

Developing the Trafford Shoulder Score: A composite assessment tool for patients with shoulder Problems



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Background and Aim

- Multiple validated scoring systems exist in the shoulder:
 - Oxford Shoulder Score/DASH/Constant/Combined shoulder assessment
- Calculation of shoulder range of motion (ROM) is a vital part of identifying shoulder pathology
- Most ROM calculations are user dependent (Estimation/goniometer)
- MIRA rehab validated to accurately measure shoulder ROM (Wilson et al. 2017)

Aim

Develop a new composite shoulder score comprising a patient reported component and a kinematic component measured by new technology.



Methods

Phase 1



- Delphi process to identify core themes and long list of PROM's
- Patient Focus groups to refine and shortlist questions
- System Usability Score to assess user satisfaction of the new software (MIRA)

Phase 2



- 12 questions selected from Phase 1 to undergo psychometric analysis
- Patients from specialist shoulder clinic asked to complete PROMS/OSS
- Internal consistency, validity and reproducibility all assessed
- Definitive Trafford Shoulder score calculation agreed (60% PROM/40% ROM)

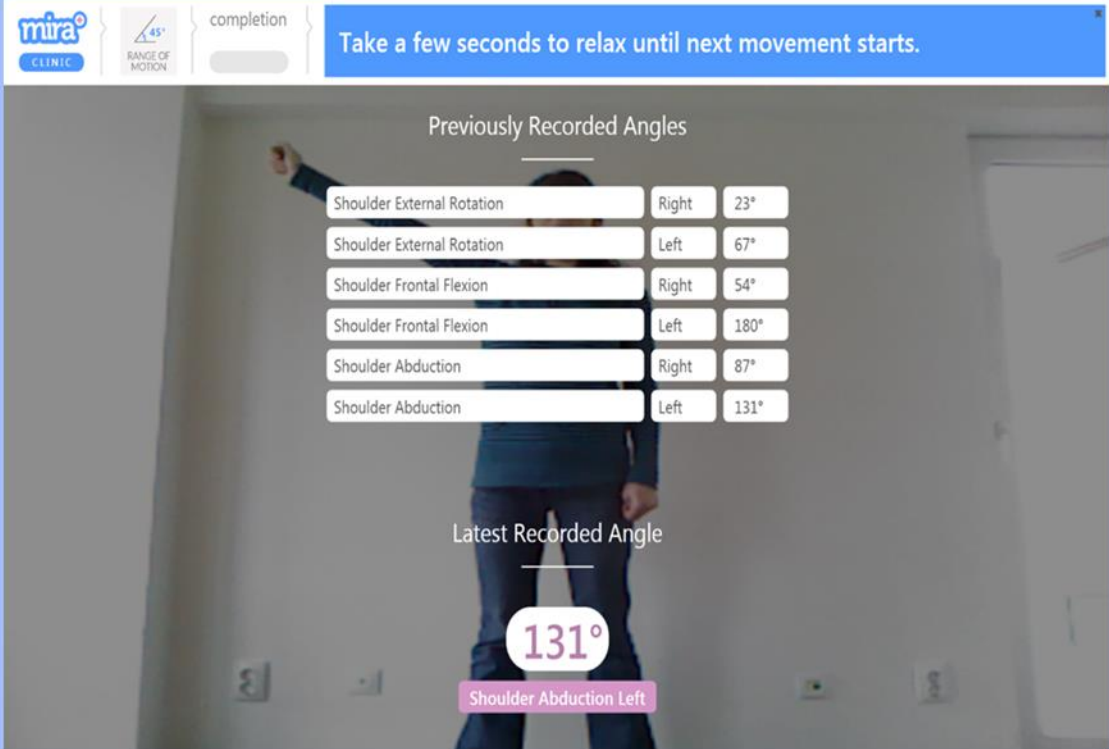
Phase 3

- Patients from both treatment arms of the GAME study were recruited to assess the clinical efficacy of the TSS
- Correlation with OSS assessed



PROMs and ROM Assessment

Trafford Shoulder Score PROM questions				
Please answer the following questions by circling the appropriate response.				
Q1 Over the last week, how painful has your shoulder been?				
unbearable	very painful	moderately painful	a little bit painful	not painful
Q2 Over the last week, has pain in your shoulder stopped you sleeping?				
every night	most nights	some nights	occasionally	never
Q3 Over the last week, has your shoulder problem stopped you from working?				
my shoulder always stops me	I can work but it's very painful	I can work but it's uncomfortable	I've changed the way I work because of my shoulder	I can work without a problem
Q4 Over the last week, has your shoulder problem made getting washed more difficult?				
my shoulder stops me completely	I can get washed but it's very difficult	I can get washed but it's quite difficult	I've changed the way I get washed because of my shoulder	I can get washed without a problem
Q5 Over the last week, have you needed painkillers for your shoulder?				
yes, I take strong painkillers like codeine, tramadol or morphine several times a day	yes, I take strong painkillers like codeine, tramadol or morphine most days	yes, I take normal painkillers like paracetamol or ibuprofen several times every day	yes, I take painkillers a few times a week	I don't take painkillers
Q6 Over the last week, has your shoulder problem made getting dressed more difficult?				
my shoulder always stops me completely	I can get dressed but it's very difficult	I can get dressed but it's quite difficult	I've changed the way I get dressed because of my shoulder	I can get dressed without a problem
Q7 Over the last week, has your shoulder problem made reaching a high shelf more difficult?				
my shoulder always stops me completely	I can reach a high shelf but it's very difficult	I can reach a high shelf but it's quite difficult	I've changed the way I reach a high shelf because of my shoulder	I can reach a high shelf without a problem
Q8 Over the last week, has your shoulder problem made opening a heavy door more difficult?				
my shoulder always stops me completely	I can open a heavy door but it's very difficult	I can open a heavy door but it's quite difficult	I've changed the way I open a heavy door because of my shoulder	I can open a heavy door without a problem
Q9 Over the last week, has your shoulder problem made hanging up clothes more difficult?				
my shoulder always stops me completely	I can hang up clothes but it's very difficult	I can hang up clothes but it's quite difficult	I've changed the way I hang up clothes because of my shoulder	I can hang up clothes without a problem
Q10 Over the last week, has your shoulder problem made grooming your hair more difficult?				
my shoulder always stops me completely	I can groom my hair but it's very difficult	I can groom my hair but it's quite difficult	I've changed the way I groom my hair because of my shoulder	I can groom my hair without a problem



The screenshot shows the mira CLINIC app interface. At the top, there's a 'completion' indicator and a blue instruction bar: 'Take a few seconds to relax until next movement starts.' Below this, a list of 'Previously Recorded Angles' is displayed:

- Shoulder External Rotation Right 23°
- Shoulder External Rotation Left 67°
- Shoulder Frontal Flexion Right 54°
- Shoulder Frontal Flexion Left 180°
- Shoulder Abduction Right 87°
- Shoulder Abduction Left 131°

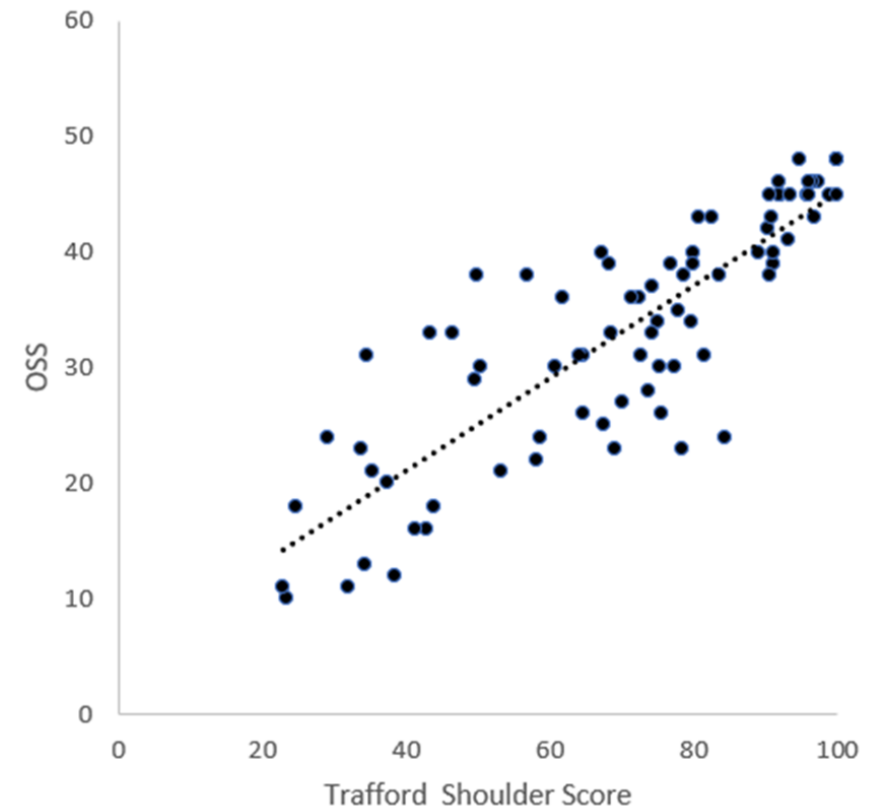
At the bottom, the 'Latest Recorded Angle' is shown as 131° for Shoulder Abduction Left. The background of the app shows a person standing in a room, with their arm raised to demonstrate the movement.



Results

- The overall SUS rate for the MIRA system was on the 74th percentile- deemed as 'above average/good'
- Cronbach's alpha for the PROMS score was **0.938** which is 'excellent'
- The new PROMs component was significantly correlated with the OSS
 - **$r(61) = 0.906, p=0.01$** .
- The test-retest analysis (**-0.8286**) indicated a slight negative bias (more pts required)
- Across both arms of the GAME study the OSS and TSS were **strongly** correlated
 - **$r(76) = 0.85, p < 0.001$**

Scatterplot of TSS versus OSS



Conclusions

- The Trafford Shoulder Score has high internal consistency and construct validity when compared with the Oxford Shoulder Score.
- To our knowledge this is the first scoring system in the literature to include a kinematic component that is not directly measured by the clinician.
- This has the potential to allow objective remote monitoring of a patient's response to treatment.
- Further work is required to assess the clinical responsiveness to change as well as the MCID for the score

