19

THE LATEST ON THE COVID-19 GLOBAL SITUATION
& HOW TO USE TESTING TO ACHIEVE PUBLIC HEALTH MEASURES

World Health Organization | EPI•WiN | infodemic MANAGEMENT

Testing should be linked to public health goals

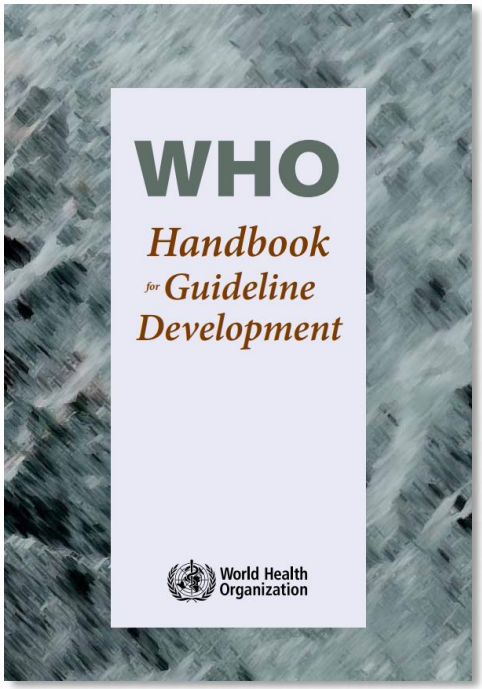
- **COVID-19 testing is part of a comprehensive strategy to:**
  - Suppress SARS-CoV-2 transmission
  - Prevent severe disease and reduce mortality
  - Protect the health system
- **Testing should be linked to public health actions such as:**
  - Clinical care
  - Isolation of confirmed cases
  - Contact tracing
  - Supported quarantine of contacts
  - Providing information to the person being tested

You cannot fight a fire blindfolded. And we cannot stop this pandemic if we don't know who is infected.

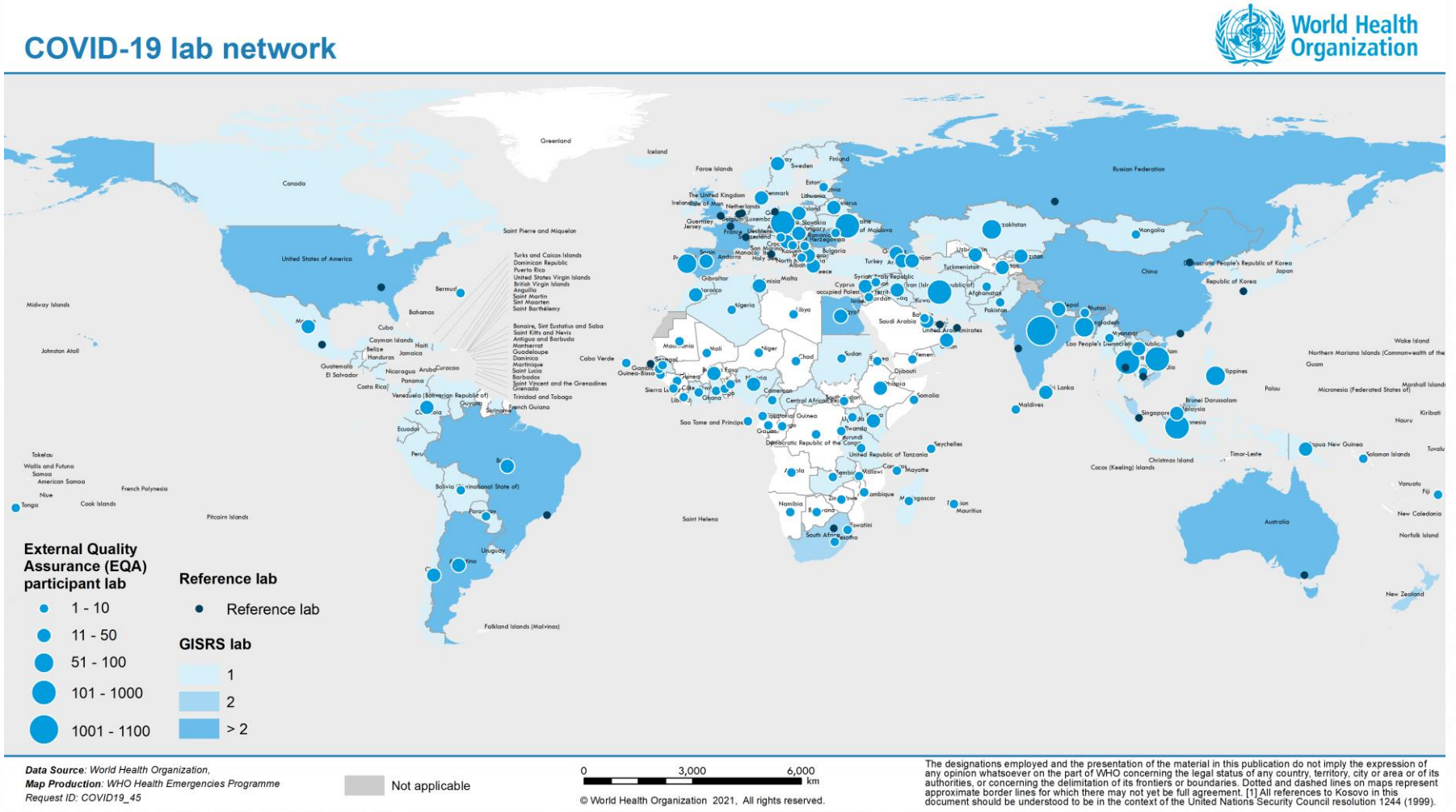
Tedros Adhanom Ghebreyesus
Director-General, World Health Organization
16 March 2020

Developing WHO guidance on testing strategies

- WHO draws upon **internal expertise across all 3 levels of the organization – HQ, regional and country offices**, and leverages the different levels to engage stakeholders:
  - Convening and coordinating partners, expert groups and Member States
  - Enhancing information sharing among and from MS such as challenges and lessons learnt
- WHO draws upon **external expertise through its reference laboratory networks, members of the ACT-Accelerator, including civil society, and open forums** including global consultations
- WHO closely monitors literature for updates and scientific developments
- A **Guideline Development Group is being established**, according to WHO procedures: https://apps.who.int/iris/handle/10665/145714 to prioritize evidence reviews pertaining to SARS-CoV-2 diagnostics and diagnostic testing strategies.
  - Will include membership of civil society



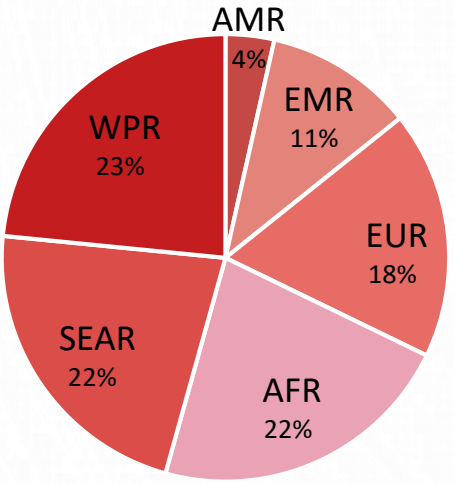
Drawing on external expertise through laboratory networks



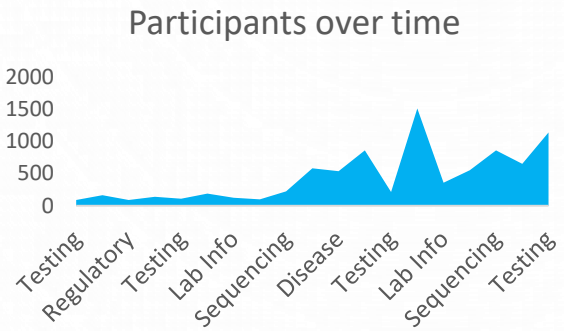
The laboratory Community of Practice

Participation

7763 participants from **182** countries



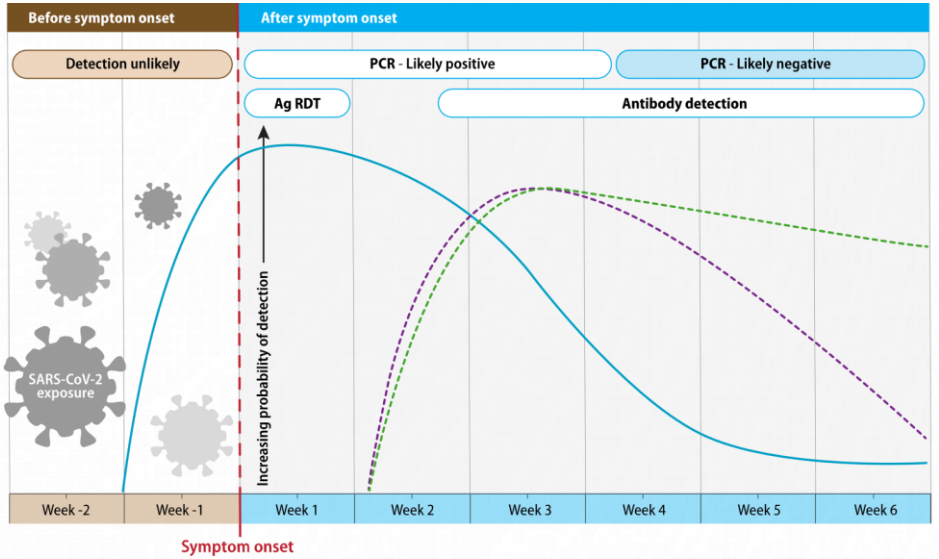
Percentage of participants from each region



- **WHO established the CoP in March 2020 and leverages this network to reach lab stakeholders from 1700+ places of work including Ministries of Health, research institutions, NGOs and private industry**
- **20 webinars have been given on topics such as testing, biosafety and sequencing, provided live in EN, FR, RU and PT**
- **High engagement with over 800 people attending more than one session**

Individual factors can contribute to SARS-CoV-2 transmission

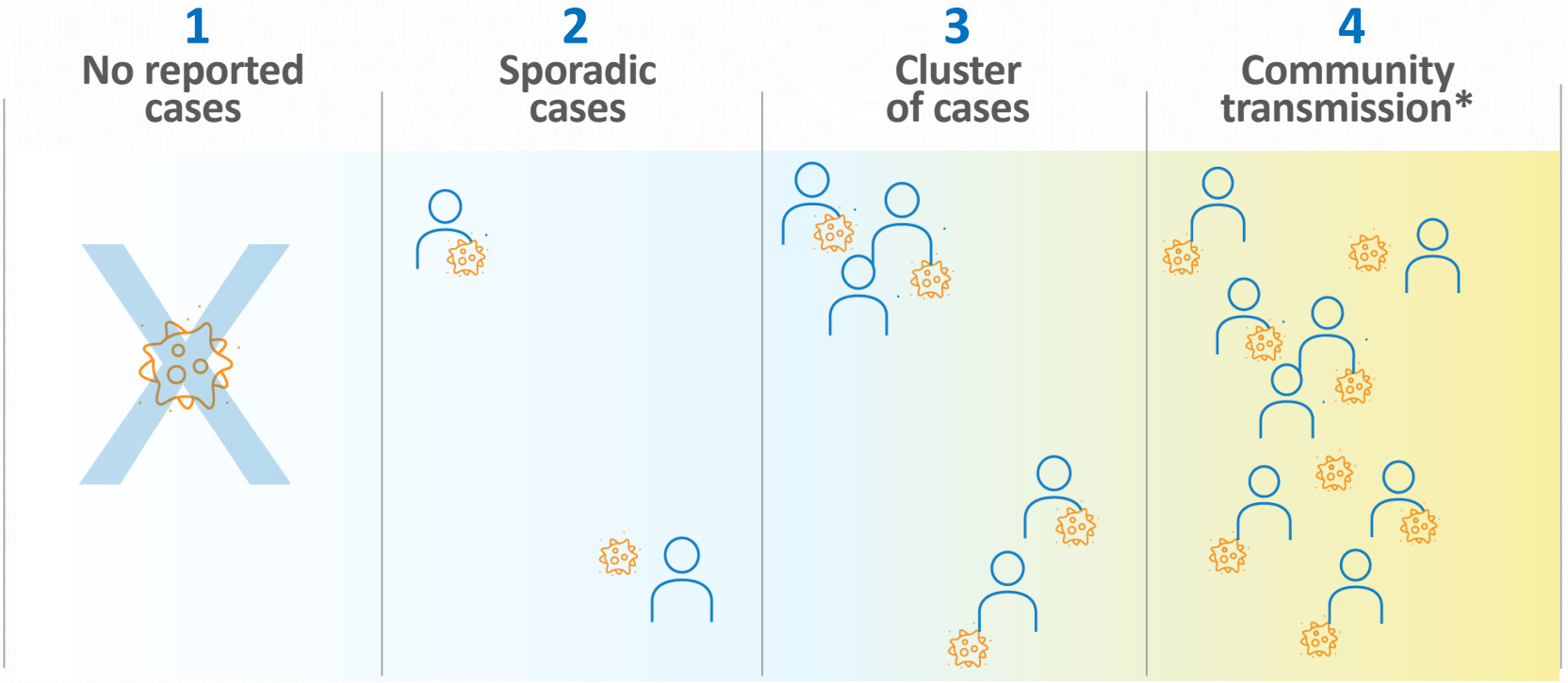
- People infected with SARS-CoV-2 can transmit virus with or without symptoms
- Most infected people transmit the virus around 2 days before they develop symptoms and up to 9-10 days after symptom onset
- People who develop severe disease can be infectious for longer
- Immunocompromised people can shed the virus for months
- Symptomatic persons infected with SARS-CoV-2 are 3 to 18 times more likely to transmit the virus than asymptomatic persons*



** https://cdn.who.int/media/docs/default-source/epi-win/covid_update-31-may-2021.pdf?sfvrsn=32d0b8d6_4*

COVID-19 testing strategies depend on the transmission scenario

Four different scenarios



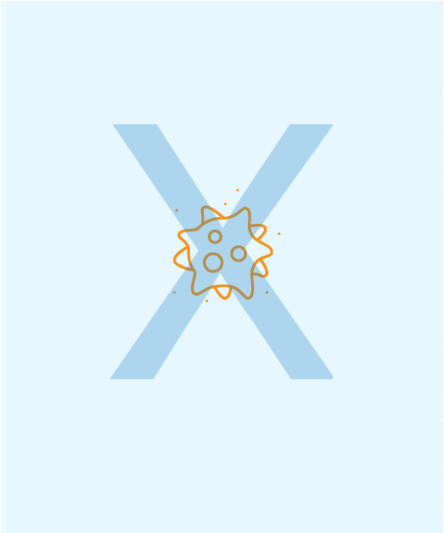
*Countries can experience one or more of these scenarios at the same time in different places

https://www.who.int/publications/i/item/considerations-in-adjusting-public-health-and-social-measures-in-the-context-of-covid-19-interim-guidance

Testing strategy when there are no cases

Transmission scenario "No cases": no reported cases

No cases



Scenario 1

Testing strategy scenario 1:

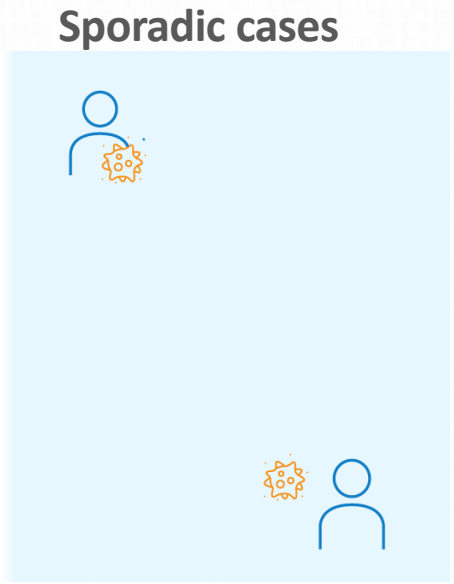
- Aim to: Detect imported cases early to prevent clusters
- Use a RT-PCR* test to confirm the first cases**
- Be vigilant, maintain testing capacity at a minimum, but surge capacity as a precaution
- Ensure robust surveillance activities continue

** https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2
https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng

*RT-PCR or Nucleic Acid Amplification Test (NAAT) is the reference test

Testing strategy when there are sporadic cases

Transmission scenario "Sporadic cases": cases detected in the last 14 days are imported, sporadic or linked to imported/sporadic cases and there are no clear signals of further transmission*



Testing strategy scenario 2:

- Aim to: Prevent onward SARS-CoV-2 transmission through case finding:
  - Test symptomatic persons and asymptomatic contacts of confirmed or probable cases
  - Treat and isolate persons with confirmed or probable SARS-CoV-2 infection
  - Trace contacts of confirmed or probable cases
- Use a RT-PCR* test**

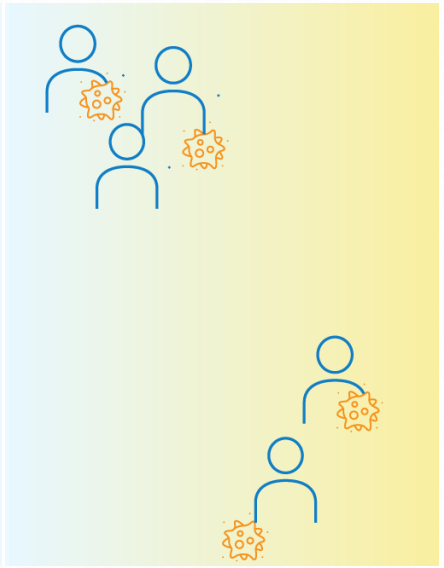
** https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2
https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng

*RT-PCR or Nucleic Acid Amplification Test (NAAT) is the reference test

Testing strategy when there are clusters of cases

Transmission Scenario "Clusters of cases": cases detected in the last 14 days are predominantly limited to well-defined clusters

Clusters of cases



Scenario 3

Testing strategy scenario 3

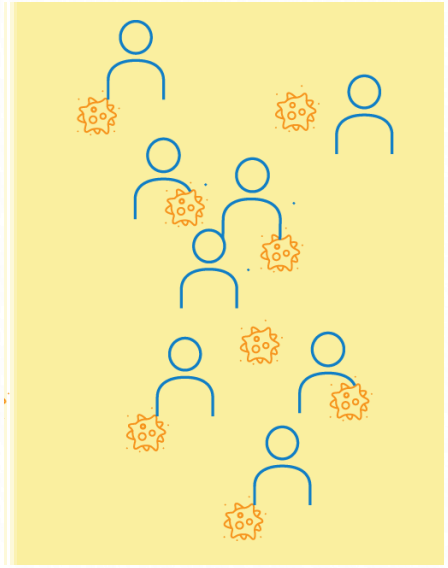
- Aim to: Prevent onward SARS-CoV-2 transmission through case finding:
  - Test symptomatic persons and asymptomatic contacts of confirmed cases
  - Treat and isolate persons with confirmed SARS-CoV-2 infection
  - Trace contacts of symptomatic persons
- Important to carry out outbreak and cluster investigations
  - Confirm suspected outbreaks of COVID-19 among symptomatic persons
- Use a RT-PCR test when available*

* https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2
https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng

Testing strategy when there is community transmission

Transmission scenario "Community transmission": high incidence of locally acquired, widely dispersed cases in the past 14 days

Community transmission



Scenario 4

Testing strategy scenario 4:

- Aim to: Prevent onward SARS-CoV-2 transmission as much as possible through case finding:
  - Test symptomatic persons
  - Test asymptomatic contacts of confirmed or probable cases if capacity allows
  - Treat and isolate persons with confirmed or probable SARS-CoV-2 infection
  - Trace contacts of symptomatic persons*
- Important to carry out outbreak investigations, especially in vulnerable groups or in areas where there can be superspreading events
  - Confirm suspected outbreaks of COVID-19 among symptomatic persons
- If there is limited testing capacity, prioritize testing of suspected COVID-19 cases who are:
  - Persons at risk of developing severe disease
  - Health workers
  - Inpatients in health facilities
  - in a closed settings such as a school, prison or long-term living facility
- Use a RT-PCR test or an antigen rapid diagnostic test (RDT)*

* In settings of widespread community transmission, an Ag-RDT can be used

SARS-CoV-2 diagnostic tests

Types of tests:

Nucleic acid amplification testing

*Detects **genetic material** of the virus*

Uses **upper respiratory specimens*** to diagnose **acute SARS-CoV-2 infection**.
Nucleic acid amplification testing (NAAT), for example RT-PCR, is the **reference method for detection of acute SARS-CoV-2 infection**.
Results: usually available **within 24 hours**. Testing takes 30 minutes to 4 hours (depending on the test), but transport to the testing laboratory can add hours to days.

Antigen

*Detection rapid diagnostic testing – detects **viral protein(s)***

Uses **upper respiratory specimens*** to diagnose **acute SARS-CoV-2 infection**.
Performance is best within first 5-7 days of symptoms.
Results: within 15-30 minutes, not requiring laboratory infrastructure.

Antibody testing

*Detects **antibodies** against the virus*

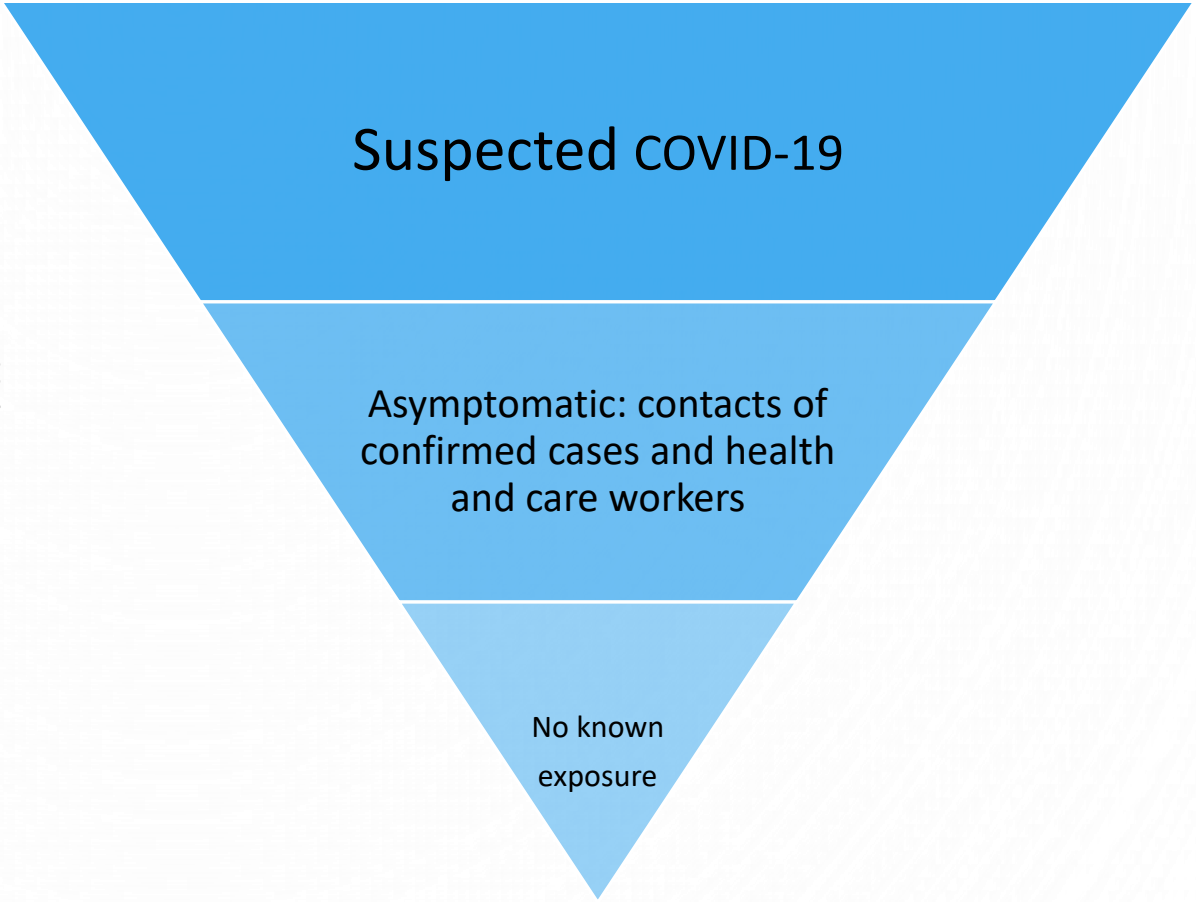
Uses **serum/plasma or whole blood specimens** to detect antibodies generated by **prior SARS-CoV-2 infection or vaccination**.
SARS-CoV-2 antibodies are usually detectable 1-2 weeks after infection or vaccination.
Results: within 24 hours; point of care tests within 10-30 mins.

**Some NAA tests and some Ag-RDTs are designed to work on upper respiratory track samples or saliva*
For more information: https://www.youtube.com/watch?v=PhdSdJu_QXI

- Countries need to test for SARS-CoV-2 according to the national strategy, using available and approved diagnostic tests
- WHO recommends testing of all SARS-CoV-2 suspected cases
- More information on diagnostic testing can be found here: https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2
- More information on use ofAg-RDTs can be found here: https://www.who.int/publications/i/item/antigen-detection-in-the-diagnosis-of-sars-cov-2infection-using-rapid-immunoassays
- More information on testing strategy recommendations can be found here: https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng

How should testing be prioritized ?

- WHO recommends that all individuals who are suspected to be infected with SARS-CoV-2 be tested with NAAT or Ag-RDT, regardless of vaccination status or COVID-19 disease history
- Asymptomatic individuals should be tested with NAAT or Ag-RDT if they are at **higher** risk of SARS-CoV-2 infection and if resources are available to test them
- Individuals at **higher** risk of SARS-CoV-2 infection include:
  - Contacts of confirmed or probable cases
  - People who are frequently exposed through their occupation, such as health and care workers or long-term care facility workers who are providing care to COVID-19 patients



How should testing be prioritized?

- In some countries or settings, there aren't enough resources to test everyone who meets the suspected case definition
- In these situations, the following people should be prioritized for testing:
  - People at a higher risk of developing severe disease
  - Health and care workers
  - Inpatients in health facilities
  - The first symptomatic individuals in a closed setting
- It is also important to expand and decentralize capacity to improve access to testing
- This can be done through expanding the laboratory network or by introducing more point of care tests such as Ag-RDTs

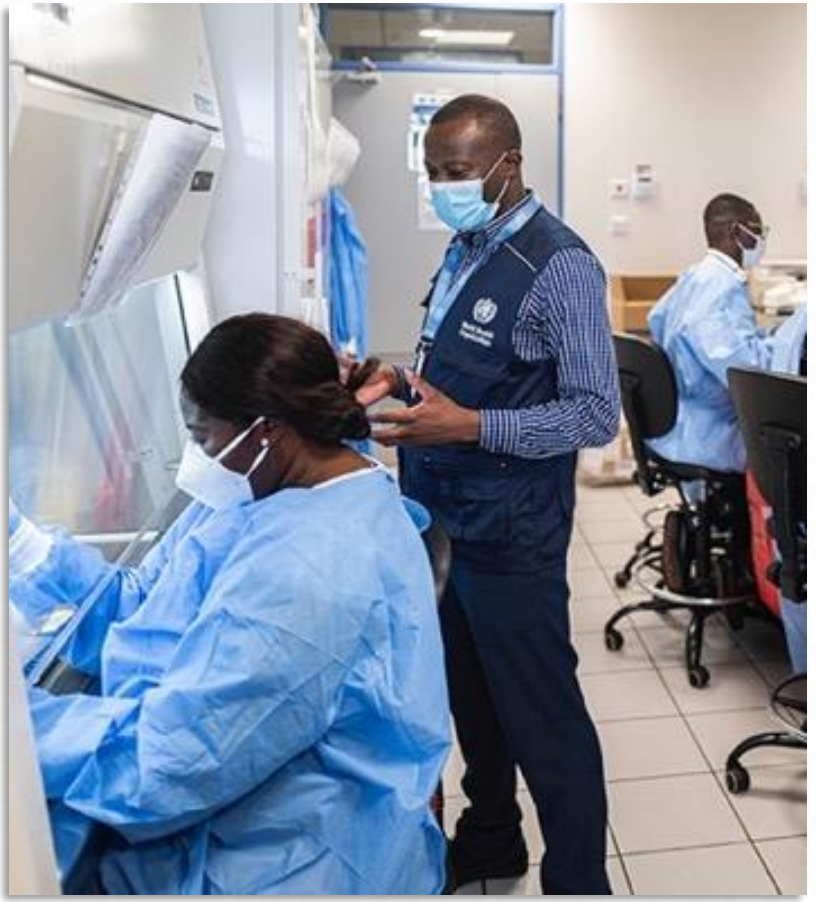
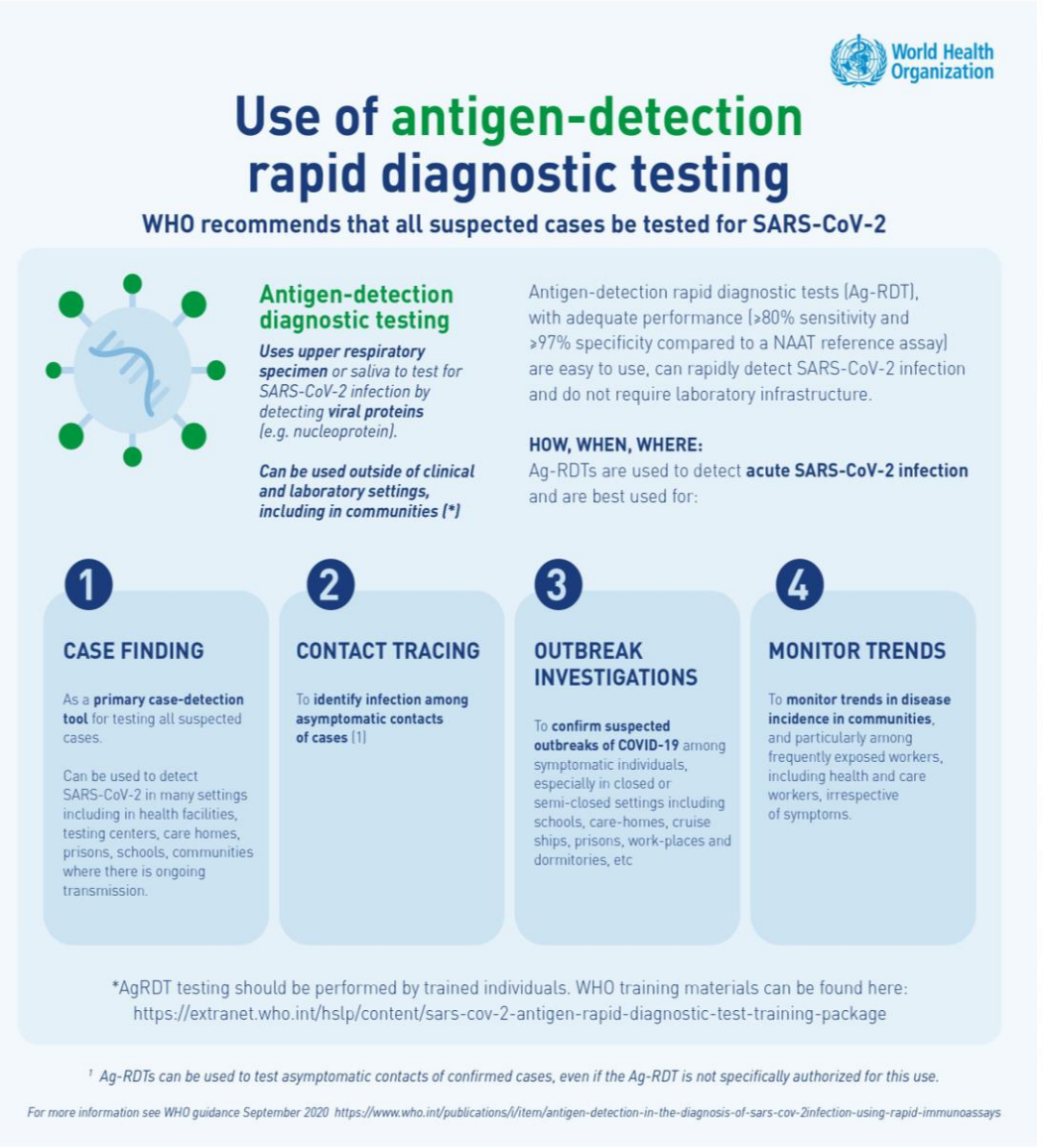


Photo: WHO

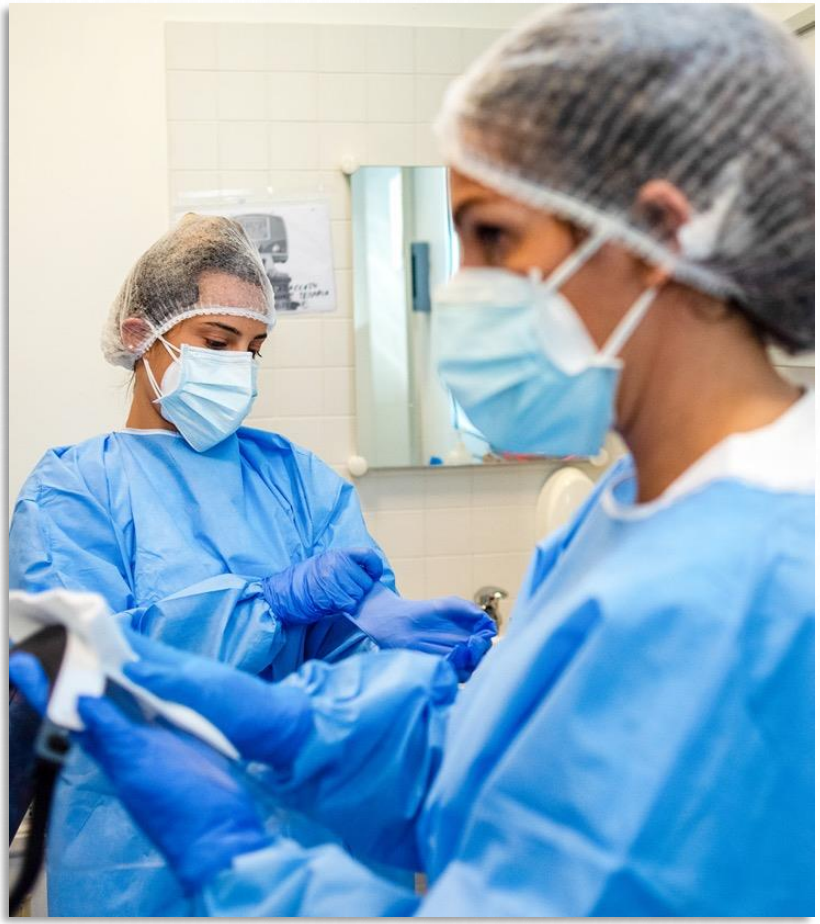
Use of Ag-RDTs

- NAAT-RT-PCR is the reference standard. High quality Ag-RDTs helps to increase access to testing and support outbreak response, especially outside of lab and clinical settings
- Some Ag-RDTs have attained WHO Emergency Use Listing
- Based on published data Ag-RDT results will be most reliable during the first 5-7 days after onset of symptoms and when SARS-CoV-2 prevalence is ≥ 5%
- Shelf life (12 months) and storage conditions (max 30°C) will pose challenges for supply chains in many settings
- End-users should be trained @ WHO/FIND have provided trainings
- Confirmatory testing by NAAT is not required, but should be considered based on the clinical history, presentation and epidemiological context



Protecting the health system

- **Health and care workers** account for around **7.7% of COVID-19 cases** reported to WHO[1]
- Health and care workers can be infected with SARS-CoV-2 while at their work or at the community level
- Those caring for COVID-19 patients are considered at a hither risk of being infected, therefore should be considered for testing, even if asymptomatic
- **Testing is a key strategy**
  - To treat and isolate cases when positive
  - To reduce the risk of transmission to patients, co-workers, visitors and their contacts outside the health facility



Source: WHO

[1] *global case-based and weekly aggregate surveillance data collected by WHO*
https://www.who.int/news/item/17-09-2020-keep-health-workers-safe-to-keep-patients-safe-who
https://www.who.int/publications/i/item/10665-336265

SARS-CoV-2 testing strategies in settings with an increased risk of transmission*

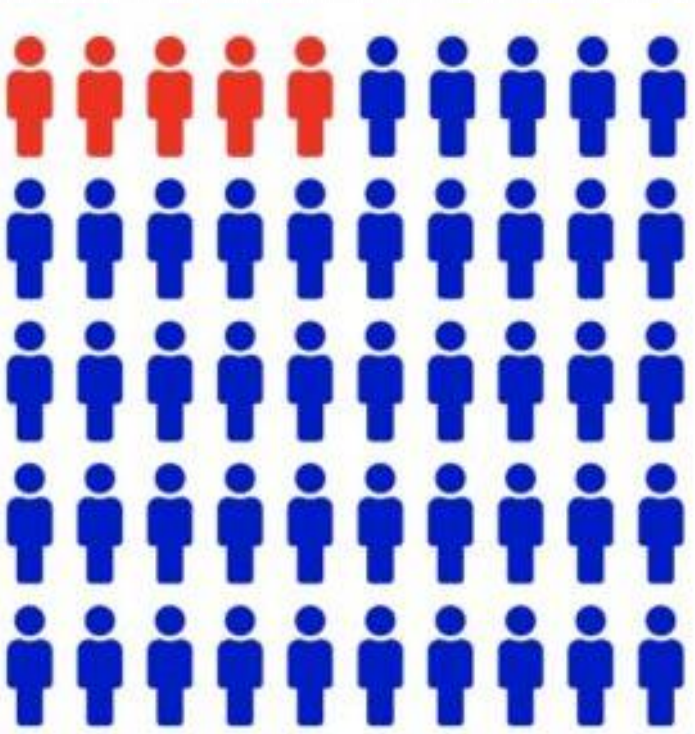
- **A higher-risk setting is any place where SARS-CoV-2 spreads more easily**, such as poorly ventilated spaces or crowded indoor settings where people tend to spend longer periods of time
- Higher risk settings include schools, workplaces, prisons, long-term living facilities and settings where people gather for long periods of time
- **Recommended testing strategy:**
  - Persons showing any symptoms should isolate
  - Test symptomatic persons, asymptomatic contacts of confirmed cases, and people caring for COVID-19 patients including health workers and long term care facility workers
  - Treat and isolate persons with confirmed SARS-CoV-2 infection
  - If there is limited testing capacity, testing symptomatic persons in settings with an increased risk of transmission should be prioritized
- **Widespread testing of asymptomatic individuals** is currently **not recommended** due to the significant costs associated with it and the lack of data on its effectiveness
- **Use public health and social measures to limit transmission**

* Outside health facilities

https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng

Transmission scenarios influence the predictive values of SARS-CoV-2 testing

- The different SARS-CoV-2 transmission scenarios affect the positive and negative predictive values of SARS-CoV-2 tests
  - **Positive predictive value** is the probability that persons with a **positive test truly have the disease**
  - **Negative predictive value** is the probability that persons with a **negative test truly don't have the disease**
- A SARS-CoV-2 test may have a poor positive predictive value (a high number of false positives) when used in a community where prevalence of SARS-CoV-2 is low
- Therefore, **in populations with few or no cases, it is preferable to use the reference NAAT to diagnose cases**, as it better correctly identities persons without COVID-19



** https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2
https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng

Source: https://www.statnews.com/2020/03/31/covid-19-overcoming-testing-challenges/

Transmission scenarios influence the predictive values of SARS-CoV-2 testing - examples

For example, when applying this to Ag-RDTs with 80% sensitivity and 97% specificity

in a fever clinic with a 27% prevalence of COVID-19:

91% of chance that a person testing POSITIVE for COVID-19 truly has COVID-19

at border screening with a 1% prevalence of COVID-19:

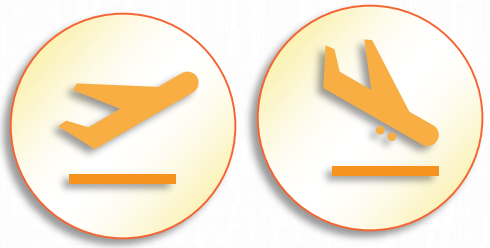
21% of chance that a person testing POSITIVE for COVID-19 truly has COVID-19

→ Therefore, in populations with few or no cases, it is preferable to use the reference NAAT to diagnose cases, as it better correctly identities persons without COVID-19

https://www.who.int/publications/i/item/9789240017740

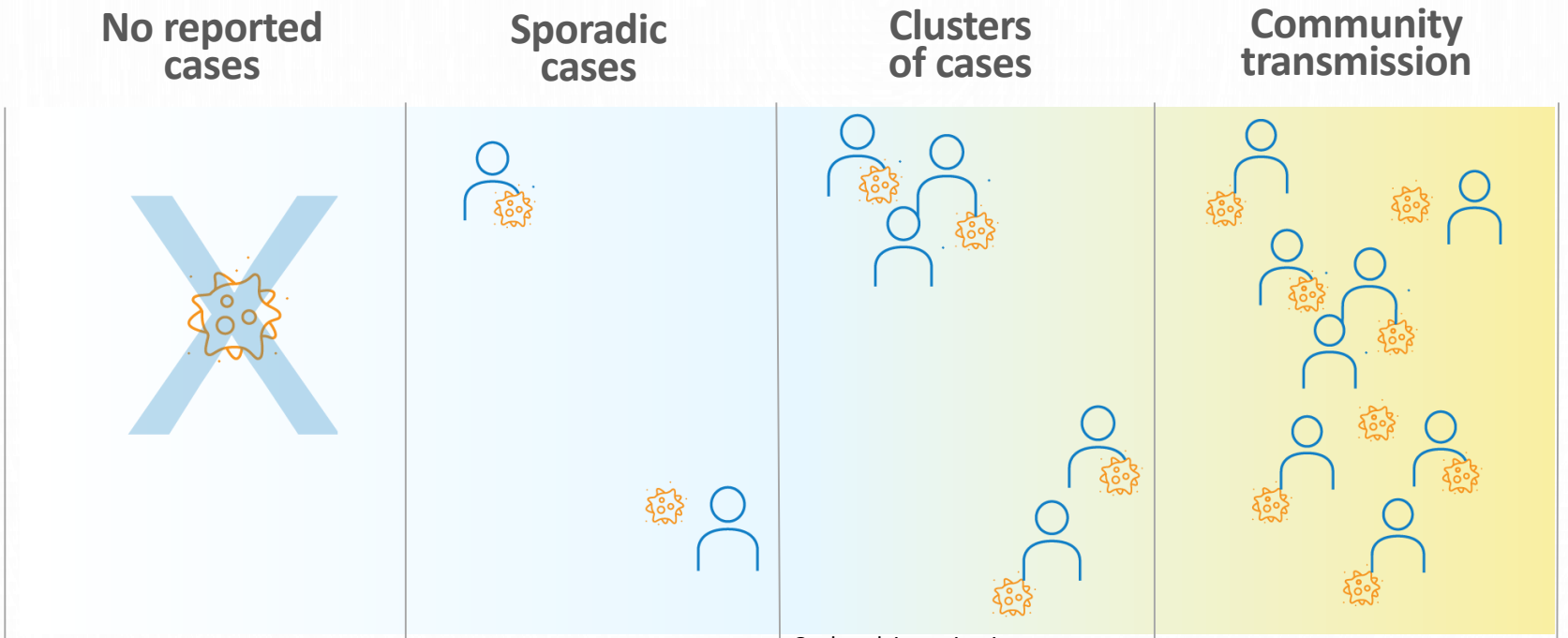
Testing for COVID-19 in the context of international travel

- Many countries test international travelers for SARS-CoV-2 prior to travel, at points of entry or after travel
- The prevalence of SARS-CoV-2 infection among travelers is expected to be low compared to the general population, considering that symptomatic travelers are prevented from travelling. This influences the predictive value of testing
- **WHO does not recommend testing for healthy travelers**, **particularly where resources may be limited and/or diverted away from priority testing groups.** Countries with sufficient resources that decide to implement testing of travelers, should do so based on risk assessment
- The risk assessment should consider the local epidemiological situation, health system capacities, volume of travel and arrangements for follow-up of incoming travelers who test positive
- **Testing does not replace public health & social measures for epidemic control**
- **Negative results from pre-travel testing cannot guarantee that travelers are free from infection** at the time of travel
- Negative results may generate a false sense of security and disregard the precaution measures during travel and at arrival
- **WHO does not recommend the issuance of so-called 'immunity passports'**



https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci_Brief-international_travel_testing-2020.1
https://apps.who.int/iris/bitstream/handle/10665/331866/WHO-2019-nCoV-Sci_Brief-Immunity_passport-2020.1-eng.pdf
https://apps.who.int/iris/bitstream/handle/10665/331512/WHO-2019-nCoV-POEmgmt-2020.2-eng.pdf

Limiting SARS-CoV-2 transmission in different scenarios



Monitor disease incidence trends in communities and particularly among frequently exposed workers, including health workers, **irrespective of symptoms**

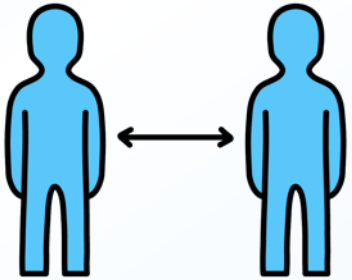
Resources

- https://www.who.int/publications/i/item/WHO-2019-nCoV-lab-testing-2021.1-eng
- https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2
- https://www.who.int/docs/default-source/coronaviruse/risk-comms-updates/update-23-epi-win-diagnostics-testing.pdf?sfvrsn=572ed182_2
- https://www.who.int/publications/i/item/considerations-in-adjusting-public-health-and-social-measures-in-the-context-of-covid-19-interim-guidance
- https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci_Brief-international_travel_testing-2020.1
- https://apps.who.int/iris/bitstream/handle/10665/331866/WHO-2019-nCoV-Sci_Brief-Immunity_passport-2020.1-eng.pdf
- https://www.who.int/publications/i/item/10665-336265

COVID-19 protection measures

Protect yourself & others

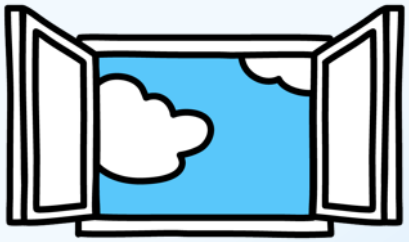
Wear a mask



Keep your distance

Wash your hands frequently

Cough & sneeze into your elbow



Ventilate or open windows

EPI•WiN

infodemic
MANAGEMENT

www.who.int/epi-win