

First Update - 06.05.2020

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Introduction

The following statements continue to represent the authors' personal assessments. As before, this paper is based on a snapshot in time, which will be continuously reviewed and adapted according to the most current regulations and evolving scientific knowledge. Before addressing specific questions concerning the field of music in the following, it is important to the authors to stress that musicians must abide by appropriate country-wide guidelines and the rules relevant to their state.

This framework of guidelines is constantly subject to change as a result of developments in the Coronavirus pandemic. They are designed for musicians working in different states and music institutions with varying relevant ministries and health authorities (and any other potentially relevant authorities). This context presents a challenge, to address current federal and state guidance for specific professions and situations – in both professional and amateur music contexts – and for both classical and popular music. In this context, technical assessments, such as the following, provide information to aid in the making of decisions, which should be adapted to suit personal and institutional circumstance. Scientific data regarding Coronavirus in general, but also specifically concerning situations relevant to the practice of music, is still lacking. Since our first risk assessment on 25.04.2020, however, scientific studies have been initiated. Risk assessments are also now available from various bodies, some of which differ considerably in their assertions. It remains our goal to correct and amend relevant assessments/studies based on the most recent scientific findings, and thereby to create an exchange of knowledge (*TN: scientific debate*).

An initial study concerning wind players and singers, initiated by the Bamberg Symphony, was carried out on 05.05.2020 (<https://www.br.de/mediathek/video/aerosole-studie-ist-gemeinsames-musizieren-in-corona-zeiten-gefaehrlich-av:5eb182bc4acf0f00149d0d7c>). The company Tintschl BioEnergie- und Strömungstechnik AG (*TN: Tintschl 'BioEnergy- and Flow-mechanics' AG*) were commissioned by the Bamberg Symphony to conduct a study in conjunction with us. All the wind instruments customarily found in an orchestra were involved, as well as recorder players, saxophonists, and singers (both classical and popular styles). The study included both qualitative investigation into flow visualisation and quantitative measurements of air velocity at different intervals. The results still need to be evaluated in detail. This will require some time. An initial 'interim-conclusion' can be stated, however, that no difference in airflow was detectable for wind players or singers at a 2 meter distance, as compared to normal (*TN: i.e. 'normal' being someone doing something other than singing or playing a wind instrument*). In the following, the statements made in the risk assessment dated 25.04.2020 are adapted in light of this interim conclusion. After a detailed analysis of the findings, the next update will include differentiated information for individual wind instruments and singers.

It remains crucial that everyone involved in the practice of music should follow the appropriate social distancing guidance, standing distance rules, minimised contact with others, upper limits on group sizes in a room, time limits for new contacts, as well as hygiene rules and should wear mouth and nose protection in public. It is also noted at this time, that as of 06.05.2020, the federal and state authorities have extended social distancing measures (albeit modified) until 06.06.2020. Additionally, musicians in every musical setting should make certain to avoid any contact with

others, as far as possible, if they have any existing symptoms, such as a fever, a cough, or loss of smell or taste. This is because the presence of a Covid-19 infection is assumed in these cases without a positive virus test, until it has been proven otherwise. In our view, a voluntary quarantine should be undertaken if symptoms present themselves even without evidence of infection. In the case of either a proven infection, entry from a foreign country, or contact with someone infected with Coronavirus, currently applicable quarantine rules should be observed. In any case, contact your GP if you experience symptoms.

In the context of children and teenagers' music lessons, their guardians should be sufficiently informed and made aware that they should not send their children to lessons with any symptoms which may suggest Coronavirus, however mild. Precautionary measures are especially strict for the elderly or immunocompromised people with pre-existing conditions, especially in the context of active music practice.

Basic information on how Corona-Virus is transmitted

The main transmission of viruses which cause respiratory infections is caused by droplets and aerosols, which are produced by coughs and sneezes and which are absorbed by another person through the mucus membranes of the nose, mouth, and potentially the conjunctiva of the eye. As the Coronavirus (scientific designation: SARS-CoV2) predominantly affects the respiratory tract, this is the main cause of its transmission: breath, saliva, and respiratory tract secretions. This is why, in the medical field, it was found that an above-average number of ear, nose, and throat doctors fell ill with Covid-19, as they carry out endoscopic examinations of mouth and throat area (1). The spread of Coronavirus, as the cause of the Covid-19 disease, occurs mainly through aerosols, which carry the virus through the air. An aerosol is a heterogeneous mixture of very small particles suspended in gas form.

A Finnish working group from Aalto University in Helsinki, led by Ville Vuorinen, carried out a computer simulation on the spread of aerosols in a closed room (a supermarket) (2). The simulation suggests that if an infected person emits the virus when coughing, the virus is detectable in the air for several minutes even if the infected person has already left the area. Other people can then breathe in the airborne virus. According to data from the Robert-Koch Institute from 17.04.2020 (3), three studies (4,5,6) showed aerosols containing Coronavirus RNA (*TN: Ribonucleic Acid*) were detected in air samples of air exhaled by patients or in air from patients' rooms. In addition to the risk of infection via droplets, contact transmission of the virus is also possible. Transmission via contaminated surfaces, especially in the immediate vicinity of an infected person, cannot be ruled out (7), as reproductive SARS-CoV2 pathogens can be detected in the environment under certain circumstances (8).

Risks Specific to the Field of Music

Singers and Wind Players – General

As the virus is spread via the air, the question for singers and wind players remains to what extent the breathing technique used for singing and playing wind raises the risk of infection. In common to both groups is that sound is produced by strong exhalation. Physiologically, this sound production is characterised, for singers and most wind players – with the exception of flutes (*TN: 'flute instruments', includes pipes and similar*) – by periodical closures of the vocal cords (singing, speaking), the lips (brass instruments) or through tubes, e.g. with reeds in mouthpieces (reeded

instruments from the woodwind family). Because of this, according to current physiological knowledge, only small amounts of air flow out of the mouths of singers or the bells of wind instruments at a time. The latest findings according to measurements taken from the Bamberg Symphony players by Dipl. Ing. Schubert (*TN: 'Dipl. Ing' is a qualification like BSc*) support this assumption.

Aside from sound production, there is also the not insignificant matter of mucus production for both singers and wind players. It is not rare to observe increased levels of mucus production during a warm up (e.g. when warming up to sing), as coughing/clearing one's throat clears it out of the respiratory system. Similarly, extended playing/singing can lead to increased mucus production due to overexertion of the respiratory tract. In our view, adherence to social distancing measures remains very important (*TN: i.e. standing distance rules*). According to the latest findings, it does not appear necessary to increase the standing distance to 3-5 meters. A minimum distance of 2 meters appears to be sufficient for wind players and singers, as no extra disturbance in the room's air was measured for singers and wind players at this distance during the study. In addition, it appears advantageous for music practice to be undertaken in large rooms, e.g. concert halls or churches. The airing out/ventilation of rooms at regular intervals also appears to be important.

Solo Singing

Solo singing requires deep inhalation and exhalation to produce sound. To our knowledge, it has not yet been scientifically researched as to how far this leads to a higher risk of infection. Additionally, even if the direct airflow is not abnormally strong during singing, as our latest findings can attest, it would be fair to assume that singing could spread the virus as an aerosol. However, according to the latest findings, it appears that aerosols are not more strongly circulated (*TN: literally 'swirled'*) in the surrounding air by singing than they are by breathing at rest. During the production of consonant sounds by solo singers, saliva particles, aka droplets, are ejected.

Choral Singing

For choral singing, the same physiological fundamentals in respect to deep inhalation and exhalation apply. For choirs, it is our opinion based on the latest findings, that a minimum distance of 2 meters between singers is sufficient. Rehearsal rooms should be as large as possible and be thoroughly and regularly aired out. The number of participants must comply with the currently applicable regulations.

Individual Singing Lessons

In our opinion, strict adherence to social distancing safety procedures (according to the latest findings, particularly keeping a distance of 2 meters) and the availability of an acceptable room (sufficient room size, breaks of 15 minutes to air out the room between students) reduce the risks associated with individual singing lessons. At this time, however, it cannot be inferred from this risk assessment that teachers or students can be obligated to carry out face-to-face lessons. If logistical conditions cannot be met, or if the people involved are members of an at-risk group, the lessons should, in our opinion, be carried out digitally rather than in person.

Wind Players

According to our knowledge at this time, there are no readings of vial load in the air which is blown out by wind players. It is known, however, that wind instruments require an intensive air exchange

in the lungs and airways, sometimes with heightened air pressure. It remains unclear how much the viral load is reduced as it travels through the instrument. It is fair to assume that the transfer of respiratory air into the surroundings whilst playing can distribute the virus in aerosol form. However, according to the latest findings, it appears that these aerosols are not circulated more in the surrounding air during the playing of a wind instrument than they are during breathing at rest. According to the latest findings, it does not seem necessary to increase the distance to 3-5 meters. A minimum distance of 2 meters appears to be sufficient, as in these conditions during tests, no extra disturbance of the room's air caused by playing was determined.

Water condensation caused by breathing out into the instrument also needs to be considered as something which could potentially spread viral material further, in the context of wind players. With regard to this, we recommend that flushing out condensed water onto the ground should be avoided and that a contained should be used instead. Furthermore, wind players should not blow through their instruments to clean them. The cleaning of wind instruments should, wherever possible, be done in a room separate to the teaching/music room.

Individual Wind Instrument Lessons

The risks are, in our opinion, essentially comparable to those posed by individual singing lessons. Precise analysis of the findings discussed above will be conducted for individual wind instruments and will be presented in the next update.

Wind Instrument Ensembles

Depending on the formation, wind ensembles can comprise of different numbers of players. The number of participants must comply with the currently applicable regulations. Generally, according to the latest findings, a minimum distance of 2 meters between players should be upheld, as during tests, no extra disturbance of the room's air caused by playing was noted. Rehearsal rooms should, however, be as large as possible and should be aired out thoroughly and regularly.

Additional Measures for Singers and Wind Players

Direct transmission through saliva can likely be reduced through the erection of plastic barriers between singers. In some institutions, pre-existing soundproofing screens could be used as make-shift barriers. In addition, we feel it is worthwhile for teachers and students to wear mouth and nose protection during individual lessons when they are not singing or playing. Here, correct usage of masks and adherence to hygiene rules should be followed. If protective masks are available for non-medical purposes, wearing a FFP-2 mask could further reduce the possible risk of infection.

As the adherence to the 2 meter rule is a very important measure, music being played in large spaces – e.g. churches in addition to concert halls – can further decrease the risks. In summertime, we also feel there is a possibility to sing and play outside. It can be supposed, that aerosols dissipate more quickly in fresh air outside and that because of this the risk of infection is lessened.

Keyboard/Piano, String, 'Plucking', and Percussion Instrument Players – General

In regard to other instrumentalists, in our current view, music practice does not propose an increased risk of infection as compared to other social situations - either through droplets or the increased formation of aerosols - as long as the appropriate rules are strictly complied with. The

known risks apply. In our opinion, however, different formations and settings in which music takes place should be differentiated (see below).

Keyboard/Piano Players

For pianists, contact transmission plays a role if different players play the same instrument one after the other. Before playing is begun, every player should wash their hands for at least 30 seconds. In addition, it is our view that the keys themselves should be cleaned with cleaning wipes before and after being played by an individual.

When others are involved (e.g. when the pianist is accompanying others), in our view it should be ensured that there is enough distance between the pianist and other musicians/singers (at least 2 meters for wind players and singers, at least 1.5 meters for all other musicians). In addition, plastic screens can be erected to minimise the risk presented by droplet-infection through saliva particles produced by singers.

String (and 'plucked') Instruments and Percussion Players

Where instruments are being shared, in our view, measures should be taken to reduce the risk of contact transmission, as was recommended for pianists.

Chamber Music Ensembles/Bands

For mixed chamber ensembles or bands it is, according to the latest findings, sufficient in our view for a minimum distance of 2 meters between singers and wind players and of 1.5 meters for all other musicians to be observed. Rehearsal rooms should be as large as possible and should be aired out thoroughly and regularly. The number of participants must comply with currently applicable regulations.

Orchestras/Big Bands

For orchestras and big bands it is, according to the latest findings, sufficient in our view for a minimum distance of 2 meters between wind players and 1.5 meters between all other musicians to be observed. Rehearsal rooms should be as large as possible and should be aired out thoroughly and regularly. The number of participants must comply with the currently applicable regulations.

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