PAIN DOES NOT ALWAYS INDICATE INJURY

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These days it is understood that for most chronic pain, ongoing nociceptive triggers are rare. Instead, therapists have to treat a much more complex mix of central sensitisation, anxiety and fear of pain. This involves having a thorough knowledge of pain neuroscience as well as biopsychosocially-driven pain management strategies. This article will allow you to start by understanding your patient before educating them to understand their pain and then to deliver a graded cognition-targeted exercise therapy plan to free your patient from their fear and limitations of chronic pain. Read this article online https://bit.ly/3pweyZI

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We currently live in an age of fear. For many of us (luckily) it's not necessarily to the extent of war, crime, abuse, poverty or safety; but a daily onslaught of fear of illness, disease, acceptance, integration, success or failure. From a health and safety perspective there is a constant assault of reminders (be it from media, parents or community figureheads), such as: Do this, Don't do that, Eat this, Wear protective gear, Be careful here, Mind your step there, etc. This is generated under the guise of protecting us, keeping us healthy, preventing injury or illness, and living a better life. However, it has also created a society of fear, anxiety and pain catastrophising.

Pain catastrophising is when one has a group of negative emotional and cognitive responses to pain, and is thought to be made up of three aspects: helplessness, magnification and rumination (1*). Pain catastrophising has arisen as one of the strongest psychological predictors of poor pain outcomes and has been repeatedly associated with increased sensitivity to pain, increased risk of persistent pain, heightened pain intensity and severity, increased disability, and higher levels of psychological distress and depressive symptoms (2*). A review by Sullivan et al. showed that pain catastrophising accounted for up to 31% of the variance in pain severity (1*). More importantly the connection between pain catastrophising and disability was independent of the severity of pain (1*).

At the core is a group of overlapping fear-related ideas, consisting of fear of pain, worry, rumination, pain-related anxiety, anxiety sensitivity, and the concept of catastrophic thinking about pain and its possible consequences (3*). It results in the development of fear-avoidance patterns caused by a distressing fear of pain during an activity (or even before the activity) in anticipation of what is to come or what may happen as a consequence of movement or activity.

What we do know is that exercise or general physical activity is a proven treatment for managing chronic pain, including musculoskeletal-related pain (4*,5*). It may be almost impossible to 'talk' a patient out of their fear of moving a limb (for example a painful shoulder or flexing their lower back). The main aim of treatment for chronic pain is to increase functioning and enhance goal achievement, for example exposing a patient to movement, tackling avoidance behaviour and patterns, not necessarily reducing their level of fear per se (6*).

A recent systematic review (which included seven randomised controlled trials and meta-analysis) of painful exercises versus pain-free exercises for chronic musculoskeletal pain found that protocols allowing painful exercises offered a small, but statistically significant benefit over pain-free exercises in the short term (7*). The improvements in patient-reported pain were achieved with a range of contextual factors, such as varying degrees of pain experienced (ranging from pain being allowed to advised, with/without a recommended pain scale) and recovery time (ranging from pain subsiding immediately to

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within 24 hours). Painful exercises were defined as exercises prescribed with instructions for patients to experience pain or where patients are told that it is acceptable and safe to experience pain (7*). But how do you get a chronic pain patient to that point of trusting and believing you that some pain during activity is OK? The pain is not causing more damage, your nerves are not tearing, the disc has not exploded, your muscle did not rupture.

Questions you and your patient may have could include:

- What type and intensity of pain is OK with exercise?
- How do you judge a little or moderate amount of pain?
- How much pain would give the best results?
- Is there such a thing as good pain (like during stretching and massage) versus bad pain which is presumably harmful?

Research has shown that patients with chronic pain are uncertain and fearful when it comes to exercising and pain (8*,9*). This will be linked to their pain- and fear-avoidance beliefs associated with their painful condition. Their belief will probably be something along the lines of, "If it's painful it must be making it worse; should I be doing this exercise or activity if it's going to be damaging?" (8*). Patients tend to associate any pain with harm, more trauma and injury. The need for pain to be alleviated or avoided altogether feeds into this pain- and fear-avoidance behaviour. This may have been relevant in a traditional biomedical pain model, but we now know that chronic pain is far more complex than this, and a paradigm shift towards a biopsychosocial model of pain is particularly relevant in the context of performing painful therapeutic exercises (10*).

In the case of acute musculoskeletal pain, the focus of treatment is to reduce or eliminate pain. Thereby reducing the 'activity' of the peripheral pain generators or nociceptive triggers. Pain science has shown that in cases of chronic musculoskeletal pain, ongoing peripheral nociceptive triggers are rare. The clinical and physiological

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picture of pain is generated by a central sensitisation to pain. Chronic musculoskeletal pain conditions including osteoarthritis, rheumatoid arthritis, whiplash, fibromyalgia, low back pain, neck pain, pelvic pain, shoulder pain and lateral epicondylitis are often characterised by brain plasticity that leads to hyperexcitability of the central nervous system (central sensitisation). The concept of this central sensitisation is more widely accepted and understood (although not entirely) (10*,11).

In such cases, musculoskeletal therapists need to think and treat beyond muscles and joints and an image of underlying pathophysiology. Within the context of the management of chronic pain, it is crucial to consider central sensitisation to pain. Modern pain neuroscience calls for treatment strategies aimed at decreasing the sensitivity of the central nervous system (ie. desensitising therapies). However, bridging the gap between clinical guidelines and clinical practice can be tricky and complex with these patients. You, the therapist may need to address:

- the individual's perspective of their condition and pain;
- diagnosis;
- stage of disorder;
- pain features;
- psychosocial considerations;
- work considerations;
- lifestyle considerations;
- whole person considerations; and
- functional behaviour.

The clinician does not need to be an expert in all elements. It is important to have awareness of all elements listed above and how they may impact management and outcomes. A clinician should embrace a team approach to management and refer on to other professionals to help with specific parts of the framework (eg. a psychologist).

Exercise therapy is proposed as a desensitising treatment for chronic pain. Bear in mind that many patients with chronic pain will be resistant to exercising, especially if the exercise is painful. They will often display avoidance and altered movements patterns, and fear and pain memories will all contribute to preventing the patient from performing the exercise or maintaining an ongoing programme. Here we endeavour to describe a step-by-step approach to implementing exercise therapy successfully by addressing the patient's pain behaviours, pain beliefs and pain memories.

STEP 1: Preparation – the Clinician, ie. YOU

The therapist should have certain prerequisites for providing pain neuroscience education and 'cognition-targeted' exercise therapy (11).

1. Therapists need to have an in-depth understanding of pain mechanisms and the dysfunctional central nociceptive processing in those with chronic musculoskeletal pain. This includes a thorough understanding of the role of fear (of movement) in the development and sustainment of chronic pain.
2. Therapists need to have the skills to explain to their patients the mechanism of central sensitisation as an evidence-based explanation for their chronic musculoskeletal pain.
3. Specific communication skills are required. For instance, a Socratic-style dialogue (a form of cooperative argumentative dialogue between individuals, based on asking and answering questions to stimulate critical thinking and to draw out ideas and underlying presuppositions) of education is preferred over 'lecturing' to the patient.
4. Therapists should be familiar (and preferably experienced) with current evidence-based biopsychosocially-driven pain management strategies including graded activity, graded exposure and acceptance-based interventions (eg. acceptance and

commitment therapy).
5. A variety of exercises may be required depending on the individual patient and how they respond. Neuromuscular training may also be an option.

STEP 2: Practical Pain Features

Types of pain include (12):

1. **Nociceptive pain.** This pain arises from actual or threatened damage of non-neural tissue. This is the type of pain most commonly encountered in clinical practice, especially in an acute injury incidence. An example of nociceptive pain is the response that occurs after hitting your leg on a coffee table. Nociceptive pain also includes inflammatory pain associated with disorders such as rheumatoid arthritis.
2. **Neuropathic pain**. This pain is caused by an injury or lesion of the somatosensory nervous system. An example of this would be peripheral neuropathy or radiculopathy.
3. **Nociplastic pain.** This is pain that is caused by altered nociception. There is no clear evidence of actual or threatened tissue injury or damage triggering peripheral nociceptors. There is also no clear evidence of a lesion or disease whereby the somatosensory system would be triggered. Conditions such as fibromyalgia and irritable bowel syndrome fit under this label.
4. **Mixed pain.** It is common to have a mix of types of pain. Central nervous system changes can happen within hours of acute tissue injury. In mixed pain presentations, the clinician should try to identify the dominant type of pain.

A presentation with clear aggravating and easing factors and a stimulus that is equivalent to the response is defined as mechanical pain. In contrast, a presentation where the response is disproportionate to the stimulus and the aggravating and easing factors are unclear is defined as non-mechanical pain.

It is difficult to differentiate between central and peripheral sensitisation in clinical practice. Sensitisation is helpful and normal after an acute injury. Following a sprained ankle an area the size of your hand will be broadly sensitised to avoid further injury to the tissues. Over time, as the injury heals, the sensitivity should normalise. However, in a proportion of people the sensitivity does not normalise even after the tissue injury has healed. Sensitisation may occur in the absence of tissue injury. The presence of sensitisation shows us that the system is too efficient and responding more than it should to a normal stimulus or excessively to a painful stimulus.

A range of factors from local tissue factors to psychosocial factors may be contributing to increased sensitivity; therefore, each patient will require a different management plan. In the presence of increased sensitivity, it is important for the clinician to step back and consider what other factors might be driving this and how they need to modify their management for that individual.

STEP 3: Subjective Assessment

At the start of the assessment it is important to take time to understand the patient's perspective. A patient may present with a complex pain presentation but their primary concern might reflect only one part of it. If the clinician does not take time to understand the patient's perspective, they cannot tailor management around the patient's expectations.

Questions that may help you to understand the patient's perspective include (12):

- What do you think is wrong?
- What do you think needs to happen?
- Do you think you are going to get better?

Explaining that half of people with neck pain have a history of injury but half of people don't have a clear cause may help a patient to start thinking about other factors that can sensitise the tissues and make the nervous system more responsive to the same level of load. These may include factors such as being unwell, poor sleep and high stress levels.

1. The Short Form Örebro Screening Questionnaire

The Short Form Örebro Screening Questionnaire (https://bit.ly/3zhgkCo) covers the key psychosocial domains and may provide additional information during the subjective assessment (13). The information gained from the questionnaire can then be used to guide further questioning and the use of more specific questionnaires. If the patient scores high on the Örebro questionnaire, then a management strategy should be developed from the start and not left until the patient does not respond to treatment.

2. Sleep

During the subjective assessment ask the patient about the quality of their sleep (12). If they are waking, try to identify what is waking them and if they can get back to sleep and how long this takes. If they are having difficulty sleeping, establish what impact this is having on them during the day. A variety of interventions may help with sleep including short-term medical interventions and a sleep hygiene assessment. Reduced sleep should be addressed as this may be the factor that is winding up the nervous system.

3. Beliefs

Beliefs drive behaviour and, therefore, faulty beliefs should be addressed by the clinician (12). Clinicians need to be careful when confronting faulty beliefs as this can result in a backfire effect. This is when someone with a false belief is presented with evidence against their belief and it strengthens their faulty belief.

It may be more appropriate to provide patients with a plausible alternative hypothesis through behavioural experiments. These enable the patient to experience things in a less threatening and painful manner and may help them move down a different treatment path. The use of reflective questions can help the patient to understand how rest or other treatments such as manipulation have had limited benefit to date and how a different approach may be required.

4. Red Flags

It is important to 'triage' and rule out

the presence of red flags and specific pathologies before concluding a patient presents with maladaptive behaviour (12). A patient who has a stress fracture or radiculopathy will need different management to a patient who is limping 3 months after a low-grade ankle sprain. Each body part has specific red flag disorders to look out for such as tumour, infections or trauma. The presence of a single red flag should not automatically increase the clinician's alarm about the presence of red flag conditions. For example, night pain is a red flag but if someone sleeps with their arm above their head this could increase local shoulder symptoms.

STEP 4: Objective Assessment

Assessment in clinical practice should be an educative process. The use of reflective questions such as "What do you think about that?" or "What do you think it means?" can help the patient to start thinking about the situation for themselves. When repeated across multiple tests and related back to their story, the patient may begin to identify other contributing factors. A detailed hands-on assessment can be used to provide the patient with confidence and reassurance. If they present with nerve-related symptoms and have a normal neurological examination the clinician should engage the patient in the physical examination specifically around sensitivity as this will help to improve compliance (12).

The patient presentation should influence how the clinician transitions from the subjective to the objective assessment. If a patient has a subjective presentation of neuropathic pain with pins and needles then the objective assessment should start with a neurological examination. However, if a patient's subjective presentation suggests increased sensitivity and non-mechanical pain then the objective assessment may start with an evaluation of allodynia (pain due to a stimulus that would not normally cause pain) and hyperalgesia (enhanced sensitivity to pain) (12).

1. Hyperalgesia and Allodynia

Traditionally clinicians have used light touch, sharp/blunt and cold testing to identify loss of conduction in the presence of sensory symptoms. However, these tests can also be used to identify heightened sensitivity in areas such as chronic back, neck or shoulder pain (12).

When assessing sensitivity, start on the opposite side of the body on an unaffected area and compare to the affected area. During sensory testing a patient may report increased pain or increased feeling of cold compared to the unaffected area. These symptoms may last longer than the unaffected side or refer over a larger area. There is a big range of normative values so look for different responses within the same person. If increased sensitivity is present during objective examination, then the clinician should establish if this is a helpful or unhelpful response. If deemed unhelpful then the clinician needs to determine what is driving this increased sensitivity. Sensitivity may have developed as the result of the initial injury or because of poor sleep or high levels of distress. Patients with increased sensitivity will often not respond well to manual treatments and do not respond well to forcing through pain. This can wind up the system and perpetuate the pain cycle. These patients may require a different approach, which includes exercise and pacing.

2. Movement Impairments

The majority of patients presenting with acute spinal pain will have a movement impairment (12). Management may target the resolution of the movement impairment, which may involve education, reassurance and manual therapy. The same approach for a patient with chronic spinal pain who has global restriction of movement and demonstrates pain behaviours such as breath holding may make them worse. For this patient, explore other cognitive factors that might be amplifying their presentation, such as sleep, mood or work situation.

> IT IS CRUCIAL TO EDUCATE THE CHRONIC PAIN PATIENT ABOUT MODERN PAIN NEUROSCIENCE SO THEY CAN RECONCEPTUALISE PAIN BEFORE MOVING ON TO EXERCISE THERAPY

3. Impairment of Function

Impairment of functional control typically manifests as disorders that have no impairments of movement but where pain is associated with postural control or muscle activity (12). Management should focus on modifying positions to improve symptoms which may be achieved through exercise.

4. Deconditioning

Deconditioning may present in patients who have avoided an activity and so have lost strength and/or cardiovascular fitness and are therefore not capable of returning to their activity (12). Management involves an appropriate targeted exercise conditioning programme with consideration of whether the reasons behind the deconditioning are helpful or unhelpful.

5. Work Considerations

There is a strong link in the literature between work and wellbeing (12). Work should be viewed as a treatment and not just an outcome. Studies show that the longer people are off work, the less likely they are to return to work (14,15*). The focus should be on getting people back earlier doing adjusted meaningful duties; however, this may not always be appropriate after trauma or surgery.

Key questions about work include:

- How much do you enjoy your job?
- Do you see yourself getting back to that kind of work?
- Are any alternative duties supported by your employer?
- How confident are you on your capacity to return?
- What is your relationship with your employer and other members of staff like?

6. Lifestyle Considerations

The patient may have been a regular

exerciser who stopped due to the onset of symptoms. Exercise may have been the way they managed their anxiety which could be winding up the system. The aim should be to get them doing some kind of activity such as walking or cycling that does not aggravate their symptoms. Provide the patient with reassurance that they need to be exercising again and give them the confidence to start doing so (12).

7. Functional Behaviours

This considers the physical manifestations of an individual's pain experience (12). These behaviours may coexist in some individuals. Using the Musculoskeletal Clinical Translation Framework (https://bit.ly/3hVuFye) mskPain app (https://bit.ly/3bQBBss) can help to identify the relationship of these factors to the patient's presentation and help the clinician to individualise the management for each patient. These tools have been developed by Tim Mitchell, Darren Beales, Helen Slater and Peter O'Sullivan, the Postgraduate Musculoskeletal Physiotherapy Teaching Team, Curtin University, Perth, Australia. Visit their website for further information: Musculoskeletal Clinical Translation Framework (https://bit.ly/3floQIA).

STEP 5: Preparation – the Patient

Before implementing exercise therapy, a preparatory phase implying deep learning and reconceptualisation of pain is proposed. It can be accomplished by providing pain neuroscience education, which should mostly rely on evidence from modern pain neuroscience rather than from psychology. If not, patients often misunderstand the neuroscience education message and believe that they are being told "the pain is all in your head", which is a common pitfall of this approach. In addition, the crucial point in all kinds of cognition-targeted therapy is that it starts from the patient's perspective – including pain cognitions and beliefs and expectations for care (11). There are a number of sites to help provide educational tools in this regard. Pain in Motion (http://www.paininmotion.be/) is but one that offers education for patients and tools for clinicians (https://bit.ly/3iwTIYI) to use in addressing issues of pain memories and fear of movement.

It is critical that the patient understands the role of fear (of movement) in the pain neuromatrix. The pain neuromatrix is likely to be overactive in patients with chronic pain syndromes. Increased activity may be present in the insula, anterior cingulate cortex, prefrontal cortex, various brain stem nuclei, dorsolateral frontal cortex and the parietal associated cortex (11). Long-term potentiation of neuronal synapses, as well as decreased gamma-aminobutyric acid-neurotransmission represent two mechanisms contributing to the overactive pain neuromatrix. A key area in the brain involved in the pain matrix is the amygdala. It is often referred to as the fear-memory centre of the brain, and plays a key role in producing negative emotions (around pain) and pain-related memories (11).

The brain of patients with chronic musculoskeletal pain has typically acquired a protective pain memory, lasting long after the original nociceptive pathology has subsided. For movements that once provoked pain, this implies protective behaviours (eg. antalgic postures, antalgic movement patterns including altered motor control, or even avoidance of such movements) (11). These habits have now become the new normal 'learned' behaviour for the patient. Providing exercise therapy to these patients with chronic pain is crucial to alter their perceptions, experiences and memories of painful movement patterns. Essentially, this is re-training of the amygdala.

Kinesiophobia, or fear of movement, is seldom applicable to all kinds of physical activity, but rather applies to certain specific movements (eg. neck extension in patients post-whiplash, overhead smashes in patients with shoulder impingement syndrome, or forward bending in patients with low back pain). Even though these movements provoked pain in the (sub)acute phase, or even initiated the musculoskeletal pain disorder (eg. the pain started following an overhead smash), they are often perfectly safe to perform in a chronic stage. The problem is that the brain has acquired a long-term pain memory, associating such movements with danger/threat. Even preparing for such 'dangerous' movements is enough for the brain to activate its fear-memory centre and, hence, to produce pain (without nociception), and employ an altered (protective) motor control strategy (11). The role of exercise therapy may therefore be to expose the patients body (and mind) in a safe controlled environment – 'without danger.' This is explained further below.

STEP 6: Exercise Therapy

Following pain neuroscience education, as soon as the patient with chronic pain understands that all pain is produced in the brain and has adopted less threatening perceptions about pain, one can proceed to the next level: cognition-targeted exercise therapy (11). Exercise therapy can include various types of exercise interventions, for example motor control training, aerobic training or muscle strengthening. In theory it can be applied to a variety of patients with chronic pain syndromes with central sensitisation. 'Cognition-targeted' exercise therapy stands for several principles to be applied during therapy for patients with chronic musculoskeletal pain (Table 1) (16*).

The goal of cognition-targeted exercise therapy is systematic desensitisation, or graded, repeated exposure to generate a new memory of safety in the brain, replacing or bypassing the old and maladaptive movement-related pain memories. Hence, such an approach directly targets the brain circuitries orchestrated by the amygdala (the memory of fear centre in the brain) (11). A number of recent studies (17*,18,19*,20,21) have shown that the combination of a treatment protocol combining pain neuroscience education and cognition-targeted exercises may be expected to normalise central alterations by addressing central nervous system dysfunctions, psychological factors, as well as peripheral dysfunctions in a broader biopsychosocially-driven framework (17*).

Table 1: Principles of cognition-targeted therapy Sourced Nijs J et al. A modern neuroscience approach to chronic spinal pain: combining pain neuroscience education with cognition-targeted motor control training. Physical Therapy 2014;94(5):730–738 (16)

Principle	How to address it
1. Make exercises time contingent	i. Do not let pain or symptoms determine the number of repetitions or exercise duration. ii. It will require the reconceptualisation of pain to exercises and in a later stage to daily physical activities, eg. gardening and lifting heavy objects.
2. Goal setting	i. Let the patient define their treatment goals. ii. Use the predefined goals to design the exercise programme. iii. Use the goals for motivating patients. iv. Goals should be SMART – Specific, Measurable, Achievable, Realistic, Time-targeted.
3. Address perceptions about exercise	i. Question (and if required discuss thoroughly) the patient's perceptions about the exercises (before, during and after exercise). ii. Include discussion of the anticipated consequences of the exercises. iii. Asking questions like: "Is this particular exercise threatening for your back?" "How confident do you feel being able to successfully do this exercise/movement/activity?" "Do you feel that the exercise is useful for your recovery?" iv. It may reveal irrational fear about performing an exercise, ask yourself and the patient why they feel it is dangerous: "Why do you think this exercise is dangerous for you?" "What do you think will happen when you perform the exercise?" v. By challenging the nature of and reasoning behind a patient's fears, the therapist may be able to decrease the anticipated danger or threat level for an activity thereby assuring them of their safety and increasing confidence and belief in movement. In some cases a graded exposure to an exercise may be required to build trust. vi. The therapist should be aware of 'inappropriate safety behaviour' – co-contraction of stabilisation muscles or segmental stabilisation exercises. Patients may use this to convince themselves of their ability to successfully perform an exercise or physical activity. This kind of behaviour can enhance the biomedical perceptions of the patient and, hence, increases the threat value of performing the exercise/activity. vii. Once an exercise has been performed for the first time, discuss with the patient their experience. Generally, the threat value of the exercise(s) decreases after performance. This is due to the fear and anticipated pain pre-exercise versus the actual experience and pain. Even if the pain increase following exercise is similar to that which was anticipated, the threat value of the exercise may be decreased due to the patient's enthusiasm and realisation of their ability to perform it. viii. The difference between actual and expected outcomes experienced through exercise is known as associative learning. Exposure of chronic pain patients to exercises or daily activities without danger aims to convince the brain of its 'error.' This is a crucial component to cognition-targeted exercise therapy.
4. Motor imagery	i. When progressing to a next level of (more difficult) exercises, a preparatory phase of motor imagery can be useful.
5. Address feared movements	i. Retrain pain memories especially for feared movements. Discuss the fear and challenge the patients negative perception of the consequences. Apply graded exposure if necessary. ii. A final step in exercise therapy would be performing exercises during a physically demanding task or doing activities, and exercising under cognitively and psychosocially stressful conditions.
6. Make use of stress	i. Progress towards exercising under cognitively and psychosocially stressful conditions. ii. This includes performing simple exercises (eg. rotation together with extension of the neck), not only while sitting comfortably on a kitchen chair, but also while walking and during cycling or cleaning. iii. Stress, through the availability of cortisol and adrenaline in the brain, facilitates long-term potentiation of brain synapses especially of excitatory synapses. iv. This is often the case when feared exercises are practised, often after a long time of avoiding these movements/ activities. v. Provoking the 'painful movement' will definitely elicit a stress response. vi. However, increasing stress can also increase central sensitisation. It is a balance between enough stress to cause memory consolidation but not enough to increase central sensitisation.

STEP 7: How Much Pain?

So, you have done all this work about building trust, changing mindsets about pain and tissue threats, endeavouring to reverse sensitisation, fear and pain memories and yet the question still remains: How much pain should a patient experience during therapeutic exercise?

For the clinician there is little (and often conflicting) information on what to advise patients. Cross-sectional online questionnaires tell us many clinicians advise patients to avoid pain altogether, whereas others recommend patients can continue if the exercises:

1. only provoke pain below a certain level (2/10 to 4/10 on a VAS);
2. are only 'moderately' painful;
3. are associated with pain that remains 'acceptable to the patient' (22).

What is 'acceptable' or 'moderate' to one person can be completely different to another and illustrates the lack of sufficient quantifiable clinical data. When a chronic pain patient receives exercise instructions from multiple clinicians with differing guidelines on how much, if any, pain is to be experienced during and after exercise, it is likely to undermine the patient's trust and belief in therapy and discourage them from adhering to any of the exercises. So, regardless of what is decided as best for your individual patient, ensure there is consistency across the team of clinicians you work with (22*).

In the published version of Consensus on Exercise Reporting Template (a guide for researchers conducting RCTs), exercise-related pain only exists as an 'adverse event'. It defines an adverse event as "an untoward occurrence, which may or may not be causally related to the intervention or other aspects of trial participation" (7*). Classifying pain as an adverse event biases exercise therapy towards being pain free. There is no recommendation or requirement to include different levels of pain during exercise in RCTs. Thus only seven RCTs have investigated painful versus pain-free exercises (7*). As a result, clinicians have very little information with which to answer patients' questions about exercise-related pain, and it is no surprise that clinicians advise inconsistently. Let's be honest, you are often forced to use your own clinical judgement.

Conclusion

The experience of and response to pain associated with exercise or movement is vitally important to so many conditions; and may be the critical factor to successful recovery or not. A patient's pain experience is currently absent from most reporting or assessment guidelines.

With more data being published about potential benefits of allowing exercise with pain, the following are questions future researchers will have to address (and are no doubt questions you have in daily practice).

- **Pain during exercise**. Is it allowed and/or recommended; and if so to what level or extent. How is pain defined or described? What about patients with pain at rest – what level of pain are they permitted during exercise?
- **Pain after exercise**. Is pain after exercise acceptable and if so for how long? If the pain has increased is this a flare-up or exacerbation or an acceptable response to loading?

Understanding the patient's pain, pain experience and any psychosocial components to their pain will help provide you with some direction of the management the patient needs beyond standard treatment and what else may need addressing if the patient is not getting better within the expected time frames. Using a framework to guide your assessment will be beneficial. Management itself does not need to be complex. Having the right pain education tools, questions and communication skills, as well as a graded cognition-targeted exercise plan may be the key to freeing patients from the fear and constraints of chronic pain.

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KEY POINTS

- Chronic pain affects up to 30% of the Western population.
- Over the past decades, neuroscience has advanced our understanding about pain, including the role of central nervous system sensitisation – more briefly termed central sensitisation.
- A stepwise musculoskeletal framework may help you and your patient successfully work through an assessment of their pain, which will lead you in the correct management path.
- It is crucial that the patient understands that pain during exercise may not mean further trauma or damage and they fully grasp the concept of central sensitisation.
- Clinicians should treat the patient as a biopsychosocial human being suffering from chronic pain, and take central sensitisation into account when educating, designing and delivering the treatment.
- Management will require the correct questions, discussions and cognition-targeted exercises for patients to overcome their fear, avoidance and altered movement patterns and change their pain memories.
- Pain neuroscience education combined with cognition-targeted motor control training is superior to usual care at reducing pain and improving function and pain cognitions.
- Recent studies have shown that pain during therapeutic exercise is superior (in reducing pain and improving function) to pain-free exercise when treating patients with chronic pain.

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DISCUSSIONS

- What is your experience and predicted success rate in changing patients' mindsets about central sensitisation of pain?
- Have you used a 'cognition-targeted' exercise programme in the past?
- What are you thoughts about allowing patients to exercise with pain and if yes, how much pain would you advise?

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