

Good morning. Welcome to the 11th annual Pain Care Skills Training. My name is James Hawkins. Before I dive in, let's get through a couple of introductions. First, I have no disclosures. Is something I don't have to worry about with the slide. I don't think I'll get completely used to presenting to a computer. I see my side in my face. But that is how it is.

I've had the privilege of presenting at some Pain Skills courses around the nation before COVID-19. It was always fun to see old friends and make new friends but be with all of you in a small room, going in depth on different ways we can help our patients feel better which is our ultimate goal. I'll do my best today to still get across the important points to you about how you can identify different orofacial patient complaints that may present you. Especially for primary care. Then give some take-home pearls you can utilize to help them feel better without needing to think about referring to one of us.

At the end of the presentation, I will give you contact information from me as well as other orofacial pain providers can be found throughout the DOD. There are very few of us but we are always here to help. I am stationed in Bethesda Maryland. I am the program director for the residency. We train tri-service and we're the only program and right now. I have two Army; one Navy and Air Force resident and they are a joy to teach. I always enjoyed one-on-one patient care. It's also awesome to be a teacher and teach every year about how they can help people and take care of their own and teach more people like you guys. We're trying to create a web to help our patients feel better. It's a privilege to be here to talk with you. I encourage you to do that. If you have any questions, you can raise your hand or put a message in the chat. I want to hear and answer your questions. If it's three hours of me talking, it's not nearly as fun. If you have questions, feel free to [Indiscernible] at me. When you go back to the clinic and care for people, I want to thank Heather to get all the setup. Thank you for all of your hard work and care along the way.

Let's get rolling. Orofacial pain. This is pain within the nervous system. All the science doesn't matter what comes to Monday morning in clinic when you have this young lady coming in, holding her face and telling you, it hurts. I need you to do something. This is after she has seen the dentist, so they rolled out tooth pain. Now she's back in your chair.

The question we ask is what do we do to help this person feel better? I'll throw in a few common options. What we give them a night guard or splint to stick between the teeth? [Indiscernible] and must stop your headaches and TMJ, whatever that is supposed to mean. How effective is that? Maybe we have some hooked up to equipment that monitors muscle activity, and the dentist may charge 20-\$30,000 in order to do a full rehabilitation. How effective is that? Maybe we should give them medication that sedates them or lowers that nerve threshold. Is that the best answer?

When it comes to orofacial pain or TMD complaints, chronic facial pain, as you can read in this recent journal, it's a giant enormous

controversy. This journal is seven years old now. It's still very accurate because there were four experts with four very differing opinions about how to help someone with a chronic TMD.

They went back and forth with points, counterpoints and each one sounds justifiable, and evidence based. When that comes to us, it leaves us with questions. What do we do?

My goal is to [Indiscernible]. I want to help you do with this ad claims to do what I want to help give you an awesome day every day, guaranteed, as much as possible. I want to dive in into what the evidence says, what's healthy, what's safe to give you the ability to apply evidence-based practices to your evaluation and management of people with temporomandibular disorders. We have about three hours a day. If you get up and leave for three hours that's your choice. If you need to go the restroom or get something to eat, even with three hours of interrupted breaks, if I talked every moment, orofacial pain is very complex, and I can only cover the highlights. If you have questions that we can't get to today, reach out. I'm more than happy to send you articles, references, concise textbooks that you may want to look at, that can help you along your journey.

There is very few orofacial pain specialists and we need your help for management. I will go through an outline of the broad topics will cover. I will start with anatomy and physiology of the system here. I'm going to go over some anatomy. We can't understand abnormal until we understand normal. Then we will do a flyover of who the typical orofacial pain patients are and how you may need to evaluate and manage different patients differently.

Patient A right here, on and off for a few months having pain, that will be very different from patient B who comes in and initially only tells you about the same pain when asked about the other body pain and also find out about their TBI and PTSD history and C challenges and psychosocial risk factors. These two patients are very different. You can help them both substantially if you're willing to do some basic self-care tips as well as other multidisciplinary care aspects. Will talk about how to help both of those people.

Most of your unfamiliar evaluation, is a basic headache exam, I want to go more in depth about how we do a good orofacial history and examination as well as diagnostic aids we may use our practice to help differentiate where pain may be coming from or what may be causing it.

I will go fairly in depth on common pain disorders which are the temporomandibular disorders. I also want to cover some broad complaints gently that may mimic orofacial pain complaints even though they come from somewhere else. I will talk about interventional orofacial pain management tools such as injection, medications, acupuncture and rarely but occasionally surgery. I want to properly focus on physical self-regulation or self-care. I believe everything else we do will not be nearly as effective and potentially not needed if we provide patients self-care to help the system be healthy in the first place.

I have it on top of the pyramid here, patient cases we'll talk about details throughout the base of that pyramid and that all comes down to caring for real patients. I'll give you examples sprinkle about the presentation today helps bring some of these things to life.

I want to encourage us all to remember as we dive in, we want to focus on the person we are treating. We are not treating the disease. If any of you practice, you will know if they come in pain wise, it's everything that makes them feel pain. They've been practicing for years and have done a lot of the fields. You cannot successfully treat dysfunction unless you treat normal function to make sure we are on the same page.

Normal starts with definitions. I just started getting an echo. Please mute your microphones. Orofacial pain, the definition I like best, is pain in her dysfunction affecting the motor and sensory transmission in the trigeminal nerve system.

If we keep it broad, helps us understand our patients I'll go more in depth today because it's the most common orofacial pain complaint outside of tooth pain. All dentists are good at managing a tooth or root canal procedure or extraction. The most common outside of that is musculoskeletal pain. Is a three disorder or TMD which is defined as musculoskeletal conditions involving the TMJ, masticatory muscles and also see the structures.

This is a picture of two of my three boys. This is pointing to that marvelous TMJ. I can update this is my third little guy. The TMJ is a hinge joint that translates and rotates. To the temporal bone, the mandible, there is a disc and that with synovial fluid on top and bottom helps the mandible or jawbone. If you put two fingers in your mouth, that's a rotation of your joint. After that, normal opening is about 40 millimeters. If you can open about 3 to 4, that's what we consider normal.

The TMJ is enervated primarily by the regular temporal nerve. I will show you how to do an anesthetic lock. It's to determine whether the pain is coming from the joint or the muscle or somewhere else. Everyone presents with their own symptoms.

Next, let's go into the muscles of mastication. The closers and the openers. The closers are typically in pain. Muscle pain is the most common non-tooth related pain. I'll go through each of these which give their motor enervation by the trigeminal nerve system. That's both motor and sensory. Will talk about both of those today. The motor branch controls these muscles, the master helps us close down. Take your finger and press right here on the side of your cheek. Clenched your teeth. That's your masseter muscle. That's the most common area we see. The medial pterygoid forms a slang. These were together to hold the mandible up. You can't palpate it effectively. If the masseter is tender, this will be also.

And have the temporalis muscle. Take your hand, put on the side of your head and touch your teeth together. That's your temporalis muscle. That helps you close primarily and if you look at the bottom left, it is just

off the top and goes all the way down if they're replicating eye pain or headache and they put on a harsh medication for something that is musculoskeletal. It's important as we palpate, not only to palpate the muscles extra orally but put on gloves and feel inside the mouth of the jawbone. We'll talk about that more later on.

Let's switch open. Most is the lateral pterygoid. I'll have you do movements with me. It's a little muscle deep to the jawbone but does attach at one area. This muscle, if they were together, that helps you move your jaw forward. I want take your bottom front teeth and move them in front of your top teeth. That's your lateral pterygoid working. That movement when you open, this is the big opener muscle. That's if they were together. They work separate or individually, they moved to the opposite side. Here's a picture. This angles medially as it goes interior early. Move your jaw to the right. If you move to the right, that is your left lateral pterygoid working for someone with your point ear pain on the left, that may be the left lateral pterygoid being overreactive, causing them to feel pain. Pain on opening, pain on perfusion, pain and moving right. This can also help with opening.

There are two more little, tiny muscles. Especially if there are people here that deal with ear symptoms frequently. The normal examine imaging, I don't find any cause for. These are tiny muscles we cannot palpate or necessarily manipulate. They attached one to the station to ban two to the tympanic membrane. They can equalize pressure or dampen sounds effectively. Why I bring these up, these are enervated with motor branch of the temporomandibular. I have lots of patients coming in with normal ENT exams and still have odd, muffled sounds or just have weird types of noises in their ear. Not necessarily tinnitus. They can figure out what's going on but it's really comfortable.

The line of thought processes, if all these other muscles enervated are overactive or extra tight, it makes sense these are also overreactive. Likely not causing the ear to be able to have the pressure equalize. Or not able to dampen the chewing sounds. I try to explain that to the patients not to go searching for answer or surgery over and over when the normal medical exams are over. There is an explanation that makes sense. If we can calm this other stuff down, it often happens you make those ear symptoms go away as all. Tinnitus is its own entity because of TMD can help that, it's not always the case. Never promised but I say there have been people to have had benefits. It's worth trying the various tech geeks we will talk about.

When we get ear dysfunction, odd sound or sensation or pain, is one of the most challenging things we see. Since they have so many innovations going to it, while I will regularly say, oftentimes someone with ear pain comments due to a muscle or referral to the ear, that's not always the case and sometimes it challenging to find out why they have ear pain. I put the slide there because of some interest to think about, I want to get in your mind to look at different reasons.

For anatomy, I want to show you this one slide. I'm not going to go into detail like I did the other muscles, that's outside the scope of this presentation. But it's equally important. As you will see later on, as

you can review in the handout provided, the cervical muscles commonly refer pain to the face, the head, the teeth, the ear, the jaw. Making people feel the symptoms they come into. If you're not comfortable missing palpating his muscles, you may miss something easily. I was teaching a group of neurologists last week about different blocks. I talked about the most common for headaches that they're not having success managing is to have myofascial pain from the cervical muscles. Palpating the uses essential in helping patients understand proper posture and other things they do throughout the day can have an impact, not only on their neck but head or face pain and can be really helpful to someone, not only short-term but long-term in preventing.

That's a lot of anatomy. I bet you're ready to move on and we will. I promise I would not go into physiology back in middle school and dental school detail unless I really thought it was beneficial. Not trying to make people feel like they're wasting their time. All the things I will try to cover briefly what we typically have 4 to 6 weeks in the residency, I will try to cover in 20 minutes, really helps us understand why our patients may be feeling pain. If we just see this without addressing the why, there's a good chance they will not get better. We need to understand why they hurt so we can address the cause of possible.

Let's briefly categorize pain for the moment in two categories. The first being acute pain. This is the one I like seeing, but we try to keep away from our client because most people get better on their own when they have acute pain. This patient is typically a straight for path management and resolution of their pain.

I want to go more into concepts that will apply to acute pain but also chronic pain which we will discuss in a few minutes. Let's talk, instead of using the word pain, talk about nociception. That's the danger signals. Which educator patients to understand and away they can comprehend. These are danger signals that travel with different nerve fibers up to the central nervous system from the periphery. I want to bring in a caveat here. Not just taking about the danger signals from nociception or noxious input, something that damages the tissue but also metabolizing reception. This is when metabolites are released, and this is normal and healthy when this goes on for an extended period of time which system is not meant to adapt to.

Will say muscle fatigue matters. These activate the same fibers which are more commonly referred to as group 3 group for. They activate the same signals which cause the brain to feel pain and fatigue. That's not healthy. I want to know where my patients feel pain and tightness and fatigue. That can make a big deal and how we help get better.

These danger signals start to travel up through neurons and we will look at a shot here in the bottom right corner of the spinal cord and move up to our territory for today's presentation in a moment in the brainstem. The information goes through the dorsal horn, the synapses go to the ballast and goes up to various areas of the brain.

Let's talk about this for a moment. This helps the patient feel the intensity and location of the pain. This helps us understand the chain of

pain. We talked about the trigeminal nerve system. In dental school, and likely medical school, we learn about the three branches of the trigeminal nerve system and information goes into those big area outside the brainstem. As dentists, we use local anesthesia in the mouth to numb me so we can do dental work. What if someone is having pain going on for a while? Where do those go after that may impact that? This is where we stop in dental school. These signals go down into an area called the [Indiscernible] it's about 12 millimeters long. Let's show this from a different angle. [Indiscernible] goes into the three-pronged ganglionic. You can see on the picture and where they go. We need to look at this differently. Not in the dermatomal but more of a lamellar pattern. That can be tongue, teeth, gums, cheek, muscle, salivary gland. All that information here, if you look from the blue on my face, zone three, converges or goes into the same small area of the brainstem.

This is called trigeminal convergence. Area number 5 is an area at the bottom. Guess what, cervical nerves also go in that same area. We don't stop there. Other cranial nerves, nine and 10 also send no information into that same area of the brainstem. You see the varus nerve, that's why potentially someone has aisle cardio infarction they not only feel pain in the chest but in their shoulder, in their neck and jaw. The cervical nerves converge here. That has someone with pain in the neck may also feel it in the face and head. This helps us understand the why which is so essential.

You can see a lot of information goes into one small 12-millimeter area of the brain. Normally, the brain is really good and can figure it out. It can say, those signals are coming from my tooth or my joint or this area of my neck. That is acute pain when the brain can your doubts. That's normal. Let's zoom in on what normal is. Normally if we look at the synapse within that, the noxious input comes in and is divided into lots of other second order nurse. As you saw, only the primary nurse synapse is strong enough to transmit a signal for. The brain is able to interpret where that pain is coming from. Let's zoom in a little more. We will come back when it comes to chronic pain. This will vary just a little bit. Let's zoom in again. This causes an influx of sodium that strong enough causing pain experience to occur.

I'm showing you just a two-dimensional service-level view. That hopefully gets the main point across. It's fairly straightforward. What happens when that young lady we saw at the beginning, when she does whatever treatment, he recommended she comes back three months later. A year later, five years later. And they're still in pain. It's what we need to recognize, this is a difference person, this is chronic pain which is a much more winding road. Unlike acute pain weather is in its you have a procedure to fix, with chronic pain, there is no it. It's a complex problem that involves a lot of thinking. Is a thinking person's sport to help manage chronic pain patients?

Since we are in a pain skills course, we will likely be the ones helping the people with chronic pain. Let's go back through some of these diagrams thinking about how challenging chronic pain can be to manage. Also being encouraged that the brain is moldable in plastic and can be changed not only in a detrimental but a beneficial way which is awesome.

Speculative information coming in for a long time. Now, not only is glutamate released but other things as well causing influx of sodium and calcium and other peptides and molecules that causes activation which makes them easier to open or stay open laundress you have even more of a positive charge entering the nerve.

Not only that we have changes in the expression of the genome causing increased receptor creation. Strengthening the action potential. You can even have within a few minutes and prolonged after that some transcriptional changes. This is all called central sensitization. Calmly touching on the brief part of this. Will be important to remember what that is it comes to helping patients.

To build on this, it has been shown more recently that we still think of purely supporter cells also become active throughout the peripheral and central nervous system during chronic pain releasing their own inflammatory neurotransmitters contributing to the pain process. Then, whereas the body typically has its own stop signal, it can blunt pain or fight pain or noxious signals itself. After a few minutes, as long as you don't touch it, it stops hurting. It can block the signals coming up.

Chronic pain, it's dis-modulated and that may amplify pain. It's no stop, it's only a go. Trying to run through a lot of information really quick. You get the hands that chronic pain due to someone being sensitized us become very complicated and complex and wants get better. And I referring to one or two sessions. It will involve a team approach and multi factorial care and types of care.

Let's go back to this graphic. If you remember before, I will send that little yellow ball down the primary nerve. That signals only strong enough to activate just the adjacent nerve. The brain can tell where the pain is coming from. Now because of central sensitization, all second order neurons have a higher reactivity. You say what's going on, I'm getting signals were everywhere. Very common dental example, initially maybe it hurts right there but after a few days more, they start to feel pain in her upper teeth as well, even though it's clear that's healthy. A few days later, they feel in their neck and face, then their eyes in their head because of these conversions combined with central sensitization makes it really challenging for the brain to figure out where this is coming from.

And also plays a role in myofascial pain referred pain. For example, in this graphic, the source of pain is from the neck. This is me sometimes. Five points on my neck with poor sleep posture because I want to push through. I tell my patients that they do it but I do it. Normally the brain will figure out where that comes from its right here. If I let that continue in central sensitization happens in the brainstem, now is the activation of the nerves. Now I may start to feel pain. Have [Indiscernible] my jaw, my teeth, my head, I'll become noshes, all because of something going on here in my upper trapezius. Is called myofascial pain and there are two slides I want to share with you. User two I encourage you to hold fast to put in your memory or hang them up in your office. These are two I included in the handout. These are from President Kennedy's when he was in the White House. She was a

cardiologist and did some work in students after President Kennedy passed away. Was she got permission to do, she injected hypertonic saline and the various spots in the medical students' bodies? She wants to find out where else besides the injection site doesn't hurt. If you look at these pictures here, you'll see lack access or she injected hypertonic saline. Each of the red dots is where someone felt pain after injection.

In the top left picture, you can see that could cause you to feel pain if the muscle has trigger points. Not only in the muscle itself but in and around the eye, the joints, the ear, sinuses, jawbone and upper and lower teeth. Temporalis muscle cannot only cause pain in the teeth but also all around the head. The bottom left can have pain in maxillary sinus, the joints in the ear. Those are just a few examples of where the masticatory muscles can cause pain. More likely in your practice will be cervical muscles. I chose intentionally not to cram the sled with more referral patterns. Their other cervical muscles that refer to the head and neck as well. You can see on the left side sorry, I mislabeled that. You can see the trapezius has a reverse?

Referral pattern. Get pain in this direction here if I don't take a break, stretch and if it's bad enough, take Motrin. Thankfully for me, that's once a month. We need to come up with something better than continuous vitamin M. They can refer on the one side and across the head. Some of these can refer to various parts of the head, and face.

Please save this to your smart phone, rent them off or commits memory the last two slides. I can't tell you how many referrals we get from various providers around the military of all different medical and dental and other allied health professional typesetter for some muscle pain the patient said, no one ever looked at this or felt that. You will be amazed at what a little palpation can do.

Are there any questions so far? Hopefully you all can hear me and I haven't been talking to an empty audience room for the past hour. Will keep checking on until I hear differently.

We talked a lot about nociception a few minutes ago. I will consider all of that the biological piece. There are a lot of modalities we can do to focus on the biological part. Oftentimes very effectively. It is essential to remember that pain is a personal experience. Is not just involving the biological part. Sometimes that may be the most minimal part of it all. We focus on this biology and information going in and coming out. We briefly touched on how the brain can modulate that information thankfully, normally. Are not just the biological parts, but cognition? Hypervigilance all of our patients with PTSD have. Always thinking the worst of things including the pain. That can play a big role in how someone expresses their pain. The context, the pain beliefs and how the family processes pain to their grandmother dying of a tumor in their job that manifested initially as the same type of pain or location they have now? Until you tell them and prove it's not a tumor, it will not listen to anything else you have to say. There focused on that. That is an example of how pain beliefs and expectations can play a role in summons pain experience. In chronic pain, chronic facial pains, things

like depression, anxiety, fear and anger are very common and can highly contribute to someone's pain experience.

If we refer back to the definition of pain, is unpleasant sensory and emotional experience. That's associated with a resembling actual or potential tissue damage. What is it saying? One thing, saying a potential, never touches the person can cause someone to have a pain experience. We need to keep that in mind when we take care of someone. Is not just a trauma victim that will have pain, is not just the physical trauma, it may be the emotional trauma patient as well.

If we think about this, keeping this very surface level, some of the same areas of the brain have processed emotions. Some of the same areas are also some of the same areas of process signals as they go up. Hopefully from a simplistic model starting to make sense and now you know why we need to focus on so many components when we try to help someone recover when they have chronic orofacial pain.

Let's bring this back. We talked about the signal going to the cortex. Again, we know now doesn't just go there. We need to look at other areas like the prefrontal cortex, the limbic system has all those play a role. The three dimensions of pain. Someone has a component that tells them location and intensity. They also have different areas across the [Indiscernible] how unpleasant the pain is and gives them motivation to try to run away although from chronic pain, we cannot. Is the motivational dimension of pain. Last, the cognitive and evaluative component of pain and how context plays a role. This can be the to the detriment of our patients. If they look at the wrong way, if we can change their frame of mind with using a team approach, we can switch that. We can have a huge benefit to our patients as well.

The last slide I shows you, that applies to any in the entire body. Low back pain which I have, and it's no fun, chronic foot pain, none of those are fine. After working with this area for a while, I think it's unique and even more important and relevant because of all the life-sustaining and life encouraging things this area does.

For example, we can breathe and eat from this area here. It makes sense why someone would want to keep this area healthy and why pain appear impact them so much emotionally. These areas are life-giving. Things like smiling, expression, kissing or intimacy, talking. Some consider it life-sustaining and I will call it life encouraging all these play a role in making us who we are hopefully can start understand why someone sitting in your waiting room crying because of pain right here, why they may do that. This area is so meaningful. They want you to understand why. If you look at the brain, you can see how much is dedicated to the face and head region. You have the neuroanatomical and emotional aspects of why this area is so important.

We talked a lot about sensory. I'm sure you are ready to drive to another area. Let's drive. We won't quite drive away from physiology it. I have one more and to touch on. Touch on sensory, let's go back to motor. This will help us understand some of our patients even more, why they experience symptoms and what we need to do to help them get better.

Especially some of our wounded warrior patients. We talked about the sensory information going in. If you look there, there is the motor nucleus out to the masticatory muscles. Nuclei in the brain, the motor nucleus of five is surrounded by other motor and premotor nuclei integrated with autonomic brain examples I can play a significant impact on what information that receives and sends out. This is one of my favorite slices in all of the articles I've ever read. That shows the area of the brain that releases norepinephrine. This has heavily impacted by norepinephrine. What does that mean in real life? Was it like?

Let's look at this picture here showing our masticatory muscles may be heavily impacted by different things going on in our mind. As an example, the prefrontal cortex, when we are focused or dealing with the politics in DC, and maybe focus if you look at the person in the car next to you or in the cube will next you, you may see them really focused and when they do that, they are unconsciously or subconsciously contracting their masticatory muscles. The prefrontal cortex can cause the motor nucleus to react causing contraction of the masticatory muscles.

Obviously, we can contract these on our own, we can chew gum or steak or anything. That's one thing to consider, what is the patient doing? Are they chewing gum all day? The limbic system all has a direct connection. Pain inputs coming up other areas of the body, my example if you're in there with me and we hang out together having this conversation in person, I'm about six foot four inches, I suspect one of you women in the room maybe wearing heels, fires get really comfortable in our conversation and take my shoes off and kicked back, and you don't really like what I say, you come over and take your high heel and step on my foot, and say I don't like that, what do I do? I jerked my foot out of the way, what else happened subconsciously? I also clench. What are these impacts of the all the way up here? That's because input from anywhere in the body has a connection to that motor nucleus of five. The shows a graph of people having spinal pain.

If we don't manage those or get them to provider that can, we may never effectively manage what's going on in their facial region.

To recap, have lots of different areas impacting the motor function of these muscles. When these contract like this, that compresses the TMJ shown earlier. Do you think, I would give you a preview of what you're talking about, do you think these muscles are meant to be contracted. Do you think it's healthy? I will give you a big hand.

We've a lot of input that we need to calm down. Can these be effectively managed orders numbed up her medication or pharmaceutically dulled enough to manage the patient pain complaint if we don't appreciate or address the drive. I want to give one more example, if you're really clenching your fist with me, you feel some tightness, fatigue, keep going. I can put a piece of plastic rubber between her teeth, I can put some local anesthetic in their almost everyone is overusing it.

We just went through a lot of stuff. Speculative transition into who the typical pain patient is. The military is tiny but different. It's primarily female in the child age bearing years although obviously

children and older individuals of both genders can have the to. Again, in the military we may see a few more males than females.

In the entire population, at least in the U.S., 34% of people have some type of TMD issue in their life about 10% will have that occurring annually. Unfortunately, high percentage of orofacial pain patients have history of abuse, sexual abuse, physical abuse, or accommodation. A lot of our patients check that box. Very few are willing to share that initially and that shown in study and anecdotally, involves establishing trust and typically involves as part of the rehabilitation process, getting someone who can help them process through and in a healthy way some of the things that happened in the past it may cause their bite to react in unhealthy ways you're not aware.

For example, if they were an abuse victim growing up with her always laying in their bed, curled up because of fear of someone coming in the room at night, if they keep that posture throughout their life, that's not healthy for these muscles and they contribute to their pain.

Most people don't only have one vocal pain complaints. A lot have other body pain as well to manage. Those typical body pains or other comorbidities are right here. I will switch to the next slide to show you a graphic instead of just a list. This is from a rheumatologist that put this out, these are central sensitivity here. You see TMD is one, but also headache, fibromyalgia one my residence turns this the wheel of misfortune. I can't tell you how many people I see unfortunately check every box or circle here. Unless they are willing to address these, it will be difficult to simply fix this portion if they're not able or willing to address other issues as well. Most people come in to see a dentist will not mention everything else. Maybe they come to see you for chronic pelvic pain. They will not mention the facial pain or headache. I was in San Diego for three years, one of my most common referrals was from an OB/GYN. She would have patients with multiple pain.

Typically, there is a real of misfortune, they also have facial muscle pain. Is not always the case. What's take a moment to talk go back into a broad overview. Back and reread some things and treat them too fully. We occasionally hopefully you'll manage the simple TMD patient. If they need to come down the line because they're not getting better, so be it. Occasionally will see some simple muscle pain patients are direct pain patients and we can manage, and this will be adaptive and hopefully recover. If they also have headache, that means that trigeminal nerve system is often centrally sensitize that patient may be a little more challenging to manage. We will call it a pain sensitive group. A second pain sensitive group is someone who also has facial pain and headache and cervical area pain and some nature. Again, this person will be a little more challenging to manage.

Then you have patients with fibromyalgia which I explained to my patients is not, I still can't tell you how many times I hear is a crazy person's disease. Please don't say that to your patients. This is hypersensitivity that we can work on overtime to calm down and provide hope, maybe not for a cure, but for restored quality-of-life. Is lots of things we talked about earlier no and she would to this. If we don't address all the pain

going off, we just address without addressing sleep or cognitive issues we just try to address the facial pain and headache, we will not do the patient justice.

This is who is considered in the literature, a global patient. Patients have been in pain a long time. This civilian data. About four years, they see lots of different providers, given lots of different diagnoses, often misdiagnosis. I can't tell you how many have been diagnosed with something that has symptoms night nothing like that. Oftentimes people would get misdiagnoses in put on inappropriate medication or have inappropriate procedure done.

There's lots of psychosocial challenges and lots of history of abuse in the military, if I had to guess, a lot of people are running away, particularly elicited from negative life circumstances when they're growing up. There may be an even higher history of abuse in our patient population. The cost a lot. They spend a lot of healthcare dollars and utilize a lot of healthcare services. This is training on our system for not doing the best we can to help patients as early as possible. Of trying to bring up too many studies.

There's one called the multimillion-dollar study, looking at the risk factors for orofacial pain over a ten-year period. Is very well done for any chronic pain study and happen to be done on the face. There are a few different risk factors and not risk factors I want to bring up with you. This may help you look for things in the patient. None of these are surprising. Anyone with stress, distress, PTSD, clinical dysfunction of the oral cavity, general health issues like other body pains, sleep disturbance or sleep apnea all have increased risk of having the set of orofacial pain. More important, patients will see us when they have acute pain, how do we keep them from transitioning to chronic pain is much more challenging to manage? Let's look at risk factors. Depression, PTSD, do they smell? Do they have sleep apnea? Those will increase the risk that hopefully early on we can get them to appropriate providers to manage. Can we help them stop smoking, lose some adipose tissue, improve sleep and manage sleep apnea? I think we can do a lot of that. Some with more effectiveness than others. We can start the patient down the road to rehabilitation by looking at these things, instead of ignoring and focusing on 15-minute complaints and then see you next time.

Here, these are not risk factors. Jaw trauma, there is about 9%, but it's not much. History of orthodontics or braces. Not a risk factor. TMG noises, can a pup or click? Doesn't matter. Tooth wear, if you look at that or they have grinding at night, those don't play a huge role in chronic pain. A lot of dentists I suspect a lot of physicians as well think, when they grind their teeth at night, that makes more risk for facial pain. In general, it's the opposite. Heavy clenching is protective. We think that's because the brain tries to not do that if you are a pain patient. There is evidence showing low levels may play a role. But not the big-time clincher is.

One concept out there for years is occlusion. How the teeth fit together. Used to be in the dental realm for 50-75 years if your bite was right, that's what caused facial pain in the has been showing over and over by

huge studies is not the case for chronic malocclusion for facial pain. Are still some that hold costly invasive procedures to fix the bites when there's very little evidence.

We will go about 15 more minutes and then take a break. Will cover this next section. Let's talk about how you can do a quality history and examination which may be beneficial.

I worried about this challenging patient comes in and they will and you're not sure what to do, just listen. The patient will tell you what they have and what's going on. The history is the key component for the vast majority of patients. Most will reinforce what you heard if you need to do a tester study, that will come from that as well. It's the vast majority of the time. I know not all of you have the ability to take long histories for your patience. If you can, set aside time later and have the patient come back for a longer appointment slot later on. To understand, would like to get to today but I want to take time to get to know you and why you are in pain so we can know how to get you better. If you can't refer them to someone who can, here are the different components you look at taken history. This will be asked for on the right-hand side. People say TMJ a have that point here. What has been done come have they had to do before? I would encourage you to take a systematic approach. Don't skip things. When you skip, you missed something big. In the history of providers, this has come back to bite us in the butt or tumor diagnosis was delayed. Be systematic. The patient will give you based on you asking them, other things that are important to know.

Medical history, do they have a history of migraine? Have them draw it out on a pain map and do they have other comorbidities? We ask our questions of our patients such as during the day are your teeth normally touching or part? Where is your tongue? Do you protrude or do odd things with your jaw or mandible, you have a chewing gum? I'll go in tomorrow about why those are important let's take a pause on that because that will be instrumental later. I will come back to those habits in a little bit.

Any personal habits such as nicotine use which is a stimulant and impact on healing and caffeine use. The muscles react to stimulants at a level that is subconscious but not ideal for chronic pain patients.

Are they hydrated? Are they given their body healthy nutrition that's a building block for getting better, not pro-inflammatory or sad dyed it that may contribute? How is nursing? If some is not sleeping well, they will not feel that here. I tell my patients, there's one thing I could take care of, would be their sleep. It's not always simple. Check the simple things like sleep hygiene, to have it anchored bedtime or wake time. No stimulants in six hours plus about. Are they not using certain wavelengths at night? After that, look at other things like are they snoring or gasping? Any risk factors for sleep apnea? For oral facial pain, are they sipping on their stomach are the activating these neck muscles causing unhealthy information to converge? That's something to be aware of and ask our patients about.

Medications are they on? Do they start or modify within a few weeks of pain complaint? Stressors and arousal? Do they have any physical or emotional trauma around the time of their chief complaint onset? Do they have a history of things like depression? Or are they always on guard? Hyper vigilant? Do they have a history of abuse? Hard questions to ask but imperative to help get our most challenging people feeling better. What is her job like? Do they never say no it's always yes? That puts a load on their emotions and body. To have an unhealthy posture before computer monitors keeping their heads turned. Are they always done on their cell phone? What is a family issue? How's her marriage or family? Are they a caregiver? Things to think about the me put unhealthy pressure on their body that it cannot recover.

They will give you 80% of the information you need, and you likely know what's going on already. The evaluation can help confirm that. Would make sure everything is good to go and check systemics's. Want to do a cervical examination, let's measure the range of motion opening and closing comfortably have them move side to side? How is that motion? Is anything contributing to the pain complaints? Does the job make sounds? And they will palpate different muscles. I like to start into one side first, work my way down anywhere from .5 to 4 kilograms of pressure. If you want to use your fingernail blanching, that's a fairly good assessment. The trapezius, the muscles, different muscles we talked about. Then, I would encourage all of you to do a quick oral exam. Are there any major issues with the teeth? Do you see one or two of the teeth have big black spots, for example.

During COVID-19, everyone is hesitant to unmask an open large. If you're unsure, refer to a dentist, especially if it's a family member. It's uncommon they have and oral issue but think about family members especially.

We'll talk about diagnostic anesthesia on the next slide.

I mentioned earlier, the nerve that innervates the vast majority of the TMJ area. It's all kind right here. You can get an anesthetic syringe; we use a shortlisting anesthetic. Rights with that middle picture shows, and a little fold in front of the ear, you slain that right behind the condyle to anger that needle parallel you and checked about one milliliter or so and find out, does it help the pain? If it does, the pain may be joint related. If not, start thinking about referred pain. What we don't want is that bottom picture of someone having a surgical procedure that never had a diagnostic block beforehand and now not only did not help the original complaint but now they have a new neuropathy from the surgery.

One thing you what's taught your patient about beforehand, we are anesthetizing right by the carotid. Is a very temporary Bell's palsy. It's minor shortlisting, nothing to be concerned about. You can fully close right about half an hour now, but pull your eye gently shut. Rarely is it significant enough to give eyedrops for the half hour. It's well worth the risk of a 30-minute Bell's palsy, that may not happen till determine where the pain is coming from.

Imaging can be occasionally helpful as well. Utility thing major is going on. You can see if something is going on with the teeth. If you want to look more focally at the joint, obviously there's MRI reasons for brain and other areas that we will not talk about today. Talk about the TMJ right now. That can help look at the disposition and see other soft tissue pathos is. Is something you may want to consider occasionally but it's often not needed. There is one imaging modality I didn't put up here which is it's very helpful. It's called the TMJ serious. I saw a lot of emergency room physicians primary care ordering TMJ serious. I would highly encourage you to consult your dentist before ordering an image or radiologist to determine what the best image is for the patient in your chair.

I think we are in a good breakpoint. It's 1423 Eastern time. Good time to recharge, stretch, get water and use the restroom. Heather, are you still online? I'm going to take a break. Let's give an eight-minute break. We'll come back and keep moving forward. Can anyone turn on their microphone and say good to go? That I am being hurt? That I am being heard? I will see all of you back in eight minutes.

It is time to start back up. Feel free to ask questions along the way. I have one there which I appreciate. Let's get into some fun stuff. Let's talk for a few minutes about different the two conditions. Then we'll talk about more uncommon ones.

Muscle is the most common of the TMD. Although they commonly cooccur, our most common diagnosis is local masseter neuralgia either with function or parafunction. When I press on it, that replicates the pain. Local chewing muscle pain.

There is a question I want you to ask yourselves. Someone comes in and you think they have a local masticatory muscles neuralgia. Is acute or chronic, is there an injury or an infection, something that can be fixed? Is there a fracture of the oral surgery can play or is it something central? The pain there all the time I just happened to manifest in here. Again, there centrally sensitized. Is it acute or chronic? Is it local, is a myofascial pain? Or is it something that adds fibromyalgia and as part of that experience they have pain in the face. If your member, the diagnostic worksheet people fill out, the jaws one of the many areas they can pay into contribute to the diagnosis.

I promise a few cases throughout. Here's one of the first. This is a patient referred to me by in the Don next. The roots canal doctors. Is a routine floral of FEMA that had migraine or tooth pain that moved around to different areas? I didn't find any reason for the tooth pain. These patients had numerous treatments and yet, she never felt good for more than a few weeks. Here is a panoramic image of her. If you see the bright white things in the teeth, the top part is the crown. Then, those white lights in the middle our root canals. You can see she's missing a few teeth and she's had a number of canals, all chasing after this pain that never got better. When she was with me, I asked, did you have pain anywhere else, and she said no one ever asked me that. Here in my neck and shoulders, when I pressed around different areas in her body,

including her face, when I pressed on that masseter muscle, caused her to feel tooth pain. I explained what and where the pain was somewhat are some options. When we ask ourselves, is that the tooth or not, that is the question? At least in this case, hopefully like I do, you say it's not the tooth.

Not every patient is ready to listen to some things we have to offer. They want a quick fix. Showing these diagnoses, she went to a civilian dentist and had another extraction before she came back into me and said I'm ready to listen to what you're willing to share. This is not a quick fix. Involves time and effort. That's not always easy. You want to be empathetic, but it doesn't change the need to improve and do self-care rehabilitation.

Let's go back to TMJ and talk about the diagnoses. I want to take a moment, I get a lot of referrals thing this patient has TMJ. I don't want to nitpick. It's kind of like saying you have me. You have two TMJ's, you have two knees and two elbows. TMJ is not a diagnosis. That doesn't help the referring provider. Trying to use these diagnoses we will go over. To be more focal can be helpful.

The first diagnosis is TMJ arthralgia, as a sickly joint pain. Very focal in front of the ear. Affected by function and when you palpate right there, take your finger and put in front of the ear, open and close, open and close we should feel your TMJ moving there. If you palpate the lateral side, that's TMJ arthralgia. That's all they have. If you do an image, yeah, some type of bony change, or if they have grinding and crunching, or degenerative joint disease. If you look at this video in the top right, let's with a bone supposed to have some change and that can cause a grinding type of sound that you may or may not be able to appreciate but the patient will be able to. If you look in that bottom image, that is showing major changes to the joint that is not normal.

That said, a lot of people can have bony change. I see some very severely degenerated joints. The patient has no pain. That's not the person you want to have a surgical procedure done. Want to treat the patient, not the picture. Next, I want to talk about the most common intra-capsular or inside the joint disorders and that is the disk displacement. Everyone watches that picture. This is a normal position. Sitting on top between the bones in the back part of the one o'clock positions when the joint is majorly injured such as trauma to the face or overused for prolonged period of time, the ligaments are not like rubber bands, they hold the disk in place, over time, they can be elongated with too much pressure. Everyone watches now, now may sit anteriorly. It can slip other areas because of the muscle pull. This is called anterior disc displacement. It can either have the with reduction or without. If it's without reduction, that can be acute or chronic.

Let's talk about a TMJ displacement with reduction. I have been told Adobe connect, this inability to play sounds over this platform. I will try to talk you through the sound that's happening. Occasionally they come in and have a click. When they open, they have a click they have a close when they click. Watch the video, as they open, it's a pop back on top of that disc. As they go off, and is a push and go on, there's a

click every time. The patient can hear that, you may or may not be able to. You are reducing backup on the top of the disk. That may cause the jaw motion on opening to move to the side because one is being held up by the disk popping back on with the other is not.

Here is an anatomical image. You see this big pearly what the in the middle. The open and push, click. And is a close, click. At the disk displacement with reduction. I know that appears like what's going on. It has to be something bad. Actually, it's very common. If you take hundred general people off the street and have no pain at all, 33% have some type of click or pop in their joints. Well, it's not normal, it's definitely common to have a clicking joints. I don't know if we have 30 people on this call, if there's 30, 9 to 10 of you will have a click or pop in your joint. If we were together, I would ask you to raise your head if you have a click or pop. Is replete in the literature. Is no diagnostic value. Most people have no other symptoms. 95% do not progress. An analogy I often use, you can pop your fingers all the time and it doesn't bother you. A lot of patients are concerned about this because they can hear by the year. I talk about that analogy that gives them peace of mind.

Bottom line, no pain, no dysfunction, no treatment needed. Unit because a little bit of pain once in a while, or the is bothersome, the first line of care is self-care stuff we will talk about later on. If we overuse these muscles, that compresses the joint. When it's compressed, it squeezes out the synovial fluid, making much more friction in the joint, much more likely to have that click or pop. If we can decrease muscle or reuse or joint loading, allow more lubrication, although the disk never goes back in place permanently, once those are elongated, even with the disk at a place and reduce back on top, if it's lubricated enough and everything is relaxed enough, you may not feel that click. I was telling the patient, this is not something you want to go to surgery for and less it's severely impact your quality of life you definitely want to do it with a nerve block to see if it helps the pain before even considering surgery. Again, if you have questions, it's a very important topic. Ask if you have any questions about that. Submit an email and we will talk.

This is a video of a guy that doesn't have pain, but he can literally play songs with his joint. I will skip it. He can play Star Wars, the Addams family with his joint. But no pain, it's really cool. Joint noise doesn't equate to a dysfunction.

Next, we went to disk with reduction to now without. This is acute, it's called an acute close lock because it will cause limited opening. Now instead of being able to reduce, it's in the position were not able to get your job him back on top. You're not able to reduce and that can cause a significantly limited range of motion at least temporarily.

As it opens, MA flex to the same side. Is unable to translate down outside so it will be stuck and move freely. Besides not being able to open, they will also not be able to move their jaw sideways. The reason I say that, there's lots of different things that can cause someone to have a decreased and tubular or general range of motion. Need to figure out which is which. If they have a decreased range of motion, a lot of people

think it's because the disk is out of place but have them moved to the opposite side as well. If they can't do it, it's much more likely something like muscle.

What do you want to do here? He would educate the patients. During that time we can facilitate remodeling. What thieves can do, they're very adaptive like the rest of the body. If we can allow our body to heal, thus we want to do. These can form a callous. Watch the video. You can see the jawbone may push up on some of the blood vessel tissues. The disk has no blood vessels and no nurse. You can pound on it as much as you like. If you pound on the area where the blood vessels are, it's highly innervated. It can be very painful. Over time, watch the video, that can form a callous if you use it gently. That can become less painful, and tissues can atrophy or thin out, allowing you over time to regain the range of motion.

You can do that with self-care or facilitated pastor was surgery. Surgery will always have risky complications in way that risk-benefit as you talk with your patients and refer them. I am always a huge self-care advocate. I understand that everyone wants to wait.

It's hard to see but the pearly white thing in the middle is the disk. I will show you what happens as atrophy, look at the bottom left corner you can see that pearly white thing squeeze and bow together, that is the disk now. You can see this person is able to push that very far forward.

I don't know if you can see my mouse, disk is being pushed forward and bunches up because it atrophied so much. This person has rehabilitated. This is a chronic with reduction.

The next diagnosis subluxation or location. Subluxation as was the person that stuck open. Subluxation, they can move around and get it closed themselves. Elected nation as a person comes to you in the ER and they can't close her mouth and it hurt. You will use some sedation or force to get it over, but I don't recommend that. You some sedation, let the patient calm down and let the muscles do their work and put it back into place.

You want to try to figure out how much this impacts someone's quality-of-life. This is something that needs to be surgically managed. Horses of in the patient can manage with putting their first over their chin when they on to protect the jaw. Cut up apples and burgers in smaller bites. It's something they can manage on their own. Why is it happening? Due to the anatomy being different? Is the area the job moves down very steep? Allowing the jaw to be caught over to easily or some neurologic condition that's causing it to be open. That's something you need to talk through, these are things to think about.

This, the person will open, and it doesn't stop at the apex. Typically goes over. You're welcome to type the question in. I will stop right now. If I don't see it in the next few minutes, we will transition on past the common TMD diagnosis which I covered quickly. Hopefully it gives you an idea of what these are. Will go into other, broader categories. I have

another video that I will play. The volume is not working, but it's a really cool video. I will try to narrate it for you.

You see all the basketballs. I want to ask you to watch and count how many passes the sateen in white Mitt? Do you, have it? Did you see the moonwalking bear is the more important question here? Watch the middle of your screen. Keep watching. Look to the right of the screen, in the middle, the moonwalking bear. Did you see that while you are focusing on the passes? Is easy to miss something you're not looking for. Reason I play that here, hopefully Dennis throughout the tooth being the issue and hopefully you are at least initially equipped enough to evaluate basic TMD. If you're focused on that one, some comes in for pain, you may miss something else. You may miss these other diagnoses I can be highly impactful to a person or potentially even life-threatening.

I will give you a big broad list. This is what I included in your handout. We will talk about some of these more in depth in the next few slides.

This our favorite place in Mission Valley, Paradise over. You can tell them I miss them. This is my son when he would eat frozen yogurt, he would say, I have a four headache. Thankfully, this diagnosis was easy to understand and manage. I understand, it's no fun. Stop eating the frozen yogurt for a few minutes, it will go away. Every time, hundred percent cure rate. Don't we wish we had that all of our patients in general. Not so much the.

Here are the different headache entities that can cause not only head pain but also pain in the face. This may be a headache with the facial pain, with the tooth pain but also the patient may feel this pain or cluster headache just in the face. It's important to ask our patients to question and think ourselves with someone comes in with the facial pain or to think that the doesn't appear to be anything wrong with the tooth of the musculature of the joint. Is anything else the patient is experiencing when they have this pain? For example, is there any light sensitivity? Or nausea? Or are all symptoms? We want to think about the photophobia, impairment and nausea. You want to write a procedure and give medication for muscles. And then the tax dissipation has tearing her stuffy nose while they have this pain? These are things to think about. Due to time, is not within the scope of this to go into, these are good things to be aware of. Migrate, especially within cluster and are predominantly young male military population of things you will see in your practice. The criteria can be very valuable to help you care for people well.

Neuropathic pain, something going on in the peripheral or central nervous system that is an abnormality that can cause pain. Pain can be episodic or chronic or continuous. For the episodic, the big one we hear about which earlier I said is misdiagnosed often but also out there as a viable diagnosis will also briefly mention due to the location.

I'm going to grab a drink of water. TN is often unilateral. Very seldom here. Should not be bilateral, shouldn't week the patient from sleep. If not, it's much more likely to be something like multiple sclerosis are

termer. A lot of dentists will do a procedure, root canal or extraction. The pain typically is sharp, stabbing, electric for a few seconds. That is our idea of what TN is. Almost half have a dull ache, continuous pain in between. May not be a set of the diagnostic criteria as we once thought.

Should be a trigger zone. Is touching an area, inside or outside the mouth can cause that pain. It's a triggered zone. Sometimes, the pain may go away for days to years. Again, it's most common in females and very common in males over the age of 50. Rarely happens in sleep or bilaterally. They give a secondary cause of it does.

Let's talk about another case. He's having pain in his teeth. Ignore the bottom, it's a common treatment, instead of dentures, much more stable. Look at the top. That tooth looks healthy. Unfortunately, the patient went in and a well-meaning, provider, we'll leave it at that, did a procedure and it wasn't helping the pain and made the pain worse. This was not the tooth.

Put the puzzle together from diagnostics and by looking at the puzzle trying to figure out what is going on. Parental pain on the other hand may cause pain in the ear in the TMJ area because of that nerve 9 and 10 convergence and that's where it comes in. This is less common than trigeminal neuralgia of may cause pain in the ear throat job and tongue areas and down the throat. It won't be as easy for us to stimulate. With all of these whether it's TN or GN it may cause compression of the trigeminal nerve or the varus nerve so imaging usually an MRI is appropriate for patients suffering from this. If you don't know what to do contact her neuroradiologist and they can give you what type of image and weight order those images.

Let's talk about continuous neuropathic pain and will focus on PT TN which is painful traumatic trigeminal neuropathy. Traumatic, they had trauma although often times trigeminal of course the neuropathy so this is had a lot of different names. As you see in the first bullet point now we call it people PT TN. It's very interesting that the severity of trauma will. What happens is not predictive of how they'll respond to the pain or how bad the pain is. You'll see a lot of dental procedures the major trauma or extractions those actually are less likely to cause this chronic neuropathic pain then just a regular small root canal which is very common. It's interesting how different patients respond differently. You probably heard about this, with small fractures causing severe debilitating pain and we are not necessarily sure why it happens in some individuals.

Characteristics, burning is the most common but ache tingling, and itching is a prevalent descriptor. It's often constant so it is always there, and the intensity stays pretty stable so it's hard to make it worse or better. It's often hyperalgesia. Here are the factors. We have few dentists on the line, but you guys can play a huge role in managing if not only afterwards if not one of us is nearby but also beforehand to minimize the risk. The first two you might not play much role in minimizing the risk but make sure your colleague is not injuring them directly. The bottom bullet point in that the patient risk factor. Who is

more likely to have a chronic neuropathic pain after a procedure anywhere including in the mouth which is what I'll talk about? We want to make sure people sleep well and make sure they have healthy nutrition and hydration. We'll talk about those playing a big role again. The risk factors are a baseline prolonged pain. The longer they obtain in the mouth beforehand the more likely they are to develop a neuropathy.

In a less than ideal expectation of the outcome have been shown to increase the risk of neuropathy. As I heard those the first time, I thought how interesting, someone having a fear of the procedure or fear of the provider or not thinking everything will go wrong, they are more likely to have a really challenging treatment and neuropathy. Does a surprise us if we think about the model we mentioned earlier. It should not. How does something happen with the patient is thinking? It's important if we can do manage that fear and expectation. They should be but they are not always equipped to do this and potentially you are understanding this can play a huge role in managing this because neuropathic pain which I'll talk about in a moment it's really challenging to manage as I'm sure you're aware of, all the places in the body it's challenging appear. The successful treatment is successful rehabilitation plan is 30 percent better which is not good so we want to prevent this if we can rather than treat it later on.

This is from a general anesthesia paper, but I thought it was good and could apply well so I wanted to show you this. Let's avoid unnecessary treatment, decrease pre-op pain with medication and anesthesia, good surgical technique, block the signal during the procedure and give that afterwards to give the healing process time to start before it starts to go back to the CNS, decreased fear and expectation of negative outcome, sleep quality and consider preoperative gabapentin which will help my colleagues have it on three days before one day after from 300 to 900 milligrams at night occasionally three times a day but most patients don't adhere to that so just at least at night.

We want to do that because it's challenging to manage, and patient will have significant impaired quality of life so let's try to prevent and treat. Moving on, other or facial pain memo occurs. I will show a big slide we've been talking about the horses; zebras are no good so we want to make sure we take these out I believe these are in the handout as well. Make sure someone is not having an infarction or referral of a lung tumor causing pain.

Make sure the patient doesn't have unilateral blindness and facial pain which may be temporal arteritis. Does is painted here sound like muscle or joint pain are there other odd symptoms co-occurring that we need to further investigate?

It's easy to miss something you're not looking for, never treat a stranger and be systematic in how you evaluate. Do your history on your exam, do studies and look for green flags. Look for things that make you think yes this is a normal pattern for primary headache or pain. Make sure someone doesn't have red flags, first or worst headache, onset age, neurologic symptoms or signs, presence of history are systematic symptoms, history of cancer, etc. Make sure you evaluate more make sure

someone can. Remember these because I know you're all familiar with this. Never forget to rule out these things.

Here's my favorite part of the presentation, it will be fun. All talk about management options which is fine in my extra most amazing fun part is a self-care part. Let's roll into the good stuff. We want safe and effective care and this can be conservative and reversible almost all the time according to every study that has come out in this journal. Let me repeat that, in almost every evidence-based journal there is for 95 percent of orofacial patients outside of tumors causing Matt. There are findings out there that will do very expensive very invasive treatment plans. Based on what you'll see did Dale let you determine if that's best, but I will have you refer back to some of those NIH research to name a few.

Our goals, the ideal to fix or cure pain and for dentists that's where it goes in general Dennis stay. We used to take someone from pain to no pain. It's not always the case so we want to improve quality of life, decrease pain intensity and frequency, those are our goals. We need to provide realistic expectations; we need to talk about this with management and make sure we maximize the healing response or the placebo response. Placebo is so powerful, and I call it the meaning response after a book I read by a physician, I blank the name out but it's a fantastic book on the meaning response. We minimize those, making the patient think they are getting worse. Realistic yet hopeful expectations. We want to make sure the patient understands it's their responsibility to manage their disease and increase their sense of personal control and self-efficacy. It's important to reiterate through conversations. Make sure to tell them it won't go over overnight, takes time and that's okay. I know it's not fun to be in pain, but we need to make sure we are doing the right things and it will take time.

We can always get zero especially in neuropathic pain. We want to make sure patients especially if they have irreversible procedures don't try to get another one like the lady you mentioned earlier. It could make things worse and it's not good for anyone so make sure they understand why there in pain, so they don't go get another invasive procedure. Let them know the pain may fluctuate. The pain may go up and down depending on what I do, how I sleep, what stressors I have, etc. I like, remember we [Indiscernible] again the body has an amazing capacity to heal the best majority of people so getting the right things in the patient's life and help them heal can prevent them -- if nothing else it's I can live well even with whatever number I have on this pain scale.

Management overview the slide is in the handouts but don't look ahead because I want that last box to be a surprise. Here are the things we can do to manage orofacial pain. This is a broad overview today. There are different medications, top goals if they are helpful but there's lots of other ones. Topical can help neuropathic pain in the mouth, instead of something systemic. Systemic Pharma therapy is a main stain and will use polypharmacy working at different mechanisms. It can decrease risk of side effects. I'm a proponent most of the time I start low and go slow. Very commonly used ibuprofen or other type of anti-inflammatory unless it's acute, especially in the joints. There are times and places for it.

If it seems like a joint issue a good long-term solution. We will jump to muscle relaxers if it's something we think we can manage quickly and we try to use these appropriately. I'm not sure why Flexeril, it's commonly prescribed because a lot has to do with that and often only take that two hour before bed and give yourself eight hours of sleep so it's out of your system more or less or less likely to cause an issue 10 hours later. I'll get something a little more or less the date of during the daytime like Robaxin or methocarbamol.

The mainstay still in our practice for the vast majority of patients are the TCAs. It's a shotgun effect and they have risk and side effects but compared to the SNR eyes at a lower dose the TCAs are very effective and still likely have minimal side effects of the low dose we prescribed period started 10 milligrams two hours before bed and increased at 30 milligrams per night and see how they do are sometimes up to 50 milligrams. I totally understand how every medication has side effects. It would not have been approved if it was presented to the market today that said we need to get the patient to sleep better and this can help that, we can increase the neurotransmitters that help the system work more effectively. Gabapentin can be helpful as well is Lyrica, but the frequent dosing is not quite as commendable for patients. A few medications can cause weight loss and others definitely don't. With that said, again, feel free to ask questions but these are things we consider as we try to find the right tool for the patient if they want a pharmacological option.

With that said here is a chart taken from lances focusing on neuropathic pain, so nothing applies to all of our diagnoses. It does of good job of explaining the need to treat and how these medications are not nearly as effective as we would like them to be. In this column the tricyclic antidepressant has 3.6. Let's rounded up to four. That means out of four people, one will improve. So, one in four. If it's 71 in -- one out of four will improve here with the antidepressant. On like this :- ) guy on the right-hand side it doesn't mean they'll improve all the way; they may get 30 percent improvement so that's what this means. Ideally, we want to lower it. We want a high in NH which is side effects. Find the best medication for each patient considering comorbidities, prior exposure and reactions and do the best for the individual and the diagnoses.

For things like headache another facial pain, this can be helpful. I forgot vitamin D, I frequently assess vitamin D levels and often times it's low so that's when I would add in to evaluate. Some medications we will consider using, oral appliances, this talks about plans, not about devices for sleep apnea, just night guards. I showed this at the beginning and how some people demonstrate in said 70 to 90 percent efficacy. The better research shows over time the efficacy response is shown to be weak. You can put plastic in their mouth and some people may feel better long-term so it may help some people, some people may feel better. Some people may hurt more. The vast majority says it doesn't help at all. It may protect the teeth but does not help with the pain or helps with pain for a few weeks and then it returns to normal. What we think we are doing, we don't know why they work, it's interesting but we think we trick the brain because there is studies if you put something on the roof of the mouth can make you feel better for abet.

Splints, they protect the teeth, but their efficacy and pain are very mixed. It's been shown that self-care is just as of the about splints if you do them in isolation, so I tell people if you do a splint add self-care at least because if we just use splints we are adding crutches to something that needs to be rehabilitated much more than that.

I mentioned over the years people thought the teeth being offer malocclusion caused pain and some people thought orthodontics are braces moving the teeth around would help. I see a message, can you please point out the difference between, that's all it says so I'm not sure if you could clarify the difference between what and I will try to address your question.

In the meantime, while we get clarity like I mentioned before there is absence of evidence showing that people grinding on the tooth or placing teeth are making teeth more natural in a normal position has no impact on chronic TMD, so we don't want to have our patients have a full rehabilitation for that.

Orthodontics, there were some people that sued some of the orthodontists in the 1980s and 1990s and said your braces cause my facial pain. You invested a lot of money doing quality studies and though showed that orthodontics does not cause, prevent or cure TMD. While everyone is an individual and doing something to the face and anyone may cause them to have co-occurring pain across the vast group there is no correlation or causation or correlation. Overall, you could say change in the teeth whether it be adjustments orthodontics does not cause, cure or prevent TMD. There we go.

With that said the patient does go in and has a filling and have a crown, when I say hi that means the dentist does not adequately check it. Something happens and now the patient's biting and its high where they bite so it's hitting hard on that restored to, that may cause the onset of pain. It's important to ask did you have dental work recently before the onset of pain.

Before I move on, we have a question. Reduction in clinic, chronic or acute -- thank you for bringing that up since that was a little back, how about if we go back to that at the end and recap that. Thank you for the question. Help remind me at the end. Thank you for asking.

Another management option is acupuncture and something you can be trained on quickly. I had the privilege of going through both the focus course in the medical acupuncture course as well so I've been through a 300-hour course I can do full body acupuncture, but I prefer the speed of it and accessibility of the ear and the effectiveness of it to do a regular acupuncture. You can easily be trained on it, so I encourage you to be trained because it's a nice adjunct for people in pain. While it's for pain only per the definition it can help people who have high stress, anxiety and sleep issues. It's off label but it can be beneficial, so I encourage you to become trained in that if you have not been already.

There a lot of other interventions based on the diagnosis that may help. Here are a few. Botox for someone with chronic migraine and facial pain

although we had in the masseter muscles which is not shown here because a lot of people come to CS, and they also have masseter pain. I'm grateful that some of my neurology colleagues would be willing to add in having the facer masseter as well. Trigger point injections and dry needling of trigger points can be very helpful.

Blocks are another intervention you can learn more about that can be helpful for certain things.

Other types of acupuncture like facial acupuncture can be helpful. Greater and lesser occipital nerve blocks especially for acute migraine attacks can be very helpful. I'm showing a lot of different things and trying to give you exposure and things to think about. Surgery is rare and not often needed, about five percent of people benefit from surgery so if you're not sure, do a block and consult with us, consult with the surgeon and talk to the patient figure out what is best based on the diagnosis.

My favorite topic, correct me at the end if you don't like it but something called physical self-regulation or self-care to keep it simple. This is a quote by two of my mentors that summarizes some of the things we broadly covered earlier. Pain is not only a function of tissue damaging stimuli but also a consequence of the way fatigue and arousal affect nerve thresholds and brain function. Some of the physical self-regulation tools all talk about today we will go through all of them, they have been shown to help patients in trials.

The big way I think about this is how we increase resiliency. We can decrease how much unhealthy input goes into the trigeminal CNS; we can increase the body's ability to fight pain. Here are my two goals and here is how you go about helping those.

I explained the diagnosis, give the patient self-efficacy and a reason to adhere to the things I recommend. That helps the body fight pain. We discuss what is modifiable and sometimes a patient is not sure what they are doing so I will have them keep a pain diary and a trigger diary to be aware of that. Here is one example.

Next, I want to decrease the unhealthy cervical and master Corey habits and decrease trigeminal implant so decrease unhealthy cervical and mastic Hattori habits. I will ask you guys to participate here. This is my favorite part in the most important part for you and your patients. I'll take you guys at your virtual word that you'll do this with me. We will call this positional awareness training. What I want you to think about and encourage your patients to think about is MI doing unhealthy habits and for us we will talk about from the top of the head to the neck. I want to ask my patients about tooth contact in their tongue position. If you add up all the time throughout the day you think your teeth should touch even gently or your tongue should anywhere except -- touch the top of the mouth or touch the teeth, how long do you think that is? I know I can hear you but how long do you think that is? Some people say my teeth touch all the time or keep my teeth together a lot and my tongue is always at the top of my mouth. Milliseconds when you chew in milliseconds when you swallow and talk it's about 15 minutes a day that it should be

there. Let's see what happens when you do this. Put your hands here on your masseter muscles and touch your teeth together. Do you feel that muscle pooch out? Put your hands on your anterior temporalis clincher teeth together again, feel that pooch out.

This one you'll do more firmly take your time and press it to the roof of your mouth nice and firm. Do you feel your temporalis muscle contract? Put your hands under your chin and push the tongue to the roof of your mouth again. Do you feel that muscle contract? Thank you for participating. Have your patients do the same thing. Anytime your teacher touching all these muscles are working. Even at a low level and all of that input or I say all that unhealthy signal into your nervous system makes it more hypersensitive. Why it's the important to change? Certain muscles and joints are marathoners and others are sprinters. The heart can go all day and all night thankfully.

These muscles here are meant to be sprinters, they are help you talk, chew, run 100 meters in rest. If I try to run a marathon 26 miles a day and one day I'd be in a lot of pain. If I do it every day I'd be in so much pain I could not move. Why do you think these sprinters are different, this joint being compressed are no different than running a marathon when they are meant to sprint? I've been overusing these significantly my whole life probably. Again you may have been able to get away with that but now you cannot. What can we do to change that? Now that we have the need to change let's show them how to change. You might not be a pain patient but how can we get you to a healthier position.

This is a position of rest for the job muscles in the joints. That position is where the teeth are a little bit apart, the tongue is relaxed on the floor of the mouth and the faces relaxed. I'll give you a couple recommendations on how to do that but there are different techniques. Try this one, say the letter M, the teeth that are part in the tongue is relaxed in my faces relaxed. Another one I like better, it's easier to feel, take a puff of air in one breath in your mouth or one breath of air in your nose and three puffs of air out of your mouth. Listen to me and you can do it.

All right, all relaxed. You are laughing, I do that all day every day without talking chewing or swallowing. That's a position of rest and help for your jaw muscles and joints. That will help you rehabilitate. The thing is, remember the picture of all the things causing these muscles to contract. If you are not aware of this you're going back to the old tablet habits so that's where we need a reminder, it can be your phone, computer on your wrist that you have a timer for, you can have an egg timer or if you're on a high security zone and can have that stuff every time you see a certain color look at your wedding ring or bracelet or get an email, something that reminds your patient about every half hour for the first month and every hour for the next couple months after that, relaxes muscles.

We are doing two things, we are giving these muscles and joints a break so instead of running a marathon they are taking a mile in taking a first break in over 2 to 3 months we are causing just like we learned a play a piano or writer type on a keyboard we teaches muscles to be in a healthy

position. Learn your body when you're in a stressful situation you may need a reminder where you relax you may not. For the first three months of an automatic reminder no matter what. The same thing with our next position, we want our head to be over our spine, not down dropped because remember these muscles which sprinters are converge into that trigeminal Cardell's and we experience neck and facial pain. That can be tablet, her laptop and find a healthy position to be in and encourage patients to do the same.

Other rehabilitation modalities. Let's not overuse the James Hawkins system, do a soft pain-free diet. Gently move the neck and jaw muscles up and down. Move from side to side, slowly and in a pain-free way, this is not no pain no gain which would not be beneficial and would make things for worse. It's nice and gentle up and down and side to side within a pain-free range. You can stretch a little bit too uncomfortable but not painful. Tell your patient to listen to their body, take it slowly over time. Moist heat to the muscles, in the morning and before you go to bed and one to two times during the day bringing fresh oxygen and nutrients and removing muscle overuse metabolite allowing for rehabilitative environment to be established.

In the TM patients which I want you to be comfortable managing after today's presentation, just those two things are very effective in almost 90 percent of patients. You know what, even in a complex patient where we need more if they can have this foundation before they come to us that will accelerate everything else because if they keep unhealthy habits here, we can do all the advanced Western medicine things, medication, injections, splints, Botox but it will be helpful to keep clenching the fest. You need to have the self-care things implemented to really be helpful.

I see your question, job range of motion side to side, is it helpful? Great question not a no pain no gain thing but just slow gentle movements that can be very helpful pumping blood flow through and moving waste products and also teaching the patient it's okay to move. We want people to move long-term, not be tied to pain. We need regular movement but again don't have the patient push it, don't have them go no pain no gain. Motion is lotion, exactly. Again, we have to find the balance where we are not causing injury, if they feel it makes it worse, they are less likely to do it. We want a consistent process day-to-day cannot once a week. Hopefully that helps answer the question.

Again, I'm generalizing to a general population. Every patient is unique so keep that in mind, they can't move to one side because the disk is blocking it and it really hurt so maybe they don't move outside for a while so customize it. The next two slides are in your handout, this is an info graphic I put together a year ago that gives a broad visual of everything I just talked about. There is a QR code at the bottom that all zoo men you can scan it and it will take you to a 45-minute YouTube video that visually and auditorily reinforces everything I talked about. Feel free to use this to give to your patients. I've heard good feedback from people, but you can be the judge of that yourself but hopefully this reinforces everything. If I don't have something that I take with me after I have this therapy or if I put that paper somewhere and don't

think about it for two hours 90 percent is gone. I want to be diligent about doing things to help myself and I want the patient to do the same thing that having a handout to reinforce that can be beneficial. Feel free to use this or make your own.

How about patients with overbite, does it make a difference in care? Did question. Broadly, no. There are patients who will do certain things to compensate for their overbite either a statically or functionally, they want to be able to chew with their anterior teeth and bite or tear something. If they are compensating and they don't want to change that habit because they don't like the way the child looks are the facial profile looks, they may need to have, that might be a time where surgery is considered to modify that. And never easy decision because surgery is never fun to go through and can potentially have negative consequences in a small number of patients but there are times where bites may lead to them developing habits that are not healthy either, so you need to find the balance.

Is a patient willing to change a habit or not? Some people don't like that setback chin for example. I hope that provided an answer, every patient is unique. Any supplements such as make a three? Definitely, I put a slide earlier for pharmaceuticals and mentioned a couple of those. I am very pro-, unfortunately there is little data in orofacial literature. If someone is willing to help me with this and be diligent, I would enjoy doing a vitamin D deficiency study but there is little out there in any of these in the chronic orofacial pain realm, but I think we can pretty safely say it's translatable from other chronic pains to chronic facial pain so yes, I recommend a lot of these. I don't prescribe them as often as I should, it's hard to figure out how much to teach but when you look at vitamin D regularly and talk about the others in prescribe them intermittently as well. I recommend patients find a good source. Thank you for bringing that up.

To recap that, a healthy anti-inflammatory diet, anything we can do to help our patients heal we want to do. Whether that be through food, although for chronic pain and anti-inflammatory diet fruits and vegetables are harder to choose so we may need to make modifications, anything we can do to help and supplements to assist with that can be really good.

If I don't take medication ever in my life again I'd be happy with that. We will see how it goes. Back to lifestyle modification, decrease unhealthy trigeminal input. We want to stop or reduce offending substances. Caffeine let's drop significantly, maybe not cold turkey but it may cause extra pain initially most likely but decrease caffeine within six hours of bedtime. Of the patient notes are reactive to caffeine and within a half hour of having caffeine they are tighter, that patient may want to consider stopping caffeine altogether. Nicotine ideally stops right away.

We need to look at the patient as a whole and what we can do overtime to decrease out. Overuse of medications, one example over the counter and saves the city fun, some of the prescription medications and opiates and barbiturates may cause headache and we want to consider stopping those

either cold turkey or very quickly and determine whether that can be outpatient which most of the time it can be.

We want to get people moving, motion is lotion someone said earlier. In general, we want to, going back to my goal slide, physical activity does this. Gentle aerobic activity and building up to this I would say. Some of you may have a little different guideline but I typically try to go 30 or 45 minutes as an end goal. I'm fine with just walking, let's get something. Some patients have more pain with certain things and other people have facial pain. Like bike riding might hurt but let's be physically active and do all we can to put healthy stuff in our bodies that facilitate rehabilitation.

Doctor Heather Tech is a family position and the pain physician but one quote she likes is every time you eat you change your body's biochemistry either for the better or worse. I would prefer to help my patients change it for the better.

Incorporate stress modification techniques, gets the point across. I like the relaxation response program -- there is someone talking in the background, if you would please mute your Mic I would appreciate it. Thank you. The relaxation response has some good thoughts I won't go in depth without today but read the book. It's fairly simple and you can incorporate it with some of your patients. Diaphragmatic breathing using to control the vagal input. Remember the Vegas no converges into the cod Dallas so we can significantly impact the way we feel by breathing. Hopefully that's not a surprise to any of you but it's a surprise to a lot of patients and if we can teach them that and start help them realize the impact within five minutes hopefully, they will continue that on. We will do additional training with that as well.

Lastly the biggest thing if I could change only one of these many good things it would be maximize sleep quality. Everything is important but sleep is medicine. Let's rule out sleep apnea if there is an obstruction there let's get it taken care of with the device that opens the airway or help with weight loss. There are different ways to manage that once the airway is open let's make sure all the other things are there that can help with sleep. Practice healthy sleep hygiene. Have an anchor of bedtime and wake time, the most important for sleep hygiene.

Even on the weekends, waking up at the same time consistently, I'm not trying to be Superman or Superwoman and go on five hours. Have that 7 to 8 hour of regular sleep time. As you can imagine working in DC there are some people that really think they're part of that genetically gifted population, but they need sleep and so do you and I.

Stimulus control, trying to have as healthy sleep posture and not keeping the head and neck turned, having a quiet safe cool dark comfortable room, although things are imperative. I've seen a number of shift workers in my career and I often say this is more challenging, that makes it very difficult to improve with the shiftwork.

Here's another thing a handout included. This is a big poster I created in San Diego and had a blown up in my laboratory. It's in a handout also.

This is a front and back that I often give patients. It covers the most common diagnosis but is by no means covering all of them. If it's neuropathic pain, your diagnosis is not here it's okay, but it may still apply. I walk the patient through, I find it helpful for patients. There is a lot to go through and some are not ready to hear so this visual may help. All talk about the middle section, why, how everything goes into this and how all these other things going on with your brain and your body, your past and present, your thoughts about your future, although things can play a role in why you experience pain here. Make sure we properly address them. Find your fat tears and help you work through these things with the right team of people to help you. Then we will move down and talk about how the team approach can help.

It primarily is going to be you being your advocate and taking care of yourself and here are some ways to do that throughout the appointment and we keep reinforcing keeping the tongue relax, teeth apart and the job relaxed, keeping the head over the spine, using sleep hygiene, modify not the stressors but we can change the way we respond to the stressors to a more healthy physiological way. Put healthy stuff then and being physically active. Yes, I'm here to help you. Besides teaching those things I will encourage you to work on these throughout the next few months.

Let's talk about these and see whether they apply to you. Would medication our injections are acupuncture apply or needling or sometimes intraoral appliances, with those be helpful? All talk through this and based on what we decide we will reinforce some of these common things and I give that other handout at this point, and this was something I created before the info graphic as a complementary thing. Also write things at the bottom specific to that person.

While I wish I could say as we wrap up the presentation that everyone gets better, it's not realistic for a number of reasons. Did I miss or have an incomplete or incorrect diagnosis? Was the treatment I gave inadequate? Was my patient not able to adhere to the treatment through either not wanting to her cognitively not being able to? Where there are other contributing factors that I did not see or the patient did not bring forward? Some of those will take time and other things are some things a patient will tell someone either they are scared and don't want it in their record or number of other reasons, maybe I didn't ask or maybe their expectation of coming into this provider, dentist for example or whatever each one of you are, maybe they were not thinking they needed to express that information. Why aren't they getting better? Figure out why, there may be a time for therapeutic endpoint that treatments are very individual and that's a very individual thing in a conversation to have with your patient.

The last slides about who we are and then I'll open it for questions. Dentist with the three-year residency training in orofacial pain. Currently there are a number of providers around the military that may be changing, will have to see we maybe get cut substantially. As of now we have 18 active-duty providers and for in training. Hopefully we continue to put people out there that care and want to help, great group of residents right now and some coming next year. I'm excited where we are

and where we are going and hopefully we can continue to equip all of you, I'm appreciative of you being on and a part of this because you guys are the hands and feet of the people who will see the vast majority of patients initially and hopefully you guys feel much more equipped to help people feel better, even with these simple things. Here is where we are, definitely to in Japan and none in Europe.

Lastly, here is my contact information. This is in the handout as well. You have my email, yet my office phone number, there is an online CE course, if you're near us you can come and chat handout in residence see. I can send you articles. Here are some great books. I want to make this as easy as it can to help you feel comfortable with us the national then, this initial evaluation. Any advice for specialists in this network?

Young lady, you ask a loaded question. All say I'm part of the American Board of Orofacial Pain, this is our board certifying process. There are 30 providers there so I can't guarantee who you are going to [Indiscernible] there are plenty of people calling themselves TMJ and sleep experts or orofacial experts are craniofacial experts that do not prop this medicine unfortunately. It's easy to find so there are only 250 truly board certified in the nation, about 25 our military active or retired so there are very few which is why see the danger of making cuts. Again, it's something outside of our control so we do the best we can with what we have. Feel free to email me if you have a question and I'll try to work with you one-on-one. The network may be the best initial resource so thank you.

Any other questions? Thank you for the comments and inputs you gave on those topics. What other questions do you have? You're welcome to stick around and ask questions, I will hang out. I'm working from home today, I don't have my commute today, so I have some extra time. Thank you.

If you are logging off, thank you, I appreciate you being a part of this today. Disc displacement with reduction, let me read the question one more time. The disc is going to be out of place typically in front of the jawbone or condyle so that is the disc displacement. With reduction is where the job moves forward and pops back up on top of the desk, so it reduces back to its normal position. That's where causes a click when you go back up on the desk. You might hear this sort might be something the patient feels. You may feel that if you put your fingers in front of the ears on the TMJ and have the patient open and close and you may feel it as well. If it just happened, those tissues might tighten up but if this has been clicking or popping for more than a few days it will not go away. Those ligaments will never read Titan in the disc will go on top long term. That's common, 33 percent hear the pop and have no issue with that. That sounds weird but it doesn't need to be fixed. If you do the things we talk about at the end, keeping the tongue and teeth relaxed and decrease the pressure in the joint that will cause increased lubrication allowing you to move over that desk and you may not even feel or hear the click after that.

Chronic, that doesn't apply with reduction, the disc is out of place without reduction so if you open and it's not popping back up and you move the desk further out of place, it could mean you have limited open

and that means in the first 3 to 6 months it happens because you Pop over the desk your range of motion is limited and you can open all the way. Over time it will stretch out and will continue the more you push those ligaments in the disc will be pushed more forward. The disc not being used will start to atrophy over time in the tissue behind it will format callous, that fibrous tissue. Over time you will be able to regain some of the range of motion so that is the term chronic.

Hopefully, was that helpful? Awesome. Any other questions or thoughts or comments or any suggestions of things you think would be more helpful to hear in this presentation? I'm open to that as well.

Yes, doing a lab would be awesome. I don't know what to tell you about that, that would have to be Heather. Thank you, Heather, for everything you've done to get this set up. Heather, you may want to jump on verbally to answer that question. There it is, perfect.

Everyone give Heather a round of applause and all hang out for a couple minutes but other than that it was nice to meet all of you virtually and I look forward to seeing you out and about at a conference. If you're ever at Walter Reed, let me know.

Heather, all hang on here until you let me know we are good to go. Sounds good. Thank you so much. You're welcome. Thank you very much.