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Therapeutic Modalities: Cryotherapy and Thermotherapy Recorded September 23, 2020

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OccupationalTherapy.com Course #4901

- [Fawn] Today's course is Therapeutic Modalities: Cryotherapy and Thermo Therapy. Our presenter today is Dr. Scott Cheatham. He is an Associate Professor in the Division of Kinesiology at California State University Dominguez Hills in Carson, California. He is the owner of Sports Medicine Alliance. He also received his Doctor of Physical Therapy and his Doctor of Philosophy in Physical Therapy. He is a Board Certified Orthopedic Physical Therapist and a Certified Athletic Trainer. He also holds several fitness certifications and is a Certified Ergonomic Specialist. Dr. Cheatham is a national presenter for various organizations and has authored over 100 peer reviewed publications, textbook chapters and several home study courses on the topics of orthopedics, health and fitness and sports medicine. His professional responsibilities include being an associate editor for the "NSCA Strength and Conditioning Journal," "Journal of the Canadian Chiropractic Association," and a manuscript reviewer for several other peer reviewed journals. Dr. Cheatham is an Education and Research Consultant for various health and fitness organizations. His research interests include myofascial interventions and the efficacy of interventions for various musculoskeletal pathologies. His current clinical practice includes sports medicine services, general orthopedics and sports performance training. Welcome, Dr. Cheatham. So glad to have you.

- [Scott] Hi. Thank you, Fawn. Hopefully everyone can hear me, just do a quick sound check. Perfect. All right, welcome everybody. Thank you so much for taking time out of your day to hang out with me for the next two hours and discussing the topic of cryo and thermotherapy. Now, a little bit more about myself. Again, I first wanna thank the team at occupationaltherapy.com for allowing me the honor of sharing some of my thoughts and what I've learned about therapeutic modalities as it applies to the occupational therapist. Now, my background is I have a neuro background but I also do orthopedics. So, I am treating kind of a lifespan of patients in my practice but also too, one thing I think it's important to kind of before we get started with the discussion is I'm also an adjunct faculty in the Master's of Occupational Therapy Program at Cal

state University Dominguez Hills. So, I've been able to work with both physical therapy and occupational therapists, and I really appreciate how each of the professions blend together, but also they have their own special, unique qualities on how they can improve a patient's life. So, understanding that, we're gonna be looking at it from that lens. Now, as far as disclosures and stuff, I did get a stipend for this talk. I do not have any conflicts of interest. The content we've used as far as the images and information, we've gotten permissions and they're cited properly. And so if there's any questions that you have about anything, please refer to the team at occupationaltherapy.com for that.

Okay. So, as we move forward in this talk, there's really three primary learning outcomes I would like everyone to understand for this discussion. So, first off is I would like the participant to be able to discuss the scientific and physiological principles behind cryo and thermotherapy modalities and we're talking about each of those as a group, right? We wanna be able to kind of understand the science behind it and when we apply it to a patient, how that energy is being transferred and I think that's important. And the second learning outcome is to be able to discuss best practices for administering these modalities for different musculoskeletal conditions. And then the third one is, is to discuss common indications for each of them of the modalities, precautions, contraindications, and also some adverse events to look for as you are applying them. Now, before we get started into the lecture and stuff, I do wanna kinda premise that we're gonna be covering a lot of information in two hours.

So, please consider this as a nice overview of the science and application of cryotherapy and thermotherapy. It's obviously not gonna go as deep as a PAMs certification or a textbook where they're gonna get heavy into the science and the physics and everything. So, we will be covering some terms and stuff, but I wanted to make this lecture kinda middle of the road because in the group of participants that we have, we may have new clinicians and we may have clinicians that have been out for

awhile. So, I wanna try to give everyone an evidence-based update, but also share some of the stuff that I've learned along the way and stuff. So, on that note, though, I wanna give everyone a quick short story of a personal experience that I had as it applies to occupational therapy and use of modalities. So, here goes the story. Hopefully everyone can go with me on this. Okay. So, about four years ago my sister came to visit with her daughter from Peru and she unbeknownst to what we knew, my wife and I, she had started a new blood pressure medication. And unfortunately the doctor who prescribed it back in Peru just prescribed it and didn't have her come back and check her blood pressure and see how the medication was controlling it. Well, she was here in California where I live and she was visiting a friend down in Orange County area.

So, we're talkin' like San Diego area and she forgot to take her medication one time and she ended up having a hemorrhagic stroke, unfortunately. So, luckily they got her to the hospital where they did the clot busting drugs and they really took care of her. Well, fast forward till her recovery from ICU. Obviously she came back to our house and that's when my neurological kind of stroke PT side came in and so for the first two months I was really focused as like a physical therapist. You know how PTs, I always kinda joke and call us hammerheads. I was really on function and range of motion and trying to get the engine going again in that eight to 12 week neuroplasticity, neuro motor window, okay? And so I found myself really kind of helping my sister-in-law with function, with gait and really kind of those first couple phases of stroke rehabilitation. But then I started seeing myself running out of kind of strategies as we started getting towards that 10, 12 week mark. So then I knew because I've owned clinics before and I've worked with occupational therapists, it was time for me to outsource. And so I brought in my friend, his name is Joe Burt. He's a DOT and he's an expert in stroke. So I ended up payin' him and he came in and he kind of picked up where I kinda left off. So, I really think with some patients where PT ends, OT begins, right? And so, he did amazing magic with my sister-in-law. His approach coming from an occupational

therapy standpoint was very holistic and when we talked about the bio-psycho-social model, he really mixed in a whole kind of functional/occupational strategy that really dig deep. But he also used modalities to kinda open up those neuromotor, neuroplastic windows, right? And so, it was amazing to see him work because he was like a magician. I mean, he opened up so many things with her emotionally, physically and really got her to kind of care about herself and increase her self-efficacy. And I was amazed to actually see it because it was a family member, right?

So, I really got a personal appreciation for the power and magic of occupational therapy. And so, that's why I believe it's an honor to be a PT and to work in an OT program, but also share kind of this eclectic approach because we all work together as a team. So, that's gonna be my lens as I discuss modalities with everybody here over the next two hours and I want everyone to kinda think about too, as we're talkin' about modalities, sure it's great to know all about the science and the application and indications and contraindications, but I want everyone to focus on more the OT aspect. How can a modality help you open up some type of window in an overall strategy? How does a modality fit into your functional occupational task driven strategy to help the whole person? So, I wanna think about modalities that way versus a passive modality that's commonly seen in clinics, right? We stick 'em in the corner and we put 'em on a hot pack. Okay? Well, times have changed and modalities are used as an adjunct for a multimodal comprehensive strategy that's interactive between the clinician and the patient.

So, I wanna make sure that we keep that in mind as we go through these topics and I want you to challenge yourself and think about how it fits into your strategy and your treatments and stuff with your patients. So, hopefully everyone's good with that. I wanted to kinda give a little bit of a story and background just to show my appreciation for that. Okay? So, let's talk about agenda. We really have five main modules to this. Now, remember, this is part one in a three part series that I'll be doing on modalities,

okay? So, in part one here we're gonna go through five modules and within each module, I'm gonna pose some clinical questions and we're gonna cover each of the major cryotherapy, thermotherapy modalities and then at the very end, we'll cover some documentation, okay? Just some basics. So, I want everyone to kinda realize that each module will be broken down but we're gonna have a lot of kinda prompts, clinical questions, some take home messages so that we can get through the two hours and then give everyone some nuggets to kind of have nuggets of information for their clinical practice.

Okay. Let's talk first about the healing process and I think that's important because when we talk about our first clinical question, we always have to ask is what are the different phases of tissue healing and responses to pain? Now, I know a lot of us might be comfortable with this, but it's a good review to realize that if a patient has suffered an injury, okay, as simple as a strained muscle, or they've had a stroke or whatever, the body typically goes through a time dependent healing process, okay? And we understand that. And so, your typical inflammatory phase, we typically understand it's one to six days, that's usually trying to protect the body and then we also have the fibroblastic phase, which is where the body begins to start repairing itself and then obviously we have the maturation phase. So, typically when we look at the textbooks or basic science, modalities are used to facilitate this time dependent process, okay? But if we take it a step further, we need to use modalities to help open up more functional windows, neuromotor windows, neuroplasticity and all that. So, we wanna look at our modalities as an adjunct, not as a primary billable treatment, okay? And so I think that that's been a challenge, at least for me practicing for 20 years, I kinda grew up in the clinics as an aide and I remember everyone got ice and STEM, right? Or everyone got ultrasound and stuff.

So, I think as we've progressed as clinicians, we just need to realize that we're trying to facilitate this process. So, then as we talk about inflammation, I think it's important to

understand that it's really how the body right after the initial injury really protects itself. So, I'm not gonna get too much into the science of it because of time but just understand that really, during the inflammatory process, the body around the injured area really shuts itself off and then really tries to begin the cleanup process. And one kind of mnemonic we want everyone to kinda think about, when you're looking at signs of what inflammation is, simply S.H.A.R.P, right? Swelling, heat, altered function, redness and pain. So, you know during the inflammatory phase or a very acute or subacute injury, our patients are not gonna have a lot of function, right? The tissue's is gonna be sore and so we're gonna have to deal with it and that's where some of our modalities may help them actually increase their movement and being able to develop their own strategies to help overcome this phase.

So, our first kinda take home here is try to remember the mnemonic or the acronym here, S.H.A.R.P as a good kinda reminder of the signs of inflammation. And then as we move to our second healing phase, so, remember between days one and six, we know that the body's shutting itself off, we get that whole S.H.A.R.P appearance. The clinical presentation is the patient's in pain, swelling, not much function. Then as we start going into the proliferation phase, that's when the body starts to rebuild the damaged structures and that's where the fibroblast and all the collagen building cells come in and really kind of pick up where the inflammatory phase left off and starts to repair itself. But remember though too, phase one of the inflammatory phase, the body's really shutting off the area and cleaning up the wound. Phase two, the body starts to lay down scar tissue. So, the integrity of the injured area is still gonna be vulnerable to re-injuries or flare ups. So, typically in my humble opinion, during the first two phases, pretty much the first month, within that first month, function's gonna be low because the client is gonna be in pain and the tissue's still healing, okay? So, then as the patient progresses into more of that maturation phase, that's when the fibroblasts, after they kind of leave a scar over the wound and start to kind of remodel, okay? And that could be anywhere between day nine to day 21, all the way up to two years with some

people. Okay? And so, maturation is really where the collagen begins that they can then strengthen over that injured area and then the client or the patient can start to function more. And to be honest I think that most basic musculoskeletal injuries around four to six weeks is kinda like that magic number, right? Where people start to kinda get back to function and start doing a little bit things. Then you can start loading them accordingly using the different phases of rehabilitation and stuff.

So, I think that that's important and stuff, but remember too, from an occupational therapy standpoint, as far as their functional or ADL or more complex tasks and stuff, you might see them after that initial, inflammatory fibroblastic phase, they might be able to become more functional and do more things. So, your goal setting may change and your strategy for using modalities and helping them may change as they start demonstrating more efficient movements, less pain and psychologically, they start to accept and adapt and start changing. So, those are just some thoughts as far as looking a little bit deeper at the phases of healing. The bottom line here though is remember, the body repairs itself with scar tissue, okay? So, it doesn't just heal itself with natural healthy tissue. That's why STEM cell research is so popular, right? We're trying to regenerate stuff. So, we just have to remember that the body does repair itself with scar tissue. Okay? So, here's some things for the occupational therapist to kinda consider. We understand though, that the body will interpret surgery or injury as the same thing. So, if you think about it, if a surgeon does surgery, that's a controlled injury, right? He's still cutting and damaging tissue, but it's done to kind of remediate or repair an injury, okay? That's kind of the thought process. We also know too, that the body will respond and go through this time dependent process.

So, we understand that modalities can facilitate it, but that should not be our whole strategy and modalities should be an adjunct, either pretreatment during or post-treatment, okay? So, that's where they should lie. So I wanted to make sure we spend a little bit of time on phases of tissue healing before we kind of move into pain.

And I think this is important and we're gonna quickly go through this, but I want people to kinda go back and kind of remind themselves a little bit about the different pain classifications. Now, one classification area is professionals and researchers classify pain by acute, okay? Less than 30 days, which is more psychological or chronic, right? We always hear the term chronic pain. Well, we know that that's been defined in the literature is basically consistent pain that lasts over three months and we understand that the patient's gonna have a psychological, emotional and sociological reaction. So, basically they're gonna have some adaptations in the nervous system from it. Okay?

So, working with chronic pain patients is completely different than a simple acute injury, like an ankle sprain or somethin' simple, right? So, we have to kind of appreciate that, especially when we use modalities because modalities have a place at times with patients, in my opinion. And so, regardless of the clinician, sometimes with modalities, you can open up a window just by helping the person feel better because it kind of blocks the pain. So, think about that with some of your patients and how a modality can facilitate more strategic interventions down the road, okay? And also too, we can't forget referred pain, right? Two rules I go by. If you have a patient with an upper quarter issue, okay? And then they have pain, numbness, tingling, whatever, any type of radicular symptoms or some type of somatics that goes past the deltoid tuberosity, we're automatically gonna consider it's coming from the neck, okay? We're not gonna disclose that to the patient, but we're gonna clear the cervical spine, okay? Also too, when we talk about lower quarter, any of those symptoms, right? Any of those symptoms or sensations that go below the gluteal fold, we're going to take a look at the lumbo-pelvic-hip complex and make sure we're not looking at some of the lower lumbar stuff, okay? So, really though to just kinda go back, we know that the lower cervical spine and lower lumbar spine get kinda beat up the most with just posture and life. So, just kinda keep those in the mix too, as you deal with maybe a patient that has referred pain.

Okay, other classifications. Some professionals use these big terms like nociceptive, which is obviously your pain receptors, okay? Neuropathic, which is nervous, neurological in origin, okay? And that can manifest itself clinically as paresthesias, itching, anesthesia, weakness. We also talk about some type of central sensitization and those are some of the more central higher brain responses to let's say cold, allodynia, hyperalgesia. We're seeing those responses to different things. And then also we have our typical psychosomatic and stuff. And we have to remember too, especially right now during these challenging times, patients might be a little bit more psychological and a little bit more sensitive about things. So, that means their nervous system's gonna be very up-regulated, right? So, that's where maybe modalities will come in and be able to try to get them in some type of parasympathetic state to kinda calm them down a little bit.

So again, think about how modalities can fit in working with some of these pain classifications. Okay? And then here, I just added a table just to kind of, and this is from basically an orthopedic text that really kind of gives everybody some indications of the type of pain or afferent stimulus that a patient will receive if any of the structures are damaged or injured or irritated. And so, if we go down the list we have cramping, aching, sharp shooting pain. If we're going down the left column here, throbbing, diffused pain, burning, stinging, aching, deep nagging, dull and sharp and severe. And that correlates with obviously muscle ligaments, nerve roots and it goes all the way down. So, just as a quick kind of overview, I think this is a great slide just to reflect upon because one of your patients may complain of something, but sometimes you have to decipher what the structure is and what the origin of the pain is. Okay. So, our next clinical question is what are the current pain theories? Well, if we look here, we have what's called the neural matrix theory. And I don't know if anyone in the group here has ever heard about it, but basically I'm gonna kinda summarize this because it's pretty comprehensive, is that the the neuromatrix theory and I'm gonna go back one slide, it was introduced by Moseley and Melzack back into 2001, 2003. If anyone has a

chance to pull these articles or you guys can email me later and I can send them to you, they give a great summary of it. The neuromatrix is a theory that it guides us away from the simple thought process that if you have an injury, your brain has a related sensation, okay? It gets away from the simplicity of just saying, oh, I have an ankle sprain or oh, I had a stroke so I just have pain. Ow. It gets away from that and it tries to further define pain by saying that it's a multidimensional experience. And that's where I think the occupational therapist has an expertise because we understand that someone who has pain, okay? And if we look at the body neuromatrix, okay?

If someone is in pain or they have an injury or they've suffered a medical condition, look at all the inputs along and we're gonna go counterclockwise from the top, you have some motivational effective negative inputs from pain or some type of effect. You're gonna have some sensory discriminatory input, right? If they're having pain but also you can have some cognitive input coming from that injured person. So, that means they might have some fear avoidance. They may have decreased range of motion because they don't wanna go through the pain. They may have some type of adaptations in their thought process. They may, as far as their functional activities and occupational activities, they might be afraid to do that. So, we have all these inputs that are occurring from an injured structure. It's much more complex than just linking it to one injury and so the output is gonna be what? The efferent output is what? What's it gonna be? Pain perception. Their action program's gonna be mixed up. So, if you try to do a task with them, they're not gonna do it efficiently. So, you may have to regress them down to a lower level task, okay? Stress regulation. We know that their sympathetic nervous system is gonna be heightened. They're gonna have all these responses and stuff.

So, just kind of in short because of time, the neuromatrix really gives us a deeper look at pain and that it's a multifaceted process. It's multidimensional. And so, we understand when we look at this slide and this is slide 25, if we look at the diagram and

when we go clockwise, we have pathological mechanisms at the tissue level, the nervous system processing that injury. We also have output issues, right? We also have a heightened up-regulated nervous system, and we also have some input stuff. So, there is a multidimensional process that can occur but sometimes though, through this process, you can disrupt what's called a neuro signature by using modalities and by using a lot of our therapeutic interventions because the neuromatrix really, really kind of typifies three points in this slide that a lotta people after experiencing an injury develop this neurosignature in their brain of this pain experience. Okay? So, then they start developing a synoptic architecture in the nerves, right? Okay? And in the brain and the nerves and stuff that leads to what? A modulation of sensory input? Okay. And also psychological stress. That's the second bullet point, okay? So, think about this. An injury occurs, the patient starts mapping this pain experience, that starts affecting their cognitive thought process, emotional, psychological, okay? And then from there, other stressors in life start to affect them and then it really becomes this complex snowball, okay?

So, a lot of times with the modalities that we use or our interventions like movement, exercise, change of environment and stuff, there's a lot of strategies that we use. We can rewrite this neurosignature that occurs from the pain neuromatrix, okay? So, I want you all to think about and as we go through, that maybe you do have that one patient that is very fearful, right? And that it manifests as fear avoidance, they're very hypersensitive and stuff. Is there a way that you can use a modality combined with a new task or new strategy that you can open up that window and build more confidence and get them past those negative neurosignatures, okay? So I wanna just to make sure that we kinda cover some of the newer theories and stuff, okay? So, really things to consider is we know pain's multi-dimensional, we know that the neuromatrix is a popular theory, okay? And also too, we know that the neuromatrix occurs because there's failed homeostasis in the body, right? There's an injury and the body just kinda gets out of whack. That's kind of simply discussing that. Okay, our next clinical

question is, well, how does the body modulate pain? And again, we're gonna quickly kinda go through this. We've all kind of hopefully studied before the gate theory of pain, okay? And we understand that there's spinal cord modulation through that and a lot of times we can use external modalities, everything from Kinesio tape, right? Compression, massage. We can use some of that and even some of our thermal modalities like heat, ice. Those all can per se affect this gate theory of pain and we've seen the gate theory over the years kinda morph into different things.

We also have the endogenous opioid system, okay? We understand that where sometimes we can use modalities or some type of activity where the neuroendocrine system will release some type of endorphins, so that can decrease pain. And then we also have central sensitization, okay? Where we talk about the injured areas giving this nociceptive impulses to the CNS, okay? And so, we understand that sometimes some more cognitive therapy or getting the person to move more and to really kinda talk about it can also work on this central sensitization and then also there's other things we can do as far as everything from light touch, using different surfaces. There's a lot of strategies that we can use to affect central sensitization. Also pain modulation and control. We understand that the pain neuromatrix is in with that. And then we also have the homeostatic system, okay? Which is more the fight or flight or the sympathetic and parasympathetic.

So, just in summary, we have a lot of ways the body controls pain, okay? And so just in short, occupational therapists pretty much at this point of the lecture, I think it's important to ask yourself how does the healing process affect the patient locally and globally, okay? And that's where I think where it's fitting to talk about the healing process, pain response and also a quick review on how the body responds to pain, right? And so, that's important to kinda decipher and also how does the pain matrix effect the patient, right? I mean, I understand we talked and I'll kinda go back a slide. I understand we talked about pain modulation and control, but a lot of times we kinda

bridge it all into the pain matrix, right? So, how does the pain matrix effect the patient and also too, within your comprehensive strategy, which modality will help enhance the rehab program? And so, I think that that's important to ask ourselves as we begin to move forward into all these topics and stuff. All right. That was a lot. So bottom line, we understand that the healing process and pain matrix can really affect the recovery after surgery or injury, right? And so we understand too, and I think this is important that when you use a modality within a strategy, you're affecting the body locally and globally, okay? So, you are causing a neurophysiological response with all the modalities that we use. And so, to me that's the big take home for this whole section and that's why I wanted to spend kind of the first kinda module in this series on the basic science because when we talk about the rest of these and then also when we talk about the next two lectures in this series of modalities, we're just gonna be considering all these scientific concepts as we learn about the different modalities.

Okay, Module II. We're gonna quickly kinda go through basic science and then we'll get to the good stuff. We'll talk about the different modalities and kind of what we can do with them clinically in different patients. So, next clinical question though, about the basic science and this is important to know, also too if you guys are all, ladies and gentlemen, if we're all writing notes, I think it's important to make a couple notes on this Module II which is the different modes of heat transfer, okay? From here, we know that when we use a modality there, if it's cold or heat, energy's gonna get transferred from a kind of environment of higher concentration to lower concentration. It's kinda basic physics. So, if we're looking at the, kind of the diagram on the left, we have five modes of heat transfer. Conduction, convection, conversion, radiation and evaporation. And so when we look at the modalities, okay? When we look first at conduction, that's typically a direct transfer of energy between two materials at different temperatures. So, if you're using ice or if you're using heat, they're obviously a different temperature than our skin or our body so they're directly gonna transfer heat. That's why we stick 'em directly on our target body region. And that's pretty much

about it. It's really direct transfer of energy. When we talk about convection, though, convection is a little bit different. Heat is transferred by direct contact between a circulating medium with another material of a different temperature, okay? So, heat transfer with convection is stronger than conduction. So, if we look at the images below, we can see a cold Whirlpool, okay?

So, obviously if you're doing water immersion with cold water, that's gonna have a stronger effect than a typical ice pack. If you're using a warm, moist heat hydrocollator pack, that's gonna have a stronger effect on the client or the patient than a dry electrical heating blanket or heating pad. So, we have to remember that if we're looking at convection, we have to monitor the patient more closely because that's when the risk of burn or irritation can occur, because it's a much stronger transfer of energy. So, that's our first kind of adverse take home for that. Okay, conversion is another one where we're converting like a non-thermal form of energy into heat. And our second discussion that's gonna be in a couple weeks is gonna be on ultrasound, right? And so when we look at ultrasound, we're converting an acoustical wave form into a mechanical wave form. And that those wave forms are going to simply reflect or refract off the skin and myofascia and the deeper tissues and that's gonna generate heat plus it's gonna make the cells move a lot. So you're gonna have a mechanical effect. So, really conversion could be therapeutic ultrasound or diathermy and they both have a mechanical and a thermo effect, okay?

So, if you're writing your notes, let's make sure that we have that in there because it's a conversion so it's a little bit different, but the important thing is especially with ultrasound and we'll talk about this more in a couple weeks, is that even though you're changing forms, we use gel on the skin to create a medium, right? But you gotta keep the sound head going. If you're using diathermy, you gotta pay close attention because you're almost cooking the body from inside out and I wanna kind of, I'm being a little dramatic with my term there, but I wanna make sure that we realize that because burns

are very common with modalities that contain conduction because a lotta times the patient will feel it directly like a hot pack or an ice pack, okay? So, somethin' to think about as we're using those modalities. And then we have some of the newer light spectrum therapies, okay? We call it radiation, right? So, we have we have the lasers, we have the thermal lights and stuff. I'm not gonna cover too much on the infrared. That's a whole 'nother technology and actually that's a whole 'nother class because when we talk about light therapies, we have hot laser, cold laser. We have infrared lights. There's a huge spectrum of technology in this area, but I wanted everyone to understand that the light therapies transfer energy through radiation, okay? And so it's a direct transfer of energy but again, you need to be careful because you can give someone a sunburn, right? You can cover that.

So, a lot of this talk is really gonna be on more of our kinda main staples of thermo and cryotherapies, but I wanted to note that a lot of the textbooks really use radiation is kinda blended in with these thermotherapies. So, just somethin' to keep in mind. And then our last kinda transfer is obviously gonna be evaporation. And we've used the fluoromethane, the upper chloride sprays and it's basically a topical anesthetic, right? It kinda cools down the skin topically and a lot of the orthopedics or whatever, will use it before someone gives you a shot, right? So, in manual therapy it's still used quite a bit with spray and stretch, right? We've all seen that or if you have somebody who has a lot of spasticity, sometimes if you're gonna be trying to work, if you're gonna try to arrange them, I know some clinicians use the vapocoolant sprays for different things. So, just kinda keep that in mind is that it really cools down the skin through evaporation.

Okay. So, bottom line, I think it's so important to remember the science of heat transfer, because each modality has a unique way of transferring that as a clinician, it's so important to understand how each of the modalities work because I also do a little bit of legal work and to be honest a lot of the cases I've been on over the last couple

years have involved injuries because there's a lack of supervision using modalities. So, just kind of somethin' that's important because if someone, if the skin gets too hot or it gets too cold, burns can happen and we'll talk about that soon, but I wanted to kinda plant the seed now as we start transitioning into our modalities right now. So, okay. So, now we're gonna move towards Module III, okay? And we're gonna be focusing on the cryotherapies first. So, as we transition and some of you that are writing notes, we're really gonna be spending some time here and then we'll move to the thermotherapies, okay? So, the first kinda thing that we wanna talk about is the physiological effects, but I also wanted to note, before we jump into it, if you look down below quite a few slides in this presentation, I've noted a couple textbooks and research articles that I use that I think are really great resources that go way more in depth than a two hour presentation. I really like the Cameron book. Cameron's a medical doctor and so I think she really has done a good job of talking about physical agents. She also has her physical therapy license. So, I think she creates a really good eclectic approach. So, that's the main textbook I use when I teach modalities and also I've used it as a foundation for this lecture, along with the current evidence or some of the classic articles, like from Nadler and stuff where we know that those articles are still valid even today.

Okay. So, when we look at cryotherapy, our first kind of thing to focus on is what are the physiological effects? What are we trying to obtain from it? Why are we using it? Okay? Well, if we look at the diagram on the slide and we go from left to right, okay? We can see that right here, we got the hemodynamics, okay? All right? We know that there's an initial decrease in blood flow 'cause of the cold, okay? We also know that we're gonna have effects on the neuromuscular system, okay? It's been shown in the research and over time that cold slows down nerve conduction, it's gonna have some type of pain modulating effect. Okay? Decreased spasticity with some neuromuscular disorders. It can also alter muscle strength and also it can facilitate some muscle activity at times, okay? But we also understand too, that it has a metabolic effect.

Okay? So, basically I call this a neurophysiological effect because the ice really affects the several different systems of the body as you can tell. The nervous system, the local vascular system and the local metabolic system, okay? So, we have to appreciate that when we apply ice and how that fits into our strategy pre-intervention, during or post intervention. How is that gonna do it? Now, one thing I wanna bring up here too, and you can kinda see the green arrow is we also have a physiological response that automatically occurs with ice.

So, perfect example. Someone has some carpal tunnel syndrome, you did a lotta deep tissue work. You did some joint mobilization of the carpals and everything and you're trying to get things to really kind of unlock in that wrist and seeing if you can kinda get them out of that whole surgery, that potential surgery. Well, the minute you put ice on them, the hunting's response is gonna kick in, okay? The local vessel structures are gonna go into immediate vasoconstriction, okay? Then from there, the local tissues are gonna cool down. Then as the client's icing, over five to maybe 15 minutes, the body is gonna try and rewarm itself by vasodilating. Okay? And then from there, if you choose to ice them, after that five to 15 minute period, the body is gonna go through the cyclic pattern of vasoconstriction and vasodilation, okay? And I think that that's important because this, the hunting's response has been shown ever since the '60s and the research, that actually explains why we typically ice people for 10 minutes, okay? That's kind of the norm is because we get this immediate vasoconstriction, but then after about, let's say five to 15 minutes, the body tries to rewarm itself because it's sensing the coldness and it's trying to increase circulation.

So, we're getting this actual pumping effect when we ice and so I think that that's important to understand and that's kinda where that 10 minutes timeframe came from. And so I think that's an interesting tidbit to understand, but it's good to understand the science behind icing because you know that there's a big debate and we'll talk about it, about how icing may slow down the healing process. Remember that? That came

out around 2010. People were going crazy over it. Should we ice or should we heat? And everyone on social media was arguing about it. And that kinda lasted so about 2015 when better research came out. Okay? So, just remember the hunting's response and also too, if you look at the lower right, hint, hint, that may be part of quiz question four. Hint, hint . So I just want you guys to see, we've put a couple prompts down here that that's something to consider, okay? All right. So now, as we look at cryotherapy, here's a summary. Here's a nice, good diagram to show all the physiological effects. As we go clockwise, pain, muscle spasm, blood flow to the local area, edema formation, nerve conduction velocity, metabolic rate. Okay? Those all decrease. Ice kinda slows everything down, okay? And this is what the current thought is for this modality. Now, also we can increase joint stiffness but it also decreases spasm, okay? So, that's the current thought right now on ice. And so, this should drive your decision making for using the modality.

Okay. Factors that influence the effects of it. Obviously, the temperature of the ice cubes versus an ice pack. The treatment duration, the size of the treatment area, the temperature of the patient. The temperature of the patient can also be assumed that if you're gonna put it over clothes, are you gonna put a pillowcase in between? Are you gonna use a towel? That also changes and also too, adipose tissue in the area does have an effect. So, now when we look at indications, okay? Here's kind of the acceptable indications in the literature. As we look at the diagram again and we go clockwise, pain modulation, inflammation, edema, we can use it for sometimes for facilitation, modify spasticity and then also it's been shown in the literature that it may help with symptoms of multiple sclerosis, okay? But if we look at the first four, right? One, two, three, four, here, we can see perhaps that ice in some cases may have a better efficacy in the inflammatory or fibroblastic phase of healing because you're trying to facilitate. So, just a thought. I'm not sure. There's a big debate on when and where you should use cryotherapy, right? And so, that's something for you guys as professionals to determine with each individual patient, but something to think about.

All right. Primary indications, though. Exactly what I talked about. I want everyone to also remember this second mnemonic or acronym, P.R.I.C.E. Remember, the first one was S.H.A.R.P. This one, if you have someone who has inflammation edema, think about the term P.R.I.C.E and everyone I think in this group who's attending today have obviously heard about P.R.I.C.E, right? Protection, rest, ice, compression, elevation, okay? That's a classic one that has stood the test of time when it comes to like an acute injury, right? But also though, too, we can use it in other phases.

So, definitely think about S.H.A.R.P. Definitely think about P.R.I.C.E as you're lookin' at the healing process with each individual patient. Okay. Let's get into a little bit of the precautions, contraindications and adverse events. Now, this list should be considered a general overview, okay? Every patient's different and so, they may have a medical condition or some other type of condition that may be precautionary or contraindicated. These are the ones that are mainly in the literature and the textbooks and as we can see as we go down precautions, we'll kinda quickly review, obviously ice over a superficial nerve, open wounds, a client that has hypertension, poor sensation. Like if you had a patient who has diabetes, some type of peripheral nerve neuropathies or nerve issues, poor mentation's another one, okay? I think that that's a big one because if your patient cannot communicate, like, for example, my sister who had a stroke, it took her awhile to reorganize her cognitive processes. So, I think maybe the first month or so, if you're putting a modality on her, she may not be able to feel it and you could have caused something. So again, there should be a right place and a right time for modalities. Okay? The very young and the very old, those are just general precautions.

Now, as we look at the next column, okay? On the right, contraindications, there's some pretty obvious ones called hypersensitivity and tolerance, cryoglobulinemia. I said it, that big word right there. Paroxysmal cold, hemoglobinuria . I know, a little tongue tied there. Raynaud's Disease. Very obvious. That's a very common one. So,

that's that kind of that allergy, area of regenerating nerves. Yep, that's important too. And also area of circulatory compromise, okay? Also too, if you have somebody who's post-cancer and they've had some type of reconstructive surgery in that area, you wanna be careful too. That could be another one. So, again, this slide is to really, meant to prompt some ideas among the group here, but it's not all inclusive. So, just please keep that in mind. When we talk about adverse events, this is an important slide. So if everyone's writing notes, please kinda focus in on this. Tissue damage with cryotherapy. You put an ice pack on somebody, the ice pack is plastic, okay? If the ice pack is greater than 15 degrees Celsius, okay? It's safe treatment but the minute it starts getting colder, more towards four to 15 degrees, you can cause a burn or frostbite in the area, okay?

Also too, they recommend keeping application time 45 minutes or less. In my clinical practice, I think 10 to 15 minutes is fine. I'll do a cyclical cycle of 10 to 15 minutes every hour, if someone is needing that. But I try to use as minimal modalities as I can only when they're freshly injured or if we need to calm some tissues down I'll do it but I'm really careful of the transfer of energy. So, if I'm using a cold pack, I'm gonna put it in a pillowcase. I like the small cotton and stuff like that and kinda knock on wood, I've been able to not have any adverse events. So just remember the cryotherapy can cause burns locally and I've known many patients every year that I see, 'cause I treat a lot of athletes, they just throw an ice pack on their skin and they get a burn, they get a sunburn. So, that's something that could be considered antigenic and it could be a legal issue if you were the one who administered it. Okay? And that's kinda leads into our topical ice burns that I'm kinda talking through here. This would be the corresponding slide. Use a barrier, monitor throughout and just remember that gel packs are the most common with the burns. Actually in some of the legal cases that I've been on were moist heat packs and ice packs. Those are the big ones where the, mainly PT more than OT. I had a couple OT, but mainly PT. The patients working with the aide, they stick them in the corner on an ice pack. They didn't cover it properly. All

of a sudden the patient gets up 'cause they're hurting and then they have frostbite and sunburn, okay? So, just somethin' to think about as we use these. Again, they should be part of an interactive treatment strategy, not a passive modality. So, cool? Okay. So, just wanna make sure. Okay, cryotherapy application. Here's a great summary of what we're looking at, okay?

Now, when we look at ice packs and ice cups, that's mainly conduction.

Cryo-compression, those ice plus compression is also conduction. Contrast bath, hot and cold is convection. Cold water immersion is also convection. Vapocoolant's evaporation and then the whole body cryotherapy, the new ones where they freeze ya for a couple of minutes, that's typically convection, okay? Now, a lotta times most of these cryotherapies are superficial. The transfer of energy is only going to penetrate the skin and the myofascia a maximum of two centimeters in depth on average. That's what they found. Okay? So, I think that that's important to note in your notes that it's gonna be superficial. That's why at the top of the slide I put superficial cold and I think that's important. Now, in this series when we move to the thermotherapies such as ultrasound or diathermy, they're gonna penetrate deeper up to five centimeters. Okay? So, it's a bit different. So, we have to remember that the physiological effect is gonna be superficial with most of the cold modalities that we use. Okay? The heat and the ultrasounds and all that are gonna be more deeper. So, that's something that's important to note because that's gonna influence your decision making on why you're using the modality. Superficial versus deep.

Okay. So, another thing I want to impress upon is we also have to go with our next kind of mnemonic or acronym, which is C.B.A.N, okay? So, remember we had S.H.A.R.P, we had P.R.I.C.E and now we have C.B.A.N. The patients are gonna describe as we go clockwise initial cold, burning, aching, and numbness when you put on the ice pack, okay? So, during your 10 or 15 minute treatment, these are common subjective sensations that the patient is gonna experience during that ice treatment,

okay? And I think that that's important to understand because they're gonna move through these stages and for you as a clinician, it's good to understand that because once they hit the numbness stage, then you know that they've kinda gone through the different stages and that's really the nervous system adapting to that energy transfer, okay? So, remember that energy transfer is afferent input. So, all the mechanical receptors, the nociceptors, the free nerve endings in that skin and myofascia is sending your brain signals of cold, burning, aching, numbness. And you need to monitor this because that's gonna be the patient's response to treatment, okay? If someone has a skin allergy or Raynaud's, they're going to describe it differently. So, this is your subjective portion to make sure that the treatment was safe for your clients.

Okay. Let's kinda look at a little bit more application. And again, we're not gonna spend a lotta time and go deep on this. I wanted to give everybody within this two hour lecture some summaries of the different modalities, the icing and thermotherapies. So, commonly we have ice and gel packs. We talked about 10 to 20 minutes, okay? Some people believe directly on the skin. Some people use a covering. I prefer to use a thin cotton covering. Ice cup ice massage I love. What I typically do is if I'm doing manual therapy on somebody, right immediately after I'll just take an ice cube and do a simple two to three minute ice massage. And for some reason in my practice, I find that if I've done a lot of deep tissue work, if I have some myofascia restriction and I'm doin' some release and stuff, if I immediately do a quick little ice massage, the patient feels better afterwards. And so I've been doin' that for the last year and a half. I don't have a lot of scientific data. I mean, my research labs closed down 'cause of COVID, but something to think about everybody, a quick kinda cool down ice massage after a deep tissue area to the upper extremity or whatever, try it. See how it goes because I swear by it and I feel that a lot of my patients, for somehow their nerves in the area kinda get calmed down and it might help them kinda go back to that parasympathetic balance. So, just some thoughts there. And then obviously we have cryo-compression, right? We have a lot of different things out there. We have the NormaTec and we have all

these different compression devices. Well, obviously you're causing, you're working on that P.R.I.C.E, right? Rest, ice, compression, elevation. Typically cryo-compression's 10 to 20 minutes. And then also on the right, we have our cold water immersion, okay? Typically it's around 11 to 15 degrees Celsius. And typically it's 10 to 15 minutes, okay? And those are the common kinda times. And again, these are all part of the cryotherapies. And then obviously you have the vapocoolant spray, okay? And again, when we talk about spray and stretch, just a quick summary here on the slide. You'll spray the area several times, you'll create that topical kinda coldness and then you would stretch 'em. And again, the vapocoolant's are really meant to cause some inhibitory effects to the nervous system so that you can actually stretch the tissues, okay?

So, again, the utility of this is done pretty well and the article below gives a good summary of it. Okay? And then obviously we have whole body cryotherapy, which you're really kind of freezing the person. And again, this is a very emerging technology where they'll take you into -110, 104 degrees Celsius, and they'll freeze you for like three minutes. And so, there's some really controversial research on this right now. There's a branch of research that say it works and some say it doesn't. So, we're gonna cover a little bit of that in our research summary but I just wanna kind of include it because it's an emerging research but we don't really have a good body of evidence on it right now. So, it's still kinda pending. Hopefully in the next couple of years we'll see if this is really effective in helping people 'cause boy, I know they charge a lot of money and most of the universities use it for a lot of different things.

Okay. So, research. Basically I did a lit for the past six years, okay? I didn't go all the way back to the 1960s. I'm don't wanna put everyone to sleep obviously with this lecture, and so what we did was is when we talk about the evidence summary, we know that the body of evidence is large and there's really overall moderate to weak evidence that support a lot of these treatments but there are some studies that have

inconclusive results, but in my opinion as a researcher and stuff and as a clinician, I think overall, the body of research when it comes to cryotherapy is pretty good given all the mixed methods among all the studies and the different outcome measures and stuff. So, when we look at cryotherapy, we're gonna pose some clinical questions here with some answers and we'll quickly go through this. Does cryotherapy alter tissue healing and repair? Well, yeah, there's studies from 2016 that actually show that it does not alter healing and repair. So, we veer on 2016, 2017, 2020. So, right away this is our biggest clinical question because there's a huge debate of saying well, don't ice. Don't ice if someone gets hurt. Well, there's mixed results. Right now we have some recent research from 2020 that say cryotherapy does not alter the healing process. It'll still go through the three stages. It might affect some of the processes, but it doesn't affect the overall effect. But then though, okay? There's two studies that came out in 2020 that say the opposite, that it slows down the healing process.

Okay? It blocks some of those healing mediators. It blocks a lot of these physiological processes. So, I'll leave it to you guys as professionals but I think it's so important to realize that there's mixed methods on icing. Now, I'm a person that loves to ice. I think ice has its utility and clinically I've never seen it totally slow down a complete process for any of my patients. So, that's where I kinda lie on this debate, but I wanted to present it today 'cause it's important, okay? And then also too, one last thing, one other question is should athletes or active individuals return to activity right after cryotherapy? Well, obviously ice makes changes in the body. Real simple. If you're gonna ice somebody pre-exercise, make sure you warm 'em back up. That's simple. We'll just move on from that. Okay? And then also too, the next clinical question, does cryotherapy improve range of motion, strength and neuromuscular control in healthy individuals? Yes. A study came out in 2020. It's a systematic review. So, anytime you guys are lookin' at these slides and you see the term review, that means it's a systematic review, okay? The other ones are clinical studies, all right? So, yeah, we can see it has positive changes. Next clinical question is does cryotherapy decrease

pain and increase function after injury or pathology? There's mixed outcomes on this, right? There's a body of evidence to say, yes, it has positive results, but then there's a couple studies, a systematic review and a study from Dantas that said there was inconclusive results. Okay? So, basically ice is kinda debatable on when you should use it. And so that's somethin' to consider with each patient that the research has mixed in these key areas based on these clinical questions.

Okay? And then kind of some of our last clinical questions is, does cryotherapy affect posture stability? Well, there's one study that says, yeah, it has no effect and there's one study saying that it does have an effect, okay? So, again cooling down the body, does it have a neurophysiological effect? Yeah, I think it does personally, but in the research we have some different competing philosophies or outcomes. Next clinical question is, does cryotherapy reduce pain and improve function after surgery? Yes. That's a big one. There was a lot of studies before 2016 that say, yes. I just pulled two from 2019. One was oral surgery, one was total knee replacements. Real simple. Yeah, it obviously helps. So, I just wanted to give you guys some latest evidence on that. And then also we go to the other modality is, does cryo-compression reduce pain and improve function? There are some positive results in the evidence. A couple studies have showed that for spine and ACL, it does have some efficacy. And then the next couple slides are really focusing on cold water immersion. Basically you're using like a Whirlpool. Believe it or not, most of the research in cryotherapy the last five, six years have been on cold water immersion. And so we understand though, too, that cold water immersion, when it comes to muscle adaptation and muscle contractility after a workout, there is actually negative effects. Is that cold water immersion may slow down the effects after a hard workout. That means the hypertrophy effects, okay?

So, there's some debatable research right now, especially right now saying, okay, well some people may use cold water immersion to prevent DOMS after a hard workout, but it could delay some of the benefits of a hard exercise or workout. So, if you're

taking somebody through rehabilitation and you decide to do some cold water immersion, we wanna kinda consider this because the question below is does cold water immersion enhance post-exercise recovery? And the research is overwhelming saying, okay, well, yeah, it helps kind of calm everything down. You don't get as much DOMS, but there's a few studies to say, well, wait a second, it's gonna slow down all the effects of a good workout. All the neuroendocrine effects, all the hypertrophic effects of exercise. So, something to think about with cold water immersion if you have a more active client, okay? Very interesting.

Now, also too, when we're comparing modalities, cold water immersion has shown better efficacy than whole body cryotherapy. Now, the whole body cryotherapy is kind of neat isn't it? Like, you're freezing down the body, but in my opinion there's not enough research yet to really kind of justify its efficacy and I think that that's important. And then a couple more clinical questions on comparisons, is cold water immersion better than contrast? And yeah and in one study, it's a systematic review that came more from the strength and conditioning folks. It's better than contrast. And then cold water immersion is better than ice cup therapy and post exercise recovery. So, we're seeing a lot of cold water immersion research actually coming out of the athletic and sports performance stuff which is interesting, right? Because as occupational therapists and physical therapists we can use it and I know it takes time 'cause we have to clean the Whirlpool and put in the chlorazine and blah, blah, blah, but cold water immersion has some pretty good research. So, we have to consider that when we have maybe that upper quarter patient that maybe some warm or cold water could work. Okay? So, somethin' to think about. Okay?

And then we obviously, we have other kinda cryotherapies that I mentioned, whole body cryotherapy has some emerging research like we talked about. There's four studies that came out in the last three years that says that it has good short-term effects. Again, more research is needed. There's also one study that came out in 2019

that says it doesn't. And then obviously there's been very few studies on the vapocoolant spray because really, it's just a simple spray and stretch, but at least the two studies from 2008 and then finally one in 2020, okay? Showed some good effects from it. So, bottom line, okay? Something that the occupational therapist should consider is that we know cryotherapy may delay tissue healing and post-exercise recovery. We need to think about that. It may delay muscle contractually and impair posture stability, okay? But it can also improve pain, right? Improve pain tolerance. So, decrease someone's pain level, change range of motion. It may affect function in a good way after strenuous exercise, injury or surgery. So we have a little bit of mixed literature. So, I think for everyone here, it's important to decide when and where to use it with your clients, pre, during or post, okay?

Now, overwhelmingly which is interesting is cold water immersion has the strongest evidence believe it or not and I was shocked to read that when I updated this PowerPoint because I would've thought just simple ice packs and ice massage would have this huge body of recent evidence. Now, obviously the stuff I presented goes all the way back to the 1960s. But if we're gonna be evidence-based, we gotta look within five or six years and whole body cryotherapy has the most evidence. So, pretty interesting. All right, now we're gonna go to Module IV, but I want everyone to take a little one minute stretch break. Everyone stand up. Yep. I'm standing up. You can hear me move. We're gonna do five squats. Arms overhead. Ready? Stretch break. Five squats. Here we go. I'm going down. One. Yep. Everyone kinda move with me. Let's get up and move. We've been sittin' in the chair for an hour. Squat number two. Good. I think my form is perfect. You guys can't see me so you can't judge . Just kidding. All right, let's go. Three more. Get up and squat. Arms above head. Stretch out. Ready? Down. Good. Okay, two more. This one though, before you do that, take a deep breath in. Let that oxygen come in and out . Good, squat number four. Ready? Come down. Exhale, good. Good squat. Come back up. Good. Good stretch break. Ready? One more time. And squat number five all the way down. Hold it. Hold it. Good. Come up all

the way. Good. Hopefully everyone's still standing. Kinda march in place. Move around for a little bit. We've got another 15 seconds in our little one minute break. Okay. We gotta stay movin'. Two hours as long time sittin'. We have to re-oxygenate that body. Okay, everyone take a last five second deep breath. Ready? In . And out . All right. Let's roll. Here we go.

Module IV. Let's talk about the hot stuff. Okay. All right, everybody. Let's focus on this. So, when we talk about thermotherapy, we're immediately gonna kinda go to that same mix as we did with cryotherapy. What are the physiological effects? Well, this section's gonna go a little bit quicker because we're really gonna do the opposite effects, right? We're gonna increase blood flow, increase pulse rate. We may modulate blood pressure, okay? We can make changes. Neuromuscular, we're gonna up-regulate the nervous system. Thumbs up. We're gonna move everything up. It's gonna increase. We can decrease joint stiffness, increase tissue extensibility and also make changes in muscle strength. We can affect it. Metabolically, we may increase the heart rate a little bit. Okay? We may increase the heart rate obviously when it comes to this, but that's also gonna increase movement metabolically and we may increase body temperature. So, think about this heat does the opposite. Real simple. Okay? And then obviously here, we know when we look at thermotherapy, okay? Pretty straightforward.

As we look at the diagram, when we go clockwise, we know it can also have an effect on decreasing pain, decreases muscle spasm but we know though, it's also going to promote increased blood flow. It can also promote increase edema formation, increased nerve conduction velocity, increased metabolic rate, decreased joint stiffness and then a lot of the research says it doesn't have much of an effect on spasticity. Okay? So, think about this. You need to think about where a hot pack will fit into your client's program, right? I mean, if you're workin' on functional stuff, if you're workin' on a lot of movement based therapy for the day, should you heat them before

to kind of stimulate the whole nervous system and get that engine warmed up or are you gonna do it afterwards or during? So, those are some thoughts to think about where thermotherapy kinda falls within your repertoire. Now, the factors that influence thermotherapy are basically the same as cryo, right? Temperature, treatment, duration, size of the area, temperature of the patient and obviously the amount of adipose tissue. And then common indications are really gonna fall into the same categories as this, is that when we look here we got pain modulation, increased range of motion of the joint, soft tissue extensibility. We can do some type of facilitation if we need to, right? We can modify spasticity.

The big question is, is how it influences inflammation. Some people believe that in inflammatory process you can apply heat and that could help jumpstart the inflammatory process. So again, there's a debate on when and where to use it in the first phase of tissue healing. And then the big one is psychology. Sometimes if I have a patient who is really up-regulated in their nervous system, they're emotional and stuff, sometimes if we just have them lay on a moist hot pack and I start doin' some light stretching with them and stuff, that can also have a relaxing effect, okay? So, think about heat as an adjunct to your strategy, but also though too, you can affect the psychology of somebody just by a nice hot shower, nice warm, and really release the opiates, right? The endogenous opiates but also use the gate theory of pain, affect the neuromatrix. Kind of all those theories we talked about early on.

Okay? So, then the next one is, is gonna be, how 'bout precautions, contraindications and adverse? Well, we're gonna fall into kinda the same categories and we'll quickly go through this, is that with precautions, we know acute injury inflammation is precautionary. Open wounds, hypertension, impaired circulation. I'm just going down the column. Edema, cardiac insufficiency. That's important. Also too, it's kind of interesting, a metal implant. Now, I've never really worried about this with my total joints that I treat and probably right now about 30% of my practice is total joints and

sometimes I'll do heat and I've never really had a problem, but it is considered precautionary. And also too, I did put this in with an asterisk, think about all your medications. That's important. Make sure you do your inventory. Medications that thin blood or topical counter irritants, sometimes it can be effected, okay? Now, for example, here's one, if you Kinesio tape somebody, but then you put a hot pack over that, well guess what? Good luck try to take off the KT tape because the adhesive is gonna get warmed up and real sticky. So again, we wanna think about when we're using modalities, what's precautionary and what's not, okay? And then obviously if you have a de-myelinating nerve, they precaution people for that.

Now, along the right column, obviously you have a hemorrhage, thrombophlebitis, impaired sensation, poor mentation. Malignancy is obviously important. Yeah, don't put it over your eyes, right? Or the abdomen if a female's pregnant and then also medications that alter sensation. I don't know about you guys, but I've had a few patients over the years kinda come in loaded after takin' some pain medication and do not put a modality on them, trust me. And so, sometimes I have to turn them away and say, "Hey, go sleep it off and come back." So, we've all seen that before and that's important. So, just kinda somethin' to think about, also make a note too, Q five is at the bottom of this slide. Somethin' to think about. Okay. All right. Adverse events to heat. Number one is burns, okay? Believe it or not people can faint. That's another one that's been kinda more prevalent. It can also can also promote bleeding, especially if someone's on blood thinners, okay? Really important. The INR, et cetera, et cetera. We've gotta keep an eye on that. Skin and eye damage from infrared light. So, those are the main adverse events but I also added a slide here to kind of drive home the message. Skin burns can occur, okay?

Again, a lot of the legal cases I've taken, at least I think around six of 'em, okay? And I also am an expert for the PT Board of California, not to toot my horn but I just wanna give context, is that we've seen clinicians get in trouble by the poor use of modalities.

So, I have to keep reconfirming that and so that's important. And so, make sure that there's a barrier between it, okay? And also too, make sure that you're monitoring them during treatment. So again, I just wanna kinda drive home the important point that we have to always keep an eye on that with our clients. Okay. Now, when we talk about application, now we move more towards the superficial and deep heats like we talked about, okay? So, moist heat, contrast, hydrotherapy, which is your water immersion. Fluido, okay? Fluidotherapy and paraffin are all superficial. Okay?

So, if everyone here is writing notes, the transfer of energy is going to go down about two centimeters or less. And I think that's important to understand, okay? Now, when we talk about deep heat, that's when we get to short wave diathermy and also ultrasound. Okay. So, moist heat. We typically use like a silicone silica gel pack. Sometimes the recommended hydrocollator temperature is 70 to 75 degrees Celsius, but in the textbooks and what everyone says, you need to wrap it six to eight layers because the moist heat is stronger, right? Remember that? The moist heat is gonna dig into this. It's gonna transfer the energy a lot quicker, a lot more rapid and within 15 or 20 minutes, your client's gonna probably be sweating, okay? So, make sure you wrap it well and make sure you avoid a client getting burned with this. Okay, Whirlpool is also the same thing, too. Whirlpool is transferring energy at a rapid rate. So, we recommend 37 to 43 degrees Celsius. And again, that's kind of a norm and really it's only about five or 10 minutes, okay? It's kinda like being in that hot jacuzzi too long, okay? It's the same philosophy. So, make sure that you're monitoring that.

Okay. Also paraffin wax. The recommended range is 52 to 57 degrees Celsius. Okay? And obviously if you're gonna be doin' it for like, if we have some of our CHT professionals out there, really, you're just gonna be dippin' the hand in four to five times, wrap it in plastic and the times I've seen averages about 10 to 15 minutes. Some experts might do a little bit longer, okay? So that's kind of an easy summary. And then obviously with the fluidotherapy, we're using dry cellulose particles, okay?

And the recommended temperature is 38 to 48 degrees Celsius, okay? And typically the time I've seen in the literature is about 20 minutes. So, we can see here too, as we kind of go back and summarize, we have our typical moist heat pack, Whirlpool, we have paraffin wax and we also have the fluido, okay? And I think all these are great adjuncts to your strategy and they all have a good neurophysiological effect on the body, okay? All right? And so, but then though you can go a little bit further and do contrast bath and a lot of clinicians are kinda going back to this a little bit with patients. Now, you can use a hot pack or a cold pack. It doesn't matter. With this slide, if you look on the left column, I simply just put an example of using cold and warm water immersion, right? And the different degrees. And usually, kinda the recipe most people use is a three to one ratio. Three minutes cold, one minute warm. You repeat that three to four times, okay? The thought behind contrast as you know is to kinda cause that vasoconstriction with an immediate vasodilation so you're almost getting like a pumping effect in the area and you're trying to flush out any of the negative metabolites or any of the byproducts of the healing that's occurring, okay?

So, that's one theory for contrast. Obviously contrast too is you're sending a lot of information into the central nervous system with cold and heat. So, you're definitely gonna have a multi modal effect as far as the pain neuromatrix, the gate theory of pain, working with the endorphin system and all that stuff, okay? So, just kinda keep that in mind. And then the last kind of technology, and again, like I mentioned too, we're not gonna get too much into the heavy science of each of these like a textbook, but just remember that short wave diathermy uses electromagnetic heat via like a drum coil or some type of capacity plate. So, in a sense it's kinda like a microwave and I know I'm kind of using a very plain example, but you're really kind of cooking the deeper tissues per se and so the recommended kind of range is 40 to 45 degrees Celsius. And most people find the diathermy between 10 to 30 minutes and these are people that I know who are still usin' it in the field or in the textbook, seem to feel that that has a good efficacy as far as their patients. Now, the research on shortwave is actually pretty

strong compared to the other thermotherapy modalities. It's pretty interesting. And then obviously we go back to our infrared lights, okay? And as we mentioned too, we're not gonna spend a lot of time because of what we have at this point as far as the presentation but just remember too, some of the new hottest things is the light spectrum modalities when it comes to laser all the way through infrared. Yeah, that whole spectrum and that might be a whole 'nother class that we could possibly do later on with the platform here to really look into those and the research on things are very mixed. Laser actually has a lot more research than a simple infrared light.

So, just kind of remember that that's still considered things. There's a ton of products out there that use it, but the efficacy in my opinion's not fully substantiated, almost like the whole body cryotherapy, right? We're still pending on the research. Okay. Now, when I looked at the thermotherapy research, I actually went back 10 years because I found that just like cryotherapy, there's moderate to weak evidence, but some of the studies and actually 10 years ago were actually stronger than the last five years. So, in the summary, we'll ask the clinical questions here, but just consider that we're covering a 10 year span of trying to give you guys the most recent evidence, okay? All right, so here we go. Does thermotherapy decrease pain, increase joint motion function after musculoskeletal injury or pathology? Obviously the research is overwhelming, is yes. Okay? Thermotherapy has positive results. We see studies, if you're looking at the slides from all the way from 2010 all the way up to 2020. So, we're doing well there and that supports a lot of our indications, right? So, that's pretty cool 'cause I like to see some research, at least supporting what we do.

Next clinical question. Does thermotherapy decrease hyperalgesia? And again, it does have positive results on sensitivity. Neurosensitivity, central or peripheral, okay? It definitely has an effect on that. Next clinical question. Does thermal therapy improve flexibility and joint range of motion better than cryotherapy? Well, actually, yes. We kind of, it's in the textbooks, but we have some recent research from 12 to 13. One

systematic review that had shown that it really had some better improvements. Next clinical question. Does thermotherapy improve muscle hypertrophy and neuromuscular function? Believe it or not a 2020 systematic review, okay? Coming out of a very specific thermo journal showed that heat improves muscle hypertrophy and neuromuscular function in animal models. That's interesting, isn't it? So, that might be something that we may consider down the road with kinda like the newer stuff, like blood flow restriction and stuff. Maybe thermotherapy might have more of a central influence than what we think. Maybe heat will help stimulate the neuroendocrine system and release more growth factors. I'm not sure. So, kind of interesting. I thought that was pretty cool. And then as we go back to the more popular warm water immersion, the research is obviously positive for it, for warm water immersion to increase joint mobility and tissue extensibility, okay? Also does warm water immersion improve post exercise muscle adaptation and contractility? No, it does not.

So, that's another kind of a contradiction to those animal models, but we know that heat afterwards doesn't have any deleterious effects. So, like if you have a bunch of athletes and they're sore or they're feeling some type of subjective delayed onset muscle soreness, they can do a warm water jacuzzi or whatever and they'll still feel okay with that. All right? So, I think that that's important to kinda keep that in context. Okay. What about paraffin? Interesting, paraffin doesn't have a ton of research and I was surprised because I know when I was, the big clinic I had before, the OT team used a lot of paraffin with their hand therapy patients and the CHTs felt that it really had a good influence on their overall treatments. And so, the big question here is, does paraffin decrease pain, increase range of motion and improve function after injury? And yeah, the research is very supportive of that. We see it for hand osteoarthritis for two studies and also in carpal tunnel syndrome. But what's interesting is we don't see a lot of the studies coming out of some of the hand therapy journals. Those of you who are on the group or who are hand therapists, it's kind of interesting. Okay. Next clinical question. Does paraffin improve soft tissue extensibility? In general yes, it does. So

they found that paraffin obviously helps globally, but also it helps with some type of pathologies. Okay? Fluido. Fluido is another one to where the therapist, the OT hand therapists that I work with currently and before, they love the fluidotherapy. And I don't know if anyone in the group uses it, but I've used it and it feels great. I almost fall asleep on the machine . I don't know about any of you, but it's like, man.

So, the question is that does it decrease pain? Does it change the edema, right? 'Cause that's a big one. Does it increase range of motion and function? And so, yeah, there's a couple studies out. There's not much on this technology, but the thing I liked is at least two studies from '17 and '19 showed good outcomes. Both of those studies had pretty good sample sizes. So, it wasn't that crazy. Only one study showed inconclusive results, okay? But the negative study was on RA and they had a smaller sample size and when I looked at the methodology, I wasn't happy with some of the methods and stuff. So, I think in this area, research definitely needs to improve. I think fluidotherapy is still decently billable because we've gotta pay for what we do, but I think it can offer a good adjunct to a lot of upper quarter strategies that we use. So, just some thoughts on that one. And then as I mentioned before, short wave diathermy, we know it uses electromagnetics, right? And again, for this two hour lecture, we're not gettin' heavy into the science, but it really creates a deep heat.

So, the clinical question is, does it decrease pain? And again, we go back to the same increased range of motion and function after injury or pathology. There's a ton of research that says, yes. If we're looking from here, we can see all the way from 2013 to 2020, we have a combination of clinical studies and systematic reviews, okay? That have shown, right? So, here's a review, carpal tunnel syndrome, shoulder impingement syndrome, knee osteoarthritis, general musculoskeletal, okay? Lateral epicondylitis. So we can see this body of evidence is showing the efficacy of short wave diathermy and I don't know if anyone's making notes or maybe in the chat or whatever, but I think it's interesting that short wave diathermy now that the machines are smaller and they're

more portable, I have both OTs and PTs and certify athletic trainers actually using it more. So, it's actually interesting in the last couple of years we've seen a surge in use of diathermy. So, I think that that's something to think about because if it's showing all these cool effects, is it better for you to use it pre treatment or post-treatment? I don't know. It's just, it's something to think about because the research is strong on this, comparable. And then also too, a good 2020 study by Fu actually showed that it had some benefits with peripheral neuropathy, too. So again, somehow these electromagnetic diathermies, these heating agents, if it's a coil or a plate, it has some cool effects on the body. So think about diathermy. I think it's one of the more popular ones because people are appreciating all these research outcomes. So, bottom line for thermotherapy, here's some considerations, is that we understand that it's gonna improve pain, range of motion, function after exercise injury or surgery and that it also may improve flexibility and joint range of motion. Okay? But also realize too, it is opposite of ice. It's that simple.

So, if you introduce heat in phase one or phase two of the tissue healing process, you may want to think about, okay, you may wanna think about that it could increase more blood to the area and increase edema. That's the only thing is 'cause it, remember, ice is a vasoconstrictor, heat is a vasodilator. That's how I look at it in the most simplest terms. Also too, last thing to consider is short wave diathermy seems to have the strongest evidence more than hot packs or warm water immersion. But it's funny because cold water immersion has a ton of research. So again, as we're kinda going through this two hour lecture and stuff, I want each of you guys to try to catalog all this and try to try to play with these new modalities if you have access to them with your patients and see how they fit into your strategy. And I think that that's so important when we're lookin' at things. Okay, we're almost done you guys. We're on the home stretch. So, we got a few more minutes so we're gonna cover documentation and again, I think that this is another important module because even though within two hours we covered so much information about the science, then we got into

cryotherapy, right? Then we got into thermotherapies, we kinda gave you a big overview, but at least for the last few minutes, I definitely wanna slow down a little bit and talk about documentation and talk about what I've seen as a practice expert for the PT Board of California. I've also done work for the OT Board, but also as an expert witness. So, I wanna kind of talk about some of the things that I've seen and that I can share with you guys because I was deposed on these as an expert for plaintiff and defense cases. So, I've seen both sides, okay? So, I think I wanna do this at least for this first installment. And then as we talk in the next series about ultrasound and electrical modalities, we can just layer in and kinda refer back to this talk, okay?

So, first of all, let's kind of go over the standard CPT coding, okay? And I think that that's important and I'm gonna give everyone a second to look at these codes. As far as my records are as far as accuracy, these are the most current CPT codes that kinda go with the newer ICD-10, okay? The diagnostic code. So again, these procedural codes are 15 minute codes. Okay? I think most of them are, they still are. And I haven't seen many changes and that is me lookin' this up last week. Now, if everyone looks at the bottom, there's a link to the sister site from Continuing Ed, okay? Which is physicaltherapy.com. They have a great article on these codings, okay? And so, I wanted to refer you guys back to the sister site because I think it's a great summary of these codes, especially if there's a lot of newer clinicians right now and you guys are using modalities, you wanna look at how they feed into your billing scheme. And it's good to know the latest codes and the limitations and stuff. Also how the insurance cascades them, et cetera, et cetera. So again, the business side of what we do, it's important because we need to get paid but also again, we don't wanna rely on modalities as our primary treatment because the philosophy of occupational therapy is to really work on the whole person, right? A holistic approach, bio-psycho-social model. Modalities are an adjunct.

Okay, charting. So, sorry that this slide's a little bit busy, but on the left, here's our basic framework. If you're doin' ice or heat, we're just gonna be simple, you need to note the modality that you used, the body region, treatment parameters. So that means the time, okay? The time you're using it, how many layers you put on, okay? Also patient positioning, okay? Now remember though, too, if you put on a hot pack and the patient's prone, they may feel less heat than if they're supine and they're putting all their body weight on it. Because once they squish down onto that hot pack, that heat is gonna be transferred a lot quicker. Okay? And then you're going to note the patient response afterwards. Okay? And I have some examples in the subsequent slides. Now, if we look on the right, when we talk about diathermy, diathermy is a little bit different. We need to go a little bit more involved where we note the type of diathermy. There is short wave diathermy, there's longer waves. There's all these different ones. So, whatever machine you're using, you have to note it. You obviously note the body region, the treatment parameters and we'll see some of those and that means the settings on the machine.

Also, too, this is important and this came up in one of my cases, the distance of the applicator. Okay? There's a small distance between the transfer of energy of the applicator because if the applicator's directly on the skin, there could be a potential for a burn. Okay? That's interesting. That came into play. Obviously patient positioning and then the patient response. So again, these are good reminders for us clinicians who've been practicing for awhile or someone who's brand new. I mean, we always have to go back to basics to protect ourselves. And also, number one is what? Protect the patient. Okay. Here's just some simple examples. Now, again, everyone's gonna chart differently. Because we're challenged with the time period here, I wanted to just give you guys some simple examples that could be in your charting, but if you're doing EMR and you're doing other charting, you might have a drop down that says it, but here's kind of the blueprint that I like to do this when I teach. Okay? Here we go. So, when we talk about post-treatment okay? Ice or heat, you typically note it for the time,

10 minutes to the quadriceps with the patient seated. Patient tolerated treatment with no incident, okay? Now, what's interesting about that is when we put in the sentence "Tolerate treatment with no incident," that showed that the patient left with no adverse effects, okay? And that's somethin' that a couple lawyers have told me over time that it's important when you're charting to note the patient's response and that's in the textbooks, okay? So, it's interesting when we do that.

Okay. Cold Whirlpool, same thing but you gotta put the degrees because if it's too cold and they complain of something afterwards and you're stuck in a court of law, right? The attorney or whatever is gonna ask you, "Well, how cold was it? Okay? How long did you do it? What body part? Were they sitting? Were they standing? Okay? Did they tolerate it?" And so remember, if it's not documented it never existed. Okay, last one, last bullet point on the left, ice massage. Okay? This is a big one. You need to discuss what ice massage, five minutes to the right forearm flexors. And I'm sorry, there's a little typo there. Times five minutes. Okay? So, we can see that we did it for a certain amount of time. Also note the patient's response, okay? Also too, I have some people, some professionals note the NRS scale afterwards, okay? So, sometimes they say, so let's say the client comes in and you get a subjective like, "Hey John, how is your wrist doin' today? You know what, it's still hurting from surgery three weeks ago. I'm at like at a three out of 10 pain." And then some people after the modality at the end of the treatment if they do it post, they may put post-treatment. Patient tolerated treatment with no incidents. Patient reports a one out of 10 pain afterwards, okay?

So, that's another one that people are starting to use a little bit more now. Okay? And so I think that that's something that's interesting. When we look at the column on the right, paraffin or fluido, same thing. We're still noting the modality. We're noting the time factor, but we're noting the degrees, okay? And also patient tolerance, okay? So, I think that that's important. Some people with paraffin, they actually note how many layers that they put on or how many times they dipped their hand in the wax, okay? To

me, that's really preferential to each clinician. I don't think from a legal standpoint that that's huge but I think the time, the body part and the degree is something that's important, okay? Because if the paraffin's at like 130 or 140, you're just gonna cook 'em, right? And so, I think that that's interesting to think about that you usually have to put the timeframe and if you're dovetailing with an aide, it's pretty simple. You just have them, and if in your organization or your state, they can chart a little bit, on their exercise sheet, you simply just have them write down those parameters or put it on a sticky for you. Pretty simple. Fluido's pretty straightforward, right? You really just know, I mean, really you can put hands in there. I've seen people put legs in there. So you can put whatever extremity, the time and really temperature. It's pretty straight forward. With fluido though, I've never really had anybody have adverse events. I've had people fall asleep when they put their leg in there . I've had people do that 'cause it's so comfortable. And then the sound's like white noise, right? When you're a small kid. It's so funny. So, I haven't really seen much from there. So with fluido there isn't really much like documentation stuff.

Okay, now, when we talk about contrast, this is another one where someone, where one physical therapist tried contrast but they ended with the ice pack and it burned the patient. So, it was really odd because the aide was helping, the physical therapist was in eye line distance. So, they kept doing ice heat, ice heat. But for some reason, I think if I can recall, the rehab aide or tech put the ice back on the forearm without a barrier in between and it frickin' scorched him and caused a two degree burn on the patient's leg, believe it or not. So, that was an interesting case because this was a PT Board of California case and they got busted because of that was considered almost like a malpractice type of a thing. So, it was a really interesting case because it was contrast. So, we have to remember that if we're doing contrast, the PT or the OT or the athletic trainer or the licensed professional, if you have an OT aide or excuse me, an OTA, a PTA, have them do it on their own, okay? And make sure that they're there. If you're the supervising OT, then you can have your rehab tech do it but I really think,

especially with contrast and also cryo-compression, that's our next one, you really have to keep an eye on them. Okay? Because this is where things keep comin' up for me, as far as an expert and stuff. Cryo-compression is another one that's great, but I've seen it get too cold on people, okay? And also too, sometimes if they're using a pneumatic battery powered machine or they're using like a pump, you need to make sure the PSI is not too much, okay? So, you gotta monitor for numbness, tingling, any type of decreased vascular issues with the compression, right? So you gotta monitor throughout. You can also too, if someone's putting on their leg or their arm, you can also check capillary refill at the toes or the fingers, okay? That's another thing I do.

So, if I'm doing cryo compression it's running through and there's a million devices out there. If the compression's set at a certain amount, I monitor subjectively. I also check capillary refill just to make sure that they're doin' okay. I usually only go a maximum of 10 to 15 minutes. I cut it after that and that seems to have a decent effect and my clients are happy with it, okay? Okay, last one. Diathermy. This one's a little bit deeper because when it comes to diathermy, I've had one case like years ago where someone really got charred with it, they got burned because the setting was way too high, okay? So, a lot of times when you turn, let's say when you have someone seated and you're gonna do diathermy on the shoulder, well, you gotta note what machine you're usin', are you using the pad or the big drum? What's your distance? Okay? Also a lot of people put a towel over the area and then the drum that's maybe 14 or 15 centimeters away.

Okay? Then you turn it up in wattage and then you have to set the parameters, okay? The pulse parameters, is it 200 hertz? Is it 100 microseconds or whatever? So, every machine's different. And obviously within your clinic, you guys will be able to train on this but just remember, and again, there's so many diathermy out there, I just don't have enough time to discuss each one but just remember when you're charting diathermy, you have to do the body part. You have to list out all the parameters and

especially the distance, okay? Also patient position's important, okay? And then you have to note, as I did here their response to treatment, okay? And I think that that kind of at least reinforces and keeps it safe but again, with diathermy you're workin' with the deeper heat. You need to be in close proximity. Don't just stick 'em in a room somewhere with somebody. If a body part has to be exposed, obviously you're gonna do precautions to protect them and make them feel safe in a gym capacity environment. But with COVID I think we're all kind of more isolated, but please make sure that you have someone there checkin' in with them like every five minutes or so, okay? Typical treatments are about 20 minutes and sometimes it can be less, okay? So, I usually set a timer outside the door for all my modalities. Let's say if they're doing like a hip region or something that's, a body part needs to be exposed, I'll set a five minute timer and either me or my aide or my assistant will go and check every five minutes, okay? And the patients know that. I'll say, "Hey, look, I'm sorry. I know you wanna rest but every five minutes we're gonna make sure you're okay." So, that's one safety thing, I chart. I also chart the numeric pain rating scale sometimes. And so I try to kind of embed the safety nets as they're getting the modality. Okay, bottom line.

Okay? Occupational. I think for occupational therapists, it's really important that we must document all details of the modality when used. Patient injuries and also misuse like we talked about are common, and then we should, modality should be used, especially cryo and thermotherapies. They should be used as needed, okay? They need to fit into your overall occupational therapy strategy for your patient, okay? As I mentioned, OT is so comprehensive where the therapists in this group here, you all are working on so many different parts of the person aren't you? So, it's good to think about modalities as just one more tool in your toolbox. And I think that that's so important and that's another way to look at it, okay? Because traditionally PT, OT, athletic trainer, whatever, chiropractic, we typically in the old days used to do what? Stick the patient in the corner on an ice pack after a whole exercise. Then when they're done, "Great, have a good day." It's not like that anymore, okay? We have to change

our thought process and say, okay, this is one more tool that we can use and we have to think about all those physiological effects and also how they affect pain and the healing process, okay? So, hopefully with this lecture, I'm gonna kind of encourage everyone to go a little bit deeper with these and don't just look at it as just a hot pack. Look at it as a strategy that you can use in your overall plan. Final thoughts, okay? This is the first kind of lecture in a three lecture series on modalities.

So, I hope to see everyone here for the other two. As we mentioned that modalities should be kind of an adjunct and we understand that today in a short kind of two hour lecture, we kinda covered a lot of stuff, right? Kind of a big kind of overview of cryo and thermotherapy. So, I encourage everyone though, too, if you feel like you need to go deeper, the textbook I noted or you guys can email me and I can give you some other sources or there's a lot of more comprehensive university level classes or PAMs classes out there that go real deep in these modalities. We're talkin' every little part of physics, et cetera, and stuff. So, just some thoughts there. And then my last thought is too is, remember, modalities also require proper documentation and patient supervision. Don't forget that because we wanna be safe with all of our patients and in my, humbly speaking, in my practice and my expert witness stuff, I've seen more and more issues occur through the poor use of modalities. Okay? And so, I think that that's an important point I wanted to kinda finish up with, okay?

All right. So, hey, I wanna thank everybody for attending. I know you guys are taking time outta your day and I hope everyone had learned a little bit from this lecture and I hope everyone is staying safe and healthy. And I hope to see everyone back for the other two installments. The other two installments will be a little bit more focused on ultrasound and electrical STEM. I wanted to focus a little bit on this series first on the sciences. So, we'll kinda dig a little bit more into those and stuff. And so, I wanna leave the last few minutes of this lecture for some short questions and please feel free to

email me if you need some more resources or just wanna share some thoughts as a clinician, and then I hope everyone enjoys their weekend. So, thank you.

- [Fawn] Thank you, Dr. Cheatham for a great talk today. We had several thank you's come in at the end. So, I think everyone's very appreciative of your knowledge and help in this area and especially for that great overview at the beginning. The first question I wanna pose to you is what is the recommendation for how many layers for cryo or thermo packs? Do you have a certain recommendation that you make?

- [Scott] Yeah, I think, yeah, that's a great question. Thank you for that. Definitely for cryotherapy, I like to use just a simple cotton sheet or cotton pillowcase. I find that that works great. If you're gonna use moist heat, you gotta do the five to six layers, okay? You have to double it up. Also too, think about the client laying their body weight on that. If you have someone who's morphologically bigger, they're gonna heat up quickly and you have to monitor it because I've seen irritation and burns happen very rapidly with the moist heat. So, just kinda some thoughts there. Thank you, great question, Fawn.

- [Fawn] Another question coming in is, or actually more a comment. Michelle says, "I do cryo sauna therapy two times a week for fibromyalgia pain."

- Oh.

- Have you ever seen that?

- [Scott] Yeah, it's awesome. Yes. That's another kind of emerging cool intervention. Actually, I did my PhD work in fibromyalgia. So, I do treat those patients and realize number one, it's real and number two, the cryo saunas, a lot of these cold and hot therapies are really good for those chronic pain disorders. So, everybody who's still

hangin' onto this lecture, don't forget that. Use some of this new stuff. Even though it's not evidence-based and it's not perfect, use this stuff. Try it with your patients. As long as it's within a standard of care, yeah, go for it.

- [Fawn] Okay. Someone also mentioned that I believe this might have been a comment when you were talkin' about fluido therapy was they thought it was very helpful with complex regional pain syndrome. That was a earlier comment.

- Oh, yes. Yeah, yeah, Fawn. I think that's a great comment because fluido, I mean the unit's expensive but from a, some of the people who are still here as participants, if your clinical owners, you know the cost of your modalities but consider fluido, it's great. For the complex regional pain syndromes, some of the RAs and stuff, it does some amazing work. So, we used it enough. When we bought it, we bought a new unit probably a couple years ago. It's paid for itself gosh, probably two or three times over now. So, consider fluido. I think it's a great one, yeah.

- [Fawn] Okay, two more questions here and then we'll wrap. "For pain management and acute to subacute stage, which is preferred, heat or cold?" I don't know quite what she's asking, but maybe you do.

- [Scott] Yeah, I think Ashley's asking as far as kind of calming down pain, as far as if we're in the subacute stage and we're not getting a lot of that inflammatory process, let's say it's starting to calm down when the beginning of that fibroblastic, sometimes I like to do cryotherapy first and then rewarm it with exercise, okay? With some patients. And I don't know, that kinda works for me and I think that that's a great question but there's no guarantee but sometimes cryotherapy works good for me with some patients. And again, it's not a perfect recipe. Also too though, too, sometimes if a patient comes in irritated and they're just in pain, sometimes believe it or not and you guys understand this, a simple 10 minute hot pack with a mindful kind of meditation for

them and just a little bit of you talking to them can work wonders. So, sometimes you gotta use these modalities to change the psychology of your patient during the treatment. So, don't be afraid to do that. Sometimes I do that and I mean, I don't bill from modalities anyways. So, sometimes I'll just slap 'em on a hot pack, let them calm down if they're fired up about somethin', talk to them, get them to relax, have them do some diaphragmatic breathing. So, just some thoughts.

- [Fawn] Oh, that's very interesting. I like that. So, we're gonna wrap with two last questions about moist heat. The first is do the amount of layers affect the duration of your treatment and then what are your thoughts on home heating pad use? Should patients use them or not?

- [Scott] Okay, yeah. Great questions. As far as the moist heat pack, yeah. I think if you're doin' a bunch of layers, it's gonna take more time for the energy transfer to get through the different layers. So, you may need to increase your treatment time 10 to 20 minutes, okay? So, that's where with each patient, if you can put them prone, put the hot pack on them first, just the weight of the hot pack and try it for like 10 or 15 minutes. That's what I like to do, or even have them sitting in a chair with heat and then maybe progress for them to lay down. Because I don't know how many times, and you all probably seen in the clinic, the aide sets them up, you're running around with a bunch of people, the patient jumps up and says, "This is too hot." The aide runs over and puts down three more towels. Right, okay? So, recently more recently to be safe, I usually have them prone. I'll put the hot pack on, just the weight of it, maybe two to four layers and then kinda progress from there. So, really with moist heat, I know it's not perfect, but you wanna just find that you want them to still be a little bit warm to create that neurophysiological effect. That's it, really. So, use as many layers as you can to be safe, but you wanna just warm up the tissues, especially if you're gonna do manual therapy immediately after, you wanna take advantage of that nice warm tissue to really get into that myofascia, okay? And then the last one is home heating packs,

that is a great question, Michelle. I usually don't recommend them just for safety reasons. Everyone's heard here, houses have been caught on fire and people burn themselves with it 'cause they sleep on it. So, I try, if I'm gonna recommend like a home heating or moist heat pack, you know how they have the ones with like, you know how you can make, you can put rice in the pillowcase and kinda create a home heat pack? And people get hungry when you smell the beautiful rice? I'm kidding. But yeah, I would recommend that. Or they have the simple heating packs that you heat up in the microwave. So, some of those I like to prefer than the ones that you plug in and you turn on. That's just a personal preference, but any recommendation I make professionally, I'm legally responsible for it. So, just some final thoughts on that. Thank you.

- [Fawn] All right, I think we're gonna wrap. I don't see any more questions coming in, so thank you so much for a great talk.

- [Scott] All right, thank you everybody. Have a great weekend and please be safe. We'll see you on the next one.

- [Fawn] All right. Thanks everyone. Hope everyone has a great rest of the day, you join us again on Continued and occupationaltherapy.com. Thank you.