

SHOULDER

The Oxford Shoulder Score: Cross-cultural adaptation and translational validation into Afrikaans

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Abstract

Purpose: The Oxford Shoulder Score (OSS) is a robust and universally utilised shoulder score that has been translated for use in Western and Asian countries. This study aimed to translate, cross-culturally adapt and psychometrically validate the Afrikaans version of the OSS for use in Africa.

Methods: Translation and cross-cultural adaptation was performed in accordance with guidelines in the literature. One-hundred-and-eight consecutive patients with either degenerative or inflammatory pain of the shoulder were prospectively enrolled. Patients were evaluated by completing the Afrikaans OSS, Constant-Murley, quickDASH, and the Subjective Shoulder Value (SSV) scores. Comprehensibility and acceptance, as well as any floor or ceiling effects, were calculated. Reliability was assessed through reproducibility. Internal consistency was assessed using Cronbach's alpha. Validity was determined using a Pearson correlation coefficient between the Afrikaans OSS and the other validated shoulder scores.

Results: Comprehensibility and acceptance were excellent, and no floor or ceiling effects were observed. Reproducibility ($r=0.99$) and internal consistency (Cronbach's alpha = 0.93) were both excellent. Correlation of the Afrikaans OSS with the Constant-Murley and quickDASH was excellent ($r=0.84$; $r=0.81$ respectively), and very good with the SSV and Visual Analogue Scale (VAS) pain score ($r=0.73$; $r=0.66$).

Conclusion: The Afrikaans OSS proved understandable, acceptable, reliable and valid. It is an appropriate instrument for use in Afrikaans-speaking patients with shoulder pain from degenerative or inflammatory origin.

Level of evidence: Level 3

Key words: Patient Reported Outcome Measure (PROM); Oxford Shoulder Score (OSS); shoulder pain; Afrikaans; questionnaire; cross-cultural; quality of life; psychometrics; rotator cuff disease

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Introduction

Shoulder pain from inflammatory or arthritic disease is a disabling condition, with an incidence of 7% in the general population rising to about 20% in the elderly.^{1,2} Most studies on shoulder pain have been conducted in developed countries,³ but the burden of musculoskeletal disease does not escape low-to-middle income countries.⁴ In these regions, manual labour consists commonly of high-risk work for shoulder pathology such as repetitive work, working with hands above shoulder height, carrying heavy loads, and operating vibrating tools.⁴⁻⁷

With specific reference to shoulder pain, the Oxford Shoulder Score (OSS) is a joint-specific patient-reported outcome measure (PROM) to assess patient perception about their shoulder pain and its effect on their quality of life. It has been translated into and validated in numerous European and Asian languages,^{5,6,8-13} reflecting its robustness and universal acceptability. It is yet to be translated into and validated in any African language.

Afrikaans is the most spoken language in the western half of South Africa, with 50% of the Western Cape population speaking it as a first language, and the total number speaking it totalling almost seven million people.^{14,15} With increased emphasis on randomised controlled trials to provide adequate answers to clinical questions,¹⁶ and the difficulty in acquiring sufficient patient numbers without multicentre international collaboration,¹⁷ the aim of this study was to translate and cross-culturally validate the OSS into Afrikaans to enable appropriate assessment of our patient populations' shoulder pain, and increase its universal applicability.

Methods

The study was conducted in three distinct phases. The first phase involved the translation of the OSS, followed by a pilot study, run to assess comprehension and suitability of the translated questionnaire. Lastly a definitive prospective trial was undertaken.

Translation

Translation was performed in accordance with guidelines in the literature.^{16,18,19} Due to the wide variety of dialects spoken among the various ethnic groups, emphasis on understanding and simplicity of concept over grammatical correctness was requested.

Three bilingual speakers independently translated the OSS into Afrikaans. Each person had a medical background and at least a university level degree of education. A single translated version was then agreed upon by consensus decision. Three different translators then back translated this version into English. Following this, a final version was agreed upon, again at consensus, which matched the original version of the OSS (*Appendix* - see end of article). The translated OSS was piloted on ten consecutive bilingual patients presenting to the upper limb outpatient clinic with shoulder pain. Comprehension of 11 of the 12 questions was perfect. One question required adjustment of one word to a more colloquial form to facilitate easier understanding. All patients completed the questionnaire in less than six minutes and none described the test as difficult or onerous.

Validation study

A total of 108 consecutive patients were prospectively recruited via the upper limb outpatient clinic of a tertiary care hospital in Cape Town, from July to November 2015.

Patients were included if they were over 18 years of age; were able to read, write and speak both English and Afrikaans; and had shoulder pain arising from inflammatory, degenerative or post-traumatic causes. Patients with shoulder pain from instability, as well as literacy and language difficulties, were excluded.

Each patient first completed the translated OSS, followed by the quickDASH²⁰ (which had a Visual Analogue Scale [VAS] pain score included), Subjective Shoulder Value (SSV)²¹ and Constant-Murley Shoulder Assessment.²² The clinical assessment of the Constant-Murley Score was administered by a single researcher, under the guidance of and following a training session with the head of the Shoulder Unit.

Patient-specific outcome scores

Oxford Shoulder Score

The OSS is a shoulder-specific PROM devised for use in patients with degenerative or inflammatory conditions thereof. It elucidates both the degree and frequency of pain, and its impact on shoulder-related activities of daily living (ADLs). There are 12 questions, graded in the original paper on a Likert scale from 1 to 5, with a range of 60 (worst) to 12 (best) score.² This was later revised to a more intuitive 0 to 4 scale, with a range from 0 (worst) to 48 (best).²³ It is simple to administer, validated, consistent,²⁴ sensitive to clinical changes, and reliable.^{2,23,25}

QuickDASH -11 Score

The quickDASH score consists of 11 questions, each graded 1 to 5. For each question one selection is made, representing the score as felt by the patient over the last week. The scores are then summed, and mathematically manipulated to a score out of 100.²⁰ This abbreviated version of the more comprehensive DASH score is reliable, valid and responsive to change.^{26,27}

A VAS score, rating pain level with activity, but not specifying the duration, was also recorded with the quickDASH. The scale was from 0 (no pain) to 10 (worst pain).

Subjective Shoulder Value

The Subjective Shoulder Value (SSV) is a patient estimation of the function in their afflicted shoulder, relative to their completely normal shoulder, expressed as a percentage.²¹

Constant-Murley Score

This shoulder scoring system is a combination of subjective (patient-reported – three questions) and objective (clinician-based – five measurements) assessment, adding to a total out of 100. Of the subjective questions, one examines the pain severity and two determine the effect on ADLs (maximum 35 points). The objective measurements involve four questions assessing range of shoulder motion (maximum 40 points), and a last question evaluating abduction force as measured in pounds by a spring scale.²²

Statistical analysis

Sample size calculation

An a priori power calculation, setting alpha at 0.05 and the power at 80%, defined a need for at least 44 patients. This assumed a population mean of 24.9 for the OSS (SD 9.0),²³ a minimal clinically important difference of half the standard deviation,²⁸ and a postulate sample mean to be within 2 points of the population mean. Despite an acceptable power with only

44 patients, most other studies, in accordance with Terwee et al.'s recommendations,²⁵ included more than 100 patients when translating and validating the OSS into their native language.^{5,8-10}

Comprehensibility, acceptance and time

Comprehensibility and acceptance were assessed by compliance via the number of questions answered or omitted. No more than two questions may be omitted for the questionnaire to be valid, and if any single question had two or more answers, we adhered to the convention of adopting the worse score for recording.²³ The time taken for the patient to complete the OSS was recorded.

Floor and ceiling effects

Floor and ceiling effects were also determined to assess whether there was any bias introduced at the extremes of the scores.¹⁹ If more than 15% of the respondents achieve either the highest or lowest score, these effects are present.²⁹ This limits content validity, as discrimination is lost at the limits of the scale.

Reliability

Reliability is a measure of stability⁸ of a test. It consists of a measure of both *reproducibility* and *internal consistency*. The American Society for Testing and Materials (ASTM) recommends both a qualitative statement of the test set-up and a quantitative statement of precision, when assessing the reliability of a measurement tool where the accepted reference values are not known or exactly defined for the population.^{30,31}

This precision in questionnaires involves test-retest reproducibility. It was measured by contacting the first 40 patients telephonically between 24 and 48 hours of their consult, to again complete the Afrikaans OSS. A Pearson correlation coefficient (r) was used to determine the correlation between these overall test scores. Pearson correlation coefficients may range from -1 (inverse correlation) to 1 (perfect correlation), with values nearing 0 indicating very poor correlation.^{9,10} Further, a Bland Altman plot was calculated to determine the test-retest score consistency relative to the overall mean, across the range of scores.³²

Internal consistency was determined by calculating Cronbach's alpha. It defines the correlation between all the items within a scale.⁸ Values may range from 0 to 1, with 0.90-0.95 optimal for clinical application.³³ Values above 0.95 indicate items are too similar and may be redundant.

Validity

Validity is a qualitative characteristic that may be described according to face, content, criterion and construct.³⁴ Validity of face exists in that the OSS is ostensibly a questionnaire developed to assess patients' perceptions about their shoulder problems. Content validity was established in the original derivation of the OSS through exploratory interviews with patients', without 'imposing clinical assumptions' and ensuring complete understanding prior to questionnaire finalisation.²

Criterion validity cannot truly be determined as there is no universally accepted benchmark PROM for shoulder pain. Validity of construct was assessed by calculating the Pearson correlation between the Afrikaans OSS and the quickDASH, the VAS pain score, the SSV and the Constant-Murley score. The correlation was interpreted as poor, fair, moderate, very good and excellent when $r=[0.00-0.20]$, $r=[0.21-0.40]$, $r=[0.41-0.60]$, $r=[0.61-0.80]$ and $r=[0.80-1.00]$, respectively.³⁵

Ethics statement

The institutional Human Research Ethics Council gave approval for the study (HREC reference number 457/2014) and it was conducted in accordance with principles in the declaration of Helsinki (2013). Each patient gave written, informed consent prior to being enrolled.

Results

Translation

No major discrepancies were noted between translators in either the forward or backward translation of the OSS. Consensus agreement was reached easily.

Patient and questionnaire characteristics

All 108 patients who met the inclusion criteria participated and completed the questionnaires. Demographic data and pathology were recorded and are outlined in *Table I*.

Thirty-nine patients were pending planned surgery, 40 patients post-surgery (not within six weeks post-operatively) and 29 patients were being managed conservatively with no scheduled surgery.

Table I: Demographic data and diagnosis for the study population

Patients (n)	108
Mean age - years (±SD)	55 (13)
Age range - years	18-84
Male:female	49:59
Right - Left handed	105-3
Right - Left shoulder	69-39
Dominant shoulder	70
Diagnoses (%)	n (%)
Impingement syndrome with rotator cuff tear	27 (25)
Impingement syndrome without rotator cuff tear	17 (15.7)
Primary or secondary OA (glenohumeral or acromioclavicular)	33 (30.6)
Adhesive capsulitis	13 (12)
Calcified deposits in rotator cuff	3 (2.8)
Other diagnoses	15 (13.9)
Proximal humerus fracture or non-union	3 (2.8)
Chronic elbow dislocation with shoulder pain	3 (2.8)
Acute R/C tear and clavicle fracture	2 (1.9)
Traumatic suprascapular nerve palsy	2 (1.9)
ACJ dislocation with pain	1 (0.9)
Tuberculosis of the shoulder	1 (0.9)
No diagnosis	3 (2.8)

Table II: Mean ± SD and ranges for the scores of all the outcomes measures used

	Scores	
	Mean ± SD	Range
OSS	18.03±11.99	0-48
quickDASH	65.00±23.85	0-100
quickDASH pain VAS	7.03±2.39	0-10
Constant-Murley	35.26±21.48	0-96
SSV (%)	41.29±23.34	2-95

Comprehensibility, acceptance and time

No patients reported any difficulty with comprehension. Acceptance was excellent with all patients answering all the questions for the OSS, and only one patient omitting one question for the quickDASH. The mean time (min:sec) to complete the OSS was 4:09 (standard deviation [SD] ± 1:12). Overall absolute values, mean scores and the ranges are given in Table II.

Floor and ceiling effects

In the OSS dataset, the lowest possible score is 0 and the highest possible score is 48. Seven respondents achieved the lowest and only one achieved the highest, totalling 7.4% of all respondents. No floor or ceiling effects were thus present.

Reliability

The test-retest reproducibility for the 40 patients was very high (r=0.99). The mean difference between the questionnaires was 0.2 points (95% CI -0.31 to 0.43). The internal consistency was also high (Cronbach's alpha=0.93). Single question elimination did not drop the value significantly, with all items correlating (item total correlation ≥ 0.65) (Table III).

Table III: Mean scores and SDs for each question of the Afrikaans OSS, along with each item total correlation and measure of internal consistency

Question	Mean score (±SD)	Item total correlation	Cronbach's alpha (one item removed)
1	1.036±0.976	0.678	0.924
2	1.772±1.359	0.777	0.920
3	2.455±1.418	0.700	0.924
4	2.200±1.543	0.770	0.921
5	1.682±1.433	0.771	0.921
6	1.818±1.546	0.676	0.926
7	1.364±1.393	0.793	0.919
8	1.255±1.112	0.760	0.921
9	1.200±1.387	0.800	0.919
10	1.536±1.488	0.851	0.916
11	1.091±1.130	0.784	0.920
12	0.836±1.129	0.646	0.926

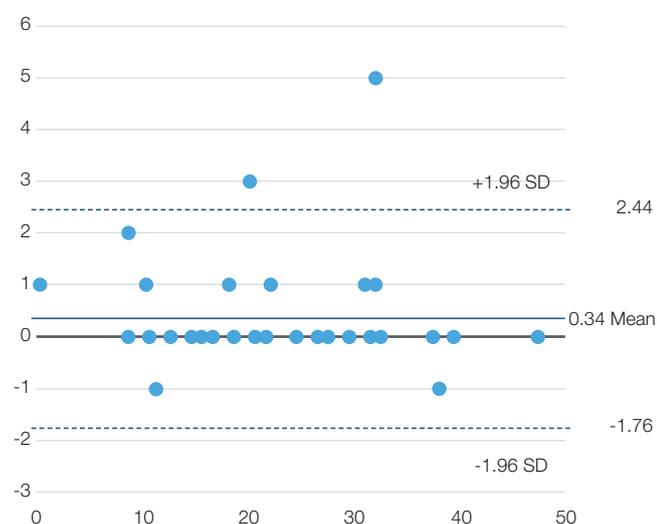


Figure 1. A Bland Altman plot of the differences between the 40 test-retest scores, plotted against the overall mean, across the range of scores achieved

A Bland Altman plot was calculated to indicate the differences between the test-retest scores, as plotted against the overall mean and across the range of scores (Figure 1).

Validity

Pearson correlation coefficients calculated between the Afrikaans OSS, the Constant-Murley, and the quickDASH were excellent (r=0.84 and 0.81 respectively), and very good for the SSV and the VAS pain score (0.73 and 0.66 respectively).

Discussion

Afrikaans was originally derived from Dutch and is now the first language for approximately seven million people in Southern Africa.¹⁵ It is a diverse language with multiple dialects and expressions within each dialect, which creates the potential for misunderstanding of questions. This was borne out in our study in the pilot phase, with one question requiring revision of a word 'kruideniersware' meaning 'groceries', to the more colloquial and direct translation of 'huishoudelike inkopies', meaning 'household shopping'. This was rectified for the definitive study, and the results indicate excellent acceptance and understanding, for all patients answered all questions, skipping none. This overall response rate of 100% was similarly high in comparison to other studies.⁸⁻¹²

The mean age of 55 years was approximately the same as that reported for other OSS translation study populations.⁸⁻¹² There was a slight female preponderance in our study (male:female, 49:59), which was similar to the Turkish¹¹ and Chinese¹² findings. The Dutch⁵ and German⁸ population had approximately equal numbers, with the Italian⁹ and Korean¹⁰ population having a strong male prevalence. This probably reflects the heterogeneity of shoulder pain from inflammatory or degenerative disease, without a specific sex-associated risk.^{36,37}

The mean time taken to complete the OSS (4 min 9 sec) was slightly longer than in other translations.^{8-10,12} This may reflect the patient population that we serve, for although the inclusion criteria mandated that patients were bilingual in both Afrikaans and English, many have only had access to a basic education possibly resulting in more time to read and complete the questionnaire.

The psychometric properties of the Afrikaans OSS were excellent across all measurements and compared favourably with other validation studies. The test-retest reproducibility was very high (r=0.99), and the internal consistency was excellent (Cronbach's alpha=0.93), indicating the translated OSS is reliable (Table IV).

By correlating the translated OSS with the Constant-Murley, the quickDASH, the SSV and a VAS pain score, construct validity was determined. All the comparative outcome scores are reliable and widely accepted outcome scores, and correlations between each were either 'very good' or 'excellent', demonstrating good construct validity. The Bland Altman plot of the differences against their means indicated no systematic bias across the range of scores.

The English (data from original paper), German, Italian, Dutch and Korean translations used the older OSS scoring system, while the Chinese and Turkish have adopted the newer, more intuitive scoring system. Absolute values for the scores give an indication of the severity of the patient's perception of their shoulder problem. With simple mathematical conversion, the standardised scores for comparison are given in Table V.

The mean score for the Afrikaans patients is at least 4.6 points below the mean of the lowest scoring population group compared. This is equal to a minimal clinically important difference for the OSS.²³ Reasons for this difference are likely to be due to access and our patient population. Low-income populations generally have inferior access to healthcare services.

Table IV: Overall mean values and standard deviations of the OSS for different translation studies^{2,5,8-12}

	Afrikaans (n=108)	Chinese (n=121)	English (n=111)	Dutch (n=103)	German (n=102)	Italian (n=140)	Turkish (n=84)	Korean (n=105)
OSS (mean & SD)	18.03±11.99	Not stated	36.3	32.5±9.5	27.34±10.42	36.05±13.95	22.58±9.88	25.6±7.3
Reliability								
Cronbach's alpha	0.93	0.92	0.89–0.92	0.92	0.94	0.95	0.92	0.91
ICC (95% CI)/Pearson's correlation coefficient	0.99	0.97 (0.94–0.98)	N/A	0.98	0.98	0.97	0.99	0.95 (0.91–0.98)
Construct validity								
Constant-Murley	0.84	0.66	0.74	0.64	0.60	0.73	N/A	0.3<r<0.6
quickDASH/DASH	0.81	N/A	N/A	N/A	N/A	N/A	N/A	>0.6
VAS (pain activity)	0.66	0.70	N/A	N/A	N/A	N/A	N/A	0.34–0.45

Table V: Standardised mean scores for the OSS for each language (range 0–48)

	Afrikaans (n=108)	Chinese (n=121)	English (n=111)	Dutch (n=103)	German (n=102)	Italian (n=140)	Turkish (n=84)	Korean (n=105)
OSS (mean)	18.0	Not stated	23.7	27.5	32.7	24.0	22.6	34.4

Patients often only seek help when it is direly needed due to prohibitive transport costs and long waiting times. This may result in perceived and 'real' differences in their shoulder pain, both from patient desperation for assistance with their shoulder and disease progression.

There are some limitations that merit discussion. Our patient cohort is only from a single centre. Although our drainage area is broad and encompasses a wide spectrum of Afrikaans dialects, it will not have included them all. Secondly, unlike many other studies that translated the OSS into their native languages,^{5,8,9,11,12} we chose not to use a generalised health assessment questionnaire when assessing construct validity. Although shoulder-specific pathology may not necessarily have direct impact on overall patient function and wellness,^{5,10} this would not reflect in our study. Lastly, we did not include a measure of sensitivity to change within the questionnaire, which would have aided assessment of responsiveness.

Conclusion

The Oxford Shoulder Score has been translated, cross-culturally adapted and validated into Afrikaans in this study. The questionnaire was easily comprehended and completed by all patients. Measures of stability and validity were robust in statistical analysis, with excellent internal consistency and construct validity in comparison to other shoulder outcome scores.

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Compliance with ethical standards

Ethical approval: The Human Research Ethics Committee (HREC) of the University of Cape Town approved the study prior to its implementation: HREC number 457/2014. A copy thereof is available from the corresponding author if required. All procedures performed in this study were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Appendix

Afrikaans Oxford Shoulder Score questionnaire

PROBLEME MET U SKOUER		Merk slegs een blokkie vir elke vraag (✓)				
1. Gedurende die afgelope 4 weke... Hoe sal u die ergste pyn van u skouer beskryf?	Geen <input type="checkbox"/>	Gering <input type="checkbox"/>	Matig <input type="checkbox"/>	Erg <input type="checkbox"/>	Onuithoudbaar <input type="checkbox"/>	
2. Gedurende die afgelope 4 weke... Het u enige probleme gehad om u self klere uit/aan to trek weens u skouer?	Geen probleme <input type="checkbox"/>	Effens moeilik <input type="checkbox"/>	Moeilik <input type="checkbox"/>	Baie moeilik <input type="checkbox"/>	Onmoontlik <input type="checkbox"/>	
3. Gedurende die afgelope 4 weke... Het u enige probleme gehad om in en uit motors te klim, of van publieke vervoer te gebruik weens u skouer?	Geen probleme <input type="checkbox"/>	Effens moeilik <input type="checkbox"/>	Moeilik <input type="checkbox"/>	Baie moeilik <input type="checkbox"/>	Onmoontlik <input type="checkbox"/>	
4. Gedurende die afgelope 4 weke... Was dit vir u moontlik om 'n mes en virk gelyktydig te gebruik?	Ja, maklik <input type="checkbox"/>	Met bietjie moeite <input type="checkbox"/>	Met moeite <input type="checkbox"/>	Met baie moeite <input type="checkbox"/>	Nee, onmoontlik <input type="checkbox"/>	
5. Gedurende die afgelope 4 weke... Kon u die huishoudelike inkopies op u eie gaan koop?	Ja, maklik <input type="checkbox"/>	Met bietjie moeite <input type="checkbox"/>	Met moeite <input type="checkbox"/>	Met baie moeite <input type="checkbox"/>	Nee, onmoontlik <input type="checkbox"/>	
6. Gedurende die afgelope 4 weke... Kon u 'n skinkbord met 'n bord kos daarop deur 'n kamer dra?	Ja, maklik <input type="checkbox"/>	Met bietjie moeite <input type="checkbox"/>	Met moeite <input type="checkbox"/>	Met baie moeite <input type="checkbox"/>	Nee, onmoontlik <input type="checkbox"/>	
7. Gedurende die afgelope 4 weke... Was dit moontlik om u hare te kam/borsel met die seer arm?	Ja, maklik <input type="checkbox"/>	Met bietjie moeite <input type="checkbox"/>	Met moeite <input type="checkbox"/>	Met baie moeite <input type="checkbox"/>	Nee, onmoontlik <input type="checkbox"/>	
8. Gedurende die afgelope 4 weke... Hoe sal u die pyn wat u gewoonlik in u skouer ervaar het, beskryf?	Geen <input type="checkbox"/>	Gering <input type="checkbox"/>	Matig <input type="checkbox"/>	Erg <input type="checkbox"/>	Onuithoudbaar <input type="checkbox"/>	
9. Gedurende die afgelope 4 weke... Was dit moontlik vir u om u klere in die kas op te hang met die seer skouer/arm?	Ja, maklik <input type="checkbox"/>	Met bietjie moeite <input type="checkbox"/>	Met moeite <input type="checkbox"/>	Met baie moeite <input type="checkbox"/>	Nee, onmoontlik <input type="checkbox"/>	
10. Gedurende die afgelope 4 weke... Was dit vir u moontlik om onder albei arms te was en af te droog?	Ja, maklik <input type="checkbox"/>	Met bietjie moeite <input type="checkbox"/>	Met moeite <input type="checkbox"/>	Met baie moeite <input type="checkbox"/>	Nee, onmoontlik <input type="checkbox"/>	
11. Gedurende die afgelope 4 weke... Tot watter mate het u skouer pyn/ongemak met u daaglikse werk (insluitend tuiswerk) u ingekort?	Glad nie <input type="checkbox"/>	Klein bietjie <input type="checkbox"/>	Matig <input type="checkbox"/>	Grootliks <input type="checkbox"/>	Heeltemal <input type="checkbox"/>	
12. Gedurende die afgelope 4 weke... Pla u skouerpyn u snags as u slaap?	Nee, geen aande <input type="checkbox"/>	Slegs een of twee aande <input type="checkbox"/>	Sommige aande <input type="checkbox"/>	Meeste aande <input type="checkbox"/>	Elke aande <input type="checkbox"/>	
Maak asseblief seker u het elke vraag beantwoord.						
Baie dankie.						

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