Physiotherapists use of and perspectives on the importance of patient-reported outcome measures for shoulder dysfunction

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Abstract

Background: Many patient-reported outcome measures (PROs) for shoulder dysfunctions have acceptable psychometric properties. The present study examined current PRO usage and perceived importance.

Methods: Delegates at the 2010 International Congress of Shoulder and Elbow Therapists were invited to participate in this cross-sectional observational study. Research Electronic Data Capture (REDCap) web-based tools were used to design an online questionnaire, which was e-mailed to participants.

Results: Participants ($n = 101$) reflected an 84% response rate. PRO use was considered 'extremely' or 'very' important by the majority of clinicians (76%) and researchers (98%). Most commonly used as a primary outcome by clinicians and researchers, respectively, were the Disabilities of the Arm Shoulder Hand Questionnaire (DASH) (40%, 44%) and the Oxford Shoulder Scale (OSS) (36%, 22%) and, as secondary outcomes, the DASH (33%, 28%), OSS (17%, 8%), the Shoulder Pain and Disability Index (SPADI) (8%, 18%), and American Shoulder and Elbow Surgeons standardized assessment form (ASES) (8%, 13%). Psychometric properties were rated as 'extremely' or 'very' important by 86% to 96% of participants.

Conclusions: The majority of shoulder therapists consider PRO use to be very important and psychometric properties to be critical in PRO selection. The DASH, OSS, SPADI and ASES are most commonly used in clinical practice and research studies.

Keywords

Outcome, questionnaire, shoulder, survey

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Introduction

Evidence for the effectiveness of some common interventions for musculoskeletal shoulder dysfunctions is inconclusive. Meta-analyses of clinical trials^{1–3} for shoulder dysfunctions have reported difficulty in pooling data because of the inconsistent use of outcome measures across clinical trials. Development of clinical practice guidelines has also been impeded by the lack of consistent use of outcome measures across clinical trials. There is no established consensus amongst clinicians and researchers with respect to a core set of outcome measures recommended for use in the assessment of shoulder dysfunctions. Clinicians and researchers use a wide variety of outcome measures that include clinically-based measures of body structure and function

(impairments) and patient-reported outcome measures (PROs), which measure activity limitations and participation restrictions (functional loss and disability).⁴

Clinically-based impairment measures do not capture what is important to the patient because they do not measure the impact that shoulder dysfunction has

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on an individual's ability to perform activities of daily living, work and recreation.⁵ Evidence suggests that patients can reliably report the impact of a shoulder condition on their health status on personally relevant outcomes.⁶ PROs capture information about the impact on aspects of physical, emotional and social functioning resulting from a musculoskeletal shoulder condition.⁵

PROs take the form of questionnaires comprised of a fixed number of items, in which patients rate their health status using Likert scales or visual analogue scales. Answers are tallied to produce a summary score, which is intended to represent the impact of shoulder pain and dysfunction on an individual's health-related quality of life, with respect to activity limitations and participation restrictions. Studies^{7–10} comparing the performance of commonly used shoulder or upper extremity region-specific PROs have identified at least five measures [Disabilities of the Arm, Shoulder and Hand questionnaire (DASH), Oxford Shoulder Score (OSS), Shoulder Pain and Disability Index (SPADI), American Shoulder and Elbow Surgeons standardized assessment form (ASES), and Simple Shoulder Test] with accumulating evidence for the psychometric properties of validity, reliability, responsiveness and practicality across a range of shoulder conditions. The evidence suggests these PROs have psychometrics that are sufficient to evaluate the health status at a single point in time and assess change over time to determine treatment effectiveness.^{7–10}

There are a large number of psychometrically assessed and validated shoulder-specific, upper extremity region-specific and shoulder disease-specific PROs. This presents a challenge in the evidence-based selection of PROs.¹¹ The clinician and researcher alike asks 'which PRO should I use to assess shoulder activity limitations and participation restrictions?' The present study aimed to identify current usage and perceived importance of shoulder or upper extremity region-specific PROs with acceptable psychometric properties in the assessment of musculoskeletal shoulder dysfunctions to inform future clinical practice and research studies. Specifically, the aims of this cross-sectional observational study were to elicit the opinions of physiotherapists about the importance of PROs, the current usage of PROs in clinical practice and research, and the importance of psychometric criteria in PRO selection for patients with shoulder dysfunctions.

Materials and methods

Design

The study comprised a cross-sectional observational study.

Subjects

Delegates at the International Congress of Shoulder and Elbow Therapists (ICSET) in April 2010 were asked if they would like to participate in a survey about the use of PROs for shoulder dysfunctions. All attendees at the ICSET meeting were asked to take part to gain a wide range of perspectives from physiotherapists who were clinicians and researchers. Individuals provided their contact details, as an expression of interest to participate in a study designed to identify current use of validated shoulder or upper extremity region-specific PROs for musculoskeletal shoulder dysfunctions. An investigator (LAM) contacted the 130 delegates who expressed an interest in participating in the study to verify the accuracy of e-mail addresses provided; any invalid accounts or duplicates, or non-physiotherapists ($n = 10$) were removed. An invitation to take part in the study, together with an (e)link to the online questionnaire was then sent to 120 eligible participants. Consent was obtained prior to completion of the questionnaire to ensure that participation was fully informed and voluntary. Potentially eligible participants were also assured that data would be kept securely and confidentially, in accordance with relevant data protection legislation. During the sampling period (November 2011 to January 2012) participants received a maximum of three reminders requesting to complete the survey. If the electronic data capture system indicated that a survey was incomplete, a reminder was sent to complete the survey.

Procedures

A survey was developed to capture individual perspectives of PROs.¹² A web-based survey was created to allow optimal access for all international participants. Face-to-face or telephone interviews were considered impractical as was the burden of administering or completing a postal questionnaire. The survey was designed to: (i) capture information on participants' professional profiles; (ii) determine how important PROs are to participants; (iii) identify current use of the shoulder or upper extremity region-specific PROs in clinical practice and research; (iv) identify the importance of psychometric and practical criteria when selecting a PRO; and (v) identify any other important issues from the participant's perspective. The 16 closed-ended and four open-ended questions were developed from a review of the literature. An 'other' category and free text boxes were used where appropriate to allow for detailed responses. The questionnaire (see supplemental data Doc. S1) and list of twelve shoulder or upper extremity region-specific PROs with acceptable psychometric properties detailed in the survey (see supplemental data Doc. S2).

Study data were collected and managed using REDCap electronic data capture tools.¹³ REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: (i) an intuitive interface for validated data entry; (ii) audit trails for tracking data manipulation and export procedures; (iii) automated export procedures for seamless data downloads to common statistical packages; and (iv) procedures for importing data from external sources.

Statistical analysis

Anonymized numerical survey data, collated by REDCap were downloaded as an Excel file (Microsoft Corp., Redmond, WA, USA). The number of responses (*n*) per question was tallied and frequency counts (%) for single selections or multiple selections if permitted, or for counts based on a sub-section of participants (i.e. by clinicians and researchers), were reported descriptively. Reliability of the data was enhanced through peer review. Data are presented graphically, supported by explanatory text, using the participants' own words where appropriate, to increase the credibility of the findings.

Results

Recruitment and retention

Of the 130 subjects screened, 120 were sent the survey via an e-mail link. One hundred and one participants completed the survey, representing an 84% response rate and a drop-out rate of 16% (*n* = 19).

Professional profile of participants

Participants were from 16 countries, with the majority (55%; *n* = 78) being from the UK. The majority of participants were licensed as a physiotherapist for more than 10 years (78%; *n* = 79), working in public or state system (68%; *n* = 69), postgraduate degree of a masters or doctorate (75%; *n* = 76). Less than one-quarter (18%; *n* = 18) were engaged as a lecturer or full-time researcher. When multiple responses permitted, the majority of participants (95%; *n* = 96) reported to be primarily engaged in clinical practice, and half (50%; *n* = 50) reported that they were engaged in research activities. The majority (70%; *n* = 71) spent 50% or more of their time treating patients with shoulder conditions and, of these, 41% (*n* = 42) spent three quarters or more of their time in clinical practice. Participant characteristics are summarized in Table 1.

Use of PROs in clinical practice and research

The clear majority of participants engaged in clinical practice (76%) and the researchers (98%) reported that the use of PROs was 'extremely important' or 'very important', as described in Table 2. No-one engaged in clinical practice or research considered that PROs were of no importance. An open-ended question asked participants to detail the main reasons for using PROs in clinical practice and research, and the results are summarized in Table 3. Both clinicians and researchers reported using PROs to establish the effectiveness of interventions, implement evidence-based practice or improve health outcomes and to include views of the patient. Clinicians also perceived that PROs provided structure to clinical practice and were a useful tool for communication. In addition, researchers also considered it important to establish the validity and reliability of the PROs.

The type of outcome measure (i.e. pain scales, shoulder disability questionnaires, global rating of shoulder function scales, patient-specific functional indices, health-related quality of life indices, and global rating of overall change/global perception of effect scales) reported to be used is summarized in Figure 1. Pain scales and shoulder-specific scales are those most commonly used by both clinicians and researchers. No additional types of scales were identified when 'other' was selected (6%; *n* = 14).

The use of shoulder or upper extremity region-specific PROs as a primary outcome measure in clinical practice and research is summarized in Table 4. Almost all clinicians (91%) and researchers (94%) reported using one or more validated shoulder or upper extremity region-specific functioning/disability PROs. The most commonly used PROs as primary outcomes by clinicians (*n* = 96) and researchers (*n* = 50) respectively, were the DASH or QuickDASH (40%, 44%) and the OSS (36%, 22%). Most commonly cited in the expanded 'other' category (*n* = 27) were the Japanese Orthopaedic Association Shoulder Evaluation Tool (4%; *n* = 1), the Western Ontario Shoulder Instability Index (19%; *n* = 5), the Oxford Shoulder Instability Score (15%; *n* = 4) and the Constant Murley Score (12%; *n* = 3). A large majority of clinicians (73%) and researchers (85%) reported using one or more validated shoulder or upper extremity region-specific functioning/disability PROs as secondary outcomes (Table 5). Clinicians and researchers, respectively, reported using the DASH (33%, 28%), OSS (17%, 8%), SPADI (8%, 18%) and ASES (8%, 13%). Only two additional validated shoulder functioning/disability questionnaires (SDQs) were identified in the expanded 'other' category (*n* = 33): the Oxford Shoulder Instability Score (12%; *n* = 4) and the Constant Murley Score (52%; *n* = 17).

Table 1. Professional profile of participants.

Variable	Number (n) and frequency (%) of responses	
Country of origin		
UK	n = 56	(55%)
Europe	n = 22	(22%)
USA	n = 10	(10%)
South America	n = 6	(6%)
Australia	n = 4	(4%)
South Africa	n = 1	(1%)
Japan	n = 1	(1%)
Canada	n = 1	(1%)
Time licenced as a physical therapist		
≤ 10 years	n = 22	(22%)
11 years to 20 years	n = 41	(40%)
21 years to 30 years	n = 30	(30%)
> 30 years	n = 8	(8%)
Main area of employment		
Public/State Healthcare System	n = 69	(68%)
Lecturer/Researcher/Practitioner	n = 15	(15%)
Private Practice/Private Healthcare System	n = 12	(12%)
Research	n = 3	(3%)
Other – not specified	n = 2	(2%)
Highest level of postgraduate education achieved		
Masters level	n = 56	(55%)
Doctoral level	n = 20	(20%)
Postgraduate Diploma/Certificate	n = 16	(16%)
None	n = 9	(9%)
Proportion of time spent treating patients with shoulder conditions		
0% to 24%	n = 18	(18%)
25% to 49%	n = 12	(12%)
50% to 74%	n = 29	(29%)
75% to 100%	n = 42	(41%)

(continued)

Table 1. Continued.

Variable	Number (n) and frequency (%) of responses	
Level of engagement in clinical practice and/or research*		
Clinical practice	n = 96	(95%)
Research	n = 50	(50%)

*Multiple responses permitted.

Table 2. Importance placed on the use of patient-reported outcome measures by clinicians and researchers.*

Level of importance	Number (n) and frequency (%) of responses			
	Clinicians		Researchers	
Extremely important	n = 28	(29%)	n = 42	(84%)
Very important	n = 45	(47%)	n = 7	(14%)
Quite important	n = 17	(18%)	n = 2	(2%)
Slightly important	n = 6	(6%)	n = 0	(0%)
Not at all important	n = 0	(0%)	n = 0	(0%)

*Multiple responses permitted.

Table 3. Main reasons for using patient-reported outcome measures in clinical practice and research.*

Reason for using patient-reported measures	Number of responses (n)	
	Clinical practice	Research
Establish effectiveness of interventions/implementation evidence-based practice/improve health outcomes	46	15
Provide structure to clinical practice	43	0
Validate practice by including views of patients	31	18
Communication tool	21	0
Validate professional practice	12	0
Clinical audit tool	10	0
Objective measure of subjective information	8	5
Established validity and reliability of measures	3	12
Practicality	6	3
Correlation of subjective/objective information	5	3
Standardize the assessment of outcome	3	4

*Multiple responses permitted.

Figure 1. Types of patient-reported outcome measures currently used in clinical practice and research. SDQ, shoulder functioning/disability questionnaire; GRF, global rating of shoulder function scale; PSFI, patient-specific functional indices; HRQoL; health-related quality of life indices; GROC/GPE, global rating of overall change/global perception of effect scales.

Table 4. Primary outcome use of shoulder or upper extremity region-specific functioning/disability questionnaires in clinical practice and research.

Shoulder functioning/disability questionnaire (first author, date of publication)	Frequency of responses (%)	
	Clinical practice	Research
Disabilities of the Arm, Shoulder and Hand Questionnaire (Hudak, 1996) ¹⁴	40%	44%
Oxford Shoulder Score (Dawson, 1996) ¹⁵	36%	22%
Shoulder Pain and Disability Index (Roach, 1991) ¹⁶	4%	12%
Penn Shoulder Score (Leggin, 2006) ¹⁷	4%	8%
American Shoulder and Elbow Surgeon's Scale (Richards, 1994) ¹⁸	3%	4%
Simple Shoulder Test (Lippitt, 1993) ¹⁹	3%	0%
Upper Limb Functional Index (Gabel, 2006) ²⁰	1%	4%
Other*	4%	6%
None	5%	0%

*Other ($n=27$): One additional validated shoulder functioning/disability questionnaire (SDQ), the Japanese Orthopaedic Association Shoulder Evaluation Tool (4%; $n=1$), and six disease-specific SDQs, most commonly the Western Ontario (19%; $n=5$) and Oxford (15%; $n=4$), shoulder instability scores.

The importance of psychometric properties and practicality aspects in the evidence-based selection of PROs is summarized in Figure 2. Reliability (96%), interpretability of change scores (90%), relevance of content (89%), practicality (89%) and responsiveness

(86%) were rated as 'extremely' or 'very' important criterion in PRO selection. A small minority of participants (10% to 14%) rated the criteria as 'quite', 'slightly', or 'not at all' important. Open-ended questions related to other criteria used in PRO selection or

Table 5. Secondary outcome use of shoulder or upper extremity region-specific functioning/disability questionnaires in clinical practice and research.*

Shoulder functioning/disability questionnaire (first author, date of publication)	Number (n) and frequency (%) of responses			
	Clinical practice, n (%)		Research, n (%)	
Disabilities of the Arm, Shoulder and Hand Questionnaire (Hudak, 1996) ¹⁴	n = 35	(33%)	n = 17	(28%)
None	n = 20	(19%)	n = 2	(3%)
Oxford Shoulder Score (Dawson, 1996) ¹⁵	n = 18	(17%)	n = 5	(8%)
American Shoulder and Elbow Surgeon's Scale (Richards, 1994) ¹⁸	n = 9	(8%)	n = 8	(13%)
Other†	n = 9	(8%)	n = 7	(12%)
Shoulder Pain and Disability Index (Roach, 1991) ¹⁶	n = 8	(8%)	n = 10	(18%)
Simple Shoulder Test (Lippitt, 1993) ¹⁹	n = 3	(3%)	n = 4	(7%)
Shoulder Disability Questionnaire (UK) (Croft, 1994) ²¹	n = 2	(2%)	n = 2	(3%)
Upper Limb Functional Index (Gabel, 2006) ²⁰	n = 1	(1%)	n = 1	(2%)
Penn Shoulder Score (Leggin, 2006) ¹⁷	n = 1	(1%)	n = 2	(3%)
Shoulder Rating Questionnaire (L'Insalata, 1997) ²²	n = 0	(0%)	n = 2	(3%)

*Multiple responses permitted.

†Other (n = 33): One additional disease-specific shoulder functioning/disability questionnaire, the Oxford shoulder instability score (12%; n = 4)

Figure 2. Importance placed on the psychometric properties of measures in the evidence-based selection of patient-reported outcome measures.

the assessment of outcome for shoulder dysfunction. Responses often related to the practicality of PROs (36%; n = 35), measurement properties (25%; n = 25), standardization of the assessment of shoulder

dysfunctions (11%; n = 11) and measurement of meaningful outcomes for patients (7%; n = 7). Also reported was the importance of the readability and comprehension (12%; n = 12) and cultural adaptability (9%; n = 9)

of PROs. A typical comment was that ‘questions involving activities such as gardening and playing golf are not useful in my country’.

In the free text boxes (Questions 40–41), some participants ($n=3$) considered a patient-based approach to the assessment of outcome for shoulder dysfunctions important to ‘reflect current trends in patient centred care’. Of importance to participants was that the questionnaires assess relevant and meaningful outcomes for patients, including physical and psychosocial well-being and participation in daily activities and work ($n=4$), noting the usefulness of patient-specific questionnaires, where patients generate the content, in terms of ease of administration and relevance to patients ($n=3$). Some participants ($n=12$) considered it important that PROs should be short ($n=6$) and quick and easy to use ($n=6$), typically noting that ‘it should be able to be completed by the patient without assistance from the clinician’. Other practical issues included the ability to administer a PRO either face-to-face, on the telephone or by post ($n=6$). Some participants ($n=3$) observed that PRO selection may be ‘a trade-off between different measurement properties’ and detailed concerns ($n=5$) about the lack of information on the responsiveness of measures, as well as the interpretability of change scores, typically commenting ‘there is no indication as to what is a significant change in score with the majority of PROs’. Some participants ($n=3$) highlighted the need ‘to adopt a standardized approach’ to the assessment of outcome for shoulder dysfunctions; others ($n=4$) commented on the importance of ensuring that time used collecting data is well spent and others ($n=4$) also noted that use of the same PROs in published studies would enable the results of research to be more easily compared.

Discussion

The present study is the first of its type to determine the current use and importance of shoulder and upper extremity region-specific PROs for a large number of experienced shoulder physiotherapists, comprised of both clinical practitioners and researchers. Almost all of the clinicians and researchers reported using one of the specified validated shoulder or upper extremity functional loss/disability focused PRO. We found that the DASH or QuickDASH, OSS, SPADI and ASES are the most common shoulder or upper extremity region-specific PROs currently used as a primary or secondary outcome in clinical practice and research. Clinicians and researchers alike reported that psychometric properties of reliability, interpretability of change scores, relevance of content and responsiveness, along with practical properties, are critical in PRO selection. The large majority indicated that PROs are

important to use in clinical practice and research. This information provides a crucial first step towards gaining a formal consensus on a core set of PROs recommended for the standardized assessment of musculoskeletal shoulder dysfunctions in clinical practice and research.

Professional profile of participants

Our participants represented physiotherapists from sixteen countries, across five continents attending a shoulder congress. However the majority were from Europe, with 55% being from the UK, which would indicate that the study findings are most generalizable to clinical practice and research in the UK. Moreover, these results are most generalizable to physiotherapists licensed for over 10 years and awarded a postgraduate degree or educated to at least a Masters level. Almost all of the participants (95%) were engaged in clinical practice, with the main area of employment being the public/state healthcare system, and the majority (70%) were likely to spend 50% or more of their time treating patients with shoulder conditions. However, half of clinical practitioners were also engaged in research activities, which included those employed in an academic environment as a lecturer/researcher/practitioner. Only three (3%) participants cited research as their main employment.

We did not specify criteria for ‘experienced shoulder therapists’. Studies that have elicited the opinions of expert rehabilitation professionals to gain a consensus^{23,24} suggests that they are likely to be experienced physiotherapists who hold a postgraduate degree, and work primarily as a clinician in the public/state healthcare sector. They are also likely to spend half or more of their time treating patients with shoulder conditions, indicating specialization. Participants in this large sample had very similar characteristics.

Shoulder region-specific PROs currently used in clinical practice and research

The majority of participants were engaged in clinical practice, with only 3% citing research as their main employment. Half of the clinicians (50%; $n=50$) also reported being involved in research activities, reflecting overlapping roles. The majority of clinicians and researchers consider the use of PROs to be ‘extremely’ or ‘very’ important in the assessment of shoulder conditions, with no-one answering that PROs are ‘not at all’ important. Given the opportunity to detail, in the free text boxes, the most common reasons given by clinicians for using PROs in rank from highest to lowest frequency of response was to measure the efficacy of treatment to improve health outcomes, provide

structure to clinical practice, validate clinical practice by including patients' perspectives, and to validate therapy to third parties. Clinical practice managers can use this information to formulate educational sessions and mentoring opportunities for clinicians to enhance and increase the use of PROs in the daily management of patients. Researchers also reported using PROs to acquire patients' perspectives to provide an objective method of reporting outcomes, and considered it important to establish the validity and reliability of measures to be able to measure intervention efficacy.

Currently, pain scales and self-report measures of shoulder functioning and disability are most commonly used by both clinicians (pain scales: 29%; $n=77$; self-report measures: 27%; $n=70$) and researchers (pain scales: 26%; $n=41$; self-report measures: 26%; $n=42$), respectively, and no additional validated scales were identified in the 'other' category by clinicians or researchers. This would appear to indicate that patient perspective is perceived to be the most relevant 'stakeholder' when evaluating the outcomes of care and reporting health outcomes to other stakeholders, including third-party payers.

The vast majority of clinicians (91%) and researchers (94%) reported using one or more of the specified validated shoulder or upper extremity region-specific functioning/disability PROs. The four most common shoulder PROs used as a primary and/or secondary outcome measure in clinical practice and in research were the DASH or QuickDASH, OSS, SPADI and ASES. We did not set out to determine current usage of disease-specific shoulder PROs (i.e. rotator cuff disease) or scales that included clinician-rated measures of shoulder impairment. In the expanded 'other' category, six disease-specific or combined impairment measure were identified; however, none are commonly used by our participants in clinical practice or research.

Psychometric properties

Participants were queried on the relative importance of the criteria of relevance of content, reliability, responsiveness, interpretability of change scores, and practicality when selecting a PRO for clinical practice or research. Existing evidence⁸⁻¹⁰ shows that the DASH or QuickDASH, OSS, SPADI and ASES have established psychometric properties. When selecting a PRO for use, psychometric properties and practicality aspects were deemed 'extremely' or 'very' important by 86% of clinicians and 96% of researchers. The psychometric properties were not defined in the survey, and this may partly explain why responsiveness criteria had the lowest importance scores, with 14% of participants considering responsiveness to be 'quite important', 39% 'very important' and 47% 'extremely

important'. This is quite interesting because our clinical experience informs us that the most common use of PROs is to determine change over time. A PRO needs to be responsive to measure change over time. Potentially, the meaning of responsiveness was not realized as a result of a complementary component of this aspect (i.e. the 'interpretability of change scores'), which was rated as 'very' or 'extremely important' by the majority of participants.

Only 3% of clinicians and researchers considered that measurement properties of reliability and responsiveness were 'not' or 'slightly' important when selecting a PRO. This may suggest that these participants do not use these measures in clinical decision-making about their patients, and in particular may not judge change over time. Of interest is the small minority of our participants (10% to 14%) indicating 'quite', 'slightly' or 'not at all' for the importance of PROs in clinical practice. This correlates with our finding that a minority of our clinicians do not use a shoulder-specific PRO as a primary (5%) or secondary (19%) outcome. This may partly be the result of a lack of understanding of the use of PROs, or more practical reasons such as time constraints for use or calculating the PRO scores. Again, this highlights a need for education and mentoring opportunities for clinical practice managers on the use of PROs.

Free text boxes enabled four issues raised elsewhere in the survey to be expanded upon. Of note is comments that questionnaires should assess relevant and meaningful outcomes for patients, including emotional and social well-being, as well as participation in daily activities and work, and existing evidence does suggest that, although the content of individual measures may vary, overall, the DASH or QuickDASH, OSS, SPADI and ASES do conceptualize the assessment of shoulder pain from a biopsychosocial perspective.²⁵ Two additional issues, specifically the readability and comprehension and cross-cultural adaptability of PROs, were also raised. Validation studies should therefore address issues of readability and comprehension and cross-cultural adaptability to ensure that measures are equally relevant and meaningful for all patient groups and subgroups in countries of the globe.

Limitations

The present study has a number of limitations and the results may be prone to selection bias. Our participants may not be representative of all shoulder physiotherapists. Another limitation was that it was not possible to estimate a response rate *a priori* because the sample was self-selecting. However, the excellent response rate of 84% would suggest that the use of an anonymous web-based interface demonstrated a willingness to

participate without undue influence from more dominant members to give socially desirable responses, which can play a significant role in face-to-face meetings.²⁶ Because the survey was self-report, it cannot be assumed that participants had similar level of understanding of the meaning of the different psychometric properties of PROs. Physiotherapists were expressly asked what measures they currently use and not what they think should be used; however, it is possible that being presented with a list of shoulder or upper extremity region-specific PROs may have resulted in selection bias. Analysis of data in the expanded 'other' category did not appear to indicate bias because very few respondents indicated other PROs currently used. Questions were designed to gain the perspectives of physiotherapists on the current use of PROs and not to statistically compare usage between PROs or participant type (clinician or researcher). Future studies should consider involving experienced shoulder therapists from around the world, orthopaedic surgeons and physicians, and researchers with relevant publications.

The findings of the present study provide important new knowledge on the current use of shoulder and upper extremity region-specific PROs for the assessment of shoulder dysfunctions in clinical practice and research. The next step is to use this information, first, to aid the development of recommendations for a core set of PROs, which should be used for the standardized assessment of shoulder dysfunctions in clinical practice and research studies, and, second, to address gaps in existing knowledge on the measurement properties of reliability, responsiveness and practicality of PROs and the interpretation of change scores, across different shoulder populations and clinical and research contexts, aiming to facilitate the evaluation of health status at a single point in time or change over time.

Conclusions

In the present study, we have elicited the opinions and preferences of a large number of experienced shoulder therapists and determined that PROs are very commonly used and considered very important in the evaluation and treatment of patients with shoulder conditions. We found that the DASH or QuickDASH, OSS, SPADI and ASES, which have established psychometric properties in a range of shoulder conditions, were identified as the most commonly used SDQs in clinical practice and research. These findings can be used to aid the development of a consensus on a core set of PROs for shoulder dysfunctions for use by both clinicians and researchers. Consistent use of such a core set of outcome measures across clinical trials will facilitate the pooling of data in future meta-analyses and the development of clinical practice

guidelines, which is integral to the provision of patient centred, evidence-based healthcare.

Declaration of conflicting interests

None declared

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Supplemental material

The online data supplements are available at <http://sel.sagepub.com/supplemental>. Doc. 1 Questionnaire and Doc. S2 Patient reported outcome measures detailed in the survey.

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