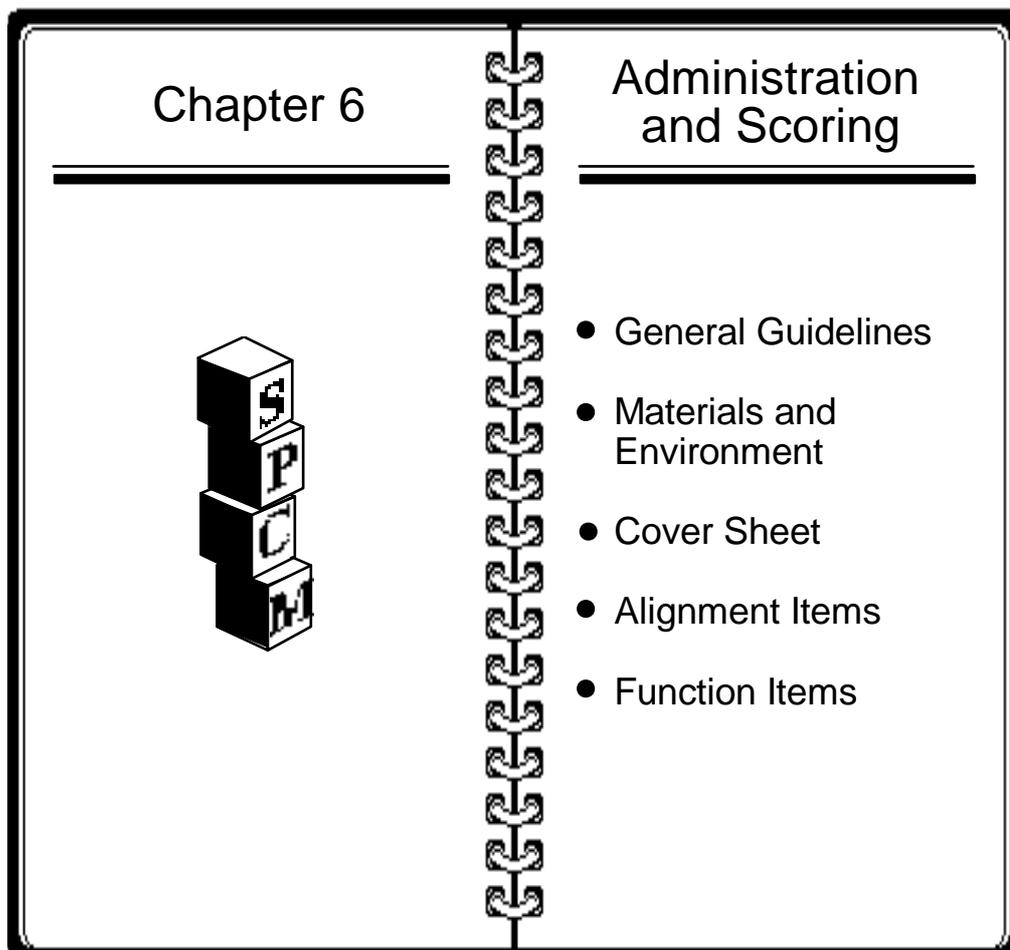


## Chapter 6: Item Administration and Scoring



Introduction

The research version of the Seated Postural Control Measure (SPCM) has been constructed and is being tested as an outcome measure to evaluate change in postural control as a result of adaptive seating intervention. It was designed as a clinical evaluation tool to measure sitting behaviors which are thought to change as a result of adaptive seating intervention. The two domains of sitting behaviours measured are: (1) static postural alignment and, (2) functional movement. The SPCM has been designed for use by pediatric occupational therapists and physiotherapists who have experience in assessing the adaptive seating needs of children with neuromotor conditions.

This chapter describes the materials required for test administration and the standardized testing and scoring procedures.

### **General Guidelines**

The SPCM is a criterion-referenced outcome measure which has standardized instructions for item administration and scoring. The time required for set up, administration and scoring of the SPCM is approximately 30 minutes. The following general guidelines should be followed when using the measure:

1. Users should review the administration guidelines and score sheet prior to administering the measure
2. All required equipment should be assembled ahead of time. A starting line in an 8 foot wide hallway, lines 10' from the starting line and 45' from the starting line should be marked with masking tape for the wheelchair

items. The location of a 33 inch wide doorway opening off the hallway should also be noted for use in function item #12.

3. The child should be dressed in light weight, close-fitting clothing.

4. All items are administered while the child is sitting. The measure may be administered while the child sits in a prescribed seating system or with any other means of seated support, other than manual support.

5. The order of administration of the sections and items can be altered to suit the preferences of the child and therapist.

6. Only item responses which are observed are scored, not those which are reported only.

7. All items except function items #11 and #12 are administered in a quiet room which is relatively free of distractions. The wheelchair management items (#11 and #12) are administered in a quiet hallway.

8. Effort should be made to complete all items in one session. However, if completion is not possible due to fatigue or other intervening circumstances, the remaining items should be completed within a week so that a significant amount of time has not passed in which changes in postural control could have taken place.

## **Materials and Environment**

The SPCM has been designed to be administered using a standard scoring sheet and equipment which is readily available or easily made in the clinical setting. A quiet room is used for administration of most test items. The following equipment and materials are required for test administration:

- SPCM scoring sheet
- Selection of toys to motivate the child for head control items
- A small toy consisting of two Duplo blocks stuck together to form a block with dimensions of 2.5" x 1.25" x 1.5. A piece of hook Velcro is secured to the largest surface of the block.
- Ruler - rigid yard or meter stick
- Stopwatch
- 2' x 2' positioning board made from two layers of 'tenplast' or other heavy cardboard. A 1" wide strip of mat Velcro, marked at 1" intervals, is attached along the midline of the board to allow target object to be secured on the board
- Target placement guide, 6" x 11", made from plastic-laminated paper or more rigid material such as ABS plastic. The guide has two lines running from the midpoint of the 11" border to form an angle of 120°. These lines provide a guide for Item 4 of the Function Section.
- Dice - six, approximately 1/2" cubes
- Pen - marker pen, approximately 1/2" diameter or adapted pen/pencil used by child
- Raisins (or Cheerios, if deemed more safe for child)
- Sheet of paper - 8 1/2" x 11"
- Jar - 90 cc jar, diameter = 2", height = 3" ( e.g., urine specimen jar)

- Container - any open container (such as a bowl) with at least a 5 " diameter opening
- Large goniometer ( 360° with 7" arms)
- Inclinator (hardware store variety)
- Flexible curve (e.g. Staedler Mars product, available in most stationary stores)
- High mat or bench with ethafoam (for Level of Sitting Scale)
- Protractor made of clear acrylic. Size = 10 3/4" long x 5 1/4' radius x 1/4' thick, marked with the following angles on the right and left of the protractor: 5°,15°, 20°, 25°, 30°, 35°, 40°, 45°, and 55° (see Appendix #2)
- Masking tape - to mark lines on floor for Function Section Items 11 and 12.

### **Guidelines for Cover Sheet Completion**

The cover sheet of the SPCM scoring form is used to document information which will assist in later interpretation of test scores.

Basic identifying information is entered to facilitate retrieval of forms. The child's name and date of birth should always be recorded. The identification number (which may be a chart number or subject number), referring physician and diagnosis are optional entries which are only recorded if required by the test user. The date of onset of the problem is important to record for conditions of sudden onset, such as brain injury or stroke, to assist in distinguishing the degree of change in seated postural control which may be attributed to spontaneous recovery from the degree of change which may be a true outcome of adaptive seating intervention.

The date of assessment and date of birth are recorded by year, month, and day to allow the precise calculation of chronological age. On subsequent testing, these dates are also used to calculate the passage of time between assessments and the change in the child's age from one assessment to the next. This information is used when attempting to determine the degree of score change which may be attributable to maturation rather than the effectiveness of the seating intervention.

An estimate of the child's level of understanding of test instructions and level of cooperation are made at the completion of test administration to gauge the extent to which these factors may have affected test performance. Two options are available on the cover sheet for characterizing "cognitive level" and three options for "cooperation level":

### **Cognitive Level**

◆ Understands most instructions

*Check this box if the child followed at least 75% of the instructions without prompting, visual or verbal cueing, or hand-over-hand demonstration*

◆ Understands few instructions

*Check this box if the child followed less than 75% of instructions; or required prompting and/or visual or verbal cueing and/or hand-over-hand demonstration*

### **Cooperation Level**

◆ Cooperates fully

*Check this box if the child cooperates (i.e., does not resist participation) in 75% or more of the test items, without the need for verbal or tactile stimulation*

◆ Cooperates with prompting

*Check this box if, for 75% or more of the test items, the child can be encouraged to participate with verbal and/or tactile stimulation*

◆ Uncooperative

*Check this box if the child cooperates in fewer than 75% of the test items*

### **Description of Seating System Used in Test**

The lower half of the cover sheet is used to describe the seating system being evaluated. The extent of information entered in this section depends upon the needs of the test user. For example, if the test user wishes to compare the effectiveness of two seating systems, detailed documentation of the type and set-up of each seating system is required. In all cases, orientation of the seating system should be documented because it directly influences the scoring of some of the alignment items. Orientation is described as follows:

#### **Seat-to-back angle**

*Record the angle, in degrees, between the planar surfaces (not the padded interface surfaces) of the seat and back. This angle may be measured with a goniometer or inclinometer.*

#### **Tilt-in-space**

*Record the angle between the planar surface of the seat back and the vertical plane. For example, record 0*

degrees when the seat back is in the vertical position and 10 degrees when the seat back is inclined 10 degrees backward. The inclination of the seat back is best measured with an inclinometer.

### **Level of Sitting Scale (LSS)**

The Level of Sitting Scale is included on the SPCM cover sheet as a global index of the child's sitting ability. The LSS is a modification of the Level of Sitting Ability Scale (Mulcahy, Pountney, Nelham, Green, & Gillington, 1988). The eight levels of the LSS are based on the amount of support required to maintain the sitting position and, for those children who can sit independently without support, the stability of the child while sitting.

Level	Descriptor
1	UNPLACEABLE
2	SUPPORTED FROM HEAD DOWNWARD
3	SUPPORTED FROM SHOULDERS OR TRUNK DOWNWARD
4	SUPPORTED AT PELVIS
5	MAINTAINS POSITION, DOES NOT MOVE
6	SHIFTS TRUNK FORWARD, RE-ERECTS
7	SHIFTS TRUNK LATERALLY, RE-ERECTS
8	SHIFTS TRUNK BACK- WARD, RE-ERECTS

### **LSS Administration**

The child is in a sitting position on a high mat or bench with the thighs supported to the back of the knees

and feet unsupported. The 'sitting position' is defined as follows:

The child's hips and trunk can be flexed sufficiently so that the trunk (defined by a line joining the first thoracic vertebra and the sacrum) is inclined at least 60°, and; the child's head position is either neutral with respect to the trunk or flexed, and; the position can be maintained for a minimum of 30 seconds, with due regard for the comfort and safety of the child.

**Note:** maintenance of sitting for 30 seconds is required to pass Levels 2 to 5. If the child has passed Level 5, it is not necessary to again maintain the position to pass Levels 6 to 8.

To assess the level of sitting, the child is first asked or assisted to assume the sitting position. If the sitting position is independently maintained for 30 seconds, the child is then requested to shift his trunk and re-erect or is further encouraged to do so by being offered a toy to reach. The highest sitting level (as described below) is recorded on the SPCM form:

**Level 1            Unplaceable**

*Child cannot be placed or held by one person in sitting position*

**Level 2            Supported from Head Downward**

*Child requires support of head, trunk and pelvis to maintain the sitting position*

**Level 3            Supported from Shoulders or Trunk  
                         Downwards**

*Child requires support of trunk and pelvis to maintain sitting*

**Level 4            Supported at Pelvis**

*Child requires support only at the pelvis to maintain sitting*

**Level 5            Maintains Position, Does Not Move**

*Child maintains the sitting position independently if he/she does not move limbs or trunk*

**Level 6            Shifts Trunk Forward, Re-erects**

*Child, without using hands for support, can incline the trunk at least 20° anterior to the vertical plane and return to the neutral (vertical) position*

**Level 7            Shifts Trunk Laterally, Re-erects**

*Child, without using hands for support, can incline the trunk at least 20° to one or both sides of midline and return to the neutral position*

**Level 8            Shifts Trunk Backward, Re-erects**

*Child, without using hands for support, can incline the trunk at least 20° posterior to the vertical plane and return to the neutral position*

**Alignment Section Items**

The alignment section of the SPCM is comprised of 22 items assessing static postural alignment. The predefined neutral sitting position (termed the "90-90-90" position) is the position in which the head and trunk are erect and each of the hip, knee, and ankle joints are at right angles. Each item assesses angular deviation of a

specific body segment from this predefined neutral position. Both the direction and magnitude of the angular deviation is estimated and recorded. For each item, operationally-defined categories of 'neutral' as well as 'mild', 'moderate', and 'severe' angular deviations are allocated scores of 4, 3, 2, and 1 respectively. Graphic representations and written description of postures are provided on the scoring sheet to facilitate item administration and scoring (Appendix 3).

### **General Administration Guidelines**

1. All Alignment Section items are administered while the child is sitting.
2. Alignment items are administered by observing the child in the sitting position and estimating the angular deviation of specified body segments
3. The therapist may palpate bony reference points when observing alignment but should not provide manual support or correct the child's position after initial correct placement of the child in the seat.
4. The large protractor or goniometer may be used as a visual aid for administration of many of the items.
5. The flexible curve is used to mark a line joining the two anterior superior iliac spines (ASIS's) of the pelvis to assist in administering items which use these reference points. The flexible curve is placed across the child's abdomen, joining both ASIS's. The ends of the curve are wrapped around the sides of the pelvis to hold the device in place. The position of the curve is checked between item administration to ensure correct positioning over the ASIS's is maintained.
6. Positions of the axial skeleton (with the exception of trunk rotation) are described according to their orientation in space. Limb joint positions are described

according to joint angle. In the item administration instructions the terminology used to describe body position is consistent with the manual published by the Terminology Task Group of the Rehabilitation Engineering Society of North America (Medhat & Hobson, 1992).

### **General Scoring Guidelines**

The 22 alignment items are grouped on the scoring form by the assessor's view of the subject (Appendix #3). This grouping of items into anterior, lateral and superior views provides a convenient sequence for item administration. The posture of the axial skeleton is represented by 12 items and the limb positions by 10 items. There are 4 scoring levels per item, with a score of 4 assigned to the neutral, erect sitting posture and scores of 3 to 1 representing mild, moderate and severe deviations from neutral. The total score for the alignment section may thus range from 34 to 88.

For each score category, a graphic representation of the midpoint of the angular deviation is provided on the score sheet and the angle range listed. To score the item, circle the picture in the row of selections which is closest to the estimated observed angle. If the child frequently changes position, select the picture which represents the most commonly sustained posture during testing. If the estimation is exactly between two scores, select the lower of the two scores (i.e. the greater postural deviations from neutral). When scoring the limb items, each side is scored separately by circling the posture of each limb. At the completion of the test, the numerical score for each item is entered in the right margin. Alignment item scores are added and a total section score is entered on the cover sheet. (See completed score sheet in Appendix #4)

## **Item Administration Guidelines**

In the following section, administration of each item is depicted through graphic illustration and description of reference points for palpation and visual observation. Instructions for the administration of each item are provided in italics following the bold item name and descriptor. Items in this section are sequenced in the same order as they appear on the scoring sheet.

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## Item

### Function Section Items

The function section of the SPCM is comprised of 12 items assessing the achievement of seated functions such as head and trunk control, reach, grasp, and release, bimanual manipulation, and wheelchair management. Each item involves the performance of a discrete functional movement task which is scored on an ordinal scale consisting of four criterion-referenced levels. Each subsequent level of the scale represents increasing task achievement.

### General Administration Guidelines

- 1 - All Function Section items are administered while the child is sitting
2. Because the SPCM is designed to measure functional skills rather than functional capacity, score only those responses which are observed during test administration, not those which are reported
3. If the seating system has an adjustable 'tilt-in-space' feature, tests are conducted at the tilt angle which is most often used by the child for the performance of upper limb activities. Information regarding the usual 'working' angle is obtained from the child or parent
4. Approximately one minute is allowed for motivating the child and completing each item. If several attempts are made during this time, score the best attempt
5. Use verbal and gestural encouragement but do not use "hands-on" assistance or support
6. A positioning board (see Equipment and Materials) is used for all items requiring reach, grasp or manipulation of objects. If the child's seating system includes a tray, the board rests upon the tray at the inclination regularly used by

the child. If the child's seating system does not include a tray, the board is held in a horizontal position by the assessor at approximately the child's waist height. A cushion may be placed on the child's lap or the armrests of the chair to help steady the board. In some cases, the location of the seating system components may necessitate a slightly higher placement of the board.

7. The following definitions apply to a number of the Function Section items:

**Arm Length:**

The distance from the acromion angle to the ulnar styloid process with the arm passively outstretched maximally and flexed approximately 90 degrees at the shoulder.

**Wheelchair:**

A manual or power mobility system regularly used by the child.

**Preferred Hand:**

The hand which is reported to be used most frequently by the child.

### General Scoring Guidelines

The Function Section items are sequenced on the scoring sheet to group items which assess head control, trunk control, upper limb functions, and wheelchair management. For each item, the criterion level of task achievement is described and assigned a score of one to four. A score of one is assigned to the lowest level of task achievement and a score of four is assigned to full task achievement. Scores of two and three represent levels of partial task achievement. To record the item score, circle the score for the highest level achieved by the child for each item. At the completion of the test, function

item scores are added and a total section score is entered on the cover sheet. (See completed score sheet in appendix #4).

#### Item Administration Guidelines

In the following section, item administration is described for each Function Section item.

## SEATED POSTURAL CONTROL MEASURE: FUNCTION SECTION

Circle score for each item.

Administer items 1 & 2 simultaneously, score separately. During a head lifting task, Item 1 assesses head alignment in the sagittal plane while Item 2 assesses head alignment in the frontal plane.

### 1. Lifts head upright and maintains 5 seconds

If child's head is not flexed forward prior to test, instruct or assist child to do so. Ask child to look up at a toy which is held in a position to encourage head raising. Encourage the child to hold the upright position for 10 seconds. When scoring this item, upright position of the head is defined as that position where central gaze is directed along the horizontal plane ( $\pm 15^\circ$  in sagittal plane).

1. does not initiate head lift
2. initiates a head lift
3. lifts head, does not attain upright, but holds for 5 sec
4. lifts head upright and maintains for 5 sec

### 2. Lifts head upright, in midline and maintains 10 sec

Score this item based on the performance of the task in Item 1. When scoring this item, midline position of the head is defined as that position where central gaze is directed along the horizontal plane ( $\pm 5^\circ$  in coronal plane)

- 1 does not initiate head lift
- 2 initiates a head lift but does not attain midline
- 3 attains midline but maintains for less than 10 sec
- 4 lifts head to midline and maintains for 10 sec

### 3. Leans forward, touches toy with preferred wrist or hand, re-erects

Place board 6" from child's stomach. Small toy (e.g., Duplo block) is placed on the board at child's **midline** at a distance one arm length anterior to the trunk midline. Ask the child to touch the toy.

1. does not lean forward and re-erect
2. leans forward but does not touch toy
3. leans forward, touches toy, but does not re-erect
4. leans forward, touches toy, re-erects

4. Leans forward and to right or left, touches toy with OPPOSITE hand, re-erects

The intent of this item is to obtain trunk rotation; either hand may be used. Small toy (e.g., Duplo block) is placed on the board in front of child on the opposite side to the reaching hand. Place toy one arm length along the target layout guide line (which runs 60 degrees from trunk midline) opposite to the reaching arm. Ask the child to touch the toy with preferred hand.

1. does not move trunk
2. leans towards toy but does not touch it
3. leans towards and touches toy with hand, does not re-erect
4. leans towards and touches toy with hand, re-erects

5. Lifts both upper arms free of support

Ask child to lift arms, or demonstrate arm lifting.

1. does not lift either upper limb off support
2. lifts **RIGHT or LEFT** upper limb off support **for less than 3 sec**
3. lifts one upper limb off support for 3 sec
4. lifts **BOTH** upper limbs off support for 3 sec

6. Reaches forward, grasps and releases toy with preferred hand

Place a small toy (e.g., Duplo block) on positioning board an arm length anterior to the trunk midline. Ask the child to pick up a toy and put it in a container. After the child has grasped the toy, place the container with a 5" diameter opening in a convenient location for the child to release the object.

1. does not touch toy
2. touches toy with palm or fingers
3. grasps toy and lifts it off board for 3 sec
4. releases toy into large container set down in a convenient place

7. Removes and replaces lid of screw-type jar

Ensure the lid is loosely screwed onto the jar. Jar placed on board anterior to child's midline at any location which accommodates child's attempts to grasp jar. Ask the child to open the jar.

1. does not touch jar
2. places one or both hands on jar
3. unscrews and removes jar lid
4. replaces jar lid and screws it closed

8. Picks up raisin (or Cheerio), places in mouth with preferred hand

Check with parent to determine whether child is able to safely eat raisins or Cheerios before administering this item. Place raisin or Cheerio on board at any location which accommodates child's attempts to pick up object. Ask the child to pick it up and put it in mouth.

1. does not touch raisin
2. touches raisin with tips of fingers and/or thumb
3. picks up raisin and holds 3 sec
4. releases raisin in mouth

9. Picks up pen, makes a mark on paper

Place a marker pen with cap removed (or the adapted pen/pencil used by the child) and an 8-1/2 x 11" paper placed midline on board, pen tip pointing toward child. Hold the paper still, then ask the child to make a mark on the paper with the pen.

1. does not grasp pen
2. grasps pen with one or both hands
3. grasps and lifts hand and/or pen clear of surface
4. marks paper with pen

10. Places dice in jar, one at a time, with preferred hand, in 30 sec

Place one die and open jar on board in front of child. Ask child to use one hand to place dice into jar, one at a time, as fast as possible. Set the next die down as soon as child has picked up the previously placed die. Repeat until all six dice have been placed. When placing the dice, avoid interfering with the child's performance.

1. does not place any dice in jar
2. places one die
3. places 2 to 5 dice
4. places 6 dice

11. Moves his/her wheelchair forward 45 feet in less than 30 sec

Ask the child to propel or drive his/her wheelchair forward along a wide corridor or across a large room with distances marked at 10 feet and 45 feet. (Score 1 if the child is using a mobility base which allows independent propulsion).

1. unable to move wheelchair forward
2. moves wheelchair forward 10' in less than 60 sec
3. moves wheelchair forward 45' in less than 60 sec
4. moves wheelchair forward 45 in less than 20 sec

12. Moves his/her wheelchair forward 10' along an 8' wide corridor, turns right or left 90' and passes through 33" doorway

From a starting position 10 feet away from a doorway, ask the child to drive forward and turn into doorway. Allow one practice trial to ensure child understands the task. Maximum of 60 seconds allowed for completion of the task. (Score 1 if the child is not using a mobility base which allows independent propulsion).

1. does not move wheelchair forward 10' without bumping into walls
2. moves wheelchair forward 10' but does not initiate a turn
3. moves wheelchair forward 10' turns and passes through doorway with wall contact
4. moves wheelchair forward 10', turns and passes freely through doorway

TOTAL SCORE FUNCTION SECTION

(MAX. = 48)