COVID-19 RISK ASSESSMENT SUMMARY

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RISK SUMMARY:

This assessment is undertaken based on the information available on 02 September 2020.

This remains a rapidly evolving situation worldwide, the level of uncertainty remains HIGH, therefore this assessment takes a precautionary approach.

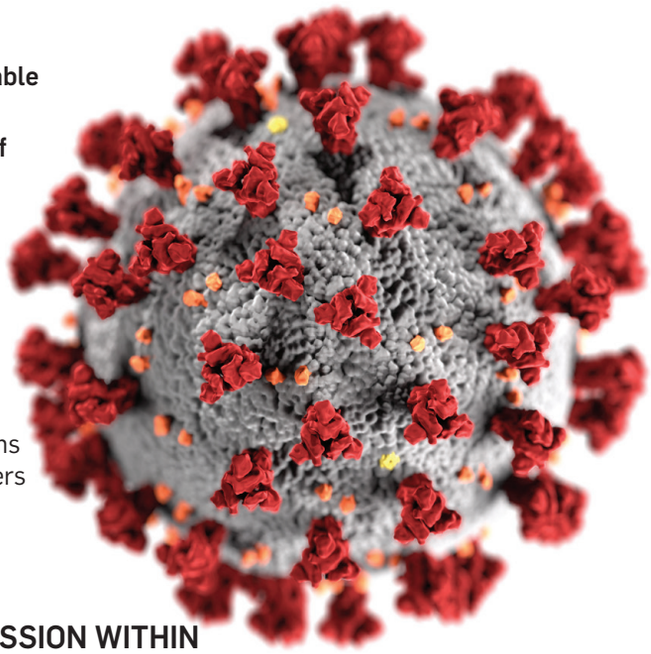
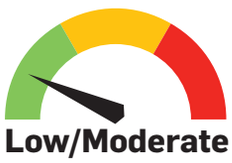


Photo: CDC Atlanta

IMPORTATION RISK:

Even with the containment and borders measures in place in other countries and the border measures and containment measures currently in place in New Zealand, there remains a **HIGH** likelihood of importations from travellers to New Zealand, due to ongoing high rates of infection worldwide.



ASSESSMENT OF RISK OF TRANSMISSION WITHIN NEW ZEALAND:

Given the current border and quarantine measures in place, the likelihood of transmission outside of isolation bubbles within quarantine facilities is **LOW-MODERATE**. This assessment assumes that cases in quarantine facilities are detected in a timely manner and that infection prevention and control measures are implemented promptly.

The likelihood of transmission in the community is currently **MODERATE** for Auckland and LOW for the rest of New Zealand. This assessment assumes that cases in the community are identified rapidly and control measures such as case isolation and contact tracing are implemented rapidly. This assessment would change rapidly in the event of cases being detected outside of managed isolation facilities in areas outside of Auckland, or in the event of increasing cases in Auckland that are not epidemiologically linked to known subclusters.

PUBLIC HEALTH IMPACT OF COVID-19 IN NEW ZEALAND:

The impact on the sector and the public from COVID-19 has been significant. The public health impact remains **HIGH** for public health staff, the wider health sector and the community.

PUBLIC HEALTH RISK:

Given the assessment of the likelihood of importation, the likelihood of transmission in New Zealand and the public health impact, the overall public health risk from this event remains **HIGH**.

RISK ASSESSMENT REFERENCE SCALE:

VERY LOW/NEGLIGIBLE to **VERY HIGH**

NOTES:

In addition to this summary assessment, ESR are also publishing a public dashboard https://nzcoviddashboard.esr.cri.nz/#!/ for COVID-19.

This assessment is based on the ECDC risk assessment methodology.[1]

This assessment is reviewed by the ESR incident management team. This team includes epidemiologists, health intelligence analysts, public health medicine specialists, a clinical virologist, laboratory scientists, informaticians and bioinformaticians. The team has in-depth experience in leading, and supporting national and local communicable disease responses, including emerging infectious diseases, such as SARs, influenza, MERS, zika and Ebola. The team has extensive experience in providing fit-for-purpose health intelligence services during response situations.

EVENT BACKGROUND/SUMMARY:

On 31 December 2019 a cluster of pneumonia cases of unknown aetiology was reported in Wuhan City, Hubei province, China. On 9 January 2020, the causative agent was reported to be a novel coronavirus.[2] The WHO have confirmed that the disease caused by this novel coronavirus is to be called COVID-19 and the International Committee on Taxonomy of Viruses have designated the official name for the causative virus to be SARS-CoV-2.[3]

The Director General of the WHO declared that the novel coronavirus outbreak constituted a public health emergency of international concern on 30 January 2020, [4] and on 11 March declared a pandemic.[5]

As of 23 August 2020 there had been over 23 million confirmed cases and 800,000 deaths have been reported to WHO.[6] The WHO Region of the Americas remains the most affected, accounting for over 50% of reported cases deaths.

As of 09:00, 01 September 2020, there have been 1401 confirmed and 351 probable cases reported in New Zealand.[7] After a period of over 100 days without locally acquired cases in the community, a case was reported in the community on 11 August. Since then there have been 147 locally acquired cases reported.

HAZARD IDENTIFICATION

There is accumulating information on the epidemiological and clinical characteristics of SARS-CoV-2 infection, though there is still significant uncertainty. There is currently no vaccine or specific treatment available, although a number of investigational approaches are being explored (register of clinical trials at clinicaltrials.gov), including antiviral therapies and convalescent plasma. National and International guidance to date is based largely on management and control of other respiratory illnesses.

Spectrum, severity of disease and vulnerable populations

The spectrum of symptomatic infection ranges from mild to critical.[8-14] The three major patterns of clinical course of infection seem to be mild illness with upper respiratory tract symptoms, non-life threatening pneumonia and severe pneumonia with acute respiratory distress syndrome (ARDS) that begins with mild symptoms for 7-8 days followed by rapid deterioration to requirements for high and intensive dependency care.[15] The major complication of COVID-19 is ARDS. In addition severe COVID-19 has been linked to cardiovascular sequelae, acute kidney injury, neurological complications and acute ischemic stroke.[16]

In the WHO–China Joint Mission on COVID-19, disease was mild to moderate in 80% of 55,924 cases, 13.8% had severe disease, 6.1% were critical.[13] This pattern is consistent with other data including that from the Chinese Center for Disease Control and Prevention and the ISARIC COVID-19 database.[16, 17]

The WHO–China Joint Mission on COVID-19 found that among 55,924 cases, the most common signs and symptoms were fever (87.9%), dry cough (67.7%), fatigue (38.1%), sputum production (33.4%), shortness of breath (18.6%), sore throat (13.9%), headache (13.6%) and myalgia or arthralgia (14.8%).[13] Less common symptoms have included rhinorrhoea and gastrointestinal symptoms such as nausea and diarrhoea. Smell and taste disorders have also been reported as common symptoms in patients with COVID-19, with 34% of cases in a survey of 59 patients with COVID-19 in Italy self-reporting either a smell or taste aberration and 19 percent reported both.[18] Similar symptom profiles have also been reported in New Zealand and other countries.

Individuals at the highest risk for severe disease and death are people aged over 60 years and those with underlying conditions such as hypertension, diabetes, cardiovascular disease, chronic respiratory disease, chronic kidney disease and cancer.[13, 19, 20]

Health workers and carers are at high risk of infection [15, 21-24], although analysis of case-based surveillance data of 124,796 cases by ECDC showed that health care workers were less likely to be hospitalised compared to non-health care workers (9% versus 17%), and were less likely to present with severe illness requiring ICU admission or respiratory support compared with non-health workers (1% versus 5%).[28]

A study of 191 adult patients in Wuhan found the median time from illness onset to discharge was 22 days and the median time to death was 18.5 days.[19] A study of outcomes in 52 critically ill adult COVID-19 cases in Wuhan found 61.5% of the critically ill patients had died at 28 days, the median duration of admission to intensive care to death was seven days. The non-survivors tended to be older (64.6 years versus 51.9 years), were more likely to develop ARDS (81% of non-survivors versus 45% of survivors) and more likely to require mechanical ventilation (94% versus 35%).[25]

While COVID-19 infections have been less frequently reported in children and children tend to present with milder symptoms compared with adults [26], there have been reports from several countries of a possible temporal associated between COVID-19 and a rare paediatric inflammatory multisystem syndrome in children.[16]

Prior to the wide availability of COVID-19 testing, between March 12 and 16, a rapid sentinel surveillance study was carried out in Los Angeles to determine what proportion of mild, outpatient influenza like illnesses were caused by COVID-19.[27] Of 131 patients tested, 5% were positive for COVID-19, none had specific risk factors for infection, and all were well enough to have been active in the community throughout their infection.[27] Authors note that sentinel testing had revealed a third seasonal spike in influenza-like illnesses during the weeks before the study, with declining influenza positivity,[27] likely due to unrecognised SARS-CoV-2.

Case fatality

According to the WHO situation report of 02 August 2020, of the confirmed cases worldwide 3.86% have died.[28, 29] The currently reported global fatality rates are lower than those reported for MERS-CoV (34%) and SARS (10%).[15, 30]

Published studies of early cases in China report mortality rates among hospitalised patients of 1.18- 4.3%, and 11%.[21-24] Reported case fatality rates vary widely over time and between countries, from over 13% in France, Belgium, Italy, the UK and to 0.06% in Singapore.[31] Case fatality ratios depend in part on sensitivity of different surveillance systems to detect cases of differing levels of severity, selection bias towards testing of more severe cases, delays between onset of symptoms and death, healthcare, patient demographics, comorbidities and differences in how deaths are attributed to COVID-19.[31]

A study published on 30 March estimated case fatality and infection fatality ratios using case data from mainland China and 37 other countries. When adjusted for demography and under-ascertainment of milder cases in Wuhan, the best estimate of the case fatality ratio in China was 1.38% (95% CrI 1.23–1.53), with substantially higher ratios in older age groups (0·32% in those aged <60 years compared to 6·4% in those aged ≥60 years), up to 13·4% in those aged 80 years or older. Estimates of case fatality ratio from international cases stratified by age were consistent with those from China (1.4% in those aged <60 years [n=360] and 4.5% in those aged ≥60 years. Authors estimated an infection fatality rate for China of 0.66% (95% CrI 0.39–1.33%), again with higher IFR for older ages.[32]

Data from passengers on the Diamond Princess was used to estimate a CFR of 2.3% and an IFR of 1.2%. Comparing these deaths with the expected deaths in China the CFR and IFR were estimated to be 1.1% and 0.5%, respectively, in China.[33]

Data from the first patients in the USA indicates that fatality was highest in patients aged 85 and over (10–27%), followed by 3-11% among patients aged 65–84 years, 1–3% for those aged 55–64 and <1% for those aged 20–54 years. No fatalities were recorded among persons 19 years and under.[34]

Asymptomatic infection

Asymptomatic infection at the time of laboratory confirmation has been reported [35], however, the proportion of cases that remained asymptomatic in various studies ranges between 4% and 41%. A meta-analysis estimated the proportion of asymptomatic cases was 15%.[26] Similar viral loads have been reported in asymptomatic and symptomatic cases, indicating the potential for transmission from asymptomatic cases. However, while transmission from asymptomatic carriers has been reported the risk of transmission from pre-symptomatic or symptomatic patients is considered to be higher [26] and the WHO-China Joint Mission concluded that asymptomatic transmission does not appear to be a major driver of transmission.[13] A recent scientific brief from the WHO states that although transmission can occur from asymptomatic cases, the extent of this remains unclear.[36]

Reproductive number

A review of published basic reproductive number (R0) estimates reported a range of 1.4 to 6.49, with a mean of 3.28 and a median of 2.79. A simulation of COVID-19 in New Zealand estimated an effective reproduction numbers of 1.8 prior to Alert Level 4 and 0.35 after moving to Alert Level 4.[37]

Incubation period

Current estimates suggest a median incubation period of five to six days, with a range from two to 14 days [20, 24, 26, 38] which supports using 14 days as an operational definition for contact tracing and monitoring. These estimates are also supported by other modelling work and the WHO-China joint mission.[13, 39]

It should be noted that occasionally longer incubation periods have been reported [22, 24]

Infectious period

Viral RNA has been identified in respiratory tract specimens from 1–2 days before the onset of symptoms and for up to eight days in mild cases and for longer in more severe cases, peaking in the second week after infection.[19, 26, 40]

Viral RNA has been detected in upper respiratory tract specimens for prolonged periods following infection, including in cases who develop new or recurrent symptoms. However, replication competent virus has not been isolated from such cases and studies have identified no secondary infections amongst contacts of such cases.[41]

Risk of transmission peaks around symptom onset and in the following 5 days.[42] This is supported by a large contact tracing study of 100 cases and over 2700 close contacts in Taiwan found an overall secondary attack rate of 0.7%. The study found contacts with exclusively presymptomatic exposure were still at risk (attack rate 0.7%), that the attack rate was higher among household (4.6%) and non-household family (5.3%) contacts than in healthcare or other settings.[43] The study also found that high risk household and hospital contacts did not develop infection if there exposure was at least six days after the cases onset of symptoms.

Transmission

Data from published epidemiology and virologic studies indicate that COVID-19 is primarily transmitted from symptomatic people to others who are in close contact through respiratory droplets, by direct contact with infected persons, or by contact with contaminated objects and surfaces (fomites).[44] Airborne spread is not believed to be a major driver of transmission (outside of aerosol generating procedures in healthcare).[45] Faecal-oral transmission does not appear to be a driver of transmission,[13] though gastrointestinal symptoms have been reported in in some cases.[21, 24, 39]

In China, human-to-human transmission occurred commonly within families, with a secondary attack rate in households of 3–10%. Extensive and comprehensive contact tracing has been undertaken in China with between 1% and 5% of identified contacts subsequently becoming laboratory confirmed cases. Testing at fever clinical and from routine ILI/SARI surveillance systems detected only very few COVID-19 cases.[13]

The secondary attack rate among household contacts in China was estimated to be 12.5 (95% CI 9.8–15.4) in close relatives and 17.1% (13.3–21.8) in those at the same residential address.[46]

As with SARS and MERS-CoV (where approximately 10% of the cases have been associated with super spreaders) [47] there is a potential for super spreaders for SARS-CoV-2. To date there have been reports from China of one case infecting 14 healthcare workers.[48, 49] A super-spreading event was reported at a choir practice in the US, with a secondary attack rate of 53.3 to 86.7%.[50]

Several outbreak investigations have found that COVID-19 transmission can be particularly effective in crowded, confined indoor spaces such as workplaces, churches, shopping centres and worker dormitories.[26]

A WHO scientific brief published on the 09 July concluded that further research is required to determine the role of airborne transmission in the absence of aerosol generating procedures.[36]

Immunity to SARS-CoV-2

An ECDC review of the evidence to date has found that the IgM and IgG antibodies to SARS-CoV-2 develop between 6–15 days post disease onset with a median seroconversion time for total antibodies, IgM and then IgG were day-11, day-12 and day-14 post symptom onset, respectively. The presence of antibodies was detected in <40% among patients within 1 week from onset, and rapidly increased to 100% (total antibodies), 94.3% (IgM) and 79.8% (IgG) from day-15 after onset.[51]

For SARS-CoV-2 the longevity of the antibody response is unknown, however for other coronaviruses antibody responses are known to wane over time and re-infections with seasonal coronaviruses occur.[51] There has been one documented case of re-infection with a phylogenetically distinct SARS-CoV-2 strain. The patient was re-infected 142 days after their initial

symptomatic episode. Despite having an acute infection, the patient remained asymptomatic during the second episode which may suggest the development of a protective immune response.[52] Further studies of patients with re-infection will shed light on protective correlates important for vaccine design.[52]

Population based seroepidemiological studies have been undertaken across several EU/EEA Member States, all Member States currently have low levels of seropositivity and with current transmission patterns it is considered unlikely that population immunity levels, sufficient for indirect protection, will be reached ahead of the 2020/2021 winter.[51]

Impact of non-pharmaceutical interventions

In response to the pandemic, many countries including New Zealand, have implemented unprecedented non-pharmaceutical interventions including stay at home policies, case isolation, closure of educational facilities, banning of mass gatherings and/or public events, and widescale social distancing measures including local and national lockdowns.[53] These non-pharmaceutical interventions have collectively been associated with a decrease in reported case numbers but the impact of individual interventions is unclear.

Several modelling studies have attempted to ascertain the impact of such interventions. The MRC Centre for Global Infectious Disease Analysis used a semi-mechanistic Bayesian hierarchical model to infer the impact of these interventions across 11 European countries.[53] Authors found that the slowing growth in daily reported deaths in Italy was consistent with a significant impact of interventions implemented several weeks earlier, with the effective reproduction number dropping to around 1 at the time of lockdown, and that overall other countries have reduced their reproduction number, but with a high degree of uncertainty.[53]

A study of control strategies employed in Wuhan used an age and location specific transmission model to assess progression of the Wuhan outbreak under different scenarios of public health interventions. It found that changes to contact patterns through closures of workplaces and educational facilities, and other social distancing measures, are likely to have substantially delayed the epidemic peak and reduced the number of COVID-19 cases in Wuhan.[54] It also found that if restrictions are lifted in March 2020, a second peak of cases might occur in late August, with a further 2 month delay if restrictions were lifted in April.[54]

Following the removal or relaxation of control measures, several countries have experienced a resurgence in case reports.[55] For example in China, two months after the easing of the lockdown in Wuhan a spike in case numbers has led to the reinstatement of restrictions in parts of Beijing; in South Korea case reports have increased since restrictions were eased in May; in Tokyo, daily case numbers have begun to rise since the state of emergency was lifted and in Singapore, following extensive contact tracing and testing measures, a second wave of cases, largely affecting foreign workers living in dormitories arose.

Over recent weeks, since the easing of restrictions in states and territories in Australia, there has been a resurgence in cases, particularly in Victoria. In the week ending 29 July 2020, there were more than 2,500 cases reported in Victoria. As of 2 August 2020, this has resulted in further non-pharmaceutical interventions including curfews, restrictions on travel distances and limits on time out of the home, being put in place for metropolitan Melbourne, with slightly lesser, stay at home, restrictions remaining in place for regional Victoria.[56] Australia remain committed to a suppression strategy until there is a vaccine or effective treatment available, with a goal of no local community transmission.[57]

Various interventions were implemented in European countries (including stay-at-home policies and community and physical distancing measures). These approaches helped to successfully reduce transmission rates and as of 9 June 2020, the 14-day incidence declined in most countries in the EU/EEA and the UK, and overall it declined by 80% since a peak on 9 April.[54] As predicted, since the phasing out of interventions to varying degrees, some countries have seen an increase in positivity rates and deaths due to an increase in community transmission.[58] Most countries (26/31) are reporting an increase in 14-day notifications, and the increase in hospitalisations and test positivity suggests this represents an increase in transmission rather than case finding. The main drivers of resurgence in many EU/EEA countries is the non-adherence to physical distancing in public places, at parties (including family gatherings) and night clubs. Adherence is being compromised by response fatigue and the economic impacts of interventions. [59]

The ECDC considers the risk of further increases in incidence in countries with increasing transmission and hospitalisations, or with increasing incidence, stable hospitalisations and increasing test positivity to be high, increasing to very high if they do not implement multiple measures, including physical distancing and contact tracing.[59] The risk is moderate to high in countries with a recent increase in cases with no change in hospitalisations or test positivity if they have sufficient test capacity. The overall risk of escalation across all EU/EEA countries and the UK is moderate for those with multiple measures, including physical distancing in place and very high for countries who do not.

The ECDC recommends a number of minimum baseline measures that should be considered irrespective of transmission rates; hygiene measures, physical distancing and limits on gathering sizes, use of face masks in the community, teleworking, isolation and quarantine and protection of vulnerable populations.[59] They recommend additional measures such as travel restrictions and limiting population movement subnationally or nationally if the reproduction number is greater than one. The ECDC reports that available evidence does not support border closures and that the capacity to test and trace is the most important factor influencing the impact of easing travel restrictions nationally and subnationally.[59]

A model of contact patterns and outbreak dynamics in China showed that preemptive school closures reduced transmission by 40-60% but would not prevent an outbreak. Limiting mixing in households was shown to be the most effective measure in limiting transmission.[60] This is supported by data from the EU which suggests that re-opening schools did not lead to a significant increase in community transmission, and that closing schools is not effective in the absence of other interventions.[61] They concluded that transmission between children in school settings is uncommon and that with the appropriate physical distancing and hygiene measures in place, it is unlikely that schools would be a more effective transmission environment than other occupational or recreational settings with similar densities of people.

A modelling study found that if 80% of cases and contacts were identified, tested immediately at symptom onset and contacts were quarantined within 24 hours the reproductive number could be reduced by 26% (95% UI 14-35%).[62] The weekly screening of health care workers and other high risks groups, including asymptomatic people, was estimated to reduce their contribution to transmission by 23% (95% UI 16-40).[62]

A New Zealand model has estimated that in order to reduce the effective reproduction number below 1, a manual contact tracing system would need to be combined with a digital system which has an uptake of at least 75% and which records 90% of close contacts.[63]

It will be important to continue to monitor the impact of the relaxation of non-pharmaceutical interventions both in New Zealand and in other countries. To minimise the risk of a resurgence in cases in New Zealand it will be important to continue to ensure robust border controls, surveillance, contact tracing and quarantine measures are in place.

Risk of importation to New Zealand

As of 23 August 2020 there had been over 23 million confirmed cases and 800,000 deaths have been reported to WHO.[6] The WHO Region of the Americas remains the most affected, accounting for over 50% of reported cases deaths.

In New Zealand border restrictions have been in place for China since 02 February, were extended on 28 February to include travellers from Iran, and require travellers from a number of other countries with community transmission to self-isolate for 14 days on arrival.[64] From 15 March, all international arrivals, except from the Pacific Islands and Territories were required to self-isolate. Additional border measures came into effect on 26 March 2020, with only New Zealand residents and citizens (and their children and partners) still permitted to enter New Zealand. Residents and citizens returning to New Zealand are required to remain in managed isolation or quarantine for at least 14 days after arrival and are required to undergo testing for COVID-19 at day 3 and day 12 of their managed isolation. [65] This testing and period of isolation has been assessed as reducing the risk of an infectious case being released into the community to a very low level.[66]

Assessment of importation risk: Even with the containment and borders measures in place in other countries and the border measures and containment measures currently in place in New Zealand, there remains a **HIGH** likelihood of importations from travellers to New Zealand, due to ongoing high rates of infection worldwide.

Risk of further spread in New Zealand

There is a high awareness of COVID-19 within the health sector and amongst the general public in New Zealand.

New Zealand has in place a COVID-19 elimination strategy which includes border controls, robust case detection and surveillance systems, contact tracing and quarantine and community support of control measures.[67] Following a period of lockdown and strict social distancing, Auckland is currently under Alert Level 2.5 restrictions and the rest of New Zealand is under Alert Level 2 restrictions. [68]

New Zealand has a strong public health capability but would have limited capacity for community cluster control if there is sustained person-to-person transmission within New Zealand and particularly if driven by asymptomatic/mild clinical illness spread.

Assessment of risk of transmission within New Zealand: Given the current border and quarantine measures in place, the likelihood of transmission outside of isolation bubbles within quarantine facilities is **LOW-MODERATE**. This assessment assumes that cases in quarantine facilities are detected in a timely manner and that infection prevention and control measures are implemented promptly.

The likelihood of transmission in the community is currently **MODERATE** for Auckland and **LOW** for the rest of New Zealand. This assessment assumes that cases in the community are identified rapidly and control measures such as case isolation and contact tracing are implemented rapidly. This assessment would change rapidly in the event of cases being detected outside of managed isolation facilities in areas outside of Auckland, or in the event of increasing cases in Auckland that are not epidemiologically linked to known subclusters.

Public health impact of COVID-19 in New Zealand:

The impact on the sector and the public from COVID-19 has been significant. The public health impact remains **HIGH** both for public health staff, the wider health sector and the community.

Overall Public health risk:

Given the assessment of the likelihood of importation, the likelihood of transmission in New Zealand and the public health impact, the overall public health risk from this event remains **HIGH**. For the overall public health risk to reduce, there would need to be a demonstrable reduction in either or both the probability and/or impact of COVID-19 on the NZ population.

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