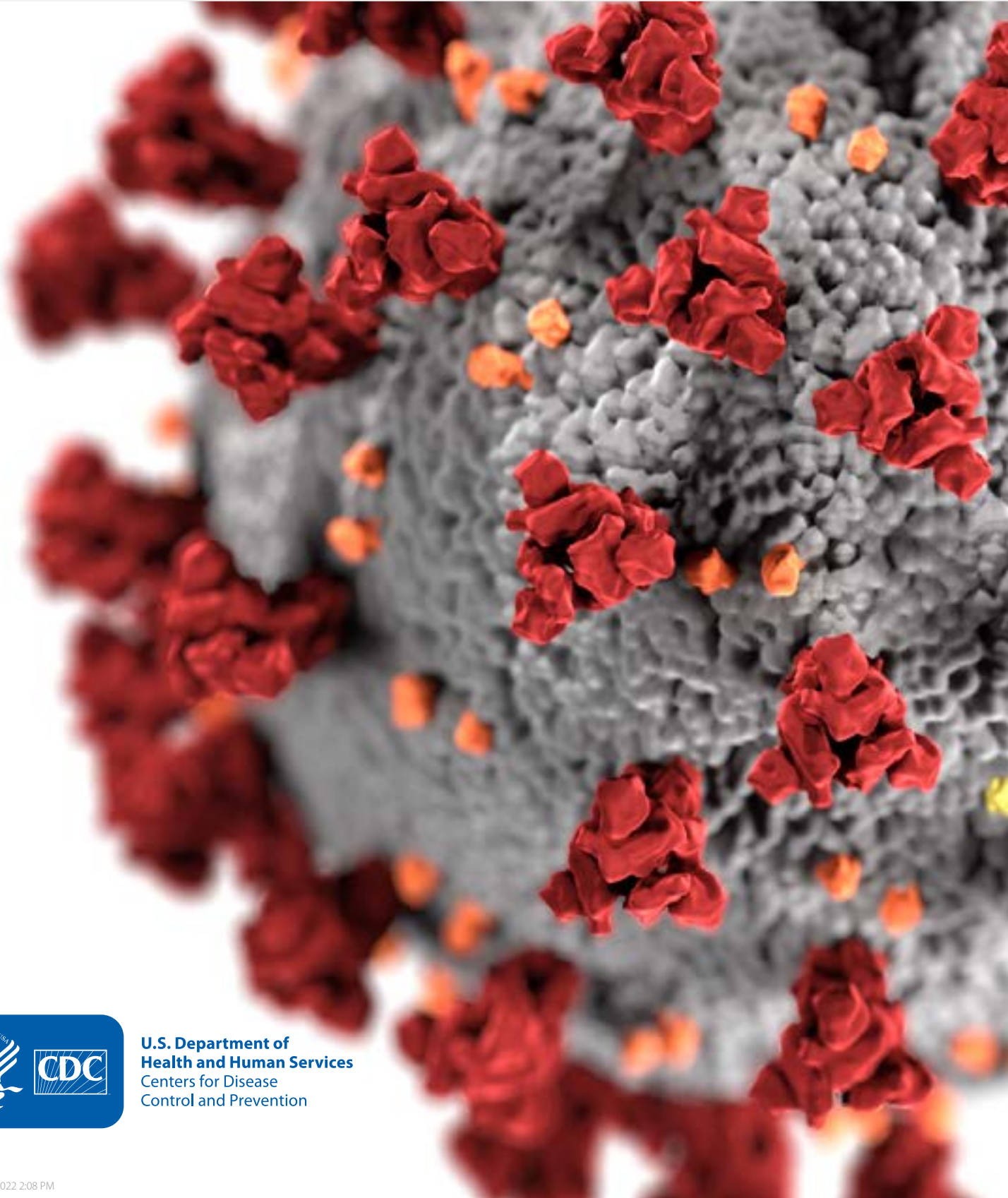


Testing for SARS-CoV-2 Infection at Air, Land, and Sea Points of Entry and Complementary Measures to Limit International Spread of COVID-19:

Strategies for Port Health Leaders Outside the United States*

*This document is intended to provide general considerations for SARS-CoV-2 testing at POEs and is not intended to be comprehensive or exhaustive.



**U.S. Department of
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Centers for Disease
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Key Points

- A strategy to reduce the risk of importation or exportation of SARS-CoV-2, the virus that causes COVID-19, via infected travelers is most likely to be successful when using realistic goals and a combination of complementary methods. This combination may include screening or diagnostic testing at points of entry (POE).
- Overall turnaround time and laboratory needs limit the use of most NAATs at POE. While some NAATs are point-of-care (POC) tests with rapid results, several considerations are needed. Considerations include throughput, performance, test availability, consequence management, characteristics of POE ([table 1](#)), and POE site-specific SARS-CoV-2 risk assessments.
- Antigen tests for screening or diagnosing travelers at POE as a condition for travel may need confirmatory NAAT testing. Considerations such as throughput, performance, test availability, consequence management, and characteristics of POE apply.
- Currently, antibody (or serology) tests are not recommended at POE as a condition for travel because they are not currently used for diagnosing active or current infection.
- Port health leaders should consider the circumstances unique to their country and types of POE, as well as the advantages and disadvantages of all possible detection and response interventions—including strategies that complement testing at POE ([table 2](#))—to make an informed decision about how to prevent the risk of importation or exportation of SARS-CoV-2 through POE.

Note: Licensing and permission for purchasing, manufacturing, and using tests rests with regulatory authorities of each respective country.

Introduction

In the United States, symptom-based entry screening for SARS-CoV-2 at airports was determined to be an ineffective use of resources, with cases confirmed in about 1 out of every 85,000 passengers screened. For these reasons, the United States shifted resources from symptom-based screening at POE to (1) increasing health communication with travelers, (2) improving response capacity for managing symptomatic travelers, (3) requiring pre-departure testing of international air passengers traveling to the United States, (4) encouraging pre-departure and post-arrival testing of other travelers, and (5) requiring vaccination of international air passengers traveling to the United States**

Because of the difficulties in detecting travelers infected with SARS-CoV-2 based on symptoms of illness alone, many countries are interested in screening travelers with a SARS-CoV-2 test to enhance detection capabilities at POE. The purpose of this resource is to provide port health leaders outside the United States strategies for testing and considerations for use at points of entry (POE), as well complementary strategies to testing at POE.

Considerations for SARS-CoV-2 Testing at POE

In the United States, most NAATs must be conducted in Clinical Laboratory Improvement Amendments (CLIA) compliant laboratories or patient care settings. Although most NAATs provide higher throughput, results are typically not available for several days. The multi-day turnaround time renders these methods impractical for rapid screening at POE. While some NAATs have shorter turnaround times, considerations regarding throughput, performance, test availability, consequence management, characteristics of POE (see [table 1](#)), and POE site-specific SARS-CoV-2 risk assessments are needed. Specific conditions, as described in [WHO](#) and [CDC laboratory biosafety guidance](#), are required to ensure safety. Antigen tests for screening or diagnosing travelers at POE as a condition for travel may need confirmatory NAAT testing. Similar to NAATs, considerations such as throughput, performance, test availability, consequence management, and characteristics of POE are needed. Serial testing with antigen tests as a strategy to offset decreased sensitivity of point-of-care antigen tests is operationally and logistically impractical for in transit travelers at POE. Antibody tests are not recommended at POE as a condition for travel because they are not currently used for diagnosing active or current infection.

Countries considering implementing testing for travelers at international borders should carefully consider how each POE's available resources and infrastructure could affect the ability to conduct testing. The table below summarizes some of the key characteristics of different POE. These characteristics will influence traveler screening considerations.

**Travelers with foreign passports from low vaccine available countries are eligible for an exception.

Table 1. Characteristics of POE likely to influence on-site COVID-19 testing effectiveness

Requirements	Capacity that is routinely present by type of POE:		Additional capacity required to conduct SARS-CoV-2 testing:
	Ground* Crossing	Airport/Port	All POEs
Infrastructure and location	<p>Often limited</p> <ul style="list-style-type: none"> • Few buildings • Limited/no electricity • Lack of climate control • Few/no services (food, toilets, etc.) <p>Usually open to environmental elements (e.g., sun, dust, rain). While there are often border towns on either side, many might still be distant from equipped healthcare facilities and diagnostic services, thus limiting timely isolation and testing of ill travelers</p>	<p>Variable, but minimum usually includes:</p> <ul style="list-style-type: none"> • Enclosed air-conditioned buildings • Electricity • Reliable communications systems <p>Often near a major city with access to one or more healthcare facilities</p>	<p>Dedicated, private climate-controlled space with electricity for sample collection and reliable refrigeration</p> <p>Depending on the test complexity, point-of-care or BSL-2 laboratory equipped to process and test specimens OR specimen storage and shipping to send to receiving laboratory off site</p> <p>Test kits, reagents, consumables, ancillary equipment</p> <p>Biohazardous waste disposal</p> <p>PPE and hand washing or sanitizing equipment</p>
Clinical or public health capacities	<p>Usually minimal on site</p>	<p>Some may have on site clinics staffed by medical or public health providers</p> <p>A few might have limited diagnostic capabilities</p>	<p>Well-trained laboratory and healthcare personnel</p> <p>Standard operating procedures and decision-making algorithms for testing</p> <p>PPE for staff collecting and processing samples</p> <p>System to link test results to persons tested</p> <p>Regulatory authority to test travelers and make decisions based on outcomes</p>
Linkage to surveillance or laboratory system	<p>In many countries, POE public health activities are siloed, with limited or no implementation of protocols or surveillance system infrastructure to integrate them into national laboratory or surveillance reporting</p>		<p>Link POE testing with other SARS-CoV-2 test reporting structures</p>
Ease of bypassing screening/testing	<p>Relatively easy</p> <p>Travelers might be able to bypass screening and testing sites by taking a detour around the control point and crossing along an informal and unstaffed area of the border</p>	<p>Very difficult</p> <p>Airports and many large shipping ports have the established infrastructure, resources, and ability to funnel people through controlled pathways to enforce screening and testing compliance</p>	<p>Signs and barriers for crowd control to direct people to sampling and testing locations</p> <p>Plans for flow management at high volume locations</p> <p>Handouts/brochures/visuals to promote public health messaging about COVID-19</p> <p>Health declaration forms in multiple languages</p>

*Could also include international entry points along rivers and at lake or ocean docking sites. Most information is relevant to less-developed countries.

Additional Considerations

Other factors that can influence decisions about testing travelers for SARS-CoV-2 infection at POE include the volume of traffic and types of travelers. Differential and risk-based approaches should be identified for different situations. For example, more stringent requirements might be in place for travelers arriving from countries with high incidence or prevalence of COVID-19. When testing all travelers at POE is not operationally or logistically feasible, providing diagnostic testing for travelers with reason to suspect infection (such as symptomatic and/or self-declared known or suspected exposure within 14 days before arrival) can provide more targeted use of resources.

Risk Assessment

Different strategies should be developed for travelers depending on individual or population level of risk for incoming and outbound travelers. This risk assessment is outside the scope of this document but can be found in other [WHO](#) and [CDC](#) guidance.

Test Availability

Availability of SARS-CoV-2 tests have been inconsistent throughout the pandemic. Tests that are easier to use (near-POC and POC testing options) are in high demand.

Consequence Management

For any type of test that is performed, a reliable and timely system for consequence management is needed, including a system for providing test results to travelers and public health authorities. Standard, evidence-based procedures are required to determine next steps for positive, negative, and invalid test results. If testing is performed pre-departure, test results should be available before initiation of travel so that travelers who test positive can be prevented from traveling and isolated, and their close contacts (such as travel companions) can be managed. If testing is performed on entry, test results should be available rapidly to manage travelers who test positive and their travel companions before they travel further or expose members of the destination community.

Currently, onsite SARS-CoV-2 testing options are limited in their ability to allow for accurate, on-the-spot decision-making at POE. Complementary strategies to testing at POE can balance the goals of reducing the risk of spread while facilitating unimpeded movement.

Complementary Strategies to Testing at POE

Some countries have elected to completely close their borders to travelers coming from areas with high rates of SARS-CoV-2 transmission. Although this might prevent importation of cases, the approach has a significant negative impact on the movement of essential goods and services, including vital humanitarian aid needed to combat the pandemic. Furthermore, closing official POE may encourage travelers to try crossing borders informally. Such informal movement has the potential to make detecting incoming and outgoing infected travelers challenging, and place receiving communities at risk of undetected imported cases.

Some countries have considered using complementary measures that require arriving travelers to:

- Demonstrate proof of vaccination before travel
- Self-monitor symptoms
- Check in with local health departments daily to report symptoms
- Self-quarantine for up to 14 days after arrival
- Get tested during or at the end of a quarantine period
- Demonstrate proof of negative test within 1–3 days before travel
- Require serial testing after arrival coupled with mandatory quarantine if/at time of positive results
- Obtain a pre-travel health certificate in their country of origin
- Comply with public health measures before, during and after travel (e.g., wear face masks, practice hand hygiene, and maintain physical distance)
- Declare symptoms and risks for recent exposure on a health declaration form
- Undergo different requirements if arriving from countries or “corridors” determined to be high or low risk by defined epidemiological criteria
- Any combination of the above

Some of these actions often still pose significant challenges at POE. Requiring conveyance operators to quarantine and wait with their cargo at or near the border for two weeks, for example, hinders international trade. To help address this specific problem, some countries now have local (domestic) drivers transport international cargo offloaded to them at the border. This approach effectively constrains the movement of potentially ill or infected people into the country while helping maintain a continuous flow of goods.

Methods for deterring fraud and preventing falsification of testing results should be explored. Additionally, because testing identifies whether a person is infected *at the time they are tested*, admitting only travelers with negative test results will not prevent all imported cases. This is because a person could be infected after the test, either before or during travel. In addition, testing too early in the course of the infection—before the test can detect the virus—will yield a negative result.

Since December 2020, CDC has provided [options](#), based on mathematical modeling, for reducing the standard 14-day stay-at-home period or self-quarantine for travelers entering the United States. A two-test strategy to reduce transmission during and after travel includes a negative test result 1 day before departure and testing again at 3–5 days after arrival. The two-test strategy also includes a 7-day self-quarantine on arrival for travelers who are not fully vaccinated against COVID-19 even if the post-arrival test is negative, unless the traveler has documentation of having recovered from COVID-19 in the past 90 days. If travelers are not tested after arrival, a 10-day self-quarantine is recommended. This strategy assumes travelers will also self-monitor for symptoms of COVID-19 and self-isolate if they develop symptoms or test positive.

It is important to understand the strengths and limitations of the various traveler screening strategies and to weigh their potential benefits (such as preventing importation of COVID-19) against the impact on local economies, including access to essential goods and services. Combinations of approaches described here—for example, testing of travelers at their point of origin **and** asking them to self-monitor on arrival to the destination country or undergo testing on arrival—could help minimize the risk of cross-border transmission.

The complementary strategies listed in the table are by no means comprehensive. Countries are encouraged to explore all feasible and acceptable options and to supplement any traveler screening measures they adopt with strong COVID-19 community surveillance and mitigation activities.

Table 2. Summary of possible measures complementary to COVID-19 testing at borders

Importation Prevention Measure	Advantages	Disadvantages
Close borders	<p>Might prevent importation of some cases</p> <p>Potentially preserves resources needed for POE operations</p>	<p>Significantly affects the movement of essential goods</p> <p>Potentially closes the country off from vital humanitarian aid needed to combat the pandemic or other problems</p> <p>Might encourage travelers to use informal border crossings, making detection of COVID-19 among cross-border travelers more difficult</p>
Travelers required to self-monitor their symptoms, including possible requirement to check-in with local health departments daily (no movement restrictions applied)	<p>Allows ongoing movement of people and goods across borders</p>	<p>Travelers might have no incentive to report daily or be truthful</p> <p>Requires health authority resources and mechanisms (e.g., phone/web applications or cold calling) to communicate daily with travelers</p> <p>Requires ability to enforce compliance and/or institution of penalties for false reporting</p> <p>Pre-symptomatic and asymptomatic infections will be undetected</p>
Travelers required to remain in quarantine for up to 14 days, with possible testing during or at the end of the quarantine period	<p>If implemented well, likely reduces risk of COVID-19 introduction from abroad and ensures imported cases are quickly identified and linked to care</p>	<p>If critical infrastructure (essential) workers are included, could cause delays in goods or services moving across borders (into or out of the country)</p> <p>Perishable items could spoil before reaching their destinations and security measures might be required to assure the safe storage of cargo</p> <p>If state-monitored quarantine, could require sufficient resources for in-country accommodations and supervision of newly arrived travelers</p> <p>Self-monitored quarantine requirements could be difficult to enforce and easily evaded</p> <p>Requires robust testing and follow-up infrastructure, as well as resources to isolate and manage travelers identified as infected during or at end of quarantine period</p>

Importation Prevention Measure	Advantages	Disadvantages
<p>Conveyances coming from abroad are offloaded at the border and reloaded onto local conveyances</p>	<p>Keeps movement of goods across borders</p> <p>With appropriate coordination, operators might experience only minimal delays (a few hours)</p>	<p>Requires local resources (drivers, trucks, personnel to offload and reload cargo) to maintain movement of goods into the country</p> <p>Potential risk of transmission during the offloading/reloading process, if individuals involved do not follow proper infection prevention and control measures (e.g., physical distancing, hand washing, face masks).</p> <p>Requires good coordination between offloading and receiving conveyances to minimize delays</p>
<p>Testing at point of origin with negative results verified at the border</p>	<p>Provides assurance that a person was tested for COVID-19 and tested negative recently, prior to international travel</p> <p>Depending on the timeframe of point of origin testing, there is a limited time for a person to be exposed to SARS-CoV-2 between testing and arrival in country</p>	<p>Testing can indicate only whether a person is infected at the time they are tested</p> <p>Travelers could be exposed and become infected after the test is performed, still posing a risk for transmission to others before, during or after travel</p> <p>Travelers incubating the virus at the time of the test (tested too early in course of infection and before the virus is detectable via the test) could have results that are falsely negative</p> <p>Limited ways to prevent fraud or falsification of lab results</p>
<p>Vaccination at point of origin with verification of vaccination status at the border</p>	<p>Traveler is less likely to be infected and to transmit SARS-CoV-2 to others before, during, or after travel</p>	<p>Fraud or falsification of vaccination records possible</p> <p>Countries or geographic locations may not have adequate vaccine supply for travelers who are not fully vaccinated</p>
<p>Travel permitted only from specified countries or “corridors” determined to be low risk by defined epidemiological criteria</p>	<p>Risk-based approach</p>	<p>There can be significant variability in COVID-19 incidence and prevalence in sub-populations within any defined geographic area</p> <p>Requires significant human resource investment using highly skilled workforce to continuously evaluate and update rapidly changing information</p> <p>Countries or geographic locations may not have resources to provide accurate or timely information about epidemiology of COVID-19 in their populations</p>

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