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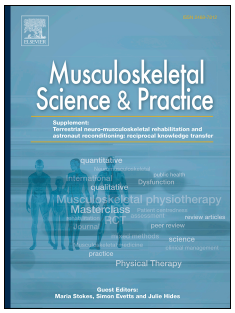

Reconceptualising manual therapy skills in contemporary practice

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Introduction

With conflicting evidence regarding the effectiveness of manual therapy for musculoskeletal pain disorders, there are calls from some quarters of the physiotherapy profession to drop these techniques from its repertoire, reduce the time spent teaching them, and focus our attention on interventions thought to be more effective. Challenges to the use of manual therapy have arisen from evidence of its limited effectiveness as a sole modality, indicated by clinically insignificant effect sizes in some populations (Gross et al. , 2015, Rubinstein et al. , 2011). Further, the reliability and validity of manual assessment findings has also come under question. So, does the evidence base truly support the abandonment of manual therapy? Do these age-old and intensively-acquired skills lack ***any*** place in contemporary practice? In this manuscript, we consider the balance of evidence around manual assessment and intervention, whilst presenting a contemporary perspective on interpretation of manual examination findings, and how these might inform clinical reasoning. With ever-increasing understanding of the multidimensional nature of musculoskeletal pain disorders (Bittencourt et al. , 2016, Simons et al. , 2014) clinicians need to be cognisant of postulated rationales and evidence for all assessments and treatments they utilise. With this knowledge, clinicans can understand the place for manual skills within multidimensional patient care.

Interpreting manual examination findings

Regarding manual assessment skills, many clinicians practice assessment of passive accessory and physiological movements, the "findings" from which (i.e. pain responses and perceptions of movement) would be incorporated into their clinical reasoning. The reliability of passive movement tests have been reported as poor to fair (Van Trijffel et al. , 2005), prompting some to abandon their use. However, clinicians' decision making around retention or exclusion of these assessments in practice should consider (a) the scientific basis for these conclusions, and (b) whether the interpretation of findings reported in the literature is reflective of contemporary practice. To reflect on this first point, it is notable that the methodological quality of the studies included in reviews on reliability of passive movement tests is generally low (Stochkendahl et al. , 2006). Further, when perceptions of movement are combined with pain responses and results from pain provocation tests, reliability and validity improves. For example, when this combination of assessments was used to identify "segmental dysfunction" in people with cervicogenic headache and, analysed with more appropriate statistical analysis (Sim et al. , 2005), intra- and inter-observer reliability of manual examination was found to be good (Hall et al. , 2010). In addition, using this combined assessment clinicians have been shown to reliably identify a motion segment that when subjected to local anaesthetic block significantly reduces a person's pain (an arguable gold-standard test for determination of a "source" of peripheral nociception) (Jull et al. , 1988, Phillips et al. , 1996, Schneider et al. , 2013). While this is encouraging, clinicians should be cognisant that when diagnostic anaesthetic blocks have been utilised to hypothesise whether an anatomical structure is the nociceptive source in people with chronic low back pain (CLBP), such a source can only be determined in approximately half of all sufferers (Laslett et al. , 2005). It should be noted that this sample consisted of people referred to a specialist diagnostic centre, many of whom were described

as “distressed”. False-positive test responses may occur, particularly when there is a significant contribution to the person’s presentation from the psychological dimension (Bogduk et al. , 2013), a factor further reflecting the multidimensional nature of many musculoskeletal disorders.

Therefore, instead of considering manual examination findings only in terms of how they should “guide” manual therapy interventions (i.e. this motion segment is perceived as hypomobile by the clinician and/or painful by the patient, so mobilisation is indicated), we propose that interpretation of manual examination findings should be based upon a contemporary, multidimensional understanding of pain disorders , and viewed as just one, albeit important, part of the information gathered during an examination that considers relative contributions from multiple dimensions to formulate an individualised treatment approach. Indeed, rather than judging the merit of clinical tests solely on their reliability, consideration of the findings from clinical tests in an integrated manner within clinical reasoning processes has been previously advocated, particularly in complex, changeable pain states, (Jull et al. , 2012, McGill, 2013).

To highlight this proposition the presentations of five fictitious people with low back pain (LBP) will be described. In each, manual assessment findings will be considered within the diagnostic reasoning process. We recognise that these examples do not completely reflect the variability evident in clinical presentations of LBP.

1) A person presents with acute, severe LBP, general malaise and pyrexia. They are an intravenous drug user. They have very limited active lumbar spine range of motion in all directions due to pain. Manual examination reveals localised, heightened pressure sensitivity over the L1 spinous process. Such a presentation should make

the clinician suspicious of an underlying infection, such as discitis. If this diagnosis were confirmed manual therapy would be contraindicated.

2) A person presents with severe LBP which commenced following lifting at work 6 weeks ago. Psychosocial screening suggests they have a low risk of chronicity. They have limited active lumbar spine forward bending due to pain. All other movements are full range and pain free. Palpation reveals localised heightened pressure sensitivity in the region over the right L4/5 facet joint; with hypomobility perceived on passive physiological intervertebral motion assessment of L4/5 and L5/S1 into flexion. Such a presentation should initiate multidimensional guideline-based care, which may be inclusive of manual therapy targeting the L4/5 region (National Clinical Guideline Centre, 2016). The possible rationale for such manual therapy will be discussed later in this manuscript.
3) A person presents with a 10-year history of LBP, which commenced following lifting at work. They exhibit fear-avoidance beliefs, catastrophising and maladaptive cognitions regarding their LBP. They have low levels of physical activity, poor sleep patterns, a history of depression, concurrent neck pain, and irritable bowel syndrome. They have very limited lumbar spine active range of motion in all directions due to pain. Manual examination reveals widespread hypersensitivity to pressure, and in places allodynia, from the low thoracic region to the upper gluteal region. With such a presentation the clinician should consider a dominance of centrally-mediated pain mechanisms (which in a research setting may manifest as heightened cold / pressure pain sensitivity and / or reduced pain inhibition in response to noxious stimuli or exercise), and greater exploration of factors contributing to the person's presentation e.g. health related beliefs, sleep, physical

activity. The aforementioned sensory findings would afford the clinician a "gateway" to educate the person regarding neurophysiological mechanisms underlying widespread (multi)sensory hypersensitivity, while exploration of associated factors would guide appropriate multidimensional management of the disorder, unlikely to include manual therapy as a key component.

4) A person presents with a 10-year history of LBP which commenced following lifting at work. They exhibit fear-avoidance beliefs, catastrophising and maladaptive cognitions regarding their condition. They have limited active lumbar spine forward bending due to pain, maintaining their lumbar lordosis throughout the movement. They also maintain a lordosis at all times when sitting, their tolerance for which is limited due to pain. All other active lumbar movements are full range and pain free. Palpation reveals hypersensitivity to pressure in the region of the L4 and L5 spinous processes, and the thoraco-lumbar erector spinae. When passive physiological motion palpation is undertaken with the person in side-lying motion is perceived as unrestricted. Also, pain is not provoked during passive movement, even when the hips and lumbar spine are flexed. The L4 and L5 spinous processes and adjacent erector spinae are significantly less sensitive upon palpation when the person is in this flexed position, than when their lumbar spine is extended. Identification of such position-specific hypersensitivity would facilitate the clinician to be able to challenge the person's maladaptive cognitions and movement patterns associated with forward bending, explain neurophysiological mechanisms underlying pain provoked with this particular movement, and guide rehabilitation of forward bending. A possible rationale for the use of manual therapy to facilitate rehabilitation of this person's forward bending will be discussed later in this manuscript.

5) A person presents with a 10-year history of recurrent, episodic LBP which commenced following lifting at work. Psychosocial screening is unremarkable. They have limited active lumbar spine flexion due to self-reported "stiffness" and pain. All other movements are full range and pain free. Palpation reveals localised hypersensitivity to pressure over the right L4/5 facet joint; with hypomobility perceived on passive physiological intervertebral motion assessment of L4/5 and L5/S1 into flexion. In such a presentation manual therapy may be considered to facilitate forward bending. A possible rationale for its use will be discussed in the next section.

Is there a rationale for the inclusion of manual therapy in the management of some of these people?

Considerations for clinical reasoning relating to the interpretation of manual assessment findings and /or therapy have been outlined for each vignette. In general, the current research evidence indicates that manual therapy would have small effects in people with (non-specific) LBP, possibly providing short-term pain relief, but unlikely to be more effective than other interventions (e.g.medication) (Gross et al., 2015, Rubinstein et al. , 2012, Rubinstein et al., 2011). However, it is important to note that these reviews, as well as other research, indicate that manual therapy may enhance outcomes as part of multimodal interventions (Jull et al. , 2002), and is in line with clinical guidelines (National Clinical Guideline Centre, 2016).

The limited effects may raise a concern among clinicians that not all patients are appropriate for manual therapy, and that a "wash-out" effect occurs in research studies if, in an heterogeneous sample similar to the five cases presented, all receive the same

intervention. Randomised controlled trials support the existence of a treatment effect (or lack thereof) at a population level, rather than the individual level. The disparate nature of LBP suggests that a "one-size-fits-all" approach is unlikely to be effective, an argument that has led to research questioning the existence of a subgroup of people most likely to respond to manual therapy. From a traditional manual therapy perspective manual therapy should, hypothetically, be most beneficial for peoples with relatively uncomplicated multidimensional profiles, where a dominant peripheral source of nociception to which manual therapy could be directed exists, such as cases 2 and 5. Indeed, case 2 may respond to manual therapy in the short-term, since there is some preliminary, low-quality evidence to suggest that when subgroups of likely responders to manual therapy are targeted with manual therapy they exhibit better treatment outcomes (Ford et al. , 2016, Haskins et al. , 2015, Slater et al. , 2012). Previously published clinical prediction rules on responders to manipulative therapy, have identified similar uncomplicated patient profiles (Flynn et al. , 2002, Fritz et al. , 2005), however, two issues are notable. Firstly, these clinical prediction rules were derived from a narrow range of clinical features. Secondly, the external validity of these clinical prediction rules remains unclear, with only one RCT performed on a population inclusive of participants both positive and negative on the clinical prediction rule (Hancock et al. , 2008), yet in this study only a small proportion actually received the manipulative technique assessed. Further, questions have been raised about the quality of evidence underpinning reports of sub-grouping for treatment responders in LBP populations (Saragiotto et al. , 2016). Hence, drawing firm conclusions from a less-than-robust evidence base about the presence or absence of responders to manual therapy could be considered ill-advised at this point.

While case 5 has a much longer duration of symptoms, this person has a similarly uncomplicated patient profile, which may be considered likely to respond to manual therapy, in addition to an exercise programme tailored to their movement-related disability. This approach, while consistent with evidence for significant short- to medium-term improvements in pain and disability (Hidalgo et al. , 2014, Rubinstein et al., 2011), may be less common in some quarters of physiotherapy practice. Patient expectations of treatment effectiveness should be considered (Kalauokalani et al. , 2001), with the short-term analgesic effects of manual therapy potentially facilitating normalisation of movement, and therefore compliance with exercise therapy (Childs et al. , 2004, Hurley et al. , 2008). Further discussion of potential multidimensional influences of manual therapy and aligned home exercises will follow.

With respect to relatively simple patient profiles, one might consider whether identification of segmental dysfunction is a worthwhile quest. Three studies (de Oliveira et al. , 2013, Donaldson et al. , 2016, Schomacher, 2009) have compared treatment outcomes following manual therapy directed at clinician-determined segmental dysfunction versus a distant motion segment in people with LBP. In each of these studies there was no difference between groups for improvements in pain (de Oliveira et al., 2013, Donaldson et al., 2016, Schomacher, 2009) or disability (Donaldson et al., 2016). However, while two studies evaluated immediate effects of one treatment session, Donaldson et al. (2016) delivered four treatment sessions over two weeks, and at six-month follow-up found a likely clinically important difference in global rating of change in favour of therapy directed at the clinician-selected motion segment. The importance of this global rating of change cannot be ignored. However, it could be argued that the lack of treatment effect on pain and disability, as well as the potentially more generalised neurophysiological effects (for changes in pain

modulation and muscle inhibition) (Bishop et al. , 2015, Coronado et al. , 2012, Voogt et al. , 2015), make the quest for identification of a segmental dysfunction redundant. One caveat here, is that we still do not know whether, in those identified as likely responders to manual therapy, better outcomes can be achieved with more localised techniques.

Overall, any beneficial manual treatment responses are likely to be short-lived, particularly in complex presentations. For instance, positive responses to radiofrequency neurotomy (which arguably aims to eliminate peripheral nociceptive input from affected motion segments) are not long-standing in people with whiplash, and when subjective pain levels increase again these are associated with increased pain sensitivity and recurrence of psychological factors (Smith et al. , 2015). This brings us back to the issue of complexity in people with musculoskeletal disorders, which is being increasingly recognised (Bittencourt et al., 2016, Simons et al., 2014). For example, detailed characterisation of people with CLBP revealed difficulty deriving distinct subgroups when considering psychological, pain sensitivity and movement dimensions. Out of 36 possible phenotypes or subgroups, 33 were represented across 294 participants highlighting the variability of CLBP presentations and suggesting multimodal management may need to be targeted towards individual presentations (Rabey, 2016).

It is important to discuss whether manual therapy has a role in these more complex presentations. Here we note that the demonstrable short-term hypoalgesic effects of manual therapy (Coronado et al., 2012, Voogt et al., 2015) are likely to be multidimensional in nature, as these effects may act both peripherally and throughout the nervous system (Bishop et al., 2015, Zusman, 2010). Perhaps therefore, manual therapy may best be considered a tool to facilitate, “functionally appropriate, relatively pain-free movement,”

(Zusman, 2004) within a multidimensional intervention. For example in case 4, following education regarding pain mechanisms and the challenging of maladaptive cognitions, a lumbar spine mobilisation with movement into forward bending (Hidalgo et al. , 2015) may reduce kinesiophobia, facilitating more relaxed, confident, and therefore more comfortable movement. This can then be appropriately encouraged during home exercises or daily activities to facilitate carry over of both the movement and more appropriate cognitions. Such a multidimensional approach could be considered to facilitate normal physiological functioning at the level of the individual (Elvey et al. , 2004). This integration of manual therapy within a more contemporary treatment framework, may result in improvements via desensitisation of the nervous system to restore normal sensory processing and subsequent extinction of aversive movement / behavioural memories (Zusman, 2004). Such an individually-tailored treatment progression, albeit less complex, is also likely to be appropriate in simpler patient profiles such as cases 2 and 5.

It is clear from previous subgrouping studies, and studies investigating manual therapy from a more mechanical perspective, that manual therapy has largely not been considered or described in the literature as conceptualised in this manuscript. We propose that manual examination skills should be considered in the light of contemporary pain science, and manual therapy as a potential component of a multidimensional intervention. For example, CLBP is undoubtedly a multidimensional disorder (Rusu et al. , 2012, Simons et al., 2014), and a multidimensional intervention (including manual therapy where the treating clinician believed it to be indicated) appears to afford better treatment outcomes than guideline-based manual therapy and exercise alone (Vibe Fersum et al. , 2013).

Furthermore, a broad philosophical understanding of the lived experiences of people suffering pain includes consideration of their expectations, beliefs and preferences (Dahlberg et al. , 2009). Empirical evidence has demonstrated that people want a physical examination (Parsons et al. , 2007), highlighted by a person with LBP in a study exploring the meaning of diagnostic tests (Rhodes et al. , 1999):

> *"And he still won't examine me …you've got to put your hands on somebody…you can't fix a car just by looking at it"*

In addition to the aforementioned benefits of manual examination, conducting a physical examination may in part contribute to the perceived credibility of the clinician and help establish trust and a positive therapeutic alliance. Ignoring patient preferences negatively impacts on the therapeutic relationship (Cooper et al. , 2008, Parsons et al., 2007, Potter et al. , 2003). Thus we argue that in most clinical cases a physical examination incorporating manual examination is appropriate. The use of manual therapy as a treatment technique will be influenced by the specific presentation as demonstrated in the vignettes. However, consideration of patient preferences could also be taken into account as matching expectations is associated with good functional outcomes (Kalauokalani et al., 2001). We suggest that where manual therapy is used it should be applied alongside an honest explanation of its short-term hypoalgesic effects whilst challenging any associated biomedical beliefs. Matched home exercises should be employed to consciously move the locus of control to the person experiencing pain.

In conclusion, we believe manual examination skills and manual therapy interventions need to be aligned with contemporary pain science. A reconceptualisation is needed from a model dependent solely on a mechanical interpretation of examination findings and basis

for manual therapy, to a contemporary multidimensional, neurophysiologically-based manual examination and intervention which may include appropriately-timed manual therapy. While we have used LBP to illustrate this perspective, we believe that this approach is relevant across musculoskeletal disorders. Further research is warranted to explore many issues discussed in this manuscript. To eliminate manual examination from the clinical evaluation would mean the loss of important data that can be usefully interpreted in terms of modern pain science, be used to facilitate a person's understanding of their presentation, and guide clinical management as part of a multidimensional approach. Further, research on manual therapy would suggest some positive effects that may be useful, particularly within this multidimensional approach, and their use within such frameworks warrants further investigation. Any rationale for manual therapy given to the patient must also be framed accordingly, and language or practice encouraging dependence on a predominantly passive approach should be avoided. However, if these age-old and intensively-acquired skills are used in a manner consistent with contemporary practice, their selective and judicious use still has an important place.

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