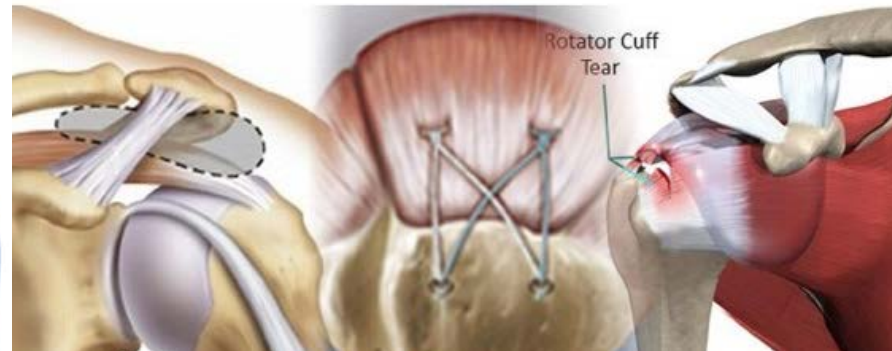




Cost-effectiveness analysis of arthroscopic rotator cuff repair surgery in Hong Kong using utility scores



TK Ma, Y Qiu, WH Yip, YB Wong, W Li
Sports Medicine & Arthroscopy Service,
Department of Orthopaedics & Traumatology,
Queen Elizabeth Hospital, Hong Kong SAR





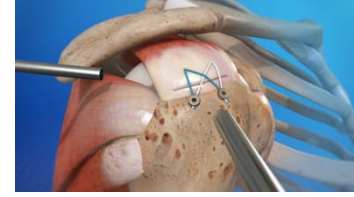
Objective

- Examine the **value** of arthroscopic rotator cuff repair (ARCR) for full-thickness tears from a societal perspective
- Through **cost effectiveness analysis** using utility scores
- Relating surgical costs to increase in **quality adjusted life-years (QALYs)**.





Introduction



- **Economic evaluation of surgical procedures necessary**
 - getting more **expensive**
 - newer **techniques**
 - increasingly cost-conscious health care environment
- **Rotator cuff tears - common orthopaedic disease**
 - impact on loss of earnings, missed workdays largely unknown
 - medical **costs** poorly documented
- **Examine value of ARCR from societal perspective in our centre**





Aims of Study



- Estimate **direct medical Cost** & potential **Cost savings** from ARCR
- Evaluate **Clinical effectiveness** of ARCR by assessing functional outcome & complication rate
- Describe **Cost effectiveness** & **Cost utility** data for ARCR in Hong Kong





Methodology

Worc

means

Western Ontario Rotator Cuff
Index

- An economic model was constructed in Microsoft Excel®, with patients undergoing arthroscopic rotator cuff tear for full thickness tears in QEH
- Clinical effectiveness measured by functional scores (**ASES & WORC**), the latter consisting of 5 subscales: Symptoms, Sports, Work, Lifestyle, Emotion
- The 12-Item Short-Form Health Survey derived from (**SF-36**), which includes 2 aggregate measures, the physical and mental components, derived from 8 subscales, was used to gauge the impact on QOL.
- Utility was first measured by changes in **SF-12** scores, which were converted into **utility scores**.





American Shoulder and Elbow Surgeons

Through educational programs and by encouraging research, the organization seeks to foster and advance the science and practice of shoulder and elbow care.

10) Is it difficult for you to wash your back/do up bra?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

12) Is it difficult for you to comb your hair?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

14) Is it difficult for you to lift 10lbs. (4.5kg) above your shoulder?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

16) Is it difficult for you to do your usual work?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

11) Is it difficult for you manage toileting?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

13) Is it difficult for you to reach a high shelf?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

15) Is it difficult for you to throw a ball overhand?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

17) Is it difficult for you to do your usual sport/leisure activity?

- Unable to do
- Very difficult to do
- Somewhat difficult
- Not difficult

The Total ASES score is:

Print page Close Window Reset

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NB: This page cannot be saved due to patient data protection so please print the filled in form before closing the window.





THE WESTERN ONTARIO ROTATOR CUFF INDEX (WORC)

Section A: Physical Symptoms INSTRUCTIONS TO PATIENTS

The following questions concern the physical symptoms you have experienced due to your shoulder problem. In all cases, please enter the amount of the symptom you have experienced in the last week. (Please mark your answers with a slash "/").

1. How much sharp pain do you experience in your shoulder?



2. How much constant, nagging pain do you experience in your shoulder?



3. How much weakness do you experience in your shoulder?



4. How much stiffness do you experience in your shoulder?



5. How much clicking, grinding or crunching do you experience in your shoulder?



6. How much discomfort do you experience in your neck because of your shoulder?



SECTION B: Sports/Recreation INSTRUCTIONS TO PATIENTS

The following section concerns how your shoulder problem has affected your sports or recreational activities in the past week. For each question, please mark your answers with a slash "/").

7. How much has your shoulder affected your fitness level?



8. How much has your shoulder affected your ability to throw hard or far?



9. How much difficulty do you have with someone or something coming in contact with your affected shoulder?



10. How much difficulty do you experience doing push-ups or other strenuous shoulder exercises because of your shoulder?

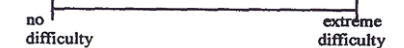


* On the actual form the lines are 100-mm long. This form is reproduced by permission of the Fowler Kennedy Sport Medicine Clinic

SECTION C: Work INSTRUCTIONS TO PATIENTS

The following section concerns the amount that your shoulder problem has affected your work around or outside of the home. Please indicate the appropriate amount for the past week with a slash "/").

11. How much difficulty do you experience in daily activities about the house or yard?



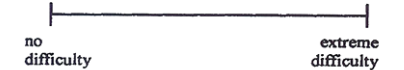
12. How much difficulty do you experience working above your head?



13. How much do you use your uninvolved arm to compensate for your injured one?



14. How much difficulty do you experience lifting heavy objects from the ground or below shoulder level?



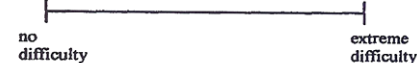
SECTION D: Lifestyle INSTRUCTIONS TO PATIENTS

The following section concerns the amount that your shoulder problem has affected or changed your lifestyle. Again, please indicate the appropriate amount for the past week with a slash "/").

15. How much difficulty do you have sleeping because of your shoulder?



16. How much difficulty have you experienced with styling your hair because of your shoulder?



17. How much difficulty do you have "roughhousing or horsing around" with family or friends?



18. How much difficulty do you have dressing or undressing?



SECTION E: Emotions INSTRUCTIONS TO PATIENTS

The following questions relate to how you have felt in the past week with regard to your shoulder problem. Please indicate your answer with a slash "/").

19. How much frustration do you feel because of your shoulder?



20. How "down in the dumps" or depressed do you feel because of your shoulder?

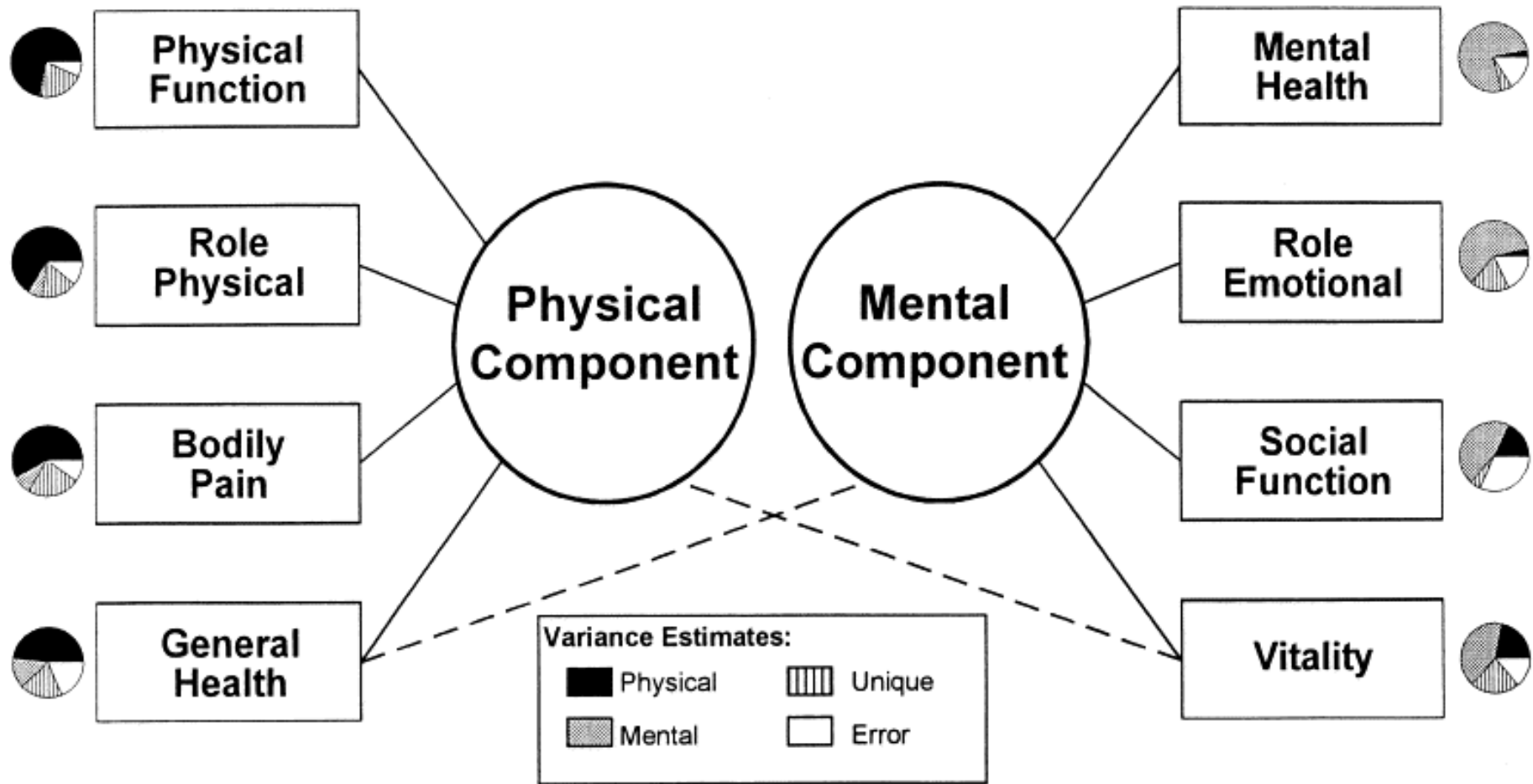


21. How worried or concerned are you about the effect of your shoulder on your occupation or work?





SF-12 生活質量評估系列量表





Methodology

Incremental Cost-Effectiveness Ratio (ICER)

$$\text{ICER} = \frac{(C_n - C_0)}{(\text{QALY}_n - \text{QALY}_0)}$$

- **Direct cost** estimates based on HA published data on charges for non-entitled persons and price quotation of the vendors for consumables.
- Cost for each procedure divided by weighted mean difference in functional outcome score to give cost-per-point change in outcome score and the **ICER**.
- **Indirect costs** estimated using government data and patient-reported occupation
- QOL Results expressed in quality-adjusted life-years (**QALYs**) and Hong Kong Dollars, after converting SF-12 scores into utility score, and then the QALY gained at 2 yrs.
- Both costs & outcomes were discounted at 3.5 % per year.





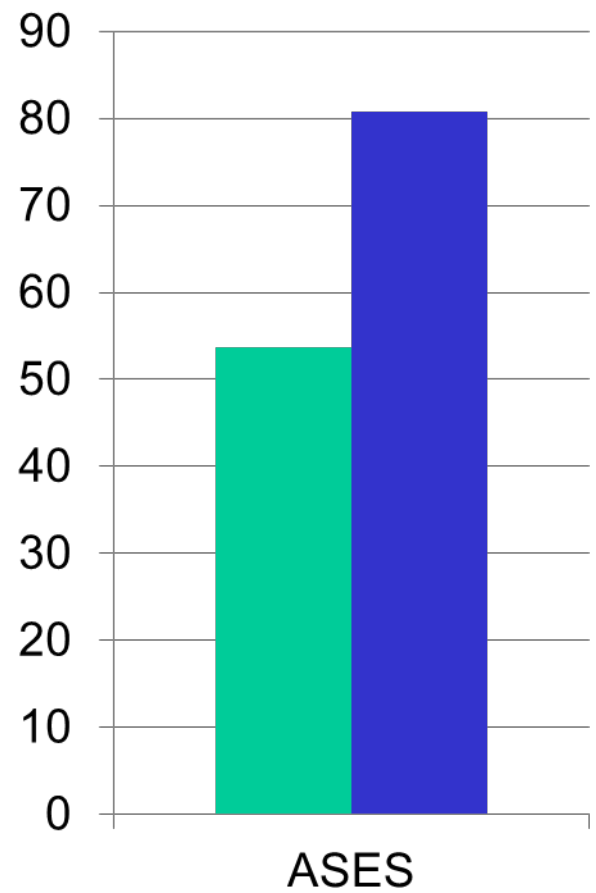
Materials

- **43 patients** who received ARCR for full-thickness tear at QEH between 2014 & 2015.
(Min. FU = 24 months)
- **M:F = 24:19**
- **Dominant arm in 55.8%**
- **Age : 37 To 73 (mean 55.1)**
- **Size of tear 0.8 to 5 cm (mean 1.9)**
- **Mean number of suture anchors: 1.35**
- **Time from onset of symptom to surgery : 4 to 25 Months (mean 9.2)**

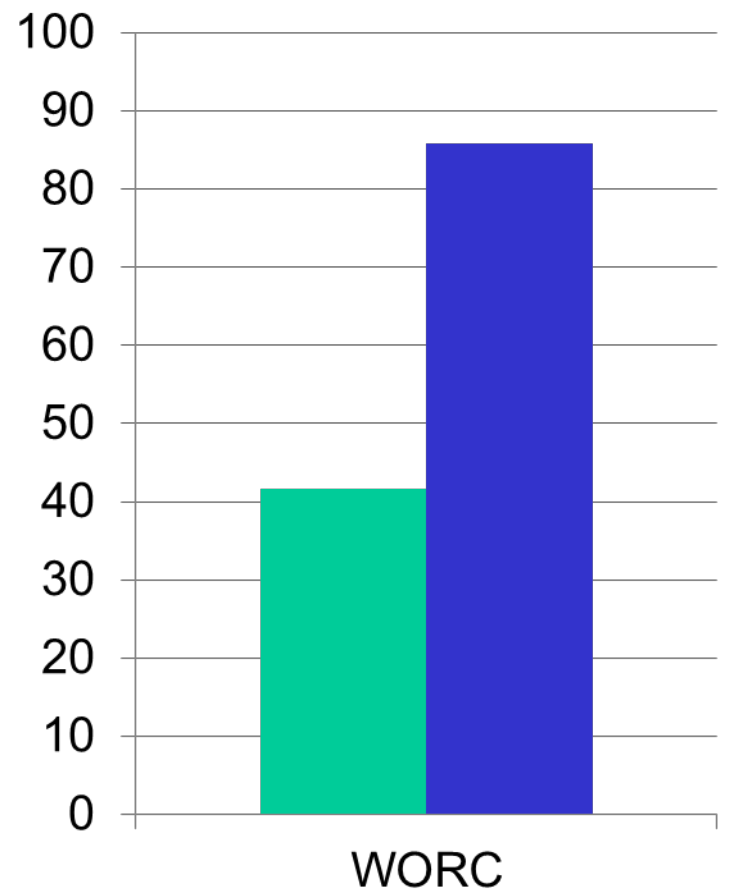




Results : ASES & Overall WORC

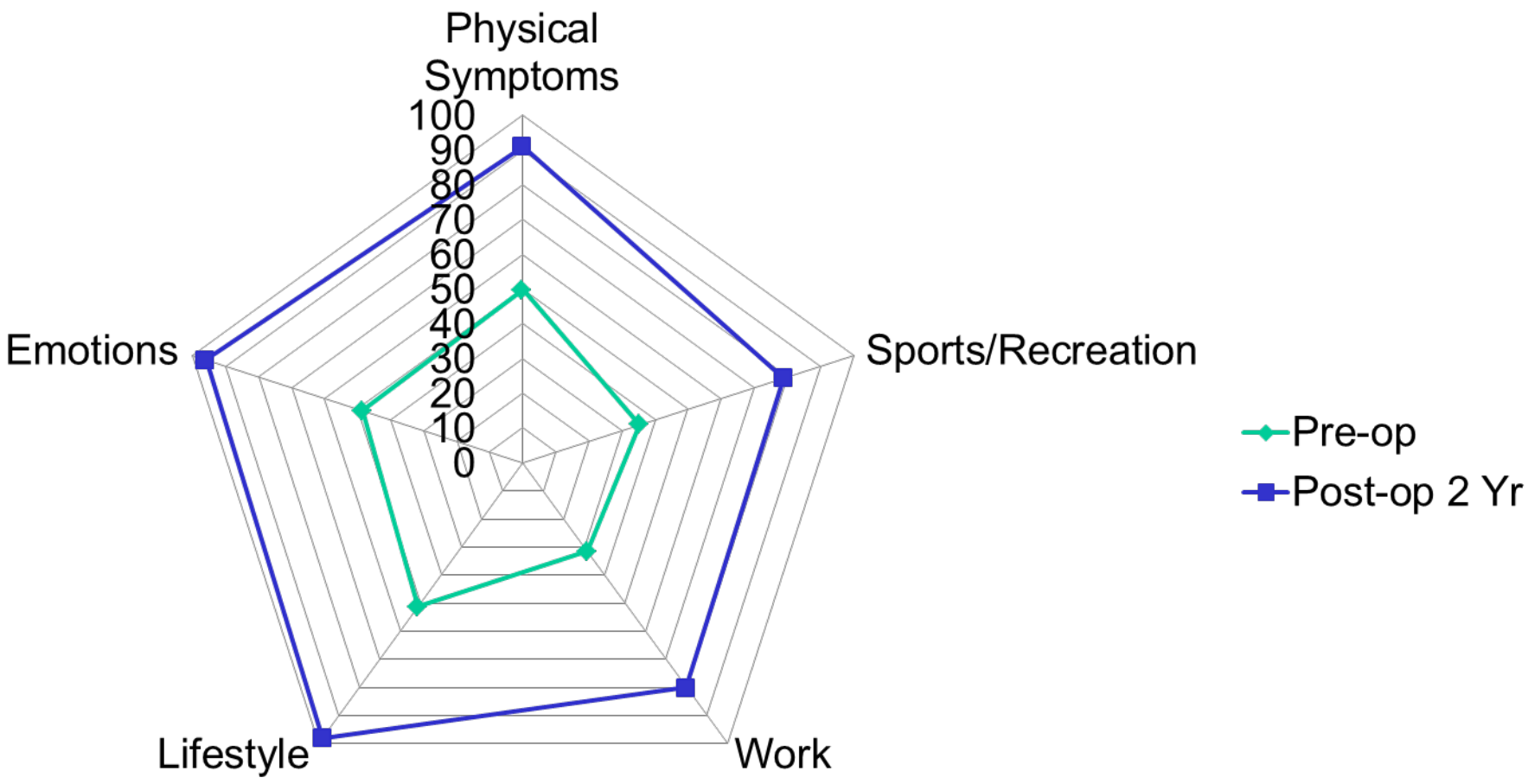


■ Pre-op
■ 2YrPost-op





Results : WORC Subscales

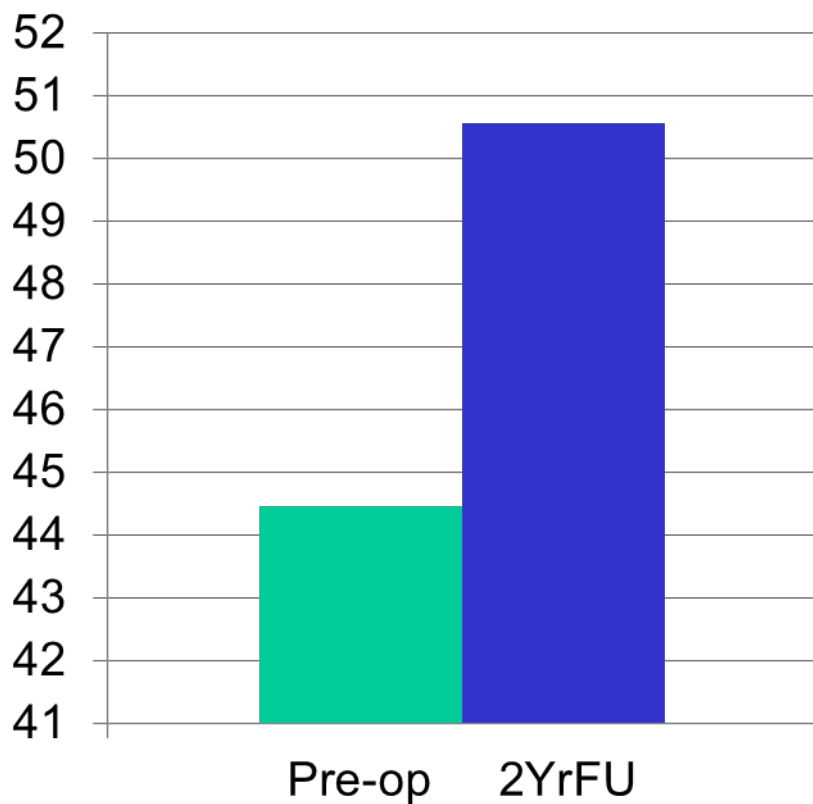
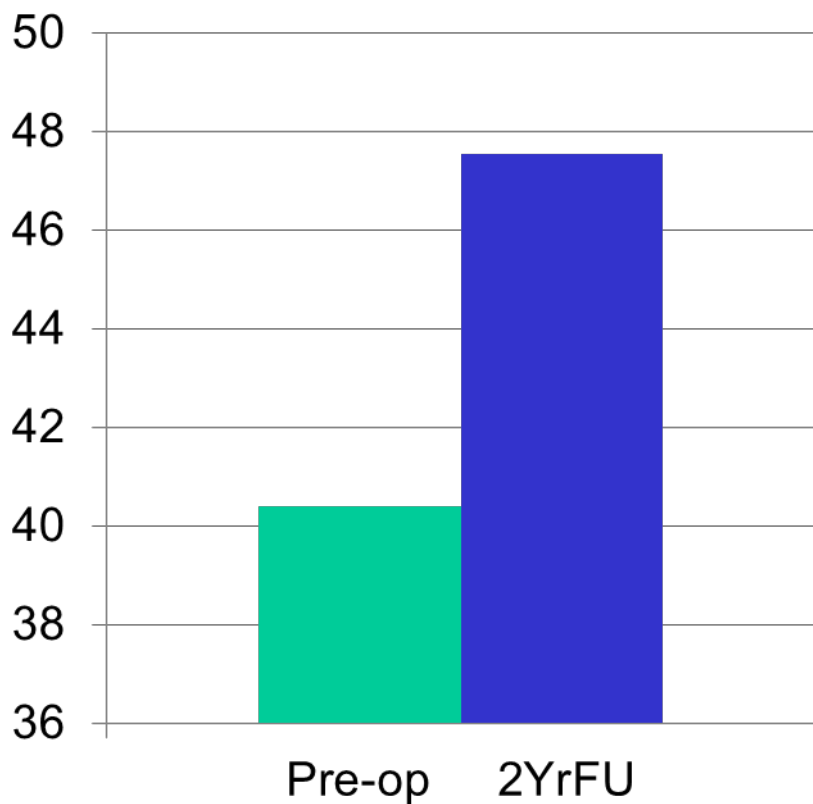




Results : SF-12

Physical component

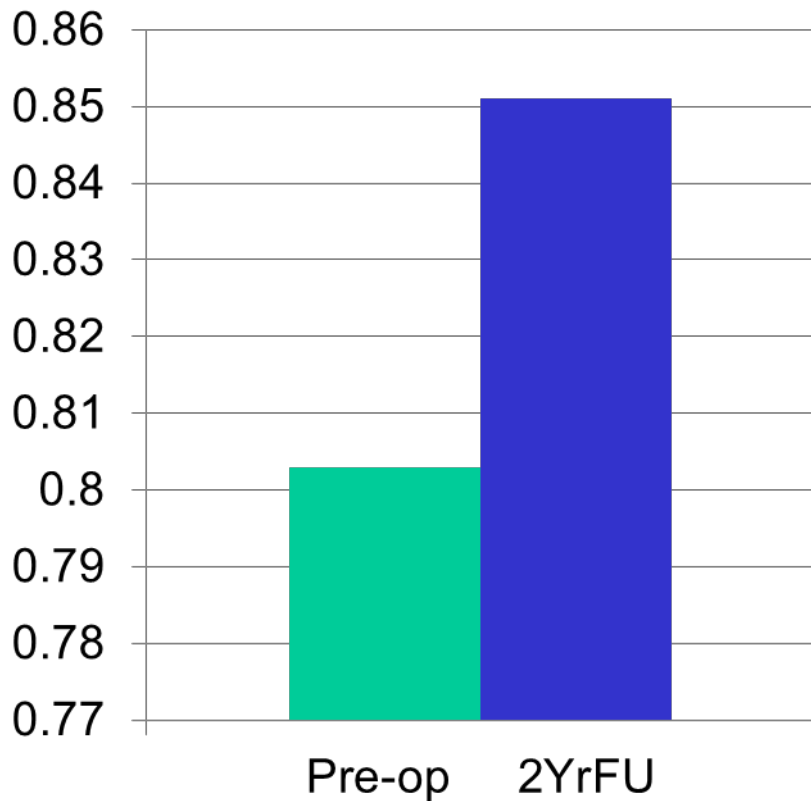
Mental component



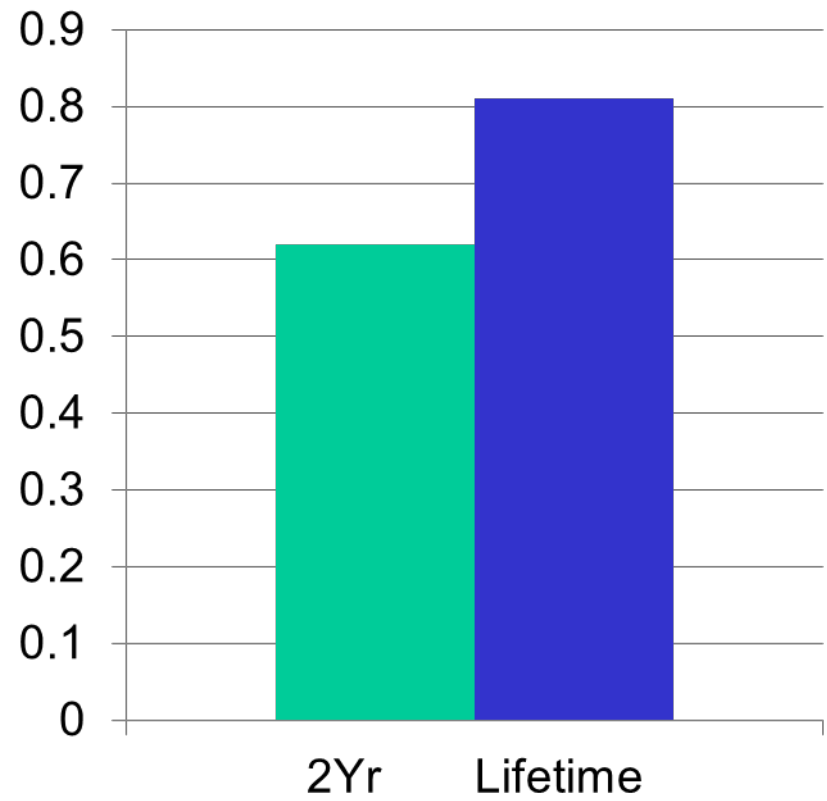


Results : Utility Scores & QALY

Utility Score from SF-12D



QALY gained at 2 Year & LT





Adverse Events

- **Complications : 18.6%**
 - Retears : 2 (SRR x LCT)
 - Stiffness : 3
 - Persistent Pain : 3
 - Infection : 0
- **Reoperations : 7%**
 - 1 x Revision (DRR)
 - 2 x MUA + Release





Direct Medical Costs



Direct cost of consumables used for arthroscopic rotator cuff repair

<u>Item</u>	<u>Cost, HKD</u>
•Drapes	230
•Cannulae	350
•Connecting tubes	910
•Saline	160
•Acromionizer	780
•RF probe	1700
•Needle for suture passer	900
•Suture Anchors (average, 1.35/case)	3520
•Sling (shoulder immobilizer)	150
•SubTotal	8700





Direct Medical Costs



Direct cost of hospitalisation for arthroscopic rotator cuff repair

<u>Item</u>	<u>Cost, HKD</u>
•Surgeon's Fee	39960
•Anaesthetist's Fee	19980
•Ward Round (3 days)	3600
•Physiotherapy (3 days)	3600
•Room & Board	19950
•Facility Charges	4840
•Subtotal	91930
•Consumables	8700
• Grand Total	100630





Societal Cost Savings

Median Monthly Wage Analysed by Occupational Group

Hong Kong Government Data 2015



Census and Statistics Department
The Government of the Hong Kong Special Administrative Region

Elementary occupations (USW)	11100	12 (27.9%)
Service and sales workers (SSW)	12400	3 (7.0%)
Craft and related workers, plant and machine operators and assemblers (SCW)	19000	10 (23.3%)
Clerical support workers (CSW)	13500	6 (14.0%)
Managers, administrators, professionals and associate professionals (MAP)	26000	10 (23.3%)

Mean of Monthly Wage

HKD16300

Annual Cost Saving from Sick Leave = HKD 195600





Cost Effectiveness

- **Incremental cost-effectiveness ratio (ICER), cost-per-point change in outcome score :**
 - ASES : 369827.3
 - WORC Overall : 227979.2
- **Cost-per-QALY gained (ICUR) :**
 - surgical treatment results in average improvement of 0.62 QALY at 2 yrs
 - estimated mean lifetime gain in QALYs from surgery 0.81
 - ratio of \$162306.5/QALY





Conclusion (Clinical Effectiveness)

- ARCR shown to be **highly effective** surgical procedures for treatment of symptomatic full thickness tears of rotator cuff
- Minimal Clinical Improvement Difference (**MCID**) of **>30%** firmly demonstrated by WORC; nearly achieved by ASES (27.2%)
- Detailed analysis using condition specific outcome assessment of WORC subscales, all 5 achieved **MCID>0.3**, more marked gain in **emotion, lifestyle & symptoms**





Conclusion (Cost Effectiveness)

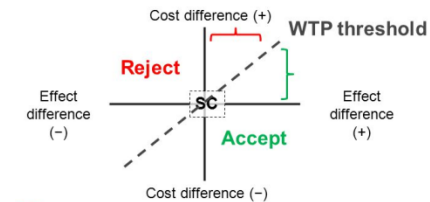
- **Orthopaedic procedures** best analyzed by use of QALYs because traditional outcome measures such as death or disease onset (eg, stroke and myocardial infarction) do not apply
- In the case of ARCR, QALYs are appropriate because repair results in significant, durable **quality-of-life improvements**. QALYs are calculated by multiplying the **utility** of the patient during a specific period by the length of time over which the improvement is experienced.





Conclusion (Cost Effectiveness)

- Principal outcome calculated was incremental cost-effectiveness ratio (**ICER**): ratio between the difference in costs and QALY of each treatment strategy
- US: ICER of <\$50,000 per QALY gained considered to be cost-effective (HK\$390K)
- UK: <£30,000 (HK\$360K)
- In this cost-effectiveness analysis, ARCR was shown to be an effective strategy with an ICER that was **less than the willingness** of both the US & UK health-care system **to pay** (HK\$162.3K)





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