

Newsletter

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Load Management in Sport

<https://www.premax.co/au/blog/load-management-in-sport>

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If you watch your fair share of sport, you may have heard the commentators talk about “getting the player’s load right” or “monitoring player loads” when discussing a player’s training regime, especially when coming back from injury.

What they’re talking about is the concept called Load Management, and although Load Management does have a very strong presence in the elite sporting world, it is an area of contemporary sports physiotherapy practice that is absolutely relevant to everyone – all the way from the elite athlete to the weekend warrior to the sedentary office worker. Load Management is even applicable to middle-aged, balding, average-looking sports physiotherapists like me!

What I want to share with you in this blog is my own personal story of Load Management error; after I sustained an injury when I didn’t monitor my training loads very well.

But first things first, let me discuss what Load Management is..

Before I get too carried away, I must admit that Load Management can be a very complex and complicated topic. For the purposes of this blog, which is aimed at a very broad audience of both health professionals and non-health professionals, I’m going to keep this very basic. If however, you are after something a bit more juicier, I highly recommend reading anything from [Tim Gabbett](#) or this [blog](#) by Tom Goom (The Running Physio).

Now, the reason why health professionals are so fascinated by Load Management is that once you know what your training loads are, you can use this information to your advantage to reduce the risk of sustaining a FUTURE non-contact, soft tissue injury (think calf/hamstring strain, achilles tendon pain). Pretty cool huh!?

So what is “Load”, and how do we measure it? In a nutshell “Load” is broken down into 2 variables – external load and internal load.

- External load - eg. distance run, distance walked, weight lifted, kms cycled/swam, repeated sprints/jumps
- Internal load - eg. heart rate (HR), rate of perceived exertion (RPE) and/or well-being scores.

Great! But how do we measure it? So, every time you go out for a run, or go to training, or play your chosen sport, you can measure your load – without any fancy equipment mind you – by obtaining a “Sessional RPE” score.

To work out your “Sessional RPE” score, you simply multiply your training session time (in minutes) by the intensity of the activity you have performed (RPE). Note: the RPE scoring system ranges from 1-10; with 1/10 being considered “watching TV”, and 10/10 being “maximal effort exercise”. See table below for a more detailed overview of RPE scoring.

RPE Scale	Rate of Perceived Exertion
10	Max Effort Activity Feels almost impossible to keep going. Completely out of breath, unable to talk. Cannot maintain for more than a very short time.
9	Very Hard Activity Very difficult to maintain exercise intensity. Can barely breath and speak only a few words
7-8	Vigorous Activity Borderline uncomfortable. Short of breath, can speak a sentence.
4-6	Moderate Activity Breathing heavily, can hold short conversation. Still somewhat comfortable, but becoming noticeably more challenging.
2-3	Light Activity Feels like you can maintain for hours. Easy to breathe and carry a conversation
1	Very Light Activity Hardly any exertion, but more than sleeping, watching TV, etc

Image: RPE Scale

So here's a Sessional RPE example – if you had a hard 60-minute training session, which you scored it as a 7/10 RPE; you would have 420 units for the day. If you did another 4 training sessions like that over the course of one week, you would have accumulated a weekly training load of 2100 units (5x 420 = 2100). This is what we call your ACUTE training load.

Now when it comes to Load Management, we're also very interested in what your CHRONIC training load is too. How you calculate CHRONIC load is by calculating the average of what you have done over the last 4 weeks. See below for an example:

- 1 week ago: 2200 units
- 2 weeks ago: 2000 units
- 3 weeks ago: 2500 units
- 4 weeks ago: 2200 units
- CHRONIC load = $2200 + 2000 + 2500 + 2200 = 8900$ units/4 weeks = 2225 units

So now that you have your ACUTE training load and your CHRONIC training load, you can do something pretty cool to determine your risk of future non-contact, soft tissue injury. What you do is divide your ACUTE training load by your CHRONIC training load and you'll get a number. This is called your ACUTE to CHRONIC workload ratio (ACWR). Let's use the current examples we have already used..

- 2100 (ACUTE) / 2225 (CHRONIC) = 0.94 ACWR

Now when it comes to ACWR, 0.94 is a good number to have, as research will show consistently that there is a "safe zone" for reducing the risk of injury that is a score that lies between 0.8 – 1.3. See table below, and notice the "sweet spot" green zone that corresponds to this 0.8 – 1.3 range:



Image: The Safe Zone & Danger Zone (Gabbett, 2015)

What you don't want however is a score above 1.5, as this carries an exponential increase in injury risk. This is clearly demonstrated by the big thick red bar that corresponds to the "danger zone" of increased risk of sustaining a future non-contact, soft tissue injury. This range is typically a score of greater than 1.5 and above, and is commonly referred to as a "spike" in training load. Spikes are commonly seen when you return to intense exercise after an extended period of time away from exercise due to another injury, illness or holiday (or laziness).

A common clinical "spike" scenario different to what I just mentioned is when people go travelling overseas, and all of a sudden start walking a significantly more amount to what they are accustomed to. It's a very subtle spike in a load, but a spike nonetheless, and I see a lot of middle-aged males and females presenting a week after returning from an active holiday with hip, knee or heel pain as a result of their increased steps.

This happened to me just recently and here is my story..

My family and I just recently visited San Francisco for 10 days. My wife had a 4-day conference, and despite my better judgement of travelling half way across the world with an infant and a toddler, I decided we should all pack up and have a family holiday doing as much as we could as a family in the first 5-6 days before the conference started.

So if you are familiar with San Francisco, you'll know that it's not exactly the flattest of all cities. Steep hills that go for literally miles, that also seem to lie on 45deg gradients are common sights all across the downtown area. If you're also familiar with the area, you'll also know that public transport with a pram, an infant and a toddler isn't that much fun. If you're also familiar with infants and toddlers, you'll also know that they aren't the keenest of all walkers.

So you can probably imagine what I'm getting at here. There was a lot of walking in San Francisco. There was also a lot of walking up and down very steep hills. There was also a lot of walking up and down steep hills in San Francisco either pushing a pram with a 10kg baby, or piggy-backing a 16kg toddler on my shoulders.

Seven days into the trip, I woke up BLOODY sore all over. But especially in and around my left knee cap, and made worse by going and up downstairs. Intuitively, I knew what was wrong (patella-femoral joint pain) and why (lots more walking than usual with a small child on my shoulders). But little did I know how much more walking I had done until I looked at my smart phone health app.

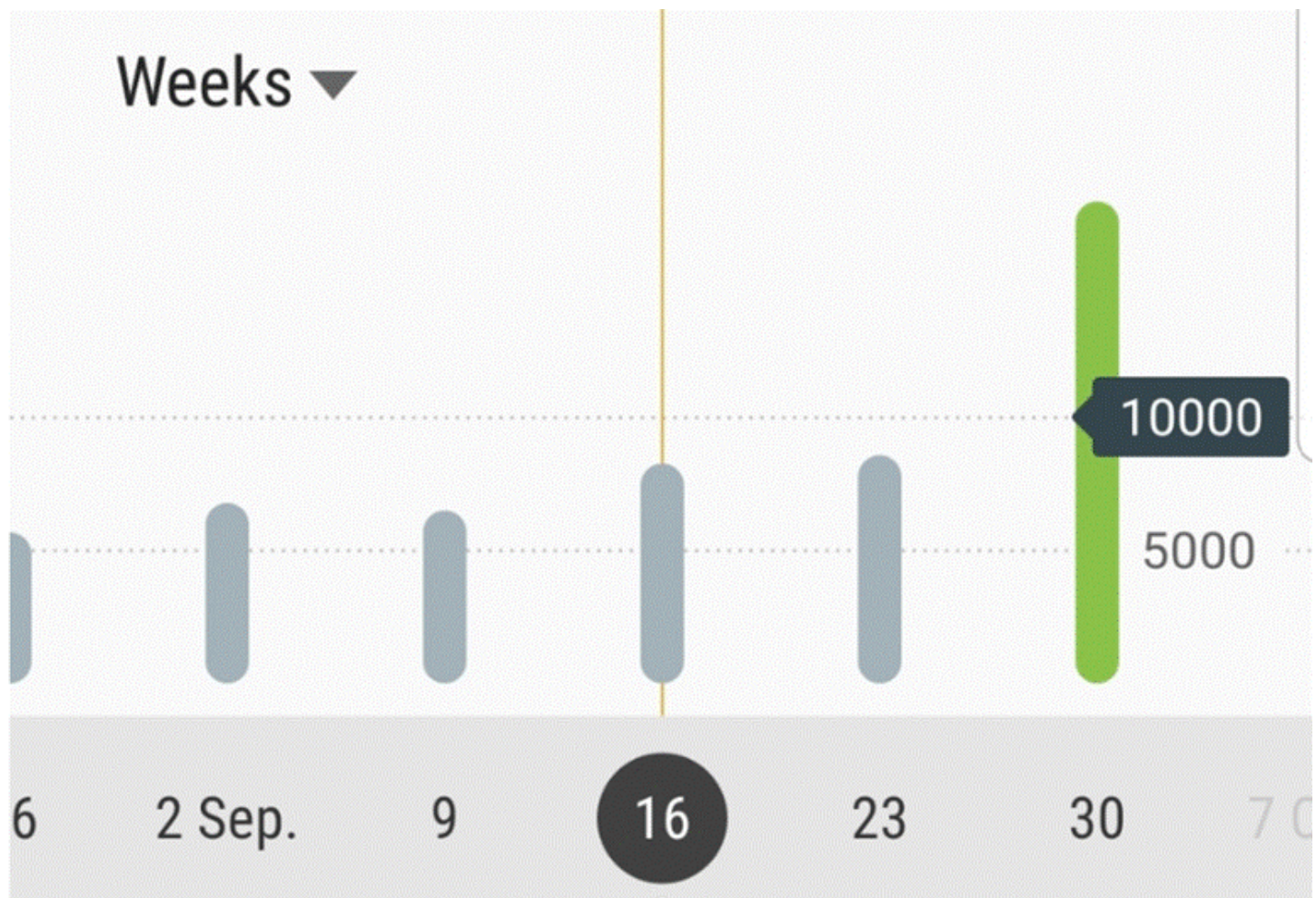


Image: A spike in my workload

I was taken aback when I saw this graph of my average weekly steps and immediately thought of the ACUTE vs CHRONIC workload ratio. As you can clearly see, the 4 weeks leading up to my family holiday were reasonably active (CHRONIC load = 7500 daily steps), but nowhere near as active as the first week of our holiday (ACUTE load = 18,000 daily steps).

When I calculated my ACUTE to CHRONIC workload, I was certainly in the "DANGER ZONE" and not at all surprised I was feeling like an 80 year-old man.

- $18,000 \text{ steps} / 7,500 \text{ steps} = 2.4 \text{ ACWR}$

NB: Although this does not specifically look at total time spent walking and RPE as per the traditional model of looking at workloads, I do feel that looking at total number of steps in a day is an objective measure and a good real-world example of exercise/physical activity that could be used by clinicians to look for "spikes" in load and potential contributing factors to injury.

So like the good physio we all should be, I didn't catastrophise the situation and rush off for any imaging. I also didn't do one VMO setting exercise, nor one clam shell exercise. And I certainly didn't look to buy a foam roller on my trip and roll my "tight ITB".

No, I simply realised that my left knee issue was a product of being poorly prepared for the demands of our holiday, and decided the last 3 days of our trip to take it easy on the walking and carrying small children and to let my knee settle. Like any good parent, I also got my 1 year old son and 3 year old daughter to take it turns of getting me ice (cold beers) from the fridge, whilst we all chilled and laid back relaxing by the poolside!

So there you have it; Load Management in a nutshell, and case study of how physiotherapists aren't immune to common injuries when they're not being careful!

I hope you have enjoyed this really interesting and emerging area of sports physiotherapy practice, and learnt something new. Here's a couple of very valuable take home messages from today's blog:

- Load Management is not just for elite athletes; everyone can work out their weekly training loads so that you can avoid "spikes" in training/exercise so that you have a lowered risk of picking up an injury that disrupts your training or exercise program.

- If unavoidable spikes do occur during your training, don't panic as injuries aren't often felt until 7-10 days after the spike. Simply reduce the training loads over the next 1-4 weeks to get your training loads back into the "sweet spot".