

Executive Summary

Overview: Evidence has been mounting over a short period and now shows a significant association between smoking and increased severity of COVID-19. While it is biologically plausible, evidence of the association between smoking and susceptibility to becoming infected with SARS-COV-2 is limited and inconclusive. There remains sound evidence to continue to support quitting during this time, and COVID-19 may increase motivation to quit.

Severity: Current evidence shows that smoking status is significantly associated with severity of COVID-19. A meta-analysis of 19 studies reporting on 11,590 COVID-19 patients found that a history of smoking was associated with an increased risk of disease progression to more severe or critical conditions or death (unadjusted OR 1.91; 95% CI 1.42-2.59).

Susceptibility: While it is biologically plausible that smoking may increase susceptibility to contracting COVID-19, there is currently no conclusive evidence that smoking increases susceptibility to COVID-19.

Shisha: The World Health Organization has recommended a ban of the public use of shisha (e.g. in cafes bars and restaurants) during the COVID-19 pandemic to reduce potential transmission from sharing mouthpieces and pipes. Shisha was previously implicated in an outbreak of tuberculosis in Queensland.

Vaping: Limited evidence is available regarding vaping and COVID-19. Vaping appears to be a risk factor for respiratory infections in general and may increase susceptibility to contracting COVID-19.

The benefits of quitting during the COVID-19 pandemic: No current evidence exists to demonstrate that quitting will reduce negative outcomes for COVID-19. However, there are many immediate benefits from quitting, including to the respiratory and cardiovascular systems, which may plausibly have 'pre-habilitation' benefits that flow on to better outcomes.

Current messaging: Many jurisdictions, including SA, are encouraging smokers to quit during this time for their respiratory health. The UK has been encouraging smokers to quit, with messaging saying that smokers are 14 times more likely to develop severe COVID-19 disease. Media reports indicate that this has prompted 300,000 smokers to quit (note: unpublished preliminary data).

The World Health Organization advised that smoking makes you more vulnerable to COVID-19 infection and [recommended that people quit smoking \(24 March 2020\)](#).

Context

- COVID-19 is predominantly a disease of the respiratory tract. Comorbidities associated with smoking including chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), diabetes and hypertension are also associated with severe disease among patients with COVID-19. Smoking is a well-established cause of many of these medical comorbidities.

- Many agencies are currently encouraging smokers to quit, in light of COVID-19 and its impact on the respiratory system.

Summary of the evidence

Current evidence suggests that smoking status is significantly associated with severity of COVID-19.

- A meta-analysis of 19 studies reporting on a total of 11,590 COVID-19 patients from China (16 studies), Korea (1 study) and the United States (2 studies) found that a history of smoking (either current or former smoking) was associated with an increased risk of disease progression to more severe or critical conditions or death (unadjusted OR 1.91; 95% CI 1.42-2.59). Among the five studies that reported whether a patient was a current or former smoker separately, there was a similar association between current (vs never) smoking and severity of COVID-19 (unadjusted OR 1.91; 95% CI 1.10-3.29) (1).

There is currently no conclusive evidence that smoking increases susceptibility to COVID-19.

- Studies published to date using data from China (2-13) and the US (14) have reported levels of smoking prevalence among patients hospitalised with COVID-19 which have been noted as being much lower than smoking prevalence in the general population in those countries. These findings must be interpreted with caution. It is likely that smoking status has not been comprehensively recorded in the data analysed to date (completeness of smoking data may not have been a priority for medical professionals, especially in the face of overwhelmed medical systems). Complete data were only available for 5.8% of COVID-19 patients in the US study, for example (14). An analysis of UK biobank data found that current or former smokers were more likely to be tested, and to test positive, for COVID-19 than never smokers. However, among those who were tested for COVID-19 only, current and former smokers were no more likely to test positive than never smokers. Hence, current or past smoking may predict the risk of developing symptoms consistent with COVID-19, but among those with such symptoms who get tested, current and former smokers are no more likely to have COVID-19 (15). Further studies using appropriate research designs are required to be confident about associations between smoking and susceptibility to COVID-19.

However, it is **biologically plausible** that smoking increases susceptibility of COVID-19 for the following reasons:

- An extensive review of the literature by the US Surgeon General published in 2014 indicated that while the mechanisms are complex and not well understood, smoking is generally detrimental to the immune system and its responsiveness to infections (16). (Note: Evidence prior to COVID-19)

- Smoking is also known to be a major risk factor for acute respiratory tract infections in general (17). Evidence has found previously that cigarette smoking can increase the incidence, duration, and/or severity of respiratory viral infections (18). Smokers were also found to have higher mortality in the MERS-CoV outbreak, a virus with some similarities to SARS-CoV-2 (19). (Note: Evidence prior to COVID-19)
- The SARS-CoV-2 virus enters cells via binding to the ACE2 receptors present on the surface of respiratory cells. Some studies have found that smoking increases expression of ACE2, the receptor for COVID-19 (20-22), which could theoretically increase susceptibility and severity. On the other hand, a group of French researchers (pre-print) have hypothesized that SARS-CoV-2 might be a nicotinic agent, meaning that nicotine might be used to treat acute infection (23). However one of the study co-authors (Jean-Pierre Changeux) [has previously received funding](#) from the tobacco industry, so the motives of the research are under question.
- Smoking involves repetitive hand-to-face actions which may help to transmit the disease (24).

Electronic cigarettes / vaping

- Limited evidence is currently available regarding vaping and COVID-19. An online survey of US adolescents and young adults found that e-cigarette ever users were five times more likely to self-report a COVID-19 diagnosis than never users (adjusted OR 5.05; 95% CI 1.82-13.96). Dual users were seven times more likely to self-report a COVID-19 diagnosis than never users (Ever use: adjusted OR 6.97, 95% CI 1.98-24.55; Past 30-day use: adjusted OR 6.84, 95% CI 2.40-19.55). The results of this study only apply to adolescents and young adults and are limited as COVID-19 diagnoses were not confirmed by medical records (25). However, the results are in line with the notion that vaping also appears to be a risk factor for respiratory infections in general, with human and animal studies indicating that e-cigarettes impair immune systems, leading to an increased susceptibility and/or delayed recovery from infection (26).

Shisha and waterpipe tobacco smoking may pose additional risks of infection from shared use of the mouthpiece.

- Waterpipe use has been implicated in an outbreak of tuberculosis (15) and in the transmission of fungal infections (16). There is similarly a risk of transmission of viruses (17).
- Waterpipe tobacco smoking may pose additional risks of infection from shared use of the mouthpiece and other components (27).
- The Waterpipe Tobacco Smoking Knowledge Hub of the World Health Organization Framework Convention on Tobacco Control recommends a complete ban of the use of waterpipes in all public establishments to help limit the transmission of COVID-19 (18).

- News reports indicate that many middle eastern countries including Iran, Kuwait, Pakistan, Qatar and Saudi Arabia have banned the use of shisha in public places to avoid COVID-19 transmission.

Is this global pandemic a good time to recommend that people to quit smoking?

Evidence supports quitting at all times:

- Quitting smoking reduces rates of respiratory infections in general (28). Airway function improves within four weeks of quitting, and the immune systems improves within a few months (29).
- Quitting smoking reduces risk of heart disease, which is associated with increased severity of COVID-19 (30). After quitting smoking, the risk of coronary heart disease decreases rapidly. Within 20 minutes of quitting, blood pressure drops, and the risk of heart disease halves within one year (28). People who have already been diagnosed with heart disease can lower their risk of dying by quitting smoking (31).
- Encouraging people to quit now could help to reduce demands on the health system by reducing hospitalisations associated with conditions that are quickly reversible by quitting, such as pneumonia (28), compromised wound healing and respiratory complications after general surgery (32), and pregnancy complications including low birthweight (28), placental abruption (33) and ectopic pregnancy (16).

What are selected tobacco control experts and health organisations recommending?

- South Australia
 - SA Government now has [a range of messages encouraging smokers to quit](#).
 - Tobacco smoking is monitored on a monthly basis through SA Health, and changes to tobacco use and quit attempts will be monitored during the epidemic.
 - Number of calls and contacts with the SA Quitline will also be monitored. Data shows that there was a 10% increase in the number of calls to the SA Quitline in the first quarter of 2020 compared to the first quarter of 2019, with the majority of the increase seen in February and March. Quitline counsellors have reported that while callers are not citing COVID-19 as their primary reason for wanting to quit, it is a topic that is regularly forming part of the call conversation, suggesting it is near the front of callers' minds.
- Quit Victoria launched a [digital campaign](#) including [a tailored Quitline ad](#) encouraging smokers to quit during COVID-19. The key message is that physical distancing gives smokers an opportunity to change their habits now they are removed from social triggers. Quit Victoria has also compiled some [FAQs](#) regarding COVID-19 and smoking.
- An article by Australian tobacco control experts in [The Conversation](#) on 14 April advised that there's never been a better time to quit because smoking increases COVID-19 risk.

- World Health Organization:
 - The [Waterpipe Tobacco Smoking Knowledge Hub of the World Health Organization Framework Convention on Tobacco Control](#) has recommended a complete ban of the use of waterpipes in all public establishments to help limit the transmission of COVID-19 on 13 March.
 - The World Health Organization advised that smoking makes you more vulnerable to COVID-19 infection and [recommended that people quit smoking](#), as well as posting a [brief Q and A](#) on smoking and COVID on 27 May.
- [Public Health England](#) has stated that smokers are 14 times more likely to develop severe disease (a figure from one of the studies (4) in the meta-analysis (1) described above) and issued specific advice against smoking on 3 April. An article in [The Guardian](#) on 4 May reported that 300,000 UK smokers may have quit due to COVID-19, based on unpublished survey data that found that 2% of smokers had quit because of concerns about coronavirus; 8% were trying to quit; 36% had cut down; and 27% were now more likely to quit.
- [The US Food and Drug Authority](#) currently advises people to quit smoking as smoking can leave you more vulnerable to respiratory illnesses such as COVID-19 (last updated 9 June 2020).

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