TABLE E-1 Independent Variables

<table>
<thead>
<tr>
<th>Independent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of motion (passive forward elevation in the scapular plane, measured with goniometry as per Hayes et al., with the exception that the patient’s feet were not placed on a foot-stool)</td>
</tr>
<tr>
<td>Shoulder-specific quality of life. (The RC-QOL is a disease-specific questionnaire that was developed to precisely assess the quality of life of those patients with a rotator cuff repair before and after surgery. This questionnaire utilizes patient self-assessment and has demonstrated excellent reliability, face validity, and ability to discriminate between large and massive cuff tears. The comprehensive 34-item questionnaire has specific inquiries into symptoms and physical complaints, work-related concerns, recreation and sport participation, lifestyle, and social and emotional domains. Patients completed the RC-QOL on the basis of their current condition. The total score was converted to a score out of 100, on which 0 is as bad as can be and 100 is perfect.)</td>
</tr>
<tr>
<td>Patient age in yr</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Smoking status (yes or no)</td>
</tr>
<tr>
<td>Duration of symptoms in mo</td>
</tr>
<tr>
<td>Size of tear (largest tear size in mm as determined by ultrasonography or MRI)</td>
</tr>
<tr>
<td>Hand dominance versus the side involved</td>
</tr>
<tr>
<td>Onset (traumatic or insidious)</td>
</tr>
<tr>
<td>External rotation strength (measured with use of manual muscle testing)</td>
</tr>
</tbody>
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Appendix 1
The nonoperative rotator cuff home rehabilitation program. (Reproduced with permission of Kristie More of the University of Calgary Orthopedic Shoulder Research Group.)

Non-Operative Rotator Cuff Home Program

What is the Rotator Cuff?
The rotator cuff is made up of four muscles (supraspinatus, infraspinatus, subscapularis, teres minor) that help to stabilize the shoulder.

Stage 1: Weeks 0 - 6
- Goal 1: Decrease your shoulder pain
- Goal 2: Increase your shoulder range of motion (ROM) through stretching and high repetition movement patterns.

Stage 1 Stretches/Exercises
Stretches should be done multiple times each day. Do each stretch 4 times in a row, holding for 30 seconds each time. Try to do this at least 4 times each day.

1) Range of Motion Using Pulleys
- Attach pulleys overhead (directly above your knees). Sit in a chair and hold the ropes in each hand.
- Pull your good arm downward and allow the injured arm to be lifted upward.
- Slowly lower your injured arm down, making your good arm do the work.
- Repeat for up to 5 minutes.

2) Shoulder Flexion/ Elevation (Bent over)
Sit on a stool or chair, with your arm on a level surface (bed, counter, desk). Use your good arm to push your upper arm down into the bed. Slowly lean your body forwards until you feel a comfortable stretch in your shoulder.

3) Abduction
PROPER TECHNIQUE
IN DIRECT TECHNIQUE
Grasp a broom handle in both hands. Slowly raise your good arm to raise your injured arm straight out to the side. Make sure you don't let your injured shoulder ride upwards.

4) Assisted elevation
- Lie on your back clasping your hands together. Slowly raise your arms over your head, using your good arm to do most of the work. Lower and repeat 10 - 15 times.
- As this becomes easier, allow the injured shoulder to more and more of the work.
- To make this even more difficult, prop your upper body up using pillows. The closer your upper body is to vertical, the harder the exercise will be.

5) External Rotation
Bend the elbow of your injured side to 90° tucking your elbow against your side. Grasp a broom handle in both hands. Use your good arm to slowly push outwards, making the injured arm pivot outwards from the elbow. Make
sure that the elbow stays tucked tightly against your side.

- 6) Internal Rotation

Grasp a towel with your good arm over your shoulder and your injured arm behind your lower back. Slowly pull upwards with your good arm until you feel a comfortable stretch in your injured shoulder.

- 7) Scapular Retraction

Sit tall. Squeeze your shoulder blades towards each other, hold, then relax.

**Stage 2: Weeks 6 - 12**

- Goal 1: Improve the strength and muscular control in your shoulder
- Goal 2: Create muscle fatigue when performing each exercise, without considerable increase in pain.

Initially, exercises should be done at least once every day. The resistance, range of motion and pace with which you perform the exercises should be comfortable. If the exercises cause a flare-up in your shoulder pain, you should decrease the activity to the level where there was previously no pain. You can also use ice after the strengthening exercises and/or anti-inflammatory medication to help reduce pain if there is a flare-up. If you are progressing well (i.e. exercises are getting easier with no increase in pain) you can increase the resistance on a weekly basis. Once resistance is significant, reduce exercises to once every second day.

**STAGE 2 EXERCISES**

Find a resistance that allows 3 sets of 10 – 15 repetitions. Start by holding each for 2 seconds per rep, increase to 5 seconds per rep once you are comfortable.

- 1) External Rotation with Towel

Bend the elbow of your injured side to 90° and tuck a rolled towel between your elbow and your side. Grasp a piece of rubber tubing that runs in front of your body, then slowly pull by rotating your arm outward. Make sure the towel doesn’t slip out!

- 2) Abduction

Grasp rubber tubing, and lift your arm straight out to the side. Start by lifting by 20°. Progress to 30°-60°, then 60°-80°.

- 3) Forward Flexion

Grasp rubber tubing and lift your arm straight in front of you. Start by lifting by 30°-60°, then progress upwards as comfortable. This exercise is easiest with your palm facing up, and your elbow bent. Straighten elbow or face palm down for increased difficulty.

- 4) Subscapularis Hug

Start in your available external rotation grasping rubber tubing in your injured arm hand. Pretend you are hugging your arms around a large tree.

- 5) Wall Pushups

Ensure your shoulder blades are moving towards each other and down your back as you perform your pushup. Place your feet a comfortable distance from the wall, and increase difficulty by moving feet further away. Keep your elbows close to your sides.

- 6) 4 Point Plank

On your hands and knees, lean slightly forward. Push your arms down into the bed, feeling like you are increasing the distance between the bed and your chest. Hold for 5 seconds.