

Chronic Pain: A Common But Invisible Disease

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Transcript

[0:00 Introduction]

Dr. Norman Buckley: Thanks very much, Anthony, for the introduction and the invitation to speak here this evening. I just want to confirm that I am, in fact, sharing a screen that says chronic pain, a common but invisible disease, and that we're now moving into the next slide, which are my disclosures. Perfect. Okay. So, thanks very much, and thanks to everyone who's listening. I hope that you'll find this interesting. We're going to work through a number of issues to do with chronic pain this evening. If you have it, you'll know it is a critically important issue, but also it has a much larger impact on society at large and the healthcare system than we really realize many days. Just quickly, with respect to disclosures, as Anthony said, I've been practicing anesthesia and chronic pain for a number of years, and I have some leadership roles in both the research fields and the clinical fields. I just want to point out that I have little, if any, industry funding, and we are very open to donations to support our activities if that occurs to you as a good idea. So, thank you very much for that. Just start off with a quick definition.

[1:18 What is pain?]

Dr. Norman Buckley: The International Association for the Study of Pain has visited this several times, and the current definition of pain that it is an unpleasant sensory and emotional experience associated with or resembling that associated with actual or potential tissue damage. Sounds a little bit complicated, but really it gets at several things. One is that pain is unpleasant. It is associated with tissue damage, although sometimes that's a perception of tissue damage, and you may or may not actually be having damaged tissues. It also has an emotional effect on you. The same IASP team has gone on to further characterize it and it's interesting. Simple sorts of pain tend to resolve fairly quickly, but the longer pain goes on, the more of an impact it has. It is a very personal experience, and the way each of us perceives pain has to do with how we grew up, our previous experiences with pain or other health care issues. Interestingly enough, it's influenced by social factors, things like lower socioeconomic status, being uncertain about your housing or food availability. Things like that. Mood disorders, and certain jobs predispose you to experiencing pain and having persisting pain. It's not a purely nervous system phenomenon, and it currently it cannot be measured independently of the individual's report.

It is a subjective experience. That's often a question that we hear in the clinic. People tell me my pain is just in my head. Well, by definition, actually, all pain is in your head, but that doesn't mean it's not real, and it doesn't mean that it's not a problem. The challenge for the clinician is trying to figure out what parts of the pain can be addressed and how should we best manage it. That comes to the next statement there, which is that if someone says they have pain, we really

have to respect that. We're all familiar with the phenomenon of, 'Well, I have real pain, but that guy down the street, he's a real piker, and I don't think he's got real back pain at all'. But really, it's a bit more complicated than that. Usually, pain is a useful signal. If you break your arm, the pain in the arm will tell you to stop moving it and keep it still till it heals. One of the problems there is that if that goes on long enough, it may start to affect your psychological well-being, inhibit your social interactions, which has a number of other adverse effects.

Finally, just because somebody can't tell you they have pain doesn't mean they aren't experiencing it. That leads us to things like, how do we appropriately measure pain in children, especially preverbal children? Or how do we measure pain in people whose communication is disrupted if they're on a ventilator in the intensive care unit, for example. Or patients who have mental health disorders or maybe dementias and are institutionalized can still be experiencing pain that has an adverse effect on them. So, it's really an interesting and complex phenomenon. It's actually really common. These are statistics from the Canadian Pain Task Force's report between 2019-2021. Ginette Petipas Taylor, the Honorable, who was the federal health minister at the time, struck a task force to look at pain in Canada. Roughly one in five people will experience chronic pain frequently enough to adversely affect their ability to carry out their daily activities. As I said earlier, it goes across the entire life lifespan from children through adults into seniors. There is some suggestion that with a lot of the things that happen as we're aging, degenerative diseases, progressive arthritis, other health problems, that pain may increase in frequency as we get older.

But also, if you have children with chronic pain, it can have a substantial impact on their ability to get on with the business of growing up, attending school, developing social relationships, getting their first part-time job, progressing to a full-time job. It has a substantial impact.

[6:14 Types and sources of pain]

Dr. Norman Buckley: Many sources. So, this phenomenon of primary pain, for example. You probably will have heard of things like fibromyalgia, chronic fatigue syndrome, or more recently, the phenomenon of long COVID disorder, which even after the respiratory symptoms of COVID resolve, some people report persistent fatigue and complaints of widespread pain. We're not able at the present time to clearly identify how that happens. It's been classified as primary pain, which is pain that seems to originate from some dysfunction in the central nervous system, but we're not certain what it is.

Cancer pain, maybe a little more obvious, either from the disease itself or treatments, post-surgical, post-traumatic pain, neuropathic pain, pain from an injury to the nerves, whether it's another disorder like diabetes, for example, that can cause nerve injuries, or from trauma to nerves, or sometimes chemotherapy, for example, will damage nerves, or nutritional disorders, vitamin D deficiencies, for example.

Headache. Everybody has heard of headache. Most people have had at least one. Orofacial pain, things like jaw pain, pain arising from nerves in the face. A trigeminal neuralgia, for example, is one example. Visceral pain, that's pain in the internal organs, heart, lungs, abdominal organs, and then finally, musculoskeletal pain, which is probably the most common. People associate that

with arthritis, your hip arthritis, your knee arthritis, for example. All of these things are various sources of pain, and some of it continues as chronic pain.

[8:07 Acute vs. chronic pain]

Dr. Norman Buckley: One of the questions that came up on the preliminary question set was, what's the difference between acute pain and chronic pain? It's both sort of a temporal difference as well as a functional difference. Go back to my example of the broken arm. That would be considered an acute pain. You have an injury, you fall, you break your arm, the bone is disrupted somehow, it hurts, you hold it still, you go get it examined, embark on a treatment, whether it's a surgical reduction or a cast or something, you immobilize it for a while, it starts to heal, and then you gradually mobilize it again. The pain that you experience warns you not to move it at the wrong time.

On the other hand, a chronic pain persists. There are some people, for example, whose arm fractures heal, but they continue to have pain 3, 4, 6, 12 months after the injury. The definition of chronic pain includes that simple time. You've had the pain for longer than three months, typically, or longer than three months after the expected resolution of the original injury or illness. In the chronic pain state, because the healing has occurred, if the bone is fixed, it's in place, that pain that you're experiencing no longer has a useful warning function. It, in fact, may prevent you from doing things that will promote your recovery. Those two concepts, the duration of the pain, three months or longer, and the apparent lack of value of the warning sign of the pain as far as protecting you from further injury is concerned.

[10:00 Prevalence and impact of chronic pain]

Dr. Norman Buckley: This is very interesting. This is a quote that came from the Canadian Pain Task Force. They had a number of quotes in the document from people who lived with pain, and this is the sort of thing that I've certainly seen and heard over the years from my own patients. People with chronic pain who are unable to participate fully in daily life may end up either leaving a job or losing a job or having to go on disability. Despite the attraction of receiving disability payments, they frequently, if not always, are much less than you would have made had you stayed working. Often people end up with not only lost income, but losing houses, significant loss of economic status and so on. This individual said that it wasn't just the pain. It was the fact that at their peak earning, at their most productive time of life, they lost their job, had to leave the workforce, and then try to figure out how to make a life going forward.

Quite apart from the individual losses, pain is very expensive for society at large. The estimate here as of 2019, and this is actually conservative because when these numbers were calculated, the team responsible for it deliberately did not include cancer as a disease causing pain, even though we know it does, because a lot of the costs of cancer that make cancer very expensive are actually costs of treatment, expensive of drugs, surgery, things like that. This is direct health costs plus indirect, people having to leave the workforce early or people who are still at work but not as productive or as effective as they would have been. That cost is nearly \$40 billion per year as of 2019, and it is almost certainly not getting smaller over time. The cost represents more than

10% of total health care expenditures. Really, it is a very expensive problem for society at large and for our health care system.

[12:16 The spiral of chronic pain]

Dr. Norman Buckley: This is one of the things that happens. It's a depressing depiction, but somebody has an injury or surgery or a disease, they experience some tissue damage. We know that there are some predictors of who will go on to have chronic or persistent pain. Some of those things are the fact that it may be, if it is a neuropathic pain from a nerve injury, that seems to predispose people to have very long-lasting pain. Something called central sensitization, which is the way your central nervous system responds to an injury. If the injury perseverates, if it's continued, if it's not treated effectively, your central nervous system actually starts to anticipate the pain from that injury. Even if the injury is finally resolved, your central nervous system may continue to behave as though that injury is still happening. The more intense the acute pain, to some extent, the more likely you are to go on to have chronic pain.

Then something called psychosocial vulnerability. Your past experience with pain, for example, or the presence of a mood disorder such as depression or anxiety, or simply your beliefs about what might happen. One of my colleagues, Jason Busse, has done a number of pieces of investigation into pain and chronic pain. One interesting thing they discovered was that people who had a certain known to be painful lower limb injury, a compound fracture of the tibia, for example, if you interviewed them immediately around the time of the injury, if they believed that they were likely to go on and have chronic pain persisting over time, that was much more likely than if they believed they were going to recover and do fine in the future. All of these things make you vulnerable. If your response then is to rest and wait to get better, that turns out not to be a great idea. You go on to limit your activities. There's a spiral downward in terms of function where your muscles become weaker because they're not being used. Your range of motion diminishes as the muscles tighten. You start to behave differently. You withdraw from social activities. You reduce your physical activity. You may start to get irritable or snappy. Even if you didn't want to withdraw from activities, other people may start withdrawing from speaking with you.

You may develop mood disorders as a result of all of these things together, the persisting pain, the loss of social activities, loss of functional capabilities. It simply spirals in and pain starts to assume a disproportionate importance in your life. Everything focuses around pain. That's actually very unfortunate, but recognizing these things has also led to some of the approaches that we use to treat pain and promote recovery.

[15:30 Physiological pathways of pain]

Dr. Norman Buckley: Just from a physiological standpoint, as Anthony said, the slides will be available. There will be no tests on this particular description of the central nervous system, but there is a physiological process that we recognize that occurs when you have an injury or pain. If you start over here on the left at the bottom, the arrow that says ascending pathway, typically, most injuries occur in the periphery, skin, bones, muscles, or they may occur in the internal organs. But you have injury to the tissues, some sort of trauma. Certain nerve receptors in the

skin, called nociceptors or pain receptors, transmit signals along the nerves that go into the spinal cord and arrive at the dorsal horn.

At the dorsal horn, they cross over and they move up the spinothalamic tract into the brain. This is really where you perceive pain when it gets to the level of the cerebral cortex and you're aware of it. But you also get some reflex responses, like changes in heart rate and blood pressure. Sometimes, depending on the severity of pain, a sensation of nausea that you get that is really a nervous system response.

It also starts to activate a built-in system that we have for pain suppression. These are described as descending pathways. On the right-hand side, the red-orange arrow pointing downwards. These are actions that the brain can take to try to modify those receptors in the spinal cord and peripherally by slowing down the transmission or trying to block it completely of these painful impulses. That's through the release of things like norepinephrine and serotonin in the central nervous system. All of these things together lead to some of the ways that we try to treat pain. On the left side, on the blue side, inhibiting ascending pathways, you can do things like using local anesthetics to block the function of these nerves, freeze them so that you don't feel the incoming painful impulse. You can use anti-epileptic drugs, anti-convulsant drugs, to try to slow the transmission of the central nervous system impulses. You can use non-steroidal anti-inflammatory drugs, NSAIDS, like aspirin, ibuprofen, naproxen, things like that, that reduce inflammation and also slow some of the transmission of these impulses, or acetaminophen, which works in the central nervous system in the brain to reduce your response to these pains. Or you can enhance the descending, what's called the descending inhibition, which is using things like tricyclic antidepressants, which promote release of norepinephrine, serotonin, and acetylcholine, or you can use drugs that inhibit the uptake of norepinephrine and serotonin. So that's why we use drugs that are otherwise considered antidepressants or mood-altering agents. Things like, for example, amitriptyline or nortriptyline, or some of the newer ones, are things like duloxetine, Cymbalta, venlafaxine, and drugs like that, all of which can improve pain control.

[19:03 Medication approaches to treat pain]

Dr. Norman Buckley: Our pharmacologic approach, the use of drugs to treat pain, is based on those mechanisms that I've just described. One of the fascinating discoveries in physiology, and it was actually being made just before I started medical school. In the late 1970s, researchers in San Francisco, in California, identified the fact that the body has receptors for opioid drugs, the specific receptors. It's maybe partly why opioids can be so effective for many kinds of pain. As you well know, if you've read a newspaper in the last 20 years, they also have other significant adverse effects, and the challenge is appropriate use. Anti-inflammatory drugs for the reasons I've just mentioned, antidepressant drugs. When your pain physician or your family doctor says, 'I'm going to give you this drug, which is an antidepressant to try to treat your pain', they're not brushing you off and saying you're hysterical or, 'I just want to fix your mood so you stop complaining'. There actually is a good physiologic reason to use the drugs, and frequently people report that their pain is diminished when we use these drugs.

Anti-convulsants, as I said, to modify nerve transmission, especially for patients who've had nerve injuries. Cannabinoids. Reefer madness, notwithstanding, this is another area where we discovered in the last 15 or 20 years that the body has receptors for various products that are derived from cannabis. Different kinds of cannabis with predominant THC or CBD effects have different effects, both on mood and physiology, inflammation, which for some people can be very helpful for pain. Others doesn't seem to help. Again, despite the popular belief that there really are very few, if any, adverse effects to using cannabinoids, that's not entirely true. There certainly are mood and behavioral effects that are unhelpful, that can be associated with using cannabinoids, especially frequently or in large doses. The whole understanding of what happens in the developing nervous system for a child or an adolescent who uses cannabinoids, it's not clear, but there certainly is a lot of concern about it. We are cautiously optimistic about the potential for cannabinoids, but at the current time, we really say that it's an empirical thing. You may try using certain types of cannabinoids for your pain, but it's really on a one-by-one basis, and it needs to be ascertained whether it's more helpful or less helpful.

Local anesthetics, steroid drugs, particularly for injections. Some of you may have either been offered or had things like epidural steroid injections or X-ray guided injections around the spine for back pain, steroid injections into joints, things like that. It can be very helpful in reducing pain and improving function. Or neuromodulation, as invasive as putting a stimulating electrode deep into the brain to drive certain aspects, or putting electrodes along the spinal cord in order to modify pain sensations, especially after nerve injury-type problems.

There's a whole non-invasive neuromodulation body of work being done now, both with things like TENs machines, for example, transcutaneous electrical nerve stimulation machines that are basically patches that you stick on in certain locations and you adjust the stimulation, or transcranial magnetic stimulation or transcranial direct current stimulation, focusing on certain areas of the brain to try to modify painful responses or improve mood responses and things like that. Really fascinating approaches to pain going from the least invasive to the most invasive. Really, it's a case of working through what seems to be helpful for people.

[23:45 Non-medication approaches to manage pain]

Dr. Norman Buckley: One of the questions was, 'I don't want to take drugs. Tell me about non-pharmacological approaches to pain'. They're really interesting and useful. In fact, we focus on things like psychological interventions, cognitive behavioural therapy, acceptance and commitment therapy, or things as straightforward as pain education. Simply sitting down with a conversation like this, for example, and explaining what happens in your body when you are injured. What's the recovery process about? If you have persisting pain, what seems to be the best thing to do for it? How do medications work? Simply the education around the experience of pain activation in the treatment of pain actually is useful in reducing the amount of pain that many people have.

Activation, exercise, moving about, getting... a lot of people tell me if they're distracted working on something, a puzzle, a crossword, a conversation, or going to work and accomplishing something at work, they're not aware of their pain while they're distracted. So, activation, both mental and physical activation.

A lot of things come under the heading of mind-body interventions, and some cross over between exercise and mind-body. So things like Tai-chi, for example, or yoga that incorporate Both physical activities, stretching, moving, breathing control, but also reflection, control of oneself, calming behavior, focusing on the activities that you're doing, things like that, are well-recognized to be very helpful. Then just exercise, exercise by itself. Range of motion, strength, aerobic conditioning, that in and of itself can lead to both improved function but also reduced pain.

[25:51 The 'invisible disease' and interdisciplinary care]

Dr. Norman Buckley: Internet is a wonderful thing in the world of pain. In part, one of the reasons people go to the internet frequently is because we still don't do a very good job educating our health care professionals about all of these issues, about pain physiology and optimal pain treatment, appropriate use and balancing of medications and their side effects, the use of things like exercise, pacing activities, counselling, and so on. Or you may not even be able to get at them. That's another issue. Also, the idea that pain is what's referred to as an 'invisible disease'. If you have the sense to have an injury and it's obvious you have a big scar, you've lost a limb or something like that, then people say, 'Oh, boy, that must be really painful'. But in fact, some of the people who experience the most pain, when you look at them, they don't appear to have any visible injury. That really is a problem. It shares that with many mental health disorders, for example. And so, because it's invisible, it's sometimes hard for other people to accept that you're in pain and you need to change your activities. We still, despite our own good fortune to some extent and being funded for research networks and so on, relative to the size of the problem, our research funding in Canada is not proportionate to the significance of pain as a problem. It really is quite a small amount of funding by comparison.

Then the other thing is optimal care is considered to be interdisciplinary care. I'll describe that a bit later. But to a large extent, it's not readily available in the provincially operated insured health plans. In most provincial health care plans, you can get access to a physician, frequently support for medication costs, admission to hospital, things like that. But you can't get physical therapy, for example, or psychological counselling, in most cases, as part of that. If you are injured in a third-party setting, workman's compensation, for example, motor vehicle accidents, they will cover this interdisciplinary care, and that can be a benefit. Some extended health plans will support it also. But for the for the best part, the largest proportion of the population doesn't have ready access. Even when clinics are supported, for example, by provincial funds, there are long wait lists because relative to the size of the problem, the volume of care is not great.

[28:47 Pain information and the Internet]

Dr. Norman Buckley: But anyway, so out on the Internet here, things like WebMD, for example, 'How to ease an older person's aches and pains'. It's very thoughtful title, but interesting enough, it walks you through a fairly useful and practical approach. Interestingly enough, one of the things is simply to ask someone if they're in pain. Recognizing that someone has pain, accepting that it is a true thing, sometimes goes a long way towards alleviating the anxiety that people experiencing pain have that nobody believes them. So, a good start, and there's some useful advice here.

This one, if you're a fan of late night television, you will have seen Dr. Ho. I actually met Dr. Ho. This was really fun. He and his business manager came to talk to us to say, 'Would we do some research on their product?', because they have strongly believe that it is highly effective. They have thousands and thousands of patient reports of how useful it is. They keep extensive records. They've actually sold hundreds of thousands of these devices. The interesting thing is it's hard to do that kind of a study, but again, it's one of these things that for some people, it seems to have a tremendous benefit. It basically is a modification of transcutaneous electric nerve stimulation therapy. But what he's done is to modify the stimulation parameters in such a way that he reports that he gets very good results. We ended up telling him that if he was doing well in sales, there was no real advantage to us doing research, because the only thing that could happen is we might find out that in a controlled study, it didn't do any better than placebo, at which point he might have trouble selling his devices. We had a lovely conversation a couple of times and ended up agreeing to go our separate ways. But you'll see it on late night television.

Things like dietary sources or anti-inflammatory diets, natural painkillers. These are some of the interesting things. There are some food products that are reported to have either an anti-inflammatory effect, and then you extend from believing that inflammation causes pain to anything that reduces inflammation is going to be helpful, so you should try these things. There's a list of foods here. Boswellia, turmeric, cloves. Remember, for years, we had oil of cloves as a toothache remedy. Acupuncture, application of heat and ice. I love the last one which says 'be careful'. Again, all of these things need to be tested.

Frequently, people say, 'Oh, I don't want to take medications. I'm going to use these natural products'. Often, the natural products are the precursors to medications. Aspirin, for example, came from distillation of the acetylsalicylic acid, for example, which is present in white willow bark. Then all of these other things, turmeric, ginger, fish oil, vitamin D, glucosamine sulfate. People are asking, 'What are natural pain killers? How do you fix old age aches and pain? What's the fastest remedy? What's a natural pain killer?' It's really, really very interesting stuff. People will swear up and down that this works or that works. For the most part, many of these things do not consistently work across everybody. You do have to be careful. There may be little harm in pursuing a diet, for example, but if you start using white willow bark extract, for example, that's the same as taking aspirins. If you have other conditions and you're taking blood thinners, for example, you may end up with bleeding problems as a result. You really need to be aware of what are the active ingredients and what you're taking.

Presbyterian Senior Living. I'm not actually quite sure how Presbyterian seniors live that's different from other seniors, but really interesting article, again. They want so-called alternative treatments. 'Right at Home'. 'Right at Home is an interesting... I don't know how widespread it is. There's a Hamilton office here that provides home care assistance, but they also have a series of advisories about how to manage pain, aches and pain. They talk, again, about natural pain relief from herbs, use of acupuncture, aging, simple applications like heat and ice. They seem to believe in glucosamine and chondroitin. Again, that's an interesting one because it makes sense, but when it's been tested, and even though they report here that there's a New England Journal of Medicine article supporting the use of glucosamine plus chondroitin, there are a number of other

large studies suggesting that it may be slightly more effective than placebo, but it's not dramatic. Again, many of these things, these things are about, does it seem to work for you?

We talked about that, turmeric, willow bark, natural pain killers. There's things in Chinese medicine, for example, different herb combinations that are advised. Again, you need to watch and try to have some understanding of what you're taking. There are actually some really neat encyclopedias that describe what are the physiological actions of the many natural products that are sold. But you really need to pay attention, I think, and look at what's going on.

This is from the Saskatchewan Health Authority. There's actually, in Saskatchewan, there's a very excellent psychologist who's been doing research in pain in seniors for about 25 years, Thomas Hedges-Divropoulos. It's interesting that he's in Saskatchewan, and the Saskatchewan Health Authority has these advisories about pain in older adults, how you should approach it, suggesting that people should have a responsibility for their own patient pain management. They should be active in it. Family can help. There may be a variety of strategies to explore. It should be treated because it may be leading to reduced function, which in the long run is not helpful, and that you should combine mind/drug and non-drug approaches.

This probably is the biggest and most important thing. I mentioned exercise. There's no question that activity is the single most useful thing that you can do. Graded activity, range of motion, stretching, but also aerobic conditioning type of activities. One of the most common and the simplest and the cheapest is walking. The National Health System in the United Kingdom has a series of postings, for example, on exercises that you can do for low back pain. Things like glute bridges, stretches, flexibility exercises, but also walking. There's a big program in Australia for walking for low back pain. It's actually been demonstrated to be quite effective in reducing the return of low back pain and lengthening the time that people go without low back pain.

One of the really interesting things when you do Google searches, when I was working some of this stuff up some months back, was in less than a minute, 0.48, in fact, less than a second, you can get almost 13 million results from a simple Google search, how to treat pain. But, things that come up as being very useful, walking, water-based exercise. The advantage of exercising in the water is that the water provides some resistance to strengthen muscles, but it also provides some support to minimize the weight that you're applying to joints like knees and hips so that you can perhaps do more activity for the muscles with less impact on the hips or things like Tai chi, dance, yoga, pilates. There's a big thing I'm spinning around on Facebook lately. About seven times a day now, I see ads for chair yoga. It's supposed to actually dramatically improve my six-pack, which I've not tested it out yet, so I'm not sure. But gentle movement programs, things that allow you to gradually increase your range of motion are very helpful.

[38:24 What is functional restoration?]

Dr. Norman Buckley: The concept of functional restoration. This really is the implementation of a multidisciplinary team. You may have a physician or a nurse, someone who's able to manage medications, but also who understands the underlying problems of pain. A psychologist to help manage the patient's behaviour, teach them coping techniques, relaxation, things like that, or things I've mentioned earlier, cognitive behavioural therapy or acceptance commitment therapy.

Occupational therapists are experts in movement and also how to structure your environment to be supportive, to avoid creating problems by inappropriately sized items, screens in the wrong place, chairs that are the wrong height, things like that.

Physical therapists that work on movement instruction, teaching you exercise, appropriate exercise. Health educators that can tell you how to incorporate all of these things into your life. Rehabilitation counselors, especially if you're at the point of thinking of trying to return to work, for example. Sometimes you may need somebody to help you negotiate through the process of establishing that you're able to work or what are any limitations you may have. So really, this multidisciplinary team is critical to functional recovery, to recovering function to the state that you can, but also managing other aspects of your life.

A lot of this comes out of an interesting piece of history, this guy, John Bonica. He was an anesthesiologist, but he worked his way through medical school as a professional wrestler, which gave him a lot of personal understanding about pain, pain reception, pain delivery, and also the long-term effects of stressing and straining your muscles and joints. After he graduated from medicine, he spent time in the military. He then went out and entered into a private anesthesia practice, but he started to focus on the study of pain. We're talking back in the '50s, '60s, and '70s, before pain was really considered within the discipline of medicine, for example.

He developed this concept of multidisciplinary teams, as I've just described. Over about 20 years, the latter part of his practice, his teachings were really taken up. He was one of the founding members of the International Association for the Study of Pain. But this concept of interdisciplinary care really started to embed itself as an important part of understanding and treating pain.

Hamilton actually has an excellent history in this regard. Back in 1973, which, as you may recall, was about five or six years into the history of the arrival of the medical school here at McMaster University, a multidisciplinary pain care team and pain clinic was established, and it has actually continued to operate in some form or another since 1973. Depending on how familiar you are with the medical community in Hamilton, you may recognize some of the names here. Jay Forrest, for example, was a mentor of mine in anesthesia. He was the one that had the curious judgment of actually offering me a job after I finished training, which has turned out to be endlessly interesting for me, and I hope he didn't regret it. He passed away a few years ago. Eldon Tunks, who's still in the business to some extent. He's a psychiatrist, but he was one of the founders of that clinic and he focused on rehabilitation science and a number of these other people here. You can see it covers a whole pain team. That program is now amalgamated with an interventional program and is placed at the Michael DeGroot Pain Clinic at the McMaster Medical Center site here in Hamilton. It is actually one of, if not the busiest pain clinic in the country, with well over 20,000 patient visits a year.

In 2016, the provincial government in Ontario actually applied funding to support interdisciplinary care. So not just medical care, but these other disciplines in the context of a pain clinic at 17 sites across the country, four pediatric sites and 13 adult sites. I think they've been successful. They certainly have increased the access to pain care for patients in the context of the health care system.

[43:38 The goal: A function-centred life]

Dr. Norman Buckley: The goal here is to try to end up with this function-centered life. You start with a focus on pain, but you provide some analgesia, you provide coping skills, you increase activity, you improve your conditioning, you have to set out to improve your social functioning, you get your depression, anxiety, anger managed, whether it's through some therapy like acceptance commitment therapy. Medications may be appropriate in some cases. You continue to increase your activity and you start to focus on function rather than focusing on the pain and how bad it is. That is very successful for many people.

[44:23 Helpful resources]

Dr. Norman Buckley: There are some neat resources. I know that the team here that runs the Optimal Aging Portal also has a number of these published. A lot of these things are online. One of the really interesting recent ones is the Power Over Pain Portal. There's been a chronic pain research network since 2016, and we're currently in the process of promoting the use of this portal. You can sign on as a child or an adult. You can receive education, but you can also develop your own file, work through a series of questionnaires, and use the information to guide your interactions with your physicians. As much as it harms me as a resident of Hamilton to say this, there is a very useful thing in Toronto called the Toronto Academic Pain Medicine Institute. They have excellent online resources. The DeGroot Pain Clinic here in Hamilton also has online resources, and there is also a pain clinic in St. Joseph's Hospital at the East End site. I'm not sure what they have in terms of online resources, but they provide many of these other similar services.

One of the things we created in the Pain Research Network was what's called Pain+CPN. It reviews published literature, identifies high-quality literature, collates it on the website, but we also create lay summaries, so what we call evidence summaries that are written as if they were a newspaper report on recent studies and how relevant they are and how effective they are.

There's a really neat book written by a McMaster professor named Jennifer Heisz. She's in the Department of Kinesiology, and she has written a fascinating book that describes very clearly the physiology of exercise and its importance in things like mood disorders. Really, really interesting book, very readable, that actually has exercises, as well, exercises, of course, descriptions of exercise programs, but also descriptions of how you can incorporate create them into your life and scale them up from 'I'm hardly walking at all without feeling whacked out', to, 'I can do a great deal, even run a marathon', for example.

I think we have a few minutes for questions. I think Anthony has been monitoring the chat, and I'm just going to, in terms of activity and focus and keeping yourself busy, this is my hobby, the Weston Silver Band, and I just want everybody online to know that we concert coming up at the end of October. We're a community brass band based in Weston in Toronto, which used to be a separate city. But we're sharing a concert with the Mississauga Temple Band with the Salvation Army. The Salvation Army is also another great source of brass banding in Canada. And music is good for the soul. Anyway, Anthony, thanks very much for the invitation. Any questions? As

much as it hurts me to take the band off the picture, I'll take the slides down so we can see what's going on.

[47:34 Pain tolerance]

Dr. Anthony Levinson: Thank you so much, Dr. Buckley. That was a wonderful and quite comprehensive overview of chronic pain, which is, as you pointed out, such an important and prevalent challenge in our society. We won't have a ton of time for questions, but if it's okay with you, maybe we can go a couple of minutes over. Lots of great questions. One of the interesting ones that came in is, 'Why can some people tolerate pain more than others?'

Dr. Norman Buckley: That's interesting. That's one of the great... When I was in my teens, everybody was very hot on Eastern mysticism and yogis who could stand on the point of a pin and the Shaolin masters who didn't feel pain and could fly and so on and so forth. It's interesting. Physiologically, not being able to feel pain is actually incredibly bad for you. Diseases like diabetes, leprosy, and so on, where you lose nerve function, you lose that warning function, you can get an injury or an infection or something, not be aware of it, and lose a limb. But the other one is the football player who, trying to make the game-winning countdown in the championship final breaks his leg and still runs 150 yards with the ball shaking off tacklers from the sky and wins the game for the Gipper, or what's called battlefield analgesia. Certain critical situations people seem to be able to either not perceive or ignore pain. Some of that is probably physiological. I talked a little bit about the importance of nervous system transmitters like adrenaline, serotonin, acetylcholine, and so on. Adrenaline, in particular, when it's released in a large quantity, as might happen if you're injured or in a life-threatening situation, may permit you to not be aware of an injury that would otherwise really bother you.

I think that people talk about the mother whose child is trapped, and they lift a car up to let their child get out, for example, which is not something they would do in the usual course of events. There are some of those physiological things. To some extent, there are people who will train themselves to tolerate pain. I ran a marathon once. That really hurt. I was not impressed. I don't recall experiencing the epinephrine or the encephalon rush that I was supposed to experience. But you can train yourself to tolerate certain degrees of discomfort, for example. I don't know if people online remember the Watergate adventures, President Nixon and his chief hitman, Chuck Colson, who used to hold his hand over a candle and burn the palm of his hand to prove how tough he was, to remind him. You can tolerate some things, but there's also variability from person to person. For example, when I started doing postoperative pain studies, for example, we would look at people who had exactly the same surgery, and we would give them access to morphine delivery systems, for example, where they could push a button and get a shot of morphine that was scaled to their weight and so on, appropriate for their age and weight. Some people would use a lot, and some people would hardly use it. People's perception of pain is different, and that may go back to the things I talked about at the beginning about your past history with pain, or what does the pain mean to you? There just is a lot of variability.

Dr. Anthony Levinson: Yeah, a lot of factors, as you say, the entire biopsychosocial and the same psychological factors that can be used to improve pain management, whether cognitive

behavioural techniques, those may also be vulnerabilities, as you alluded to, in people who may have depression or anxiety that can also sensitize and exacerbate pain symptoms.

[52:04 Managing chronic joint pain with non-medication strategies]

Dr. Anthony Levinson: One of the other questions that came in was around some of the latest understanding of the different causes of arthritis-related pain. Are there particular ways to manage chronic joint pain, especially without relying on medications like NSAIDs, due to their potential side effects?

Dr. Norman Buckley: The short answer is yes. It comes back to the emphasis on exercise that I was talking about earlier, range of motion, things like that. There are some very good studies describing how strengthening the muscles around an arthritic joint. Doing an exercise, for example, with your legs that doesn't involve pressure on the knee, so you're not going to go skipping maybe or running up and down the stairs, but you will do exercises to strengthen the muscles around your knee joint. Stabilizing the joint that way by improving the muscle function does seem to have a significant benefit in terms of reducing the amount of pain that people experience without changing the arthritis at all. Some people can't tolerate anti-inflammatories. Sometimes, narcotics work for things like that. But for a number of people, either don't like the feeling of narcotics, or they find that they don't seem to be terribly helpful for the pain that bothers them.

Dr. Anthony Levinson: Some of the recent guidelines have suggested that topical analgesics, things like Volteran, may be as effective, but exercise and for those of you who are interested, Jessica posted the link to our handout with some of the resources that Dr. Buckley identified. We've also included a link to one of our other e-learning lessons on the Portal, specifically about the use of exercise in osteoarthritis of the hip and knee. And there's also some handouts that talk about some of the range of motion and exercises that you mentioned. So that's a great resource.

[54:13 Managing neuropathic pain]

Dr. Anthony Levinson: Finally, I guess 'What are some of the best practices for managing neuropathic pain, particularly when standard medications might be ineffective?'

Dr. Norman Buckley: Neuropathic pain is a real challenge. The current guidelines around neuropathic pain, first of all, involve looking for reversible causes. Things like vitamin deficiencies, for example, especially vitamin B12. Controlling diabetes, trying to achieve really excellent control is important. The medications that are used orally start with things like tricyclic antidepressants, again, because they affect the physiology of the nerve function. Anti-convulsants like gabapentin and pregabalin or Lyrica is the common one. There are some topical agents that are available. Typically, they're not covered by drug plans, but a number of them are available over the counter. Things containing alpha-lipoic acid as a topical is actually something which has been shown to have an effect of reversing nerve degeneration. Even though you reverse the degeneration, it may take a long time for sensation to return to a more normal state. Maintaining normal activity is important, and maintaining nutritional status, controlling other diseases.

Dr. Anthony Levinson: I totally agree. We see quite a lot of patients with neuropathic pain and psychiatric illness because it is really one of the more challenging syndromes to live with, and the management options are not great. I think, to your point, previously, the goal and the focus usually is more about improving function and having realistic expectations with respect to how much of the pain can be controlled or managed. I guess that's another focus, isn't it?

Dr. Norman Buckley: The one thing I'd reiterate is, and it sounds weird, and it sounds like I'm telling you that nothing is really wrong and that nothing could be farther from the truth, but behaving as normally as possible in the presence of neuropathic pain at least maintains the other activities that you do. People talk about the pins and needles burning, knife sensation in their feet, for example, if you have neuropathic pain in your feet. But if you can, as much as possible, maintain a normal walking gait and things like that. You do have to be careful that you don't unintentionally injure yourself if you have loss of sensation, even though you have pain, those two often go together. But also being aware, understanding what's going on or what's not going on. The fact that it's sore at that point or that it really hurts, doesn't mean that anything more bad is happening. It's not like a broken leg, where if it hurts, it means you're breaking down the healing process. With neuropathic pain, even though it hurts in that setting, the hurting is not causing more nerve deterioration. It's like a reflection of a short in an electrical wiring system. It's arcing, it's buzzing and crackling, but it's not getting any worse than it was going to get otherwise. But that's easier said than done, too, sometimes. But sometimes just being aware of what's going on may make you worry about it less, at which point it doesn't have quite the same impact on you, although it may not make the pain any better.

Dr. Anthony Levinson: Just to close the loop on that topic, one of the questions was wanting more information about Cymbalta, which is the trade name for duloxetine. This is one of the dual action antidepressant medicines that affects both serotonin and norepinephrine that Dr. Buckley talked about. And it's one of the first-line pharmacologic treatments in the management of neuropathic pain. So it's possible, especially in settings where we see people who have nerve pain, like neuropathic pain, and may also have major depression, sometimes people may be trying to treat both conditions with a medicine like duloxetine.

Dr. Norman Buckley: Yeah. No, it's a really interesting drug. There are studies showing that it has an effect even on mechanical low back pain, for example, as well as neuropathic pain and, as you say, mood disorders, anxiety, depression.

Dr. Anthony Levinson: I just want to thank Dr. Buckley again for a great overview. I'm just going to finish up a little bit of promotion of the McMaster Optimal Aging Portal, where some of the evidence-based resources that we spoke about and that are in the handout as well. And there were a few questions that we didn't have time to get to where there were questions about the evidence for something. So the Portal is a great source for evidence-based content on a range of conditions, and there's quite a lot on pain and back pain on the Portal. You can subscribe to receive weekly email updates with notices about sessions like our webinar today, as well as up to date new blog posts that are posted on the Portal. New content is added regularly. There's also a wide range of video topics. So this session, the recorded webinar, will be eventually housed on

the Portal as well. You'll be able to access this and other videos from the videos menu item. We have a range of different e-learning. I mentioned the one on exercise in the setting of osteoarthritis of the knee or hip. We also have content on dementia risk reduction and other things like walking speed. So, another good way to build up your walking speed with a healthy physical activity.

There's a new series, and several of our online programs also have weekly email series if you enjoy learning in that way. So that's another way you can access it, and that's also available from the e-learning drop down main menu.

We have a YouTube channel, and recorded webinars and other video content are posted on the YouTube channel. Thanks to those of you who joined via YouTube tonight. So, once again, I'll ask you to hold the date for our next health webinar on December fourth, and you'll see that promoted. That'll be on Falls Prevention, coming with Dr. Marla Beauchamp, December fourth. So once again, thank you so much, Norm, for a great overview of chronic pain. And thank you all for joining us. We look forward to seeing you again soon.

Dr. Norman Buckley: Thanks for the invitation, and it was very enjoyable. Appreciate it..

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