

# Timing of evidence-based non-surgical interventions as part of multimodal treatment guidelines for the management of cervical radiculopathy

Thoomes, Erik; Thoomes-de Graaf, Marloes; Cleland, Joshua; Gallina, Alessio; Falla, Deborah

DOI:  
[10.1136/bmjopen-2020-043021](https://doi.org/10.1136/bmjopen-2020-043021)

License:  
Creative Commons: Attribution-NonCommercial (CC BY-NC)

*Document Version*  
Publisher's PDF, also known as Version of record

*Citation for published version (Harvard):*  
Thoomes, E, Thoomes-de Graaf, M, Cleland, J, Gallina, A & Falla, D 2021, 'Timing of evidence-based non-surgical interventions as part of multimodal treatment guidelines for the management of cervical radiculopathy: a Delphi study protocol', *BMJ open*, vol. 11, no. 3, e043021. <https://doi.org/10.1136/bmjopen-2020-043021>

[Link to publication on Research at Birmingham portal](#)

## General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

## Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact [UBIRA@lists.bham.ac.uk](mailto:UBIRA@lists.bham.ac.uk) providing details and we will remove access to the work immediately and investigate.

# BMJ Open Timing of evidence-based non-surgical interventions as part of multimodal treatment guidelines for the management of cervical radiculopathy: a Delphi study protocol

Erik Thoomes <sup>1,2</sup>, Marloes Thoomes-de Graaf <sup>2</sup>, Joshua Cleland,<sup>3</sup>  
Alessio Gallina <sup>1</sup>, Deborah Falla <sup>1</sup>

**To cite:** Thoomes E, Thoomes-de Graaf M, Cleland J, *et al*. Timing of evidence-based non-surgical interventions as part of multimodal treatment guidelines for the management of cervical radiculopathy: a Delphi study protocol. *BMJ Open* 2021;**11**:e043021. doi:10.1136/bmjopen-2020-043021

► Prepublication history and supplemental material for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2020-043021>).

Received 22 July 2020  
Revised 30 January 2021  
Accepted 22 February 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

<sup>1</sup>School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, Birmingham, UK

<sup>2</sup>Research Department, Fysio-Experts, Hazerswoude Rijndijk, Netherlands

<sup>3</sup>Doctor of Physical Therapy Program, Department of Public Health and Community Medicine, Tufts University School of Medicine, Boston, Massachusetts, USA

## Correspondence to

Erik Thoomes;  
ejt979@student.bham.ac.uk

## ABSTRACT

**Introduction** Cervical radiculopathy (CR) is a clinical condition whereby motor, reflex and/or sensory changes such as radicular pain, paraesthesia or numbness can exist. Conservative management is a preferred first treatment option as the risk–benefit ratio for surgery is less favourable. Systematic reviews and treatment guidelines gather evidence on the effectiveness of non-surgical management of patients with CR from randomised controlled trials, which do not consider the natural course of recovery to modify the management strategy accordingly. The aim of this study is to establish consensus on effective non-surgical treatment modalities for patients in different stages (acute, subacute and chronic) of CR, using the Delphi method approach.

**Methods and analysis** Through an iterative multistage process, experts within the field will rate their agreement with a list of proposed treatment modalities and suggest any missing treatment modalities during each round. Agreement will be measured using a five-point Likert scale. Descriptive statistics will be used to measure agreement (median, IQR and percentage of agreement). Consensus criteria will be defined a priori for each round. Data analysis at the end of round three will produce a consensus list of effective treatment modalities for the management of patients with CR in different stages of recovery.

**Ethics and dissemination** Ethical approval has been granted from the University of Birmingham ethics committee under ERN\_20-1121. The study findings will be submitted to a peer-reviewed journal and to relevant conferences for dissemination of the study results.

## INTRODUCTION

Cervical radiculopathy (CR) is a clinical condition whereby motor, reflex and/or sensory changes such as radicular pain, paraesthesia or numbness may be present and may be provoked by neck posture(s) and/or movement(s).<sup>1,2</sup> An incidence of approximately 83 per 100 000 persons is reported<sup>3</sup> with a prevalence of 3.5 per 1000 persons.<sup>4</sup> The societal

## Strengths and limitations of this study

- This will be the first study to establish consensus from international experts on effective non-surgical treatment modalities for patients in three different stages (acute, subacute and chronic) of cervical radiculopathy.
- This study will be reported in line with Conducting and Reporting Delphi Studies recommendations.
- This study will use both qualitative and quantitative data.
- The views of the Delphi panellist may differ from those experts that declined to participate and so may not fully represent an opinion of all experts in the field.

burden of CR is substantial. In the Netherlands, with a population of 17 million, on average 2000 patients yearly receive surgery for a cervical herniated disc, resulting in direct costs of about €30 million per year. Although direct costs for conservative care are lower, this group might have higher indirect costs due to a longer period of reduced labour productivity.<sup>5</sup>

The natural history of CR is favourable as most (83%) patients with symptomatic radiculopathy recover within 24–36 months and substantial improvements usually occurs 4–6 months post onset.<sup>6</sup> It has been suggested that those who receive conservative care might have higher indirect costs due to a longer period of reduced work productivity.<sup>5</sup>

Conservative management is a preferred first treatment option, since the risk–benefit ratio for surgery is less favourable.<sup>7–11</sup> Several systematic reviews<sup>7–9</sup> and contemporary (inter)national treatment guidelines<sup>12–16</sup> suggest effective non-surgical management strategies could include: information and

patient education, advice to stay physically active, manual therapy alone or in combination with different types of supervised exercise, traction, neurodynamic mobilisation and use of a cervical collar.

Systematic reviews, traditionally include outcomes from randomised controlled trials (RCTs) and sometimes controlled clinical trial (CCTs). RCTs have a limitation in that the management strategies are often not tailored to the individual<sup>17 18</sup>; RCTs usually report central tendencies of a cohort, which is not representative of an individual patients.<sup>19</sup> The limited external validity is partly related to the inclusion of patients and practitioners in RCTs which are different from those in routine practice. Additionally, RCTs in general do not relate the management strategy under scrutiny to the different stages of the studied condition. Instead they manage all participants identically, regardless of the stage of the studied condition being acute, subacute or chronic.<sup>20</sup> Rehabilitation programmes, however, are based on the logical assumption that some treatment modalities might potentially be better suited in the early acute stage of the disorder, while others might be better for the management during the subacute or chronic phases.<sup>21 22</sup> Current evidence on the effectiveness of non-surgical management of patients with CR reports a lack of consensus on the optimal timing and dosage of treatment modalities.<sup>8 9 23</sup>

The Delphi technique is described as 'a method used to obtain the most reliable consensus of opinion of a group of experts by a series of intensive questionnaires interspersed with controlled feedback'.<sup>24 25</sup> Delphi studies are often used to combine clinical expertise and achieve consensus on what preferred management options should or could be included in the management of patients with CR at varying stages.<sup>25 26</sup>

## Objective

To establish consensus on effective non-surgical treatment modalities for patients in different stages (acute, subacute and chronic) of CR, using the Delphi method approach.

## METHODS AND ANALYSIS

### Design

An electronic version of the Delphi method will be used, modified for the purpose of this study<sup>25–28</sup> and recent studies.<sup>29–32</sup> The e-Delphi technique used will involve the iterative process of administering rounds of surveys to an international expert panel, using an electronic platform to construct and distribute the rounds of surveys to panellists.<sup>27 33</sup> This design will allow the recruitment of a homogenous group of international experts (participants) and allow participation without geographical constraints, avoid dominance of opinion from minority members, and offer anonymity therefore encouraging freedom of expression and removing peer or authoritative pressure.<sup>26</sup> The study will be reported in line with the Conducting and Reporting Delphi Studies (CREDES)

recommendations (online supplemental file 1) to ensure rigour.<sup>25</sup>

### Participants

In line with the CREDES recommendations, experts will be sought globally from a variety of different professional backgrounds (physiotherapy, medicine, allied healthcare, academia).<sup>25</sup> Experts will be defined and agreed on by the steering committee according to predefined eligibility criteria informed by previous similar studies.<sup>29 31 32</sup>

Proposed eligibility criteria for experts to serve as panellists will be ( $\geq 1$  criterion required for inclusion):

- ▶  $\geq 1$  peer-reviewed publications on clinically relevant CR or cervical spinal entrapment neuropathies within the past 10 years or
- ▶  $\geq 10$  years' experience working in a pain/musculoskeletal outpatient of either primary and/or secondary care service with patients with CR or spinal entrapment neuropathies.

Additionally, potential panellists need to have sufficient English and computer literacy skills, which will be judged by the language of authored publications as well as being the corresponding author of that publication.

Past work has suggested that 20–30 panellists are appropriate in a Delphi study to enable consensus.<sup>26 34 35</sup> An upper limit for panellist numbers will not be defined.

### Recruitment

Electronic libraries (PubMed, Embase, CINAHL, Google Scholar) will be searched for individuals meeting the eligibility criteria. Potential panellists will then be contacted via email that they have been identified by the steering committee as an expert within the field, together with a provision of the study objective and an outline of the Delphi procedure. The recruitment period duration will be set at 6 weeks. A snowballing strategy will be adopted by the recruiting author (ET), requesting contacted panellists to recommend peers who satisfy the eligibility criteria. Additionally, members of the steering committee will also be eligible to recommend potential panellists from their professional network. Additionally, the steering committee will post invitations on social media. Participation will be confirmed following receipt of a signed consent form, conflict of interest form and participant information form.

### Steering committee

The steering committee consists of the five authors of this study: the lead investigator (ET) and four senior academics (MT-dG, JC, AG and DF), all with experience in the Delphi technique, qualitative and quantitative research methods and more than 10 years of clinical experience within musculoskeletal medicine. The responsibility of the committee will be to recruit experts and to design, circulate and analyse the questionnaires. The steering committee will make collective decisions regarding methodology, data analysis and quality assurance.

## Delphi procedure

Panellists will receive an email containing a link to the platform hosted on LimeSurvey ([www.limesurvey.com](http://www.limesurvey.com)). All the participants' information such as age, country of origin, country of current habitation/ work, highest qualification, current occupation, professional background and working period in patients with CR or nerve-related arm pain will be collected.

The steering committee will compose a list of proposed treatment modalities collated from systematic reviews and (inter)national guidelines.<sup>9 12 13 23 36 37</sup> Panellists will be invited to provide their level of agreement for each proposed treatment modality for each stage of CR. Additionally, an open question will be provided in each section in order to explore any missing treatment modalities which may have been overlooked. All additional treatment modalities, which are suggested by at least one panellist, will be added into the next round. In round 2, the questionnaire will be returned to each participant, indicating their response from round 1 and how this compares with the overall panel's response. As a result, participants will be given the opportunity to reconsider the issues they identified in round one. A third repeat round of this process will be carried out to reach consensus.<sup>38</sup> At the end of round 3, panellists will be asked to rank the treatment modalities in terms of importance based on consensus agreement of effectiveness. The treatment modalities generated following round 3 will be collated to create the final list of treatment modalities for each stage of CR. In line with similar studies, panellist will be allowed 3 weeks to complete each round and 3 weeks will be allocated per round for data analysis.<sup>26 29 31 32</sup> Non-responders will be sent two reminders per round at equally distributed intervals and/or contacted in person by the lead investigator.

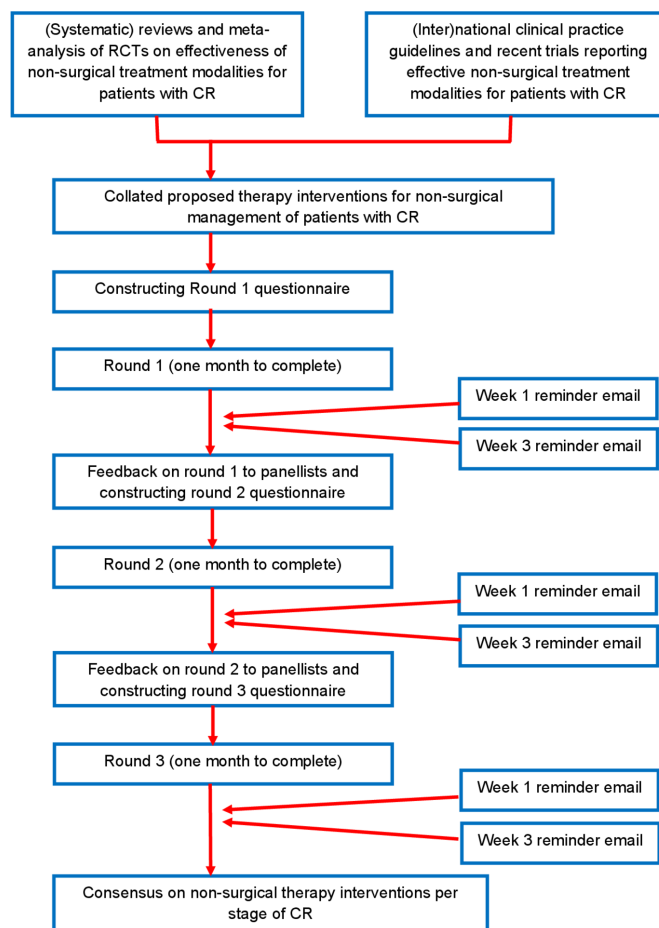
**Figure 1** details the procedure and timeline for the study. Round 1 of the questionnaire (online supplemental file 2) will be sent out mid-December of 2020; collection of the final data is likely to take 6 months, that is, in July 2021, at which point analysis of data can begin.

Prior to the start of the study, a prenotification period of 6 weeks will be allocated to recruit participants. Questions will be sent to the panellists en bloc and comments will be returned in a non-blinded fashion to the lead investigator (ET), who will incorporate the comments. A five-point Likert scale (1=strongly disagree, 2=disagree, 3=do not agree or disagree, 4=agree, 5=strongly agree) will evaluate level of agreement throughout.<sup>39</sup> Consensus will be assessed through analysing descriptive statistics against predefined criteria for consensus.

A pilot will be conducted with eight students at the University of Birmingham with musculoskeletal expertise (PhD/MRes/MSc) who will be invited to complete the round 1 survey over a 1-week period and asked to feedback any points to help improve the usability of the survey.

## Definition of stages of CR terminology

For this study we will choose to align the different clinical stages of CR with established pain terminology for



**Figure 1** Procedure and timelines for participants in Delphi study. CR, cervical radiculopathy; RCT, randomised controlled trial.

example, 'acute', 'subacute' and 'chronic' as proposed by the International Association for the Study of Pain.<sup>40 41</sup> 'Acute' pain is pain that has been present for up to 6 weeks.<sup>41</sup> 'Subacute' pain is a subset of acute pain: it is pain that has been present for at least 6 weeks but less than 3 months.<sup>42</sup> 'Chronic' pain is defined as pain that persists or recurs for more than 3 months.<sup>40 41</sup>

## Data collection and analysis

All data will be stored offline on a password encrypted computer in a locked office with access only available to the researchers. In accordance with university guidelines, data will be destroyed 10 years after completion of the study. Content analysis will be used to analyse data from the free text boxes; treatment modalities will be identified by two authors (ET, MT-dG) which will help to inform the construction of the round 2 survey. Results of the descriptive statistics and content analysis will be fed back to the steering committee and discussed before constructing the round 2 survey. The five-point Likert scale is an ordinal scale.<sup>39 43 44</sup> Qualitative data will be extracted deductively (to identify treatment modalities) and inductively (to identify additional treatment modalities). Descriptive statistics including median, IQR, quartile and percentage

of agreement<sup>39</sup> will be used to assess consensus in each round according to the following criteria<sup>29 30 45</sup>:

Round 1: criteria of consensus

- ▶ Median value of participants' Likert scale data  $\geq 3$ .
- ▶ Percentage of agreement  $\geq 50\%$ .

Round 2: criteria of consensus

- ▶ Median value of participants' Likert scale data  $\geq 3.5$ .
- ▶ IQR value of participants' Likert scale data  $\leq 2$ .
- ▶ Percentage of agreement  $\geq 60\%$ .

Round 3: criteria of consensus

- ▶ Median value of participants' Likert scale data  $\geq 4$ .
- ▶ IQR value of participants' Likert scale data  $\leq 1$ .
- ▶ Percentage of agreement  $\geq 70\%$ .

All quantitative data will be analysed using IBM SPSS V.26.

### Ethical considerations

Ethical approval has been granted from the University of Birmingham ethics committee under ERN\_20-1121. Formal consent and declaration of conflict of interests will be required prior to participation. Quasi-anonymity will be guaranteed which refers to blinding of participation between panel members but not to the researchers. All participants will be assigned a unique identification code to aid the feedback process and to protect confidentiality of responses.

There are no conflicts of interest between the steering committee and this project.

### Dissemination plan

To ensure methodological rigour, this study protocol will be submitted to an open access peer-reviewed journal. The study findings will be submitted to a relevant peer-reviewed journal for dissemination and then presented at relevant conferences.

### Patient and public involvement

The research question in this study forms part of a larger discussion within our patient and public involvement meetings as part of an existing programme of research that is centred on CR. Patients will not be involved in the analysis and data collection of the study.

## DISCUSSION

The results from this study will assist clinicians and researchers in formulating an individualised management plan for patients with CR. By grouping separate effective treatment modalities with respect to the stage of recovery, clinicians will be better able to tailor management plans to the individual patient through their course of recovery, instead of using a standardised 'one size fits all' approach. The results from this study will also serve a need both clinically and within the contemporary literature to inform further research.

We also aim to contrast this study's findings with systematic reviews and (inter)national guidelines.<sup>9 12 13 23 36 37</sup>

## CONCLUSION

Current literature provides the clinician with only a list of potential effective individual treatment modalities derived from RCTs and CCTs. It does not allow for individualised management plans tailored to the stage of recovery patients might be in. In order to ascertain a consensus derived set treatment modalities, thought to be especially effective during certain stages of recovery, a modified Delphi study has been designed. The clinical implications of this study are the results facilitate the decision-making of clinicians in formulating individualised management plans through the natural course of recovery for patients with CR.

**Twitter** Erik Thoomes @Fysio\_Experts and Deborah Falla @Deb\_Falla

**Contributors** All authors devised the focus of this Delphi study. ET is a PGR student, DF is the lead supervisor, AG is the cosupervisor, JC and MT-dG are coresearchers. ET drafted the initial protocol manuscript with lead and cosupervisors providing guidance on methodological decisions and proposed analyses. All authors have contributed subject-specific expertise. ET will recruit participants into the study. All authors will contribute to data interpretation, conclusions and dissemination. All authors have read, contributed to and agreed to the final manuscript. DF is the guarantor of the study.

**Funding** This study will be conducted as part of a Post Graduate Research project through the University of Birmingham, UK and as such received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Not required.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

### ORCID iDs

Erik Thoomes <http://orcid.org/0000-0001-6375-2267>

Marloes Thoomes-de Graaf <http://orcid.org/0000-0002-2865-5389>

Alessio Gallina <http://orcid.org/0000-0003-1945-5518>

Deborah Falla <http://orcid.org/0000-0003-1689-6190>

## REFERENCES

- 1 Kuijper B, Tans JTJ, Schimsheimer RJ, *et al.* Degenerative cervical radiculopathy: diagnosis and conservative treatment. A review. *Eur J Neurol* 2009;16:15–20.
- 2 Thoomes EJ, Scholten-Peeters GGM, de Boer AJ, *et al.* Lack of uniform diagnostic criteria for cervical radiculopathy in conservative intervention studies: a systematic review. *Eur Spine J* 2012;21:1459–70.
- 3 Radhakrishnan K, Litchy WJ, O'Fallon WM, *et al.* Epidemiology of cervical radiculopathy. A population-based study from Rochester, Minnesota, 1976 through 1990. *Brain* 1994;117:325–35.
- 4 Salemi G, Savettieri G, Meneghini F, *et al.* Prevalence of cervical spondylotic radiculopathy: a door-to-door survey in a Sicilian municipality. *Acta Neurol Scand* 1996;93:184–8.

- 5 van Geest S, Kuijper B, Oterdoom M, *et al.* CASINO: surgical or nonsurgical treatment for cervical radiculopathy, a randomised controlled trial. *BMC Musculoskelet Disord* 2014;15:129.
- 6 Wong JJ, Côté P, Quesnele JJ, *et al.* The course and prognostic factors of symptomatic cervical disc herniation with radiculopathy: a systematic review of the literature. *Spine J* 2014;14:1781–9.
- 7 Bono CM, Ghiselli G, Gilbert TJ, *et al.* An evidence-based clinical guideline for the diagnosis and treatment of cervical radiculopathy from degenerative disorders. *Spine J* 2011;11:64–72.
- 8 Salt E, Wright C, Kelly S, *et al.* A systematic literature review on the effectiveness of non-invasive therapy for cervicobrachial pain. *Man Ther* 2011;16:53–65.
- 9 Thoomes EJ, Scholten-Peeters W, Koes B, *et al.* The effectiveness of conservative treatment for patients with cervical radiculopathy: a systematic review. *Clin J Pain* 2013;29:1073–86.
- 10 Nikolaidis I, Fouyas IP, Sandercock PAG, *et al.* Surgery for cervical radiculopathy or myelopathy. *Cochrane Database Syst Rev* 2010;24:Cd001466.
- 11 van Middelkoop M, Rubinstein SM, Ostelo R, *et al.* Surgery versus conservative care for neck pain: a systematic review. *Eur Spine J* 2013;22:87–95.
- 12 Bier JD, Scholten-Peeters WGM, Staal JB, *et al.* Clinical practice guideline for physical therapy assessment and treatment in patients with nonspecific neck pain. *Phys Ther* 2018;98:162–71.
- 13 Blanpied PR, Gross AR, Elliott JM, *et al.* Neck pain: revision 2017. *J Orthop Sports Phys Ther* 2017;47:A1–83.
- 14 Kjaer P, Kongsted A, Hartvigsen J, *et al.* National clinical guidelines for non-surgical treatment of patients with recent onset neck pain or cervical radiculopathy. *European Spine Journal* 2017;26:2242–57.
- 15 Lin I, Wiles L, Waller R, *et al.* What does best practice care for musculoskeletal pain look like? eleven consistent recommendations from high-quality clinical practice guidelines: systematic review. *Br J Sports Med* 2020;54:79–86.
- 16 Chou R, Côté P, Randhawa K, *et al.* The global spine care initiative: applying evidence-based guidelines on the non-invasive management of back and neck pain to low- and middle-income communities. *Eur Spine J* 2018;27:851–60.
- 17 Hannan EL. Randomized clinical trials and observational studies. *JACC Cardiovasc Interv* 2008;1:211–7.
- 18 Shadish WR, Clark MH, Steiner PM. Can nonrandomized experiments yield accurate answers? A randomized experiment comparing random and nonrandom assignments. *J Am Stat Assoc* 2008;103:1334–44.
- 19 Williams BA. Perils of evidence-based medicine. *Perspect Biol Med* 2010;53:106–20.
- 20 Sibbald B, Roland M. Understanding controlled trials. why are randomised controlled trials important? *BMJ* 1998;316:201.
- 21 Alentado VJ, Lubelski D, Steinmetz MP, *et al.* Optimal duration of conservative management prior to surgery for cervical and lumbar radiculopathy: a literature review. *Global Spine J* 2014;4:279–86.
- 22 Meadows JR, Finnoff JT. Lower extremity nerve entrapments in athletes. *Curr Sports Med Rep* 2014;13:299–306.
- 23 Thoomes EJ. Effectiveness of manual therapy for cervical radiculopathy, a review. *Chiropr Man Therap* 2016;24:45.
- 24 Dalkey N, Helmer O. An experimental application of the Delphi method to the use of experts. *Manage Sci* 1963;9:458–67.
- 25 Jünger S, Payne SA, Brine J, *et al.* Guidance on conducting and reporting Delphi studies (CREDES) in palliative care: recommendations based on a methodological systematic review. *Palliat Med* 2017;31:684–706.
- 26 Keeney S, Hasson F, McKenna H. Consulting the oracle: ten lessons from using the Delphi technique in nursing research. *J Adv Nurs* 2006;53:205–12.
- 27 Gill FJ, Leslie GD, Grech C, *et al.* Using a web-based survey tool to undertake a Delphi study: application for nurse education research. *Nurse Educ Today* 2013;33:1322–8.
- 28 McKenna HP. The Delphi technique: a worthwhile research approach for nursing? *J Adv Nurs* 1994;19:1221–5.
- 29 Mistry J, Falla D, Noblet T, *et al.* Clinical indicators to identify neuropathic pain in low back-related leg pain: protocol for a modified Delphi study. *BMJ Open* 2020;10:e033547.
- 30 Rushton AB, Fawkes CA, Carnes D, *et al.* A modified Delphi consensus study to identify UK osteopathic profession research priorities. *Man Ther* 2014;19:445–52.
- 31 Wiangkham T, Duda J, Haque MS, *et al.* Development of an active behavioural physiotherapy intervention (ABPI) for acute whiplash-associated disorder (WAD) II management: a modified Delphi study. *BMJ Open* 2016;6:e011764.
- 32 Zambaldi M, Beasley I, Rushton A. Return to play criteria after hamstring muscle injury in professional football: a Delphi consensus study. *Br J Sports Med* 2017;51:1221–6.
- 33 Helms C, Gardner A, McInnes E. The use of advanced web-based survey design in Delphi research. *J Adv Nurs* 2017;73:3168–77.
- 34 Armstrong D, Marshall JK, Chiba N, *et al.* Canadian Consensus Conference on the management of gastroesophageal reflux disease in adults - update 2004. *Can J Gastroenterol* 2005;19:15–35.
- 35 Akins RB, Tolson H, Cole BR. Stability of response characteristics of a Delphi panel: application of bootstrap data expansion. *BMC Med Res Methodol* 2005;5:37.
- 36 Kjaer P, Kongsted A, Hartvigsen J, *et al.* National clinical guidelines for non-surgical treatment of patients with recent onset neck pain or cervical radiculopathy. *Eur Spine J* 2017;26:2242–57.
- 37 Côté P, Wong JJ, Sutton D, *et al.* Management of neck pain and associated disorders: a clinical practice guideline from the Ontario protocol for traffic injury management (optima) collaboration. *Eur Spine J* 2016;25:2000–22.
- 38 Jairath N, Weinstein J. The Delphi methodology (Part one): a useful administrative approach. *Can J Nurs Adm* 1994;7:29–42.
- 39 De Vet HC, Terwee CB, Mokkink LB. Measurement in medicine: a practical guide: Cambridge university press 2011.
- 40 Merskey HE. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms. *Pain* 1986;3:226–26.
- 41 IASP. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms: IASP press 1994.
- 42 van Tulder MW, Koes BW, Bouter LM. Conservative treatment of acute and chronic nonspecific low back pain. A systematic review of randomized controlled trials of the most common interventions. *Spine* 1997;22:2128–56.
- 43 Norman G, scales L. Likert scales, levels of measurement and the "laws" of statistics. *Adv Health Sci Educ Theory Pract* 2010;15:625–32.
- 44 Allen IE, Seaman CA. Likert scales and data analyses. *Quality progress* 2007;40:64–5.
- 45 Rayens MK, Hahn EJ. Building consensus using the policy Delphi method. *Policy Polit Nurs Pract* 2000;1:308–15.