

The range of the Oxford Shoulder Score in the asymptomatic population: a marker for postoperative improvement

F Younis, J Sultan, S Dix, PJ Hughes

Royal Preston Hospital, UK

ABSTRACT

INTRODUCTION The Oxford Shoulder Score (OSS) is a validated scoring system used to assess the degree of pain and disability caused by shoulder pathology. To date there is no knowledge of the range of the OSS in the healthy adult population. This study aimed to establish the range in asymptomatic individuals.

METHODS The OSS of 100 asymptomatic volunteers was compared with the preoperative OSS of 100 symptomatic individuals who had had elective shoulder surgery performed at the Royal Preston Hospital.

RESULTS The difference in mean scores in the operated group (36.7) and the asymptomatic group (15.3) was statistically significant ($p < 0.0001$). There was, however, a substantial overlap between the scores of the two groups (operated group range: 19–55, asymptomatic group range: 12–47). Factors such as age, sex, body mass index, co-morbidities and smoking did not have a statistically significant impact on the eventual score in the asymptomatic group.

CONCLUSIONS This study has established the range of OSS in the asymptomatic adult population. Symptom scores can only be used effectively when the range in the asymptomatic population is known. This is so that disease severity can be gauged in the context of the normal population and postoperative improvements can be forecast more accurately.

KEYWORDS

Oxford Shoulder Score – Patient reported outcome measures – Asymptomatic group – Operated group

Accepted 25 August 2011

CORRESPONDENCE TO

Jawad Sultan, Department of Orthopaedics, Royal Preston Hospital, Sharoe Green Lane, Fulwood, Preston, Lancashire, PR2 9HT
T: +44 (0)1772 716 565; E: jsultan@hotmail.co.uk

It is believed that the prevalence of shoulder pain in the UK is 7% overall, rising to 26% in the elderly.^{1,2} Referrals for shoulder pain comprise a substantial portion of the orthopaedic outpatient workload. Besides the foreseeable impact this has on the health service, shoulder pathology can be very disabling for the patient. The socioeconomic implications are also pronounced as the majority of patients afflicted by shoulder pain are middle-aged and ill health in this group results in lost working hours.⁵

The management of shoulder problems is complex and centred on alleviating symptoms. In the current climate where patients are generally better informed, it is imperative for surgeons to have the tools at their disposal to demonstrate the efficacy of their interventions. This need has coincided with a multitude of quality of life measures becoming available for assessing health status and outcomes of healthcare interventions.⁴

Outcome measures in orthopaedics have historically been reliant on clinical and radiological parameters judged by the surgeon. There has, however, been a recent shift, with outcome measures becoming more patient orientated, recognising the contrasting priorities of the patient and the

surgeon. Despite the disparity, patient-based assessment tools have been shown to provide accurate judgements of treatment outcomes.^{5,6}

There are a number of questionnaires that are appropriate for use in assessing both pain and disability in shoulder pathology. These include the Constant Shoulder Score, the Oxford Shoulder Score (OSS), the Stanford Health Assessment Questionnaire and the Medical Outcomes Study Short Form-36 questionnaire (SF-36®). A scoring system must be valid, reliable, sensitive to change and practical to use.⁶ Shoulder-specific scoring systems have been shown to be more sensitive to significant differences in outcomes than more general scores.^{2,7} It is the policy of our department to use the OSS.

The OSS was designed to assess the outcome of all shoulder surgery with the exception of instability surgery. It contains 12 items, each with 5 potential answers. A mark between 1 (best/fewest symptoms) and 5 (worst/most severe) is awarded to correspond to the patient's symptoms. The combined total gives a minimum score of 12 and a maximum of 60. A higher score implies a greater degree of disability.⁸ In 2009 the scoring method for the OSS was

Table 1 Oxford Shoulder Score using the old and new scoring systems^{7,8}

No.	Question (During the past four weeks...)	Answers	Score (old)	Score (new)
1	How would you describe the worst pain you had from your shoulder?	None Mild Moderate Severe Unbearable	1 2 3 4 5	4 3 2 1 0
2	Have you had any trouble dressing yourself because of your shoulder?	No trouble Little trouble Moderate trouble Extreme difficulty Impossible to do	1 2 3 4 5	4 3 2 1 0
3	Have you had any trouble getting in and out of a car or using public transport because of your shoulder?	No trouble Little trouble Moderate trouble Extreme difficulty Impossible to do	1 2 3 4 5	4 3 2 1 0
4	Have you been able to use a knife and fork – at the same time?	Yes, easily Little difficulty Moderate difficulty Extreme difficulty No, impossible	1 2 3 4 5	4 3 2 1 0
5	Could you do household shopping on your own?	Yes, easily Little difficulty Moderate difficulty Extreme difficulty No, impossible	1 2 3 4 5	4 3 2 1 0
6	Could you carry a tray containing a plate of food across the room?	Yes, easily Little difficulty Moderate difficulty Extreme difficulty No, impossible	1 2 3 4 5	4 3 2 1 0
7	Could you brush/comb your hair with the affected arm?	Yes, easily Little difficulty Moderate difficulty Extreme difficulty No, impossible	1 2 3 4 5	4 3 2 1 0
8	How would you describe the pain you usually had from your shoulder?	None Very mild Mild Moderate Severe	1 2 3 4 5	4 3 2 1 0
9	Could you hang your clothes up in the wardrobe using the affected arm?	Yes, easily Little difficulty Moderate difficulty Extreme difficulty No, impossible	1 2 3 4 5	4 3 2 1 0
10	Have you been able to wash and dry yourself under both arms?	Yes, easily Little difficulty Moderate difficulty Extreme difficulty No, impossible	1 2 3 4 5	4 3 2 1 0
11	How much has the pain from your shoulder interfered with your usual work (including housework)?	Not at all A little bit Moderately Greatly Totally	1 2 3 4 5	4 3 2 1 0
12	Have you been troubled by pain from your shoulder in bed at night?	No nights Only 1–2 nights Some nights Most nights Every night	1 2 3 4 5	4 3 2 1 0
Total best score			12	48
Total worst score			60	0

modified so that each of the 12 items is scored from 4 (best/fewest symptoms) to 0 (worst/most severe). The total score therefore ranges from 48 to 0, with a lower score indicating a greater degree of disability.⁷ Table 1 shows the OSS with the two scoring methods. For the purposes of this paper, the

original scoring system with a maximum of 60 for a higher degree of disability was used.

The use of the patient-based OSS as an outcome measure has been shown to be more stable over time than the Constant score, which is based in part on surgeon assessment.^{4,7}

Procedure	Number (n)	Mean preoperative OSS
Arthroscopic subacromial decompression	45	35.8
Arthroscopic rotator cuff repair	23	36.7
Arthroscopic ACJ excision	7	40.0
Arthroscopic capsular release	5	34.2
Copeland resurfacing	5	42.8
Arthroscopic biceps tenotomy/tenodesis	3	25.3
Arthroscopic debridement	3	42.7
Manipulation under anaesthesia	3	33.0
Open rotator cuff repair	2	42.0
ACJ reconstruction (Weaver–Dunn procedure)	2	32.0
Open excision of lateral end of clavicle	1	53.0
Diagnostic arthroscopy	1	43.0
Total	100	36.7

ACJ = acromioclavicular joint

Using the OSS, the success of an intervention is judged by the relative improvement from the preoperative score as well as the absolute postoperative score approaching the minimum of 12. At present there is no knowledge of the baseline score of the OSS in the asymptomatic population.

One of the perceived advantages of using a joint-specific score such as the OSS is that it allows it to be as sensitive to the disability from the shoulder as possible and to be influenced as little as possible by other co-morbidities ('noise').⁷ It is assumed that an asymptomatic individual would score near the minimum of 12, taking into consideration that a 'normal' score may be somewhat more than 12 in elderly patients.⁷ However, if this is not the case and the baseline score in the asymptomatic population is in fact higher, our attitude towards what constitutes a severe score and our expectations of postoperative improvements may alter. This is to say that a postoperative score is expected to approach the baseline rather than the minimum score of 12.

Work is currently underway to use the OSS to categorise patients into mild, moderate and severe groups.⁷ For this to be accurate, the 'normal' baseline score should be defined. With this in mind, our study was designed to assess the baseline range of the OSS in the asymptomatic population.

Methods

Two equal groups, the asymptomatic group and the operated group, were compared. The asymptomatic group was recruited from visitors and hospital staff at our institution with no prior diagnosis or treatment of a shoulder problem. The eventual cohort of 100 was derived from 150 consecutive participants; 27 were excluded for a prior diagnosis or treatment of a shoulder problem and a further 23 were excluded for incomplete data. Every participant in the asymptomatic group completed an OSS questionnaire by a stand-

ardised interview technique. In addition to the standard questionnaire, details on age, sex, body mass index (BMI), smoking and past medical history were included. This was in an attempt to establish the impact of these factors on the eventual value of the OSS in this group. The questionnaire was approved by the Patient Advisory Liaison Service prior to its use in the hospital.

A comparable cohort of 100 individuals was recruited into the operated group. This comprised 100 consecutive patients with confirmed shoulder pathology who underwent elective shoulder surgery under the care of the senior author over a period of 7 months. Patients who underwent surgery for instability were excluded as these were scored using the Oxford Shoulder Instability Score. The preoperative OSS of the patients in this group was collected using the same standardised interview technique and questionnaire. The mean preoperative OSS in the operated group was compared to that in the asymptomatic group. A Mann–Whitney U test was used to determine the statistical significance of any difference in the scores.

Results

The asymptomatic group contained 36 men and 64 women, of which 17 were smokers. The operated group consisted of 45 men and 55 women. The operative procedures performed for these individuals are detailed in Table 2.

The difference between the mean OSS of the asymptomatic group (15.3) and the operated group (36.7) was found to be statistically significant ($p < 0.0001$). Despite this, there was considerable overlap of the range of scores in the two respective groups (12–47 in the asymptomatic group, 19–55 in the operated group). This indicates that patients with scores as little as 19 may be suitable candidates for surgery

Table 3 Mean Oxford Shoulder Score (OSS) defined by age range in the asymptomatic and operated groups

Age (years)	Asymptomatic group		Operated group	
	Number (n)	Mean OSS	Number (n)	Mean OSS
<35	18	14.8	9	34.2
35–44	10	17.8	13	37.5
45–54	21	15.0	28	35.6
55–64	27	15.4	33	37.0
≥65	24	14.8	17	38.4

whereas some with scores as high as 47 may have no apparent symptoms.

The scores of both groups were stratified by age. In addition, in the asymptomatic group the scores were stratified by sex, smoking status, BMI and presence of co-morbidities (Tables 3 and 4). This was in an attempt to illicit the impact of these factors on the eventual scores in the asymptomatic group. No statistically significant difference in the mean scores was detected in any of the above groups.

In the asymptomatic group, the mean OSS for men was 14.75 compared with 15.60 for women ($p=0.98$). It was 18.82 in smokers and 14.58 in non-smokers ($p=0.06$). Twenty-seven individuals had one or more medical co-morbidities that included renal failure, asthma, chronic obstructive pulmonary disease, dermatological condition (eczema, psoriasis), heart disease (ischemic, arrhythmia, valve disease), diabetes, thyroid disease, cerebrovascular accident, epilepsy, depression and cancer (breast). The difference in the mean OSS between asymptomatic individuals with co-morbidities and those without was statistically insignificant. Co-morbidity subgroup analysis was not possible due to the small numbers.

Discussion

Patient reported outcome measures (PROMs) have become an integral part of virtually all disciplines of orthopaedics. Their emergence and increased uptake has been fuelled by the emphasis on practising evidence-based medicine. Orthopaedic surgeons have traditionally relied on clinical and radiological parameters as principle outcome measures. However, these scoring systems may require the surgeon to review the patient and can be labour intensive. The other disadvantages of such scores are that they are susceptible to bias and may not always be representative of the patient's views. Subjective PROMs were primarily designed to augment the use of clinical and conventional measures of outcome. However, in circumstances where objective measures are either unavailable or impractical to use, they have become instrumental primary measures of outcome. PROMs have also been shown to have good medium-term reliability in assessing outcome following shoulder surgery.^{5,7}

Despite the unquestionable value of PROMs, we feel that knowledge of the range of these scores in the asymptomatic

Table 4 Mean Oxford Shoulder Score (OSS) defined by body mass index in the asymptomatic group

Body mass index (kg/m ²)	Mean OSS
<20	16.6
20–24	14.6
25–29	14.2
≥30	15.7

population would enhance their reliability. To our knowledge, little has been done to evaluate the range of orthopaedic PROMs in asymptomatic individuals. The reason for this may well be that it has been assumed that asymptomatic individuals will accumulate the minimum score. However, work on scoring systems in otolaryngology and indeed the research we have carried out has clearly demonstrated that this is not the case.⁹ The work done by Walker and White using the International Conference on Sinus Disease scoring system for rhinosinusitis showed that the average score in asymptomatic adults was greater than the minimum score and that there was substantial overlap between the scores of symptomatic and asymptomatic individuals.⁹

We can only speculate about the reasons for our findings. It is possible that there is a background incidence of shoulder pathology in the general population that never requires medical intervention. This may be the case in young sports players or manual workers or, at the other extreme of age, occult arthritis that has not been diagnosed or treated. Alternatively, the presence of less specific questions in the OSS survey such as on ability to carry a tray across a room or sleep disturbance may generate greater than minimum scores. This is to say that individuals may struggle to carry a tray across a room or have sleep disturbed for a number of other reasons and may misinterpret the emphasis on the shoulder limiting such activities.

Our study also attempted to establish the effect of various confounding variables such as age, sex, BMI and co-morbidities on the OSS of asymptomatic individuals. None of these factors appeared to have a statistically significant impact on the eventual score. Nevertheless, there was a difference between the scores of smokers (18.82) and non-smokers (14.58) ($p=0.06$). This may be due to the fact that smokers in general are less healthy and more likely to have other medical conditions. Despite this, co-morbidities such as diabetes, ischaemic heart disease, cerebrovascular accidents or asthma did not appear to have a statistically significant impact on the scores.

Conclusions

The numbers in our study were small and recruitment of a higher number of individuals into the asymptomatic group coupled with an objective method for establishing normality prior to participation may have provided superior results. Nevertheless, this study has shown that the scores in the general population are not the minimum of 12 as would be

expected. This knowledge is instrumental in gauging the severity of a patient's symptoms, especially if patients are to be categorised into groups according to the severity of their symptoms as measured by the OSS. In addition, the knowledge of the baseline OSS is helpful in managing a patient's expectations during preoperative counselling and in measuring the return to normality postoperatively.

References

1. Chard MD, Hazleman R, Hazleman BL *et al*. Shoulder disorders in the elderly: a community survey. *Arthritis Rheum* 1991; **34**: 766–769.
2. Dawson J, Hill G, Fitzpatrick R, Carr A. Comparison of clinical and patient-based measures to assess medium-term outcomes following shoulder surgery for disorders of the rotator cuff. *Arthritis Rheum* 2002; **47**: 513–519.
3. Urwin M, Symmons D, Allison T *et al*. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis* 1998; **57**: 649–655.
4. Amadio PC. Outcomes measurements. *J Bone Joint Surg Am* 1993; **75**: 1,583–1,584.
5. Dawson J, Hill G, Fitzpatrick R, Carr A. The benefits of using patient-based methods of assessment. *Medium-term results of an observational study of shoulder surgery*. *J Bone Joint Surg Br* 2001; **83**: 877–882.
6. Fitzpatrick R, Fletcher A, Gore S *et al*. Quality of life measures in health care. I: Applications and issues in assessment. *BMJ* 1992; **305**: 1,074–1,077.
7. Dawson J, Rogers K, Fitzpatrick R, Carr A. The Oxford shoulder score revisited. *Arch Orthop Trauma Surg* 2009; **129**: 119–123.
8. Dawson J, Fitzpatrick R, Carr A. Questionnaire on the perceptions of patients about shoulder surgery. *J Bone Joint Surg Br* 1996; **78**: 593–600.
9. Walker FD, White PS. Sinus symptom scores: what is the range in healthy individuals? *Clin Otolaryngol Allied Sci* 2000; **25**: 482–484.