Examination of the neck when a patient complains of shoulder pain: a global survey of current practice (2019).

Abstract

Background: Shoulder pain is a common musculoskeletal problem. Despite this, much uncertainty still exists regarding diagnosis, prognosis and effectiveness of treatments. One diagnostic challenge is the determination of the role of the neck when a patient complains of shoulder pain. The aim of this survey was to investigate health-care professionals' indications for examining the neck in this case and subsequent methods used.

Methods: An online survey was developed and distributed via Twitter and the authors' professional networks. Responses were collected over a four-week period in 2019.

Results: A total of 918 respondents replied; 804 completed the full survey. The majority were physiotherapists. Over 80% would examine the neck of patients presenting with shoulder pain. The most commonly used method was neck active range of movement testing (n = 822/95.3%), followed by neurological examination (n = 713/78.1%). Less commonly used tests were neck resistance testing, palpation of the neck and Spurling's test. Fewer numbers (n = 176/22%) resorted to using diagnostic tests such as imaging.

Conclusions:

This survey provides some insight as to how healthcare practitioners examine the neck when a patient complains of shoulder pain. Most would examine on the basis of antero-lateral shoulder pain, using variable combinations of movement, resistance, neurological and palpation/other testing. A minority would perform any form of diagnostics or imaging.

The results of the survey highlight that practice in this area is mixed, which may be due to uncertainty regarding optimal methods. This highlights the need for further work to better understand this clinical dilemma.

Keywords:

Shoulder

Neck

Examination

Survey

1. Introduction

Shoulder pain is a common musculoskeletal pain presentation with a prevalence estimated between 7 and 27% at any one time (Luime et al., 2004) (Harkness, Macfarlane, Nahit, Silman, & McBeth, 2003; Kuye, Jain, Warner, Herndon, & Warner, 2012; Marks, Comans, Bisset, & Scuffham, 2016; Van Der Windt et al., 1996). Despite considerable research, much uncertainty still exists with regards to diagnosis, prognosis and effectiveness of treatments for shoulder pain (Lewis et al., 2009; Littlewood, Malliaras, et al., 2013; Van Der Windt et al., 1996).

One diagnostic challenge is the determination of the role of the neck when a patient complains of shoulder pain. There are clinical situations (e.g. cervical radiculopathy or radicular pain) where this might be more apparent(Cannon, Dillingham, Miao, Andary, & Pezzin, 2007; Lauder, 2002; Polston, 2007) but the clinician must also consider the potential of the neck's influence in more equivocal presentations, such as somatic referred pain. In these instances of shoulder pain, the assessment of the neck can become ever-more challenging. The overall consequence is that despite recommendations for the assessment of the neck in patients presenting with shoulder pain(Kulkarni et al., 2015), clear guidance supported by higher levels of evidence is not available(Rubinstein, Pool, Van Tulder, Riphagen, & De Vet, 2007; Thoomes et al., 2017). A recent systematic review of randomised controlled trials used to inform practice on sub-acromial shoulder pain found that either no or minimal attempts were made to screen the neck (26% of the included studies), and in 48%, symptoms were the predominant guide to indicate involvement of the neck (Walker, Salt, Lynch, & Littlewood, 2018). The effect of the absence of an examination of the neck when a patient complains of shoulder pain is to be determined, but one concern is that it risks sub-optimal outcomes for patients if treatment is mis-directed. An additional concern is the risk of incorrect conclusions drawn from research studies on patients with shoulder pain.

The aim of this survey was to expand on the previous systematic review(Walker et al., 2018) and to investigate more closely the methods used by a range of health-care professionals (HCPs) when examining the neck with a patient presenting with shoulder pain. It is anticipated that this will help develop a better understanding in this clinically important but under-researched area.

2. Methods

2.1 Study design

A multiple-choice online survey was developed by the authors to ascertain the indications for neck assessment and subsequent methods utilised by a range of HCPs when examining the neck of a patient who complains of shoulder pain.

A clinical scenario (See Table 1) was used to describe a typical presentation of a patient who complains of shoulder pain(Bury & Littlewood, 2018). From this, survey responses were collected. The use of such clinical scenarios has been shown to be a valid tool for eliciting information on clinical practice (Peabody, Luck, Glassman, Dresselhaus, & Lee, 2000).This shoulder pain presentation was used as it is representative of the most common shoulder pain presentation, sub-acromial shoulder pain (increasingly known as rotator-cuff related shoulder pain(Littlewood et al., 2019))(Littlewood, May, & Walters, 2013). However, the shoulder pain presentation itself was not

the primary issue under examination and therefore a diagnostic label was not given; the focus was on the indications for, and methods of, neck examination.

Table 1: clinical scenario
A thirty-nine year-old lawyer presents with a 3-month history of antero-lateral shoulder pain which developed during a 2 week rock-climbing holiday. Her symptoms are intermittent, and are exacerbated by movements above shoulder height (such as her main hobby of rock-climbing) and lying on the painful side. They are eased by rest and over-the-counter analgesia. On examination, observation is unremarkable. She has full range-of-movement in the shoulder, but pain beyond 70 degrees of shoulder flexion and abduction. She has no loss in passive range-of-movement. Strength is largely maintained, but resisted movements are painful. She is otherwise systemically well, with no significant medical history.

The survey consisted of fifteen questions and was broadly divided into the following sections:

Respondent demographics (Questions 1-5), clinical scenario and indications to assess the neck (Questions 6-7), range-of-movement testing (Questions 8-10), resistance testing (Questions 11-12), neurological testing (Question 13) and further testing and diagnostics (Questions 14-15). The answers received were largely quantitative in response to multiple-choice questions. Respondents did not necessarily have to answer all questions, with subsequent questions dependent on previous answers.

The survey was initially trialled within the group of authors. An amended version was piloted subsequently by eight clinicians in two of the authors' (XX, XX) place of work. The suggestions (which included minor changes to wording and survey structure) from both these processes informed the final version.

2.2 Dissemination and data analysis

Ethical approval to conduct this research was granted by the New Zealand Ethics Committee (http://www.nzethics.com/). The survey was presented via the Survey Monkey platform, with respondents invited to complete the survey via Twitter and the authors' professional networks via e-mail. Approximate time for completion was five minutes. The survey was available for a one-month period spanning 4th March to 1st April 2019. This is consistent with previous surveys of this type (Bury & Littlewood, 2018)

Informed consent was implied through the following statement at the start of the survey;

"By continuing, you consent for your responses to be used. Your responses will be anonymous (unless you wish to submit your contact details at the end of the survey) and your details will not be accessible. Ethical approval has been granted by the New Zealand Ethics Committee."

Data were analysed using descriptive statistics created by SurveyMonkey and downloaded into Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

2.3 Inclusion criteria

The inclusion criteria were HCPs who self-reported experience in assessing shoulder pain.

3. Results

3.1 Survey response

A total of 918 participants responded to the survey. Eight hundred and four respondents completed the survey in its entirety 87.6%), and six respondents failed to meet the inclusion criteria of prior experience of assessing patients with shoulder pain and were excluded from further participation in the survey.

3.2 *Clinical Background*

The majority of respondents to the survey were physiotherapists (physical therapists) (n = 812/92.5%). The other clinical backgrounds represented in the survey included sports therapists n = 48/(5.4%), sports and exercise medics (n = 37/4.2%), musculoskeletal physicians (n = 21/2.4%), osteopaths (n = 13/1.5%), chiropractors (n = 11/1.3%), general practitioners (n = 7/0.8%) and orthopaedic surgery (n = 6/0.7%). Fifteen respondents (n= 15/1.7%) selected 'Other'.

3.3 Years since qualification

HCPs who qualified more than fifteen years ago represented the greatest proportion (n = 333/37.9%). Those who qualified 0-2 years ago represented a smaller proportion (n = 107/12.2%), as did those who qualified 3-5 years ago (n = 117/13.3%), those who qualified 6-10 years ago (n = 167/19.0%) and those who qualified 11-15 years ago (n = 154/17.5%).

3.4 Special interest

There was a good balance between respondents who considered themselves to have a special interest in the shoulder (n = 432/49.2%) compared to those that did not (n = 446/50.8%).

3.5 Country of practice

The United Kingdom represented the largest population of respondents (46.8%). The next largest populations of respondents were from the United States of America (10.9%), Australia (7.6%) and New Zealand (5.0%).

Eight hundred and seventy-eight respondents answered all demographic questions (95.6%).

Table 2 describes the demographic details of the participants.

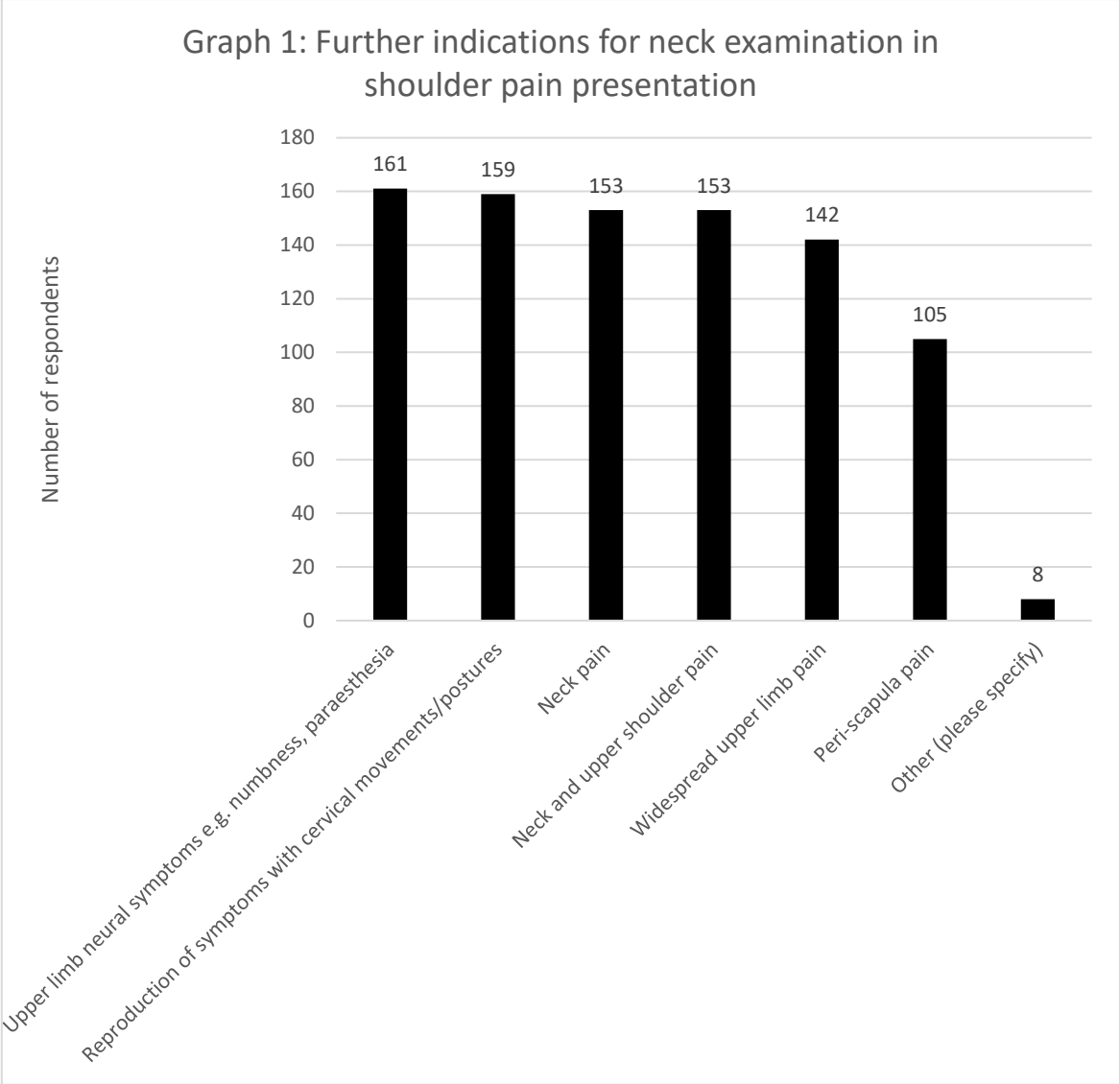
Table 2: demographic details of the participants	**Number of respondents**
Do you have experience of assessing patients with shoulder pain?	
Yes	912 (99.4%)
No	6 (0.6%)
What is your clinical background?	
Physiotherapist	812 (92.5%)
Sports Therapist	48 (5.5%)
Sports and Exercise Medicine	37 (4.2%)
Musculoskeletal Physician	21 (2.4%)
Osteopath	13 (1.5%)
Chiropractor	11 (1.3%)
General Practitioner	7 (0.8%)
Orthopaedic Surgery	6 (0.7%)
Other (please specify)	15 (1.7%)
Years since qualification?	
0-2	107 (12.2%)
3-5	117 (13.3%)
6-10	167 (19.0%)
11-15	154 (17.5%)
>15	333 (37.9%)
Do you consider yourself to have a special interest in the shoulder?	
Yes	432 (49.2%)
No	446 (50.8%)

3.6 Examination of the neck based on the initial clinical scenario

A significant proportion of respondents (n = 713/81.2%) would examine the neck based on the clinical scenario (see Table 1) versus those that would not (n = 165/18.8%)

3.7 Further indications to examine the neck

Of the respondents (n = 165/23.1%) who would not assess the neck based on shoulder pain alone, respondents would consider the following as further indications to examine the neck based on the scenario (Table 1); neck pain (n = 153/93.9%), neck and upper shoulder pain (n = 153/93.9%), widespread upper limb pain (n = 142/87.1%), upper limb neural symptoms (n = 161/98.8%) and reproduction of symptoms with cervical movements/postures (n = 159/97.6%). Less respondents would consider peri-scapula pain an indication to examine the neck (n = 105/64.4%) (Graph 2). Eight respondents (4.9%) selected 'Other'.



3.8 Range of movement testing

Please refer to graph 2 for examination of the neck, including methods used and interpretation of findings.

3.8.1 Examination of neck range-of-movement

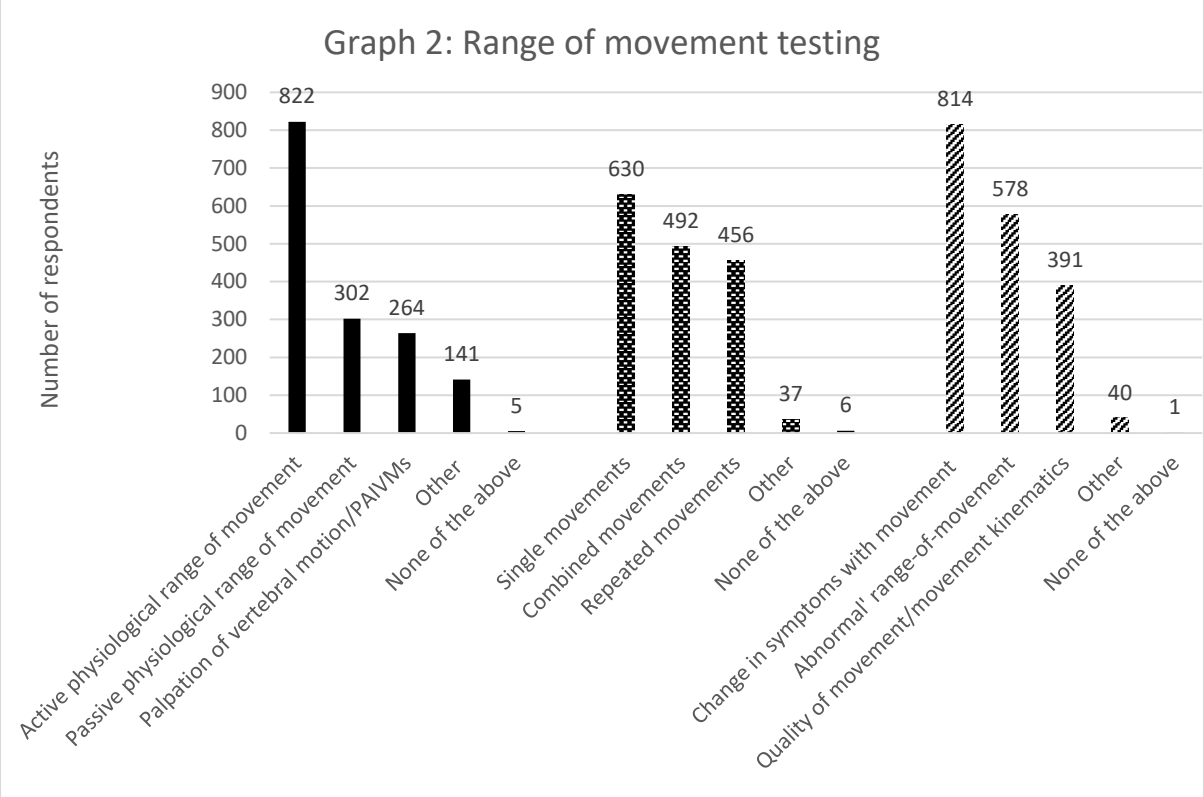
Eight hundred and sixty-three respondents (94.0%) answered the question relating to neck range-of-movement. The majority of respondents would perform active physiological range of movement testing (n = 822/95.3%), with smaller proportions performing passive physiological range of movement testing (n = 302/35.0%) and palpation of vertebral motion/vertebral accessory movements (PIVMs) (n = 264/30.6%). One hundred and forty-one respondents (16.3%) selected 'Other'; these included methods such as over-pressure and re-testing of the shoulder following neck examination, however the majority of comments described methods presented later in the survey.

3.8.2 Range-of-movement examination methods

Eight hundred and fifty-one respondents (92.7%) answered this question. Of those who would perform neck range-of-movement (ROM) testing, a majority would perform single movements (n = 630/74.0%). Over half stated they would perform repeated movements (n = 492/53.6%) and over half would perform combined movements (n = 492/57.8%). Thirty-seven respondents (4.4%) selected 'Other'.

3.8.3 Interpretation of findings in neck ROM testing

Of the eight hundred and thirty-four respondents (90.8%) who answered this question, a large majority would consider a change in a patients' symptoms a significant finding (n = 814/97.6%). 'Abnormal' range-of-movement (i.e. increased/decreased) was considered significant by over two-thirds (n = 578/69.3%) and 'Quality of movement/movement kinematics' was considered significant by nearly half (n = 391/46.9%). Forty respondents (4.8%) selected 'Other'.



3.9 Resistance testing

Please refer to graph 3 for resistance testing of the neck, including methods used and interpretation of findings.

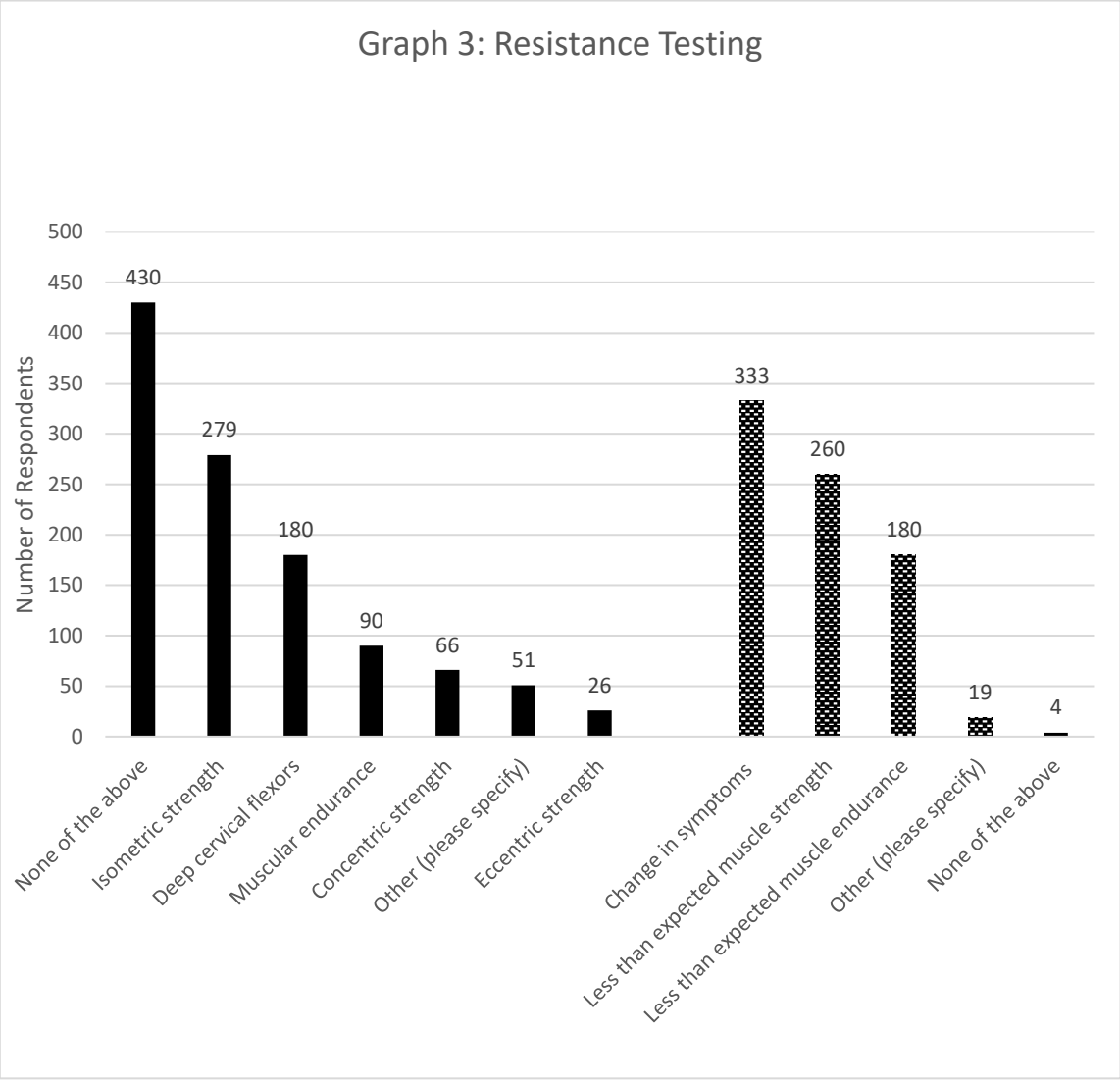
3.9.1 Resistance testing of the neck

Just under half of respondents informed that they would perform resistance testing of the neck (48.8%). Of those who would perform resistance testing of the neck, the testing of the following would be performed; concentric strength (n = 66/7.9%), isometric strength (n = 279/33.2%),

eccentric strength (n = 26 /3.1%), muscular endurance (n = 90/10.7%) and deep cervical flexors (n = 180/21.4%) and 'other' (n = 51/6.1%).

3.9.2 Interpretation of findings in resistance testing of the neck

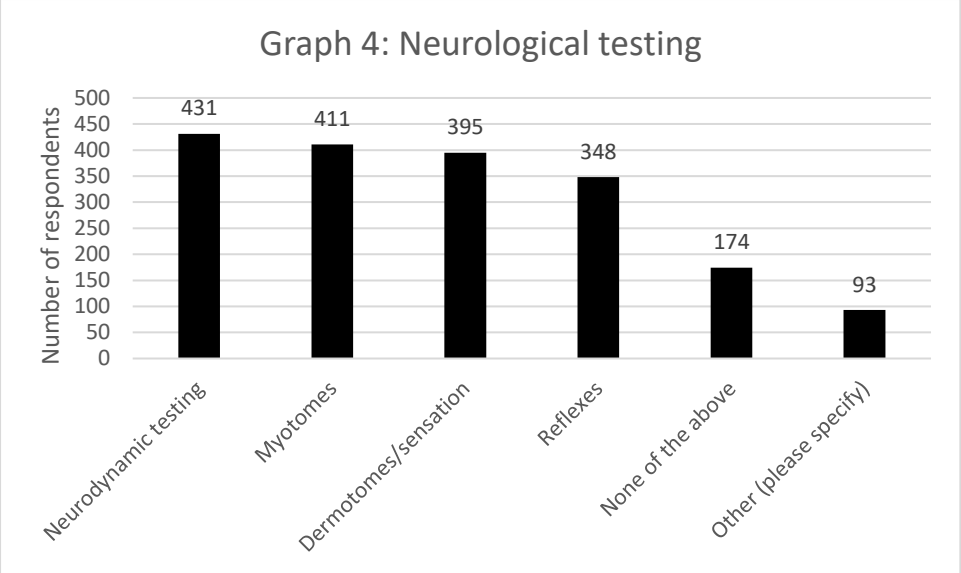
Of four hundred and four respondents (44.0%), the majority (n = 333/82.4%) considered a change in symptoms (increased/decreased pain/paraesthesia) as clinically relevant finding. Lesser numbers considered less than expected muscle strength (n =260/64.4%) and less than expected muscle endurance (n = 180/44.6%) to be of significance. A small number of respondents selected 'other' (n = 19/4.7%) or considered none of the available options to be of significance (n =4/1.0%).



3.10 Neurological testing

Seven hundred and ninety-nine respondents (87.0%) answered this question. Nearly four-fifths of respondents would perform neurological testing (n = 713/78.1%) versus those that would not (n = 174/21.9%). The following methods would be used; dermotomal/sensory testing (n = 395/49.4%),

myotomal testing (n = 411/51.4%), reflexes (n = 348/43.6%), neurodynamic testing (n = 431/53.9%) and 'other' (n = 93/11.6%) (Graph 5).



3.11 Further testing and diagnostics

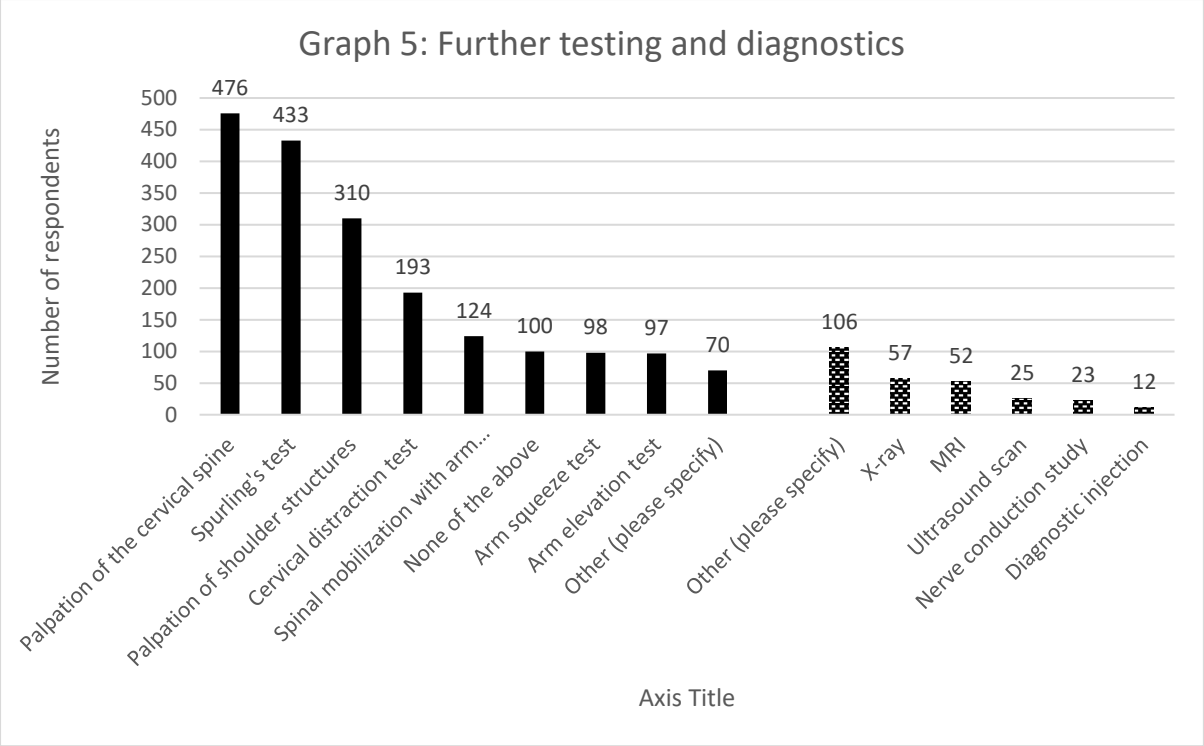
Please refer to graph 5 for further testing and diagnostics of the neck and other structures.

3.11.1 Further testing

Seven hundred and ninety-nine respondents answered this question (87.0%). Respondents would also use a variety of other tests in assessing the neck, including Spurling's test (n = 433/54.2%), palpation of the neck (n = 476/59.6%) and shoulder structures (n = 310/38.8%), the arm squeeze test (n = 98/12.3%), the cervical distraction test (n = 193/24.2%), the arm elevation test (n = 97/12.1%), the spinal mobilization with arm movement test (n = 124/15.5%), or 'other' (n =70/8.8%). A proportion of respondents would perform no further testing (n = 100/12.5%).

3.11.2 Diagnostics

Seven hundred and ninety-nine respondents answered this question (87.0%). The majority of respondents would not perform any further diagnostic testing (n = 623/78.0%). Of those that would, the responses included diagnostic injection (n = 12/1.5%), X-ray (n = 57, 7.1%), MRI (n =52/6.5%), ultrasound scan (n = 25/3.1%), nerve conduction study (n = 23/2.9%) or 'other' (n = 106/13.3%).



4. Discussion:

4.1 Summary of findings

This survey describes the rationale and methods used by a variety of HCPs to assess the neck when a patient complains of shoulder pain. This survey found that in a substantial majority of respondents, antero-lateral shoulder pain with movement alone would be considered sufficient indication to examine the neck. Nearly all respondents would use range-of-movement testing in examination of the neck and less than half would perform neck resistance testing. A change in patient symptoms with movement or resistance testing of the neck would be considered significant by the majority of respondents. Variation of 'expected' response with respect to movement and resistance testing was also considered significant by just under half to two-thirds of respondents. Nearly eighty percent of respondents would perform neurological testing, and a substantial proportion of respondents would perform further testing, with palpation of the neck and Spurling's test the most popular options. Only 22.0% would perform any form of diagnostics or imaging.

The majority of respondents (81.2%) reported that they would physically examine the neck given the clinical scenario outlined, i.e. antero-lateral shoulder pain only. This contrasts with earlier work performed by the authors(Walker et al., 2018) which found that a significant proportion (73.5%) of RCTs of physiotherapeutic interventions in sub-acromial shoulder pain reported no or relatively minimal attempts (patient reported symptoms) to screen the neck in such patients. It could be considered encouraging that the results of the survey are more in keeping with guidance on assessment of patients with shoulder pain (Kulkarni et al., 2015). However, as stated at the outset, the importance of assessment of the neck in shoulder pain is not fully understood.

A minority of respondents (18.8%) required further signs and symptoms to examine the neck, with high numbers (>90%) reporting neck +/- upper shoulder pain, upper limb neural symptoms and reproduction of symptoms with neck movements/postures as indications to examine. Slightly lower numbers (87.1%) would consider widespread upper limb pain an indication, and nearly two-thirds (64.4%) would assess the neck in the incidence of peri-scapula pain. It is not understood why over a third of respondents would not consider this latter symptom an indication to examine the neck, as it's potential to refer into this area has long been recognised(Cloward, 1959)

The results demonstrate ROM testing as the most common method of neck assessment used by respondents, with active physiological ROM testing being performed by 95.3%. Whilst the results indicate that 74.0% of clinicians would only use a single movement in examining the neck, and around half would use combined (57.8%) or repeated movements (53.6%), the format of the survey has some limitations in capturing the nuance of clinical practice. Therefore, one extreme is that around half of respondents do both and half do neither, the other extreme is that half of respondents use one method only, and half use the other method exclusively. The results may also indicate that if the patient had a full apparent cervical range of movement with no effect on the shoulder symptoms, the clinician may deem this sufficient to exclude the role of the neck. Future research could look at indications for clinicians assessing single movement testing versus repeated or combined movement testing. Whilst performing ROM testing, a change in symptoms with movement was considered by the majority of respondents (97.6%) as significant. "'Abnormal' range-of-movement (i.e. increased/decreased)" was considered significant by 69.3% and "Quality of movement/movement kinematics" was considered significant by 46.9%. However, the significance of such examination findings must be questioned, given previous research demonstrating variable reliability of such range and movement quality assessments(Burns, Cleland, Carpenter, & Mintken, 2016; May, Chance-Larsen, Littlewood, Lomas, & Saad, 2010).

Resisted testing of the neck contrasts against ROM testing, which would be performed by less than half of the respondents (48.8%). The rationale for this is not understood. This is perhaps illustrative of differences in examination of the neck versus peripheral joints such as the shoulder, where resistance testing would be commonplace (Bury & Littlewood, 2018; Littlewood, Malliaras, Mawson, May, & Walters, 2014). "Less than expected muscle strength" considered significant by 64.4% and "Less than expected muscle endurance" considered significant by 44.6%, raises similar issues to those previously highlighted regarding examining the qualities of ROM; namely that the literature does not support the reliability of resisted muscle testing performed by the clinician in the absence of methods such as dynamometry or isokinetic testing(Burns et al., 2016; Land & Gordon, 2011; May et al., 2010).

It is of interest that a relatively large number of respondents (78.2%) would perform neurological testing based on the clinical scenario. This suggests a significant majority would perform this examination in the presence of anterior-lateral shoulder pain only, and the absence of both symptoms more typical of 'neurological' presentation, (e.g. numbness, paraesthesia), or more widespread pain distribution. It is not known if this reflects a 'blanket' approach to assessment, which potentially raises questions on clinical reasoning, or is a reflection of the inherent issues in survey design and an unspoken pressure on a clinician to appear thorough. This illustrates the needs for further qualitative work in this area. Additionally, the validity of such examination methods has also been called in to question(Thoomes et al., 2017)

A substantial proportion of respondents would perform further testing, with palpation of the neck and Spurling's test the most popular options, at 59.6% and 54.2% respectively. Again, the literature highlights issues with the diagnostic validity of these examination methods(Rubinstein et al., 2007; Siegenthaler, Eichenberger, Schmidlin, Arendt-Nielsen, & Curatolo, 2010; Thoomes et al., 2017). Whilst the systematic review of Thoomes et al (2017)(Thoomes et al., 2017) reported that when consistent with patient history, a combination of Spurling's test, axial distraction, and the arm squeeze test(Gumina, Carbone, Albino, Gurzi, & Postacchini, 2013)may have merit in the diagnosis of cervical radiculopathy, and four negative neurodynamic tests and negative arm squeeze test may be of use in ruling out the condition, they also highlight the limited evidence overall for the accuracy of physical examination tests in this diagnosis.

No further imaging or diagnostics would be performed by 78.0%. This may be due to a number of factors; clinical examination being deemed sufficient, access to imaging/diagnostics (perhaps representative of the fact that the majority of respondents are physiotherapists), concerns regarding radiation exposure or funding considerations(Remedios, France, & Alexander, 2017).

Overall, the results of the survey highlight that practice in this clinical area is mixed, which may be reflective of the fact that clear guidance from the literature is lacking. Clearly this highlights the need for further work to better understand the methods and perhaps more importantly, the significance, of this clinical dilemma.

4.2 Study strengths and limitations

Over nine hundred participants were recruited in this survey via social media and professional networks. Social media is a relatively new platform and the breadth of engagement in this is not fully known. Therefore, it is difficult to say how representative this is of wider practice. It is often assumed that those clinicians on social media are not representative of their wider profession but this is a view that is unproven. Given the vast number of clinicians using social media, it might be more plausible to reflect those who actively engage in discussion and debate via social media might not be representative of their wider profession. But as this survey did not require such active engagement, critique of the lack of representativeness is open to question, especially given the large number of respondents.

As highlighted in the discussion above, the format of the survey has inherent limitations in capturing the nuance of clinical practice. This highlights the need for further qualitative research in this area.

A final limitation is that the respondents were largely physiotherapists, and so inferences in terms of practitioners in other clinical roles are less robust.

5. Conclusion:

This survey describes the rationale and methods used by a variety of HCPs to assess the neck when a patient complains of shoulder pain. Most would examine on the basis of only antero-lateral shoulder pain, using variable combinations of tests of movement, resistance, neurology and palpation/other tests. A minority would seek diagnostic imaging as part of their assessment.

As stated, the importance of neck examination in shoulder pain presentations is not fully understood. The survey responses raise a number of potential issues with clinical examination

methods used including the significance attached to clinical testing of 'expected' kinematics and resistance testing, and the rationale for neurological examination.

Overall, the results of the survey highlight that practice in this clinical area is mixed, which may be reflective of the fact that clear guidance from the literature is lacking. The survey format has some inherent limitations, which whilst providing a valuable 'broad-brush' idea of clinical practice, does not extract the intricacies of clinical reasoning. Clearly this highlights the need for further work to better understand the methods and perhaps more importantly, the significance, of this clinical dilemma.

Conflicts of interest

None declared

Ethical approval

Ethical approval to conduct this research was granted by the New Zealand Ethics Committee (http://www.nzethics.com/).

Funding

Thanks to the North East Musculoskeletal Society (NEMS) who provided funding for this project.

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