

ICSC053.2-VIEW Running Injuries with Luke Nelson and Pete Garbutt 21.17.mp4

ICSC Lower Extremity Module 5

Section 2.1_ICSC05

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Video Lesson: 21:17

Luke Nelson: Welcome to this FICS module which is on the assessment of the running athlete. Very privileged to present for FICS, both myself, Luke Nelson, and Pete Garbutt all the way from Australia. We are both sports and exercise chiropractors involved with FICS and Sports Chiropractor Australia for several years, and we look forward to talking about a particular passion of both of ours, and that is running. Just to quote the great man himself from his book, **The Running Machine**. I would recommend having a read of that.

"Running is born out of our inner need to move and breathe and experience all that we are capable of. It is the true expression of life in motion." I love that quote because it pretty much sums up what running means to me as well. As a runner and someone that sees a lot of runners, I think that quote is quite fitting.

Pete Garbutt: Injuries in runners is a fascinating area because we consider running as, by and large, a non-contact sport but we see high injury rates. Studies that are out there show variance between 19% and 92%, and generally the acceptance falls somewhere halfway in between. Fifty percent of runners are likely to get injured and of that, 25% of runners will be injured at any one time. Now, that is a lot of people, that is a lot of people injured. Particularly considering how many people run. Then when you consider that those that are injured are then 50% more likely to be reinjured, we start to see patterns occurring within running, which initially a lot of people take up for health. It starts to put quite a shadow over this sport or this activity that is designed to be health related.

Let us have a look at some of the things that might lead to that. We say running is a non-contact sport but each time your foot hits the ground, it's absorbing about two and a half times your body weight. If you are an average 70-kilo athlete, that is 175 kilograms every time the foot hits the ground. Now, if you consider somebody running several kilometers, the average is always going to make 1,000-foot strikes per kilometer. 10,000-foot impacts per 10 kilometers. Start to do the math and you see that it may be a non-contact on other bodies, but we are making a lot of contact with the ground and absorbing a lot of force through there.

Luke Nelson: Going on from that load that Pete mentioned, this is a term that I have learned from Pete Garbutt, rather than classifying injuries as overuse, which implies that something's being used more, "which is overload injuries". The vast majority of injuries that you are going to see in runners are overload injuries. There are very few acute injuries that you'll see, such as an ankle sprain, a soft tissue in the calf or hamstring. The vast majority of them are going to be an accumulation of load over a period of time, an overload on a particular structure. By far and away, the biggest injury area that you'll see in runners is at the knee. That is up to 50% of injuries around the knee. Then, some are scattered throughout the lower limb: the ankle, the feet, and the lower leg, and some proximally, a few injuries up around through the hip, the thigh, and the back.

When you are dealing with runners, most of the injuries you are going to see are from the knee down. This is where you need to be good at your management of these conditions. Then if we go through and break this down by types of injuries, again, we see the biggest injury. The biggest type of injury that you'll see in runners is patellofemoral pain, and that is almost 50% of running injuries. Unfortunately, females get the short end of the stick there. They are more prone to developing this condition, at 62% in miles of 38. Then if we have a look at some of the other common injuries, you'll see medial tibial stress syndrome or sometimes classified as shin splints, plantar heel pain, and Achilles tendinopathy, which tend to be tendon-related pains. Tibial stress fractures are always a nasty one to deal with, and females, again, being at the short end of the stick are more prone to 70% of tibial stress fractures. With ITB, again, females are more prone to those injuries there.

Pete Garbutt: When we look at the cause of injury, and when you have got stats like that and the numbers that we have already spoken about, we want to know where they are coming from. The trouble is when we

are dealing with the human body and its interaction with the world around it, we are not dealing with the same contact injuries you might see in other sports. We have got quite a multivariate area of ideology for these injuries so we start to look at the genetic structure of the athlete, the mechanics, the way they are moving, their training loads, the tissue qualities, and the psychology, all of these things interact to create a load on this athlete, that is how we get to manage that and see how these loads are affecting the body that might give us a clue into what we might need to look at. If we put it in a seesaw-type relationship, on the one side we see what the stresses are, and on the other side is our capacity meant to manage those stresses. Basically, when this gets out of balance, we believe that injuries start to occur.

Traditionally, a lot of the research starts to look at things such as volume, intensity, and frequency. Other stresses to consider within this side as well, are the recovery. We know that to build any strength, muscle, endurance, or any sort of fitness, we need to have, essentially, insult to the body that we need recovery. The recovery phase is where we do the building. If we are not sleeping properly and nutrition is not up to it, then these stresses become a greater risk for the runner. Psychosocial factors also. Some papers that came out a couple of years ago from the IOC spoke quite specifically about the psychological load that creates stress within the body. This is one that we are just starting to recognize. It's certainly one. If you guys are coming out of the COVID world, this psychosocial stress is certainly one to consider in the athletes coming back. Our capacity is what we can take, how is our resilience in different areas, how's our resilience within our mechanics of how we are running, our previous injury profiles, as we have mentioned, wherever we got our training load up to, and how are we able to manage the different stresses. Looking at the runner, not so much as a point of injury, but how are the scales being balanced may help us to manage these runners in a more holistic way.

Luke Nelson: If we have a look at some of the risk factors, and there has been a lot of research that is investigated this, you will see there is some conflicting research that is looked at this, if we have a look at gender firstly, we sort of force that some of those injuries are more prone in females. In terms of other risk factors, consistently females have been shown to have an increased risk of stress fractures throughout the lower limb, but other injuries are not necessarily so, and there is some debate over that.

Age is also debated about being an independent risk factor. We know that a previous injury is an increased risk factor. We have mentioned before that there is a 50% increase there. As you go through age and more running exposure there is more likely to be an injury. You are more prone to have a subsequent injury, but age is not necessarily a risk factor. With age there comes a challenge of sarcopenia, losing muscle masses as we age so that is something that we do need to consider, otherwise, there may or may not be involvement there.

Then, we look at anatomy. This is something that I think a lot of us have been guilty of in the past: Looking at someone's anatomy and blaming that for their injuries. There is a great infographic here done by Tom Goom, in the Running Physio. He looked at things, looked at all the evidence regarding static lower limb alignment and running injuries. Those are things like your femoral inclination angle, your pelvis width, your Q-angle, your static foot posture, which is another one that quite often gets blamed on having a pronated foot, leg length discrepancy, and hip anteversion. There is no strong evidence to support all of these things in contributing to injury.

The fact that the patient in front of you may possess one of these things does not necessarily increase their risk of injury. Even if they were to possess some of these things, there is not a lot that can be done about that structure anyway, so don't put a huge emphasis on this. Obviously, in things like leg length discrepancy there can be if there is a very large discrepancy, we are talking about sort of 2 centimeters, there can be some increased injury risk. Static foot posture is not reliable, just to look at the foot posture in a static position. Foot pronation, there is a lot of debate in the podiatry world about what is overpronation, and whether pronation is normal. We do need it as part of normal shock absorption but what is abnormal there? Static lower-limb alignment is not great for determining someone's injury risk.

Pete Garbutt: let us go on to the extrinsic risk factors. Those are the factors that are not within your body and things that we may have a greater chance of managing. There has been a lot of study on this. Different training variables such as distance, frequency, duration, and intensity have all been studied heavily. It is interesting

because when you have a look at the literature and when you have got a lot of papers, they start to make some nice meta-analyses, which then come together and basically tell you not a great deal. Whilst one paper may have shown things specifically, or trends of one certain way, we see a lot of that dropping out once we start to bring the larger multi-study assessments.

What is starting to come out, we believe, is that there might be more of an impact on the sudden change of load rather than any of these specific variables on their own. Certainly, work at the Australians you support, from the acute chronic workload ratio is one that speaks to that where the various workloads can be incorporated, and it is the change that is the big difference. Stretching or warm-ups have been contested for many years. The research doesn't give us a lot of clear indication there.

Very much what I tend to do in my clinic, and I think that you might as well, is to look for more of a patient-tailored approach to these things because whilst the research is not particularly clear we know that some people do well with a warm-up, some don't need a warm-up at all. So, we need to be looking at the patient and how that is managed there because the research does not support one or the other. BMI gets thrown around a lot. It is a handy measurement but not always a meaningful one. Certainly, in running, one of the things that we see coming through is the BMI, in it on itself, is not one of the extrinsic factors that we can rely upon to determine whether someone is going to have an injury or not.

Extrinsic factors we might look at are shoe wear and orthotics. Here is an interesting one. There is no actual research out there that suggests that any shoe can prevent any injury whatsoever, although it's quite often why people will be heading to the shoe store. What we do know is that at least from some of the studies, it looks like if you are wearing shoes that are more worn than others, then that may be one of the contributors. Orthotics sway both ways. The Van der Worp study in 2015 demonstrated that there was a greater incidence of injury in those who had orthotics, but whether your orthotic is in there because they had injuries or were the injuries because I had orthotics was very unclear. So, again, we are left without a clear definition. One of these we do know, though, is that there are no specific shoes for any injury, and even shoes with specific foot types do not tend to guard you against injury.

I have looked at running surfaces. lots of research and lots of different theories on the different surfaces that we are on. Is it safe to be on a soft surface or a hard surface? A hard surface, meaning that the stiffness coefficient is more in favor of the ground, therefore, the body doesn't need to do as much work. The trend that I believe we see is more about the durability of the surface or very much being prepared for the surface. If you are going to race, prepare for that surface. Do not try it on the beach and expect to run a marathon on the road.

Running technique is an exciting area. It is certainly an area that Luke and I have done a lot of work in over the last nearly 10 years now. We are seeing trending towards running technique having certain commonalities as far as ways that we can help to correct injuries or injuries start to develop. That includes a whole bunch of things from where the foot's landing in relation to the body, or your cadence to the position of the body, and posture, and so forth. This is a trending area of research rather than an established area. Certainly, the technique is probably one of the more reliable areas.

Impact forces are another one where there has been a lot of discussions around. You better do from ground reaction force to braking forces. Some of these come down to pure physics. We can show an increased load in certain areas. When we look at impact forces, maybe it's the speed at which they are coming rather than the actual overall force that we are looking at. One of the things that has come into the discussion more recently is vibration. Is that part of the injury force that we are taking? These are areas that we need to watch, we need to do more research on. For your extrinsic factors to be a little bit more noteworthy, I would be looking towards the running technique impact forces as where we want to look for future solutions to running injuries.

Luke Nelson: If we have a look at some going on and discussing a little bit more detail about the training variables that are mentioned before being a risk factor, what we found from Rasmus Nielsen's 2013 study is they looked at a whole heap of running injuries. We can classify a large percentage of them into either being

more running volume-related or running pace-related. What that means is that volume tends to be your weekly mileage or your total weekly amount of what you have done. Whereas the pace tends to be more the speed at which you have run relative to your aerobic pace. What they found was that those injuries that were more related to running volume, large amounts there, are more knee-based injuries, so your ITB, your patellofemoral pain, and your patellar tendinopathies. Whereas those injuries that were more related to running pace were more the lower leg, so your calf, your calf-Achilles complex, and the plantar fascia.

What that means clinically is that when we are seeing someone present with one of these injuries, potentially, in terms of returning them back to running, we can then direct them to one or the other. If we have got someone with patellofemoral pain and we know that it is probably more related to running volume and that can potentially upset that, then we might get them not increasing the volume so much but increasing some speed early. Conversely, on the other side, if we have got someone with an Achilles tendinopathy and we know that it's more related to running pace then we can work on keeping the pace low, to begin with, nice and slow, but build their volume before adding a pace later on. Pete Garbutt has also an observation on this study as well, on these injuries.

Pete Garbutt: This is a great study. I had the privilege of chatting with a couple of the authors shortly after they published this. At that time, pretty exciting to have something there that we can put in, as you say, with helping a runner stay active. Maintaining that fitness when you are coming through an injury is exciting. If we have a look at the two sides there, what are your thoughts regarding the type of structures we got on each side? On the running volume side, we very much wear around the knee. My thoughts were that they are very much a load-accepting part of the body. The structures where we are looking at the calf, the Achilles tendon, the plantar fascia, I classify the Achilles and plantar fascia as essentially one continuous structure--they are more propulsive. Is this something that might be of use, do you think, when we are starting to look at our athletes in this area of mine?

Luke Nelson: Yes, absolutely. I think as Pete Garbutt pointed out; the calf-Achilles complex is predominantly almost exclusively involved in that propulsion. Whereas, as Pete Garbutt said, the knee-based structures and around the quad are the structures that are involved in that load acceptance phase, that initial ground contact. It is involved in all those things throughout the whole phase of gait. If you look predominantly at what's involved and where then you may be looking at things like, for the knee, you might be looking at that initial load acceptance phase of their running and potentially analysis of their running technique and see what's going on there, things such as overstride or increased vertical oscillation, those sort of things, or lower cadence which we know alter that knee load.

On the other side of that, we might look at things in the calf-Achilles complex. Look at the terminal stance phase, anywhere from sort of mid-stance to terminal stance. In that mid-stance phase, are we seeing a lot of sloppy and knee-over-toes type of movement and then poor propulsion out the other backside potentially not coming off, pushing off through that big toe? Maybe they are rolling off through the outside of the foot. I think that is where we can start to marry some of these things together.

Whilst we mentioned before in those risk factors, maybe looking at a population as the whole they are not significant but when you start to get the individual in front of you, then all those things do need to be taken into consideration because that leg length discrepancy may be involved in that runner. I think it's something that we do look at. That is where I think we, as chiropractors are quite uniquely placed here, that we look at the individual as a whole addressing all these things together to work out why a particular injury has occurred.

Pete Garbutt: What an exciting area to be involved in right now when we see these different factors coming through in the research. Now, as Luke Nelson pointed out, in the area that we study specifically we can start to bring into looking at the runner areas that we are comfortable with that we start to marry with the new research provided.

Luke Nelson: That brings us to the conclusion of our lesson. I hope you enjoy the remainder of the content on the online FICS portal. Thanks very much, and I hope to hear from you soon. [END]