Australian Nursing & Midwifery Federation

ANMF EVIDENCE BRIEF

COVID-19: TESTING FOR COVID-19

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Question: What is the best available evidence regarding testing for COVID-19?

***ALERT* Evidence regarding COVID-19 is continually evolving. This Evidence Brief will be updated regularly to reflect new emerging evidence but may not always include the very latest evidence in real-time.**

Key messages:

- There is currently a global shortage of COVID-19 tests which has impeded widespread testing in many regions including Australia.
- New testing methods for COVID-19 are frequently emerging. Many require further testing before clinical adoption.
- Criteria for testing is continually changing subject to resource availability, the emergence of new testing approaches, and the rapid development of infection patterns across different regions.
- Asymptomatic patients may exhibit similar viral loads in respiratory samples to symptomatic patients highlighting the urgency of testing to identify asymptomatic cases to halt transmission.
- Effective testing should provide a rapid result; ideally within one hour. Current COVID-19 testing provides results in several hours but is hampered by demand and bottlenecks resulting in days-long waits which increases risk of transmission.
- Positive tests should be verified by retest to confirm results.
- Patients with suspected COVID-19 awaiting test results should ideally be quarantined while results are confirmed.
- False-negative tests are problematic as asymptomatic patients may still be infectious. Blood testing may be an effective approach for identifying infection following a false-negative respiratory sample test.
- Low-cost, accessible, and efficient testing protocols are required for effective outbreak control and management.
- Robust and widespread testing enables more rapid achievement of population-level outbreak control as has early findings have shown in several regions (eg. South Korea).
- Australia, States and Territories may be able to expand current testing criteria as more testing resources become available.

Background

COVID-19 pandemic

COVID-19 (from 'severe acute respiratory syndrome coronavirus 2' (or 'SARS-CoV-2') is a newly discovered (novel) corona virus first identified in Wuhan, Hubei province, China in 2019 as the cause of a cluster of pneumonia cases.[1] Coronaviruses are similar to a number of human and animal pathogens including some of those which cause the common cold as well as more serious illnesses including severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).[2] Since discovery, COVID-19 has spread to many countries and was declared a pandemic on 30 January 2020.[3] As a novel virus, as yet there is no population-level immunity to the pathogen as with many strains of the influenza virus.

COVID-19 testing

Testing to identify a microbial cause of suspected COVID-19 infection is a vital component of national and global response efforts to the COVID-19 outbreak and is fundamental to public health and safe, quality care.4 Despite the fact that no vaccine or cure currently exists for COVID-19 infection, rapid identification of COVID-19 positive individuals in the community, within heath and aged care settings, and at national borders underpins effective tracking, quarantine, and treatment measures that are critical to bringing the outbreak under control and providing necessary care to at-risk individuals.[5] As many people tend to appear asymptomatic or exhibit only mild symptoms, testing is essential to identifying individuals who may inadvertently transmit the virus to others in healthcare settings and the community.[6,7]

Despite the critical nature of testing, due to the recent discovery of the virus, there is currently a global shortage of COVID-19 testing kits, while at the same time, new testing methods are regularly emerging.[7] COVID-19 testing is therefore often restricted in many settings and individuals are required to meet various criteria in order to be eligible.[8] The United Arab Emirates, South Korea, Australia, and Germany currently lead globally in the total number of tests performed per million people with countries such as the United States appearing very low in the list.[9]

Some emerging testing methods may be useful for asymptomatic individuals but are not recommended for people presenting with symptoms consistent with COVID-19 presentation eg. the real-time reverse-transcription PCR (rtPCR)-based assay protocol developed by Won and colleagues which after further testing may be helpful later on to detect early cases.[7] Resource restrictions hamper widespread testing efforts which have been shown to contribute to population level disease control. Indeed, in countries where widespread testing has been implemented, efforts have been rewarded with comparably better infection control results and reductions in the number of newly emerging cases.

The COVID-19 virus can be detected through the identification of amplified SARS-CoV-2 genetic material (often in respiratory samples) as well as through antibody detection (from blood samples).[10] The WHO recommends collecting specimens from both the upper respiratory tract (naso- and oropharyngeal samples) and lower respiratory tract such as expectorated sputum, endotracheal aspirate, or bronchoalveolar lavage.[8] Some people test positive on initial screening due to the detection of other coronaviruses with the same gene. A further confirmation test is then required to detect the presence or absence of another target COVID-19 gene. False-negative test results are also an issue, where missing the time window of viral replication and summarily not detecting a present infection can result in further transmission by an unknowing host.[10]

If initial test results are positive, it is recommended that the test is repeated for verification. In patients with confirmed COVID-19 diagnosis, laboratory evaluation should be repeated to evaluate for viral clearance prior to being released from observation.[8]

Testing criteria: COVID-19 testing criteria are regularly changing and differ between countries and jurisdictions. Initially, many regions based testing requirements on recent travel to areas with known outbreaks, however as community-level transmission becomes more common and access to testing resources improves, efforts to ramp up testing have become widespread.[11] The US Centers for Disease Control state that healthcare staff should make every effort to interview and assess people of interest, such as symptomatic close contacts of known cases remotely using telehealth to assess individuals for respiratory symptoms and fever.[12]

Already, there are significant differences in testing in Australia and widespread testing is impeded by resource supply deficiencies.[13,14] The most up to date national guidance regarding who should be tested are below, however States and Territories are permitted to expand eligibility criteria as capacity allows and doctors may use discretion regarding whether a test is necessary.

As of the 26 of March in Australia, to be tested, a person should meet one of the following criteria:[15]

- Returned from overseas in the past 14 days or spent time on a cruise ship, and have developed respiratory illness, with or without fever.
- Close contact with a confirmed COVID-19 case in the past 14 days and have developed respiratory illness, with or without fever.
- Presence of severe community-acquired pneumonia and with no clear cause (including patients who have already been hospitalised for this condition).
- Presence of a fever or acute respiratory infection while;
    - working in the healthcare or aged/residential care sectors,
    - and/or or have spent time in a location that's defined by a state or territory as having an elevated risk of community transmission.
    - and/or have spent time at a "high-risk" location where there are two or more linked cases of COVID-19, such as an aged-care home, a remote Aboriginal community, a correctional facility, a boarding school, or a military base (including Navy ships) with live-in accommodation.

Testing centres: COVID-19 can be tested for in a number of settings including designated pathology clinics, hospitals, and dedicated pop-up and/or drive-through clinics.

Testing samples: COVID-19 testing requires collection of sample material. Sample material may be collected via; nasopharyngeal swab, oropharyngeal swab, sputum collection, bronchoalveolar lavage, or a blood test. Different testing approaches are useful at different points; sample material from the respiratory system can be used to detect the virus sooner after infection, while point-of-care blood tests only detect the virus a few days after infection usually when symptoms have already appeared.

Samples from the nose appear to contain higher viral loads than samples taken from the throat, with viral loads in asymptomatic patients appearing similar to those who are symptomatic.[16]

Bronchoalveolar lavage samples should only be performed for mechanically ventilated patients as lower respiratory tract samples appear to remain positive longer.[8]

Blood tests to detect antibodies to COVID-19 may be usefully combined with tests that detect viral nucleic acids to increase detection rates and reduce false-negative results which is particularly useful for testing of asymptomatic patients with suspected COVID-19.[10]

Testing time and turnaround: While initial COVID-19 testing only takes four to six hours, due to demand individuals may need to wait one or more days to receive results. This can be problematic as infected people may pass on infection unless quarantined or become infected themselves while waiting for results.

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