



National Health and Nutrition Examination Survey (NHANES)

National Youth Fitness Survey (NYFS)
Lower Body Muscle Strength Component
Procedures Manual



July 2012

TABLE OF CONTENTS

| <u>Chapter</u> | | <u>Page</u> |
|----------------|---|-------------|
| 1 | OVERVIEW OF THE LOWER BODY MUSCLE STRENGTH COMPONENT..... | 1-1 |
| | 1.1 Background..... | 1-1 |
| | 1.2 Purpose | 1-1 |
| | 1.3 Exam Overview | 1-2 |
| | 1.4 Role of Examiner..... | 1-2 |
| 2 | EQUIPMENT AND SUPPLIES..... | 2-1 |
| | 2.1 Dynamometer..... | 2-1 |
| | 2.1.1 Operating Features | 2-2 |
| | 2.1.2 Dynamometer Calibration..... | 2-2 |
| | 2.1.3 Dynamometer Battery Power Check..... | 2-3 |
| | 2.1.4 Dynamometer Force Measurement Settings | 2-3 |
| | 2.2 Muscle Strength Testing Chair | 2-4 |
| | 2.2.1 Straps..... | 2-7 |
| | 2.3 Supplies..... | 2-7 |
| 3 | SETUP PROCEDURES | 3-1 |
| | 3.1 Daily Equipment Preparation..... | 3-1 |
| | 3.2 Equipment Maintenance and Malfunctions | 3-1 |
| | 3.2.1 Chair Maintenance | 3-1 |
| | 3.2.2 Dynamometer Cleaning and Maintenance | 3-2 |
| | 3.2.3 Dynamometer Malfunctions..... | 3-2 |
| 4 | TEARDOWN PROCEDURES..... | 4-1 |

TABLE OF CONTENTS (CONTINUED)

| <u>Chapter</u> | | <u>Page</u> |
|----------------|---|-------------|
| 5 | LOWER BODY MUSCLE STRENGTH PROTOCOL | 5-1 |
| | 5.1 Eligibility | 5-1 |
| | 5.2 Sitting Knee Extension | 5-2 |
| | 5.2.1 Pre-exam Setup and Introduction Procedures | 5-2 |
| | 5.3 Exam Procedures | 5-3 |
| | 5.3.1 Sitting Knee Extension Test..... | 5-3 |
| 6 | INTEGRATED SURVEY INFORMATION SYSTEM (ISIS) DATA ENTRY | 6-1 |
| | 6.1 Recording and Retrieving Test Data..... | 6-1 |

List of Exhibits

Exhibits

| | | |
|-----|---|-----|
| 1-1 | Lower body muscle strength key elements | 1-3 |
| 2-1 | Hoggan MicroFET2™ manual muscle tester | 2-1 |
| 2-2 | View of the muscle strength testing chair in Room 1 | 2-4 |
| 2-3 | View of back of muscle strength testing chair | 2-5 |
| 2-4 | Testing chair showing adjustable straps | 2-6 |
| 5-1 | Knee extension in sitting position..... | 5-1 |
| 5-2 | Script for the lower body muscle strength in sitting position | 5-3 |
| 6-1 | Initial physical activity question | 6-1 |
| 6-2 | Second physical activity question..... | 6-2 |
| 6-3 | Component data entry screen..... | 6-3 |
| 6-4 | Component data entry screen with measures..... | 6-4 |
| 6-5 | Standard component closing screen..... | 6-5 |

1. OVERVIEW OF THE LOWER BODY MUSCLE STRENGTH COMPONENT

1.1 Background

Lower extremity performance plays an essential role in mobility. Sufficient strength of the knee extensor muscles is a prerequisite for optimal performance of weight-bearing tasks. Isokinetic assessment of muscle strength has been used in research, athletic, and clinical settings since its rise in popularity in the late 1960s. It is mainly used in evaluating the effects of training, muscle fatigue, injury rehabilitation, or the functional abilities of individuals. Strength testing provides important information regarding human performance.

The objective measurement of knee extension strength can be accomplished through the use of hand-held dynamometers (HHD). The validity of measurements using them is dependent upon an examiner having adequate strength to hold the device against the effort of the individual being tested. Because examiners do not always possess sufficient strength, “belt-stabilized” testing with the HHD will be used in the National Youth Fitness Survey (NYFS).

Instead of the examiner applying the resistance, isometric resistance is supplied using a belt passing through the dynamometer, which is applied to the limb tested, and around a fixed structure; in this case, it is the testing chair.

1.2 Purpose

The purpose of this component is to collect nationally representative data on lower body muscle strength among youth aged 6–15; to develop data related to children’s muscle strength by age, gender, other characteristics; and to collect data to study the association between muscle strength and other health conditions and risk factors.

Testing of the knee extension force with this protocol is appropriate because of good test reliability, ease of performing the test, correlation of test results to overall strength, and consistent measures in both field and lab settings with this testing protocol.

These data can be compared with norms (i.e., gender, age, and activity level) that serve as the basis of evaluating muscle strength, balance, endurance, growth, and power to increase motor performance and reduce the risk of injury.

1.3 Exam Overview

The method we are using to assess muscle strength is isometric testing. Isometric testing removes variation in the velocity of movement because all tests are performed at the same angle, with the sample person (SP) restrained so as to isolate the muscles to be tested. Knee extension force is used to measure quadriceps strength.

The lower body muscle strength component will be conducted with participants 6–15 years of age. A hand-held dynamometer (HHD) will be used to measure lower body muscle strength through maximum knee extension. Hand-held dynamometry is well established as a procedure for measuring muscle strength, including use with children as young as 4 years of age. Participants will be asked to push their legs as hard as possible against the HHD.

1.4 Role of Examiner

The examiner plays a key role in assuring standardization of the various steps in the exam protocol. Proper positioning of the SP in the testing chair is important to establishing a starting angle of 90° with each knee. Placing the strap restraints on the SP, so as to adequately restrain movement of other muscle groups while not compromising comfort is also important. Ensuring a proper vector of the lower restraint strap to the ankle and providing proper placement of the dynamometer on the SP's ankle, in addition to providing an adequate counterforce during the measurement, are also key aspects of the examiners' role.

Exhibit 1-1. Lower body muscle strength key elements

| | |
|-------------|---|
| Ages | 6 – 15 years |
| Eligibility | Participants ages 6 – 15 years who do not meet exclusion criteria. |
| Exclusions | Musculoskeletal or neurological problems involving legs and/or knees; missing leg; leg paralysis; cast on leg or knee, most of leg or knee covered by bandages; surgery on leg or knee in the past 3 months; parent states reason why SP cannot do test, i.e., kick legs as hard as SP can. |
| Risks | Slight risk of sprain or strain to quadriceps or hamstrings. |
| Equipment | Digital hand-held dynamometer, model MicroFET2™ Manual Muscle Tester, testing chair, restraint straps |
| Test Timing | 15 minutes |
| Data Points | Peak forces of knee extension for each lower extremity in pounds |
| ROF | The results of the lower body muscle strength test will not be reported to participants. |

2. EQUIPMENT AND SUPPLIES

The equipment and supplies used in the Lower Body Muscle Strength (LBMS) component are described below.

2.1 Dynamometer

- Digital hand-held dynamometer, model Hoggan MicroFET2™ manual muscle tester (Exhibit 2-1).

Exhibit 2-1. Hoggan MicroFET2™ manual muscle tester



- Includes one attachment: Curved transducer pad.
- Each dynamometer comes with two 3.6V 1/2 AA lithium batteries, a protective carrying case, and a MicroFET2 User Guide.
- A tray is provided to hold the dynamometers and disposable covers when not in use.

2.1.1 Operating Features

On/Off Switch:

- The On\Off switch slides back and forth to turn the unit on and off. Even though the device is equipped with a battery saver function, the unit should be turned off when not in use. If the device is left on and goes into sleep mode, it can be awakened by pressing the reset button.

LCD Windows:

- Peak force: The peak force LCD displays the actual force being applied to the transducer pad. At completion, the LCD displays the maximum force value.
- Duration: The LCD window displays the elapsed time (in tenths of a second) from the time the threshold was crossed (3 lbs of force when set to high threshold) until pressure was released.
- The brightness of the LCD windows can be adjusted by putting the unit in display mode – by holding down the Threshold button and clicking the Reset button twice. Once the unit is in display mode, press and hold the Threshold button until the desired brightness level is achieved. Press the Reset button to return to test mode.

Buttons:

- Reset: This button activates the unit. It can also be used to clear the displays and to reinitialize the unit when it has gone into sleep mode.
- Threshold: For NYFS testing, we are using the high threshold setting. In this setting, 3 pounds of force must be exerted before the device begins recording data. This allows for easier placement of the unit without concern for false starts.

2.1.2 Dynamometer Calibration

The microFET2 was calibrated by Hoggan Health Industries at the time of shipment. The unit should be recalibrated annually by an authorized service technician. A record of these annual checks will be kept as part of the quality control (QC) procedures.

2.1.3 Dynamometer Battery Power Check

Conduct a power check on Saturdays (prior to the start of the exam session) and replace batteries when they reach approximately 15 percent power level. Performance of the batteries declines rapidly in the last few percentages of battery life, so to avoid any interruption of use, replace the battery when it reaches 15 percent. Follow the battery power check instructions on page 7 of the *User Guide*.

Battery:

- The dynamometer has a self-activating sleep mode which is designed to extend battery life. The NYFS protocol is to turn off the unit when not in use. The unit will go into sleep mode if it has not received any input for 3 minutes. The unit can be awakened by pressing the reset button.
- The battery is rated for 300 hours of operating use. Extra batteries have been purchased in the event that a battery reaches a 15 percent level, at which time it should be replaced.

2.1.4 Dynamometer Force Measurement Settings

Always keep the device's threshold setting on high. In the high setting, 3 pounds of force must be exerted before the dynamometer begins recording test data. This allows for easier placement of the device, and reduces false starts. Pressing reset does not change the threshold setting.

The unit of measure must be set in lbs. Check the unit of measure by pressing and holding the Threshold button for 5 seconds; the display will go blank, only showing a hash mark for the unit of measurement currently chosen. Check that the hash mark is next to "lbs" If the unit of measure is not set at "lbs," press the Threshold button to toggle through the options (Newtons, KGF, lbs) and stop at lbs. Press the Reset button to return to test mode.

2.2 Muscle Strength Testing Chair

The LBMS testing chair has been specifically developed and built by Pierce Manufacturing of Weyauwega, WI for this type of isometric testing. It features padded seating at a height which allows for the testing of virtually all SPs based upon the length of their lower leg. The seat back is adjustable, which allows it to be moved forward and back in order to provide proper back support to SPs.

Exhibits 2-2 and 2-3 show front and back views of the LBMS testing chair. Exhibit 2-4 shows the full set of bars on the back of the chair, with the straps that reach around the ankle of the SP, and are used to help provide counterforce. A platform across the bottom rungs of the chair keep the belts from dropping to the floor, thereby providing easier access to them by the examiner.

Exhibit 2-2. View of LBMS chair in Room 1

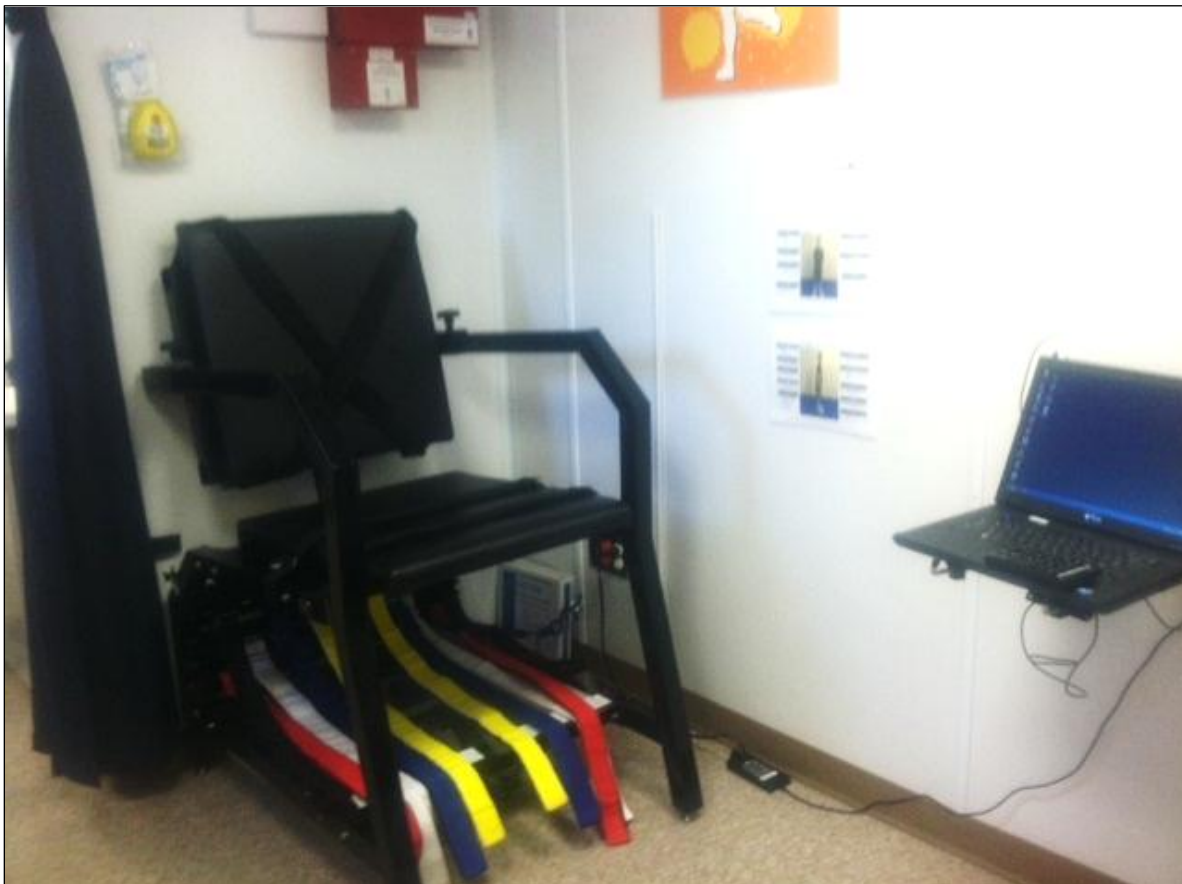


Exhibit 2-3. View of back of LBMS chair



Exhibit 2-4. LBMS chair showing bars and adjustable straps



2.2.1 Straps

Four upper straps are used to provide restraint to the SP and to isolate the quadriceps muscles being tested. All straps are adjustable and are secured with Velcro. The straps are secured to the testing chair in set positions so that they are placed on SPs at the same relative location. The first strap is placed across the SP's lap or waist; the second is placed mid-thigh. The third and fourth straps crisscross the SP's upper torso.

Longer straps are affixed to bars on the lower back of the chair. This series of straps is used to provide the resistance to the force exerted by the SP during the test. The strap which best provides a flat or level vector from the back of the chair to the SP's ankle is fed through the strap on the back of the dynamometer. Different colored straps provide the examiner with an easier time of finding the proper matching strap for each leg.

2.3 Supplies

- Wipes are used to clean the seat surface of the testing chair and the outside of the dynamometer
- Disposable covers are placed over the curved transducer pad for each SP for sanitary purposes

3. SETUP PROCEDURES

3.1 Daily Equipment Preparation

Every day before the start of the first session, prepare the equipment used in the Lower Body Muscle Strength component.

1. Check that the chair surface is clean; wipe the chair surfaces with disinfectant.
2. Remove the dynamometers from their carrying cases and place them in the tray.
3. Slide the “On/Off switch to make sure the dynamometer powers on.
4. Check for low batteries. Fading LCD displays and unlit segments of the LCD are indications that the battery power may be low. If LCD segments remain unlit after pressing Reset, change the batteries.
5. Check that the force measurement setting is in lbs and that the threshold setting is on high.

3.2 Equipment Maintenance and Malfunctions

Under normal use, both the testing chair and the dynamometers should perform without incident.

3.2.1 Chair Maintenance

The testing chair’s adjustable seat back can prove difficult to move. The two adjustable bolts on either side of the arms must be unscrewed in order for the seat back to slide back and forth. Due to the powder-coating of the paint used, this issue may persist even when the chair has been in service over a longer period of time. Products available through the facilities and equipment specialist (FES), such as WD-40, can be used to temporarily alleviate the problem.

The Velcro straps on the chair may wear out over time and need to be replaced. They may also work loose from their connection to the chair. The straps are placed around the frame or bars of the

chair, and secured by looping the strap through a metal slide twice. Should a strap pull free from the slide, it simply has to be fed back through the slide and tightened.

3.2.2 Dynamometer Cleaning and Maintenance

The microFET2 should not be dropped, banged against hard surfaces, or used as a scale. During testing, care should be taken that the dynamometers are not placed in a position on the floor where they can be stepped on or kicked by the SP or the examiner. If a device is dropped or banged against a hard surface, it should be checked to make sure it continues to function properly by turning it on and off and confirming that the device continues to register force applied to the transducer pad.

Clean the exterior surface with a damp soft cloth; the light household cleaner provided should be used and residue removed with clean water.

The home office will determine whether the devices need to be recalibrated during the data collection period, or simply rotated.

3.2.3 Dynamometer Malfunctions

The testing protocol requires that the examiner hold the dynamometer with two hands. During the test, the examiner may inadvertently touch the On\Off switch, the Threshold button, or the Reset button.

The Reset button can be used to wake up the gauge from sleep mode, or to clear occasional stray readings.

4. TEARDOWN PROCEDURES

At the end of stand, dynamometers must be placed in their hard cases and packed securely along with the other component supplies. Straps should remain on the chair with the Velcro attached; no straps should be loose.

The LBMS chair has been secured to the wall of the MC with straps and bolts so that no specific actions need to be taken at the end of the stand.

5. LOWER BODY MUSCLE STRENGTH PROTOCOL

5.1 Eligibility

The lower body muscle strength (LBMS) will be performed on participants aged 6–15 years who do not meet exclusion criteria.

SPs will be tested in a sitting position (Exhibit 5-1). Maximum isometric knee extension force will be measured using the hand-held dynamometer (HHD). Knee extension will be tested three times on each leg, first on one leg and then the other, with a 60-second rest period between each test. All test values will be recorded in the application, but only the highest value of the three tests will be used as peak force in pounds.

Exhibit 5-1. Knee extension in sitting position



5.2 **Sitting Knee Extension**

Participants will be tested for knee extension while seated upright on the testing chair, with the knee bent at approximately a 90-degree angle with the lower leg hanging down the front of the chair. The participant's hips, thighs, and upper torso will be secured on the chair using adjustable straps as shown in Exhibit 5-1 above.

Participants will be given one practice trial before beginning the series of tests. Knee extension force will be tested three times in each leg, alternating between legs, with a 60-second rest period between each test. All three results for each leg will be recorded in ISIS.

5.2.1 **Pre-exam Setup and Introduction Procedures**

1. Log into the Component and wand in the SP.
2. Introduce the Component (Exhibit 5-2): *“In this exam, we want to get some information about how strong your legs are. We will be asking you to push as hard as possible with each of your legs. First I want to ask you a few questions.*
3. Ask the two pretest questions on exercise and physical activity.
4. Demonstrate the warm-up and ask the SP to perform ten short bounces, five body squats, and ten more short bounces.
5. Ask the participant to remove shoes, thick socks, and any ankle jewelry.

Assist and position the participant onto the chair. Make sure that the participant's knee is relaxed and bent at approximately a 90-degree angle with the lower leg hanging down the front of the chair.

6. Secure the participant's hips and thighs first with the adjustable belts, making sure that the straps fit snugly but are not restricting the quadriceps muscle; confirm that the participant is comfortable. Secure the upper torso straps across the SP's chest.
7. Choose the lower restraining strap which provides the flattest vector or angle from the back of the chair to the point at which the dynamometer will be placed on the SP's ankle (directly above the malleoli bones). The belt should be horizontal within 10 degrees from where it is attached to the bar, to its placement around the SP's ankle.

Exhibit 5-2. Script for the lower body muscle strength in sitting position

In this exam, we want to get some information about how strong your legs are. We will be asking you to push as hard as possible with each of your legs. First I want to ask you a few questions.

Now I'd like you to sit in this chair, with your knees right at the edge of the chair so that your legs hang straight down. I will place this device (SHOW DYNAMOMETER) on the front of your ankle and ask you to push against it for a few seconds as hard as you can. You will do this three times on each leg. Before the test, I'll put these straps across your upper body, around your waist, and over your thighs. That way, I can test just your leg muscles.

[Script for practice.] *Now we will practice once just to get the feel of it. For this practice, don't push as hard as you can. Put your hands on your legs, but don't push down with them or grab your legs with them. Ready, take a breath in, let it out, and push your leg forward until I tell you to stop.*

[Script for test.] *When I say "push," push your leg as hard as you can until you can't push any harder and until I tell you to stop. Remember to blow out when you push. **"Ready, take a breath in, let it out, and push, push as hard as you can, keep pushing, keep pushing until you can't push any harder!"***

5.3 Exam Procedures

5.3.1 Sitting Knee Extension Test

1. Check the application to determine which leg is selected for the practice.
2. Starting with leg opposite the one selected for the practice, thread the appropriate restraint strap through the strap of the dynamometer, ensuring a straight vector (within 10 degrees) from the back of the chair to the leg. Adjust the strap for length around the SP's ankle, securing the Velcro. Check to make sure that the strap runs in a straight line from the back of the chair to the SP's ankle, so that there is no left or right twisting force introduced, based upon the strap placement. Place a disposable cover over the curved transducer pad of the device, slip the strap off the SP's ankle, and lay it on the chair's platform.
3. Following the procedures described in step 2, secure the restraining strap on the practice leg but keep the strap on for the practice trial.
4. Re-check that the SP's knee is bent at approximately a 90-degree angle with the lower leg hanging down the front of the chair, that the strap is at a straight vector from the back of the chair to the leg, and that both hands are lying loosely on his or her legs.
5. Make sure the dynamometer is powered on, with the threshold set to high and the force measurement in pounds (lbs). Follow the script to inform the SP as to the expectations for the practice trial. The practice provides the SP with a feel for pushing against the dynamometer for the appropriate period of 6+ seconds, and also provides

the examiner with an opportunity to observe the SP and reinstruct the SP if there are any positional or exertion issues.

6. Once the practice trial is completed, slip the strap holding the dynamometer off the SP's leg and place it on the chair's shelf.
7. Position yourself in front of the leg to be tested first and slip the SP's foot through the strap, placing the curved surface of the dynamometer lengthwise along the front of the lower leg, often called the "shin bone." The dynamometer is placed just above the malleoli bones. These are the two rounded bones that protrude from either side of the leg where the foot and leg meet. They are often called the "ankle bones."
8. Facing the participant in the "power position," ask the participant to push into the HHD slightly to stabilize the HHD and take 1 or 2 seconds to get comfortable with the position.
9. Following the standard script, tell the participant that when you say "Go," the participant should push his or her lower leg as hard as possible into the HHD for at least 6 seconds. The SP should come to maximum effort while you apply counterforce through the HHD and restraining strap.
10. Start the test by following the script in Exhibit 5.1, shown earlier. When the test is completed, ask the participant to relax his or her leg and slip the strap off his or her ankle.
11. Record the peak force of the start leg in pounds in the ISIS application. The timer in the application will begin timing of 60 seconds when you enter a test result for the leg.
12. Switching to the other leg, repeat steps 6 – 10.
13. Complete two more cycles of the tests alternating between legs, making sure to provide 60 seconds of rest for each leg between tests, as shown by the timer on the computer screen.

6. INTEGRATED SURVEY INFORMATION SYSTEM (ISIS) DATA ENTRY

6.1 Recording and Retrieving Test Data

In test mode, results are displayed for the most recent test only. Results for each new test, peak force, and duration will be displayed as soon as the test is completed, replacing results from the previous test.

See Exhibits 6-1 through 6-5. Exhibits 6.1 and 6.2 are screenshots of the two physical activity questions that are asked at the beginning of the component. Exhibits 6-3 and 6-4 are screenshots of the data entry screens, with 6.3 showing the screen without data and 6.4 showing the screen with data entered and the timer started for each leg. Exhibit 6.5 is the status screen with space for comments.

Exhibit 6-1. Initial physical activity question

The screenshot displays a software interface for data collection. At the top, a title bar reads "Lower Body Muscle Strength: Stand:617 Session:617047 10/18/2011 08:30 am - 09:00 pm". Below this, a menu bar includes "File", "View", "Utilities", "Reports", "Window", and "Help". A secondary title bar repeats the session information. The main content area is titled "Lower Body Muscle Strength Exercise Data Collection Screen (Today)". It shows patient information: "SP ID: 878128 Name: TRAINING73, SARAHMS Age: 8 years Gender: Male Date: 02/29/2012 Time: 09:25 AM". The screen is divided into two columns of questions, each with a list of activities and a dropdown menu for frequency.

| What physical activities and sports, such as basketball, wrestling, weightlifting, or long distance running did you do today? (PROBE: Did you do any other physical activities?) | When did you last (do/play) [ACTIVITY]? | What physical activities and sports, such as basketball, wrestling, weightlifting, or long distance running did you do today? (PROBE: Did you do any other physical activities?) | When did you last (do/play) [ACTIVITY]? |
|--|---|--|---|
| AEROBICS/GYM/EXERCISE | <input type="checkbox"/> [] | ROLLER BLADING/ROLLER SKATING | <input type="checkbox"/> [] |
| BASEBALL/SOFTBALL/CATCH/PITCHING | <input type="checkbox"/> [] | RUNNING/JOGGING | <input checked="" type="checkbox"/> 1-3 hours ago |
| BASKETBALL | <input type="checkbox"/> [] | SCOOTER RIDING | <input type="checkbox"/> [] |
| BIKE RIDING/DIRT BIKING/MOUNTAIN BIKING | <input type="checkbox"/> [] | SKATEBOARDING | <input type="checkbox"/> [] |
| CHEERLEADING | <input type="checkbox"/> [] | SOCCER | <input type="checkbox"/> [] |
| DANCE | <input type="checkbox"/> [] | SWIMMING | <input type="checkbox"/> [] |
| FIELD HOCKEY/STREET HOCKEY/ROLLER HOCKEY | <input type="checkbox"/> [] | TENNIS | <input type="checkbox"/> [] |
| FOOTBALL | <input type="checkbox"/> [] | TRACK AND FIELD | <input type="checkbox"/> [] |
| GOLF | <input type="checkbox"/> [] | VOLLEYBALL | <input type="checkbox"/> [] |
| GYMNASTICS/TUMBLING | <input type="checkbox"/> [] | WALKING | <input type="checkbox"/> [] |
| HIKING | <input type="checkbox"/> [] | WEIGHT TRAINING | <input type="checkbox"/> [] |
| ICE HOCKEY | <input type="checkbox"/> [] | WRESTLING | <input type="checkbox"/> [] |
| ICE SKATING | <input type="checkbox"/> [] | OTHER (SPECIFY) [] | <input type="checkbox"/> [] |
| JUMPING ROPE | <input checked="" type="checkbox"/> 4-6 hours ago | REFUSED | <input type="checkbox"/> [] |
| LACROSSE | <input type="checkbox"/> [] | DON'T KNOW | <input type="checkbox"/> [] |
| MARTIAL ARTS (KARATE/TAE KWON DO/JUDO, ETC.) | <input type="checkbox"/> [] | NONE OF THE ABOVE | <input type="checkbox"/> [] |

At the bottom of the screen, there are navigation buttons: "End of Section", "Close Exam", and "Print". A status bar at the very bottom shows "Ready", "MEC Layer: 2/8/2012", "Application: 10.0.3", "Not connected to Coordinator", and "09:27 AM".

Exhibit 6-2. Second physical activity question

Lower Body Muscle Strength: Stand:617 Session:617047 10/18/2011 08:30 am - 09:00 pm

File View Utilities Reports Window Help

Lower Body Muscle Strength: Stand:617 Session:617047 10/18/2011 08:30 am - 09:00 pm

SP ID: 878128 Name: TRAINING73, SARAHMS Age: 8 years Gender: Male Date: 02/29/2012 Time: 09:25 AM

Lower Body Muscle Strength Exercise Data Collection Screen (Yesterday)

What physical activities and sports, such as basketball, wrestling, weightlifting, or long distance running did you do yesterday? (PROBE: Did you do any other physical activities?)

- AEROBICS/GYM/EXERCISE
- BASEBALL/SOFTBALL/CATCH/PITCHING
- BASKETBALL
- BIKE RIDING/DIRT BIKING/MOUNTAIN BIKING
- CHEERLEADING
- DANCE
- FIELD HOCKEY/STREET HOCKEY/ROLLER HOCKEY
- FOOTBALL
- GOLF
- GYMNASTICS/TUMBLING
- HIKING
- ICE HOCKEY
- ICE SKATING
- JUMPING ROPE
- LACROSSE
- MARTIAL ARTS (KARATE/TAE KWON DO/JUDO, ETC.)

What physical activities and sports, such as basketball, wrestling, weightlifting, or long distance running did you do yesterday? (PROBE: Did you do any other physical activities?)

- ROLLER BLADING/ROLLER SKATING
- RUNNING/JOGGING
- SCOOTER RIDING
- SKATEBOARDING
- SOCCER
- SWIMMING
- TENNIS
- TRACK AND FIELD
- VOLLEYBALL
- WALKING
- WEIGHT TRAINING
- WRESTLING
- OTHER (SPECIFY)
- REFUSED
- DON'T KNOW
- NONE OF THE ABOVE

2 of 4
End of Session Close Exam Finish

Ready
MEC Layer: 2/8/2012 Application: 10.0.3 Not connected to Coordinator 09:28 AM

Exhibit 6-3. Component data entry screen

Lower Body Muscle Strength

File View Utilities Reports Window Help

Lower Body Muscle Strength: Stand617 Session:617063 11/03/2011 08:30 am - 09:00 pm

SP ID: 715761 Name: LIU, MICHELLE Age: 7 years Gender: Female Date: 02/01/2012 Time: 11:18 AM

Lower Body Muscle Strength Extension Data Collection Screen

Extension

Practice with the Left Leg

Right Leg Begin the test with this leg.

Extension, leg 1, test 1 CNO RF

Right Leg

Extension, leg 1, test 2 CNO RF

Right Leg

Extension, leg 1, test 3 CNO RF

Left Leg

Extension, leg 2, test 1 CNO RF

Left Leg

Extension, leg 2, test 2 CNO RF

Left Leg

Extension, leg 2, test 3 CNO RF

3 of 4

End of Section Close Exam Eject

Ready | MEC Layer: 12/12/2011 | Application: 10.0.2 | Connected to Coordinator | SP not assigned to room | 11:22 AM

Exhibit 6-4. Component data entry screen with measures

The screenshot displays a software interface for data entry. At the top, a window title bar reads "Lower Body Muscle Strength". Below it, a menu bar includes "File", "View", "Utilities", "Reports", "Window", and "Help". A secondary title bar shows "Lower Body Muscle Strength: Stand617 Session:617063 11/03/2011 08:30 am - 09:00 pm". The main header area contains patient information: "SP ID: 715761 Name: LIU, MICHELLE Age: 7 years Gender: Female Date: 02/01/2012 Time: 11:18 AM". The main content area is titled "Lower Body Muscle Strength Extension Data Collection Screen".

The central section is titled "Extension" and "Practice with the Left Leg". It features a dropdown menu set to "Right" with the instruction "Begin the test with this leg." Below this, there are two columns of test results. The left column is labeled "Right Leg" and the right column is labeled "Left Leg". Each column contains three rows of data for "Extension, leg 1, test 1", "test 2", and "test 3". Each row includes a numerical value, a "1-Maximal" dropdown, and checkboxes for "CNO" and "RF".

| Leg | Test | Value | 1-Maximal | CNO | RF |
|-----------|--------|-------|-----------|--------------------------|--------------------------|
| Right Leg | test 1 | 23.1 | 1-Maximal | <input type="checkbox"/> | <input type="checkbox"/> |
| | test 2 | 24.7 | 1-Maximal | <input type="checkbox"/> | <input type="checkbox"/> |
| | test 3 | 25. | 1-Maximal | <input type="checkbox"/> | <input type="checkbox"/> |
| Left Leg | test 1 | 19.4 | 1-Maximal | <input type="checkbox"/> | <input type="checkbox"/> |
| | test 2 | 20.1 | 1-Maximal | <input type="checkbox"/> | <input type="checkbox"/> |
| | test 3 | 20. | 1-Maximal | <input type="checkbox"/> | <input type="checkbox"/> |

Large blue text at the bottom of the data entry area indicates "43 seconds" for the right leg and "51 seconds" for the left leg.

The bottom of the screen features a navigation bar with "End of Section", "Close Exam", and "Erase" buttons. A status bar at the very bottom shows "Ready", "MEC Layer: 12/12/2011", "Application: 10.0.2", "Connected to Coordinator", "SP not assigned to room", and "11:23 AM".

Exhibit 6-5. Standard component status screen

