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COVID-19 and PT:
Characteristics, Considerations, and Care
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- [Calista] And today's course is titled COVID-19 and PT: Characteristics, Considerations, and Care. And it's my pleasure to welcome back to PhysicalTherapy.com, Dr. Pamela Bartlo. Pam received her Bachelor of Science Degree in Physical Therapy from Daemen College, and then her Doctorate of PT from D'Youville College. Pam has been a board-certified specialist and cardiovascular and pulmonary PT since 2005. And since 2004, Pam has been a full-time faculty member at D'Youville College in Buffalo, New York, with primary teaching responsibilities in cardiovascular and pulmonary rehab, research seminar and clinical field work. Her research has been published in multiple peer reviewed journals and textbooks. National presentations include presentation at numerous APTA's CSM conferences, the American Association of Cardiovascular and Pulmonary Rehabilitation, and the American Conference for the American Alliance for Health, Physical Education, Recreation, and Dance. Pam is also the Vice President of the Cardiovascular and Pulmonary Section of the APTA. Well, thank you so much for presenting on such a timely topic--

- [Pam] Thank you, and PT.com for having me, and thank you all for joining today. I know it's still a difficult time, people are starting to ease back into things a little bit, which is good. But we're gonna work our way through this today. One of my precursors that I'll just warn you is, of course, this information is as of today. Most of the presentation was put together about two weeks ago, so even then, some things have changed. But within the next couple of weeks, even more will probably change. So this is, whatever, May 20th we are today, this could be different within a week or so. So, hopefully, it's as up to date as we can be and we'll kinda just keep moving forward as we learn more about COVID and how our patients present with it. These are my disclosures, so you feel free to read through those on your own, and then these are the outcomes that I will read through just so we're assured before we start. You will be able

to, by the end of this course, describe at least three pathology or common symptoms of the COVID-19 virus, describe at least two challenges the PT interaction and performance of interventions with patients with COVID bring, describe at least two parameters for PT interventions for both acute care and post-acute care for patients with COVID-19, and identify at least three components of our care for those patients as we continue to think about outpatient care. So, I wanna touch a little bit on the pathophysiology of COVID-19. You probably all have varying degrees of knowledge on COVID-19 right now. Some of you may have expertise on it in the fact that you've been working in it since day one back in early March. Some of you, maybe just what you've heard through the news. So I kinda wanna go through some of the path of physiology, some of the more the backgrounds of the disease as well, so that if people aren't familiar with it, they really understand the disease.

So, the coronavirus classification, or what we call CoVs, it's a family of single stranded RNA viruses, this has been around for years. So SARS that you all remember, from, the biggest point where it peaked was back in 2003, and then there was MERS, Middle East Respiratory Syndrome, that peaked about 2012, these are also strains of the coronaviruses. And so this is not a new virus, it's a new strand of this virus. And what makes it different is this crown-like appearance with these spiky glycoproteins on there.

And you can kinda see them in the purple on that picture, but we're gonna look at it a little closer in another minute or two. So about 2% of the population are healthy carriers of a coronavirus. Not COVID-19, but of the larger viruses called coronaviruses. They also say that estimates are about five to 10% of all acute respiratory infections are from a coronavirus strand. This is your common cold, some of your upper respiratory infections, even in people that are immunocompromised. However, when we kinda look at things in immunocompromised patients, they also estimate that some of the lower respiratory tract infections are also from coronaviruses. So how is this one

different then? So this is what has been named the SARS coronavirus 2. And we've started calling it COVID-19 because it started in 2019 in December, and we'll kinda get into some of these background things. But it started in Wuhan, China, back in December 2019, which is why they named it COVID-19. The glycoproteins that I talked about a minute ago, and we're gonna see another picture of in a minute, what happens here is that they actually bind to the angiotensin, or ACE 2 receptors, on the outside of a cell. When that happens, it triggers the cell to bring the coronavirus in, and then it uses the cell itself to replicate and then expel more coronaviruses back out into the bloodstream. It also creates an inflammatory response.

So, we'll get clotting factors and other inflammatory types of factors that will get delivered around the body. And then it also introduces or encourages an immune system response. So, we'll get an increasing white blood cell counts, we'll get especially some of the prostaglandins and leukotrienes, and some of the other immune responses that occur. So what does this sorta look like? You can see, this is our coronavirus and the yellow and red things now are what was those purple things in the other picture. These are the spiky glycoproteins. And on your regular cells, in your body, you have these ACE 2 receptors. And these spiky these, the glycoproteins, will attach there.

And that's what show's happening in this picture. So what happens is that attaches there. It then is brought into the cell. This RNA that is inside the coronavirus is then brought into the cell, it's replicated, and you're actually creating new coronavirus cells. And those are then expelled back out into the bloodstream. So what coronavirus is doing, or the COVID-19 ones specifically, is it is using your own body to make more of itself. So, it is not like a live bacterial virus or a bacterial infection, it's a little bit different. It actually goes into your body and uses your own cells to create more of it. And this is why it's very different for each person of how sick they get from it. Some people are able to fight that off and their body will not make more of it. Others make

lots and lots and lots of it and that's why they get to severe infections. So what is the impact? Well, the absolute greatest impact is on the pulmonary system. And this is across the board. Even your cases that are sort of atypical, their largest problem after the fact is almost always the pulmonary system. But most patients, throughout the whole presentation of their virus, the pulmonary system is impacted the most. It will also impact the GI system, musculoskeletal, possibly neurologic, sometimes the integument through an indirect system of whether we're maybe more bedrest or less mobile, we might have some pressure issues, things like that. Also, it could be because of some of the sweating and things, from fevers breaking, you might have some skin issues there. So the integument is more of an indirect involvement. What happens at the pulmonary system?

Well, we do get fluid buildup, but it's not what you think of with your typical cold or upper respiratory infection. It's really the fluid will build up in that interstitial space between the alveoli and the capillaries, and then, also, we'll get some little build up inside the alveolar sacs, similar to like a pulmonary edema or an ARDS. And we'll touch on those throughout this presentation as well, its similarities and its differences. But the problem here is that the fluid that develops in the lungs will create problems with gas exchange.

We can't get oxygen and carbon dioxide through from the alveoli to the capillaries and back as easily because that fluid is blocking it. And as the virus progresses, the inflammation inside the alveoli creates a little bit more fluid, like I said, similar to a pulmonary edema or ARDS, and that just further complicates the problem. So some of the timeline behind this. Back in January 30th was the first time. So, man, it started in December and Wuhan was the first recognized case. In January, end of January, is when the World Health Organization declared it a public health emergency of international concern. It was not declared a pandemic right away. That phrase kinda came in that. Classification came out a little bit later, but it was as early as January

30th being called a public health concern. Around February 22nd was when the first U.S. case, transmitted within the U.S., was believed to have happen. So most of the early us cases were people that had traveled from another country. So maybe they had been visiting in China or they had been in another country that had somebody that was infected and they brought it back with them. So, around February 22nd was the first time that, no, it was somebody that never left the U.S. and actually caught it from someplace else within the U.S. As of May 4th, 187 countries had it reported. Most of my data will be about May 4th 'cause, again, we had to kinda front-end this presentation a little bit for you guys, so that number may have changed. I didn't check today how many more countries, if there's more or not, but about 187 were at that point. So this data is as of May 4th, these numbers have gone up, obviously. So, global cases, I actually just checked this morning, they are nearing 5,000... Oh, I'm sorry, five million.

They're at about 4.9, I think, million, so we're approaching five million cases globally. The United States was at about 1.1 million, they're now over 1.2, I believe. And you can see there, as far as the next highest countries, so we have the United States, then Spain, then Italy, then the United Kingdom, and then Germany. China, where it originated, is actually down around 11th. I am not going to remotely get into any political discussions on this. I don't care what beliefs are either way. But realistically, there are estimates that that should be higher. But it doesn't matter what conjecture is, those are the numbers we have.

So, based on the numbers, China is around the 11th highest country in cases, and that's what we use. And this data came right from the Johns Hopkins website that's been tracking all of this for the U.S., and it's an amazing website. If you go to the Johns Hopkins coronavirus website, that is what are... They are working in partnership with our CDC and some of our other government agencies to kinda provide some of this real-time tracking for all of our cases in the United States as well as worldwide.

And they also have breakdowns of counties and states throughout the country. So, it's a great reference to go to if you want really up to date. It's usually, at least once, but I believe two or three times a day, it is updated. So, some of the characteristics of the people that are testing positive for COVID-19. There are slightly more men than women. And here's the problem we have, is there was no data that ever existed on this before this, of course, because we've never seen this. We've never seen a virus of this magnitude before in our lifetimes. And so, most of the data that's been coming out has kind of unlimited, it may be a couple of sites, it may be government or whatever, we could get our hands on from whatever country, so not all of this is considered 100% accurate. It's our sort of best, this is what we can see right now, this is what the research has provided.

So most studies are showing around 60% men versus 40% women. There have been a couple that have shown it is high as 80% men, and those are within the U.S., that's not even worldwide. Age is around 60 to 65 is the mean age of people that are coming down with it. This is not taking into account some of the newer things we're seeing with some of the pediatric cases, because the pediatric presentation of COVID is very different. I'm not really gonna touch on that much today because it's very different than the adults there.

Symptoms are different, usually, their presentations are different, their recoveries are different. And so, there are a couple of great webinars that have kind of been coming through APTA and some of the sections about the pediatric presentations of COVID. And so I would refer you kind of towards those, or to some of the more specific pediatric cases, or, I'm sorry, pediatric outlets to get some of that information. Because, overall, the age is around 60 to 65. The race data. So, anecdotally, we know that African-American population is getting much harder hit on this than the Caucasian and other nationalities or races and ethnicities. I shouldn't say nationalities, everybody's within the U.S. But our races or ethnicities, the African-Americans are

getting hit much harder. However, we don't have a lot of hard data to prove that yet. There are some studies coming out, and I actually just saw that there was one coming out, I believe, next week, that definitely is a more substantial study and not just anecdotal reporting. So, we'll have to kinda wait to see what these actual numbers come out to be. But, as of May 4th, based on all of the studies that are out there and some of the anecdotal stuff that's out there, we're talking, it ranges around the 20 to 30% of those patients with it are African-Americans. But it just kinda depended. Like every age group is a little different. So some of the younger age groups were maybe around 20%, some of the older age groups were around 30%. Some of the studies might show that's even higher. There have been some studies that showed that it was about 50%. So we'll have to kinda just keep an eye on that.

But we do know, so far from what we have seen, that African-Americans are getting hit at substantially higher rates, and so we have to keep an eye on that, and we have to try to be proactive in communities that have higher proportions of African-Americans in them to try to help with preventative measures, education, testing, those kinds of things. So this is a graph that came directly from the CDC.

And I know it might be a little bit tough to see, but it's hospitalizations based on age group. And as you can see there, the green, the gray, blue, purple, orange, they go down in age, they are exactly like that on the graph. So, this is... Oh-oh! There we go. This is the oldest age group. So these are eight people, 85 years and older. This is then, 75 to 84, 65 to 74, 50 to 64, 18 to 49. Again, I did not include choice on there 'cause they're a little bit lower rates. But you can see that the people that are older definitely have a greater impact from this virus. It hits them harder and they tend to have more medical complications both pre-morbidly and from the complications from COVID-19. And so, we really do have higher hospitalization rates with those older ages. So, the bad news is that the virus can be transmitted even before symptoms show up. The good news is though, the virus itself is able to be killed. So, it is sensitive to

ultraviolet rays and heat and we can kill it with some of our disinfectants. So ethanols, chlorine containing, acid type of things. So, when we use some of these cleaners, it is great 'cause it will kill the virus. I don't have a specific slide on how long the virus lives on different surfaces, because, again, that's under a little bit of different debate.

There's been some studies that just looked at aerosoling an area with the virus and then seeing how long it lasts on surfaces, and there are some studies that actually looked at in-reality surfaces and how it was the virus is still there or not. And so it's kinda some tough data that's out there 'cause nobody has 100% agreement. But basically, what they're finding is, the shortest it'll live is on cloth, like your softer materials, cottons, things like that, for about two, upwards, I've seen some studies that say about six hours. Then some of you are polyester, nylons, things like that, that have a tighter weave where it can't get in there as much, it might live a little bit longer 'cause it stays on the surface.

And then, as you get to your less porous things, so things that are a little bit less ability to absorb it, you have longer times. So your plastics, all your different steels, whether it's stainless steel or iron or gold or whatever it is, the longest I have seen is, I think I saw something that it was still alive at 14 days, but that wasn't a closed lab environment. For the most part, we're saying it'll go anywhere from about two to four hours on cloth, upwards of about six or seven days on some of your metal surfaces. So you really have to be careful with what we're doing with transmission because you never know if it's still alive on that surface or not. So how does it really get transmitted? And we're gonna spend a little bit of time on this. So it occurs through droplets, usually from a coughing or sneezing. And we'll touch on it a little bit more. According to CDC and some of the other World Health Organization and some other sites, incubation is about three to seven days from the time you've been exposed until the time symptoms will present, but it can go up to two weeks. The longest time from infection to symptoms was about 12-and-a-half days. But, again, that's just an estimate. You can go 14 days, which is why they've sort of given that as a guideline for isolation, is 14

days. But typically, it's gonna be three to seven days after exposure. On average, each person has been transmitting the infection to about 2.2 individuals. So what are the signs and symptoms will see? Well, as you've all kinda heard, the most common ones are fever, and dry cough, and then also malaise. So those flu type of symptoms. Fever's usually going at least 99 or 100 degrees Fahrenheit. Most people with them, however, are going up 102, 103, 104, and they're having that continually for several days in a row. The dry cough, some people are stating it's constant, some people are stating intermittent, but it doesn't change based on position, and it's usually not productive.

And it goes back to that pathophysiology. It's not really fluid inside the lung, it's fluid between those alveoli and those capillaries creating that interstitial fluid or that pressure on the outside of the lungs. So there isn't really fluid inside the lung to cough up. That's why it's tends to be more of a dry cough. There are some other symptoms that people will say. Headache has kind of become over the last few weeks something that we're starting to hear a little bit more of. Dyspnea, some people have short of breath, some people don't. We'll touch on that throughout this presentation. The GI issues have started being a little bit more common.

Typically, it's cramping or abdominal pain, and then some people will report diarrhea. The appetite loss tends to always be there but it's just because of the malaise and fever as well. Some people have had nausea and vomiting, but that's pretty mild, it's pretty low numbers of people that have that. When we look at vital signs, usually, they will have an increased respiratory rate, heart rate, and blood pressure. But they didn't go to seek medical attention because of that, they went because of these other symptoms. One of the other things I didn't put on there because it seemed to be something really early on, now I'm hearing about it less, is the loss of smell. And so, early on, you're hearing a lot of people say they had a new or immediate loss of sense of smell. I'm hearing it a lot less now, and I don't know if that's just because people

already know that that's one of the signs or if it's just having it less, I'm not sure. So it's just something to kinda keep in the back of your head. But fever and dry cough are still always gonna be the ones that come up the most often. When they do a CAT scan in an inpatient or an urgent care type of setting, it's gonna look like pneumonia, but even then, it doesn't look exactly like pneumonia. And this is why, early on, back in December, January, people in the U.S. might have had it and it got diagnosis as pneumonia. Now, that won't happen 'cause they know it definitely doesn't look like that. It does have infiltrations like pneumonia, but typically, what happens with pneumonia, is you get one-sided.

And with COVID-19, it's definitely bilateral. And most of the time, with pneumonia, you get sort of one area or segment of the lung. And with COVID-19, it tends to be much more diverse. You'll get multiple areas much more throughout the entire lung area on both sides. The other difference is the actual look of air and opacity on the CAT scan. You'll get what's called GGO, or ground glass opacities. It looks like little bits of ground glass throughout the CAT scan. And that's a really unique sign that they have started to see that's specific to COVID-19.

So, we're gonna talk a little bit about sort of the categorizations, which is mild, severe, and critical. Luckily, 80% of the people that will have COVID-19 will be in the category of mild. That means they either have no or mild respiratory impairments. Or they might have, especially if they had this back in February, March, they might have had moderate respiratory impairment, but it was not enough to require hospitalization. And even now, a lot of people are trying to stay out of the hospital as much as they can. So they might have moderate respiratory impairment, but it never become severe enough that they have to seek hospitalization for it. So they would still fall into that mild category, too. Severe is about 15% of the people with COVID-19. They're definitely gonna have dyspnea, which will advance to hypoxia. They usually have greater than 50%, their lung involvement, when they take the CAT scan. Blood oxygen levels are

gonna be lower. And then those PaO₂s and FiO₂ ratios will be lower. I'm not gonna go into that a lot today because that could be a half-an-hour just on its own. But that becomes a big thing to think about in the more severe cases, and especially in the acute care and ICU cases, is looking at that pressure of oxygen inside the capillaries in relation to the functional use of the FiO₂ of oxygen. How much is there versus how much is the patient able to use? And that becomes a big issue that helps guide what level of oxygenation they go on, do they need to go on a ventilator or not, those kinds of things. But it's a little bit beyond what we're gonna talk about today. And then about 5% of the patients are what we consider critical.

These are the people that will go into respiratory failure, shock, multi-organ dysfunction or multi-organ failure, what we call MOD or MOF, and we'll touch on that a little bit, too. So, as I said, the good news is most cases will present mild to moderate. However, in that small number of patients, those 15 and then an additional 5%, some of them become much worse. And this is what we were the most scared of back in February and March as people started being hospitalized and we started hearing about these deaths. Really, it was, I guess, kinda March more than February.

So, March, that middle to end of March is when we really started hearing about all these people that were getting so sick so fast and dying in the hospital and what was going on. We still are not 100% sure of what sorta causes that or what markers to watch, but luckily, we do have some things to kinda help guide now. And now, obviously, as the PT, we're not the ones doing these tests and following these, but we do need to be aware of them so that when we're seeing in a patient's chart in the acute care setting, we're able to see, "Oh-oh, is that person more stable "or are they more towards that possibility "of a sudden decline in their status?" And so, one of the first things they'll do, besides the repeated CAT scans, 'cause sometimes those might not change as much, is they'll do bloodwork. What we see in general with bloodwork are sort of those first two bullets. So, we'll see elevated neutrophil counts, c-reactive

proteins, the lactate levels, the AST levels, ALT levels, and then urea, and then we'll see decreased white blood cell counts and albumin. But what really needs to be looked at even closer, if we're starting to see a possible decline, that's when we really wanna have them check the D-dimer levels and then also keep an eye on the c-reactive protein or the CRP. Those two, especially even the D-dimers, have shown that when they change dramatically, it's more likely that the person is going to become very unstable very quickly. And so, it kinda helps to gauge, when we have somebody that's maybe that moderate case, are they getting worse, are they gonna go all the way to that critical case, those, when the D-dimer starts to go up, and the CRP levels start to go up even more, then it might be a sign that we have more problems coming. And what that is, is a cytokine storm, and I'll touch base on that in a couple of minutes.

Going back sorta through those mild, moderate, and severe cases, if we talk on what the symptoms were, at that mild level, it's that fever, chills, sometimes you'll have people who have repeated shaking with their chills, and this will vary throughout the day as they go in and out of the fever. So, they'll be very hot, very sweaty, then the fever will break, and they'll be very cold and they're shivering, and then the fever will come back. Just like it would with a flu, but in a much more severe rate usually.

The dry cough, and it may or may not have a sore throat. The sore throat's not really the direct result of the COVID-19, it's because of the coughing without something there, so that's what happens. The shortness of breath or difficulty breathing, it varies. A lot of people with the mild cases don't feel they have a lot of difficulty unless they're trying to exert themselves. Other people find they do, so it's just up to the person. Malaise and headache, we kind of touched on, similar to flu-like symptoms, but it might be more severe. Muscle pain or muscle achiness is also what's complained about a lot. And then loss of smell or taste, as I sort of mentioned already. For the moderate cases. So the same ones as the mild, but they're probably gonna have a greater cough. This is when the shortness of breath and the hypoxia start to become

an issue. So, they'll be more short of breath, they'll feel like they can't catch their breath, probably have an increased respiratory rate, and a lot of times, with the little bit of data we have showing over 30 respiratory rate per minute, hypoxia starts to come in. Those O₂ levels start to drop. And so, then, what happens is the COVID-19 can latch on to the hemoglobin and start to kind of dissociate the oxygen off the hemoglobin. And so, we start to see those decrease in SaO₂ levels as well as that overall PaO₂ level might be lower. We're gonna see those clinical findings in pneumonia even though we know it's COVID-19 causing it and not necessarily pneumonia.

And then I mentioned here, the cyanosis can occur in children more so than adults. If we get to the severe case, it presents very similarly to an ARDS or the acute respiratory distress syndrome. And this is when they'll really go off those PaO₂ versus FiO₂ ratios. This is that decision, do we ventilate or not? Early on, back in March, people were going on ventilators. You needed it, they were desaturating their O₂, PaO₂ levels were so low, we needed them on ventilators.

Then that shift has started to change a little bit, that ventilators aren't necessarily the best option. And so, now, they're trying to do, in those ICU settings, trying to do some other high flow O₂ options and positioning options to maybe prolong or prevent going on a ventilator if we don't have to, because the ventilators weren't always showing the best results, and there might be some possibility of some other complications. So this is a case by case basis, that the doctors will really work, and hopefully within the team, with respiratory therapy nursing, PT, if they're part of that positioning in COVID team, hopefully, are weighing in on this as well to make that decision of could the person stay on some kind of a supportive supplemental oxygen, or do they need to go on to the ventilator, and if so, what rate should the ventilator be set at? And so, this is what I alluded to a few minutes ago. What happens is what we call the cytokine storm. So they, all of a sudden, for some reason, start to become rapidly debilitated or their status changes rapidly. And it's because what we're finding is that a cytokine storm

kicks in. So the immune system goes into overdrive, it rapidly multiplies, and it starts invading those immune response hormones and enzymes, start invading the lungs and the heart. So blood vessels will start to leak blood cells into the interstitial space. Blood itself starts to clot. We're starting to see a lot of things coming out now about patients with clotting issues, with forming clots. Their BP will start to drop. And then the organs will start to fail because of the lack of oxygen being delivered to them. And so this is that patient that was moderate, into severe, and now into critical. That's what the cytokine storm is. So, again, 80% of the people will never have this. And even of that 20% left, not everybody will have this. But when we hear those patients that just got very sick very quickly, and there just was no tipping the scales back in our favor and we lost them, this is most likely what has happened to cause that, is the cytokine storm. How do we prevent that? Nobody knows specifically yet.

There's a lot of stuff going on right now, there's a lot of different medication trials, there's different oxygen level trials, there's positioning trials, everybody is just kinda doing whatever they can on those individual bases to try and prevent this from going on. Because once the person goes into the cytokine storm, it's not impossible to keep them alive, it's just that much more difficult. And so we wanna try to keep them as stable as we can.

Some of the other issues from COVID-19. Neurologically, we're gonna probably have some confusion delirium for people that were in the ICU, not everybody because of COVID-19, but more of the people that were in the ICU, especially because of some of the meds they had. There might be some viral encephalopathy that we're starting to see. Stroke is the other thing that's starting to come out. As I mentioned a minute ago, probably over the last three to four weeks is when we've started hearing more and more about clotting, that people are starting to form clots. So even people that gets discharged home might come back in with blood clots, and those might have become a PE, or we run the risk of those going to one of the cerebral arteries and causing a

stroke. So it's very important to keep that in mind, that people with COVID-19 are at increased risk of stroke, too, if we go to that point where they start having more clotting issues. The cytokine storm, I talked about, but the other thing here is that it can lead to platelet aggregation and thrombosis can come off of that. So that's another thing that kinda contributes to that risk of stroke. Skin integrity, I touched a little bit on. That's really more indirect of result because of the bedrest or positioning issues. And then pulmonary fibrosis changes. It's kinda too soon in our COVID treatment to really know how much this is gonna exist or not. I would say, within the next year to two years, we'll have a better understanding of what kind of permanent lung damage occurred because of the COVID-19 and people that recover.

The initial or early thoughts are that people are showing some fibrotic changes at those alveoli sacs as well as the alveoli as a whole. So we're gonna need to keep an eye on that and see. We might have people that have fibrotic changes that cause further pulmonary damage that they'll have the rest of their life, but there's not enough concrete data on that yet. So now, we're gonna kinda go over into a little bit of infection control since this is a big part of what we need to do to treat our patients.

Those that are in acute care, this is your bread and butter. You're very familiar with different precautions usually related to pneumonia or it could have been from other, MRSA, VREs, things like that, TB has always been one we were trained on, a little bit different now. And so, if we kinda look at this, we talk about contact, versus droplet, versus airborne. So contact precautions are really just the ones where it's more, you have to have sort of that direct contact. So this is MRSA, VRE, some of the things like C. Diff that are spread through diarrhea, those kinds of things, open wounds. In those cases, your line of defense is gloves, and maybe a gown, or maybe a face shield if there's gonna be some kind of a splashing involved. But typically, it's just gloves. Droplet precautions. So this is now through droplets, through coughing or sneezing, and it was more of our pneumonias, flus, whooping cough, more in children even more

so than adults, and gowns were definitely here, and gloves. Surgical mask usually don't need anything more than that. Glasses, really if it's just a risk of splashing in the face. And then there's airborne. These, we didn't used to be as exposed to as much. Tuberculosis was probably the one that was the most common, even that wasn't very common anymore now because of some of the vaccines. But there's also measles or chicken pox, things like that. This is when something can spread in the air from one person to another. If that's the case, it's an airborne pathology, you wanna wear gloves, gown, a fit tested N95 or higher level respirator, and then a face shield or goggles or glasses.

So how does that apply then to COVID-19? Well, COVID-19 is sort of a hybrid between a droplet and an airborne. It's kinda being treated as an airborne because that one is the one that takes even more precaution, and COVID-19 can be spread through an airborne manner, but it also is spread through droplet. And so that's why it's sort of a hybrid 'cause it's kinda spread either way. Somebody could cough in the air, you could walk through right afterwards, breathe that air in, and you could catch COVID. Or somebody could cough onto a surface, you can touch that surface, wipe your eye, and you could catch COVID-19. So that's sort of how it's kind of both a droplet and an airborne. When the person coughs, sneezes, or sometimes even just exhales, it stays in the air for a little while.

How long? Up for debate. I've seen some studies say that it can be there for as long as three hours, just hovering in the air. But one of those studies was done in a lab where it was a closed space. And they aerosol the virus into that space, and then just checked later on, and it was hovering there. But what was the viral load, and what would happen if people were going in and out of that? I'm not sure. But we do know that you can catch it from somebody coughing and you walking through that airspace. How long? That's up for debate. And would you ever be able to time that anyway? Probably not. How do you know somebody didn't cough there 10 minutes ago? Typically what's

happening more often, we think, or at least what we've been able to show, is that somebody will cough, breathe, sneeze, whatever, and some of those droplets will land on the surfaces. It doesn't die right away on those surfaces, somebody will touch it, and then they'll touch their mouth, they'll touch their nose, they'll touch their eyes, and now have then transmit it into themselves. So, it's kind of being treated as both a droplet and an airborne because of that. When we talk about an acute care setting, sometimes the patient might get a negative pressure room, but we don't have enough negative pressure rooms for all of these COVID-19 patients.

So some of the patients are gonna be in regular rooms. If we're talking a subacute long-term care setting or a home health setting, we don't have negative pressure rooms there. So, obviously, they're going to be in a regular room, and so we will still treat it as an airborne even though they don't have a negative pressure room. And so that's why we'll kinda say it's sort of an airborne and a droplet as well. There was a question in, "Are piece of people also having necrosis of the digits?" When we were talking about skin integrity complications.

There's not enough data to say that that's occurring very frequently. But yes, it is occurring. Because of the change in blood flow, and especially, it's really those more severe patients that are in the ICU and may or may not have gone through cytokine storm, we are seeing some lack of blood supply to the fingertips in the toes, especially, that we'll see some necrotic tissue start to develop there. I have not read any substantial data of people requiring amputation because of a high level of necrosis, but I can't say that it's not happening, because I just haven't read that it's happening on a wide scale, but it is possible. The majority of patients aren't having that many problems though with the necrosis of the digits. But, like I said, it can happen in especially more of those more severe patients. So, when we talk about general guidelines for social distancing, this was a term, if you asked us all six months ago what social distancing was, nobody had ever heard of that term before. Now, we all know what social

distancing is. But we have to take this into account when we're treating patients that are COVID-19 positive. In the acute care settings, we're still not seeing many hospitals allow family members in. So you don't really have to worry about that much in that setting, it's just you and the patient, and you will know if they're COVID-19 positive or not based on where they are. When they're coming to subacute, sniff settings, LTACs, or if you're in your home health settings, that's when you will know if the patient is COVID-19 positive or not, but you may or may not know about other family members. So, I would say, just in general, keep your six feet distance.

Especially in home health, subacute and LTAC and nursing homes, they're still tending not to let visitors in. But in home health, there's going to be other people in the home. You don't know they've been exposed to the patient, but, again, you still don't know if they're positive, and the patient may not be positive, but maybe the family member has just kinda come in with it. So, maintain that six foot. If they can leave the room, that's even better. If it's just you and the patient one-on-one, that's even better, it's cutting down everybody's risk of any kind of transmissions. The biggest thing here we talk about is being a vector.

Well, what is a vector? A vector is the person that spreads the disease. And so, we don't wanna be the person that becomes the vector, we don't wanna take it from one patient. And we might be carriers but not really ever get affected much by it, and then take it to another patient, and again, it might be an older patient, and then they succumb to it. So, we really wanna make sure we're following all these social distancing and PPE precautions to try to not spread from one patient to another, and then, of course, from us. I mean, never in my career, I've been practicing for over 20 years, never in my career was I really that worried about contracting an illness from a patient. I mean, there were always issues there, possibly, but she took the precautions, no big deal. And this is one of those first viruses in most of our lifetimes that we're seeing healthcare workers really are at risk and can come succumb to it as well. And

so, we wanna protect ourselves as well as not be a vector. So, leaving the surfaces, this is a little bit more specific to home health, but it can also be patients' rooms if you're in a rehab setting or an acute care setting. Try not to touch any sort of surface you don't have to touch. And if you do, just make sure you have gloves or some other protective barrier in place. So, if you have to open up a door, if you can use your arm to open the door, that's great. Or if you have to move something aside, if you don't have to pick it up and move it, if you can use your leg to sorta push it to the side a little bit, do that instead. So, now, what if we know the person is COVID-19, when can they go outside or leave their house? When are they no longer contagious? We don't have any easy answers for when they're no longer contagious. I keep hoping, every few weeks, maybe we'll have some kinda more concrete data.

There just isn't yet. The data that's coming out varies a lot for how long the person is considered positive for COVID-19, and therefore could be a vector to spread it somebody else, we just don't know. So what I've given you are the best guidelines we have to use at this point. So, if you're treating somebody that is COVID-19 positive, you should be treating them with full droplet/airborne PPE precautions as long as your agency and facility recommends.

And I'm gonna give you my recommendations and what I would feel comfortable with, but that's not what all facilities are following. So, I'm also gonna give you the guidelines from the CDC, and some facilities are just following these. So, there's sort of this catch-22 of what we would like to see versus what may happen. So these are the guidelines out of the CDC. So, if the patient tested positive for COVID-19, and they are not going to get tested again, and this is kind of the majority of the people, the majority of people won't get retested to see if they're now negative, but if they're not gonna get retested again, at a minimum, they should be at least seven days after their symptoms first appeared. I put that in bold and italicized because the CDC changed that. It was originally 14 days. And then about a month, month-and-a-half ago, they changed it to

seven days. I don't know why. I have not seen anything written as to why that decreased. My personal opinion is I would still want it 14 days because you don't know how long the virus is contagious for, but this is what the CDC is recommending. So, if you work for a facility that is telling you, "You don't get an N95 mask anymore "because that person is over seven days "from their symptoms," at this point, I don't have anything to back you up to give you longer than that yet. There are some documents being worked on within APTA for some of the recommendations since PTs have such close contact with patients. But, at this point, the CDC recommendation is seven days. It had originally been 14, now it's seven.

I do have some other resources. If you get into a facility that's fighting you and saying, "No, a PT doesn't get an N95 mask "'cause the patient's two weeks since "their symptoms first appeared," I do have some other documents that at least help support. My email is right away at the beginning of the slide, or the beginning of the presentation, you can email me and I can give you some information. But this is the CDC recommendation, is only seven days. So you might find some people follow that. And so they have to be seven days since their symptoms, and at least 72 hours since the last fever without medication to break it.

So they have to be fever-free for at least three days and it has to be at least seven days since their symptoms first appeared or their test was positive. If the patient is gonna be retested, then it's a little bit easier, because they can't leave until they're going to get some negative. So, it's either they no longer have a fever, and their symptoms have improved, and they've got two negative tests in a row. But, as I said, most people aren't getting retested. So, those last couple bullets there, this is what I was already touching on of how long are they contagious. We just don't know. There's some studies have shown that people can shedding the virus for up to 30 days, but that doesn't mean the viral load is high enough for them to be contagious to spread it. Some sources are showing maybe six to eight weeks, we just don't know yet at all. So

now we're gonna get into some of the PT considerations. So I wanna touch first on PPE since this really is such a big thing. So the country is still in what's deemed a surge capacity strategy. And so, what I've listed there, this PPE burn rate calculator, the individual PT probably won't use this, this is really geared more for facilities or agencies to use. And this will give a good idea of how much PPE that facility or agency is gonna need. So, if you're a home health agency, and you can always give this, like if you're just a home health PT and you're not the manager, you can give this to your manager or give this to the director of rehab, whoever.

They can use this calculator to get an idea of how much PPE do they need to have on hand. And then I wanna go through some PPE stuff specifically in a minute. But the general reminder is, every time you touch or adjust your PPE, you should be washing your hands. That's one of the biggest things. So when you're working in a facility that you're wearing a surgical mask all day long, if you walked out of the patient's room and you washed your hands or whatever and then you're doing something else, then if you touch the outside of that mask, that is considered dirty, and so you need to hand sanitizer wash or your hands again at that point.

Another person just wrote in that they had heard CDC recently changed the guidelines to 10 days post symptoms onset. As of a week-and-a-half ago when I checked the website, they had not changed that. I have not gone back on the CDC website in the last week-and-a-half. So, I think May 5th or 6th was the last time I was on there, I know a lot of these were May 4th, but I think May 5th or 6th was the less than on there, so that is possible that the CDC has changed it to say that it has to be 10 days post their symptom onset, which I would be well in favor of. But that's sort of the guideline places we're using right now, so keep an eye on that. Like I said, it used to be 14, it was changed to seven, now it may or may not have been changed back to 10. So a couple things about donning and doffing PPE. First, you wanna don and doff away from the patient environment. So, if you're in an acute care or a rehab setting, do this

either in the designated area or outside of the patient's room. So, some of our acute care hospitals, like the one I work per diem, in an acute care hospital, typically, I do outpatient cardiac and pulmonary rehab, but that's obviously now all shifted because of the issues here. So, we have designated that this is a red COVID zone, versus a yellow zone, versus green as the rest of the hospital. We don and doff in the yellow zone to go into the red zone and come out of the red zone. So it might be like that and your facility or agency or it might be right outside the patient's room like it used to be in the past. If you are in home health, you really wanna do this outside. I know this becomes an issue because of HIPAA.

People in the neighborhood or in their apartment building or whatever will see you getting gowned and gloved outside that patient's home or their apartment, and now you've blown HIPAA because they know there's an issue. What we recommend is if it's a home, if you can go in a backyard or in a garage or something like that to don and doff, that's great. If you're in an apartment building or something like that and you really can't, then we say, do it immediately inside the door for both your donning and doffing and stay away from the patient as you do that. The key procedures here, when you're doffing or donning your PPE, make sure that that area between the glove and the gown is covered.

You don't want that little area of the wrist exposed. If you're wearing an N95 mask, make sure that the seal is on there. So take a few breaths in and out first to get that seal on your face before you then approach the patient. When you're doffing, this is a key issue. And you can see that very last bullet on this slide. The greatest risk of spread of any virus of this type of thing is when you're doffing. Because what happens is people start doffing their gowns especially, and if you don't do it correctly, you're spreading the virus through the air. So, it's really important, when you take your gown off, take your gown shoulders first and start rolling it into itself, taking the gloves off inside out, and then lots of hand hygiene. We're gonna touch on masks. But in the

past, if we went into a negative pressure room and needed an N95 mask for whatever reason, when we came out, we threw that out. Well, we cannot do that at this point, N95 masks are like gold. So we are reusing N95 masks. So, depending on what your facility is using, and we'll touch on this in a minute, you need to make sure you're storing it correctly. Big thing is, the outside of the mask is considered dirty. So when you take it off your head with those straps, do not let the straps, which are also dirty, touch the inside of the mask, because the inside of the mask is your clean area that you're gonna go against. So those straps and the outside of the mask need to stay outside and not touch the inside of the mask. And then we'll talk about storing when we talk about it, too.

How to don and doff, and what equipment you need, I'm not gonna go into a ton of specifics here because every agency and facility are gonna be a little different. What I would say is Jayco has standards that your facility or agency had to follow to begin with, those probably have been modified a little bit because of COVID-19, so just follow those. If you are, let's say, doing home health as an independent contractor, and so you don't have policies and procedures other than what you've created, you can absolutely use the CDC's.

That's what most facilities are kind of using anyway. But this way, if you don't have your own to begin with, if you're an independent contractor, that's what you wanna use. So and this is, these both came directly from the CDC website, so feel free to go right there, use them. This is the process or the steps in order of how you should put on your equipment, too. The only thing that varies a little bit is the mask, if you are reusing the N95 mask. So, in the past, you'd put the mask on and you'd put gloves on, no big deal. Well, now, since those masks are considered dirty, because you've already worn it once, you're gonna put gloves on, put the mask on, but then take those gloves off and put fresh gloves on. Because that mask was considered dirty. So we're gonna go through a little bit through some of the PPE. I'm not gonna go in really in-depth

'cause everybody will use it a little differently, some people are using it, some people aren't. So eyewear, you can either use goggles, glasses, or a face shield. Single versus reusable. Reusable is really recommended because of the PPE shortage, and this is one of those areas that luckily most places have a lot of face shields, glasses, and goggles. So we're not tending to run as low on those face shields a little bit. If you wear glasses, it's up to you which one you wanna use. Some people find goggles can go for glasses okay, some people find the face shields better 'cause it doesn't fog up as easily. It's up to you. A lot of little tricks and treats out of there of how to keep your goggles or your glasses from fogging up if you wear glasses, then you have to do goggles over them. So, feel free to ask around or Google for those types of little tricks of how to not get your glasses fogging up.

If you use the reusables, it is important that when you go to disinfect them that you do it correctly. You wanna clean the inside of the lens first, then the outside of the lens, and then the whole rest of the frame. You want that area that would be near your eye cleaned first, so that that way, if there is anything else, any other areas, you're not putting that inside. Once you've done that, let them totally dry for whatever the kill time is for your disinfectant. Some are a minute, some are five minutes, whatever the kill time is for your disinfectant, let them totally dry.

Then, if they're streaky, you can run them underwater and use a paper towel or whatever to dry them off after that, because you've let the germs already get killed first, and then you can kinda wash them so that they get a little bit less streaky. For gowns, single gowns are still preferred at this point because a lot of the reusable ones aren't waterproof. However, now, we're starting to run a little bit of a shortage on gowns. What I'm really hearing from a lot of home health therapists is they struggle. I had one therapist tell me a week or so ago that they were told they get one gown, and that has to last them the whole day. So it's a little tricky. You definitely want something that's waterproof, if you can. And that's why like those surgical gowns or the reusable ones

weren't as preferred 'cause they're not usually as waterproof. The other thing is to make sure your gown is tied nice and tight because we move a lot, we bend, we shift, and you don't wanna be exposing more of your clothing underneath if you're moving around. When you're doffing, as I talked about, make sure you take it off correctly, do not shake it out. If your facility is making you reuse those gowns, there are some options of how to disinfect after each one, but just be really careful that you don't shake it out or anything like that. If you have to spread it out and use disinfectant on it, make sure you're in gloves for that, definitely, and mask and flat goggles and that if you can, but definitely make sure you do it very carefully, very quietly, so that you're not possibly spreading any of that up into the air that you're then gonna breathe. As a last resort, if your facility runs out of gowns, you could use coveralls or a lab coat, but again, they're not what we would prefer.

So, the masks. Surgical masks are for everybody that does not have COVID-19. So that's what we're all wearing around outside, your cloth masks, surgical masks are a little bit better than a cloth mask, that's great. If a patient has COVID-19, that's when we run into that, do we wear an N95 or not? The recommendation is an N95 mask for somebody that is COVID-19 positive. That how many days is where I get into the sticky place. So, people in the hospital setting, they're not having much issues with this, they're really able to get those N95 masks. I mean, there's a shortage, but we're able to justify using those N95 masks.

Where I've had so many people around the country contacting me is the home health and subacute, LTAC kind of areas, where they're saying, "My facility says I'm just at a surgical now, "can you give me something that proves I need an N95?" And, as I've said, at this point, we don't have anything that proves you need an N95. We're working on, within APTA, working on some documents that may help support PTs getting longer use of N95. But at this point, all we have is a CDC guidelines, and so you have to kinda just go with those. But you can also, as I said, there's a few different

documents out looking at the justification that PT is a close contact situation. So that is similar to an aerosol generating procedure, which usually validates the need for an N95 mask. So if you can get an N95, use it. If you can't, surgical might be all you can. And, again, if you run into big issues, email me and I'll try to help you as much as I can. 'Cause I'm a big proponent that if we can get N95s, we should have them. I mean, we should not be putting ourselves at risk when we don't need to. The big thing with N95 is you do have to be fit tested for it and you need to make sure you know, are you a size small, or size regular, or a size X-large, and you need to make sure you get a good seal. Most places are using masks, as I talked about, know what your facilities protocol is. Is it based on number of hours worn?

Is it based on number of times worn? I actually heard of a therapist a week or so ago tell me they got one N95 mask and then and they were told this is your mask. So, they weren't even given an end date, they were basically just told this is the only one you're getting. That's a scary situation because they don't have an exorbitant amount of time and it's like an endless date. So, figure out what your facility's protocol is. A lot of times, it's either a certain number of times worn or certain number of hours worn. When you store it, you wanna store it in a dry place that is open to air.

So, a lot of times, what's really kinda being used and what's great is a paper bag, like your paper sandwich bags that you take your sandwich to bag lunch to school in, cut a part of that off and just put your mask in there. Just be sure, again, when you put it in there, that the straps don't touch the inside of the mask. All your equipment. If you're in an inpatient or a rehab setting, try to leave everything outside of the room as much as you can. If you're in home health, try to leave everything in the car as much as you can. Whatever you do have to bring into either a patient's room or a patient's house, just be aware of what you're setting it down on. This applies the most probably for home health because you have a lot of stuff you have to bring with you. A lot of different ideas out there for how to protect your stuff. So, you can either bring in a piece of tarp

or a newspaper, put that down on their table, and then put your bag or your equipment on it, and then when you go to leave, you can wrap that tarp up inside itself, put it in a ziplock baggie, and then you'll be good to go. If you wanna do a newspaper and then just throw it out in there, that would be fine. Some therapists have told me, too, what they started doing, which were quite idea, was a garbage bag. So, they would take just like your smaller garbage bag, put all their stuff in that, bring the garbage bag in there, set that down on the table, and then that way, when they left, they could just fold that garbage bag up and throw that out in the patient's house as well. You do want to leave all of your dirty stuff at that patient's house as much as you can. Now, I know that runs into a rest, but sometimes you're in a setting in a home health where they're saying, "No, you can't," you work with your facility or your agency to figure out what you can and can't do at that point.

You should not have to really bring it into your car if you don't have to. But it's, again, up to you our facility. There are some places that won't let you throw it out in the patient, or agency, I should say, there are some places that won't let you throw it out in the patient's house, and then you'll have to kinda look. At it that case, I would say, double garbage bag in your trunk so that that way it's not being in contact with anything else. Somebody had written in that they'd be a little bit more nervous about permeability of newspaper.

It just depends. As long as you're not putting it on a wet surface, if you've double-layered the newspaper, it should not be able to go through there. But, again, that's why I recommend a tarp or something like that. You can cut a tarp to sort of the size of your bag, and then, like I said, you can fold it in itself, put it in a ziplock baggie, and then you know you're good. And then when you get home, you can disinfect it and you can have that again for the next day. Whatever your facility recommends is what you wanna sanitize with afterwards. So, blood pressure cuffs, stethoscopes, things like that, a lot of patients, luckily, they're able to get those ones when either the PT or the

nurse opens the case, they're able to get the disposable ones left in the patient's house, so you don't have to bring that in yourself. But other stuff that you might bring in, whether you had to bring in some weights or you had to bring in your stethoscope or whatever, use the facility or the agency's disinfectant for that one. Pulse oxes, it depends on your pulse ox. So the ones that we use at our facility, we can use the alcohol-based cleaners on them. Some of your finger ones, you can't, because it will cause build up over the laser and it won't breathe correctly. So you have to kinda look at which pulse ox you have and what cleaners are approved to use with that pulse ox. If the patient has one in their home, just use theirs. Or if it's an inpatient or rehab setting where there's one being left in the room, just use that, that makes life a lot easier.

And then that last bullet there is just a reminder that softer surfaces, the virus live shorter, on higher surfaces, the virus lives less on, but softer surfaces usually are tougher to clean, harder surfaces are easier to clean. So just keep that in mind as you're doing things, within a person's room or their house, what surfaces you're coming in contact with. If it's a harder surface that you can wipe down yourself, do it. The more you know that you're disinfecting, the better. If it's a softer surface and you can't, then maybe try to just avoid that surface a little bit. So now, we're gonna really get into the nitty gritty of our patient care.

We're gonna start in the acute care and we're gonna start in the ICU. And, at this point, I don't know how many people on this webinar are in which kinda setting because everybody's kind of in a different setting at this point. So some of this will apply to you, some may not, but it's good for everybody to know what the abilities are in these different settings. Because if you're working in an ICU, it's good to know what's gonna happen later on for them when they go to home health, how can I help set them up for it now? If you're working in, say, subacute home health, something like that, what do they look like back in ICU, what do I expect coming to me? So we're gonna start right

in the ICU. Proning or positioning. In-prone has been a big thing that came about. We, as PTs, have not been highly involved in this in the past. Usually, we did a lot of upright positioning, we did postural drainage, we didn't have to do a lot of proning because we didn't have a lot of patients requiring that. This is a huge thing for COVID-19. We have found that it's a huge benefit. It may help prevent people from even having to go on the ventilator. So, it's important for PTs to know about it, and if we can be involved in the proning team, that's even one step better. And what happens here is, because that fluid is in the interstitial space, it's that gas exchange is the problem. When we put somebody in prone, the majority of our lung volumes are through the posterior and basilar or lower segments of our lungs. So, when we put somebody in prone, we're pulling that fluid more towards the anterior areas, but the volume of air still isn't in that area. So, we've actually, in effect, created more surface area for that gas exchange to happen, even though we technically didn't change anything in the person's anatomy.

And so that's why proning really helps. It might prevent them from needing a ventilator, or it might just help stabilize them on a ventilator or on whatever oxygen they're on. You gotta follow your facility's protocols. There are a bunch of great publications that are coming out on these two. So, if you don't have a good facility protocol, you can kinda look up some of the studies that have been coming out. It's typically a very prolonged extended period of time. We're talking 12, maybe 14, maybe 16 hours that the person in an ICU is in a prone position. What we can also do in that, is if they are not sedated, we can help work with them in that position on some of the other breathing stuff. Most of the time, people go in prone are probably going to be sedated or at least a little bit more unstable, that maybe were not working as much on their breathing. But we kind of, if they're able to, we want to. Other things in the ICU is we do wanna encourage upright position and mobility as much as we can. So, if we can get somebody sitting at the side of the bed, if we can encourage upright standing, any inspiratory efforts, so trying to get deep breathing, trying to get diaphragm moving, anything like that to try and get greater inspiratory volumes, that's gonna make a huge

difference for the patient. We also wanna look at prevention. So skin breakdown was something we talked about. Prolonged immobility, we're used to doing pressure relief for ischial tuberosities or sacrums or any sort of the heel issues through calcaneus or Marioli. But now, we have to think of new ones when we put the patient in prone, too. So really think about all of the positioning with proning or other ICU positioning and how do we help prevent that skin breakdown. And then muscle atrophy. We have these patients that are very unstable and very ill and just not able to move much. We wanna try to encourage as much movement as we can. Can we at least do isometric exercises with them?

Can we at least do general range of motion or active assistive so that we can kind of prevent as much muscle atrophy as we can? We wanna reduce the need for ventilator use. And, as I said, any of those inspiratory techniques, the only other one on there that I didn't mention, the IMT, inspiratory muscle trainer, I'll touch even more on it there, but we might be able to use that starting in an ICU, otherwise, we're definitely gonna use it starting in an acute care setting. Breath stacking and holding. So that's taking a breath in, taking a little bit more on top of it, that's breath stacking, or an inspiratory hold is taking a breath in and then holding it for a second or two before you release.

So any of those kinds of things. We have our ICU delirium issues. We wanna try to manage delirium as much as we can. And I've given some few different scales there that have been shown to be very reliable and valid in an ICU setting to help with that. And then there's also the ICU mobility scales and the bullet right below that. All of these are great scales that those that are working in ICU, you're probably already familiar with these scales. But many people are now working in ICU that maybe we're just doing general acute care before, these are scales you wanna make sure you're familiar with, and if you can use them with your patients, they're very beneficial. This is another thing that's really beneficial in an ICU, it's the ABCDEF Bundle. So A is the assessment, prevention, and management. And then it goes through B, C, D, E, and F,

and I'm not gonna read them to you, you can read those. But the biggest thing I wanted to cover on this slide is this should be a team involvement for this. We wanna be part of that team. Early on in the treatment of COVID patients, PTs were kinda getting left out because there was a worry of using up too much PPE. Now, that's starting to come around a little bit that people are realizing we need to be involved. So, even if you're not in the patient's room, you can be involved in their ICU care. You can be looking at the chart and then asking the patient questions through the door or through the nursing staff. I've had PTs tell me that they've called in and talked to the patient and interviewed them on the phone, that way, to get an idea of how they're feeling and what kinds of recommendations we can make. So, this ABCDEF Bundle Strategy for ICU, this should be done as a team.

So, this is the physician, the nurse, the PT, the respiratory therapist, PAs, nurse practitioners, whoever is involved. We wanna prevent ICU-acquired weakness. There are a whole lot of talks specifically about this, so I'm not gonna go way in-depth on here, it's also not my specialty. I did ICU care years ago, I have not done much in the latter part of my career now. So it's important to make sure though that we prevent this ICU-acquired weakness. It is different than what we're seeing with some of our others patients.

So, ICU-acquired weakness, in general, is muscle atrophy or wasting, we can get some myopathies or polyneuropathies, or both. And that last bullet there, and the last two bullets there, really show the long-term effect of ICU acquired weakness. And this was not even COVID related, this was for people in ICU with other medical conditions. There was a higher one-year mortality rate, there were quality of life issues, there were poor health issues, function issues, for several years after their ICU stays. So, we don't have enough data on COVID-19 patients yet, but I assume this is going to be the same or even worse, because they're spending higher amounts of time in ICU and longer amounts of time in the hospital in general. PICS is the other one that I wanted to kind of

bring to your attention. So post-intensive care syndrome. This is when you'll see issues with people both physically, cognitively, and mental health. And so those sort of three domains are where we'll see issues. And those can have problems for, again, up to 12 years after the ICU stage. So, we're not even talking one or two years, we've seen people with some of those physical and cognitive and mental health issues years and years later. So, it's really important if we can help minimize that as much as we can while they're in the ICU with us. And so, those are the three domains and what are some of the symptoms we see in those domains. So now, I'm gonna talk specifically about acute care, but not specifically about ICUs.

So these are the patients that either never had to go into an ICU or they've now come back out of the ICU onto the general acute care floors. What's our involvement? We really wanna do a lot of positioning, get them upright as much as we can, any kind of general conditioning exercises. Is it supine, is it sitting at the edge of the bed, is it standing, whatever we can get them doing the best. Bed mobility and transfers. Ambulation stairs as much as we can. Now, this may or may not be limited if you're allowed to take the person out of their room or not. Some places, you're still not because of the issue of we're trying to minimize the infection rate. So you might have to just be walking back and forth from the bathroom to the bed, bathroom to the bed in the patient's room.

But as much as you can, work on ambulation or stairs. Biggest thing here is focus on their safety, and then the endurance as much as you can. Inspiratory muscle training, I said I would start to touch on. So these are the special devices. There's about three or four big name brands out there. I don't find any one is any better than any others. I've used probably three different brands. There's one brand I think I've probably never used. But there's about three different brands I've used, it doesn't matter. The point is just get one started at this point and we'll keep touching on how do we use those. So, for inspiratory muscle training, you can go basically with diaphragmatic breathing

exercises, or you, again, can go without a device, doing deep breathing, the inspiratory holds, or the stacking, or you can use a device. Now, when you use the device at this stage, I would say go about eight to 10 breaths, two to three times a day. So I would do it with a patient first, figure out what intensity level they need. Most of these work on a dial with a hole system. So one hole is more intense, one hole is less intense, and there's usually anywhere from four to eight holes to choose from. So do it with the patient first like you would an exercise program, figure out what intensity level is good for them, and then prescribe to them, "Okay, I want you to do this eight to 10 breaths, "two to three times a day." The other thing is, though, they don't necessarily need to do all eight to 10 breaths right in a row, that might fatigue them a little too much. So have them take two or three breaths with it, take a couple normal breaths, then another two or three breaths with it.

But the more they do it, the more we're going to build strength. It's just like lifting weights with your bicep to build bicep strength, you're trying to build inspiratory muscle strength, because the more of those muscles strength returns, the more volume somebody can get in, and then the less complications and more endurance they'll have. So, these are some parameters when we're not in ICU. Modes are as of that last slide that I talked about.

So, all your walking, exercise, all that kind of stuff. Duration. Goal is to work them up to about 12 to 20 minutes of continuous activity. So I would start maybe three to five minutes, and they might need one to two minutes of rest, they might need even more, and then I would go another three to five minutes. So you do it as intervals with rest. We are seeing that patients with COVID-19 have much greater rates of dyspnea and fatigue. And so that's why I said, typically, we'll go three to five minutes with a one to two minute rest. Well, with some of our COVID patients, we're going three minutes with a five-minute rest, and then three minutes with a five-minute rest. We will build out of that though. So start with whatever duration you can get, and then build on that as

much as you can. And so, if that last bullet says you might need longer rest, but the goal, by the time we send them home, hopefully, is to get about 15 to 20 minutes of overall activity. And that might mean that they're still resting five to eight minutes in there, but at least we're getting them active for a good 15 or 20 minutes. The intensity level, and I'm gonna show you these scales, again, in a minute. But you want people to be about a 12 on the Borg Scale, which is their rate of perceived exertion, and a two on the Modified Borg Scale, which really is a dyspnea scale. Realistically, they might be kind of higher than this because that's sorta what we're seeing with patients with COVID-19. But we wanna try to exercise until they're up about a dyspnea of three or four, and then rest, and then exercise again. And so you're gonna just adjust the intensity and the duration as you can within that sort of rate of perceived exertion and perceived dyspnea scales.

The frequency in our acute care, again, still is where we are. We wanna try to go a good five to seven days a week if we can. I know that's not possible in every facility, you don't have the staffing or you don't have the PPE that they're allowing you to treat them that much, I'm not sure. So, at this point, that's the goal, is five to seven days per week, but if you can't see them every day, you wanna set them up with exercises that they can be doing on their own. That can be the inspiratory muscle trainer, but you also wanna do some other kinda maybe sitting exercises or standing exercises if they have the balance, maybe some walking if they're stable balance-wise and safety-wise. So those kinds of things. Here are the scales again. So the one on the left there, that's the Borg RPE Scale. Runs from six to 20, this is that exertion of how they feel they're doing. We want them at 12, which is still kinda light, we're not quite getting into hard yet. The middle scale is a general dyspnea scale, but the right is the other scale I mentioned, the Modified Borg Scale, this is for dyspnea from a zero to 10. We want them to go about a two or three with a slight or moderate shortness of breath. They might go up where they'll say they're a six. Well, if they got to the six, okay, then just let them rest, and then try to do something again when they're down around a two. Energy

conservation. So this is an interesting one, because typically, with restrictive lung disorders, which is like an asthma or a pneumonia, we don't recommend energy conservation for a patient, we want them to be as active as they possibly can. However, COVID-19 threw a wrench into that. We want them to be as active as we can, but the patients tend to have more dyspnea and fatigue, and those symptoms tend to go on for weeks and weeks after their initial symptoms and hospitalization. So we might need to teach them energy conservation as well as being active. And I'm not gonna go way in-depth on that, but some of that last bullet there is just some of the things we consider with energy conservation.

So I would tell the person who wants you to be as active as you can, we're trying to push your activity level. However, if you're then fatigued for the entire day and can't do anything else, that didn't do us any good. So here are some other techniques to manage your daily activity so that we can push you a little bit more with your exercising activity. And so that's how I would sort of play the home exercise program of exercise and activity along with energy conservation.

There was a question from one of the audience from are we using O₂ sets to guide when patients require rest any range? I would use those with the vital signs. And we'll touch a little bit more on those as we get more towards the outside of the acute care. The problem we're finding is that the pulse oxes or the SaO₂ readings are not completely representative of the PaO₂ in people with COVID-19. So we always kinda give a little bit of a caution with that on any patient. But with patients with COVID-19, we're seeing that even more. So I definitely would still use them, and I would use your general rules of you want the patient at least above an 88 or 90%. It depends on your facility how low they're letting you go with these patients, and it also depends on how stable they are or not. Are they on four liters of O₂ or are they on 15 liters of O₂? I'm gonna try and keep that sat as high as I can with everybody, but I'm gonna be a little bit more cautious with somebody on 15 liters 'cause I don't want them to be saturating

down so much that we cause more complications that they have to go on a ventilator. Versus somebody at four liters of O₂, I might let them drop down around 88% and then rest then come back up. That person on 15 liters, I might not wanna try to get them anyone lower than 92%, because once they go low, I might not be able to get them back up. So there's a lot of play within that, but absolutely, use vital signs and O₂ stats as some of your guidance for how much to push somebody or not. Those previous were sort of ideals. And what we're sort of seeing is that, as I said, sometimes, we're not involved in the ICU setting, so we wanna help as much as we can and get involved as much as we can.

The other part of that is, a lot of times, we're trying to get people out of the hospital as soon as possible. And so, they might not hit full independence. Like we used to be called in, "Can you clear this person and to be safe to go home?" That's not necessarily even the case anymore. Now, we might say, we want the person to go to a subacute or LTAC, and the patient will say, "I'm not going there, I wanna go home with my family, "I don't wanna be exposed to any more issues." And/or we might have a subacute or an LTAC that says, "We're not taking patients that are COVID-19 positive." And so they might have to go home even though they're not independent.

So really, work within your individual settings and with those individual patients to figure out what's the ideal for that patient. If the person really needs more care, and they might not be getting it right away, or they're gonna be getting home PT but that might not start right away, work a lot with the family and the patient to educate them as much as you can. You can do Skype stuff, Zoom stuff, in a HIPAA-approved kind of way. I mean, it's not directly on Skype or Zoom, but there are some telehealth sort of things that still relate to HIPAA. Or if you have the patient's permission to go ahead and call the family member or do a FaceTime or something, then you can do it that way as well. So now, we're gonna kinda work into a post-acute. what are some of the symptoms and presentation first, and then the interventions? There isn't a lot of great

data right now. There are several studies that I know of personally, and so I'm sure there's probably several more that I don't know about probably, 20 more I don't know about, that are going on looking at what do these patients look like when they go home, medically and functionally? What we do know from the little bit that everybody's sharing around the country and around the world with each other, is some may even still have that fever if they're quickly discharged home from the hospital, most don't. Most, they'll have that persistent cough, they're definitely gonna have this moderate severe decrease in endurance, fatigue, the malaise, still, a lot of muscle weakness issues, and a lot of dyspnea even with easy activity. So something that used to be really easy, not so much anymore. So now, what are those considerations then? Well, first, we wanna kinda look at that patient presentation.

Right now, they still do have somewhat similar presentations to say other people in the ICU with ARDS, but what we're seeing is there's really a much more severe decrease and endurance and dyspnea. So, regardless of what we've seen in the past, these patients are much more fatigued and much more short of breath, and this can go on for weeks after they're discharged home. And so it's really much different. The other issue is, we are seeing a lot more muscle weakness, not always atrophy per se, but a greater muscle weakness. So, even more so than similar pulmonary patients who are ICU stays. And so we gotta be aware of that...

So that you can say, "Okay, I can't treat them the way "I would somebody else has just been in the ICU, "I'm gonna expect a lot more muscle weakness," but more importantly, to educate them on that. Because something, like I said a minute ago, something that was not exercised before might be now. It might be exercise for them to walk from their bedroom to their bathroom or out to their mailbox to get their mail, or whatever it is. So, you might have to really talk to them about that 'cause we're seeing a lot more muscle weakness and a lot more decreases in endurance. Somebody wrote in, "Many acute rehab units "and facilities are taking these patients." Yeah, we are

seeing that a lot more now. Early on, a lot of subacute and LTACs and acute rehabs were refusing these patients. Luckily, that is not happening now. A lot of places are actually setting up specific COVID units at their facility so that they can manage these patients without risking infecting any of their others. I know, I'm in New York State, we had a huge issue over the last few weeks with the numbers in nursing homes because of some of the other stuff that was going on. And, again, we'll get into all these background things, but some of our nursing homes were having huge outbreaks. And it was not that they were being irresponsible, it was that the setups and the protocols and the PPE they had in place were not adequate for what they were dealing with. Now, a lot of places are saying, "Okay, this will be our COVID wing, "or this will be our COVID building."

And so, they're setting themselves up to really help address some of those issues. So, yeah, a lot of the sniffs, subacutes, LTACs are starting to really take these patients and do well with it. And that's really our wheelhouse as PTs, too, to say, "Look, we can take these on, "and we can take these patients "and help them get better in a safe way." Another person had asked, "Are you recommending cardiopulmonary outpatient PT, "or would a regular outpatient PT place be good?" The problem we're seeing right now is that there aren't a lot of places opening yet, outpatient.

They're just now starting to open back up. Most of the country, or I shouldn't say most, several areas of the country started kinda opening back up last week. New York State, we just got the approval yesterday to start opening back up certain things, but that's not including outpatient therapy places yet. Now, some have stayed open the whole time for certain types of patients, so I can't give a good yes or no answer. As I said in the beginning, I do outpatient cardiopulmonary PT. We've been in talks, we're looking at hopefully by mid-June to end of June, so we're talking probably another two to four weeks from now, we will have our outpatient settings open back up for outpatient cardiac and pulmonary rehab. At the end of this talk, I'll touch more on that and we'll

touch on what will that look like for places. But yes, I would, as we get a little further out and those places open back up, I absolutely would recommend outpatient pulmonary rehab for these patients. So the PPE recommendations, and we kinda already touched on this. N95 masks, preferably up to 14 days. CDC might be saying seven or maybe 10 now. That's the one reference I was talking about that I said you guys email me, I forgot I did specifically put it in here to cut down on the number of emails I might get. But that Thomas reference there, they have, in sections 5.1, 6.1, and 7.5., they're very specific about how PT is a close contact profession, and therefore, we require the same equipment as aerosol generating procedures.

So that might be something to help you fight for N95 masks if you need to have that fight. Some general notes about oxygen. And this was kinda touching back to some of the things we talked about already with PaO₂s, SaO₂s, many of these patients are gonna require supplemental oxygen if not most of these patients. The goal for us, whether we're in the ICU, the acute care, or any post-acute care setting, we wanna try to wean down in oxygen as much as possible and wean them off of it as much as possible.

So, if we can get them back off the oxygen, that's what we want. We're gonna need to watch those two saturations closely, but as I'll talk about in a minute, it may not be super accurate. I did also give you, although this isn't specific to COVID-19, it was written a couple of years ago before COVID-19, there is a practice guideline on supplemental oxygen for PTs, and so I gave you that reference, that that's a good reference to go to, too, if you need some kinda background on some of the oxygen stuff. Some other considerations. If they used oxygen before this, we're not gonna get them back off of it. We may or may not be able to get them back down to the level they were at. Let's say they used to use it intermittently, they might need it continuously now, we're not sure. But if they didn't use action before this, we are most likely going to be able to get them weaned off of it. I have heard of very few cases where the

people stay on longer term oxygen because of COVID. We almost always gonna get people weaned off of it. How do we do that? Well, one of the best things you can do is get a tight ration order. So I gave you just sort of an option there at the bottom or an example of one because, a lot of times, PTs might not have this in their standard orders from doctors. Get something that says you are allowed to titrate that oxygen based on the person's saturations and presentation. Because, like in New York State, as it is in most states, oxygen is considered a medication. So, if the doctor wrote for the patient beyond two liters of oxygen, I can't change that oxygen level at all. The person could be seen there at 76% oxygen SaO₂s, I can't change it because the doctor wrote an order for two liters, and that's a medication and I can't change it. I'd have to get ahold of the doctor, get them to change it to a patient, yada, yada.

But, if you go in and get an order from the doctor with one of these titration orders, that allows you. So, I could have written on that very last little bullet, I could have written, "Going from zero, to seven liters, or eight liters, "or 10 liters, whatever it is." That way, I can titrate the oxygen with the person based on their O₂ stats and on their own other vitals and on their presentation. So that's a really good thing to think about in your settings, is to get a titration order so that you have that ability to change that. This is where we go back to the pulse axes.

So, if they have their own, absolutely use it. If they don't, use yours and you're gonna clean it as you can. But that second bullet is where I was touching on. We don't have a lot of research yet. But anecdotally, what we're finding is that the patients that the patients that had blood gases in an inpatient setting, their O₂ stats didn't match the blood gases. They actually grossly underrepresented it. So, on the pulse ox, it might have said they were 96%, but their PAO₂ is so low on a blood gas that there's no way that even if they were saturating at 96%, it wouldn't have been good. So, we're struggling with how accurate is the pulse ox or not, we don't know. It might not be as accurate as we'd like it to be with patients with COVID-19, but the whole point is, it's

the best thing we have anyway, we don't have anything better. So it's better to use it and maybe be a little bit off, and so that's why you would use your vital signs and your patient presentation along with it, than to go with nothing and then you have nothing. So kind of again, use it along with your vitals, but realize it may or may not be perfectly accurate. And as I've talked a couple times now, just make sure you're cleaning what you can and can't do. So, this version that's on there, these are the types that might not be able to be cleaned with a regular alcohol cleaner, you might need to have to look and see. So, now, we're gonna talk specifically about the care. So, what's the mode, duration, all that kind of good stuff. So, our primary goals is endurance, strength, independence, and safety. As I talked about, these patients usually have longer hospital stays, they might have ICU acquired weakness or picks, they might have more dyspnea and oxygen desaturations. So endurance is a huge issue for all our post-acute settings.

Strength, as I talked about, they have a lot more muscle mass issues than some of our other ICU patients. Not necessarily always atrophy, although we usually see that too, or we haven't seen that too, but a lot of muscle weakness, so that's something to really focus on. Independence, which it's not sure, but a lot of people are getting sent home so fast from the hospital that they just might not be fully independent. What percentage of that? We just don't know yet. And hopefully we'll know over the next month or two.

And then, safety goes along sort of with that, because it's such a big thing with all this weakness and endurance, we really have to look at their safety and their independence level. So, from the endurance standpoint, on average, what we saw from a study out of Wuhan was that they had an average of 28 days in the hospital. We don't have any great U.S. data yet. That could be different just because of differences in how we treat in hospitals versus they do, I'm not sure. But we anecdotally know that they are staying longer in ICUs and hospitals than other patients with similar respiratory conditions. We are seeing a lot with ICU-acquired weakness and PICS, and those will affect an

endurance a lot. And I have some references in the reference on how to look at some webinars that are going on about ICU-acquired weakness or PICS. So, if you have patients having those, it might be good to check out some of those webinars. We're really seeing that moderate to severe decrease endurance. And this is sort of correlated, or I should say, mostly correlated with the severity of the disease progression. So, if patient had a mild case versus a moderate case, they're probably gonna have a little bit less endurance issues than the person with the moderate case. But, at the same time, almost all patients are reporting a decrease in endurance. So, even those mild cases, we're seeing this with. And dyspnea and high respiratory rate were really shown to be predictors of severe disease or death, so we will wanna keep an eye on those.

So, what do we focus on? Well, we're gonna focus most of our pulmonary care on that endurance. We want quantifiable measures of endurance, how do we progress it, and so we wanna kinda look at that. Our interventions are gonna need to take into account more frequent rests, working up to sort of that longer duration, and we wanna make sure we write goals on that as well. So, first mode would be aerobic exercise. Wherever you are, use what you have.

Are you in a subacute, LTAC kind of environment? Are you in a home health? Whatever you have available. So, ambulation, stairs, pedaling. If you're in a home health and they have their own equipment, like they have a treadmill or a bike at their house, that's great, use that, too, whatever mode you have available. The duration, we're gonna wanna do intervals. We're probably not gonna use high intensity training, which is what hit us. That would just create more of a problem with droplet precaution. When you're working at those high intensities, people are breathing heavier, it also might encourage coughing more, which would expel some of that aerosolized virus. So we do wanna probably keep our intervals at more of longer types of things. So, low intensities, longer durations, versus that high intensity training. So that intensity, lower intensity, and

there's a reference there where they really showed you should probably stay in that lower intensity to start with. But we wanna make sure we're not under training too. So you don't wanna work at such a low level that the patient's not even really gonna improve. So make sure that you get to at least that two to three range on a dyspnea scale, the modified dyspnea scale, or try to get upwards towards that somewhat light to somewhat hard kind of workload. Don't let them work too light even though you don't wanna push them too high. Frequency is gonna depend on the setting. Your rehab, subacute, your LTAC kinda settings, you probably gonna have a little bit more frequency of maybe a three to five, or maybe even a seven day a week, versus home health, hopefully two to three days a week.

I know a therapist in the New York City area that it's getting a little better, but the first couple of weeks, she was told she got to see a patient once per week, and the rest, she had to just tell them what to do on their own. So it just depends on your setting what frequency you might get. So, for those intervals, here's sort of some of the guidelines I've given you. The activity early on in your rehab, activity for X-amount of minutes, rest for about half of that time. So, if you worked for, say, five minutes, give them about a two-and-a-half minutes rest, and then another five minutes of exercise. The other example I gave you there is two minutes ambulation, rest for a minute, two minutes in ambulation, rest for a minute.

However, that's sort of a guideline. If they need longer rest, let them do longer rest. If they can go longer durations, let them do longer durations. The goal is to accumulate as many minutes as you can. Early in that rehab, we're looking at 15 to 20 minute range, again, because that's sort of where we're taking off from the acute care, but then we wanna push that as we get further into our rehab with that patient. Progression of that, increase the activity, one session, decrease the rest time maybe the next session, and you kinda can go back and forth that way. But you don't wanna do both on the same day. So try to increase your duration of the activity they're doing, and then

try to decrease the amount of rest that they need. No matter what, you wanna increase duration even more before intensity too. Breathing early on in our rehab, use those inspiratory muscles to train your devices again. If you have to do diaphragmatic deep breathing, breath stacking at this point still, too, that's great. Hopefully, at this point, they're stable enough. Those won't be as beneficial. But here's where your inspiratory muscle trainers might help to really build more of that inspiratory strength. You also might wanna teach deep breathing with ambulation or exercise or timing with exercise. Patients might get more short of breath during their ambulation of exercise 'cause they're not sure how to work those two together.

And so, that's where your breathing training kinda changes. You're not necessarily just teaching them deep breathing and breath sacking, now it's okay, now we're gonna look at how do we time your breathing with your activities, or how do we get deep breathing during activity so that you're able to go for longer activities? The progression. With an inspiratory muscle trainer, you're gonna progress their resistance with any of your other ones. It's really just once you've taught them that, they'll need to use it less and less. Somebody had written, "And do you want them to recover in dyspnea "or in board scale before resuming additional exercise?" You don't necessarily have to recover 100%, but you want them to recover to a point that they can go forward again stable. So, let's say they got to a three on a dyspnea scale, you don't need them to go all the way back to zero, but you'd like them to go back down to like the one or two.

If they got to a Borg Exertion Scale of say, a 14, which is getting towards that harder range, we'd want them to get back down around a 10 or 11 where it's sort of light. So, yes, you want them to recover a little, and same with vital signs, you want them to recover a little, but they don't have to come all the way to baseline before you can exercise again. So, still continuing with aerobic exercise, there aren't clear cut guidelines, so that's why I kinda gave you those little bit of guidelines I gave you to sort of give you an idea of where to go from. Even with a general population that isn't

COVID positive, we don't have specific clear cut guidelines that you always exercise at this intensity for this person, because everybody's very different. So, I would say, look at those vital signs, look at their symptoms, and sort of adjust from that. And those, go back to the settings there, that last bullet, the one other thing from home health, if you are limited with how many times you can see them, that what I meant by that patient buy-in is, what are they willing to do, and what kind of assistance do they have? Do they have another family member at home that can help them? Or is their family member ill also? A lot of times, what happens is, you'll get two or three older people that are in the same environment. So, maybe it's a married couple, or it's the couple and an older child that they took care of before this.

So just how much help do they have at home? Functional exercise. So, this is what I've kind of touched on a little bit already, that it's now something that wasn't accepted before, now is, but use that to our advantage. So, really educate the patient 'cause they might get frustrated. Something that was easy for them before, now it's hard, and they might get very frustrated with that. And especially because what we're seeing so far is it takes weeks for some people to really build their endurance back up, I know a couple of PTs that are healthy people before this that contracted COVID and were down and out for a while.

And one PT, in general, I know, it's about two months later and they are finally starting to be able to get through activities without being short breath the next day, they're doing activities, but to start to get back towards exercise and that. So educate the patient that it might be a longer road, but use those activities as part of your treatment. So, if it's work for them to walk from the bedroom to the living room now, use that as part of your home exercise program. I want you to walk that path six times today, walk it, then sit there and rest for 10 minutes, walk it again, sit and rest. Those kinds of things just to start to get the person's functional endurance back up too. Sorry, I forgot I put a little fun little thing there. Strength. We touched on this, how they've been losing

more muscle mass and they're a little bit weaker than their counterparts from the ICU. We're not really sure why. But because they're so much weaker than other people in the ICU, it's pasteurized or theorized that maybe that's either because of a specific COVID-19 viral load, or because of the lack of oxygenation to the muscle tissue, or because of a physiologic reaction, the longer periods of the increased respiratory rate with decreased CO₂. We're not really sure why these muscles are taking a bigger hit than other patients from the ICU, but it's something just to be aware of that it's not just because they were in the ICU, there's something specific to COVID that seems to be making them even weaker.

So we wanna assess strength values just like we would using our normal systems, whether you use a three, three-plus, four, or five, whatever you use, functional limit type of stuff, definitely assess their strength the way you would have for any other patient using your standardized tests and measures. And there's a reference there that kinda shows you the importance of maintaining this assessment and reassessment throughout Thursday. So how do we treat it then? And then this is still in the post-acute setting, so our mode, functional movements, or weights. So, functional movements, this is our stairs or step ups, sit to stands, pulling and pushings with upper extremities, lunges, squats, dips, bridges, whatever the patient can do, whatever is appropriate for them.

If you have something much more lower functioning and because of their poor endurance and poor strength, you might not be doing some of this quadruped core muscle, opposite arm opposite leg stance tough. Versus if you have some that is not progressing a little bit more and you wanna try and get some of that core strength back, you might be doing that with them. So individualize it to your patient with what they need and what they can do, but try to push them as much as you can with this functional movement. So try and get some of that strength back. Weights, add them in when you can. And it depends on what environment you're in and it depends on the

person. Sterilizing things, you may or may not have the ability to use weights if you can't sterilize them. So, subacute and LTACs, it's a little bit easier, you tend to have like more kettle bells and dumbbells and things like that that aren't the soft-sided ones, so they're much more easy to disinfect. Home health, it depends on what you have in your stash. If you feel comfortable bringing that in and being able to disinfect it, or use what the patient has in their home. So weighted cans, weighted bags, throw a bunch of stuff in a backpack, use that or something like that. That goes along with kinda how we add the weights in.

What you really wanna do is say what muscle groups are the weakest for that patient that are creating their safety issues and their endurance issues. And so, if it's, say, a problem with sit to stand, use that functional training to also work on sit to stand, kill kind two birds with one stone there. For the duration, it's whatever the patient tolerance is gonna be. The initial goal is to try to get to about 15, 20 reps of each exercise, you can break that into sets. Really, what it boils down to is that lower intensity, longer duration to start with. We wanna really build some of that strength up, possibly initiate some high intensity stuff depending on what setting you're in and it's how far out the patient is.

And that goes with the frequency, we've kinda already touched on that, are you able to see them more or less frequently. For ability, when you are able to see them more, three to four days a week, you don't have to do strength training every single day. So three to four days a week is fine. Home health, you want them to at least get up to two days, up to four, if they can, when they're not with you, even though you're not treating them that often. So, independence, we talked about endurance, we've talked about strength. When we talk about independence, this is where I touched we don't have a lot of data yet to see what do these patients look like when we discharged them home. We were so quick to just get everybody out, and some people left without ever even seeing PTs that we just don't have a lot of data yet. There are sections working on this

right now, and hopefully, we can kinda start making some recommendations. But we also know what our general PT recommendations are and our general PT management with independence. We wanna feel about the patient we have in front of us, where is their independence level, what are they able to do versus they're not, and how do we attack that? That has not changed just because the patient has COVID versus some other diagnosis we saw along before we knew what COVID-19 was. And so, just kinda think about that. As we've kinda already touched on too, there are a lot of subacute and LTAC facilities around the country that have been opening up specifically for patients with COVID, so we know the need is there, and luckily, we're able to kinda answer that call. When we're talking about functional mobility testing, we wanna do some of that, and I'm gonna talk about some of the standardized tests.

And then safety goes along with that independence. We wanna look specifically there at that patient, what's their safety issues? Is it a mobility issue? Is it endurance? Is it balance? Is it cognition? And then address the patient concern for that patient. Also teach them on that self-monitoring. If they can do vital signs, great, but otherwise, some of those symptoms and subjective scales. And then interprofessional collaboration as much as possible.

We work a lot in teams in the inpatient setting. When we get into our rehab settings, we do really well. When we get into home health, we do well, but it's tougher because we're not right there with a person. So, really, try to keep working within that interprofessional collaboration. So these are some of the functional capacity testing. I'm not gonna go through a ton on these specifically. I actually gave a webinar for PT.com a while ago, I don't know if it was this past year, but on endurance testing, definitely go there, I go way more in-depth on all these endurance tests. But these are some specific ones to sort of look at 'cause they're easy to use for people with COVID-19, whether you're in an inpatient setting, or a rehab, or a home health setting. So the SPPB looks at both balance, gait speed, and sit to stand. We've got several sit

to stand tests. There's either the 30 seconds sit to stand or the 5x sit to stand test. You can do mobility assessment, like how far were they able to walk, what's their transfer status, you can use those as functional tests. These are some of the other outcome measures that you can kinda use. So those are more functional endurance measures. These are standardized outcome measures. Figure out what's appropriate for the patient. And there's a few studies going on right now looking at what might be the recommendations for patients with COVID, specifically, but these aren't gonna change the actual test.

So figure out what might work for your patient. If you're in a subacute or an LTAC setting, there's a chance that you're confined to the patient's room, you might not be able to do a two minute walk test 'cause you don't have that space. Or if you're, say, in a home health setting and you don't have that space or that equipment, you might have to be able to limited there. So just decide what works for your patient. So there's two and six-minute walk tests, there's a lot of different step tests out there. The one I specifically referenced here was shown to be the best for pulmonary patients. That was for CLPD patients.

So, a COVID-19 patient might be different, we're just not sure yet. But those are some great tests, all the different step tests. The TUG. Although it's not really an endurance test, it gives good functional endurance measure. So feel free to use the TUG. Modified shuttle run tests. You might have to modify it even lower for some of your patients, but it's a great test to use. If you have a recumbent stepper, New Step is one of the brands, so that you might be familiar with that, but there are other brands, if you have a recumbent stepper, you can use that. The problem here is gonna be the disinfection issue. So make sure that you're really disinfecting a lot from that standpoint, and then any of the other tests. And so there is, I presented it in 2019, so you can go to that webinar and take that webinar, and I'll go much more in-depth from that. These are some of the clinical methods. So what are their signs and symptoms? As I said, we

know that they tend to be more dyspneic and more issues with difficulty breathing or shortness of breath. Positioning and posture control. Is it a lot of work for them to even hold themselves up and hold their posture? Well, then, we're working that basic. We don't need to go to higher level endurance tests, like I said, to stand 'cause we know just sitting there is difficult. How many rest breaks do they need? How much activity can they do? As much as you can quantify those things, that'll help you measure their endurance. And so you wanna quantify those as much as you can. Breathing patterns. If you can remember the names of the breathing patterns, perfect, I'm happy. I mean, I know them 'cause I do that in my day-to-day life.

But a lot of people don't remember what's the difference between a doorstep versus a Tic Tac neck, and there's all kinds of other things out there. I don't care if you don't remember the names, just look at, is it a high effort for them to breathe? Could it be easier? Could I help them become more efficient at their breathing? Because that's gonna impact their endurance. So that's where I care a little bit more about their clinical endurance. Functional mobility skills. Any of those skills, make them measurable. So, if their problem is that they can't transfer independently, they get short of breath during transfers, make that measurable. How many times can they do it before they can't do it right now, and then work on that. Look at their adaptive devices and equipment utilization.

Sometimes we have to give adaptive devices or assistive devices to help with their mobility and safety, but those also carry our higher energy expenditure to them. So make sure you're sort of weighing out their energy expenditure versus the safety and independence. We need them to be safe and independent, but at the least amount of energy expenditure, we need to get that. So, if I don't need to hand somebody a walker, if they can be safe with a cane, let's give them a cane instead. Environmental accessibility. Is their environment the easiest or more efficient way that we could do things? And this is, I kinda touched a little bit on this in my last few slides, is endurance

and mobility and strength all together. They really go all together. So, if we have poor strength, patient's gonna fatigue, they're gonna have lower endurance. If we have poor endurance, the muscles are gonna fatigue quicker, we're not gonna be able to do as much, so our mobility is gonna be less. So you can see, they really interplay with each other. The good thing is, as you improve one, it improves the other. So, if I can improve somebody's aerobic endurance, that means they've got the capacity to deliver oxygen to those muscles longer, they won't fatigue as quickly, they can do more. Or if I can improve some of these muscle strength, that means they can go longer before the muscle fatigue, they can do more, they lose their endurance at a slower rate. So those three things really will impact each other.

So, if we can really work on those, it really helps. So, now, as we're going forward, and somebody had written in from an outpatient point of view, "Are there any sort of red flags "for us to kind of be aware of?" And what I would say is any of your general red flags as far as vital signs and patient presentation. So if a patient's having adverse symptoms like dizziness or increased cough or severe shortness of breath, and then the vital signs, whether it's pulse ox and heart rate and respiratory rate or whatever, if they're all matching up but the patient's not doing really well, those are sort of your red flags.

The only other red flags, I would say, is if they show any other kind of complications, if somehow they started spiking a fever again, or they started complaining of increased shortness of breath, it might be a sign that maybe they had a PE that they didn't have before. So, any of those sorts of adverse signs and symptoms, that's what I would say are your red flags to be aware of. So now, as we talk about going forward, so we talked post-acute, but now, what if we go forward into outpatient, as I already answered one of the questions earlier in that webinar, we don't really know when everybody's outpatient pulmonary rehab programs will open up. I suspect, in the next couple weeks, some will start to open up. I suspect in the next couple months, most will

probably start to open up. We don't really know. There hasn't really been a lot of telehealth for pulmonary rehab, because at this point, the true pulmonary rehab code is not reimbursed for telehealth. PT codes, we finally got able to be reimbursed. But pulmonary rehab code itself is not reimbursable under Medicare for telehealth. So, some places, we're kinda just doing it anyway as a pro bono thing. Some people were able to get some third-party payers to cover it, but overall, telehealth hasn't been as good for pulmonary rehab 'cause we just haven't been able to do it as well. So, as we now start opening up, there are no guidelines I can give you yet. We've got several groups working on them, a lot of individual facilities are working on them. So, if you start working on them, start working on them.

Use what guidelines are out there, but there's not anything specific yet. But one of those considerations you have to think about is, how long since the patient was diagnosed for COVID-19? Are you gonna let them come into your rehab facility? Is it a minimum of two weeks? Is that a minimum of four weeks? Whatever. How long since their symptom resolution or discharged from hospital? Is it that you use that versus their initial symptoms?

Do you mix COVID positive with non-COVID patients if the COVID patients are not symptomatic anymore. So let's say the patient was COVID positive, but that was six weeks ago and they haven't had symptoms, will you mix them in with a non-COVID positive patient? Those are things that every facility and agency are gonna have to figure out on their own. And we don't have hard guidelines yet for that. As that starts to come around, myself, if I can now try and educate people as much as I can, but I think a lot of the organizations, we're all part of the professional organizations, we're trying to get those guidelines out as they come about. Some of the basic things, you're definitely going to need to maintain social distancing. So, my facility I work at, we typically run anywhere from... We run our cardiac and our pulmonary classes mixed, so we run anywhere from eight to about 13 patients in a room at a time, we won't be able

to run that full when we open back up. We're probably gonna have to cut that probably in half. We'll probably run about six patients, because we're gonna need to keep that six foot or a bigger variation in our clinic. Equipment is gonna have to be disinfected like crazy. So, this is the exercise equipment, the weights, the treadmill handles, the arm ergometer handles, whatever, but also all your railings, your door handles, all that kinda stuff is gonna have to be disinfected every time the patient or anybody touches it. Regardless of whether the patients are mixed or not, so let's say you have a class that's just COVID positive patients, any patient that is symptomatic should not be coming in, they have to be asymptomatic before they can exercise. And how long that timeframe is for COVID positive patience is gonna be based on your facility. Are you gonna go with two weeks of symptom-free?

Are you gonna go for weeks from onset of symptoms? Whatever, you'll have to kinda figure that out. And there aren't great guidelines yet. All patients and staff are gonna have to wear masks. I was in a conversation with a man the other day, who's a PT in Ohio, and he was saying that they're running the risk with that because some of their patients don't wanna wear masks when they come back. My facility, that is our rule we're looking at right now when we open back up, is that everybody will have to wear a mask for whether it's a patient or a staff.

So, if the patient does wanna wear masks, they can't come in and exercise. So, it's gonna be a sticky situation in your facilities. People are exercising, it's not comfortable to exercise in a mask and it's not easy to breathe. So, if you have somebody with a pre-existing pulmonary condition, like asthma, or emphysema, or something like that, and now you're making them wear a mask to exercise, that might put a burden on them and you might have to work out. Is that a hard or fast rule in your facility or not? And I can't answer that other than to say, you will have to decide that at your facility. Aerobically, so when we talk about mode, duration, intensity, all that kind of stuff, aerobic mode is gonna be to follow traditional pulmonary rehab guidelines as far as

your intensity and duration too. We want them to do aerobic exercise, we want them to do longer durations, push the duration longer first, then push the intensity. We'll still exercise around that 12 to 13 on the board scale and around the two to three on the dyspnea scale. O2 sats, we're gonna probably try to keep up at least that 90% if we can. Depending on how far out from their diagnosis, it might be a little bit lower, but that's gonna be our guidelines, is try to keep that 90%. They're gonna, most likely, they'll have higher amount of supplemental oxygen you need than some of our other pulmonary patients we've seen in the past. So you're definitely gonna wanna have supplemental oxygen at your facility if you're doing outpatient pulmonary rehab program.

And this goes for outpatient PT places, too, that are treating patients that are COVID positive, whether that's specifically for endurance and strengthening kinds of things but under a PT code, or if you're treating them for something else but they also happen to be COVID positive. 'Cause that's gonna start to be something we're not used to seeing. You might start getting people coming back in with knee problems or back problems or whatever and they're COVID positive from a month-and-a-half ago, so just important to think about the fact that... And we wanna keep that issue with supplemental oxygen and the fact that they might need more when they're exercising. Strength and resistance, here's where you're definitely gonna wanna start adding in more weights.

So, if all they can do to start with is that functional strengthening, then do it, but then start adding in more resistance and more weights in those exercises as well. You wanna really start to rebuild some of that muscle mass. They've started to gain some of it back, really start to benefit from that. This is where you really might be able to start putting in the hit techniques, but I'm just not sure yet. Some of these patients, they're lingering with this muscle issue and endurance issue for a couple months, so they might not tolerate a hit right away. You'll have to kind of play that by ear, especially if

you're a facility that used to use high-intensity training plan, you might have to just look and see, you might have to modify that a little bit. If you're a facility that didn't used to use it, you might wanna consider using some of those techniques to push the muscle mass issue. So, it just depends on the patient's age, their length of stay, were they on a ventilator or not, do they show any signs of PICS or ICU weakness? These are some references or some resources I gave besides just the references. So my references on references, these are some resources. The APTA, and it started from the section level, but luckily, it became an APTA level pretty quickly, the acute care and the cardiopulm section, right away in the beginning, jumped on of, okay, we need to start providing educational information for PTs and PTAs that are practicing.

Luckily, the APTA said, "Yes, we agree with you," and now, a lot of sections and components, almost all of them, are involved in this sort of training, whether it's telehealth or breathing strategies or whatever. So these are a lot of the resources. So the academy of acute care is on there, APTA has a whole page on COVID resources, cardiovascular and pulmonary section, there's the CDC websites. This, the last bullet on there, so Kyle Ridgeway is a cardiovascular and pulmonary certified specialists, that he's part of the cardiovascular and the acute care section, he's out of Colorado. He and a couple of other colleagues put together this Google Doc.

It is amazing. It's got like all kinds of resources on it. But the good thing is, they curated it so that these are acceptable resources. It's not Joe Schmo who wrote an article on what you should do for COVID, these are references, resources, websites that you can use. And you can feel free to add or delete to this document if it's something that, again, is reputable. So this is an open Google Doc that is completely free to use. So it's a wonderful resource to go use. And we're so, everybody in PT should be so thankful to Kyle and his colleagues for kind of putting that together. The Geriatric Academy, they also have a really great delirium fact sheet on their page. So that if you're not as familiar with post ICU delirium issues, if you're gonna be working in

a post-acute care setting, you might wanna check that out because you might be seeing some of those problems with your patients. There's the home health sections, and then the PACER Project. So this came out of a lot of sections collaborating. It's the post-acute COVID-19 exercise and rehabilitation project. There should be about 15 to 17 in total. And actually, I've heard there's several more going on. This is a phenomenal series of webinars that's completely free. Many of them, you can get through the APTA's Learning Center, too, so you actually can get CEUs for them. But otherwise, they're just great webinars. They focus on a different topic. So, it might be a topic related to what's the pathophysiology, or it might be a topic related to what are some breathing techniques. The speakers that are on this PACER Project are the leading people in those areas.

So who are the people publishing textbook chapters, who are the people presenting research around the country on these topics? Those are the people that are in these topics. And so it's a really great reference to use. And, as I said, you can kinda share them around too, they're sorta specific to PT, but they can be cross-disciplinary too. And then, I'll kinda come back to other picture, but here's all the references. Again, feel free.

All of these kinda things are really gonna help move it along. We are all at a point that this is like nothing we've ever seen in our lifetimes. And so, as I said in the beginning, this is where we are at this point in time, this is the best I can give you. Two weeks from now, it might be totally different, or it might just be slightly different, we're just not sure. So, don't throw out everything you've learned in the past, because a lot of those same strategies, techniques, interventions, clinical decision-making skills, you're gonna use all those still. It's just try to absorb as much as you can on what the specifics of this virus is, of how it impacts those things. I am always open, all my contact information was on that first slide, so Twitter, LinkedIn, my email address, do not hesitate to ever reach out to me. I feel that, in general, in my career, I feel that collaboration and open

communication is great, but since COVID-19 hit, it just illustrated that even more for us. It doesn't help anyone if I sit back and say, "Well, that's my personal information, "I'm not gonna share that with anybody." You know, that doesn't help anybody. And there are loads of you out there that might have experiences different than what I've come in contact with, too. So, feel free to share with me things that you've seen or encountered or you've experienced with some of these patients. Because the more we all share with each other, the more we're gonna be able to kinda work through this. And so, are there any other questions? I threw a lot of information out at you. I talk really fast because I always wanna get so much in as much as I can before time is up for all of you guys. But as you re-listen to it, if you have questions, don't hesitate. But if there are any other questions, now I can take them as well.

Oh, this is a good one. So there's a question. "Have I come across a scientific code, "sort of proven way of how to disinfect N95 masks?" There's a lot of discussion out there on that. I haven't seen great studies done on it yet as far as COVID is. What I have seen is what people are sort of recommending. The UV light, definitely has, there's been some not necessarily high level studies, but there have been some studies that were showing that the UV light really did kill most, if not all the virus on N95 masks.

So, if you have a facility that has the ability to basically lay all the N95 masks out, and the whole room is bathed in that UV light, that has been phenomenal. That's not really all that realistic for most places. So, what some people have started looking at is some of the baking methods. There are some different references out there as to putting your N95 in an oven at a certain temperature for a certain amount of time. I don't feel comfortable giving any of those recommendations because that has sorta changed a little bit as to how long and what temperatures. So I would say, you can look up those, and then get an idea of is that from a reputable source or not. But that is some of the stuff that's going on, is is sort of baking it. Getting it wet with disinfectant is not a good

idea. So, spraying it with something that's a disinfectant, that's not usually a good idea, 'cause getting it wet can make it even more porous. So, I would say, some of the baking methods, the UV light methods, those might be ways to go. So, I'm trying to get through some of these. Oops! Sorry. Oh, so here's a good question. Oh, where did it go? "What does COVID positive inactive mean, "and what are PPE guidelines?" So that's the new phrase people are trying to use, that they're saying the person still COVID positive, but they're inactive, meaning that they are several weeks since the beginning or they never even developed symptoms. I don't have any specific guidelines to tell you as far as how many days, other than I always use the CDC guidelines for they have to be symptom-free and fever-free for at least three days, and it has to be at least the seven or possibly 10 days since their symptoms were first coming on.

So that's what it means why they were COVID positive but inactive. "Until how long after diagnosis could blood clots "be a concern?" That's a good question. We don't know yet. Over the last three or four weeks is when we really just started noticing blood clotting issues. And so, we're just not sure how long afterwards it's gonna be. Anecdotally, what I've heard from people is it was about a week or two after they had been discharged home from the hospital that they developed blood clotting that either caused a PE or something like that, and that's why they had to go back. But there might be people that are getting minor clotting that aren't going back to the hospital, we're just not sure.

Somebody asked, "After the 14-day period, "would you recommend continued use of full PPE?" I, my personal opinion, is use full PP as long as you possibly can. If you have a facility that's gonna let you keep using it, keep using it, because we just don't know yet if the person is contagious or not. What's happening more often is, especially in a home health type of setting, you don't get that ability to have it for that long. So, I would say, at a minimum, I would go the 14 days if you can. If you have to stop after

that, you're definitely still gonna use gloves and a surgical mask. There's nothing stopping you from putting goggles on or glasses on or some kind of a gown on, too. It just might mean you might not get an N95 anymore. But I would still use your full PPE for as long as you kinda can. If the patient really is a good four weeks, they haven't really shown any symptoms, then yeah, you can start backing off and just do your surgical mask and gloves. But they also should be wearing a mask at that point, too. Somebody asked, "Do you have any resources "for how long antibodies are present?" I don't.

That's really all still starting. And then it's a question of, well, if somebody has the antibodies, can they still be reinfected again or not? We just don't know yet. All of that stuff is still kind of coming out. I did hear of a study this morning that came out of... I can't remember. It was not in Japan. I wanna believe it was either out of Taiwan or Singapore, it might have been Singapore. Where it talked about, that they showed patients could not reinfect after they had already had COVID-19. So, that's a newer study just came out, I'm not sure. Some of the studies are saying anecdotally that people can be reinfected, so we just don't know yet what that timeframe is. Okay, I'm still kinda getting through some of the questions just to make sure. "Any barriers that you have heard "with third party payers and PT for strictly post-acute?"

So far, most third party payers are paying for PT, whether it's at subacute, LTACs, or in home health. Medicare did give a diagnosis code for COVID-19 to be treated at those facilities. And so, I think most people are being able to get reimbursed for COVID-19 care. When we talk about our thing for pulmonary rehab, pulmonary rehab does not have a specific code yet for COVID-19. I'm not sure exactly what we're gonna do about that. Because to get that code put in there might take a little while. So, we may have to look at billing under PT codes and not do specific pulmonary rehab but do more of a PT endurance conditioning type of thing instead of pulmonary rehab. We'll have to look at that. Because true pulmonary rehab and cardiac rehab are separate codes. They're

not PT codes 'cause they could be done by nursing or exercise physiology or whoever. But as far as PTs treating people with post-COVID, whether it's sub acute or home health, we have found that most third party payers are paying for it. How long or how many visits? I don't know 'cause everybody's sorta varied. And we don't have a lot of people because New York was so slow in reopening, we don't have a lot of people yet that are really treating these patients in anything but a subacute or a home health setting yet. So they haven't shown up in our outpatient types of settings yet because they weren't open.

Okay, I think I've gotten through... Oh, here's a couple more other questions. "Is there evidence "that says COVID ages the body organs by 10 years?" I haven't seen any true evidence that says that. I know some people have kinda anecdotally been saying that. It just really depends on the severity of the disease. That's when we talked about some of that multi-organ failure or multi-organ involvement. If they are that more severe or a critical stage, there is a chance that they will run long-term damage to their organs that is not repairable. If they're at that mild stage, there is no evidence yet that they will or will not.

So I can't say that they can't have organ damage or that it ages the organs by 10 years, I can't say that can't happen, but there's nothing so far that says somebody with mild will have that. If we see organ issues, my bet would be definitely pulmonary system, and then possibly kidney and liver because they're processing so much of the body. But there's no real evidence yet to say that that's in most of the cases, which are the mild cases. Somebody else had said that they heard that some sailors have sort of reinfect. Again, that's going on with can people be reinfect or not? There's no concrete evidence on that yet. That one study I set out, I think, again, I think it was Singapore, they showed you couldn't, but there have been others that have shown that people can be reinfect. So we just don't know about that yet. Oh, somebody wrote in, "Just an FYI, "acute inpatient rehab is a separate post-acute option." Yeah, when I

talked about LTACs, that's what I meant by inpatient acute. Yes, they are, absolutely. So you've got your regular acute care, then you've got your medical rehab units, acute inpatient rehab units, those kinds of things, and some people also call those LTACs. And so, that's sorta what I meant when I was calling them LTAC, is absolutely those separate from acute care, but those inpatient rehab settings versus then also your subacute nursing home settings, which are more of a out of the hospital. I think I've worked through all the questions. So I'm grateful for all of you that joined us today. I'm glad a lot of people kinda typed in, "Thank you, that was great presentation," well, I'm glad that I could be helpful to all of you guys. We're definitely all working our way through it together.

- [Calista] All right, well, thank you so much, Dr. Bartlo, for sharing your expertise with us today, and thank you everyone for attending. Glad you could share your afternoon with us. Have a great day, everyone. And thank you, again, Pam.