






# BMJ Open How do people perceive different labels for rotator cuff disease? A content analysis of data collected in a randomised controlled experiment

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## ABSTRACT

**Objectives** Explore how people perceive different labels for rotator cuff disease in terms of words or feelings evoked by the label and treatments they feel are needed.

**Setting** We performed a content analysis of qualitative data collected in a six-arm, online randomised controlled experiment.

**Participants** 1308 people with and without shoulder pain read a vignette describing a patient with rotator cuff disease and were randomised to one of six labels: *subacromial impingement syndrome*, *rotator cuff tear*, *bursitis*, *rotator-cuff-related shoulder pain*, *shoulder sprain* and *episode of shoulder pain*.

**Primary and secondary outcomes** Participants answered two questions (free-text response) about: (1) words or feelings evoked by the label; (2) what treatments they feel are needed. Two researchers iteratively developed coding frameworks to analyse responses.

**Results** 1308/1626 (80%) complete responses for each question were analysed. Psychological distress (21%), uncertainty (22%), serious condition (15%) and poor prognosis (9%) were most often expressed by those labelled with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear*, psychological distress (13%), serious condition (9%) and poor prognosis (8%) were relatively common, while minor issue was expressed least often compared with the other labels (5%). Treatment/investigation and surgery were common among those labelled with a *rotator cuff tear* (11% and 19%, respectively) and *subacromial impingement syndrome* (9% and 10%) compared with *bursitis* (7% and 5%).

**Conclusions** Words or feelings evoked by certain labels for rotator cuff disease and perceived treatment needs may explain why some labels drive management preferences towards surgery and imaging more than others.

## INTRODUCTION

Shoulder pain is the third most common musculoskeletal condition seen in primary care.<sup>1</sup> The 1-year and lifetime prevalence of shoulder pain ranges from 5% to 47% and 7% to 67%, respectively.<sup>2</sup> Rotator cuff disease, an

## Strengths and limitations of the study

- Our study used a large sample size and a highly reliable coding frameworks ( $k=0.90-0.97$  across labelling groups for both questions).
- The online experiment which provided data for this study used randomisation and allocation concealment.
- Since this is an online experiment, people's feelings towards different labels and what treatments they feel are needed might be different in a real-life clinical encounter.
- Other labels not investigated in this study (eg, rotator cuff disease, painful arc syndrome) may have provoked different words or feelings and perceived treatment needs.
- We only focused on the feelings and needs of patients and the public, whereas clinician-related factors (eg, beliefs, bias) might be a stronger driver of management choices in real-life

umbrella term that encompasses conditions relating to the rotator cuff and surrounding structures (including rotator cuff tendinopathy and tears, calcific tendinitis and subacromial bursitis) accounts for 85% of cases of shoulder pain.<sup>3</sup> Other causes of shoulder pain include adhesive capsulitis, glenohumeral osteoarthritis, fracture, dislocation and instability, malignancy and referred pain from visceral causes.<sup>4</sup>

Neither clinical features nor diagnostic imaging can reliably pinpoint a specific nociceptive cause of rotator cuff disease from the numerous candidate pain-sensitive structures in the shoulder (eg, tendon, bursa).<sup>5-11</sup> Possibly as a result of such uncertainty, there are a plethora of diagnostic labels that have been used in both routine practice and research to indicate the same condition.<sup>12</sup> Some labels describe the clinical features (eg, painful arc syndrome), the

purported or observed pathology (eg, rotator cuff tear), or the presumed aetiology (eg, subacromial impingement syndrome).

Different labels for the same condition can influence people's management preferences, psychological outcomes and perceptions of condition severity.<sup>13</sup> For example, we recently conducted a large online randomised controlled experiment in people with and without shoulder pain (n=1308) to explore whether different labels for rotator cuff disease influence people's management preferences. People told they had a *rotator cuff tear* had higher perceived need for both surgery and imaging compared with those told they had *bursitis*, and those told they had *subacromial impingement syndrome* had higher perceived need for imaging compared with those told they had *bursitis*.<sup>14</sup>

Shoulder surgeries such as subacromial decompression and rotator cuff repair<sup>15–20</sup> are frequently performed for patients with rotator cuff disease,<sup>15–18</sup> but current evidence indicates these procedures are not superior to placebo or non-operative management.<sup>19–20</sup> Diagnostic imaging is also unnecessary for most patients with rotator cuff disease because it cannot reliably identify a specific nociceptive cause of rotator cuff disease, it does not inform management decisions, and can encourage use of surgery by identifying 'incidentalomas'.<sup>7–11</sup> Despite this, clinicians frequently order imaging.<sup>21–22</sup> Our trial identified labels for rotator cuff disease that reduce people's perceived need for shoulder surgery and imaging. These findings could be an important starting point for reducing unnecessary healthcare for shoulder pain.

As part of our online randomised controlled experiment,<sup>14</sup> we collected qualitative data that could help to uncover why preferences differed based on the diagnostic label people received. The aim of this study was to explore how people with and without shoulder pain in our online experiment perceived different labels for rotator cuff disease in terms of words or feelings evoked by the label and treatments they feel are needed.

## MATERIALS AND METHODS

### Study design

We performed a content analysis of qualitative data collected in a six-arm, online randomised controlled experiment in participants with and without shoulder pain.<sup>14</sup>

### Participants and recruitment

Participants aged 18–65 years old from Australia, New Zealand, USA, UK and Canada were recruited through Qualtrics (www.qualtrics.com) between April and June 2020. Qualtrics is a market research company that recruits using existing, nationally representative panels of individuals who have previously agreed to complete surveys. Qualtrics employs random sampling and provides incentives for participants to complete surveys (eg, cash, airline miles, gift cards). Details on the sampling and recruitment

procedures Qualtrics use are reported elsewhere.<sup>14–23</sup> Qualtrics recruited three groups of participants (evenly distributed) for our study: those who had never experienced shoulder pain, those who had shoulder pain at the time of participation and those who had previously experienced shoulder pain but were pain-free at the time of participation.

### Data collection

Participants provided data on demographics, and if applicable, healthcare utilisation and shoulder symptoms. This included data on age, gender, educational attainment, country of residence, employment status, private health insurance status, symptoms of anxiety and depression, history of shoulder pain, history of diagnostic imaging for shoulder pain (X-ray, ultrasound, MRI), history of injections for shoulder pain, history of shoulder surgery, history of sick leave due to shoulder pain, history of receiving a diagnosis for shoulder pain, duration of current shoulder pain and Shoulder Pain and Disability Index (SPADI) scores. Details on how these data were collected are reported elsewhere.<sup>14</sup>

Participants read a vignette describing a patient with rotator cuff disease and were randomised to one of six labels. Randomisation was not stratified by the three groups of participants with different experiences of shoulder pain. Each label was accompanied by a brief explanation of the label:

- ▶ 'Subacromial impingement syndrome. Subacromial impingement syndrome describes shoulder pain caused by compression of soft tissue (eg, tendons, bursa) from bony parts of the shoulder'.
- ▶ 'Rotator cuff tear. A rotator cuff tear is a tear in one of the shoulder tendons'.
- ▶ 'Bursitis. Bursitis is inflammation of a fluid-filled sac called a bursa in the shoulder'.
- ▶ 'Rotator-cuff-related shoulder pain. Rotator-cuff-related shoulder pain describes shoulder pain caused by an injury to one of the shoulder tendons'.
- ▶ 'Shoulder sprain. Shoulder sprain describes shoulder pain caused by a sprain of either muscles, ligaments and/or tendons that support the shoulder'.
- ▶ 'Episode of shoulder pain' (control label; no explanation provided).

In the vignette, the health professional described all labels as non-serious and likely to resolve over time (box 1).

Outcome data were collected immediately after participants were randomised to a label. In this paper, we focus on free-text responses to two questions:

1. When you hear the term (one of the six labels), what words or feelings does this make you think of? Please list.
2. What treatment(s) (if any) do you think a person with a (one of the six labels) needs? Please list.

### Data analysis

Free-text responses to the above questions were analysed using content analysis. Content analysis combines

## Box 1 Vignette

### You have shoulder pain

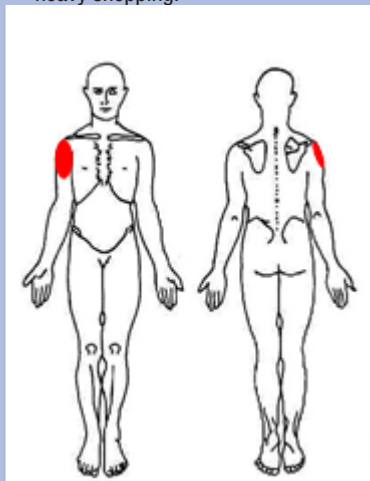
This next section describes a person with shoulder pain who goes to a healthcare provider.

We want you to put yourself into this scenario, and do your best to imagine that you are the person having this shoulder pain.

After reading it, you will be asked a number of questions. Please do your best to answer them based on this imagined scenario.

### Your shoulder pain

- ▶ Imagine you are suffering from pain in your right shoulder.
- ▶ It started 2 months ago.
- ▶ There was no specific incident/injury/trauma that caused your pain.
- ▶ You think the pain was triggered by reaching for a plate in a high cupboard, but you are not sure.
- ▶ You have no pain or other unusual sensations past your shoulder (eg, pins and needles, numbness).
- ▶ The pain is at the front, side and back of your right shoulder and right upper arm, as shown by the red circles on the picture of the body chart below.
- ▶ You find it hard to move your shoulder normally. In particular, you find it very hard to lift your right arm past horizontal ('eye level') and reach up to high cupboards.
- ▶ You cannot lie on your right side in bed as this increases your pain.
- ▶ You have used heat and over the counter pain relievers, and have been avoiding using your right shoulder to reach for objects or carry heavy shopping.



### You visit a healthcare provider (eg, general practitioner or physiotherapist)

Your healthcare provider asks you questions about your shoulder pain, and some health questions to rule out any worrying causes.

Your healthcare provider does a detailed physical examination. It involves:

- ▶ Looking at your shoulder.
- ▶ Checking if you can move your shoulder in certain directions, and whether this causes pain.
- ▶ Checking if they can move your shoulder in certain directions, and whether this causes pain.
- ▶ Checking if movement of your shoulder against resistance causes pain.

### After this, your healthcare provider tells you:

'You have (label)'

'I am not worried that there is anything serious going on here because your pain is not related to severe trauma. I am also not worried that

Continued

## Box 1 Continued

you have arthritis in your shoulder or a specific condition called frozen shoulder that causes severe pain and stiffness. Your pain should gradually improve over time by itself. It is recommended that you temporarily avoid activities that aggravate your pain and continue to use your arm so your shoulder does not stiffen up'.

This vignette was originally published in the *Journal of Orthopaedic & Sports Physical Therapy*.<sup>14</sup> They own the copyright to this material.

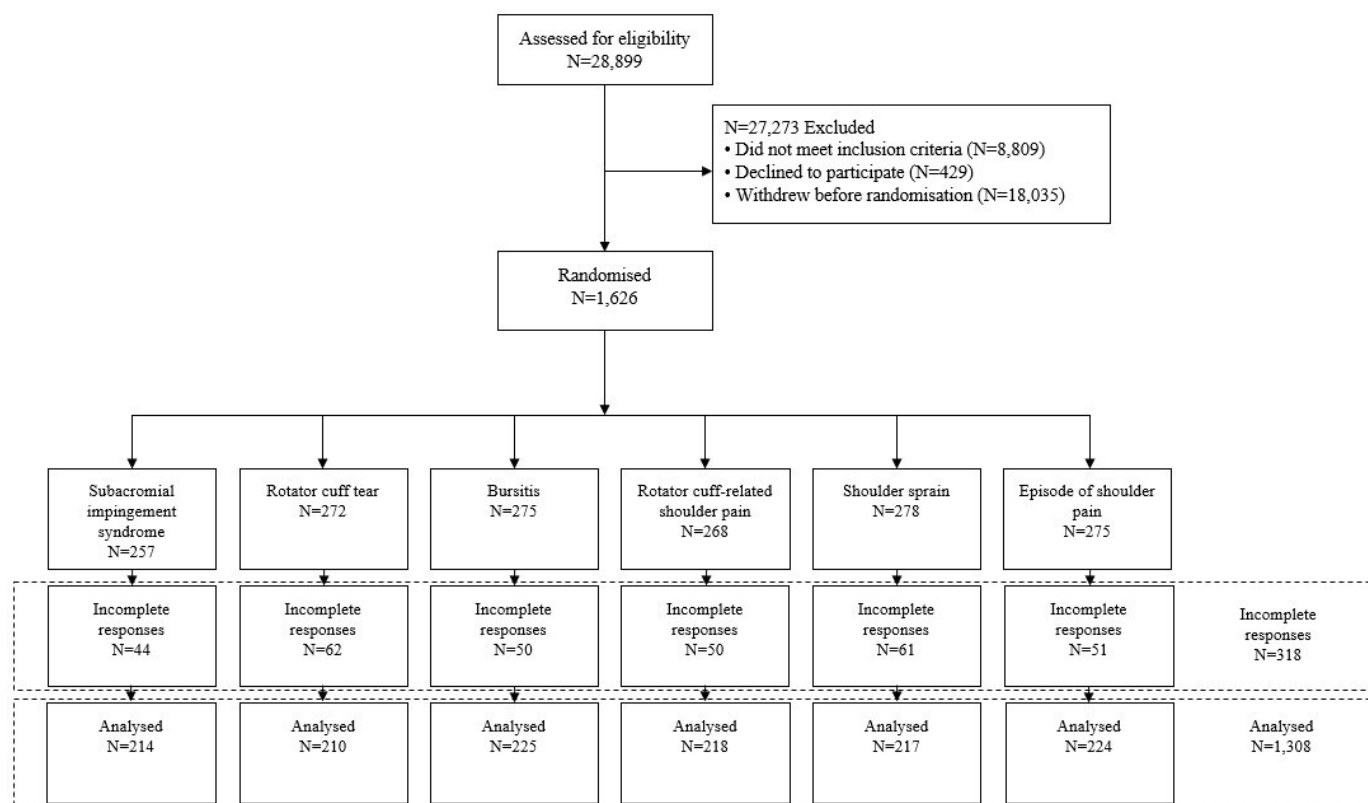
quantitative and qualitative research methods and is a well-accepted approach for analysing text data.<sup>24</sup> Content analysis allowed us to report the frequency of themes expressed in responses. Two researchers with experience in qualitative research and a physiotherapy background (JZ and ZAM) initially read through the responses to become familiar with their content. As such, the analysis represents the perspectives of physiotherapists currently working in research and with extensive experience managing patients with musculoskeletal pain. To develop the coding frameworks (one for each question), an inductive approach embedded in grounded theory was used. The two researchers independently coded 50 responses from each labelling group for both questions (~24% of all responses). The frameworks were then compared, discussed and harmonised into one framework for each question for the next stage of coding.

Once the frameworks had been developed, the two researchers independently applied the frameworks to a random sample of responses, ensuring at least 20% of responses from each labelling group were coded. Each response was allocated as many codes as appropriate; nine was the highest number of codes given to a single response. The development and use of the frameworks occurred between July and August 2020. Kappa statistics (k) and 95% CI and exact agreement (%) were calculated to assess the level of agreement between JZ and ZAM for coding responses to both questions. k values were interpreted as: <0.00='poor', 0.00–0.20='slight', 0.21–0.40='fair', 0.41–0.60='moderate', 0.61–0.80='substantial' and ≥0.81='almost perfect'.<sup>25</sup> Analyses investigating level of agreement were performed using Stata (V.16.1) and 5000 bootstrap replications were used to calculate 95% CI. Reliability of the coding framework was deemed acceptable if level of agreement between the two researchers coding a random sample of responses was k≥0.8. Once agreement was acceptable, the two researchers (JZ and ZAM) applied the framework to the remaining responses. A detailed outline of the final coding frameworks is presented in online supplemental table 1.

### Patient or public involvement

Patients and members of the public were not involved in the design of this study nor were they involved in the validation of the data.





**Figure 1** Flow diagram.

## RESULTS

### Sample characteristics and level of agreement

In our online trial, 1626 eligible participants were randomised to the six labelling arms (figure 1); 318 participants (19.6%) did not respond to the free-text response questions, leaving 1308 (80.4%) responses to each question for inclusion in the analysis (2618 total responses). Level of agreement between the two researchers coding a random sample of responses was ‘almost perfect’ for question 1 (range across the six labelling groups:  $k=0.90$ – $0.97$ ) and question 2 ( $k=0.91$ – $0.97$ ) (online supplemental table 2).

Characteristics of the sample are reported in table 1. In summary, there were 437 (33.4%) participants with no history of shoulder pain, 434 (33.2%) currently experiencing shoulder pain and 437 (33.4%) with a history of shoulder pain but currently pain free. Participants’ mean age (SD) was 40.3 (16.0) years and 59.1% were females. For participants with previous or current shoulder pain, 65.6% had received treatment for their shoulder pain and 27.7% had been given a specific diagnosis, 44.4% had received imaging, 21.2% an injection and 8.7% surgery for their shoulder pain. Characteristics were largely similar between the six labelling groups.

### When you hear the term (one of the six labels), what words or feelings does this make you think of?

Our framework included 15 themes (table 2). Online supplemental table 3 provides examples of participants’ free-text responses for this question. Pain experience

was the most common theme across all labelling groups (30.8%–59.4% of responses). Activity restriction was most often expressed by participants labelled with a *shoulder sprain* (25.8%), *rotator-cuff-related shoulder pain* (21.1%) and *episode of shoulder pain* (18.3%). Tissue damage or dysfunction was most often expressed by participants labelled with *bursitis* (36.0%), *rotator cuff tear* (21.9%) and *shoulder sprain* (20.7%).

Uncertainty was most often expressed by participants labelled with *subacromial impingement syndrome* (22.0%) and *bursitis* (13.3%), and least often expressed by those labelled with a *rotator cuff tear* (4.8%) and *shoulder sprain* (0.9%). Psychological distress (20.6%) and serious issue (15.4%) were most often expressed by participants labelled with *subacromial impingement syndrome*; serious issue was least often expressed by those labelled with *bursitis* (2.7%), *rotator-cuff-related shoulder pain* (4.1%), *shoulder sprain* (2.3%) and *episode of shoulder pain* (0.9%) (table 2).

Good prognosis was most often expressed by participants labelled with an *episode of shoulder pain* (17.4%) and *shoulder sprain* (16.6%), and least often expressed by those labelled with *subacromial impingement syndrome* (4.7%) and *rotator-cuff-related shoulder pain* (4.1%). Poor prognosis was most often expressed by participants labelled with *subacromial impingement syndrome* (9.3%) and *rotator cuff tear* (8.1%), and least often expressed by those labelled with *bursitis* (2.7%) and *episode of shoulder pain* (3.1%). Treatment/investigation was most often

**Table 1** Characteristics of participants

All participants		Total sample (n=1308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
Type of participant n (%)								
No history of shoulder pain		437 (33.4%)	74 (34.6%)	70 (33.3%)	67 (29.8%)	76 (34.9%)	74 (34.1%)	76 (33.9%)
Current shoulder pain		434 (33.2%)	67 (31.3%)	69 (32.9%)	72 (32.0%)	79 (36.2%)	68 (31.3%)	79 (35.3%)
History of shoulder pain (currently pain free)		437 (33.4%)	73 (34.1%)	71 (33.8%)	86 (3.2%)	63 (28.9%)	75 (34.6%)	69 (30.8%)
Age (years), mean (SD)		40.3 (16.0)	39.9 (15.6)	41.0 (16.4)	40.9 (15.0)	41.0 (17.3)	39.4 (16.5)	39.4 (15.4)
Female, n (%)		773 (59.1%)	132 (61.7%)	109 (51.9%)	132 (58.7%)	127 (58.3%)	131 (60.4%)	142 (63.4%)
Country, n (%)								
Australia		270 (20.6%)	42 (19.6%)	50 (23.8%)	39 (17.3%)	49 (22.5%)	47 (21.7%)	43 (19.2%)
New Zealand		224 (17.1%)	37 (17.3%)	30 (14.3%)	40 (17.8%)	35 (16.1%)	40 (18.4%)	42 (18.8%)
USA		273 (20.9%)	48 (22.4%)	39 (18.6%)	53 (23.6%)	47 (21.6%)	42 (19.4%)	44 (19.6%)
UK		270 (20.6%)	34 (15.9%)	43 (20.5%)	54 (24.0%)	46 (21.1%)	39 (18.0%)	54 (24.1%)
Canada		271 (20.7%)	53 (24.8%)	48 (22.9%)	39 (17.3%)	41 (18.8%)	49 (22.6%)	41 (18.3%)
Education, n (%)								
High school (not completed)		98 (7.5%)	10 (4.7%)	21 (10.0%)	13 (5.8%)	16 (7.3%)	20 (9.2%)	18 (8.0%)
High school (completed)		438 (33.5%)	78 (36.5%)	71 (33.8%)	55 (24.4%)	88 (40.4%)	70 (32.3%)	76 (33.9%)
Non-university tertiary education		175 (13.4%)	24 (11.2%)	22 (10.5%)	37 (16.4%)	32 (14.7%)	28 (12.9%)	32 (14.3%)
University		597 (45.6%)	102 (47.7%)	96 (45.7%)	120 (53.3%)	82 (37.6%)	99 (45.6%)	98 (43.8%)
Employment, n (%)								
Employed		792 (60.6%)	134 (62.6%)	132 (62.9%)	142 (63.1%)	138 (63.3%)	125 (57.6%)	121 (54.0%)
Unemployed		303 (23.2%)	53 (24.8%)	46 (21.9%)	51 (22.7%)	39 (17.9%)	54 (24.9%)	60 (26.8%)
Student		62 (4.7%)	6 (2.8%)	9 (4.3%)	9 (4.0%)	9 (4.1%)	11 (5.1%)	18 (8.0%)
Retired		151 (11.5%)	21 (9.8%)	23 (11.0%)	23 (10.2%)	32 (14.7%)	27 (12.4%)	25 (11.2%)
Private health insurance, n (%)		563 (43.0%)	106 (49.5%)	94 (44.8%)	90 (40.0%)	91 (41.7%)	91 (41.9%)	91 (40.6%)

Continued

Table 1 Continued

All participants		Total sample (n=1308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
Participants with previous or current shoulder pain		Total sample (n=871)	Subacromial impingement syndrome (n=140)	Rotator cuff tear (n=140)	Bursitis (n=158)	Rotator-cuff-related shoulder pain (n=142)	Shoulder sprain (n=143)	Episode of shoulder pain (n=148)
Previous shoulder pain treatment, n (%)		571 (65.6%)	97 (69.3%)	87 (62.1%)	99 (62.7%)	99 (69.7%)	90 (63.0%)	99 (66.9%)
Previous shoulder surgery, n (%)		76 (8.7%)	12 (8.6%)	5 (3.6%)	13 (8.2%)	20 (14.1%)	13 (9.1%)	13 (8.8%)
Previous shoulder imaging, n (%)		387 (44.4%)	65 (46.4%)	56 (40.0%)	70 (44.3%)	74 (52.1%)	63 (44.1%)	59 (39.9%)
Previous shoulder injection, n (%)		185 (21.2%)	37 (26.4%)	24 (17.1%)	33 (20.9%)	34 (23.9%)	27 (18.9%)	30 (20.3%)
Previous sick leave for shoulder pain, n (%)		344 (39.5%)	58 (41.4%)	44 (31.4%)	62 (39.2%)	62 (43.7%)	55 (38.5%)	63 (42.6%)
Previous shoulder pain diagnosis, n (%)		241 (27.7%)	45 (32.1%)	31 (22.1%)	41 (26.0%)	42 (29.6%)	42 (29.4%)	40 (27.0%)
Participants with current shoulder pain		Total sample (n=434)	Subacromial impingement syndrome (n=67)	Rotator cuff tear (n=69)	Bursitis (n=72)	Rotator-cuff-related shoulder pain (n=79)	Shoulder sprain (n=68)	Episode of shoulder pain (n=79)
Duration of current shoulder pain, n (%)								
Less than 1 week		61 (14.1%)	9 (13.4%)	13 (18.8%)	8 (11.1%)	11 (13.9%)	11 (16.2%)	9 (11.4%)
1 week–3 months		161 (37.1%)	27 (40.3%)	26 (37.8%)	21 (29.2%)	32 (40.5%)	24 (35.3%)	31 (39.2%)
4 months–12 months		62 (14.3%)	10 (14.9%)	4 (5.8%)	19 (26.4%)	13 (16.5%)	8 (11.8%)	8 (10.1%)
Longer than 12 months		150 (34.6%)	21 (31.3%)	26 (37.7%)	24 (33.3%)	23 (29.1%)	25 (36.8%)	31 (39.2%)
Total SPADI (0– 100), mean (SD)		53.1 (21.0)	58.8 (20.7)	52.1 (22.0)	54.3 (21.7)	51.6 (19.1)	52.5 (20.0)	49.9 (22.2)
Pain subscore (0–100)		58.5 (19.9)	63.7 (19.4)	56.3 (21.8)	60.1 (18.9)	57.2 (17.7)	58.7 (19.7)	55.7 (21.1)

Continued

Table 1 Continued

	Total sample (n=1308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
All participants	47.7 (24.4)	53.9 (23.4)	47.8 (24.6)	48.5 (26.8)	46.0 (22.7)	46.4 (23.2)	44.1 (25.2)
Disability subscore (0–100)							

n, number of participants; SPADI, Shoulder Pain and Disability Index.

expressed by participants labelled with a *rotator cuff tear* (11.0%) and *rotator-cuff-related shoulder pain* (9.6%). Minor issue was most often expressed by participants labelled with a *shoulder sprain* (12.9%), and least often expressed by those labelled with a *rotator cuff tear* (4.8%) (table 2).

### What treatment(s) (if any) do you think a person with (one of the six labels) needs?

Our framework included 41 themes. The most common treatment themes expressed across the labels were medication (17.1%–37.1% of responses), rest (15.6%–28.0%), physiotherapy (13.3%–25.0%) and exercise (11.7%–19.8%). Surgery was most often expressed by participants labelled with a *rotator cuff tear* (19.0%) and *rotator-cuff-related shoulder pain* (18.3%), and least often expressed by those labelled with *bursitis* (4.9%) and *episode of shoulder pain* (5.8%). Injection was most often expressed by participants labelled with *subacromial impingement syndrome* (11.7%), *bursitis* (9.8%) and *episode of shoulder pain* (9.4%), and least often expressed by those labelled with a *rotator cuff tear* (5.7%). Investigation was most often expressed by participants labelled with an *episode of shoulder pain* (8.9%) and *rotator-cuff-related shoulder pain* (7.3%), and was expressed by 3.1%–4.6% of participants across the other labels (tables 3 and 4; online supplemental table 4).

## DISCUSSION

### Summary of key findings

There was a variety of themes elicited from the two questions regarding words or feelings evoked by the diagnostic label and treatments perceived as necessary for rotator cuff disease. The findings could explain why, in the quantitative part of our trial,<sup>14</sup> participants labelled with *subacromial impingement syndrome* had higher perceived need for imaging when compared with those labelled with *bursitis*, and those labelled with a *rotator cuff tear* had higher perceived need for surgery and imaging when compared with those labelled with *bursitis*. Feelings of psychological distress, uncertainty and that the condition is serious and has a poor prognosis were commonly expressed by those labelled with *subacromial impingement syndrome*. For those labelled with a *rotator cuff tear*, feelings of psychological distress, and that the condition is serious and has a poor prognosis were relatively common, while few perceived it as a minor issue. Although feelings of tissue damage or dysfunction were expressed most often by participants labelled with *bursitis*, it was uncommon for participants to perceive *bursitis* as a serious condition, a condition with a poor prognosis or a condition associated with psychological distress. These themes might explain why the need for treatment/investigation and surgery were more common among those labelled with a *rotator cuff tear* and *subacromial impingement syndrome* compared with *bursitis*.

**Table 2** Themes for words or feelings across all labels

Theme	Subacromial impingement syndrome				Rotator-cuff-related shoulder pain			Episode of shoulder pain	
	Total sample (n=1308)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Pain (n=224)		Pain (n=224)	
1	Pain experience (n=637, 48.7%)	Pain experience (n=105, 50.0%)	Pain experience (n=106, 47.1%)	Pain experience (n=106, 48.6%)	Pain experience (n=129, 59.4%)	Pain experience (n=125, 55.8%)	Pain experience (n=125, 55.8%)	Pain experience (n=125, 55.8%)	Pain experience (n=125, 55.8%)
2	Tissue damage or dysfunction (n=278, 21.3%)	Tissue damage or dysfunction (n=46, 21.9%)	Tissue damage or dysfunction (n=81, 36.0%)	Activity restriction (n=46, 21.1%)	Activity restriction (n=56, 25.8%)	Activity restriction (n=41, 18.3%)	Activity restriction (n=41, 18.3%)	Activity restriction (n=41, 18.3%)	Activity restriction (n=41, 18.3%)
3	Activity restriction (n=207, 15.8%)	Psychological distress (n=44, 20.6%)	Uncertainty (n=30, 13.3%)	Tissue damage or dysfunction (n=36, 16.5%)	Tissue damage or dysfunction (n=45, 20.7%)	Good prognosis (n=39, 17.4%)	Good prognosis (n=39, 17.4%)	Good prognosis (n=39, 17.4%)	Good prognosis (n=39, 17.4%)
4	Psychological distress (n=157, 12.0%)	Psychological distress (n=27, 12.9%)	Activity restriction (n=20, 8.9%)	Psychological distress (n=30, 13.8%)	Good prognosis (n=36, 16.6%)	Tissue damage or dysfunction (n=27, 12.1%)	Tissue damage or dysfunction (n=27, 12.1%)	Tissue damage or dysfunction (n=27, 12.1%)	Tissue damage or dysfunction (n=27, 12.1%)
5	Good prognosis (n=123, 9.4%)	Serious issue (n=33, 15.4%)	Psychological distress (n=19, 8.4%)	Treatment/investigation (n=21, 10.0%)	Minor issue (n=28, 12.9%)	Psychological distress (n=25, 11.2%)	Psychological distress (n=25, 11.2%)	Psychological distress (n=25, 11.2%)	Psychological distress (n=25, 11.2%)
6	Uncertainty (n=114, 8.7%)	Minor issue (n=21, 9.8%)	Irrelevant response (n=17, 7.6%)	Minor issue (n=19, 8.7%)	Mechanism of injury (n=21, 9.7%)	Minor issue (n=22, 9.8%)	Minor issue (n=22, 9.8%)	Minor issue (n=22, 9.8%)	Minor issue (n=22, 9.8%)
7	Minor issue (n=113, 8.6%)	Treatment/investigation (n=20, 9.3%)	Treatment/investigation (n=16, 7.1%)	Uncertainty (n=17, 7.8%)	Unhappy/frustration (n=20, 9.2%)	Treatment/investigation (n=17, 7.6%)	Treatment/investigation (n=17, 7.6%)	Treatment/investigation (n=17, 7.6%)	Treatment/investigation (n=17, 7.6%)
8	Treatment/investigation (n=112, 8.6%)	Poor prognosis (n=20, 9.3%)	Good prognosis (n=14, 6.2%)	Mechanism of injury (n=14, 6.4%)	Treatment/investigation (n=15, 6.9%)	Unhappy/frustration (n=17, 7.6%)	Unhappy/frustration (n=17, 7.6%)	Unhappy/frustration (n=17, 7.6%)	Unhappy/frustration (n=17, 7.6%)
9	Unhappy/frustration (n=84, 6.4%)	Activity restriction (n=15, 7.0%)	Minor issue (n=14, 6.2%)	Poor prognosis (n=14, 6.4%)	Psychological distress (n=15, 6.9%)	Mechanism of injury (n=13, 5.8%)	Mechanism of injury (n=13, 5.8%)	Mechanism of injury (n=13, 5.8%)	Mechanism of injury (n=13, 5.8%)
10	Serious issue (n=74, 5.7%)	Unhappy/frustration (n=11, 5.1%)	Unhappy/frustration (n=8, 3.6%)	Irrelevant response (n=10, 4.6%)	Poor prognosis (n=8, 3.7%)	Uncertainty (n=8, 3.6%)	Uncertainty (n=8, 3.6%)	Uncertainty (n=8, 3.6%)	Uncertainty (n=8, 3.6%)
11	Mechanism of injury (n=72, 5.5%)	Good prognosis (n=10, 4.7%)	Mechanism of injury (n=7, 3.1%)	Good prognosis (n=9, 4.1%)	Serious issue (n=5, 2.3%)	Feels dismissed (n=8, 3.6%)	Feels dismissed (n=8, 3.6%)	Feels dismissed (n=8, 3.6%)	Feels dismissed (n=8, 3.6%)
12	Poor prognosis (n=70, 5.4%)	Mechanism of injury (n=5, 2.3%)	Serious issue (n=6, 2.7%)	Serious issue (n=9, 4.1%)	Irrelevant response (n=3, 1.4%)	Poor prognosis (n=7, 3.1%)	Poor prognosis (n=7, 3.1%)	Poor prognosis (n=7, 3.1%)	Poor prognosis (n=7, 3.1%)

Continued



Table 2 Continued

Theme	Total sample (n=1308)	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
13	Irrelevant response (n=47, 3.6%)	Irrelevant response (n=4, 1.9%)	Irrelevant response (n=6, 2.9%)	Poor prognosis (n=6, 2.7%)	Unhappy/frustration (n=7, 3.2%)	Uncertainty (n=2, 0.9%)	Irrelevant response (n=7, 3.1%)
14	Feels dismissed (n=12, 0.9%)	Feels dismissed (n=2, 0.9%)	Ageing (n=1, 0.5%)	Ageing (n=5, 2.2%)	Ageing (n=1, 0.5%)	Feels dismissed (n=2, 0.9%)	Serious issue (n=2, 0.9%)
15	Ageing (n=9, 0.7%)	Ageing (n=1, 0.5%)	Feels dismissed (n=0, 0%)	Feels dismissed (n=0, 0%)	Feels dismissed (n=0, 0%)	Ageing (n=1, 0.5%)	Ageing (n=0, 0%)
	0%–4.9%	5%–9.9%	10%–14.9%	15%–24.9%	25%+		

### Strengths and weaknesses of this study

Key strengths of this study include use of a large sample size, highly reliable coding frameworks ( $k=0.90$ – $0.97$  across labelling groups for both questions) and including people with and without shoulder pain. Including people with and without the target health condition is important when trying to explore the perceptions of both patients and the general public, yet it is uncommon in labelling studies.<sup>13 26–29</sup> Another strength is that the online experiment which provided data for this study used high-quality methods (eg, randomisation, allocation concealment).

The main weakness of this study is that it was an online experiment; hence, people's feelings towards different labels and what treatments they feel are needed might be different in a clinical encounter. Other labels not investigated in this study (eg, rotator cuff disease, painful arc syndrome) may have provoked different words or feelings and perceived treatment needs. We were missing data from 318 participants who were randomised but did not complete outcome measures. However, our sample appears representative of people presenting with shoulder pain in primary care in terms of demographics, healthcare utilisation and shoulder pain and function.<sup>3 30–33</sup> Outcomes were only assessed immediately after participants were given the label. Our findings may have been different if we gave participants more time to reflect on their label. Since the health professional in the vignette was not concerned about any label, participants may have had fewer negative feelings towards the labels and felt extensive treatment was unnecessary. Very low health literacy may have also limited understanding of the message from the health professional in the vignette. The need for investigation may have been low in response to the second question (3.1%–8.9%) because the question only referred to what 'treatments' a person needs. This study only focused on the feelings and needs of patients and the public, whereas clinician-related factors (eg, beliefs, bias) might be a stronger driver of management choices in the real world. Finally, since two researchers, both with a physiotherapy background developed and applied the coding frameworks, it is possible professional bias and beliefs may have influenced the coding.

### Meaning of the study

The qualitative findings from our online randomised controlled experiment (ie, the current content analysis) corroborate with the quantitative findings<sup>14</sup> and highlight the potential value of avoiding certain labels for rotator cuff disease. Our online experiment found participants labelled with a *rotator cuff tear* had higher perceived need for surgery and imaging when compared with those labelled with *bursitis*, while those labelled with *subacromial impingement syndrome* had higher perceived need for imaging when compared with those labelled with *bursitis*. In this content analysis, participants labelled with *subacromial impingement syndrome* and *rotator cuff tear* were more likely to associate these labels with psychological distress, a serious condition, poor prognosis and the need for

**Table 3** Top 10 treatment themes for each label

Theme	Subacromial impingement syndrome (n=214)	Rotator cuff tear (n=210)	Bursitis (n=225)	Rotator-cuff-related shoulder pain (n=218)	Shoulder sprain (n=217)	Episode of shoulder pain (n=224)
1	Rest (n=59, 27.6%)	Physiotherapy (n=49, 23.3%)	Medication (n=69, 30.7%)	Medication (n=61, 28.0%)	Medication (n=71, 32.7%)	Medication (n=83, 37.1%)
2	Physiotherapy (n=51, 23.8%)	Rest (n=47, 22.4%)	Rest (n=63, 28.0%)	Physiotherapy (n=52, 23.9%)	Rest (n=55, 25.3%)	Physiotherapy (n=56, 25.0%)
3	Medication (n=48, 22.4%)	Surgery (n=40, 19.0%)	Activity modification (n=31, 13.8%)	Surgery (n=40, 18.3%)	Physiotherapy (n=43, 19.8%)	Rest (n=42, 18.8%)
4	Activity modification (n=38, 17.8%)	Medication (n=36, 17.1%)	Exercise (n=31, 13.8%)	Exercise (n=34, 15.6%)	Exercise (n=43, 19.8%)	Exercise (n=34, 15.2%)
5	Injection (n=25, 11.7%)	Activity modification (n=30, 14.3%)	Physiotherapy (n=30, 13.3%)	Rest (n=34, 15.6%)	Heat (n=33, 15.2%)	Heat (n=24, 10.7%)
6	Exercise (n=25, 11.7%)	Exercise (n=26, 12.4%)	Injection (n=22, 9.8%)	Exercise (intensity not specified) (n=25, 11.5%)	Exercise (intensity not specified) (n=32, 14.7%)	Massage (n=22, 9.8%)
7	Surgery (n=21, 9.8%)	Heat (n=16, 7.6%)	Heat (n=20, 8.9%)	Activity modification (n=19, 8.7%)	Cold (n=25, 11.5%)	Injection (n=21, 9.4%)
8	Exercise (intensity not specified) (n=19, 8.9%)	Unsure (n=16, 7.6%)	Cold (n=18, 8.0%)	Injection (n=16, 7.3%)	Activity modification (n=20, 9.2%)	Investigations (n=20, 8.9%)
9	Unsure (n=17, 7.9%)	Exercise (intensity not specified) (n=15, 7.1%)	Exercise (intensity not specified) (n=16, 7.1%)	Investigations (n=16, 7.3%)	Massage (n=17, 7.8%)	Exercise (intensity not specified) (n=19, 8.5%)
10	Heat (n=14, 6.5%)	Wait and see (n=13, 6.2%)	Normal movements (n=16, 7.1%)	Irrelevant response (n=12, 5.5%)	Surgery (n=16, 7.4%)	Activity modification (n=18, 8.0%)
	<b>0 – 9.9%</b>	<b>10 – 14.9%</b>	<b>15 – 24.9%</b>	<b>25% +</b>		

treatment/investigation and surgery, compared with those labelled with *bursitis*.

Encouraging clinicians to avoid labels that increase patients' perceived need for unnecessary care, such as shoulder surgery and diagnostic imaging, could improve the management of patients with rotator cuff disease. However, since there are no data on the acceptability of avoiding certain labels among patients and health professionals, educating clinicians on the importance of addressing misconceptions among patients with rotator cuff disease may be a more acceptable starting point. For example, patients labelled with *subacromial impingement syndrome* may need reassurance that they do not have a serious condition and education to reduce any psychological distress or uncertainty. Similarly, patients labelled with a *rotator cuff tear* may need reassurance that tears rarely need to be repaired because they are common in asymptomatic people and symptoms associated with tears often improve without surgery.

### Comparison to existing literature

Although this is the first study to examine public and patient perceptions of different labels for rotator cuff disease, the findings align with qualitative work which suggests patients given a structural diagnosis (eg, subacromial impingement syndrome, where pain is caused by a bone spur that is reducing the subacromial space) believe surgery will fix their problem.<sup>34</sup> We found perceived need for treatment/investigation was most common among those labelled with a *rotator cuff tear* (11.0%) and *subacromial impingement syndrome* (9.3%). Furthermore, surgery was most often expressed by those labelled with a *rotator cuff tear* (19.0%).

The findings of this study also align with a content analysis conducted by our group exploring public and patient perceptions of different labels for low back pain (O'Keeffe M, *et al.* Public and patient perceptions of diagnostic labels for low back pain: a content analysis. Under review). The study analysed free-text responses to two

**Table 4** All treatment themes from participants (n=1308)

Treatment label	N (%)
Medication	368 (28.1)
Rest	300 (22.9)
Physiotherapy	281 (21.5)
Exercise	193 (14.8)
Exercise (intensity not specified)	126 (9.6)
Light exercise	67 (5.1)
Activity modification	156 (11.9)
Surgery	141 (10.8)
Heat	117 (8.9)
Injection	110 (8.4)
Cold	86 (6.6)
Massage	83 (6.3)
Unsure	74 (5.7)
Investigations	69 (5.3)
Doctor	61 (4.7)
Topical treatments	55 (4.2)
Normal movements	54 (4.1)
No treatment	48 (3.7)
Wait and see	37 (2.8)
Irrelevant response	35 (2.7)
Chiropractor	29 (2.2)
Acupuncture	22 (1.7)
Immobilisation	16 (1.2)
Specialist	15 (1.1)
Taping/bracing	14 (1.1)
Hydrotherapy	9 (0.7)
Natural or unknown therapies	9 (0.7)
Compression	7 (0.5)
Time off work	7 (0.5)
Diet	6 (0.5)
Electrotherapy	5 (0.4)
Manipulation	5 (0.4)
Prayer/hope/meditation	5 (0.4)
Second opinion	4 (0.3)
Elevation	3 (0.2)
Ergonomics/posture	3 (0.2)
Osteopathy	3 (0.2)
Stay healthy	3 (0.2)
Emergency department/hospital	2 (0.2)
Cognitive behavioural therapy	1 (0.1)
Good mattress	1 (0.1)
Pain clinic	1 (0.1)

N, number of participants; N/A, not applicable.

questions (identical to the questions asked in this study) which were collected in a six-arm, online randomised controlled experiment in participants with and without low back pain. Feelings of a poor prognosis were most

common among participants labelled with a *disc bulge*, *degeneration* and *arthritis*, while feelings of a good prognosis were most common among those labelled with *lumbar sprain*, *non-specific low back pain* and an *episode of low back pain*. This is similar to our study where 'poor prognosis' was often expressed by participants given structural labels for rotator cuff disease (eg, *subacromial impingement syndrome*) and 'good prognosis' was often expressed by those given non-specific labels (eg, *episode of shoulder pain*, *shoulder sprain*). *Bursitis* was the exception to this trend; a structural diagnosis that was rarely associated with 'poor prognosis' (2.7%).

Perceived treatment needs for low back pain and rotator cuff disease appear to be similar. The top four treatments in the low back pain content analysis were exercise, medication, rest and physiotherapy (O'Keeffe M, *et al.* Public and patient perceptions of diagnostic labels for low back pain: a content analysis. Under review). In this study, the top four treatments for rotator cuff disease were medication, rest, physiotherapy and exercise. One difference is that exercise appears to be a more acceptable treatment for low back pain. For both low back pain and rotator cuff disease, labels appear to influence participants' perceived need for surgery. For low back pain, surgery was perceived as necessary among participants labelled with *disc bulge*, *degeneration* and *arthritis* more often than it was among those labelled with *lumbar sprain*, *non-specific low back pain* and an *episode of low back pain*. For rotator cuff disease, surgery was perceived as necessary among participants labelled with a *rotator cuff tear*, *rotator-cuff-related shoulder pain* and (to a lesser extent) *subacromial pain syndrome* more often than it was among those labelled with *bursitis*, *shoulder sprain* and *episode of shoulder pain*.

### Unanswered questions and future research

Although some labels provoked negative feelings and perceived need for unnecessary care more than others, we do not know whether health professionals would find avoiding certain labels acceptable. Qualitative research is needed to fill this important knowledge gap. Our quantitative analysis also found only small differences in patients' perceived need for surgery and imaging between certain labels; these differences may not be clinically meaningful. Providing context and explanation for imaging findings (ie, that they are common in people without pain and in older people) and addressing misconceptions that are associated with certain labels might be more important for patients than avoiding certain labels. Testing these approaches should be a research priority.

### CONCLUSION

Words or feelings evoked by certain labels for rotator cuff disease and perceived treatment needs may explain why some labels drive management preferences towards surgery and imaging more than others. Feelings of psychological distress and that the condition is serious and has a poor prognosis, and the need for treatment/



investigation and surgery were common among those labelled with a *rotator cuff tear* and *subacromial impingement syndrome*, but not among those labelled with *bursitis*. Interventions addressing misconceptions and perceived need for unnecessary care in patients given different labels for rotator cuff disease, and the clinicians who provide these labels, should be tested.

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**Supplementary Table 1. Coding frameworks**

*Questions 1: When you hear the term [one of the six labels], what words or feelings does this make you think of?*

<b>Code</b>	<b>Explanation</b>	<b>Examples</b>
Activity restriction	Any reference to being unable to do typical daily activities	Caution, light work, rest, sleep loss, time off work, careful
Aging	Any reference to the condition being due to aging	Old, getting old/older, ancient
Psychological distress	Any reference to feelings of fear, anxiety, worry or stress	Fear, anxious, worry, stress, scared, depressed, nervous, etc.
Feels dismissed	Any reference to feeling dismissed by another person	Not interested in my opinion, not bad to those who don't suffer from it, not real, made up
Good prognosis	Any reference to the condition recovering either quickly or without treatment	Temporary, no treatment needed, heal over time
Irrelevant response	The response did not address the question	"Nothing at all", "I don't really have any feelings"
Mechanism of injury	Any reference to why the pain started	Injury, overuse issue, caused by lifting, sports injury
Minor issue	Any reference to the condition being 'non-serious'	Not serious, everyday issue, common, annoyance, uncomfortable, inconvenient
Pain experience	Any reference to pain	Pain, hurt, intermittent, discomfort, recurrent
Poor prognosis	Any reference to the condition taking a long time to recover	Persistent pain, long recovery, long-term issue
Serious issue	Any reference to the condition being 'serious'	Deteriorating, serious, bad, very ill
Tissue damage or dysfunction	Any reference to tissue damage or dysfunction	Tendon tear, arm out of place, sprained ligaments, pulled muscle, stiffness, weakness
Treatment/investigation	Any reference to the need for treatment or investigation	Rest, pain medication, heat, surgery, physiotherapy, requires imaging
Uncertainty	Any reference to being unsure what the label means	Complicated, confused, uncertainty, need more information
Unhappy/frustration	Any reference to being unhappy or frustrated	Sad, anger, annoyed, feel bad, upset, helpless, useless

*Question 2: What treatment (s) (if any) do you think a person with [one of the six labels] needs?*

Code	Examples (if needed)
Activity modification	Avoid lifting, avoid aggravating activities, avoid strenuous activities
Acupuncture	
Chiropractor	
Cognitive behavioural therapy	
Cold	
Compression	
Diet	
Doctor	
Electrotherapy	Laser, ultrasound
Elevation	
Emergency department/hospital	
Ergonomics/posture	Adjust computer screen height
Exercise	
Good mattress	
Heat	
Hydrotherapy	
Immobilisation	Sling
Injection	Cortisone injection
Investigations	X-ray, ultrasound, MRI
Light exercise	Gentle exercise, exercise but be careful
Manipulation	
Massage	
Medication	Panadol, anti-inflammatories, muscle relaxants, supplements
Irrelevant response	
Natural or unknown therapies	Stone therapy, finger therapy, natural remedies, tea, spa baths
No treatment	Time, patience, will heal itself in time
Normal movements	Keep arm moving, normal activity, stay active
Osteopathy	
Pain clinic	
Physiotherapy	
Prayer/hope/meditation	
Rest	Taking it easy, relaxation, reduce overall activity
Second opinion	
Specialist	
Stay healthy	Good sleep, avoid smoking
Surgery	
Taping/bracing	Brace, strapping
Time off work	

Topical treatments	Ointment, rub, Voltaren gel, oils
Unsure	
Wait and see	



Supplementary Table 2. Number of responses, codes, percent exact agreement and Kappa (95% Confidence Interval) for the level of agreement between reviews for coding a random sample of responses

<b>Feelings about label</b>	<b>N (%)</b>	<b>Codes</b>	<b>Agreement</b>	<b>k</b>	<b>95% CI</b>
All labels	300 (22.9)	562	93.9%	0.93	0.90-0.95
Subacromial impingement syndrome	50 (23.4)	90	94.3%	0.93	0.86-0.98
Rotator cuff tear	50 (23.8)	96	91.6%	0.90	0.82-0.97
Bursitis	50 (22.2)	86	93.3%	0.92	0.84-0.98
Rotator-cuff-related shoulder pain	50 (22.9)	87	97.3%	0.97	0.91-1.00
Shoulder sprain	50 (23.0)	111	93.8%	0.92	0.86-0.98
Episode of shoulder pain	50 (22.3)	92	93.3%	0.92	0.85-0.98
<b>Treatment for label</b>	<b>N (%)</b>	<b>Codes</b>	<b>Agreement</b>	<b>k</b>	<b>95% CI</b>
All labels	300 (22.9)	586	94.4%	0.94	0.92-0.96
Subacromial impingement syndrome	50 (23.4)	94	93.3%	0.93	0.87-0.98
Rotator cuff tear	50 (23.8)	99	94.7%	0.94	0.88-0.99
Bursitis	50 (22.2)	89	97.8%	0.97	0.94-1.00
Rotator-cuff-related shoulder pain	50 (22.9)	93	95.7%	0.95	0.90-0.99
Shoulder sprain	50 (23.0)	108	93.9%	0.93	0.88-0.98
Episode of shoulder pain	50 (22.3)	103	92.0%	0.91	0.85-0.97

N: number of responses coded; k: kappa coefficient; CI: confidence interval.

Supplementary Table 3. Examples of participants' open-ended responses regarding 'words or feelings' (question 1) across labels (top 10 codes only)

Subacromial impingement syndrome	Rotator cuff tear	Bursitis	Rotator-cuff-related shoulder pain	Shoulder sprain	Episode of shoulder pain
<b>Pain experience</b>					
"Unbearable pain." <i>[P130, Female, age 40]</i>	"Very uncomfortable to have." <i>[P329, Female, age 65]</i>	"Pain in the shoulder area." <i>[P520, Male, age 79]</i>	"Pain & discomfort." <i>[P797, Male, age 69]</i>	"Tingling, hot sensation, pain on lifting arm up." <i>[P1044, Female, age 58]</i>	"Aching pain throbbing." <i>[P1120, Male, age 34]</i>
"I think that it is pain and very uncomfortable." <i>[P121, Male, age 45]</i>	"Painful, agony." <i>[P331, Male, age 49]</i>	"Pain, swelling, redness." <i>[P559, Female, age 49]</i>	"Pain that incurs when moved." <i>[P682, Female, age 38]</i>	"Pain in shoulder hurting bad." <i>[P869, Male, age 64]</i>	"Very, very sharp pains." <i>[P1085, Female, age 32]</i>
<b>Tissue damage or dysfunction</b>					
"Bones trapping tendons/muscles." <i>[P188, Female, age 28]</i>	"Shoulder tear that hurts real bad." <i>[P236, Female, age 60]</i>	"Fluid sac that is maybe torn or ruptured." <i>[P577, Female, age 56]</i>	"An injury to muscles." <i>[P821, Female, age 63]</i>	"A muscle sprain or pinched nerve." <i>[P922, Male, age 65]</i>	"I think if things like a trapped nerve or general injury to the area." <i>[P1259, Female, age 41]</i>
"Something pressing in the shoulder. Seizing and/or swelling." <i>[P208, Male, age 38]</i>	"I have tendon damage." <i>[P341, Male, age 48]</i>	"Inflammation in the shoulder." <i>[P533, Male, age 45]</i>	"Sounds like it is in the area of the shoulder joint. Makes me think there is inflammation or perhaps a pinched nerve."	"You didn't break anything you just sprained the ligaments or muscles." <i>[P1080, Female, age 69]</i>	"Tendon, muscle and all this other pain." <i>[P1129, Male, age 26]</i>

			[P837, Male, age 61]		
<b>Activity restriction</b>					
<p>“Pain, being uncomfortable, not being able to do the things you normally do.”</p> <p>[P200, Female, age 63]</p> <p>“Disability, not being able to work or do activities.”</p> <p>[P106, Male, age 21]</p>	<p>“I’m useless on one side.”</p> <p>[P243, Male, age 58]</p> <p>“It’s painful and hard to function day to day.”</p> <p>[P267, Female, age 39]</p>	<p>“Pain and trouble with movement.”</p> <p>[P593, Male, age 42]</p> <p>“Inflammation, pain, decrease range of motion.”</p> <p>[P569, Female, age 30]</p>	<p>“Something painful they may limit the ability to move your arm in the way you are accustomed to doing things.”</p> <p>[P792, Female, age 63]</p> <p>“Annoying restriction to movement.”</p> <p>[P866, Male, age 66]</p>	<p>“Limited movement.”</p> <p>[P960, Female, age 67]</p> <p>“Take more care in the things I do.”</p> <p>[P1054, Male, age 60]</p>	<p>“Affects my everyday actions”</p> <p>[P1189, Male, age 68]</p> <p>“Hard to do normal things”</p> <p>[P1294, Female, age 68]</p>
<b>Psychological distress</b>					
<p>“Pain, stress, anxious.”</p> <p>[P25, Male, age 64]</p> <p>“Pinched nerve, sounds scary.”</p> <p>[P145, Female, age 45]</p>	<p>“Bad feeling, is very not cool.”</p> <p>[P238, Male, age 38]</p> <p>“The term rotator cuff tear sounds scary.”</p> <p>[P256, Female, age 29]</p>	<p>“A little scared, because if you don’t get it fixed right away, it’ll cause stiff shoulder disease.”</p> <p>[P564, Male, age 34]</p> <p>“It sounds quite scary.”</p>	<p>“Scared - what if I lose use of my shoulder?”</p> <p>[P741, Female, age 37]</p> <p>“Makes me worried.”</p> <p>[P701, Male, age 38]</p>	<p>“That I am getting weaker. To sprain my shoulder whilst doing a simple task worries me a little.”</p> <p>[P1050, Female, age 62]</p> <p>“Scarred, worried, confused.”</p> <p>[P985, Male, age 19]</p>	<p>“That my body might possibly be deteriorating, perhaps seriously. I would be quite concerned. Anxious, worried.”</p> <p>[P1218, Male, age 47]</p> <p>“Anxious, teary, worried, troubled”</p>

		[P445, Female, age 46]			[P1088, Female, age 62]
<b>Good prognosis</b>					
<p>“Pain which will subside with time. Healing over time if care taken.”</p> <p>[P134, Male, age 69]</p> <p>“Temporary pain in the shoulder blade.”</p> <p>[P166, Female, age 28]</p>	<p>“It just needs time to repair itself.”</p> <p>[P407, Female, age 64]</p> <p>“It sounds threatening, but I am sure this can be recovered during reasonable period of time.”</p> <p>[P395, Male, age 45]</p>	<p>“Inflammation. Pain eventual recovery.”</p> <p>[P532, Female, age 57]</p> <p>“Temporary shoulder pain that will just go away.”</p> <p>[P602, Male, age 47]</p>	<p>“Great now but with the time it cures and no need of doing anything let time show magic.”</p> <p>[P730, Male, age 33]</p> <p>“Not serious, will heal itself, relax.”</p> <p>[P745, Female, age 65]</p>	<p>“Strain which eventually will heal itself.”</p> <p>[P1040, Male, age 79]</p> <p>“Temporary pain from something strenuous I tried to do.”</p> <p>[P1067, Female, age 69]</p>	<p>“Temporary. Not very serious. Annoying.”</p> <p>[P1271, Female, age 36]</p> <p>"Short term pain"</p> <p>[P1273, Male, age 47]</p>
<b>Uncertainty</b>					
<p>“What the hell is that? Can't they speak in simple terms?”</p> <p>[P129, Male, age 61]</p> <p>“Complicated, serious, nervous.”</p> <p>[P114, Female, age 32]</p>	<p>"I am not sure actually about this except that fact that it is related to shoulder."</p> <p>[P272, Female, age 34]</p> <p>“Pain, uncertainty.”</p> <p>[P378, Male, age 68]</p>	<p>“No idea, something common.”</p> <p>[P565, Male, age 47]</p> <p>“Do not know what it is.”</p> <p>[P627, Female, age 40]</p>	<p>“It sounds complicated.”</p> <p>[P858, Female, age 71]</p> <p>“Not sure what to do at all very sorry but I will go to the therapy.”</p> <p>[P662, Male, age 49]</p>	<p>“Scarred, worried, confused.”</p> <p>[P985, Male, age 19]</p> <p>“Honestly it first time I see this world and really I can't guess what it is but it still doesn't mean a serious issue.”</p> <p>[P955, Female, age 41]</p>	<p>"Episode of shoulder pain is too vague of a term. When I hear it, I want more definitive answers and diagnostic."</p> <p>[P1144, Male, age 25]</p> <p>“Does not give a good cause, not a very good name.”</p>



					<i>[P1210, Female, age 36]</i>
<b>Minor issue</b>					
<p>“The injury is probably just due to overextending my arm, it is not too serious and should get better.”</p> <p><i>[P180, Female, age 38]</i></p> <p>“Not sure maybe a slight disorder.”</p> <p><i>[P113, Female, age 20]</i></p>	<p>“Shoulder pain in the short-term mild discomfort.”</p> <p><i>[P405, Male, age 51]</i></p> <p>“This is not a serious medical condition. I will recover reasonably soon.”</p> <p><i>[P399, Female, age, 41]</i></p>	<p>“Words and feelings that come to mind is not to worry.”</p> <p><i>[P640, Female, age 24]</i></p> <p>“Not as bad as it could have been.”</p> <p><i>[P498, Male, age 44]</i></p>	<p>“Simple pain, no injury.”</p> <p><i>[P775, Male, age 21]</i></p> <p>“Painful but not serious.”</p> <p><i>[P820, Female, age 36]</i></p>	<p>“That it is nothing too serious, just needs rest and gentle exercise.”</p> <p><i>[P1073, Male, age 75]</i></p> <p>“Temporary, not serious, will improve with time.”</p> <p><i>[P1051, Female, age 67]</i></p>	<p>“A minor injury with some discomfort</p> <p><i>[P1231, Male, age 61]</i></p> <p>“Will not stay long. Will cures by itself and no need for medicine”</p> <p><i>[P1249, Female, age, 47]</i></p>
<b>Treatment/investigation</b>					
<p>“It is pretty serious I may need surgery.”</p> <p><i>[P129, Male, age 61]</i></p> <p>“It sounds like a serious condition and I thought that surgery is require to fix it.”</p> <p><i>[P51, Female, age 31]</i></p>	<p>“Pain, off work, surgery.”</p> <p><i>[P420, Male, age 36]</i></p> <p>“Shoulder, muscle, surgery, orthopaedics, throwing.”</p> <p><i>[P308, Female, age 23]</i></p>	<p>“Infection or inflammation that can be treated.”</p> <p><i>[P635, Female, age 62]</i></p> <p>“A little scared, because if you don't get it fixed right away, it'll cause stiff shoulder disease.”</p> <p><i>[P564, Male, age 34]</i></p>	<p>“Need to attend very quickly.”</p> <p><i>[P774, Male, age 38]</i></p> <p>“Long term discomfort, need for exercise regime.”</p> <p><i>[P790, Female, age 76]</i></p>	<p>“Pain, doctors, sling, X-rays, medication.”</p> <p><i>[P910, Female, age 44]</i></p> <p>“Damn, now I have to go through physical therapy.”</p> <p><i>[P890, Male, age 21]</i></p>	<p>“If it persisted for some time, I would visit a doctor and go from there.”</p> <p><i>[P1296, Male, age 66]</i></p> <p>“It makes me realise that my health professional should point me in the right direction to enable me to help myself.”</p> <p><i>[P1209, Female, age 71]</i></p>

<b>Unhappy/frustration</b>					
"Fear, anxious, angry, tired."  [P30, Male, age 35]	"Disgusting pain, unhappy, sad, mad."  [P300, Male, age 23]	"Fear, hurt, angry."  [P446, Male, age 23]	"Frustrated, annoyed, anxious, nervous."  [P663, Male, age 20]	"Frustrated, tired."  [P966, Female, 47]	"Painful, tiredness, unhappy"  [P1305, Female, age 56]
"Sad, living in pain isn't fun."  [P87, Female, age 47]	"Causing me to be unhappy when I cannot reach. Causing me to be unhappy when I cannot carry items."  [P351, Female, age 71]	"Pain, stress, anger."  [P452, Female, 42]	"Muscular, hurts more when I try and sleep, frustrating, can't do my normal activities."  [P796, Female, age 53]	"Limitations, pain, frustration."  [P899, Male, age 23]	"Pissed off anxious and angry"  [P1133, Male, age 33]
<b>Serious issue</b>					
"It sounds scary and serious."  [P95, Female, age 54]	"Serious condition."  [P301, Female, age 65]	"Serious condition, something has burst, worried."  [P620, Female, age 33]	"Serious, long term injury."  [P826, Female, age 38]	"It's really bad because the stress is here, you think like you got something anywhere else that's more serious."  [P875, Male, age 25]	"That my body might possibly be deteriorating, perhaps seriously."  [P1218, Male, age 47]
"Sounds like very serious injury."  [P58, Male, age 39]	"It sounds very serious."  [P268, Male, age 25]	"Inflamed area within the body that could harm the human body."  [P506, Male, age 49]	"Sounds bad and sounds like it would hurt a lot and might need surgery to fix."  [P695, Male, age 45]	"It could be cancer."  [P1066, Female, age 46]	"Hurt, shoulder, arm, cancer"  [P1213, Prefer not to say gender, age 26]

P: participant.

Supplementary Table 4. All treatment themes across labels

Subacromial impingement syndrome (n=214)		Rotator cuff tear (n=210)		Bursitis (n=225)		Rotator-cuff-related shoulder pain (n=218)		Shoulder sprain (n=217)		Episode of shoulder pain (n=224)	
Theme	N (%)	Theme	N (%)	Theme	N (%)	Theme	N (%)	Theme	N (%)	Theme	N (%)
Rest	59 (27.6%)	Physiotherapy	49 (23.3%)	Medication	69 (30.7%)	Medication	61 (28.0%)	Medication	71 (32.7%)	Medication	83 (37.1%)
Physiotherapy	51 (23.8%)	Rest	47 (22.4%)	Rest	63 (28.0%)	Physiotherapy	52 (23.9%)	Rest	55 (25.3%)	Physiotherapy	56 (25.0%)
Medication	48 (22.4%)	Surgery	40 (19.0%)	Activity modification	31 (13.8%)	Surgery	40 (18.3%)	Physiotherapy	43 (19.8%)	Rest	42 (18.8%)
Activity modification	38 (17.8%)	Medication	36 (17.1%)	Exercise	31 (13.8%)	Exercise	34 (15.6%)	Exercise	43 (19.8%)	Exercise	34 (15.2%)
		Activity modification	30 (14.3%)	Exercise (intensity not specified)	16 (7.1%)	Exercise (intensity not specified)	25 (11.5%)	Exercise (intensity not specified)	32 (14.7%)	Exercise (intensity not specified)	19 (8.5%)
Injection	25 (11.7%)	Exercise	26 (12.4%)	Light exercise	15 (6.7%)	Light exercise	9 (4.1%)	Light exercise	11 (5.1%)	Light exercise	15 (6.7%)
Exercise (intensity not specified)	19 (8.9%)	Exercise (intensity not specified)	15 (7.1%)	Physiotherapy	30 (13.3%)	Rest	34 (15.6%)	Heat	33 (15.2%)	Heat	24 (10.7%)
Light exercise	6 (2.8%)	Light exercise	11 (5.2%)	Injection	22 (9.8%)	Activity modification	19 (8.7%)	Cold	25 (11.5%)	Massage	22 (9.8%)
Surgery	21 (9.8%)	Heat	16 (7.6%)	Heat	20 (8.9%)	Injection	16 (7.3%)	Activity modification	20 (9.2%)	Injection	21 (9.4%)
Unsure	17 (7.9%)	Unsure	16 (7.6%)	Cold	18 (8.0%)	Investigations	16 (7.3%)	Massage	17 (7.8%)	Investigations	20 (8.9%)
Heat	14 (6.5%)	Wait and see	13 (6.2%)	Normal movements	16 (7.1%)	Irrelevant response	12 (5.5%)	Surgery	16 (7.4%)	Activity modification	18 (8.0%)
Doctor	12 (5.6%)	Injection	12 (5.7%)	Unsure	15 (6.7%)	Chiropractor	11 (5.0%)	Injection	14 (6.5%)	Cold	18 (8.0%)
Massage	12 (5.6%)	Massage	10 (4.8%)	Doctor	13 (5.8%)	Massage	11 (5.0%)	Topical treatments	14 (6.5%)	Doctor	14 (6.3%)
Cold	10 (4.7%)	Investigations	9 (4.3%)	Massage	11 (4.9%)	No treatment	11 (5.0%)	Doctor	12 (5.5%)	Topical treatments	14 (6.3%)
Normal movements	9 (4.2%)	No treatment	8 (3.8%)	Surgery	11 (4.9%)	Heat	10 (4.6%)	Unsure	11 (5.1%)	Surgery	13 (5.8%)
Investigations	7 (3.3%)	Normal movements	8 (3.8%)	No treatment	9 (4.0%)	Cold	9 (4.1%)	Investigations	10 (4.6%)	No treatment	8 (3.6%)
No treatment	7 (3.3%)	Topical treatments	7 (3.3%)	Investigations	7 (3.1%)	Normal movements	9 (4.1%)	Chiropractor	6 (2.8%)	Acupuncture	7 (3.1%)
Topical treatments	6 (2.8%)	Cold	6 (2.9%)	Wait and see	6 (2.7%)	Topical treatments	9 (4.1%)	Immobilisation	6 (2.8%)	Chiropractor	6 (2.7%)

Wait and see	6 (2.8%)	Acupuncture	5 (2.4%)	Specialist	5 (2.2%)	Unsure	9 (4.1%)	Irrelevant response	6 (2.8%)	Normal movements	6 (2.7%)
Acupuncture	4 (1.9%)	Doctor	5 (2.4%)	Topical treatments	5 (2.2%)	Doctor	5 (2.3%)	Normal movements	6 (2.8%)	Unsure	6 (2.7%)
Hydrotherapy	4 (1.9%)	Irrelevant response	5 (2.4%)	Electrotherapy	4 (1.8%)	Wait and see	5 (2.3%)	No treatment	5 (2.3%)	Irrelevant response	5 (2.2%)
Irrelevant response	4 (1.9%)	Specialist	5 (2.4%)	Chiropractor	3 (1.3%)	Acupuncture	3 (1.4%)	Wait and see	5 (2.3%)	Immobilisation	4 (1.8%)
Specialist	2 (0.9%)	Taping/bracing	5 (2.4%)	Hydrotherapy	3 (1.3%)	Taping/bracing	3 (1.4%)	Compression	3 (1.4%)	Diet	3 (1.3%)
Chiropractor	1 (0.5%)	Immobilisation	4 (1.9%)	Irrelevant response	3 (1.3%)	Diet	1 (0.5%)	Natural or unknown therapies	3 (1.4%)	Manipulation	2 (0.9%)
Compression	1 (0.5%)	Chiropractor	2 (1.0%)	Natural or unknown therapies	3 (1.3%)	Hydrotherapy	1 (0.5%)	Acupuncture	2 (0.9%)	Second opinion	2 (0.9%)
Ergonomics/posture	1 (0.5%)	Compression	2 (1.0%)	Prayer/hope/meditation	2 (0.9%)	Immobilisation	1 (0.5%)	Elevation	2 (0.9%)	Wait and see	2 (0.9%)
Good mattress	1 (0.5%)	Diet	2 (1.0%)	Taping/bracing	2 (0.9%)	Manipulation	1 (0.5%)	Taping/bracing	2 (0.9%)	Natural or unknown therapies	1 (0.4%)
Natural or unknown therapies	1 (0.5%)	Time off work	2 (1.0%)	Time off work	2 (0.9%)	Pain clinic	1 (0.5%)	Electrotherapy	1 (0.5%)	Osteopathy	1 (0.4%)
Taping/bracing	1 (0.5%)	Cognitive behavioural therapy	1 (0.5%)	Acupuncture	1 (0.4%)	Natural or unknown therapies	1 (0.5%)	Emergency department/hospital	1 (0.5%)	Prayer/hope/meditation	1 (0.4%)
Time off work	1 (0.5%)	Manipulation	1 (0.5%)	Compression	1 (0.4%)	Osteopathy	1 (0.5%)	Ergonomics/posture	1 (0.5%)	Specialist	1 (0.4%)
Cognitive behavioural therapy	0 (0.0%)	Second opinion	1 (0.5%)	Elevation	1 (0.4%)	Prayer/hope/meditation	1 (0.5%)	Hydrotherapy	1 (0.5%)	Taping/bracing	1 (0.4%)
Diet	0 (0.0%)	Electrotherapy	0 (0.0%)	Emergency department/hospital	1 (0.4%)	Second opinion	1 (0.5%)	Manipulation	1 (0.5%)	Stay healthy	1 (0.4%)
Electrotherapy	0 (0.0%)	Elevation	0 (0.0%)	Ergonomics/posture	1 (0.4%)	Specialist	1 (0.5%)	Prayer/hope/meditation	1 (0.5%)	Cognitive behavioural therapy	0 (0.0%)
Elevation	0 (0.0%)	Emergency department/hospital	0 (0.0%)	Immobilisation	1 (0.4%)	Time off work	1 (0.5%)	Specialist	1 (0.5%)	Compression	0 (0.0%)

Emergency department/hospital	0 (0.0%)	Ergonomics/posture	0 (0.0%)	Osteopathy	1 (0.4%)	Cognitive behavioural therapy	0 (0.0%)	Time off work	1 (0.5%)	Electrotherapy	0 (0.0%)
Immobilisation	0 (0.0%)	Good mattress	0 (0.0%)	Stay healthy	1 (0.4%)	Compression	0 (0.0%)	Stay healthy	1 (0.5%)	Elevation	0 (0.0%)
Manipulation	0 (0.0%)	Hydrotherapy	0 (0.0%)	Cognitive behavioural therapy	0 (0.0%)	Electrotherapy	0 (0.0%)	Cognitive behavioural therapy	0 (0.0%)	Emergency department/hospital	0 (0.0%)
Pain clinic	0 (0.0%)	Pain clinic	0 (0.0%)	Diet	0 (0.0%)	Elevation	0 (0.0%)	Diet	0 (0.0%)	Ergonomics/posture	0 (0.0%)
Osteopathy	0 (0.0%)	Natural or unknown therapies	0 (0.0%)	Good mattress	0 (0.0%)	Emergency department/hospital	0 (0.0%)	Good mattress	0 (0.0%)	Good mattress	0 (0.0%)
Prayer/hope/meditation	0 (0.0%)	Osteopathy	0 (0.0%)	Manipulation	0 (0.0%)	Ergonomics/posture	0 (0.0%)	Pain clinic	0 (0.0%)	Hydrotherapy	0 (0.0%)
Second opinion	0 (0.0%)	Prayer/hope/meditation	0 (0.0%)	Pain clinic	0 (0.0%)	Good mattress	0 (0.0%)	Osteopathy	0 (0.0%)	Pain clinic	0 (0.0%)
Stay healthy	0 (0.0%)	Stay healthy	0 (0.0%)	Second opinion	0 (0.0%)	Stay healthy	0 (0.0%)	Second opinion	0 (0.0%)	Time off work	0 (0.0%)

N: number of participants.