A Massage Therapist's Guide to COVID-19

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Definition: What Is It?

COVID-19 is the name given to the disease caused by a virus called SARS-CoV-2. Its name derives from ***Co**rona **Vi**rus **D**isease of 2019*—it did not have eighteen predecessors. This pathogen is an RNA-based coronavirus that attacks many different types of cells, with potentially devastating consequences.

Demographics

As of this writing, COVID-19 has been diagnosed in 18.1 million people worldwide, and it has caused 690,000 deaths so far. In the United States it has been diagnosed in 4.6 million people, and caused about 155,000 deaths.

Anyone can contract this infection, but not everyone gets sick enough to be hospitalized. Most resources suggest that about 20% of those with symptoms need inpatient care, and a small number of those need intensive care. Of course, this prediction varies with the age and relative health of the infected population.

It is also important to recognize that many people who are not hospitalized for COVID-19 have substantial consequences of their infections, and their long-term health may be affected as well, and in ways that we can't yet predict.

People of color are disproportionately affected by COVID-19, in rates of diagnosis, the need for hospitalization, and mortality risk.

COVID-19 appears to be rare in children (at least in terms of causing symptoms). It occurs on a spectrum of severity, and older people are most likely to have more severe versions of this disease. Other predictors for morbidity (how sick people get) or mortality (whether they survive) include pre-existing conditions like obesity, hypertension, diabetes, chronic obstructive pulmonary disease, and other chronic diseases.

Pathophysiology: What Happens?

SARS-CoV-2 enters the body most efficiently by way of the respiratory tract, although the virus has also been found in stool, suggesting that oral-fecal transmission, or fecal-aerosol transmission may be possible. Most researchers agree that airborne respiratory droplets are the most likely mechanism for the virus to spread from one person to another.

Airborne virus is spread when a person breathes, talks, laughs, sings, coughs, or sneezes, and another person contacts it via their nose, mouth, or eyes. The typical agreed-upon distance for likely spread is 6 feet (2 meters), but some research suggests this is an under-estimation. Further, air conditioners or HVAC systems may push airborne virus further away from the infected person and toward others.

When respiratory droplets fall on surfaces, a person who touches the surface and then touches their nose, mouth, or eyes can contract a new infection. This virus is seen to stay intact in the air for about three hours, and on various surfaces for several hours, possibly up to three days depending on the ambient environment. (It is useful to point out that while viral RNA has been found on surfaces for much longer than three days, that doesn't mean those particles are capable of causing a new infection.)

Once the virus enters the body, it enters target cells by way of membrane markers called angiotensin converting enzyme-2 (ACE-2) receptors. These receptors are found on cells that populate the lungs, heart, kidneys, pancreas, intestines, nervous system, and endothelial cells that line the blood vessels that supply all these organs.

When the virus is in the lungs—usually its first site of attack—it has access to alveolar epithelium and the cells that manufacture surfactant, the substance that keeps alveoli inflated. As the infection progresses, alveoli collapse, their surrounding capillaries are damaged, and the capacity for gaseous exchange in the lungs is impaired. By the time

a person develops shortness of breath, they may have lost significant lung function. One of the still-to-be explored phenomena of this infection is that some people accrue substantial lung damage and hypoxia (low blood oxygen), without developing major symptoms.

In the most severe infections, acute respiratory distress syndrome may develop, along with bacterial pneumonia. In some patients, an exaggerated inflammatory response exacerbates tissue damage throughout the body. This promotes blood clotting, and contributes to multiple organ failure and death.

The incubation period between exposure and the development of COVID-19 symptoms ranges from 2-14 days, but is usually about 5 days long. Viral load builds first in the nose and upper respiratory tract, before symptoms develop. Communicability appears to be highest just before and after the onset of symptoms, but it is possible to shed virus with no symptoms at all—specialists estimate that 25-50% of infections are spread from people before symptoms develop, or those whose symptoms are so mild they don't realize they are sick. Most experts agree that a person with diagnosed COVID-19 should isolate for two weeks to minimize the risk of spreading the virus to others.

Two important factors in infectivity for this virus appear to be time and proximity. The longer an uninfected person spends in close contact with an infected one, the greater the chance for transmission. This is an important consideration in massage therapy settings.

Complications

Because this virus affects so many different types of tissues, its impact on function is extremely wide-ranging. Complications typically begin in the lungs, but may progress to affect the heart, the liver, the kidneys, and even the neurons and glial cells of the central nervous system.

The tissue disruption the virus causes is usually due to a combination of three factors: direct viral attacks on cells with ACE-2 receptors, a normal immune system response that destroys infected cells and their neighbors, and—for some patients at least—an hugely exaggerated inflammatory reaction that can lead to much more tissue damage than would otherwise happen.

The complications discussed here do not comprise a comprehensive list. Instead, here is a system-by system look at some well-documented situations that are most likely to impact decisions about massage therapy.

Respiratory system

For most patients the virus begins in the respiratory system, and has its first serious effects here. After it moves from the upper respiratory tract into the lungs, the virus attacks pneumocytes, causing a loss of surfactant that keeps the alveoli inflated. Progressive lung damage can complicate to bacterial pneumonia, and acute respiratory distress syndrome, a situation that can cause respiratory shock and circulatory collapse. And COVID-related blood clotting disorders increase the risk of pulmonary embolism.

Many COVID-19 patients have signs of substantial scarring in the lungs, even without debilitating symptoms. The "ground glass opacities" found in lung imaging are strong indicators of this infection. In addition, some survivors may eventually develop a type of pulmonary fibrosis, a chronic lung disorder that causes permanent damage and loss of function. These complications and their long-term ramifications are uncharted territory at this point.

Cardiovascular system

- **Blood vessels and coagulopathy:** SARS-CoV-2 can invade and degrade the endothelial cells that line the cardiovascular system. While other viruses have also been seen to damage endothelium, when this infection elicits an excessive inflammatory response, the damage to capillaries (endotheliitis) and passing red blood cells raises the risk for blood clotting in both small and large blood vessels. The exact nature of this coagulopathy is still being explored, but it is a common factor in patients with severe infections. How common this is in people with mild infections is an open, and very concerning, question, but the evidence to date suggests that it is rare.
- **Heart:** Myocardial cells have ACE-2 receptors, and they are vulnerable to direct viral attack, immune system response, and excessive inflammation. The net result can involve tissue damage leading to heart failure, infarction related to coagulopathy, and arrhythmia. The heart damage that some patients experience may be permanent. It is not known how many COVID-19 survivors sustain heart injuries. Estimates range from 20%-80%. It is also not know how long heart damage may persist. It is reasonable to suggest that COVID-19 survivors may be an increased risk for other heart problems later in life.

Integumentary system

The coagulopathy that accompanies endotheliitis can disrupt blood supply to the skin. This may manifest as petechiae (flat areas of discoloration that do not blanch with pressure), rashes, blisters, or other skin lesions. When this happens on the feet it is sometimes called "COVID toe."

Musculoskeletal system

Some people with COVID-19 experience severe, deep, aching pain of muscles and joints over a large part of the

body: upper back and shoulders for instance. The pain has a relatively sudden onset, and is not related to recent physical activity. Several factors may be at work in this situation, including hypoxia and blood clotting problems that can reduce the availability of oxygen and poor tissue perfusion.

It is rare, but severe infections can cause rhabdomyolysis: a situation where muscles degenerate, and their by-products damage the kidneys, leading to renal failure.

And of course, deep, severe muscle and joint pain can also be signs of systemic inflammation that has rebounded, or not yet subsided—although typically this would be accompanied by fever.

Digestive system

- **Gastrointestinal tract:** The cells that line the GI tract are rich with ACE-2 receptors, which means they are vulnerable to infection with SARS-CoV-2. It's not the typical presentation, but some patients report nausea, vomiting, and diarrhea among early symptoms. And many patients report long-term bouts with gastrointestinal pain.
- **Liver:** Some patients have elevated enzymes that indicate liver damage, especially in the aftermath of severe infection. It is not clear if the liver damage is from direct viral attack, an extreme inflammatory response, or other factors. One possibility is liver toxicity related to medication use—this is called drug-induced liver injury, or DILI.

  COVID-19 patients who develop mild liver problems may not require treatment, and can probably expect full recovery of liver function. But in more severe cases drugs that support the liver may be prescribed.

Urinary system

Patients with COVID-19 who have pre-existing kidney disorders are at risk to develop new kidney problems, as are are some people with no history of renal impairment. Kidneys can be damaged through tiny clots and infarctions (this time clogging the glomeruli), low tissue perfusion due to hypoxia, direct viral attacks on the nephrons, and extreme inflammation with immune system overreactions leading to tissue damage, scarring, and loss of function.

Many hospitalized COVID-19 patients require dialysis while they are in the acute phase of the infection, but some need it during recovery, and may require long-term treatment.

Nervous system

SARS-CoV-2 affects neurological function for many patients. Not surprisingly, patients with severe central nervous system (CNS) complications related to the virus also have a poorer prognosis for recovery compared to those without major CNS involvement.

Some reports suggest that the virus can attach to olfactory nerve endings in the nasal sinuses, and travel to the CNS via axonal transport. ACE-2 receptors have been found on glial cells and within the cerebral blood vessels. Damage here may break down the blood-brain-barrier that normally shields the CNS from pathogenic invasion. In some cases viral particles have been found in cerebrospinal fluid, even while the standard diagnostic tests were negative.

Early COVID-19 symptoms for some patients include the loss of smell and taste, possibly for several months, and these suggest sensory nerve impairment. Some people report numbness, tingling, or other types of paresthesia in various areas after their infection has peaked, which also indicates that the virus may have a direct and lingering effect on sensory nerves.

Specific brain and brainstem problems may develop as well. Factors may include a direct viral attack on nerve or glial tissue, or cerebral hypertension from an extreme immune response and inflammation. This is essentially a form of encephalitis, and it can depress the respiratory drive, which creates a vicious circle of poor oxygen saturation and further difficulties with breathing. In addition, pressure and inflammation inside the CNS can cause dizziness, nausea, vomiting, headaches, and seizures.

We see that many COVID-19 survivors are vulnerable to strokes related to coagulopathy, and this may occur in people much younger than those usually at risk. COVID-related strokes can cause permanent CNS damage, and require a long rehabilitation process that may or may not be completely successful.

To make things even more complicated, hypoxia and inflammation can affect various parts of the brain to cause neuropsychiatric symptoms, including agitation, memory loss, altered mental state, loss of cognition, and other problems. These issues do not appear to be permanent, although many patients report ongoing struggles with concentration and the ability to focus long after the acute phase of the infection subsides.

Mental and Mood Challenges

The stress of living under the long-term threat of pandemic has led to heightened levels of anxiety and depression in many people, and these conditions take a serious toll on quality of life. However, COVID-19 survivors, especially those who have had very severe infections that required hospitalization and ventilation, are vulnerable to mental and emotional challenges that don't affect others.

Post intensive care syndrome (PICS) is a common consequence of time spent in an intensive care unit for any reason. This condition involves physical, psychological, and cognitive effects of being in a high-stress environment,

often while constrained and heavily sedated. Delirium, nightmares, and paranoia are common consequences, and these effects can persist for weeks or months after a patient is released from the ICU.

People recovering from COVID-19 have some added vulnerability for PICS because the anxiety related to breathing problems can trigger a whole-body sympathetic reaction. Added to this are the stress of isolation, touch deprivation, separation from loved ones, fear of getting other people sick, and the many unknowns about what recovery looks like and what long-term consequences might be. Anxiety, depression, and post-traumatic stress disorder are also predictable issues for people who have been through COVID-19, as well as those who care for them.

Signs and Symptoms

Most cases of COVID-19 are asymptomatic or mild to moderate (meaning patients doesn't require hospitalization). Eighty percent or more of diagnosed people meet this description.

The most common symptoms of a new infection include fever, dry cough, shortness of breath, muscle aches and pains (myalgia), fatigue, and a loss of taste and/or smell. Note: these symptoms can be associated with non-COVID viral infections as well.

Less common symptoms include sore throat, headache, productive cough, gastrointestinal pain with nausea, vomiting and diarrhea, and new skin lesions that can look like purple spots, measles, chickenpox blisters, or a rash—these usually appear on the extremities, typically the toes.

About 20% of patients with COVID-19 symptoms have an infection severe enough to require hospitalization.

Testing

Testing for SARS-CoV-2 occurs in two contexts: the search for a current infection, and the search for antibodies: evidence of a recent infection that has subsided.

Tests for current infection rely on a deep swab from the back of the sinuses. The swabs don't always pick up viral samples, and some people who are further along in the disease process have viral populations in the lower respiratory tract, so this type of test has a relatively high false-negative rate. That is, a patient who may have an infection could be told they are virus-free, even with multiple tests.

Antibody testing can help determine if a person has had a case in the past, but this too is fraught with problems. Serum antibodies don't develop until 5-10 days after exposure, so premature tests are negative. The accuracy of antibody tests is still in development, and while some provide information about the strength of the antibody reactions, others only give a yes-or-no answer to the question of past exposure.

In addition, we have some indication that a history of COVID-19 may not yield a strong antibody reaction in all patients. We don't know how long the antibodies last, or what the risk is of future infection. Consequently, a positive antibody test does not necessarily mean that a person is fully immune to SARS-CoV-2.

Treatment

As of this writing, treatment for severe COVID-19 consists of symptom management, with special focus on inflammation and blood clotting risk. It has been found that "proning" patients, that is, positioning them on their bellies, takes some pressure off the lungs and reduce resistance in breathing.

Antiviral medications, anti-inflammatories, and immune system modulators are all being investigated, and the race toward a vaccine is of course under way. The use of convalescent plasma—that is, employing the antibodies of people who have recovered to treat those still under attack—also shows promise, so survivors who have high antibody levels are asked to donate plasma for this purpose.

If lung damage is severe and no other interventions have helped, then a patient might be intubated and attached to a ventilator or extracorporeal membrane oxygenation (ECMO) machine in the hopes that their lungs will recover.

MEDICATIONS

The medical strategies to treat COVID-19 evolve rapidly. Some treatments can be helpful at specific stages of the infection, and harmful in others, so it is a complicated process. The search for effective combinations of antiviral, anti-inflammatory, and anticoagulant therapies is ongoing.

SIDEBAR

QUESTIONS FOR CLIENTS WHO HAVE HAD COVID-19

COVID-19 carries the risk of long-term complications that may impact choices about massage therapy. At this point in time it's difficult to predict all the possible conditions that survivors may live with. In general, the most important information we can gather reveals what kind of activity level this client can tolerate. This will help us keep the challenges of our bodywork within that limitation. (Note: *this is true for every client and always has been*, but it's even more important for people who have had a bout with SARS-CoV-2.)

QUESTIONS TO ASK—IN ADDITION TO REGULAR SCREENING QUESTIONS

• ***What does your medical doctor say about your risk of communicability?***
(Rationale: If the client has been cleared to return to work or to end self-isolation, then the risk of communicability should be over. If not, we need to delay, for their benefit and ours.)

• ***What does your medical doctor advise about getting physical activity?***
(Rationale: If the client is advised to return to normal activity levels as soon as possible, then massage is more likely to be safe. However, if the client is advised to be careful about exercise—as might be seen with a cardiac or pulmonary rehabilitation program—then the intensity of massage therapy must also be scaled back.)

• ***What do you do in terms of physical activity?***
(Rationale: We need a clear sense of what kinds of physical challenges people put their bodies through on a daily basis. This might range from someone who is essentially sedentary but takes a hot shower each morning, to someone who walks a few times a week, to someone who is training for an event with newly scarred lungs or potentially inflamed blood vessels. Within these questions we must dig out the most specific information we can find: "walking for 20 minutes" might mean a leisurely stroll on a smooth sidewalk, or it might mean a quick jaunt up a hill that raises the heart rate. That makes a difference in a client's ability to adapt to environmental challenges. Further, many COVID-19 survivors have widely varying and unpredictable levels of fatigue and energy. We must not risk overwhelming someone's physical capacity with overenthusiastic massage.)

• ***Do you have any* new *(that is, since your infection) skin marks, lesions, or rashes, especially on the toes, but anywhere on the body?***
(Rationale: If yes, delay the session until these have cleared OR use very light work everywhere, and especially in the area of any discoloration—this may be a sign of microvascular clotting/ bleeding, especially if the lesions don't blanch with finger pressure.)

• ***Do you have any* new *(that is, since your infection) experience of* severe *deep muscle or joint pain—unrelated to recent physical activity?***
(Rationale: If yes, do very light pressure work, and refer them to their primary care provider. This symptom might prompt people to seek massage, but it can be an indicator of acute inflammation, muscle damage, or poor tissue perfusion.)

• ***Do you have any* new *(that is, since your infection) discomfort with exertion?***
(Rationale: We are looking most specifically for chest pain, shortness of breath, dizziness, headache, or cramping in a new pattern. If the answer is yes, refer them to their primary care provider, who should know about this, because it may be a sign of cardiovascular or respiratory distress.)

• ***Do you have any heat, swelling, pain, itching, or swelling in a leg or elsewhere?***
(Rationale: If yes, refer to primary care provider because of the risk of DVT.)

• ***Are you taking any drugs to manage blood clotting?***
(Rationale: If yes, delay massage until this is finished, OR use very light work because of blood clotting and bruising risk.)

• ***What other long-term consequences of your infection affect your life?***
(Rationale: This could include relapsing symptoms, kidney dysfunction, gut pain, headaches, heart problems, debilitating fatigue, seizures, PTSD related to the trauma of surviving a life-threatening infection, or things we haven't even thought of yet. Decisions about bodywork must be made with these complications in mind, so you might want to have a decent pathology reference at hand.)

Again, this list of questions must continue to evolve as we learn more about short-term and long-term challenges that people who have lived through COVID-19 may face. This list will continue to evolve as we learn more about long-term consequences of living with this infection.

Apply What You Know

COVID-19

Risks

The most obvious risk relating to massage therapy with a client in the context of COVID-19 is the possibility of transmitting the infection from one person to another. But assuming that the client has been cleared of communicability, and the practitioner has taken all appropriate steps to prevent the transmission of infectious agents, then the risks that must be addressed for this population begins to look very different.

The most important information needed to work with this population safely is a very clear understanding of the client's normal activities of daily living. Because this infection can impact so many aspects of health, it is more-than-usually important to work conservatively, and to be sure that the allostatic load presented by massage is not overwhelming to a taxed system.

At the time of this writing, perhaps the most concerning risk for massage therapy is the possibility of unrecognized blood clots, either in the small vessels that supply the skin and internal organs, or in the larger vessels that might lead to heart attack, stroke, or pulmonary embolism. Massage therapists can mitigate this risk by working conservatively, especially over areas of discolored but intact skin, and by monitoring for any signs of cardiopulmonary distress carefully: this means following up each session with a check-in on whether the client experienced any chest pain or pressure, shortness of breath, headache, dizziness, cramping, or other new symptoms after their massage. If this occurs, they should report it to their doctor.

Another complex question revolves around muscle soreness. The deep, severe muscle and joint pain seen with COVID-19 infections and during recovery can have many possible causes: hypoxia, inflammation, ischemia, fibromyalgia or chronic fatigue-like symptoms, or rhabdomyolysis, to name a few. Of these, inflammation (probably seen in conjunction with fever) and rhabdomyolysis (usually very severe and localized, possibly with urinary system symptoms like changes in urination frequency or color) are the situations that contraindicate massage most completely.

Blood clots and rhabdomyolysis are only two of many complications that may be negatively affected by massage therapy, but it is important to remember that COVID-19 survivors are essentially an entirely new community of clients with specific needs, and bodywork practitioners must be prepared to respond to unforeseen complications as they arise. (See sidebar for a sample list of post-COVID screening questions.)

Benefits

The benefits that massage therapy may provide someone who is recovering from COVID-19 could be substantial. If massage can be offered safely, we can help to address some of the anxiety, stress, pain, fatigue, touch deprivation, and other challenges that accompany what is often a long and difficult recovery process from this life-threatening infection.

Accommodations

A person who has been through a moderate to severe case of COVID-19 is likely to have a number of challenges that others do not. This may range from lung damage and pulmonary fibrosis, to infection-related stroke, to unpredictable bouts of debilitating fatigue. Accommodations must be gauged to keep the client as comfortable as possible (many may breathe more easily when prone, for example), and to be sure that they are not overwhelmed with over-enthusiastic or overly intense bodywork.

Because this infection often starts with the lungs, and because the inability to breathe easily can contribute to symptoms of anxiety and panic, it may be especially helpful to COVID-19 survivors to receive bodywork that focuses on the ease of breathing.

In all cases it is wise to work conservatively when offering massage to people who have been through this infection, and to increase the intensity of massage gradually, while checking in after each session to be sure the work was received without negative reactions.

One final word of advice for working with clients who have had COVID-19, and even those who haven't: document everything. Inquire deeply about their activities, and record what they say. Write down how you prepared for their session with hygienic practices, and what you did with them and why. Make your follow-up call, add what they say about any delayed responses or experiences from the massage to their information. In this way you will demonstrate your dedication to their safety, and you will be in a position to gather data on how your work affects clients who have been through this infection, possibly for a future case report.

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