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Joint dysfunction

InTouch

PHYSIO FIRST EST. 1952

Editorial

I hope that you all have received our new online Physio First newsletter *The Core*, and what a brilliant thing it is. Put together by our members for our members, with the help of our amazing office team, just reading its content really shows the value of being together, in Physio First. *The Core* is reactive (no, not Chernobyl…). We know if you read it and how you read it, so your engagement will shape its future; the content of *The Core* is guided by you. If, for any reason, you haven't received *The Core*, please contact minerva@physiofirst.org.uk.

I joined Physio First because I didn't want to stand alone, because I wanted to know more about the healthcare market that I was part of, and so that my business could thrive and grow. I needed to be part of an organisation that would support my goals, and that's what Physio First did and still does. The world is changing **so** quickly and you can really sense it. As Physio First members, we have the opportunity to be ahead of the curve and have the chance to future-proof ourselves. We will need to demonstrate our value and commercialise ourselves if we wish to survive. Doing nothing is **not** an option.

Those who were able to attend our symposium in April may be interested to learn that our aim towards a physiotherapy co-operative gathers momentum as we recognise that we are stronger together, and if you want to see collaboration in action then look no further than our recent partnership with Simplyhealth. More than 2,000 Physio First members are now signed up to their Practitioner Community, giving our members access to their 3.5-million customer base. More details can be found on p43.

We have chosen the theme of this edition because the mass of data, collected by you as one of the 500-plus Physio First members involved in our data for impact project towards Quality Assured Practitioner status, indicates that the most common diagnosis we see is joint pain or dysfunction. Our articles are all aimed at educating our members further on aspects of this subject, and helping us all towards our new future in which we will need to have our wits about us to show the fast-changing marketplace that we can demonstrate our value and measure our quality.

As always, we are grateful to our authors who generously give their time and expertise to the cause of supporting our profession in general, and Physio First members in particular.

I am now entering my fifth year as editor of *In Touch*, and 17 years as an active supporter of our great organisation. *In Touch* is now Physio First's only hard-copy publication. I remain proud of what we, as a bunch of enthusiastic team players, can achieve and I am constantly inspired by my fellow members who step up because they can, and because they believe in helping themselves to help others to a better future. At our last executive meeting, when she was asked why she was a post-holder, Amanda Marsh, my friend and fellow-Physio First volunteer, said: "Because it is the longest and the best business course I have ever been on. Why would you not?"

I read this recently… "Let's aim high and see how far we can reach". So, come on then, let's do that.

PAUL JOHNSON | MSc BSc MMACP MCSP | EDITOR

Contents

4 Finding spinal 'dysfunction': frailties of testing, the tester or the test? Is it time to reframe our descriptions?
Dr Neil Langridge

10 Patellofemoral pain: evidence-based updates in rehabilitation of patellofemoral joint dysfunction
Kay M Crossley, Adam G Culvenor and Christian Barton

18 Joint dysfunction related to Rheumatoid Arthritis
Jack March

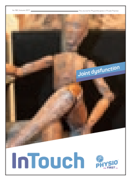
24 On the road to embracing endogenous pain modulation systems
Tobias Bremer

30 Cartilage – can it repair?
Nicky Snazell

36 Quality, quality assurance and quality assured practitioners
George W J Olivier, Liz Bryant and Shemane Murtagh

42 Education and round up

Editorial Panel



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Finding spinal 'dysfunction': frailties of testing, the tester or the test? Is it time to reframe our descriptions?

Dr NEIL LANGRIDGE DClinP MSc MMACP MCSP
Consultant Physiotherapist within the NHS

This paper explores the relevancy of manual testing in the spine and how this may contribute to the notion of "dysfunction". It looks critically at positional palpation, motion testing and pain provocation. Clinical reasoning and how this can be applied to the patient's barriers to recovery is highlighted with reference to a model that attempts to capture a sensible, clinical, critical approach to the choice of testing, enabling clinicians to generate clear rational decisions in the use of spinal testing.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 A greater understanding of the relevancy of palpation findings.
2 Improved awareness of the research underpinning the assessment of movement in the spine.
3 Improved contextual understanding of the role of manual therapy assessment in spinal pain.

The term "dysfunction" in musculoskeletal physiotherapy is a well used – perhaps overused – term that suggests, in essence, there is something wrong; that function, whatever that may be, is sub-optimal in the neuro-musculoskeletal system. When concerning ourselves with the use of this term and its application to spinal pain, there are numerous further sub-descriptions within the health professions and between them that go on to describe something that appears to be wrong, sub-optimal and requiring intervention. "Somatic dysfunction", "subluxation", "misalignment", "resistance" and many others are terms that bridge many professions that utilise hands-on therapies in the aim of resolving these "dysfunctions", with the proposal that patient outcomes will be improved and altered from dysfunctional to functional.

So, what is the consensus on what "dysfunction" actually is? Is there relevancy to this, how can it be applied, and does it matter? These are important questions and ones this article will attempt to consider.

Many authors in the field of manual therapy propose that the mechanism underpinning the clinicians' interpretation of a loss of spinal function at a vertebral level links to para-spinal activity. Assessment of this activity is proposed as a method of ascertaining a baseline and creating hypotheses that either support the dysfunction theory or negate it. Changes in para-spinal activity have been observed in low back pain, either through movement, static postures and reactions to stress (Fryer *et al* 2004). This proposed observable phenomenon is thought to be understood in a number of ways; watching, asking, touching, analysing being the key assessment principles, but this is only a small part of the battle as these observations can be judged to be relevant only under a number of clear proposals:

- That the assessment of a sub-optimal neuro-musculoskeletal vertebral function is possible.
- There is a "normal" that we can baseline and therefore assess against.
- We can demonstrate a clear link between a change in local soft tissue reactionary activity via treatment, and improvement in patient reported outcomes.

When reviewing the literature and making generalisations across / within professions regarding interventions or clinical paradigms, it is first useful to understand our own clinical bias towards what we believe are effective assessments and treatments. Therapists will propose hypotheses that they want to maintain as robust, as it gives clear guidance towards the treatment and intervention they apply, such as "the soft tissues are tight, they need to be stretched" and through confirmation bias, enables a link to every test and response to this hypotheses, and negates other rational questions and proposals that oppose it, such as "the literature fails to be able to justify the use of certain tests that evaluate the length of soft tissues in the spine". Therapists may propose that the literature concerning reliability for pain provocation is robust for this assessment; however, this may be without consideration of the recall bias of the patient who, after multiple palpatory techniques, may

"IT IS USEFUL TO UNDERSTAND OUR OWN CLINICAL BIAS TOWARDS WHAT WE BELIEVE ARE EFFECTIVE ASSESSMENTS AND TREATMENTS"

become biased towards the response (Malone *et al* 2014). An example of this is demonstrated in a study on the use of purposeful sampling leading to potential bias whereby manual therapists were surveyed by the International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) who, unsurprisingly in this cohort, found that the confidence with manual testing was high and correlated positively with engagement in the literature (Karas *et al* 2016). What the actual literature and its quality was, however, was not commented on.

So, the acceptance that there will be bias to all that is done within practice, and the acknowledgement that our clinical assessment is not a binary process, and that it is multi-factorial, enhances the critical consideration of the worthiness of a single test, or even a small cluster. Clinical questions that are asked by the therapist may involve a "test" with positive and negative responses that must be developed in line with the clinical proposals made throughout the clinical examination. Therefore, even though this article looks at manual therapy tests in this way, it should be recognised that tests should be part of complex thinking that is multi-dimensional, interactive and requires the clinician to develop strategies that are not simplistic or totalising, with a framework of dynamic reflection and critical thinking (Bartlett & Cox 2002; Jones *et al* 1992).

Touch perception is described as a primary feeling rather than a thought process (Nyberg & Smith 2013), with the practitioner understanding the relationship between sensory neurones via touch receptors, and the perception and direct pain appreciation of that intensity. This then has to be evaluated and linked to associated memories of past experiences and expectations that have been built on following the initial assessment, observations, tests and outcomes that are all part of the clinical reasoning process (Kumaran *et al* 2009). This limited framework then develops the hypothesis of relevancy. Without the question of relevancy, or "so what?", many of the palpation tests become meaningless and riddled with confirmatory bias.

Professional groups have postulated that positional tests, movement analysis, and direct pain provocation are hallmarks of manual therapy practice, and link to the vertebra or bones in terms of bony movement or position (McCarthy 2001; Vickers & Zollman 1999). Ultimately, there are a number of reasons why this proposal is flawed, as suggestions even as far back as 1952, where Travell & Rinzler postulated that muscular loss of motion is a primary reaction to pain rather than a structural lesion (Travell & Rinzler 1952), indicating that early theories were not based on bony anomalies. The theory of a muscular response to a pain experience, leading to a persistent loss of motion, is developed through a cascade of reactions (Knutson 2000; Wytrążek *et al* 2011).

Nociceptors, when stimulated within soft tissues, may elicit a motor response via muscle spindles as part of a "reflex" protective mechanism. This has been proposed to be sustained via two feedback loops (Johansen & Sojka 1991). The first loop suggests that the sustained muscle contraction creates a reduction in the local vascular supply that subsequently leads to further chemical nociception, which then further stimulates the pain response and the muscular contraction, resulting in the system self-perpetuating the pain experience. The second proposal is that muscle spindle information that projects to the spinal cord will continue to cause a motor-neurone output which further feeds the loop. The end result is a sustained tonic, segmental tonal change that theoretically maintains a local pain response and inhibits the normal eccentric, concentric muscular action, while the tonicity generated by the intrafusal fibres inappropriately feeds the proprioceptive system, thus leading to loss changes in kinaesthesia and proprioception (Brumagne *et al* 2000; Gill & Callaghan 1998; O'Sullivan *et al* 2003).

If we accept that, with spinal pain, there are potential muscular changes in the musculoskeletal system, and that one approach in establishing a normal responsive muscular system is to improve the function of this feedback system, then methods to reduce the pain response either peripherally through descending inhibition, or supra-spinally, would seem a reasonable proposal. It would also be clinically sensible to attempt to mechanically change the resting tone of the muscles, while retraining the proprioceptive system with exercise to restore a normal reaction to movement and changes in posture.

To address this theory, the treatment needs to allay fearful movement and guarding, change the pain experience, and improve the system's ability to be variable and reactive to new movements and environments. The aim being to reduce the safe, but painful and

"MANUAL THERAPY TESTS SHOULD BE PART OF A COMPLEX, MULTI-DIMENSIONAL AND INTERACTIVE STRATEGY TOWARDS CRITICAL THINKING"

> "PALPATING THROUGH THE SOFT TISSUES OF ERECTOR SPINAE TO POSITIONALLY ASSESS THE TRANSVERSE PROCESS MAKES LITTLE ANATOMICAL SENSE"

functionally unrewarding guarding and protective stability. So, how in practice does the clinician make the reasoned judgement that there is a local fault or dysfunction that is playing a part in the overall picture? Figure 1 illustrates the interactions that we, as clinicians, should be aware of when considering the assessment of local "dysfunction" for spinal pain.

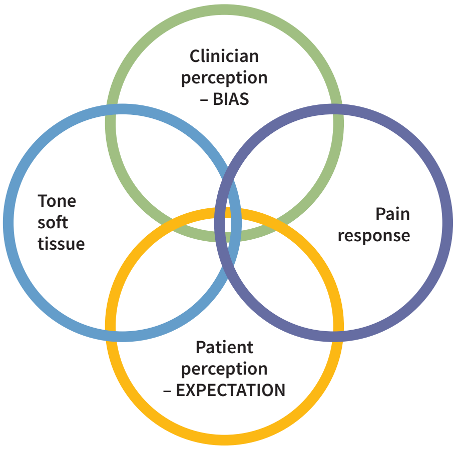

FIGURE 1: Inter-linkages of palpation

Positional palpation

This model proposes that suboptimal positioning of bony landmarks means a loss of function in certain directions dependent on the static palpation assessment, which can be adapted in different spinal positions. There are, however, serious flaws with this method. The intra- and inter-reliability in the sacro-iliac joint in symptomatic and asymptomatic presentation is poor, and demonstrates highly doubtful clinical utility (Holmgren & Waling 2008). Palpating through the soft tissues of the erector spinae, particularly if they are tonically hyperactive, to find and then positionally assess the transverse processes makes very little anatomical sense. One can see that studies evaluating the depth of structures, for example the epidural space, can show them to be 8cm under the skin. Kawchuk *et al* (2011) demonstrated that the mean depth for transverse process was 6.9cm, couple this with local tissue tension and assessing for subtle alterations in position seems to render this suggested method less than adequate. Haneline and Young (2009) completed a literature review of a range of orthopaedic tests for lumbar syndromes and pointed out that the chance of errors in spinal palpation reliability studies is essentially doubled when examiners are required to name the specific level of involvement. This is because the particular level judged to be tender or misaligned might be reported as different due to misnaming the level, rather than true disagreement about the location of the problem. Therefore, even when examiners are actually in agreement and call the same location dysfunctional, they might be reporting different spinal levels due to identification problems. Some researchers have compensated for this by having an independent person mark the bony landmarks before the examiners perform their palpations. This procedure limits the confounding variable of having the palpator determine the level because the levels are predetermined. In a review of muscular changes Fryer *et al* (2004) were unable to provide any reasonable evidence on the reliability assessment of tissue texture. Fryer *et al* cite the work of Njoo & van der Does (1994) who assessed the inter-rater reliability of trigger points in the quadratus lumborum and gluteus medius and found this to be poor, although locating pain was a stronger variable. Texture or firmness cannot, therefore, be defined as reliable indicators and without the reproduction of a pain response, nor can they necessarily be directly linked to the patient presentation. Maigne *et al* (2012) assessed the ability of the examination of palpation of muscular tension in unilateral LBP to be indicative of the site of pain. In 64% of cases the palpation of perceived "tension" correlated with the side of pain, therefore the clinical utility of these tests really must be enhanced as part of the assessment process.

Motion testing

A further proposed mechanism of assessing dysfunction in the spine is described as motion palpation. Through manual techniques over bony prominences or soft tissues, clinicians will evaluate alteration in movement and / or tension while a movement is performed (figure 2). In physiotherapy this is classified as a passive movement, defined as a movement provided by an external agency. A study of 35 clinicians found there was poor reliability in them identifying the inter-spinous space at L5/S1 (Chakraverty *et al* 2007), a result that immediately brings into question the clinical utility of the test. This is confirmed by the previous findings of Billis *et al* (2003) who were also unable to demonstrate reliability in palpating spinous processes.

Generally, the literature surrounding motion palpation shows poor reliability inter-tester, and only slight intra-tester reliability. Conclusions either recommend not using the technique at all, or combining it with other tests that have greater validity and reliability

FIGURE 2: An example of motion testing in the spine

(Haneline *et al* 2008; Panzer 1992). Clearly, this test in isolation fails to offer any clinical benefit in decision making. What is required is consideration of its relevance in a complex thinking framework which, in terms of choosing manual therapy, is discussed later in this article.

Pain provocation

The final, most common assessment tool used by the physiotherapist in a manual therapy paradigm is the reproduction of pain with palpation. This test involves mechanical pressure into tissues with the aim of stimulating the patient's familiar pain experience (figure 3). The reliability in this test is far stronger than those previously discussed. It would, however, be naïve to suggest that pressing a painful area is diagnostic, and it cannot be claimed that locating a pain response in a tissue means that is the local source.

FIGURE 3: An example of pain provocation in the spine

In a review of spinal assessment procedures, pain provocations were shown to be the most reliable, and soft tissue quality the least, while regional motion palpation had a greater reliability when contrasted with segmental motion palpation (Seffinger *et al* 2004; Schneider *et al* 2008). It could, however, be argued that, with any of these reliability tests, there is a lack of content validity with regard to palpation as the production of pain is possibly not a true physical finding, and the identification of the perceived symptom fails to indicate the multi-dimensional nature of spinal pain (Buchbinder *et al* 2011; Pincus *et al* 2002).

Clinical reasoning

Perhaps it is in the complexity of the patient presentation that the issue with manual tissue based tests lies. Spine pain is a complex experience that is arguably unique to the patient, and the reactions to test procedures are intimately related to a number of confounding variables that could be related to, and alter with, each individual patient's perception of their problem. How an individual behaves, responds, understands, and perceives their pain and disorder will lead to the subjective and physical responses to testing (Foster *et al* 2008). The assumption that mechanical testing can be carried out without reference to the emotional, social, cultural, and historical perspectives of the recipient is a naïve view. The relationship between the patient and the tests / tester is also balanced with the tester and their relationship to bias, including the literature they have read and their experience, emotion, knowledge and reasoning as a clinician (Langridge *et al* 2015, 2016). When we consider this complexity, we can see why the role of singular tests is effectively meaningless, and that triangulation and direct linkages to the patient narrative is far more relevant. The question then is, how the use of mechanical testing when assessing for dysfunction, ultimately requires us to consider a reasoned approach to allow the conceptualisation of the results into a meaningful outcome.

Consider the concept of a loss of motion / increased pain with proposed associated changes in tissue biochemistry, contractile characteristics and / or fibre type changes, and alterations in the responses of the nervous system (Fryer *et al* 2004). Therapists can approach this presentation with a number of theoretical constructs:

- That the local loss of motion is a direct cause of the patient's loss of function.
- The local loss of motion is consequence of the main cause of the loss of function.
- The pain is causing the loss of motion.
- The loss of motion is causing the pain.
- The pain is a consequence of the nature of the patient experience.

As therapists, before we even begin to consider the reliability or validity of a motion or pain provocation test, we need to understand the drivers to a lack of recovery.

By asking ourselves why a patient has not naturally recovered, we can then set up a range of pre-hypotheses that will begin the process of making sense of physical testing. Emotional, social, biomechanical, pathological, and biochemical barriers to normal homeostatic recovery and their inter-relationships gives the therapist an understanding that can underpin the assessment and outcomes of certain tests, allowing us to address the theoretical constructs, leading to the development of a sound, clinically evidenced treatment plan. Based on the patient's narrative, the therapist can extrapolate what may have been a causative factor in their presentation, what barriers to their recovery still remain, and produce a treatment plan that addresses all these factors.
For example, a patient reporting a functional loss of bending that is led by the experience of pain and stiffness, with no pathological, emotional concerns,

> "IT COULD BE ARGUED THAT IDENTIFICATION OF THE PERCEIVED SYMPTOM FAILS TO INDICATE THE MULTI-DIMENSIONAL NATURE OF SPINAL PAIN"

> "TESTS THAT ARE BASED ON THE PATIENT NARRATIVE, AND SUBSEQUENT ASSESSMENT OF THAT NARRATIVE, CAN IMPROVE PATIENT OUTCOMES"

and with clear patterns of movement that are reproducible in their history, would immediately suggest local / non-complex based mechanisms, potentially driven by seemingly consistent, adaptive movement patterns. In developing this hypothesis, the clinician then proposes the assessment of pain, stiffness and movement to be relevant, reproducible and would require a patient / therapist collaboration in identifying the areas of prevalence. In this scenario, movement and pain provocation tests would provide greater clinical understanding of the barrier to movement, the possible cause of related movement pain and, ultimately, the formation of a reasoned treatment plan. In direct contrast, an individual with a predominance of social and emotional related barriers to a movement or function, where the symptoms seem inconsistent with repeatable activity, would potentially still present with local barriers to movement in the spine and experience a pain response to palpation. Here, the relevance of the motion and provocation tests are less valuable as they fail to support a construct that links pain, movement and local tissue-based mechanisms with the suggestion that external drivers are the cause of the spinal "dysfunction", rather than the other way round.

Choosing tests that are based on the patient narrative and subsequent assessment of that narrative is, therefore, proposed to be the most effective way to develop a hypothesis and, by proceeding in this fashion, the options for manual and tissue based tests and the patient outcomes would be improved.

Figure 4 illustrates the role of linking the narrative to the barrier, and to the potential relevancy of testing and how, as therapists, we might consider when

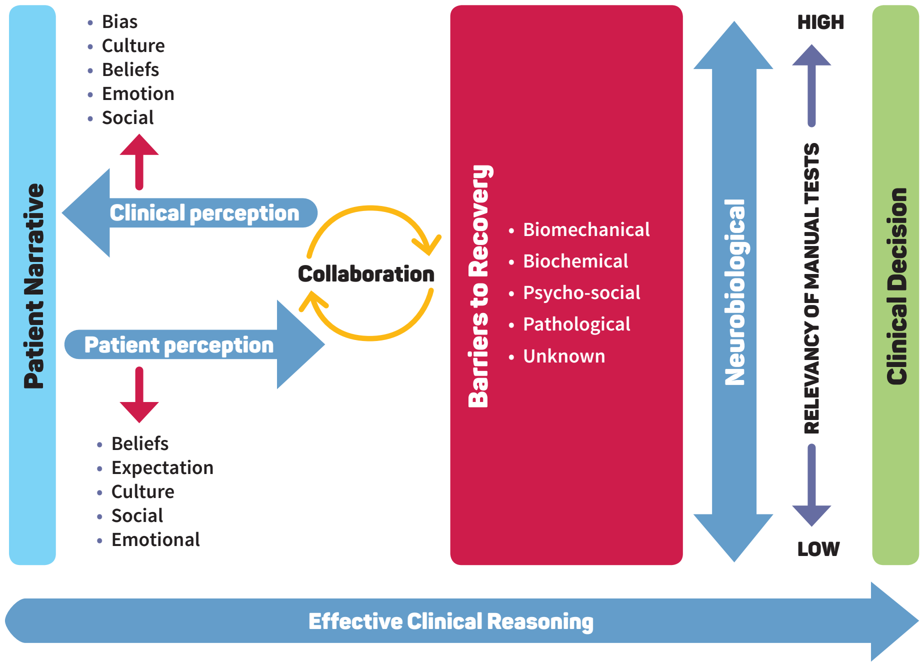

FIGURE 4: Clinical reasoning framework – context of manual testing

to take notice of a perceived tissue-based "dysfunction" or not. Noting the mechanical barrier to recovery would increase the relevancy of physical testing, improving the clinical decision-making process. There are many frailties to finding "dysfunction" that can only be resolved with sensible, sound reasoning, a self-critical approach, and a methodology of clinical evaluation that centres on the person in front of you and their own, specific, individual barriers to recovery rather than simple, singular mechanical tests.

About the author

Neil is a Consultant Physiotherapist within the NHS. He has attained a clinical doctorate at the University of Southampton and completed his MACP training in 2002 and his MSc in 2003. He has presented all over the UK and abroad, leading manual therapy and clinical reasoning educational sessions. His current post in the NHS covers ESP leadership, complex patient management and research activities.

CONTACT DETAILS
neil.langridge@nhs.net
@neiljlangridge

References

Bartlett D, Cox P. Measuring change in students' critical thinking ability: Implications for health care education. *Journal of Allied Health* 2002;31(2):64-69

Billis E, Foster N, Wright C. Reproducibility and repeatability: Errors of three groups of physiotherapists in locating spinal levels by palpation. *Manual Therapy* 2003:8(4);223-232

Brumagne S, Cordo P, Lysens R, Verschueren S, Swinnen S. The role of paraspinal muscle spindles in lumbosacral position sense in individuals with and without low back pain. *Spine* 2000;25(8):989-994

Buchbinder R, Batterham R, Elsworth G, Dionne C, Irvin E, Osborne RH. A validity-driven approach to the understanding of the personal and societal burden of low back pain: development of a conceptual and measurement model. *Arthritis Research & therapy* 2011;13:R152

Chakraverty R, Pynsent P, Isaacs K. Which spinal levels are identified by palpation of the iliac crests and posterior iliac spines? *Journal of Anatomy* 2007;210:232-236

Foster N, Bishop A, Thomas E, Main C, Horne R, Weinman J, Hay E. Illness perceptions of low back pain patients in primary care: What are they, do they change and are they associated with outcome? *Pain* 2008;136(1-2):177-187

Fryer G, Morris T, Gibbons P. Paraspinal muscles and intervertebral dysfunction: part one. *Journal of Manipulative and Physiological Therapeutics* 2004;27(4):267-274

Gill K, Callaghan M. The measurement of lumbar proprioception in individuals with and without low back pain. *Spine* 1998;23(3):371-37

Haneline M, Cooperstein R, Young M. Spinal motion palpation: A comparison of studies that assessed intersegmental end feel Vs excursion. *Journal of Manipulative and Physiological Therapeutics* 2008;31(8):616-626

Haneline M, Young M. A review of interexaminer and intraexaminer reliability of static spinal palpation: a literature synthesis. *Journal of Manipulative and Physiological Therapeutics* 2009;32(5):379-386

Holmgren U, Waling K. Inter-examiner reliability of four static palpation tests used for assessing pelvic dysfunction. *Manual Therapy* 2008;13(1):50-56

Johansen H, Sojka P. Pathological mechanisms involved in genesis and spread of muscular tension in occupational muscle pain and in chronic musculoskeletal pain syndromes: A hypothesis. *Medical Hypotheses* 1991;35(3):196-203

Jones M. Clinical reasoning in manual therapy. *Physical Therapy* 1992;72(12):875-884

Karas S, Schneiders A, Reid D, Talisa V. Factors affecting confidence and knowledge in spinal palpation among International Manual Physical Therapists. *Manual & Manipulative Therapy* 2016;24(3)166-173

Kawchuk G, Prasad N, Parent E, Chapman S, Custodio M, Manzon M, Wiebe A, Dhillon S. Spinal landmark depth in relation to body mass index. *Manual Therapy* 2011;16:384e-387

Knutson G. The role of the y-motor system in increasing muscle tone and muscle pain syndromes: A review of the Johansson/Sojka hypothesis. *Manipulative and Physiological Therapeutics* 2000;23(8):564-572

Kumaran D, Summerfield J, Hassabis D, Maguire EA. Tracking the emergence of conceptual knowledge during human decision-making. *Neuron* 2009;63(24):889-901

Langridge N, Roberts L, Pope C. The clinical reasoning processes of extended scope physiotherapists assessing patient with low back pain. *Manual Therapy* 2015;20(6):745-750

Langridge N, Roberts L, Pope C. The role of emotion in clinical reasoning: Balancing the analytical process. *Manual Therapy* 2016;21:277-281

Maigne JY, Cornells P, Chatellier G. Lower back pain and neck pain: is it possible to identify the painful side by palpation only. *Annals of Physical and Rehabilitation Medicine* 2012;55(2):103-111

Malone H, Nicholl H, Tracey C. Awareness and minimisation of systematic bias in research. *British Journal of Nursing* 2014;23(4)

McCarthy C. Spinal manipulative thrust technique using combined movement theory. *Manual Therapy* 2001;6(4):197-204

Njoo K, van der Does E. The occurrence and inter-reliability of myofascial trigger points in the quadratus lumborum and gluteus medius: A prospective study in non-specific low back pain patients and controls in general practice. *Pain* 1994;59(3):317-323

Nyberg R, Smith A. The science of spinal motion palpation: A review and update with implications for assessment and intervention. *Manual and Manipulative Therapy* 2013;21(3):160-167

O'Sullivan P, Burnett A, Floyd AN, Gadsdon K, Logiudice J, Miller D, Quirke H. Lumbar repositioning deficit in a specific low back pain population. *Spine* 2003;28(10):1074-1079

Panzer D. The reliability of motion palpation. *Manipulative and Physiological Therapeutics* 1992;15(8):518-524

Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine* 2002;27(5):E109-E120

Schneider M, Erhard R, Brach J, Tellin W, Imbarina F, Delitto A. Spinal palpation for lumbar segmental mobility and pain provocation: An interexaminer reliability study. *Manipulative and Physiological Therapeutics* 2008;31(6):465-473

Seffinger MA, Nairn WI, Mishra SI, Adams A, Dickerson VM, Murphy LS, Reinsch S. Reliability of spinal palpation for diagnosis of back and neck pain: A systematic literature review of the literature. *Spine* 2004;29(19):E4130-E425

Travell J, Rinzler S. The myofascial genesis of pain. *Post-graduate Medicine* 1952;11(5):425-434

Vickers A, Zollman C. The manipulative therapies: osteopathy and chiropractic: *British Medical Journal* 1999;319(7218):1176-1179

Wytrążek M, Huber J, Lisinski P. Changes in muscle activity determine progression of clinical symptoms in patients with chronic spine-related muscle pain. A complex clinical and neurophysiological approach. *Functional Neurology* 2011;26(3):141-149

Patellofemoral pain: evidence-based updates in rehabilitation of patellofemoral joint dysfunction



KAY M CROSSLEY PT PhD
ADAM G CULVENOR PT PhD
CHRISTIAN BARTON PT PhD

Patellofemoral pain, typically presenting as diffuse anterior knee pain aggravated by activities that load the patellofemoral joint, is common in active individuals across their lifespan. Patellofemoral pain is unlikely to recover spontaneously. Best available evidence suggests that patellofemoral pain and patellofemoral osteoarthritis exist on a continuum and are often a sequel to acute knee trauma, such as anterior cruciate ligament injury. Exercise therapy is the cornerstone of patellofemoral pain management, with the greatest evidence for graduated hip and quadriceps focused muscle strengthening. Tailored education on symptoms and management of exercise loads should also be a primary component of patellofemoral pain rehabilitation.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1. Recommendations from the most recent 4th International Patellofemoral Pain Research Retreat in Manchester, 2015 on terminology, diagnosis, clinical examination and treatment.
2. Exercise therapy has strong and sustained evidence supporting its benefits, but adherence is critical.
3. Education is a key component of patellofemoral pain rehabilitation.
4. Patellofemoral pain often follows other knee injury (specifically anterior cruciate ligament injury and rehabilitation), is problematic across the lifespan and appears to exist along a continuum from pain to osteoarthritis; we can't assume that it will resolve with rest.

Background and recommendations from 4th International Patellofemoral Pain Research Retreat in Manchester, 2015

(adapted from: Crossley *et al* 2016a; Crossley *et al* 2016b)

Patellofemoral pain typically presents as diffuse anterior knee pain, usually with activities such as squatting, running, stair ascent and descent. It is common in active individuals across the lifespan and is a frequent cause for presentation at physiotherapy, general practice, orthopaedic and sports medicine clinics. The condition often reduces the ability of those with patellofemoral pain to perform sporting, physical activity and work-related activities pain-free. Increasing evidence suggests that it is a recalcitrant condition, persisting for many years.

In 2015, many key researchers attended the 4th International Patellofemoral Pain Research Retreat in Manchester, and convened a consensus meeting (Crossley *et al* 2016a). Results from this meeting included a number of statements that are important to our understanding of patellofemoral pain:

TERMINOLOGY

The term "patellofemoral pain" is the preferred term and is a synonym for other terms including:
(i) patellofemoral pain syndrome
(ii) chondromalacia patella
(iii) anterior knee pain and/or syndrome
(iv) runner's knee.

Defining patellofemoral pain

The core criterion required to define patellofemoral pain is pain around or behind the patella, which is aggravated by at least one activity that loads the patellofemoral joint during weight bearing on a flexed knee, e.g. squatting, stair ambulation, jogging/running, hopping/jumping.

Additional criteria, although not essential, can include:
(a) crepitus or grinding sensation emanating from the patellofemoral joint during knee flexion movements
(b) tenderness on patellar facet palpation
(c) small effusion
(d) pain on sitting, rising on sitting, or straightening the knee following sitting.

People with a history of dislocation, or who report perceptions of subluxation, should not be included in studies of patellofemoral pain unless the study is specifically evaluating these subgroups.

Currently, such patients are considered to be a subgroup of people with patellofemoral disorders and / or pain, who may have distinct presentations,

> "THERE ARE FEW PUBLISHED GUIDELINES TO HELP CLINICIANS CHOOSE THE APPROPRIATE EVIDENCE-BASED TREATMENT FOR PATELLOFEMORAL PAIN"

biomechanical risk factors and require different treatment approaches.

Clinical examination of patellofemoral pain

Clinical examination is the cornerstone to diagnose patellofemoral pain (Crossley *et al* 2015a), but there is no definitive clinical test (Nunes *et al* 2013).

The best available test is anterior knee pain elicited during a squatting manoeuvre: patellofemoral pain is evident in 80% of people who are positive on this test (Nunes *et al* 2013).

Additional tests with limited evidence:
– Tenderness on palpation of the patellar edges: patellofemoral pain is evident in 71-75% of people with this finding (Nunes *et al* 2013).

Tests with limited diagnostic usefulness:
– Patellar grinding and apprehension tests, e.g. Clarke's test, have low sensitivity and limited diagnostic accuracy for patellofemoral pain (Nunes *et al* 2013; Doberstein *et al* 2008).
– Knee range of motion and effusion.

Treatment

Despite its high prevalence among active individuals and frequent presentations for treatment, there are few published guidelines to help clinicians choose the appropriate evidence-based treatment for patellofemoral pain. A paper from Barton and colleagues (Barton *et al* 2015) combined systematic review findings with qualitative interviews from expert clinicians to provide a clinically relevant synthesis, covering the literature up to September 2013. The treatment guide produced is open access (**http://bjsm.bmj.com/content/49/14/923.short**) and recommends an individually tailored programme with emphasis on active exercise rehabilitation and education.

The 2015 Patellofemoral Pain Research Retreat and treatment consensus meeting resulted in more succinct recommendations, based on evidence published between January 2010 and June 2015 and expert panel voting. These recommendations should be combined with information gathered from individual patients, regarding their preferences, experiences, presentation and values, along with the values, expertise and skills of individual practitioners to create a patient-centred treatment approach.

RECOMMENDATIONS

Six recommendations, in four categories, were made based on consistency between consensus voting and the current evidence:

Exercise therapy
1. Exercise is recommended to reduce pain in the short, medium and long term, and improve function in the medium and long term.
2. Combining hip and knee exercises is recommended to reduce pain and improve function in the short, medium and long term, and this combination should be used in preference to knee exercises alone.
Combined interventions
3. Combined interventions are recommended to reduce pain in adults with patellofemoral pain in the short and medium term.
Foot orthoses
4. Foot orthoses are recommended to reduce pain in the short term.
Other adjunctive interventions
5. Patellofemoral joint, knee and lumbar mobilisations may not improve outcomes.
6. Electro-physical agents may not improve outcomes.

Exercise therapy for patellofemoral pain

(adapted from Crossley *et al* 2017)

Exercise therapy is the cornerstone of patellofemoral pain management. Usual components include:
- quadriceps focused exercise therapy
- hip focused exercise therapy
- retraining of functional activities (including sports- or work-related).

It is likely that exercise therapy to improve muscle function of the whole lower limb and trunk may help improve patellofemoral pain and function. However, as noted previously, the greatest evidence is for hip and quadriceps focused exercise therapy, and this is the focus of our article. The

PAIN MONITORING SYSTEM:
Using a pain monitoring system (Thomee 1997, where pain is recorded on a 10cm numerical pain scale and pain levels of 0-2 are considered appropriate) may avoid pain-induced muscle inhibition and enhance adherence to an exercise programme. Pain levels up to 5 out of 10, momentarily during exercise or immediately following exercise, are acceptable, but not extending to the following morning. Patellar taping may help to reduce or remove pain during rehabilitation and recreational exercise. Tailoring patellar taping to patient presentations appears to be important to optimising pain relieving effects (Barton *et al* 2015).

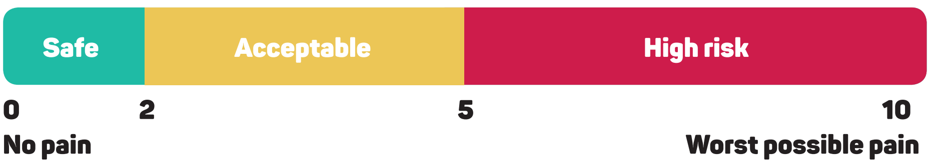

FIGURE 1: Visual pain scale, which can be used to monitor pain during exercise therapy and other activities

> "THE AIM OF QUADRICEPS TRAINING IS TO ACHIEVE A CARRY-OVER FROM FUNCTIONAL EXERCISES TO FUNCTIONAL ACTIVITIES"

exercises should be chosen based on an individual patient's presentation, preferences and needs.

QUADRICEPS FOCUSED EXERCISE THERAPY

Do we need to retrain the vastus medialis obliquus (VMO)? Retraining the vasti can reduce patellofemoral pain and symptoms (Crossley *et al* 2002; Collins *et al* 2008), as well as enhance VMO activation relative to vastus lateralis (Cowan *et al* 2002). However, current evidence suggests that patients cannot activate the VMO in isolation and that no exercise appears to be preferential for activation of the VMO. Therefore, for most patients, a graduated quadriceps focused exercise therapy programme is likely to be effective, without specific attention to the VMO.

GRADUATED QUADRICEPS FOCUSED EXERCISE THERAPY

The first step is to find an exercise that provides the greatest load on the quadriceps, i.e. the one most likely to elicit a strengthening effect, but in a position that is tolerated by the patient (figure 1). For some patients, quadriceps exercises may commence as a low load isometric contraction, in sitting with the knee at 90°, and the foot on the floor. For others, quadriceps exercises may start as a lunge or as a weighted squat. The important criterion is to have the highest load tolerated by the patient.

Regardless of the starting position, the patient should begin training as soon as possible, in functional positions that are also relevant to their needs. Importantly, when possible, exercises should be progressed with steadily increasing load and difficulty. Progression is based on the patient's ability to maintain control and the absence of significant pain (2-3 out of 10 on the pain monitoring system). Lower load tasks may include lunges, squats and step-ups, (figures 2-4). Further progressions can be made from minimal weight-bearing, e.g. using hand rails or other supports to full weight-bearing that will eventually include added loading, and through various knee flexion ranges.

The final aim of quadriceps training is to achieve a carry-over from functional exercises to functional activities. As loads increase and greater strength gains are targeted, the frequency of sessions should be reduced to allow adequate recovery time; 48 hours between sessions, and two to three sessions a week is recommended to optimise strength gains. Further guidance on exercise prescription principles can be found in the American College of Sports Medicine guidelines (2009).

HIP FOCUSED EXERCISE THERAPY

Retraining the hip abductors, external rotators and extensors is thought to stabilise the lateral pelvis and to control internal hip rotation and adduction. Such strengthening programmes are associated with pain reduction in patients with patellofemoral pain, potentially more so than quadriceps focused exercises in the initial stages of rehabilitation (Lack *et al* 2015). Indeed, evidence suggests that hip retraining is an essential component to any patellofemoral pain rehabilitation (Crossley *et al* 2016b). Hip and quadriceps exercises should be combined in the longer term, especially considering the likely deficits in muscle strength in both areas. The principles for retraining hip muscle function are the same as for the quadriceps, with exercises performed initially at the highest load possible, and of a similar frequency. For example, hip exercises could start in non-weight-bearing positions and then progress to weight-bearing positions, particularly if loading the quadriceps and knee is irritable in the early stages of rehabilitation. The focus of all retraining exercises is on quality, then quantity.

As soon as it is possible and practical, the patient can be taught to combine hip and quadriceps focused exercises and to target those exercises to their functional needs. Retraining exercises could emphasise alignment of the lower limb, i.e. neutral hip rotation and adduction during weight-bearing flexion tasks such as lunge, step-up and step-down (figure 5). For some patients, this may be important, since excessive hip internal rotation and adduction can be related to a "dynamic valgus" movement pattern at the knee, which may contribute to the development or persistence of patellofemoral pain (Crossley *et al* 2017). However, retraining of dynamic alignment in these positions

FIGURES 2-4: Lower loading tasks include squats, step-ups and lunges (Crossley *et al* 2017) reproduced with permission

FIGURE 5: Step-down exercises (Crossley *et al* 2017) reproduced with permission

may not carry over into more functional tasks, including walking and running (Willy & Davis 2011). Some patients may require retraining of their movement patterns during functional or potentially aggravating activities (Noehren *et al* 2011).

MOVEMENT RETRAINING

This may be required in order for patients to return to high loaded activities, involving knee flexion during full weight-bearing, e.g. stair descent, deep squats, or higher intensity activities such as running, jumping, cutting. Patients need additional training to facilitate progression to these high patellofemoral joint loading activities for which motor control, strength and endurance should be trained in the quadriceps and global muscles, such as the triceps surae, hip and trunk, as well as balance and co-ordination. Exercise choice and progression decisions are based on the patient's needs, their ability to maintain control and the absence of significant pain. More detail on movement (and running) retraining is covered by Barton *et al* (2015).

Running has received the most attention in research related to movement pattern retraining for patellofemoral pain. Barton *et al* recently published a guide related to using running retraining to treat lower limb injuries based on a systematic review of the literature which was synthesised with expert opinion (Barton *et al* 2016). This guide recommended running retraining should be considered for patellofemoral pain, with limited evidence supporting the use of visual and verbal feedback to reduce hip adduction in female runners. Verbal instructions worthy of trialling include cues to "open knees", "widen stance" or "engage the buttock muscles", while visual feedback could be provided via mirrors or video. Logically, these same cues and movement retraining approaches may also work for other tasks, which people with patellofemoral pain have difficulty with, such as stair negotiating, squatting and jumping.

A number of other running retraining cues were also suggested to be worthy of consideration, including increasing step rate by 5-10% and transitioning from a rearfoot to a non-rearfoot strike. Subsequent randomised trials to support these suggestions have provided mixed results. One small trial suggested transitioning to a non-rearfoot strike led to significantly greater pain reductions when compared to a control intervention (Roper *et al* 2016). However, another larger randomised trial indicated that running retraining, including an increased step rate of 7.5% and consideration to transitioning to non-rearfoot strike if deemed necessary by the treating physiotherapist, added no additional benefit to education about load management (Esculier *et al* 2017). Further research is clearly needed to better understand which patients may or may not benefit from movement pattern and running retraining.

Education for patellofemoral pain

To date, most patellofemoral pain research has focused on exercise therapy and passive adjuncts, with less emphasis on patient education, even though it is considered by international experts as critical to treating patellofemoral pain, despite a lack of evidence on its isolated effects (Barton *et al* 2015). A recent randomised trial completed by Esculier *et al* (2017) highlights the clear importance of good patient education. Specifically, neither eight weeks of hip and quadriceps exercise therapy or running retraining focused on increasing step rate produced greater treatment effects than education about load management.

Effective education may allow self-management and optimise adherence to other interventions like exercise therapy. Quality patient education for patellofemoral pain should include load management, weight management when appropriate, understanding the potential value of treatments such as exercise therapy, and addressing any fear of movement (Barton *et al* 2015). Patient education should also be tailored to the individual and it may require multiple consultations to facilitate adequate knowledge gains or behaviour change.

There are currently few published educational resources for people with patellofemoral pain. However, Barton & Rathleff recently developed and published a leaflet (figure 6) based on syntheses of the literature with input from international experts, and adapted the final version based on feedback from patients and clinicians (Barton & Rathleff 2016). This leaflet may support clinical practice, but it is not designed to replace individual consultation with a physiotherapist, therefore strong communication skills are still needed by the treating clinician, as well as the ability to facilitate and support shared decision making (Barton & Crossley 2016). Pain is a complex protective mechanism.

"RUNNING HAS RECEIVED THE MOST ATTENTION IN RESEARCH RELATED TO MOVEMENT PATTERN RETRAINING FOR PATELLOFEMORAL PAIN"

Although nociception is an input to the brain that may result in the output of pain, the brain considers many other inputs before deciding to create pain, some of which may be far more decisive than the level of nociception. The experience of knee pain is modulated at different sites in the body, locally and centrally within the brain and spinal cord. This means that local peripheral nociceptors and facilitated central pain mechanisms may influence the pain that is experienced by the patient, and these complexities are beginning to be evaluated.

Current evidence suggests that central pain mechanisms may be a factor we need to consider in some, but not all, patients with patellofemoral pain. In a clinical setting, the following signs may suggest facilitated central pain mechanisms:

1. disproportionate pain, implying that the severity of pain and related reported or perceived disability are disproportionate to the nature and extent of the injury

2. presence of diffuse pain distribution, allodynia and hyperalgesia.

Previous recommendations to assist in addressing central sensitisation (Nijs *et al* 2014) in chronic musculoskeletal

FIGURE 6: Manage My Patellofemoral Pain education leaflet. Print version can be downloaded from here: http://bmjopensem.bmj.com/content/bmjosem/2/1/e000086/F1.large.jpg

On the La Trobe Sport and Exercise Medicine Research blog, we have created a patient education page including numerous multimedia resources which physiotherapists may find useful to show and discuss with their patients – **http://semrc.blogs.latrobe.edu.au/5-things-to-help-knee-cap-pain**

pain apply to patellofemoral pain. These include pain neuroscience education and a cautious approach to initial exercise loads and progression to avoid symptom flaring, along with encouraging exercise of non-painful areas of the body (Nijs *et al* 2014). The clinical implications are that rehabilitation may take longer and require more time. Additionally, it may also be important to avoid pain flares throughout the rehabilitation process and worth considering adjunctive interventions, such as taping and orthoses, if effective. Following the proposed pain monitoring system outlined earlier in this article may assist in the presence of central sensitisation.

Patellofemoral pain: a continuum from adolescence to osteoarthritis?

(adapted from Crossley 2014)

What is the natural history of people with patellofemoral pain?

Once thought to be self-limiting, patellofemoral pain is now considered unlikely to spontaneously recover. Patellofemoral pain is also theorised to precede the development of patellofemoral osteoarthritis (Wyndow *et al* in press). The best available evidence supporting this conjecture (Thomas *et al* 2010) observed that individuals undergoing arthroplasty for patellofemoral osteoarthritis were more than twice as likely (odds ratio = 2.31, 95% confidence interval = 1.37 to 3.88) to report having had patellofemoral pain in adolescence, than patients undergoing an arthroplasty for isolated tibiofemoral osteoarthritis.

In the absence of rigorous research, we can infer a relationship between patellofemoral pain and osteoarthritis from the striking similarities in impairments between people with each condition (Wyndow *et al* in press). Cross-sectional studies of people with patellofemoral osteoarthritis and with patellofemoral pain reveal consistent impairments, such as patellar malalignment, quadriceps dysfunction and altered walking patterns. Furthermore, pain patterns and difficulties with stair ambulation in people with patellofemoral osteoarthritis are similar to those with patellofemoral pain.

Is patellofemoral osteoarthritis the progression of patellofemoral pain?

Clearly not all patients with patellofemoral pain will suffer patellofemoral osteoarthritis. However, the best available evidence suggests that patellofemoral pain and patellofemoral osteoarthritis are likely to exist along a continuum of disease. We don't know at this time which patients will be more, or less likely to develop osteoarthritis. Therefore, while we continue to utilise interventions with the best efficacy for reducing pain and improving function (Crossley *et al* 2016b) for patellofemoral pain, perhaps it is time to expand our treatment options to include education about osteoarthritis and secondary prevention measures, such as weight management and the importance of continuing exercises therapy. Patients should be advised of the long-term implications of patellofemoral pain. Expectations of a "cure" should be avoided and patients educated to recognise and monitor their joint health status to effectively manage their joint loading and symptoms.

The problem of patellofemoral pain does not necessarily start in adulthood (Rathleff 2016). Chronic or recurrent knee pain affects a third of adolescents (Rathleff CR *et al* 2013; Rathleff MS *et al* 2013, 2016) and is associated with reduced physical activity levels, quality of life, school attendance, participation in hobbies and social activities (Brattberg 2014; Incledon *et al* 2016; Fuss *et al* 2011). Patellofemoral pain is the most common cause of knee pain in female adolescents (Rathleff 2016), and clinicians working in a musculoskeletal or sport setting will acknowledge that adolescents frequently attend with patellofemoral pain. Clinicians will also recognise that many adolescents do not spontaneously recover from patellofemoral pain. Thus, the education and treatment for patellofemoral pain and potential patellofemoral osteoarthritis in adulthood may need to start in adolescence.

Adolescent patellofemoral pain should not be expected to recover spontaneously and evidence-based interventions consisting of exercise and education should be employed (Rathleff 2016; Rathleff *et al* 2015). Until we have definitive answers regarding the relationship between patellofemoral pain and patellofemoral osteoarthritis, ideally from prospective controlled studies, clinicians who are treating people with patellofemoral pain should consider the possibility that their patients may be at risk of degenerative joint changes.

Patellofemoral pain and osteoarthritis: a sequel to acute knee injury?

(Crossley *et al* 2017)

Anterior cruciate ligament (ACL) injury increases the risk of tibiofemoral and patellofemoral osteoarthritis. MRI evidence of patellofemoral osteoarthritis is observed in 17% of individuals at one year following ACL reconstruction (Culvenor *et al* 2015). By 10 years after ACL reconstruction, almost 50% of people will demonstrate radiographic patellofemoral osteoarthritis (Culvenor *et al* 2014). Meniscal tears requiring partial meniscectomy, either in association with ACL reconstruction (Li *et al* 2011) or in isolation (Englund & Lohmander 2005), are associated with two to five times greater odds of patellofemoral osteoarthritis development than knees without meniscal pathology over the following eight to 20 years.

The mechanisms driving the development of post-traumatic patellofemoral osteoarthritis following ACL and meniscal injury are not well understood, but may relate to concomitant damage to the patellofemoral joint at the time of initial trauma, or inherent biomechanics that are risk factors for both patellofemoral pain and ACL injury, e.g. high knee abduction moments.

Patellofemoral trauma, such as patellar dislocation, doubles the risk of patellofemoral osteoarthritis at 13 years post-injury (22% vs 11%), irrespective of non-operative or surgical management (Maenpaa & Lehto 1997).

Patellofemoral osteoarthritis can be managed using an approach similar to patellofemoral pain

Can we prevent patellofemoral osteoarthritis (OA) in people with patellofemoral pain or ACL injury?
Strategies targeting prevention of patellofemoral pain and traumatic knee injuries are vital to prevent patellofemoral OA in active adults. Following knee injury or patellofemoral pain, treatments to optimise patellofemoral biomechanics may reduce the risk of patellofemoral osteoarthritis.

Until more research can determine which features of an individual makes them more likely to develop osteoarthritis after patellofemoral pain or knee injuries, such as ACL rupture or meniscal tear, interventions with potential to reduce patellofemoral joint stress, e.g. patellofemoral malalignment, low quadriceps strength, higher body mass, valgus knee malalignment, should be included as part of a treatment package. Furthermore, it's probably never too early to discuss the possibility of chronic knee pain and the need for ongoing management of their knee.

How do we treat people with established radiographic patellofemoral OA?
Once patellofemoral OA has developed, conservative management is the preferred primary treatment. Although few clinical trials exist to inform best-practice management, multimodal physiotherapy treatment, i.e. exercise, education, manual therapy, taping (Crossley *et al* 2015b), and knee braces (Callaghan *et al* 2015) may be efficacious. Patellar bracing may improve patellofemoral joint kinematics and knee pain and shrink bone marrow lesions in those with patellofemoral osteoarthritis (Callaghan *et al* 2015; McWalter *et al* 2011). Although tibiofemoral and patellofemoral osteoarthritis frequently co-exist, it is inappropriate to assume that treatments designed for tibiofemoral osteoarthritis are optimal for patellofemoral osteoarthritis.

> "PATIENTS SHOULD BE ADVISED OF THE LONG-TERM IMPLICATIONS OF PATELLOFEMORAL PAIN, AND EXPECTATIONS OF A CURE SHOULD BE AVOIDED"

Can we optimise treatments for patellofemoral osteoarthritis?
In order to improve treatments for those with patellofemoral osteoarthritis, we need to recognise the clinical findings that identify and discriminate them from tibiofemoral osteoarthritis (Crossley *et al* 2016a). A number of factors associated with patellofemoral osteoarthritis may alter the mechanics of the patellofemoral joint and increase joint stress, leading to osteoarthritis. Identification of these impairments in patients with patellofemoral osteoarthritis may lead to targeted and personalised interventions, with capacity not only to reduce the symptoms of patellofemoral osteoarthritis, but have potential to slow disease progression. Such factors include:

- *Abnormal patellofemoral joint alignment and trochlear morphology:* associated with patellofemoral osteoarthritis, both radiographic and MRI features (Wyndow *et al* in press; Macri *et al* 2016).

> "EXERCISE AND EDUCATION IS THE KEY TO MANAGING PATELLOFEMORAL PAIN"

- *Muscle weakness:* quadriceps function, such as muscle size, strength and muscle force is impaired in people with patellofemoral osteoarthritis (Wyndow *et al* in press) and quadriceps weakness is a risk factor for patellofemoral osteoarthritis (Amin *et al* 2009; Stefanik *et al* 2011). Impairment in proximal muscle function is also evident in patellofemoral osteoarthritis (Wyndow *et al* in press).
- *Abnormal biomechanics:* abnormal movement patterns during functional activities may affect patellofemoral joint loading and stress (Powers 2003, 2010; Farrokhi *et al* 2011), which can lead to osteoarthritis and pain and therefore are potential targets for rehabilitation interventions. Individuals with patellofemoral osteoarthritis demonstrate altered biomechanics during gait (Wyndow *et al* in press). In the only longitudinal study to date, Teng *et al* (2015) found that peak knee flexion moment and flexion moment impulse at baseline led to progression of patellofemoral cartilage damage over two years (Teng *et al* 2015).

Conclusion

Exercise and education is the key to managing patellofemoral pain. Exercise therapy should focus on the hip and quadriceps, with consideration to the remainder of the lower limb and trunk, as well as movement pattern retraining where necessary. Key patient education should include load management and guidance on pain monitoring during exercise therapy and other activities, and we encourage the use of developed resources to assist this. Patellofemoral pain likely consists of a continuum from adolescents to patellofemoral osteoarthritis and may also occur following other knee injuries. Importantly, similar exercise and education treatment approaches appear to be beneficial across the proposed continuum.

About the authors

Kay Crossley, Adam Culvenor and Christian Barton are Physiotherapists with a special interest in patellofemoral pain and osteoarthritis. They have completed PhDs in the field of patellofemoral pain, knee injury and osteoarthritis and have published many peer-review articles in international journals and written several book chapters on these topics. They currently lead research projects in patellofemoral pain and osteoarthritis within the La Trobe University Sport and Exercise Medicine Research Centre and continue to treat patients with knee pain clinically. Additionally, they lead numerous workshops and symposiums around the world to teach physiotherapists how to manage knee and patellofemoral pain. Blog: **http://semrc.blogs.latrobe.edu.au/blog**

CONTACT DETAILS

k.crossley@latrobe.edu.au
a.culvenor@latrobe.edu.au
c.barton@latrobe.edu.au

References

American College of Sports Medicine position stand. Progression models in resistance training for healthy adults. *Medicine and Science in Sports and Exercise* 2009;41(3):687-708

Amin S, Baker K, Niu J, Clancy M, Groggins J, Guermazi A, Grigoryan M, Hunter DJ, Felson DT. Quadriceps strength and the risk of cartilage loss and symptom progression in knee osteoarthritis. *Arthritis & Rheumatism* 2009;60(1):189-98

Barton C, Bonanno DR, Carr J, Neal BS, Malliaras P, Franklyn-Miller A, Menz HB. Running retraining to treat lower limb injuries: a mixed-methods study of current evidence synthesised with expert opinion. *British Journal of Sports Medicine* 2016;50(9):513-26

Barton C, Crossley KM. Sharing decision-making between patient and clinician: the next step in evidence-based practice for patellofemoral pain? *British Journal of Sports Medicine* 2016;50(14):833-834

Barton C, Rathleff MS. "Managing My Patellofemoral Pain": the creation of an education leaflet for patients. *British Medical Journals: Open Sport and Exercise Medicine* 2016;2(1):e000086

Barton C, Lack S, Hemmings S, Tufail S, Morrissey D. The 'Best Practice Guide to Conservative Management of Patellofemoral Pain': Incorporating level 1 evidence with expert clinical reasoning. *British Journal of Sports Medicine* 2015;49(14):923-934

Brattberg G. Do pain problems in young school children persist into early adulthood? A 13-year follow-up. *European Journal of Pain* 2014;8(3):187-99

Callaghan MJ, Parkes MJ, Hutchinson CE, Gait AD, Forsythe LM, Marjanovic EJ, Lunt M, Felson DT. A randomised trial of a brace for patellofemoral osteoarthritis targeting knee pain and bone marrow lesions. *Annals of the Rheumatic Diseases* 2015;74(6):1164-1170

Collins N, Crossley KM, Beller E, Darnell R, McPoil T, Vicenzino B. Foot orthoses and physiotherapy in the treatment of patellofemoral pain syndrome: randomised clinical trial. *British Medical Journal* 2008;337:a1735.

Cowan SM, Benell KL, Hodges P. Therapeutic patellar taping changes the timing of vasti muscle activation in people with patellofemoral pain syndrome *Clinical Journal of Sports Medicine* 2002;12:339-347

Crossley K. Is patellofemoral osteoarthritis a common sequela of patellofemoral pain? *British Journal of Sports Medicine* 2014;48(6):409-410

Crossley K, Cook J, Cools A, Hutchinson M, McCrory P, Bahr R, Kham K. Anterior knee pain, in *Brukner & Khan's Clinical Sports Medicine* (5th edition) McGraw Hill Education: Sydney 2017;769-804

Crossley KM, Stefanik J, Selfe J, Collins NJ, Davis I, Powers C. Patellofemoral Pain Consensus Statement from the 4th International Patellofemoral Pain Research Retreat, Manchester Part 1: Terminology, definitions, clinical examination, natural history, patellofemoral osteoarthritis and patient-reported outcome measures. *British Journal of Sports Medicine* 2016a;50(14):839-843

Crossley KM, van Middelkoop M, Callaghan MJ, Collins N, Rathleff MS, Barton CJ. Patellofemoral pain consensus statement from the 4th International Patellofemoral Pain Research Retreat, Manchester Part 2: recommended physical interventions (exercise, taping, bracing, foot orthoses and combined interventions). *British Journal of Sports Medicine* 2016b;50(14):844-852

Crossley KM, Callaghan M, van Linschoten R, Patellofemoral pain: Practice pointer. *British Medical Journal* 2015a;351:h3939

Crossley KM, Vicenzino B, Lentzos J, Schache AG, Pandy MG, Ozlurk H, Hinman RS. Exercise, education, manual-therapy and taping compared to education for patellofemoral osteoarthritis: A blinded, randomised clinical trial. *Osteoarthritis and Cartilage* 2015b;23(9):1457-1464

Crossley KM, Bennell K, Green S, Cowan S, McConnell J. Physical therapy for patellofemoral pain. A randomised, double-blinded, placebo controlled study. *American Journal of Sports Medicine* 2002;30(6):857-865

Culvenor AG, Collins NJ, Guermazi A, Cook JL, Vicenzino B, Khan K, Beck N, van Leeuwen J, Crossley KM. Early knee osteoarthritis is evident one year following anterior cruciate ligament reconstruction: A magnetic resonance imaging evaluation. *Arthritis & Rheumatology* 2015;67(4):946-956

Culvenor AG, Lai CCH, Gabber BJ, Makdissi M, Collins NJ, Vicenzino B, Morris HG, Crossley KM. Patellofemoral osteoarthritis is prevalent and associated with worse symptoms and function after hamstring tendon autograft ACL reconstruction. *British Journal of Sports Medicine* 2014;48(6):435-439

Doberstein S, Romeyn RL, Reineke DM. The diagnostic value of the Clarke sign in assessing chondromalacia patella. *Athletic Training* 2008;43(2):190-6

Englund M, Lohmander LS. Patellofemoral osteoarthritis coexistent with tibiofemoral osteoarthritis in a meniscectomy population. *Annals of the Rheumatic Diseases* 2005;64:1721-1726

Esculier J-F, Bouyer LJ, Dubois B, Fremont P, Moore L, McFadyen B, Roy J-S. Is combining gait retraining or an exercise programme with education better than education alone in treating runners with patellofemoral pain? A randomised clinical trial. *British Journal of Sports Medicine* 2017;Epub: doi: 10.1136/bjsports-2016-096988

Farrokhi S, Keyak JH, Powers CM. Individuals with patellofemoral pain exhibit greater patellofemoral joint stress: a finite element analysis study. *Osteoarthritis and Cartilage* 2011;19(3):287-94

Fuss S, Pagé MG, Katz J. Persistent pain in a community-based sample of children and adolescents. *Pain Research and Management* 2011;16(5):303-309

Incledon E, O'Connor, M, Gialto R, Chalkiadis GA, Palermo TM. Child and Family Antecedents of Pain During the Transition to Adolescence: A Longitudinal Population-Based Study. *Pain* 2016;17(11):1174-1182

Lack S, Barton C, Sohan O, Crossley KM, Morrissey D. Proximal Muscle Rehabilitation is effective for patellofemoral pain: A Systematic Review with Meta-Analysis. *British Journal of Sports Medicine* 2015;49(21):1365-1376

Li RT, Lorenz S, Xu Y, Hamer CD, Fu FH, Irrgang JJ. Predictors of radiographic knee osteoarthritis after anterior cruciate ligament reconstruction. *American Journal of Sports Medicine* 2011;39(12):2595-2603

Macri EM, Stefanik JJ, Khan K, Crossley KM. Is tibiofemoral or patellofemoral alignment or trochlear morphology associated with patellofemoral osteoarthritis? A systematic review. *Arthritis Care & Research* 2016;68(10):1453-1470

Maenpaa H, Lehto MU. Patellofemoral osteoarthritis after patellar dislocation. *Clinical Orthopaedics and Related Research* 1997;339:156-162

McWalter EJ, Hunter DJ, Harvey WF, McCree P, Hirko KA, Felson DT, Wilson DR. The effect of a patellar brace on three-dimensional patellar kinematics in patients with lateral patellofemoral osteoarthritis. *Osteoarthritis and Cartilage* 2011;19(7):801-808

Nijs J, Meeus M, Cagrie B, Roussel NA, Dolphens M, Van Oosterwick J, Danneels L. A modern neuroscience approach to chronic spinal pain: combining pain neuroscience education with cognition-targeted motor control training. *Physical Therapy* 2014;94(5):730-8

Noehren B, Scholz J, Davis I. The effect of real-time gait retraining on hip kinematics, pain and function in subjects with patellofemoral pain syndrome. *British Journal of Sports Medicine* 2011;45(9):691-696

Nunes GS, Stapalt EL, Kirsten MH, de Noronha M, Santos GM. Clinical test for diagnosis of patellofemoral pain syndrome: Systematic review with meta-analysis. *Physical Therapy in Sport* 2013;14(1):54-59

Powers CM. The influence of abnormal hip mechanics on knee injury: a biomechanical perspective. *Orthopaedic and Sports Physical Therapy* 2010;40(2):42-51

Powers CM. The influence of altered lower-extremity kinematics on patellofemoral joint dysfunction: a theoretical perspective. *Orthopaedic and Sports Physical Therapy* 2003;33(11):639-46

Rathleff CR, Olesen JL, Roos EM, Rasmussen S, Rathlef MS. Half of 12-15-year-olds with knee pain still have pain after one year. *Danish Medical Journal* 2013;60(11):A4725

Rathleff MS. Patellofemoral pain during adolescence: Much more prevalent than appreciated. *British Journal of Sports Medicine* 2016;50(14):831-832

Rathleff MS, Rathleff CR, Olesen JL, Rasmussen S, Roos EM. Is knee pain during adolescence a self-limiting condition? Prognosis of patellofemoral pain and other types of knee pain. *American Journal of Sports Medicine* 2016;44(5):1165-71

Rathleff MS, Roos E, Olesen J, Rasmussen S. Exercise during school hours when added to patient education improves outcome for 2 years in adolescent patellofemoral pain: a cluster randomised trial. *British Journal of Sports Medicine* 2015;49(6):406-412

Rathleff MS, Skuldbol SK, Rasch Mn, Roos EM, Rasmussen S, Olesen J. Care-seeking behaviour of adolescents with knee pain: a population-based study among 504 adolescents. *British Medical Council Musculoskeletal Disorders* 2013;14:

Roper JL, Harding EM, Doerfler D, Dexter JG, Kravitz L, Dufek JS, Mermier CM. The effects of gait retraining in runners with patellofemoral pain: A randomized trial. *Clinical Biomechanics* (Bristol, Avon) 2016;35:14-22

Stefanik JJ, Guermazi A, Zhu Y, Zumwalt AC, Gross KD, Clancy M, Lynch JA, Segal NA, Lewis CA, Roemer FW, Powers CM, Felson DT. Quadriceps weakness, patella alta, and structural features of patellofemoral osteoarthritis. *Arthritis Care & Research* 2011;63(10):1391-1397

Teng HL, MacLeod TD, Link TM, Majumdar S, Souza RB. Higher Knee Flexion Moment During the Second Half of the Stance Phase of Gait is Associated With Magnetic Resonance Imaging Progression of Patellofemoral Joint Osteoarthritis. *Orthopaedic and Sports Physical Therapy* 2015;45(9):1-32

Thomas MJ, Wood L, Selfe J, Peat G. Anterior knee pain in younger adults as a precurser to subsequent patellofemoral osteoarthritis: a systematic review. *British Medical Council Musculoskeletal Disorders* 2010;11(201)

Thomee R. A comprehensive treatment approach for patellofemoral pain syndrome in young women. *Physical Therapy* 1997;77(12):1690-1703

Willy RW, Davis IS. The effect of a hip-strengthening program on mechanics during running and during a single-leg squat. *Orthopaedic and Sports Physical Therapy* 2011;41(9):625-32

Wyndow N, Collins N, Vicenzino B, Tucker K, Crossley KM. Is there a biomechanical link between patellofemoral pain and osteoarthritis? A narrative review. *Sports Medicine*, in press.

Joint dysfunction related to Rheumatoid Arthritis

JACK MARCH BSc (Hons) MCSP
Clinical Lead, Chews Health Rheumatology Clinic

Rheumatoid Arthritis (RA) can have a seriously deleterious effect on joint function and, while medical advances have made good strides in improving function and quality of life over the long term, for people diagnosed, management of these dysfunctions remains a necessity. Physiotherapists can play a pivotal role in providing education and interventions to manage joint dysfunction as part of the multidisciplinary team.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1. Overview and characteristics of Rheumatoid Arthritis.
2. The impact of Rheumatoid Arthritis on joint function.
3. Physiotherapy management.
4. Practical considerations.

Introduction

It is important for physiotherapists to understand the characteristics, symptomology and concomitant conditions prevalent in the RA population. It is paramount that an understanding of the evidence base for available treatments is conveyed to the individuals participating to enhance engagement, reduce anxiety and ultimately maximise effectiveness.

The mainstay of physiotherapy management should consist of exercise and education aimed at increasing muscular strength, cardiovascular endurance and mitigating the effects of co-morbidities. Due to the extremely variable nature of RA, a variety of exercise types, settings and consideration of individual preference is required to ensure tolerance of any prescribed programme.

Joint dysfunction and Rheumatoid Arthritis

Joint dysfunction and RA has long been a common association. Previously, it was thought that ulnar drifted metacarpal phalangeal joints (MCPJs) and large joint replacements at a young age were an inevitability. Advances in management from our medical colleagues, with earlier interventions and more efficacious medications, means that this is no longer the case for many, if not most, of those newly diagnosed with RA.

There is now a requirement for physiotherapy to target much higher functioning individuals whose quality of life depends on the management of their joint dysfunctions. This article will explore the physiotherapy approach to management of joint dysfunction in RA and the considerations required to ensure adherence, tolerance and ultimately effectiveness for the individual. It also aims to encourage, through the understanding of the characteristics of RA, its impact on joint function and associated concomitant health issues that can arise.

Some adaptations are likely to be required to achieve the recommendations set out in published guidance and to achieve individual goals and targets which will be unique to each person diagnosed with RA. This complexity is likely to require close working with the wider multidisciplinary team (MDT) as well as the individual themselves. This will enable the physiotherapist to reassure and encourage the individual to partake in management strategies that will benefit their joint function, RA management and general health in the long term.

Overview and characteristics of Rheumatoid Arthritis

RA is a chronic inflammatory disease characterised by joint swelling, joint tenderness and destruction of synovial joints (figures 1 and 2), leading to severe disability and premature mortality (Alehata *et al* 2010). Guidance recommends it is treated by those who offer expertise in exercise and education regarding both the specific condition and general health (Luqmani *et al* 2006, 2009). The persistent synovitis of the joints presents as swelling, heat, stiffness and pain that is usually worse in the early part of the day. The presence of inflammatory infiltrate, if left untreated by medication, eventually causes irreparable erosion to the joint structure which can be extremely disabling. While the MCPJs are the most commonly affected, any synovial joint can be involved and large joint replacements occur at a younger age in RA sufferers (Lee & Choi 2012), than in the general population.

Traditionally, those with RA have required large amounts of input from different specialisms, such as rheumatologists, orthopaedic surgeons and physiotherapists. However, developments in early detection and management from a medical point of

> "INTERVENTION FOR RHEUMATOID ARTHRITIS IS NOW ABOUT EXERCISE AND EDUCATION ON SELF-MANAGEMENT"

view have significantly improved patient outcomes and prolonged function (Stoffer *et al* 2016). These advancements in medical management have led to the requirement for physiotherapy to change its approach. Intervention no longer consists of splinting, wax bath treatment and hydrotherapy; the aim is now for more exercise and education on self-management of the condition.

There is a suggestion that there are two "stages" to a person's experience of RA (van Beers-Tas *et al* 2015). This is more obviously borne out in the clinical guidelines (Luqmani *et al* 2006, 2009). While both of these studies are clearly on the same medical condition, they are associated with different joint dysfunctions and, therefore, offer significant nuance in the management of the joints from a physiotherapy perspective. It is extremely important to understand the effect of interventions on the symptomology of the patient in order to maximise adherence and, ultimately, the effectiveness of physiotherapy interventions. While there are studies that show no detrimental effect of even intense exercise on active rheumatoid joints (van Den Ende *et al* 2000), the individual's perceptions of exercise are of significant worry and wariness (Law *et al* 2013).

In almost all of its characteristics, RA is an extremely variable condition. Symptom severity, number of joints affected, associated issues such as fatigue or malaise, and age of onset are all individual in their presentation. In addition, the person themself brings with them their own beliefs, tolerances, requirements and functional challenges.

As well as the obvious impact on joints, RA has multisystem effects such as heightened risk of cardiovascular disease, osteoporotic fractures, higher incidence of infection and development of some malignancies (Giles 2015). These have multi-causation, i.e. systemic inflammation, immune modifying medication and cortico-steroid use are all contributing factors. There is also a significantly raised prevalence of depression associated with RA compared to the general population (Matcham *et al* 2013).

Impact on joint function

As previously mentioned, there are two stages of joint dysfunction described in the literature (van Beers-Tas *et al* 2015); "early disease" and "established disease", while in differing parts of the disease timeline and of the same cause, there are important distinctions. It is important to remember that people with established disease can also suffer a "flare up" and experience acute or chronic synovitis. This leads to a complicated overlap of symptoms and joint dysfunction.

EARLY DISEASE

In this stage there are usually no joint erosions or deformities to contend with. Instead, acute synovitis causes hot, swollen, stiff and painful joints. This is often coupled with a lack of understanding of the new diagnosis, concern regarding the future, and side-effects of new medication. Patients often find hand functions extremely restricted as the range of motion in the MCPJs decreases and pain in gripping activities increases, a symptom that is particularly exaggerated in the morning. In the feet the MTPJs are often affected with similar problems; swelling, temperature, stiffness and pain affect any weight bearing activities, and driving.

ESTABLISHED DISEASE

Many individuals suffer from varying degrees of joint damage that can result in deformity (Markatseli *et al* 2011). The classic image of RA is that of MCPJs succumbing to ulnar drift due, in part, to the chronic synovitis stretching the joint capsule, the erosion of the MCP heads and the stronger ulnar-direction pull of the flexor tendons. Individuals can find this disabling and painful as the function and strength of the fingers is reduced. Many also dislike the appearance and MCPJ replacements are an option. In the larger, weight bearing joints, erosion

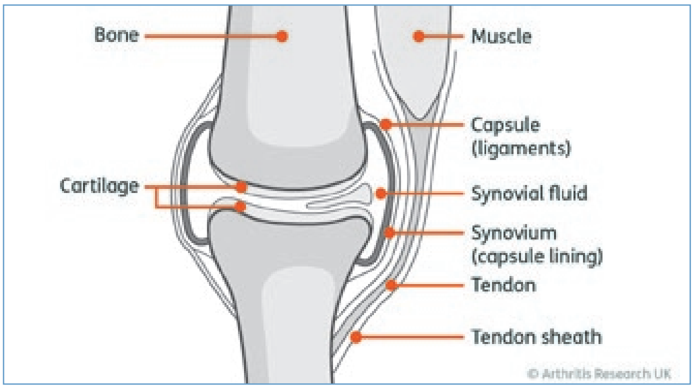

FIGURE 1: Front view of a normal joint

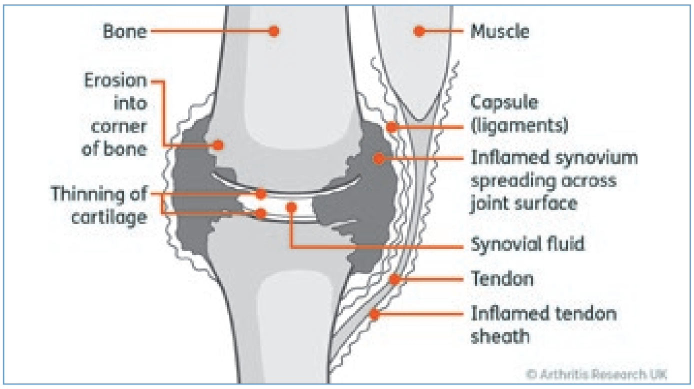

FIGURE 2: Front view of a joint badly affected by Rheumatoid Arthritis

Diagrams reproduced with kind permission of Arthritis Research UK

> "EXERCISES SPECIFICALLY TARGETING THE JOINTS OF THE HAND HAVE SHOWN TO NOT ONLY BE EFFECTIVE, BUT POSSIBLY ALSO COST-EFFECTIVE"

and destruction can also occur. Large joint replacements are more common in RA patients, but also more complex due to the systemic inflammation, bone quality and other co-morbidities associated with the condition (Lee & Choi 2012). Persistent pain is also an issue in established disease with many patients developing fibromyalgia, which further impacts on their joint function as they reduce their activity levels, causing the symptom reaction to any activity they do undertake to be exaggerated (Perrot *et al* 2017).

Indirect effects on joint function come from the co-morbidities associated with RA. Osteoporotic fractures are more prevalent in those with the condition and can have an obvious impact on overall function and specific joint function depending on the fracture location. Rheumatoid Cachexia is a condition that causes muscle loss due to the systemic inflammation, this greatly decreases muscle strength and endurance, impacting directly on joint function.

Physiotherapy interventions

In the guidance for patients with RA (Luqmani *et al* 2006, 2009; Combe *et al* 2016), recommended physiotherapy interventions are centred around a combination of exercise and education. Much of the guidance is aimed at management of the condition as a whole with regard to reducing risk of impact of co-morbidities such as the risk of cardiovascular disease, osteoporosis and general function. Currently, there is no consensus to suggest that physiotherapy interventions have either a positive or negative influence on the progression of joint damage in the long term. However, more specific guidance in the context of this article suggests exercises to strengthen and improve the function of the hands.

The effect of exercise has been well researched and shows positive outcomes on maintaining and reversing skeletal muscle loss (Sharif *et al* 2011), improving hand joint function (Lamb *et al* 2015a), muscle strength (van Den Ende *et al* 2000), reducing pain, and increasing function in general (Christie *et al* 2007). It is accepted that higher intensity exercises are most effective at inducing the muscular effects that improve strength and the cardiovascular system (Pollock *et al* 1998). High intensity programmes have been shown to be tolerated without compromising the RA disease activity, pain levels or joint integrity (van Den Ende *et al* 2000).

While individual preferences and tolerance need to be considered when creating an exercise programme, patients should be educated and encouraged to participate in higher intensity exercises for strength and aerobic capacity. However, there is a place for lower intensity exercises as these are useful for joints with significant synovitis, especially if exercise worsens symptoms such as temperature, swelling or pain in excess of 48 hours, or outside of individual tolerance. Gentle active mobility exercises may help to maintain mobility and keep the joints active during "flares" (Brosseau *et al* 2014).

Exercises specifically targeted for the joints of the hand are a suggested treatment for all individuals diagnosed with RA as they have shown not only to be effective, but possibly also cost-effective (Lamb *et al* 2015a; 2015b) in improving hand function. As previously mentioned, the published guidance advises provision of this therapy to patients of both early and established disease. To achieve this, the SARAH Trial (Lamb *et al* 2015a) contains an excellent protocol containing specifics on exercise technique, resistance levels, progression and volume showing good results on the hand function of a large cohort of enrolled individuals, compared to usual care.

It is extremely important for physiotherapists to educate patients with RA effectively on the positive effects of exercise for joint function and encourage participation and adherence. It has been shown that there are many barriers to exercise in this population, but most significant are psychosocial beliefs regarding the safety of physical activity and exercise (Loof *et al* 2015). It is therefore essential that, prior to and during promotion or prescription of exercise programmes, positive messages with regard to physical activity should be reinforced and any concerns specifically addressed.

Electrophysical agents such as Therapeutic Ultrasound and TENS have been shown to reduce pain and increase function in the hand and wrist. However, the methodological quality of these studies is limited and it is therefore considered low-quality evidence (Christie *et al* 2007; Brosseau *et al* 2014). In the case of TENS, results were inconsistent, while a protocol of Therapeutic Ultrasound in water suggested by the Ottawa panel, was seen as the most robustly evidenced study (Brosseau *et al* 2014).

Thermotherapy for RA has not been shown to be effective after systematic review (Christie *et al* 2007; Brosseau *et al* 2008, 2014) and acupuncture for RA has not been shown effective over sham (Lee *et al* 2008; Christie *et al* 2007; Brosseau *et al* 2014).

Practicalities of implementing treatments

As previously discussed, the very nature of RA means that it has the potential to

SCENARIO	JOINT DYSFUNCTION(S)	TREATMENT(S)	CONSIDERATIONS/PRACTICALITIES
70-year-old; 30-year history of RA "Established RA"	– MCPJ erosions and deformity – MTPJ erosions and deformity – Large joint replacement (e.g. knee)	– Hand exercises – Balance work – Global strengthening – CV exercise – Exercise education	– Adjust for deformities – Setting (hydrotherapy) – Persistent pain – Symptoms 24-48 hours post treatment – pain, swelling, temperature – Individual's tolerance and preference
30-year-old; six-month history of RA "Early RA"	– MCPJ synovitis (swelling, redness, temperature) – Large joint synovitis (e.g. knee)	– Hand exercises – Maintain ROM of synovitic joints – Swelling management – CV exercise – Global strengthening – Exercise education	– Symptoms 24-48 hours post treatment – pain, swelling, temperature – Individual's tolerance and preference

TABLE 1: Case studies showing treatment programmes and considerations for joint dysfunction

involve multiple systems and multiple synovial joints. This can pose some potential difficulties in the clinical setting. The interventions outlined above are relatively simple in their application when appraised as a standalone theoretical model but become extremely complex when attempting to apply them to an individual. Beliefs, fears and past experiences all play a significant role alongside the patient's physical symptoms as potential barriers to their adherence to proposed interventions and, therefore, the potential benefit gained from those interventions. As a result, an individualised approach must be taken from the outset to ensure the patient is involved in the selection and planning of therapy interventions. Where necessary, it may be required to complete significant educational input prior to the commencement of physical interventions.

Case studies indicate that the interventions are relatively similar for early disease and established disease (table 1), although it must be noted that there are differences in application which will be key to ensuring adherence and, therefore, likely effectiveness. Obvious practical considerations include gripping in the presence of hand deformities / pain, weight bearing in the presence of foot deformities / pain, joint replacements and the reaction of symptoms following intervention. Less clear is consideration of co-morbidities related to RA such as cardiovascular disease, osteoporosis and side-effects of medications.

Accommodating for the very joint dysfunctions that are the target of treatment requires access to a variety of measures that will fit each individual.For example, different settings can be used to offload painful weight bearing joints, such as a hydrotherapy pool or a recumbent bike, and equipment such as wrist weights can be utilised to avoid the need for gripping. Greater accommodations are likely to be required in the early stages of an exercise programme as the individual gets accustomed to the demands placed on their joints and the symptomology following completion. These may be able to be relaxed over time as symptoms improve and the individual understands how their symptoms react following exercise.

Planning a programme can take some imagination when joints react adversely to exercise. It may be necessary to exercise around the joint, or use a lower loading environment in the short term. It is important to include both the patient and their MDT in these more reactive cases. Ensuring that the rheumatologist is aware of the situation, and happy with the severity / duration of these symptoms, is important in the context of medication levels and the intensity of the exercise performed. For example, if only light or moderate exercise elicits significant synovitis and / or pain it may be that a medication review is warranted to enable closer disease control.

About the author

Jack qualified as a Physiotherapist from the University of Plymouth in 2008, taking up rotational posts in the NHS before completing more than five years as a Senior Physiotherapist in Rheumatology. He now works in private practice as rheumatology clinical lead for Chews Health and Prestons Health.

Jack also provides continued professional development via podcasts with "The Physio Matters Podcast Team", seminars as a tutor with "The Clinical Maze" team and has spoken at conferences on the topics of spondyloarthropathy, rheumatology masqueraders in sports and fibromyalgia. He has a keen interest in assimilating the available evidence base and using it to help rheumatology patients to self-manage their condition.

CONTACT DETAILS
www.facebook.com/physiojack
physiojack@hotmail.co.uk
07535416323

"PLANNING A TREATMENT PROGRAMME CAN TAKE SOME IMAGINATION WHEN JOINTS REACT ADVERSELY TO EXERCISE"

References

Alehata D, Neogi T, Sliman A, Funovits J, Felson D, Bingham C, Birnbaum N, Burmester G, Bykerk V, Cohen M, Combe B, Costenbader K, Dougados M, Emery P, Ferraccioli G, Hazes J, Hobbs K, Huizainga T, Kavanaugh A, Kay J, Kvien T, Laing T, Mease P, Menard H, Moreland L, Naden R, Pincus T, Smolen J, Stanislawska-Biernat E, Symmons D, Tak P, Upchurch K, Vencovsky J, Wolfe F, Hawker G. 2010 Rheumatoid Arthritis classification criteria. *Arthritis and Rheumatism* 2010;62(9):2569-2581

Brosseau L, Rahman P, Poitras S, Toupin-April K, Paterson G, Smith C, King J, Casimiro L, Angelis G, Loew L, Cavallo S, McEwan J. A systematic critical appraisal of non-pharmacological management of rheumatoid arthritis with appraisal of guidelines for research and evaluation II. *PLos ONE* 2014;9(5)

Brosseau L, Wells G, Tugwell P, Egan M, Dubulouz C, Casimiro L, Robinson V, Pelland L, Mcgowan J. Ottawa Panel evidence-based clinical practice guidelines for electrotherapy and thermotherapy interventions in the management of Rheumatoid Arthritis in adults. *Physiotherapy* 2008;84(11):1016-1043

Christie A, Dahm K, Moe R, Haavardsholm E, Hagen K. Effectiveness of non-pharmacological and non-surgical interventions for patients with Rheumatoid Arthritis: an overview of systematic reviews. *Physical Therapy* 2007;87(12):1696-1715

Combe B, Landewe R, Daien C, Hua C, Aletaha D, Alvaro-Gracia J, Bakkers M, Brodin N, Burmester G, Codreanu C, Conway R, Dougados M, Emery P, Ferraccioli G, Fonseca J, Raza K, Silva-Fernandez L, Smolen J, Skingle D, Szekanecz Z, Kvien T, van der Helm-van Mill A, Vollenhoven R. 2016 update of the EULAR recommendations for the management of early Arthritis. *Annals of the Rheumatic Diseases* 2016;1-12

Giles J. Cardiovascular disease in Rheumatoid Arthritis: current perspectives on assessing and mitigating risk in clinical practice. *Best Practice & Research Clinical Rheumatology* 2015;1-15

Lamb S, Williamson E, Heine P, Adams J, Dosanih S, Dritsaki M, Glover M, Lord J, McConkey C, Nichols V, Rahman A, Underwood M, Williams M. Exercises to improve function of the rheumatoid hand (SARAH): a randomised controlled trial. *The Lancet* 2015a;385(9966):421-429

Lamb S, Williamson E, Heine P, Adams J, Dosanih S, Dritsaki M, Glover M, Lord J, McConkey C, Nichols V, Rahman A, Underwood M, Williams M. Exercises to improve function of the rheumatoid hand (SARAH): a randomised controlled trial and economic evaluation. *Health Technology Assessment* 2015b;19(19):ISSN 1366-5278

Law R, Markland D, Madison P, Thom J. Perceptions relating to exercise in Rheumatoid Arthritis: a UK based questionnaire study. *Musculoskeletal Care* 2013;11:147-158

Lee J, Choi C. Total knee arthroplasty in Rheumatoid Arthritis. *Knee Surgery and Related Research* 2012;24(1):1-6

Lee S, Shin B, Ernst E. Acupuncture for Rheumatoid Arthritis. *Rheumatology* 2008;47:1747-1753

Loof H, Demmelmaier I, Henriksson E, Lindblad S, Nordgren B, Opava C, Johansson U-B. Fear avoidance beliefs about physical activity in adults with Rheumatoid Arthritis. *Scandinavian Journal of Rheumatology* 2015;44:93-99

Luqmani R, Hennell S, Estrach C, Birrall F, Bosworth A, Davenport G, Fokke C, Goodson N, Jeffreson P, Lamb E, Mohammed R, Oliver S, Stableford Z, Walsh D, Wasbrook C, Webb F. British Society for Rheumatology and British Health Professionals in Rheumatology Guideline for the management of Rheumatoid Arthritis (The first two years). *Rheumatology* 2006;45(9):1167-9

Luqmani R, Hennell S, Estrach C, Basher D, Birrell F, Bosworth A, Burke F, Callaghan C, Candal-Couto J, Fokke C, Goodson N, Homer D, Jackman J, Jeffreson P, Oliver S, Reed M, Sanz L, Stableford Z, Taylor P, Todd N, Warburton L, Washbrook C, Wilkonson M. British Society for Rheumatology and British Health Professionals in Rheumatology Guideline for the management of Rheumatoid Arthritis (after the first 2 years). *Rheumatology* 2009;48(4):436-9

Markatseli T, Voulgari P, Alamanos Y, Drosos A. Prognostic factors of radiological damage in Rheumatoid Arthritis: a 10-year retrospective study. *Rheumatology* 2011:38:44-52

Matcham F, Rayner L, Steer S, Hotopf M. The prevalence of depression in Rheumatoid Arthritis: a systematic review and meta analysis. *Rheumatology* 2013;52:2136-2148

Perrot S, Peixoto M, Dieude P, Hachulla E, Avouac J, Ottaviani S, Allanore Y. Patient phenotypes in Fibromyalgia co-morbid with systemic sclerosis or Rheumatoid Arthritis: influence of diagnostic and screening tests. Screening with the FiRST questionnaire, diagnosis with the ACR1990 and revised ACR 2010 criteria. *Clinical and Experimental Rheumatology* 2017:Epub ahead of print

Pollock M, Gaesser G, Butcher J, Despres J, Dishman R, Franklin B, Garber C. ACSM position stand on the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in adults. *Medical Journal of Science, Sports and Exercise* 1998:30(6):975–991

Sharif S, Thomas J, Donley D, Gilleland D, Bonner D, McCrory J, Hornsby W, Zhao H, Lively M, Hornsby J, Always S. Resistance exercise reduces skeletal muscle cachexia and improves muscle runction in Rheumatoid Arthritis. *Case Reports in Medicine* 2011;2:205691

Stoffer M, Schoels M, Smolen J, Aletaha D, Breedveld F, Burmester G, Bykerk V, Dougados M, Emery P, Haraoui B, Gomez-Reino J, Kvien T, Nash P, Navarro-Compan V, Scholte-Voshaar M, Vollenhoven R, van der Heijde D, Stamm T. Evidence for treating Rheumatoid Arthritis to target: results of a systematic literature search update. *Annals of the Rheumatic Disease* 2016;75:16–22

van Beers-Tas M, Turk S, Schaardenburg D. How does established rheumatoid arthritis develop, and are there possibilities for prevention? *Best Practice & Research Clinical Rheumatology* 2015;29(4-5):527-42

van Den Ende C, Breedveld F, Cessie S, Dijkmans B, de Mug A, Hazes J. Effect of intensive exercises on patients with active Rheumatoid Arthritis: a randomised clinical trial. *Annals of Rheumatological Disease* 2000;59:615-621

On the road to embracing endogenous pain modulation systems

TOBIAS BREMER MSc MCSP
Clinical Director, Physio Clinic, Brighton

It is imperative for private practice practitioners to be able to demonstrate the ability to deliver high-quality interventions and excellent clinical outcomes to internal and external stakeholders. The vehicle to do this for the private practitioner is via the Data for Impact tool, which is run in conjunction with the University of Brighton. The inputted data is independently analysed and, once certain benchmarks are achieved, the practitioner is awarded the Quality Assured Practitioner status. This article will help guide practitioners on how to enhance their clinical outcomes by educating them on how to harness the potential of the placebo effect in everyday clinic, as well as highlighting the complexity of the placebo effect and empowering practitioners to defend its use to peers, purchasers of their service and the public. The improved clinical outcomes will not only raise the practitioner's individual standing, but also that of the whole QAP scheme to demonstrate through data the efficacy of the physiotherapy profession.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1. Understand the complexities of the placebo and nocebo effect in terms of definition and application.
2. Understand how to use the placebo effect ethically to improve your clinical outcomes.
3. Understand the interaction between patient-centred care and the placebo effect.

The placebo effect

Imagine this: you are walking down the road, your toddler in tow; they are happily skipping along but then trip and fall to their knees. They start crying, but you realise it is nothing serious, so you rub their knees, blow on them and tell your little one in a calming voice that you've made the pain "go away".

Now what exactly happened here? This, arguably, is a completely normal ritual between a parent and child, where the parent knowingly, or unknowingly, uses the placebo effect by performing a sham treatment on their toddler without questioning it, and usually with a successful outcome. In terms of accessing the placebo effect this is a master class and the results are instant, so why is the placebo effect still deemed a controversial entity (McCullough 2017) in the biomedical field?

The placebo effect and its associated semantics in the biomedical world have had different connotations in the past, and has been deemed a "loaded" term (Fulton 2015). Literally translated, placebo means "I will please", which accurately states its noble intention but does not address the wider implications of the paradigm the placebo effect operates within.

Nunn (2009) argues that the definitions of the placebo effect fail as it is like "*grafting more epicycles on an earth centred theory of the universe. No matter how accurate, the placebo, like the earth, is not at the centre of the construct*".

In order to understand the complexity of the term, and the difficulty in appreciating the validity of the placebo effect, it is important to understand the thought processes surrounding the shaping of its definition.

As Miller & Brody (2010) explain, "*conceptual clarity in the medical field is taken for granted*" and in the 20th century there was a clear distinction between the body and the mind. They were, in effect, two separate entities and the world view at the time was simply not able to attribute so much power to the effectiveness of the mind on the healing process. However, with the advances of science, we now understand the effect of expectancy and conditioning on the healing powers of the mind and body. Hence, the clarity that was once taken for granted now needs to be reassessed and within this the definition and applicability of the placebo effect as part of the treatment (Miller & Brody 2010).

The core of the placebo effect, as Miller & Brody (2010) state, has been perplexing for the scientific medical world as it involves observing a reaction after an intervention, usually of an inert substance which has no causal link or efficacy to produce the observed event.

Further to this, the "inert placebo" raises ethical considerations for the practitioner. Is utilising the placebo effect ethical? Is using an "inert" substance

"WITH ADVANCES OF SCIENCE, WE NOW UNDERSTAND THE EFFECT OF EXPECTANCY AND CONDITIONING ON THE HEALING POWERS OF THE MIND AND BODY"

misleading and does it break the trust between the therapist and patient? In order to understand the answer we need to understand that the placebo effect, even the inert substances, are taken by individuals with complex belief systems and therefore an individual's construct of the "meaning of medicine" needs to be considered as part of this.

Chiffi & Zanotti (2017) detail the epistemological complexity of the term placebo and, with regard to the individual's perception of the interaction, associated meanings and beliefs, summarise their findings as: "*Failure to appreciate this complexity, like all failures to appreciate complexity in the clinical setting, usually makes things worse.*"

In other words, it is the combination of the healthcare interaction, patient beliefs and context of the interaction that count, not the definition of the placebo effect. Arguably, in the age of clinically generated evidence (Kerry 2014) it is paramount to understand the complexity of the therapeutic interaction in order to access placebo so practitioners can understand each patient as an individual (Hoffman *et al* 2005).

Measuring the 'dark art'

There is now a growing body of evidence, using neurological imaging, to show the brain response to placebo treatment is the same as to active drugs. This, in our modern understanding of the term, includes utilising the patient's expectancy of the treatment, contextual aspects of the interaction and conditioning to achieve a response (Testa & Rossettini 2016).

The renewed interest in the placebo effect, and the current change in mindset towards it, has to some degree been facilitated by the ability to measure the placebo response findings on neurological imaging, and the measurable effect on neurotransmitters (Marchant 2016), effectively making the dark art of the placebo visible to science.

Bialosky *et al* (2011) suggest the analgesic response to the placebo effect can be seen on pain modulation, emotion, cognitive appraisal and in the opioid and reward systems. More recent work by Testa & Rossettini (2017) confirms these earlier findings. The authors report neurophysiological changes to the neural network composed of the anterior cingulate cortex, the dorsolateral prefrontal cortex, the hypothalamus, the periaqueductal gray, the rostro-ventro-medial medulla and the dorsal horn of the spinal cord. Testa & Rossettini (2017) also provide evidence that these brain regions respond in a top down fashion to placebo substances in order to dampen down the effects of pain, exactly as active pharmacological substances would.

Interestingly, Bialosky *et al* (2011) also report that the placebo effect can be significantly lessened by disruptive transcranial stimulation of the pre-frontal cortex, as well as being severely reduced in Alzheimer's sufferers. This inadvertently strengthens the argument that the neural pathways of the brain can be seen to have a significant somatic affect. Indeed, the placebo response is not just limited to pain modulation; further conclusive work by Frisaldi *et al* (2014) demonstrated that dopamine levels returned to normal in Parkinson's patients after the insertion of sham electrodes into the relevant brain regions.

A fascinating example of the mind's power to expectancy is found in the work by Benedetti *et al* (2015) who, while working on the body's response to low oxygen levels in the Alps, reported a measurable effect of the synthesis of prostaglandins which are powerful localised acting vasodilators. The level of synthesis of the prostaglandins within each participant's blood changed depending on whether they had received placebo or nocebo enhancing instructions before their ascent into the mountains. From this work, Benedetti *et al* (2015) concluded that placebos and analgesic drugs seem to use common biochemical pathways and the responses could be manipulated depending on the participant's expectancy to instructions.

The above examples, drawn from the all corners of the medical spectrum, demonstrate without difficulty the physiological impact of the placebo and nocebo on humans, and the ability to measure this effectively and prove its relevance as a valued clinical tool. It is, therefore, imperative for clinicians to understand the complexity of this and harness the placebo response potential in their daily clinical lives. As mentioned earlier, all interactions within the therapeutic field are laden with meaning and have the potential to influence the therapeutic outcome. There are several key issues, such as communication, expectancy, and contextual aspects in terms of clinical interaction, which need to be explored further in order to understand this fully.

"RENEWED INTEREST IN THE PLACEBO EFFECT HAS BEEN FACILITATED BY THE ABILITY TO MEASURE THE PLACEBO RESPONSE ON NEUROLOGICAL IMAGING"

"IT IS IMPERATIVE FOR CLINICIANS TO UNDERSTAND AND HARNESS THE PLACEBO RESPONSE POTENTIAL"

Communication

Engaging and warm communication between the therapist and patient is key to achieving a reciprocal relationship. Studying the effect of pain medication and communication, Amanzio *et al* (2001) produced seminal findings in this field. In their study, patients recovering from surgery received four types of painkillers. The post-operative group was split into two, one group received their drugs from a machine controlled drip, while the other from an engaging doctor. There was a reported 50% improvement in the pain of the group who received their drugs from a doctor who spoke to them during the process, than from the machine administered group. The authors concluded that the difference in the subjective pain measurements was down to the communicative element of the treatment.

Kaptchuck *et al* (2008) took this argument further by dividing their participants who were receiving treatment for irritable bowel syndrome into three groups. Group one was an observation group with no intervention, group two received sham acupuncture from a stern-faced, cold practitioner, group three received sham acupuncture from an engaging, warm and friendly practitioner. In group one, 28% reported adequate relief by just being on the waiting list; 44% of participants in group two reported adequate relief with sham acupuncture; but 62% of participants in group three reported adequate relief through sham acupuncture and a warm and engaging practitioner. The authors concluded that the non-specific effects can produce statistically and clinically relevant results. However, the patient / therapist relationship was the most robust component. Both studies highlight how engaging, patient-centred communication can influence the therapeutic outcome.

Bialosky *et al* (2017) argue that physiotherapists typically present themselves in an enthusiastic manner and readily inform the patients of the benefits of receiving interventions, such as manual therapies. The authors report that "*therapists communicate verbally and non-verbally and use their hands on skills to augment their enthusiasm*".

The subtle difference to the earlier highlighted work within the communication strategy is that of the practitioner setting an expectancy of a positive outcome through their hands-on techniques. This view is echoed by Bialosky *et al* (2017) who, in their work on enhancing the placebo analgesic effect, found the following criteria as being significant for clinical outcomes:

- Expectancy enhancing instructions improve the analgesic effect.
- Analgesia is more effective when the stimulus is lessened after the intervention.
- Experience of a previous, positive response to treatment, or the patient knows someone who has had successful treatment.
- Patient believes they have received an analgesic intervention.

The illustration (figure 1) highlights the findings that could be incorporated into the communication strategy between the practitioner and patient in order to enhance their clinical outcomes.

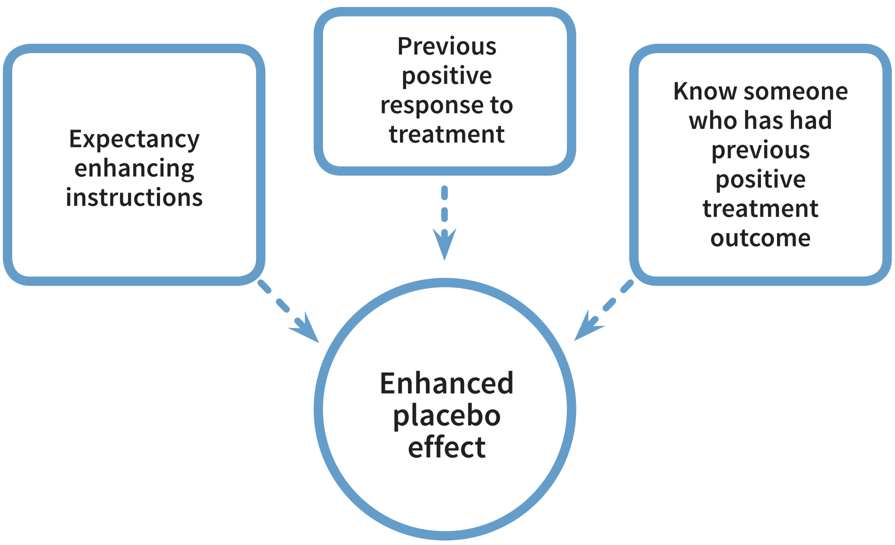

FIGURE 1: Main themes to use to enhance the placebo effect as part of the communication strategy (Bialosky *et al* 2017)

Ritual and appearance

In their work on the meaning of medicine, Moerman & Jonas (2002) present this rather enlightening succinct example of how medicine and medical intervention takes on meaning when contextualised as such:

"The cure for the headache was a kind of leaf, which required to be accompanied by a charm, and if a person would repeat the charm at the same time that he used the cure, he would be made whole; but that without the charm the leaf would be of no avail."
—Socrates, according to Plato

Campbell (2003) argues that *"a ritual is an opportunity to participate in a myth. You are in one way or another putting*

> "PHYSIOTHERAPISTS TYPICALLY PRESENT THEMSELVES IN AN ENTHUSIASTIC MANNER AND INFORM PATIENTS OF THE BENEFITS OF INTERVENTIONS"

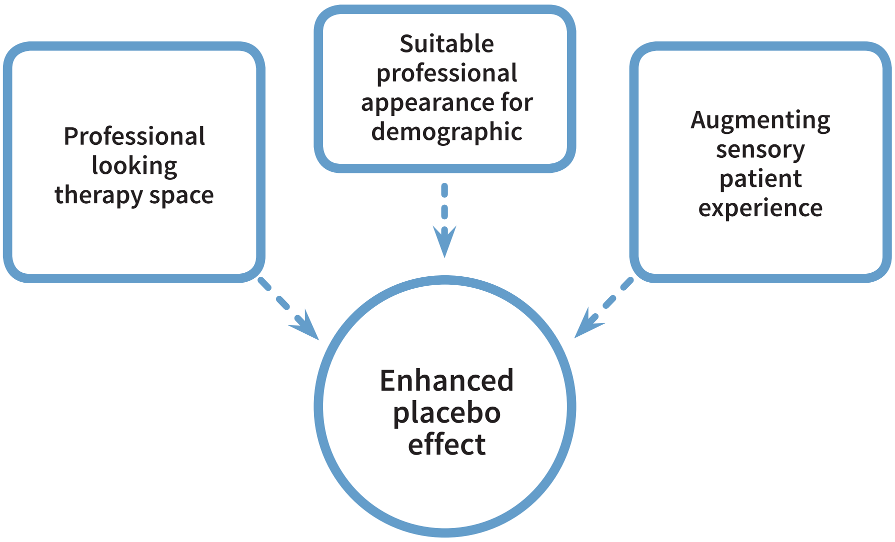

FIGURE 2: The effect of appearance of therapy room, practitioner and sensory input on the placebo effect (Testa & Rossettini 2016)

your consciousness, even the action of your body, into play in relation to a mythological theme." Campbell further argues that the science that supports conditioning is the same that supports the use of rituals, as ritual cues are used to reinforce behaviours and responses.

Bronfort *et al* (2010) coined the phrase "contextual effect" to sum up their findings that the *"ritual between practitioner and patient in itself has a therapeutic effect"* or, as Marchant (2016) agrees, that the placebo effect is further facilitated by the "theatre" of the interaction. People, through rituals, are conditioned to expect a response.

Understanding the need for a professional interaction as being part of the expected ritual is therefore paramount. The expectancy by the patient and delivery of a professional "feeling" the interaction, therefore enhances this ritual effect and thereby the placebo effect (Testa & Rossettini 2016). Indeed, the use of the therapy space as a tool is also mentioned by Fulton (2015) as being essential. Patients expect a professional-looking therapy space with an appropriately dressed practitioner who fulfils the role to that demographic (Fulton 2015). For instance, a sports physiotherapist would look out of place working in a suit, while a suit may have the right effect for a population seeing a pain consultant. Expanding on this argument, Fulton (2015) also suggests that not fulfilling this expectancy will lower the potential placebo effect for the patient. In order to modulate the patient experience, Testa & Rossettini (2016) suggest considering the use of soft lighting, calming colours, gentle music, pleasant aromas, and easy-to-read signs in the private therapy setting to facilitate this.

The presented research demonstrates how the interplay between therapy space, appearance and sensory perceptions adds to the therapeutic ritual and how all these elements interact with the patient's conditioned response. Figure 2 highlights the consideration for daily clinical practice based on the research by Testa & Rossettini (2016).

Ethical considerations and n=1

So, where does this leave us as physiotherapists? What are the ethical considerations when harnessing the placebo effect and tailoring it to our individual patients?

Bialosky *et al* (2011) suggest that the placebo-induced perception is of benefit to the patient and noble in its quest. The authors go on to report that there is no research to date that suggests there is any loss of trust by the participant in their practitioner, even once they realise they have received a sham intervention. Indeed, the ethical arguments regarding the placebo effect usually centre around the archaic biomedical idea of the placebo being inert and, therefore, the patient being at a disadvantage by being subjected to it. From the evidence presented in this article however, it is clear that harnessing the placebo effect takes the practitioner away from the biomedical understanding of the response and evokes a holistic treatment approach (Lichtenberg *et al* 2004), and it could be argued that the associated results of withholding this modern understanding of the connection between body and mind is, in itself, unethical.

A further aspect to understanding and applying the placebo effect is the reframing of the actual mechanisms of the interventions physiotherapists provide. Manual therapists should continue their clinically excellent work, honed by hours of practice, but be aware that the mechanisms of their intervention may differ from their initial thoughts (Bialosky *et al* 2017). Authoritative application of their techniques enables practitioners to present an air of confidence which allows for the ritual and theatre of the interaction to take place and, with that, the placebo effect is induced.

It is this patient-centred approach to the contextual heavy interaction which physiotherapists are extremely competent at, the ability to draw on a rich tapestry of language to illuminate

"THERE IS NO SUGGESTION OF LOSS OF TRUST BY THE PARTICIPANT IN THE PRACTITIONER WHEN THEY REALISE THEY HAVE RECEIVED A SHAM TREATMENT"

and tailor specific understanding to the individual patient's belief system (Swenson *et al* 2004). This is a phenomenon that the biomedically driven, randomised controlled study era has been unable to measure. Returning to the literal definition of placebo, "I will please", it becomes obvious that the n=1 patient-centred approach combined with a professional environment, appearance, rituals, and the patient's own associated conditioned response, has a validity as an intervention that is backed by a great deal of research. What needs to change is our understanding as practitioners of what defines the term "placebo effect".

It is always interesting to take our thought processes out of our usual medical settings and focus on how human interaction and responses manifest themselves. As with the example of the toddler's grazed knees, it is obvious that the response to the parent's assurance that it is "all better" is similar to what we, as practitioners, do over and over every day, and it is a power that should be used each and every time for the benefit of our patient outcomes.

CONTACT DETAILS
info@physioclinicbrighton.co.uk

About the author

Tobias is a Musculoskeletal Physiotherapist, working in private practice, with a passion for high-quality physiotherapy interventions, underpinned by clinically generated research. He is also the Physio First RO Representative and, as book editor, is part of the In Touch editorial team.

References

Amanzio M, Pollo A, Maggi G, Benedetti F. Response variability to analgesics: a role for non-specific activation of endogenous opioids. *Pain* 2001;90(3):205-15

Benedetti F, Durando J, Giudetti L, Pampallona A, Vighetti S. High-altitude headache: the effects of real vs sham oxygen administration. *Pain* 2015;(11):156 2326–2336

Bialosky J, Bishop M, Penza C. Placebo mechanisms of manual therapy: a Sheep in wolf's clothing? *Orthopaedic Sports Physical Therapy* 2017;47(5):301-304

Bialosky J, Bishop M, George S, Robinson M. Placebo response to manual therapy: Something out of nothing? *Manual and Manipulative Therapy* 2011;19(1):11-19

Bronfort G, Haas M, Evans R, Leininger B, Triano J. Effectiveness of manual therapies: the UK evidence report. *Chiropractic and Osteopathy* 2010;25:(18)1-33

Campbell J. *The myths and masks of God (Audio Book Collection)*. High Bridge Company, Minneapolis 2003;disc 5:track 9

Chiffi D, Zanotti R. Knowledge and belief in placebo effect. *Medical Philosophy* 2017;42(1):70-85

Frisaldi E, Carlino E, Lanotte M, Lopiano L, Benedetti F. Characterization of the thalamic-subthalamic circuit involved in the placebo response through single-neuron recording in Parkinson patients. *Cortex* 2014;60:3-9

Fulton B. *The Placebo Effect in Manual Therapy Improving Clinical Outcomes in Your Practice*. Handspring Publishing 2015.

Hoffman G, Harrington A, Fields H. Pain and the placebo effect. What we have learned? *Perspectives in Biology and Medicine* 2005;48(2):248-265

Kaptchuck T, Kelley JM, Conboy LA, Davis RB, Kerr CE, Jacobson EE, Kirsch I, Schyner RN, Nam BH, Nguyen LT, Park M, Rivers AL, McManus C, Kokkotou E, Drossman DA, Goldman P, Lembo AJ. Components of placebo effect: randomised controlled trial in patients with irritable bowel syndrome. *British Medical Journal* 2008;7651(336):999-1003

Kerry R. Evidence based physiotherapy: a crisis in movement. *Evidence* 2014; www.rogerkerry.wordpress.com

Lichtenberg P, Heresco-Levy U, Nitzan U. The ethics of the placebo in clinical practice. *Medical Ethics* 2004;30(6):551-4

Marchant J, Cure *A. Journey into the Science of Mind Over Body*. Canongate Books 2016

McCullough L. Philosophical provocations: the lifeblood of clinical ethics. *Medical Philosophy* 2017;42(1):1-6

Miller F, Brody H. Understanding and harnessing placebo effects: clearing away the underbrush. *Journal of Medicine and Philosophy* 2010;1–10

Moerman, D, Jonas W. Deconstructing the placebo effect and finding the meaning response. *Annals of Internal Medicine* 2002;136(6):471-476

Nunn R. It's time to put the placebo out of our misery. *British Medical Journal* 2009;338:b1568

Swenson SL, Buell S, Zettler P, White M, Ruston DC, Lo B. Patient-centered communication: do patients really prefer it? *General Internal Medicine* 2004;19(11): 1069-79

Testa M, Rossettini G. Context effect in physiotherapy: is it time to potentiate our clinical practice by integration of placebo responses? *Pain in Motion* 2017; www.paininmotion.com

Testa M, Rossettini G. Enhance placebo, avoid nocebo: how contextual factors affect physiotherapy outcomes. *Manual Therapy* 2016;1-10

Cartilage – can it repair?

NICKY SNAZELL BSc BSc (Hons) MCSP AACP FiSTOP
Consultant Physiotherapist in pain relief

Cartilage is a connective tissue made up of specialised cells called chondrocytes which produce an extracellular matrix of collagen fibres, proteoglycan, and elastin fibres. This article focuses on joint cartilage, specifically in the knee. It will discuss how damaged cartilage affects pain and the latest research into cartilage repair.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1. Revisit and familiarise ourselves with cartilage anatomy and physiology.
2. Gain a deeper understanding of pain mechanisms associated with cartilage damage.
3. Reflect on latest clinical evidence for surgical and non-surgical intervention on cartilage repair.
4. Reflect on a new physiotherapy modality MRT and its role in cartilage repair.

A refresher of structure

Cartilage is a connective tissue made up of specialised cells called chondrocytes. The extracellular matrix is classified into three types: elastic, hyaline and fibrocartilage, which differ in amounts of collagen and proteoglycan.

The surface area of cartilage condyle is negatively charged and composed of collagen, embedded with a proteinaceous matrix. Young cartilage is around 85% water and, as we age, that figure gradually declines to 70%, and the negative charges and sialic acids reduce – a factor that is believed to be a possible link to early osteoarthritis (Laver-Rudich & Silbermann 1985). Cartilage can be divided into zones, all of which have three regions:

- The superficial zone communicates directly with synovial fluid to obtain nutrients. Being avascular, aneural and with no lymphatic system, the nutrients needed for the chondrocytes are obtained by diffusion and this fluid flow occurs with the compressive forces of movement (exercise). Dense collagen fibres are parallel to the articular surface, while the chondrocytes lie flat. This layer has a tensile strength that can withstand the articulation of the joint surfaces on each other, and protects the deeper structures.
- The mid zones have oblique, thicker collagen fibres and larger amounts of proteoglycans that act like a bridge between the superficial and deep cartilage. Here the chondrocytes are less dense and more rounded in shape but are more numerous. The collagen is not arranged parallel to the joint surface. This zone functions to resist compressive forces.
- The deep zone has the thickest collagen fibres with a lessening density of columns of chondrocytes, perpendicular to surface of the joint. It provides the greatest resistance to compressive forces and, through a calcified layer of cartilage, anchors it to the bone. Its function is to adhere the articular cartilage matrix to the subchondral bone and provide a barrier between this zone and the bone. It is the primary site of articular cartilage pathology.

The three regions in each zone are:
Area 1: The pericellular matrix that is a thin layer made up mostly of glycoproteins that cover the chondrocytes, and may play a role on load bearing (Eggli *et al* 1985).
Area 2: The territorial matrix made up of a fine "basket weave" of collagen fibres. It is suggested that these may protect the cartilage cells against mechanical stresses and heavy loads (Guilak & Mow 2000; Muir 1995; Poole 1993; Szirmai 1969).
Area 3: Made up of proteoglycans and random bundles of collagen, the orientation of which is determined by which zone they are located (Mow & Guo 2002).

The relationship between glycogen aggregates in the matrix and the interstitial fluid provides a compressive resilience to cartilage through negative repulse forces. This gives it biphasic viscoelastic behaviour that lessens as we age, and the changes in the chondrocyte distribution through the zones reduce their ability to reverse any damage (Fox *et al* 2009; Buckwalter *et al* 1990; Mow *et al* 1980).

Cartilage is found in joints, intervertebral discs, bronchial airways, the nose, the ear and ribcage. As physiotherapists, we are most interested in the musculoskeletal aspects of cartilage, so this article will focus on the cartilage present in joints specifically in relation to the knee, owing to the similarities of the purpose of cartilage. This is because it tends to be common for the knee joint to be affected by osteoarthritis, a problem

> *"DEEPER DAMAGE OF ARTICULAR CARTILAGE DOES NOT NECESSARILY RESULT IN A WORSENING OF PAIN"*

associated with the wear and tear of cartilage.

The character of cartilage is one of strong resilience and, in varying amounts, smooth and flexible movement. Hyaline cartilage is found in joints at the end of bones and, when bathed in synovial fluid, provides a shock absorbing and low friction surface for ease and range of movement. The menisci in the knee joints consist of fibrocartilage that offers more strength.

Cartilage damage and pain

The International Cartilage Repair Society has set up an arthroscopic grading system by which cartilage defects can be ranked:

- grade 0: (normal) healthy cartilage
- grade 1: the cartilage has a soft spot, blisters, or superficial wear
- grade 2: minor tears less than one-half the thickness of cartilage layer
- grade 3: lesions have deep crevices of more than one-half thickness of cartilage layer
- grade 4: the cartilage tear is full thickness and exposes the underlying (subchondral) bone.

Being avascular and aneural, articular cartilage has a very limited capacity for self-repair so even small incidences of damage can get worse over time.

When shallow damage deepens, however, it does not necessarily result in a worsening of pain and the chondral defect can reach the subchondral bone undetected. Wang *et al* (2006) found that these seemingly harmless small defects in the cartilage could progress to osteoarthritis.

When a defect in cartilage does go through the healing process, it is instigated by the blood supply in the bone. The scar tissue in this process is made up of a type of fibrocartilage; a denser cartilage that is unable to withstand the demands of everyday activities in the way that hyaline cartilage does. Fibrocartilage is, therefore, at a higher risk of breaking down.

Acute injuries to articular cartilage can be caused by overuse through impact loading and weight bearing forces that lead to mechanical disruption of both the chondrocytes and extracellular matrix, or through joint immobilisation, i.e. lack of use that can cause loss of matrix macromolecules without mechanical damage to the chondrocytes or the collagen fibril meshwork. In the case of impact loading injuries, if the process of the injury is repeated, the subsequent degeneration of matrix macromolecules, such as proteoglycans can lead to irreversible mechanical disruption of the articular cartilage surface.

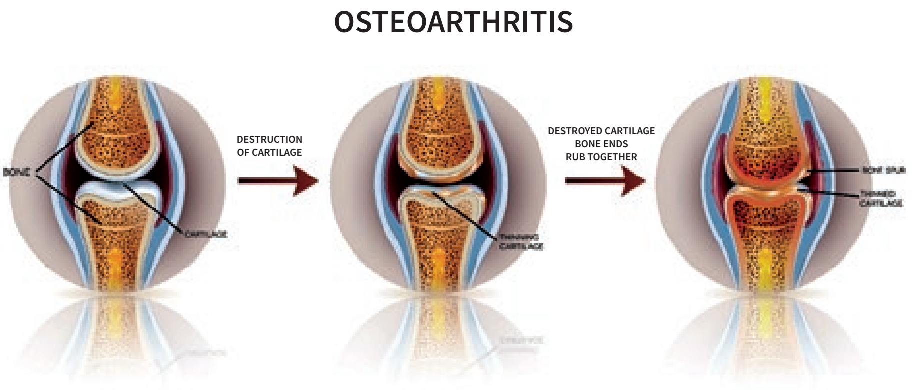

FIGURE 1: Destroyed cartilage

The response of articular cartilage to an injury is determined by a number of factors:

- the extent and severity of the injury
- the state of the cartilage
- age
- structure
- composition
- function
- durability of the repair tissue.

For repaired tissue to fulfill the demands of a joint surface, it must return normal, pain-free motion for an extended period to prohibit further degeneration of the joint (James & Uhl 2001).

So, can we feel pain from cartilage wear? Given that cartilage lacks any nerves, it makes sense that pain wouldn't be felt in any severity of wear (Felson *et al* 1990). This view continues to be supported by two very large, ongoing USA studies: the Osteoarthritis Initiative and the Framingham Osteoarthritis Study that are currently tracking a combined total of almost 1,200 patients with knee arthritis, and results show that loss of cartilage is not strongly linked to pain (**www.semarthritisrheumatism.com**).

These findings seem to fly in the face of common orthopaedic thinking which constantly drums into patients that the appearance on x-ray of narrower joint space equates to more pain – clearly a view that is not based on current scientific evidence. There is a need to move beyond this "cartilage-centric" approach to osteoarthritis pain and its joint replacement strategy to focusing instead on finding out what is causing pain. It is clearly a myth to suggest that cartilage thinning is the root cause.

This raises the obvious question of why do we feel pain when the cartilage wears? Here are some facts that may have an impact:

- Inflammatory chemicals in the joint cause swelling, structural breakdown and pain.
- Cartilage breakdown leads to bone damage (figure 1), swelling, osteophytes and bone pain-associated brain changes, and the centralisation

> "REGULAR MOVEMENT AND DYNAMIC LOADING IS NECESSARY TO MAINTAIN FUNCTIONING ARTICULAR CARTILAGE"

phenomenon. Recent studies analysed the brain in chronic osteoarthritic joint pain states and found modifications in grey matter that did not regenerate until six to nine months after surgery (Gwylim 2010).

- Neuropathic pain is a less understood part of joint pain. Studies suggest that patients with joint pain may exhibit degrees of neuropathic pain (Cedraschi *et al* 2013; Hochman *et al* 2014) and that neuropathic pain is more frequent and underdiagnosed (Jespersen *et al* 2010).
- A knee with cartilage erosion leads to sensitisation peripheral nociceptors in the inflamed synovium and damaged subchondral bone (Mapp 1995).
- Continuous nociceptive input drives chronic pain central sensitisation. Interactions between central and peripheral systems suggest a general plasticity of the nociceptive system in osteoarthritic pain (Imamura *et al* 2008).
- This plasticity includes emotional factors, hence the therapist / patient relationship and the patient's mind state may impact their response to treatment.
- Some studies have analysed brain activation and have demonstrated that chronic joint pain is associated with brain modifications. Central sensitisation (Graven-Nielsen & Arendt-Nielsen 2002) in osteoarthritis has been confirmed both by quantitative sensory testing (QST) analysis and functional MRI (Suokas *et al* 2012; Arendt-Nielsen *et al* 2010).

All of these factors underpin the complexity of pain and could explain failures of traditional therapeutic approaches, including physiotherapy and joint replacement surgery.

When it comes to treating cartilage wear, there are currently three available options:

- conservative treatment and management
- surgical repair
- joint replacement.

Non-surgical approaches to cartilage treatment

Clearly, the most attractive treatment option in terms of risk and cost is the conservative route. Even though science progresses at an unbelievable pace, the fact remains that we are better off with the joints we are born with than any artificial modification, and thus it makes total sense to pursue this vigorously before considering other options.

Conservative treatment typically consists of exercise and medication to reduce pain and control inflammation. However, this falls short of addressing some of the issues mentioned earlier. For example, neuropathic overlay from the spine not only compounds the pain problem, but can have long-term consequences for the deterioration of the condition due to the interference in nerve feedback to the brain. Therefore, the neuropathic condition should always be investigated as part of the clinical assessment. Similarly, the inclusion of a biomechanical assessment makes total sense.

Joints need to move to remain healthy. Inactivity leads to an increased risk of cartilage damage and makes the progression of osteoarthritis far more likely, so regular motion and dynamic loading is necessary in order to keep the normal articular cartilage functioning. The prescription of appropriate exercise for range of movement such as Tai Chi or yoga, walking, and swimming, is essential to ensure sufficient nutrient supply that will assist in retaining healthy cartilage. Additional muscle strengthening work such as Nordic Pole walking, Pilates and weight training to improve joint support is also vital. Exercise / movement will fire the piezoelectric currents in collagen, which is essential to cartilage repair (Fernandez 2012).

Unfortunately, long-term prescription of medication is overused, despite the fact that it makes no logical sense to promote a daily dose of pills with the potential multitude of side effects. Further, Shield (1993) suggests that local anaesthetics and medications such as ibuprofen can have adverse effects on the functioning of cartilage cells.

Where these conservative options fall short, however, is in addressing some of the consequences of cartilage thinning such as osteophyte growth, as they don't necessarily offer longer-term solutions that might help reduce the need to consider invasive procedures. There is an option that enables the treatment of such conditions conservatively and this will be discussed later in this article.

Non-conservative interventions

It is not within the scope of this article to review in detail all of the available invasive options for treating loss of cartilage. Instead, this is a brief overview of some of the clinical evidence.

CARTILAGE CELL INJECTIONS

Cartilage cells can be cloned and reproduced in a laboratory. However, the real problem comes in placing those cells in a particular joint and in getting them to function effectively.

New cartilage must somehow adhere to the surface of the joint in the right place. It must then be able to support the weight of the body and glide smoothly to allow normal movement. Research into the use of growth factors and genetic engineering will in future be directed at manipulating the body to repair the damage before arthritis destroys the joint.

As previously discussed, cartilage is much more than just chondrocyte cells. It is a scaffolding tissue made up mostly of non-cellular material, mainly water, with collagen and other proteins. Injecting cartilage cells into the knee doesn't mean the body can make up the other components of cartilage. As knee arthritis progresses, the joint can become further damaged which, over time, may include the formation of osteophytes – changes that make restoring a joint impossible, even if cartilage repair were a possibility.

ARTHROSCOPIC LAVAGE / DEBRIDEMENT

This is a palliative treatment, rather than a restorative one. Its aim is to resolve mechanical restriction by removing small flaps of cartilage or fibrous tissue.

MICROFRACTURE SURGERY

Damaged cartilage is drilled to expose subchondral bone of the joint in order to access the bleed underneath. At eight weeks the body makes a fibrous patch and, at four months, a fibrocartilage one that wears out after a year (Knutsen *et al* 2007).

The next stage of the process of microfracture surgery is the implantation of a collagen membrane inserted at the fracture site to aid mesenchyme stem cells (MSCs). Known as autologous matrix-induced chondrogenesis (AMICs), these techniques are aimed more at the most severe levels of osteoarthritis. In their paper on a five patient case study, Saw *et al* (2011) injected blood progenitor cells and hyaluronic acid into the surgically prepared fracture sites. The fact that this resulted in some hyaline cartilage growth led this Malaysian team to look into future, larger randomised trials.

OSTEOCHONDRAL AUTOGRAPHS AND ALLOGRAPHS

Briefly, this technique involves a dowel of bone being "punched" out of a strong bit of the joint and placed into the weak part, altering the overall stresses across the joint surface (Solheim *et al* 2010). The donor site can be from a deceased person. Rejection drugs are not needed in this procedure, but the repair is difficult to secure as cartilage takes two years to achieve 75% adaption and needs a lengthy, structured rehabilitation programme.

AUTOLOGOUS CHONDROCYTE IMPLANTATION (ACI)

This now requires two surgical procedures; chondrocytes are harvested through an arthroscope from the patient, grown in a laboratory for six weeks then replaced with a matrix or membrane structure (Knutsen *et al* 2007). The chondrocytes can, however, only be inserted into small spaces and are not suitable for "resurfacing" the whole joint. As this process only helps in tiny areas of damage, it is unsuitable for arthritic knees.

AUTOLOGOUS MSC TRANSPLANT

This is still an experimental, minimally invasive arthroscopic technique. In this procedure MSCs are derived from bone marrow, placed in a gel matrix and implanted at the site where new cartilage would develop (Behrens 2005). It is a relatively safe procedure as it uses the patient's own cells and, at three years post treatment, there has been no evidence of cancer cells developing at the repair site (Centeno *et al* 2010).

In a 2008 study, Robert Litchfield concluded that routine knee surgery is ineffective at improving joint function or pain in knee osteoarthritis (Kirkley *et al* 2008). Arthroscopic surgery helped only with a minority of milder symptoms, such as meniscal pad tears. However, even meniscal surgery, when compared to sham treatment, proved ineffective (Sihvonen *et al* 2013). I would conclude that, while there is tentative evidence for surgical procedures for cartilage repair in patients with limited areas of damage, there is no proven procedure as yet for cartilage repair in more advanced knee arthritis.

Magnetic resonance treatment

In the earlier discussion on non-surgical treatment options, I mentioned that there might be a treatment in our toolbox that offers a solution for the complexity of pain and loss of function that we currently associate with cartilage wear in the knee. We may never have the luxury of a complete toolbox, but one item that I believe should be considered as an important option is magnetic resonance treatment (MRT).

As its name implies, MRT utilises the same scientific principles as MRI. In fact, the development of MRT or MBST resulted from the repeated observation that some patients gained therapeutic benefit from MRI (Frobose 2000). MRI science relies on the ability to focus energy into targeted body tissue by spinning hydrogen ions from a high to low energy state. While this concept is used in MRI to create an image, in MRT it is used as a treatment tool. Cartilage tissue is subjected to a multidimensional polar axis of electromagnetic fields, the spin axis of the hydrogen nuclei or protons align parallel to the magnetic field precess at their larmor frequency. This field then transfers the energy to the proton and inverts its spin direction. When the field is switched off, the proton gives out energy as it returns to its original position; it is the resonance between proton spin and precession frequency that gives the therapeutic signal that, it is proposed, regenerates cartilage.

Although MRT is relatively unheard of in the UK and is not, as yet, NICE approved for the NHS, it's a technique that has been used for more than 20 years in Germany and, with the number of treatments approaching 200,000 and zero incidences of side-effects, it is increasingly being recognised for use around the world (Frobrose *et al* 2000).

While the exact mechanism of how MRT works is still not fully understood, there are a number of promising double blind trials. For example, a study on osteoarthritic fingers (Kullich & Außerwinkler 2008) clearly shows encouraging results. An in-vitro study of cell proliferation in petri dishes showed a 270% rate above control for

> "MRT IS A TECHNIQUE THAT HAS BEEN USED IN GERMANY FOR THE TREATMENT OF CARTILAGE REPAIR FOR MORE THAN 20 YEARS"

chondroblasts, and 290% osteoblasts (Temiz-Artmann *et al* 2005).

I have treated hundreds of patients with this method in my own practice and have observed inspirational anecdotal evidence, with a 75% success rate of significant change. Surgeries have been cancelled, painkillers reduced, exercise adhered to, significant reductions in pain on the VAS scale, and significant improvements in function and quality of life.

In order to evaluate how MRT could work in conjunction with physiotherapy I, together with my in-house orthopaedic surgeon, visited the scientists at Medtec in Germany. A comment that my colleague made with regard to the lack of risk in using MRT treatment has stuck with me ever since: *"The worst thing that can happen is that it doesn't work, and that's not something I can say about anything else I offer."*

As helpful as medication is, it is stated elsewhere that prescriptions kill thousands every year (Bates 2003). More than six million British patients suffer hip and knee osteoarthritis and, in a 2015 UK study of mortality rates 30 days post total knee and total hip replacement, the mortality rates were 0.8%, i.e. 4,800 individuals (Smith *et al* 2015).

Conclusion

Articular cartilage is a highly specialised bit of kit. Its lubricated action copes with large loads, but its complexity makes treating, healing and researching it a significant challenge. There is strong evidence to show that a healthy cartilage is dependent on nutrition, exercise, and safe mechanical loading, as well as internal factors such as piezoelectric and hydrostatic effects. Aging causes a reduction in its viscoelastic state, stiffness and fragmentation. The jury is still out on the clinical evidence for effectiveness of surgical repair. However, it is encouraging that there is some promising evidence emerging from the use of developing technology, such as MRT, that suggests a future where damaged or aging cartilage may be repaired successfully and safely.

CONTACT DETAILS
nickyS@painreliefclinic.co.uk

About the author

Nicky graduated in biological sciences in 1988 and then physiotherapy in 1991. During the following 25-year search to find better methods to treat pain, she studied Gunn Intermuscular Stimulation (IMS) and qualified at the highest level. She has taught and presented on health and pain internationally and is the founder and owner of three health companies. She treats and teaches her painkiller methods at her Stafford, Harrogate, Norwich and Harley Street clinics. Nicky embraces holistic, hands-on physiotherapy and recognises the importance of the mind and health in improving treatment outcomes. She has travelled internationally to evaluate new technologies.

Nicky is an Honorary Fellow of the Institute for the Study and Treatment of Pain (iSTOP) and was awarded the Acupuncture Association of Chartered Physiotherapists (AACP) 2016 award for excellence in patient care, and the 2017 Best UK Pain Relief Clinic in recognition of her unrelenting commitment, and her outstanding cutting edge approach to treating patients, presenting internationally at seminars, on radio, and in writing for books for the public on how to improve their health.

References

Arendt-Nielsen L, Nie H, Laursen MB, Laursen BS, Madeleine P, Simonsen OH, Graven-Nielsen T. Sensitization in patients with painful knee osteoarthritis. *Pain* 2010;149:573-81

Bates D. Adverse drug events cause 180k deaths per year. In: Strands R, *Death by Prescription*. Thomas Nelson 2003

Behrens P. Matrixgekoppelte Mikrofrakturierung. *Arthroskopie* 2005;18(3):193–197

Buckwalter JA, Hunzinker E, Rosenberg L. *Articular Cartilage and Knee Joint Function: basic science and arthroscopy*. Raven Press, New York 1990

Cedraschi C, Delézay S, Marty M, Berenbaum F, Bouhassira D, Henrotin Y, Laroche F, Perrot S. Let's talk about OA pain: a qualitative analysis of the perceptions of people suffering from OA towards the development of a specific pain OA-related questionnaire, the osteoarthritis symptom inventory scale (OASIS). *PLoS ONE* 2013;8(11):e79988

Centeno CJ, Schultz JR, Cheever M, Robinson B, Freeman M, Marasco W. Safety and complications reporting on the re-implantation of culture-expanded mesenchymal stem cells using autologous platelet lysate technique. *Current Stem Cell Research and Therapy* 2010;5(1):81–93

Eggli PS, Hermann W, Hunziker EB, Schenk RK. Matrix compartments in the growth place of the proximal tibia of rats. *Anatomical Record* 1985;211:246-257

Felson DT, Hannan MT, Naimark A, Weissman BN, Aliabal P, Levy D. The epidemiology of knee osteoarthritis: results from the Framingham Osteoarthritis Study. *Seminars in Arthritis & Rheumatism* 1990;20(3):42-50

Fernandez JR. Piezoelectric properties of aligned collagen membranes. *European Journal of Applied Mathematics* 2012;23:635

Fox AJ, Bedi A, Rodeo S. The basic science of articular cartilage. *Sports Health* 2009;1(6):461-468

Frobose EL. Evaluation of the effectiveness of MBST theory on the regeneration of cartilage structure. *Orthopaedic Praxis* 2000;39(8):5105-15

Graven-Nielsen T, Arendt-Nielsen L. Peripheral and central sensitisation in musculoskeletal pain disorders: an experimental approach. *Current Rheumatology Reports* 2002;4:313-21

Guilak F, Mow VC. The mechanical environment of the chondrocyte: a biphasic finite element model of cell-matrix interactions in articular cartilage. *Biomechanics* 2000;33:1663-1673

Gwylim SE, Filippini N, Douaud G, Carr AJ, Tracey I. Thalamic atrophy associated with painful osteoarthritis of the hip is reversible after arthroplasty: a longitudinal voxel-based morphometric study. *Arthritis and Rheumatology* 2010;62:2930-40

Hochman JR, Davis AM, Elkayam J, Gagliese L, Hawker GA. Neuropathic pain symptoms on the modified Pain DETECT correlate with signs of central sensitization in knee osteoarthritis. *Osteoarthritis Cartilage* 2014;21:1236–1242

Imamura M, Imamura ST, Kaziyama HH, Targino RA, de Souza LP, Cutait MM, Fregni F, Camanho GL. Impact of nervous system hyperalgesia on pain, disability, and quality of life in patients with knee osteoarthritis: a controlled analysis. *Arthritis and Rheumatology* 2008;59:1424-31

James C-B, Uhl TL. A review of articular cartilage pathology and the use of glucosamine sulfate. *Athletic Training* 2001;36(4):413-419

Jespersen A, Amris K, Bliddal H, Andersen S, Lavik B, Janssen H, Poulsen PB. Is neuropathic pain underdiagnosed in musculoskeletal pain conditions? The Danish Pain DETECTive study. *Current Medical Research and Opinion* 2010;26(8):2041-5

Kirkley A, Trevor B, Litchfield RB, Giffin JR, Willits KR, Wong CJ, Feagan BG, Donner A, Griffin SH, D'Ascanio LM, Pope JE, Fowler PJ. A randomized trial of arthroscopic surgery for osteoarthritis of the knee. *New England Journal of Medicine* 2008;359:1097-1107

Knutsen G, Drogset JO, Engebretsen L, Grøntvedt T, Isaksen V, Ludvigsen TC, Roberts S, Solheim E, Strand T, Johansen O. A randomized trial comparing autologous chondrocyte implantation with microfracture. Findings at five years. *American Journal of Bone and Joint Surgery* 2007;89(10):2105–12

Kullich W, Außerwinkler M. Functional improvement in finger joint osteoarthritis with therapeutic use of nuclear magnetic resonance. *Orthopadische Praxis* 2008

Laver-Rudich Z, Silbermann M. Cartilage surface charge. A possible determinant in aging and OA processes. *Arthritis and Rheumatology* 1985;28(6):660-670

Mapp PI. Innervation of the synovium. *Annals of Rheumatic Disease* 1995;54:398-403

Mow VC, Guo XE. Mechano-electrochemical properties of articular cartilage; their inhomogeneities and anisotropies. *Annual Review of Biomedical Engineering* 2002;4:175-209

Mow VC, Kuei SC, Lai WM, Armstrong CG. Biphasic creep and stress relaxation of articular cartilage in compression; theory and experiments. *Biomechanical Engineering* 1980;113:73-84

Muir H. The chondrocyte, the architect of cartilage; biomechanics, structure, function and molecular biology of cartilage matrix molecules. *Bio-essays* 1995;17;1039-1048

Poole AR. Cartilage in health and disease. In McCarety DJ (Ed): *Arthritis and Allied Conditions. A Textbook of Rheumatology*. Lea and Febiger, Philadelphia 1993;279-522

Saw KY, Anz A, Merican S, Tay YG, Ragavanaidu K, Jee CS, McGuire DA. Articular cartilage regeneration with autologous peripheral blood progenitor cells and hyaluronic Acid after arthroscopic subchondral drilling: a report of 5 cases with histology. *Arthroscopy* 2011;27(4):493–506

Shield MJ. Anti-inflammatory drugs and their effects on cartilage synthesis and renal function. *European Journal of Rheumatology and Inflammation* 1993;13(1):7-16

Sihvonen R, Paavola M, Malmivaara A, Itälä A, Joukainen A, Nurmi H, Kalske J, Järvinen TLN. Meniscectomy versus Sham Surgery for a Degenerative Meniscal Tear. *New England Journal of Medicine*. 2013;369 (26): 2515–2524

Smith EJ, Mau M, Siegmeth A. Thirty-day mortality after elective hip and knee arthroplasty. *Surgery* 2015;13(1):5-8

Solheim E, Hegna J, Øyen J, Austgulen OK, Harlem T, Strand T. Osteochondral autografting (mosaicplasty) in articular cartilage defects in the knee: results at 5 to 9 years. *Knee* 2010;17(1):84–7

Suokas AK, Walsh DA, McWilliams DF, Condon L, Moreton B, Wylde V, Arendt-Nielsen L, Zhang W. Quantitative sensory testing in painful osteoarthritis: a systematic review and meta-analysis. *Science Direct* 2012;20(10):1075-85

Szirmai JA. Structure of cartilage. In Engel A, Larson T (Eds). Stockholm, Sweden 1969; 163-200

Temiz-Artmann P, Linder P, Kayser I, Digel GM, Artmann, Lücker P. NMR in-vitro effects on proliferation, apoptosis and viability of human chondrocytes and osteoblasts. *Methods and Findings in Clinical Pharmacology* 2005;27(6):391

Wang Y, Ding C, Wluka AE, Davis S, Ebeling PR, Jones G, Cicuttini FM. Factors affecting progression of knee cartilage defects in normal subjects over two years. *Rheumatology* 2006;45(1): 79–84

Useful websites

www.mrtcentre.co.uk

www.semarthritisrheumatism.com

Quality, quality assurance and quality assured practitioners

GEORGE W J OLIVIER PhD MSc MRPharmS MRSC
Principal Lecturer in Pharmaceutical Sciences, University of Brighton

LIZ BRYANT PhD BSc
Research Fellow, Centre for Health Research, University of Brighton

SHEMANE MURTAGH PhD MSc BSc
Research Fellow, Centre for Health Research, University of Brighton

Left to right, Liz Bryant, Shemane Murtagh and George W J Olivier

The need for consumers to differentiate competing products on the grounds of quality has been around since ancient times and, over the centuries, various bodies have been formed with the aim of ensuring consumer confidence in the quality of the goods and services being traded. The goal of standardising the measurable quality of healthcare also has historical precedence and, in more recent times, the requirement for continuing medical education that has now evolved to continuing professional development, is recognised by healthcare professionals as an essential part of enhancing and maintaining their quality of practice. Physio First has continually expanded on this national requirement by championing evidence-based practice, initially through encouraging members to participate in data collection, and most recently in the option, through the analysis of this collected data, of obtaining the status of Quality Assured Practitioner (QAP).

LEARNING OUTCOMES

1. Explore the concepts of quality.
2. Identify how quality applies with regard to healthcare practitioners.
3. Understand how the Physio First QAP scheme contributes.

Standardisation

The importance of having standardised weights and measures has been recognised since antiquity and naturally occurring objects that were consistent in weight or length were used to benchmark standards. In medieval times, grains of barley were used as a reference and larger weights were defined against this measure. For example, a Pound of Troy was defined as being 5760 grains of barley and that was subdivided into 12 Troy ounces with each ounce further divided into 20 pennyweights. These measures were used in commerce until the 19th century.

The system of imperial measurements evolved from Roman and medieval practice and became increasingly precise through time. Imperial weights and measures have now largely been replaced in the UK by the metric system, which was developed in France in 1795 and imposed on Europe during the Napoleonic era.

With the industrial revolution came the need for standardisation of goods. The British Standards Institute (BSI) was formed in 1901 (**www.bsigroup.com**). The BSI kitemark was registered in 1903 and was used initially to indicate that products were manufactured to published standards. This enabled consumers to differentiate between competing products on grounds of quality.

The International Standards Organisation (ISO) is an independent non-governmental organisation with a membership of 163 national standards bodies (**www.iso.org**). It has its headquarters in Geneva and has published more than 21,000 international standards on products, services and systems. ISO was formed in London after the Second World War with the intention of co-ordinating and unifying industrial standards across the world. The purpose was to facilitate international trade as agreed common standards would mean trading partners would have confidence in the quality of the goods and services being traded.

Quality control and quality assurance

A finished product can be tested to ensure it meets expected standards. In some cases the product is physically changed during these tests and thus samples of the product are tested and the results are extrapolated to infer that the rest of the product meets the same specification. The childhood story of the little boy taking a basket of eggs to the market exemplifies this: he has a complaint from a customer that one of his eggs sold the day before was

> "ESTABLISHING A STANDARD ENABLES CONSUMERS TO DIFFERENTIATE BETWEEN COMPETING PRODUCTIONS ON GROUNDS OF QUALITY"

rotten. To ensure that none of today's eggs are bad, he cracks open every one of them before realising that he now has no product to sell! The inference that an entire batch of a product meets required standards can only be true if each item is produced in exactly the same way, and this can only be done if the process for making the product is closely specified. This is the process of quality assurance in which attention is paid to each stage in the production. It may be possible to have confidence that a product meets specifications, even if very few tests are actually carried out on the finished product, so long as each of the contributing materials and all the associated processes are monitored and tested.

Quality of service provision

Quality assurance and control of goods is conceptually straightforward. In the early 20th century, Frederick Winslow Taylor pioneered time and motion studies (Blake & Moseley 2011). He reasoned that in industrial manufacturing processes there must be an optimal method in which a task can be carried out, and that standardising this would lead to increased efficiency and productivity. Taylor was not concerned by the loss of autonomy and the consequences of this on worker morale.

Time-study methods are now commonplace in many areas of work, including healthcare. Richardson *et al* (2016) conducted a time and motion study on the work patterns of junior doctors in an attempt to identify factors contributing to the so-called "weekend effect" in which it is perceived that patients admitted to hospital on a weekend have a greater risk of mortality than those admitted during the week (Richardson *et al* 2016). Checklists for medical procedures are widely used, especially in surgical interventions, and these are generally seen as a sensible and effective means to standardise practice and thus reduce errors and complications associated with complex procedures. They are a form of quality assurance (Anderson *et al* 2015).

Quality control of healthcare practitioners

The regulation of medical practitioners dates back to the 15th century when physicians presented a petition to parliament requesting constraints on who was allowed to practise medicine (Raach 1944). Henry VIII introduced the Physicians and Surgeons Act in 1511 which limited medical practice to those who had been examined by the bishop of their diocese, or were graduates of Oxford or Cambridge universities (Warren 2000). The College of Physicians was founded in 1518 and took over the licensing of doctors in London. The Medical Act of 1858 saw the beginning of modern regulation (**www.chstm.manchester.ac.uk**) with the establishment of the General Medical Council (GMC). The current primary legislation for medical practitioners is the Medical Act 1983 (**www.gmc-uk.org**).

Until the late 20th century the only requirement to practise was an accredited qualification in medicine and registration with the GMC. The commercially competitive nature of fee-for-service healthcare in the USA led to the ranking of "best hospitals" and "best healthcare plans", based on various forms of certification (Bashook & Parboosingh 1998). The basis of this certification was contested, leading to uncertainty of how meaningful it was. Continuing medical education was a major topic of discussion in leading medical journals through the 1990s and was a contentious subject. In 1994, the Chairman of the Royal College of Obstetricians and Gynaecologists published a letter (Atlay 1994) in which he stated that "provided subscriptions are paid, fellows and members of the college will remain on its register, and there can be no question of preventing them from remaining in practice. The sanction for those who do not take part in the programme is that their names will not appear on the roll of specialists". To have one's name on the role of specialists required 200 hours of postgraduate work over a five-year period. This requirement for continuing medical education was seen as enhancing the quality of practice.

Continuing medical education progressed into continuing professional development (CPD) and revalidation. Since 2012, it has been a GMC requirement for doctors to revalidate their licence to practise every five years, a process that positively affirms to the GMC that the individual is up to date on latest medical knowledge, and is fit to practise (**www.bma.org.uk**). Revalidation involves CPD, quality improvement activities such as clinical audit and case reviews, reflection on significant clinical events that have occurred in practice, feedback from colleagues and patients, and a review of complaints and compliments. Other healthcare professions have followed the lead of the GMC but most have not, as yet, gone as far as requiring this level of revalidation on a regular basis. From a quality assurance perspective this

> "THE REGULATION OF MEDICAL PRACTITIONERS DATES BACK TO THE 15TH CENTURY"

> "THE HCPC SPECIFIES THAT PHYSIOTHERAPISTS MUST MEET THE STANDARD OF BEING ABLE TO ASSURE THE QUALITY OF THEIR PRACTICE"

revalidation requirement is a major change from what went before. Prior to 2012, the requirement for ongoing registration was largely through continuing education; the process now requires evidence of practice quality through peer review in order to maintain registration.

The Health and Care Professions Council (HCPC) is the regulator for many professions involved in delivering many healthcare services, including physiotherapy. Regulation of healthcare practitioners is not comprehensive. For instance, herbal practitioners, somewhat surprisingly, do not come under any regulation.

Herbal practitioners – an interesting dilemma

Herbal medicines, i.e. medicinal products manufactured from herbal materials, are fully regulated through the Human Medicines regulations 2012 (**www.legislation.gov.uk**) and the Traditional Herbal registration scheme (**www.gov.uk/guidance**). The Herbal Medicines Advisory Committee is a government body (**www.gov.uk/government/groups**) that advises on the safety and quality of herbal medicines. In 2014, this committee published a report (UK Herbal Medicines Advisory Committee 2014), in which very clear statements were made concerning problems with unregistered herbal practitioners and suggested strongly that these practitioners should be brought under the control of HCPC. In 2015, the Walker report (Walker 2015), commissioned by parliament in 2013, looked at the options associated with the regulation of herbal practitioners and concluded that statutory regulation of herbal practitioners was not feasible. The reasoning articulated in regard to the regulation of herbal practitioners is interesting; the evidence base for efficacy of herbal medical practice is weak and it is thus difficult to differentiate good practice from poor and, consequently, it would not be possible to establish standards for practice, which is a requirement at the heart of regulation. At the centre of this dilemma is the lack of good quality data that measures efficacy and the impact of treatments.

Regulation of physiotherapists

As you will be aware, physiotherapists are required to renew their registration every two years and confirm that they continue to meet the HCPC's standards of proficiency for their profession, meet fitness to practise requirements, and meet the HCPC's standards for CPD (**www.hcpc-uk.org/registrants/renew**). The CPD activity is audited on a random selection basis. It is expected that registered practitioners' CPD records will be up to date and available for inspection. The CPD activities are mainly centred on work-based learning, professional activity, formal education and self-directed learning. The implication is that these requirements for ongoing registration as a physiotherapist will ensure that a practitioner will meet the Standards of Proficiency for Physiotherapists as laid down by the HCPC (**http://www.hcpc-uk.org/registrants/assets**).

A significant standard in the context of this article, and specified in the HCPC document, is for physiotherapists to be able to assure the quality of their practice. Included in this standard is the requirement for practitioners to:

- be able to engage in evidence-based practice, evaluate practice systematically and participate in audit procedures
- be able to gather information, including qualitative and quantitative data, that helps to evaluate the responses of service users to their care
- be aware of the role of audit and review in quality management, including quality control, quality assurance and the use of appropriate outcome measures.

It might not be obvious to many how this standard will be met through CPD activity alone, or whether the team evaluating CPD records has a requirement that some or all of these standards are mandatory and should be reflected in the CPD records.

The Data for Impact project and the Physio First QAP scheme

Since 2005, through funding by the Private Physiotherapy Educational Foundation, we at the University of Brighton (UoB) have worked collaboratively with Physio First in the development and introduction of standardised data collection systems for use by private physiotherapy practitioners. These have had the specific aim of gathering datasets that demonstrate the evidence of effectiveness of practice (Bryant *et al* 2016; Moore *et al* 2012). The current Data for Impact (DfI) project is available

> "PHYSIO FIRST MEMBERS PARTICIPATING IN OUR ONLINE DATA COLLECTION SYSTEM WILL RECEIVE INDIVIDUALISED REPORTS THAT HELP THEM TO BENCHMARK THEIR PRACTICE AGAINST THE NATIONAL DATASET REPORTS"

to all Physio First members who, once registered, are provided with continuous access to our online data collection system. In addition to providing a means to enable standardised data collection, we are providing practitioners with individualised reports enabling them to benchmark their practice against the national dataset reports also supplied.

We are also able to offer practitioners the opportunity to be part of the Physio First QAP scheme which was launched last year. This scheme aims to provide individual practitioners with a means of benchmarking their patient outcomes and demonstrating quality. Following the undertaking of complex data analysis, and discussions with Physio First, standard criteria were developed that were statistically derived based on analyses of the national dataset. The current criterion are:

- waiting time
- change in the functional, physical and subjective outcome scores pre/post treatment
- the average number of treatments
- goal achievement at discharge
- outcome of referral on discharge.

Details of the QAP scheme were published in *In Touch* (2016). The national dataset is downloaded by the UoB three times a year; January, May and September and, in order to be assessed for the QAP scheme, practitioners need to input a minimum of 50 datasets for patients discharged within the last 12 months. To achieve QAP status, a minimum of three of the five criteria listed above must be achieved by the practitioner.

The DfI project provides opportunities for the profession and individuals to demonstrate, at several levels, the quality of their service provision. At an organisational level, the analysis of the data demonstrates norms for the practice of many hundreds of physiotherapists. For an individual practitioner, gathering sufficient data to generate a personal report is invaluable and provides an incontestable basis for addressing the HCPC Standards of Proficiency for Physiotherapists. Comparing data from one's own practice with a national dataset allows that individual to take an objective stance in determining the quality of their practice and to identify their own professional development needs.

Patient reported outcome measures (PROMs)

A potential problem with practitioner reported data is the possibility of bias in the reporting. Gathering data directly from patients is a means of reducing this bias and achieving a more balanced measure of outcomes. The DfI project is currently piloting an online patient outcome measure with the purpose of being able to feed back their patients' responses to practitioners. This will close the loop and provide practitioners with a significantly more robust evidence base for their own practice.

Challenges of data collection

In order to extrapolate the conclusions from a sample to the whole population of patients, one has to be confident that the data used is truly representative of the population as a whole. There is always variability between individuals, but if enough data is collected then it becomes possible to derive norms for any particular criterion. One obvious approach to ensuring that the datasets collected are representative of the whole population is to collect data for every single patient. This presents a logistical challenge to the practitioner and, ideally, the data collection should be integrated into practice management systems. Here, an obvious issue with the DfI project is that the data has to be standardised and all this would need to apply to practice management systems if comparable sets are to be extracted for all practitioners taking part in the study.

Conclusions

Quality assurance has progressed from the pragmatic beginnings needed to ensure that the weights and measures used in commerce were consistent and reproducible, to the technically far more complex systems needed to facilitate international trade in goods and services. Assurance of the quality of healthcare practice has developed relatively recently and remains in a state of development, with medical practitioners being required to demonstrate their ongoing fitness to practise in a more rigorous manner than that required for most other healthcare practitioners, for whom the requirement at present remains nested in continuing education activities rather than practice-based evidence.

The DfI project provides physiotherapists with the opportunity to contribute to a national dataset that demonstrates effectiveness of practice, while simultaneously providing practitioners with the objective evidence needed to verify the quality of their own practice. The development of a patient-reported outcome measure that will integrate with the DfI project data will further enhance the quality of the data. The ultimate outcome of these activities will be that patient care is enhanced.

> "GATHERING SUFFICIENT DATA TO GENERATE A PERSONAL REPORT PROVIDES AN INCONTESTABLE BASIS FOR ADDRESSING THE HCPC STANDARDS OF PROFICIENCY"

About the authors

George Olivier is a Principal Lecturer in Pharmaceutical Sciences at the University of Brighton. He lectures in medicinal and pharmaceutical chemistry

CONTACT DETAILS
Dr George Olivier
g.w.j.olivier@brighton.ac.uk
01273 642073

and has an interest in quality issues surrounding the use of plants when used as medicines. He is a pharmacist by training and, for more than 20 years, has been using electronic methods for learning, teaching and assessment involving the online gathering and interpretation of data. George has worked on the DfI project and its predecessors since 2005.

Liz Bryant has also been working, since 2005, on DfI related projects as a Research Fellow in the Centre for Health Research at the University of Brighton. She is also Research Lead / Senior Research Fellow at Chailey Heritage Clinical Services, part of Sussex Community NHS Foundation Trust.

Shemane Murtagh is a Research Fellow in the Centre for Health Research at the University of Brighton. Following completion of her PhD in 2012, she began working on the DfI project. Shemane brings a wealth of experience working with large datasets and data analysis and has a very active role within the DfI project and the QAP scheme.

References

Anderson M, Fitzgerald M, Martin K, Santamaria M, Arendse S, O'Reilly G, de Smit V, Orda U, Marasco S. A procedural check list for pleural decompression and intercostal catheter insertion for adult major trauma. *Injury* 2015;46(1):42-44

Atlay R. Continuing Medical Education. *British Medical Journal* 1994;308(6928):598-599

Bashook PG, Parboosingh J. Continuing medical education: recertification and the maintenance of competence. *British Medical Journal* 1998;316(7130):545-548

Blake AM, Moseley JL. Frederick Winslow Taylor: one hundred years of managerial insight. *International Journal of Management* 2011;28(4):346-352

Bryant E, Murtagh S, Olivier G, Lewes S, Winrow K, Lewis E, Moore A. Impact of using an online standardised data collection system in private physiotherapy practices in the UK: practitioners' views. *Physiotherapy* 2016;102 (s1):e111-e112

Moore AP, Bryant EC, Olivier GWJ. Development and use of standardised data collection tools to support and inform musculoskeletal practice. *Manual Therapy* 2012;17(6):489-496

Physio First. Physio First's quality assured practitioner scheme is launched. *In Touch* 2016;157:32-33

Raach JH. English medical licencing in the early seventeenth century. *Yale Journal of Biology and Medicine* 1944;16(4):267-288

Richardson LC, Lehnborn EC, Baysari MT, Walter SR, Day RO, Westbrook JI. A time and motion study of junior doctor work patterns on the weekend: a potential contributor to the weekend effect? *Internal Medicine Journal* 2016;46(7):819-825

UK Herbal Medicines Advisory Committee. Safety, regulation and herbal medicines: a review of the evidence. UK Government 2014

Walker DR. Report on the regulation of herbal medicines and practitioners. UK Government 2015. www.gov.uk/government/uploads/system/uploads/attachment_data/file/417768/Report_on_Regulation_of_Herbal_Medicines_and_Practitioners.pdf

Warren MD. A chronology of state medicine, public health, welfare and related services in Britain 1066-1999. Royal College of Physicians 2000. www.fph.org.uk/uploads/r_chronology_of_state_medicine.pdf

Recommended websites

British Medical Association – introduction to revalidation: www.bma.org.uk/advice/employment/revalidation/introduction

British Standards Institute: www.bsigroup.com/en-GB/about-bsi/our history

Centre for the History of Science, Technology and Medicine, University of Manchester: www.chstm.manchester.ac.uk/research/areas/medicalprofession

International Standards Organisation: www.iso.org/about-us

General Medical Council, supporting information for appraisal and revalidation: www.gmc.uk.org/RT_supporting_information_for_appraisal_and_revalidation_DC5485.pdf / 55024594.pdf

General Medical Council, UK primary legislation: www.gmc-uk.org/about/legislation/uk_primary_legislation.asp

HCPC, renewing your registration: www.hcpc-uk.org/registrants/renew

HCPC, standards of proficiency, physiotherapists: www.hcpc-uk.org/assets/documents/10000DBCStandards_of_Proficiency_Physiotherapists.pdf

HCPC, what activities count as continuing professional development? www.hcpc-uk.org/registrants/cpd/activities

Herbal Medicines Advisory Committee: www.gov.uk/government/groups/herbal-medicines-advisory-committee

Human Medicines Regulations 2012: www.legislation.gov.uk/uksi/2012/1916/contents/made

Medicines and Healthcare Products Regulatory Agency: www.gov.uk/guidance/apply-for-a-traditional-herbal-registration-thr

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Mercia	Pain management – integration of the cognitive behavioural approach	**Saturday 14 October 2017**	**CBT1717**	Bolton Arena, Horwich, Bolton BL6 6LB	**Member** £145* **Non-member** £175*
Kent	Mindfulness and compassion for pain and illness – the Breathworks way	**Saturday 14 October 2017**	**BREATH0117**	Churchill Centre, Preston Hall, Aylesford, Maidstone ME20 7NJ	**Member** £145* **Non-member** £175*
London	Increasing returning and referring patients with confidence	**Tuesday 17 October 2017**	**PAINREF175** celia@painlesspractice.com 07717 843 540	Meat & Co, Private Dining Room, Westfield Shopping Centre, Ariel Way, London W12 7GA	**Member** £175 **Non-member** £200
East Pennine	Increasing returning and referring patients with confidence	**Thursday 19 October 2017**	**PAINREF175A** celia@painlesspractice.com 07717 843 540	Novotel Leeds Centre, 4 Whitehall Quay, Leeds LS1 4HR	**Member** £175 **Non-member** £200
Essex	CPR	**Saturday 28 October 2017**	**CPR0817**	Haverhill Physiotherapy, Hamlet Road, CB9 8EE	**Member** £60 **Non-member** £70
Oxford	Myofascial spine	**Saturday 04 November 2017**	**MYS0917**	Chris Moody Centre, Moulton College Gate 4, Pitsford Road, Northampton NN3 7QL	**Member** £145* **Non-member** £175*
Scotland	Scottish conference	**Friday 10 – Saturday 11 November 2017**	**SCONF17**	Stirling Highland Hotel, Spittal Street, Stirling FK8 1DU	
East Pennine	Managing people and your business	**Tuesday 28 November 2017**	**PAINPRAC176** celia@painlesspractice.com 07717 843 540	Meat & Co, Private Dining Room, Westfield Shopping Centre, Ariel Way, London W12 7GA	**Member** £175 **Non-member** £200
London	Managing people and your business	**Thursday 30 November 2017**	**PAINPRAC176A** celia@painlesspractice.com 07717 843 540	Novotel Leeds Centre, 4 Whitehall Quay, Leeds LS1 4HR	**Member** £175 **Non-member** £200

Please refer to our website www.physiofirst.org.uk for further details on all of our courses.

Disclaimer Physio First reserves the right to change the venue, cancel (or reschedule) any education course at any time with a full refund. In this case, course fees will be fully refunded to the attendee but Physio First is not responsible for travel, hotel or any other expenses incurred.

How to book a centrally run course: There are two ways to book your place on a Physio First centrally run course:
1) Book online via www.physiofirst.org.uk under our ***Events*** tab to receive our **£10 discount**.
2) Call Education on 01604 684968 – specifying which course you would like to attend and providing your card details. Please note that standard prices will apply as you will only be able to receive our £10 discount online.

Course confirmation and a sales receipt, plus any additional information will be sent to you via email on receipt of full payment.

†All rates may be subject to the addition of VAT at prevailing rates.
Some courses are run directly by our Regional Officers. Please contact them direct if contact details are listed under event reference – online discount will not apply.

Members and patients to benefit from Physio First and Simplyhealth alliance

Following the launch of our collaboration at the Physio First annual conference, here's a reminder of the benefits of our Simplyhealth partnership with Physio First.

More than 2,000 Physio First members are part of the Simplyhealth Practitioner Community, with access to more than 3.5 million Simplyhealth customers through the "Find a Practitioner" tool on our Simplyhealth website. This portal provides tools to help your business grow and support your CPD. To learn more, visit **simplyhealth.co.uk/practitioner**

Expanding the team

It is with great pleasure we introduce our dedicated full-time Practitioner Community team here at Simplyhealth. Chris Lambert, Practitioner Community Relationship Manager and Felicity Farrell, Practitioner Community Marketing Manager will take on the Physio First relationship management and daily activity. They can be contacted on our new dedicated phone line **0330 678 0282** or by emailing **healthcareprofessional@simplyhealth.co.uk**

If you would like to display Simplyhealth cash plan literature in your practice, or need to supplement your existing supplies, please let Chris or Felicity know.

We've been busy improving the Practitioner Community for you

We're delighted to announce the launch of our Practice Manager functionality which allows a single user to control profiles and / or appointment requests for other colleagues within your practice. Previously, as each user was required to have their own unique email address, this didn't support larger practices with one email account managed across all practitioners. Now your Practice Manager can add, amend and remove practitioners and colleagues at their associated practices. This allows for a more joined-up experience, making sure the practice and its practitioners have consistent profiles, and that appointments are managed effectively between them.

To enable you to keep up to date with Simplyhealth Practitioner Community news and content, we have added a social media newsfeed tab that links you to our Facebook and Twitter channels.

Don't forget to log in to our Practitioner Community where you can update your profile and add a photo in order to improve how patients searching for practitioners see your details.

Simplyhealth Practitioner Community Team

SIMPLYHEALTH AND AXA PPP

Simplyhealth sold its private medical insurance and self-funded health plan businesses to AXA PPP healthcare in August 2015. The two companies are now entirely separate entities. If you have any claims or provider queries with AXA PPP, their phone number is **0800 854929**.

Simplyhealth is a business with no shareholders – its profits go straight back into supporting customers and healthcare charities. Last year, Simplyhealth donated £1.4m to charitable causes, touching the lives of more than two million people.

We look forward to continuing our partnership with Physio First and working collaboratively with you to achieve our mutual goals.

Physio First Working for us

Tips from our team

INTRODUCING THE CORE

In our last edition of *Update*, May 2017, we advised our members it would be the last printed version of our newsletter.

The Core was launched on 26 July 2017 via e-alert to our full members. *The Core* replaces *Update*.

This new dynamic format allows us to deliver the same great marketplace information directly to your email inbox and is immediately available under the ***Resources*** section of our website **www.physiofirst.org.uk**. Without lengthy print times, the speed of delivery for *The Core* means we will communicate marketplace changes much quicker. We aim to deliver *The Core* nine times a year, meaning you will receive more regular information, and gives us the opportunity to find out what is your most valued marketplace information; we can tailor content to what our members really want to read.

If you have a not received an email with the subject line “The Core | Issue 001 | July 2017”, please let us have your most up-to-date email address by contacting **minerva@physiofirst.org.uk** and we will make sure you don’t miss out on this fabulous member benefit.

Enjoy reading *The Core*.

Boost the business side of your practice before the end of the year

To run a successful physiotherapy practice you need to be clinically sound **and** business savvy. Working on the business, not just on the patients, is key to a painless practice. Ultimately, the better the practice is managed, the more patients you’ll be able to help.

Many factors go into running a business, but let us briefly explore three key areas:

1. Patient management
2. People management
3. Business management

Patient management
Patients choose to come to you for your advice and rely on your expertise to help them to get better, have better functionality and, ultimately, a better quality of life. How good are you (or your team) at engaging patients in treatment plans, in building rapport so patients return for all their clinically recommended treatments and future episodes or needs? Perhaps it is time to look at the statistics of your practice to determine the thoroughness of your patient management and then put a plan in place to improve communication with your patients along their entire journey with your practice and practitioners.

People management
Whatever plans and processes you have in place, it is people who carry them out. How would you rate yourself as a leader and how would you describe the level of engagement of your team? It is common in practices for everyone to be “ships in the night” which makes team engagement and team member retention tricky. In today’s tough recruitment environment, bringing the right people on board and keeping them is more important than ever. Be clear about who you need in your practice to achieve your vision and have a clear plan in place to ensure your team members understand their role and are keen to meet and excel expectations.

Business management
Knowing your numbers and statistics of your business is key to building the practice you want. Getting into a habit of producing that information regularly and interpreting it can really help you make more educated decisions and be proactive rather than reactive. Visibility is power. What would be really useful to know about your practice that you don’t currently know? Some information to look at might include your profitability, the number of new patients and returning patients, the capacity / utilisation of the clinic, the number and cost of cancellations, and the demographic of your patient base, to name but a few.

Running a practice may feel daunting at times but it needn’t be. Painless Practice have two more courses this year in London and Leeds. Painless Practice team members are passionate about helping physiotherapists enjoy their work and achieve their vision. Have a look at the course info at **www.physiofirst.org.uk/events-landing/education-courses.html** and sign up today.

To book your place, please contact celia@painlesspractice.com

PPEF ELECTS A NEW CHAIRMAN

At the PPEF Trustee meeting on 8 June, Fleur Kitsell was elected Chairman of PPEF, with Sally Roberts elected to Vice Chair and Company Secretary. Michael Whale remains as Treasurer.

Over the last six months, PPEF has funded a number of individuals to attend conferences with poster presentations, and has also supported applicants who are completing MSc modules.

We are now inviting grant applications for presentations, MSc modules and research projects for consideration at our next Trustees meeting which will be held in January 2018. Details of how to apply for grants can be found on our website **www.ppef.org.uk**

Small ads

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Physio First, Minerva House, Tithe Barn Way, Swan Valley, Northampton NN4 9BA.
Tel 01604 684960 **Fax** 01604 58923
email minerva@physiofirst.org.uk • www.physiofirst.org.uk

All enquiries for *In Touch* to: Paul Johnson, Editor.
email: editor@physiofirst.org.uk
or post to: Physio First, Minerva House, Tithe Barn Way, Northampton NN4 9BA.
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