



Choirs and COVID-19: UPDATE

Disclaimer:

This *Quick Response Report* was published on September 15, 2020 as an update of an earlier report published in June of this year. Given the rapidly changing nature of the coronavirus pandemic, some of the references included in this report may quickly become out-of-date. We further caution readers that researchers at the Newfoundland & Labrador Centre for Applied Health Research are not experts on infectious diseases and are relaying work produced by others. This report has been produced quickly and it is not exhaustive, nor have the included studies been critically appraised.

Readers will note that some text below has been highlighted for emphasis.

Original Request

What is the risk of acquiring COVID-19 associated with singing in a choir?

This is an update of an earlier report that includes new evidence published between May 20, 2020 and August 15, 2020.

Summary of Findings

- Since our original *Quick Response Report* on Choirs and COVID-19, new research evidence and expert opinion have indicated:
 - an increasing consensus that singing in choirs presents a significant risk of SARS-CoV-2 transmission, the virus that causes COVID-19.
 - an emerging consensus, albeit with limited evidence, that SARS-CoV-2 can be transmitted by aerosols as well as by droplets and that singing can produce both.
 - the identification of loud vocalization and some styles of singing as potentially responsible for increased risk of transmission during singing.
- **Guidance from a range of authorities continues to recommend against in-person choir practice/performance.**
- Some recent studies and reports suggest precautions that may lower the risk of choral singing, including: singing outdoors or in large and well-ventilated indoor spaces; reducing duration of singing together (e.g., less than 20 minutes); modifying spaces between singers depending on vocalisation, instruments, and other environmental factors; having singers face away from one another; placing physical barriers between singers; and using face masks.
- Recent studies have also raised debates about the extent to which singing disperses aerosol further/faster than dispersion by normal speech, and whether there is a safe distance between singers that could reduce the risk of choral singing.

Guidance from the Choir Community

International Double Reed Society: **COVID-19 Risk Assessment for Wind Instrumentalists: A Panel**

Discussion (YouTube). July 31, 2020. [LINK](#)

- Discussion by medical, infectious disease, and aerosol experts about the role of aerosols in the spread of COVID-19.
- Aerosols potentially play a significant role in COVID-19 spread and there is 'good' evidence that singing produces aerosols.
- The Loud vocalisation necessary in singing generates aerosols that can travel further than in normal speech.
- Options for increasing safety include singing outdoors, using bigger spaces for practice and performance, and singing for shorter durations.

Guidance from Health Authorities

Alberta Health Services: **Singing as a risk for transmission of SARS-CoV-2 virus**. May 22, 2020 [LINK](#)

- While limited in quantity, “published literature suggests that singing could be an aerosol generating respiratory activity, and that singing may can [sic] generate more respiratory particles (including aerosols) than normal talking”.
- Given the potential increase in transmission risk posed by singing, restrictions on singing in a group setting (e.g. choir, religious services) should be maintained, particularly in indoor or enclosed environments.
- Since singing in group settings (e.g., choirs, religious services) occurs in close proximity to others, prolonged and direct contact, the sharing of materials should be avoided and appropriate social distancing, hand hygiene before and after the activity, masking and any other relevant public health recommendations should be strictly followed and enforced.
- Even after reductions of current COVID-19 public health measures are introduced, “restrictions regarding group singing activities should be maintained and not included in the initial round(s) of measures reduced unless new evidence emerges”

Government of Manitoba: **COVID-19 - Guidelines for Vocalists and Instrumentalists**. No date. [LINK](#)

- “Choirs or musical theatre activities should not be allowed, due to a higher risk of transmission through singing compared to speaking”.
- Evidence is still limited and not properly understood, however, recommended preventive measures include:
 - Individuals should not participate in these activities when ill, even if symptoms are mild
 - Individuals at higher risk of serious illness may consider waiting to return to these activities when they involve other people
 - Virtual opportunities should continue to be offered or should be explored for those who are not able to attend or who may prefer to participate in these activities from home.
 - Use alternatives such as pre-recorded audio or video or virtual training and recording sessions
 - Performers and audiences should observe limitations on the size of gatherings.
 - Preference should be given to outdoor sites for events to further minimize risk
 - If the activity is indoors, the duration should be reduced.
 - Consider placing a physical barrier in front of the vocalist or musician as another way to reduce risk of transmission.

British Columbia Ministry of Health: **Guidance for Faith-Based Organizations to Prevent COVID-19 Transmission.** July 21, 2020. [LINK](#)

- “Singing can produce large and small droplets that the virus lives in. While large droplets tend to fall to the ground fairly quickly, smaller droplets can be suspended in the air for up to nine minutes.”
- The number of people singing increases the number of these small droplets. In a poorly ventilated room, these droplets can fill a room quickly.
- The number of singers, the room size, the level of ventilation, and duration of singing all contribute to the risk of transmission in the group as well as to the community.
- There may be no safe physical distance between singers if someone singing is infected with COVID-19.
- For people who are well enough to attend services, maintain the two-metre distance between singers and between those the singers and non-singers.
- Consider the size of the room that the singing is taking place in, and whether the ventilation is adequate.
- Open windows or doors to help ventilate the room. Singing should be avoided in unventilated rooms.
- Try singing outdoors wherever possible.
- Limit the number of people who are singing and the time spent singing – aim for less than 30 minutes.
- Consider having one soloist sing for the entire congregation, ensuring at least two metres between the singer and the audience.
- Do not share microphones, music stands, or other equipment.

Public Health Ontario: **COVID-19 Transmission Risks from Singing and Playing Wind Instruments – What We Know So Far.** July 09, 2020. [LINK](#)

- Reported COVID-19 transmission among choirs has prompted questions regarding the role of singing in transmitting the virus.
- No transmission via wind instruments reported but, theoretically, there is risk of transmission via respiratory droplets or aerosols produced during this activity.
- In observational studies, multiple sources of transmission (e.g., prolonged close contact, touching common objects, or sharing food) may have contributed to COVID-19 spread.
- Avoid singing activities in poorly ventilated indoor settings.
- Maintain physical distancing and source control measures – e.g. face coverings.

Grey Bruce Health Unit: **COVID-19 Considerations for Singing and Bands.** July 14, 2020. [LINK](#)

- Preliminary evidence indicates that singing may be a higher risk activity as it may generate and disperse respiratory droplets further than normal speech
- It is possible that other methods of transmission such as direct contact or shared surfaces were involved.
- Currently, no evidence on what safe distance between singers is, but greater distance between singers and larger spaces can reduce risk
- Playing musical instruments also potentially increases the risk of transmission through saliva or respiratory droplets
- Other precautions to reduce risk include:
 - Use of virtual platforms for practices and performances

- Use of soloist or instrumental music for live performances
- Singers completely separated from audience and one another
- Have singers face away from one another or use physical barrier, such as, Plexiglas
- Limit the number of people in a singing groups according to current public health guidelines

Other Reviews

Freiburg Institute for Musicians' Medicine (FIM). **Risk Assessment Of A Coronavirus Infection In The Field Of Music.** July 17, 2020. [LINK](#)

- “It can be assumed that aerosols dissipate faster outdoors, that deactivation of the pathogen is greatly accelerated, and that the overall risk of infection is therefore much lower.
- If sufficient distancing is observed, the risk of infection while singing and playing music outdoors can be considered to be very low
- “The first choice when making music with larger groups is the outdoor option.”
- Mouth and nose cover can reduce the risk of transmission via aerosol in choral settings
- Singing in very large rooms, such as concert halls or church sanctuaries reduces risk of transmission.

National Collaborating Centre for Environmental Health: **COVID-19 Risks and Precautions for Choirs.** July 10, 2020. [LINK](#)

- Virus spread via smaller droplets or respiratory aerosols (< 5 µm diameter) produced by speaking, singing, shouting, or breathing increasingly considered to be important route of transmission.
- Small respiratory droplets can remain in the air longer than large droplets, increasing risk of transmission from exposure to infected persons
- Preliminary evidence under experimental conditions suggests that SARS-CoV-2 may remain viable for several hours when airborne over short distances.
- Control of airborne transmission may depend on reducing crowding, reducing the duration of interactions in indoor spaces, and ensuring good ventilation.

European Centre for Disease Prevention and Control. **Transmission of COVID-19.** July 16, 2020. [LINK](#)

- Several outbreak investigation reports show that COVID-19 transmission can be particularly effective in crowded, confined indoor spaces such as workplaces including factories, churches, restaurants, ski resorts, shopping centres, or events occurring indoors.”
- Transmission can be linked with specific activities, such as singing in a choir or in religious services that may be characterised by increased production of respiratory droplets through loud speech and singing
- Other factors may contribute to transmission during group singing activities such as handshaking, close proximity, touching contaminated objects and surfaces, or through aerosols.

Naunheim et al. **Safer Singing During the SARS-CoV-2 Pandemic: What We Know and What We Don't.** July 02, 2020. [LINK](#)

- Respiratory particles are “beyond doubt responsible for, at least, some transmission” of Covid-19, and aerosol transmission “is plausible”
- Different types of vocal performances “will require different levels of complexity to optimize safety”
- Places of worship must consider not only choirs but also singing by the congregation.
- Aerosolised viral load risk increases through

- singing or congregating for extended periods
- the number of infected singers – choir or congregation members – in a closed space
- ventilation

Primary Research

Becher et al. **Risk assessment of the spread of breathing air from wind instruments and singers during the COVID-19 pandemic.** June 26, 2020. [LINK](#)

- “When singing a note, the greatest air spread can be observed at the beginning of the note. If a tone is held or a longer phrase is sung, only a small amount of air escapes from the mouth of the singer. The greatest air spread can be seen when singing with a lot of articulation.”

Anfinrud and Stadnytskyi. **Visualizing Speech-Generated Oral Fluid Droplets with Laser Light Scattering.** May 21, 2020. [LINK](#)

- “We found that when a person says, “stay healthy,” numerous droplets ranging from 20 to 500 μm were generated. These droplets produced flashes as they passed through the light sheet.... the number of flashes increased with the loudness of speech...”

Kähler and Hain. **Singing in choirs and making music with wind instruments – Is that safe during the SARS-CoV-2 pandemic?** May 15, 2020. [LINK](#)

- When singing, “the safety distance should in any case be greater than 1.5 m, in order to be largely safe even when people in the vicinity are coughing without observing the rules of hygiene”
- “Staggered positioning of the persons is recommended, as this increases the distance to the person in the direction of flow”
- “To be sure that the spread of droplets and aerosol is contained, pop-screens are highly recommended when singing”

Additional Sources

Maestro Arts: **Reshaping the concert stage.** June 26, 2020. [LINK](#)

- “The aerosol was measured for trumpet, trombone, horn, tuba, flute, piccolo, oboe, bassoon, clarinet, bass clarinet, man’s voice (bass) and woman’s voice (soprano). It was clear that the greatest aerosol came from the bass voice, although the intensity and speed depended on the style of singing. For example, the vocal line from Beethoven’s Ninth Symphony (‘O Freunde, nicht diese Töne!’) created less aerosol than Italian songs, which had many bursts on the consonants”
- “The wind instrument tests showed that players make less spray during a concert than they do in daily conversations before and after the concerts and in daily life.”

The following articles are preprints and have not been peer-reviewed. They report new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

Miller et al. **Transmission of SARS-CoV-2 by inhalation of respiratory aerosol in the Skagit Valley Chorale superspreading event.** June 18, 2020. [LINK](#)

- Ventilation requirements for spaces that are used for singing should be reconsidered in light of the potential for airborne transmission of infectious diseases
- “Meetings of choirs and other kinds of singing groups during pandemics should only be in spaces that are equipped with a warning system of insufficient ventilation which may be detected with CO₂ ‘traffic light’ monitors”

- Systems that combine the functions of heating and ventilation should remain operational throughout singing activity to ensure optimum ventilation

Buonanno, et al. **Quantitative assessment of the risk of airborne transmission of SARS-CoV-2 infection: prospective and retrospective applications.** June 2, 2020. [LINK](#)

- “We applied the proposed approach to four distinct scenarios for a prospective assessment, highlighting that, in order to guarantee an acceptable individual risk of 10⁻³ for exposed subjects in naturally ventilated indoor environments, the exposure time should be shorter than 20 minutes.”
- “We show that such outbreaks are not caused by the rare presence of a superspreader, but can be likely explained by the co-existence of conditions, including emission and exposure parameters, leading to a highly probable event, which can be defined as a superspreading event.”

News Articles

LMU University Hospital Munich: **Singing in times of COVID-19: more space to the front than to the side.** July 04, 2020. [LINK](#)

- “Evaluating the measurements of the aerosol clouds emitted showed that choir members would need to maintain a greater distance from colleagues in front of them than from those at either side. However, this presupposes that the aerosol is regularly removed from the room via a constant flow of fresh air”
- “For the singers’ safety, it’s important that the aerosols are also continuously removed from the room so that there’s no accumulation”
- “Singing with surgical masks filters out the large droplets completely and the aerosols partially, but a portion of the aerosols are emitted in a jet-like fashion slightly upwards and to the sides”

Huffington Post. **The Science Behind Why Singing Could Spread Coronavirus.** July 01, 2020. [LINK](#)

- “We also expel these droplets when we sneeze, cough, talk and breathe. But with singing, the volume of our voice tends to be louder and it’s been suggested we end up expelling more droplets as a result. It is also been suggested droplets can travel further during singing”

Edmonton Journal. **Choral conundrum: Assessing the art of song circa COVID-19.** July 09, 2020. [LINK](#)

- “Experts from the University of Alberta have teamed up to discover whether choir singing deserves its bad rap as a dangerous pastime in the era of COVID-19. Ever since stories broke early in the pandemic about outbreaks and deaths in the United States and Europe traced to choir practices and performances, health officials have been worried.”

CBC, British Columbia. **Choirs reimagine themselves as singing proves an effective way to spread COVID-19.** June 20, 2020. [LINK](#)

- “... Increasingly, research has shown that singing, with its deep breathing and voice projection, spreads airborne droplets more efficiently than other activities, leaving choirs and church groups struggling to reimagine rehearsals and performances.”

LA Times. **Scientists to choirs: Group singing can spread the coronavirus, despite what CDC may say.** June 01, 2020. [LINK](#)

- “Scientists studying tiny exhaled particles that could transmit the coronavirus say a Centers for Disease Control and Prevention decision to drop warnings against choral singing is dangerous,

risking more “super-spreading events” such as a Washington state choir practice linked to two deaths.”

Aalto University News: **Researchers modelling the spread of the coronavirus emphasise the importance of avoiding busy indoor spaces.** June 4, 2020. [LINK](#)

- “A joint project carried out by four Finnish research organisations has studied the transport and spread of coronavirus through the air. Preliminary results indicate that aerosol particles carrying the virus can remain in the air longer than was originally thought, so it is important to avoid busy public indoor spaces. This also reduces the risk of droplet infection, which remains the main path of transmission for coronavirus.”

The New York Times. **When Will It Be Safe to Sing Together Again?** June 09, 2020. [LINK](#)

- “William Ristenpart, a chemical engineer at the University of California, Davis, who has studied how disease carrying particles spread during speech, said in a Zoom interview that he would strongly agree with the assessment that singing, especially indoors in enclosed spaces, is a terrible idea right now.”

The Guardian. **Science Weekly - COVID-19: How risky is singing?** – Podcast. July 28, 2020. [LINK](#)

- “With evolving evidence on airborne transmission of COVID-19 and early super-spreading events linked to choir practices, musicians have been left wondering how risky it is to sing and play instruments in person. Investigating a listener question, Nicola Davis speaks to Prof Jonathan Reid about the science of aerosols and why he’s getting musicians to sing into funnels — in the middle of an operating theatre”

Methodology

Newfoundland and Labrador Centre for Applied Health Research (NLCAHR) COVID-19 Quick Response reports are initiated by, and shared with, our partners in the provincial health system, including the four Regional Health Authorities, the Departments of Health and Community Services and Children, Seniors and Social Development, and public health officials.

NLCAHR staff work with topic submitters to clarify the research question. We then search for related systematic reviews, meta-analyses, other reviews, interim and other guidance statements, primary research, expert opinion and health and science reporting.

Two researchers (Kazeem Adefemi, Pablo Navarro) carried out individual internet searches (Google and Google Scholar), and divided, and searched, the following databases:

- [Alberta Health Services](#)
- [CADTH](#)
- [Canadian Pharmacists Association](#)
- [Campbell Collaboration](#)
- [Cochrane Collaboration](#)
- [Centre for Disease Control](#)
- [Centre for Evidence Based Medicine](#)
- [Evidence for Policy and Practice Information and Co-ordinating Centre](#)
- [European Centre for Disease Prevention and Control](#)
- [Health Canada](#)
- [HIQA \(Ireland\)](#)
- [Joanna Briggs Institute](#)
- [MedRxiv](#)
- [National Collaborating Centres on Methods and Tools \(NCCMT\)](#)
- [National Institutes of Health](#)
- [National Institute of Allergy and Infectious Diseases](#)
- [National Library of Medicine](#)
- [Public Health Agency of Canada](#)
- [Trip Database](#)
- [World Health Organization](#)

Each researcher screened search results and extracted data, and checked the other's work. The two researchers wrote and edited the report together.

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