BTE
TECHNOLOGIES™

MCU™
Multi-Cervical Unit

OPERATOR'S MANUAL

40040005

Original Instructions

Printed in the U.S.A.

This manual supports the BTE Multi-Cervical™ Unit (MCU 2)

40040005, CO 5062, Rev. C

Manufacturer's information

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WARRANTY

We guarantee that the BTE Technologies, Inc. rehabilitation products are free of manufacturer defects in both workmanship and material. We will replace or repair defective parts or equipment for a period of time and in accordance with the conditions set forth below:

This warranty covers the structure and framework for 1 year of normal institutional use. All mechanical components including bearings, bushings, pulleys and glides are warranted from manufacturer defects in both workmanship and material for a one-year period. Cords and padding are covered for a 1-year period under normal use.

This limited warranty is in lieu of all warranties, expressed or implied and all other obligations or liabilities on the part of BTE Technologies Inc. We neither assume nor authorize any person to assume any other obligation or liability in connection with the sale of this product.

Under no circumstances shall BTE Technologies, Inc. be liable by virtue of this warranty or otherwise, for damage to any person or property what so ever for any special, indirect, secondary or consequential damage of any nature however arising out of the use or inability to use this product.

This limited warranty applies only while the BTE Technologies, Inc. product remains in the possession of the original purchaser and has not been subject to accident, misuse, abuse, unauthorized modification, failure to follow instructional use, failure to do proper maintenance, incorrect adjustments or failure due to cause beyond the manufacture's control.

DISCLAIMER

The information presented in this manual is given in good faith and is to the best of our knowledge accurate. However, anyone who uses this information in any way does so entirely at his or her own risk. Neither BTE Technologies, Inc., its officers nor their representatives can accept any responsibility for any damage or injury incurred as a result of information presented here except under the terms of the product warranty.

CLASS A DIGITAL DEVICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

BTE TECHNOLOGIES™

MCU™
Multi-Cervical Unit

OPERATOR'S MANUAL

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Warnings

Do not operate the system with the transport casters attached.

To avoid risk of electric shock, this equipment must only be connected to supply mains with protective earth.

To avoid neck injury, ensure that the correct pin is used for weight selection

To avoid the risk of injury, do not place foot on the frame base between the chair and the column

Do not modify this equipment without authorization of the manufacturer

Client Safety

- Follow instructions for use
- To avoid risk of electric shock, do not open isolation transformer enclosure. Refer servicing to qualified service personnel
- To avoid fall injuries, do not unbuckle client until the chair is in position for safe egress
- Do not insert hand into path of halo parts
- Do not place hand in weight stack
- Do not position the equipment to make it difficult to disconnect the MCU column and chair power cord
- The MCU is not intended to be connected to a network, do not do so unless instructed by BTE
- To avoid computer screen damage, use only cleaners identified in the maintenance section

Electromagnetic Interference

The MCU should not cause electromagnetic interference with any other equipment. The equipment needs to be placed into service according to electromagnetic compliance information provided in Appendix 1 of this manual.

Operating Voltages

The MCU has 2 components, the computer cart and the base unit. The computer cart is capable of operating at the following voltages and frequencies which are factory set and noted on the external transformer case.

- 100V~ 60 Hz
- 115V~ 50/60Hz
- 200V~ 50/60Hz
- 215V~ 50/60Hz
- 230V~ 50/60Hz

The base unit is capable of operating at the following voltages and frequencies which are set at the factory.

- 115V~ 50/60Hz
- 230V~ 50/60Hz

General Description

The Multi-Cervical Unit (MCU) is an apparatus for measuring the active range of motion of the neck and the isometric strength of neck muscles. Range of motion (ROM) and Isometric strength measurements can be taken in the following directions: flexion, rotation, extension, lateral flexion, and in combined planes.

Applied Parts

MCU applied parts include head braces (load cells) and the chair. The parts are designated as Type B Applied Parts.

Servicing

- No parts shall be serviced or maintained while in use with a patient
- Transformer must be serviced by qualified personnel
- Upon request BTE will provide circuit diagrams, component parts lists, descriptions, calibration instructions, or other information to assist service personnel to repair parts

Connections

Hosting Device	Port	Connected Device
Computer	USB	Keyboard
		Mouse -or- pointing device
		Printer
		USB Powered Speakers
		BTE Wireless Hub
	VGA video output	LCD -or- LED Monitor
BTE Wireless Hub	SMA Connector	Wired connection to base unit
Base Unit	RJ45 Connector	Load cell attachments
	SMA Connector	Wired connection to BTE wireless hub

Environmental Conditions

Permissible Environmental Conditions for Transport and Storage:

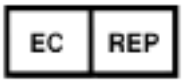
Ambient temperature: -20°C to +40°C
Relative humidity: 30% to 90%
Atmospheric pressure: 550 hPa to 1060 hPa

Permissible Environmental Operating Conditions

Ambient temperature: +10°C to +40°C
Relative humidity: 30% to 75%
Atmospheric pressure: 700 hPa to 1060 hPa

The MCU sound pressure level does not exceed 70dbA at the workstation.

Definitions of Symbols and Certification Marking

	Manufacturer		Temperature Limit
	Authorized Representative in the European Community		Humidity Limitation
	Catalogue Number		Atmospheric Pressure Limitation
	Serial Number		CE Conformity Marking (for reference only)
	Type B Applied Part		Safety Certification where applicable
	Follow Instructions for Use		Pinch Point
	General Warning Sign		Crush Zone
	Protective Earth (Ground)		“ON” (Power)
	Alternating Current		“OFF” (Power)
	Do not open with blade		Do not forklift

Intended Use

Summary

The MCU is intended to be used by physical therapist, chiropractic physician, or osteopathic physician for musculoskeletal testing and treatment. Applications include chronic neck pain, whiplash and associated disorders, neck weakness, and cervicogenic headaches. The system is intended to evaluate deficits, increase strength and range of motion, and to track patient progress through the process.

Detailed

The MCU is an exercise and evaluation device that is intended for use in physical rehabilitation. The system provides isometric and dynamic resistance for the physical rehabilitation of patients with injuries that affect the cervical spine. The system is used to improve the muscle strength and endurance of selected body segments, and improve the range of motions at effected joints.

The MCU is also used in functional rehabilitation therapy where the patient is allowed to perform compound motions which are intended o simulate the motions of real life tasks, for example, looking over one's shoulder, looking up overhead, or looking down to the floor. The intent of exercising in this manner is to improve the patient's general strength, endurance, and coordination for performing such movements.

The system measures force output (in terms of maximum isometric contraction) and ROM of patients using the device. The information gathered by the computerized data collection systems on the device is used:

- In the documentation of patient progress from one treatment session to the next,
- As visual performance feedback, and
- To measure and compare the strength and ROM of the right side of neck to the left.

The type of injuries or disorders that patients using these devices might have would include:

- Mended fractures
- Muscle strains
- Ligamentous strains
- Sprains
- Cumulative trauma disorders
- Neuromuscular disorders

Intended Patient Population

The device can be used with clients that weight up to 158 kg (350 lbs).

Contraindications

Cervical spinal cord injury
Neural torticollis
Cervical malignancies
Spinal malignancies (unless medically cleared)
Pregnancies in the final trimester

Intended User Profile

Medical healthcare professionals

Intended Conditions of Use

Office or clinic setting

Use of Energy Source

An electric power source is required to move chair, for system communication, and computing purposes.

Operating Principles

A patient is seated with their head positioned in a ring. The ring can rotate about the vertical axis and horizontal axis. The patient is asked to move their head in the axis through available or unrestricted range of motion. A load cell measures the force applied while potentiometers measure the distance moved. The data is reported to the operator for examination.

The MCU provides rehabilitation of the neck muscles through the use of a weight stack that resists the movement of the ring. Various weights can be applied allowing the operator to increase or decrease force. A program used to strengthen can be entered into the software and progress monitored.

Essential Functions

- Assessment

Provides charts and graphs with sufficient data for an OPERATOR to measure the neck strength and range of motion of a CLIENT

- Exercise

Permits the CLIENT to perform neck strengthening exercises.

- Reports

Allows the operator to view and print reports on the CLIENT's progress.

Components Designated as Repairable by Service Personnel

There are no components on which preventative inspection and maintenance shall be performed by service personnel. Components will be replaced if needed in accordance with BTE service policy. In addition, documentation and instructions for any in-field repairs to be conducted by service personnel will be provided.

Environmental Protection

At the end of the equipment service life, dispose the device components in accordance with all local, state and federal laws for electronics recycling.

Performance Characteristics

Load Cells maximum is 50 lbs. accuracy +/-0.2% over range

The accuracy of potentiometers for rotation and flexion are not given in absolute values. What is defined is that the repeating the measurement should provide a result within 2% of the initial reading. Rotation and flexion ranges are each +/- 90 degrees

Information regarding EC Declaration of Conformity

BTE has issued the EC Declaration of Conformity declaring that the MCU meets the provisions of the European Union medical device regulations and applicable directives. The declaration may not apply to each unti.

The following information applies to the product:

Name and contact information of the manufacturer	 BTE Technologies, Inc. 7455-L New Ridge Road Hanover, MD 21076, USA Telephone: (410) 850-0333 Fax: (410) 850-5244
Product identification	Product Name: MCU Model: MCU2
Medical device class	Class 1
Route to compliance	Annex VII of Medical Devices Directive
Intended use	System used for cervical neck assessment and rehabilitation
Contact information of the manufacturer's authorized representative operating in the European Community	 Emergo Europe Authorized Representative in Europe Prinsessegracht 20 2514 AP, The Hague The Netherlands Email: Europe@emergogroup.com
CE Marking	 The CE conformity marking is placed on the device. where applicable.

A copy of the EC Declaration of conformity can be obtained by sending a written request to BTE at the address above.

Notice to Customers Located in the European Union

Emergo Europe is BTE's Authorized Representative in the European Union as noted in section "Information Regarding EC Declaration of Conformity". The Authorized Representative's function is described in the Council Directive concerning medical devices. BTE Customer Service is your point of contact for technical support.

Important Information For Safety

Warning
Only the MCU computer, printer and monitor may be safely attached to the multiple socket outlet

Warning
Connect the multiple socket outlet only to the specified MCU equipment

Warning
Connecting electrical equipment to the multiple socket outlet effectively leads to creating a medical electrical system and the result can be a reduced level of safety

Warning
An additional multiple socket outlet or extension cord shall not be connected to the MCU system

Warning
The MCU is not intended to be connected to a network. Do not do so unless instructed to by BTE or a BTE representative.

- The multiple-socket outlet located inside the MCU computer cart column base is used to connect the system computer, printer, and monitor. The multiple-socket outlet shall only be used for supplying power to the intended electrical equipment that is part of the medical electrical system. If other electrical equipment is connected, electrical current drawn by the system could exceed the maximum allowed current tripping the circuit breaker. This could make the equipment non-operational and delay treatment benefits for the patient.
- The responsible organization (e.g. the customer) must refer to the standard IEC 60601-1, third edition, for the requirements that are applicable to a medical electrical system (ME System).
- The appliance (power) inlet located on the back side of the MCU column near the floor can be used to disconnect the equipment from a supply mains. The MCU should not be located where access to the inlet is blocked.

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INSTALLATION AND SETUP

I. INTRODUCTION

This MCU™ Operator's Manual will review the basic components of the Multi Cervical™ Unit. Once you are familiar with the components, you can explore the techniques and protocols for performing a cervical assessment, including range of motion and isometric strength testing.

This Manual will also review the different types of reports that are automatically generated using the information acquired throughout the assessment.

BTE Technologies recommends that the Multi-Cervical™ Unit be used in conjunction with a certified training program on The Melbourne Protocol. Two-day comprehensive training programs are tailored to suit the specific needs of your facility. Refer to Chapter 10 for more information.

II. MCU™ COMPONENTS

DO NOT CHANGE OR MODIFY ANY COMPONENTS

Any changes or modifications, not expressly approved by BTE Technologies, Inc. could void the user's authority to operate the equipment.

A. MULTI CERVICAL™ STATION

The Multi Cervical™ Station consists of the base, column with weight stack, seat, halo, weight stack pins, ROM stop, (2) head braces, (3) Velcro straps, and (4) RJ45 cables - 2 short and 2 long (Figure 1-1).

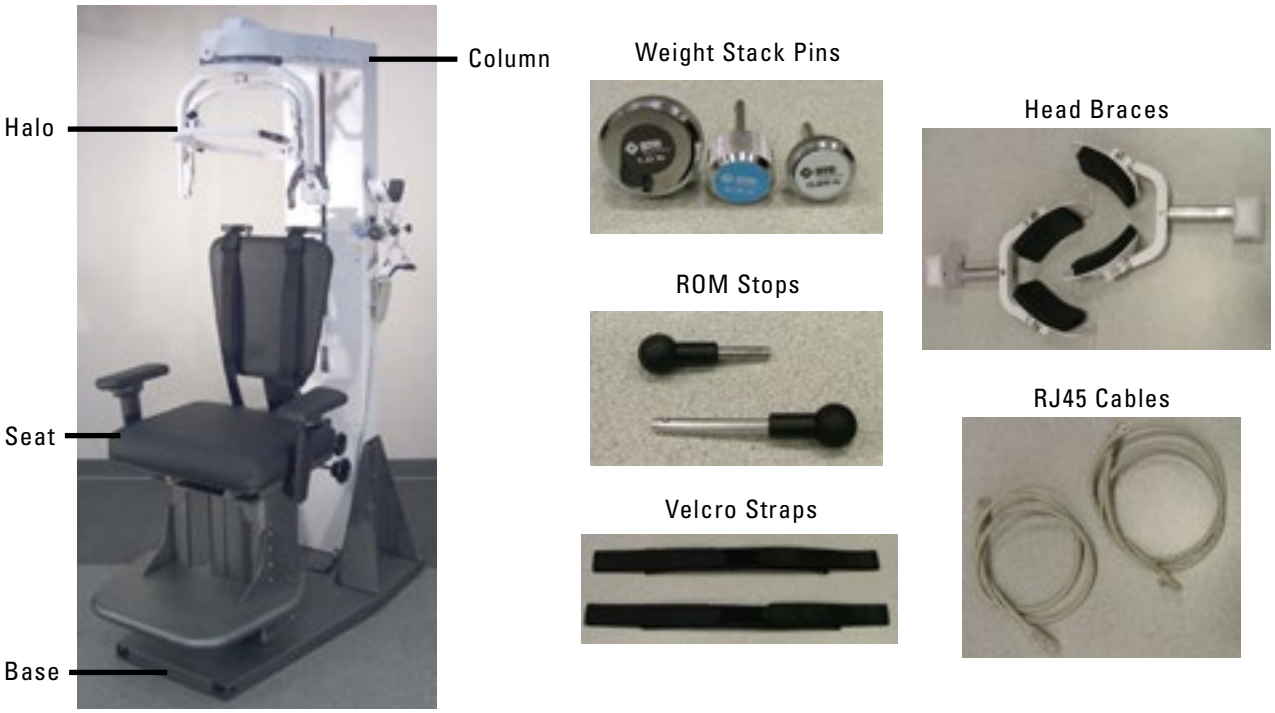

Figure 1-1. Multi-Cervical™ Station

B. CALIBRATION TOOLS

The MCU™ calibration kit consists of (1) calibration block, (1) 10 lb weight, and (1) 15 lb weight (Figure 1-2).

Figure 1-2.
Calibration Tools

C. COMPUTER EQUIPMENT AND CART

The computer equipment consists of a computer cart, LCD monitor, CPU, printer, speakers, isolation transformer, hub, and Direct Connect Cable (Figure 1-3).

Figure 1-3. Computer Equipment and Cart

III. ASSEMBLY INSTRUCTIONS

Once the MCU™ Station and computer cart have been unpacked, you are ready to start assembling the unit.

A. SETTING UP THE MCU™ STATION

The MCU™ is shipped on casters to provide maximum protection in transit and ease of installation. The caster assemblies also provide adjustable ground clearance. The system is shipped in the highest position to clear ramps, curbs, and thresholds, but it can also be lowered to pass under low doorways.

Step 1. Move the MCU™ to the location you wish it to be used. Using a 3/4" wrench, lower each caster a small amount until the MCU™ base is resting on the ground. Once the base is on the ground, remove the casters (Figure 1-4).

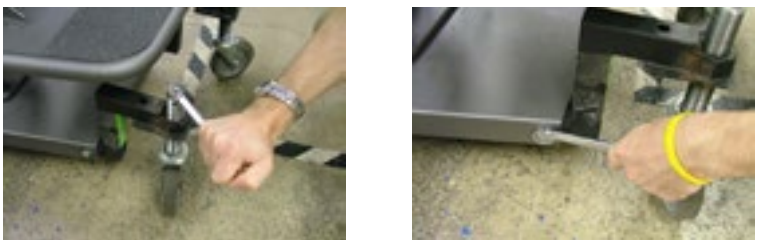

Figure 1-4. Lowering and Removing the Casters

Step 2. Locate the weight stack pins and ROM stop pin and place them in the corresponding holes on the calibration plate (Figure 1-5).

Figure 1-5. Location of Weight Stack Pins & ROM Stop Pin

Step 3. Locate the head braces (also known as load cells) and secure them to the calibration plate (Figure 1-6).

Step 4. Locate the Velcro straps and RJ45 cables. These may be placed on the computer cart.

Figure 1-6. Head Braces Secured to Column

Step 5. Locate the calibration weights and calibration block and place them in the triangular bracket on the base (Figure 1-7).

Figure 1-7. Location of Calibration Tools

Step 6. Locate the Direct Connect Cable and then locate the large hole on the top back of the MCU™ station. Insert the cable through this hole and secure it to the PCB (Figure 1-8).

Figure 1-8. Attachment of cable.

Step 7. Locate the arm rests (note which is labeled left and which is right) and attach them to the seat on the appropriate sides (Figure 1-9). Note that the armrest is inserted below the plastic piece that is within the bracket.

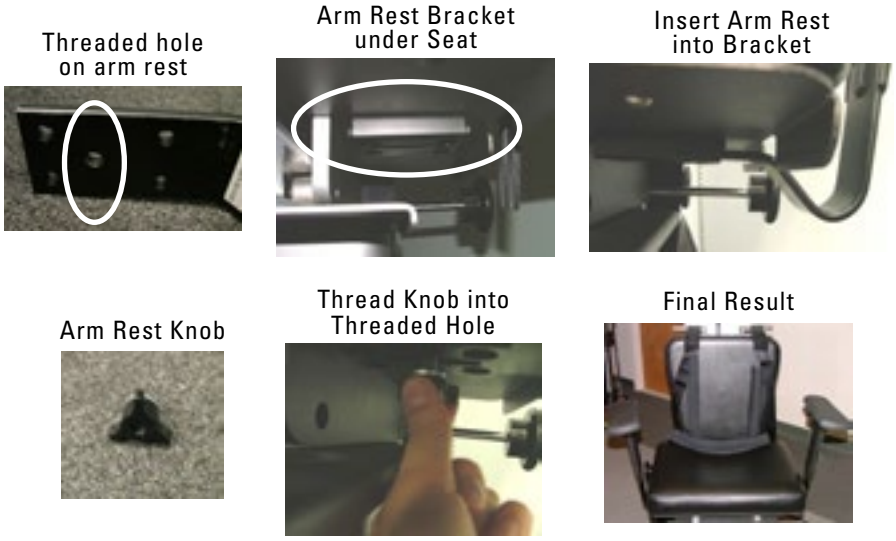

Figure 1-9. Attaching the Arm Rests

Step 8. Plug the power cord, which is located at the bottom back of the MCU™, into the designated wall outlet. Hold your hand above the back of the MCU™, next to the cable, and verify a light shines on your hand; this confirms the PCB is receiving power (Figure 1-10).

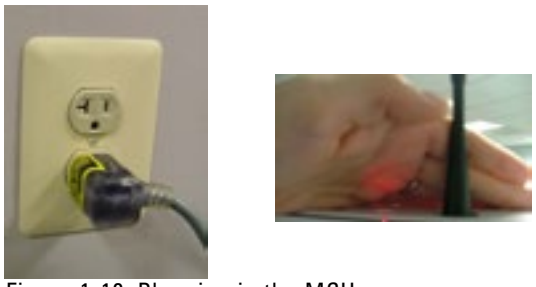

Figure 1-10. Plugging in the MCU

B. SETTING UP THE COMPUTER EQUIPMENT AND CART

1. LCD MONITOR

For help on securing the monitor to the computer cart, refer to the instructions provided with the monitor.

2. PRINTER

Remove the printer from its box and place it on the 2nd shelf of the computer cart. Following the instructions within the printer box, insert the ink cartridges and plug in the power cord and USB cable. Once the computer is running and the printer is turned on, print a test page.

3. CPU

Remove the CPU (computer tower) from its box and place it on the 3rd shelf of the computer cart. Plug in the power cord, monitor serial cable, and printer USB cable.

4. SPEAKERS

Remove the speakers from their box and place them on the 3rd shelf of the computer cart. Plug the cable from the left speaker into the designated jack on the right speaker. Next, plug the power cord into the designated jack on the right speaker. Finally, plug the speaker cable, which is attached to the right speaker into the CPU.

5. KEYBOARD & MOUSE

Remove the keyboard and mouse from their box. Place the keyboard on the top shelf of the computer cart and plug the cord into the CPU. Place the mouse on the auxiliary shelf of the computer cart and plug the cord into the CPU.

6. HUB

Locate the Hub and place it on the 1st or 2nd shelf of the computer cart. Note that inside of the Hub are magnets, which are intended to keep the Hub stable on the shelf. Secure the cable (from Step 6 of 'Setting up the MCU Station') to the Hub (Figure 1-11). Plug the USB cable into the CPU.

Figure 1-11. Placement of Hub

7. ISOLATION TRANSFORMER

Locate the isolation transformer and its power cord and place it next to the designated wall outlet. Attach the computer cart cable, which is located at the bottom back of the cart, to the isolation transformer. Plug one end of the isolation transformer power cord into the isolation transformer and the other end into the designated wall outlet. Turn on the isolation transformer via the green switch (Figure 1-12).

Figure 1-12. Placement of Transformer

IV. STRONGLY RECOMMENDED ADDITIONAL PURCHASES

In addition to the equipment shipped to you from BTE Technologies, the purchase of the following items from a local supplier is strongly recommended for adequate protection of your patient data:

> The use of extension cords is not recommended. If an extension cord cannot be avoided, use no less than 14 gauge wire. Keep the cord as short as possible, and use only hospital approved plugs. The extension cord MUST complete the ground from the MCU power supply cord to the wall outlet.

- Several "CD-RW" re-writable compact discs for backing up and archiving copies of patient data

IMPORTANT

In case of a malfunction, your computer can be repaired or replaced, but your valuable patient data can only be restored from copies kept on "back-up" CDs (See Section 2 - General Information).

- An Uninterruptible Power Supply (UPS) unit providing at least 14 amps as a safeguard against the permanent loss of patient information due to power surge or electrical power failure.
- Disinfectant wipes to clean the commonly used surfaces on the machine and components.

V. COMPUTER CARE

IMPORTANT

Handle your computer with extreme care. A drop or a bump, even from a height of 3-4 inches, may cause serious damage, which is not covered by the warranty.

A computer's hard disk is vulnerable to loss of data and "corruption" of data (may not function correctly when you attempt to retrieve patient information) from a sudden change in the level of electrical power. In the event of a power failure, the UPS battery will generate electricity long enough to allow you to shut down the system without damage to your patient data.

Since computers are sensitive to extremes of temperature, do not place equipment close to a direct source of heat or cold (for example, in direct sunlight, next to a radiator or an air conditioner).

Do not install any additional software onto the controlling computer. The BTE Technologies MCU™ system is in constant communication with the computer, so a "clean", dedicated computer system is crucial to the integrity of this communication system. Lastly, your computer will not be covered under the warranty if any unapproved software has been installed.

A. CHECK COMPUTER CABLES

Check that all cables are securely connected to the computer. Just about every cable connector is made in such a way that it will only attach in its appropriate location. If the cables are not secured properly, there may be an interruption of the data transmission, resulting in error messages.

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GENERAL OPERATION

I. GETTING STARTED

IMPORTANT

Unless the system is designated as an international unit, voltages over 125V can result in eventual damage to the MCU™ electronics and produce frequent error messages. Even if you have a dedicated circuit for your MCU™, have a technician check the outlet with a voltmeter to ensure that the wall voltage does not exceed 125 Volts (U.S. and Canada). If your wall voltage exceeds this voltage, call BTE Technologies immediately.

Damage to your MCU™ resulting from wall voltages exceeding 125 Volts is not covered under the warranty.

Ensure that you have carefully read Chapter 01 of this manual prior to starting up your MCU™.

Step 1. After making sure everything is plugged in properly, turn on the computer.

Step 2. Access the software by double-clicking on the MCU™ icon, which is located on the "desktop" of the computer monitor.

II. BASIC SOFTWARE NAVIGATION

The BTE Technologies MCU™ is controlled through its own unique software. Use this chapter as both an initial primer and a to-the-point, quick reference guide to your MCU™ software.

A. THE WINDOWS XP ENVIRONMENT

As a new user of MCU™, it is important for you to first acclimate yourself to the Microsoft Windows XP operating system.

Familiarize yourself with these basic functions:

Desktop – Once Windows loads up, the entire screen is taken up by the desktop. Double-clicking the ODES shortcut icon, which is located on the desktop, launches the MCU™ software.

Minimize – Clicking this button hides the open program and reduces it to a button on the start bar (Figure 2-1).

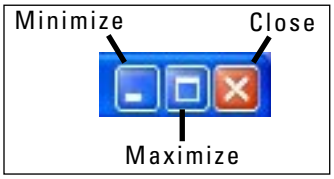

Figure 2-1. Minimize/Maximize/Close

Maximize/Restore – Expands the program window to fit the size of the entire screen. If the program is already expanded, clicking this will shrink the screen to a smaller window (Figure 2-1).

Close – Closes the active program window (Figure 2-1).

Scrollbars – Click the small black up and down arrows on the bar at the right of a given window to scroll up and down in screens.

Start bar - This horizontal bar located at the bottom of your screen displays a button of every open program. Clicking a program name here switches you to that program.

Start button – This button is used to launch nearly every program and function of Microsoft Windows (Figure 2-2).

Figure 2-2. Start Icon

B. USING THE MCU™ SOFTWARE

Once you are comfortable with Windows XP, take some time to familiarize yourself with the general layout and functionality of the MCU™ software. Doing this now will maximize your efficiency down the line.

To access MCU™, click on the MCU™ icon, which is displayed on the computer's desktop. You will be prompted for a username and password (Figure 2-3). The username is bte and the password is bte (both lower case); the username and password may be modified through the Administration Menu if you choose to do so later (Section IV-D).

Figure 2-3. MCU Software Username and Password

Upon entering the MCU™ software, you will notice the following elements are used throughout:

Title Bar – The narrow blue strip located at the top of the screen which displays the database into which the data is being stored.

Taskbar – Located at the top of the screen under the title bar; while in the home screen, this bar includes the menus: File, Calibration, Statistics, Snapshots, Forms, Utilities, Calculators, Digital Capture, Patient Standing and Sitting icons, and Help. This bar changes depending on which area of the software you are using.

Taskbar items – Items listed under each menu title which allow you to perform an operation or to pull up a report.

Text fields – Text and numerical values are entered into "fields". To enter text or an integer into a field, click the field, and a blinking black cursor will indicate that the field is active. Type in the required information.

Check boxes – A checkbox is like a switch; click one to activate a setting and click it again to de-activate the setting.

Drop-down menu – A text field with an arrowhead pointing down. When the arrowhead is clicked, the menu drops down to show a list of options available.

III. HOME (START-UP) SCREEN

The first active screen you will see when the MCU™ software is initiated is the Home Screen (Figure 2-4). Within this screen all of the settings, patient information, and protocols may be accessed.

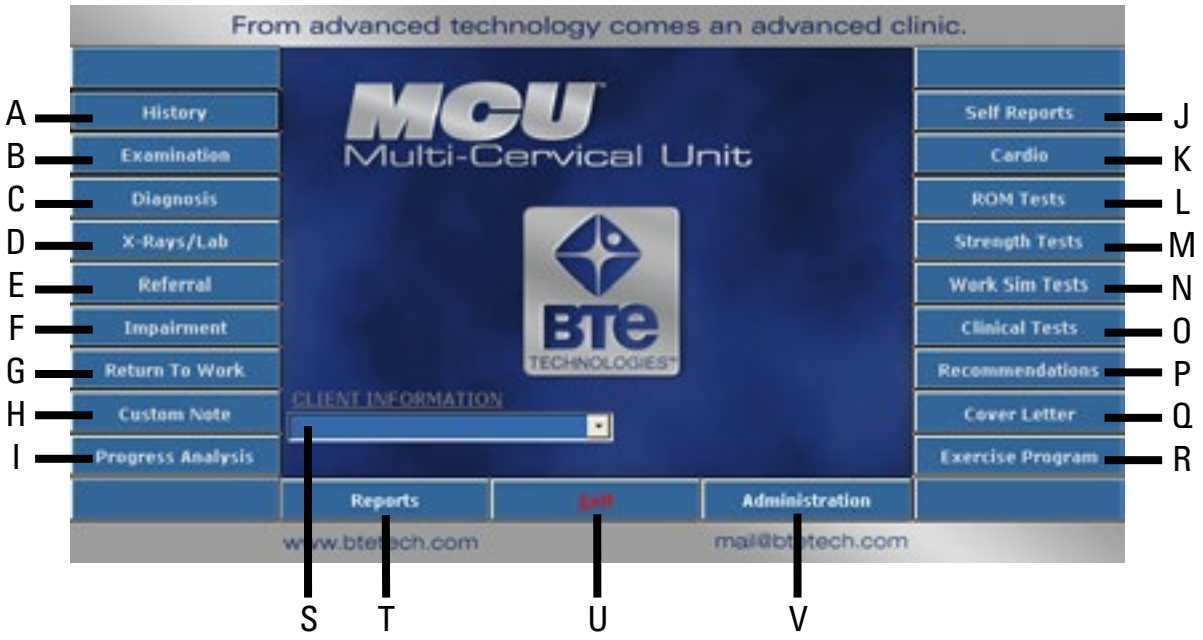

Figure 2-4. MCU™ Home Screen

A. History – Patient History Templates

B. Examination – Patient Examination Results Templates

C. Diagnosis – Patient Diagnosis Templates

D. X-Rays/Lab – Patient X-Ray and Lab Results Templates

E. Referral – Patient Referral Letter Templates

F. Impairment – Patient Impairment and Disability Templates

G. Return To Work – Patient Return To Work (RTW) Letter Templates

H. Custom Note – Blank Template for Customized Notes

I. Progress Analysis – Patient Progress Analysis Templates

J. Self Reports – Patient-Filled Questionnaires

K. Cardio – Cardiovascular Measurement Protocols

L. ROM Tests – Range of Motion Protocols

M. Strength Tests – Muscular Strength Protocols

N. Work Sim Tests – Work Simulation Protocols

O. Clinical Tests – Clinical Analysis of Pain Protocols

P. Recommendations – Recommendation Letter Templates

Q. Cover Letter – Cover Letter Templates

R. Exercise Program – Pre-programmed Exercises to add to a case

S. Client Information – Create and find clients and cases; display the current client

T. Reports – Create, edit, and print reports

U. Exit – Exit the MCU software

V. Administration – Clinic and Practitioner Personalization Settings, Software Settings, Heart Rate Comments, and Protocol Settings

Note that the sections on Self Reports, ROM Tests, Strength Tests, and Exercise Program are covered in this manual; however, these sections are also comprehensively covered in the training program on The Melbourne Protocol. Refer to Chapter 10 for more information on this training program.

IV. ADMINISTRATION MENU

From the Administration Menu you can control several types of settings, templates, and protocols as well as remove cases (Figure 2-5).

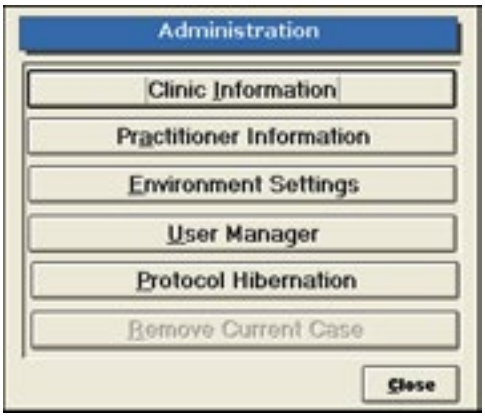

Figure 2-5. Administration Menu

A. CLINIC INFORMATION

This screen allows you to personalize the reports with your clinic's information and logo (Figure 2-6).

Add a clinic by clicking New.

To enter a clinic logo, double click on the Clinic Logo blank field. Locate the saved logo file on your hard drive.

The logo can be in any graphic file format (.jpg, .gif, etc.) and should be 3.2" x 0.8", so that it doesn't become distorted when attached to a report.

Edit a clinic's information by pulling up the clinic's screen, modifying the necessary information, and then clicking New, Previous, Next, or Close.

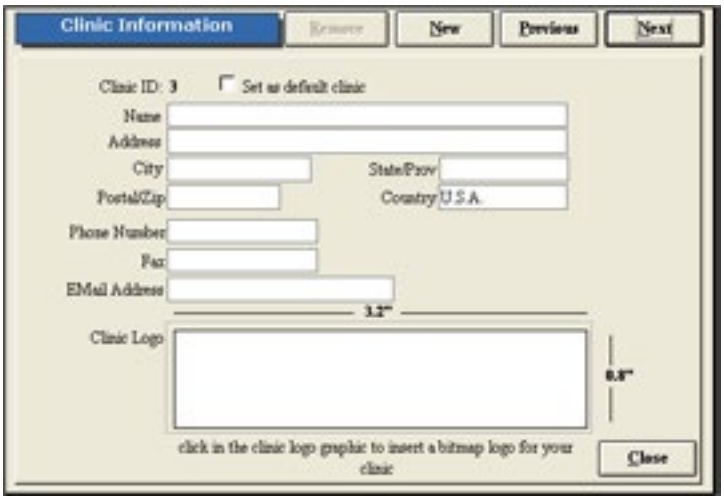

Figure 2-6. Clinic Information

Remove a clinic by clicking Remove.

Change the default clinic by clicking Next or Previous to select the correct location and then checking the 'Set as default clinic' box. Note that a default clinic cannot be removed until another clinic has been assigned as the default. When a report is printed, the default clinic and logo are included on the report.

B. PRACTITIONER INFORMATION

This screen allows you to personalize the reports with the practitioner's name and digital signature (Figure 2-7).

Step 1. Type in the name and demographics of the practitioner.

Step 2. To add a digital signature, you must first scan the signature and save it to your hard drive in a graphic file format (.jpg, .gif, etc.).

Click the Allow Digital Signature box, enter a password (optional), and double click the icon in order to locate the signature file on your hard drive.

Step 3. Click Add to include the practitioner to the database. The name will now appear at the bottom of the screen.

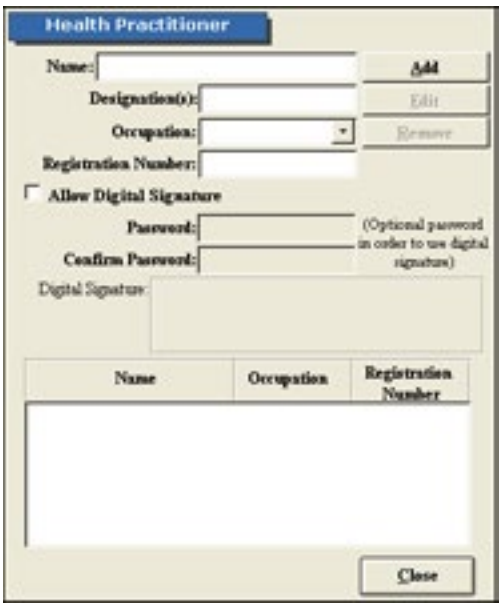

Figure 2-7. Health Practitioner

Edit the health practitioner information by highlighting the name from the list and then clicking Edit. A practitioner may also be replaced by another within the Edit screen. Once the changes have been made click on Add.

Remove the health practitioner information by highlighting the name from the list and then clicking Remove.

C. ENVIRONMENT SETTINGS

This screen allows you to set up communication between your wireless hub and computer, change how you interface with the software, set up reminders, and monitor the wireless configurations (Figure 2-8).

1. DATA ACQUISITION CHANNEL

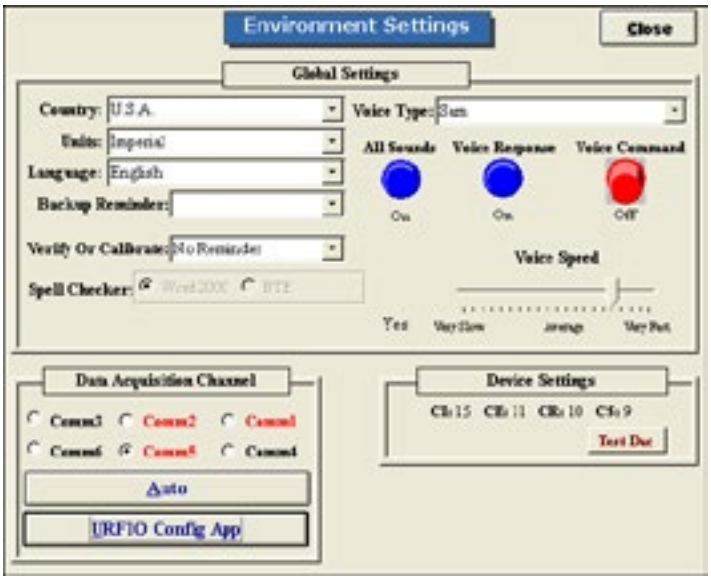

Figure 2-8. Environment Settings

Click Auto to ensure the wireless hub is communicating properly with the computer (Figure 2-9). If there is a problem, an error message will appear stating that the software cannot communicate. Otherwise, if everything is working properly, a message will appear stating the data acquisition box has been set up successfully.

Figure 2-9. DAQ Channel

2. DEVICE SETTINGS

The Device Settings section indicates which channel the various tools are being read from based on the set-up of the software (Figure 2-10). This section is most helpful for troubleshooting.

Figure 2-10. Device Settings

3. GLOBAL SETTINGS (FIGURE 2-11)

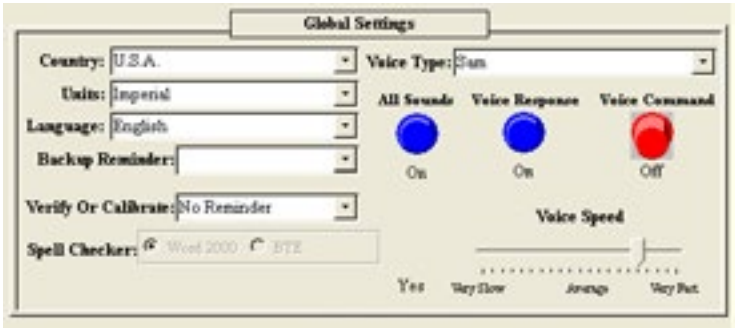

Figure 2-11. Global Settings

Country, Units, and Language – Specify the country, units of measurement, and language to be used in printed reports.

Backup Reminder – Set reminders for backing-up your data. The recommended amount of time between back-ups is 7 days. The backups should be saved on floppy disks, CDs, or ZIP disks and be kept separate from your system in case of fire, theft, or other equally damaging events.

Verify or Calibrate – Set reminders for calibrating and verifying the equipment. The recommended amount of time between calibrations is 7 days, and the unit should be verified before each day of testing to ensure your tools are accurate. The accuracy of your equipment is extremely important, particularly if your reports will be used in litigious cases. In addition, the Reminder can be set up as 'Remind only' or 'Must Be Done'.

Spell Checker – Spell check your documents using Microsoft Word or the provided Medical Spellchecker.

Voice Type and Speed – Change the type and speed of the voice interface. You may also turn the sounds and voices on and off by clicking on the knobs.

4. URFIO CONFIGURATION APPLICATION

The URFIO Configuration Application is the portion of the software that monitors the wireless configurations of the system (Figure 2-12).

Figure 2-12. URFIO Config

Clicking on the URFIO Configurator icon brings up the URFIO Configuration Tool Mapping screen (Figure 2-13). This screen displays which wireless channel the system is operating on and which tool is mapped to that current wireless channel. This screen should only be used when a new tool (i.e. MCU™ Column or load cell) needs to be mapped or for troubleshooting purposes.

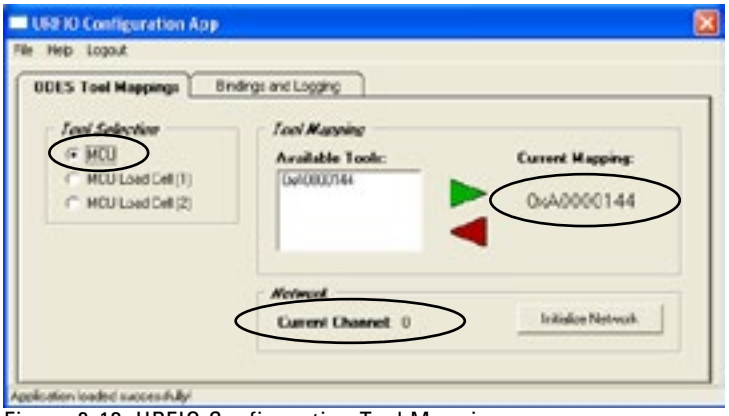

Figure 2-13. URFIO Configuration Tool Mapping

To map a tool: click on the tool name under Tool Selection, highlight the tool's serial number under Available Tools, and then click the green arrow to map the tool; the serial number should appear under Current Mapping.

To unmap a tool: click on the tool name under Tool Selection (the serial number must appear under Current Mapping), click on the red arrow; "Not Mapped" should appear under Current Mapping.

If a tool isn't listed under Available Tools, click on Initialize Network. Doing so will scan all of the channels to find any available tool.

D. USER MANAGER

User Manager allows you to add, edit, and remove users as well as set each user's level of rights to the software (Figure 2-14).

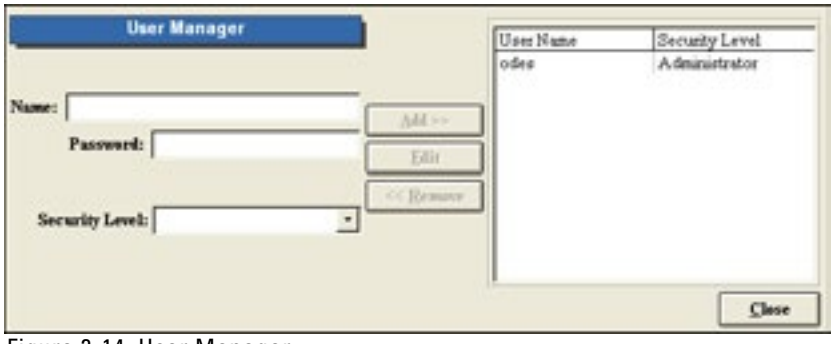

Figure 2-14. User Manager

To add a new user, enter a user's name, password (case sensitive), and select a security level from the drop-down menu. Click Add to include the new user. When the user signs into the software, he or she will use the name and password assigned in this screen.

Edit a user's information by highlighting their name on the right hand side of the screen and clicking on Edit. Once the changes have been made, click on Update.

Delete a user by highlighting their name and then clicking on Remove.

Descriptions of the security levels:

- Administrator – All rights
- High – All rights except User Manager
- Medium High - All rights except User Manager and removal of cases
- Medium - All rights except Administration
- Low Medium - All rights except Administration, Reports, removal of assigned protocols to a client, and deletion of tests
- Low - All rights except access to client notes, Administration, Reports, and unable to edit, delete or create tests
- Lowest - Only access to client information and client case information

E. PROTOCOL HIBERNATION

Protocol Hibernation allows you to place protocols, which may not be used often, in hibernation as well as remove protocols, which may be needed, from hibernation. Moving protocols in and out of hibernation does not delete the data or testing information. Note that protocol hibernation can also be accessed through the protocol pages (Figure 2-15).

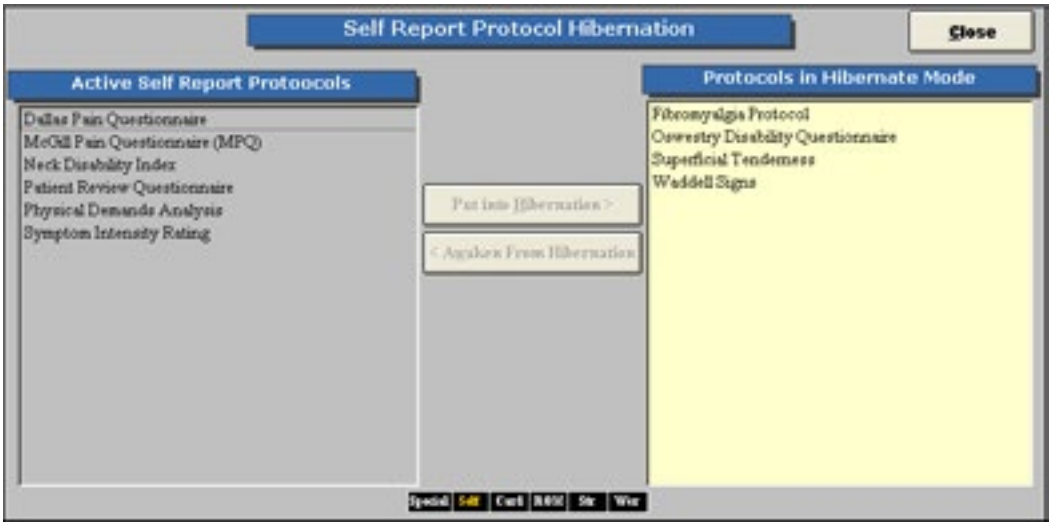

Figure 2-15. Protocol Hibernation

Hibernate a test by highlighting the test on the left hand side of the screen and then clicking Put into Hibernation. The test should now appear on the right screen and not the left one.

Bring a protocol out of hibernation by highlighting the test from the right hand side of the screen and then clicking Awaken From Hibernation. The test should now appear on the left screen and not the right one.

F. REMOVE CURRENT CASE

Remove Current Case allows you to delete the client case that has been selected from

within the home screen. After the last case is removed, the client information may also be removed in the same manner. Note that once a case or client has been deleted, it cannot be retrieved by your or BTE Technologies.

Step 1. Remove the current client case by clicking Remove Current Case.

Step 2. A warning will appear prior to deleting data. Click Yes to remove the case.

V. TASKBAR (FIGURE 2-16)

Figure 2-16. MCU™ Software Taskbar

A. FILE DROP-DOWN MENU

1. DATABASE UTILITIES

Database Utilities allows you to open a database, create a new database, rename an existing database, and remove an existing database (Figure 2-17).

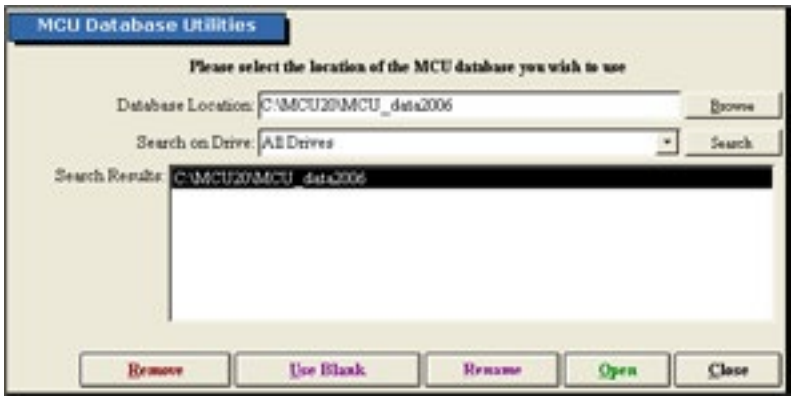

Figure 2-17. Database Utilities

Open a database by locating the database, double clicking the name in the Search Results field, and then clicking Open. After confirming that you would like to open the database selected, the home screen will appear with the selected database available to use. The blue title bar at the top of the screen should now read the opened database.

Create a new database by typing in the new database name within the Database Location text field, clicking Use Blank, and then confirming you would like to create this new database.

Rename an existing database by locating the database you would like to change, double clicking the name in the Search Results field, modifying the name within the Database Location text field, clicking Rename, and then confirming you would like to rename this database.

Remove a database by double clicking the name in the Search Results field, clicking Remove, and then confirming you would like to delete this database.

Note that once a database has been removed, it can not be recovered by you or BTE Technologies.

2. COMPACT & REPAIR DATABASE

Compact & Repair allows you to repair any small errors that may occur due to networking (Figure 2-18).

Repair the database by clicking on Compact & Repair. A screen will pop up confirming you would like to repair the database currently in use.

Another screen will appear once the repair is successful.

Figure 2-18. Compact & Repair Database Message

It is recommended that you compact and repair your database every one to two months.

3. BACK UP DATABASE

Back Up Database allows you to back up your databases; this is highly recommended in the case your hard drive becomes irrecoverable and you cannot access your files (Figure 2-19).

Back up a database by locating the directory you would like to save the database to, selecting whether or not to use a password, selecting whether or not to back up the impairment ratings, selecting whether or not to erase the disk, and then clicking Start Back up.

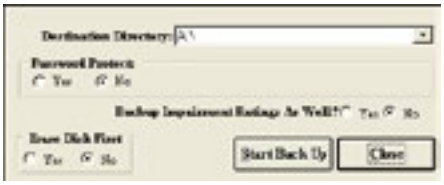

Figure 2-19. Back Up Database

Note that BTE Technologies cannot recover any lost or forgotten passwords that have been used for back ups.

It is highly recommended that you back up your database to a floppy disk, CD, or ZIP disk at the end of each day. A back-up reminder can be set within the Environment Settings Screen.

If you are using a laptop or will be transporting your computer, we recommend backing up your database prior to moving the system.

4. RESTORE DATABASE

Restore Database allows you to restore a previously backed up database (Figure 2-20).

Restore a database by locating the directory you would like to restore the database from, entering the password if necessary, selecting whether to keep the original name or not, selecting whether to restore the impairment ratings or not, and then clicking Start Restore.

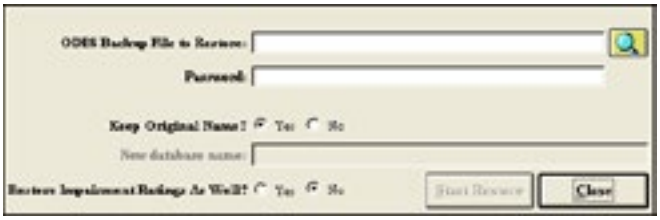

Figure 2-20. Restore Database

Note that if you choose to restore with a name that is the same as another database, the other database will be overwritten by this new restore.

After you restore a database, you must use the Database Location field to find the newly restored database.

5. LOG OFF AND EXIT

The Log Off option is to be used if you are going to be using the MCU™ software on and off throughout the day. By logging off rather than exiting, the speed of the MCU™ software will be enhanced.

It is recommended you exit the program at the end of each day and shut down the computer.

B. CALIBRATION DROP-DOWN MENU

Calibration is covered in Chapter 05 - Calibration & Verification.

C. STATISTICS DROP-DOWN MENU

1. EMPLOYER INFORMATION

Employer Information provides a summary of all Employers that are stored within the Case Information section of the MCU™ database. The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

2. PATIENT STATUS INFORMATION

Patient Status Information provides a summary of all Client Statuses. If the status of a client has been added to the database in the Client Case page, the client will be added to this report. You may sort by last name or by the status of the client. The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

3. PATIENT INFORMATION

Patient Information provides a summary of all client information that has been added to the database. The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

4. REFERRAL INFORMATION

Referral Information provides a summary of all referral sources that have been entered into the database. The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

5. INSURANCE INFORMATION

Insurance Information provides a summary of all insurance companies that have been entered into the database. The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

6. NOTE SECURITY REPORT

Note Security Report provides a summary of all the locked notes that have been entered into the templates in the database. The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

7. STATISTICAL QUERIES

Statistical Queries allows you to query for information regarding existing clients by searching various criteria (Figure 2-21):

- Case Manager
- Employer
- Physician
- Attorney
- Referral Source
- Insurance Company
- Supervising Practitioner
- Status
- Pre/Post off of employment
- Start/End Date
- Injury Locations

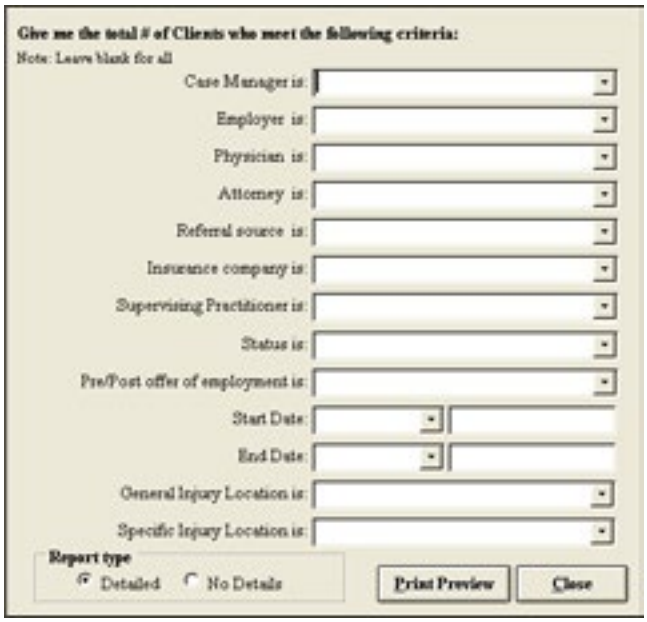

Figure 2-21. Statistical Queries

The report provides detailed information on length of treatment, common injuries, and the number of clients being referred from a specific source.

Under report type, select 'Detailed' to obtain a list of the clients, and select 'No Details' to obtain the summary without client names.

The report can be printed, exported to a snapshot file format, or exported to Microsoft Word (if Word is installed on the computer).

8. REAL TIME ANALYSIS

Real Time Analysis allows you to analyze the data from each individual client in detail. It also allows you to compare individual or multiple trials of any strength test that is recorded in the database. Real Time Analysis is useful for research, analyzing job demands, and client progress/tracking (Figure 2-22).

Step 1. Select the protocol to analyze.

Step 2. Select the test range.

Step 3. Specify whether you wish to analyze a specific trial or the average of the trials relating to the specific protocol for a specific client.

Step 4. Specify which position you would like to graph.

Step 5. Indicate the time frame

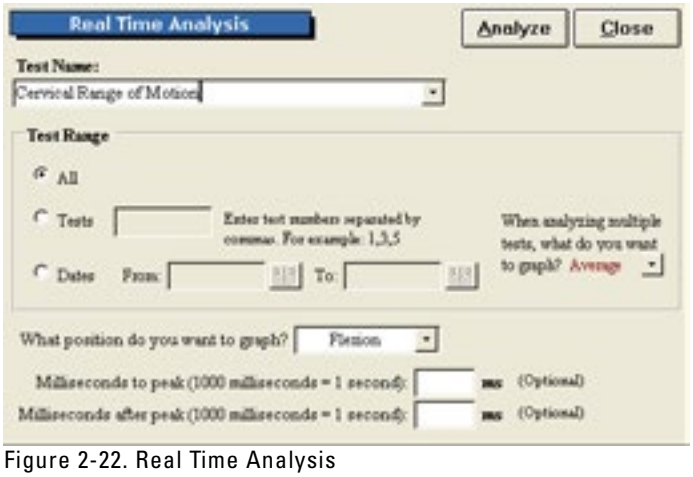

Figure 2-22. Real Time Analysis

you would like to analyze (optional).

Step 6. Click Analyze and a graph of the real time analysis will appear.

9. EXPORT CERVICAL DATA

Export Cervical Data allows Multi-Cervical™ users participating in International research with The Melbourne Protocol to export raw data into a program outside of the MCU™ software. This allows the user to work with the data in a spreadsheet format if so desired (Figure 2-23).

Step 1. Select the type of testing data you wish to export.

Step 2. Select the fields you wish to include when exporting.

Step 3. Specify your target population (including client status, gender, and age range) or target dates.

Step 4. Select a file name and a directory – your data will be saved as a text file here.

The file name that you chose will now be written in the 'File Name to Export Into' line.

Step 5. Click on Export.

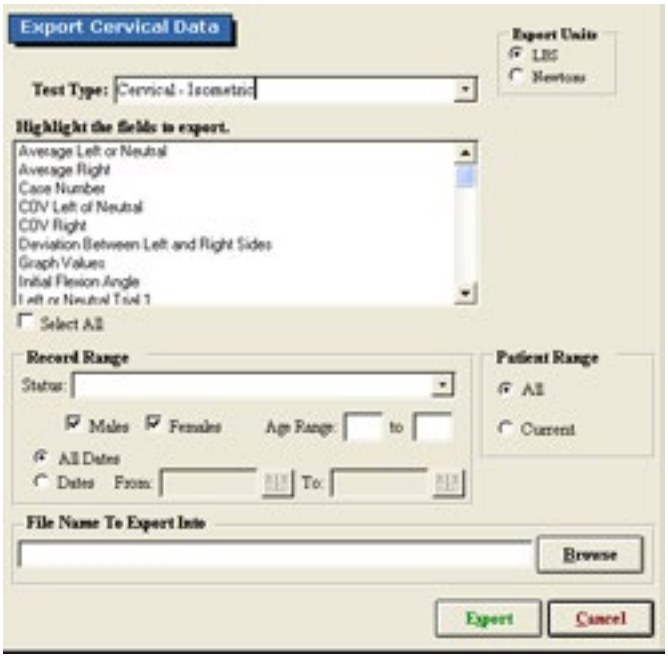

Figure 2-23. Export Cervical Data

A confirmation message will appear once the export is successful.

In order to locate the exported data, close the MCU™ software and return to the Windows Desktop. Open the program into which the data was exported (e.g. Excel). Click on the Data tab, select Import External Data and then Import Data. Locate the text file which was just exported, open the file, and follow the directions given. The exported data should now appear in the spreadsheet.

10. EXPORT ADMIN INFORMATION

Export Admin Information allows you to export the administrative information related to the various protocols, super protocols, and templates (Figure 2-24).

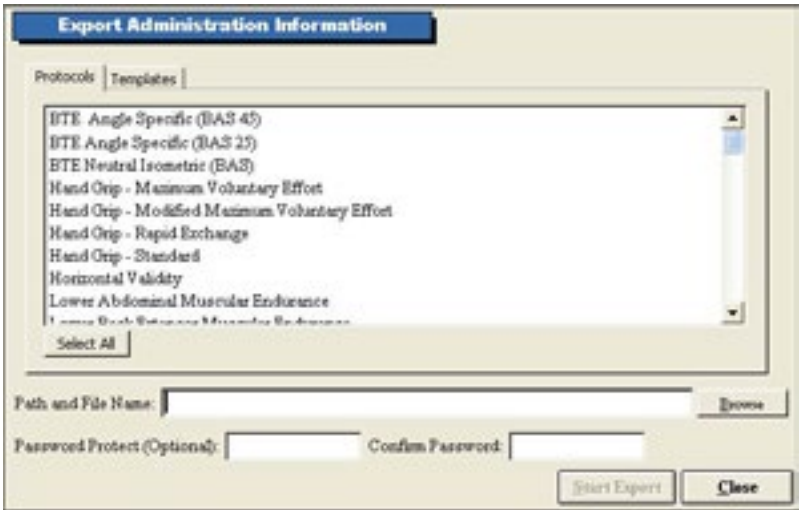

Figure 2-24. Export Administration Information

Step 1. Select which protocols, super protocols, or templates you would like to export.

Step 2. Click Browse to find the directory you would like to export into.

Step 3. Enter a password (optional) and click Start Export.

11. IMPORT ADMIN INFORMATION

Import Admin Information allows you to import the administrative information related to the various protocols, super protocols, and templates (Figure 2-25).

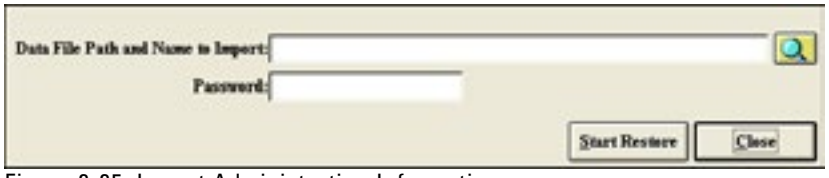

Figure 2-25. Import Administration Information

Step 1. Locate the directory you would like to import from.

Step 2. Enter the password if needed and click Start Restore.

D. SNAPSHOTS

Snapshots allows you to create PDF-like files from reports so that they may be emailed without compromising the validity of the document (Figure 2-26).

A snapshot viewer executable file is bundled with the report file, which will allow individuals without the MCU™ software (e.g. insurance companies and manufacturing plants) to view the reports.

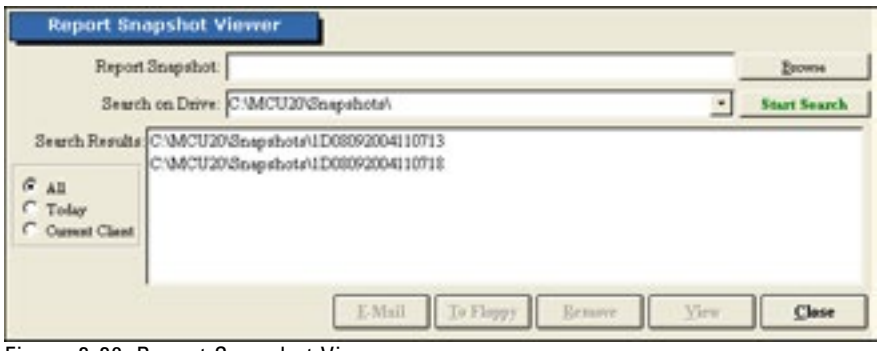

Figure 2-26. Report Snapshot Viewer

1. CREATING A SNAPSHOT

Step 1. Click on Reports within the Home Screen.

Step 2. Preview the report you would like to snapshot.

Step 3. Within the taskbar, select Export then Create a Report Snapshot.

The report will now be exported into a report snapshot, and a message will appear once the save is successful.

2. EMAILING, SAVING, REMOVING, AND VIEWING A SNAPSHOT

Step 1. From the Home Screen taskbar, click on Snapshots.

Step 2. Locate the snapshot you wish use. Double click on the file name within the Search Results field, and the file name should appear within the Report Snapshot text field.

Step 3. Click on whichever operation (Email, To Floppy, Remove, or View) you would like to perform.

If you choose to email the snapshot, a message will appear asking if you would like to include the snapshot viewer. If the email recipient does not have the MCU™ software or has never viewed a snapshot before, you must email the viewer. Make sure the recipient is aware that the viewer is included with the email and it must be used to view the report.

E. FORMS DROP-DOWN MENU

Forms offers a variety of questionnaires and forms available for printing. The client can fill out these forms and the information can be entered manually into the software.

F. CALCULATORS DROP-DOWN MENU

1. CALCULATOR

Calculator for basic arithmetic needs

2. DEVIATION CALCULATOR

Calculator for finding the standard deviation of at least two values

G. DIGITAL CAPTURE

This screen allows you to insert a variety of pictures with accompanying headings and

comments. This feature is useful for showing clients how to perform tasks or exercises (Figure 2-27).

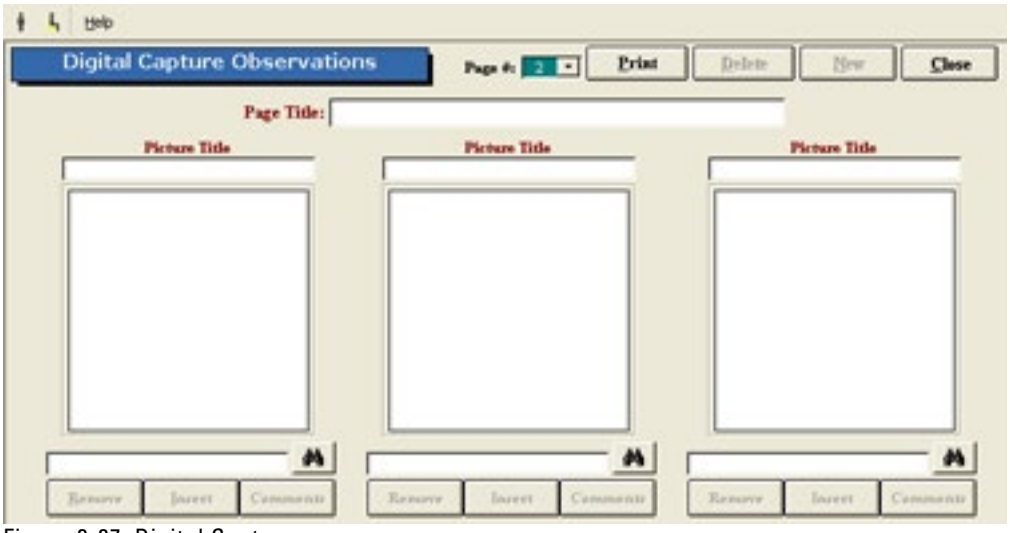

Figure 2-27. Digital Capture

Step 1. Take the picture with a digital camera and then download the picture to your hard drive using your camera software.

Step 2. Within the Digital Capture Observations screen, click on the binoculars icon to locate the picture in the directory it was saved in and click Open.

Step 3. Click Insert and the picture should appear in the large box.

Step 4. Enter a picture title and any comments if desired. The comments are included when a page of pictures is printed.

A picture may be removed by clicking Remove below the file name text field.

An entire page of pictures may be printed, deleted, and created by using the Print, Delete, and New icons at the top of the screen.

H. HELP DROP-DOWN MENU

1. HELP MANUALS

A PDF version of this MCU™ manual is located here. If you have loaded the Adobe Acrobat Reader and the help manuals onto your hard drive, you will be able to access the manuals directly. However, if you have no loaded software and manuals, you will be prompted to insert the MCU™ CD in your disk drive. You can load Adobe Acrobat Reader for free at www.adobe.com.

2. ABOUT

A screen showing the attributes of your specific MCU™ and MCU™ software. This is a helpful screen to view whenever you need to call customer service.

03 - CLIENT INFORMATION

I. INTRODUCTION 3-2

II. ADDING A CLIENT 3-2

III. ADDING A CASE 3-3

A. ADDING A FAMILY PHYSICIAN/SPECIALIST/ATTORNEY/REFERRAL SOURCE/INSURANCE COMPANY/EMPLOYER 3-3

B. ADDING CURRENT MEDICATIONS 3-3

C. CLIENT PHOTOS 3-4

D. CLIENT STATUS 3-4

E. START/END TIME 3-4

F. EVALUATOR 1 AND 2 3-4

G. ADDING ICD-9 CODES 3-4

H. AREAS OF COMPLAINT 3-5

I. LOCKING CASES 3-5

IV. FINDING A CLIENT/CASE 3-5

V. ADDING AND REMOVING TESTS 3-6

CLIENT INFORMATION

I. INTRODUCTION

The client information screen can be accessed from the center of the home screen, just above the client drop-down menu (Figure 3-1).

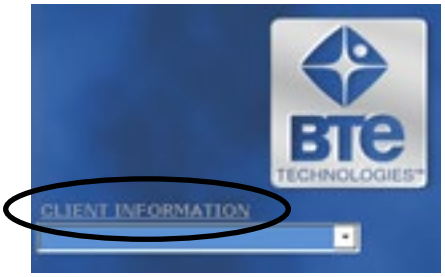

Figure 3-1. Client Information Icon

II. ADDING A CLIENT

In order to utilize the MCU™ software, a client must first be entered. It is recommended to start by creating a sample client in order to get familiarized with the software without having to worry about losing valuable information (Figure 3-2).

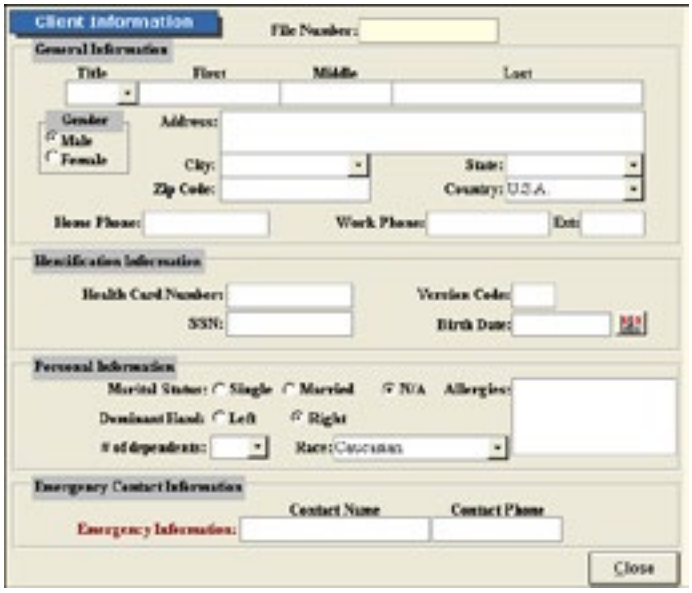

Figure 3-2. Client Information

Step 1. Click on Client Information within the Home Screen.

The Client Information screen will appear.

Step 2. Click on New Client.

Step 3. Enter all the demographics of the client.

The required information includes the name, gender, birth date, and dominant hand. This data is required for tests which compare the client's objective measurements with a normative database.

Step 4. Click Close once all the information is entered.

The client is now stored in the database and should appear in the drop-down menu within the Client Information screen.

III. ADDING A CASE

All clients must have a case associated with their file.

Within the Client Information screen, click New Case.

The Case Information screen allows you to enter information regarding the client's physician, medications, referral sources, employment, insurance, ICD-9 codes, etc. (Figure 3-3).

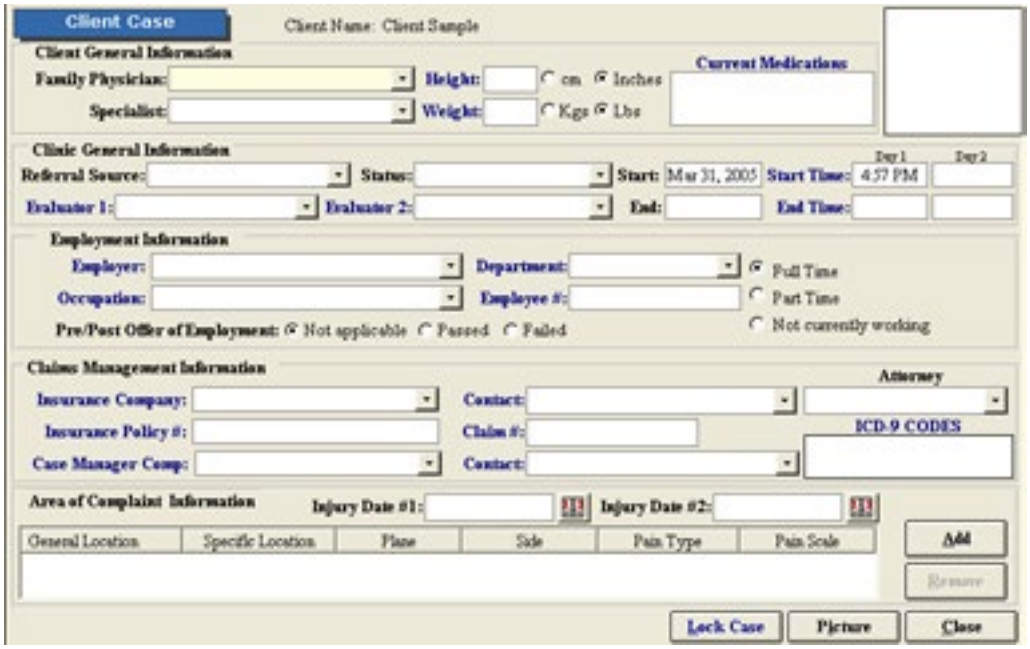

Figure 3-3. Case Information

Once the Client Case page is complete, you may click the Close button located at the bottom right hand corner of the page; this will bring you back to the Client Information page, and a case number will now be associated with your client.

Click the Close button in order to return to the Home Screen. The new client will now be listed in the drop-down menu underneath the Client Information button. To quickly access a client's information screen, double click on the client's name. You can also quickly access the client's case information by double clicking on the case number under the client name drop-down menu.

A. ADDING A FAMILY PHYSICIAN/SPECIALIST/ATTORNEY/REFERRAL SOURCE/INSURANCE COMPANY/EMPLOYER

Enter a new contact by double clicking on the white text box. A new window will appear that allows you to add in the contact information. After entering in the information and closing the new window, the contact's name will appear in the drop-down menu for that particular contact type. This data will be saved in your database so the information will only have to be entered once.

B. ADDING CURRENT MEDICATIONS

A list of client medications can be added by double clicking in the white text box. The

Current Medications screen will appear, which allows you to enter in the name of the medication as well as a description of its purpose and usage. If the client is taking a medication that has previously been entered, select the name of the medication from the drop-down menu and enter the remaining information by either typing it in or selecting it from a drop-down menu. Once all the information has been added, and the screen is closed, the Current Medications text box will be populated with all of the medication names.

C. CLIENT PHOTOS

A client photo may be added to the client's file. This photo will be incorporated into the reports as well as into the center of the Home Screen when the client is selected. You must first take a picture with a digital camera and then save the picture to your hard drive. Once that is done, click on the large white box in the upper right hand corner of the Client Case page or click on Picture at the bottom right hand corner of the page. Click Browse to locate the picture and then click Insert to add the photo.

D. CLIENT STATUS

The client status field is useful for keeping track of the number and type of assessments you have completed. Client status can also be used as a criterion under Statistical Queries. The drop-down menu should already be populated with status options, but you can also add, edit, or remove status information by double clicking on the blank text field.

E. START/END TIME

The assessment start time and date are automatically logged on the Client Case page when you click on New Case in the Client Information Screen. In order to record an end time, simply double click in the corresponding blank field once the assessment is completed, and the current time will be entered into the field. You may also manually enter a time by typing in the text field. The evaluation times will be displayed on the cover sheet of your report.

F. EVALUATOR 1 AND 2

The Evaluator 1 and 2 fields allow the evaluator(s) to enter their name and credentials into the Client Case page. Enter a new Evaluator by double clicking in text field. A screen will pop up which will allow you to enter in the Evaluator's name, designation, occupation and registration number. This information will be included in the front of the report and beneath the signature sign-off line (if a signature is requested when printing the report). Please note this is not a feature of all reports printed in the MCU™ software. Click the Allow Digital Signature checkbox if you would like to add your signature to the software; this is a useful tool if you are anticipating e-mailing reports. See Chapter 02-IV-B on directions for adding a digital signature.

G. ADDING ICD-9 CODES

ICD-9 codes can be stored within the MCU™ software for later use. Double click the blank ICD-9 Codes box on the Client Case page, and a screen will pop up allowing you to select the proper codes. To assign an existing ICD-9 code to your client, select the code from the Codes in Database drop-down menu and click Add. Create new codes by double clicking on the ICD-9 Codes in Database field and entering in the code and description. Once an ICD-9 code has been added to the database, it will be available from the drop-down menu for future clients. In addition, once a code is entered, it is available for use in the note

templates.

H. AREAS OF COMPLAINT

A client's areas of complaint may be obtained from his or her responses to the Pain Diagram or the Ransford Pain Diagram. To enter the information into the database, double click on the large Area of Complaint Information box or click Add in the Area of Complaint Information section of the Client Case page. A pain diagram will be displayed, which will allow you to enter in location information and pain descriptions. After clicking on the diagram location where the client presents a complaint, complete the chart that is below the body diagrams. Once you have entered all the information, click Add and it will appear on the Client Case page.

I. LOCKING CASES

This feature allows the evaluator to prevent other individuals from modifying a case. In order to access a locked case, a password must be entered. Please note that it is your responsibility to remember this password. If the password is forgotten, our technical support/customer service staff at BTE Technologies, Inc. will not be able to help you retrieve it. Lock the case by clicking Lock Case at the bottom of the Client Case page. A screen will appear prompting you to enter and confirm a password. Click OK when you are done. Once locked, you will see the Lock Case icon change to Unlock Case.

IV. FINDING A CLIENT/CASE

The MCU™ software allows you to search for a client or case using various probes. Within the Client Information screen, click on Find a Client or Find a Case (if available) to access these options (Figure 3-4).

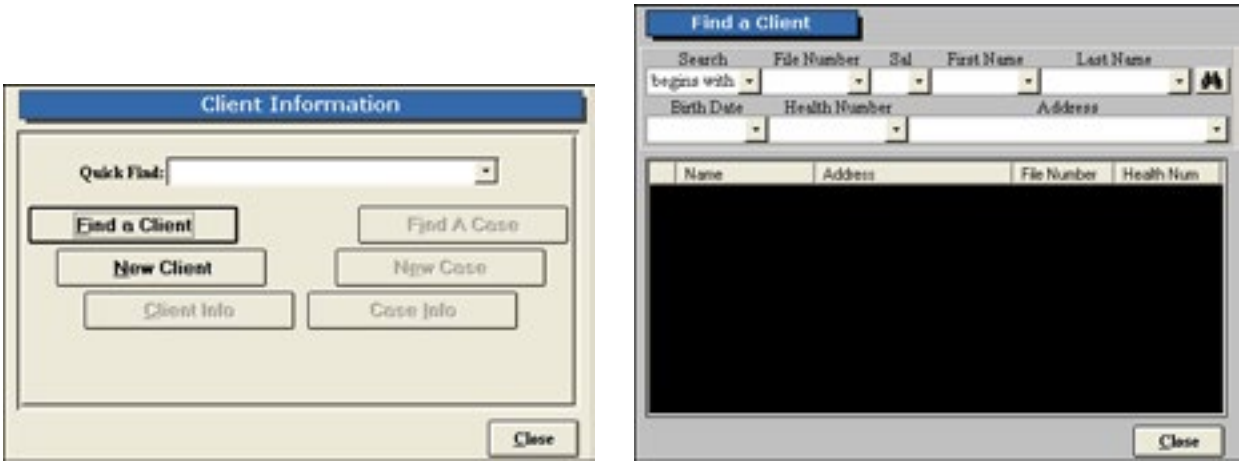

Figure 3-4. Find a Client

You may search using any of the fields. Remember that the more fields which are selected, the narrower the search. If you're having trouble finding a case or a client, try selecting only one or two fields to broaden the search.

Once you have populated the fields you wish to search by, click on the binoculars icon to retrieve the search results.

Open a client or case file by clicking on the arrow button to the left of the name or case number.

V. ADDING AND REMOVING TESTS

Once you had added your client into the MCU software you may assign tests to the client.

From the Home Screen, click on Self Reports, Cardio, ROM Tests, Strength Tests, Work Sim Tests, or Clinical Tests. The same basic screen appears for each icon: the box on the left lists the tests related to the icon you selected, and the box on the right lists all the tests assigned to the client (Figure 3-5).

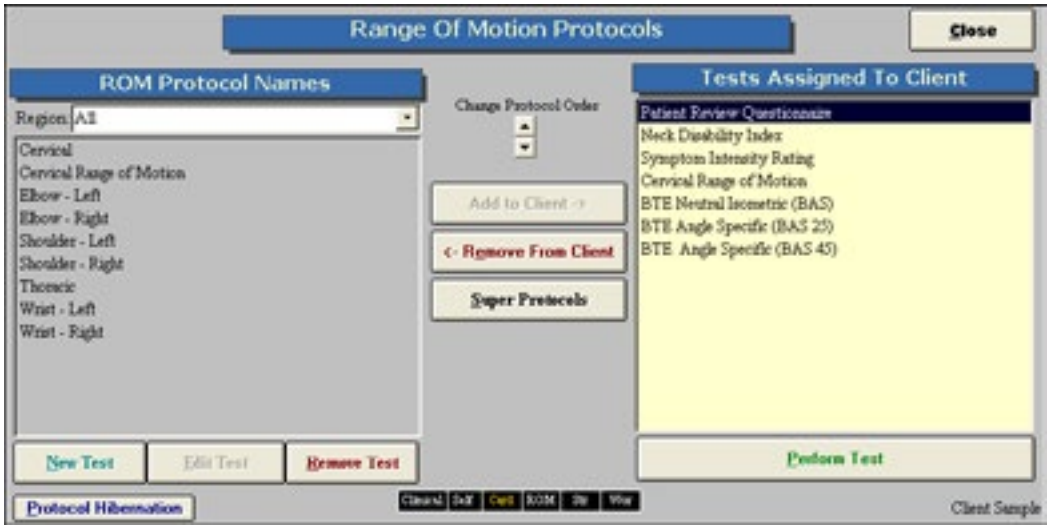

Figure 3-5. Adding and Removing Tests

Add a new test to the client by either highlighting the test name in the left box and clicking Add to Client or by double clicking on the test name in the left box.

Once the test has been assigned to the client it will appear in the right box.

Change the order of the tests by highlighting the test in the right box and use the up and down arrows under Change Protocol Order.

Perform the test assigned to a client either by highlighting the test in the right box and clicking on Perform Test or by double clicking on the test in the right box.

Remove a test from a client by highlight the test in the right box and clicking Remove From Client.

You can access the other types of tests without having to go back to the Home Screen every time by clicking on the desired test-category box displayed at the bottom of the Protocol Screen.

04 - TEMPLATES

I. PRE-PROGRAMMED TEMPLATES 4-3

II. CUSTOM TEMPLATES 4-5

TEMPLATES

Each of the Notes pages in the MCU software has a template section that allows you to create any number of templates. This feature allows you to specify which client information you would like to include in each report. It also speeds up reporting time, improves efficiency, and hence, profitability.

You can find pre-programmed templates or create your own templates within the following Home Screen categories:

- History
- X-Rays/Lab
- Return to Work
- Recommendations
- Examination
- Referral
- Custom Note
- Cover Letter
- Diagnosis
- Impairment
- Progress Analysis

I. PRE-PROGRAMMED TEMPLATES

To access the pre-programmed templates, click on the desired category listed on the far left and far right sides of the Home Screen (Figure 4-1).

Figure 4-1. Available Templates

Click on the template icon in the lower right hand corner of the screen (Figure 4-2).

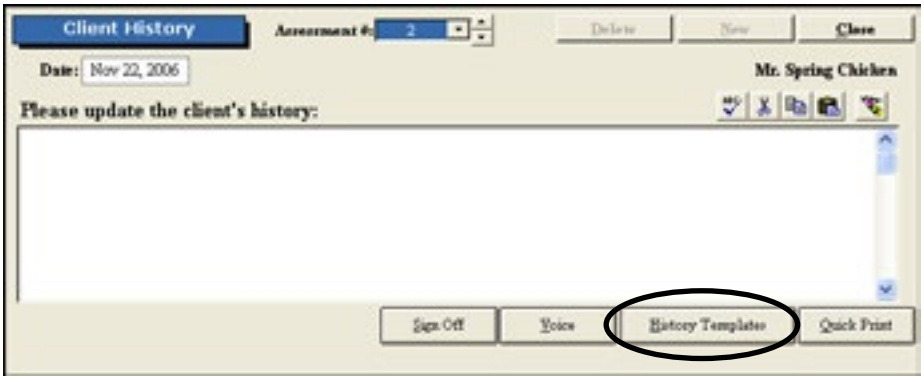

Figure 4-2. Template Icon

This will bring you to the main Templates screen for the designated category (Figure 4-3).

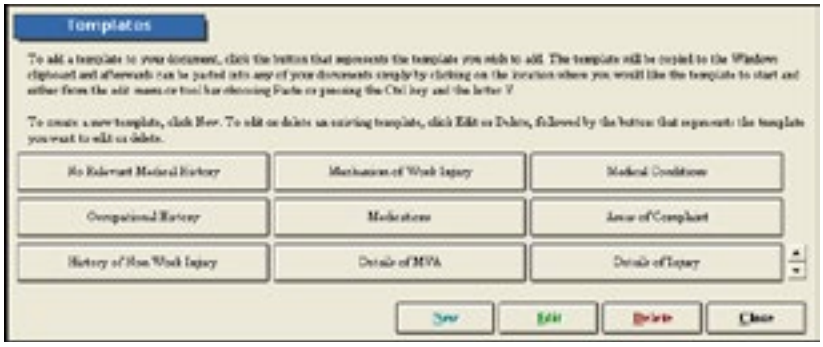

Figure 4-3. Main Templates Screen

Step 1. Click on the pre-programmed template you wish to use.

A blank screen will appear (Figure 4-4).

Figure 4-4. Blank Notes Screen

Step 2. Click on the clipboard icon to paste the template code into the blank screen (Figure 4-5).

Figure 4-5. Blank Notes Screen

The code will be updated with the client's information, but you must still populate the fields with carets and select which bracketed options apply (Figure 4-6).

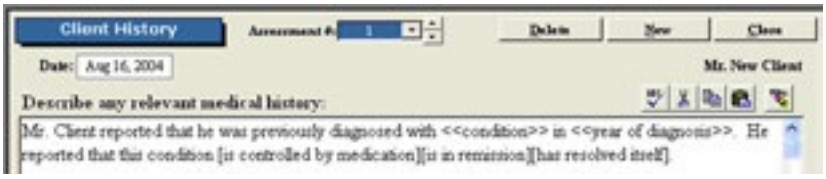

Figure 4-6. Updated Template Code

Note that any client demographics within brackets – [ ] – will automatically be populated with the client's information that has been entered in the client information and case screens (e.g. title, name, gender). All other information which is bracketed but isn't available from these screens will remain intact until deleted. This is typically used when there are several options to describe the situation and you must pick the most applicable one (e.g. condition is either controlled by medication, in remission, or has resolved itself). Any text within

carets – << >> – is intended to alert the evaluator to fill in the information (e.g. name of the condition and year of the diagnosis).

Edit a pre-programmed template by clicking Edit in the main Templates screen and selecting the template you wish to modify. You can then add fields by selecting the desired field from the Insert Field drop down menu and clicking Insert or delete fields using the delete key on your keyboard. The text may also be modified as you see fit.

To delete any template, first click the Delete icon in the main Templates screen; the Delete icon should change to Cancel Delete. Next click on the pre-programmed template you wish to delete.

II. CUSTOM TEMPLATES

To create or access a custom template, click on one of the categories listed on the left side of the Home Screen (Figure 4-7).

Figure 4-7. Available Templates

Click on the template icon in the lower right hand corner of the screen (Figure 4-8).

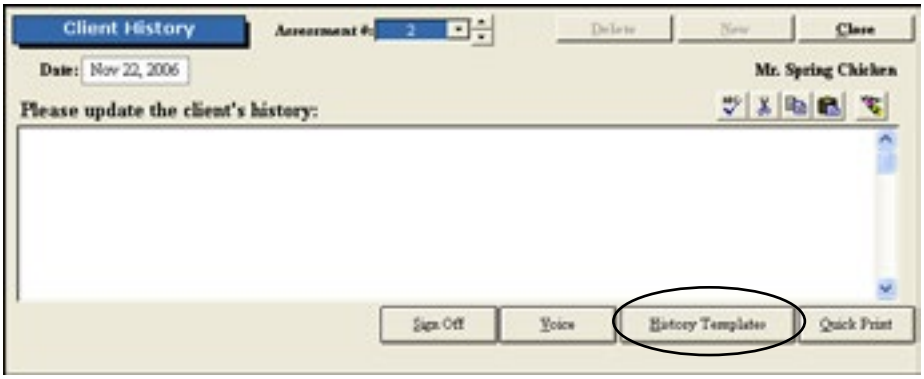

Figure 4-8. Template Icon

This will bring you to the main Templates screen (Figure 4-9).

Figure 4-9. Main Templates Screen

Step 1. Create a new template by clicking on New. A new icon will appear within the main Templates screen.

Step 2. To view the template, first click on Edit; the Edit icon should change to Cancel Edit. Next click on the template you just created.

A screen will appear with a blank text box (Figure 4-10).

Figure 4-10. Blank Template

Within this screen you can change the name of the template as well as create the generic code by inserting fields and typing text.

Step 3. Begin by writing what you wish to include in the report, but use the merge fields when you would like information automatically populated. The software already includes multiple pre-programmed merge fields which are listed under the Insert Field drop down menu.

Insert a merge field by selecting the field from the Insert Field drop down menu and clicking Insert. The merge field will be inserted where the text cursor is located. The merge field should have brackets – [ ] – around the text.

You may create your own merge fields by typing the options you would like to include and placing brackets around each one. This is useful when there are several options to describe the situation and you must pick the most applicable one (e.g. "client arrived [early][on time][late] for the assessment…").

You can also include characters which alert you to personalize a field for the client. This is useful when you need to include information which is different for every client but must be included in the report (e.g. "client has been diagnosed with <<Enter Diagnosis>> on <<Enter Date>> by a <<Enter Specialist>>…"). The pre-programmed templates use carets – << >> – to bring your attention to the field, but you may use any characters you like (Figure 4-11).

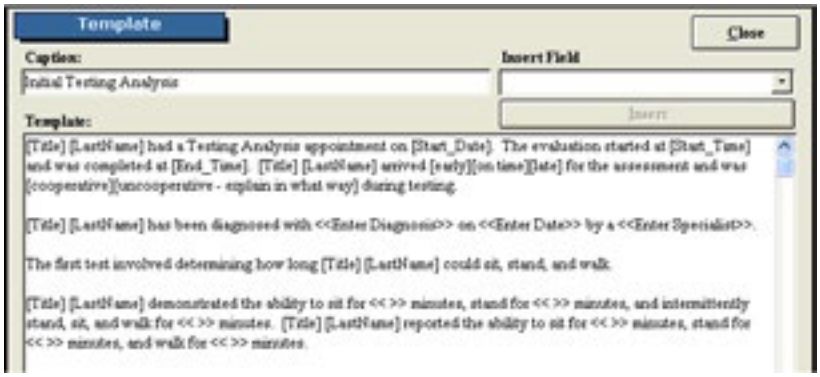

Figure 4-11. Custom Template Code

Step 4. Once you have finished creating the code, click the Close icon within the custom template's screen. This will return you to the main Templates screen.

Step 5. Click Cancel Edit and then select the template you just viewed. This will bring you to a blank screen.

Step 6. While in the home template screen, Click on the clipboard icon to paste the template code into the blank screen (Figure 4-12).

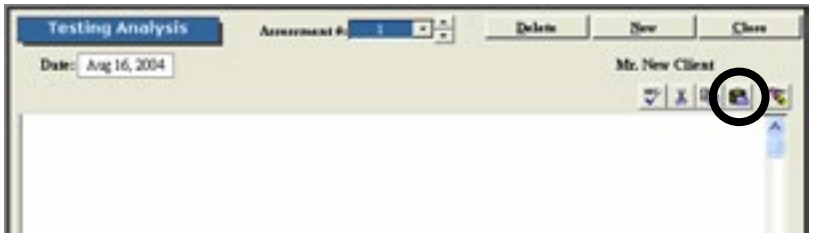

Figure 4-12. Blank Notes Screen

The code will be updated with the client's information, but you must still populate the fields with carets and select which bracketed options apply (Figure 4-13).

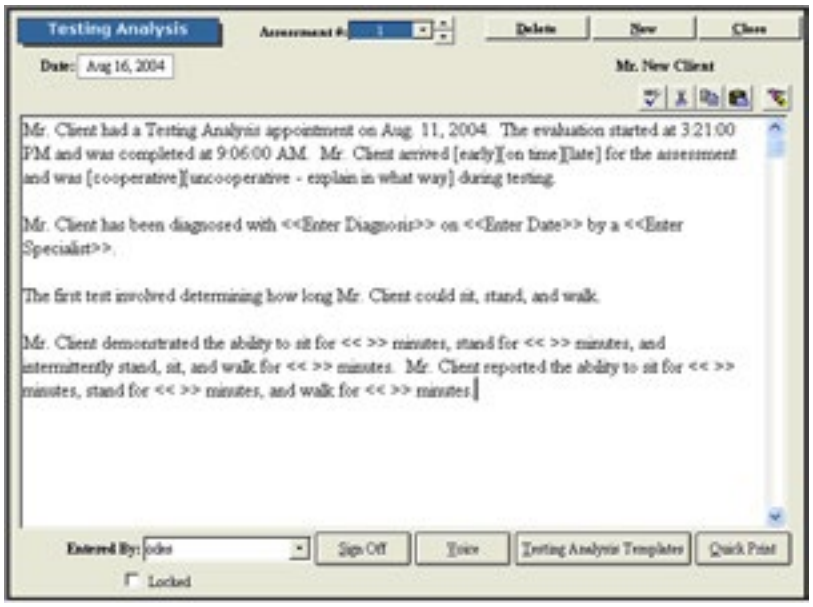

Figure 4-13. Updated Custom Template Code

Edit a custom template by clicking Edit in the main Templates screen and selecting the template you wish to modify. You can then add fields by selecting the desired field from the Insert Field drop down menu and clicking Insert or delete fields using the delete key on your keyboard. The text may also be modified as you see fit.

To delete any template, first click the Delete icon in the main Templates screen; the Delete icon should change to Cancel Delete. Next click on the pre-programmed template you wish to delete.

05 - CALIBRATION & VERIFICATION

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II. PERFORMING THE CALIBRATION 5-3

III. PERFORMING THE VERIFICATION 5-7

IV. CALIBRATION REPORTS 5-8

CALIBRATION & VERIFICATION

I. INTRODUCTION

Calibration is an important component of the Multi-Cervical™ system. Since one of the main attributes of the system is the ability to track the progress of your patients, it is essential that the equipment is always giving accurate feedback. Therefore, we recommend calibrating every 7 days and verifying the beginning of every day.

As shown in Chapter 02 under the Administration Menu overview, reminders may be set for calibrations and verifications. There is also an option of requiring that the calibration and verification must be done.

II. PERFORMING THE CALIBRATION

Calibration may be performed for the head brace, the halo (2 locations), and the seat.

Access the Calibration Screen by selecting Calibrate MCU™ from the Calibration drop-down menu, which is located in the taskbar (Figure 5-1).

Figure 5-1. Calibration Drop-Down Menu

The MCU™ calibration screen will appear (Figure 5-2). Included in the calibration screen is the Detail On feature, which allows you to directly view the voltage values of any tool that can be calibrated; this is useful when troubleshooting.

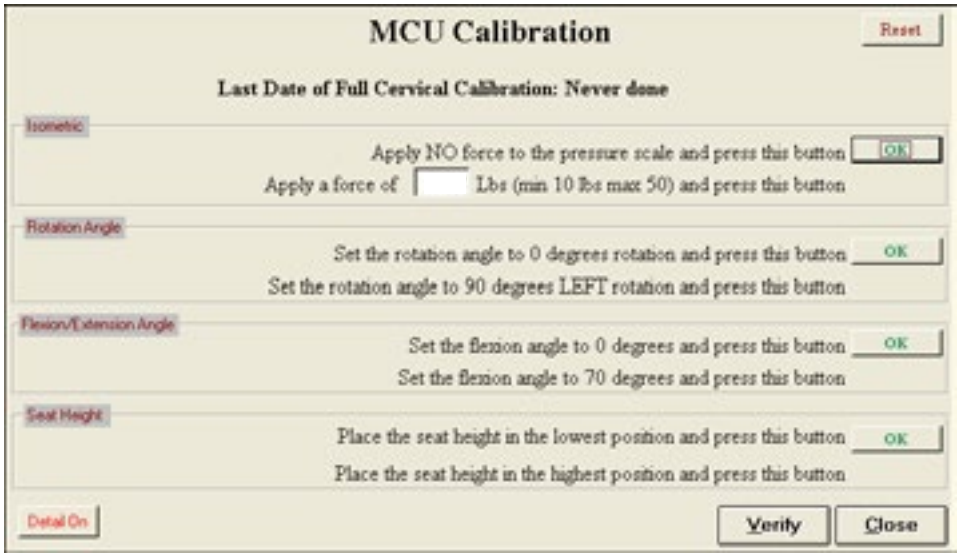

Figure 5-2. Cervical Calibration Screen

The screen will always indicate the last day of successful calibration in addition to the amount of weight used for the last calibration.

Step 1. Secure the rod of the head brace you wish to calibrate to the calibration plate. Make sure the RJ45 cable is plugged into the head brace as well to the jack closest to the front of the unit on the top of the MCU™ (Figure 5-3). Click the first OK on the calibration screen.

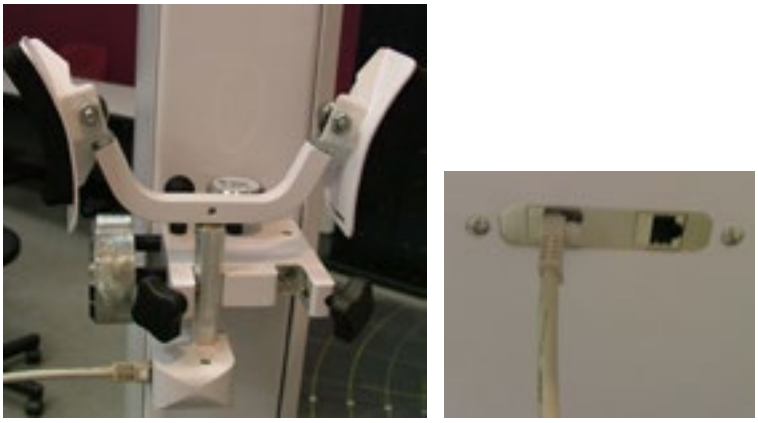

Figure 5-3. Preparing Head Brace for Calibration

Step 2. Place the calibration block on the head brace (Figure 5-4).

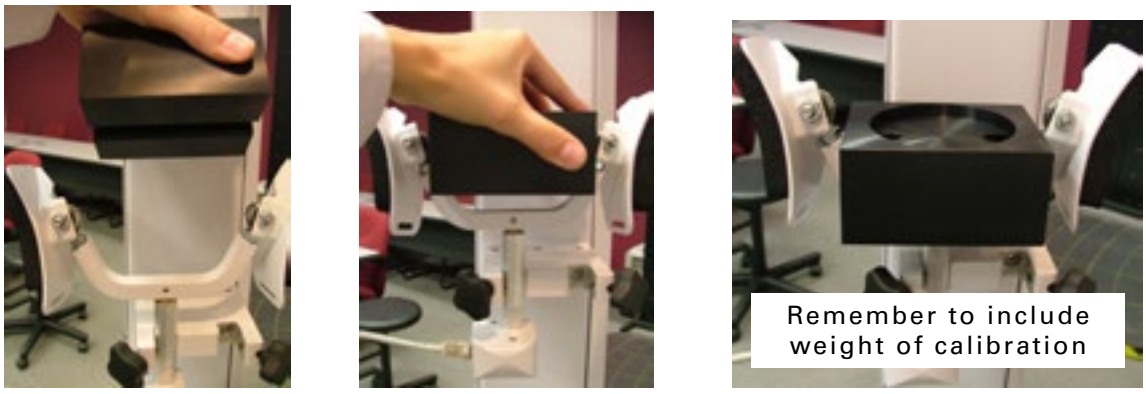

Figure 5-4. Placing Calibration Block on Head Brace

Step 3. Place the calibration weight(s) on the calibration block (Figure 5-5). Enter the amount of weight you are using to calibrate (remember to add the weight of the calibration block) in the calibration screen and then click OK.

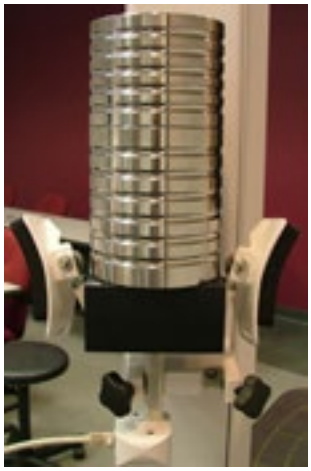

Figure 5-5. Calibrating the Head Brace

Verify that neither the calibration block nor the U-bracket of the head brace are touching the calibration plate.

Step 4. Remove the calibration weights from the calibration block before proceeding with the rest of the calibration.

Step 5. If it isn't already, set the halo rotation to 0 degrees (Figure 5-6). Click OK on the calibration screen.

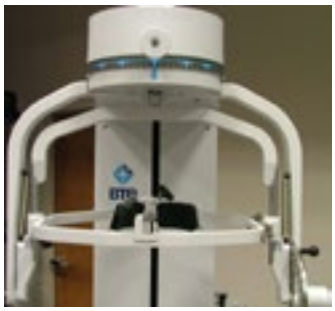

Figure 5-6. Halo at 0° Rotation

Step 6. Unlock the rotation pin, set the halo rotation to 90 degrees LEFT (which means the halo is rotated to the right), and then lock the rotation pin (Figure 5-7). Click OK on the calibration screen.

Figure 5-7. Halo at 90° Rotation

Step 7. Unlock the rotation pin, rotate the halo back to 0 degrees, and then lock the rotation pin.

Step 8. If it isn't already, set the halo flexion/extension angle to 0 degrees and insert the ROM

Figure 5-8. Halo at 0° Flexion/Extension

stop pin (Figure 5-8). Click OK on the calibration screen.

Step 9. Remove the ROM stop pin, set the halo flexion/extension angle to 70 degrees flexion, and then insert the ROM stop pin (Figure 5-9). Click OK on the calibration screen.

Figure 5-9. Halo at 70° Flexion

Step 10. Remove the ROM stop pin, set the halo flexion/extension angle back to 0 degrees, and insert the ROM stop pin.

Step 11. If it isn't already, lower the seat height to its lowest position (Figure 5-10). Click OK on the calibration screen.

Figure 5-10. Seat Height at Lowest Position

Step 12. Make sure the seat back is at its lowest position, and then raise the seat height to its highest position (Figure 5-11). Click OK on the calibration screen.

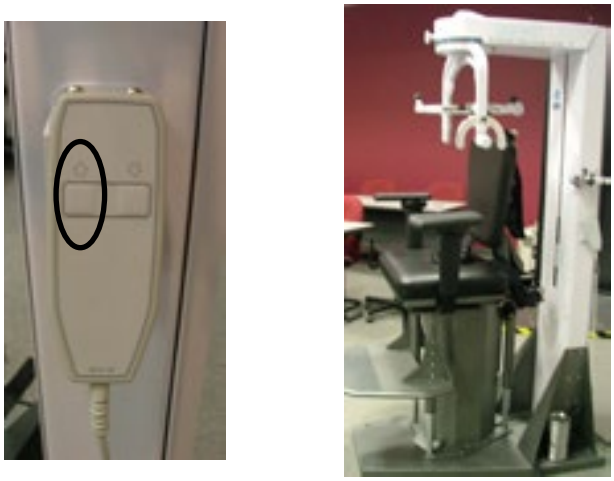

Figure 5-11. Seat Height at Highest Position

Step 13. Once the device has been successfully calibrated, a screen will appear requesting the name of the individual who just completed the calibration.

III. PERFORMING THE VERIFICATION

It is recommended that the accuracy of the device be verified after calibration. In addition, verification should be completed prior to testing each day or after the equipment has been set up.

Note that verification may only be performed on the head braces.

The Verification Screen can be accessed under the Calibration menu within the taskbar or within the MCU™ calibration screens (Figure 5-12).

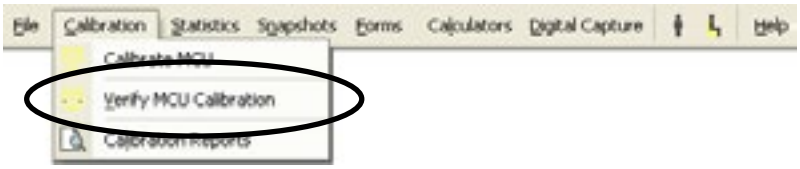

Figure 5-12a. Calibration Drop-Down Menu

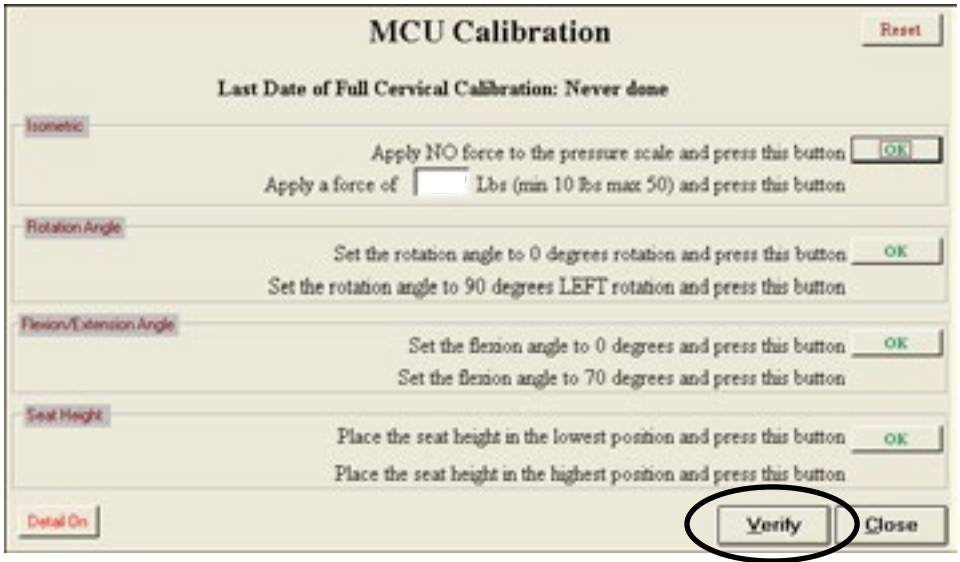

Figure 5-12b. MCU™ Calibration Screen

The MCU™ verification screen will appear (Figure 5-13).

Figure 5-13. MCU™ Verification Screen

The screen will always indicate the last day of successful verification.

The verification tools and process are essentially the same as calibration. However, you must make sure to use a different amount of weight for the verification than you did for the calibration.

Step 1. With the head brace secured to the calibration plate, place the calibration block on the head brace.

Step 2. Place a weight on the calibration block. The total weight used for verification may not be the same as what was used for verification.

Step 3. Enter the amount of weight you are using to verify (remember to add the weight of the calibration block) in the verification screen and then click Start Verification Isometric.

Step 4. Once the device has been successfully verified, a screen will appear requesting the name of the individual who just completed the verification. In addition, the verification screen will show the weight that you entered compared to the weight that the software calculated.

IV. CALIBRATION REPORTS

To print or view the calibration and verification reports, go to the Calibration menu within the taskbar and then Calibration Reports (Figure 5-14).

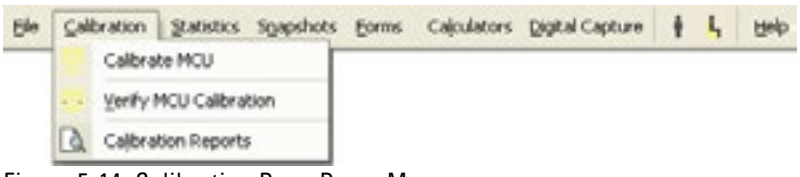

Figure 5-14. Calibration Drop-Down Menu

You may filter the calibration report according to latest calibration, all calibrations, or date range (Figure 5-15).

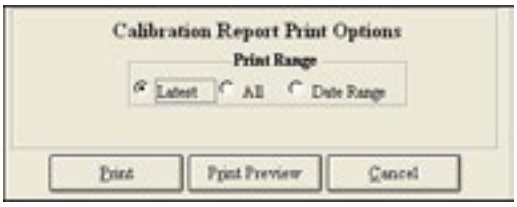

Figure 5-15. Calibration Report Options Menu

Print a report by clicking Print.

View a report by clicking Print Preview.

Reports include the name of the person who performed the calibration/verification, the date when the calibration/verification occurred, the actual weight vs. measured weight, and any deviation from the accuracy of the device (Figure 5-16).

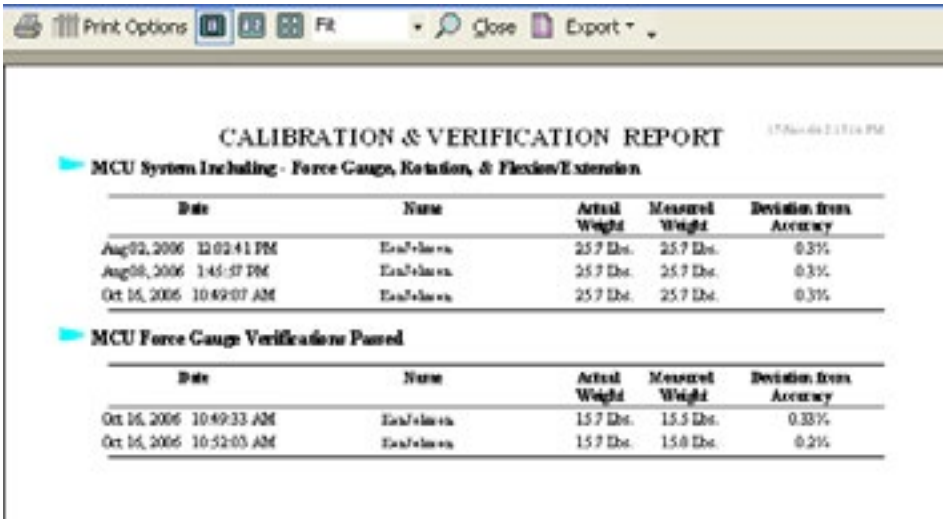

Figure 5-16. Calibration and Verification Report

06 - PROTOCOLS

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B. EDITING AND CREATING SELF REPORTS 6-4
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PROTOCOLS

Through the MCU™ software, you can access many pre-programmed protocols as well as create customized protocols. The following protocol categories are relevant to the MCU™ and can be accessed through the Home Screen:

• Self Reports • Cardio • ROM Tests • Strength Tests • Clinical Tests

BTE Technologies recommends that the MCU™ be used in conjunction with a certified training program on The Melbourne Protocol. This training program covers the practical and clinical application of Evaluation Protocols for patients suffering from various cervical disorders. Precautions, indications, and contra-indications for the evaluation of patients on the MCU™ are also covered. Refer to Chapter 10 for more information on this training program.

I. SELF REPORTS

The MCU™ software includes several pre-programmed Self Report protocols, which are intended to be completed without the use of any tools. These are typically questionnaires used to evaluate the patient's perceived level of injury and pain.

A. UTILIZING SELF REPORTS

Access the pre-programmed Self Reports protocols by clicking the Self Reports icon on the Home Screen.

This will bring you to the Self Reports Protocols main page. From this page you have the ability to access all the pre-programmed protocols, including those in hibernation, add and remove tests to clients, create new range of motion tests, edit tests, and delete tests (Figure 6-1).

Figure 6-1. Self Reports Protocols

Step 1. Assign a test to a client by highlighting the test in the left box and clicking Add to Client or by double clicking on the test in the left box.

Step 2. Once a test has been assigned to a client, highlight the test name in the right box and click Perform Test to bring up the testing screen.

Step 3. Fill out the questionnaire using the following options: a) Read the questions aloud and enter in the answers; b) Allow the patient to enter in the answers via the computer; c) Print out the questionnaire and allow the patient to enter in the

answers on the paper.

Step 4. Store and/or file the questionnaire according to your clinic's procedures.

B. EDITING AND CREATING SELF REPORTS

Access the pre-programmed Self Reports protocols by clicking the Self Reports icon on the Home Screen.

This will bring you to the Self Reports Protocols main page, where you can edit and create tests.

Edit a test by highlighting the test you would like to edit in the left box and clicking Edit Test.

Create a new test by clicking on New Test.

If you are editing a test, a screen will appear with the current settings of the test you selected. If you are creating a test, a screen will appear with the same headings as if you were editing a test, but all of the text fields will be blank (Figure 6-2).

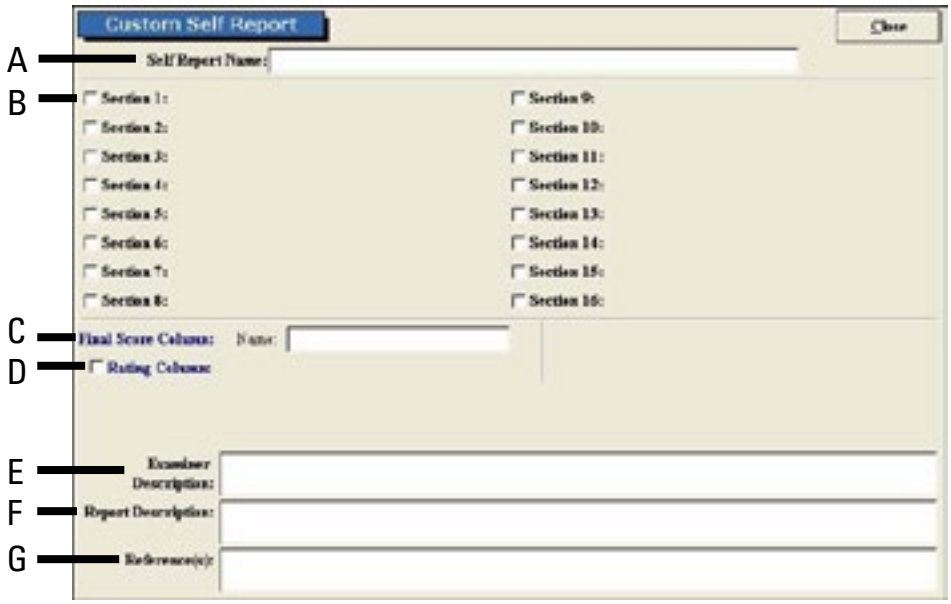


Figure 6-2. Custom Self Report

The following can typically be edited or created on Custom Self Report Tests:

A. Test Name - Type in the name of the test

B. Section - Select the section to add and type in the section name

C. Final Score Column Name - Type in the name of the final score column

D. Rating Column - Select whether to include a rating column and then type in the name of the column

E. Examiner Description - Type in any description the examiner will need to perform the test; this field is especially useful for supplying instructions on how to perform the evaluation

F. Report Description - Type in any description that should be included on the report

G. Reference Information - Include any reference information that needs to be added to the report

Once the screen has been closed, the protocol is saved under the assigned test name with the new specifications.

II. CARDIOVASCULAR PROTOCOLS

A. UTILIZING CARDIOVASCULAR PROTOCOLS

Access the pre-programmed Cardiovascular protocols by clicking the Cardio icon on the Home Screen.

This will bring you to the Cardiovascular Protocols main page. From this page you have the ability to access all the pre-programmed protocols, including those in hibernation, add and remove tests to clients, create new range of motion tests, edit tests, and delete tests (Figure 6-3).

Figure 6-3. Cardiovascular Protocols

Step 1. Assign a test to a client by highlighting the test in the left box and clicking Add to Client or by double clicking on the test in the left box.

Step 2. Once a test has been assigned to a client, highlight the test name in the right box and click Perform Test to bring up the testing screen.

Step 3. Follow the instructions on the test screen.

B. EDITING AND CREATING CARDIOVASCULAR PROTOCOLS

Access the pre-programmed Cardiovascular protocols by clicking the Cardio icon on the Home Screen.

This will bring you to the Cardiovascular Protocols main page, where you can edit and create tests .

Edit a test by highlighting the test you would like to edit in the left box and clicking Edit Test.

Create a new test by clicking on New Test.

If you are editing a test, a screen will appear with the current settings of the test you selected. If you are creating a test, a screen will appear with the same headings as if you

were editing a test, but all of the text fields will be blank (Figure 6-4).

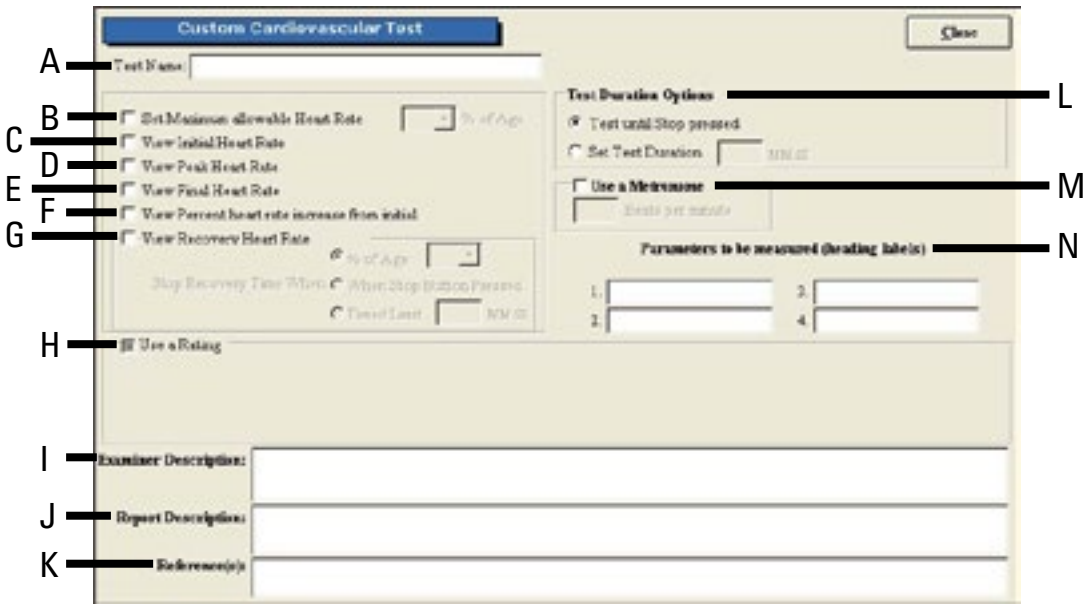


Figure 6-4. Custom Cardiovascular Protocol

The following can typically be edited or created on Cardiovascular Tests:

A. Test Name - Type in the name of the test

B. Set Maximum Allowable Heart Rate - Select whether to set the maximum allowable heart rate and at what percentage of age.

C. View Initial Heart Rate - Select whether to view the initial heart rate within the test screen

D. View Peak Heart Rate - Select whether to view the peak heart rate within the test screen

E. View Final Heart Rate - Select whether to view the final heart rate within the test screen

F. View Percent Heart Rate Increase from Initial - Select whether to view the percent heart rate increase from the initial within the test screen

G. View Recovery Heart Rate - Select whether to view the recovery heart rate within the test screen and choose when to stop the recovery time

H. Use a Rating - Select whether to use a rating and then set the rating

I. Examiner Description - Type in any description the examiner will need to perform the test - this field is especially useful for supplying instructions on how to perform the evaluation

J. Report Description - Type in any description that should be included on the report

K. Reference Information - Include any reference information that needs to be added to the report

L. Test Duration Options - Choose which method will determine test duration

M. Use a Metronome - Select whether to use a metronome and number of beats per minute

N. Parameters to be Measured (Heading Labels) - Type in the parameters that will be measured

Once the screen has been closed, the protocol is saved under the assigned test name with the new specifications.

III. CERVICAL RANGE OF MOTION (ROM) PROTOCOLS

A. POSITIONING THE PATIENT FOR CERVICAL ROM PROTOCOLS

In order to prepare for cervical range of motion testing, it is extremely important to understand how to properly position the patient; this will prevent any injury during testing. The following 7 steps are required prior to each type of ROM testing. Outlined after these 7 initial steps are the subsequent steps, which vary according to the test being performed.

Step 1. Insert the range-of-motion stop pin in the zero degree position on the halo (Figure 6-5).

Figure 6-5. Insert ROM Stop

Step 2. Lower the chair all the way down to its lowest position.

Step 3. Using the latch on the right side, open the halo (Figure 6-6).

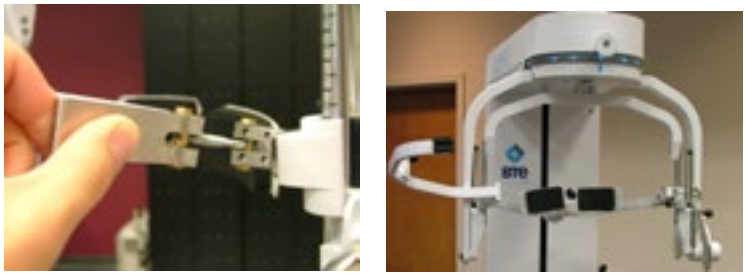


Figure 6-6. Open Halo

Step 4. Ask the patient to sit in the chair.

Step 5. Adjust the height of the seat, the position of the seat, the position of the back of the chair, the height of the back of the chair, and the arm rests to accommodate the patient's size, height, and posture. Set the halo height to 3 as a starting position (Figure 6-7).

Figure 6-7. Seat and Halo Adjustments

Step 6. Secure the patient with the waist strap and shoulder straps (Figure 6-8).

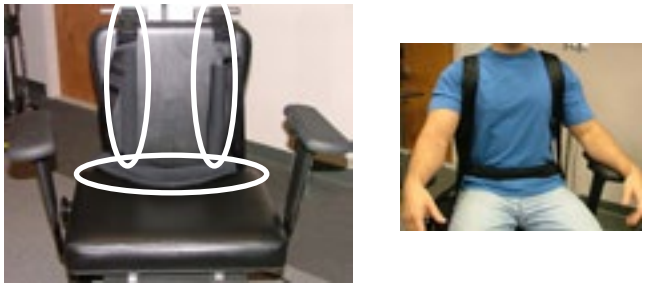


Figure 6-8. Waist and Shoulder Straps

Step 7. Close and lock the halo (Figure 6-9).

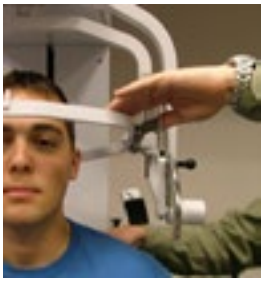
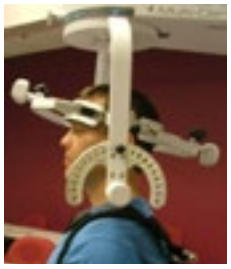


Figure 6-9. Close and Lock the Halo

1. POSITIONING THE PATIENT FOR A ROM FLEXION OR EXTENSION TEST

Step 8. For a flexion test, insert both of the head braces in the halo. For an extension test, insert the back head brace with a Velcro strap attached. Note that the bottom of the back brace should be located at the external occipital protuberance (Figure 6-10).

Flexion Set-up



Attaching Strap for Extension

Location of Back Brace

Figure 6-10. Initial ROM Flexion & Extension Set-ups

Step 9. Set the halo to 15 degrees below the horizontal (Figure 6-11).

Figure 6-11. Halo Angle

Step 10. Position the head brace(s) against the patient's head, but do not secure his/her head in place.

Step 11. Make fine adjustments to the seat and halo such that C5/C6 of the patient's spine lines up with the pivot point of the halo (Figure 6-12).

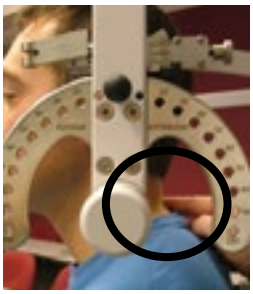
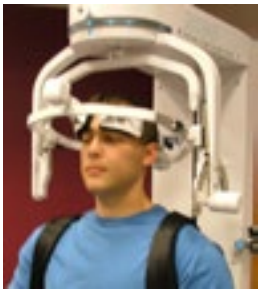


Figure 6-12. Fine Adjustments and Locating C5/C6

Step 12. Firmly secure the patient's head with the head brace(s) and Velcro strap (if performing an extension test).

Step 13. Remove the range-of-motion stop pin before performing the test (Figure 6-13). Note that the RJ45 cable is not required for this test.

Flexion



Extension

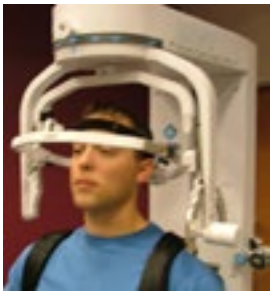


Figure 6-13. Final Set-ups for ROM Flexion & Extension

2. POSITIONING THE PATIENT FOR A ROM L/R ROTATION TEST

Step 8. Insert both of the head braces in the halo (Figure 6-14).

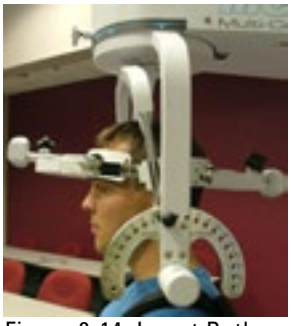


Figure 6-14. Insert Both Head Braces

Step 9. Set the halo to 0 degrees with respect to the horizontal and 10 degrees flexion (Figure 6-15).

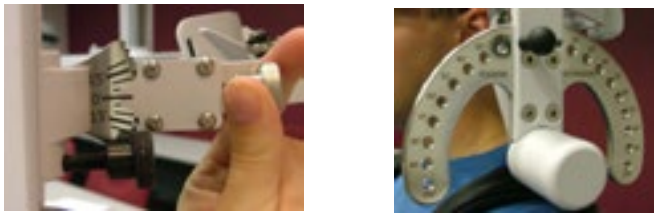


Figure 6-15. Set halo angles

Step 10. Position the head braces against the patient's head, but do not secure his/her head in place.

Step 11. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with the pivot point of the halo (Figure 6-16).

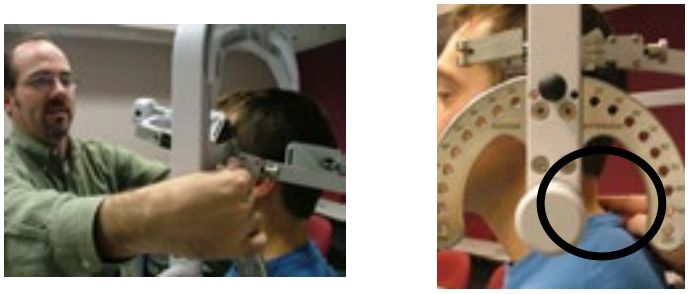
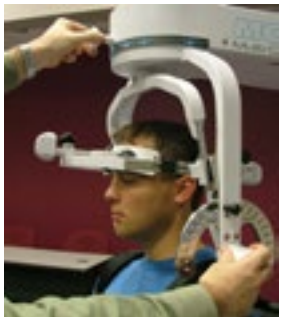


Figure 6-16. Fine Adjustments and Locating C5/C6

Step 12. Firmly secure the patient's head with the head braces.

Step 13. While holding onto the side of the halo, unlock the rotation pin, which is located at the top middle of the halo, before performing the test (Figure 6-17). Note that the RJ45 cable is not required for this test.

Unlock Rotation Pin



Final Rotation Set-up

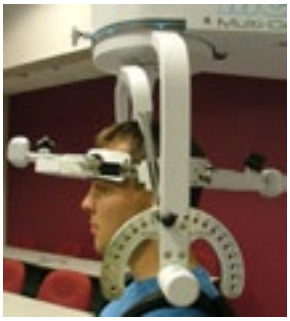


Figure 6-17. Unlocking Rotation Pin and Final ROM L/R Rotation Set-up

3. POSITIONING THE PATIENT FOR A ROM LATERAL FLEXION TEST

Step 8. Unlock the rotation pin and rotate the halo to 90 degrees right rotation. Lock the rotation pin back into place (Figure 6-18).

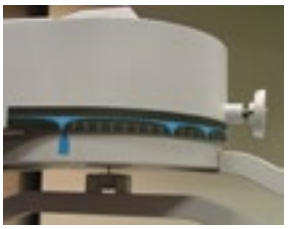


Figure 6-18. Halo at 90° Rotation

Step 9. Insert both of the head braces in the halo (Figure 6-19).

Figure 6-19. Attach Head Braces

Step 10. Set the halo to 0 degrees with respect to the horizontal. Make sure the flexion/extension angle is set to 0 degrees as well (Figure 6-20).

Figure 6-20. Set halo angles

Step 11. Position the head braces against the patient's head, but do not secure his/her head in place.

Step 12. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with

the pivot point of the halo (Figure 6-21).

Figure 6-21. Fine Adjustments and Locating C5/C6

Step 13. Firmly secure the patient's head with the head braces.

Step 14. Remove the range-of-motion stop pin before performing the test (Figure 6-22). Note that the RJ45 cable is not required for this test.

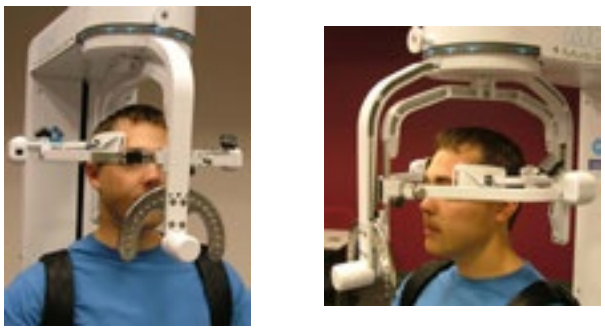


Figure 6-22. Final Set-up for ROM Lateral Flexion

B. UTILIZING THE CERVICAL RANGE OF MOTION (ROM) PROTOCOL

1. ACCESSING THE CERVICAL ROM PROTOCOL

Access the pre-programmed ROM protocols by clicking the ROM Tests icon on the Home Screen.

This will bring you to the ROM Protocols main page. From this page you have the ability to access all the pre-programmed protocols, including those in hibernation, and add and remove tests to clients (Figure 6-23).

Note that the Cervical Range of Motion protocol is the only pre-programmed ROM test that will be needed for the MCU™.

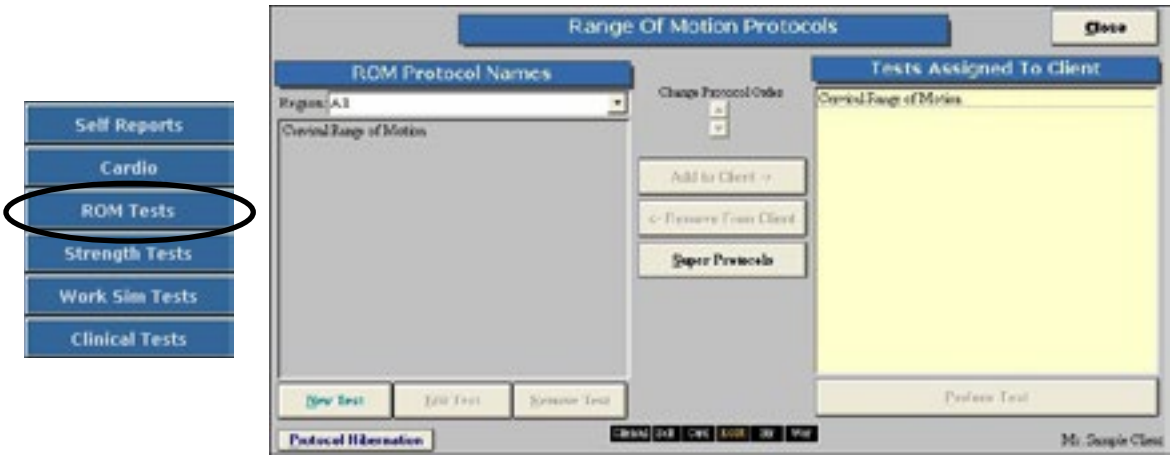


Figure 6-23. Range of Motion Protocols

Step 1. Assign a test to a client by highlighting the test in the left box and clicking Add to Client or by double clicking on the test in the left box.

Step 2. Once a test has been assigned to a client, highlight the test name in the right box and click Perform Test to bring up the testing screen (Figure 6-24).

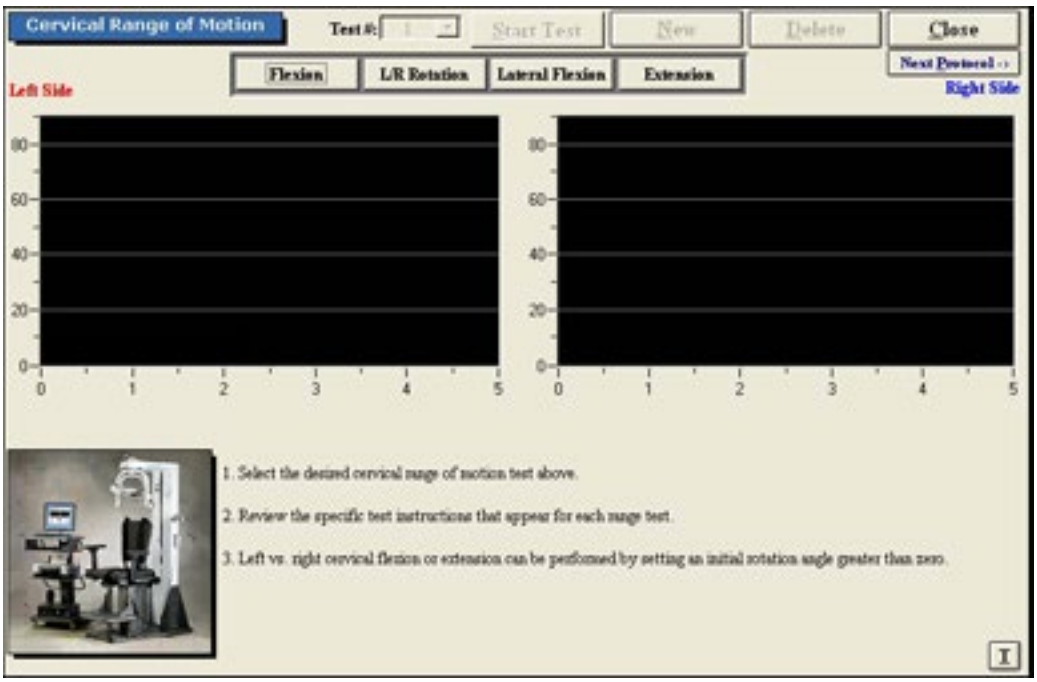


Figure 6-24. Cervical Range of Motion Main Screen

The initial Cervical Range of Motion protocol screen contains the following features:

- Name of the test
- Test number
- Start Test icon, which changes to Stop Test after the test has begun
- New icon to begin a new set of tests
- Delete icon to delete the selected test's results
- Close icon to return to the protocol screen
- Next Protocol icon to move on to the next protocol

- Flexion icon, which switches to the Flexion test screen
- L/R Rotation icon, which switches to the Rotation test screen
- Lateral Flexion icon, which switches to the Lateral Flexion test screen
- Extension icon, which switches to the Extension test screen
- Graphs and tables to illustrate the test results
- Instructions on how to perform the tests
- Threshold icon ('T'), which allows a threshold to be set

2. UTILIZING THE ROM FLEXION TEST

The ROM Flexion test measures the patient's range of motion with respect to the flexor muscle group.

Step 1. Select the Flexion icon. The Flexion Testing screen will appear (Figure 6-25).

Figure 6-25. Cervical ROM - Flexion Test

Step 2. Position the patient as described in Section III-A-2 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once the test is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The ROM Flexion test calls for three trials to be performed.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average ROM, peak ROM, coefficient of variation (COV), and the percent of normal. The pain rating determined by the patient will also appear in the pain scale text field (Figure 6-26).

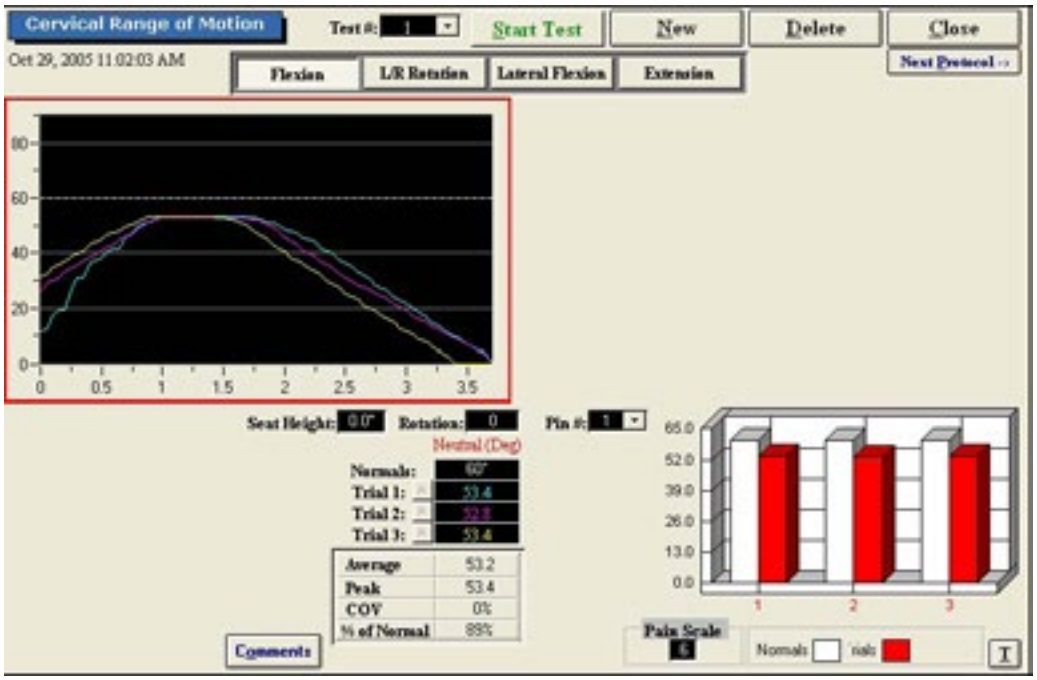


Figure 6-26. Cervical ROM - Completed Flexion Test

You may retest a trial by clicking on the R icon to the left of the trial table. However, once a test has been closed, the trials can not be retested.

3. UTILIZING THE ROM ROTATION TEST

The ROM Rotation test measures the patient's range of motion with respect to the lateral rotator muscle group.

Step 1. Select the L/R Rotation icon. The Rotation Testing screen will appear (Figure 6-27).

Figure 6-27. Cervical ROM - L/R Rotation Test

Step 2. Position the patient as described in Section III-A-2 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once each side is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The ROM L/R Rotation test calls for three trials to be performed per side.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph. These figures are especially helpful in comparing the abilities of each side.

In addition to the test results, the screen will tabulate: the average ROM, peak ROM, coefficient of variation (COV), the percent of normal, and the percent difference between the left and right side. The pain ratings determined by the patient will also appear in the pain scale text fields (Figure 6-28).

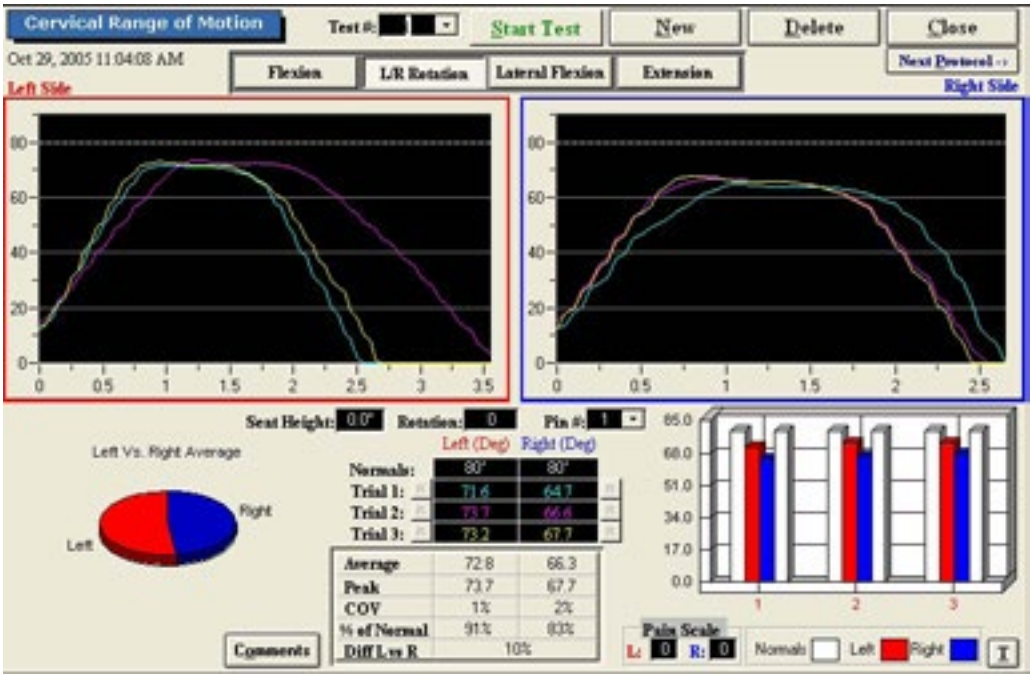


Figure 6-28. Cervical ROM - Completed L/R Rotation Test

You may retest a trial by clicking on the R icon to the left or right of the trial table, depending on which trial you would like to redo. However, once a test has been closed, the trials can not be retested.

4. UTILIZING THE ROM LATERAL FLEXION TEST

The ROM Lateral Flexion test measures the patient's range of motion with respect to the lateral flexor muscle group.

Step 1. Select the Lateral Flexion icon. The Lateral Flexion Testing screen will appear (Figure 6-29).

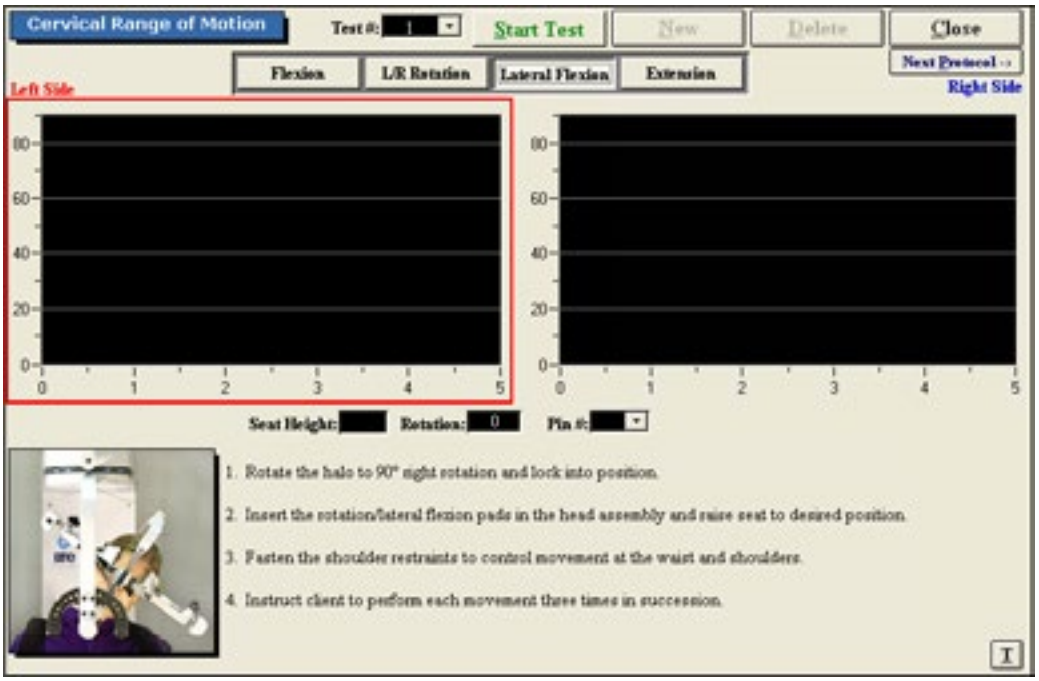


Figure 6-29. Cervical ROM - Lateral Flexion Test

Step 2. Position the patient as described in Section III-A-3 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once each side is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The ROM Lateral Flexion test calls for three trials to be performed per side.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph. These figures are especially helpful in comparing the abilities of each side.

In addition to the test results, the screen will tabulate: the average ROM, peak ROM, coefficient of variation (COV), the percent of normal, and the percent difference between the left and right side. The pain ratings determined by the patient will also appear in the pain scale text fields (Figure 6-30).

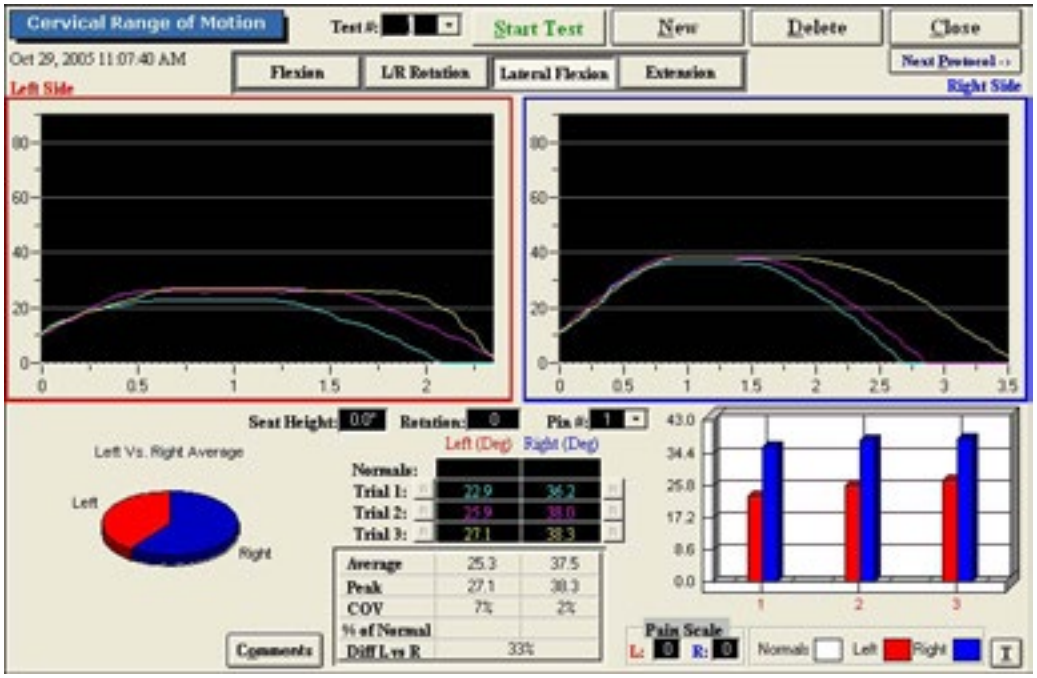


Figure 6-30. Cervical ROM - Completed Lateral Flexion Test

You may retest a trial by clicking on the R icon to the left or right of the trial table, depending on which trial you would like to redo. However, once a test has been closed, the trials can not be retested.

5. UTILIZING THE ROM EXTENSION TEST

The ROM Extension protocol measures the patient's range of motion with respect to the extensor muscle group.

Step 1. Select the Extension icon. The Extension Testing screen will appear (Figure 6-31).

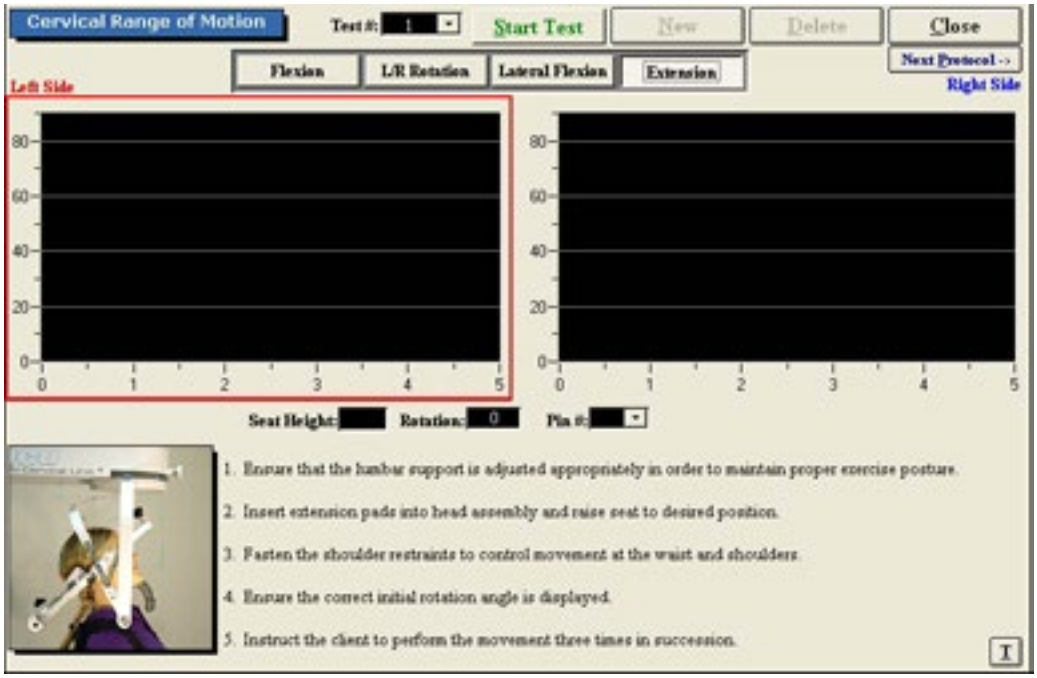


Figure 6-31. Cervical ROM - Extension Test

Step 2. Position the patient as described in Section III-A-1 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once the test is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient determined and then click OK.

The ROM Extension test calls for three trials to be performed.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average ROM, peak ROM, coefficient of variation (COV), and the percent of normal. The pain rating determined by the patient will also appear in the pain scale text field (Figure 6-32).

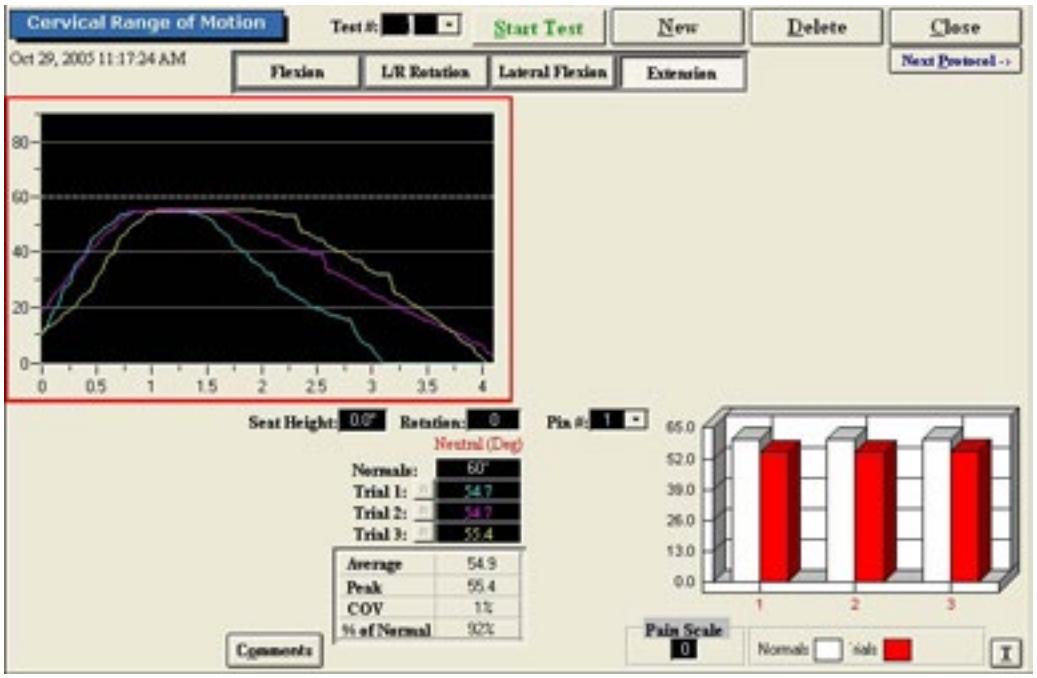


Figure 6-32. Cervical ROM - Completed Extension Test

You may retest a trial by clicking on the R icon to the left of the trial table. However, once a test has been closed, the trials can not be retested.

IV. STRENGTH PROTOCOLS

A. POSITIONING THE PATIENT FOR NEUTRAL CERVICAL ISOMETRIC STRENGTH PROTOCOLS

In order to prepare for cervical strength testing, it is extremely important to understand how to properly position the patient; this will prevent any injury during testing. The following 7 steps are required prior to each type of strength testing. Outlined after these 7 initial steps are the subsequent steps, which vary according to the test being performed.

Step 1. Insert the range-of-motion stop pin in the zero degree position on the halo (Figure 6-33).

Figure 6-33 Insert ROM Stop

Step 2. Lower the chair all the way down to its lowest position.

Step 3. Using the latch on the right side, open the halo (Figure 6-34).

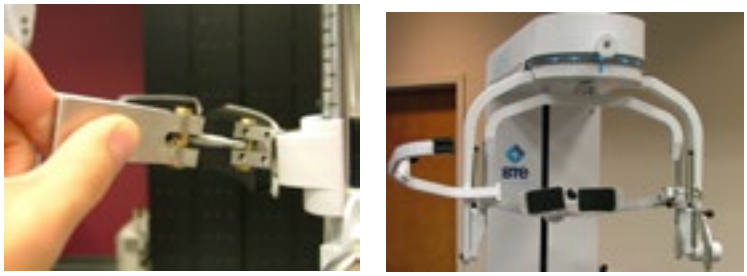


Figure 6-34. Open Halo

Step 4. Ask the patient to sit in the chair.

Step 5. Adjust the height of the seat, the position of the seat, the position of the back of the chair, the height of the back of the chair, and the arm rests to accommodate the patient's size, height, and posture. Set the halo height to 3 as a starting position (Figure 6-35).

Figure 6-35. Seat and Halo Adjustments

Step 6. Secure the patient with the waist strap and shoulder straps (Figure 6-36).

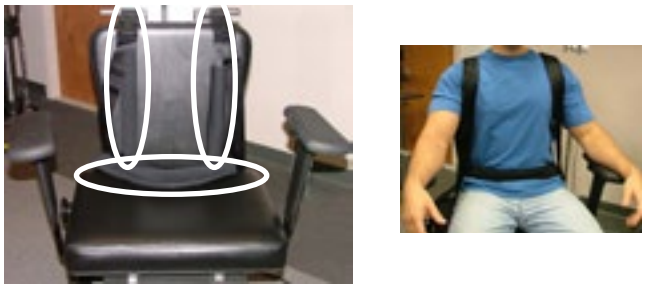


Figure 6-36. Waist and Shoulder Straps

Step 7. Close and lock the halo (Figure 6-37).

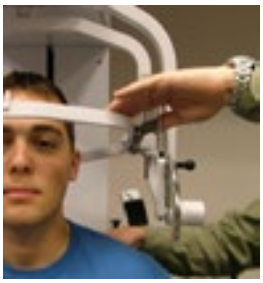


Figure 6-37. Close and Lock the Halo

1. POSITIONING THE PATIENT FOR AN ISOMETRIC FLEXION OR EXTENSION TEST

Step 8. For a flexion test, insert the front head brace. For an extension test, insert the back head brace. Note that the bottom of the back brace should be located at the external occipital protuberance (Figure 6-38).

Flexion Set-up

Location of Back Brace

Figure 6-38. Initial Isometric Flexion & Extension Set-up

Step 9. Set the halo to 15 degrees below the horizontal (Figure 6-39).

Figure 6-39. Halo Angle

Step 10. Position the head brace against the patient's head.

Step 11. Make fine adjustments to the seat and halo such that C5/C6 of the patient's spine lines up with the pivot point of the halo (Figure 6-40).

Figure 6-40. Fine Adjustments and Locating C5/C6

Step 12. Attach the RJ45 cable to the head brace being used and the RJ45 jack that is closest to the front of the unit at the top of the MCU™ (Figure 6-41).

Figure 6-41. MCU™ RJ45 Jack and Final Isometric Flexion & Extension Set-ups

2. POSITIONING THE PATIENT FOR AN ISOMETRIC LATERAL TEST

Step 8. Unlock the rotation pin and rotate the halo to 90 degrees right rotation. Lock the rotation pin (Figure 6-42).

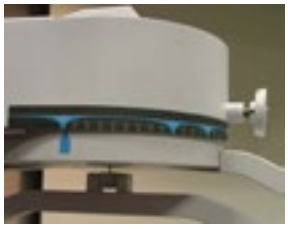


Figure 6-42. Halo at 90° Rotation

Step 9. Attach the head brace to the halo on the side being tested (Figure 6-43).

Figure 6-43. Attach Head Brace

Step 10. Set the halo to 0 degrees with respect to the horizontal. Make sure the flexion/extension angle is set to 0 degrees as well (Figure 6-44).


Figure 6-44. Set halo angles

Step 11. Position the head brace against the patient's head.

Step 12. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with the pivot point of the halo (Figure 6-45).

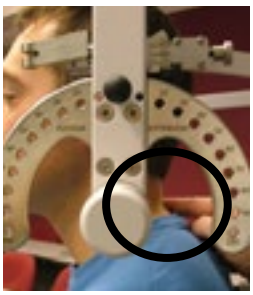



Figure 6-45. Fine Adjustments and Locating C5/C6

Step 13. Attach the RJ45 cable to the head brace being used and the RJ45 jack that is closest to the front of the unit at the top of the MCU™ (Figure 6-46).

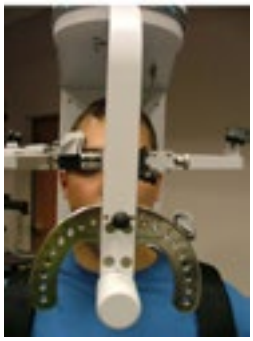



Figure 6-46. MCU™ RJ45 Jack and Final Isometric Lateral Set-up

B. POSITIONING THE PATIENT FOR 25 DEGREE CERVICAL ISOMETRIC STRENGTH PROTOCOLS

In order to prepare for cervical strength testing, it is extremely important to understand how to properly position the patient; this will prevent any injury during testing. The following 7 steps are required prior to each type of strength testing. Outlined after these 7 initial steps are the subsequent steps, which vary according to the test being performed.

Locate the rotation labels to the left and right of the rotation lock pin. The label to the right of the lock pin says "Rotation Left" and the label to the left of the lock pin says "Rotation Right." The left and right direction refer to the patient's point of view. Any reference in the manual to left or right will correspond to the label and therefore the patient.

Step 1. Insert the range-of-motion stop pin in the zero degree position on the halo (Figure 6-47).

Figure 6-47. Insert ROM Stop

Step 2. Lower the chair all the way down to its lowest position.

Step 3. Using the latch on the right side, open the halo (Figure 6-48).

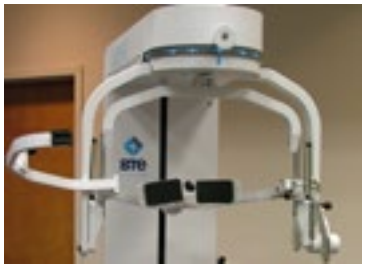


Figure 6-48. Open Halo

Step 4. Ask the patient to sit in the chair.

Step 5. Adjust the height of the seat, the position of the seat, the position of the back of the chair, the height of the back of the chair, and the arm rests to accommodate

Figure 6-49. Seat and Halo Adjustments

the patient's size, height, and posture (Figure 6-49).

Figure 6-50. Waist and Shoulder Straps

Step 6. Secure the patient with the waist strap and shoulder straps (Figure 6-50).

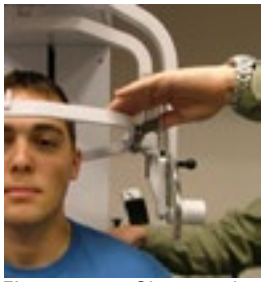
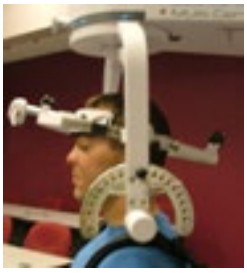


Figure 6-51. Close and Lock the Halo

Step 7. Close and lock the halo (Figure 6-51).

1. POSITIONING THE PATIENT FOR A 25 DEGREE ISOMETRIC FLEXION OR EXTENSION TEST

Flexion Set-up



Location of Back Brace

Figure 6-52. Initial Isometric Flexion & Extension Set-up

Step 8. For a flexion test, insert the front head brace. For an extension test, insert the back head brace. Note that the bottom of the back brace should be located at the external occipital protuberance (Figure 6-52).

Figure 6-53. Halo Angle

Step 9. Set the halo to 15 degrees below the horizontal (Figure 6-53).

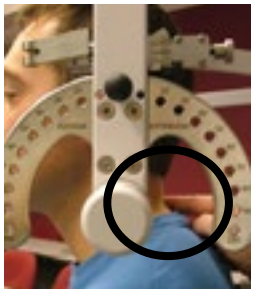


Figure 6-54. Fine Adjustments and Locating C5/C6

Step 10. Position the head brace against the patient's head.

Step 11. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with the pivot point of the halo (Figure 6-54).

Step 12. While holding onto the side of the halo, unlock the rotation pin, which is

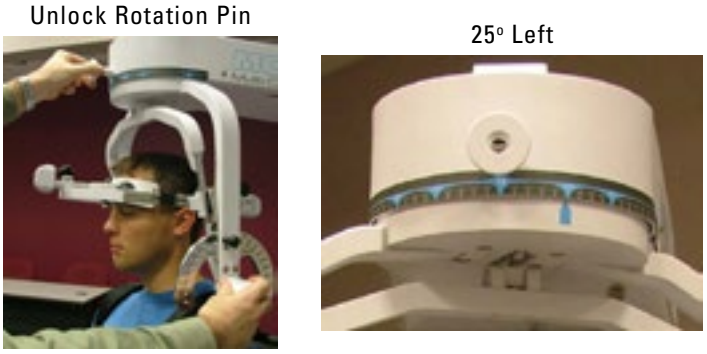


Figure 6-55. Halo Rotation of 25°

located at the top middle of the halo. If you're testing the patient's left side, rotate the halo to 25 degrees right rotation and then lock the rotation pin. Rotate the halo to 25 degrees left rotation to test the patient's right side

Figure 6-56. MCU™ RJ45 Jack and Final 25° Isometric Flexion & Extension Set-ups

(Figure 6-55).

Step 13. Attach the RJ45 cable to the head brace being used and the RJ45 jack that is closest to the front of the unit at the top of the MCU™ (Figure 6-56).

2. POSITIONING THE PATIENT FOR A 25 DEGREE ISOMETRIC LATERAL TEST

Step 8. Unlock the rotation pin, which is located at the top middle of the halo. If you're

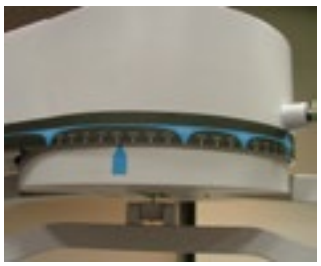


Figure 6-57. Halo Rotation of 25° Lateral

testing the patient's left side, rotate the halo 65 degrees toward the right, and

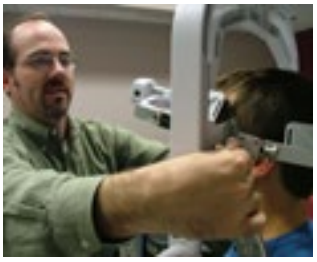
Figure 6-58. Attach Head Brace

then lock the rotation pin. Rotate the halo 65 degrees toward the left when testing the patient's right side (Figure 6-57). Note that the figures show a set-

Figure 6-59. Set halo angles

up for testing the patient's right side.

Step 9. Attach the head brace to the halo on the side being tested (Figure 6-58).



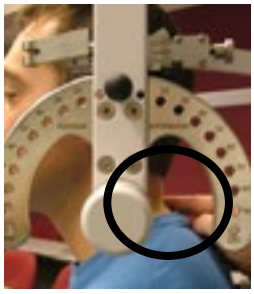


Figure 6-60. Fine Adjustments and Locating C5/C6

Step 10. Set the halo to 0 degrees with respect to the horizontal. Make sure the flexion/ extension angle is set to 0 degrees as well (Figure 6-59).

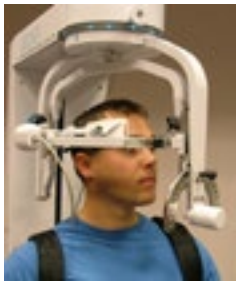


Figure 6-61. MCU™ RJ45 Jack and Final 25° Isometric Lateral Set-up

Step 11. Position the head brace against the patient's head.

Step 12. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with the pivot point of the halo (Figure 6-60).

Step 13. Attach the RJ45 cable to the head brace being used and the RJ45 jack that is closest to the front of the unit at the top of the MCU™ (Figure 6-61).

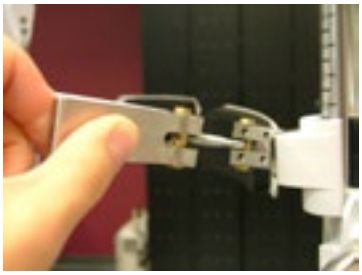
Locate the rotation labels to the left and right of the rotation lock pin. The label to the right of the lock pin says "Rotation Left" and the label to the left of the lock pin says "Rotation Right." The left and right direction refer to the patient's point of view. Any reference in the manual to left or right will correspond to the label and therefore the patient.

C. POSITIONING THE PATIENT FOR 45 DEGREE CERVICAL ISOMETRIC STRENGTH

Figure 6-62. Insert ROM Stop

PROTOCOLS

In order to prepare for cervical strength testing, it is extremely important to understand



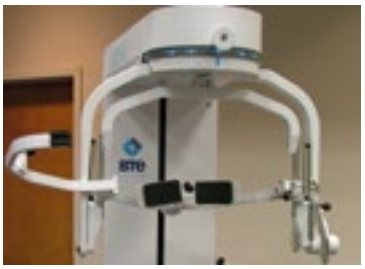


Figure 6-63. Open Halo

how to properly position the patient; this will prevent any injury during testing. The following 7 steps are required prior to each type of strength testing. Outlined after these 7 initial steps are the subsequent steps, which vary according to the test being performed.

Step 1. Insert the range-of-motion stop pin in the zero degree position on the halo (Figure 6-62).

Figure 6-64. Seat and Halo Adjustments

Step 2. Lower the chair all the way down to its lowest position.

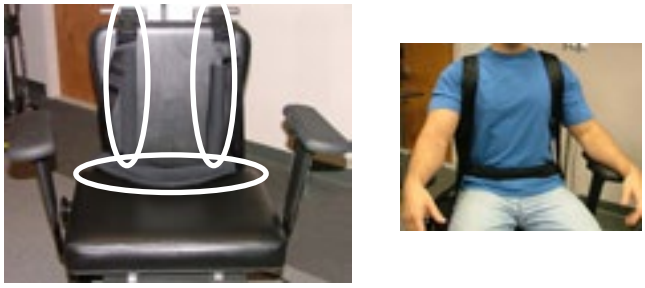


Figure 6-65. Waist and Shoulder Straps

Step 3. Using the latch on the right side, open the halo (Figure 6-63).

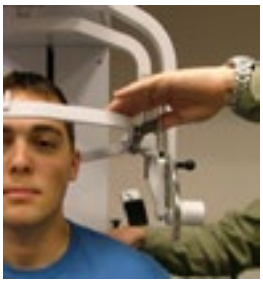


Figure 6-66. Close and Lock the Halo

Step 4. Ask the patient to sit in the chair.

Step 5. Adjust the height of the seat, the position of the seat, the position of the back of the chair, the height of the back of the chair, and the arm rests to accommodate the patient's size, height, and posture. Set the halo height to 3 as a starting

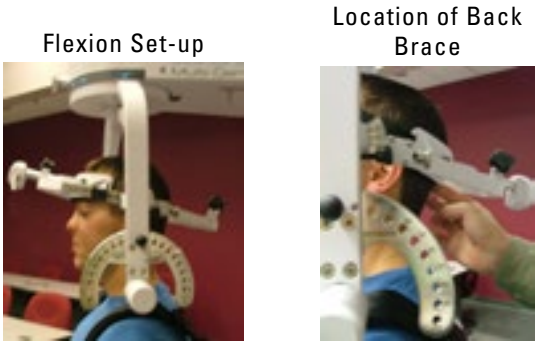


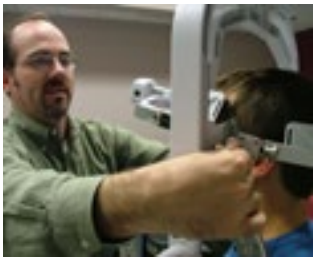
Figure 6-67. Initial Isometric Flexion & Extension Set-up

position (Figure 6-64).

Figure 6-68. Halo Angle

Step 6. Secure the patient with the waist strap and shoulder straps (Figure 6-65).

Step 7. Close and lock the halo (Figure 6-66).



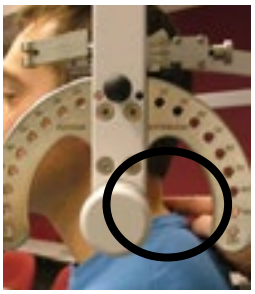
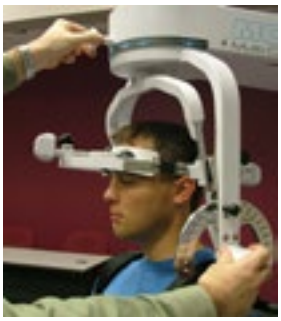


Figure 6-69. Fine Adjustments and Locating C5/C6

1. POSITIONING THE PATIENT FOR A 45 DEGREE ISOMETRIC FLEXION OR EXTENSION TEST

Step 8. For a flexion test, insert the front head brace. For an extension test, insert the back head brace. Note that the bottom of the back brace should be located at the external occipital protuberance (Figure 6-67).

Unlock Rotation Pin



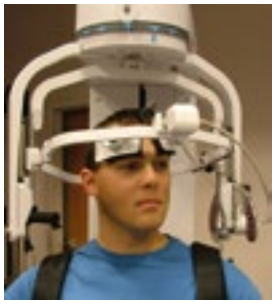
45° Left

Figure 6-70. Halo Rotation of 45°

Step 9. Set the halo to 15 degrees below the horizontal (Figure 6-68).

Step 10. Position the head brace against the patient's head.

Flexion



Extension

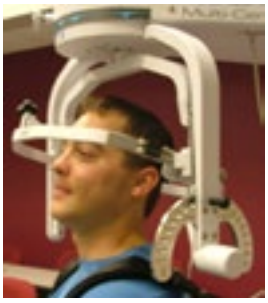


Figure 6-71. MCU™ RJ45 Jack and Final 25° Isometric Flexion & Extension Set-ups

Step 11. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with the pivot point of the halo (Figure 6-69).

Step 12. While holding onto the side of the halo, unlock the rotation pin, which is

located at the top middle of the halo. If you're testing the patient's left side, rotate the halo to 45 degrees right rotation and then lock the rotation pin.

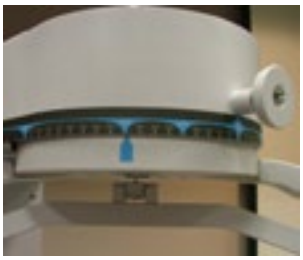


Figure 6-72. Halo Rotation of 45º Lateral

Rotate the halo to 45 degrees left rotation to test the patient's right side

Figure 6-73. Attach Head Brace

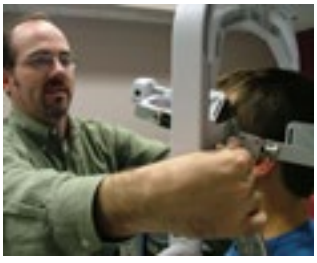
(Figure 6-70).

Step 13. Attach the RJ45 cable to the head brace being used and the RJ45 jack that is

Figure 6-74. Set halo angles

closest to the front of the unit at the top of the MCU™ (Figure 6-71).

2. POSITIONING THE PATIENT FOR A 45 DEGREE ISOMETRIC LATERAL TEST



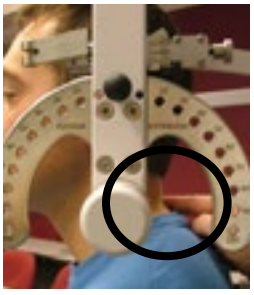


Figure 6-75. Fine Adjustments and Locating C5/C6

Step 8. Unlock the rotation pin, which is located at the top middle of the halo. If you're testing the patient's left side, rotate the halo to 45 degrees right rotation, and

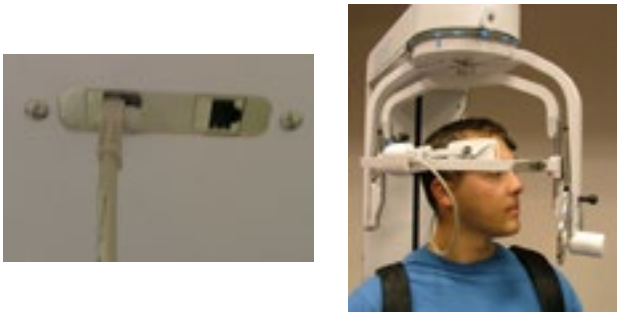


Figure 6-76. MCU™ RJ45 Jack and Final 45° Isometric Lateral Set-up

then lock the rotation pin. Rotate the halo to 45 degrees left rotation when testing the patient's right side (Figure 6-72). Note that the figures show a set-up for testing the patient's right side.

Make sure the load cell is plugged into the top of the MCU and mapped prior to entering the test screen. Refer to Chapter 2-IV-C-4 for more information on tool mapping.

Step 9. Attach the head brace to the halo on the side being tested (Figure 6-73).

Step 10. Set the halo to 0 degrees with respect to the horizontal. Make sure the flexion/extension angle is set to 0 degrees as well (Figure 6-74).

Step 11. Position the head brace against the patient's head.

Figure 6-77. Strength Protocols

Step 12. Make fine adjustments to the seat to line up C5/C6 of the patient's spine with the pivot point of the halo (Figure 6-75).

Step 13. Attach the RJ45 cable to the head brace being used and the RJ45 jack that is closest to the front of the unit at the top of the MCU™ (Figure 6-76).

D. UTILIZING THE CERVICAL STRENGTH PROTOCOLS

1. ACCESSING THE CERVICAL STRENGTH PROTOCOLS

Access the pre-programmed Strength protocols by clicking the Strength Tests icon on

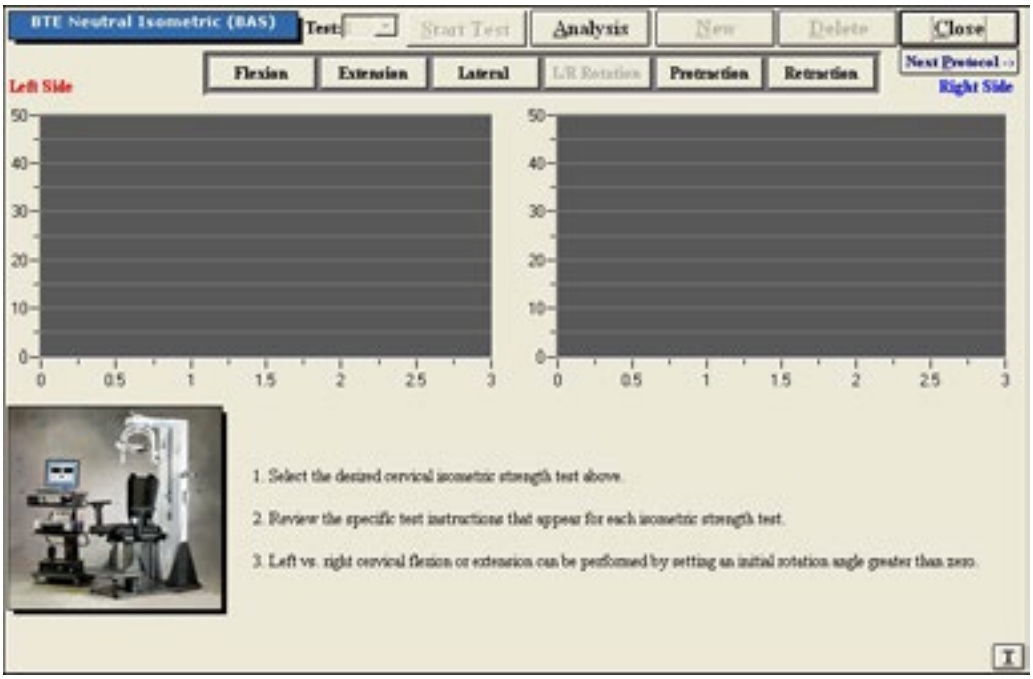


Figure 6-78. Cervical Strength Main Screen

the Home Screen.

This will bring you to the Strength Protocols main page. From this page you have the ability to access all the pre-programmed protocols, including those in hibernation, add and remove tests to clients, create new isometric strength tests, edit tests, and delete tests (Figure 6-77).

Note that three strength protocols have been designed for the Multi-Cervical™ Unit: BTE Neutral Isometric, BTE Angle Specific 25 Degrees, and BTE Angle Specific 45 Degrees. The only difference between the three protocols is the rotation angle at which the halo is set (i.e. 0 degrees, 25 degrees, and 45 degrees).

Step 1. Assign a test to a client by highlighting the test in the left box and clicking Add to Client or by double clicking on the test in the left box.

Step 2. Once a test has been assigned to a client, highlight the test name in the right box and click Perform Test to bring up the testing screen (Figure 6-78).

The initial Cervical Strength protocol screens contain the following features:

- Name of the test

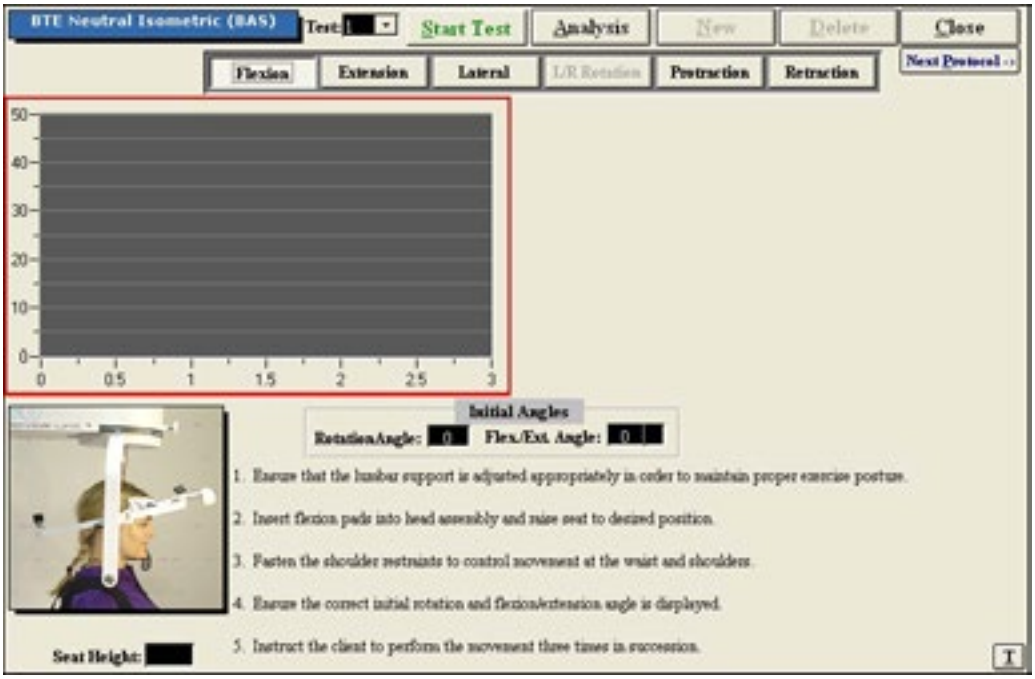


Figure 6-79. Cervical Strength - Flexion Test

- Start Test icon, which changes to Stop Test after the test has begun
- Analysis icon to extensively analyze the data of a completed test
- New icon to begin a new set of test results
- Delete icon to delete the selected test's results
- Close icon to return to the protocol screen
- Next Protocol icon to move on to the next protocol
- Flexion icon, which switches to the Flexion test screen
- Extension icon, which switches to the Extension test screen
- Lateral icon, which switches to the Lateral test screen
- Protraction icon, which switches to the Protraction screen
- Retraction icon, which switches to the Retraction screen
- Graphs and tables to illustrate the test results
- Instructions on how to perform the tests
- Threshold icon ('T'), which allows a threshold to be set

2. UTILIZING THE STRENGTH FLEXION TEST

The Strength Flexion test measures the patient's strength with respect to the flexor muscle group.

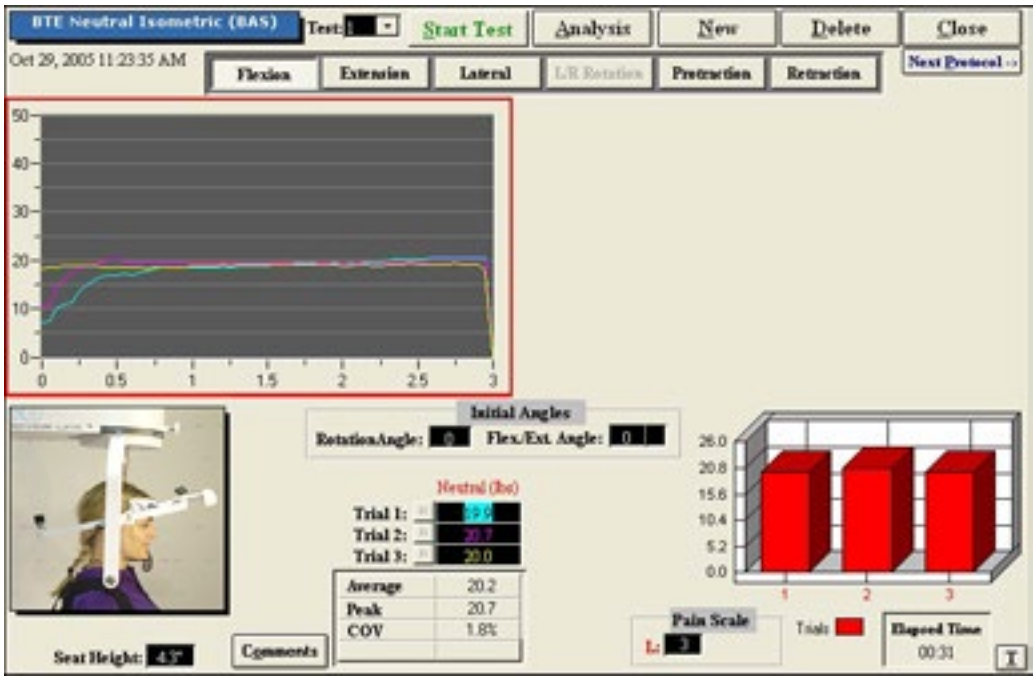


Figure 6-80. Cervical Strength - Completed Flexion Test

Step 1. Select the Flexion icon. The Flexion Testing screen will appear (Figure 6-79).

Step 2. Position the patient as described in Section IV-A/B/C-1 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once the test is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The Strength Flexion test calls for three trials to be performed.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average force, peak force, coefficient of variation (COV), and the percent of normal. The pain ratings determined by the patient will also appear in the pain scale text field (Figure 6-80).

You may retest a trial by clicking on the R icon to the left of the trial table. However, once a test has been closed, the trials can not be retested.

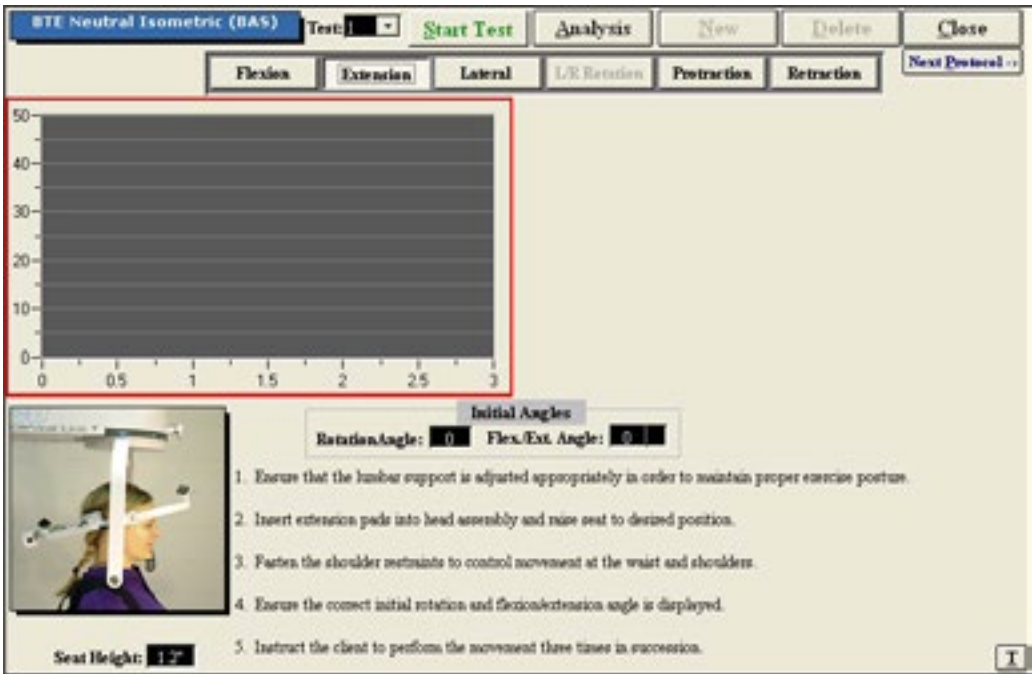


Figure 6-81. Cervical Strength - Extension Test

3. UTILIZING THE STRENGTH EXTENSION TEST

The Strength Extension test measures the patient's strength with respect to the extensor muscle group.

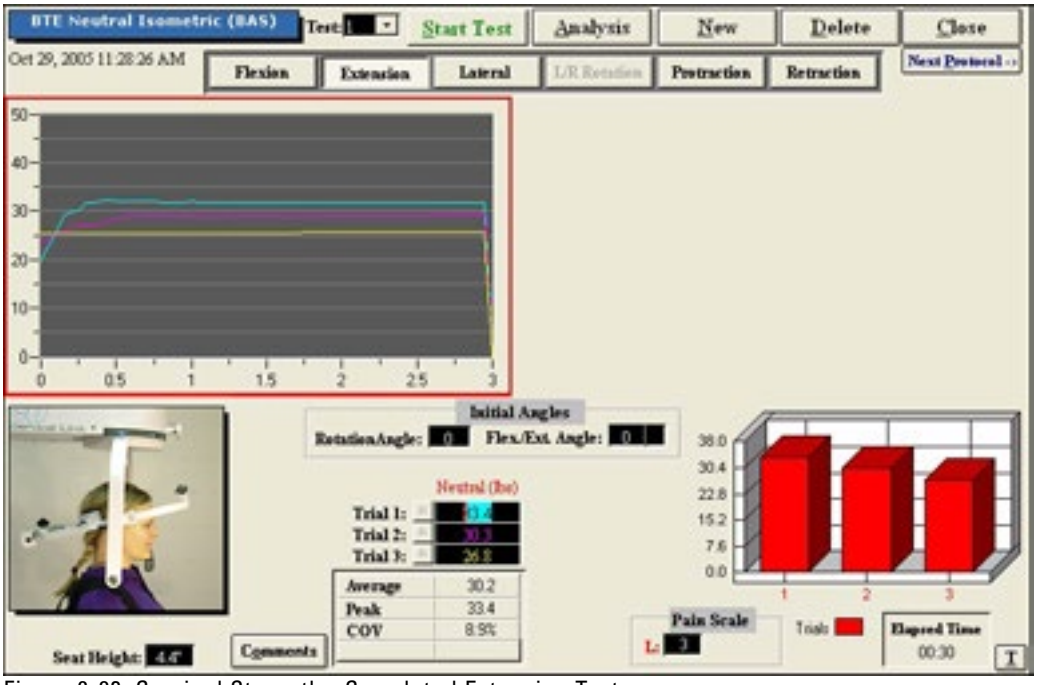


Figure 6-82. Cervical Strength - Completed Extension Test

Step 1. Select the Extension icon. The Extension Testing screen will appear (Figure 6-81).

Step 2. Position the patient as described in Section IV-A/B/C-1 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once the test is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The Strength Extension test calls for three trials to be performed.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average force, peak force, coefficient of variation (COV), and the percent of normal. The pain ratings determined by the patient will also appear in the pain scale text field (Figure 6-82).

You may retest a trial by clicking on the R icon to the left of the trial table. However, once a test has been closed, the trials can not be retested.

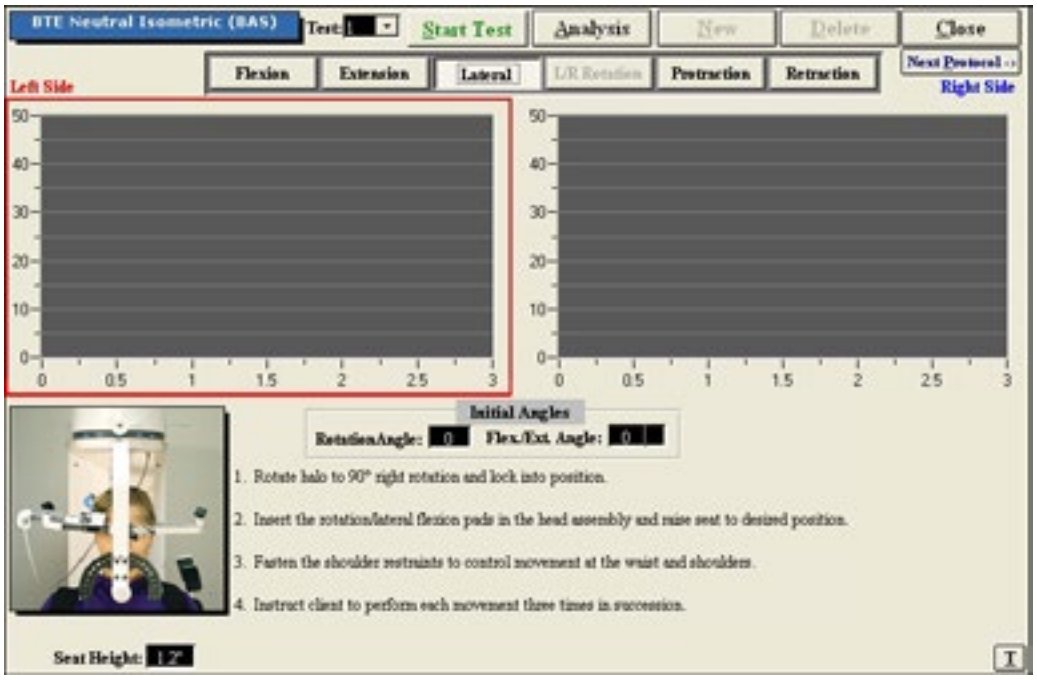


Figure 6-83. Cervical Strength - Lateral Test

4. UTILIZING THE STRENGTH LATERAL TEST

The Strength Lateral test measures the patient's strength with respect to the lateral muscle group.

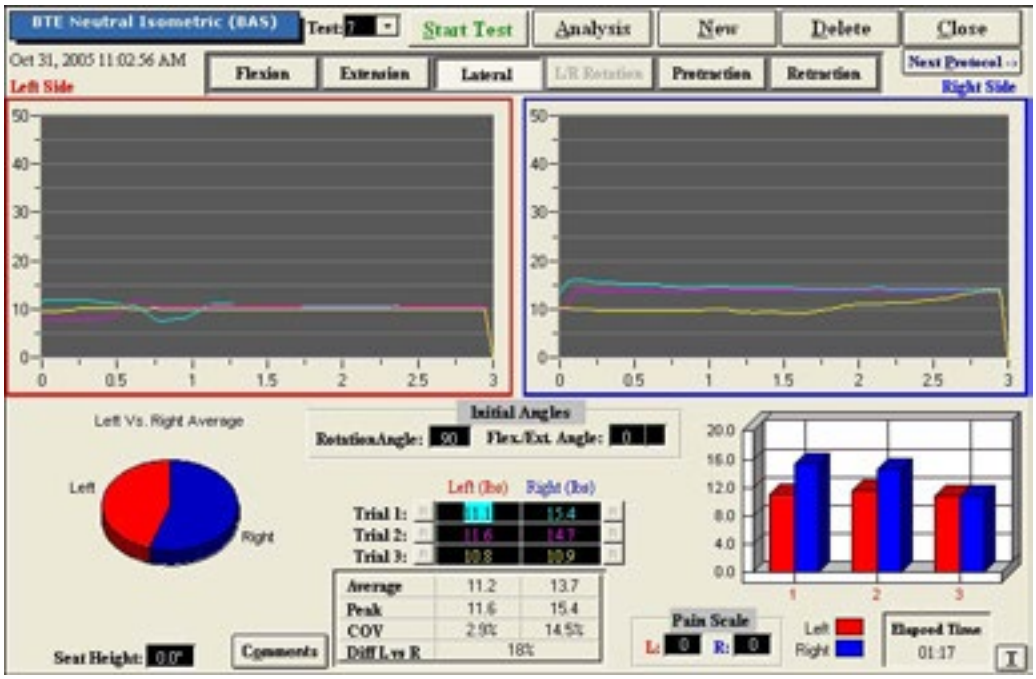


Figure 6-84. Cervical Strength - Completed Lateral Test

Step 1. Select the Lateral icon. The Lateral Testing screen will appear (Figure 6-83).

Step 2. Position the patient as described in Section IV-A/B/C-2 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once each side is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient determined and then click OK.

The Strength Lateral test calls for three trials to be performed per side.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average force, peak force, coefficient of variation (COV), and the percent of normal. The pain ratings determined by the patient will also appear in the pain scale text field (Figure 6-84).

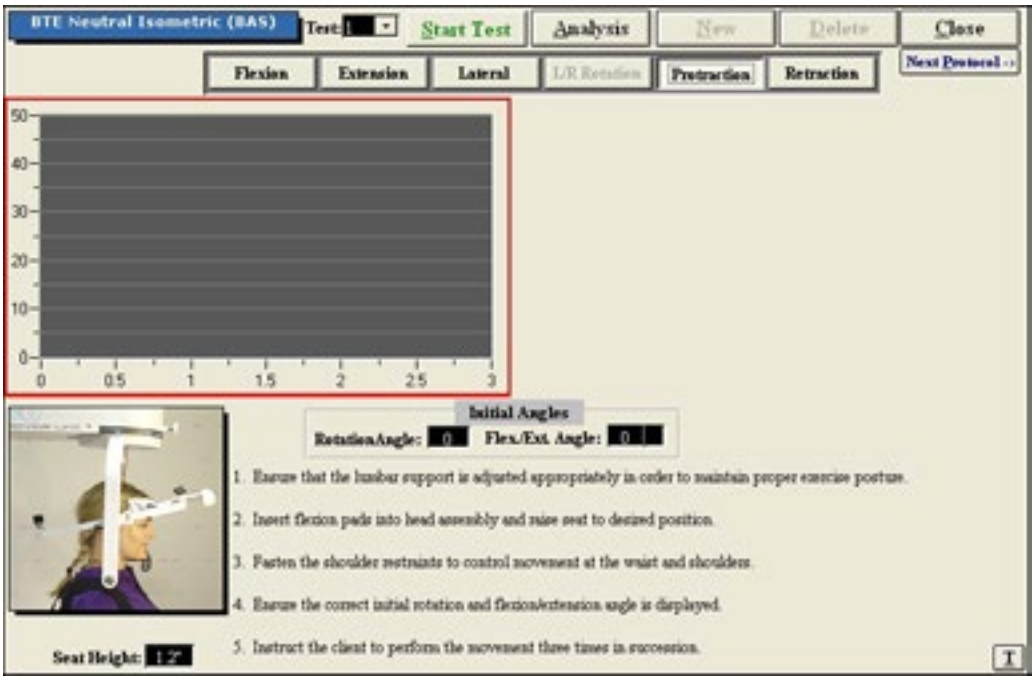


Figure 6-85. Cervical Strength - Protraction Test

You may retest a trial by clicking on the R icon to the left or right of the trial table, depending on which trial you would like to redo. However, once a test has been closed, the trials can not be retested.

5. UTILIZING THE STRENGTH PROTRACTION TEST

Step 1. Select the Protraction icon. The Protraction Testing screen will appear (Figure 6-85).

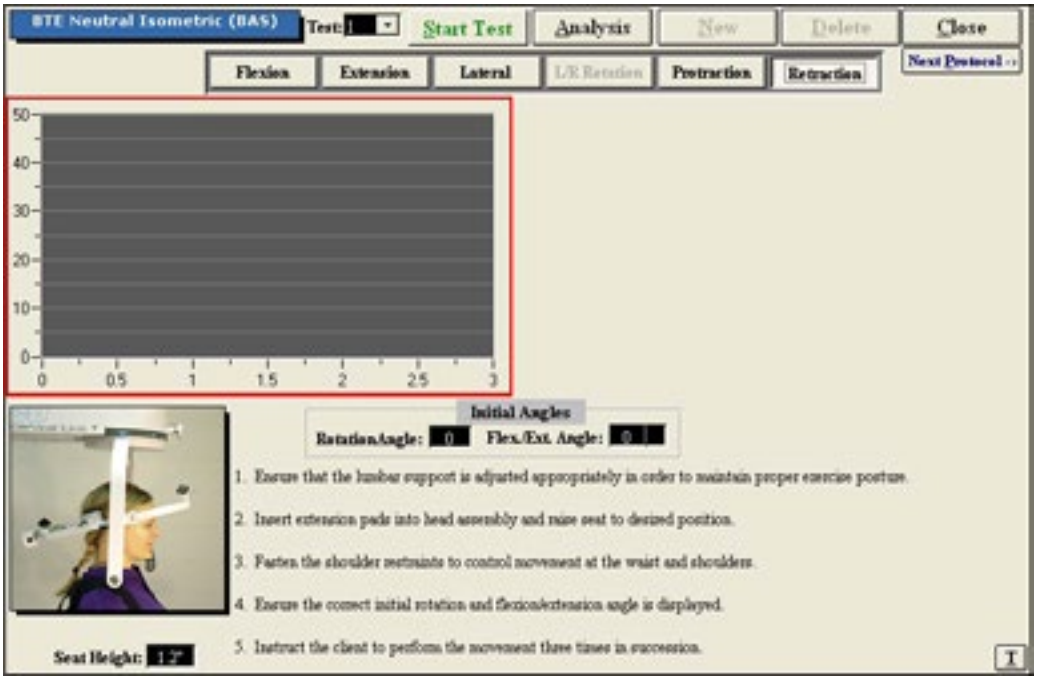


Figure 6-86. Cervical Strength - Retraction Test

Step 2. Position the patient as described in Section IV-A/B/C-1 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once the test is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The Strength Protraction test calls for three trials to be performed.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average force, peak force, coefficient of variation (COV), and the percent of normal. The pain ratings determined by the patient will also appear in the pain scale text field.

You may retest a trial by clicking on the R icon to the left of the trial table. However, once a test has been closed, the trials can not be retested.

6. UTILIZING THE STRENGTH RETRACTION TEST

Step 1. Select the Retraction icon. The Retraction Testing screen will appear (Figure 6-86).

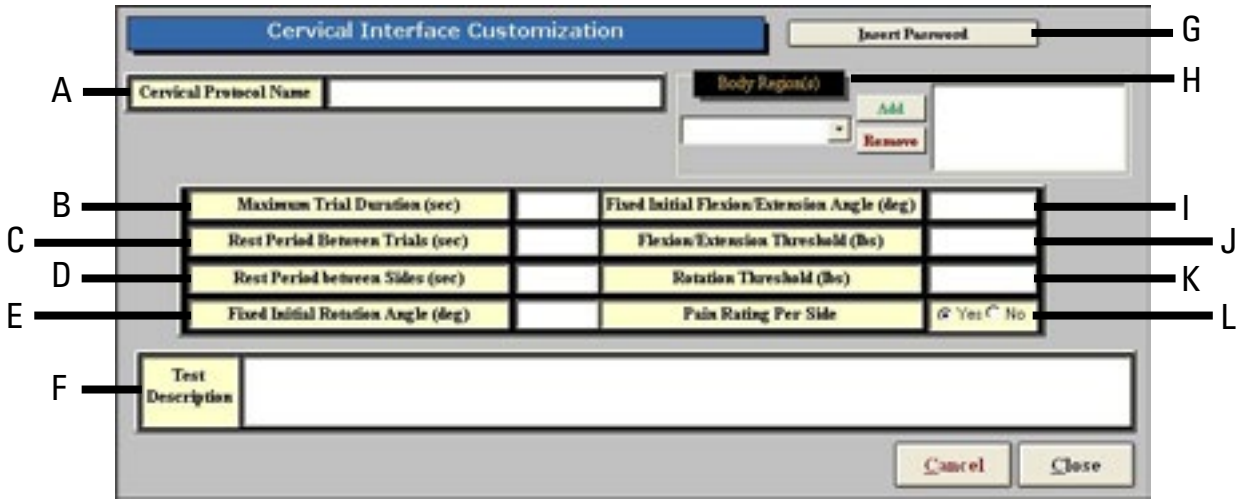


Figure 6-87. Custom Cervical Integration Protocol

Step 2. Position the patient as described in Section IV-A/B/C-1 of this chapter.

Step 3. Click Start Test to begin testing.

Step 4. Once the test is completed, a pain scale will appear. Ask the patient to rate his/her pain on a ten-point scale (0 is equivalent to no pain and 10 is equivalent to the worst pain possible). Click on the number the patient stated and then click OK.

The Retraction Strength test calls for three trials to be performed.

As the protocol is performed, the screen will display the results and averages via a line graph, table, pie chart, and bar graph.

In addition to the test results, the screen will tabulate: the average force, peak force, coefficient of variation (COV), and the percent of normal. The pain ratings determined by the patient will also appear in the pain scale text field.

You may retest a trial by clicking on the R icon to the left of the trial table. However, once a test has been closed, the trials can not be retested.

7. CREATING CUSTOM CERVICAL INTEGRATION PROTOCOLS

Access the pre-programmed Strength protocols by clicking the Strength Tests icon on the Home Screen.

This will bring you to the Strength Protocols main page, where you can edit and create tests.

Edit a test by highlighting the test you would like to edit in the left box and clicking Edit Test.

Create a new test by clicking on New Test and then clicking Cervical Integration (Figure 6-87).

The following can be created on Custom Cervical Integration Protocols:

A. Cervical Protocol Name - Type in the name of the test

B. Maximum Trial Duration - Set the maximum amount of time (seconds) for the trial duration

C. Rest Period Between Trials - Set the amount of time (seconds) to rest between trials

D. Rest Period Between Sides - Set the amount of time (seconds) to rest between switching sides

E. Fixed Initial Rotation Angle (deg) - Set the initial angle (degrees) for a rotation test

F. Test Description - Type in any description that should be included on the test

G. Insert Password - Choose whether a password is required to edit the test – if this option is selected, any user will be prompted for the password whenever he or she

Figure 6-88. Clinical Protocols

tries to edit the test.

H. Body Region - Select which body region is to be evaluated

I. Fixed Initial Flexion/Extension Angle (deg) - Set the initial (degrees) for a flexion or extension test

J. Flexion/Extension Threshold (lbs) - Set the amount of force (lbs) required for a flexion or extension test to begin

K. Rotation Threshold (lbs) - Set the amount of force (lbs) required for a rotation test to begin

L. Pain Rating Per Side - Choose whether to display the pain rating scale

Once the screen has been closed, the protocol is saved under the assigned test name with the new specifications.

V. CLINICAL PROTOCOLS

The MCU™ software includes several pre-programmed Clinical protocols, which are intended

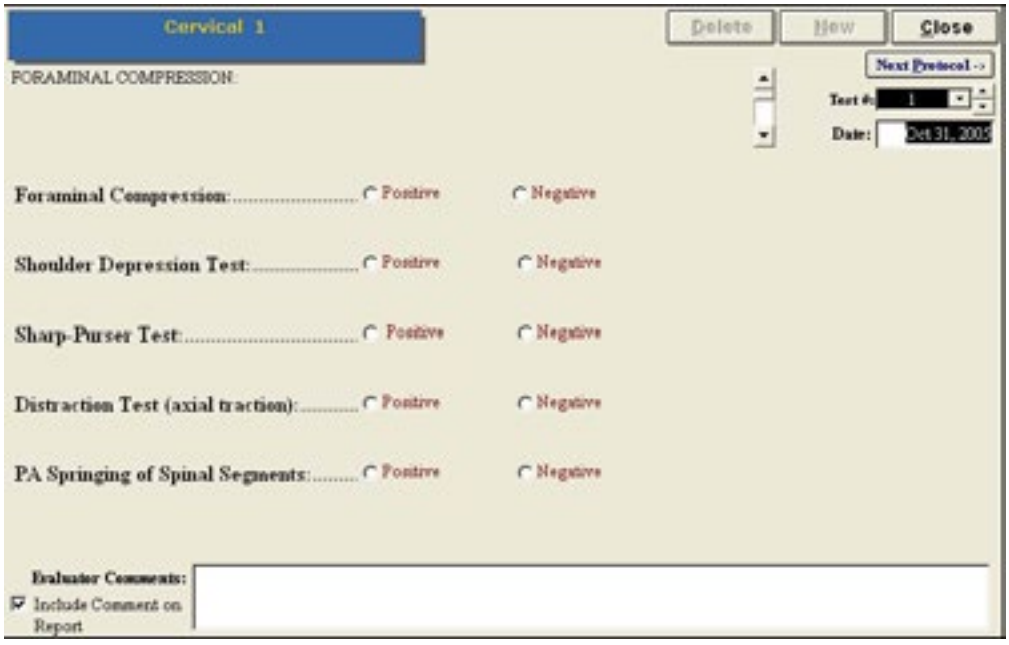


Figure 6-89. Clinical Protocol - Cervical 1

to be completed without the use of any tools. These protocols help to identify any injuries or anomalies the patient may have.

A. UTILIZING CLINICAL PROTOCOLS

Access the pre-programmed Clinical protocols by clicking the Clinical Tests icon on the Home Screen.

This will bring you to the Clinical Protocols main page. From this page you have the ability to access all the pre-programmed protocols, including those in hibernation, add and remove tests to clients, create new range of motion tests, edit tests, and delete tests (Figure 6-88).

Step 1. Assign a test to a client by highlighting the test in the left box and clicking Add to Client or by double clicking on the test in the left box.

Step 2. Once a test has been assigned to a client, highlight the test name in the right box

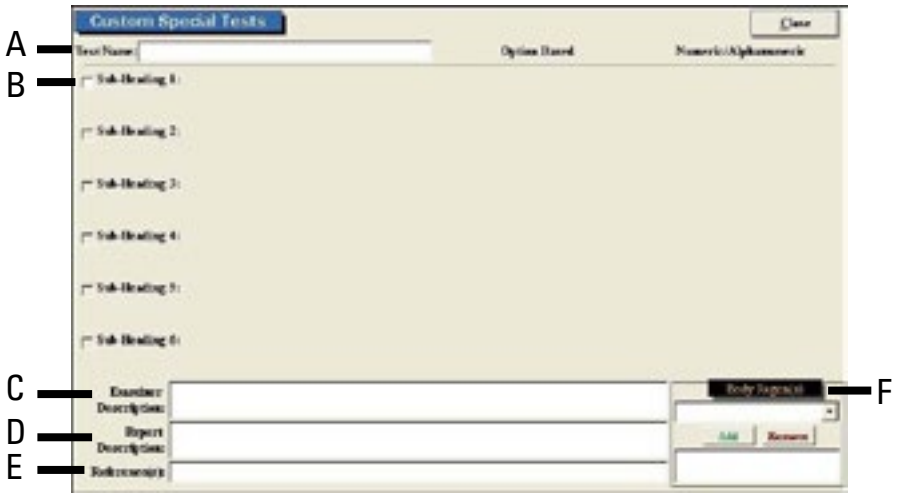


Figure 6-90. Custom Clinical Protocol

and click Perform Test to bring up the testing screen (Figure 6-89).

Depending on the test, every screen will look slightly different, but most will have the following features:

- Name of the test
- Delete icon to delete the selected test's results
- New icon to begin a new set of test results
- Close icon to return to the protocol screen
- Next Protocol icon to move on to the next protocol
- Date of Test
- Instructions on how to perform the tests
- Comments field

Step 3. Follow the instructions, which are located at the top left of the screen, and indicate whether the patient showed positive or negative results or if the location wasn't tested.

B. EDITING AND CREATING CLINICAL PROTOCOLS

Access the pre-programmed Clinical protocols by clicking the Clinical Tests icon on the Home Screen.

This will bring you to the Clinical Protocols main page, where you can edit and create tests.

Edit a test by highlighting the test you would like to edit in the left box and clicking Edit Test.

Create a new test by clicking on New Test.

If you are editing a test, a screen will appear with the current settings of the test you selected. If you are creating a test, a screen will appear with the same headings as if you were editing a test, but all of the text fields will blank (Figure 6-90).

The following can typically be edited or created on Clinical Protocols:

A. Test Name - Type in the name of the test

B. Sub-Heading - Type in the sub-headings to include in the test

Figure 6-91. Super Protocol Link

C. Examiner Description - Type in any description the examiner will need to perform the test - this field is especially useful for supplying instructions on

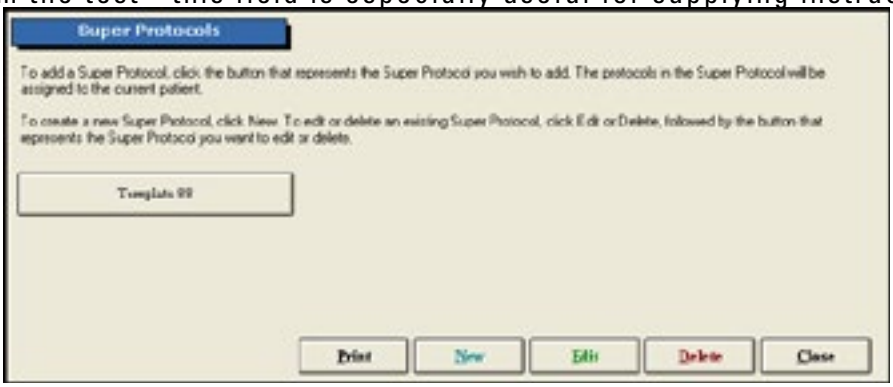


Figure 6-92. Super Protocol Main Screen

how to perform the evaluation

D. Report Description - Type in any description that should be included on the report

E. Reference Information - Include any reference information that needs to be added to the report

F. Body Region - Select which body region is being evaluated

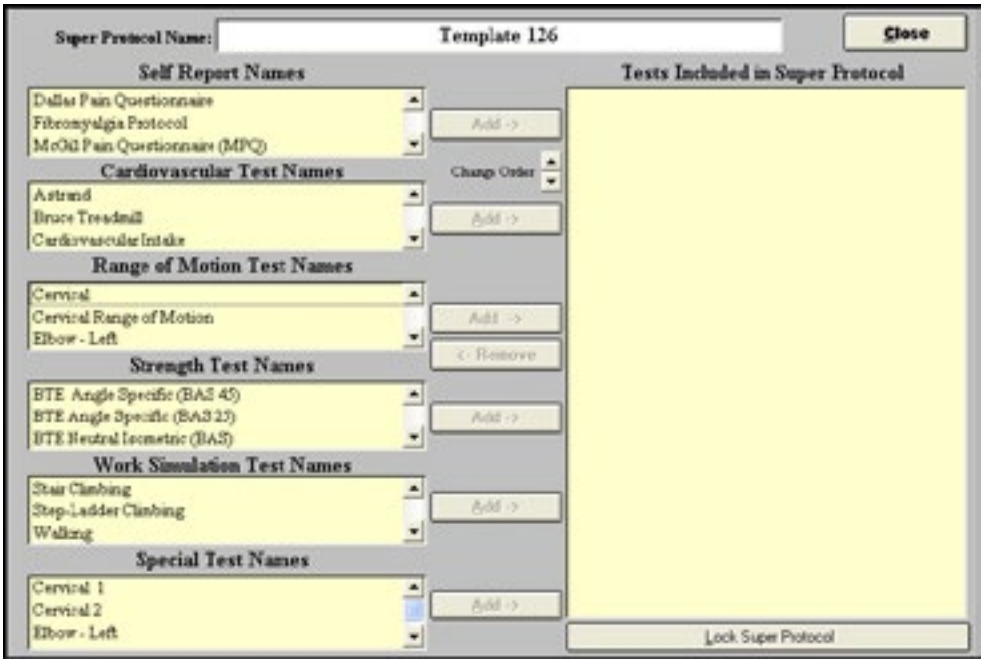


Figure 6-93. Create/Edit Super Protocol

Once the screen has been closed, the protocol is saved under the assigned test name with the new specifications.

VI. SUPER PROTOCOLS

Super Protocols can be created when you require a standardized protocol for testing. They can also be used if you want to decrease the amount of time required to select specific tests for specific injuries.

The Melbourne Protocol has defined the optimal sequence of testing suitable for a patient suffering Whiplash and Associated Disorders (WAD); this Super Protocol is covered in The Melbourne Protocol Training Program. Refer to Chapter 10 for more information on this training program.

Figure 6-94. Super Protocol Added to Client

07 - REPORTS

I. ACCESSING THE REPORTS 7-3

II. TYPES OF REPORTS 7-6

A. MCU DISCHARGE ASSESSMENT 7-6

B. MCU PROGRESS ASSESSMENT 7-7

C. MCU GENERAL PROGRESS ASSESSMENT 7-7

D. MCU REASSESSMENT 7-7

E. MCU SUMMARY REPORT 7-7

REPORTS

I. ACCESSING THE REPORTS

The MCU™ software allows you to create a unique report that may include any information you deem necessary. This may include such items as the raw data from a protocol or comments about the patient's performance.

Access the Reports screen by clicking the Reports icon on the Home Screen.

Each report will be slightly different with respect to what may be included in it; the following steps are a combination of what may be encountered for any one test. Therefore, follow only those steps which apply to the report you wish to view.

Step 1. Click on the arrow to the right of Report Title to access the drop-down menu and select the report you would like to view (Figure 7-1).

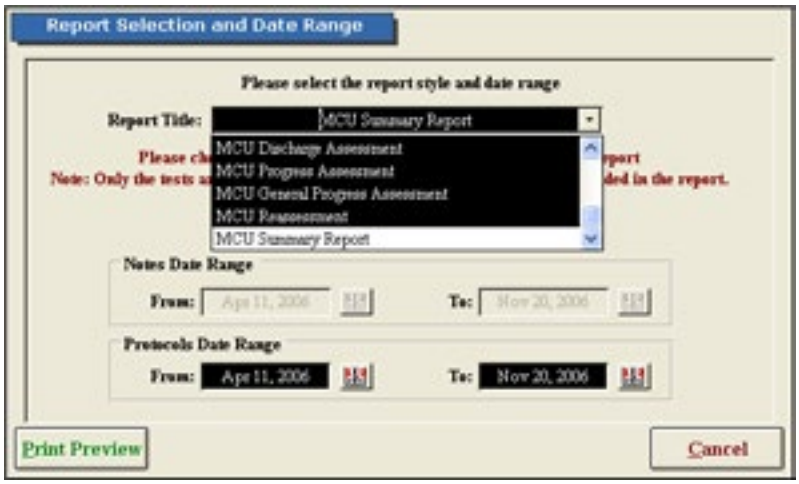


Figure 7-1. Report Title Selection

Step 2. Verify the appropriate start and end dates for the notes and for the protocol (Figure 7-2).

Figure 7-2. Report Selection & Date Range

Step 3. Click Next. The Patient Notes to Print screen will appear (Figure 7-3).

Figure 7-3. Patient Notes to Print

Step 4. Select whether you would like to include page numbering when printing the notes from the Notes screen.

Step 5. Select whether you would like to start page numbering when printing the notes from the Notes Screen.

Step 6. Choose which notes you would like to include in the report by highlighting the note in the left box and clicking Add Note. If you wish to include all of the listed notes, click Select All. If you would like to remove a note, highlight the note in the right box and click Remove Note.

Step 7. Depending on which step you would like to do next, click Next, Print Notes, or Preview Notes. Note that if you click Preview Notes, you will be able to print them from the Preview Screen. If you click Next, the Tests to Print Screen will appear (Figure 7-4).

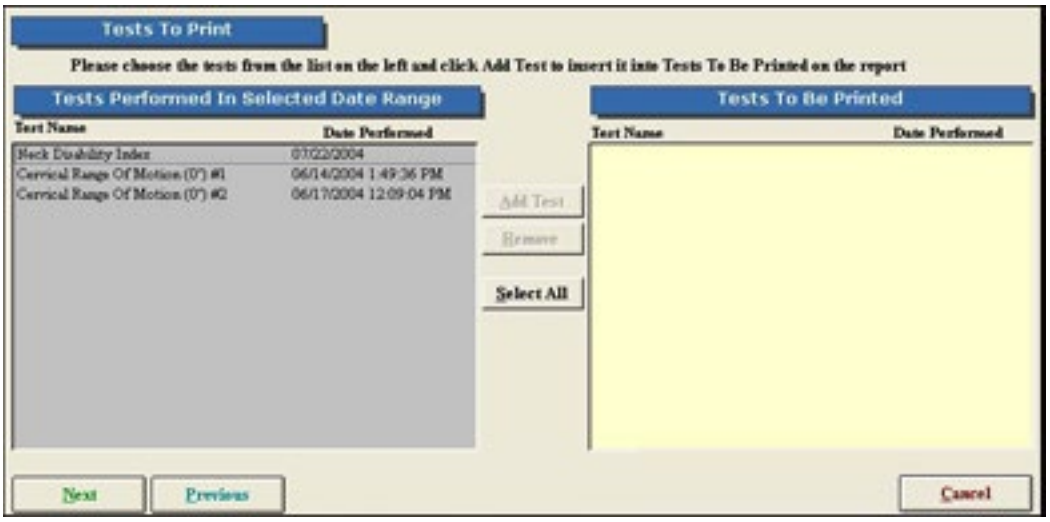


Figure 7-4. Tests to Print

Step 9. Choose which tests you would like to include in the report by highlighting the test in the left box and clicking Add Test. If you wish to include all of the listed tests, click Select All. If you would like to remove a test, highlight the test in the right box and click Remove.

Step 10. Click Next. The Report Options screen will appear (Figure 7-5).

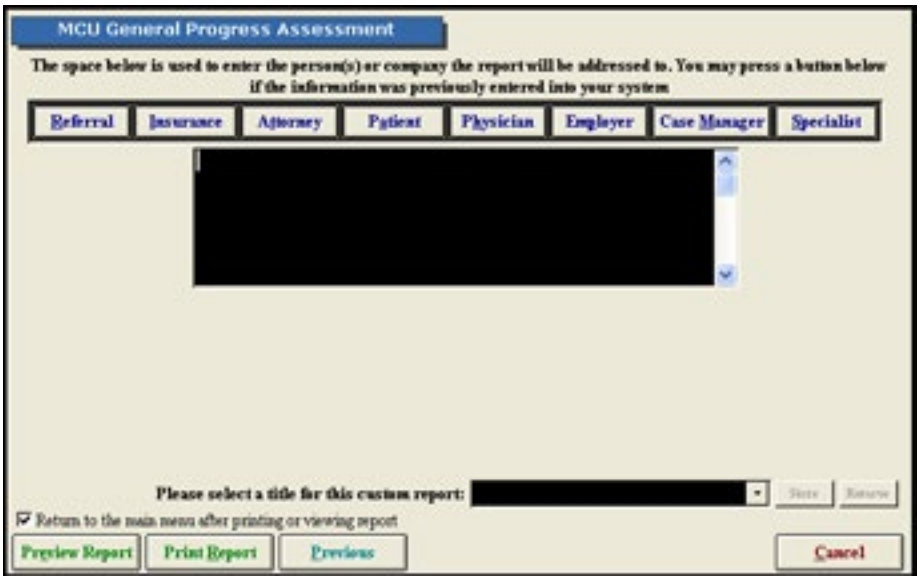


Figure 7-5. Report Options

Step 11. Choose whether you would like to address the report to a Referral, Insurance, Attorney, Patient, Physician, Employer, Case Manager, or Specialist. If you select one of these listed icons, the address needs to have been entered in the client information screen. If you wish to address the report to a person or company other than the ones listed, or an address hasn't been entered in the client information screen, you may manually enter the address in the text field.

Step 12. Select whether you would like to include the following in the report (note that these may not be available for every report):

- Injury Location Diagram
- Injury Location Chart
- Evaluator Comments
- Job Demands on a separate page
- Page numbering
- Client's name at the bottom of every page
- Client's file number at the bottom of every page

Step 13. Type in a title name for this report and click Store. Note that this option may not appear for every type of report.

Step 14. Check the box if you would like to return to the Home Screen after previewing or printing the report.

Step 15. Depending on which step you would like to do next, click Preview Report or Print Report. Note that if you click Preview Report, you will be able to print it from the Preview screen. If you choose Preview Report, the Report Preview screen will appear (Figure 7-6).

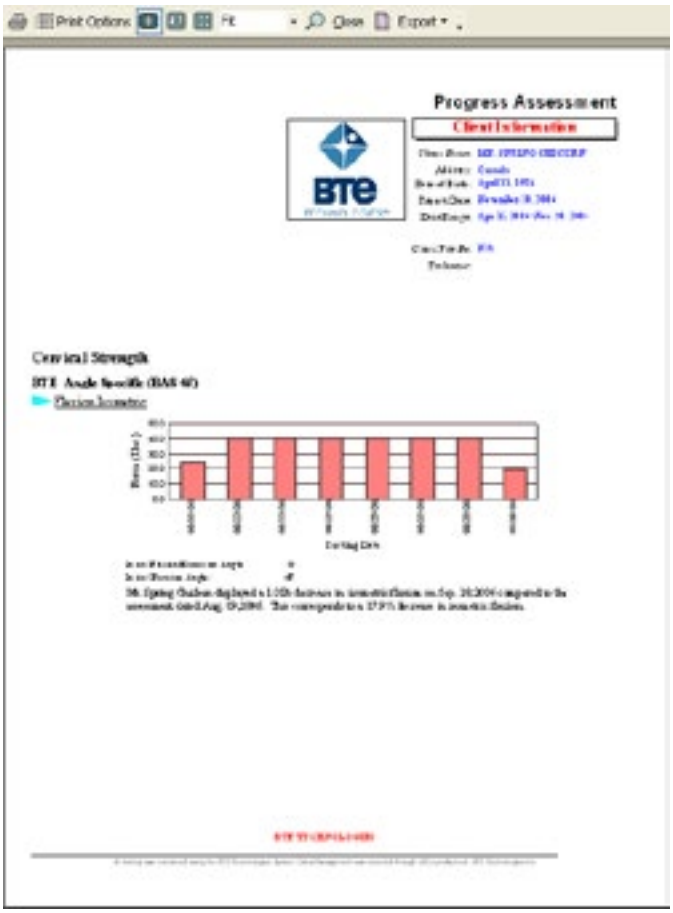


Figure 7-6. Preview Report

II. TYPES OF REPORTS

Depending on which report you select to view, each will look somewhat different. The following is a list of each report type and all the options that may be incorporated into it.

A. MCU DISCHARGE ASSESSMENT

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Add specific tests to the report
- Address the report to the following: Referral, Insurance Company, Attorney, Patient, Physician, Employer, Case Manager, Specialist
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include client's name at the bottom of each page of the report
- Include client's file number at the bottom of each page of the report
- Print or preview the report

B. MCU PROGRESS ASSESSMENT

This report allows you to:

- Select date range of data
- Address the report to the following: Referral, Insurance Company, Attorney, Patient, Physician, Employer, Case Manager, Specialist
- Print or preview the report

C. MCU GENERAL PROGRESS ASSESSMENT

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Add specific tests to the report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager, Specialist
- Create a custom title for the report
- Print or preview the report

D. MCU REASSESSMENT

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Add specific tests to your report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager, Specialist
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include client's name at the bottom of each page of the report
- Include client's file number at the bottom of each page of the report
- Print or preview the report

E. MCU SUMMARY REPORT

This report allows you to:

- Select date range of data
- Print preview all raw data obtained for a specific client

08 - CERVICAL CONDITIONING

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II. SELECTING EXERCISES 8-4
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VI. SUPERVISING PRACTITIONER 8-6
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X. TIME 8-8
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XII. DEFAULT 8-9
XIII. ACCURACY VALUE 8-9
XIV. NOTES 8-9

CERVICAL CONDITIONING

Included in the exercise portion of the MCU™ software is a protocol for cervical conditioning. This function was created specifically for Multi-Cervical™ Units and allows evaluators to customize cervical exercise programs for their clients. Results are directly integrated into the software, making this feature extremely user friendly, functional, and efficient.

The Rehabilitation Program on the MCU™ for patients suffering cervical conditions is covered extensively during the training program on The Melbourne Protocol. This training program includes basic to advanced set-up to accommodate various patients groups including:

- Whiplash and Associated Disorders (WAD)
- Acute and Chronic Cervical Injury Management
- Specific Cervical Pathologies
- Hypertrophy Training for the Athlete

I. ACCESSING CERVICAL CONDITIONING

The cervical conditioning protocol is located within the Exercise Program Menu. To locate it, click on the Exercise Program Button located on the home screen (Figure 8-1).

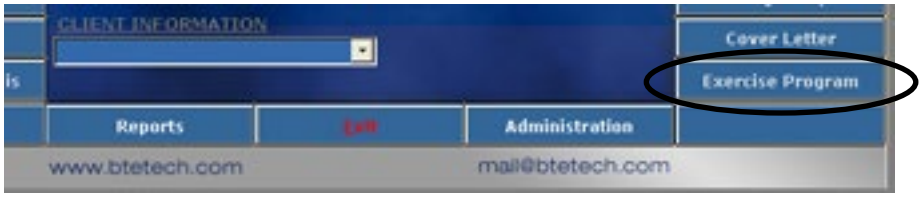


Figure 8-1. Exercise Program Icon

This will bring you to the Active Conditioning Protocol Screen (Figure 8-2).

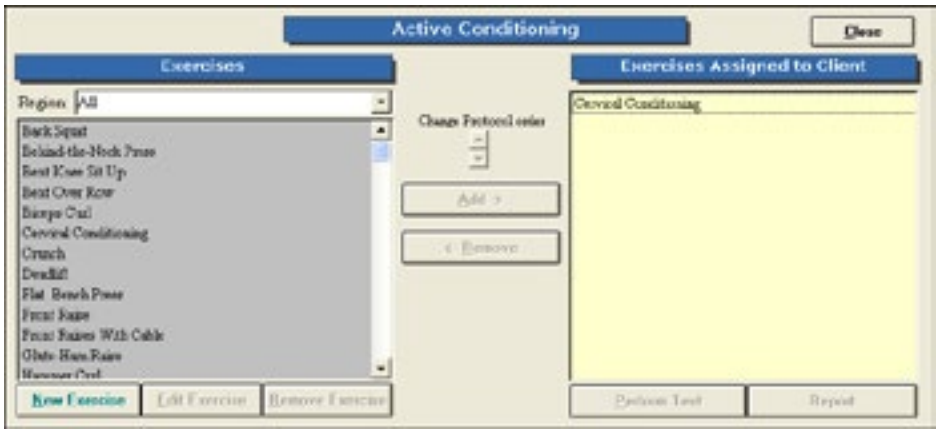


Figure 8-2. Active Conditioning Protocols

Step 1. Assign the Cervical Conditioning program to a client by highlighting Cervical Conditioning in the left box and clicking Add to Client or by double clicking on the test in the left box.

Step 2. Once the program has been assigned to a client, highlight the name in the right box and click Perform Test to bring up the testing screen (Figure 8-3).

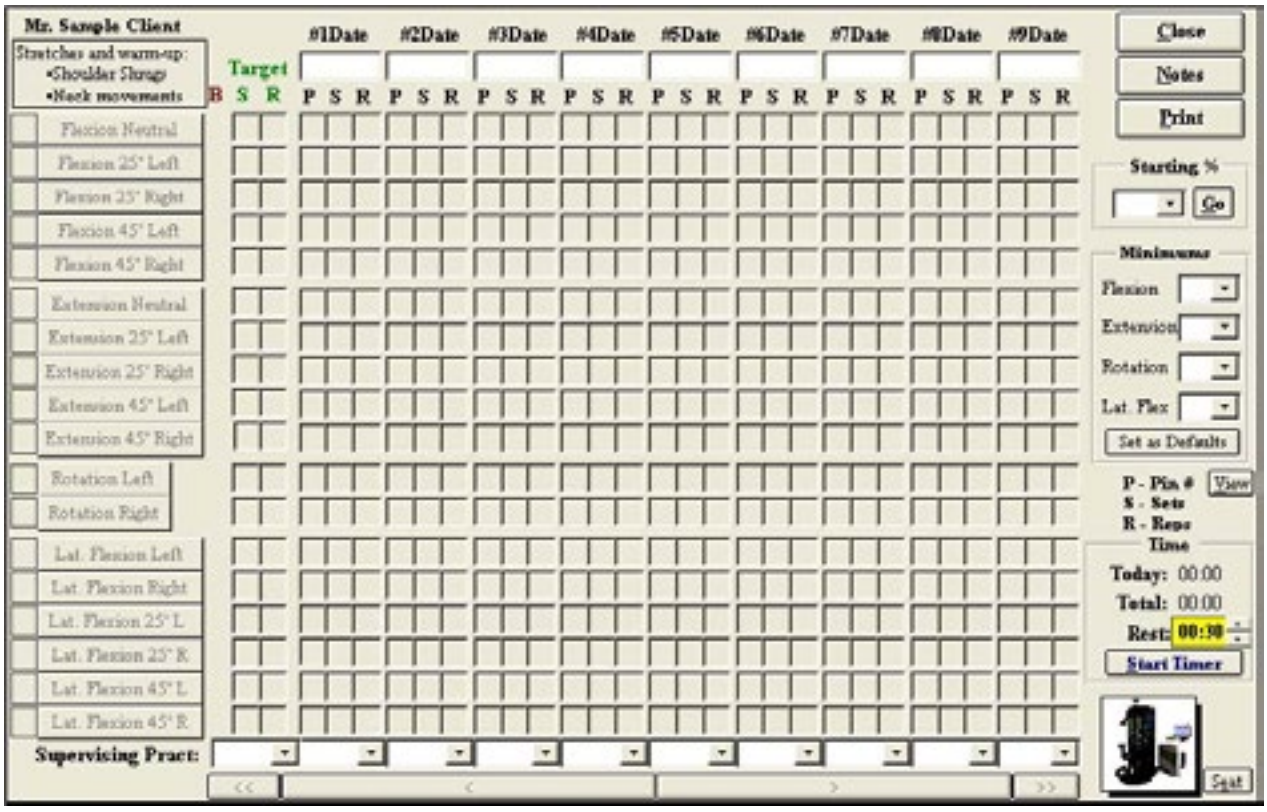


Figure 8-3. Cervical Conditioning Screen

II. SELECTING EXERCISES

There are various options to choose from within the Cervical Conditioning screen. On the left hand side of the screen, all possible movements are listed. In order to select the exercises for the client, simply click on the name of the movement. A number will be assigned to the exercise, and the name of the movement will turn black. If you wish to order the exercises differently (e.g. place flexion in a neutral position as exercise #2), simply double click on the number beside the exercise, and all the numbers will change accordingly (Figure 8-4).

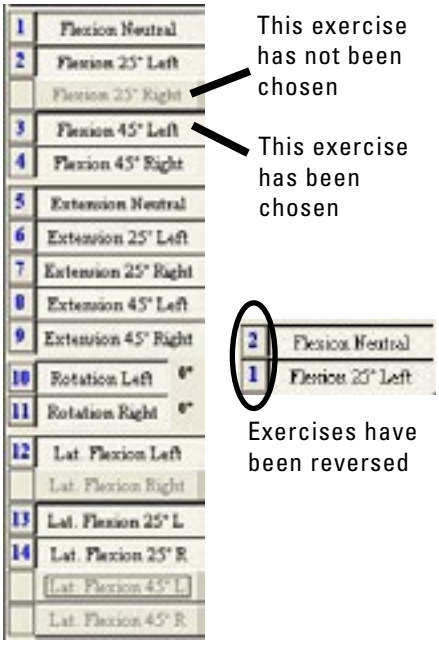
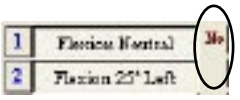


Figure 8-4. Selecting Exercises

III. BLACKOUT FEATURE

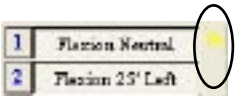
For certain movements, a blackout option is available. This feature is primarily for client safety beacause it sets a limit that the client can perform safely. The blackout feature automatically defaults to “no” – meaning no value is assigned and the client can perform all exercises without any limitations (Figure 8-5).



No blackout has been selected

Figure 8-5. No Blackout

In order to set the blackout value, place your mouse over the word No – it should turn yellow. Then click your left mouse button in order to specify the maximum range of motion the client should perform (Figure 8-6). Every mouse click increases the blackout amount by 10°.



No turns yellow

Setting blackout value

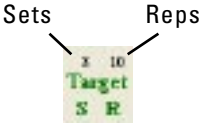
Blackout has been set to 30°

Figure 8-6. Setting Blackout Value

In the example above, the client should not exceed 30 degrees of neutral flexion. Therefore, the pin on the halo should be placed in the 30 degree position to limit the movement.

IV. TARGET FEATURE

The target represents the number of sets and repetitions to be performed for each selected exercise. The default for this is 3 sets of 10 repetitions. It can, however, be changed. If you double click on the word Target, two numbers will appear above it. The number on the left represents the number of sets, and the number on the right is the number of repetitions. To change these default values, double click the left mouse button on the number you wish to change. Once changed, these values will be the new defaults for ALL clients (Figure 8-7). Double click on Target if you wish to hide the set and repetition values.



Double click to change sets or reps

Figure 8-7. Setting Target Values

V. TRACKING DATES

Multiple dates can be tracked within the software in order to perform continual conditioning programs. The software also reminds you to do re-assessments to compliment the conditioning program. There is no limit or cap to how many conditioning programs a client may perform. The date does not need to be manually inputted into the correct field. Instead, it will be imported automatically after the rehab program has been initiated. You may also double click in the blank field – a calendar will appear and you can select the correct date (Figure 8-8).

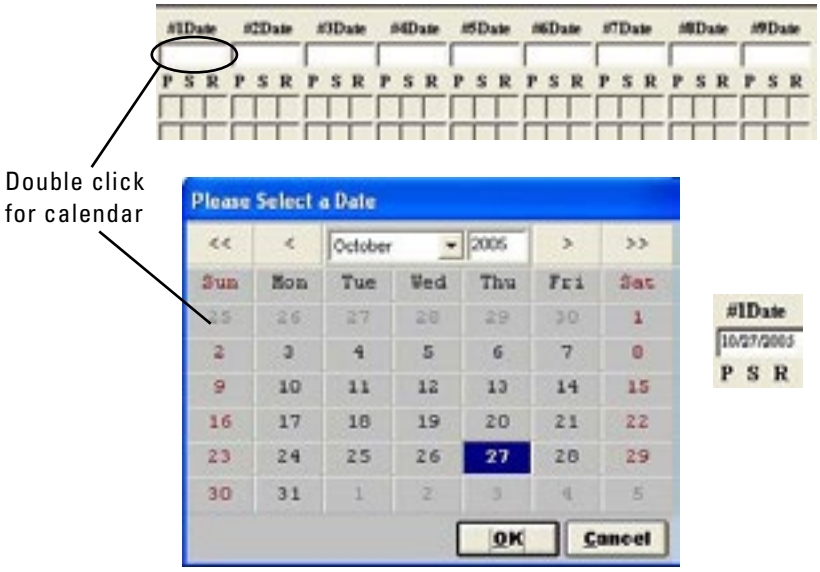


Figure 8-8. Setting the Date

VI. SUPERVISING PRACTITIONER

To enter your name as a supervising practitioner, your name must be entered in case information. If you have already entered yourself as a supervising practitioner, your name will appear in the drop down menu. (Figure 8-9).

Figure 8-9. Adding Supervising Practitioner

If your name is not listed, exit out of the Cervical Conditioning screen, click on Administration and then enter the Health Practitioner screen (Figure 8-10).

Figure 8-10. Health Practitioner Information

Fill out the health practitioner screen (refer to Chapter 02-IV-B) and then reenter the Cervical

Figure 8-11. Supervising Practiioner Drop-Down Menu

Conditioning screen. Your name will now appear in the drop down menu (Figure 8-11).

VII. WEIGHT STACK SELECTION

For reference purposes, you may view the actual values of the weight stack. Click on View in the bottom right hand corner of your screen (Figure 8-12).

Figure 8-12. Weight Stack Setting

A table will appear that displays the pin number and its corresponding weight (Figure 8-13).

Figure 8-13. Weight Stack Values

VIII. SEAT VALUES

In the bottom right hand corner of your screen, you will find an icon that will allow you to make notes on the positioning of your seat (Figure 8-14).

Figure 8-14. Seat Icon

To enter in information on your seat positioning, click on Seat.

This Seat Positioning screen allows you to comment on certain seat features which may or may not be taken into account. For example, if you are utilizing lumbar support, place a check mark in the box located beside lumbar support. You may now track these specifications for your client and ensure that the same positioning is achieved for each conditioning session (Figure 8-15).

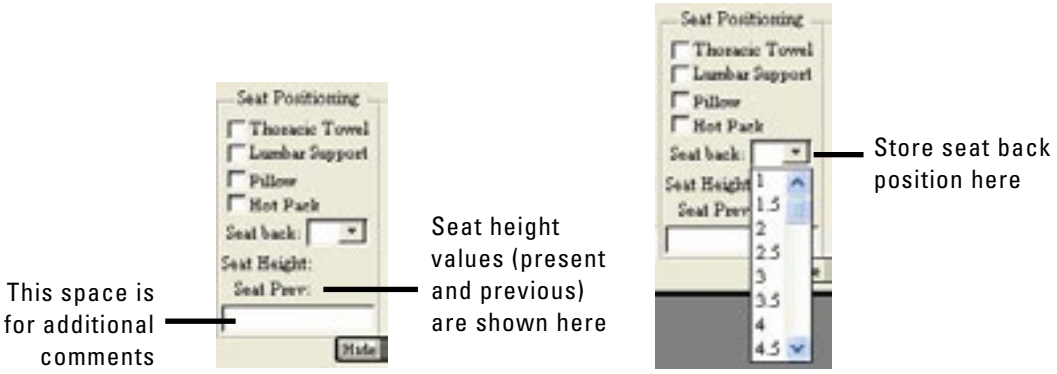


Figure 8-15. Seat Settings

IX. MINIMUM VALUES

This minimum values feature in the cervical conditioning program allows the practitioner to enter a minimum range that must be obtained in order for the motion to register in the software (Figure 8-16).

Figure 8-16. Minimum Settings

For example, if the practitioner wishes to set a minimum value of 50 degrees for flexion, a minimum value of 50 should be selected from the drop-down menu. If this is the case, the client must now perform at least 50 degrees of flexion before the repetition will register in the software (Figure 8-17). Any minimum can be selected, and if you wish, you can set these values as default values by clicking on the Set as Defaults button.

Figure 8-17. Minimum Flexion Setting

X. TIME

The total time of the conditioning program (daily and cumulative) is shown in the lower right hand corner of the testing screen. You may modify the client's rest time with the corresponding arrow (up increases the time allotted, down decreases the time allotted). Click Start Timer when ready to begin (Figure 8-18).

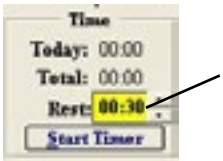


Figure 8-18. Timer

XI. STARTING %

Before performing a cervical exercise program, a starting percentage should be selected. This feature refers to the amount of weight being used (i.e. the pin # you select on your weight stack). After you select the correct weight stack type, you may use this feature (Figure 8-19).

Figure 8-19. Starting %

The data you receive from your cervical assessment of the client will provide you with the maximum amount of weight that they can maneuver in that motion. You will want to use a percentage of this weight for the cervical conditioning program (e.g. 40% of their maximum capabilities). In order to do this, select the correct percentage from the drop down menu. When you click go, the software will automatically fill the grid with the correct Pin # (e.g. the Pin that is associated with 40% of the client's maximum) (Figure 8-20).

Figure 8-20. Setting Starting %

XII. DEFAULT

The default button sets the current values entered into the Starting %, Minimum Values and Weight Stack fields as the default values for ALL patients (Figure 8-21).

Figure 8-21. Set as Default

XIII. ACCURACY VALUE

After double clicking on the word Target, a number "7" will appear in the very bottom left hand corner of your screen (Figure 8-22).

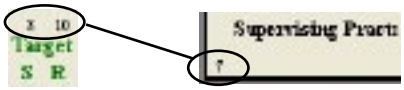


Figure 8-22. Accuracy Value

This number relates to the number of degrees a client is allowed to be within to register a repetition. In this case, the range is "7" degrees. Therefore, the repetition will not register until the client is within 7 degrees from the initiation point of the motion. To change this value, simply click on the number located in the bottom left hand corner.

XIV. NOTES

Notes can be added into the conditioning program. In order to do this, click on Notes in the upper right hand corner (Figure 8-23).

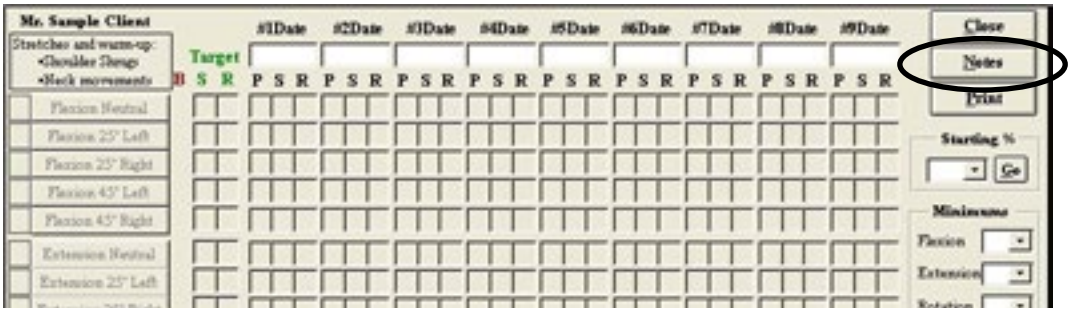


Figure 8-23. Notes Icon

The Notes screen will appear, which will allow you to enter in multiple notes on your client (Figure 8-24).

Figure 8-24. Notes Screen

To enter in notes, place your cursor in the top text box. You may now type any information that you wish to include. If you wish to include to date prior to entering your note, click Insert Date (located on the tool bar). The date will now appear in the text box (Figure 8-25).

Figure 8-25. Insert Date

You may also enter information into a template format. This allows you to save popular phrases so that you do not have to re-enter them time and time again. To do this, enter the information you wish to save in the bottom text box and then click Add to List, which is highlighted in green (Figure 8-26).

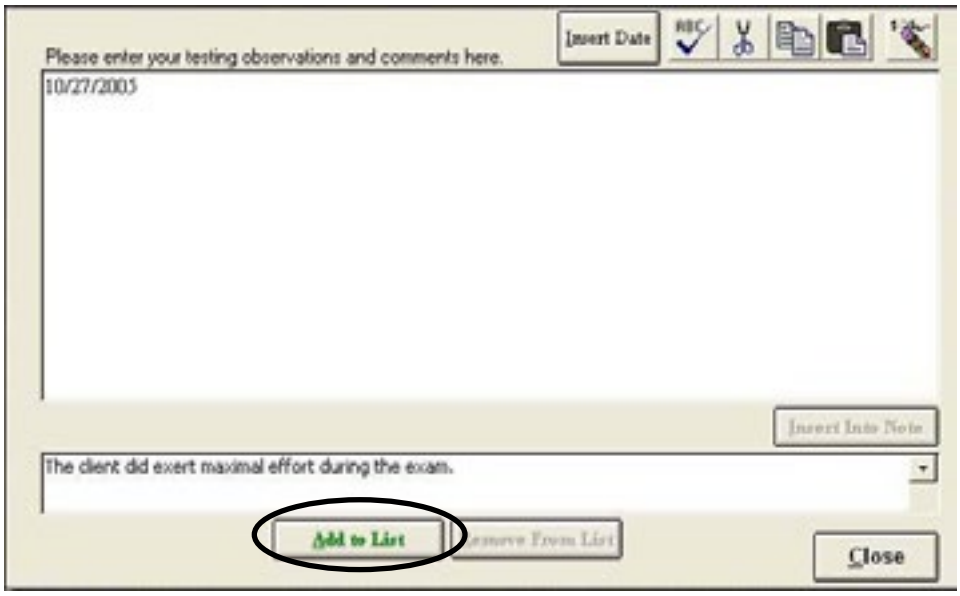


Figure 8-26. Create a Common Note

Your information will now appear in a list, which you can access by clicking on the drop-down menu (Figure 8-27).

Figure 8-27. Add Common Note to List

To insert this information into your note, select the phrase you wish to include and click Insert into Note, which is highlighted in blue (Figure 8-28).

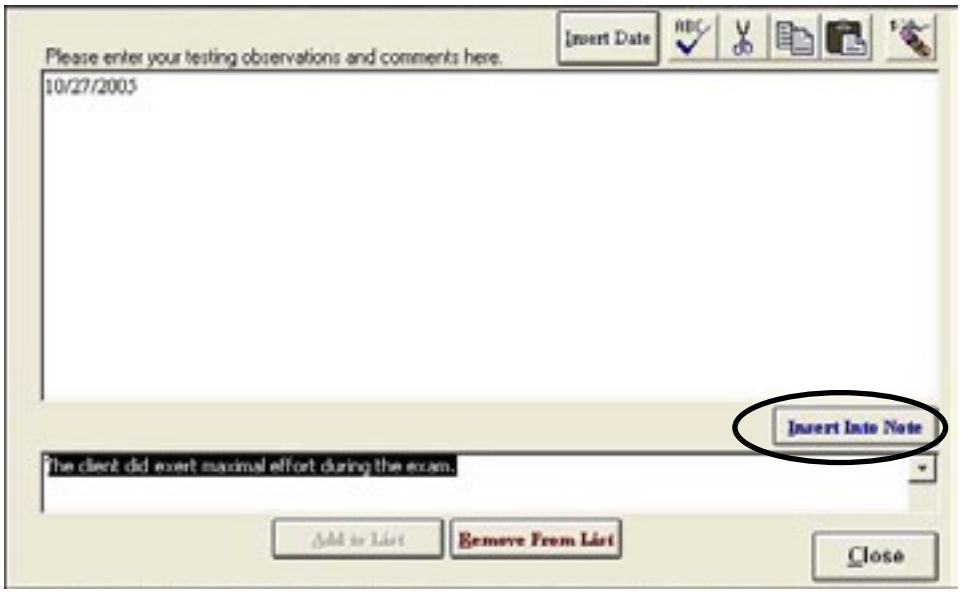


Figure 8-28. Select Common Note to Insert

Your information will now appear in the notes section (in the top text box) (Figure 8-29).

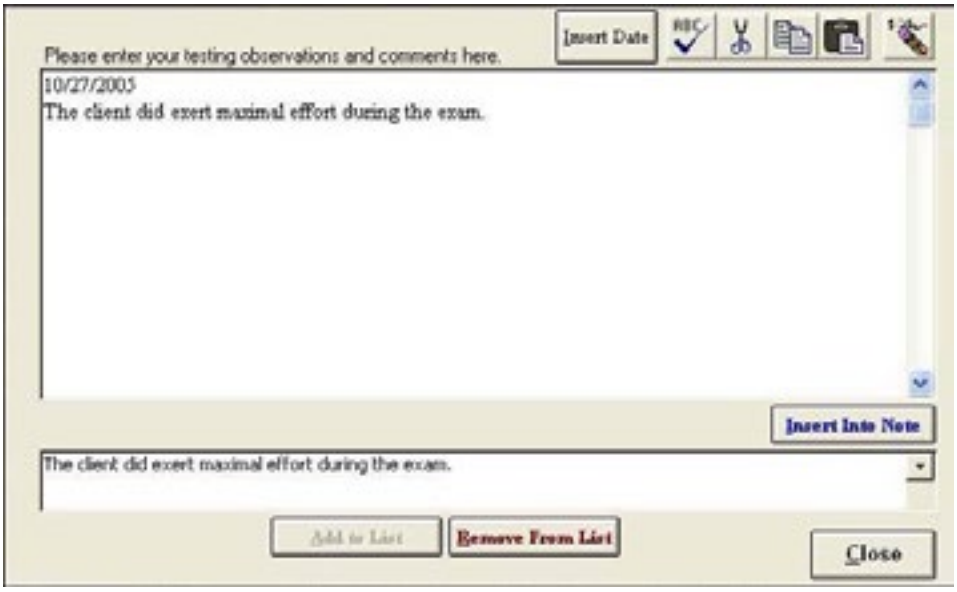


Figure 8-29. Common Note Inserted into Main Notes Field

09 - MAINTENANCE AND CARE

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A. DO NOT INSTALL ANY ADDITIONAL SOFTWARE 9-3
B. SHUT DOWN THE COMPUTER PROPERLY 9-3
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MAINTENANCE AND TROUBLESHOOTING

I. GENERAL COMPUTER MAINTENANCE

The MCU™ software runs in the Microsoft Windows XP environment; Windows XP Professional is an extremely reliable and secure operating system, but extended use requires some degree of system maintenance.

It is recommended that a log is kept for the maintenance of the computer equipment.

A. DO NOT INSTALL ANY ADDITIONAL SOFTWARE

Do not install any additional software onto the controlling computer. The BTE Technologies MCU™ system is in constant communication with the computer, so a "clean", dedicated computer system is crucial to the integrity of this communication system.

B. SHUT DOWN THE COMPUTER PROPERLY

To avoid possibly damaging the computer system, do not shut down the computer by simply pressing the power button.

Step 1. When you are ready to shut down the MCU™, click Start at the bottom left corner of the computer screen.

Step 2. Click Shut Down.

Step 3. Make sure Shut Down is highlighted in the drop-down menu and click OK.

C. MAINTENANCE SCHEDULE

1. DAILY
   - Backup the database - you should have a backup disk for each day of the week

2. WEEKLY
   - Backup the database - you should have a backup disk for each week of the month

3. MONTHLY
   - Compact and repair the MCU™ database - see Chapter 2 for instructions
   - Clear hard drive of any unnecessary files (go to Start| Programs | Accessories | System Tools | Disk Cleanup, select the C:\ Drive and then the files you would like to delete)
   - Run the defragment program to ensure optimum computer performance (go to Start | Programs | Accessories | System Tools | Disk Defragmenter)

II. GENERAL PRODUCT MAINTENANCE

The MCU™ station and tools are designed to be robust and used frequently, but extended use requires some degree of maintenance.

It is recommended that a log is kept for the maintenance of the system.

A. DO NOT DISASSEMBLE ANY COMPONENTS OF THE MCU™

Do not attempt to disassemble any component of the MCU™ or its tools. The system is

assembled in such a way that components of it may break if disassembled incorrectly.

If one of the BTE Technologies products is not working properly, call customer service at 1-800-331-8845 so the problem may be properly diagnosed and repaired.

B. MAINTENANCE SCHEDULE

1. AFTER EACH CLIENT
   - Clean the head braces and arm rests with an antibacterial wipe or rubbing alcohol (70% alcohol). Make sure to not allow any liquid to enter the RJ45 jacks on the head braces or the top of the column.

2. DAILY
   - Verify any equipment that has been calibrated. If verification fails, then recalibrate the tool
   - Clean the halo with an antibacterial wipe or rubbing alcohol (70% alcohol)
   - Clean the seat bottom and back with an antibacterial wipe or rubbing alcohol (70% alcohol)

3. WEEKLY
   - Calibrate and verify all tools

4. MONTHLY
   - Check all the cables to ensure they are secure and in good working condition

III. TROUBLESHOOTING

If you are able to verify all of the possible solutions related to a scenario, but the problem still exists, then call customer service for assistance: (800) 331-8845 or (410) 850-0333. You may also wish to visit the Support section of www.btetech.com, which contains a trouble-shooting section.

A. Unable to acquire the Hub

Verify the following:

- The Hub's USB cable is securely connected to the computer - you may also wish to try another USB port on the computer
- In the Administration screen, press Shift D-D on the keyboard, and verify the type has been set to Wireless type
- Unplug and re-plug the Hub's USB cable to make sure it is correctly recognized by the computer.

B. Unable to interface with a load cell/head brace

Verify the following:

- The RJ45 cable is securely connected to the head brace and to the top of the MCU™
- The head brace is plugged into the RJ45 jack closest to the front of the machine
- The load cell/head brace is recognized and properly mapped (refer to Chapter 02-IV-C-4)
- The head brace was not plugged in while a calibration, verification, or test screen was

open. If so, exit the test screen for ~5 seconds and then re-enter the test

- The MCU™ is plugged into a wall outlet or power strip and receiving power
- The Hub USB cable is plugged into the computer and communicating properly

C. Unable to verify the load cell

Verify the following:

- The load cell/head brace is properly recognized and mapped (refer to Scenario B)
- The calibration block isn't touching the calibration plate
- The U-shaped bracket on the load cell/head brace isn't touching the calibration plate

If performing verification immediately after calibration, remove all of the weights and calibration block from the load cell/head brace. Place the calibration block and required weight back onto the load cell/head brace prior to verifying.

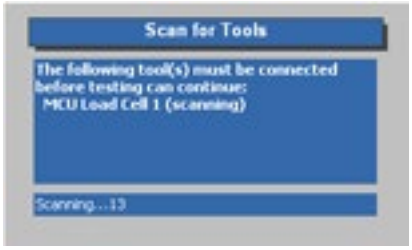
D. “Alert! Could not open COMM port _ for communications with URFIO Wireless System!”

This message is indicating the Hub is not recognized on the expected COMM port - contact customer service for assistance.

E. “New MCU Load Cell tool ID: 0xB000XXX is not bound in URFIO Configurator. Please bind this tool and perform a calibration!”

This message is indicating an MCU load cell/head brace has been plugged into the machine, but it has not yet been mapped. Refer to Chapter 02-IV-C-4 for information on tool mapping.

F. “The following tool(s) must be connected before testing can continue: MCU Load Cell.”



This message is indicating the software can not find the load cell/head brace. Verify the head brace cable is properly attached to the head brace and the MCU™. Otherwise, follow the troubleshooting steps outlined in Scenario B (Unable to interface with a load cell/head brace).

10 - THE MELBOURNE PROTOCOL

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II. OUTCOME DATA RELIABILITY SUMMARY 10-4

III. RELIABILITY STUDY DATA 10-5

IV. WORLD WIDE SPINE ARTICLE 10-6

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THE MELBOURNE PROTOCOL

I. INTRODUCTION

To compliment the BTE User Manual, Robert De Nardis, (Physiotherapist, Director of the Melbourne Whiplash Centre and Panel Member for the International Whiplash Taskforce) has designed a specific protocol (The Melbourne Protocol), which is gaining international recognition and is being used in over 50 specialist whiplash facilities around the world. The Melbourne Protocol details evaluation and treatment protocols based on evidence from ongoing research into the treatment of Whiplash and Associated Disorders (WAD). Some of the topics covered in training include:

- Assistance with branding your Center as a Neck Care Center of Excellence
- Whiplash Center Marketing Strategies (12 month Marketing Plan provided
- Whiplash Center Business Administration
- Reliability and Validity on the Multi-Cervical™ Unit
- Initial assessment protocols including Vertebro-Basilar Insufficiency (VBI) Testing and the application of Functional Questionnaires
- Management of the Irritable Patient and Exclusion Criteria for The Multi-Cervical™ Unit
- Treatment Protocols including Contra-indications for Treatment and Key Prognostic Indicators from current research
- Patient Positioning for Evaluation of Range of Motion and Isometric Strength on The Multi-Cervical™ Unit
- Patient Positioning for Treatment on the Multi-Cervical™ Unit
- Advanced Treatment Ideas and Options for Whiplash and Associated Disorders Patients
- Current Whiplash and Associated Disorders Research Trends
- Collecting and Analyzing Data Collected on The Multi-Cervical™ Unit
- Research at The Melbourne Whiplash Centre

Contact BTE Technologies for more information on registering for this program:

U.S. & Canada: 800.331.8845

International: 410.850.0333

Fax: 410.850.5244

Internet: www.btetech.com/training_sched.htm

II. OUTCOME DATA RELIABILITY SUMMARY

Greenwood, K.M. & De Nardis, R.J. (2000). Melbourne Whiplash Centre Outcome Data. Preliminary Report. Melbourne Whiplash Centre (Manuscript in preparation).

Summary of Findings

Having established that the measures produced by The Melbourne Protocol on the BTE Multi-Cervical Unit have an acceptable degree of reliability (Greenwood & De Nardis, 2000a), the focus of research attention should now move to the issue of the validity of measurements and the efficacy of therapy using the unit. **Validity** refers to the "appropriateness, meaningfulness, and usefulness of the specific inferences made from test scores" (Standards for Educational and Psychological Testing, 1985, p.9).

Method

The data were obtained from 123 patients (66% female, average age 40.4 years, average chronicity of symptoms 98.0 months, average duration of treatment 6.9 weeks). Patients were assessed before and after the treatment program on 8 variables: scores on Neck Disability Index, strength of isometric Flexion/Extension/Lateral Flexion and range of motion of Flexion/Extension/Lateral Flexion/Rotation.

Paired t-tests were used to compare changes from pre- to post-program values.

Results

	Pre-Program	Post-Program	t	df	p
Measure					
Neck Disability Index	33.8	17.5	15.165	98	<.001
ROM (degrees)					
Flexion	58.2	65.5	-8.041	116	<.001
Extension	48.7	55.3	-6.530	115	<.001
Lateral Flexion	38.8	48.0	-10.695	114	<.001
Rotation	63.5	73.4	-8.593	114	<.001
Isometric Strength (lbs)					
Flexion	10.1	17.1	-15.808	116	<.001
Extension	14.5	25.0	-15.352	117	<.001
Lateral Flexion	10.9	18.6	-14.490	116	<.001

It can be seen that highly significant changes were found in all variables in the expected direction, most notably for strength. It is clear from these results that treatments using the Melbourne Protocol with the BTE Multi-Cervical Unit results in improvements in Neck Disability Index, strength and ROM in these patients as a group.

Six month follow-up data (thus far only available for 18 patients) indicates that there is no evidence of changes in the values of NDI, strength and ROM from post-program to 6 month recording. Therefore, treatment gains have persisted in this sample.

III. RELIABILITY STUDY DATA

Greenwood, K.M. & De Nardis, R. (2000). An assessment of the reliability of measurements made using the Melbourne Protocol and the BTE Multi-Cervical Unit. Melbourne Whiplash Centre (Manuscript in preparation).

Summary of Findings

The **reliability** of a measurement refers to "the consistency, the reproducibility and the repeatability of the instrument or measurement procedure" (Richman, Makrides & Prince, 1980).

The Reliability Trial

To assess the reliability of measures made using The Melbourne Protocol and the BTE Multi-Cervical Unit, a trial was designed in which 26 individuals (who did not have ailments involving the neck) were assessed by three therapists on two occasions each. The trial allowed assessment of inter-observer and intra-observer reliability.

Results:

Inter-Tester Reliability

The consistency of a measurement technique when used by different clinicians over time.

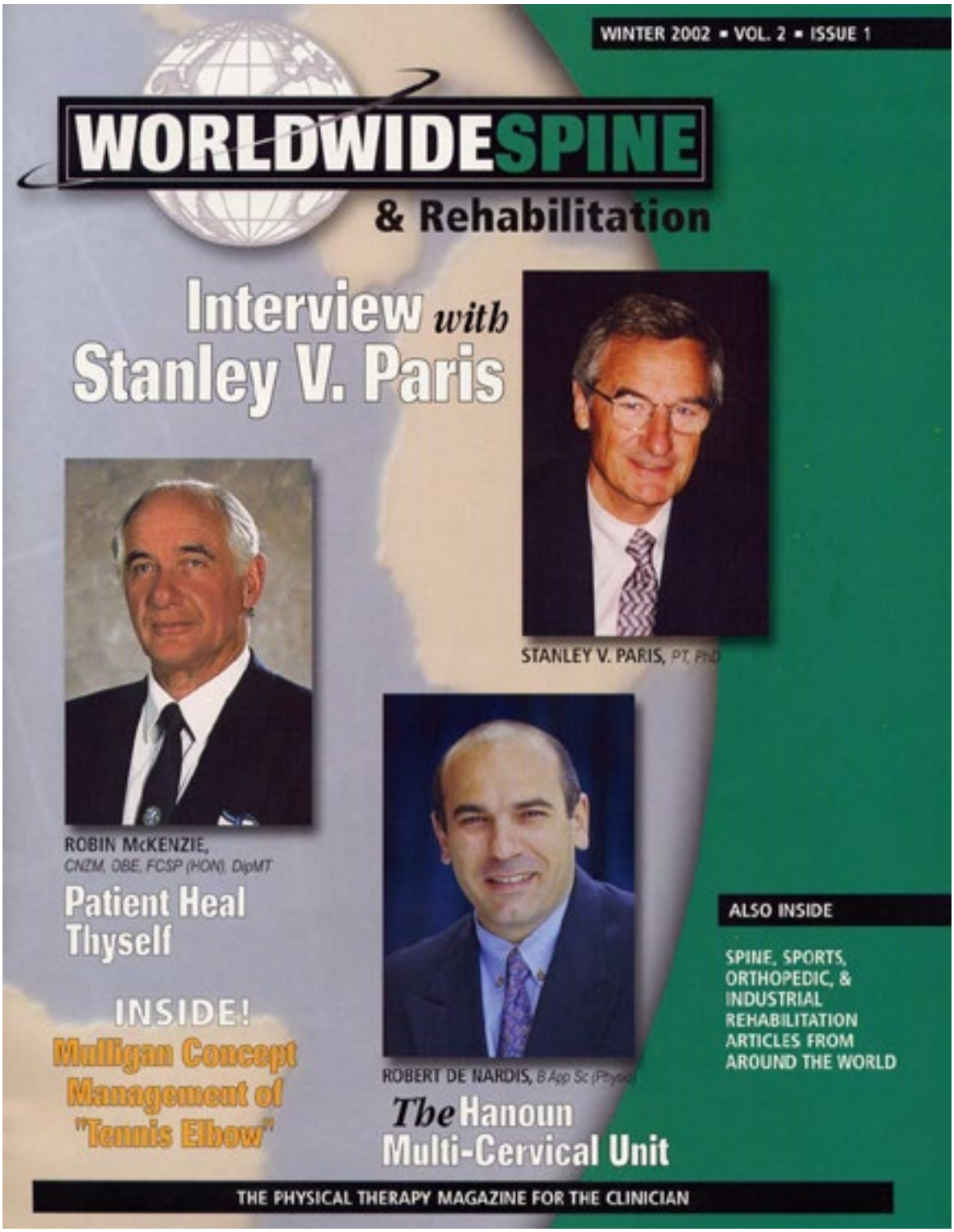
- **Systematic Difference between Therapists**
  Results indicate a good degree of agreement between therapists. All averages reported were within 3.3 degrees for ROM measurements and 0.8 lbs for strength measurements.
- **Order of Testing Effects**
  There were no systematic differences between the first, second and third measurements. Results indicate that there are no major "warm-up" or familiarisation of technique changes in value and further indicate that the pre-measurement trials conducted in the protocol are sufficient to rule out these effects.
- **Relationship Between the Therapists' Scores – Correlations**
  Correlation coefficients are high (.747 to .949 [approaching 1.0]) indicating good inter-observer reliability.
- **Relationship Between Therapists' Scores – ICCs**
  Intra-Class correlation coefficients are high (.767 to .930 [approaching 1.0]) indicating good inter-observer reliability.
- **Standard Error of Measurement**
  SEM's are low (1.56 to 4.10) indicating good inter-therapist reliability.

Intra-Tester Reliability

The consistency of a measurement technique when used by the same clinician over time.

- **Systematic Changes Over Time**
  No systematic differences were identified in scores over time.
- **Relationship Between the Therapists' Scores – Test-Retest Correlations**
  The majority of the correlation coefficients are high (.667 to .895 [approaching 1.0]) indicating good test-retest reliability. ROM extension scores were lower (.529 to .747) indicating some attention is required for this particular measure.
- **Test-Retest Reliability of Therapists' Scores – ICCs**
  The majority of the ICC's are high (.654 to .879 [approaching 1.0]) indicating good test-retest reliability. Again ROM extension was lower (.531 to .742).
- **Standard Error of Measurement**
  SEM's are low (1.54 to 5.73) indicating good test-retest reliability.
- **Minimum Detectable Change – Test-Retest**
  The same therapist over a one week period can reliably detect changes of around 10 degrees in ROM and around 5lbs in strength.

IV. WORLD WIDE SPINE ARTICLE



The Hanoun Multi-Cervical Unit

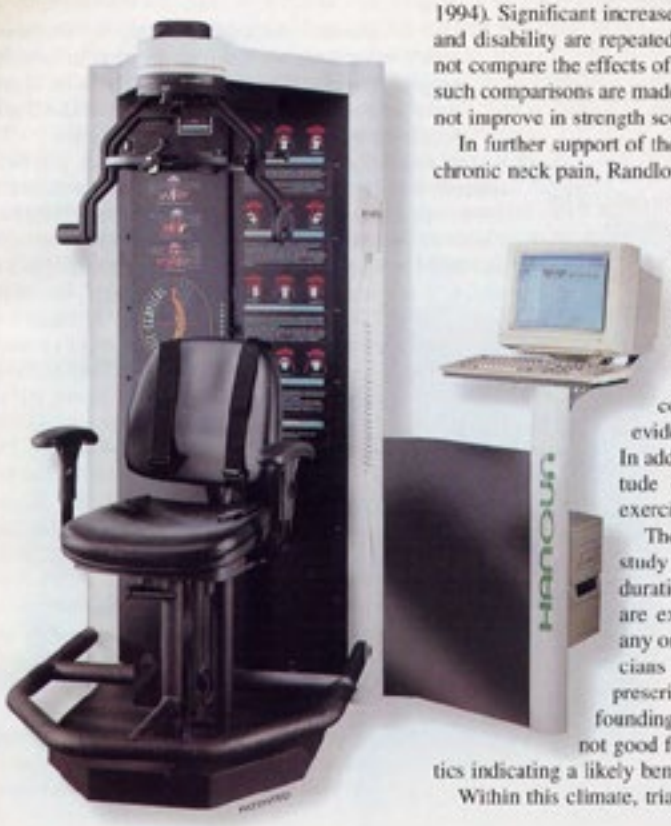
Flexible exercise delivery for individualizing neck rehabilitation programs.

Robert De Nardis
B App Sc (Physio)

By Robert De Nardis, B App Sc (Physio)
and Jenny Keating, PhD

There are some preliminary studies investigating the response to strengthening programs in people with neck pain (Berg et al., 1994; Jordan et al., 1998; Highland et al., 1992; Levoska et al., 1993; Nelson, 1999; Randlov et al., 1998; Taimela, 2000; Ylinen, 1994). Significant increases in strength and significantly reduced pain and disability are repeatedly demonstrated. Many of these studies do not compare the effects of exercise to the effects of time alone. When such comparisons are made (Levoska et al., 1993), control subjects did not improve in strength scores during a five-week intervention period.

In further support of the likely benefits of exercise for people with chronic neck pain, Randlov et al. (1998), in a well-designed, randomized controlled trial, found that intensive exercise conferred significantly greater benefits than light exercise. Hence, it is unlikely that the consistent findings of strength changes and pain decreases associated with exercise programs for people with chronic neck pain are due to time alone. Nevertheless, quality randomized control trials are required to establish strong evidence of an effect due to exercise programs. In addition, information is required on the magnitude of exercise-related strength changes and exercise-related changes in pain and function.



The types of exercise programs vary from study to study in the intensity, frequency, and duration of exercise, and the muscle groups that are exercised. No justification is provided why any one program is better than another, and clinicians are left to decide what type of exercise to prescribe on a case by case basis. Another confounding factor is that exercise is almost certainly not good for everyone, but the presenting characteristics indicating a likely benefit of exercise have not been identified.

Within this climate, trial by therapy is the way clinicians decide if

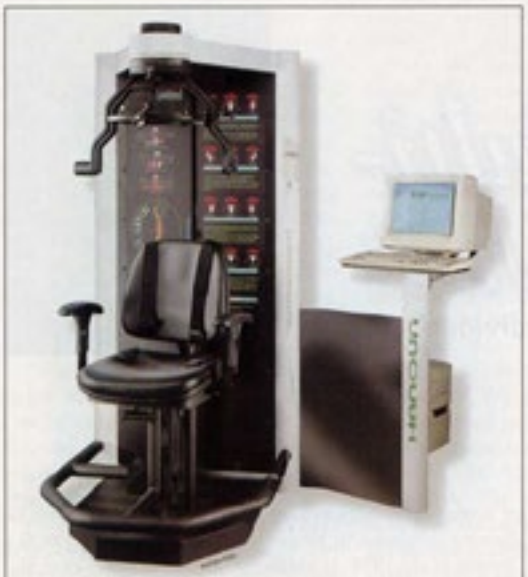


Figure 1: The Hanoun Multi-Cervical Unit

exercise is beneficial. A limitation has always been that exercise prescription is imprecise, inviting the opportunity for aggravation of the condition and client dissatisfaction. Alternatively, inadequate resistance with exercise might diminish the possible benefits of the prescribed exercise. The level of resistance provided and the part of the range in which exercise occurs have often been difficult for the clinician to quantify and progress with accuracy.

For these reasons, the Directors of the Melbourne Whiplash Center (MWC) were immediately interested when they first became aware of the Hanoun Multi-Cervical Unit (MCU) (Figure 1). They had developed a common sense approach to neck rehabilitation in their Sports Injury/Physiotherapy Center in Melbourne, Australia by applying a sports injury rehabilitation model to the treatment of chronic neck pain. The active, functional approach facilitated by the Hanoun MCU seemed a logical step to take.

The Hanoun MCU provides objective measurements of cervical spine range of motion (ROM) and isometric strength.

The major features of the Hanoun MCU include:

1. A multi-axial head brace that allows free motion of the cervical spine for ROM assessment.
2. A dynamometer to measure isometric cervical strength.
3. Sophisticated software and computer technology that records and displays real-time data analysis.
4. A pin-loaded weight stack with 0.5 lb. increments, allowing measured resistance in the rehabilitation of the cervical spine.

In 1997, the MCU came with few instructions for its therapeutic application. Consequently, the directors of the MWC systematically evaluated procedural options, and standardized assessment procedures for clients with chronic neck pain. This led to the development of what is called the Melbourne Protocol.

Our initial goals were to:

1. Develop the pathway of best practice for the treatment of neck dysfunction.
2. Establish the reliability of the Melbourne Protocol assessment .
3. Define the validity of the Melbourne Protocol rehabilitation program for the treatment of neck pain.
4. Promote our findings through the manufacturer of the MCU (Hanoun Medical) and provide training for other MCU users.
5. Establish a worldwide network of like-minded practitioners who specialize in the management of chronic neck pain.
6. Standardize assessment and treatment methods across this network.
7. Standardize the measurements taken of people with neck pain, so we could combine and analyze this data.
8. Use assessment and outcome data to determine which individuals are likely to respond to exercise programs, which individuals are likely to be aggravated by such programs, and which individuals will benefit from different or additional therapies.

The reliability of the Melbourne Protocol has been addressed in two phases. The first phase, conducted in 1998, was a study conducted at the Melbourne Whiplash Center on the reliability of the measurements of strength and ROM in unimpaired subjects. A trial was designed in which 26 subjects were assessed by three therapists, blind to each other's measurements. Tests were repeated one week later. This design allowed quantification of variability in repeated measurements taken by one, or different observers. Test-retest data was highly correlated for all strength and range of motion tests. Retest correlations were high, averaging .79 (range .53 - .9, SD .09). The standard error of all measurements of range of motion had a mean of 4.1 degrees (sd .8) and ranged from 3.1 degrees to 5.7 degrees. This represents excellent utility of the measurements for judging clinically important change, if the error margins end up similar for subjects with known impairment. The standard error of all measurements of strength of movements had a mean of 2.4 lbs. (sd .8) and ranged from 1.5 lbs. to 4 lbs. The second phase, a study of the reliability of measurements of subjects with neck pain, will commence in January 2002.

Initially we collected data for 123 patients who went through a program of treatment varying from 3 to 18 weeks (average 6.9 weeks). Subjects were 16 to 68 years

old (mean 40.4 years) and 34% were male. The duration of time since injury ranged from 1 to 540 months (mean 98.0 months). At present, follow up data is available on 59 subjects. Results indicate that strength and range of motion were significantly improved during the program, and that perceived disability decreased during the program (manuscript in preparation). Treatment gains persisted over 6 months. Follow-up assessments indicate that on average 98.2% of functional gains, 90.1% of range of motion, and 76.5% of strength gains were maintained.

These changes may have occurred spontaneously, but the longstanding chronicity of the problems experienced by the majority of people in the program argues against an interpretation of the findings due to spontaneous change.

Improvement may have been due to a non-specific treatment (placebo) effect. If this is the case, it is a placebo effect that has not been achieved over a very long period of time by other treatments given to these patients. Nevertheless, to convince ourselves that the program was responsible for the observed changes, we plan to conduct a randomized controlled trial in 2002 comparing effects in the intervention group to effects in a wait listed control group.

THE MELBOURNE PROTOCOL

The initial assessment protocol is conducted over two sessions, each of one hour's duration, and involves:

1. History taking
2. Objective questionnaires, neck disability index, and recording twelve symptoms using a visual analogue intensity rating scale.
3. Objective ROM for cervical flexion, extension, lateral flexion, and rotation
4. Objective isometric testing of the cervical flexors, extensors, and lateral flexors in a total of 16 different movement combinations.

The test results are then analyzed. ROM values are compared to normative data supplied by the American Medical Association. Isometric strength values are compared to the isometric values achieved by over 1200 current responders.

Individual rehabilitation programs are then derived for the patient considering their strength deficits, muscle strength imbalances, and flexion/extension strength ratios.

The program design is modified according to observed restrictions in ROM and to positions in ROM where movement is painful. A great asset of the MCU is the option to use both auditory and physical cues to keep the patient exercising through pain-free ROM.

The initial resistance to exercise is determined by the patients' level of irritability and their response to the initial assessment. Typically, this resistance is between 25-40% of their maximum isometric test result. A target number of sets/reps is set (typically 3 x 10). The principles of graduated challenges to strength and ROM are applied to progress treatment. Subjects are provided with resistance to movement that constitutes a moderate challenge. Although the presence of pain dictates the range through which subjects are exercised, they are encouraged to use as much of their available range as possible. Resistance to movement is increased as tolerated, if it can be managed without a loss in ROM.

Patients undergo reassessment of all baseline measurements after every nine rehabilitation sessions, and the MCU software allows for a comparison of results to baseline readings. The rehabilitation goals are to restore target strength where weakness is identified and to restore ROM where limitations occur.

Outcomes from all centers utilizing the Hanoun MCU and the Melbourne Protocol are sent to the MWC and La Trobe University for analysis. Currently data on over 1200 subjects is available. Clinicians using the MCU are treating patients who have had symptoms for an average of 8.3 years. Strength gains averaged 105% across the 1200 subjects. 74% of patients respond to the treatment, a responder being a patient who reports to be "significantly" better and whose NDI score diminishes by 20% or more upon reassessment. We are in the process of analyzing the presenting characteristics of the non-responders. If we can recognize and recommend alternative therapy for non-responders, we can hope to further improve the response rate. Presently, we have identified four common characteristics in this group of non-responders.

For example, if a patient has an exacerbation of symptoms which lasts longer than 36 hours post- initial assessment, then they are excluded from the rehabilitation program.

The Directors of the Melbourne Whiplash Center would like to acknowledge the involvement of Hanoun Medical, who have been very supportive of our efforts in research and development of the Melbourne Protocol. They have endorsed the Melbourne Protocol as their recommended protocol when utilizing the MCU for rehabilitation of chronic neck pain. There are now approximately forty centers around the world specializing in the management of chronic neck pain, twenty-seven in the United States, six in Australia, three in Canada, and one in the United Kingdom.

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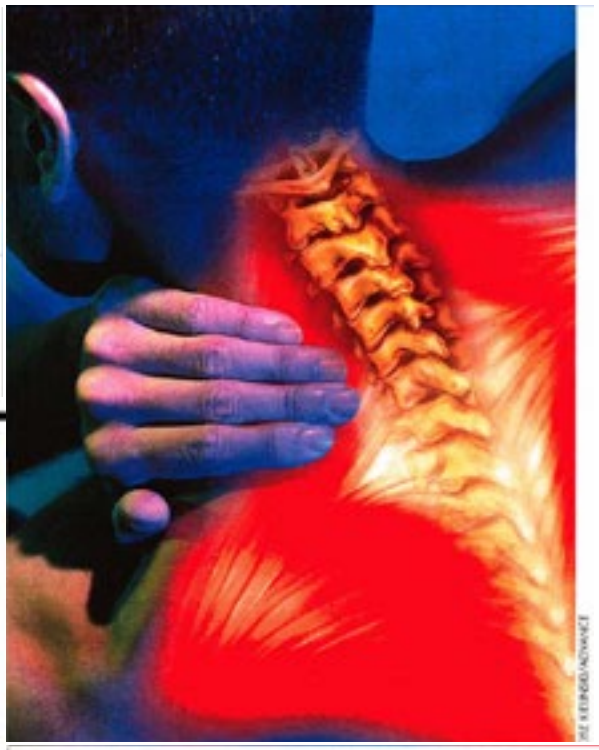
NOTE

For further information regarding the research conducted or planned at the Melbourne Whiplash Center contact Robert De Nardis via email: rjd@whiplashcentre.com ■

V. "PAIN IN THE NECK" ARTICLE

PAIN IN THE NECK

Neck sprains and strains are costly problems. Can you treat these injuries effectively and efficiently?



BY EDO ZYLSTRA, PT, MS, AND KEN JOHNSON, PT

Automobile accidents in the United States cost money. Just take a look at the facts and figures. In 2000, approximately 5.5 million nonfatal injuries occurred and over $230 billion was spent because of automobile accidents. The costs of medical and productivity losses alone account for approximately $90 billion, which is almost 40 percent of total medical costs.[1]

Neck sprains and strains are among the most frequently reported injuries in auto insurance claims. In 2002, the National Highway Traffic Safety Administration reported that an estimated two-thirds of all insurance claimants with bodily injury liability coverage and approximately 50 percent with personal injury protection coverage reported a minor neck injury. Of those who reported a neck injury, one in three suffered a neck sprain or strain.

The cost of the claims in serious neck pain cases exceeded $7 billion.

The cost of the claims in serious neck pain cases exceeded $7 billion, according to the Insurance Research Council. In a Swedish study, one out of every two people who had neck pain following a motor vehicle accident continued to report pain and disability 17 years later.[2]

For rehab clinicians, these statistics illustrate the importance of applying the best methods of diagnosis and treatment, and then alleviating the burden that neck injuries place on patients, the health care system and society. Clinicians must find the most effective, efficient and fiscally responsible ways to hasten the healing process for patients with neck pain.

Patients who are suffering from a neck injury seek treatment at various stages of their condition, and clinicians need to recognize the characteristics associated with these stages. The term "whiplash" typically carries negative connotations, and it's often incorrectly used as a diagnosis. However, whiplash more accurately describes the mechanism of injury. Barnsley was one of the first researchers to define the term whiplash to accommodate various injuries associated with motor vehicle accidents.[3]

Whiplash and associated disorders (WAD) is now the more appropriate and accepted term.[3] Aside from the physical manifestations that arise from whiplash injuries, there may also be a concomitant negative psychological and social stigma that can affect a patient's outlook. In turn, this also affects a therapist's ability to treat the overall disorder.

WAD is difficult to treat because numerous tissues and structures may have been injured. After reviewing randomized controlled trials, the Australian Physiotherapy Association (APA) released a position statement supporting the use of a multi-modal approach and active exercise therapy to treat neck pain. (However, the APA didn't recommend using a cervical collar.)[4]

In addition, a systematic review by Kay et al. on 31 study subjects reported that 60 percent of neck pain patients responded positively to exercise therapy. Researchers saw an even stronger response from those who were treated with a multi-modal approach.[5]

To help treat patients with neck pain, some clinicians are turning to hi-tech options to diagnose and treat the condition. A multi-cervical unit that focuses on functional isotonic testing can evaluate cervical strength and range of motion by identifying direction-specific weakness of the cervical musculature. This type of device can also map the data into an appropriate treatment plan.

Robert DeNardis, BSc, a physiotherapist from Melbourne, Australia, developed the Melbourne protocol (TMP) to work in conjunction with a multi-cervical unit. He spent more than a year working with researchers at Latrobe University perfecting the construct validity of TMP and ensuring proper inter-rater and intra-rater reliability. The protocol measures strength of isometric flexion, extension and lateral motion, and range of motion for flexion, extension, lateral flexion and rotation.

A follow-up study at the Hong Kong Polytechnic University confirmed the initial reliability claims.[6] DeNardis also performed clinical studies to support the validity of evaluating strength loss of the cervical musculature. And his studies also demonstrated the effectiveness of neuromuscular re-education. Preliminary results showed that nearly two-thirds of people with neck dysfunction and pain improved over 60 percent of their perceived disability and more than doubled strength in the cervical musculature.

Recent reported outcomes by Keating confirmed that up to 56 percent of patients with chronic neck pain make statistically significant improvements by using a multi-cervical unit.[7] The Keating study used scoring tools, such as the neck disability index[8] and the symptom intensity rating tool. Clinicians were able to predict the most likely candidates who

would respond positively to this method of isotonic strengthening, with a 70 percent degree of accuracy.

This level of functional change achieved with the Melbourne protocol has proven to be twice as effective as other traditional therapeutic exercises and manual therapy techniques.[9,10]

As a treatment device and evaluation tool for cervical dysfunction, a multi-cervical unit promotes improved treatment outcomes and creates the opportunity for better, more advanced research-supported treatment.

But are chronic cervical problems the result of decreased strength alone? When clinicians have the tools to accurately assess cervical strength objectively and efficiently, the logical answer is yes. If a person presents with pain, loss of function and range of motion, most therapists generally conclude that there's a strong possibility of the presence of concomitant strength and neuromuscular deficits. Research shows that using technology-assisted evaluation and rehab devices enables clinicians to place more of a focus on safety, biomechanics and neuromuscular re-education.

In a University of Queensland study, investigators found that patients with neck pain demonstrated greater activation of accessory neck muscles during a repetitive upper limb task compared to asymptomatic controls. Greater activation of the cervical muscles in patients with neck pain may represent an altered pattern of motor control to compensate for reduced activation of painful muscles.[11]

It's important to emphasize correct muscle balance and postural symmetry to build a foundation that will allow strengthening to take place. During a strength progression, emphasis should be on maintaining an appropriate velocity of movement, along with postural stabilization of the deep cervical neck flexors. Clinicians should encourage patients to remain in control of weight and posture at all times.

With a proper evaluation and exercise program, patients can eliminate neck pain for good. ■

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11 - APPENDIX

I. EMC GUIDELINES.....11-2

Guidance and manufacturer's declaration – electromagnetic emissions		
MCU is intended for use in the electromagnetic environment specified below. The customer or the user of MCU should assure that it is used in such an environment		
Emissions test	Compliance	Electromagnetic environment - guidance
RF Emissions CISPR 11	Group 1	MCU uses RF energy only for its internal function. The RF emissions from the MCU are very low and not likely to cause interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	MCU is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/ flicker emissions 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
MCU is intended for use in the electromagnetic environment specified below. The customer or the user of MCU should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance Level	Electromagnetic environment guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be non-conductive.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV	± 2 kV	
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	.
Power Frequency, Magnetic Fields IEC 61000-4-8	3A/m	3A/m	

Guidance and manufacturer's declaration – electromagnetic immunity			
MCU is intended for use in the electromagnetic environment specified below. The customer or the user of MCU should assure that it is used in such an environment.			
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 10mS 40 % U_T (60 % dip in U_T) for 100mS 70 % U_T (30 % dip in U_T) for 500mS <5 % U_T (>95 % dip in U_T) for 5 s	<5 % U_T (>95 % dip in U_T) for 10mS 40 % U_T (60 % dip in U_T) for 100mS 70 % U_T (30 % dip in U_T) for 500mS <5 % U_T (>95 % dip in U_T) for 5 s	

Guidance and manufacturer's declaration – electromagnetic immunity

MCU is intended for use in the electromagnetic environment specified below. The customer or the user of MCU should assure that it is used in such an environment.

Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of MCU, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\ P$ $d = 1.2\ eP$ 80 MHz to 800 MHz $d = 2.3\ eP$ 800 MHz to 2.5GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m).
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [1] should be less than the compliance level in each frequency range.[2] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Guidance and manufacturer's declaration – electromagnetic immunity

MCU is intended for use in the electromagnetic environment specified below. The customer or the user of MCU should assure that it is used in such an environment.

Recommended distance between portable/mobile RF communication equipment and MCU

MCU does not need to be used in a radiated RF controlled environment. Customers or users of MCU shall maintain the minimum safe distance between portable/mobile RF communication equipment (transmitter) and MCU to prevent electromagnetic interference. The minimum distance shall be accordance with the maximum output of the communication equipment as recommended below.

Rated Maximum output power of transmitter W	Separation distance according to the frequency of the transmitter		
	150Khz to 80Mhz $d = 1.2\ e\sqrt{P}$	80Mhz to 800Mhz $d = 1.2\ e\sqrt{P}$	800Mhz to 2.5 GHz $d = 1.2\ e\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.