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How to reduce your risk

As countries ease coronavirus lockdowns, Linda Geddes looks at what the science says about how to stay as safe as possible

The coronavirus is still circulating yet many countries are taking steps to relax restrictions. If you have been asked to return to work or send your children back to school, how can you minimise the risk of infection to yourself and your family?

Avoiding infection

You are most likely to catch the SARS-CoV-2 virus by spending a long time near an infected person in an enclosed space. Researchers in Guangzhou, China, examined how the virus was transmitted between 347 people with confirmed infections and the people they had contact with. They found that the risk of the infection being passed on at home or by repeated contact with the same person was approximately 10 times greater than the risk of passing it on in a hospital and 100 times greater than doing so on public transport (medRxiv, doi.org/dwgl).

Outside the home, it is difficult to rank the relative risks, because environments vary so widely. However, “what we can say is that SARS-CoV-2 spread tends to be higher in communal areas where there are higher numbers of people passing through, or in areas where there is more physical engagement with the surroundings, for example door handles, desks and computer keyboards”, says Seema Jasim at the MRC-University of Glasgow Centre for Virus Research, UK.

The risk also seems to be higher when people are more physically active. Investigations into a cluster of cases in the South Korean city of Cheonan revealed that eight fitness instructors became infected with the virus after attending a 4-hour Zumba workshop. Some of them subsequently passed it on to students during classes which involved high intensity exercise in a small indoor studio (Emerging Infectious Diseases, doi.org/ggwpjz).

“The moist, warm atmosphere coupled with turbulent air flow generated by intense physical exercise can cause more dense transmission of isolated droplets,” writes the team that conducted the study. However, students attending smaller yoga and pilates classes in the same space didn’t become infected.

Regular, thorough handwashing is still advised. It remains unclear how long the virus can survive and remain infectious on surfaces, but this is still thought to be a significant route of transmission.

“If surfaces have been contaminated with droplets from an infected person, there might be sufficient virus to infect a person who touches the surface and subsequently transfers the virus to their mouth, nose, eyes or face,” says Margaret Hosie, also at the MRC-University of Glasgow Centre for Virus Research. “However, if they wash their hands thoroughly with soap and warm water for a minimum of 20 seconds, any virus on their hands will be destroyed.”

A recent study revealed that handwashing six to 10 times a day is associated with a 36 per cent reduction in the risk of becoming infected with the coronavirus (Wellcome Open Research, doi.org/dwgg).

Because soap dissolves the virus’s fatty outer envelope, washing with water but no soap isn’t as effective. Alcohol hand rubs work, but are only necessary where there is no access to handwashing facilities, says Hosie.

Getting around

Many people need or are being asked to travel to work, while in some countries exercising outdoors is permitted. So how can you minimise the risk in these circumstances?

“Whatever you’re doing outdoors, a 2-metre distance [from other people] should be enough,” says Lena Ciric at University College London. This is based on observations that large, virus-packed droplets from infected people tend to settle within a few metres of their source. “Smaller droplets, carrying fewer virus particles, can travel further but will be dispersed by air currents quickly,” says Ciric.

But more research is needed to understand the role of small, aerosol particles in transmitting the virus. A recent study suggested that droplets may be carried as far as 8 metres in clouds of moist, turbulent air, such as those produced by sneezing (JAMA Insights, doi.org/ggqtj). The study didn’t, however, test if such clouds could transmit the virus or what would happen to similar clouds in an outdoors setting.

For getting to work, modes of transport that avoid other people, such as walking, cycling or driving in your own car, are the lowest risk. Car sharing may be the next safest option, assuming the driver is only giving lifts to a limited
number of people. Taxis carry numerous passengers, so there is a risk of contracting the virus from surfaces like seats and door handles, or from the driver speaking, coughing or sneezing.

If these options aren’t available, that leaves public transport. People who travel on buses or trams during the winter flu season may be approximately six times more likely to develop a respiratory infection than those who don’t use public transport.

If you do have to use it, there are things you can do to reduce your risk. The amount of time you spend near other transport users matters, says Anders Johansson at the University of Bristol, UK, who has modelled disease transmission in crowds and on the London Underground.

36% reduction in risk of infection if you wash your hands frequently

Protective plastic screens have been fitted in a cafe in Naples, Italy

Besides trying to avoid the busiest stations and travelling times, it is worth considering the amount of time you spend navigating stations. Those with long underground passages – especially if they involve encountering people walking in the opposite direction – are best given a wide berth, and changing trains is also best avoided. These “usually mean you spend a longer time in the station, and are mixed together with people coming from various different parts of the city, if not the country”, says Johansson.

The risk of exposure may be slightly lower on buses, trains and trams with outdoor platforms, but once inside the vehicle, infection risk depends on how well passengers can spread themselves out and how many are getting on and off. “If you stand next to the door of the bus, there will be lots of people passing by you at close distance,” says Anders.

Simulation of respiratory disease transmission on aircraft has found that moving around the cabin increases a person’s risk of encountering an infected passenger, while those seated by windows tend to have the lowest contact with other people.

When travelling, continue to be mindful of surfaces. The aircraft transmission study identified tray tables, seat belts and lavatory handles as high-risk objects, but hand or grab rails, payment terminals and protective plastic screens can also harbour viruses.

Countries vary in their advice on face coverings when getting about. So far, the evidence suggests there may be a small benefit to wearing some kind of face covering, as these seem to lower the extent to which sick people spread the virus. In addition, face coverings may help protect vulnerable people who temporarily enter high-risk places like hospitals – but using medical masks can deprive healthcare workers of protective equipment.

Risks at work

There are reasons to be nervous about indoor workspaces. A study in Japan that followed up the contacts of 110 infected people concluded that the chance of catching the coronavirus in a closed environment is more than 18 times greater than in an open-air environment. Super-spreading events, where an infected individual passes the coronavirus onto many others, were also more likely to occur indoors (medRxiv, doi.org/dwgn).

Some indoor environments may be riskier than others. During the covid-19 outbreak in Wuhan, China, researchers sampled air from various locations in two hospitals. Viral RNA was detected in an intensive care unit, in staff changing areas and in a small, unventilated toilet (Nature, doi.org/ggtgn). Hosie says poorly ventilated areas are likely to have a higher risk of infection. “Good ventilation means changing the air within the space regularly, not just cooling and recirculating the same air,” says Ciric.

Another study from Wuhan revealed desktops, computer keyboards, doorknobs and hand sanitiser dispensers to be the most contaminated surfaces within hospitals. More virus was detected on these than on gloves, eye protection and face shields used in the hospitals (medRxiv, doi.org/ggg4tp). Regularly disinfecting high-contact surfaces and shared objects is therefore essential – as is washing your hands after touching them.

Workplace schedules can also be tweaked to reduce the chances of people mixing. “Maybe everyone doesn’t need to arrive or go for their lunch break at the same time,” says Johansson. “You might not think that staggering the time when people start work is a big deal, but in the case of a big warehouse it could make a massive difference because you wouldn’t necessarily have a massive crowd waiting outside for when the door opens.”

Clear plastic screens may be useful for workers whose roles mean they encounter large numbers of people and make social distancing difficult, such as supermarket checkout staff, pharmacists or medical receptionists. “In these settings, they would act as a physical barrier to airborne droplets,” says Jasim.

But how effective they are depends on their size and how well they are fitted. “They can also become a risk if they are not”

Social distancing inside an elevator in the World Trade Center, Sri Lanka
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regularly cleaned,” says Ciric. Face coverings may also benefit workers who need to interact with many people.

Returning to school

From the data published so far, children seem less likely to acquire the infection than adults, and when they do, they are less likely to develop serious symptoms. Although a small minority do become seriously ill – including with a newly identified inflammatory syndrome – this is also true of many other viral illnesses.

“In a pandemic, where so many people are being infected without any prior immunity, it is perhaps no surprise that some people are getting infection during the later stages,” says Saul Faust at the University of Southampton, UK. “We do need to understand it better. But what is clear is that for children, it is a very small number and they are almost all getting better, although some do need hospital treatment.”

There is also little evidence of schools and nurseries being major breeding grounds for infection, so far – although this is difficult to assess because many countries closed their schools relatively early in the pandemic.

Some new reassurance comes from a report by the Children’s Commissioner for England, whose team has interviewed the managers of 44 nurseries that are attached to NHS hospitals and have remained open. Three have reported a confirmed case of covid-19 in a child and eight have reported a suspected case, but they have found no evidence of child-to-child transmission within the nurseries. And although 19 nurseries reported a confirmed or suspected case of covid-19 among their staff, in 10 cases the manager stated that it wasn’t caught from the nursery, while in the remaining cases the source was unclear. Similarly, in New South Wales, Australia, just two out of 735 students contracted the virus after attending schools where there were nine infected children and nine infected adults.

On the other hand, opening schools may prompt an increase in cases among the general population. Denmark, which reopened its primary schools on 15 April, did report an increase in the R number – the average number of people each case goes on to infect – from 0.6 to 0.9 in the following two weeks, but this has since dropped again.

Even if children don’t seem to spread the virus as much as some people had feared, for some families, the risks of sending their children back to school or nursery will outweigh the benefits. “Of course, you have to consider each family’s circumstances, and the risk changes if you have a mum or dad who has cancer, or a grandmother who is living in the same house who has hypertension, or the only after-school childcare available to you is grandma, who has cancer,” says Faust. “But if it’s your child’s health you’re most worried about, the risk to them appears low.”

However, waiting a while longer could reduce this risk even more. On 22 May, a group of independent scientists announced that modelling suggests that delaying plans to reopen schools in the UK on 1 June by two weeks would halve the risk to children, while waiting until September could reduce the risk even further.

Meeting up with friends and family

Evidence suggests that infection in the home, and between family members, is a significant source of viral transmission, and visiting people at home is still not allowed in many countries. Because transmission risk is probably much lower in the open air and can be reduced by maintaining a distance of 2 metres, it is probably safer to meet with people from outside your household in uncrowded outdoor spaces.

But what if you and a friend have both been strictly self-isolating? Would it then be safe to visit each other? Generally, you would expect any symptoms of an infection to have developed, and viral shedding to have largely ceased, 14 days after catching the virus. This may also be true of asymptomatic cases. “In both instances, at the end of the 14-day period they would be considered non-infectious,” says David Heymann at the London School of Hygiene & Tropical Medicine. This may suggest that, if you have remained at home for the past 14 days and had no external contact, you are unlikely to be carrying the virus.

However, there have been reports of the virus persisting in the body for longer than two weeks. An analysis by US researchers calculated that 97.5 per cent of people who develop covid-19 symptoms do so within 11.5 days of exposure, but they estimated that for every 10,000 individuals quarantined for 14 days, about 101 of them would develop symptoms after this period (Annals of Internal Medicine, doi.org/dph3). A study in China reported incubation periods ranging from 0 to 33 days, and suggested an 18 or 21-day quarantine would catch far more cases (medRxiv, doi.org/dwgp).

For this reason, people should remain cautious about visiting other people, especially if they know they have been infected or have encountered other infected people. Additionally, if either of you are in groups deemed vulnerable to covid-19, Heymann suggests you both wear masks as an extra precaution when getting together.

PLEASE NOTE
We urge you to keep up to date with and follow your local guidelines. When New Scientist went to press, the guidelines for England, for example, were that anyone who is able to work from home should continue to do so, and that social visits should be limited to outdoor meetings with only one person at a time, at least 2 metres apart. Face coverings are advised in enclosed public spaces.