

# Diagnostic uncertainty in musculoskeletal pain: Implications for physiotherapy education

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## Abstract

**Background:** Diagnostic uncertainty in musculoskeletal pain presents as a frequent and challenging dilemma encountered by physiotherapists. Current literature indicates that diagnostic uncertainty impacts the clinical decision making of experienced and new graduate physiotherapists, highlighting a need for training and support in this space. **Aim:** This paper outlines considerations for diagnostic uncertainty in the management of musculoskeletal pain. It outlines five key strategies to help student and novice physiotherapists experiencing and navigating diagnostic uncertainty when managing individuals with musculoskeletal pain. These strategies include looking critically at diagnostic certainty; recognising and normalising uncertainty; utilising direct practice and authentic experiences, and Balint groups as a strategy for sharing. **Conclusion:** New graduate physiotherapists frequently experience diagnostic uncertainty in the management of musculoskeletal pain. There is a need to focus on acknowledging and managing diagnostic uncertainty in physiotherapy education and workplace support to address the ethical and emotional reactions associated with uncertainty. Physiotherapy educators and professionals can lead by example, acknowledging and sharing uncertainty and exploring this with students.

**Keywords:** diagnosis, diagnostic uncertainty, musculoskeletal, pain, physiotherapy education

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## Introduction

Physiotherapists face the significant challenge of assessing and managing musculoskeletal pain of increasing prevalence and complexity. The Institute of Medicine has emphasised the need for “a cultural transformation to effectively prevent, assess, treat and understand pain of all types” (Institute of Medicine, 2016). Thus, it is critical that physiotherapy programs provide graduates with the knowledge and skills to meet clinical practice requirements (International Association for the Study of Pain, 2018). Considering the multi-dimensional nature of musculoskeletal pain, differentiating between various musculoskeletal structures to identify nociceptive sources, constitutes a significant challenge routinely encountered by health professionals (Arendt-Nielsen et al, 2011; Forde et al, 2019), often referred to more broadly as diagnostic uncertainty (Carlson & Carlson 2011). Recently, diagnostic uncertainty has been defined as “a subjective perception of an inability to provide an accurate explanation of the patient’s health problem” (Bhise et al, 2018, p103), in the case of musculoskeletal pain, their pain experience. The experience of uncertainty is a frequent challenge within healthcare (Santhosh et al, 2019), including physiotherapy (Slade et al, 2012; Almond et al, 2021) and not only has implications for healthcare systems but has significant repercussions for individuals. It has been associated

## Implications for practice

Diagnostic uncertainty is an omnipresent feature of physiotherapy practice when managing individuals with musculoskeletal pain. There is a critical need to guide health professional students to acknowledge and communicate diagnostic uncertainty throughout the continuum of training. There are a range of strategies that aim to build student and graduate capacity and self-efficacy to manage the implications of diagnostic uncertainty in practice. These range from guiding students to think critically about diagnostic certainty, modelling practice and professional socialisation.

with increased distress, depression, anxiety, and disability among healthcare seekers (Alam et al, 2017; Neville et al, 2019). The implications of uncertainty for health professionals have been associated with burnout, overuse of imaging and other investigations and increased healthcare costs (Hancock & Mattick, 2020).

Diagnostic uncertainty is an emerging area for clinical practice and training that, as physiotherapy educators and professionals, warrants our attention. It is highly frequent in practice and can impact health professionals' reasoning and clinical decision

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making (Alam et al, 2017), including physiotherapists when managing individuals presenting with pain (Slade et al, 2012; Almond et al, 2021). Slade and colleagues (2012) reported that experienced physiotherapists were of the belief that a specific diagnosis underpins effective treatment of persistent low back pain and as a result, persist with pathoanatomical labels to guide management, despite guideline recommendations (Chou et al, 2007; Wheeler et al, 2018). More recent research however has indicated that physiotherapy new graduates feel that seeking a specific diagnosis for musculoskeletal pain is not always critical, once serious pathologies are excluded, and effective management can be provided in the absence of a clear diagnosis (Almond et al, 2021). Acknowledging, supporting, and managing diagnostic uncertainty may be additionally important considering the increasing literature highlighting the potential negative consequences of pathoanatomical labels in non-specific musculoskeletal pain as potential barriers to recovery (Darlow et al, 2014; Ludewig et al, 2017).

With professional experience, clinicians become increasingly comfortable with navigating diagnostic uncertainty as they develop clinical confidence in using provisional or working hypotheses as opposed to only singular definitive diagnoses (Christancho et al, 2017). They develop self-efficacy in clinical reasoning through synthesising clinical information as new information emerges and are more able to contextualise decision making to the specific patient or setting (Mamede et al, 2007). Students and novice health professionals, however, are largely challenged by uncertainty. These challenges are usually attributed to limited clinical experience and knowledge and less ability to synthesise information alongside pattern recognition (Beck et al, 2020). What is less talked about, is that students and other novice professionals are also challenged by diagnostic uncertainty due to the negative emotional reactions to uncertainty, a lack of role models who openly share uncertainty and a lack of curricula opportunities during training to both experience and manage this dilemma (Gheihman et al, 2020; Beck et al, 2020; Almond et al, 2021). Students are often rewarded for displaying confidence and certainty in clinical education settings which may further exacerbate this issue. Demonstrating uncertainty may be associated with a perceived lack of knowledge or competence which may amplify corresponding ethical and emotional reactions (Nevalainen et al, 2014; Almond et al, 2021).

## Five considerations to address diagnostic uncertainty

With significant innovation in pedagogy within the classroom and through clinical education, it is critical that we introduce, scaffold and support students to navigate situations of diagnostic uncertainty. In this article, five key considerations for addressing diagnostic uncertainty in the context of physiotherapy education, reflected on by the authors as

physiotherapists and educators following extensive reviewing of the literature, are presented.

### 1. Looking critically at diagnostic certainty

When we look critically at physiotherapy education and training, we may not actively prepare students or graduates, in a traditional sense, to acknowledge uncertainty. Physiotherapy training and practice often includes deductive algorithms, checklists, tick boxes and flow charts to encourage learners to 'hang their hat' on the most likely diagnosis for pain presentations. This often develops as a learner is encouraged to develop differential diagnoses based on the patient's 'script' rather than acknowledging the complexity of the presenting individual and their context. Similarly, students are actively encouraged and often rewarded for displaying confidence in a diagnosis (Beck et al, 2020). As an educator, it is often concerning when students narrowly focus their patient interview solely on the location and description of the patient's pain. Students tend to focus on this to try and achieve what they perceive to be most important: finding a 'diagnosis' rather than exploring the individual's pain experience. The pattern recognition that prevails in patient care through clinical education and out into practice may lead to appropriate management of musculoskeletal pain in many cases, however it does not prepare our future professionals for the uncertainty that they will inevitably experience given the complexity of musculoskeletal pain.

### 2. Clinical reasoning and diagnostic uncertainty

Clinical reasoning in musculoskeletal pain cannot be separated from diagnostic decision making and is thus a critical consideration for both recognising and managing diagnostic uncertainty. Research suggests that those with more clinical experience and expertise tend to use inductive reasoning while student and novice professionals rely on deductive reasoning (Shin, 2019). Deductive reasoning, where one moves from information gathering through pattern recognition and quickly through to differential diagnoses is subject to a range of cognitive biases, including confirmation and availability bias (Hayes et al, 2017). This approach is often used by experienced professionals where patient presentations are straightforward, however for students or novice professionals, this increases risks of inaccuracies and biases (Dunlop & Schwartzstein, 2020). Students may feel more comfortable using the term 'diagnosis' simply because it implies certainty which can provide a sense of competence (Simpkin et al, 2019). As a result, students need role models and learning opportunities where they are encouraged to pause when making clinical decisions and to reflect on their feelings of certainty or a lack thereof. "Holding uncertainty" to allow more possibilities to remain "in play" (Danczak et al. 2016), while questioning one's cognitive biases, helps individuals and teams define the assumptions they are making. Clinical educators and mentors in clinical settings

can reiterate to students that the challenges of uncertainty do not abate with years of clinical experience or clinical reasoning expertise and furthermore, can relay to students the natural part of uncertainty considering the complex and multidimensional nature of musculoskeletal pain.

### 3. *Recognising and normalising uncertainty*

Physiotherapy students may enter clinical education settings with an ingrained belief that diagnoses are always clear or, if there is uncertainty, that this will disappear once clinical experience and knowledge is gained. To help students recognise and normalise uncertainty in pain settings, it is critical that educators lead both discussion and role modelling of uncertainty and the normalising of these feelings (Beck et al, 2018). This should extend not only to communicating with students, but by actively creating professional spaces where uncertainty is normalised amongst teams and colleagues within wider settings, especially given the strong impact of professional modelling on student development (Wilesmith et al, 2020).

Talking openly about uncertainty in both classroom and clinical settings is a critical step to normalise the experience of uncertainty, further modelling that it is not only safe but also helpful to acknowledge uncertainty. Beck and colleagues (2020) have recommended that educators communicate messages such as “making a diagnosis is sometimes challenging, and oftentimes there are several possibilities that we may need to consider”. Such messages can create spaces for open dialogue about uncertainty and help address and normalise resulting discomfort. As self-efficacy is strongly linked to vicarious experiences (Bandura, 1997), especially when modelling is provided by those deemed by students to be skilled, physiotherapy students would strongly benefit from observing individuals with non-specific or complex pain presentations being managed effectively where diagnostic uncertainty prevails. If students can observe first-hand that these encounters can be ‘successful’, this may help foster self-efficacy in future patient interactions (Forbes et al, 2018).

### 4. *Direct practice and authentic experiences*

Tversky and Kahneman noted, “the brain appears to be programmed to provide as much certainty as it can. It is designed to make the best possible case for a given interpretation rather than to represent all the uncertainty about a given situation” (Tversky & Kahneman, 1974). Put simply, we are hardwired to seek certainty and thus we actively avoid unpleasant emotions that arise from uncertainty (Berker et al. 2016). Simply exposing students to such experiences of uncertainty and corresponding emotional responses is only one step. Students need to be equipped with practical strategies to navigate this dilemma and observe these strategies being used in action. New graduates have reflected on the need for more active acknowledgement of both the prevalence and challenge of diagnostic uncertainty during their pre-professional training

(Almond et al, 2021). New graduates feel that training should provide opportunities to experience diagnostic uncertainty, especially using authentic approaches that provide active opportunities to directly experience and manage uncertainty and the implications of it (Almond et al, 2021). Open and transparent patient communication, relaying assessment findings, and navigating shared decision making could be integrated into learning activities to support student’s cognitive, emotional, and ethical reactions that occur with managing diagnostic uncertainty, including recognizing and managing stereotypes and biases (Alam et al., 2017). Senior physiotherapists and other colleagues should endeavour to provide support for new graduates, through mentorship, modelling and observational opportunities, given the reliance that new graduates have on external sources to navigate diagnostic uncertainty (Almond et al, 2021). Further research should aim to investigate the most effective training and workplace support approaches to enhance performance and readiness for practice in managing diagnostic uncertainty.

### 5. *Balint groups: a strategy for sharing*

Balint groups are named after the psychoanalyst Michael Balint. These professional groups have been used for decades, particularly in medical practice, but have become more popular in other fields of healthcare (Balint Society of Australia and New Zealand). In a Balint group, participants are encouraged to present patient cases where they have experienced a strong reaction such as distress or uncertainty (Lustig, 2006). The patient case is presented briefly and informally to the wider group, which focuses also on the health professionals’ feelings and reactions during and following the described patient interaction. The group is encouraged to ask questions to explore the patient case more deeply. In a traditional Balint group, the presenter will be encouraged to sit back from the group and reflect while the patient case is discussed among the other group members. The idea is for the group to reflect on what they have heard, and the feelings that the story has evoked in themselves (Jablonski et al, 2013). Rather than focus on ‘solving’ the case, the group seeks to understand and explore the meaning of a patient’s behaviour and symptoms, especially in their individual context. In doing so, Balint group participants, especially students and novice professionals, develop increasing respect for diagnostic uncertainty and appreciate the challenge of this dilemma regardless of their years of professional experience. The Balint approach to case study practice may be a valuable way to help students and professionals normalise uncertainty but also manage the ethical and emotional reactions that arise with uncertainty through peer support and discussion.

## Conclusion

With diagnostic uncertainty as an omnipresent feature of clinical practice (Bhise et al., 2018), recent literature has emphasised the importance of acknowledging its presence, and the need to guide health professional students to communicate

diagnostic uncertainty throughout the continuum of training (Santhosh et al., 2019). The issue with uncertainty is not about learning how to eliminate it but how to accept it (Coles, 2013). Educators and mentors across physiotherapy classroom and clinic settings can lead by example with being able to say, “I don’t know yet.” These simple words may welcome input and curiosity, helping learners gain confidence in recognizing where clinical uncertainty exists, and understand that communicating and sharing uncertainty is part of managing the complex and multidimensional nature of musculoskeletal pain.

## References

- Alam, R., Cheraghi-Sohi, S., Panagioti, M., Esmail, A., Campbell, S. & Panagopoulou, E. (2017) [Managing diagnostic uncertainty in primary care: a systematic critical review](#). *BMC Family Practice*, 18, 79-84.
- Almond, A., Zou, Y. & Forbes, R. (2021). [Navigating diagnostic uncertainty in musculoskeletal practice: the perspectives and experiences of new graduate physiotherapists](#). *Musculoskeletal Science and Practice*.
- Arendt-Nielsen, L., Fernández-de-Las-Peñas, C., Graven-Nielsen, T. (2011). [Basic aspects of musculoskeletal pain: from acute to chronic pain](#). *Journal of Manual and Manipulative Therapy*, 19, 186-193.
- Bandura A. (1997). *Self-efficacy: the exercise of control*. New York: W.H. Freeman. Beck, J.B., McGrath, C., Toncray, K., Rooholamini, S.N. (2018). [Failure is an option: using errors as teaching opportunities](#). *Pediatrics*, 141(3).
- Beck, J.B., Long, M. & Ryan, M.S. (2020). [Into the unknown; helping learners become more comfortable with diagnostic uncertainty](#). *Pediatrics*, 146(5).
- Bhise, V., Rajan, S.S., Sittig, D.F., Morgan, R.O., Chaudhary, P. & Singh, H. (2018). [Defining and measuring diagnostic uncertainty in medicine: a systematic review](#). *Journal of General Internal Medicine*, 33:103-115.
- Bowen, J.L. (2006). [Educational strategies to promote clinical diagnostic reasoning](#). *New England Journal of Medicine*, 355:2217–2225.
- Carlson, H. & Carlson, N. (2011). [An overview of the management of persistent musculoskeletal pain](#). *Therapeutic Advances in Musculoskeletal Disease*, 3, 91-99.
- Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, J.T., Shekelle, P. & Owens, D.K. (2007). [Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society](#). *Annals of Internal Medicine*, 147, 478-491.
- Coles C. (2013). *Learning About Uncertainty in Professional Practice*. In: Sommers L., Launer J. (eds) [Clinical Uncertainty in Primary Care](#). Springer, New York, NY.
- Cristancho, S., Lingard, L., Forbes, T., Ott, M. & Novick, R. (2017). [Putting the puzzle together: the role of ‘problem definition’ in complex clinical judgement](#). *Medical Education*, 51(2):207– 214
- Danczak, A., Lea, A. & Murphy, G. (2016). [Mapping uncertainty in medicine: What to do when you don't know what to do?](#) Royal College of General Practitioners. London.
- Darlow, B., Dean, S., Perry, M., Mathieson, F., Baxter, G.D. & Dowell, A. (2014). [Acute low back pain management in general practice: uncertainty and conflicting certainties](#). *Family Practice*, 31: 723-732.
- Dunlop, M. and Schwartzstein, R.M. (2020). [Reducing diagnostic error in the intensive care unit: Engaging uncertainty when teaching clinical reasoning](#). *ATS Scholar*, 1(4).
- Forbes, R., Mandrusiak, A., Smith, M., & Russell, T. (2018). [New-graduate physical therapists' self-efficacy to perform patient education is influenced by entry-level training experiences](#). *Journal of Physical Therapy Education*, 32(1), 46–54.
- Forde, J., Hahne, A., Surkitt, L., Chan, A. & Richards, M. (2019). [The evolving case supporting individualised physiotherapy for low back pain](#). *Journal of Clinical Medicine*, 8: 1334.
- Gheihman, G., Johnson, M. & Simpkin, A.L. (2020). [Twelve tips for thriving in the face of clinical uncertainty](#). *Medical Teacher*, 42(5):493–499
- Hancock, J. & Mattick, K. (2020). [Tolerance of ambiguity and psychological well-being in medical training: a systematic review](#). *Medical Teacher*, 54(2):125–137
- Hayes, M.M., Chatterjee, S., Schwartzstein, R.M. (2017). [Critical thinking in critical care: five strategies to improve teaching and learning in the intensive care unit](#). *Annals of the American Thoracic Society*, 14:569–575.
- Institute of Medicine. National Academies of Sciences, Engineering and Medicine. (2016). [Relieving pain in America: A blueprint for transforming prevention, care, education, and research](#). *Military Medicine* 181: 397–399

International Association for the Study of Pain. (2018). [IASP curriculum outline on pain for physical therapy](#).

Jablonski H., Kjeldmand D. & Salinsky J. (2013) Balint Groups and Peer Supervision. In: Sommers L., Launer J. (eds) [Clinical Uncertainty in Primary Care](#). Springer, New York, NY.

Kennedy, A.G. (2017). [Managing uncertainty in diagnostic practice](#). *Journal of Evaluation in Clinical Practice*, 23: 959-963.

Ludewig, P.M., Kamonseki, D.H., Staker, J.L., Lawrence, R.L., Camargo, P.R. & Braman, J.P. (2017). [Changing our diagnostic paradigm: movement system diagnostic classification](#). *International Journal of Sports Physical Therapy*, 12: 884-893.

Lustig, M. (2006). [Balint groups: an Australian perspective](#). *Australian family physician*, 35(8), p.639.

Mamede, S., Schmidt, H.G. & Rikers, R. (2007). [Diagnostic errors and reflective practice in medicine](#). *Journal of Evaluation in Clinical Practice*, 13(1):138-145

Nevalainen, M., Kuikka, L. & Pitkälä K. (2014). [Medical errors and uncertainty in primary healthcare: a comparative study of coping strategies among young and experienced GPs](#). *Scandinavian Journal of Primary Health Care*, 32: 84-89.

Neville, A., Jordan, A., Beveridge, J.K., Pincus, T. & Noel M. (2019). [Diagnostic uncertainty in youth with chronic pain and their parents](#). *Journal of Pain*, 20, 1080-1090.

Prince, M.J. & Felder, R.M. (2006). [Inductive teaching and learning methods: definitions, comparisons, and research bases](#). *Journal of Engineering Education*, 95, 123-138.

Santhosh, L., Chou, C.L. & Connor, D.M. (2019). [Diagnostic uncertainty: from education to communication](#). *Diagnosis*, 6(2), 121-126

Simpkin, A.L., Murphy, Z. & Armstrong, K.A. (2019). [A randomized experimental study to assess the effect of language on medical students' anxiety due to uncertainty](#). *Diagnosis*, 6(2), 269-276.

Slade, S.C., Molloy, E. & Keating, J.L. (2012). [The dilemma of diagnostic uncertainty when treating people with chronic low back pain: a qualitative study](#). *Clinical Rehabilitation*, 26: 558-569.

Tversky, A., & Kahneman, D. (1974). [Judgment under uncertainty: Heuristics and biases](#). *Science*, 185(4157), 1124-1131.

Wilesmith, S., Lao, A., Forbes, R. (2020). [New-graduate physiotherapists' self-efficacy and preparedness for patient](#)

[education practice: a mixed methods study](#). *Focus on Health Professional Education: A Multi-Professional Journal*, 21 (3), 44-64.

Wheeler, L., Karran, E. & Harvie, D. (2018). [Low back pain](#). *Australian Journal of General Practice*, 47, 614-617.

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## Peer review reports

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