

STUDY OF OSTEOPOROTIC FRACTURES (V4)

V4 Performance Cohort

Reaction and Movement Time Protocol

1. Introduction:

This test measures the speed of reactions and the speed of movement of the hands and feet. These speeds might be related to the risk of falling and, in particular, the risk of fractures when a fall occurs. Testing will be performed for the dominant hand, or if ambidextrous, on the right side. We will measure both **response time** (time to release key after stimulus is presented) and **total movement time** (time to hit second key after stimulus is presented).

2. Equipment:

A two-clock response and movement time device (Manufacturer: Lafayette Instrument Co.) modified with 2 1/2" x 3 1/2" switch pads for hand and foot targets and an enlarged light stimulus. The device measures response and movement times of the hand and foot. The unit allows a variable 1-10 second delay period between the ready cue and initiation of the stimulus light.

The switch pads (and metal plates) can be mounted side by side on a flat piece of plywood or plexiglass. The inside edges of the switch pads should be exactly 8 1/2 inches apart. Connect the pads to the control box so that when the start selector is on "right", depressing the left pad activates the "ready" light on the control box, and vice versa. When testing the right side, the subject starts with the hand on the left pad and moves it to hit the right pad. When testing the left side, this is reversed.

The response time is the time from when the stimulus light comes on until the subject lifts her hand from the first pad. The total movement time is the time from when the stimulus light comes on until the subject presses down on the second pad. Total movement time is always greater than the response time since it includes response time plus the time to reach over and press the other pad.

The stimulus light unit should be placed on the table top 10 inches from the front edge of the table. For hand testing, the mounted switch pads should be placed on the table top in front of the light unit, with the stimulus light centered between the switch pads. For best results, have the stimulus light unit on one table and the switch pads on another. This may help to preserve the life of the machine.

3. Subject Preparation:

For hand testing, the participant should be seated comfortably at a table, positioned so that her shoulder is centered between the two switch pads. Loose sleeves which might interfere with the measurement should be rolled up.

"Now we are going to test the speed of your reactions. We do this by testing how quickly you can lift your hand from one pad (*point to pads*) after the light goes on (*point to light*), and move the hand to press down the other pad."

4. Measurement procedure:

A. DETERMINE WHICH SIDE TO TEST

a) Test on the dominant side, unless:

i) subject is ambidextrous, then test the right side;

ii) subject has had a mastectomy, stroke, or injury that has left one hand weaker or clumsier than the other, then test less affected side;

iii) subject has had a limb amputated, or limb is in a cast or otherwise can't be tested, then test the other side.

b) Recent sedative use may affect reaction time. Ask the participant "In the past 24 hours, have you used any medication to help you sleep or relax, or for anxiety or nerves, such as Valium, Xanax, Librium, Elavil, and Dalmane?" Record the answer and proceed with the reaction time testing.

c) Select the side to test with the "Start" selector. Record which side is tested.

d) The limb movement should always be from the "inside to the outside". For example, when testing the right limb the left pad is depressed at the beginning of the trial and the limb is moved to the right pad to end the trial.

B. TEST THE HAND

a) Have the participant sit with both hands resting on the table top and elbows bent. Ask her to touch each of the switch pads with all four fingers. Participants with arthritis or hand problems may use their fist or heel of hand.

"Put your [*right/left*] hand on this pad (*point to pad*), press down and hold it down. After I say 'Ready!', a few seconds will pass and then the light here (*point to light*) will go on. Keep your eyes on the light. As soon as it goes on, lift your hand and then hit the other pad. Do this as quickly as possible. Let me show you how it is done."

b) Set the cue delay to 3 seconds. Demonstrate one time.

"Now I would like you to practice this one time."

Repeat the practice trial until the participant does it correctly once. If necessary, hold her hand and move it from pad to pad.

c) Test the hand.

"Now we are going to do the test. We will test the same hand ten times."

For each trial, set the cue delay as indicated on the form. When the participant is settled and looking at the light box, say:

"OK, press the pad and hold it down. Watch the light. Ready! "

When the subject is correctly pressing down on the first pad, the green "ready" light on the console will be lit. When the participant is ready, press the "Initiate" switch. Repeat this ten times, saying "Ready!" each time. Record all the measurements of response and total movement time to 1/1000 of a second. Reset the cue delay before each trial, as indicated on the form.

C. SCORING AND SPECIAL CIRCUMSTANCES

- a) Subjects with painful arthritis of the hand may use their fist or heel of hand to depress the pads.
- b) **Unable to test:** Subjects who cannot comprehend the procedure are scored as "Unable to test" in the first box and no trials are attempted.
- c) It may sometimes help to move the subject's hand when demonstrating.
- d) **Participant errors:** If the subject misses the switch pad entirely on a trial or if the participant misses the trial due to inattention, repeat the trial. If this happens more than once, then score that particular trial as checking unable as indicated on the form.
- e) **Machine malfunctions:** If the machine sticks, then repeat the trial. If the machine continues to stick, switch to a different machine. **Do not write any values on the form that occurred when the machine was malfunctioning. Instead, check the "machine malfunction" box for those trials where the machine malfunctioned.**
- f) If for any reason you can only get partial data on a participant then collect the partial data, as long as it appears valid. If the machine starts to have problems, record this on the scoring form (a field will be provided).

5. Settings for Cue Delay

	<u>Trial #</u>	<u>Set delay to:</u>
HAND	1	5 seconds
	2	3 seconds
	3	3 seconds
	4	4 seconds
	5	2 seconds
	6	5 seconds
	7	2 seconds
	8	1 second
	9	1 second
	10	4 seconds