THE SEATING IDENTIFICATION TOOL (SIT)

Development, Testing and Guidelines
of the Seating Identification Tool

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I  INTRODUCTION

There is a growing body of knowledge that supports the premise that an optimum fit between a person and their wheelchair/seating system will improve mobility, function and comfort while reducing the need for restraint and repositioning and potentially decrease the incidence of decubiti ulcers. Clinical experience suggests that the fit is not always optimum and that frequently wheelchairs are used to 'store' individuals, especially in long-term care facilities. Ensuring that there is a good fit necessitates that an individual, usually a therapist with seating experience, assesses the situation. Unfortunately few long-term care facilities have seating therapists on staff. The health care providers in long-term care facilities generally make the decisions regarding the need for wheelchair and seating despite having little knowledge in this area. Identifying the need for assessment and intervention is the first step in ensuring appropriate equipment is provided.

A review of the literature revealed that there is no assessment tool that can assist health care providers who have limited understanding of issues related to wheelchair and seating prescription, to identify individuals who need a formal assessment. Given this dilemma a screening tool, the Seating Identification Tool (SIT), was developed to fill this need.

II  DEVELOPMENT OF THE SEATING IDENTIFICATION TOOL

To develop the SIT we used a modified form of the Delphi-Technique. The seating team, consisting of a PT and OT, developed a list of 25 items that were considered important indicators of the need for wheelchair/seating intervention. The 25 items were derived based on a review of the literature (Medline, CINAL, EMBASE) and the clinical experience of those involved. The list was circulated to 13 other health professionals in the fields of OT, PT and nursing in order to ensure that all possible indicators were included. The final list (which included no new additions) was compiled and operationalized into question format and circulated to the 13 member panel for feedback regarding the wording of the SIT items. Further we requested that the panel identify those items they thought were critical to include, those that were unimportant and those that were redundant. A total of 15 questions remained as a result of the panel review.

The SIT was then subject to a reliability and validity study. The results of this study (to be included in a subsequent version of these guidelines) indicated that four of the items generated unreliable results and two items
needed additional operationalization. The SIT was reduced to its current total of 11 items and subjected to a second round of study of the psychometric properties.

The present version of the SIT contains items from five different categories related to wheelchair use. These categories include: skin condition, comfort, positioning, stability and mobility.

III INSTRUCTION GUIDELINES FOR THE SEATING IDENTIFICATION TOOL

The Seating Identification Tool is a screening tool to assist caregivers to identify individuals who require seating and/or wheelchair intervention. The following definitions of the SIT items are designed to assist users to better understand the meaning behind the questions posed in the individual items. Further the descriptions guide the scoring of the SIT. We recommend that individuals who have little or no experience in the area of wheelchair and seating intervention review these guidelines prior to using the tool and keep the guidelines close by when using the SIT. Moreover, we recommend new users discuss any items that are unclear to them with an experienced therapist or one of the authors of this manual. Following these guidelines will assist in providing the best quality data. (Please Note: The SIT items in these guidelines are not presented in the “correct” numerical order. This was done to reduce redundancy of discussing items that have similar definitions (SIT items 1 and 3 and 2 and 4).

Collecting Data

A variety of techniques can be used to answer the SIT items. These techniques include observation, questioning the wheelchair user, their caregiver(s) or archiving their chart. The best technique depends on the rater who is completing the SIT. For example, caregivers are likely to have knowledge of the individual without having to access other sources. For the best quality of information we recommend that raters use multiple sources to cross-reference the information they are collecting.

ITEM 1: Has the individual had red areas on their bottom in the past 4 weeks?

Give a score of 2 for “Yes” and a score of 0 for “No”.

Common areas to consider are the buttocks (ischial tuberosities), coccyx, and hips (trochanters).

ITEM 3: Has the individual had red areas on their back in the past 4 weeks?

Give a score of 1 for “Yes” and a score of 0 for “No”.

Common areas to consider are the spinous processes of the thoracic, lumbar and sacral regions, scapulas and rib humps.
Definition: Red areas are defined as Stage 1 skin breakdown by the Agency of Healthcare Policy and Research (AHCPR) Guidelines (1994). See figure below.

ITEM 2: Has the individual had an open pressure sore on their bottom in the past 4 weeks? Give a score of 2 for “Yes” and a score of 0 for “No”.

ITEM 4: Has the individual had an open pressure sore on their back in the past 4 weeks? Give a score of 2 for “Yes” and a score of 0 for “No”.

Definition: Open pressure sores are defined as Stage 2, 3, 4 of the AHCPR Guidelines (1994). See figure below.

Please Note: Because of the similarities between items 1 and 3 and items 2 and 4 (eg skin that is broken down is also likely to be red), raters are encouraged to select either item 1 or 3 and either item 2 or 4, unless the area of skin breakdown is remotely different than the area that is red.
ITEM 5: Has the individual reported or demonstrated behaviours that indicate they could be in discomfort or pain while sitting for any length of time in the past 4 weeks? Give a score of 1 for “Yes” and a score of 0 for “No”.

Definition: Signs of discomfort or pain may be indicated by moaning, grimacing, crying, agitation or frequent weight shifting.

ITEM 6: Has the individual had difficulty propelling their wheelchair in the past 4 weeks? Give a score of 1 for “Yes” and a score of 0 for “No”.

Definition: This assumes the individual has the capability to self propel the chair through the use of hand and/or feet. Difficulty propelling the wheelchair may be the result of a chair that is too large, too high, inaccessibility of the hands to the rear wheels or feet to the floor. If the individual cannot move the chair, a score of 0 is given.

ITEM 7: Has the individual required repositioning as a result of sliding or leaning in the past 4 weeks? Give a score of 1 for “Yes” and a score of 0 for “No”.

Definition: The need for repositioning is the key criteria for this item. An indication that an individual has slid forward in their wheelchair is that there is a space between the back of the individual’s buttocks and the back of the wheelchair. Another indication is the individual appears to be slumped in their chair.

Below is an example of an individual in a proper seating position and an individual who is sliding forward in the wheelchair.

Definition: An indication that an individual is leaning in their wheelchair is that their head is not in midline, their shoulders are not level and they are laterally flexed through the trunk. They may be leaning over one side of the wheelchair.

Below is an example of an individual in a proper seating position and an individual leaning in a wheelchair.
ITEM 8: Has an anti-slide device such as a foam bolster, pommel, roll bar, posture pal, or posey restraint been used in the past 4 weeks?  
Give a score of 1 for “Yes” and a score of 0 for “No”.

Definition: A foam bolster is a 4-6” U-shaped foam covered with fabric that is fit across the individual’s abdomen and jams the individual into the chair. A pommel, which can be used therapeutically for positioning, is usually a wedge shaped piece of wood covered in foam and placed between the knees. A roll bar is a metal bar covered in foam in the shape of a rolling pin that attaches onto the wheelchair armrests and is placed in front of the individual’s abdomen. A posey restraint is a Y-shaped piece of fabric and webbing that is placed across the individual’s hips and down under their groin area and is usually tied around the back of the chair. Below are two common examples of restraints.

Please Note: The use of physical restraint devices in wheelchair and seating prescription is problematic and controversial. In many cases an individual’s wheelchair system may be adequate however, a physical restraint may have been ordered for such reasons as preventing falls, family wishes or facility policy. Restraints are also occasionally used to achieve “positioning” goals. Proper scoring of the SIT requires raters to identify the reason such devices are used. A score of 1 should be assigned if the device is being used to position the individual.

ITEM 9: Have rolled blankets, pillows or homemade devices been used to prevent leaning in the past 4 weeks?  
Give a score of 1 for “Yes” and a score of 0 for “No”.

Definition: These homemade solutions are usually stuffed into spaces between the individual and their wheelchair. This is indicative of a wheelchair that is too large for the individual or there is a lack of trunk and pelvic support.

ITEM 10: Has the individual not been using a wheelchair seat cushion in the past 4 weeks?  
Give a score of 2 for “Yes” and a score of 0 for “No”.

A wheelchair cushion should offer comfort, positioning and pressure reduction. A folded flannel, sheepskin, pillows and open cell foam are not appropriate cushions. Immediately below are examples of “unsuitable” or inappropriate wheelchair cushions.

a. Clockwise from top: folded flannel, folded sheet, sheepskin.  
b. Clockwise from top: pillow, open cell foam, kitchen chair cushion.
Proper wheelchair cushions are available in prefabricated commercial forms or may be custom made. Cushions generally fall into three categories: foam, gel/foam combinations or air. They usually have a removable cover. Immediately below are examples of appropriate wheelchair cushions.

Clockwise from top: air cushion, foam cushion with cover, gel/foam combination cushion with cover.

Please Note: Several geriatric wheelchairs chairs (see below) have “built in” cushions. The authors advocate against the use of unsuitable cushions or cushions identified as appropriate (as identified above) in geriatric wheelchairs that have “built in” cushions. In this instance the score for SIT item 10 should be recorded as a 2.

ITEM 11: Has the individual tipped their wheelchair or been at risk of tipping their wheelchair in the past 4 weeks? Give a score of 1 for “Yes” and a score of 0 for “No”.

Definition: This is indicative of a wheelchair that is not stable and can be found among agitated and bariatic individuals. To score a “Yes” for this item risk of tipping can include rocking the chair backwards and side to side so that all four wheels are not in contact with the ground at any one time. Otherwise, score this item as “No”.

Types of Wheelchairs

The SIT also collects information on the type of chair the individual is currently using. The following are examples of different types of chairs.

1. Geriatric Wheelchair

A geriatric chair, also called geri chairs is a seating system that has the seat and back cushion “built in”. Geri chairs are generally a one size fits all system that allows minimal adjustment for individual fitting. Further these chairs are difficult if not impossible for the wheelchair user to move as there is no large “push” wheel.

These are examples of geriatric chairs.

a. Geri-chair 

b. Broda geri-chair

c. Horizon geri-chair
2. Standard Manual Wheelchair

A standard manual wheelchair has a seat and back frame with armrests and footrests. There are large wheels in the back which are usually 22” or 24”. There are front casters (small rotating wheels) which are usually 6 or 8 inches. It does not tilt or recline.  

This is an example of a standard manual wheelchair.

3. Broda Wheelchair

A Broda chair has webbing across the back and seat frame. It usually reclines and/or tilts. It has front casters and can have rear casters or large rear wheels. It is not compatible with the majority of commercial seating components. This type of chair is difficult for self-mobilization and can be difficult to push also.

This is an example of a Broda chair.

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1 Tilt occurs when the wheelchair back and seat can be rotated backwards allowing the person to be tipped backward (see #4 below). Recline occurs when only the chair back slants backward but the seat position remains static.
4. Tilt-in-Space Wheelchair

A tilt-in-space wheelchair looks very similar to a standard manual wheelchair however it can tilt back. It usually has large rear wheels from 12” to 24” diameter and small front casters. It is compatible with commercial seating components that are available “off the shelf” at local wheelchair suppliers or with custom seating.

This is an example of a tilt-in-space manual wheelchair.

IV SCORING THE SIT

The SIT consists of 11 items that assess five areas related to wheelchair and seating issues (skin conditions or pressure areas, discomfort behaviors, mobility, positioning and stability). All of the item responses are recorded as either a yes or no. A score is given for a positive response (yes) to all items. All responses are scored as 1 except for items 1, 2, 4 and 10, which are weighted as 2 (see table below). These items were weighted with a score of 2 as they are considered to leave the individual at a higher level of risk of other health complications. The responses are summed to provide a total score that ranges from 0 (no need for intervention) to 15 (serious need for intervention). A score of 2 or higher is indicative of a need for a formal intervention by a therapist with wheelchair and seating experience.

<table>
<thead>
<tr>
<th>Category</th>
<th>SIT Item Numbers</th>
<th>Score Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Condition or Pressure Area</td>
<td>1, 2, 4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Discomfort</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Positioning</td>
<td>7, 8, 9</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Mobility</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Stability</td>
<td>11</td>
<td>1</td>
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V RESEARCH

To date the SIT has been subjected to two separate studies in order to determine the reliability and validity and a third study is currently being implemented. The second study was conducted to assess the psychometric properties after the SIT had been modified to improve the operationalization based on results and feedback from the first study. Here we present a brief review of the results of the psychometric testing of the SIT from the second study. The study objectives were to assess: i) inter-rater reliability; ii) test-retest reliability; and iii) the concurrent validity of the SIT.

A test-retest design was used to assess the psychometric properties of the SIT on a sample of 43 residents. The subjects were randomly selected from a list of all wheelchair users at a long-term care facility in London, Ontario, Canada. To be included subjects had to be 60 years of age or older and had to be using a wheelchair as their primary seating and/or mobility device. Two assessors, both health care providers with no wheelchair/seating experience, who knew the residents, were selected to administer the SIT on two separate occasions, two weeks apart. As there is no gold standard the assessment of an experienced seating therapist provided an indication of the concurrent validity. The seating therapist assessed the subjects within 2-6 hours of the first application of the SIT. At no time did the seating therapist have access to any of the rater’s SIT results.

Analyses
The intra-class correlation coefficient (ICC) was derived to assess total score test-retest and intra-rater reliability and Cohen's Kappa was used to assess item by item reliability. Sensitivity and specificity statistics were derived to assess the validity of the SIT.

Study Results
One resident died before the final study was complete. Of the remaining 42 subjects, 39 were female. The sample had a mean age of 83.2 years. Inter-rater reliability was ICC=0.83 and the two week test-retest reliability was 0.86. Individual item inter-rater agreement ranged from 0.29-1.00 and test-retest agreement ranged from 0.25-1.00. The sensitivity of the SIT was 100% and the specificity was 65%. The positive predictive value was 80%.

Discussion
The SIT was found to have good reliability and validity when used among health care providers who had little or no seating experience. It is possible that further development of the SIT may improve the specificity, however, as there are no serious implications resulting from having an assessment, improving the specificity is not considered to be critical. In summary, the SIT is a tool that can assist health providers, with limited knowledge of seating and wheelchair issues, to identify individuals who need a formal seating/wheelchair assessment.
VI REFERENCES


Statistics Canada, Selected Nation Series Macrodata, Population by Five-Year Groups (12A), 1996 Census form 93F0022XDB96002

Recognition: Special thanks goes out to those subjects who helped us with various SIT projects and Nora Dun (OT student) who assisted with the creation of the manual.
# Seating Identification Tool (SIT)

<table>
<thead>
<tr>
<th><strong>Within the Last Four (4) Weeks:</strong></th>
<th><strong>Yes</strong></th>
<th><strong>No</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Has the individual had red areas on their bottom?</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2) Has the individual had an open pressure sore on their bottom?</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3) Has the individual had red areas on their back?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4) Has the individual had an open pressure sore on their back?</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5) Has the individual reported or demonstrated behaviours that indicate they could be in discomfort or pain while sitting for any length of time? (such as moaning, grimacing, or agitation)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6) Has the individual had difficulty propelling their wheelchair? (<em>if the individual does not propel their wheelchair circle 0</em>)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7) Has the individual required repositioning as a result of sliding or leaning?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>8) Has an anti-slide device such as a foam bolster, pommel, roll bar, posture pal, or posey restraint been used?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>9) Have rolled blankets, pillows or homemade devices been used to prevent leaning?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10) Has the individual <em>not</em> been using a wheelchair seat cushion? (<em>do not include linens, pillows, incontinence pads, or home made foam cushions</em>)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>11) Has the individual tipped their wheelchair or been at risk of tipping their wheelchair?</td>
<td>1</td>
<td>0</td>
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</table>

**Overall Score**

The overall score is the sum of all items. Scores greater than or equal to two indicate a need for intervention. The higher the overall score the greater the need for intervention. Intervention may include formal assessment or education.