

## Deciphering the Science and Medicine of SARS-CoV-2

by Justin M. Glasgow

**S**ince initial identification of the novel coronavirus SARS-CoV-2, the virus that causes COVID-19, there has been a constant and often dizzying outpouring of information as scientific and medical communities begin to understand characteristics of the virus and its effects on both individual and public health. This has often resulted in confusing and conflicting pronouncements, making it difficult for pastors, musicians, and lay leaders to understand how best to support their congregations during this pandemic. The following question–answer scenarios reflect the best scientific and medical evidence available at the time of writing. Citations have been (mostly) omitted in an effort to maintain clarity, but recommended resources available to the general public are included at the end.

### ***Is it safe to hold in-person services if appropriate distances are maintained?***

Physical distancing—maintaining at least six feet between individuals who do not otherwise reside together—does not eliminate the chance of infection but can decrease risk of infection. To develop a bacterial or viral infection, one must be exposed to a certain number of infectious particles; the required exposure varies across viruses and between people. Sitting in an enclosed space with others—even if all are appropriately spaced—runs the risk of providing sustained exposure to small amounts of virus which, cumulatively, can result in an infection. Although congregants may be seated six feet apart, they presumably pass through or use shared spaces (such as doorways and restrooms) where they could be exposed either to airborne particles from someone who passed through the same space earlier or to a contaminated surface.

### ***What about the use of masks or shields?***

Masking helps contain most of the virus but will not completely prevent its spread. Masking does not replace the need for physical distancing. All who can wear a mask should. Furthermore, everyone should learn how to safely place and remove a mask in order to prevent contamination.<sup>1</sup> While many are also using face shields and other protective barriers, a shield should be viewed as an additional layer of protection, not as a substitute for a mask.

### ***What should we know about droplets and aerosols?***

Unfortunately, attempts to differentiate between the two are complicated because droplets and aerosols represent flexible categories on a continuum of fluid particle size. Aerosols are particles that are anticipated to stay suspended in the air for a period of time; droplets, on the other hand, are anticipated to fall to the ground in a short period of time. The exact size and behavior of these particles depends on any number of factors and parameters—from humidity levels in the space to the opinion of the scientist taking measurements. [Editor’s note: As an analogy, consider the tactus of a hymn: it, too, can be perceived along a continuum—as a half note or whole note, or as too fast or too slow—depending on fixed and variable factors such as the physical space and acoustics, as well as more subjective criteria of both leaders and observers.]

### ***What should we know about singing?***

Compared to regular breathing or speaking, singing generates a greater proportion of aerosols that are able to stay suspended in the air longer and circulate throughout a given space. The cumulative effect makes singing a higher-risk activity for

transmission if those particles contain the virus. Until it can be proven that individuals are not capable of spreading the SARS-CoV-2 virus, singing in enclosed spaces is highly discouraged. Gathering outdoors decreases the accumulation of aerosols in a given area but does not prevent a breeze or wind from blowing those aerosols into a vulnerable group.

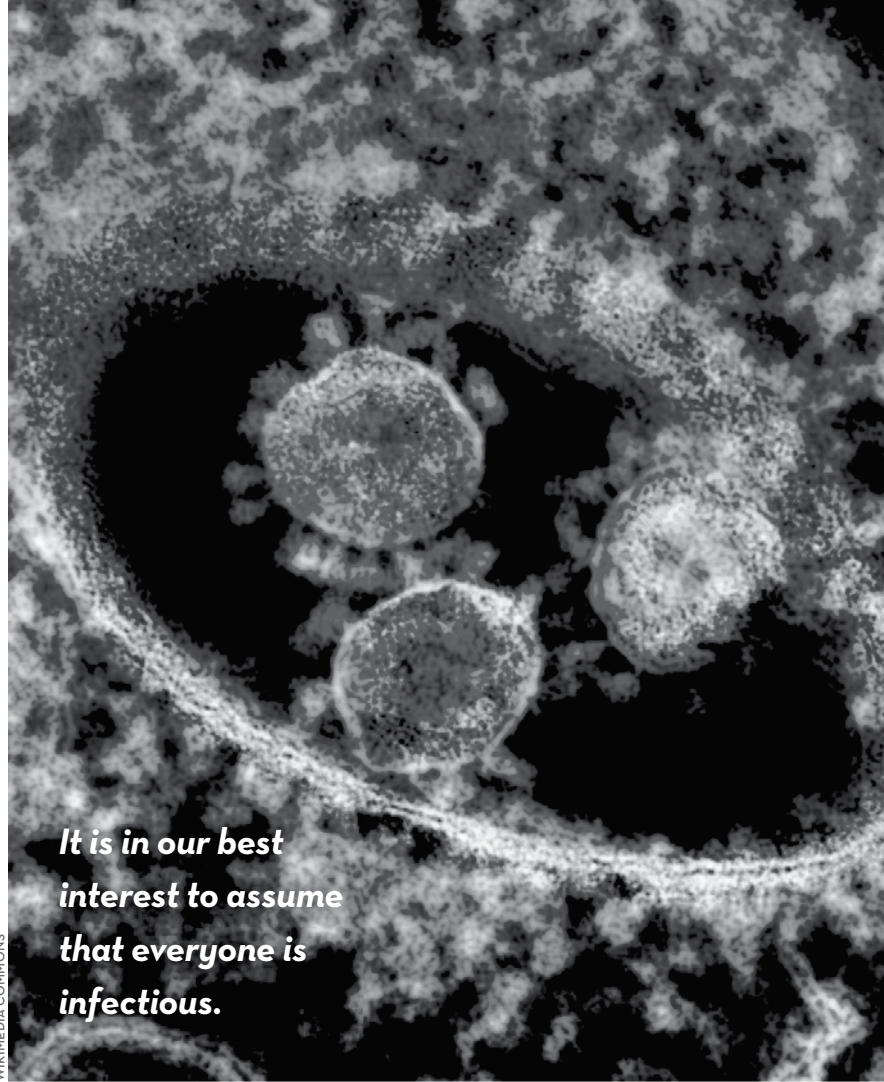
### ***Will screening before worship reduce risk?***

Unfortunately, screening through symptom questionnaires or temperature monitoring will have little benefit. Anyone exhibiting symptoms of a respiratory illness should not be around others. But, if necessary or appropriate for your context, screen individuals prior to entering an indoor or outdoor worship space to ensure that those with symptoms are staying home. Ultimately, checking for fever is also ineffective for a few reasons: infection can spread without having a fever; a fever could have occurred the night before but be resolved in the morning; and many over-the-counter pain relievers reduce fever, and these may be taken for other reasons without an individual even realizing that they had a fever.

It is in our best interest to assume that everyone is infectious. There is a period during which infection can be spread by those who do not yet exhibit symptoms, and even some cases where individuals with infection never develop symptoms. After infection, there is a period of time in which a person will not develop a repeat infection, but the precise duration is still being researched.<sup>2</sup>

### ***What treatments are available?***

As with most viral illnesses, the mainstay of treatment is supportive care. Doctors and scientists have identified two drugs, remdesivir and dexamethasone, that are used for treatment in some clinical scenarios. In a Phase 3 clinical trial, remdesivir has been shown to decrease the duration of symptoms when tested in hospitalized patients. However, it has not been proven to reduce risk of death from



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infection. Dexamethasone is a corticosteroid that has many clinical uses. In its Phase 3 clinical trial, it was shown to decrease mortality in patients with severe cases of COVID-19. However, it did not appear to have the same effect for patients with milder infections.

Despite their existence, these drugs should not be viewed as reasons to decrease protective measures. Remdesivir is an investigational drug with limited supply and production capacity.<sup>3</sup> There is not enough drug available to treat all patients with COVID-19. Neither can it be given to everyone; those with advanced kidney or liver disease may be ineligible to receive this medication. Even among those who qualify to receive these treatments, chances of survival still decrease with age. There are several other therapies being tested, but none provide consistent evidence that they reduce symptoms, severity, or mortality.

### ***Why don't we have a vaccine yet?***

Vaccine development is a complex process, and many promising ideas fail to become successful vaccines. This process begins in a laboratory where

much work is done to develop a vaccine that has the potential to stop a virus from causing illness. Vaccine candidates that succeed in a laboratory setting must then go through a rigorous sequence of clinical trials in humans. The Phase 1 clinical trial is limited to a small group and aims to ensure that the developed vaccine does not have major side effects and that it creates the desired immune response. A Phase 2 trial broadens the population involved in the study with a goal of identifying the optimal preparation, dose, and administration schedule that, in turn, provides the best immune response. A Phase 3 trial is a large study that determines if the dose and administration schedule identified in Phase 2 is efficacious and safe. A successful Phase 3 trial must be completed before receiving approval for a vaccine.

There are vaccine candidates for SARS-CoV-2 that began enrolling participants in a Phase 3 study this summer. However, it remains unclear at this time how much data the Food and Drug Administration will require from these Phase 3 studies before reviewing the drugs for approval. Once there is a successful vaccine approved for use, companies are required to continue monitoring for safety issues, a process that constitutes Phase 4 of clinical development.

### **What resources can provide additional information for my region?**

Three recommended resources are:

- **CovidActNow.org** | This modeling site tracks at the state—and, in some cases, county—level through five metrics that can be useful for understanding the current activity of SARS-CoV-2 in your community.
- **CovidExitStrategy.org** | This site tracks each state's progress toward reduction in symptoms, as well as rates of testing and overall readiness of its health system.
- In addition, major hospital systems (such as university hospitals) are often equipped with

the resources and staff to monitor developments in COVID-19 research, as well as to synthesize data on behalf of the public. Their websites often provide answers to frequently asked questions as well as other local updates.

## **Conclusion**

In patient care, I must often consider the risks and benefits of various treatments. As you receive information in this and other resources, it is important to recognize that decisions made during this pandemic will rarely be either “right” or “wrong.” Rather, you will have to process available information, consider underlying questions and goals, distinguish between “wants” and “needs” while understanding their respective risks, and consider alternative solutions. Then, one hopes, you can arrive at an appropriate decision that is best for the wider community, one that minimizes risk while maximizing benefit.



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## **Notes**

1. See [https://youtu.be/Yc\\_yKQryMIQ](https://youtu.be/Yc_yKQryMIQ).
2. According to the Centers for Disease Control and Prevention, “it remains uncertain to what degree and for how long individuals with antibodies (neutralizing or total) are protected against reinfection with SARS-CoV-2 or what concentration of antibodies may be needed to provide such protection.” See <https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests-guidelines.html>.
3. For more about the production of remdesivir, see <https://www.gilead.com/purpose/advancing-global-health/covid-19/working-to-supply-remdesivir-for-covid-19>.