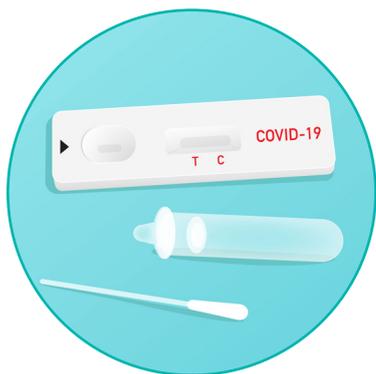


RAT testing in children

What are RAT tests?



RAT stands for **Rapid Antigen Test** – these are tests for COVID-19 that can give a result in 15-30 minutes. Some of these can be purchased and used at home.

There are three types of laboratory test for COVID – RATs, Polymerase Chain Reaction (PCR) tests, and serology or antibody tests. RAT and PCR tests detect parts of the COVID virus. PCR tests are performed at a laboratory, and are more accurate, though slower. They use similar nose/throat swabs as RAT tests. Serology or antibody tests don't look for the virus directly, they look for the immune response (antibodies) that your body makes in response to the virus. These are not commonly used in Australia, and since they take time after infection to become positive, can give falsely reassuring results.

RAT tests, while not quite as accurate as PCR tests, are quicker and easier to access, which means they can play a useful role in early detection of infectious cases and reducing further community transmission.

How do they work?

RATs look like a pregnancy test, and work in a similar way. They are a “lateral flow assay”, which detects a surface marker (an “antigen”) that is unique to the SARS-CoV-2 virus that causes COVID.

Depending on the specific test, results are ready in 15-30 minutes.

Where do I get a RAT test, and how much do they cost?

RAT tests can be purchased at pharmacies and supermarkets, though stock shortages are common. They usually cost \$5-10 per test, and there are some government programs to supply free RATs to concession card holders and other specific groups.

There are lots of different brands, which one should I buy?

The Therapeutic Goods Administration (TGA) approves RAT tests for sale in Australia only if they meet strict quality, accuracy and usability standards, and subjects them to ongoing review. An up to date list of approved tests can be found at the TGA website [COVID-19 rapid antigen self-tests that are approved in Australia | Therapeutic Goods Administration \(TGA\)](#).

All available tests have been shown to be at least **80% sensitive** and **98% specific** (some of them have shown much higher sensitivity and specificity) **in detecting COVID in symptomatic individuals.**

80% sensitivity means that the **test identifies 4 out of every 5 infected people who are tested.** **98% specificity** means that **1 in every 50 people who are NOT infected will get a false positive test result.**

When should RAT tests be used?

RAT tests are most useful when there is a lot of COVID circulating in the community, and can be misleading in many cases when there is very little COVID in the community. Compared to PCR tests, RAT tests are not quite as accurate, but can still be very useful¹.

A RAT test could be useful:

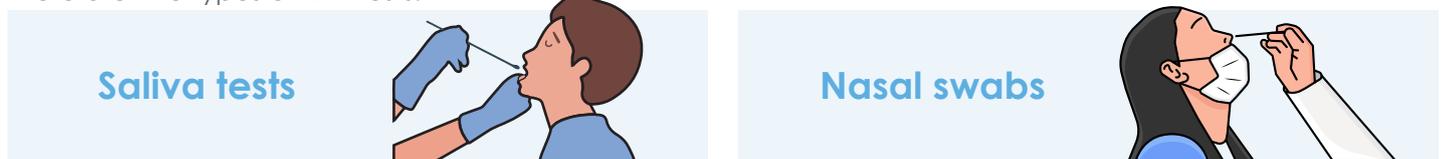
- Before attending a large gathering, to minimise the risk of passing COVID to others
- Before visiting an elderly or other vulnerable person, or a high risk setting like a hospital or nursing home, to protect those most at risk
- If your child has had contact with a known COVID case and is in isolation, but hasn't developed symptoms (current testing recommendations are for a RAT on day 1 and 7 of a one week isolation period)
- PCR is unavailable or inaccessible
- For school and workplace screening programs
- In line with WA health home isolation and quarantine rules

A PCR test is still the most accurate test, and while testing resources are easily accessible, PCR tests would be the best choice if:

- Your child has symptoms of COVID, even if a RAT test is negative
- PCR testing is accessible

How do I use a RAT?

There are two types of RAT tests:



They aren't interchangeable (they won't be accurate if you use saliva in a nasal test kit and vice versa).

There are some helpful video guides available at [Go low, go slow: how to rapid antigen test your kid for COVID as school returns \(theconversation.com\)](https://www.theconversation.com) and at pic.twitter.com/zfnGFIHTp.

Each kit comes with instructions, and they do vary between manufacturers, so read them carefully. Our tips for RAT tests in kids:

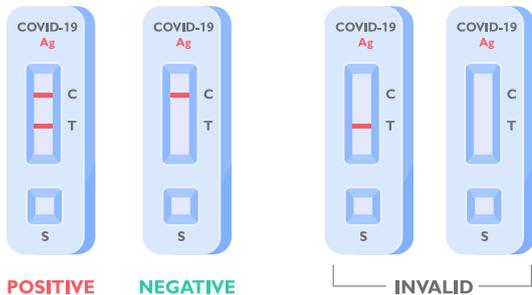
- High school children need supervision to take a RAT, and younger children will need someone to help them.
- Set aside plenty of time, and talk to your kids about why testing is important. It's important to try to make sure they have a good experience with early RAT tests, because they may have to do quite a few over time.
- It probably will be uncomfortable, but shouldn't cause pain. Be realistic in setting your kids' expectations – don't say "you won't even feel it!" Most kids have picked their nose (even if they've been told not to) – it's like quite a deep version of that!
- For young children, the best approach is with your child lying on their side on the bed or couch, and your swabbing hand supported to keep everything still.
- When you do the test, **aim low and go slow**. Putting the swab in too high or too fast can hurt! Aim for the pink skin inside the nostril, about 1-2cm in, past the dry skin with hair that sits at the entrance to the nostril.
- For families who speak languages other than English at home, translated versions of RAT instructions are here [Rapid antigen testing in schools - information for parents and carers | Coronavirus Victoria](#)

A study performed by Telethon Kids Institute with WA school kids performed almost 14 thousand nose and throat swab PCR tests on almost 7 thousand students. 71% of students reported no or minimal discomfort and 96% were willing to be reswabbed².

What do the results mean?



First, check the instructions to find out how long to wait before reading the results – usually 15 minutes. Reading the test too early means the result might not be accurate.



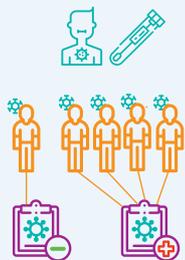
The RAT will have two letters in the result window: **C for control** and **T for Test**.

- A line should appear against the C, which indicates that the test has reacted to the liquid. If there is no line against the letter C, the test has not worked and a new test will need to be conducted.
- A line against the letter T indicates a positive COVID-19 result. *Note: the result is positive even if the second line is very thin/faint.*
- If there is a line at the C, and no line against the T, the test is negative.

Are they accurate? Can I trust the result? If it's positive, does my child have COVID? What if they feel totally fine? Are the contagious to others?

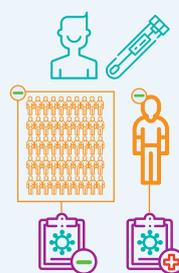
Headline figures – to be approved by the TGA for sale in Australia, tests had to demonstrate a sensitivity of at least 80% for specimens collected within 7 days of symptom onset, and a specificity of at least 98% in symptomatic individuals. Many of the tests for sale have been proven to be much MORE sensitive than this minimum standard.

80% sensitivity means:



when people who **DO have COVID** are tested, **at least 80% of them** (ie 4 COVID infected people out of every 5 tested) **get a positive result on the RAT test.**

98% specificity means:



in people who **do NOT have COVID** and take the test, **at least 98% of them will get a negative result on the test** (ie. About one out of 50 people without COVID may test falsely positive for COVID-19)

No test is 100% accurate. Incorrect results can be “false positives” (when the test reads positive, but the patient doesn't actually have the infection) and “false negatives” (when the test reads negative in a patient who actually DOES have the infection).

Accuracy depends on performing the test correctly (if the sample doesn't get enough saliva or nasal mucus, it can't detect the virus), and on when in the course of illness the test is done. RAT tests are most accurate when viral load is highest, so in the first 7 days of infection, including the day before symptoms develop. Many children who are infected with COVID never develop symptoms³ – even if your child feels perfectly well, a positive RAT test should be taken seriously.

In hospitals where asymptomatic healthcare staff performed regular screening testing, serial RAT tests had comparable accuracy to weekly PCR tests, and were better at telling when a person no longer had live (and therefore contagious) virus in their nose/throat⁴, a finding supported by research that shows a RAT is more likely to be positive in an individual with a higher viral load⁵.

Have RAT tests been proven in children?

RAT tests perform similarly in children and adults, though most of the research has been conducted in adults. Studies of large real-world testing programs that included both children and adults have shown similar sensitivity and specificity for children and adults, both in asymptomatic and symptomatic individuals⁶⁻⁹. Some smaller studies have shown lower sensitivity in children^{10, 11}. Children may have a higher or lower “load” of virus in their noses and throats, need supervision and help to take a test properly, and are more likely to be asymptomatic when infected, all of which impact test accuracy

Why haven't we had these available sooner?

RATs are most useful when there are at least moderate numbers of COVID cases in the community, which has not yet been the case in WA.

As mentioned above, no test is right 100% of the time. When there is no or very little COVID in the community (like in WA for most of the past two years), the chance of any individual having COVID is really low, especially if they're asymptomatic and haven't had contact with a known case, which means that if you did a lot of RAT tests in that setting, most of the positive results would be false positives. When there is more circulating COVID, **false positives** do still happen at the same rate (maximum 2 per 100 tests, though some tests are even more specific than this), but there are much more TRUE positives per 100 tests taken, so the chance of any person's positive result being real (the “positive predictive value” of the test) is much higher, so RATs become useful.

Also, it takes some time for the TGA to approve each individual manufacturer's RAT tests, to make sure that what you can buy on the shelves meets standards for accuracy.

Some examples to show how RAT usefulness changes with case numbers

Using a very accurate test, with a sensitivity of 98.1% and a specificity of 99.8% in symptomatic people, and a sensitivity of 66.0% and specificity of 99.8% in asymptomatic people (like one of the available TGA approved tests¹²)

Low transmission setting – 1 in 1000 people actually have COVID:

- ▶ 67% of positive tests of symptomatic people, and 75% of positive tests in asymptomatic people would be false positives (that is, symptoms must be due to something other than COVID)
- ▶ 2 in 100 true COVID cases would be missed in symptomatic people, 34 in 100 true cases would be missed in people without symptoms.

High transmission setting – 200 in 1000 people (20%) actually have COVID:

- ▶ Only 0.8 % of positive tests of symptomatic people, and 1.2% of positive tests in asymptomatic people would be **false positives**
- ▶ 2 in 100 true COVID cases would be missed in symptomatic people, 34 in 100 true cases would be missed in people without symptoms.

If you'd like to explore how the positive and negative predictive value of a test changes with community prevalence, there's calculator here¹³ [Serial Rapid Antigen Testing | The BMJ](#)

What about Omicron?

We know that children were often asymptomatic or only mildly symptomatic with previous COVID variants, including delta. While data is still emerging, it appears that children are even less likely to have severe or even symptomatic disease with Omicron¹⁴.

Small studies undertaken on specific tests (one oral swab¹⁵ and one nasal swab¹⁶) and have shown that performance is similar with Omicron as with other variants, including Delta.

What about saliva versus nasal swabs – the nose ones can be uncomfortable! Could I do damage to my child?

Seven of the 26 RATs approved by the TGA for sale in Australia are designed to work with saliva¹². They meet the same rigorous standards of quality and accuracy as nasal swab tests do. You and your child might prefer to purchase and use these tests. Remember, you can't use saliva or other oral samples in a RAT designed for a nasal swab.

There are rare cases of patients suffering complications from nasal swabs¹⁷ (usually professionally performed PCR swabs, not RAT tests), but RAT tests have proven to be safe over millions of uses worldwide, and small studies show that parent-collected samples are equally accurate when compared to swabs collected by trained technicians¹⁸.

What should I do if my child's RAT test is positive?



First, don't panic. Most children who catch COVID will be asymptomatic or only mildly unwell. Register the positive [RAT result online](#). All Western Australian children with a registered COVID positive result will be offered follow-up with the COVID Care @ Home service, run by clinicians at WA Health.



Stay home! The household are now all contacts of a COVID case, so you'll need to follow current isolation rules.



Think about who your child has been seeing and playing with – you'll need to let their contacts know about their positive test.

What if my child has symptoms, but a RAT test is negative?

First, check the instructions – was the test performed correctly? Repeat it if you're not sure.

Depending on how much COVID is circulating in the community and whether they've been in contact with a known case, your child is likely to have another, non-COVID, respiratory virus – if so, they should be staying home from school and other places where viruses can be transmitted to others.

If my child catches COVID, how long will their RAT test be positive for? And how long are the infectious for?

This varies between individuals, but research shows that RAT tests are less likely to be positive when the amount of living (and therefore contagious) virus drops off, usually some time in the first week of infection^[5]. PCR tests might be positive for longer than RAT tests, because they are more accurate at detecting small amount of virus.

RAT testing in schools

In some Australian states, as well as in many other countries^{19, 20}, regular RAT testing for asymptomatic school children has been implemented successfully²¹, and has been reported to be an important part of keeping school open and safe with widespread circulating COVID, with evidence that some school testing programs that let children who test negative stay at school even after a COVID exposure have saved thousands of days of in-person schooling, depending on local policies²².

What else can we do to stay safe?

- Social distancing – play in smaller groups is best.
- Outdoors activities are best, with lower transmission compared to indoors[23].
- Keep doing things that are fun and support your family's mental wellbeing – whatever changes in behaviour you make need to be sustainable for a long period of time.
- Keep in touch with family – even over skype/facetime.
- Wear masks ([see Telethon Kids Institute's fact sheet on this](#))
- Think about the exposure risks of parents and other household members – household transmission is where most children contract COVID²⁴⁻²⁶
- Vaccination for children who are eligible, and for adults around them when they're too young or otherwise unable to be vaccinated.
- Check-in wherever you go

¹ Dinnes, J., et al., *Rapid, point of care antigen and molecular-based tests for diagnosis of SARS CoV 2 infection*. Cochrane Database of Systematic Reviews, 2021 (3).

² Thomas, H.M., et al., *Acceptability of OP/Na swabbing for SARS-CoV-2: a prospective observational cohort surveillance study in Western Australian schools*. BMJ Open, 2022. 12(1): p. e055217.

³ Nikolopoulou, G.B. and H.C. Maltezou, *COVID-19 in Children: Where do we Stand?* Arch Med Res, 2022. 53(1): p. 1-8.

⁴ Smith, R.L., et al., *Longitudinal Assessment of Diagnostic Test Performance Over the Course of Acute SARS-CoV-2 Infection*. The Journal of Infectious Diseases, 2021. 224(6): p. 976-982.

⁵ Landaas, E.T., et al., *Diagnostic performance of a SARS-CoV-2 rapid antigen test in a large, Norwegian cohort*. J Clin Virol, 2021. 137: p. 104789.

⁶ Pollock, N.R., et al., *Performance and Implementation Evaluation of the Abbott BinaxNOW Rapid Antigen Test in a High-Throughput Drive-Through Community Testing Site in Massachusetts*. J Clin Microbiol, 2021. 59(5).

⁷ Pollock, N.R., et al., *Performance and Operational Evaluation of the Access Bio CareStart Rapid Antigen Test in a High-Throughput Drive-Through Community Testing Site in Massachusetts*. Open Forum Infect Dis, 2021. 8(7): p. ofab243.

⁸ Hanson, K.E., et al., *The Infectious Diseases Society of America Guidelines on the Diagnosis of Coronavirus Disease 2019 (COVID-19): Antigen Testing*. Clinical Infectious Diseases, 2021.

⁹ Jung, C., et al., *Diagnostic Accuracy of SARS-CoV-2 Antigen Detection Test in Children: A Real-Life Study*. Front Pediatr, 2021. 9: p. 647274.

¹⁰ González-Donapetry, P., et al., *Think of the Children: Evaluation of SARS-CoV-2 Rapid Antigen Test in Pediatric Population*. Pediatr Infect Dis J, 2021. 40(5): p. 385-388.

¹¹ Carbonell-Sahuquillo, S., et al., *Evaluation of a rapid antigen detection test (Panbio™ COVID-19 Ag Rapid Test Device) as a point-of-care diagnostic tool for COVID-19 in a pediatric emergency department*. J Med Virol, 2021. 93(12): p. 6803-6807.

¹² COVID-19 rapid antigen self-tests that are approved in Australia. 2022 [cited 2022 18/2/2022]; Available from: <https://www.tga.gov.au/covid-19-rapid-antigen-self-tests-are-approved-australia>.

¹³ Mytton, O.T., et al., *Interpreting a lateral flow SARS-CoV-2 antigen test*. BMJ, 2021. 373: p. n1411.

¹⁴ Wang, L., et al., *COVID infection severity in children under 5 years old before and after Omicron emergence in the US*. medRxiv : the preprint server for health sciences, 2022: p. 2022.01.12.22269179.

¹⁵ Weishampel, Z.A., et al., *OraSure IntelliSwab (®) Rapid Antigen Test performance with the SARS-CoV-2 Variants of Concern Alpha, Beta, Gamma, Delta, and Omicron*. medRxiv, 2022.

¹⁶ Regan, J., et al., *Detection of the Omicron Variant Virus With the Abbott BinaxNow SARS-CoV-2 Rapid Antigen Assay*. Open Forum Infect Dis, 2022. 9(3): p. ofac022.

¹⁷ Koskinen, A., et al., *Complications of COVID-19 Nasopharyngeal Swab Test*. JAMA Otolaryngology–Head & Neck Surgery, 2021. 147(7): p. 672-674.

¹⁸ Chaves, S.S., et al., *Side-by-side comparison of parent vs. technician-collected respiratory swabs in low-income, multilingual, urban communities in the United States*. BMC Public Health, 2022. 22(1): p. 103.

¹⁹ Polechová, J., et al., *SARS-CoV-2 rapid antigen tests provide benefits for epidemic control - observations from Austrian schools*. J Clin Epidemiol, 2022. 145: p. 14-19.

²⁰ Lee, R.C., et al., *Evaluation of a COVID-19 Rapid Antigen Testing Program in a Supervised Community Distance Learning Setting for K-8 Students*. J Sch Health, 2022.

²¹ Hughes, D.M., et al., *Rapid antigen testing in COVID-19 management for school-aged children: an observational study in Cheshire*