

Smoking, Vaping & COVID-19

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Summary of Evidence

The European Centre for Disease Prevention and Control (ECDC), in their rapid risk assessments for COVID-19, highlight the importance of identifying potential vulnerable groups and possible preventable determinants of severe COVID-19, as they may contribute to increased numbers of severe cases and impact hospital capacity.^{1, 2}

Smoking in Acute Respiratory Infections (ARI)

According to the Oxford University COVID-19 rapid evidence review service, used in alignment with the AHS COVID-19 Scientific Advisory Group (SAG) process, smoking is a risk factor for all respiratory infections: it increases both the risk of getting an infection, and its severity.³ Quitting smoking leads to almost immediate improvements in cardiovascular and respiratory health, and reduces the risk of acquiring an ARI.⁴ Quitting during an ARI reduces the risk of serious complications, such as bronchitis and pneumonia, even after decades of smoking.⁵

COVID-19 Disease Transmission and Smoking/Vaping

Research has documented that Angiotensin-Converting Enzyme-2 (ACE2) is identified as a potential receptor for SARS-CoV-2 (COVID-19).⁶ Elevated levels of the ACE2 receptor was found in people who smoke, indicating that people who smoke may have higher susceptibility to COVID-19.⁷ Conversely, findings have also suggested that smoking prevalence is lower than expected among patients with symptomatic COVID-19, both hospitalized or outpatients, when compared with population smoking rates.^{8,9} Issues with the existing data have been noted¹⁰ and the conflicting findings indicate that the association between smoking and susceptibility to contracting COVID-19 continues to require further research.

The very act of smoking and vaping, however, is highlighted as a risk for viral transmission.^{11, 12} Frequent hand to mouth contact and the communal nature of waterpipe smoking, and more recently vaping, are noted risk factors. Waterpipes are also said to increase a person's exposure to harmful microorganisms due to moisture conditions that encourage their development and device structures that make proper cleaning and sanitization difficult.¹³ A large study of the association between COVID-19 and youth smoking and vaping in the US recently concluded that a COVID-19 diagnosis was seven times more likely among youth who had ever smoked or smoked and vaped (dual users).¹⁴

COVID-19 Disease Progression in Smoker/Vapers

It is well-established that cigarette smoking is a risk factor for the severity of any lower respiratory tract infection, in addition to cardiovascular and lung diseases.^{15,16} Studies from the United States, China and Italy demonstrate that individuals with underlying cardiovascular or respiratory diseases, are at higher risk of severe disease or death from COVID-19.¹⁷

While studies of disease progression or adverse outcomes have noted, with some consistency, a low prevalence of current smoking among COVID-19 cases, all found associations with severity and mortality with COVID-19.^{18,19,20} The most recent contribution to this evidence base is comprised of a meta-analysis examining 19 peer-reviewed papers which showed a significant association between smoking and progression of COVID-19.²¹

More specifically, findings on the clinical characteristics of affected patients in Wuhan city, China, showed that among the group of patients with a 'primary composite end point' (needing mechanical ventilation, admission to intensive care unit, or who ultimately died), 25.5% were current smokers.²² Smokers were found to be 1.4 times more likely to have severe symptoms of COVID-19 and 2.4 times more likely to have a primary composite end point, compared to non-smokers.²³ A large study in the UK examining the risk of in-hospital COVID-19 death found current smoking to be associated with a higher risk compared with never-smokers when adjusted for age and sex, both alone or with other individual covariates.²⁴

As the virus that causes COVID-19 primarily affects respiratory systems²⁵, the more recent emergence of severe pulmonary illnesses associated with vaping²⁶ must also be considered. In light of COVID-19. This consideration has prompted early responses, such as by the California Department of Public Health (CDPH), who provisionally updated the state's case definition for e-cigarette, or vaping, product use-associated lung injury (EVALI) to require a negative COVID-19 test.²⁷ The CDPH has highlighted the current importance of healthcare providers asking teenagers and young adults with symptoms consistent with EVALI about their vaping during COVID-19 evaluations.²⁸

COVID-19 and Potential Protective Effects of Nicotine

Several earlier studies garnered substantial attention from the public and the media, regarding potential protective effects of nicotine from COVID-19. A systematic review first reported unexpectedly low rates of current smoking among all COVID-19 patients in China and hypothesized that while unlikely to prevent infection with COVID-19, pharmaceutical nicotine for use in treatment warrants investigation.²⁹ A study of inpatients and outpatients in a French hospital then compared the rate of daily smokers among COVID-19 patients to the general population, and suggested that active smokers may be protected from symptomatic COVID-19.³⁰ Additionally, a UK study found that when fully adjusted for all covariates combined, evidence emerged of a slightly lower risk of COVID-19 death in current smokers.³¹

Importantly, each of these studies specifically cautioned that more research is needed and clinical application requires careful consideration. Most notably, the study from France bore a strong message surrounding the potential protective effects of nicotine and hypothesized its therapeutic use in the prevention and treatment of COVID-19³² although later removed this emphasis and acknowledged pertinent limitations to the study, not least, its exclusion of hospitalized ICU patients; a key population to be studied in order to inform of disease trajectory and severity among those who smoke. The potential protective effect in the UK study was described as "weak" by the authors who also acknowledged their study reflects the risk of being infected, or risk of dying once infected only. It did not examine disease trajectory, specifically, indicators of severity such as ventilation requirement or ICU admission.

The above studies each acknowledge that smoking remains responsible for significant public health burden and mortality, that generalized advice to quit smoking remains valid and any protective effects are outweighed by adverse effects.^{33, 34, 35} The studies also do not examine, and therefore do not change, current knowledge regarding the progression of COVID-19, specifically among current smokers who have been infected. The acknowledgements were echoed by the WHO as they urged researchers, scientists and the media to exercise caution in

amplifying claims that remain unproven and insufficient to confirm any link between nicotine and the prevention or treatment of COVID-19.³⁶

COVID-19 and Smoking/Vaping Abstinence

The evidence suggests that current smoking and vaping are lifestyle factors that may increase the risks of COVID-19 transmission. Smoking is linked to increased disease severity and adverse outcomes. Importantly, there is no clear evidence that cutting down on smoking, without completely quitting, results in health benefits.³⁷ Therefore, efforts to reduce before quitting during the pandemic should ensure the reduction period is as short as possible (i.e. days or weeks; not months).³⁸ Smoking cessation is known to have almost immediate positive impacts on lung and heart health.³⁹ Improving response and milder symptoms are also said to reduce the risk of transmission to others.⁴⁰ Thus, abstinence from smoking/vaping (even temporary) bears an important potential for immediate cardiovascular and respiratory health improvements that may: i) protect Albertans who smoke/vape by reducing the harm caused by COVID-19 and ii) support measures to reduce the demand on resources (i.e. work to flatten the curve).

Limitations surrounding the quality of emerging evidence must be acknowledged. It is of note that during this time of public health emergency, evidence-grading and peer-review processes are impeded by urgencies and time-sensitivity in the need for high-level evidence. This evidence review is not intended to be exhaustive and is subject to ongoing revisions according to the available evidence.

¹ European Centre for Disease Prevention and Control (ECDC). (2020, March 25). *Rapid Risk Assessment: Novel Coronavirus disease 2019 (COVID-19) pandemic: increased transmission in the EU/EEA and the UK – sixth update*. European Centre for Disease Prevention and Control. <https://www.ecdc.europa.eu/en/publications-data/rapid-risk-assessment-novel-coronavirus-disease-2019-covid-19-pandemic-increased>

² European Centre for Disease Prevention and Control (ECDC). (2020, March 25). *Rapid Risk Assessment: Coronavirus disease 2019 (COVID-19) pandemic: increased transmission in the EU/EEA and the UK – seventh update*. European Centre for Disease Prevention and Control. <https://www.ecdc.europa.eu/en/publications-data/rapid-risk-assessment-coronavirus-disease-2019-covid-19-pandemic#no-link>

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⁴ *Ibid*

⁵ *Ibid*

⁶ Brake, S.J., Barnsley, K., Wenying, L., McAlinden, K.D., Eapen, M.S., & Sohal, S.S. (2020). Smoking Upregulates Angiotensin-Converting Enzyme-2 Receptor: A Potential Adhesion Site for Novel Coronavirus SARS-CoV-2 (Covid-19). *Journal of Clinical Medicine*. 9(3); p. 841.

⁷ Wang, J., Luo, Q., Chen, R., Chen, T., & Li, J. (2020). Susceptibility Analysis of COVID-19 in Smokers Based on ACE2. Preprints. doi: 10.20944/preprints202003.0078.v1.

⁸ Farsalinos, K., Barbouni, A., & Niaura, R. (2020). Systematic review of the prevalence of current smoking among hospitalized COVID-19 patients in China: could nicotine be a therapeutic option? *Internal and emergency medicine*., 1–8. Advance online publication. <https://doi.org/10.1007/s11739-020-02355-7>

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¹⁰ *Supra*, note 3.

¹¹ Ontario Tobacco Reduction Unit (OTRU). (2020, March). COVID-19 FAQs: Are Smokers and Vapers at Higher Risk of COVID-19 Infection? Retrieved from: <https://www.otru.org/documents/are-smokers-and-vapers-at-higher-risk-of-covid-19-infection/>

¹² World Health Organization (WHO) Regional Office for the Eastern Mediterranean. (2020). Tobacco and waterpipe use increases the risk of suffering from COVID-19. Retrieved from: <http://www.emro.who.int/tfi/know-the-truth/tobacco-and-waterpipe-users-are-at-increased-risk-of-covid-19-infection.html>

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- ¹⁵ *Supra*, note 3.
- ¹⁶ US Department of Health and Human Services. (2014). The Health Consequences of Smoking – 50 Years of Progress: A report of the Surgeon General. Retrieved from: https://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm
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- ²⁹ *Supra*, note 8
- ³⁰ *Supra*, note 9.
- ³¹ *Supra*, note 24.
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- ³⁹ *Supra*, note 16.
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