

# WEBINAR TRANSCRIPT: THE LOWER BACK WITH DR. BRYAN BOND

## **Mandi Swanson:**

Good afternoon and welcome, thank you for joining us today. My name is Mandy Swanson from NCMIC's corporate relations team. Before we get started, there are a few housekeeping items that I'd like to review. All listeners are on mute. If you have questions, please enter them in the chat box, we will address questions as time allows. If we don't get to your question, please feel free to contact us and we'll be happy to talk with you and connect you to resources to help. Today's webinar is live and being recorded, the recording will be emailed to registered attendees a couple of hours after the program. We will also post the recording in our resources section of ncmic.com.

## **Mandi Swanson:**

It takes a bit of time to process the recording and to get it posted, so please be patient. Our next webinar will be on October 20th at 2:00 PM central Time. We hope you can join us, but if not, that webinar will be recorded as well. Now I'd like to introduce our guest and start our discussion. Obviously, low back pain is something most chiropractors see every day in their practices. So, how do you help these patients? To discuss this important topic, I'm so happy to be joined today by Dr. Brian Bond. Dr. Bond has a diverse background including teaching and clinical knowledge. He earned his doctor of chiropractic from National University of Health Sciences, a master degree in Biomechanics from the University of Kansas and his PhD in Rehabilitation Science from the University of Kansas Medical Center.

## **Mandi Swanson:**

Dr. Bond is here today to share some low-tech, low time ways to help your patients manage their pain. Dr. Bond, welcome and thank you for joining us today, I'm going to turn it over to you.

## **Bryan Bond:**

Thank you, I appreciate the kind introduction Mandy. I'm going to start by sharing my screen and here we go. So, our topic for discussion is Evidence-informed Rehab for Low Back Pain A Brief Overview again, my name is Brian Bond. And I welcome everybody to today's presentation and we're going to go ahead and get started here. So, I do want to thank NCMIC, I do want to thank you doctors for participating and listening today. Just a very quick disclaimer to start with, the views and opinions expressed in this presentation are solely of the author, myself. NCMIC does not set practice standards and we offer this only to educate and inform. And Mandy, can you perhaps help me out? I think I need to go the presentation mode, am I sharing my screen just to make sure?

## **Mandi Swanson:**

You are sharing your screen. If you click on the bottom right of the bottom of the PowerPoint, one of the options, I think it's the one right next to the-

## **Bryan Bond:**

Oh, I just need the full press-

## **Mandi Swanson:**

Yeah, just make it full screen.

## **Bryan Bond:**

Got you. Sorry, I appreciate that sorry, I apologize everybody.

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**Mandi Swanson:**

No problem.

**Bryan Bond:**

So, just really quickly some objectives for today, we're going to basically look at the therapeutic effect of benefit of exercise in context of low back pain. And then we're also going to just briefly touch on some evidence informed clinical practice guidelines in order to improve treatment decisions and patient outcomes. So, this is our outline for today, we're going to just briefly touch on some introduction and background information just to give us a context for our discussion. We're going to look at some clinical practice guidelines for low back pain.

**Bryan Bond:**

Next, we'll shift our attention towards clinical prediction rules and we'll share and discuss what we mean by clinical prediction rules. And then lastly, we'll touch on some exercise that may be helpful for low back pain patients. So, we're all aware of this, I'm going to go through the introduction and background just very briefly, but we're all aware that low back disorders represent the most common complaint within a chiropractic practice so, this is just from the National Board of Chiropractic Examiners. And again, just to give us some more context, low back pain affects up to 85% of the adult population and it costs \$86 billion annually in the United States.

**Bryan Bond:**

So, it is costly, it affects many people. Many people transition from acute to chronic low back pain, we're all aware of that. So, approximately one third to two thirds of people that are acute transition to chronic. And chronic low back pain represents 75% of the total treatment costs and it's associated with significant disability and it represents the major cause of absenteeism from the workplace worldwide. So, it does affect and impact people's lives, it does also have a financial burden associated with it and it's certainly a drain on resources.

**Mandi Swanson:**

Dr. Bond, I'm sorry to interrupt. It looks like the slides aren't changing, we're still seeing the disclaimer slide.

**Bryan Bond:**

Oh, okay, let me just-

**Mandi Swanson:**

Sorry about that.

**Bryan Bond:**

No, that's okay. If I do this, are you seeing introduction and background slide right now?

**Mandi Swanson:**

Right now, we see you, you'll need to do share your screen again.

**Bryan Bond:**

Okay.

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**Mandi Swanson:**

Now yes, introduction and background.

**Bryan Bond:**

Okay, all right. If it's okay, so if I go into presentation mode just really quickly again and I change the slide. Is it changing the slide?

**Mandi Swanson:**

It's not going into presentation mode. Sorry, folks for the technical issue. It's staying in the design format, I'm not sure why.

**Bryan Bond:**

Okay.

**Mandi Swanson:**

Maybe click on view up on the menu.

**Bryan Bond:**

If I go out of the presentation mode then?

**Mandi Swanson:**

Yeah, it's changing now, it's changing, yeah, okay.

**Bryan Bond:**

Would that work then?

**Mandi Swanson:**

Yes, that's fine thank you.

**Bryan Bond:**

Okay, sounds great. So, just continue on with the introduction background, things that have efficacy certainly may prevent or improve disability that would be helpful for our patients. And exercise as a viable treatment option for low back pain. And if we look at clinical practice guidelines from around the globe, including the United States, Canada, the United Kingdom, Europe, these practice guidelines recommend exercise from managing chronic low back pain. So, shifting gears just really quickly, what constitutes evidence-based medicine or chiropractic? Well, it's a blend, it's a blend of clinical expertise, best research evidence, patient values and preferences, we have to consider all these things in making our clinical decisions.

**Bryan Bond:**

So, what are the chiropractic clinical practice guidelines? What does evidence-based chiropractic tell us? And part of it would include the evidence that we might look towards. And so, according to the ACA, the American Chiropractic Association, we should look towards a document from the American College of Physicians which I'm going to share with you as well as a document from the Council On Chiropractic Guidelines & Practice Parameters, I'm going to share those with you as well. So, this is the document

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from the ACP, the American College of Physicians. This is the clinical practice guidelines from what we might describe as a non-DC source.

## **Bryan Bond:**

So, what do these guidelines have to say? So, the first recommendation from the ACP in the context of acute and subacute low back pain is they recommend non-pharmacological treatment as their first recommendation for people with acute and subacute low back pain. So, as you can see on the screen here, that might include things like heat, massage or soft tissue or acupuncture, spinal manipulation. And if pharmacological treatment is indicated or necessary, they recommend incense or skeletal muscle relaxants. You can see this was a strong recommendation, so acute and subacute, these are certainly some things that we would do as chiropractors.

## **Bryan Bond:**

We might be involved in soft tissue acupuncture and certainly spinal manipulation. So, there's many things in this first recommendation that we may be incorporated into our rehab of our patients that have low back disorders. So, recommendation two from the ACP is for chronic low back pain. So again, they're recommending non-pharmacological intervention as the approach for managing people with chronic back pain. This might include exercise, multi multidisciplinary rehab acupuncture, stress reduction, tai chi, yoga, motor control exercise, other things that are listed there as well and includes spinal manipulation.

## **Bryan Bond:**

Again, this is a strong recommendation from the ACP. So, many of the things that you see in this recommendation would be perhaps incorporated into our treatment plan as chiropractors including spinal manipulation and including exercise and different types of exercise. So, recommendation three from the ACP is in patients with chronic low back pain who've had an inadequate or are non-responsive to non-pharmacological therapy. Then maybe the approach is looking towards pharmacology. And this might include NSAIDs as the first line therapy or tramadol or duloxetine as the second line therapy. So again, even as the first line recommendation they're suggesting like NSAIDs rather than perhaps like an opioid type of medication.

## **Bryan Bond:**

So, you can see their recommendation is clinicians should only consider opioids as an option in patients who have failed the aforementioned treatments and only if the potential benefit outweighs the risk basically and after discussion with the patient of the benefits versus the risks. So, many of the things from the ACP would include things that we might provide as services as part of our chiropractic care, including spinal manipulation and including different types of exercise or psychosocial interventions that may be helpful for our patients, basically. So, next I just want to share with you the clinical practice guideline for low back pain from the CCGPP.

## **Bryan Bond:**

And this is from Globe in 2016, so again, we've mentioned the CCGPP and the conclusions are that the evidence supports the chiropractors are well suited to diagnose, treat, and manage people with low back disorders. And specifically, I just want to share with you from this document from again, Globe in 2016, from the CCGPP, we can see that our chronic pain management would include spinal inflammation but might include other procedures and they're listed there for you on the screen as well.

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But it also might include exercise recommendations and it might include rehab or therex. It might include general or specific exercise programs, mind body programs, [inaudible 00:11:50], yoga, tai chi, multidisciplinary rehab. And then again, maybe addressing the psychosocial aspect of pain, particularly chronic pain would be the cognitive behavioral programs.

## **Bryan Bond:**

So again, we see recommendations from both the ACP and within the chiropractor profession that exercise may be helpful and beneficial for some of our patients with low back disorders in particular, it may be that chronic low back pain population. So, this is an illustration just showing you, again just a rationale for including physical activity in chronic care management. We're really trying to avoid this disuse syndrome or this downward spiral of chronic disease. So, if you look at this illustration, we start with health and then through there's a series of disuse or downward spiral of disease to the point where we get infirmity.

## **Bryan Bond:**

And so, it just recognizes the importance and relevance of, again physical activity in terms of just our overall health. This next slide just represents the fear avoidance cycle. Again, the idea is that a person might avoid activities due to the belief that those activities will cause pain or further injury. And again, we see this in particular in the chronic pain populations, including people with chronic lower back pain. So, there's an initial injury or event, there's either a near death experience or pain and then there's this cycle of catastrophe ideation sorry, hypervigilance all the way to down to cognitive and effective decline and it's suspicious cycle.

## **Bryan Bond:**

And so, they've developed this fear avoidance and they stopped moving. And again, this lack of movement is detrimental towards their musculoskeletal health as well as just their general health. So just part of our discussion, I just want to this touch on walking speed, just movement in general, walking speed as an indicator of health. So, you can see this is from a paper in 2015 by Middleton, walking speed is a valid, reliable, sensitive and measure appropriate for assessing and monitoring functional status and overall health in a wide range of populations and it's been described as the sixth vital sign. So, just pointing towards the idea of, again mobility and just moving, for example, just walking.

## **Bryan Bond:**

So, this is again a slide from Middleton in 2015 and it actually quantifies walking speed for us. So, on the horizontal axis we have walking speed and meters per second and as we sort of look at the left end of the spectrum, generally we're describing people that are unhealthy. At the top line, we see people that are extremely frail, there's a risk of death or hospitalization, there's a risk of morbidity or mortality or someone that's highly dependent on others, they're unable to take care of themselves, they're heading towards an institution. As we go further to the right, then again people will be described as just generally more healthy. So, just walking speed can be associated with health and various health outcomes.

## **Bryan Bond:**

So, this idea of movement and exercise in its importance, some of you may have heard of the blue zones. There's the different pockets of people from around the globe that have high incidents of living to be centurions to an older age. So, there's pockets in California, Costa Rica, Greece, Italy, Japan and the idea from the blue zones was to say, "Okay, is there something in particular about these pockets of people in terms of their approach to overall health and lifestyle that influences this longevity?" So, I

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would ask the question, think about the disease especially chronic disease and does scientific literature tell us exercise is beneficial? So, just some examples might include cardiovascular disease, heart disease, stroke for example, we might put in their diabetes, we might include it in there other things like Parkinson's, Alzheimer's, dementia, multiple sclerosis.

## **Bryan Bond:**

There could be a long list of diseases and you probably would find evidence that would suggest that exercise might be helpful and beneficial for many of the chronic conditions that often affect longevity and morbidity and mortality. So, what is it about the individuals around the globe in those pockets where there's a high incidence of longevity? And again, this comes from the Blue Zones by Dan Buettner and this is a pyramid, at the top of the pyramid if you want to be a centurion, he puts at the top of the pyramid to move naturally. So, make daily physical activity an unavoidable part of your environment. So, he studied these people, so Dan Buettner studied these individuals across the globe and this is what he determined was that they move naturally, essentially from birth to death.

## **Bryan Bond:**

They make daily activity and exercise part of their lifestyle. Other components would be the right outlook and you can see there know your purpose and downshift. Eat wisely, so don't overeat, Mediterranean type of diet, veggies, less meat, processed food, alcohol consumption was part of to eat wisely. And then at the bottom of the pyramid you can see belong, so again, create a healthy social network, connect, reconnect with religion, prioritize family. So, there's the physical component and then there's the psychosocial components. And so, again, this is what he determined in terms of longevity and becoming a centurion, these were the ingredients, this is what we might describe as the secret to longevity.

## **Bryan Bond:**

And again, I'm bringing this into our discussion and the context in particular of just moving naturally and just exercise. So, there's a research hierarchy, many of you I'm sure have seen this before, are familiar with this. I'm just going to present some literature coming up here on the upcoming slides and I've tried to pick resources that oftentimes are either meta-analysis or systematic reviews or some variation on those cases. So, I'm trying to present evidence that we describe as high-quality evidence and evidence that has a low risk of bias. So, we're going to get into some specifics here in terms of the exercise, so this is exercise for chronic low back pain. So, this comes from a network meta-analyses and this is a paper from 2022 and you can see the title is Best Exercise Options for Reducing Pain and Disability in Adults With Chronic Low Back Pain, Pilates, Strength, Core Based and Mind Body.

## **Bryan Bond:**

So, we're going to discuss this just a little bit further so these are the conclusions from this meta-analysis. Although most exercise interventions have benefits for pain disability in chronic low back pain, the most beneficial were those that included number one, at least one to two sessions per week of Pilates or strength exercises. Number two, sessions of less than 60 minutes of core-based strength or mind body exercises. And number three, training programs from three to nine weeks of Pilates and core-based exercises. So again, these are the various forms of exercise that we might consider to be helpful in our chronic low back pain populations.

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## **Bryan Bond:**

But in the review itself, other forms of exercise were helpful, just these were the ones that were more beneficial. So, this comes from the same paper, this is a ranking of the different types of exercise considered in this review from 2022. And you can see near the top of the ranking in terms of the ranking for interventions for their effect on pain was Pilates, the mind body, core-based and strength. So, Pilates has the highest probability of being the most effective intervention for reducing pain and it had that the highest ranking. So, this is example of a graph from the paper just showing us again which exercises might be beneficial. So, this is another graph from the same paper and this is the ranking for each intervention on disability.

## **Bryan Bond:**

So, they looked at the effects of exercise on both pain and disability and notice again, we see in the high ranking is Pilates, strength, combined, core-base, mind body. So again, just pointing us towards the idea of what types of exercise may be most beneficial. Again, this is a meta-analysis from 2022 suggesting that these types of interventions might be helpful. So, next I just want to shift towards a clinical prediction rule and just talk about that just really briefly. So, what are they? Why you use them? How to use them? A couple statistical definitions and then I'm going to share a clinical prediction rule for low back pain and exercise.

## **Bryan Bond:**

So, clinical prediction rules are basically algorithms to help clinicians with either diagnosis, prognosis, or intervention type decisions. We use clinical findings to find statistically meaningful predictors and this is usually collected or as a result of information related to history, physical exam and diagnosis. So, why would we use them? Well, that's part of evidence-based healthcare which I mentioned earlier, making the best decisions based again upon patient preferences, evidence as well as clinical experience. So, we want to use the best available evidence and clinical prediction rules, provide real world evidence to try to improve patient outcomes, quality of care, clinical decision making, perhaps patient satisfaction and referrals, those types of things. And we want to discuss next how to use [inaudible 00:22:25].

## **Bryan Bond:**

So, they're really just tools, they're things to help guide us in our clinical decisions but they should not be used in isolation. We should use clinical prediction rules along with what we mentioned previously. Current evidence, patient preferences, clinical experience and clinical prediction rules are not 100% predictive. There's false negatives, there's false positives, they're helpful tools just like any other procedures so we just use it as part of our decision-making progress. So, this really quickly, a really quick chart to show us a little bit about likelihood ratios, like a little statistical interpretation. So, the bottom line is if we see a positive likelihood ratio associated with a clinical prediction role, while the higher the number, the larger the shift in probability. If it's a negative likelihood ratio while the smaller the value, the larger the shift in probability.

## **Bryan Bond:**

So, just positive and negative likelihood ratios and just discussing those in the context again of clinical prediction rules. So, if I ask everybody right now, how would you decide who benefits or needs exercise for low back pain? I'm sure many of you would probably describe some of the things that are listed on this screen. It may range from everything from orthopedic testing range of motion, nobody gets exercise, maybe I don't really give that much thought or consideration or maybe there's other rationale. But the point is if we took a hundred people, we might get lots of different variations on describing who benefits or needs exercise.

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## **Bryan Bond:**

And the question is, is there a more systematic way to maybe make that decision? And the answer is one of the things that might be helpful would be clinical prediction rule, a clinical prediction rule for exercise in low back pain. So, this is a clinical prediction rule from 2005 from Hicks and this is lumbar stabilization exercises for low back pain. And these are our predictive variables for both success and non-success and I really just mostly want to focus on the predictive variables for success for right now. And that is, could we again have some tools, some predictors that would allow us to make a decision about who might benefit from exercise, lumbar stabilization exercises that has low back pain.

## **Bryan Bond:**

So, you can see our four predictive variables for success would be a straight leg raise, greater than 91, less than 40 years old. Avert motion is present when bending forward and they have a positive prone instability test. So, we'll just briefly talk about what some of these are and so the first one is a straight leg raise. We could use an inclinometer, we could just eyeball it but we're just looking again for them to get around that cutoff, that threshold of around 91 degrees. The second particular variable was age, so that's pretty easy, that's just part of our historical information that we collect with people. So, straight leg rays, age less than 40, they have aberrant motion, this was another particular variable.

## **Bryan Bond:**

So, they for example, might have a Gower's Sign or they have some inability or instability when they move forward so aberrant motion when moving forward. And then the last predictor variable was a prone instability test. And so, I've cut and pasted a link into the presentation here. I won't show the video right now, but I've made it available to everybody if you want to watch the video that describes the prone instability test, there's a video there. But for time's sake, I won't show it at the moment but there's a description there. And essentially it is a test with the patient prone where we're looking for evidence instability.

## **Bryan Bond:**

And so, really quickly we palpate the patient's spine, the spinous processes when they're relaxed. We look for areas of tenderness or pain and then we ask them to contract and turn on their lumbar stabilization muscles. And if the areas that were tender become less tender or not painful, then we describe that as a positive prone instability test. In other words, if shearing forces pushing P to A lead to pain and then when we turn on the lumbar stabilization muscles, if that pain dissipates or goes away, that's a positive step test. So, it's indicative or suggestive of this idea that if we stabilize your spine, your pain goes away, that's a predictor of success basically.

## **Bryan Bond:**

The other predictor associated with this prediction rule was P-A spring testing. So, that's just a patient in pro test, prone position and just springing olden spines processes. So, here's our clinical bottom line, the presence of at least three directive variables suggest that are indicated a small meaningful shift in probability of at least 50% improvement in function after eight weeks of stabilization exercises. So, we could be relatively certain that if a patient met three or more of those clinical predictors, I'm going to go back a couple slides just to refresh your memory.

## **Bryan Bond:**

The straight leg raise, the age less than 40, the aberrant motion and the positive prone instability test. If they were three or four, then they're good candidates, they're likely to be responders to stabilization exercises. So again, it helps to narrow our clinical decision making gives us something, a tool once again



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to use to help guide us to decide who might benefit from lumbar stabilization exercises. So again, this comes from the paper from Hicks, so the question is what did they do in this particular design? There was a treatment two times a week for eight weeks, the treatment focused on training the rectus abdominis, the transverse abdominis, the oblique, the rectus [inaudible 00:28:33], the multifidi and quadratus lumborum, muscles that we might often describe as trunk or core muscles.

## **Bryan Bond:**

I've also included on this slide is the link again to a demonstration of some of these exercises. Again, for time's sake I won't share it right now but if you're interested, you have the link, you can watch a video and the video is actually a gentleman named Stuart Neil, who I'm sure many of you are familiar with where he demonstrates some of the exercises that were incorporated into this rehab or this exercise pro program. So again, this comes directly from the paper, these are the stabilization exercises with the criteria for progression in the paper from Hicks in 2005. So again, there were focusing on transversus abdominus muscles director spine or multifidi, multifidi QL and the oblique abdominals.

## **Bryan Bond:**

So, notice again, they were doing a series of different exercises. I'm going to share some of them with you here on upcoming slides as well with things like side bridge, a quadruped or a bird dog type exercise, abdominal curl, curl up. And again, you can see the criteria for progression as well on the slide as well. So, their definition of success in this paper was more than 50% or greater than 50% improvement on the Oswestry Disability and non-successs was defined as less than a six-point improvement on the Oswestry Disability. So again, that was the original paper from 2006, there's some been some follow up research since the original paper.

## **Bryan Bond:**

So, this is a validation study, so this is from Rabin in 2014. And essentially, they found this similar or same thing for this clinical prediction rule. They found that the presence of aberrant motion in a positive prone instability test again were predictors of success. Another paper from Teyhem in 2007, similar findings again that it's always nice to have overlap and people from other research groups to have similar findings. The findings again from this paper suggests individuals with mid-range aberrant motion without signs of hypermobility are likely to benefit again from stabilization exercises.

## **Bryan Bond:**

So, just some further support and evidence for the stabilization exercises. So, I'll share with you again just some exercises that may be helpful for people with low back pain. These are relatively what I describe as low tech, you don't need a lot of space or equipment or things like that. It's relatively simple but yet maybe beneficial for many individual's low back pain, including individuals with chronic low back pain. So again, the focus was on these muscles that are described here, we described them earlier. So, this example, this comes from the McGill, 2007. This is example of a curl up exercise, a woman described as a beginner in intermediate exercise.

## **Bryan Bond:**

So, the beginner is curling up with the elbows supporting you. The intermediate version of this exercise is lifting the elbows away from the floor so there's less support so it makes it a little more challenge. The curl up advance might be adding in some resistance, so in this picture here, McGill was illustrating what we describe as digging into the obliques or raking the abdominal wall, attempting to activate more muscle or to get more muscle activation out of the abdominal wall. So, these would be muscles that would be training primarily again, the anterior abdominal wall.

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## **Bryan Bond:**

Other exercises might be the side bridge, so this is what we described like a side plane or a side bridge. This is the beginner's description of it where the person is bridging up on their knees. And in the realm of the context of McGill's work, the focus oftentimes is to try to keep the spine neutral when you're doing these exercises. So, the bottom picture just illustrates that you wouldn't want this lagging position of the spine, you wanted to try to keep the spine neutral. This is again beginner and intermediate, the intermediate is bridging up rather than on the knees bridging up on the feet.

## **Bryan Bond:**

So again, working on the lateral abdominal wall, the bird dog exercise, the beginner again would be just lifting the lower extremity, an attempt to again focus on strengthening and creating some endurance in the posterior muscles. Again, the bottom pictures are illustrating the idea that you want to try to keep the spine neutral. And again, the intermediate version of the bird dog exercise would be alternating upper and lower extremity, sort of a cross crawl type of pattern. So again, these would be exercises that would target the anterior, lateral and posterior muscles around the truck.

## **Bryan Bond:**

So again, those may be some excellent exercises, again, simple low tech that many patients might benefit from. So, is there a relationship between the gluteal muscle function and low back pain? So again, there's some evidence and some resource that would suggest there's an association between gluteal muscle function and low back pain. So, this is a paper from 2008, I'll show you a couple others here as well but this paper essentially took individuals that didn't have low back pain and they requested that these individuals stand for extended periods of time. And some people that didn't have low back pain initially developed low back pain after standing on occupational setting, for example, for an extended period of time and some of them develop low back pain.

## **Bryan Bond:**

So, their conclusion or interpretation, agonist, antagonist, coactivation may not be entirely adaptive and may in fact predispose some individuals to develop low back pain. Muscle activation patterns at the hip may be a useful addition for screening individuals to identify those at risk of developing low back pain during standing. So, just points towards again the hip muscle, the gluteal muscle activation may have a role in low back pain and there's a test called a side lying hip production test. Some of you may be familiar with it, if you're familiar with beyond those ideas from many years ago and we may, for example, be screening individuals for gluteal muscle function by putting them in this side lying hip abduction test.

## **Bryan Bond:**

But again, we're just trying to target, if you will, the strength and endurance or control on the gluteal muscles. So, this is another paper, a systematic review from 2019 and the results, you can see the gluteus medius muscle and participants with low back pain tend to demonstrate reduced strength and more trigger points compared to the gluteus medius muscle of those without low back pain. So again, just pointing us towards this idea, there's some research and evidence that perhaps we need to also consider training other muscles including the gluteal muscles.

## **Bryan Bond:**

This paper is from 2015 and in this paper, they actually compared stabilization plus stabilization exercise, plus gluteal muscle training to just stabilization exercises and you can see their conclusions. Lumbar, segmental stabilization plus exercises that focus on gluteal muscles resulted in a greater

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decrease in low back pain disability and an increase in lumbar muscle strength and balance ability compared to those that were just stabilization exercises. So again, pointing us towards the idea that training the gluteal exercises may be helpful for those with low back pain. In this case, these were individuals with chronic low back pain.

## **Bryan Bond:**

So, next I just want to talk about training the gluteal muscles. So, what are some exercises that may be helpful in terms of training the gluteal muscles? So, this is a systematic review from 2012 and you can see the title of this paper is a literature review of studies evaluating gluteus maximus and medius activation during rehab exercises. So, the question is, is there a way that we can try to target or be prescriptive with our exercises? In particular in this case, we want to talk about the gluteal muscles. So, the progression exercise may be based on EMG activity and again, this comes from the paper in 2012. There's some thresholds, we described low muscle activation up to 20%, moderate up to 40%, high level activation is up to 60% and very high level activation is greater than 60% of the maximum voluntary isometric contraction.

## **Bryan Bond:**

So, on the next few slides, just to ask you to keep in mind that those cutoff points 20%, 40%, 60% and greater than 60%. So, as a way that we can be prescriptive and really try to be systematic in the way that we recommend exercises. So, this is again, gluteus maximus, so exercise prescription EMG for the gluteus maximus muscle and this table in this chart you can see on the left-hand side, the muscles are organized by EMG and they're in ascending order. So, you can see for example, the prone bridge plank exercise is 9% of the MVIC so that's a low-level activation. And we might describe the exercise on the left-hand side of this chart as muscles that it would be helpful for neurological reeducation.

## **Bryan Bond:**

So, these are what we might describe as relatively low-level exercises where we're perhaps trying to rewire the brain to the muscle. We're trying to maybe establish the neurological reeducation and just teach the brain to work in coordination with the muscles, so motor control type of exercises. And on the right-hand side, these are higher level activation muscles, again these are in ascending order. So, the sideways lunge is 41% in the forward step up is 74%. So, we might describe these muscles as muscles targeting strength pain. So, oftentimes we might start patients in terms of exercise and rehab at the lower end or maybe that's their capacity to start at the lower end so we might give them exercises that are maybe low level.

## **Bryan Bond:**

And then once they have established that neuromuscular reeducation, then maybe we want to make some gains and strengths. We might target the gluteus maximus muscles that are listed on the right-hand side of this table. So, the sideways lunge for example or if we wanted the muscle and to give the patient an exercise where we had the greatest activation of gluteus muscle, you can see in this chart it would be the forward step up, it had the highest-level EMG activation at 74%. So again, this is a way for us to be prescriptive and systematic and try to match our exercises to the capacity that the patient has.

## **Bryan Bond:**

So, for example, we don't want to give a patient a strength exercise that it's too much, the demand is too high, they can't control the movement of the exercise, that may not be beneficial. So, it's a way to a

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range or be prescriptive with their exercises. So again, a prone bridge plank, a lunge, a bridge, a clam shell, we're going to describe a few of these different exercises on the upcoming slides here basically. So, keep in mind this is gluteus maximus, these are the exercises that may be helpful in terms of neurological reeducation or strength training for the gluteus maximus. So, this was the exercise that was the highest activation, this was the forward step-up exercise.

## **Bryan Bond:**

So, even within the forward step-up exercise, we could make the demand either more or less by changing the height of the step up. So, we could make it 5 centimeters, 10 centimeters, 20 centimeters, we could change the demanded exercise by the height and we could also change the demand by adding some resistance. So, in this picture here, you see this woman is holding a dumbbell on her hand. So, there's lots of ways to layer the exercise or a given exercise to make even within the exercise either more or less demanding so we can be prescriptive. This is a similar chart except for this is gluteus medius.

## **Bryan Bond:**

So again, all the gluteal muscles are responsible for abduction, but if you remember gluteal maximus as responsible for external or lateral rotation and extension versus gluteus medius. There's anterior, middle and posterior fibers of the [inaudible 00:41:47], the anterior fibers flex and internally rotate the posterior fibers that extend and loudly rotate and then all fibers that group need to abduct. So again, what type of exercises may be helpful for training and targeting gluteal medias as well as which ones would be helpful for neurological education again, as well as ones that might be helpful for strengthening. So, for example, on this slide here, the prone bridge with the plank, well that was the lowest EMG activation of 27%.

## **Bryan Bond:**

So, that would be a neurological reeducation exercise again, based on the patient's capacity. The clam shell was 40%, so again, that's a neurological reeducation. The muscle or the exercises prior or the demanded higher muscle activation included the lateral step-up which was 41%. And the highest in the case for gluteus medius was the single limb deadlift at 58% of the maximal voluntary isometric contraction. So again, allows us to pick and target which exercises based on the demands of the muscle activation allows us to be prescriptive.

## **Bryan Bond:**

So again, just shifting towards some other exercises that you see listed on the table there and the bridging exercise. So, this is a paper from 2016, you can see the title of this paper Modifying the hip abduction angle during bridging exercise can facilitate gluteus maximus activity. So, the question might be again, does the movement, does the exercise, how we perform it, does it matter? Does it influence the activation of the muscle? So, in this paper, again this points us towards how we do the exercise matters. So, in this paper they looked at again activation in the erector spinae, the glute max and then they recorded the ratio between the glute max and erector spinae.

## **Bryan Bond:**

And then they also looked at the angle of the pelvis, the interior pelvic tilt angle. And so, the question was does hip abduction angle matter in terms of bridging exercise? And the answer based on the paper is yes. So, they compared zero degrees or neutral hip abduction, 15 degrees hip abduction and 30 degrees and you can hopefully appreciate that as we went from zero to 15 to 30, the erector spinae activation goes down and the gluteus maximus activation increases. And the anterior pelvic tilt angle

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actually decreased as we went from zero to 30. And that's likely again because the erector spinae muscle started to shut down as we went from zero to 30 degrees.

## **Bryan Bond:**

So again, this allows us to be prescriptive. If we want more activation of the gluteus maximus, we might ask the patient to abduct their hip to 30 degrees. If we want less activation of glute max, we might have the patient perform the bridging exercise in a neutral hip angle. So again, how we do the exercise, how we perform it influences the demands of the exercise. So, this paper from 2015, the idea was here was does putting a band around the extremity around the knees, for example, does it matter when we do a bridging exercise? And the answer is yes, again based on this paper. So, using a TheraBand or using some sort of elastic resistance with the bridge increase the glute max activity compared to no TheraBand.

## **Bryan Bond:**

So, if you want to increase the demand of exercise during the bridging exercise, you might have the patient resist, isometrically resist. And if you want to decrease the demand you might do it without the band, same thing. The last paper suggested a similar idea that the hip angle mattered, that zero degrees of hip abduction was different than 15 which was different than 30. So, another paper here from a recent of 2014 if I remember this paper is from, which exercises target the gluteal muscles while minimizing activation of the tensor fascia latae. And the question might be, well why would that matter?

## **Bryan Bond:**

So, what we do find is abnormal hip kinematics such as internal rotation and hip abduction are linked to lower extremity disorders. For example, knee injuries, so in this position of IR and abduction, we see there's an increase of valgus angle at the knee and this valgus loading at the knee, for example, is associated with ACL type injuries. So, the TFL is a hip abductor but it's also an internal rotator. So, we may want to strengthen hip abduction without activating the internal or the IR muscles like the TFL. So, the question is, is there a way to do that? Does exercise and what type of exercises matter once again.

## **Bryan Bond:**

So again, this is same paper, so there's a list of exercises here and they have the various exercises listed and the gluteal to TFL activation index, just a ratio if you will. And so, they have clam, side step, unilateral bridge all the way down to a lunge. And you can see the clam is at 115, so the gluteal, the TFL activation for the clam was 115. So, what that tells us is the clamshell exercise, for example, is an exercise with high activation of the glute med and glute max with low TFL activity. Again, this would be a way that we're trying to avoid that mechanically unfavorable position of internal rotation and abduction, but yet still train the gluteal muscles, the clam shell exercise would be an effective exercise.

## **Bryan Bond:**

So, what's the clam shell exercise? So, here's an illustration just showing us the clam shell exercise. So, the patient's in a sideline position, we could do this again with or without a band. We would assume that with the band, with resistance that would increase the demand and if we didn't have the band, it's probably a lower demand. But it really is just a hip abduction exercise, a clam shell exercise. So again, this is from the paper in 2014, the clamshell exercises decreased TFL activation while compared to side lying hip abduction exercises. In this paper, the rotating the hip either ER, IR did not affect activation with TFL in the side lying hip abduction. Varying the hip angle 30%, 40% 60% did not affect activation of the TFL in the clam shell exercise, at least in this paper once again.

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## **Bryan Bond:**

So, if the goal is to decrease TFL activation but still get gluteal muscle activation, the side lying clam is the preferred exercise. So, it's a good way to again target the gluteal chain but not at the expense of an unfavorable mechanical position. So, one last paper for you to just of try to answer the question, does movement matter? Does the position matter how we perform certain exercises? Does it change or increase the demand exercise? So, in this paper we had resisted side stepping and they were looking at the effect of posture on hip abductor muscle activation. So, with really four conditions in this paper to consider which was either upright position or standing position.

## **Bryan Bond:**

And then they either looked at the stance limb or the moving room. So, imagine this is a side-stepping type of movement or exercise. There would be a stance limb or a support limb and there would be a moving limb. And so, the question was, does it matter once again? So, they looked at activation of the glute max, glute med and the TFL once again. Again, if you look at this table, this chart, they're comparing again, upright standing and squat and they're also looking at the moving limb versus the stance limb and saying, "Okay, well what does it look like? Do these conditions and variables influence the exercise?"

## **Bryan Bond:**

So, you can see hip abductors in the stance limb are more active than in the moving limb. So, we know again, based on this paper against the stance limb, hip abductors in the stance limb are more active than the moving. So again, this gives us an idea of what we should, if we think there's asymmetrical muscle activation or loss of strength, it tells us which side maybe target. Do we need to spend more time on the stance limb on the left side because that's where we're getting more activation? So again, allows us to be prescriptive and the other conclusion was, or other question they were looking at, does position matter? Does squat versus upright matter? You can see squat position, yes, the TFL activities reduced while glute max and glute med activity increased.

## **Bryan Bond:**

So, upright versus standing, the condition matter, it's again allows us to look at the exercise and make it either more or less demanding based on the patient's capacity and what they have based on the patient's capacity to exercise. So, if I wanted to make the exercise the side-stepping exercise more difficult, then I would have the patient do it in a squatting position. If I wanted to lower the demand, I might have them do it in the upright position. So again, the stance limb compared to the moving limb changed, the activation in the upright compared to the squat changed the activation. So again, TFL is reduced and glute max and glute med increased with the squat in position.

## **Bryan Bond:**

So, just really quickly, a summary, so we talked about some introduction and background information. We talked about low back pain is the most common complaint for DCs we all know that. Chronic low back pain represents 75% of the total treatment costs. Next, we discuss some clinical practice guidelines again from the ACA. They recommend and point us towards these two clinical practice guideline documents for low back pain one from the ACP, American College of Physicians, one from within our chiropractic profession. And then next we shifted towards clinical prediction rules. We talked about a clinical prediction rule for lumbar stabilization exercises and lower back pain. And lastly, we focused on some exercises for low back pain. Again, think about targeting trunk and core muscles as well as the gluteal muscles.

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## **Bryan Bond:**

So lastly, to close, I'd just like to pose a question or I'd like you to ask you to do this one thing, just consider your exercise and movement and its benefit for low back pain. If you have questions or comments or feedback at all, my email address is provided here on this screen, it's bryan.bond@allencollege.edu. I do want to thank EU doctors and I do want to thank NCMIC for their support. And just very lastly, there's several slides here in references if you want more information related to any of the information in this discussion. There's plenty of references there for you as well as my email if you have any additional questions, I'm happy to answer those. And I'll close by just thanking everybody for your time.

## **Mandi Swanson:**

Thank you Dr. Bond, great information for our listeners today. It has been a pleasure talking to you and I appreciate the fantastic information you've shared. Before we go, I'd like to remind you of our resources page on ncmic.com. This webinar will be posted there as soon as the recording is processed and you can find our past webinars out there as well. While on our resources page have a look around, we have a lot of information focused on topics that can relate to your daily practice. You can also keep up to date on any new resources from NCIC by following us on Facebook, Twitter, LinkedIn and Instagram. Once again, thank you for listening.