Hand Held Dynamometry (HHD) employs a portable hand-held device that measures mechanical force. Hand Held Dynamometry measures an individual’s muscle performance. The test positions used for Hand Held Dynamometry are derived from those employed for Manual Muscle Testing. Hand Held Dynamometry provides a quantitative measurement of the patient’s force in pounds or kilograms. During the Hand Held Dynamometry examination, patients are typically asked to push against the clinician performing a maximal isometric contraction (make test), or hold a position until the clinician overpowers the tested muscle (break test).

Reliability and validity of Hand Held Dynamometry has been established (1-5). Hand Held Dynamometry is an objective and accurate method in measuring maximal isometric strength in healthy individuals and individuals with neurologic disorders and orthopedic conditions.

Test Procedure: Each position tested consists of three trials. The maximum isometric force of each trail is recorded and averaged. To ensure maximum effort is generated by the patient, a coefficient of variation is calculated. A coefficient a variation of less than 10% for males and 12% for female has been suggested to reflect maximum effort during testing (6).

References
7) Photo courtesy GNR.
8) MediClip image copyright 2002 Lippincott Williams & Wilkins. All Rights Reserved.
Date of Onset: 8/1/02

Patient: ExamplePatient, Shoulder (1-53-8007)

Physical Therapy Inc.
Right Shoulder Hand Held Dynamometry Progress Report

Right Shoulder Flexion

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Affected Shoulder (Right)</th>
<th>Unaffected Shoulder (Left)</th>
<th>Coefficient of Variation</th>
<th>Percent Improvement</th>
<th>Percent Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/18/02</td>
<td>12.0 lbs.</td>
<td>21.3 lbs.</td>
<td>0.0%</td>
<td>First Test</td>
<td>43.8%</td>
</tr>
<tr>
<td>8/18/02</td>
<td>16.0 lbs.</td>
<td>21.3 lbs.</td>
<td>0.0%</td>
<td>33.3%</td>
<td>25.0%</td>
</tr>
<tr>
<td>9/18/02</td>
<td>20.3 lbs.</td>
<td>21.3 lbs.</td>
<td>2.8%</td>
<td>69.4%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

Right Shoulder Extension

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Affected Shoulder (Right)</th>
<th>Unaffected Shoulder (Left)</th>
<th>Coefficient of Variation</th>
<th>Percent Improvement</th>
<th>Percent Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/18/02</td>
<td>14.0 lbs.</td>
<td>29.7 lbs.</td>
<td>0.0%</td>
<td>First Test</td>
<td>52.8%</td>
</tr>
<tr>
<td>8/18/02</td>
<td>20.0 lbs.</td>
<td>29.7 lbs.</td>
<td>0.0%</td>
<td>42.9%</td>
<td>32.6%</td>
</tr>
<tr>
<td>9/18/02</td>
<td>28.3 lbs.</td>
<td>29.7 lbs.</td>
<td>2.0%</td>
<td>102.4%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>
The Physical Capacity Evaluation (PCE) is a battery of six work-related lift tasks. The PCE lifts have been established by the National Institute of Occupational Safety and Health¹ (NIOSH).

Each of the six lifts are recorded in pounds or kilograms of force. A dynamometer is used to measure and record the subjects maximal voluntary isometric strength. To ensure a consistent and valid result, each work-related lift is performed three times. From these three trials, a coefficient of variation is calculated. A coefficient of variation the difference in strength between lift trials. If the difference is greater than 10% for males and 12% for females the test is considered invalid. Invalid tests may indicate inconsistent or sub-maximal effort for the particular lift task in question². Pain may also be a factor that limits a subject’s performance on these tests. Pain limitations may also be recorded for each lift task attempted. These pain limiting factors are categorized as none, minimal, moderate, severe, and unable to perform task due to pain.

According to standards established by NIOSH, the 25th percentile is considered the minimal acceptable level of performance. According to established criteria, 75% of the population can adequately and safely achieve this occupational standard¹. Individual’s with lift test results below the 25th percentile are at higher risk of injury.

References

1) Badger DW. Work practices guide for manual lifting, National Institute of Occupational Safety & Health technical report, Center for Disease Control, division of biomedical and behavioral science, Cincinnati, Ohio, 1981.

Physical Therapy Inc.

PCE - Static Lift Test Progress Report

Patient: ExamplePatient, Shoulder (1-53-8007)
Date of Onset: 8/1/02

Arm Lift Test

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Patient Score</th>
<th>Coefficient of Variation</th>
<th>Percent Improvement</th>
<th>Percentile Ranking</th>
<th>Meets NIOSH Minimal Safety Standards</th>
<th>Pain Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12/02</td>
<td>20.0 lbs.</td>
<td>0.0%</td>
<td>First Test</td>
<td>10th</td>
<td>No</td>
<td>Minimal</td>
</tr>
<tr>
<td>8/18/02</td>
<td>25.0 lbs.</td>
<td>0.0%</td>
<td>20.0%</td>
<td>10th</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>9/18/02</td>
<td>30.0 lbs.</td>
<td>0.0%</td>
<td>33.3%</td>
<td>10th</td>
<td>No</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

High Far Lift Test

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Patient Score</th>
<th>Coefficient of Variation</th>
<th>Percent Improvement</th>
<th>Percentile Ranking</th>
<th>Meets NIOSH Minimal Safety Standards</th>
<th>Pain Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12/02</td>
<td>10.0 lbs.</td>
<td>0.0%</td>
<td>First Test</td>
<td>&lt;10th</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>8/18/02</td>
<td>15.0 lbs.</td>
<td>0.0%</td>
<td>33.3%</td>
<td>&lt;10th</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>9/18/02</td>
<td>20.0 lbs.</td>
<td>0.0%</td>
<td>50.0%</td>
<td>10th</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>
Patient: ExamplePatient, Shoulder (1-53-8007)
Date of Onset: 8/1/02

The measurement of joint range of motion (ROM) provides information that will affect many facets of physical rehabilitation and orthopedic medicine. The data obtained from ROM measurements may be used for comparison against normal predetermined values to establish joint motion deficits, and to monitor patient improvement/progress. Examination of joint range of motion will help identify and quantify impairments. This information will assist with establishing or altering the patient’s diagnosis, and is employed to assist with determining a patient’s plan of care. The pre-determined method established by the American Medical Association, and the American Academy of Orthopedic Surgeons, measures active range of motion (AROM). Therefore, measurements of this patient’s range of motion is in conformance with this AROM method. AROM is defined as the unassisted voluntary movement of a joint.

The instruments used to measure ROM are the universal goniometers, inclinometers, and tape measures (ruler). The most common values that these devices produce are represented in degrees, centimeters, millimeters, and inches. Normative data has been published by the American Academy of Orthopedic Surgeons (AAOS), Joint Motion: Method of Measuring and Recording (1), and the American Medical Association (AMA), Guides to the Evaluation of Permanent Impairment (2). Reliability and validity of range of motion measurements have demonstrated to be good to excellent (3-8).

References

Physical Therapy Inc.

AAOS Right Upper Extremity ROM Progress Report

Patient: ExamplePatient, Shoulder (1-53-8007)
Date of Onset: 8/1/02

### Right Shoulder Flexion

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Patient Score</th>
<th>Normal Score</th>
<th>Percent Improvement</th>
<th>Percent Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/17/02</td>
<td>85.0º</td>
<td>180.0º</td>
<td>First Exam</td>
<td>52.78%</td>
</tr>
<tr>
<td>8/18/02</td>
<td>100.0º</td>
<td>180.0º</td>
<td>17.65%</td>
<td>44.44%</td>
</tr>
<tr>
<td>9/18/02</td>
<td>160.0º</td>
<td>180.0º</td>
<td>88.24%</td>
<td>11.11%</td>
</tr>
</tbody>
</table>

Testing By: Physical Therapy Inc.
Normative Data: American Academy of Orthopedic Surgeons¹

### Right Shoulder Extension

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Patient Score</th>
<th>Normal Score</th>
<th>Percent Improvement</th>
<th>Percent Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/17/02</td>
<td>23.0º</td>
<td>50.0º</td>
<td>First Exam</td>
<td>54.00%</td>
</tr>
<tr>
<td>8/18/02</td>
<td>30.0º</td>
<td>50.0º</td>
<td>30.43%</td>
<td>40.00%</td>
</tr>
<tr>
<td>9/18/02</td>
<td>45.0º</td>
<td>50.0º</td>
<td>95.65%</td>
<td>10.00%</td>
</tr>
</tbody>
</table>

Testing By: Physical Therapy Inc.
Normative Data: American Academy of Orthopedic Surgeons¹
Physical Therapy Inc.

Simple Shoulder Test (SST) Progress Report

Patient: ExamplePatient, Shoulder (1-53-8007)
Date of Onset: 8/1/02

The Simple Shoulder Test is a self-reported outcome assessment designed to measure shoulder function. The Simple Shoulder Test consists of 12 items that ask about one's ability to tolerate or perform certain activities of daily living (shoulder comfortable at rest, sleep comfortably at night, tuck in shirt behind the back, placing hand behind head with elbow straight out to the side, placing a coin on high shelf with elbow straight, lifting one pound to shoulder height without bending elbow, carry 20 pounds, toss a softball underhand 10 yards, wash the back of your opposite shoulder, and work full-time at your regular job). Each item is answered Yes or No. The individual tested indicates that he or she is able or unable to do the listed activity. Overall scores range from 0 to 100% with higher scores indicating greater dysfunction. The Simple Shoulder Test showed high internal consistency, indicating good reliability. The Simple Shoulder Test also demonstrated construct and convergent validity.

### Functional Limitations of the Shoulder

<table>
<thead>
<tr>
<th>Date of Exam</th>
<th>Patient's Limitations</th>
<th>No Limitations</th>
<th>Percent Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/17/02</td>
<td>75%</td>
<td>0%</td>
<td>First Test</td>
</tr>
<tr>
<td>8/18/02</td>
<td>33%</td>
<td>0%</td>
<td>41.7%</td>
</tr>
<tr>
<td>9/18/02</td>
<td>8%</td>
<td>0%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

Testing By: Physical Therapy Inc.
Lower scores indicate less functional limitations of the shoulder

References

