The 'need to know' of Strength & Conditioning for Rehabilitation

by Dr Claire Minshull

Rehabilitation & Conditioning Specialist

The aim of this document is to give you some of the best, *evidence-based* information from which you can construct *effective* muscle resistance conditioning / rehabilitation programmes for your patients to achieve *specific outcomes*

You will be able to transform 'okay' or ineffective rehabilitation programmes into specific, super effective strategies that achieve the outcomes you want.

This download answers the following questions posed by *actual* physiotherapists:

What are the top 3 principles in strength and conditioning for physiotherapists?

Should we move away from 3 sets of 10-12 reps?

Resistance training is a BIG topic. It seems each week a 'new' form of training or recovery is invented or re-designed and presented as the next best thing for aspiring athletes, or those recovering from injury. It's easy to get caught up in the hype and the headlines, especially when you already have a full-time and demanding job and time pressures from patients to get them back to normal ASAP!

What I wanted to do here was provide you with some fundamental and critical information from which you can start to design effective resistance training programmes, to achieve different and specific outcomes.

I'm asked frequently about the effectiveness of blood flow restriction training, potentiation complexes and other more involved and often resource heavy protocols. My response is firstly we need to get the basics right. It's tempting to look for things and technologies to accelerate outcomes, and in truth, they may exist, however, we need to get the basics right first. If we overlook this bit, we're not likely to see the gains in our patients that we're trying to effect, no matter how brilliant the new science!

I reckon at least 80% of a programme's success is doing the basics right, so, just for now, let's forget about things like occlusion training. Understand these following principles, which have been proven time and time again in the scientific literature, apply them to you rehab and you won't go far wrong. Then we can layer on the other things! :-)

I hope you find the following useful!

Claire

Director, Get Back To Sport

1. Top 3 principles of S&C you need to know

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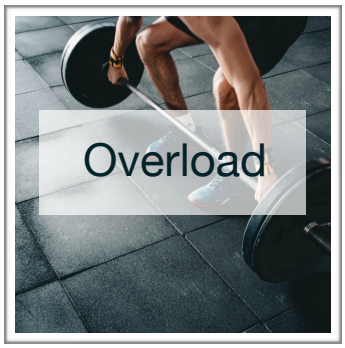

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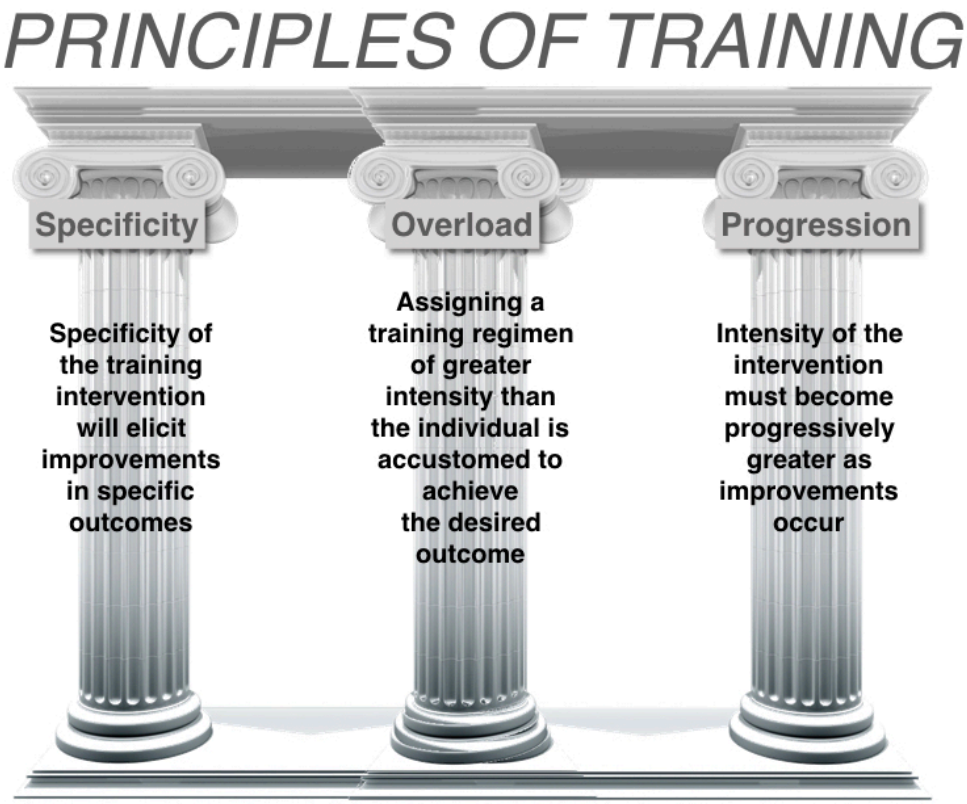
These are collectively referred to as the *Principles Of Training*[1] and they should form the starting point from which any rehabilitation plan is developed.

The *principles of training* will determine the efficacy of your intervention (achieving the outcomes that you want to achieve) and will help you develop your specific goals. They will enable you to transform generalised 'okay' or ineffective rehabilitation programmes into specific, super effective strategies that achieve the outcomes you want.

Figure 1: Principles of Training



Minshull (2019; in press)

What do these principles mean?

"The **Specificity** of the training programme will elicit improvements in specific outcomes"

This principle is really useful as it will force you to decide *exactly* what you want to focus on. So the question to ask yourself here is:

"What do you want to achieve with your patient?"

As a guide, from a muscle rehabilitation perspective, we can categorise muscle performance, or function into broadly 3 types:

1. Muscle Strength
2. Muscle Power
3. Muscle Endurance

When you're you've answered the above question, you then need to ask yourself:

"When in the rehabilitation programme do you want to focus each index [strength; power; endurance]?"

"By how much do you want each index [strength; power; endurance] to improve?"

There isn't a single magic exercise that will improve all three of these things optimally. So it's really important to be specific about what we want to achieve, when and by how much to maximise the effectiveness of your rehabilitation programme and achieve the desired outcomes with your patient; specificity is important! It's better to do one thing very well than several things poorly

"**Overload:** Assigning a training regime that is of greater intensity than the individual is accustomed to achieve the desired outcome."

You need to create a load that's commensurate with what you want to achieve, whether that be strength, power or endurance; one that's greater than the person is accustomed to in order challenge the appropriate system to adapt.

Here we're talking about the *load*, or *resistance*, and the *dose*, that is sufficient to bring about the improvements in that specific outcome.

For example, assigning the right load, repetitions and exercise frequency to rehabilitate strength is very different to that required to rehabilitate muscle endurance, or power.

"**Progression:** The intensity of the intervention must be come greater as improvements occur."

Plan to succeed! If you get the first 2 principles right: Specificity and Overload, your patient will start to make improvements - hurrah!. To account for this you need to make sure you progress the programme/exercises over time, if you don't, improvements will quickly stall. This is a common failing in many rehabilitation programmes.

For example, giving a patient an exercise whereby they lift a heavy load for only a few repetitions will train/rehabilitate muscle strength. Progression of this exercise is NOT increasing the number of repetitions as this will lose the specificity of the exercise. Here the *load* needs to be increased to continue to provide that strengthening stimulus.

So if your patient comes back to your saying they can now perform 20 repetitions of the exercise your given them, when they started at 5, you've missed a trick!

Fear not, if you're unsure of specifically what weight, how much load and how many repetitions, I will cover exactly this in the upcoming webinar.

2: Move away from 3 sets of 10-12..?

Should we move away with 3 sets of 10-12? **Yes**!

Okay, some may argue that 3 x 10 is effective and that it's what you've been taught. But, there are so many things wrong with this. For me 3 sets of 10 is useful when:

1. familiarising tissue to accommodate load (which would be in the acute phase of rehab)

OR

2. when you stipulate lift to failure, and even then we can do better

One of the reasons why I think we should move away from this type of prescription is that it's become automatic. I see it so often in busy practices where the volume of patients is high but time is limited. It's easy to give out a pre-prepared exercise sheet that prescribes 3 x 10 without giving much thought to the specificity of the intervention (exactly what do we want to rehabilitate?).

Furthermore, not only might the dose of exercise be sub-optimal, there's probably little thought given to the patient's capacity and to individualising the prescription. 3 sets of 10 repetitions will do different things for different people with different baseline physical capacities, and in some you could argue it won't be effective at all, especially if the load isn't adequate.

So, coming back to *specificity* - we need to provide the correct exercise prescription and the manipulation of reps / sets / intensity to achieve this. As we'll learn in the webinar, 3 sets of 10 repetitions isn't really all that useful in the training of strength.

To achieve specific resistance training goals, we need to select the optimal number of repetitions per set AND the load.

HOW?

The strength-endurance continuum of resistance training[2] is really helpful here. Scroll down.

The figure is a bit busy, I know, but focus on the **Repetitions Maximum Continuum** bit first. The numbers indicate the intensity of the exercise: 5 RM = a load that can only be lifted 5 times; 12 RM = a load that can only be lifted 12 times (safely and with correct form), and so on.

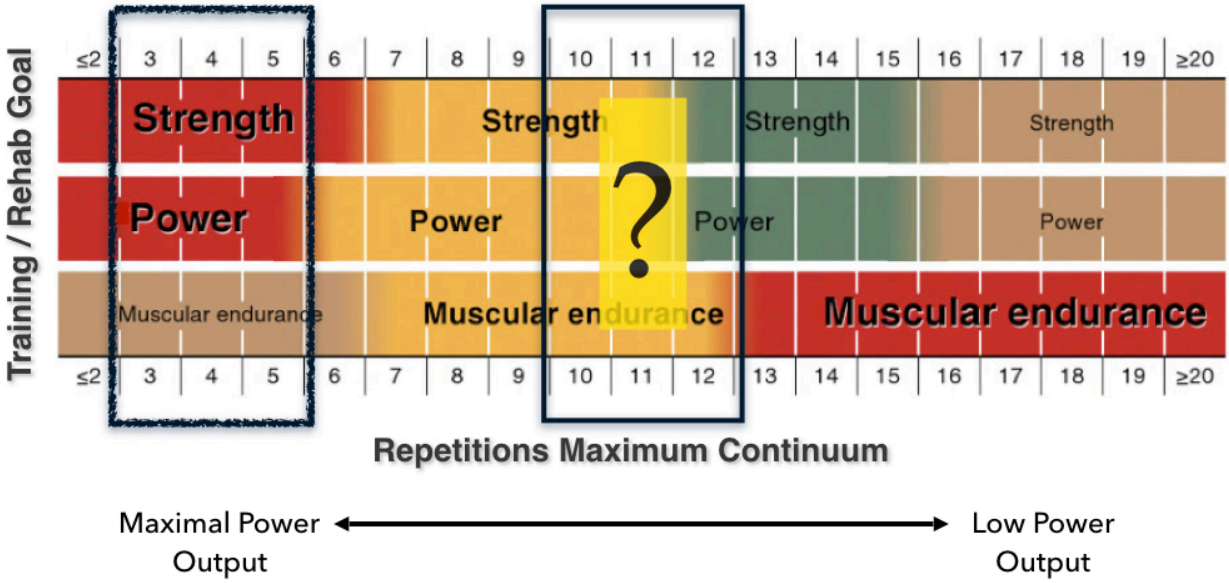
The numbers that run from left to right refer to Repetitions Maximum (RM) - the maximal number repetitions that can be performed.

LOOK HERE!

10-12 reps sound familiar as an exercise prescription?

We can be far more effective than this, and we're probably wasting time and effort.
10-12 reps doesn't condition any aspect of muscle performance very well!

Figure 2. The Strength-Endurance Continuum of Resistance Training



Adapted from Baechle T, Earle R, (2008). Essentials of Strength Training and Conditioning-3rd Edition. Human Kinetics Champaign, Ill & Fleck SJ, Kraemer WJ. (2014). Designing resistance

Now look at the size of the text: **Strength**; **Power**, **Muscular Endurance**. The LARGER the size of text, the LARGER the training stimulus at that corresponding intensity. So, if we look at 10-12 RM, where I've placed the question mark, we can see that we're not really maximising any training stimulus. We can be far more effective and get far better results by not blindly prescribing 3 sets of 10, even if we do work to failure.

Decisions on repetitions:

Once you've decided which aspect of muscle performance you're aiming to rehabilitate, you can assign the number of repetitions your patient should perform by using the Strength-Endurance Continuum!

Don't forget, however, the load should be heavy enough so that they cannot perform another repetition once they get to the desired number (the repetitions-maximum principle). So if you want to improve strength, you should assign a rep range of 3-5RM, meaning your patient is unable to lift the load for a 6th repetition (safely & with correct form)

MUSCLE STRENGTH

Want to improve muscle strength?

3-5RM is the optimal training load to achieve this.

That's heavy!

** These guidelines are intended to be used when it's clinically appropriate to maximally load tissue and do not replace clinical judgement **

Don’t Forget, Measure the Outcomes

Finally, don't forget to monitor your patient’s progress. There are a multitude of ways in which you can do this, and you may have your preferred method. Measurement is a topic in itself. I’ve published several scientific and peer-reviewed articles on measurement precision, reliability and reproducibility, however, distilled down, it’s important that you establish some standardised markers to judge the efficacy of your intervention (assuming the patients adhere!).

For example, for strength testing, there are a range of options, from instrumented dynamometry, through to more pragmatic solutions that require few resources. If you have access to a dynamometer, take measures at baseline and at set time points, perhaps every 4-6 weeks during your programme, depending on the outcome goal. Use standardised protocols that minimise the intrusion of error and variability.

If you don’t have access to a dynamometer, a more pragmatic approach is to use an exercise that’s a part of your patient’s programme. For example you could use the 1RM on a fixed resistance machine as your marker for progression. This isn’t often possible with symptomatic patients, so why not use the 3RM or 5RM…? At least then you’ll have a marker of the % improvement over time (i.e. how much more weight could the patient lift for 3RM?).

Summary

The information provided here provides you with a great starting point to maximise the effectiveness of your rehabilitation programmes.

There's so much more to cover, like the sets, frequency and dose of resistance training, adapting exercise to accommodate clinical conditions and pain, types and volume of muscle work and more. I'm really looking forward to covering this in future webinars. and courses.

In the meantime, here's a checklist and summary of what we've covered to guide your programme design:

Checklist

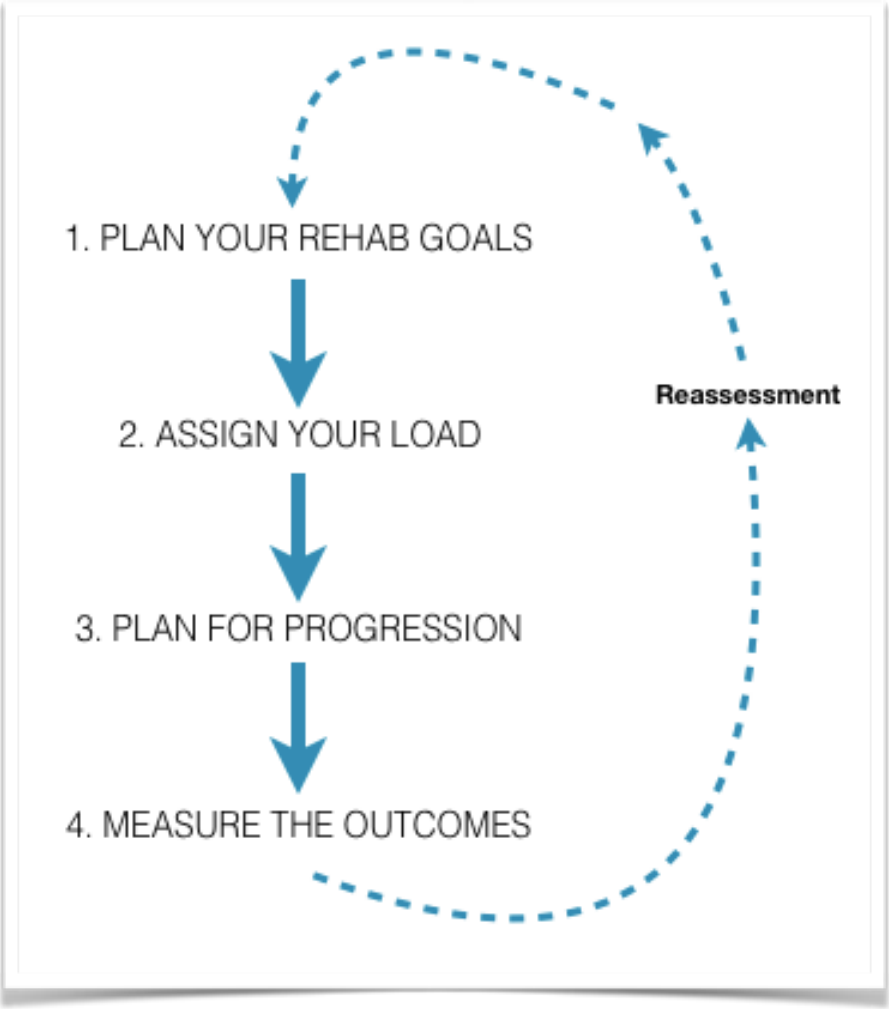
1. Refer to the Principles of Training when you start to construct a rehabilitation plan to determine:

   - Specificity: What do you want to improve/rehabilitate?
   - Overload: The training stimulus (reps, sets, load) you need to assign to make these improvements
   - Progression: plan for improvement, include follow-up measures, how will exercises progress etc

2. Use the Continuum of Resistance Training to achieve the correct training load

3. Measure and monitor your patient's performance so that you can progress the prescription accordingly

THE WHOLE PROCESS



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