

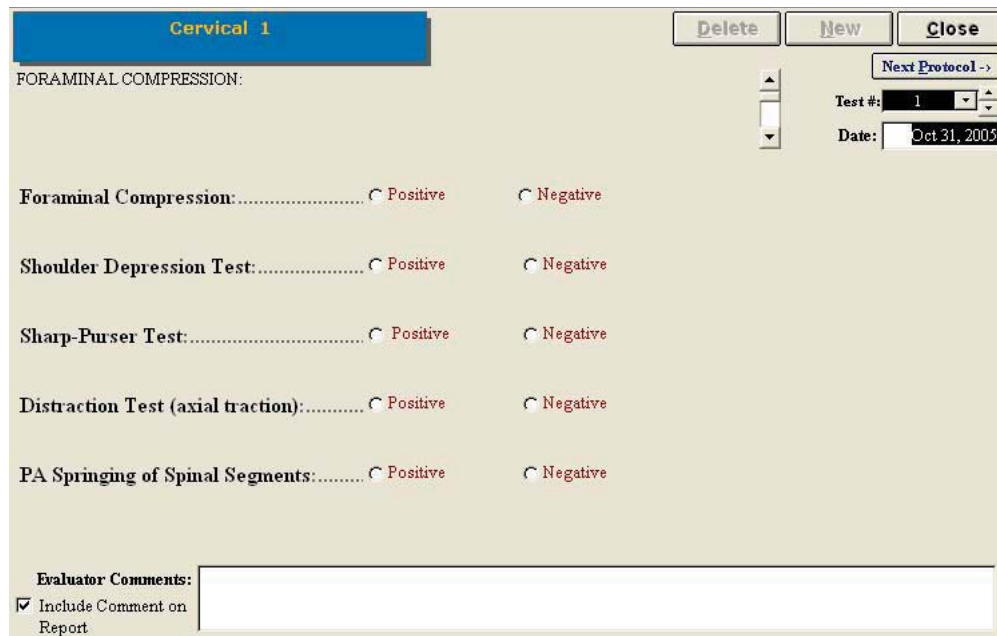


Figure 6-89. Clinical Protocol - Cervical 1

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).

Figure 6-90. Custom Clinical Protocol

Since editing and creating protocols are very similar, an example of an edited test will be given, but the same guidelines apply for creating a test.

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
- C. 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
- 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

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 (i.e. Post Offer of Employment 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 Training Protocol. Refer to Section 10 for more information on this training program.

To **create** or **access** a super protocol, click on the **Super Protocol** link on the Home Screen above the Administration icon (Figure 6-91).



Figure 6-91. Super Protocol Link

This will bring you to the main Super Protocols screen (Figure 6-92).

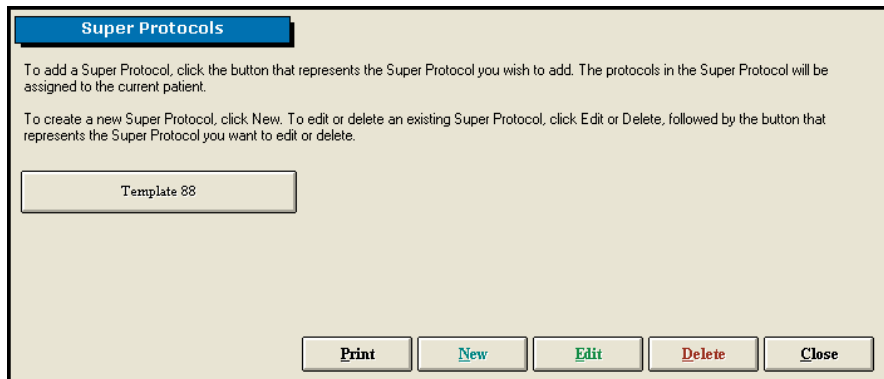


Figure 6-92. Super Protocol Main Screen

Step 1. Create a new protocol by clicking on **New**. A new icon will appear within the main Super Protocols screen.

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

A screen will appear with boxes of test names on the left and a blank box on the right (Figure 6-93).

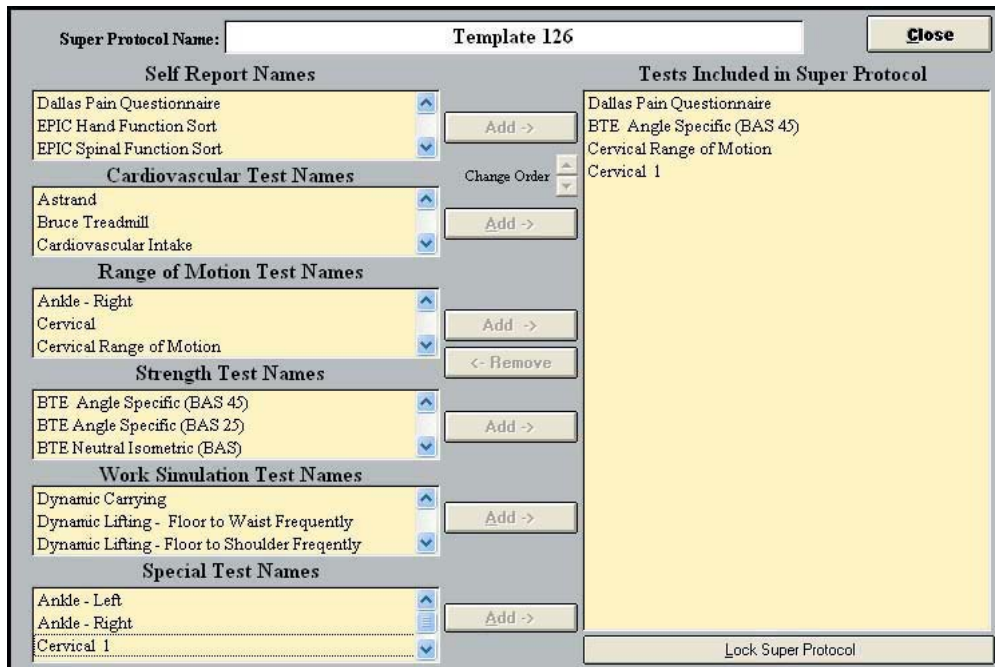


Figure 6-93. Create/Edit Super Protocol

Step 3. Select the applicable tests from the lists on the left-hand side of the page and **Add** them to the Super Protocol.

The order of testing can be changed by highlighting one of the included tests and using the Change Order arrows to move it up or down within the list.

Step 4. Once you have added all the applicable tests and arranged them in the desired order, finish the process by clicking **Lock Super Protocol**.

Step 5. You will be prompted to enter and confirm a password to lock the Super Protocol.

Step 6. To apply a Super Protocol, select a client then click Super Protocol from the Home

Screen.

Step 7. Click the Super Protocol you wish to use.

A testing screen will appear with the tests for the super protocol already added to your client. If other tests have already been added to the client, the super protocol tests will be listed below them (Figure 6-94).



Figure 6-94. Super Protocol Added to Client

Edit a super protocol by clicking **Edit** in the main Super Protocol screen and selecting the super protocol you wish to modify. You can then add and remove tests by highlighting a test and clicking **Add** or **Remove**.

To **delete** any protocol, first click the **Delete** icon in the main Super Protocol screen; the Delete icon should change to Cancel Delete. Next click on the super protocol you wish to delete.

VII. VALIDITY ANALYSIS

The Validity Analysis allows you to evaluate the patient's actual results versus the expected results. This may be done for any or all of the tests completed by the patient.

Access the Validity Analysis by clicking on the **Validity Analysis** icon located on the Home Screen. (Figure 6-95)

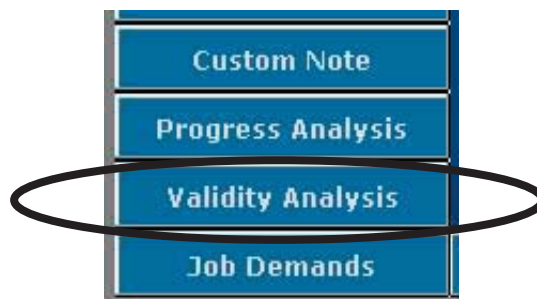


Figure 6-95. Validity Analysis Icon

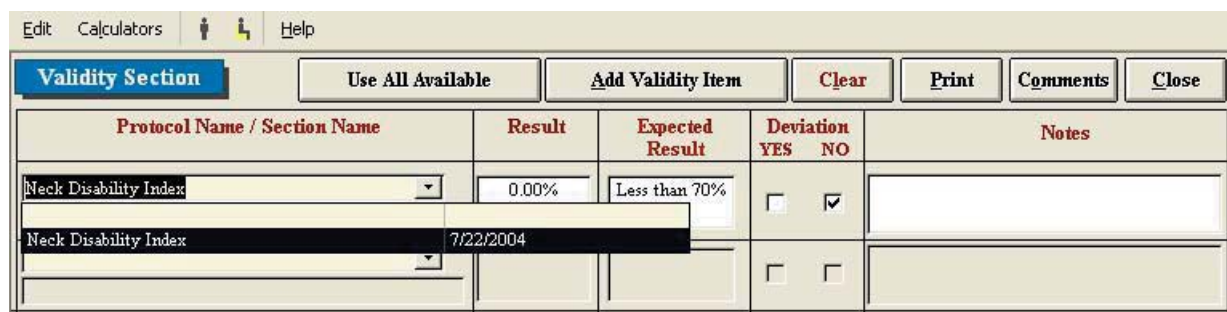
This will bring you to the main Validity Analysis screen (Figure 6-96).



Protocol Name / Section Name	Result	Expected Result	Deviation YES NO	Notes
			☐ YES ☐ NO	
			☐ YES ☐ NO	

Figure 6-96. Validity Analysis Main Screen

Step 1. Once the Validity Analysis screen is open, click on the arrow to the right of the first drop-down menu and select the protocol you wish to evaluate. You may also click **Use All Available** if you wish to use all of the tests (Figure 6-97).



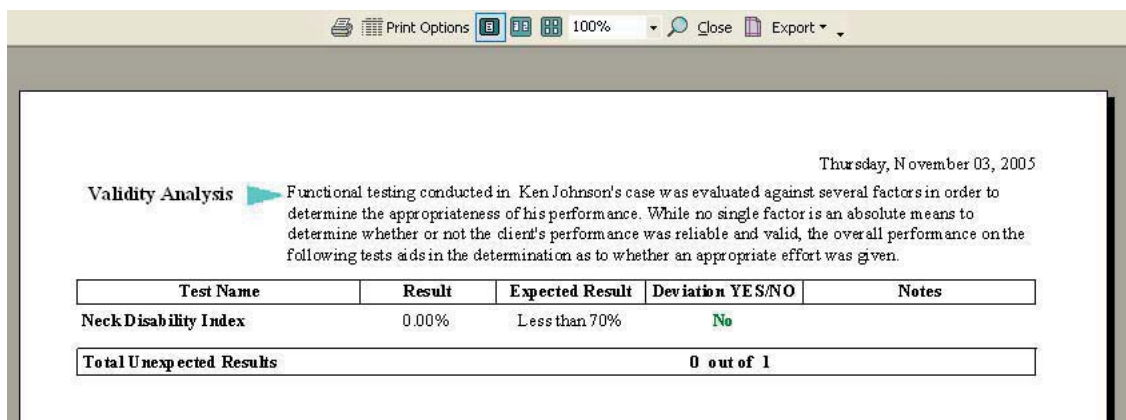
Protocol Name / Section Name	Result	Expected Result	Deviation YES NO	Notes
Neck Disability Index	0.00%	Less than 70%	☐ YES ☒ NO	
Neck Disability Index	7/22/2004		☐ YES ☐ NO	

Figure 6-97. Select Protocol for Validity Analysis

The Protocol or Section Name, Result, Expected Result, and Deviation fields will automatically be populated.

Step 2. Add any necessary notes regarding the validity of the protocols.

Step 3. Click **Print** to preview the report (Figure 6-98).



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Validity Analysis Functional testing conducted in Ken Johnson's case was evaluated against several factors in order to determine the appropriateness of his performance. While no single factor is an absolute means to determine whether or not the client's performance was reliable and valid, the overall performance on the following tests aids in the determination as to whether an appropriate effort was given.

Test Name	Result	Expected Result	Deviation YES/NO	Notes
Neck Disability Index	0.00%	Less than 70%	No	
Total Unexpected Results			0 out of 1	

Figure 6-98. Preview Validity Analysis Report

You may also add protocols to the analysis by clicking **Add Validity Name** and typing in the protocol name, section name, and expected result.

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REPORTS

I. ACCESSING THE REPORTS

ODES allows you to create a unique report that can include any information you deem necessary, such as the raw data from a protocol, heart rate capture, 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).

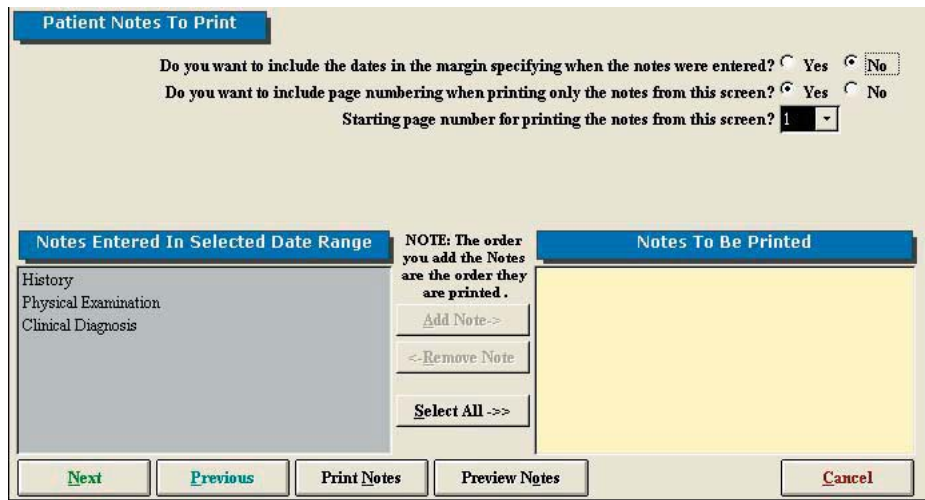


Figure 7-3. Patient Notes to Print

Step 4. Select whether you would like to include the dates in the margin.

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

Step 6. Select whether you would like to start page numbering when printing the notes from the Notes Screen.

Step 7. 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 8. 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).

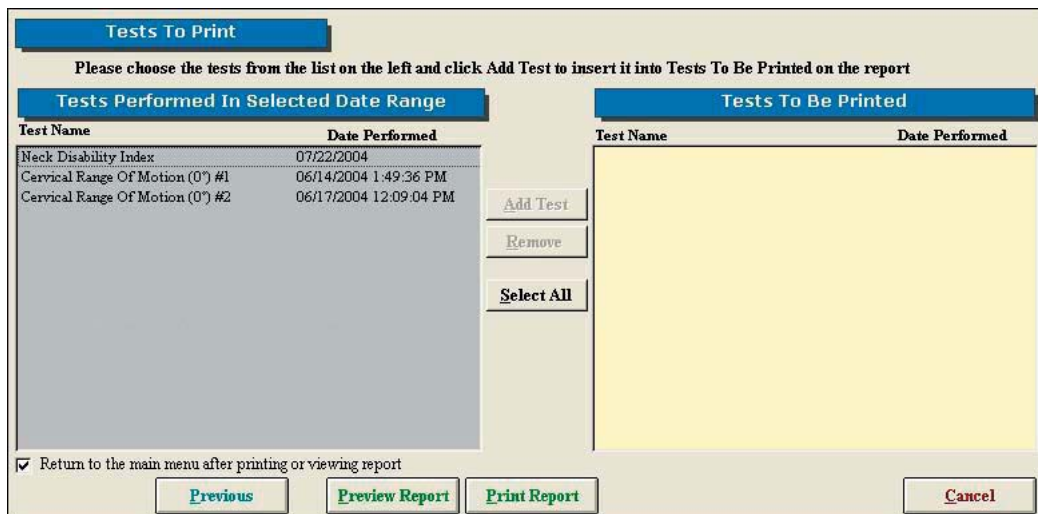


Figure 7-4. Tests to Print

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 Test**.

Step 10. Depending on which report you have selected to view and 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 are able to 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 for a Referral, Insurance, Attorney, Patient, Physician, Employer, Case Manager, or Specialist. If you select once 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).

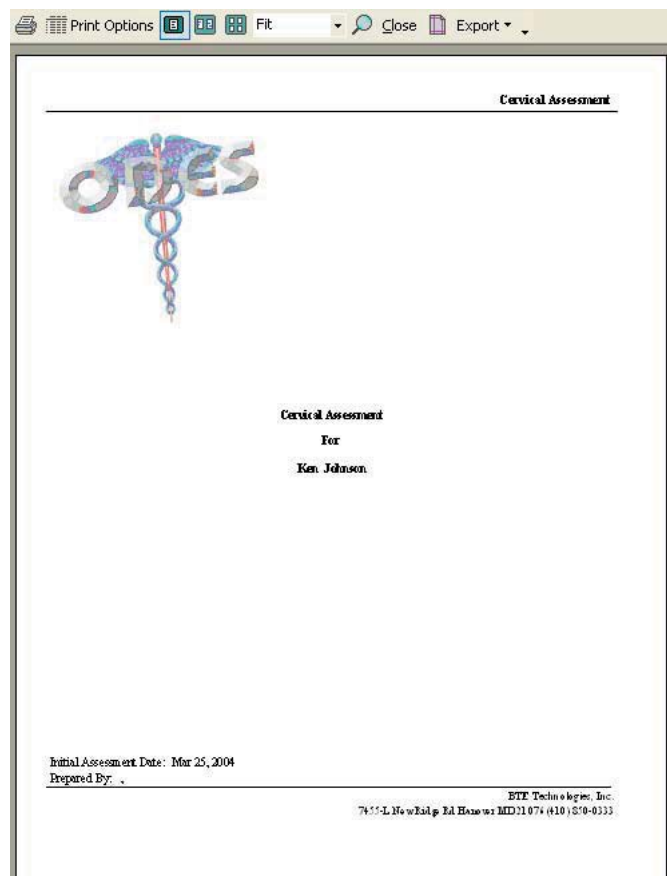


Figure 7-6. Preview Report

II. TYPES OF REPORTS

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

A. CERVICAL ASSESSMENT

This report allows you to:

- Select date range of data
- Add and remove client notes from the report
- Alter page numbers
- Enter dates in the margins beside client notes
- Select all or only specific tests to include on the report
- Print or preview the report

B. CUSTOM REPORT

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager
- Include injury diagram and/or chart on the report

- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report
- Create a custom title for the report

C. CUSTOM REPORT (NON-INTEGRATED)

This report is designed to include only Non-Integrated tests that have been performed.

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Add specific non-integrated tests to your report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager
- Include injury diagram and/or chart on the report
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report
- Create a custom title for the report

D. FCA PROGRESS ASSESSMENT (NON-INTEGRATED)

This report is designed to include only Non-Integrated tests that have been performed. It is specifically used to track the progress of multiple assessments.

This report allows you to:

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

E. FCA (NON-INTEGRATED)

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Add specific non-integrated tests to your report

F. MCRP ASSESSMENT

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager
- Include injury diagram and/or chart on the report
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report

G. MCRP DISCHARGE ASSESSMENT

This report allows you to:

- Select date range of data
- Alter pages numbers
- Add and remove client notes from the report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager
- Include injury diagram and/or chart on the report
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report

H. MCRP PROGRESS ASSESSMENT

This report allows you to:

- Select date range of data
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report

I. MCRP 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 your report
- Address the report to the following: Referral, Insurance Company, Attorney, Client, Physician, Employer, Case Manager
- Include injury diagram and/or chart on the report
- Put the job demand on a separate page

- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report
- Create a custom title for the report

J. MCRP 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
- Include injury diagram and/or chart on the report
- Put the job demand on a separate page
- Add or remove page numbers from the report
- Include clients name at the bottom of each page of the report
- Print or preview the report

K. MCRP 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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CERVICAL CONDITIONING

Recently, the exercise program portion of the ODES software has been reintroduced. Included in this feature 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 can be located within the Exercise Program Menu. To locate it, click on the **Exercise Program** Button located on the main screen of your ODES software (Figure 8-1).

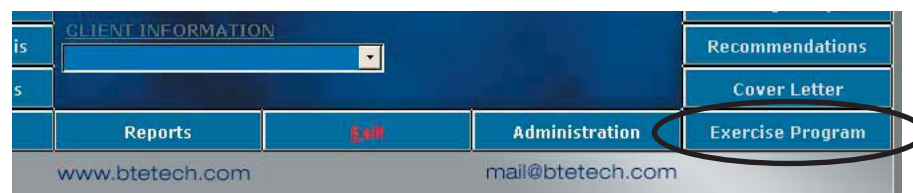


Figure 8-1. Exercise Program Icon

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

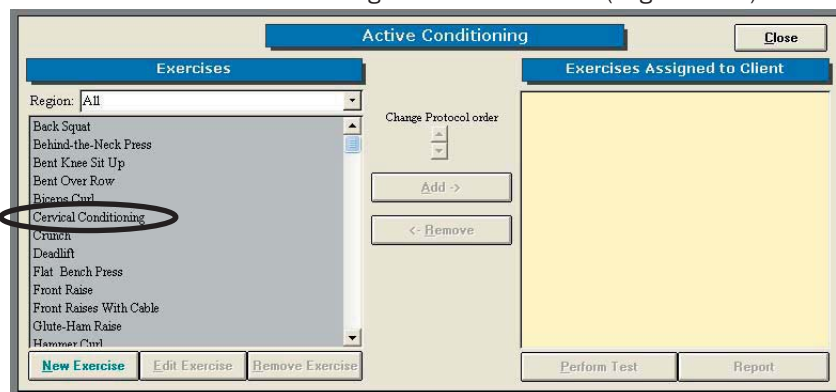


Figure 8-2. Active Conditioning Protocols

In order to use the cervical conditioning feature, you may perform either of the following steps:

1. Highlight **Cervical Conditioning** on the left hand side and click the **Add** button.
2. Double click on **Cervical Conditioning** to add this protocol to the **Exercises Assigned to Client** list.

Cervical Conditioning will now appear on the right hand side of your screen under Exercises Assigned to Client (Figure 8-3).

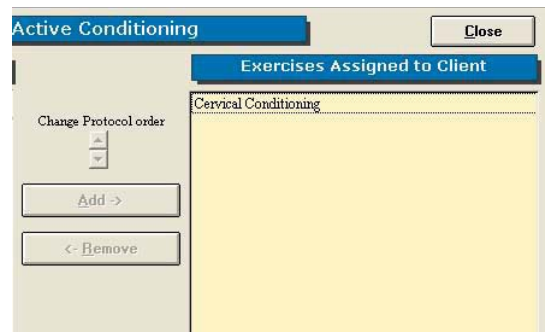


Figure 8-3. Cervical Conditioning Selected

When entering the program for the first time, two warnings will appear; one is shown below (Figure 8-4).

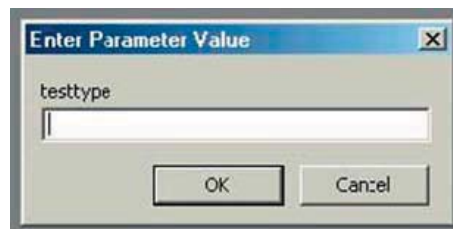


Figure 8-4. Warning Screen

Simply click **OK** and you will be allowed into the cervical conditioning program.

You will now enter into the cervical conditioning screen (Figure 8-5).

Mr. Sample Client		#1Date	#2Date	#3Date	#4Date	#5Date	#6Date	#7Date	#8Date	#9Date	Close	
Stretches and warm-up: • Shoulder Shrugs • Neck movements											Notes	
											Print	
											Starting %	
											Go	
											Minimums	
											Flexion	
											Extension	
											Rotation	
											Lat. Flex	
											Set as Defaults	
											P - Pin # View	
											S - Sets	
											R - Reps	
											Time	
											Today: 00:00	
											Total: 00:00	
											Rest: 00:30	
											Start Timer	
											Seat	

Supervising Pract: [Dropdown] [Dropdown] [Dropdown] [Dropdown] [Dropdown] [Dropdown] [Dropdown] [Dropdown] [Dropdown] [Dropdown]

<< < > >>

Figure 8-5. 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 8-6).

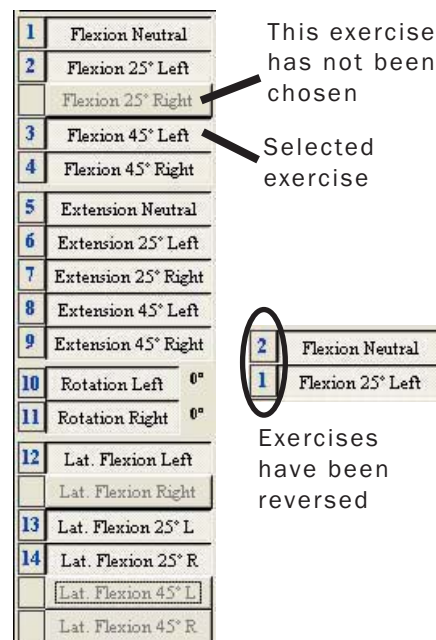


Figure 8-6. Selecting Exercises

III. BLACKOUT FEATURE

For certain movements, a blackout option is available. This is important for client safety since it may be set to limit the range of motion a 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 8-7).



Figure 8-7. No Blackout

In order to set the blackout value, place your mouse over the word “no” – it should turn yellow. Then double click your left mouse button in order to specify the maximum range of motion the client should perform (Figure 8-8).



Figure 8-8. 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. 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 that the program will default to, and the number on the right is the number of repetitions. To change these default values, left click on the number you wish to change. Once changed, these values will be the new defaults for ALL clients (Figure 8-9).

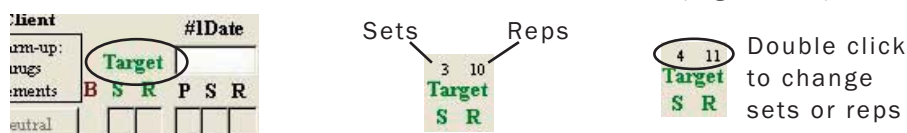


Figure 8-9. Setting Target Value

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 8-10).

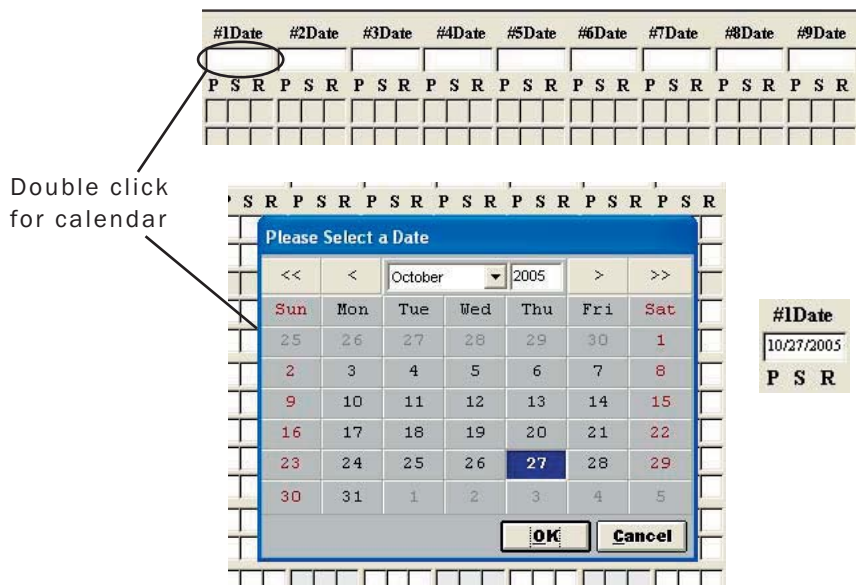


Figure 8-10. Setting the Date

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. If not, go into case information; double click in the space besides supervising practitioner (Figure 8-11).



Figure 8-11. Adding Supervising Practitioner

Then, fill out the health practitioner screen (Figure 8-12).

Figure 8-12. Health Practitioner Information

Your name will now appear in the drop down menu (Figure 8-13).



Figure 8-13. Supervising Practitioner Drop-Down Menu

VII. WEIGHT STACK SELECTION

In order to make the cervical conditioning program specific to your Multi-Cervical™ Unit, a feature was added to the software to allow you to change the weight stack type. In order to alter this setting, you must click on **View** in the bottom right hand corner of your screen (Figure 8-14).



Figure 8-14. Weight Stack Setting

Once the View button is clicked, a table will appear that displays the pin number and its corresponding weight (Figure 8-15).

Pin Weight	Pin Weight
1 - 0.5 lbs	14 - 10.5 lbs
2 - 1.0 lbs	15 - 12.5 lbs
3 - 1.5 lbs	16 - 14.5 lbs
4 - 2.0 lbs	17 - 16.5 lbs
5 - 2.5 lbs	18 - 18.5 lbs
6 - 3.0 lbs	19 - 20.5 lbs
7 - 3.5 lbs	20 - 22.5 lbs
8 - 4.5 lbs	
9 - 5.5 lbs	
10 - 6.5 lbs	
11 - 7.5 lbs	
12 - 8.5 lbs	
13 - 9.5 lbs	

Figure 8-15. 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 8-16).



Figure 8-16. 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 8-17).

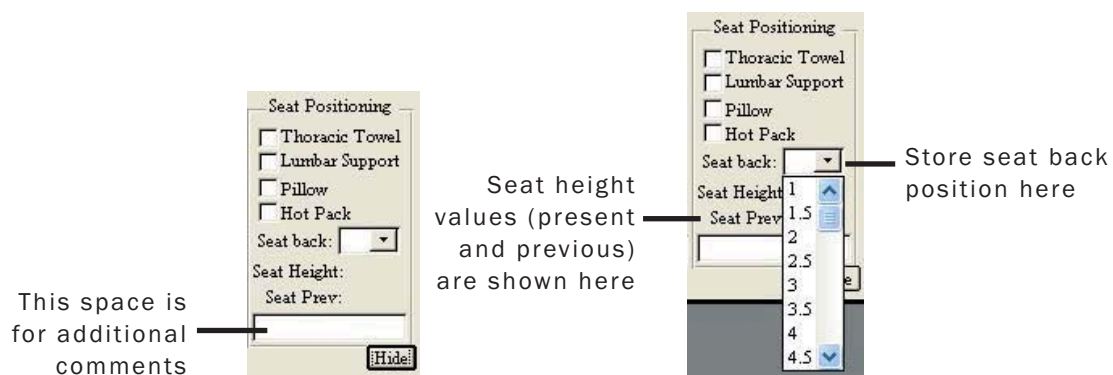


Figure 8-17. Seat Settings

IX. MINIMUM VALUES

This 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 8-18).



Figure 8-18.
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. 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 8-19). 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.

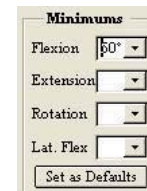


Figure 8-19.
Minimum Flexion Setting

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 8-20).



Left clicking with your mouse in the yellow box increases rest time by 1 hour.

Figure 8-20. Timer

XI. STARTING %

Before performing a cervical exercise program, a starting % 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 8-21).



Figure 8-21.
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 (i.e. 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 # (i.e. the Pin that is associated with 40% of the client's maximum) (Figure 8-22).

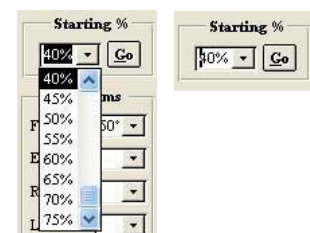


Figure 8-22.
Setting Starting %

XII. DEFAULT

The default button sets the values entered into the Starting %, Minimum Values and Weight Stack fields as the default values for ALL patients (Figure 8-23).

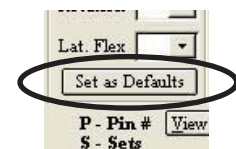


Figure 8-23.
Set as Default

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 8-24).



Figure 8-24. 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.

IXV. NOTES

Notes can be added into the conditioning program. In order to do this, click on **Notes** in the upper right hand corner (Figure 8-25).

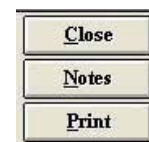


Figure 8-25. Notes Icon

The Notes screen will appear, which will allow you to enter in multiple notes on your client (Figure 8-26).

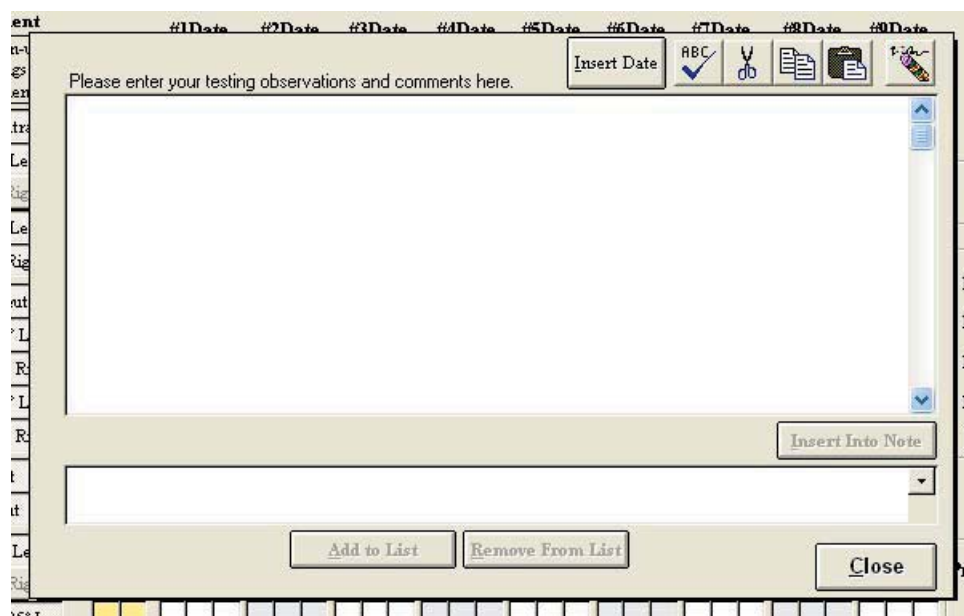


Figure 8-26. Notes Screen

To enter in notes, place your cursor in the large upper white 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 8-27).

Figure 8-27. 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 lower text box and then click **Add to List**, which is highlighted in green (Figure 8-28).

Figure 8-28. Create a Common Note

Your information will now appear in a list, which you can access by clicking on the drop down icon (Figure 8-29).

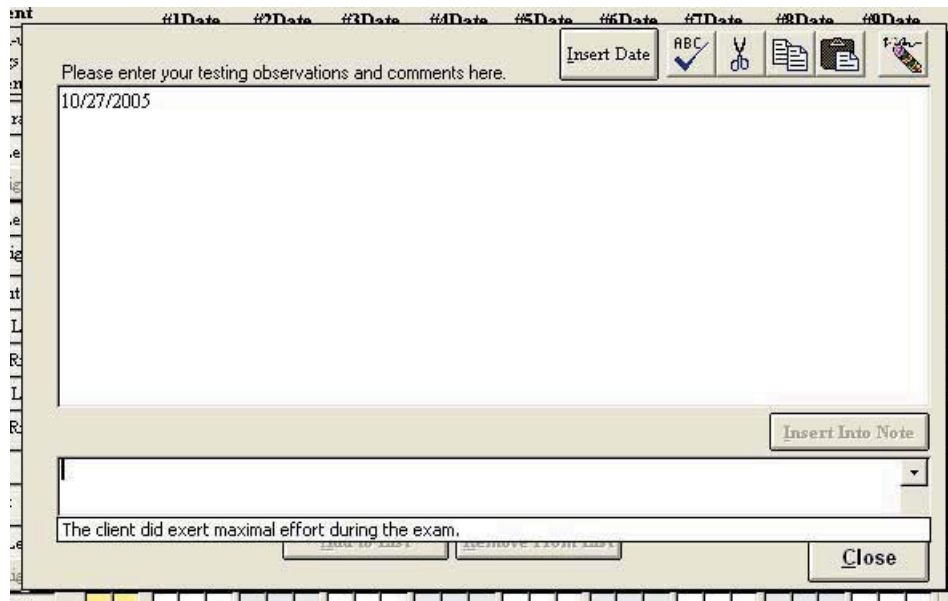


Figure 8-29. Add Common Note to List

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 8-30).

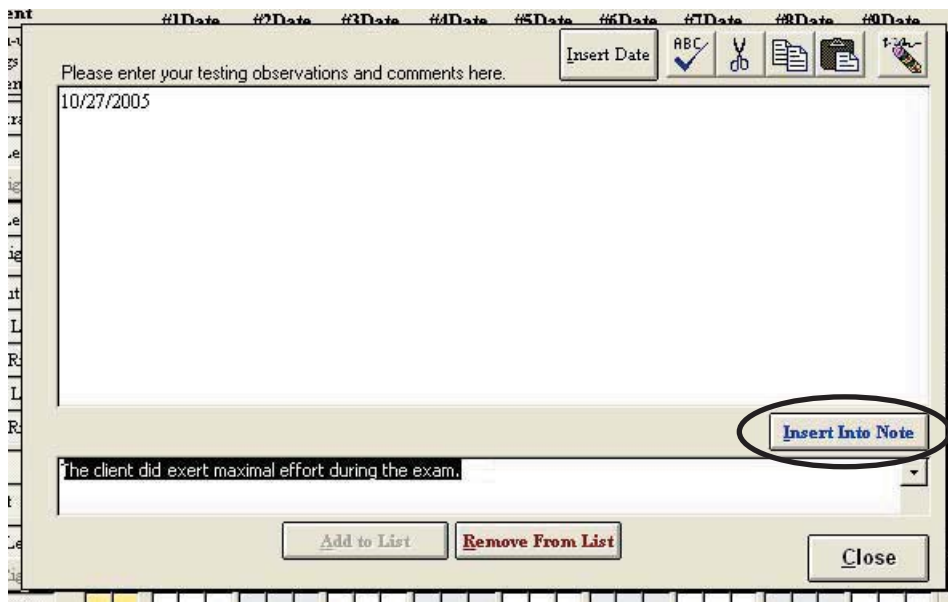
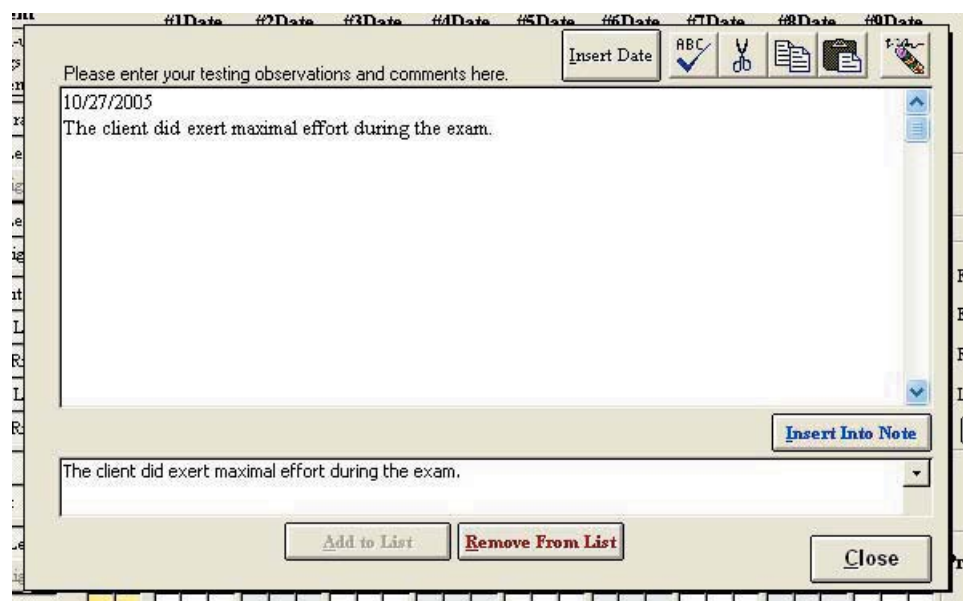


Figure 8-30. Select Common Note to Insert

Your information will now appear in the notes section (in the upper text box) (Figure 8-31).



The screenshot shows a software window with a title bar containing date fields (#1Date through #10Date). The main area is divided into two sections. The top section, titled "Please enter your testing observations and comments here.", contains a text box with the date "10/27/2005" and the text "The client did exert maximal effort during the exam." To the right of this text box is a toolbar with icons for "Insert Date", "ABC", "V", "scissors", "document", "folder", and "pencil". Below the top section is a smaller text box containing the same text: "The client did exert maximal effort during the exam." To the right of this box is a button labeled "Insert Into Note". At the bottom of the window are three buttons: "Add to List", "Remove From List", and "Close".

Figure 8-31. Common Note Inserted into Main Notes Field

09 - RECOMMENDED MAINTENANCE

General Computer Maintenance	3
Do Not Install Additional Software	3
Shut Down the Computer Properly	3
Maintenance Schedule	3
General Product Maintenance	3
Do Not Disassemble Any Components of the MCU	3
Maintenance Schedule	3
After Each Client	4
Daily	4
Weekly	4
Monthly	4
Prevention of Interference between Wireless Components	4

RECOMMENDED CARE AND MAINTENANCE

I. GENERAL COMPUTER MAINTENANCE

ODES 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 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 ODES database - see Section 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. PREVENTION OF INTERFERENCE BETWEEN WIRELESS COMPONENTS

Interference, which can result in an inability to acquire accurate data, may occur in the following scenarios:

- a. There are multiple wireless systems within 50 feet of each other that are on the same wireless channel (e.g. 2 wireless MCUs in the same clinic on channel 16).
- b. The antennas of any wireless components are within 3 feet of each other (e.g. the antenna on the Hub is within 3 feet of the antenna on top of the MCU).
- c. There is not a direct line of sight between the antennas of the wireless components. In addition, any metal that is between the antennas will cause interference.

You may prevent interference by maintaining your system in the following manner:

- a. Do not allow the Hub to fall on the floor; there are magnets inside the Hub that will aid in securing it to the computer cart.
- b. Regularly check the USB cable that is attached to the Hub and check the power cable that is attached to the MCU.
- c. Verify the antennas are in good working order and properly secured.

You may also prevent interference by using the following guidelines:

- a. If there are multiple wireless systems within 50 feet of each, verify that each unit is on a different wireless channel. Refer to Section 02-IV-C-4 (URFIO Configuration Application) for how to determine on which channel a system is operating.
- b. The recommended location for the Hub is on the second shelf of the computer cart. This ensures the antenna of the Hub will always be at least 3 feet from the antenna on the top of the MCU.
- c. Verify there is a direct line of sight between the Hub antenna and the MCU antenna.

10 - THE MELBOURNE PROTOCOL

Introduction	3
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THE MELBOURNE PROTOCOL

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

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.

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.

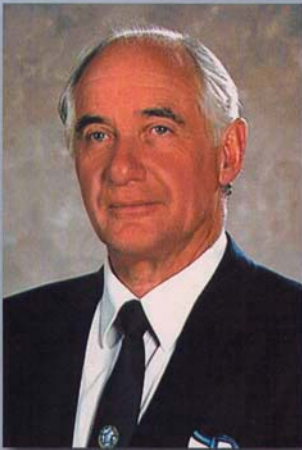
- **Systematic Changes Over Time**
No systematic differences were identified in scores over time.
- **Relationship Between the Therapists’ Scores – Test-Retest Correlations**
The majority of the correlation coefficients are high (.667 to .895 [approaching 1.0]) indicating good test-retest reliability. 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.

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WORLDWIDESPINE

& Rehabilitation

Interview *with* **Stanley V. Paris**



ROBIN MCKENZIE,
CNZM, OBE, FCSP (HON), DipMT

Patient Heal Thyself



STANLEY V. PARIS, PT, PhD



ROBERT DE NARDIS, B App Sc (Physio)

The Hanoun Multi-Cervical Unit

INSIDE!
**Mulligan Concept
Management of
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ALSO INSIDE

SPINE, SPORTS,
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REHABILITATION
ARTICLES FROM
AROUND THE WORLD

THE PHYSICAL THERAPY MAGAZINE FOR THE CLINICIAN

The Hanoun Multi-Cervical Unit

Flexible exercise delivery for individualizing neck rehabilitation programs.

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



*Robert De Nardis
B App Sc (Physio)*



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 norma-

tive 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 move-

ment 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.



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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 recom-

mended 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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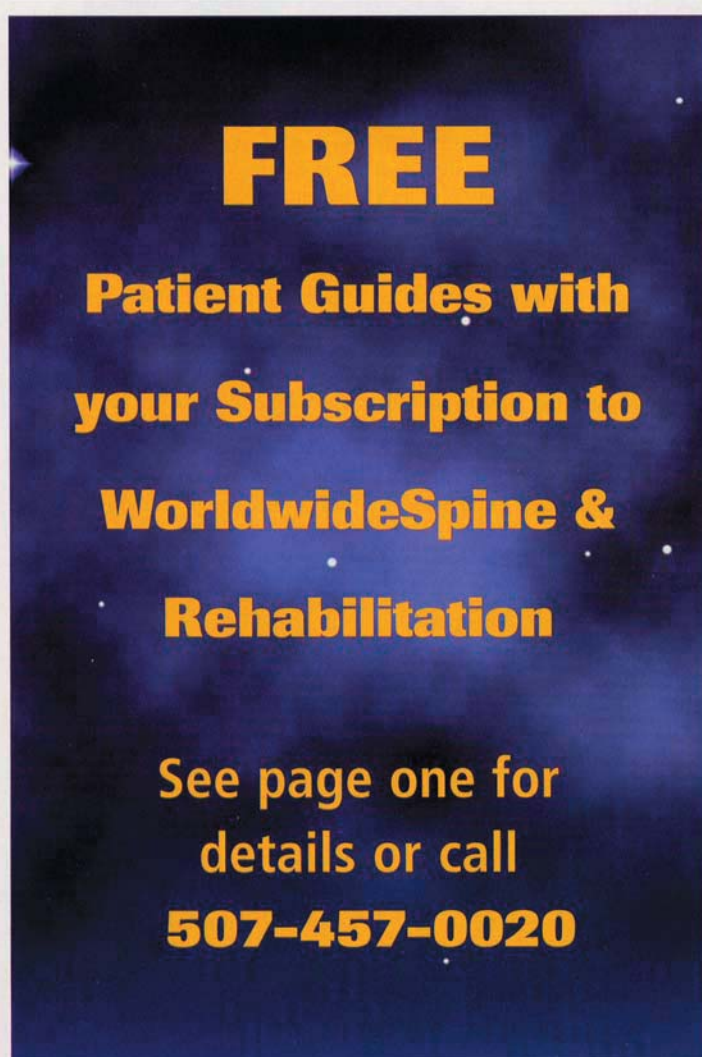
Randlov, A., Ostergaard, M., Manniche, C., Kryger, P., Jordan, A., Heegaard, S. & Holm, B.: Intensive dynamic training for females with chronic neck/shoulder pain. A randomized controlled trial. Clinical Rehabilitation 12: 200-210, 1998.

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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. ■



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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, 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

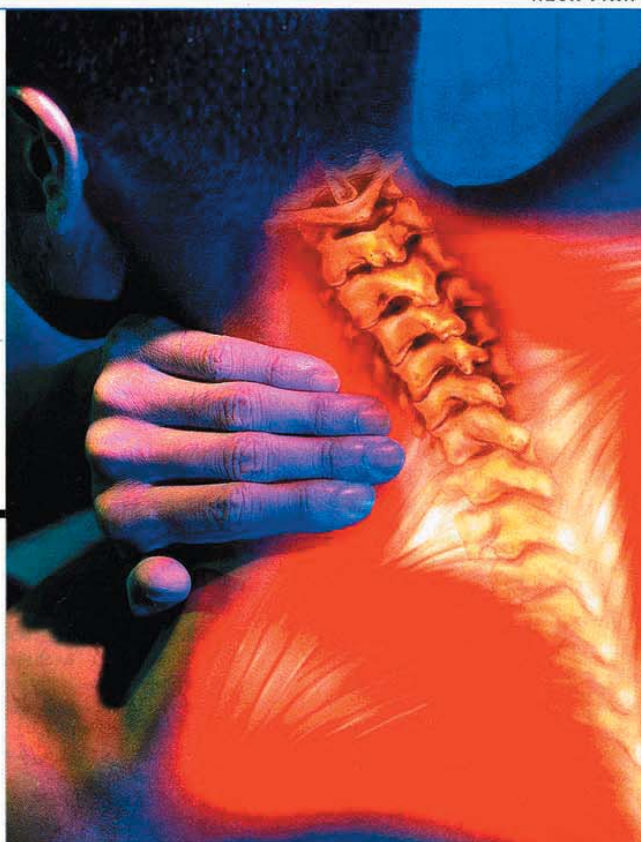
For rehab clinicians, these statistics illustrate the importance of applying the best methods of diagnosis and treatment, and then alleviating the burden that neck injuries place on patients, the health care system and society. Clinicians must find the most effective, efficient and fiscally responsible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

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



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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 index⁸ and the symptom intensity rating tool. Clinicians were able to predict the most likely candidates who

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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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