CHAPTER 9

COVID

WITH SO MUCH division in the world today, I think we can all agree: 2020 was a terrible year. A new virus called SARS-CoV-2 tore across our planet within a few short months, causing the disease COVID-19, and reaping a heavy toll in human suffering and loss of life.

As we each became aware of the pandemic's unfolding, country by country, creeping ever closer and eventually landing in our own communities, there was a sense of unreality. It was hard to believe what we were witnessing—a chaotic scramble to understand this new infection and rally the best of science to find treatments and cures. At the same time, we watched in horror as healthcare systems buckled and patients died in droves. Some perished at home, unable to receive treatment in time. Worse yet, many died in isolation in hospital beds, separated from their loved ones, due to fear of spreading the disease. The climbing numbers of infections, hospitalizations, and deaths became mind-numbing. By the end of 2020, the U.S. had more COVID-related deaths than any other nation.

We completed this manuscript before the pandemic hit, hence the omission of the word "COVID" until now. But in this final chapter, we want to bring this new scourge into the fold and reveal the painful similarities that COVID has with the gallery of infections covered in the book. They share many of the same issues—unreliable testing, questionable treatments, and a large number of patients developing chronic illness after the acute infection. Not unlike individuals saddled with Lyme+, many of these patients have also been marginalized by mainstream medicine, and their numbers are so large, and growing every day, that they constitute their own pandemic within this pandemic. Many of the same challenges we've faced combatting COVID have been the same ones we've been tackling for decades with Lyme+. All those lessons learned from years spent in the war rooms, unraveling the complexities of vexing infections, have led us to this point. Here. Now. Through not only our own experiences, but with the help of countless others, we hope that the skill set that we've cultivated can help shine a light into the many shadows of this pandemic—and help us be better prepared for the next one.

As we say with Lyme+, you don't get it till you get it. It was the same with COVID. In New York City and its suburbs, where COVID first hit the hardest in the U.S., many experienced an existential crisis. Life for the most part went on as usual in the rest of the country, where the "it can't happen to me" mentality was pervasive until the virus finally hit their own backyards and living rooms. I (Dana) moved out of New York City early in the pandemic and many thought I was a fearmonger. I (Dr. Phillips), changed my practice to telemedicine about a month sooner than my colleagues, many of whom thought I was an alarmist. Unfortunately, many doctors, nurses, and other frontline caregivers didn't have that same degree of professional flexibility. Some were terrified to go to work each day, out of concern both for themselves and for what they might bring home to their families, but they couldn't stop working out of financial necessity. I also know some who closed their practices not knowing when they'd open again, if ever.

Because we want to focus on exploring the complexities of COVID and proposing solutions, we will purposely not spend much time bemoaning the failures of our government and healthcare authorities in handling the pandemic. That is another book. Still, we'd be remiss not to highlight a few of the epic errors in the U.S. that helped the virus infect far too many people. We, meaning the U.S., were the architects and authors of the best-laid pandemic plans in the world, yet ignored our own playbook. Ironically, we exported that playbook to many countries with far fewer resources, and many of them successfully gained control of the virus. It was hard to watch certain countries ring in the new year of 2021 with a semblance of normalcy, while we experienced rising cases, with one American dying every minute.[1]

On multiple fronts, the grave mismanagement of this pandemic presents déjà vu moments for Lyme+ patients. We often felt helpless shouting from the sidelines, trying to share our hard-won knowledge with the public. Take, for example, the initial mixed messaging around masks that quickly grew into a political statement and remained a sticking point throughout the pandemic. The confusion sowed doubt that could never be fully expunged, with resulting damage that can't be overstated. Doubt also fell upon patients who complained of symptoms months after the acute phase of the infection had passed and were dismissed by many doctors who didn't think it was possible for infections to rage on, despite an ever-growing body of evidence to the contrary. Another problem was the CDC's insistence on developing its own testing, rather than using verified tests from other countries. This delayed the establishment of a U.S. test-and-trace program, which could have stemmed the spread of the disease. After the CDC finally distributed its homegrown tests, it was discovered that they were contaminated[2] and unreliable. A subsequent investigation showed that officials knew[3] they were bad, yet they sent them out anyway. For those outside of the Lyme+ community, the rapidly evolving scenario seemed unbelievable. To the Lyme+ community, it was, wearily, more of the same.

The CDC's lack of transparency and consistency further sowed distrust. When its hospital and ICU bed data suddenly vanished[4] on July 14, 2020, the move thwarted communities from effectively managing their scarce resources. There wasn't even a clear consensus about the most basic and imperative information—how COVID spread—droplet vs. airborne transmission. Droplets are small drops of saliva and mucus we expel when we cough, sneeze, or talk, but they're too heavy to stay suspended in the air. They fall to the ground pretty quickly, so they can only infect people within a short distance. This is why you've heard so much about staying six feet apart. Airborne transmission is when even smaller particles, referred to as aerosols, are expelled, also by coughing, sneezing, and talking, but these stay suspended in the air for long periods, floating around a room, and potentially farther, like smoke. Both droplets and aerosols can infect people through the eyes, nose, or mouth, but aerosols can do so at a much greater distance and are far more insidious. For example, aerosols can get around gaps in a poorly fitting mask. Even though Chinese health officials[5] and WHO's director general, Dr. Tedros Adhanom,[6] characterized COVID as airborne by early February, the U.S. public was still being told to wear gloves but not masks, so they went about their business doing the exact opposite of what they could and should have been doing to protect themselves. The CDC and many others acknowledged far too late that the virus spreads primarily through airborne transmission. The CDC's continual revisions and back-pedaling on guidance made for pervasive division, skepticism, and distrust. The standard answer is that as they learned more, their guidance was updated, but there was sound evidence of airborne transmission early on and using masks for airborne infections is a well-established and effective policy.

Molecular biologist and president of the Federation of American Scientists, Dr. Ali Nouri,[7] expressed similar frustrations when he spoke to us: "We have seen over and over how, as a country, we have failed to follow science and evidence when it comes to things like how severe is the pandemic? Is it airborne? Are masks going to be helpful? Those are basic issues where we have failed. Going forward, we really need to think about how we communicate public health to the public."

And we can't forget to mention the race for a vaccine that, while admirable and necessary, left behind what should have been an equally ferocious race for early treatments. At this writing—a year into the pandemic—in the U.S. alone we have approximately 4,000 people dying per day and no early, at-home treatments sanctioned by our health officials, other than the usual advice to stay in bed, stay away from others, keep hydrated, and use over-the-counter pain relievers like Tylenol. And as vaccines roll out slowly,[8] millions will not have access to them for months, and many still don't have access to quick and reliable testing.

Clearly, even those with the highest honors, credentials, and responsibilities are fallible and make mistakes. If there is anything to be gained from this enormous tragedy, it's that the same failures and gaslighting the Lyme+ community has suffered at their hands have now played out on the world's stage for all to see. If not for the horror of COVID, it would have been a hard sell.

Next, we'll put those fallibilities behind us and turn to what you need to know going forward. We assume you've already learned about prevention—wear a mask, watch your distance around others outside your household, and wash your hands routinely—but we'd like to add a few more tips. There is varying data on different types of masks, but we prefer N95 respirators, when available. Since they filter out tiny viral

particles so well, they're associated with a lower infection rate. They were in short supply early on but are now more widely available to the public. Proper fit with a good seal is imperative, so please seek out one of the "how-to" videos from OSHA[9] or other trusted sources for at-home instructions on how to use them. Eye protection (glasses or goggles) also lowers risk. And finally, we feel that it's also crucial to highlight the importance of ventilation. Dr. Shelly Miller, environmental engineer at the University of Colorado Boulder, told us, "COVID primarily spreads indoors, and it's the long-range exposure that's concerning since infectious aerosols can float for hours in a poorly ventilated room. Ventilation is key. We like to use the cigarette smoke analogy so people can visualize this and understand how to keep themselves safe indoors. Simply opening windows and using air cleaners with HEPA filters can help prevent transmission." Though she warns against fogging unsafe chemicals into the air, Miller says that as long as a space is unoccupied, using an ozone machine to clean the air is okay. Still, even if we do everything right, not everyone will escape this beast.

THE NEW CORONAVIRUSES

Seasonal coronaviruses have been infecting us for eons, with studies concluding that "coronaviruses appear to be an ancient viral lineage."[10] While the early strains have remained relatively innocuous human pathogens, causing mild upper respiratory symptoms comparable to the common cold, in the last few years, things have changed.

The word "changed" doesn't seem to quite do it justice. "Quantum leap" might be a more accurate term. SARS was first discovered in Asia in 2003.[11] With a 15 percent case fatality rate,[12] terror gripped most of the continent, and almost overnight, inhabitants of Asian countries started wearing surgical masks for protection. WHO's official consensus statement[13] straddled the fence on how the virus was spread, saying that airborne transmission was "plausible" and "could not be excluded." Unlike COVID, patients with SARS were not infectious before the development of symptoms, and by 2004, the pandemic was largely contained. SARS was demonstrated to be spread by airborne transmission in the analysis that followed the pandemic.[14]

In 2012, another coronavirus, Middle East Respiratory Syndrome (MERS), sprang up in Saudi Arabia. The case fatality rate of this coronavirus was a staggering 35 percent.[15] Fortunately, it proved to be less contagious than SARS[16] and the worst of it was contained quickly, but it continues to smolder to this day, with small numbers of cases still occurring. Despite its reduced transmissibility, evidence of airborne transmission has also been demonstrated in MERS.[17]

And then in 2020, when the now infamous third iteration from this same coronavirus lineage began ravaging us, theories as to its provenance began circulating in scientific circles. At first, COVID-19 was viewed as simply a severe upper respiratory virus with an average incubation period of 5 to 6 days (with a range of 2 to 14 days), but it quickly became clear that its clinical features were multi-systemic and alarmingly severe. Doctors were told to be on the lookout for fever, cough, and shortness of breath. They didn't know about the nausea and diarrhea, as well as a set of more ominous features: heart failure with fatal arrhythmias, kidney failure, hepatitis, loss of taste and smell, heart attacks, strokes, and pulmonary embolisms. The medical community was left reeling.

One of the puzzling features of COVID-19 was that patients who had incredibly low blood oxygen saturations didn't feel short of breath. In ordinary pneumonias, patients with similarly low oxygen levels would be gasping for air. Doctors have called this "happy hypoxia," and it's mainly due to numerous small blood clots developing in the lungs.

We now know that vascular injury resulting in abnormal clotting is arguably the most significant part of COVID's ability to cause disease. When Dr. William Li, president and medical director of the Angiogenesis Foundation, looked at tissue from autopsies of people who died from COVID, what he found astounded him: "It wasn't just lung destruction, inflammation, and pneumonia. The virus was invading and infecting blood vessel cells in the lungs and every other organ in the body. We saw it in the brain, heart, the kidneys, testicles, lymph nodes. Seeing microscopic blood clots everywhere was really a Eureka moment to understanding how some of the damage that this disease causes is beyond simple pneumonia or respiratory distress."[18]

THE LONG HAUL

Today, there are a staggering number of reports on "recovered" COVID patients who are saddled with months of debilitating, chronic symptoms, many of which can be serious, even resulting in organ damage.[19] There is also an ever-growing number of patients with "mild" cases that initially resolve, but who become extremely ill weeks or months later. The presence of such a latency period is eerily reminiscent of what happens in many Lyme+ infections, and it begs the question of whether acute COVID can turn into a chronic, insidious infection. A study of protracted illness after initial COVID documented a whopping 205 symptoms across ten body organs.[20]

These patients have been referred to by a growing group of monikers: "long-haulers," "long-COVID," and "long-term COVID." Some doctors refer to their condition as "post-COVID syndrome," a name that implies, perhaps erroneously, that the virus is gone. The list of those affected, and their symptoms, is terrifying in both its breadth and its randomness. Even young, otherwise healthy patients are being struck down.[21]

Diana Berrent, founder of Survivor Corps, the largest long-term COVID movement in the world, tells us, "We have seen an untold number of heart-wrenching pediatric COVID cases that are experiencing the same devastating manifestations as their adult counterparts."

Berrent's 12-year-old son is a perfect example. She described his February case of COVID as extremely mild. Yet nine months later, one of his adult front teeth fell out spontaneously while he was watching TV.[22] The oral surgeon was stunned and said it should have looked like "a bloodbath," yet there was no blood at all. Berrent said, "There had evidently been vascular damage, but we still don't know whether it was to the tooth, the gum, or the jaw," and there were no warning signs. He felt just fine. "The data varies between 10 to 80 percent, but we're seeing that about a third of those who contract COVID become long-haulers—and those are the people who *have* symptoms. We don't know how many have invisible damage, like my son. We don't know how many may have an internal time bomb about to go off, or if we'll even hear it if it does. For example, my case of COVID-onset glaucoma was found accidentally when I went in for complaints of blurry vision."

Twelve-year-old Maggie Flannery, a Manhattan sixth-grader, and her family, had a three-week bout with COVID in early March. They all recovered, but Maggie soon suffered a horrific relapse that left her with trouble breathing, extreme fatigue, nausea, joint pain, and light-headedness. She can no longer walk to school or participate in her beloved virtual ballet classes. Yet, since she had no positive COVID-19 test to prove she had the disease, doctors initially suggested this once-healthy girl's debilitating symptoms may be psychological.[23] (Sound familiar?)

Dr. Natalie Lambert, an associate professor at Indiana University School of Medicine, has analyzed thousands of COVID patients' health narratives. She's a leading expert in how COVID impacts health and works closely with Survivor Corps. She tells us it's not unusual for those with serious symptoms to be written off as psychosomatic. "One of the most common complaints that COVID patients have is that they go to their doctor to get help with ongoing symptoms and go home in tears. Many quickly realize that they'll have to prove that they're ill; that their joint pain, their racing hearts, their blurry vision, their inability to remember words is not some form of mass-pandemic anxiety. These patients are reluctant to seek care as they don't want to be re-exposed to COVID, yet the fact that they know their own bodies and know that something's really wrong is still often dismissed."

Lambert said the most shocking part in all of this is that COVID is still talked about in certain circles as "the flu." "This is nothing like the flu, with its vast neurologic, psychiatric, and vascular complications. It can even cause autoimmune disorders. It's an incredibly serious disease and people need to understand that there *are* long-term, terrible health impacts that can affect anyone—even young, healthy marathon runners."

So, how do we understand those who experience such an array of prolonged symptoms? From our perspective, the terms "post-viral syndrome," "post-infectious syndrome," and "post-COVID" are misleading. They leave patients floating in a sea of uncertainty, with no clear path back to health. Damage to the body from the acute infection is perhaps the easiest potential cause of long-term COVID for most of us to grasp, but it's not the only one, and it wouldn't explain people developing long-term symptoms after a latency period of feeling fine, or after mild cases.

We don't claim to have all the answers, but as is often the case, missing links tend to hide in plain sight. As described in the book, there is precedent for chronic infections as the cause of ongoing symptoms in a multitude of chronic disease states. Aside from the vector-borne infections that have been the focus of this book, persistent infection has been documented as a potential root cause in illnesses ranging from ulcers[24] to back pain.[25] We're concerned by the echo chamber in the medical community that defaults patients who develop chronic illness after an acute infection to a "post-viral" or "post-infectious" syndrome, without deep exploration into the likelihood of ongoing infection. We fear that long-term COVID patients will be relegated to the same fate.

Many viruses, including coronaviruses,[26] set up persistent infection in various cell lines, organs,[27] and body fluids,[28] in some cases long after presumed recovery from the acute phase. For coronaviruses, this has been known since at least 1979.[29] So, it's not surprising that SARS-CoV-2 has been found not only within the brain,[30] spleen,[31] and many other sites[32] distant from the lungs, but also that it's been shown to persist[33] for many months[34] after apparent recovery from acute COVID infection. An immune-suppressed man experienced a series of multiple confirmed COVID relapses[35] after thinking he was free of the virus, and he ultimately died from COVID after a grueling 154 days. All of this is deeply troubling, especially when we realize that the pharmaceutical industry has succeeded in putting more of us on lifelong immunosuppressants than at any time in history. And to add salt to this wound, the virus itself also induces a degree of immunosuppression.[36]

And then there are those like Chris Long,[37] who was not immunosuppressed but was still admitted to the hospital seven times after contracting COVID in March of 2020. Hospital readmissions after acute COVID are shockingly common.[38] Unlike the aforementioned cases that have had documented SARS-CoV-2 persistence, in Long's case we don't have proof that the virus is persistent—but we also don't have proof that it's not. Nature isn't fickle. If the virus can persist in some and cause chronic illness, why assume that it's gone in others who have had similar chronic illness after acute COVID? Documenting persistent SARS-CoV-2 infection isn't as simple as a repeat throat swab PCR or simple blood test. It has taken invasive and painstaking measures to confirm its presence, which aren't available to patients outside of a research setting.

Harvard neuroscientist Dr. Michael VanElzakker points out, "Blood tests produce both false negatives and false positives. There was a tragic case of a woman with COVID-19 losing her pregnancy in the third trimester. Her blood and urine tested negative, but the placenta tested positive. Chronically ill people often have a blood test come back negative, and doctors assume this must mean infection isn't involved and the issues must be psychological. It's absurd to think that everything happening in the human body is represented in 1 milliliter of blood."

We expect that drug trials for long COVID will be a burgeoning field over the next few years.[39] One drug being studied, leronlimab,[40] is an immunomodulator—meaning it can help support immune function. Accumulating data shows that SARS-CoV-2 can persist long after the acute phase of illness has resolved. So, in addition to drugs that work on the immune system, it would be logical to also study medications with direct anti-SARS-CoV-2 activity. Given the institutional denial of the overwhelming evidence of active infection in chronic Lyme+, if persistent viral infection is a major cause of long-term COVID, we fear that history may repeat itself.

In addition to persistent infection with SARS-CoV-2, another potential explanation for COVID long-haulers is that the insult from the initial infection upsets the immunologic apple cart, allowing other asymptomatic chronic infections to manifest as disease, which has already been documented with COVID.[41] It's a hard notion to get your head around, that we're all walking around with a bunch of hidden infections. Lyme is a perfect example—random blood testing of healthy individuals in the northeastern U.S. routinely reveals that almost 10 percent[42] of the population has been infected with this organism, often unbeknownst to the infected healthy person. Studies from Italy demonstrate that 11 percent of healthy adults have been infected with *Bartonella,*[43] another common but widely overlooked bacterium whose spectrum of illness, including Lyme,[44] ranges from asymptomatic infection to debilitating and even deadly. Could a tip of the

scales turn asymptomatic infection into symptomatic infection? Could this be the cause of chronic symptoms in a subset of COVID long-haulers?

It's going to take a lot of objective research to solve the riddle of what's causing chronic suffering in long-haulers. We believe that both of the above theories warrant exploration. What should be stricken from the medical lexicon is the term "post-infectious syndrome," as no good ever comes from this characterization. It only serves to stifle further research into the cause of ongoing symptoms. Uncovering the root cause of disease is the clearest path to a lasting remedy. Simply describing a set of symptoms and providing symptom relief is an unacceptable substitute.

EARLY TREATMENT SAVES LIVES

Let's say you slice your finger with a knife while cooking in the kitchen. The next day it gets infected and you call your doctor. By that point, your finger is red and throbbing and you have a low-grade fever. Would your doctor tell you to stay home and take no action until your entire arm gets infected? To do nothing until you're in septic shock and need ICU treatment? Of course not. And if you ever get advice like that from a doctor, please find a new doctor. That's not the way infections are managed. From bacterial infections like typical community-acquired pneumonia and syphilis, to viral infections like herpes or HIV, treating early leads to better outcomes.

This is especially true in COVID-19. The disease has two main phases. The first part is the viral replication phase. But after about five days or so, the later stages of the illness can be characterized by a hyper-inflammatory phase, more commonly referred to as a cytokine storm, causing vascular damage leading to dangerous blood clots resulting in heart attacks, pulmonary embolisms, strokes, and multi-organ failure. Vascular injury and clotting are the main mechanisms of disease and death in COVID-19.

An ounce of prevention during the viral replication phase, with the goal of heading off the hyper-inflammatory phase, is worth a thousand pounds of cure. But the corollary is also true: A thousand pounds of cure won't work as well as an ounce of prevention once the disease has gotten to the latter phase. Like so many infectious diseases, there is a window of opportunity during which anti-pathogen treatment can be most helpful.

But in the dystopian year of 2020, decades of accumulated medical wisdom dissipated like a puff of smoke. In its place, reason has been clouded with harmful mixed messaging, which has spread through the U.S. and Western Europe as insidiously as an aerosol. Doctors are not being widely informed that there are early, outpatient treatment options, so patients are being advised to only take action when they're sick enough to go to the hospital. By this time, the disease is advanced, and the odds of dying are markedly increased. Politicians and celebrities have had access to early treatment; everyday patients have the right to these options as well.

It's beyond the scope of this book to offer treatment protocols for every type of COVID patient in this rapidly changing landscape. The take-home message is that at-home treatments and those administered in hospital settings exist and that they may help reduce loss of life when used properly for COVID-19. The treatments listed here are for informational purposes only and do not constitute medical advice. Please consult with your physician before considering any treatments for COVID-19.

Information on COVID-19 treatment options is an evolving area, so we invite you to visit our website (https://www.thechronicbook.com/) for more specifics.

COVID-19 treatments can be grouped into several categories: antiviral, immunologic, and anti-clotting. Antiviral treatments generally work best early on, before the hyper-inflammatory phase begins. Many agents that are not typically thought of as "antivirals" have antiviral activity against COVID. Immunologic treatments serve to calm the inflammatory pathways leading to cytokine storm, and anti-clotting strategies are

used in order to mitigate what's now accepted to be a major cause of COVID-related pathology. And some treatments have activity that falls within more than one category—they can have both antiviral and immunologic effects. Different drugs are used at different phases of the disease, with some requiring a hospital setting, and others recommended off-label by doctors who take an individual's symptoms and personal risk factors into account when prescribing and creating a treatment protocol. Others are over-the-counter medications and supplements. Vitamin D is a great example of this. Vitamin D deficiency has been associated with worse outcomes in many infections, and in COVID-19 it's associated with an almost quadrupling of mortality.[45] A letter from over 4,000 experts was sent to world leaders, imploring them to increase vitamin D intake recommendations in order to mitigate COVID-19.[46] A randomized controlled trial of vitamin D in early COVID-19 demonstrated improved viral clearance. More is not always better, however, as too much vitamin D can be toxic.[47] Ideally, supplementation should be taken under the supervision of a doctor.

In October 2020, the FDA approved the first treatment for COVID-19—the antiviral drug remdesivir. This drug has a mixed track record. One randomized controlled trial failed to demonstrate improved survival rates in COVID-19 patients.[48] In another study, surviving patients treated with remdesivir recovered more quickly, but the study failed to demonstrate a statistically significant survival benefit.[49] In a subsequent clinical trial of 11,000 people from 30 countries, remdesivir also failed to prevent death.[50] The WHO recommends against using remdesivir for COVID-19.[51] Notably, Gilead Sciences, the maker of remdesivir, spent more money lobbying in the first quarter of 2020 than it ever had before,[52] and remdesivir is still the only antiviral drug approved for the treatment of COVID-19 in the United States.[53]

If there is any silver lining to the pandemic, it's the breakdown of long-standing silos in medicine and the forced collaboration among the sciences. Many drugs that have long been on our shelves for use in other areas of medicine are currently being explored for COVID-19.

I (Dr. Phillips) have treated more than sixty COVID-19 patients, most at high risk due to underlying medical conditions, with early, outpatient combination therapies that have demonstrated benefits in clinical studies throughout the world. All did exceptionally well, and none required hospitalization or developed long-term COVID. My only long-term COVID patient is one who came to me several months into her illness. Her primary care doctor's treatment was, "Stay home and rest." Weighing the pros and cons of treating early with drugs I deem safe for my patients, in my opinion, has ultimately kept them out of the hospital and alive.

More people should have access to early treatments to potentially change the course of their disease. Even monoclonal antibodies that are approved for hospital settings, and meant for the early stages of infection in those at high risk for severe illness, are rarely being used. Convalescent plasma, a blood component from recovered COVID-19 patients that contains antibodies against the virus, has demonstrated some benefits[54] but is still being evaluated. Other drugs that warrant more attention and study within the context of COVID-19 include ivermectin, which, in a WHO-sponsored meta-analysis of eleven randomized controlled trials, reduced COVID-19 mortality by an average of 83 percent among 1,452 patients.[55] More studies are underway to cover a greater number of patients. The controversial drug hydroxychloroquine is also still being studied, as a meta-analysis of chloroquine and HCQ demonstrated about a two-thirds reduction in mortality,[56] although some of these studies also included other antiviral therapies. Then there are over-the-counter medicines such as bromhexine, zinc, quercetin, vitamin C, bromelain, NAC, glutathione, melatonin, and aspirin, which all show promise in research studies. We expect many more will come into the spotlight as more data accumulates.

Our point being: Early treatment is key to surviving COVID-19 and may be able to reduce the risk of becoming a long-hauler. But, as with Lyme+, we need to advocate for ourselves (or a loved one). There are scores of possible treatment protocols out there being used by physicians in both academic settings and private practice. When it comes to COVID, subscribing to the notion that we should "ride it out" and hope to avoid dire consequences just doesn't cut it. We've heard horror stories from people—young and old—who were sent home from their doctor with no treatments whatsoever other than a "prescription" for isolation, a bed, and chicken soup. And they go on to suffer mightily or, worse, end up in the ICU.

By the time you read this, vaccines will have been deployed globally and on a massive scale. You may have received one already. We are likely going to have to learn how to live with this virus in our environment for the rest of our lives, and it remains to be seen how effective the vaccines will be as the virus mutates and changes. But even with a vaccine, there will be people who are not candidates for it or whose immune systems may not respond well enough to protect them. Effective treatments will increasingly become important.

We believe that there are crucial lessons from the Lyme+ world scattered throughout this book that could prove invaluable to COVID-19 patients. First, prevention is key. Second, early treatment is associated with better outcomes. Third, advocate for yourself if you're not being heard by your doctor. And, most importantly, don't give up. Never in the history of the world has science moved at such lightning speed with the goal of unraveling complex, chronic illness caused by infection. We are hopeful that COVID-19 will inspire the global scientific community and clinicians to view chronic illness in a new and treatable light.