

Thermal scanners at airports in cities such as Rome (right) help flag incoming travellers with a high fever. But even if these travellers are then tested for Covid-19, such tests are not perfectly accurate and may produce a false negative if the passenger has caught the virus from another person on the same flight and the infection is still in the incubation stage.
PHOTO: REUTERS



ScienceTalk

Can rapid tests for Covid-19 give a booster shot to global tourism?

Business gains must be weighed against risks of false discoveries, false negatives in testing



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For The Straits Times

International fervour for mass-market tourism continues to compel governments to reopen borders, raising questions about how to prevent an importation of travellers who are either symptomatically or asymptotically carrying the Sars-CoV-2 virus that causes Covid-19.

Several governments, including Singapore's, have prudently relied on multilateral travel pacts to allow essential business and tourism travel to resume, especially between countries experiencing a similar level of Covid-19 outbreak.

On the other hand, other countries, especially in Europe, have permitted a greater degree of unrestricted cross-border movements during these summer months, resulting in worrying surges of new infections.

Singapore recently declared that it intends to further ease measures, relying on a prudent mix of quarantine and testing at all land, air and sea borders to catch any infected travellers early, before they have a chance to mingle with the community.

Imposing a period of quarantine – 14 days in the context of Covid-19 – is a traditional and proven public-health safety net to prevent an incoming traveller from spreading any disease to an immunologically naïve population.

But this is not viable for mass-market tourism, where cost and duration of a holiday are often the primary determinants.

Thus, the question that many are asking is: Surely, in this day and age, we should be able to rely on deploying fast and affordable tests on every traveller and do away with quar-

antine altogether, to allow the borders to reopen completely?

In fact, why stop at screening incoming travellers? We could even deploy these tests to screen entire populations and aim for an elimination strategy to completely eradicate the presence of Sars-CoV-2 in the community.

The answer has to do with false discoveries and false negatives.

FALSE DISCOVERIES

With infection testing, there are two definitions of accuracy: sensitivity – the ability to correctly identify someone who is truly infected with Covid-19; and specificity – the ability to correctly identify someone who is genuinely healthy and free from Covid-19 infection.

A perfectly accurate test means there is no error in determining the infected among the healthy all the time. But there is no perfect test in reality.

Many diagnostic tests focus on making sure they do not misdiagnose someone who is truly infected – that is, preventing false negatives. Unfortunately, this also comes at the expense of mislabelling some healthy individuals.

And this is where the problem of false discoveries arises, especially when the number of infected is just a tiny fraction of the total number of travellers.

Consider a scenario where Singapore sees 1,000 infected from among one million travellers coming through its borders monthly, or an infection prevalence of just 0.1 per cent of incoming travellers.

A test kit with near-perfect performance, yielding 100 per cent sensitivity and 99 per cent specificity, will correctly identify all 1,000 infected travellers, but incorrectly label almost 10,000 healthy travellers as infected.

Operationally, we would not be able to

distinguish between the 11,000 positive results.

In other words, only one out of every 11 positive tests is actually a true infection and the remaining 10 are false positives, leading to an overwhelming occurrence of false discoveries.

Clearly, if every positive case is tested again, it will significantly whittle down the number of misdiagnosed positive cases.

But this adds extra cost and delays to travel plans, and uncertainties are always a deterrent when it comes to travel.

If the protocol dictates that anyone who tests positive will be hospitalised for 21 days of clinical observation, the economic cost of false discoveries escalates rapidly, since the majority of these travellers will be expected to bear the full hospitalisation costs.

FALSE NEGATIVES

The nature of travel may also introduce false negatives as all currently available test kits are unable to detect the presence of Sars-CoV-2 during the first few days of the infection, known as the incubation period.

Consider a scenario where an infectious traveller takes a plane into Singapore and, in the process, un-

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wittingly infects several fellow passengers.

This infected traveller will almost certainly be picked up during border screening, but those who were newly infected during the flight will not test positive, given that the incubation lag time exceeds the flight duration.

In fact, this may be why infections continue to persist among migrant workers despite the declaration of clearance for all the dormitories – the batch testing of more than 300,000 workers is likely to see a number of false negatives when newly acquired infections happened to be tested during the incubation period.

The present quarantine requirement of 14 days actually serves to guard against the false negatives from secondary infections during transit, besides picking up primary infections acquired prior to commencing travel.

In addition, testing all travellers at the end of the 14-day quarantine prevents missing any asymptomatic cases.

A COMPROMISE
Singapore is a globalised

Mass testing remains but one element of a suite of public health measures against the virus, says the writer.
PHOTO: AGENCE FRANCE-PRESSE

uation, it is highly unlikely that anyone coming from these countries will be infected in the first place.

Singapore even launched a Safe Travel Office, whose mandate is to explore, establish and regularly evaluate protocols to resume some degree of normalcy for travel and aviation while managing importation risk.

Finding a solution to the conundrums of false discoveries and false negatives must be part of this mandate.

Nevertheless, we have to be mindful not to be lulled into a false sense of security because of our quarantine and mass-testing strategy at the borders, and instead be mentally prepared that there may be the rare few imported cases that will slip past despite these measures.

Mass screening at the borders remains but one element of a suite of public health measures that include contact tracing and swift isolation and quarantine of exposed individuals to break any community infection chain, just as how mask wearing and safe distancing will always remain as the last line of personal defence.

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