CSIRO PUBLISHING
The Royal New Zealand College of General Practitioners
Te Whare Tohu Rata o Aotearoa

QUANTITATIVE RESEARCH
https://doi.org/10.1071/HC24180

Journal of Primary Health Care

Understanding gaps in the diagnosis of degenerative cervical myelopathy in Aotearoa New Zealand's primary healthcare – a nationwide cross-sectional survey

Rohil V. Chauhan[A,B,*], Joanne Kennedy[C] and Steven White[B]

For full list of author affiliations and declarations see end of paper

***Correspondence to:**
Rohil V. Chauhan
Auckland Spine Surgery Centre, Spine Orthopaedics, 96E Carlton Gore Road, Newmarket, Auckland, New Zealand
Email: rohil.chauhan@hotmail.com

Handling Editor:
Felicity Goodyear-Smith

Received: 7 December 2024
Accepted: 8 March 2025
Published: 21 March 2025

Cite this: Chauhan RV *et al.* (2025) Understanding gaps in the diagnosis of degenerative cervical myelopathy in Aotearoa New Zealand's primary healthcare – a nationwide cross-sectional survey. *Journal of Primary Health Care* doi:10.1071/HC24180

ABSTRACT

Introduction. Degenerative cervical myelopathy (DCM) is the most common cause of spinal cord dysfunction in adults. Adequate condition awareness and the ability to recognise key clinical signs are crucial for timely referral and diagnostic imaging. However, the level of awareness and diagnostic confidence among New Zealand primary care clinicians remains unclear. **Aim.** This study aimed to evaluate self-reported condition awareness, diagnostic confidence, and understanding of DCM signs, symptoms, and management pathways among New Zealand primary care clinicians. **Methods.** A cross-sectional survey with two sections was developed, piloted, and distributed through professional associations. Participants included general practitioners, nurse practitioners, physiotherapists, osteopaths, and chiropractors. Section A (demographics, DCM education, and ratings of awareness and confidence) was completed by all respondents. Section B (knowledge-based items) was completed by respondents who reported being at least 'slightly' confident. **Results.** The survey yielded 336 responses, of which there were 320 complete responses for Section A and 227 complete responses for Section B. Over half (57.2%) of respondents reported no prior DCM education, and 43.1 and 32.5% reported 'average' or 'limited' awareness respectively. Low diagnostic confidence was reported by 25.9 (slightly confident) and 22.2% (not at all confident). Symptoms such as upper limb paraesthesia/numbness and neck pain/stiffness were selected by 98 and 95% of respondents as being associated with DCM. The most recognised clinical sign, tandem gait disturbance, was noted by only 65%. Magnetic resonance imaging was identified as the key diagnostic investigation by 73.6%, and 64.8% selected referral to an orthopaedic surgeon, spine surgeon, or neurosurgeon. **Discussion.** These findings reveal critical gaps in DCM awareness, diagnostic confidence, and knowledge among New Zealand primary care clinicians. It is possible that these gaps contribute to missed and delayed diagnosis for people living with DCM, who subsequently face irreversible neurological compromise resulting from delayed intervention. This study suggests that there is a need for improved education of primary healthcare professionals in regard to this condition and the development of standardised diagnostic criteria.

Keywords: assessment, awareness, clinical diagnosis, clinical education, degenerative cervical myelopathy, New Zealand, orthopaedics, primary healthcare.

Introduction

Degenerative cervical myelopathy (DCM) is the leading cause of adult spinal cord dysfunction globally.[1] It has an estimated global prevalence of 2.3%, which rises to 5% in people over the age of 40 years of age.[2,3] DCM is characterised by cervical spinal cord compression due to degenerative changes, leading to a wide array of upper motor neuron dysfunctions.[3,4] With an aging population seen in Aotearoa New Zealand (NZ) and globally, DCM represents a significant and growing health burden.[4] Early and accurate diagnosis is critical given the unpredictable disease trajectory, which is often characterised by periods of

WHAT GAP THIS FILLS

What is already known: Degenerative cervical myelopathy (DCM) is the leading cause of adult spinal cord dysfunction, with average diagnostic delays of 2.5 years often resulting in irreversible neurological impairment. Primary care clinicians are well positioned to identify DCM early, yet international research suggests that condition awareness is lacking.

What this study adds: This study is the first to assess DCM awareness and diagnostic confidence among primary care clinicians in Aotearoa New Zealand, revealing critical knowledge gaps. The findings highlight the need for targeted education and standardised referral criteria to facilitate timely detection and surgical consultation.

rapid stepwise symptomatic or functional decline interspersed with periods of quiescence.[5,6] However, diagnostic delays are common, with research suggesting that the average delay from the onset of DCM symptoms to diagnosis is 2.5 years.[7] This delay undoubtedly contributes to irreversible neurological damage and suboptimal functional and treatment outcomes.[6,8] Timely surgical decompression remains the only evidence-based intervention to halt this disease progression associated with chronic spinal cord compression.[9]

Accurate and prompt diagnosis of DCM largely depends on clinicians' awareness of the condition and their proficiency in conducting and interpreting neurological assessments.[5] In NZ, primary care constitutes the main access point for non-emergency health care, encompassing a broad range of clinicians, including general practitioners (GPs), nurse practitioners (NPs), physiotherapists (PTs), chiropractors, and osteopaths. Unlike some healthcare systems where musculoskeletal assessment is largely GP-led, NZ operates under a direct-access model, enabling patients to seek care from allied health professionals without referral. While this decentralised model broadens patient access, it also necessitates strong clinical acumen across primary care disciplines to ensure timely recognition and referral of conditions requiring specialist input, such as DCM.[5] International evidence suggests that significant gaps in DCM awareness persist among healthcare clinicians, particularly in primary care.[10,11]

Despite the key role that these clinicians could play in the early detection of DCM, there is no data on the awareness and diagnostic confidence of primary care clinicians in NZ. This study seeks to address this gap by assessing the current level of DCM awareness and diagnostic confidence among NZ primary care clinicians. Furthermore, it aims to gain an understanding of their current level of knowledge in respect to the understanding of clinical signs and symptoms of this condition and management pathways employed by primary care clinicians with greater familiarity with DCM, to inform future educational and early identification initiatives.

Methods

Study design

This study employed a cross-sectional survey design to gather anonymised responses from primary healthcare clinicians in NZ. The survey was administered using the SurveyMonkey online platform, and informed consent was obtained from all participants prior to their involvement.

Eligibility criteria

Eligible participants were consenting NZ-registered primary healthcare clinicians currently working in a primary care setting at the time of engaging in the survey. This cohort included GPs, NPs, PTs, osteopaths, and chiropractors.

Survey development and piloting

The development of the survey questions was informed by a review of recent relevant literature pertaining to DCM.[12] Particular attention was given to a study by Cook *et al.*, where a composite score based on four key clinical features of DCM yielded a specificity of 100%.[13] These core features formed the basis for the DCM symptom and sign list used in the survey. Additionally, common symptoms and signs typically seen in other otorhinolaryngological conditions, such as dizziness, visual changes, and difficulty swallowing, were included as alternate options. This approach was designed to provide a broader assessment of respondents' diagnostic acumen by distinguishing between characteristic and non-characteristic features of DCM.

The survey instrument was piloted with a convenience sample of 13 primary care clinicians, recruited from clinical environments in Auckland and Christchurch through the co-investigators' networks. The pilot group consisted of five GPs, six PTs, and two chiropractors. An orthopaedic spine surgeon with expertise in the diagnosis and management of DCM reviewed the survey to assess its clinical relevance and face validity. Minor revisions to the wording and sequencing of items were made based on feedback from the pilot group and the surgeon to enhance clarity and clinical applicability.

Survey

The final version of the survey was structured into two sections (Table 1). Section A, completed by all participants, comprised four demographic questions and two 5-point Likert scales designed to assess self-reported awareness of and confidence in recognising the clinical signs and symptoms of DCM. Section B was presented only to participants who reported being at least 'slightly confident' in recognising DCM. It contained more detailed questions regarding DCM-specific symptoms, signs, diagnostic investigations, and referral pathways (Table 1).

Table 1. Survey sections and questions.

Section	Categories	Questions
A	Clinical demographics	1. Which of the following healthcare clinicians are you currently practising as? (current NZ-registered: general practitioner, nurse practitioner, physiotherapist, chiropractor, or osteopath). 2. For how many years have you been working clinically as the above? 3. In which city/region of Aotearoa New Zealand have you spent the majority of the past 5 years practising? 4. Which country did you first gain professional registration in?
	Previous DCM education	5. Have you received any education or training on DCM? Either formal or informal training (eg a client who you or a colleague have seen, formal course, conference presentation).
	Perceived rating (5-point Likert scales)	6. How would you currently rate your awareness of DCM? (you might also know this condition by the name of 'cervical spondylotic myelopathy' or 'cervical stenosis'). 7. How confident are you currently at recognising the signs/symptoms of DCM?
B	Knowledge-based questions	8. What are the commonly presenting DCM symptoms to look out for? 9. What clinical signs do you test for when screening for DCM? 10. Which of the following investigations is the most important for confirming the diagnosis of DCM? 11. To whom would you refer if you are suspicious of DCM?

DCM, degenerative cervical myelopathy.

Recruitment

Participants were recruited through professional member associations, which disseminated survey advertisements to their registrants. Additional recruitment was facilitated via targeted advertisements in closed social media groups and online professional networks commonly accessed by physiotherapists, chiropractors, and osteopaths in NZ. To maintain data integrity, the survey was distributed with a single-use browser-restricted link, ensuring that each participant could only complete the survey once.

Statistical analysis

Descriptive statistics were used to summarise demographic data, self-reported levels of confidence and awareness, and responses to content-specific questions. Kendall's Tau B (τb) were conducted to examine the association between independent variables, including years of clinical experience and previous training in DCM, and condition awareness and diagnostic confidence. The relationship between clinical discipline and receiving previous training in DCM was analysed with Cramér's V. The significance threshold was set at $P < 0.05$, and all analyses were performed using IBM SPSS Statistics for Windows, version 28 (IBM Corp., Armonk, NY, USA).

Ethics

Ethical approval for this study was obtained from the Auckland University of Technology Ethics Committee (23/351).

Results

The survey was conducted between May and October 2023, yielding a total of 336 responses (Fig. 1). Sixteen incomplete responses were excluded, resulting in 320 complete submissions for analysis (3.05% response rate). Of these, 42.8% ($n = 137$) were from PTs, 33.4% ($n = 107$) from GPs, 14.1% ($n = 45$) from chiropractors, 8.8% ($n = 28$) from NPs, and 0.9% ($n = 3$) from osteopaths. The majority of respondents (59.1%) had over 10 years of clinical experience, with 36.6% reporting more than 20 years. Responses were evenly distributed between urban (47.1%) and rural or small-town settings (52.8%) across NZ. Most respondents (76.3%) had received their professional qualifications within NZ, and a majority (57.2%) reported no prior formal or informal training in DCM. Further details on the characteristics of survey responses are provided in Table 2.

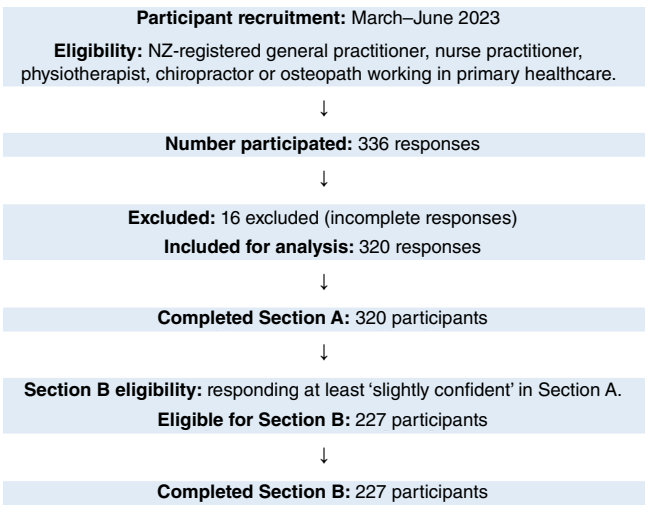

Fig. 1. Participant recruitment and flow through the study phases.

Section A: awareness and confidence levels

Section A of the survey was completed by all 320 participants. Among the respondents, the majority indicated 'average' (43.1%, $n = 138$) or 'limited' (32.5%, $n = 104$) awareness of DCM. Notably, 5.9% reported 'no awareness' of DCM

Table 2. Characteristics of survey respondents.

Characteristic	Number	Percentage (%)
Primary care profession		
General practitioner	107	33.4
Nurse practitioner	28	8.8
Physiotherapist	137	42.8
Chiropractor	45	14.1
Osteopath	3	0.9
Years since qualifying		
Under 2 years	20	6.3
2–5 years	55	17.2
5–10 years	56	17.5
10–20 years	72	22.5
20+ years	117	36.6
Location of current practice		
Cities	151	47.1
Rural and smaller towns	169	52.8
Country of training		
NZ	244	76.3
Non-NZ	76	23.7
Previous education in DCM		
Yes	137	42.8
No	183	57.2

DCM, degenerative cervical myelopathy; NZ, Aotearoa New Zealand.

(n = 19). A higher level of awareness was only indicated by 15.3% (n = 49) responding with 'very good' and 3.1% (n = 10) with 'excellent' awareness (Fig. 2).

Regarding confidence in diagnosing DCM, the majority indicated moderate confidence (36.6%, n = 117). Just over a quarter were 'slightly' confident (25.9%, n = 83) and, notably, 22.2% (n = 71) reported 'not at all confident'. Higher levels of confidence, including 'very' or 'extremely' confident were only selected by 11.9% (n = 38) and 3.4% (n = 3.4%) respectively (Fig. 3).

High levels of clinical experience were positively associated with greater confidence in diagnosing DCM. Clinicians with less than 5 years of clinical experience were more likely to report lower confidence than those with greater than 20 years of clinical experience ($\tau b = 0.140$, $P = 0.002$).

Additionally, previous training in DCM was positively associated with both greater confidence in diagnosing DCM (reporting moderate or very confident) ($\tau b = 0.494$, $P < 0.05$) and higher condition awareness (reporting moderate, very good, or excellent awareness) ($\tau b = 0.488$, $P < 0.05$). Chiropractors and PTs were significantly more likely to report receiving training on DCM compared to GPs and NPs (Cramér's $V = 0.444$, $P < 0.05$).

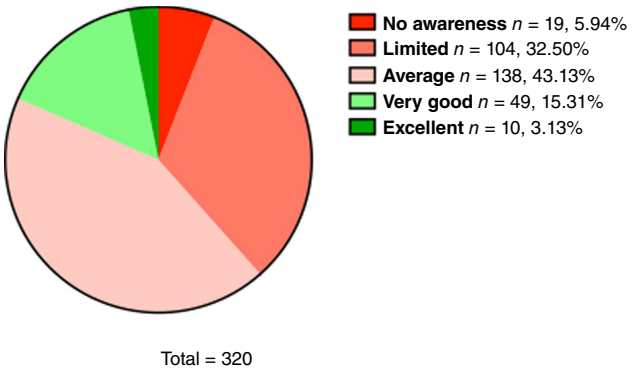

Fig. 2. Level of condition awareness of DCM among respondents.

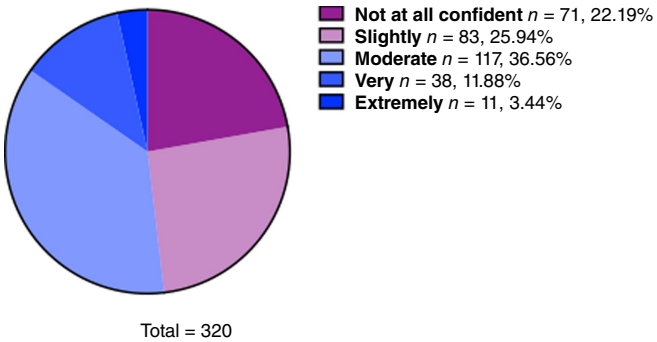

Fig. 3. Level of confidence to detect DCM among respondents.

Section B: DCM diagnostic understanding

Section B was completed by 227 respondents. In response to question eight, 'what are the commonly presenting DCM symptoms to look out for', respondents considered upper limb paraesthesia/numbness (selected by 98% of respondents) as the most commonly associated with patients with DCM, followed by neck pain/stiffness (95%), hand dexterity decline (87%), and gait disturbance (74%). In response to question nine, 'what clinical signs do you test for when screening for DCM', respondents selected tandem gait disturbance (65%), age over 45 years (62%), Babinski sign (57%), Hoffmann's sign (45%), and the inverted supinator sign (27%).

In response to question 10, 'which of the following investigations is the most important for confirming the diagnosis of DCM', the majority of respondents (73.6%) correctly identified cervical spine magnetic resonance imaging (MRI) as the most important investigation in the diagnosis of DCM, followed by cervical spine plain radiographs (selected by 7.5% of respondents).

In response to question 11, 'to whom would you refer to if you are suspicious of DCM', the majority of respondents (64.8%) reported referring to an 'orthopaedic surgeon/neurosurgeon/spine surgeon' when suspecting DCM, followed by 'general practitioner' (8.8%), 'emergency department/urgent care facility/accident & emergency' (8.4%), or 'neurologist' (7.5%). There were no significant differences between professions or

location of practice when choosing which clinician to refer to when suspecting DCM.

Discussion

This study provides a detailed evaluation of primary care clinicians' awareness and understanding of DCM in NZ and highlights critical gaps that could contribute to diagnostic delays. As primary care clinicians are often the first point of contact for musculoskeletal complaints in NZ, their role in recognising progressive conditions like DCM is vital to prevent long-term neurological impairment and disability.[5,6]

Notably, our findings revealed significant gaps in awareness of DCM, with 40% of clinicians reporting 'limited' or 'no awareness' of the condition. Additionally, approximately 50% of respondents reported being 'slightly' or 'not at all' confident in their ability to diagnose DCM. Similar results have been reported in the United Kingdom, where a recent survey revealed that 57.4% of GPs had very limited awareness of DCM.[10] This low level of awareness is of concern and raises the possibility that people living with DCM may face significant diagnostic delays or even remain undiagnosed within primary care and community settings.[14] Given the progressive nature of DCM, a delay in diagnosis can lead to significant and irreversible neurofunctional consequences.[6] For this reason, raising condition awareness has been ranked as the number one clinical and research priority for DCM.[5]

Of the clinicians who self-reported at least 'slightly' confident in their ability to diagnose DCM, over 70% considered that upper limb paraesthesia, neck pain, and hand dexterity decline were most commonly associated with DCM. Tandem gait disturbance was the clinical sign that most (62%) respondents considered as important in the assessment of patients with suspected DCM. It is possible that the high variability in responses reflects the lack of consensus on the most diagnostic upper motor neuron signs for DCM and highlights the need for standardised diagnostic criteria.[15] Cook *et al.* found that a cluster of signs, including gait deviation, Hoffman's sign, Babinski's sign, and age over 45, provided high specificity for DCM, but these signs were infrequently recognised by our respondents.[13] Although clinical signs such as Hoffman's and Babinski's reflexes have high specificity for DCM, they are frequently overlooked by primary care clinicians.[16,17] Importantly, up to 20% of patients with DCM may not exhibit overt clinical signs despite having DCM symptoms and correlative imaging findings, further complicating early recognition.[18] This reinforces the need for clinicians to avoid being falsely reassured by the absence of clinical examination signs and to maintain a high index of suspicion when assessing patients with neurological symptoms.

Moreover, symptoms often present in a variable and progressive manner over the course of the disease trajectory adding to the challenge of recognising the various non-specific DCM symptoms. This diagnostic ambiguity complicates early recognition and delays appropriate referral for confirmatory diagnostic assessment and investigations.[19] As such, people living with DCM experience average diagnostic delays of 2.5 years, leading to irreversible neurological impairment and disability.[6,7] Surgical decompression remains the only evidence-based intervention, and its efficacy is significantly higher when performed within 4–6 months of symptom onset.[9,20] Surgical decompression for DCM is both efficacious and cost-effective and indicated for moderate, severe, or neurologically progressive cases.[8,9,21] Delayed intervention results in persistent disabilities for 95% of patients and 40% of sufferers are unable to maintain paid employment or maintain independence with daily activities, leading to poorer quality of life compared to other chronic conditions.[6,8,22]

Encouragingly, approximately 70% of confidently responding clinicians in this study recognised cervical spine MRI as the definitive confirmatory investigation for DCM, and identified the need for referral to an orthopaedic surgeon, spine surgeon, or neurosurgeon when suspecting DCM. This aligns with current consensus that MRI is the definitive radiological investigation for DCM, with high levels of sensitivity for the evaluation of spinal cord compression, a hallmark radiological feature of DCM.[19] Interestingly, despite low levels of awareness among respondents, many correctly identified the appropriate referral pathway and diagnostic modality. This may reflect an understanding of the role of specialist clinicians in providing diagnostic clarity and access to advanced imaging. However, variations in referral preferences may be influenced by regional differences in access to neurosurgical and orthopaedic services in NZ, where other specialists with musculoskeletal expertise may be more accessible. As such, it is important for primary care clinicians to suspect DCM and recognise its clinical features, as this is a prerequisite for appropriate onward referral to specialist services for definitive diagnostic workup.

Given the aging population seen in NZ and internationally, the prevalence of DCM is expected to rise.[14] With the low levels of awareness and confidence in diagnosing DCM in the present study, strategies to improve the awareness and chances of early detection for at-risk groups are crucial.[5] In particular, Māori and Pacific people are thought to be at a higher risk due to narrower cervical spinal canal widths when compared to NZ Europeans.[23] There is evidence that routine screening protocols for at-risk populations, such as patients over 45 years old, those with lumbar stenosis, a history of falls and fragility fractures, and Māori and Pacific people, may improve the timeliness of detection.[23–26] Screening tools, such as the modified Japanese Orthopaedic Association scale and the DOWN questionnaires, may aid the assessment of various clinical features of DCM.[27,28] They can be utilised for screening in primary care, in the absence of validated clinical criteria, enabling clinicians to identify DCM, monitor for signs of progression, and refer for imaging when DCM is suspected. Clinicians should exercise a low threshold to refer onwards for diagnostic and surgical workup in the presence of

clinical signs and symptoms of DCM, particularly in the aforementioned at-risk patient groups.[3]

Limitations

The signs and symptoms included in the survey questions did not encompass the full spectrum of characteristic DCM features identified in more recent reviews by Jiang and colleagues, as survey development and data collection were completed prior to their publication.[16,25] While Jiang *et al.* highlighted a broader range of clinical features, our survey focused on a core set of hallmark symptoms to assess whether clinicians could distinguish DCM from other conditions with overlapping features.

The sample size was relatively small, which may limit the generalisability of the findings to the wider primary care sector. This is a common limitation in survey-based studies, where response rates can be influenced by several factors, including clinician interest, availability, and familiarity with the subject matter. In particular, there was very low representation of osteopaths, despite targeted engagement efforts. Selection bias is another potential issue influencing participation, as clinicians with limited knowledge of DCM may have been less likely to participate. Typically, this would lead to an overestimation of results, but given the nature of the hypothesis and results confirming very low awareness and confidence, it is equally possible that the true condition awareness and confidence in diagnosing DCM may be lower than the findings we present in this paper.

Conclusion

This study highlights significant gaps in the awareness and diagnostic confidence of primary care clinicians in Aotearoa New Zealand regarding degenerative cervical myelopathy. Nearly 40% of clinicians reported low awareness of DCM, and 50% expressed low confidence in their ability to diagnose the condition, likely contributing to the diagnostic delays and disability and irreversible neurological impairment seen in people living with DCM. Clinicians with prior DCM education demonstrated greater awareness and confidence, highlighting the importance of targeted educational interventions. Future research should focus on the development of standardised diagnostic criteria and tailored educational tools to enhance the early recognition of DCM in primary care, particularly for high-risk clinical groups such as older adults, individuals with lumbar spinal stenosis, and Māori and Pacific peoples.

References

1 Badhiwala JH, Ahuja CS, Akbar MA, *et al.* Degenerative cervical myelopathy - update and future directions. *Nat Rev Neurol* 2020; 16(2): 108–24. doi:10.1038/s41582-019-0303-0

2 Smith SS, Stewart ME, Davies BM, *et al.* The prevalence of asymptomatic and symptomatic spinal cord compression on magnetic resonance imaging: a systematic review and meta-analysis. *Global Spine J* 2021; 11(4): 597–607. doi:10.1177/2192568220934496

3 Davies BM, Mowforth OD, Smith EK, *et al.* Degenerative cervical myelopathy. *BMJ* 2018; 360: 186. doi:10.1136/bmj.k186

4 Nouri A, Tetreault L, Singh A, *et al.* Degenerative cervical myelopathy: epidemiology, genetics, and pathogenesis. *Spine* 2015; 40(12): 675–93. doi:10.1097/BRS.0000000000000913

5 Davies BM, Mowforth O, Wood H, *et al.* Improving awareness could transform outcomes in degenerative cervical myelopathy [AO Spine RECODE-DCM Research Priority Number 1]. *Global Spine J* 2022; 12(1_suppl): 28. doi:10.1177/21925682211050927

6 Pope DH, Mowforth OD, Davies BM, *et al.* Diagnostic delays lead to greater disability in degenerative cervical myelopathy and represent a health inequality. *Spine* 2020; 45(6): 368–77. doi:10.1097/BRS.0000000000003305

7 Behrbalk E, Salame K, Regev GJ, *et al.* Delayed diagnosis of cervical spondylotic myelopathy by primary care physicians. *Neurosurg Focus* 2013; 35(1): E1. doi:10.3171/2013.3.FOCUS1374

8 Fehlings MG, Wilson JR, Kopjar B, *et al.* Efficacy and safety of surgical decompression in patients with cervical spondylotic myelopathy: results of the AOSpine North America prospective multi-center study. *J Bone Joint Surg Am* 2013; 95(18): 1651–8. doi:10.2106/JBJS.L.00589

9 Fehlings MG, Tetreault LA, Riew KD, *et al.* A clinical practice guideline for the management of patients with degenerative cervical myelopathy: recommendations for patients with mild, moderate, and severe disease and nonmyelopathic patients with evidence of cord compression. *Global Spine J* 2017; 7(3 Suppl): 70S–83S. doi:10.1177/2192568217701914

10 Rufus-Toye RM, Rafati Fard A, Mowforth OD, *et al.* Degenerative cervical myelopathy awareness in primary care: UK national cross-sectional survey of general practitioners. *JMIR Form Res* 2024; 8: e58802. doi:10.2196/58802

11 Waqar M, Wilcock J, Garner J, *et al.* Quantitative analysis of medical students' and physicians' knowledge of degenerative cervical myelopathy. *BMJ Open* 2020; 10(1): e028455. doi:10.1136/bmjopen-2018-028455

12 Cook CE, Wilhelm M, Cook AE, *et al.* Clinical tests for screening and diagnosis of cervical spine myelopathy: a systematic review. *J Manip Physiol Ther* 2011; 34(8): 539–46. doi:10.1016/j.jmpt.2011.08.008

13 Cook C, Brown C, Isaacs R, *et al.* Clustered clinical findings for diagnosis of cervical spine myelopathy. *J Man Manip Ther* 2010; 18(4): 175–80. doi:10.1179/106698110X12804993427045

14 Grodzinski B, Stubbs DJ, Davies BM. Most degenerative cervical myelopathy remains undiagnosed, particularly amongst the elderly: modelling the prevalence of degenerative cervical myelopathy in the United Kingdom. *J Neurol* 2023; 270(1): 311–9. doi:10.1007/s00415-022-11349-8

15 Hilton B, Gardner EL, Jiang Z, *et al.* Establishing diagnostic criteria for degenerative cervical myelopathy [AO Spine RECODE-DCM Research Priority Number 3]. *Global Spine J* 2022; 12(1_suppl): 55. doi:10.1177/21925682211030871

16 Jiang Z, Davies B, Zipser C, *et al.* The value of clinical signs in the diagnosis of degenerative cervical myelopathy - A systematic review and meta-analysis. *Global Spine J* 2024; 14(4): 1369–94. doi:10.1177/21925682231209869

17 Hilton B, Tempest-Mitchell J, Davies B, *et al.* Assessment of degenerative cervical myelopathy differs between specialists and may influence time to diagnosis and clinical outcomes. *PLoS One* 2018; 13(12): e0207709. doi:10.1371/journal.pone.0207709

18 Rhee JM, Heflin JA, Hamasaki T, *et al.* Prevalence of physical signs in cervical myelopathy: a prospective, controlled study. *Spine* 2009; 34(9): 890–5. doi:10.1097/BRS.0b013e31819c944b

19 Martin AR, Tetreault L, Nouri A, *et al.* Imaging and electrophysiology for degenerative cervical myelopathy [AO Spine RECODE-DCM Research Priority Number 9]. *Global Spine J* 2022; 12(1_suppl): 130. doi:10.1177/21925682211057484

20 Tetreault LA, Zhu MP, Howard RM, *et al.* The discrepancy between functional outcome and self-reported health status after surgery for degenerative cervical myelopathy. *Spine J* 2019; 19(11): 1809–15. doi:10.1016/j.spinee.2019.06.026

21 Goacher E, Yardanov S, Phillips R, *et al.* Cost-effectiveness of surgery for degenerative cervical myelopathy in the United Kingdom. *Br J Neurosurg* 2024; 1–5. doi:10.1080/02688697.2024.2346566

22 Oh T, Lafage R, Lafage V, *et al.* Comparing quality of life in cervical spondylotic myelopathy with other chronic debilitating diseases using the short form survey 36-health survey. *World Neurosurg* 2017; 106: 699–706. doi:10.1016/j.wneu.2016.12.124
23 Goddard-Hodge D, Boukebous B, Baker JF. Anteroposterior cervical spine canal diameter: exploring ethnic variation between European and Polynesian populations. *ANZ J Surg* 2024; 94: 1963–70. doi:10.1111/ans.19186
24 Overley SC, Kim JS, Gogel BA, *et al.* Tandem spinal stenosis: a systematic review. *JBJS Rev* 2017; 5(9): e2. doi:10.2106/JBJS.RVW.17.00007
25 Jiang Z, Davies B, Zipser C, *et al.* The frequency of symptoms in patients with a diagnosis of degenerative cervical myelopathy: results of a scoping review. *Global Spine J* 2023; 14(4): 1395–421. doi:10.1177/21925682231210468
26 Zhang H, Buell T, Baldwin III E, *et al.* High prevalence of cervical myelopathy among hip fracture patients. *Oper Tech Orthop* 2023; 33(4): 101066. doi:10.1016/j.oto.2023.101066
27 Tetreault L, Kopjar B, Nouri A, *et al.* The modified Japanese Orthopaedic Association scale: establishing criteria for mild, moderate and severe impairment in patients with degenerative cervical myelopathy. *Eur Spine J* 2017; 26(1): 78–84. doi:10.1007/s00586-016-4660-8
28 Treanor C, Gallagher C, Lenehan W, *et al.* Flipping the mJOA: clinical utility of the modified Japanese Orthopaedic Association score as a tool for detecting degenerative cervical myelopathy. *Brain Spine* 2024; 4: 102853. doi:10.1016/j.bas.2024.102853

Data availability. Data sharing is not applicable as no new data were generated or analysed during this study.

Conflicts of interests. The authors declare that there are no financial or personal conflicts of interest.

Declaration of funding. This research was supported by the New Zealand Manipulative Physiotherapists Association (NZMPA-2023-111). The funding source had no involvement in the study design, data collection, analysis, manuscript preparation, or the decision to submit this article for publication.

Acknowledgements. The authors thank all participants and acknowledge the support of Dr. Sheetal Singh (chiropractor) and Dr. Kesava Sampath for their valuable contributions in participant recruitment.

Author contributions. RVC: conceptualisation, project administration, visualisation, writing – original draft preparation, writing – review and editing. JK: conceptualisation, funding acquisition, project administration, writing – review and editing. SW: writing – methodology, resources, writing – reviewing and editing.

Author affiliations
[A]Auckland Spine Surgery Centre, Spine Orthopaedics, 96E Carlton Gore Road, Newmarket, Auckland, New Zealand.
[B]Active Living and Rehabilitation: Aotearoa New Zealand, Health and Rehabilitation Research Institute, Faculty of Health and Environmental Sciences, Auckland University of Technology, 90 Akoranga Drive, Northcote, Auckland, New Zealand.
[C]Health New Zealand Christchurch Hospital, Emergency Department, 2 Riccarton Avenue, Christchurch Central City, Christchurch, New Zealand.