COVID-19, Viral Load and Shedding: An Update

By Chuck Dinerstein, MD, MBA — November 25, 2020

Nearly a year into the pandemic, can we begin to make some definitive statements about the transmission of COVID-19 between individuals, based on a patient’s symptoms or testing? A meta-analysis provides some answers. (Or at least it gets us into the ballpark.)

How many particles of COVID-19 you are infected with, the viral load, and for how long they may appear in our breath or fluids, viral shedding, are reasonable measures of how able a person is to transmit the virus to another. The virus has been found in our lungs, feces, and bloodstream, among other sites, and testing for virus particles has provided intervals for up to several months.

The researchers performed a meta-analysis of studies to try and narrow the range of concerns. To give you a sense of the explosion of information and studies, their searches identified 1486 papers, which they winnowed down to 78, the majority from China. They considered adults and children, along with a variety of timeframes. Apply grains of salt as you may feel necessary.

The static picture

- COVID-19 RNA hung around for about 17 days in general. Shedding of RNA could go on for 83 days in the upper respiratory tracts (nose and throat) and 60 days in the lower respiratory tract (associated with sputum). It could be found for up to 60 days in the blood and 4 months in the stool.
- Shedding duration increased with age but not gender in respiratory samples.
- Shedding, in general, was longer in those severely affected, but not always.

The dynamic “ebb and flow” picture

- Respiratory virus peaked in the first week of the illness; stool varied with several peaks.
- The virus cleared more quickly in those that were asymptomatic, although some studies reported similar clearance rates to those that were symptomatic.

This is useful indirect information. Remember, all of the testings that we routinely do measures the current or previous presence of COVID-19 RNA. A non-viable virion counts the same as a viable one in these tests, but only viable COVID-19 can transmit the disease from one person to another.

- No live virus was found in any respiratory specimen after 8 or 9 days after the onset of symptoms.
- Identifying live virus diminished with the increasing cycles necessary for a positive PCR test. [1] A cycle number of 24 in one study and 34 in other studies were associated with no live virus being identified. As a generalization, PCR tests are considered positive at cycle values of 35. So even a PCR test is no guarantee of infectability.

For respiratory transmission, the risk is greatest during the first week of illness. Because of a lack of standardization as to what constitutes the “initial” symptom, we could add a day or so onto the “pre-symptomatic” period. Bottom line, if you have had direct contact with an individual positive for COVID-19, your period of risk transmission is from a day before they became symptomatic until a week later. More importantly, those with a positive PCR are not likely to remain transmitters after 9 days; that should be sufficient self-isolation.

Evidence of the presence of COVID-19 will linger long past its peak infectivity, which is especially true in those that are more symptomatic or older. There is so little data on the asymptomatic virus's shedding that no timeline can be fashioned.

The most important take-home message is that a positive COVID-19 test by any method does not correspond to the presence of a viable virus. Our best belief is that the viral load and transmission peaks relatively early in the course of symptomatic disease and that by day 8 or 9, transmission risk is rapidly approaching baseline.

[1] In this amplification study, the RNA in the specimen is doubled every cycle. Higher initial dosages allow the test to become positive with fewer amplification cycles.

Source: SARS-CoV-2, SARS-CoV, and MERS-CoV viral load dynamics, duration of viral shedding, and infectiousness: a systematic review and meta-analysis Lancet DOI: 10.1016/S2666-5247(20)30172-5