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## The Value of Occupational Therapy in the Acute Care Management of Patients with COVID-19

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- [Fawn] Today's topic is the value of occupational therapy in the acute care management of patients with COVID-19. Our presenters today are Lyndsay Laxton and Julia Smith. Lyndsay is a senior occupational therapist currently in her seventh year at the University of Colorado Hospital. Her clinical experience at UCH spans multiple units including neurosciences, medical ICU, and surgical trauma ICU. Her clinical and research interests include ICU rehabilitation, delirium management, and utilization of the ICU diary. In November, 2017, Lyndsay presented implementation of the ICU diary intervention within the medical intensive care unit at the fifth European conference on weaning and rehabilitation in critically ill patients in London, England. Julia graduated from the University of Pittsburgh in 2012 with a bachelor of science in rehabilitation science with a certificate in psychosocial issues in rehabilitation. She received her master of science in occupational therapy from the Ohio State University in 2014. She began her career as a travel therapist in multiple skilled nursing facilities before transitioning to acute care. She's a senior occupational therapist at the University of Colorado Hospital where she has practiced since 2015. She has primarily been in the cardiothoracic surgical trauma and burn ICUs. She has experience throughout the hospital. Julia is passionate about providing quality evidence-based care to critically ill burn and trauma patients to promote functional outcomes. As a Colorado transplant, Julia loves to spend time outside of work hiking, skiing, and traveling. Welcome to the both of you. Julia, you can get started.

- [Julia] Thank you for having us. So let's get started Here are our disclosures. And our learning outcomes for the day are to be able to describe three functional performance deficits commonly seen in patients experiencing COVID-19, identify three outcome measures associated with this population, and list five evidence-based interventions occupational therapists can use across the acute care continuum. So here's just a quick rundown of our agenda. We're gonna do a little bit of overview of COVID-19, get into caseload management strategies, hospital acquired deficits, appropriate outcome measures, and evidence-based OT interventions before going through some case

studies and a Q&A session. So just to preface this, we did not get too deep into the epidemiology or physiology of the disease because science is so quickly evolving around this novel condition. But we did wanna give you just a few things.

First of all, the virus is called Severe Acute Respiratory Syndrome Coronavirus 2 or SARS-CoV-2. The analogy can be used of HIV to AIDS, HIV being the virus, AIDS being the disease process. So SARS-CoV-2 is the actual virus where coronavirus 19 is the disease process that happens because of this virus. So in a lot of the literature, you may see SARS-CoV-2 being listed, and that's why. Per the WHO, SARS is a contact droplet precaution disease except during aerosolizing procedures. So the example of aerosolizing procedures, which would then indicate airborne precautions include a tracheostomy, the process of intubation or extubation, during CPR or whenever somebody is on high flow oxygen. So the illness severity ranges from mild to critical. Some people also go asymptomatic. Majority of people who have COVID-19 experience mild to moderate symptoms. So 81% of the population deals with this. Mild symptoms can include no symptoms, headache, body aches leading up to a mild pneumonia. Most of these people do not ultimately need occupational therapy. Many of them don't even require hospitalization. The more severe, 14% of people with COVID-19, these are the ones that experience dyspnea, hypoxia. Will generally require a new O2 need or they have greater than 50% lung involvement on their chest x-rays.

And then 5% of people with COVID-19 will experience critical illness, which is mostly what we'll be talking about today. And those are people that go through respiratory failure, shock, or multi-organ system requiring an ICU stay, intubation, and all of the many side effects that come along with those things. So the clinical progression of COVID-19 generally around day five to eight after symptom onset is when patients begin to experience dyspnea. Oftentimes, this is when we see them presenting to the hospital. Days eight to 12 is when they experience acute respiratory distress syndrome. And again, these are the more critical patients who then require this ICU

admission. So this is important for us to note because a lot of times, patients can be functioning relatively well with relatively stable oxygen needs. And then when they hit this portion of their clinical progression can rapidly decline and deteriorate to reaching an ICU admission. So this affects not only when we intervene on them but our monitoring of them and our expectation of how they will progress.

One of the things to note is that a lot of the information that we're gonna be getting in to here is related to this ARDS population, acute respiratory distress syndrome. As we know, there isn't a lot of, the research around COVID is continuing to progress. So the ARDS that these patients experience is we're correlating a lot of this to the research associated with ARDS because this is the experience similar to how these people progress. The clinical presentation that we are seeing is generalized weakness, dyspnea, delirium associated with these long hospital stays, upper extremity plexopathies associated with the proning position that many of these patients are placed in. Fatigue is enormous problem for these patients. And then anxiety. Other considerations, not necessarily physically related but very important are the social isolation these patients experience. Most hospitals are not allowing visitors, especially on the COVID units. So they are not able to be around their families during this. The occupational deprivation that goes along with all of the physical symptoms that they're experiencing as well as their hospitalization. The stigma of COVID-19, there's a lot of fear in the world right now about contagion and how you got it, where you got it. So just the stigma and the fear associated with this, as well as caregiver exposure and illness.

So some caseload management considerations. Because this is such a new population to work with that is greatly affecting how hospitals are functioning during this pandemic. So the most important thing is that we prioritize the right people. So prioritize those most directly impacted by intervention. You really wanna go into the rooms that you know that you're gonna make a difference in. So a large portion of that

is maximizing the timing of evaluation. If somebody is incredibly independent, then it's probably not appropriate that we go see them at that time. At the same time, if somebody is a RASS of minus four, not following commands, not able to engage in anything, then maybe it's also not appropriate that we intervene then. So working with your nursing colleagues, physical therapy colleagues to figure out when is the most appropriate time for OT to become involved. And then the biggest thing is to promote throughput through the hospital. So getting those patients from the ICU to the floor transitions and most importantly discharging. So we wanna get these patients out of the hospital as safely and quickly as possible, but also set them up for success so that they don't return to the hospital where we see frequent readmissions. Capacity has been a huge concern. And depending on the hospital that you're in, it might not be as big of an issue as other places. But because we do know that we're in a pandemic situation, capacity, bed availability, vent availability is a big thing to be aware of. In the same thought, PPE preservation is huge. Again, this is a very site specific concern. Some places have more access to PPE than others. So of course, follow what your institution is dictating. But some strategies that we have found successful for preserving PPE are clustering care. So if you're already in the room and treating a patient, making sure that if they have to toilet, you do that while you're in the room so a CNA doesn't have to come in. Or for setting them up to feed, so again, a nurse or a CNA doesn't have to come in to minimize the people putting on gowns and masks to go in and out of these rooms.

One of the things we found most successful in our practice is screening patients through the window prior to evaluation. Our nurses have been great about leaving the bedside phones near the patients so we can call in from outside of the room, gain some prior level potentially even if they have to go to the bathroom or they're up with nursing watching through the window and seeing how they're mobilizing. And then using that information to determine whether or not it is appropriate for us to evaluate at this time if they're in that window where we're still monitoring for potential decline in

symptoms. But right now, they're mobilizing with nursing, they're still at their baseline. It's probably not appropriate that we intervene at this time. And then as always, coordinating with your nurse, physical therapy, and speech counterparts. If a physical therapist has just spend an hour and a half in the room with a patient, you don't wanna then just go in the room to meet a patient who's too fatigued to be able tolerate your session. So working with them on timing throughout the day, as well as with your nurses to give them strategies to help to progress these patients even when you're not in the room. And the last, again, is very site-specific with the discharge option availability. Where we are working, local SNFs are accepting patients with COVID as well as our hospital has an acute rehab open. So our discharge options have expanded. Initially, none of those were options to us. So working within the hospital setting to progress these patients to a level of independence where they were safe for home. So being aware of your community resources to be able to set these patients up for success. And lastly, family COVID status. Can the family assist at discharge? Have they been exposed? Have they had COVID or have they not? There are so many different moving pieces and parts to this because if say a family or a patient's caregiver has COVID and is no longer able to take care of them and that's how they've been functioning. Is it more appropriate for them to go to a rehab-based setting or is there a way that we can facilitate them getting home without exposing any further family? Okay, I'm gonna pass it off to Lyndsay.

- [Lyndsay] All right, hello everybody. So as Julia mentioned, COVID-19 specifically as it relates to rehabilitation and kind of long-term functional outcomes, the research just isn't there because we're not to that point yet. So that being said, we're utilizing a lot of anecdotal data that we're seeing in the setting, in the clinical setting, as well as previously existing literature related to different symptoms or disease processes that COVID patients are presenting with. One of those being acute respiratory distress syndrome. And kind of the overarching concept of critical care rehabilitation as it

relates to ICU survivors, specifically ARDS patients, is this idea of post-intensive care syndrome.

This may be a new concept for some of you guys. And if it isn't, bear with me while I go through it, but basically back in 2010, Society of Critical Care Medicine found that patients were surviving the ICU at higher rates due to advancements in medical care. However, those that were surviving were left with very profound neuromuscular physical deficits as well as psychological and cognitive deficits. And this cluster of symptoms was pretty consistent throughout kind of ICU survivors general patient population. So they deemed this post-intensive care syndrome. And there's a ton of research around it, and it has kind of been brought to the forefront again due to this COVID pandemic because there has been a huge influx of critically ill patients with a majority of them surviving and being left with these additional deficits that they didn't come into the hospital with. So it's been on the forefront and this is gonna be kind of a framework we're gonna use throughout our presentation today.

So think of post-intensive care syndrome and kind of these four pillars of that syndrome we're seeing. In terms of neuromuscular deficits, risk factors for neuromuscular impairment include multiorgan failure, prolonged periods of bed rest or immobility, which obviously these COVID survivors are experiencing during their potentially month-long period of intubation and ICU stay. And previous literature on ICU survivors shows that 85% to 95% will experience persistent weakness at hospital discharge. And this obviously results in atrophy, impaired deep tendon reflexes, potentially sensory loss or foot drop. And then another big one that we're seeing in terms of neuromuscular impairments is the brachial plexus injuries due to the proning position that has received a lot of high efficacy in terms of treating pulmonary deficits in these patients. And Julia is gonna go into that a little bit more later in the presentation, so get ready for that. In terms of physical functioning, patients at one

year after ICU discharge, about 50% of them experience deficits in ADL function, and 70% are experiencing deficits in IADL function.

So again, this is based on historical data we have on general ICU survivors, but we don't have any reason to anticipate this doesn't also apply to our COVID survivor patient population given what we're seeing in the inpatient setting. Additionally, decreased six-minute walk time and less likely to return to work, as well as increased need for caregiver support. So critical illness, definitely impacts people's ability to get back to the life they had at baseline. And then the last two, from a psychological perspective, one in three ICU survivors will experience depression, and 60% of ICU survivors experience post-traumatic stress disorder. Risk factors for this are delirium, those traumatic or delusional memories of the ICU, impairments and physical functioning, use of physical restraints while in the ICU. Prolonged periods of mechanical ventilation. Younger age is correlated with higher rates of depression, anxiety, and post-traumatic stress syndrome, as well as lower level of education. And data on COVID survivors is showing that it definitely has an impact on the younger patient population, as well as those with lower socioeconomic status. And lastly, for cognition, ICU survivorship demonstrates impairments in memory, attention, and executive functioning. And importantly, that impairment in executive functioning is associated with higher rates of depression. So you can see kind of how those two tie in together in terms of the cognitive component and the psychological component.

Risk factors for cognitive deficits are, again, delirium, prolonged periods of sedation, and this acquired brain injury presentation related to hypoxia which is common obviously in patients with acute respiratory distress syndrome, which again is a symptom of COVID-19. All right, so we've been talking a lot about delirium. So wanted to highlight that 'cause I think this is actually a really key aspect for OT and how we can impact change and prevention for these patients. So based on current literature, delirium is a key component that is affecting the likelihood of this post-intensive care

syndrome. And unfortunately, our COVID patients are in a very unique situation that researchers believe is inciting higher rates of delirium. When you think about the COVID-19 pandemic in general, it's a all hands on deck approach, but a lot of it is very medically focused because there's not a lot known about the disease. These patients are decompensating very rapidly. So of course, the first thing you have to do is stabilize the patient medically. So everything, all the efforts are going towards medical stability, which unfortunately has created this perfect storm where the patients are isolated. We're clustering cares so the nurse or the other care providers aren't in the room a lot. Increased potential workload for our other interdisciplinary members. So we're not able to track or assess for delirium like we may have before because this is a very unique situation where PPE utilization is of a concern, etc. So we were creating a perfect storm where delirium is likely at a higher incidence, but we're just not able to track for it. And we know from the previous slides that delirium leads to deficits in cognition, in potentially anxiety, depression, as well as issues potentially returning back to their prior level.

Another kind of caveat here is delirium has three subsets. So there's an agitated subtype of delirium, a hypoactive subset of delirium, and then a mixed. So kind of a combination of both. And for patients who have the hyperactive or agitated subtype, they're likely to get more attention from staff, right? They're the ones that are trying to climb out of bed. Maybe they're trying to self-extubate, pulling at tubes. Where conversely, those patients with the hypoactive, they're very motor slowed. They're not as interactive. They just look like they might be sleeping. So if you're trying to conserve PPE cluster cares, your patient looks like they're sleeping, they're comfortable. You may not intervene as frequently. So those patients with the hypoactive subset, researchers are anticipating are going to be kind of bypassed in terms of assessment for delirium as well as intervention for delirium. So this is definitely one to keep on our radar at highest risk for those functional and cognitive deficits.

All right, so we'll jump a little bit into, now we know the neuromuscular, physical functioning, cognitive, psychological, we know what those look like, how those present, but how do we track them? What do we do about it? So neuromuscular, two basic ones. Manual muscle testing is probably something you're all doing in your clinical practice already. Just an objective grading of your global strength that you can then use to track progress. Hand-held dynamometer, this is a noninvasive, simple, and pretty inexpensive assessment that has been a high predictor of functional mortality, or pardon me, functional morbidity and overall mortality. There was a recent article that showed in COVID-19 survivors that lower grip strength equated to higher rates of intubation, and it also correlated with respiratory muscle strength. So I think this is potentially one that we could incorporate into our clinical practice that could show some potential long-term predictors of function. In terms of physical functioning, here's a few related to general mobility as well as ADLs. The ICU Mobility Scale is a zero to 10 scale for tracking progression of mobility. Starts with zero, is passively lying in bed or being rolled by staff for repositioning. It includes sitting edge of bed, standing, marching in place, etc. And then 10 is walking independently without a need for a gait belt. So something that can be utilized by nursing staff, PT/OT. It can really be kind of an interdisciplinary approach to tracking general mobility in your patients.

Similarly, the Functional Status Score for the ICU, or FSS-ICU, it has a really high 99% inter-rater reliability. It has five features including rolling, supine to sit transfer, sitting edge of bed, sit to stand transfer, and walking. And then each of these features are graded from zero being unable, seven to being independent. So again, a really great objective measure to monitor progress. At our site, we also use the AM-PAC for ADLs. This is six ADLs with a scale of one to four grading level of independence. And then based on the input of data, it calculates a degree of impairment. So this can show progress, everything from self-feeding, grooming, donning/doffing clothing, and toileting. And then these last two, they're not as sensitive. They're not my favorites, but they are supported by literature. So I wanted to include them. The Katz Independence

of ADLs includes six ADLs. And the limitations are that it's really one point for independent, zero for dependent. So it doesn't have a wide range in terms of grading progress. So may not be as strong of an indicator for use in acute care where we're seeing slower progress. But again, it is supported by literature. And the last one is the Barthel Index has 10 ADLs and mobility tasks including grading it from independent, needs help, and dependent. So here, you only get three ways to identify patient's progress, so not as sensitive but is supported by literature.

All right, so delirium. The first three, the CAM-ICU, the CAM-S, and the ICDSC, these are all rated for use in the ICU. I should say validated for use in the ICU. The CAM assessment method for ICU and the Intensive Care Delirium Screening Checklist are both high inter-rater reliability, high specificity, and with the CAM-ICU being the gold standard for use in screening for delirium in the ICU. Strong research or breadth of research I should say. But the Intensive Care Delirium Screening Checklist also has very strong psychometric properties and one that I really appreciate utilizing because the ICDSC is based on observation. Which sometimes, the patient for whatever reason, whether it's profound neuromuscular weakness, they may not be able to reliably participate in the CAM-ICU, which includes like squeezing whereas the ICDSC, you can observe patients' interactions and might be able to get a better sense of their cognitive functioning. I will say if you are using the CAM-ICU, I would strongly recommend using the CAM-S or the severity. This is great because it evaluates the severity of delirium symptoms. Sometimes it's not sensitive enough just to say, "Yes delirium, no delirium." Sometimes we need to be able to objectively kind of stratify the progress, i.e., the severity of those symptoms of delirium from profound to mild because that may be the sensitivity that we need for these patients with prolonged ICU stays. And then lastly, the Brief Confusion Assessment Method. This is validated for use on the floor. So if your site uses the CAM-ICU in the ICU, it would be great to then train your floor therapists, or if you are treating patients on the floor to roll over to the brief CAM. This one is a modified design on the CAM-ICU. But it has been modified to

increase validity for use in those floor status patients. It's less than two minutes to administer and would be a really great way to continue tracking delirium outside of the ICU because it definitely still exists.

All right, in terms of cognition, the RASS or the Richmond Agitation and Sedation Scale, this is a scale from negative five meaning unresponsive to sternal rub all the way up to plus five meaning swinging, pulling at things, a danger to themselves as well as staff around them. So again, another objective way to demonstrate level of arousal in your patients, and this is also a subset of the CAM-ICU. Another one that we enjoy using here at our site is the orientation log. I think it's pretty standard practice to assess your patient's AOx4. But this digs a little bit deeper. It's 10 questions and really gets at kind of the heart of patient's understanding of their situation and their circumstance, which I find for myself, very valuable because while it is important to know where you're at and what day it is, I think it's similarly as important, if not more important to really understand what is going on with your body. So being able to identify deficits that these patients have in their level of understanding, and then be able to provide education based on the deficits that are highlighted within the orientation log. And lastly, the MoCA is a great way to screen for just kind of general cognition that then can maybe segue into other more sensitive assessments.

Okay, for outcomes lastly, the psychological component, the Hospital Anxiety and Depression Scale, it's a self-assessment screen. And this can be used to trigger a consult to psychology, psychiatry, or potentially an outpatient referral. So this is a great way to have the patient self-assess different symptoms that they're experiencing. I would say use your kind of toolbox and other assessments and make sure that the patient is of sound mind and cognition prior to administering a self-assessment screen just to make sure you're getting accurate data to then trigger out-patient referrals or other inpatient consultations. And the last one is the Impact of Event Scale. Again, another self-report questionnaire that has the patient subjectively measure the

response to a traumatic event, which we know, something as a virus related to a pandemic and then an ICU stay with prolonged intubation is definitely traumatic. So this would be another easy and quick. So I should say reasonable for administration in an acute care setting that the patient can self-report their response to events. All right, and I'll hand it over to Julia.

- [Julia] Okay, so as Lyndsay mentioned earlier, prone positioning is an intervention that the medical teams have been using for pulmonary function. So why do they do this? And again, prone positioning is having somebody lay onto their belly. So what's the importance of this? This improves gas exchange efficiency, increases perfusion and recruitment of the dorsal lung and those posterior inferior lobes and mobilizes secretions. So if you think about somebody laying on their back with lungs that are heavily full of fluid and the weight of their heart, it's very hard for them to expand their chest and to breathe through it. So by us repositioning them, this helps kind of redistribute that perfusion and access the posterior lung. This resource here that is linked, I really recommend that you use it. It is through the ICS, the Intensive Care Society out of the UK. And it gives a lot of information on why proning is important. But more importantly, has step by step pictures on how to safely prone position somebody who is sedated. It is a very complex process that I don't get into here. But this is a wonderful resource for staff to use.

So there's two ways that we can prone somebody. One is when they're awake and one is when they're sedated. So conscious proning when somebody is awake, why would we do that? So this is for somebody who's above their baseline oxygen needs, but is able to independently position themselves into prone. We wouldn't wanna do this in somebody whose respiratory rate is very high, over 35, or somebody who's using those accessory muscles and already struggling to breathe at baseline. If they're confused, delirious, or have any sort of altered mental status, this is not appropriate. As well as somebody who's hemodynamically unstable. So somebody whose blood

pressure already plummets when you roll them into side lying is not a patient that you then wanna prone. Or what we're seeing most of is those who are physically unable. So morbid obesity where they just physically, their body habitus impedes them from laying on their belly comfortably. Those who are pregnant, those who have wounds. Some people with back pain just really can't tolerate this position. So if they're not able to do it and reposition themselves, then this is not an appropriate intervention. When you have somebody consciously prone, the goal is to maintain this for 30 minutes to two hours as they tolerate it. They can also alternate into side lying for comfort. Again, this is kind of a repositional strategy to mobilize the lungs. So if they can tolerate 30 minutes on their belly, 30 minutes on their side, 30 minutes on their other side, 30 minutes on their back, that's also helpful in the purpose of this proning intervention. If somebody is not able tolerate or that it's contraindicated, we encourage that we utilize the head of the bed elevated greater than 30 versus a flat supine to help for both comfort and pulmonary function.

So proning is something that is used by the medical team, but this can also be helpful during our therapy interventions because this enables the patients to recover more comfortably. So for those patients who you do some sort of activity and then they're sitting up at the edge of the bed and it's taking them a long time to recover or they're having a lot of anxiety trying to recover sitting on the edge of the bed, this can be a good tool to use during your therapy sessions. Just have them lay back down like you would normally do when somebody is not tolerating your session. But then encourage them to lay on their belly. You don't have to be in the room for this. So before you leave, just reminding them that as they're able to throughout the day, roll onto their belly. And the ultimate goal with this is to prolong or hopefully completely avoid intubation by maximizing the gas exchange and mobilizing those secretions in the lungs before the disease process progresses to the point of needing intubation. So prone positioning of a sedated patient is much more complicated, and this is indicated for moderate to severe ARDS patients. At least 12 hours intubation and when

somebody is on paralytics because you don't want somebody who's already fighting the vent to now repositioned in a prone position because it's more difficult to regulate this.

So referring two slides back, if you click on that link, there are pictures of the Swimmer's position that I'm gonna describe, but the ultimate position that you want these patients in is with one arm abducted to 40 to 70 degrees with the elbow at 90. So you don't want the arm elevated too high, but you want it bent up a little bit. The other arm will be down at the side. Your head should be facing towards the abducted arm with the neck not extended. You want the neck neutral or if needed, in slight flexion with some slight scapular elevation. So a slight shoulder shrug and then a pillow under the chest so the chest is supported. And that gives your shoulders a little bit of forward flexion. You'll want pillows padding the chest, pelvis, and knees, as well as in males, ensuring that the genitalia is not in a compromising position. The ultimate goal is to have a patient in prone positioning for 16 hours a day. And so just like you would normally turn a patient who is on paralytics, you're gonna wanna rotate them and turn them every two hours. In this case when they're proned, you're gonna alternate the abduction of the arms and rotate the neck every two hours. This is both for skin protection of the face, but also to prevent a brachial plexopathy, which we're gonna get into. Complications to monitor are wounds typically on the face. But we also have seen some from peripheral IVs that are resting on their arms or blood pressure cuffs resting in places that we're not as used to checking. ETT dislodgement, which is the ultimate goal is what you don't wanna do is accidentally extubate somebody during proning or pull out their CRT lines. So again, that resource from the ICS walks through multiple strategies to do that.

Facial edema from their face being in a dependent position is also something to monitor and corneal abrasion. So it's encouraged that you use ointment on the eyes and tape them shut while you're doing this. This is generally a three to five person job.

It's a complicated process because of their lines. If ECMO is involved, it becomes a much more complicated process. So of course, this is up to the medical team to dictate when it's appropriate for somebody to be prone. We won't be the ones necessarily making that decision, but we can be, as experts in positioning, it can be helpful to use our expertise to make sure that these patients are positioned correctly. In some hospitals, I also know that therapists have been utilized on prone teams to go around and to help turn these patients forward and backwards because it does require so much manpower.

Okay, so brachial plexopathy. As you can see from this picture here, as a very brief review, the brachial plexus, the nerves pass under the clavicle through the axilla and down the arm. So the ultimate goal is for patients to leave here without brachial plexus injuries. This is something that is preventable through proper prone positioning. And a lot of this really has to do with nursing education. Educating them on what a proper prone positioning looks like, why it's so important, and what the side effects of improper placement of the arms and neck could cause. So when somebody is more awake and able to engage in a formal assessment after you know that they've been prone, it's important that you assess both their sensory and motor function, and if appropriate, their reflexes to help identify the level of injury. Is this a peripheral injury that's happening below the elbow? Is it a radial groove injury? Is it something that's happening more cervicogenic at the neck level? So by doing a full sensory and motor assessment, that can help you determine that. So then what do we do? From an acute care side of things, the most important treatment for brachial plexus injuries is positioning. So we want to ensure that no muscle nerves are on, or once they're more awake, that you're making sure that the brachial plexus is not on tension. So ensuring that their arm is in a place. Especially, you're gonna pay most attention to the pec minor because stress on the pec minor is where a lot of brachial nerve tension injuries can happen.

And then helping to splint a patient. So we've been mostly utilizing an off the shelf D-ring because what we've been seeing is a lot of radial nerve injuries with wrist drop. So a simple D-ring splint can be really helpful in keeping a wrist in a functional position. If you're noticing more tone or more finger involvement, it's also appropriate to use a resting hand splint. Again, each patient is gonna be different in this process, but always consider that as an option of intervention. And then education both with the nurses and with the patient on why this happened, what the recovery process is gonna look like. Compensatory strategies is most important because as we know, peripheral nerve injuries take a very long time to recover if they do recover. Luckily, most of these or all of these injuries should be related to tension and strain on the nerve as opposed to what we commonly see in terms of lacerations or complete injuries to the nerves. So the prognosis for recovery is better, but it's not guaranteed.

So we really need to spend our time, especially in these acute phases, teaching these patients compensatory strategies. I mean, additionally this really affects their delirium because if a patient now presents with bilateral brachial plexus injuries, their family can't be at their bedside. Nurses aren't consistently in the room because of the considerations of the pandemic. It's important that we give our patients strategies to access their environment, interact with their call bell, participate in ADLs, use their remote so that they feel empowered and also able to engage so that they don't progress into that delirium. And the neuro-reeducation is also appropriate. But generally something that's gonna happen more at the acute rehab phase or the outpatient phase. But you can always initiate task specific training in these patients.

Okay, so another really important intervention is early mobility. So from what we know from all of the literature, it is safe and feasible to mobilize patients at an ICU level even if they're intubated. Because it reduces the risk of ICU-acquired weakness. Which as Lyndsay spent a lot of time talking with, has such a profound impact on their long-term function, mental health, physical health. So as soon as we can intervene and it's safe,

it's important that we do so. And this requires a lot of coordination with the interdisciplinary teams. That the doctors understand that what we're doing is safe and feasible and feel comfortable with the medical level of the patient. Coordinating with RT especially if somebody's on the ventilator or is trached, that it's appropriate timing from there and potentially even having them in the room to help us if needed. If settings need to be adjusted based on their mobility. Coordinating with the physical therapist, with their plan, as well as the nurse and CNA. And progressive mobilization is the most important.

So at the very beginning, some patients might only tolerate being positioned into chair mode. If they have not been in an upright position for two or three weeks at this point, from a hemodynamic standpoint, activity tolerance standpoint, this might be the first thing that they tolerate and that's okay. If they're able to tolerate more than that, you can transition them to the edge of the bed, where again, you're monitoring those hemodynamics, their activity tolerance, their trunk control. And this is a good place to formally assess their strength as well. And then from there, transferring them out of bed. So is it appropriate to trial them with, you know, a non-mechanical lift like a Sara Steady or a two person assist. Or even just a one person assist to trial standing based on your strength assessment. Or if it's really not appropriate, or they're not cognitively appropriate to engage in that sort of transfer, then even utilizing passive means to get them to a chair. So whether it's a Hoyer Lift or what we commonly use is just a lateral slide to a striker or a stretched chair where you can just slide them over and sit them up. That upright tolerance is so important. Not only for their weakness standpoint, but also from the respiratory standpoint to progress them. And potentially help them progress off the vents quicker. It is important to note though that you have to make sure that they have the optimum seating and positioning depending on appropriate cushioning or pillows or whatever propping that they need. Because if these patients are as profoundly weak as we're seeing most of them to be, they're not gonna have the strength or the activity tolerance to be able to reposition themselves safely. So whether

it means that they're not able to sit up for long periods of time is okay. Communicating well with the nurse to reposition them as appropriate or giving them appropriate questioning for that.

- [Lyndsay] All right, and I'm gonna go back one slide 'cause we did have a great question from Samantha saying that a lot of her coworkers are co-treating like OT and speech. "Would you recommend this or is it too much of a risk?" And I think to kind of highlight some of the things that Julia has said specifically about early mobility, I think co-treating is amazing. Again, given this kind of overarching theme of the pandemic and PPE utilization and we really wanna try to cluster care as much as possible. And sometimes having multiple sets of hands is what is safest for these patients, for safe mobilization as well as to progress. I think we can all speak to situations where we've been in a patient room. Not necessarily in the ICU, but if we just had one extra set of hands, the session might've progressed a little bit differently. Or we might've been able to challenge the patient a little bit more. So I think if speech wants to work on a swallow evaluation or some sort of cognitive component and OT wants to work on ADL performance in a some sort of progressive upright position, maybe that's a great time that you guys go in together. You're using each other's skill set a little bit to progress the patient. Whereas if you went in solo, you wouldn't have been able to accomplish as much.

And same thing with nursing, I think. When we go into rooms, we'll always ask like, "Hey, is now a good time to do a linen change?" Maybe we can go in together and nurse can pass meds, do the hourly vitals, and then we can help roll, mobilize for linen changes and then continue on with our session. So from a billing perspective, please seek out information from your specific sites. But I think clustering care is the most important for really the patient's benefit. And some of the billing components may take a back seat for the overarching needs of the patient and the overall health of the, ah, hospital or healthcare system. Goodness, tongue-tied. All right, guys.

So from a delirium standpoint, I know I've preached on it a little bit. But I feel that OT specifically is an absolute powerhouse in this domain. If we go back to school and we learned about the PEO model. We understand that you can't have a person without an environment and an occupation, right? Everything is transactional between those three components. So we know, it is no surprise to us, that COVID has been catastrophic to people, right? We're making themselves isolate. We are reducing the interaction with staff and they're not able to get up, mobilize, engage in occupations or meaningful tasks. So this unique situation has been quite catastrophic for our patients. And this I think is kind of our time to shine. So I think delirium in general, assessing for it with those outcome measures we talked about before is key. As soon as we can start assessing for delirium, we should. And then we should be communicating that information to our interdisciplinary team members and following that up with recommendations. So things as simple as applying hearing aids, dentures and glasses. If somebody cannot appropriately interact from a sensory perspective, they are more likely to fall into this delirious state. So giving them the sensory regulating tools they need to be able to interact with their environment, as well as sleep hygiene.

Coordinating with nursing. Again, clustering those cares so that people can maybe get a nap during the day if they need it. Or clustering care so that during the evenings, they're able to have longer periods of time where they're not interrupted. And then modifying the environment. Again, clustering cares. Nurses and nursing staff are not in the room as much. So what can we do to set up the environment for long-term benefit? Once we walk in the room or a nurse walks in the room, turning on the lights, making sure there's a clock visible or a calendar on their bedside table that can help orient the patient throughout the day. As well as collaborating with our speech therapy colleagues to figure out adaptive communication strategies or an adaptive call bell. If somebody is in respiratory distress and due to neuromuscular weakness, they can't

press that really hard button, that can obviously increase anxiety, increase that posttraumatic stress response.

So something as simple as a call light is truly a lifeline for patients. So I think, again, knowing that there's such a medical focus on COVID because it is so novel, really bringing it back to our basic skill set of how do we set up the environment, the occupation, and modify specific client factors to make patients as independent and as safe as possible? And then lastly, the reorientation. I think the O-Log is a great objective measure to figure out where the patient is at from an orientation perspective, and then follow that up with a calendar, verbal education. Maybe setting something up in the environment or setting up like a hospital journal or an ICU diary that I'll talk about in a little bit. All right, so along the lines of early mobility, getting people engaged in ADLs as quickly as possible. So we know that neuromuscular weakness and pulmonary function deficits are huge in this patient population. So using our expertise in being able to modify ADLs, applying different adaptive equipment or durable medical equipment strategies as a way to make people modify the activity for energy conservation and promoting independence. And another one that I think we've noticed a lot is the symptom identification. I think a lot of our patients have been on the younger side of things. So maybe this is their time with a specific disease process or illness that has required hospitalization and they don't know when they've reached their limit in terms of endurance or activity tolerance. So really being able to help these patients identify this is your breaking point in terms of safety for your fatigue level and then how do we then manage it? And another one is the breathing techniques for our patients who've been on the mechanical ventilator for a prolonged period of time. Or because of that pneumonia respiratory failure component of COVID, it's really hard to take a deep breath. Really retraining the body in terms of safe and appropriate breathing techniques to help them be able to engage in their meaningful activity has been something that we've noticed a lot of our patients have needed help with.

All right, and then the mental health component, I kind of clustered the functional cognition as well as the psychological all into this umbrella of mental health because from the slides at the beginning, we know they're so intertwined. You can't really have one without the other, especially because we learned that deficits and executive functioning are independently linked with increased rates of depression, we wanna tackle all of it. So as you can see here, we've created like a little activity book, and there's a couple of resources that I'll talk about here in a minute. But they have great options for cognitive engagement. Things like word searches, crossword, puzzles, different apps that patients can use on their phone. And speaking of the phone, the social engagement piece, that's huge. FaceTiming with family. Our hospital, we're lucky enough to have five iPads in our therapy department that we are able to bring in for our sessions and maybe FaceTime a family member so the family can watch the therapy session or just have a conversation. As well as phone calls if the patient doesn't have access to a smart device, phone calls are also sufficient for just being able to reach out and touch base with family.

Routines are important. I think it also a little bit helps us as the provider. And when I say us, I mean the whole hospital staff where if a patient has a routine set in place, it's a little bit easier to cluster care versus just popping in and out whenever the patient presses their call bell or needs something. So not only is it great for the patient's engagement and their mental health, it also is a little bit easier to have staff support the patient in that. And then the ICU diary is a wonderful intervention that you guys can kind of Google search and look up on your own. But basically, it looks a little bit like a journal. So the one that we use here, it has one column for the date and one big column for just kind of free text. And it can be written for a patient if they're unable to write. And then once the patient is able to participate, then they're able to read and look back at all the things that they've been through. All the things that have happened during their hospital stay. It improves orientation, short-term memory, and definitely helps with the psychological components of anxiety and depression. And lastly,

mindfulness. That is something that I have found success with, especially with our floor status. Patients who are a little bit more mobile or their tolerance is a little bit more robust. So I've gone to just YouTube and typed in mindfulness breathing exercises, and there's great like 10-minute little videos that really help people kind of disconnect with all the chaos going on around them. And again, taking it back to a more mindful place, reducing anxiety, as well as working on their breathing technique, which patients have reported has been great and they've really found it valuable.

Okay, so kind of to bring everything together, I'll go through case study number one and then I'll hand it off to Julia for a case study that she has. But this lady, Sally, she's a 78-year-old female and she was in the hospital for 45 days. 20 days was spent in the ICU. And her situation was quite catastrophic in that her and her husband had their son and daughter-in-law living with them. All four of them contracted COVID-19. And her son and daughter-in-law actually passed away in our ICU. And her husband was critically ill in the ICU with a tracheostomy and had a very, very poor medical prognosis. So by the time I had worked with Sally, she was on our floor. And due to strictly her experience with COVID, her activity tolerance was very poor as well as she was having some mild cognitive deficits. She was CAM-ICU positive for 10 days of her ICU stay. And then by the time I had seen her on the floor, I had done the bCAM as an outcome measure and she was negative. However, she carried a significant psychological trauma from not only her experience in the ICU, as well as the experience of losing her son, daughter-in-law that she obviously could not see because of the restrictions as well as her critical illness. And then her husband being in very tenuous medical situation in the ICU.

So I started a hospital journal with her. She reported to me like, "When I wake up in the morning, "I'm really happy and I'm very motivated. "But then by like 10:00 or 11:00 in the morning, "it just kind of all hits me and it lays really heavy "in my mind and I just don't wanna do anything else." So she was definitely experiencing depressive

symptoms, just grieving the loss of her family, grieving the loss of her function. She was extremely independent. And then that social isolation and deprivation piece. In addition to this hospital journal and establishing a routine, we also established a routine for daily phone calls with her daughter because that was kind of now her one family connection outside of the hospital that was helping her with this grieving process, as well as to kind of rationalize everything that they had been through and help her connect with her family unit. And then leisure engagement, she really enjoyed reading her Bible and writing out different scriptures. So that was something that we helped set her up with. So just kind of one example of the myriad of issues that these people are affected by, which is quite sad.

- [Julia] Okay, and our second case study, it'll be Randy. He was an independent 40-year-old. Really highly active at baseline, travels a lot, goes to the gym all the time. No previous comorbidities. He had a 38-day hospital stay, which is prior to him transitioning to a two-week acute rehab stay. So ultimately into the hospital for over 50 days. He did have a 22-day intubation prior to his tracheostomy placement, and he was just profoundly impaired in almost every realm. He had a hyperactive delirium, was CAM positive for 15 plus days crawling out of bed, pulling at lines. The significant thing for him was really engaging him in these ADLs, getting him into routine. And then we also did implement an ICU diary. Because he wasn't able to engage, we communicated closely with his spouse at home and had his spouse journal and now Randy is able to reflect on that with his spouse. His activity tolerance due to profound neuromuscular weakness and fatigue was a significant thing. He required frequent rest breaks even to the fact of if he was washing his face, he would need a rest break before we did anything else. So incorporating that into his routine.

And we also asked nursing to really help us position him to chair mode throughout the day. And this helped regulate his delirium because it would fatigue him so then he could take a break. But also to work on that upright tolerance instead of trying to cram

it all into our 30 or 45-minute sessions. Once he did begin to clear, he had significant anxiety. So we utilized breathing strategies. We FaceTimed his significant other during every session because that was really a calming force for Randy. And just hearing that and the familiar voice and having that motivation was helpful for us in redirecting him. And then maximizing communication strategies because he did have that tracheostomy and he also had a right radial nerve injury so he couldn't use his right hand. He was left hand dominant, but he was so weak that he could barely move his arm against gravity. So with the wrist drop on that right arm, we placed a D-ring splint on his hand and then we were able to kind of finagle it so that he had a stylus that stuck out of his D-ring splint, which he was able to use to not only hit the call bell and change the station, but also to use the iPad that he had in his room to call his husband when he wanted. We positioned him in elevation 'cause he had significant edema. And then like I said, we used a lot of compensatory strategies for him to be able to interact with his environment a little bit more and use the iPad to communicate with us. He's now independent and home and rocking it.

- [Lyndsay] All right, last slide and then we'll get into questions. You guys have a ton of questions and we really wanna get to them. But if there's one thing that we have learned from this whole COVID outbreak is that it really is a global effort, and I have absolutely been so impressed with the sharing of knowledge. And that is one of my passions and reasons for doing this webinar, is to try to share little knowledge I have with you guys. So this resource page has been a huge lifeline for us as we've created our protocols here at our hospital. There's two Facebook pages that have been amazing. COVIDRehab4OT is just a general COVID rehabilitation page. So that includes everything from acute care, outpatient, home health, etc. And then the COVID4CCOT is specific to critical care. And there have been some amazing therapists out of the United Kingdom, mostly from this Royal College of OTs, and they have been so, so helpful and just kind of going on that Facebook site, writing a question, and just watching people submit their anecdotal evidence, kind of what literature they are

aware of. It's been absolutely amazing. So I wanted to pass those along to you guys, as well as the Hospital Elder Life Program. This is here in the US and they have a very robust delirium program. And that second link there, which you guys can access after the presentation, they just rolled out yesterday is when I learned about it. It is free delirium protocols. They have one for like interventions and then one for assessments. So go on there, and that is a great resource that you guys can use more in depth. I know today we just kind of did an overview from our perspective but go to those for more information. Johns Hopkins University has an Everybody Moves Campaign. That's great. It has a ton of information for like handouts for educating patients, clinicians, as well as handouts for exercises for patients to complete. It's a grassroots effort to combat immobility in acute care and post acute settings. So again, robust information as well as handouts. And then the last one is Rehab Care Alliance, and it's an online collection of resources specific to COVID rehabilitation. So that one has been a great resource as well. So that's that.

And then let's see if we can answer some of your questions here. Okay, Sarah, "What is the average length of treatment stay for your COVID positive patients?" I believe our hospital length of stay is about seven days for COVID patients, but those are primarily people that we are not seeing on our caseload. I would say most of ours have been like 20 to 30 days maybe. And are we seeing them five days a week? We have been doing a pretty good job of setting our frequencies based on how we would normally set frequencies for patients. So in the ICU, it may be two to three times a week. And then if they have a discharge plan, or like a discharge disposition I should say like home with family or maybe an acute rehab is gonna take them, we will titrate our frequency based on that. So really no hard and fast rules.

Let's see, Nadia says, "Is a patient able to be on a ventilator without being sedated? Or when you start progressive mobilization, the patient is off the ventilator and may use supplemental oxygen." So again, all patient specific, I would say most patients, the

ventilator is extremely uncomfortable. So they have some sort of pharmacological component that is maybe taking the edge off so to speak. But that's when we would use that Richmond Agitation Sedation Scale. So if somebody is maybe a RASS of negative three where they are waking up and opening their eyes and scanning the environment, I would say yes they're sedated, but they're not sedated to a degree where mobilization would be unsafe or harmful. So then we would proceed as long as all those other kind of safety things check out from a medical component. So yeah, we definitely in the ICU are able to see people on ventilators and using those objective kind of assessments to tease out whether or not the level of sedation would be okay for initiating mobility.

And then Nadia again said, "How often do patients demonstrate delirium? Does delirium develop while a patient is at the hospital or does it begin to develop prior to hospital admission? How long it usually take "for delirium severity to decrease." Great question. Current literature for general ICU patient states approximately upwards of 80% of people in the ICU will experience delirium at any given time. Delirium typically starts in the hospital due to the sedation, the intubation, all of that. However, there are some specific risk factors such as infection, advanced age, decreased mobility in the community setting where somebody may come into the hospital with symptoms and a component of acute delirium or acute mental or altered mental status. So it's really hard to say. And then again, how long does it take for delirium to decrease depends on the patient. I think that's why for us, it's extremely important that we intervene and start assessing patients as soon as possible to figure out when that delirium is occurring and then start our battery of interventions to try to reduce that length of delirium.

Let's see. Roberto, "Do you see a correlation between impaired cognition and disturbed breathing? Literature supports faulty breathing as learned behaviors affecting cognition via respiratory alkalosis. OT's role in psychosocial and psychophysiology is a powerhouse." Yeah, I would agree with you. I think we know that people with delirium

have difficulty weaning from the vent. They have prolonged periods of ventilation due to inability to wean. So I think there truly is a correlation based on the literature that shows changes in cognition leads to impaired breathing. So I think, again, not to beat a dead horse here, but really being able to get in and assess when delirium begins, and then start those interventions to try to prevent it and then reduce its length of duration.

"Any breathing techniques that specifically help or hurt for COVID patients," says Natasha. And maybe I'll hand that one over to...

- [Julia] So breathing strategies that we use, we do use a lot of pursed lip breathing, which you can employ with patients with COPD or other obstructive lung disease. We actually find that cuing patients to focus on their exhalation is usually more successful for us because they have more control with that. When you encourage them to try and take a deep breath and they can't, it can kind of prolong that cycle of anxiety and shortness of breath. So really encouraging them to push that air out. And we also encourage a huffing technique, so like you're trying to fog up a window or a mirror. We encourage that which again kind of forces that exhalation and usually gives them a greater sense of control.

So another question that we have from Sarah is, "How does the positioning of the arm being abducted affect the outcomes of proning a patient? Is it used to prevent a brachial plexopathy?" Yes, exactly. So by doing that, that helps take some of the tension off of the brachial plexus in the direction that your head is turned. So the goal of that ultimately is to decrease brachial plexopathies especially in the cervicogenic area. We have some other questions about what would likely cause a healthy 40-year-old patient to have such severe respiratory distress. And do you suspect an underlying cause? With a similar question of, does the severity of the condition depend on age, sex, and prior patient's health? Right now, we just really don't know enough about COVID to know that. Some of the young healthy patients that we see really just

have no known comorbidities. We do see a lot of young patients with obesity, hypertension, diabetes that have complex cases, but we are also seeing these healthy patients that have no other indicators. But as of now, the disease is just too new for us to fully understand exactly what's going on with that. There was another question of, can you explain the value of the dynamometer for COVID patients? And that is, again, to just kind of give us an objective measure of the neuromuscular weakness that they're having, especially in there. And also, we can use it for assessment of brachial plexus injuries and brachial plexus recovery to track their progress as they go. I'll let Lyndsay answer the question about the ICU diary and the CAM.

- [Lyndsay] All right, another question. "Can you explain how you would explain hospital journals to a patient to set them up?" So yeah, I would normally say, you know, "I've noticed that you or I saw on your chart that you were experiencing delirium in the ICU and I'm noticing that you're having challenges with your short-term memory or your orientation. And this is a great way to be able to look back at all the things that have happened to you. And it might clarify some questions or maybe some traumatic memories that you remember. And also be able to show progress." I think especially in our patients or younger patients, they get very frustrated. Like, "I've been here 30 days, what's going on? I wanna leave." It's like, "Well, let's look back at this experience that you weren't conscious for and here's all that you've been through and look how far you've come." And it really can kind of put it into perspective. So I think it depends on why I'm using the hospital journal on how I'll frame it, but those were kind of a few examples.

And then one last question here before we wrap it up. Jennifer asks, "Can you explain the difference between the CAM-ICU and the CAM Severity outcomes?" Yes, so the CAM-ICU is a screen for the presence of delirium. So delirium is an altered level of consciousness within attention. And then either disorganized thinking or a change in level of arousal. So using the CAM will assess whether or not delirium is present or not.

If delirium is present, then you would go to the CAM Severity Scale. And then based on those inattention, disorganized thinking, altered status of level of arousal, you will grade. It lays it out really nicely and tells you how many points to give for each subsection, but you'll grade out of seven how severe the delirium symptoms are. So sometimes, we find in the ICU, somebody may be delirious for 10 days and it's not necessarily as powerful just to say, "Yes/no, "delirium is or isn't there." And that's when we utilize this severity scale to show, "Hey, two days ago, they were CAM positive "with a severity of seven out of seven. "Today, they're CAM positive with a severity "of two out of seven." So are they delirious? Yes, but we know our interventions are pushing the needle a little bit and we're decreasing that severity of symptoms. So sorry we didn't get too much into the specifics today. Just due to time, we weren't able to, but feel free to to Google independent study and then look at some of those resources on the resources page, and I think they'll be able to guide you pretty well. So thank you guys so, so, so much for hanging out with us today. I hope this has been valuable. Julia and I obviously love to talk about this stuff, and we love to hear all the things that you guys are doing at your sites. So please email us and hopefully we can touch base in the future. All right, thanks everybody.

- [Fawn] Thank you so much for the presentation today, and thanks for all the good work you're doing. I hope everyone joins us again on Continued and [occupationaltherapy.com](http://occupationaltherapy.com). Thanks, everyone.