The Wheelchair Skills Program Manual

Version 4.3

“low tech, high impact”

Editorial Committee
R. Lee Kirby, MD, Halifax, Canada (Chair)
Cher Smith, BScOT, MSc, Halifax, Canada
Kim Parker, MAsc, PEng, Halifax, Canada
Mike McAllister, PhD, Halifax, Canada
Joy Boyce, Hons, BScOT, Halifax, Canada
Paula W. Rushton, PhD, Montreal, Canada
François Routhier, PhD, Quebec City, Canada
Krista L. Best, PhD, Quebec City, Canada
Diane MacKenzie, PhD, Halifax, Canada
Ben Mortenson, PhD, Vancouver, Canada
Åse Brandt, PhD, Odense, Denmark

Suggested citation: Kirby RL, Smith C, Parker K, McAllister M, Boyce J, Rushton PW,
Routhier F, Best KL, Diane MacKenzie, Mortenson B, Brandt A. The Wheelchair Skills
Program Manual. Published electronically at Dalhousie University, Halifax, Nova Scotia,

For further information, contact: wsp@dal.ca
TABLE OF CONTENTS

1. Introduction to the Wheelchair Skills Program .......................................................... 13
   1.1. Scope .................................................................................................................. 13
   1.2 Subjects ............................................................................................................. 13
   1.3 Special considerations for caregivers ................................................................. 13
   1.4 The circle of education ....................................................................................... 14
   1.5 Cost-effectiveness of the Wheelchair Skills Program ........................................... 14
   1.6 Languages ......................................................................................................... 14
   1.7 Initial interview ................................................................................................. 14
   1.8 Wheelchair and subject set-up .......................................................................... 15
   1.9 Getting out of the wheelchair to accomplish a task ........................................... 15
   1.10 Starting positions ............................................................................................ 15
   1.11 Warnings to subject ......................................................................................... 16
   1.12 Wheelchair Skills Program personnel ............................................................ 16
   1.13 Versions of the Wheelchair Skills Program ..................................................... 18
   1.14 Individual skills .............................................................................................. 18
   1.15 Skill levels ...................................................................................................... 18
   1.16 Skill groups .................................................................................................... 20
   1.17 Wheelchair Skills Program forms .................................................................... 22

2. Introduction to the assessment of wheelchair skills .................................................. 23

3. The Wheelchair Skills Test (WST) ........................................................................... 24
   3.1 Setting and equipment needed .......................................................................... 24
   3.2 Indications ......................................................................................................... 24
   3.3 Contraindications ............................................................................................. 24
   3.4 General instructions to test subject ................................................................ 25
   3.5 Feedback .......................................................................................................... 25
   3.6 Disclaimer re sensitivity and specificity ........................................................... 25
   3.7 Number of attempts permitted ......................................................................... 26
   3.8 Use of aids ....................................................................................................... 26
   3.9 Scoring of individual skills on capacity ........................................................... 26
   3.10 Comments ....................................................................................................... 28
   3.11 Training goals ................................................................................................. 28
   3.12 Timing ............................................................................................................. 29
   3.13 Rests and breaks ......................................................................................... 29
   3.14 Order of tests ............................................................................................... 29
   3.15 Left- versus right-sided components of skills ................................................. 30
   3.16 Minimizing ways in which training can invalidate WST scores ..................... 30
   3.17 Calculated scores ......................................................................................... 30
   3.18 WST test report ............................................................................................ 31

4. The Wheelchair Skills Test Questionnaire (WST-Q) ............................................. 32
7. Individual skills ................................................................. 61
   7.1 Moves controller away and back ..................................... 63
   7.2 Turns power on and off ............................................... 66
   7.3 Selects drive modes and speeds ..................................... 69
   7.4 Disengages and engages motors .................................... 72
   7.5 Operates battery charger ............................................. 75
   7.6 Rolls forwards short distance ....................................... 79
   7.7 Rolls backwards short distance ..................................... 87
   7.8 Turns in place ............................................................ 91
   7.9 Turns while moving forwards ....................................... 95
   7.10 Turns while moving backwards .................................... 100
   7.11 Maneuvers sideways ................................................ 103
   7.12 Reaches high object ................................................ 107
   7.13 Picks object from floor .......................................... 111
   7.14 Relieves weight from buttocks .................................. 114
   7.15 Operates body positioning options ............................... 119
   7.16 Level transfer .......................................................... 123
   7.17 Folds and unfolds wheelchair ..................................... 133
   7.18 Gets through hinged door ......................................... 138
   7.19 Rolls longer distance ............................................... 144
   7.20 Avoids moving obstacles .......................................... 147
   7.21 Ascends slight incline ............................................ 151
   7.22 Descends slight incline ........................................... 156
   7.23 Ascends steep incline ............................................. 161
   7.24 Descends steep incline .......................................... 164
   7.25 Rolls across side-slope ........................................... 166
   7.26 Rolls on soft surface ............................................. 171
   7.27 Gets over threshold ............................................... 177
   7.28 Gets over gap ...................................................... 183
   7.29 Ascends low curb ................................................ 187
   7.30 Descends low curb ................................................. 192
   7.31 Ascends high curb ................................................ 196
   7.32 Descends high curb ............................................... 199
   7.33 Performs stationary wheelie ..................................... 202
   7.34 Turns in place in wheelie position .............................. 209
   7.35 Descends steep incline in wheelie position ................... 216
   7.36 Descends high curb in wheelie position ....................... 219
   7.37 Gets from ground into wheelchair ............................... 219
   7.38 Ascends stairs ..................................................... 225
   7.39 Descends stairs ................................................... 231

8. Games ............................................................................. 235
   8.1 Line game .................................................................. 236

WSP 4.3 originally approved for distribution and use: November 6, 2015
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>169</td>
<td>8.2 Traffic lights.</td>
<td>237</td>
</tr>
<tr>
<td>170</td>
<td>8.3 Gears.</td>
<td>238</td>
</tr>
<tr>
<td>171</td>
<td>8.4 What time is it Mr. Wolf?</td>
<td>239</td>
</tr>
<tr>
<td>172</td>
<td>8.5 Red light, green light.</td>
<td>240</td>
</tr>
<tr>
<td>173</td>
<td>8.6 Follow the leader.</td>
<td>241</td>
</tr>
<tr>
<td>174</td>
<td>8.7 Trains.</td>
<td>242</td>
</tr>
<tr>
<td>175</td>
<td>8.8 Slalom.</td>
<td>243</td>
</tr>
<tr>
<td>176</td>
<td>8.9 Orienteering.</td>
<td>244</td>
</tr>
<tr>
<td>177</td>
<td>8.10 Go fish.</td>
<td>245</td>
</tr>
<tr>
<td>178</td>
<td>8.11 Circle game.</td>
<td>246</td>
</tr>
<tr>
<td>179</td>
<td>8.12 Relay race.</td>
<td>247</td>
</tr>
<tr>
<td>180</td>
<td>8.13 Shrinking space.</td>
<td>248</td>
</tr>
<tr>
<td>181</td>
<td>8.14 What’s your clearance?</td>
<td>249</td>
</tr>
<tr>
<td>182</td>
<td>8.15 Case open and shut.</td>
<td>250</td>
</tr>
<tr>
<td>183</td>
<td>8.16 Stormy seas.</td>
<td>251</td>
</tr>
<tr>
<td>184</td>
<td>8.17 Simon says.</td>
<td>252</td>
</tr>
<tr>
<td>185</td>
<td>8.18 Reverse limbo.</td>
<td>253</td>
</tr>
<tr>
<td>186</td>
<td>8.19 Garbage-can basketball.</td>
<td>254</td>
</tr>
<tr>
<td>187</td>
<td>8.20 Beach ball chaos.</td>
<td>255</td>
</tr>
<tr>
<td>188</td>
<td>8.21 Horse</td>
<td>256</td>
</tr>
<tr>
<td>189</td>
<td>Appendix 1. Lesson plans</td>
<td>257</td>
</tr>
<tr>
<td>190</td>
<td>Appendix 2. Sample outline for a series of group training sessions</td>
<td>259</td>
</tr>
</tbody>
</table>

WSP 4.3 originally approved for distribution and use: November 6, 2015
WARNINGS, DISCLAIMERS AND CONDITIONS OF USE

Some of the wheelchair skills addressed in the Wheelchair Skills Program materials can be dangerous and result in severe injury or death if attempted without the assistance of trained personnel. Attempting these skills may not be appropriate for some wheelchair users or caregivers. If the skills are attempted, for assessment or training purposes, one or more experienced spotters should be available to intervene. The ultimate responsibility for safety during the performance of wheelchair skills lies with the person performing the skills. Even if a spotter acts properly, injuries can occur. Safely performing a skill in the supervised Wheelchair Skills Program context provides no guarantee that the same or similar skills will be performed safely on other occasions.

The information in this Manual is provided for information and educational purposes only. The information is not intended to be and does not constitute healthcare advice. Any decision concerning the health, treatment and/or wheelchair of a wheelchair user or caregiver should be made in consultation with a qualified health-care professional. The members of the team who developed the Wheelchair Skills Program, the members of the Editorial Committee, Dalhousie University and the Nova Scotia Health Authority are not responsible for any injuries or deaths arising from the use of the WSP materials. Users of these materials assume full responsibility for their actions.

Anyone wishing to use the Wheelchair Skills Program materials may do so without permission or charge, as long as they accept and comply with the Conditions of Use posted on the Wheelchair Skills Program website (http://www.wheelchairskillsprogram.ca/eng/conditions.php).
ACKNOWLEDGEMENTS

This Manual, like the other materials in the Wheelchair Skills Program, has resulted from the work of many people. Those who have had the greatest recent involvement constitute the members of the Editorial Committee, whose names are shown on the title page.

The list of colleagues who have contributed and research funding agencies that have supported our work is extensive and continues to grow. Their names are noted in specific published papers, which can be found on the Wheelchair Skills Program website (www.wheelchairskillsprogram.ca/eng/publications.php).

Similarly, our work would not have been possible without the many excellent papers, textbooks and training manuals that have been published by others. Some of this literature has been acknowledged in the reference sections of our published papers and the Suggested Reading section.
LIST OF ABBREVIATIONS

- CG  Caregiver
- NP  Not possible
- RAD Rear anti-tip device
- SCI Spinal cord injury
- SU  Scooter user
- TE  Testing error
- UN  United Nations
- WC  Wheelchair
- WCU Wheelchair user
- WHO World Health Organization
- WSP Wheelchair Skills Program
- WST Wheelchair Skills Test
- WSTP Wheelchair Skills Training Program
- WST-Q Questionnaire version of the WST
PROLOGUE

In the 2008 World Health Organization (WHO) Guidelines on the Provision of Wheelchairs in Less-Resourced Settings (www.who.int/disabilities/publications/technology/wheelchairguidelines/en/), it was estimated that there were 65 million people globally who would benefit from wheelchairs but that 20 million of these people did not have access to them. The prevalence of wheelchair use is rising, in part due to the aging of the population. Of the wheelchairs in use in highly developed parts of the world, about 70% are manual wheelchairs, with the remainder divided about equally between powered wheelchairs and scooters.

The wheelchair is arguably the most important therapeutic tool in rehabilitation. Research studies have documented such benefits as improved mobility, improved participation, reduced caregiver burden and reduced likelihood of placement in long-term-care facilities. Yet, despite the importance of wheelchairs, they are far from perfect. Many wheelchairs are inappropriate for their users, fit them poorly or are poorly set up. Repairs are needed often and many wheelchair users suffer from acute or chronic injuries due to wheelchair use. Improvements in safety often come at the expense of performance and vice versa. For instance, a highly stable manual wheelchair may be less likely to tip over, but will create problems when the wheelchair user attempts to unload the front wheels (casters) to overcome obstacles. Inaccessibility restricts the usefulness of wheelchairs for some users.

The manner in which people receive wheelchairs varies widely. At the “commodity” end of the spectrum, a wheelchair can be purchased without any clinical input, “over the counter” at the corner drugstore. Optimally, as described by the 2008 WHO Guidelines on the Provision of Wheelchairs in Less Resourced Settings, there is a care pathway that includes assessment by professionals, the development of a prescription with the involvement of the wheelchair user and family, assistance (if needed) with the organization of funding for the wheelchair, proper fitting and adjustment of the wheelchair, training of the wheelchair user and caregiver in maintenance and handling skills, and long-term follow-up for refinements, routine servicing and periodic replacement.

Two important elements in this care pathway are wheelchair skills assessment and training for wheelchair users and their caregivers. The Wheelchair Skills Program is a set of assessment and training protocols related to wheelchair skills. Wheelchair skills assessment and training are topics that have received relatively little attention until the past two decades. What has spurred current interest in this topic has been an accumulating body of research evidence.

Skill in wheelchair use is not an end in itself, it is a means to an end. In terms of the WHO’s International Classification of Function (2001), wheelchair skills are “activities”. The ability to perform them represents “capacity” and their use in everyday life represents “performance”. The purpose of these activities is to overcome barriers in the environment and to thereby permit the wheelchair user to fulfill his/her desired role in society (“participation”). Other potential benefits of wheelchair-skills training for wheelchair users and caregivers include fewer acute and overuse injuries, an improved sense of wellbeing (through self-esteem, confidence and personal control,
the sense of becoming newly enabled, empowered and having accomplished something of
worth), improved development (of children) and having fun.

In addition to or instead of learning wheelchair skills, there may be alternative ways to
accomplish the learner’s goals (e.g. by changing wheelchairs, by accepting the assistance of a
caregiver or by eliminating accessibility barriers). Alternatively, if the goal of performing a
wheelchair skill proves not to be feasible one, the most appropriate strategy may be to assist the
learner in adjusting his/her expectations to a more realistic level.

Although there are many similarities in how to best perform a skill, regardless of the
characteristics of the wheelchair user and the impairments that have led to wheelchair use, there
are also differences. What is safe and effective for a young fit woman with incomplete paraplegia
may be different for a middle-aged overweight man with complete tetraplegia, and even more
different for the elderly foot-propelling person with a stroke.

The characteristics of the wheelchair – its features, fit and setup – can have major effects on skill
performance. In helping improve the safety, effectiveness and efficiency of wheelchair use,
service-delivery providers should try to optimize the wheelchair user (e.g. by improving strength
or range of motion), the wheelchair (e.g. by moving the axles of a manual wheelchair forwards
or adjusting the programming of a powered wheelchair) and/or training.

Major independent bodies such as the United Nations (UN) (Convention on the Rights of
Persons with Disabilities, 2006) and the WHO (Guidelines on the Provision of Wheelchairs in
Less-Resourced Settings, 2008) have endorsed the importance of this topic.

The Wheelchair Research Team at Dalhousie University and the Nova Scotia Health Authority
(specifically the Nova Scotia Rehabilitation Centre Site) in Halifax, Nova Scotia, Canada began
in the early 1980’s with a research project to determine why rehabilitation professionals were
observing that recently developed lightweight wheelchairs were tipping over as often as they
were. This was followed by a series of research studies that developed testing methods and
answered questions about the nature of static and dynamic stability of occupied wheelchairs.

The work on dynamic stability led to the development of the Wheelchair Skills Test (WST) in
1996 as a means of assessing the ability of wheelchair users to safely perform the skills they
needed in their everyday lives. Subsequently, a questionnaire version (the WST-Q) has been
added. There has been a growing number of peer-reviewed papers
(www.wheelchairskillsprogram.ca/eng/publications.php) about the measurement properties of
the WST/WST-Q or that have used the WST/WST-Q as an outcome measure in other studies.

Having developed a useful measurement tool, it became apparent that many wheelchair users
could not perform all of the skills that might be helpful to them. This led to the development of
the Wheelchair Skills Training Program (WSTP), using the best available evidence on motor
skills learning principles and the best available evidence on wheelchair skill techniques. Since
then, there have been a growing number of peer-reviewed papers
The Wheelchair Skills Program is a set of protocols for the assessment and training of wheelchair skills – the WST/WST-Q and WSTP respectively. The Wheelchair Skills Program has expanded its scope from manual wheelchairs to include powered wheelchairs and scooters, and to include caregivers in addition to wheelchair users. The Wheelchair Skills Program website, all of the materials on which are provided free of charge, had 97,818 visits from 62,971 users in 175 countries as of December 31, 2015. Members of the Wheelchair Research Team have provided practical training on the Wheelchair Skills Program to therapists in a number of countries around the world, in both highly developed and less-resourced settings. The Wheelchair Skills Program is now recognized by a variety of national and international organizations.

The Wheelchair Skills Program has evolved over time, in response to feedback and our experience with it. Various iterations of the Wheelchair Skills Program – #1.0, 2.4, 3.2, 4.1, 4.2 and 4.3 to date – have been released for general use. Wheelchair Skills Program 4.3 (that is the basis for this Manual) was originally released for use on November 6, 2015. Even within the lifespan of an iteration, the Wheelchair Skills Program materials are periodically updated. As such, the materials are “living” rather than fixed. If the iteration number has not changed (e.g. from 4.2 to 4.3) despite an update, it is because the changes have been deemed by the Editorial Committee to be predominantly of a minor nature. However, for academic purposes, users of the Wheelchair Skills Program materials should cite the date of the iteration that they use. This can be found in the footer of each page.

Wheelchair Skills Program 4.3 is different from Wheelchair Skills Program 4.2 in the following notable ways:

- The skill set has evolved slightly.
- Some of the skills have been renamed to make them easier to understand.
- The order of the skills has been revised to better reflect their relative difficulty.
- Confidence scoring has been added to the WST-Q.

The Wheelchair Skills Program is different from most other resources on wheelchair skills in a number of ways:

- It is based on the best evidence of which we are aware on how to perform, assess and teach wheelchair skills.
- Where there are gaps in evidence, ongoing evaluation of the Wheelchair Skills Program has been initiated with as much scientific rigor as possible.
- The process and sequence of the training has evolved.
- The materials are continuously being updated.
- The Wheelchair Skills Program deals with both assessment and training.
- The Wheelchair Skills Program deals with the skills of the wheelchair users themselves, alone or in combination with their caregivers.
The Wheelchair Skills Program deals with the full spectrum of wheelchair users (e.g. hand propellers such as those using wheelchairs due to spinal cord injury as well as foot propellers such as those using wheelchairs due to stroke or dementia).

The Wheelchair Skills Program deals with manual wheelchairs, powered wheelchairs and scooters.

All of the materials on the Wheelchair Skills Program website have been made available free of charge (“open source”).

In this Manual, we have attempted to provide a wide spectrum of readers with comprehensive but easily understandable materials. The target audience includes practicing and student rehabilitation therapists (e.g. occupational, physical and recreational), their aids and assistants, rehabilitation nurses and rehabilitation medicine physicians and residents. In addition to clinicians, we hope that researchers and their staff will find the Manual to be a useful resource. Additionally, because we have written the material in plain language, many wheelchair users and caregivers should be able to understand the content. Because the assessment and training of wheelchair skills are low-tech and the training program is high-impact, the Wheelchair Skills Program is equally relevant for highly developed and less-resourced parts of the world.

As recommended in the WHO Guidelines, a new wheelchair user should go through an 8-step process in the course of his/her wheelchair service delivery. One of those steps is assessment. As part of this assessment, the wheelchair skills of the wheelchair user should be assessed. This should be done at intake, as part of the prescription and fitting steps (e.g. to compare how well the wheelchair user can perform skills with a rigid versus a folding wheelchair, or with the rear axles in more and less stable positions) and during follow-up to determine what revisions in the wheelchair are needed. The assessment can be performed using the WST or the WST-Q. Another WHO step is training, that includes wheelchair skills training of the wheelchair user and/or caregiver. For this training, the WSTP can be used during the initial provision of the wheelchair and as necessary at follow-up. The WHO’s eight steps of wheelchair service delivery need not be sequential and are often iterative. For instance, following training, it may be possible to revise the prescription and set-up.

This Manual provides chapters dealing with overviews of the Wheelchair Skills Program, the assessment of wheelchair skills, the WST, the WSTP and safety issues. Following that, each of the individual skills that make up the Wheelchair Skills Program skill set are dealt with in detail. At the end of the Manual, there is a chapter on games that can be played to reinforce learning. A section on suggested reading provides a starting point for those interested in further study. Finally, appendices provide some options regarding the organization of training sessions for individuals or groups.

We welcome feedback on any aspect of the WSP. Please send your suggestions and questions to wsp@dal.ca.
1. INTRODUCTION TO THE WHEELCHAIR SKILLS PROGRAM

1.1 Scope
The Wheelchair Skills Program is intended for manual wheelchairs or powered wheelchairs, operated by wheelchair users or caregivers. The Wheelchair Skills Program can also be used for scooter users. Whenever appropriate in the Manual, the word “wheelchair” should be understood to include scooters. Throughout the Manual, to simplify descriptions, unless otherwise specified it has been assumed that the wheelchair being used is one with rear-wheel drive (i.e. large diameter wheels in back and smaller diameter swivel casters in front). Other types of wheelchairs and scooters can be dealt with using Wheelchair Skills Program materials, but some of the instructions and explanations may need to be adapted accordingly. Wheelchair technology is diverse and evolving at a rapid rate. There may be wheelchairs that do not easily fit the categories described. In such situations, the tester or trainer needs to exercise judgement regarding which skills are appropriate. For instance, for pushrim-activated, power-assisted wheelchairs, a combination of skills from the manual and powered wheelchair skill sets would be appropriate.

The Wheelchair Skills Program is not intended to be an adequate approach for other important wheelchair skills (e.g. maintenance and repair skills), more extreme skills (e.g. some wheelchair sport activities) or community-integration activities that combine a number of skills (e.g. use of accessible transport, shopping). The skills chosen for inclusion in the Wheelchair Skills Program are intended to be representative of the range of skills that wheelchair users and/or caregivers may need to regularly perform, varying from the most basic to the more difficult. However, it would be impossible to be all-inclusive without making the size of the Wheelchair Skills Program unmanageable.

1.2 Subjects
In the Manual, the term “subject” is often used because the person who is the object of testing or training may be a wheelchair user, a caregiver, a health-care student or a research participant. In addition to testing or training for a wheelchair user and a single caregiver separately, the Wheelchair Skills Program may be used to assess or train the extent to which one or more caregivers and a wheelchair user can function as a team; the “subject” in such situations is the combination of the wheelchair user and the caregiver(s). Unless otherwise specified, the assumption is that it is a single person operating alone who is the subject. If an animal (e.g. a service dog) is used to assist with a skill, the animal is considered an “aid” rather than a caregiver.

1.3 Special Considerations for Caregivers
If the usual circumstance for a skill in real life is that a wheelchair user and his/her caregiver ordinarily share the duties, then “blended” wheelchair user/caregiver testing or training may be the most appropriate choice, but the relative roles of the two people involved should be noted. It is not a reasonable expectation that a single caregiver could complete some skills alone without special equipment or the cooperation of the wheelchair user. The score achieved is often a combination of the capacity of the wheelchair user and caregiver functioning together (i.e. a “blended” score). The caregiver-assisted score is specific not only to the wheelchair and setting (as is the case for the WST in general), but is also specific to the wheelchair user being assisted.
In addition to physical assistance, caregiver assistance may be just the presence of the caregiver (for reassurance, moral support, spotting) without necessarily any cues being provided (i.e. “standby assistance”). If a caregiver is the subject of testing, he/she must meet the same criteria used for the wheelchair user (e.g. keeping the caregiver’s feet as well as the wheelchair wheels inside any designated limits). Special additional caregiver considerations are noted in the later section on individual skills.

### 1.4 The Circle of Education

Assessment and training are both elements in the classical circle of education. In this circle, one begins with an assessment (the WST or WST-Q) to identify the learner’s starting point. From this, the educational objectives are individualized. This is followed by the curriculum (the training program), aimed at meeting these objectives. This is followed by another assessment to confirm that the objectives have been met. If not, the cycle continues.

### 1.5 Cost-effectiveness of the Wheelchair Skills Program

Although no formal studies of cost-effectiveness have yet been conducted, we do have some basis for believing the Wheelchair Skills Program to be highly cost-effective. The WST requires an average of about 30 minutes to conduct and the WST-Q about 10 minutes. The training studies to date suggest that improvements in capability can be accomplished with as little as 4 hours of training (although many more are recommended). No equipment is required, only trained personnel. For personnel, we generally recommend occupational or physical therapists or their assistants. However, we have also had good results when using university students or research assistants as trainers. Learning a new skill lasts a lifetime, unlike strength or endurance training that requires ongoing efforts to maintain benefits. For all of these reasons, the Wheelchair Skills Program can be considered to be a cost-effective intervention that would compare favorably with other rehabilitation assessment measures or interventions.

### 1.6 Languages

The Wheelchair Skills Program was originally developed in the English language. It has since been translated by a team led by Francois Routhier (a member of the Wheelchair Skills Program Editorial Committee) into French ([www.wheelchairskillsprogram.ca/fre](http://www.wheelchairskillsprogram.ca/fre)). Translation into other languages is encouraged and we are aware of some initiatives in other countries (to some of which the Wheelchair Skills Program website provides links – [http://www.wheelchairskillsprogram.ca/eng/links.php](http://www.wheelchairskillsprogram.ca/eng/links.php)).

### 1.7 Initial Interview

Wheelchair skills assessment and training in the clinical setting usually takes place as part of a broader process related to the wheelchair user’s and/or caregiver’s health, function and context. Prior to beginning testing or training, the tester or trainer should screen the subject for the ability to communicate and should obtain consent to proceed. If appropriate, demographic, clinical and wheelchair-related data are recorded. These data may be obtained from the wheelchair user, the caregiver and/or the health record.
1.8 Wheelchair and Subject Set-up

The wheelchair user and/or caregiver should be dressed and equipped as usual (e.g. wearing artificial limbs or braces) when using the wheelchair. The wheelchair should be set up as usual for that user. This is important because changes in the personal equipment or wheelchair set-up can affect how and how well the skills are performed.

If the wheelchair has user-adjustable features that could affect handling (e.g. rear anti-tip devices for a manual wheelchair or a more powerful controller mode for a powered wheelchair), the subject is permitted to adjust them for testing as long as the subject can do so without assistance. If tools are needed to make the adjustment, then they must be carried by the subject. The tester must not cue the test subject to make the adjustment. Having adjusted the wheelchair to accomplish a skill, unless otherwise specified, the subject may leave the wheelchair in the new configuration for the remainder of the WST. If the subject wishes to restore the wheelchair to its original configuration, he/she must do so without assistance and without cueing from the tester. When the WST is over, the tester should remind the subject about any adjustment that has been made, especially if the adjustment might affect safety.

For training purposes, unless otherwise specified for the purposes of a research study, the wheelchair set-up may and should be modified if such a change is believed by the trainer to be one that would improve the safety or effectiveness of the skill performance.

1.9 Getting Out of the Wheelchair to Accomplish a Task

If possible to do so safely, a wheelchair user may get out of the wheelchair to accomplish a task or to adjust a wheelchair feature (e.g. the rear anti-tip devices). For the WST, this does not include using any sitting surface other than the ground, unless specifically noted in the individual skill section, because such a surface might not always be available when such an adjustment is needed. The policy of permitting wheelchair users to get out of their wheelchairs is in recognition that many people who use wheelchairs do so in combination with walking for their mobility.

1.10 Starting Positions

Unless otherwise noted, the starting positions for each skill are as follows:

- **Wheelchair user**: The wheelchair user is seated in the wheelchair, in whatever position and state that he/she prefers.
- **Caregiver**: If a caregiver is the subject or learner, his/her starting position is generally standing near the wheelchair.
- **Wheelchair**: All of the wheelchair components that are usually used should be in place. The brakes may be locked or unlocked. A rolling start is permitted (i.e. there is no need to come to a complete stop before beginning the skill attempt). When a starting position for the wheelchair is defined (e.g. relative to an obstacle), the tester may assist the subject or learner in getting into this position. The tester should be careful not to provide inadvertent cues to the subject on how to perform the skill. For instance, with a powered wheelchair that has both caregiver and user-operated controls, the tester should use the caregiver controls because they are usually out of the wheelchair user’s line of sight. If the subject
expresses the wish to attempt a task by moving the wheelchair backwards, the tester may
assist him/her in getting into the requested starting position, but the tester must not
suggest alternative approaches. Also, when the testing instructions call for the axles of
the leading wheels to be behind a starting line, the leading wheels are ones that are
normally in contact with the ground (i.e. not the wheels of anti-tip devices that are off the
ground).

- Tester or trainer: The starting position for the tester or trainer is initially where he/she can
be well seen and heard when providing instructions for the skill. After initially
communicating instructions to the subject, the tester or trainer may need to reposition
him/herself where he/she will be best able to observe the skill.

- Spotter: The starting position for the spotter is near the wheelchair (within an arm’s
reach) where he/she will be best able to respond to any safety concerns. The exact
position varies with the skill being attempted, the number of spotters involved and the
method being used to complete the skill. For powered wheelchairs, the spotter should be
in a position where the power can be turned off or the joystick accessed. If a caregiver is
the subject, he/she is expected to behave in a manner that is safe for both the wheelchair
occupant and the caregiver. The spotter in such situations should remain close enough to
intervene if the caregiver fails to exercise due caution.

If the starting positions are different for a specific skill, the starting positions are alternatively
specified in the section on individual skills.

1.11 Warnings to Subject
Prior to beginning the initial Wheelchair Skills Program session, the subject should be warned by
the Wheelchair Skills Program personnel that some wheelchair skills can be dangerous and that
the subject or learner should not attempt any task that he/she is not comfortable performing.
Also, to avoid overuse injury, the subject should be instructed by to avoid overexerting
him/herself in the mistaken belief that success on every skill is expected. These warnings may be
repeated at any time during a Wheelchair Skills Program session. If, with the subject’s knowledge
and permission, the rear anti-tip devices are adjusted or removed, the Wheelchair Skills Program
personnel should inform the subject that this has been done.

1.12 Wheelchair Skills Program Personnel
Wheelchair Skills Program personnel are important elements in testing and training. During
Wheelchair Skills Program activities, the roles of the tester and trainer are primarily to oversee
the assessment and training of participants. The spotter is the person, other than the person
performing the skill, who is primarily responsible for ensuring the safety of the subject from the
moment the session begins until it is completed. The spotter focuses on the prevention of major
acute injury. Wheelchair users, caregivers, testers and trainers also play a role in preventing
injury.

Although it is common for the tester or trainer to simultaneously fulfill the role of the spotter, it
is useful to consider the roles separately. Although related, the competencies of spotters are
different from those of testers and trainers. If the spotter and tester or trainer roles are being
fulfilled by different people, and there is a difference of opinion between the Wheelchair Skills
Program personnel, the tester or trainer shall make the final decision, after carefully considering the opinion of the spotter. Ordinarily, a single spotter can adequately minimize the likelihood of serious injury.

However, for some situations (e.g. a heavy or impulsive wheelchair user), one or more additional spotters may be needed. If more than one spotter is used, one spotter should take the lead role. With few exceptions, a single spotter can adequately minimize the likelihood of serious injury. Although testers and trainers need not be able to perform the physical spotter tasks themselves, they should understand the spotter’s role and be able to supervise the spotter.

Wheelchair Skills Program personnel may be rehabilitation clinicians who are regularly involved in wheelchair provision, but there are no minimum educational pre-requisites. However, Wheelchair Skills Program personnel should be thoroughly familiar with all elements of the Wheelchair Skills Program for which they have responsibility. Wheelchair Skills Program personnel should feel free to refer to the Manual whenever necessary.

Those interested in becoming Wheelchair Skills Program personnel should read this Manual, study related materials, review practice materials (e.g. videos on the website) and, if possible, observe in-person how experienced Wheelchair Skills Program personnel function. Ideally, the Wheelchair Skills Program should only be used by personnel who have been trained in its administration. However, good results are possible by careful attention to the Manual because the materials have been designed to be reasonably self-explanatory and to reflect normal clinical practices.

Because practice outside formal training sessions can be useful, members of the rehabilitation team (e.g. members of the nursing profession, personal care workers, recreation therapists, volunteers, physicians) other than the primary trainer can be of assistance. Good team communication among team members about a learner’s progress can help to ensure that the input from multiple team members is complementary rather than conflicting. Because the principles of motor skills learning used for wheelchair skills are the same as those used when learning other skills (e.g. music or sport), a background in teaching such other motor skills is an asset for a trainer. Similarly, experience in managing groups (e.g. coaching sports or supervising children) is an asset to any trainer teaching wheelchair skills in a group setting.

Both experts and non-experts can play important roles in the training process. Wheelchair-using or caregiver peers may possess or be able to acquire the necessary knowledge, skills and attitudes to function as Wheelchair Skills Program personnel. Peers have a number of advantages over able-bodied personnel – real-life experience with barriers, familiarity with practical solutions to common problems, credibility and superior capacity to empathize with the difficulties being experienced by a wheelchair-using subject. However, the peer may have limited clinical knowledge (e.g. about what triggers a spasm), his/her expertise in performing wheelchair skills is likely to be highly specific (e.g. a peer with a spinal cord injury [SCI] may have difficulty advising a person using a wheelchair due to a stroke) and a wheelchair user may have difficulty spotting some skills (particularly moving skills).
The personal characteristics of Wheelchair Skills Program personnel are also important. Personnel should be credible, friendly, supportive, non-judgemental, interested and honest. Personnel should be familiar with the structure and operation of the specific wheelchair used by the subject.

1.13 Versions of the Wheelchair Skills Program

There are five modular versions of the Wheelchair Skills Program (Table 1). The version selected for use is based on the type of wheelchair and the nature of the subject or learner.

<table>
<thead>
<tr>
<th>Version #</th>
<th>Type of Wheelchair</th>
<th>Type of Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
</tr>
<tr>
<td>2</td>
<td>Manual</td>
<td>Caregiver</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
</tr>
<tr>
<td>4</td>
<td>Powered</td>
<td>Caregiver</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Scooter user</td>
</tr>
</tbody>
</table>

1.14 Individual Skills

The individual skills (Table 2) are the units of assessment and training. These skills can be put together in various combinations and permutations to allow participation (e.g. going shopping, attending an educational event, performing a job). A brief description of each skill and the rationale for including it in the Wheelchair Skills Program can be found in the later section on individual skills. In naming the individual skills, we have attempted to be as generic and universal as possible. This is in recognition that the environments in which wheelchairs are used vary widely around the world, although they share many common characteristics.

The WST, the WST-Q and the WSTP all deal with the same set of skills, but the correspondence should not be considered exact. For instance, for the “rolls forward short distance” skill, the WST by necessity deals with exact dimensions (10 m), the WST-Q questions are stated in more general terms because subjects may not be able to easily visualize such exact distances and the WSTP involves variations that enhance learning. The order of skills in Table 2 reflects the functional groupings of skills (e.g. inclines in different directions and with different slopes are grouped together) and the approximate order of difficulty (although this can vary depending upon the subject and wheelchair).

1.15 Skill Levels

Although somewhat arbitrary, it is possible on the basis of difficulty to roughly group skills into three levels – basic, intermediate and advanced. This can be helpful for communicating with others, for planning therapies and for justifying the purchase of different types of wheelchairs. Which skills have been assigned to which levels is indicated in Table 2. If appropriate to the circumstances, users of the WSP may select only skills of one or two levels to focus on (e.g. the basic level for residents of a long-term-care facility who rarely use their...
wheelchairs in the community without assistance).

<table>
<thead>
<tr>
<th>#</th>
<th>Skill Level</th>
<th>Individual Skill Names</th>
<th>Manual WC</th>
<th>Powered WC</th>
<th>Scooter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Basic</td>
<td>Moves controller away and back</td>
<td>X</td>
<td>X</td>
<td>✔</td>
</tr>
<tr>
<td>2.</td>
<td>Basic</td>
<td>Turns power on and off</td>
<td>X</td>
<td>X</td>
<td>✔</td>
</tr>
<tr>
<td>3.</td>
<td>Intermediate</td>
<td>Selects drive modes and speeds</td>
<td>X</td>
<td>X</td>
<td>✔</td>
</tr>
<tr>
<td>4.</td>
<td>Basic</td>
<td>Disengages and engages motors</td>
<td>X</td>
<td>X</td>
<td>✔</td>
</tr>
<tr>
<td>5.</td>
<td>Basic</td>
<td>Operates battery charger</td>
<td>X</td>
<td>X</td>
<td>✔</td>
</tr>
<tr>
<td>6.</td>
<td>Basic</td>
<td>Rolls forwards short distance</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>7.</td>
<td>Basic</td>
<td>Rolls backwards short distance</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>8.</td>
<td>Basic</td>
<td>Turns in place</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>9.</td>
<td>Basic</td>
<td>Turns while moving forwards</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>10.</td>
<td>Basic</td>
<td>Turns while moving backwards</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>11.</td>
<td>Basic</td>
<td>Maneuvers sideways</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>12.</td>
<td>Basic</td>
<td>Reaches high object</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13.</td>
<td>Basic</td>
<td>Picks object from floor</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>14.</td>
<td>Basic</td>
<td>Relieves weight from buttocks</td>
<td>✔</td>
<td>✔</td>
<td>X</td>
</tr>
<tr>
<td>15.</td>
<td>Basic</td>
<td>Operates body positioning options</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>16.</td>
<td>Basic</td>
<td>Level transfer</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>17.</td>
<td>Intermediate</td>
<td>Folds and unfolds wheelchair</td>
<td>✔</td>
<td>✔</td>
<td>X</td>
</tr>
<tr>
<td>18.</td>
<td>Intermediate</td>
<td>Gets through hinged door</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>19.</td>
<td>Intermediate</td>
<td>Rolls longer distance</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>20.</td>
<td>Intermediate</td>
<td>Avoids moving obstacles</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>21.</td>
<td>Intermediate</td>
<td>Ascends slight incline</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>22.</td>
<td>Intermediate</td>
<td>Descends slight incline</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>23.</td>
<td>Advanced</td>
<td>Ascends steep incline</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>24.</td>
<td>Advanced</td>
<td>Descends steep incline</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>25.</td>
<td>Intermediate</td>
<td>Rolls across side-slope</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>26.</td>
<td>Intermediate</td>
<td>Rolls on soft surface</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>27.</td>
<td>Intermediate</td>
<td>Gets over threshold</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>28.</td>
<td>Intermediate</td>
<td>Gets over gap</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>29.</td>
<td>Intermediate</td>
<td>Ascends low curb</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>#</td>
<td>Skill Level</td>
<td>Individual Skill Names</td>
<td>Manual WC</td>
<td>Powered WC</td>
<td>Scooter</td>
</tr>
<tr>
<td>----</td>
<td>-------------</td>
<td>----------------------------------------</td>
<td>-----------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>30</td>
<td>Intermediate</td>
<td>Descends low curb</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>31</td>
<td>Advanced</td>
<td>Ascends high curb</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>32</td>
<td>Advanced</td>
<td>Descends high curb</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>33</td>
<td>Advanced</td>
<td>Performs stationary wheelie</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>34</td>
<td>Advanced</td>
<td>Turns in place in wheelie position</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>35</td>
<td>Advanced</td>
<td>Descends high curb in wheelie position</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>36</td>
<td>Advanced</td>
<td>Descends steep incline in wheelie position</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>37</td>
<td>Advanced</td>
<td>Gets from ground into wheelchair</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>38</td>
<td>Advanced</td>
<td>Ascends stairs</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>39</td>
<td>Advanced</td>
<td>Descends stairs</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Abbreviations and symbols: WC = wheelchair, WCU = wheelchair user, CG = caregiver, SU = scooter user, ✓ = included, X = not included

### 1.16 Skill Groups
Most of the individual skills can be grouped, as described below, although some of these groupings only apply to manual wheelchairs.

How to operate the parts of the wheelchair. Wheelchairs vary widely in their components and how they work. It is important that wheelchair users and caregivers learn about the structures and operating idiosyncrasies of the wheelchairs they use. This includes normal daily operations, transportation and storage of the wheelchair, as well as regular maintenance duties. At the time of sale, new wheelchairs are usually delivered with user manuals. Wheelchair users and caregivers can learn about special features of their wheelchairs by studying the user manuals. If the user manual has been lost, instructions can often be found on-line. Maintenance and repair issues are also usually dealt with in the user manual (e.g. how to recognize when maintenance or repair are needed, how often a battery needs to be charged).

Understanding the dimensions of the wheelchair. The dimensions of the occupied wheelchair are important to understand, for instance when judging if a door is wide enough to pass through, if there is enough space in which to turn around or if there is enough clearance beneath the wheelchair to pass over an object on the ground.

Getting into, out of and repositioning oneself with respect to the wheelchair. This includes transferring between the wheelchair and various other surfaces, unloading pressure-sensitive body parts and changing position in the wheelchair.
Moving the wheelchair around on smooth level surfaces. Although the method of propulsion may vary, depending upon the impairments of the wheelchair user (e.g. using two hands, one hand and one foot, or power), basic propulsion includes being able to move the wheelchair forwards and backwards, being able to turn in place or while moving, and being able to maneuver the wheelchair into position (e.g. to pick something up off the ground, getting close enough to a bed to make a transfer, or negotiating doors).

Using the environment. Although the environment is often a barrier to activities, there are times when it can be an asset, especially for manual wheelchair users. For example, when turning a manual wheelchair around a solid object, placing a hand on the object can allow the wheelchair to swing around the object without slowing down, rather than the usual approach of slowing down and turning using both hand-rims. Other examples are when the wheelchair user uses the hand rails on a ramp to pull the wheelchair up the slope or uses a doorframe to guide passage through a door.

Skills that require leaning in the wheelchair. The wheelchair user’s position in the wheelchair has a dramatic effect on the amount of weight that is on the front versus rear wheels because the wheelchair user’s trunk and upper body constitute a considerable proportion of the combined mass of the wheelchair and wheelchair user. This is especially true for manual wheelchairs. Leaning to alter weight distribution with respect to the wheels will affect the stability of the wheelchair in a predictable way. For instance, when ascending an incline in a manual wheelchair, there is a risk of the wheelchair tipping over backwards. To prevent this, the wheelchair user should lean forwards enough to keep the front wheels on the surface.

In addition to stability, the balance of weight between the front and back wheels has an effect on rolling resistance. Wheels with large diameters have lower rolling resistance, whereas small-diameter wheels will tend to dig into soft surfaces. When crossing soft surfaces (e.g. carpet, gravel, grass), the wheelchair user should keep his/her weight on the rear wheels to the extent possible. When crossing side slopes, the tendency for the wheelchair to turn downhill can be reduced by leaning away from the swivel casters.

Leaning towards one side can also affect the lateral stability of the wheelchair. Also, if one wheel is spinning due to a lack of traction, this can often be corrected by leaning toward the spinning wheel.

Skills that require popping the front wheels briefly off the surface. There are some obstacles that require that the smaller (usually front) wheels clear the obstacle. These skills are most appropriate for manual wheelchairs. Examples include negotiating gravel, potholes, vertical obstacles (e.g. door thresholds) and getting up level changes (e.g. curbs).

Skills for which balancing on the rear wheels is necessary. For manual wheelchair users, the full wheelie position (balancing on the rear wheels) can be used to deal with situations like those described above that require the front wheels to be unloaded. However, there are some desirable skills that can only be carried out by keeping the front wheels off the surface. These skills include the stationary wheelie (e.g. to improve neck comfort), turning around in a tight
space, the forward descent of large level changes (e.g. a high curb) and the forward descent of steep inclines. These skills require the ability to perform a stationary wheelie, to turn around in the wheelie position, and to move forward or backwards in the wheelie position. These skills are impossible in most powered wheelchairs and scooters.

**Working with a helper.** Most wheelchair users have at least some skills that they cannot safely perform themselves or that they find stressful. In such situations, the wheelchair user can benefit from the assistance of a helper. This may be in the form of minimal assistance (e.g. someone standing nearby to respond to a tip), the caregiver doing the task completely (e.g. ascending a curb) or the caregiver working in combination with the wheelchair user. The helper may be a regular one (e.g. friend or family member) or a passerby who can be recruited to help under the wheelchair user’s direction.

**1.17 Wheelchair Skills Program Forms**
The forms that facilitate the administration, recording and reporting of each of the five versions of the WSP can be found at [www.wheelchairskillsprogram.ca/eng/manual.php](http://www.wheelchairskillsprogram.ca/eng/manual.php).
2. INTRODUCTION TO THE ASSESSMENT OF WHEELCHAIR SKILLS

There are a variety of measures that can be used to assess wheelchair skills, a comprehensive discussion of which is beyond the scope of this Manual. However, it may be helpful to consider the available measures as ranging along a spectrum of granularity from less to more detailed measures.

At the less detailed end of the spectrum, there are questionnaire-based measures. One of these, the Wheelchair Skills Abilities Score (a 0-10 overall score reflecting the subject’s perception of his/her wheelchair skills ability) can be found on the Wheelchair Skills Program website (http://www.wheelchairskillsprogram.ca/eng/wsas.php). Another example of a questionnaire is the Life Space Assessment Score that provides a score corresponding to being limited to the room where one sleeps, being in other rooms of the home, being outside the home, being in the neighbourhood, being outside the neighbourhood and being outside one’s town.

More technology-based measures at the low granularity level are dataloggers (e.g. to document the number of km travelled in a day or the number of times the tilt mechanism is used) and global positioning system sensors (e.g. to document where the wheelchair travelled during the day).

At the very detailed granularity level, examples are the use of instrumented rear wheels to document the forces applied to the hand-rims, the Wheelchair Propulsion Test (to assess such parameters as cadence, push efficiency) (see http://www.wheelchairskillsprogram.ca/eng/propulsion_test.php), video-recordings, three-dimensional motion analysis to document the relative movement of body parts and oxygen consumption studies to document the metabolic energy cost of wheeling.

The WST and WST-Q are measures that focus on the intermediate level of granularity. These measures test a subject’s ability to perform a representative set of skills and, in the case of the WST-Q, current confidence in performing the skill and how often these skills are performed. Arguably, this intermediate level of detail is the level of greatest interest to wheelchair users, their caregivers and their clinicians. Knowing such details provides the data needed for intervention through a change in wheelchair type, wheelchair set-up, skills training, modification of the physical environment or provision of needed assistance. The WST and WST-Q are not intended to serve as “readiness” tests for independent wheelchair use, although they may be components of such an assessment.

Which measure(s) should be used to assess wheelchair skills depends upon the purpose of the assessment, the measurement properties (e.g. reliability and validity) of the tool, the characteristics of the test subject, the features of the wheelchair, the propulsion method, the equipment necessary, the skill of the assessor and the time available. However, for the purpose of this Manual, the emphasis will be on the WST and WST-Q.
3. THE WHEELCHAIR SKILLS TEST (WST)

The WST is a standardized evaluation method that permits a set of representative wheelchair skills to be simply and inexpensively documented. This test is intended to assess a specific person in a specific wheelchair in a standardized manner.

As noted earlier, the measurement properties of the WST have been studied to a moderate extent (see http://www.wheelchairskillsprogram.ca/eng/publications.php). In these studies, the WST has been found to be safe, practical, reliable, valid and useful. The WST has been used as a screening or outcome measure in a number of studies. Further study is needed to re-evaluate the measurement properties of the WST as it evolves, in different settings and with different clinical populations.

3.1 Setting and Equipment Needed

The test setting for the WST should be reasonably quiet, private, free from distractions and well lit. A standardized obstacle course may be used, but is not necessary. The specifications for such an obstacle course are provided later in this Manual in the section on individual skills. Some of the tests (e.g. turns controller on and off) require no equipment and can be performed anywhere. In general, the settings described in the sections on individual skills should be considered as guidelines to enhance standardization, rather than as rigid constraints. If lines are used to mark limits (e.g. during moving turns), whether it is permissible for the wheelchair parts in contact with the floor (or the subject’s feet) to touch the lines depends on whether the inner or outer borders of the lines reflect the dimensions specified. For instance, if a skill setting states that the subject must stay within a 1.5 m-wide space, if the outer borders of the lines represent the 1.5 m dimension then the subject may touch the line. Comparable challenges in the existing natural or built environment (e.g. in and around a hospital or the wheelchair user’s home), may be used. Indeed, the WST can be completed as part of a community outing. However, if the setting is materially different from the one specified, this should be noted in the Comments section of the WST Form and may preclude the WST values from being compared to those conducted in more standardized settings.

3.2 Indications

For clinical purposes, the WST can be used early in the course of a rehabilitation program as a diagnostic measure, especially to determine which (if any) skills might be addressed during the rehabilitation process (e.g. by training or equipment change). However, predicting future performance on the basis of early attempts is of limited use. The trainer should not prejudge the outcome of training. By repeating the test on completion of the rehabilitation phase (or later during follow-up), the WST can be used as an outcome measure. The WST may also be used for program evaluation, to answer research questions and to assist in wheelchair design.

3.3 Contraindications

No skill should be objectively evaluated if the subject is unwilling to attempt it or if the subject or Wheelchair Skills Program personnel would be placed at undue risk during testing (e.g. due to the subject’s unstable cardiac disease, uncontrolled seizures or excessive weight).
3.4 General Instructions to Test Subject

The paragraph below may be paraphrased or read to wheelchair-using subjects when the WST is being administered. It can be modified slightly if the subject is a caregiver or if the purpose of the WST is research.

“For about the next 30 minutes, I will be asking you to perform a number of different skills in your wheelchair. The reason for this is to find out which skills you do well and which might benefit from some practice or from changes to your wheelchair. We want to see if you can perform the skill properly and safely. We do not want you to hurt yourself, but there are some mild risks involved. To reduce the chances of you hurting yourself, we will be spotting you while you try each skill. Please wait until the spotter is in position before attempting each skill. The spotter will say “spotter on” to indicate when he/she is in position to protect you and “spotter off” to indicate if he/she is no longer in position. Please do not overexert yourself. We do not expect you to be able to perform every skill. Please do not try any skill that you are not comfortable performing. If you do not understand what we are asking you to do, feel free to ask questions. There is no need to hurry; this is not a race. If you would like to take a rest or to stop at any time, feel free to tell us. Do you have any general questions now, before we begin?”

Instructions may include gestures for people with language disorders or be in writing for people with hearing disorders but the tester should not demonstrate the skill. When giving instructions for each skill, before moving into the best position for observing and spotting the skill (if the tester is also serving as the spotter), the tester should stand or sit to the front or side of the subject so the subject can see and hear the tester well. The tester must not instruct the subject in how to accomplish the task. If the tester asks for the task to be performed on both the left and right sides (e.g. turning the wheelchair around) but the subject performs the skill on only one side, the tester may prompt the subject (e.g. “Now in the other direction”) without penalty.

3.5 Feedback

After the attempt, non-specific feedback may be given on how the subject did – for instance, “You did well”. If the subject fails a skill, neither feedback on the reason for the failure nor instruction on how the skill might have been performed better should be given prior to completion of the entire WST. To do so would not affect the score for the skill already tested, but there may be other skills later in the WST that could be influenced by premature instruction. If observers (e.g. students or family members) are present during the test, they should be asked to remain silent and to refrain from providing cues or feedback. Once the entire WST has been completed, the tester may explain the reasons for any failures unless the WST is being administered to a research participant.

3.6 Disclaimer re Sensitivity and Specificity

The WST is a sensitive and specific test. A change in the subject (e.g. by a reduction of spasticity), the subject’s equipment (e.g. removal of a prosthesis), a change in the wheelchair (e.g. by addition of a rear anti-tip device) and/or a change in the test environment (e.g. by
lowering lighting conditions) may affect the test scores. The objective WST findings are therefore specific to the situation assessed.

### 3.7 Number of Attempts Permitted

For each skill during the WST, the subject is ordinarily permitted only a single attempt. During the course of any single attempt, a subject may use different approaches (e.g. in a manual wheelchair first attempting the soft-surface skill forwards, then backwards if unable to proceed or, in a powered wheelchair, pausing to change controller settings or the degree of tilt). It is only considered a second attempt if the subject clearly starts over (e.g. with a repetition of the instructions) and a significant pause between attempts.

There are some circumstances in which a second attempt may be permitted without penalty:

- If the subject misunderstood the instructions.
- If a correctable testing error is recognized when it occurs (e.g. the spotter intervened prematurely).
- If a subject appears to be rushing his/her skill attempts and failing to meet test criteria because of this, on the first occasion that this occurs, the tester may permit a second attempt and explain the importance of listening carefully to the instructions before beginning the skill attempt.
- It is sometimes the case that a test subject who has just failed a skill will ask for a chance to “try again”. This may be permitted, but it is the first attempt that is scored.

A second attempt should not be considered a routine; ultimately, this is at the tester’s discretion. If a second attempt is believed to be appropriate, the tester should provide no feedback on the reason for the failure, nor any instruction on how to perform the task, between the two attempts. The task instructions may be repeated. If the skill is performed better on the second trial, the tester should record the better score. If a subject is unsuccessful when asked to perform a task (e.g. sideways maneuvering) but does it correctly later, incidental to another task (e.g. the transfer), the score must not be revised. The WST requires that the subject be able to perform the skill on demand. If a skill has been failed early in the attempt (e.g. after going through a door in one direction), it may still be useful to allow the subject to complete the remainder of the skill attempt (e.g. going through the door in the other direction) as a means of identifying issues that can be dealt with later during training.

### 3.8 Use of Aids

Aids (e.g. for reaching) are permitted if the subject carries them with him/her. An animal (e.g. a service dog) that assists with the performance of a skill is considered an aid, not a caregiver, for the purpose of the WST.

### 3.9 Scoring of Individual Skills on Capacity

The tester scores the success in accomplishing each skill, using the scale shown in Table 3. If there are criteria specific to individual skills, these are noted later, in the section on individual skills.
### Table 3: Scale for Scoring Skill Capacity Objectively

**Pass (Score of 2):**
- Task independently and safely accomplished without any difficulty. Unless otherwise specified, the skill may be performed in any manner. The focus is on meeting the task requirements, not the method used. Aids may be used.
- A “pass” score may be awarded automatically if the subject has passed a more difficult version of the same skill (e.g. if a subject successfully “ascends high curb”, a pass may be awarded on the “ascends low curb” skill without the subject needing to actually perform the latter).

**Pass with difficulty (Score of 1):**
- If the evaluation criteria are met, but the subject experienced difficulty worthy of note (e.g. excessive time or effort required, inefficient method used, ergonomically unsound method used, poor technique that may lead to overuse injury at a later time, minor injury [e.g. minor blisters or abrasions] incurred) or a caregiver creates more than minimal discomfort or potential harm.
- Unintentional transient tips are not sufficient reasons to fail a subject’s attempt at a skill but may justify a ‘pass with difficulty’ score (e.g. if they interfere with smooth completion of the skill or are startling to the wheelchair user).
- If a tester is ambivalent about whether to award a score of 1 vs 2, he/she may find it helpful to ask him/herself if the identified problem is one that warrants efforts to resolve.

**Fail (Score of 0):**
- Task incomplete.
- If there are defined limitations of the space within which the skill is to be performed and the wheelchair wheels or the subject’s feet in contact with the ground extend beyond those limits. Feet on footrests or wheelchair parts not in contact with the ground are usually permitted to extend beyond the limits, to simplify testing.
- Unsafe performance. A skill is considered unsafe if the subject requires appropriate and significant spotter intervention to prevent acute injury to the subject or others. A significant spotter intervention is one that interferes with the skill performance. Full tips should never occur, because the spotter should intervene. A skill performance is obviously unsafe if it results in a significant acute injury (e.g. lacerations, sprains, strains, fractures or head injury) that interferes with test continuation. If the spotter intervention is one that neither hinders nor helps the subject, it can be ignored (“no harm, no foul”).
- Likely to be unsafe in the opinion of the tester (e.g. on the basis of the subject’s description of how a task will be attempted).
- Performing a skill quickly is not, in and of itself, unsafe.
- Unwilling to try.
- Has failed an easier version of the same skill (e.g. if the subject fails the “ascends slight incline” skill, he/she automatically fails the “ascends steep incline” skill).
• If a caregiver is the subject of testing, he/she may not ask the wheelchair occupant for advice or physical assistance in the performance of the skill unless specifically permitted in the caregiver section of the individual skill descriptions or unless a blended WST is being administered.

• Wheelchair part malfunction preventing completion of the skill.

Not Possible (NP):
• The wheelchair does not have the parts to allow this skill. For instance, if a manual wheelchair does not fold, the “folds and unfolds wheelchair” skill cannot be tested.

Testing Error (TE):
• If the tester cannot assess the skill for some reason, for instance the tester many not be able to get the wheelchair user into position to test the skill (e.g. on the floor for the “gets from ground into wheelchair” skill) or if a necessary item of equipment (e.g. the battery charger for a powered wheelchair).
• If testing of the skill was not sufficiently well observed to provide a score (e.g. if the skill is being scored from videotape and the entire skill could not be viewed).
• If a correctable testing error is recognized when it occurs, the test should be repeated.
• If there is a minor testing error that the tester judges as not affecting his/her ability to score the test, this can be ignored.

3.10 Comments
In addition to the scores for each skill, the comments add valuable qualitative data to the WST. The tester should record any comments that are appropriate (e.g. the reasons for any failures, left-right asymmetry). If there is appropriate spotter intervention during a skill attempt, the extent of the intervention and the reason for it should be recorded in the Comments section. The extent of spotter intervention may consist of a warning to a subject to stop or change the approach, minor physical contact from the spotter (even if the subject was able to complete the trial) or full intervention (e.g. if the subject required the spotter to prevent him/her from potentially injuring him/herself).

The nature of any potentially dangerous incident should be documented. Note should be made of any observations that require action (e.g. further training in alternative ways to accomplish a task or a change in equipment that might help). The WST tester should be alert to potentially correctable limiting factors in the wheelchair user’s health (e.g. limited range of motion), wheelchair (e.g. rear axles too far back) and environment (e.g. if the WST is performed in the subject’s home, a doorway that is too narrow). Comments by the test subject may also be recorded.

3.11 Training Goals
If, at the beginning of the WST, it is decided by the tester or subject that one purpose of the assessment is to identify potential training goals then, before the assessment of individual skills, the subject should be asked if there are any specific wheelchair skills on which he/she
would be interested in receiving training. Doing this before assessing the individual skills is intended to reduce the likelihood of “training to the test”. After the objective assessment of each skill has been completed (regardless of the scores recorded) and if an assessment of training goals is one of the purposes of the assessment, the subject may be asked whether that skill is one for which he/she would like to receive further training. On completion of the assessment of individual skills, the subject is asked if there are any other skills on which he/she would be interested in receiving training.

3.12 Timing
The WST only requires the timing of 3 skills – “rolls forward short distance”, “relieves weight from buttocks” and “performs stationary wheelie”. These need only be timed to the nearest second. However, the time required to perform other individual skills, a series of skills or the entire WST can provide an additional level of sensitivity to change (e.g. due to training or the use of a different wheelchair) that clinicians or researchers may wish to use.

There is no formal upper time limit for each skill or for the entire WST. This is to avoid the necessity of the tester timing every skill and to avoid having the subject feel rushed to complete the task. Although in real life a skill must be performed within a practical time to be useful, the definition of what such a time limit should be may vary with the circumstances. Fortunately, when administering the WST, this does not usually present a dilemma because the subject stops a task when it is taking too long. However, if a subject is persistently taking an apparently hopeless approach, the tester may intervene and stop the testing of that skill.

3.13 Rests and Breaks
Rests are permitted during the skill attempts, unless precluded by the nature of the skill (e.g. the “performs stationary wheelie” skill). If the subject is making progress, he/she should be allowed to continue. Resting and then continuing is not considered a second attempt. For instance, a subject may get the casters up on the low curb, rest for a moment, then get the rear wheels up on the curb. It is also permissible for subjects to rest between skills. Indeed, there is no need for all of the skills to be performed on the same day. The WST is a test of individual skills, not a test of endurance. However, if the testing is conducted on more than one day, the tester should document the dates. Also, the wheelchair, its set-up and subject aids (e.g. prosthesis) must remain the same on both test occasions if an overall score is to be valid.

3.14 Order of Tests
During the WST, the tests may be performed in any order. For instance, it is usually practical to test the subject’s ability to fold and unfold the wheelchair after testing the ability to transfer out of the wheelchair, but before evaluating the transfer back into the wheelchair. The order of testing may also vary depending on the availability and layout of equipment and test settings. For highly skilled test subjects, it may even be practical to use a “top-down” approach, starting with the more advanced of similar skills. As noted earlier, if the subject can perform the advanced-level version of some skills (e.g. the “ascends high curb” skill), then a pass may also be awarded for the simpler version of the same skill (e.g. the “ascends low curb” skill).
3.15 Left- vs. Right-Sided Components of Skills

In objectively evaluating skill performance, both sides are tested (e.g. turning to left and right). Although this may be redundant for subjects with symmetrical impairments (e.g. of strength or range of motion), it may be valuable for subjects with asymmetrical impairments (e.g. due to hemiplegia or amputation) or for wheelchairs with asymmetrical flaws (e.g. a bent wheel rim on one side). A left-sided skill can be performed using the right hand without penalty and vice versa.

3.16 Minimizing Ways in Which Training Can Invalidate WST Scores

There are three avoidable ways in which wheelchair skills training can have undesirable effects on WST scores:

1. **Inflation of the baseline score**: If the same person is serving as both the tester and trainer, he/she may be tempted to conduct testing and training together. For instance, if the subject fails the “gets over threshold” skill, the tester/trainer may be tempted to provide instruction immediately, before continuing with the testing. However, the tester should complete as much of the pre-training WST as possible before beginning any training because the pre-training score of some skills may be artificially inflated by just having received training on a similar skill. In the threshold-skill example, training is likely to improve the subject’s ability to perform the subsequent “gets over gap” skill. To reduce potential frustration by a subject who wants to proceed immediately to training, the tester should explain the process and indicate when training on the skills will be provided.

2. **Failure to ensure skill retention**: It is not unusual for a subject learning a new skill to experience transient success during a training session (skill “acquisition”), but to be unable to perform the same skill at the next session (skill “retention”). The ultimate goal of training is that the subject will be able to perform the skill in a variety of settings at any time in the future (skill “transfer”). To ensure at least short-term retention, the post-training WST should be performed at least 3 days after the training has been completed.

3. **The “training to the test” or “specificity of training” phenomenon**: If the training and testing are carried out in the same setting, it is possible that the subject may perform well in that setting, but not others. The trainer should be aware of this phenomenon, should have the subject practice in a variety of settings (e.g. indoors and outdoors) and should vary the order of skills during practice. This increases the likelihood that the subject will be able to transfer or generalize the skill.

3.17 Calculated Scores

The following scores can be calculated by hand (as described below) or by using software developed for the purpose. Subtracting the number of NP (not possible) scores from the denominator avoids penalizing test subjects by the inclusion of skills that would be impossible to complete. Subtracting the number of TE (testing error) scores has a similar purpose. However, there may not be more than 2 TE scores for a calculated score to be valid.

**Total WST Capacity Score (%):** The formula is shown below. Possible percentage scores
range from 0-100%.

Total WST Capacity Score = \( \frac{\text{sum of individual skill scores}}{\left( \text{number of possible skills} - \text{number of NP scores} - \text{number of TE scores} \right) \times 2} \times 100\% \)

Goal Attainment Score (%): Goal setting is discussed later in the section on training. The Goal Attainment Score (GAS) is of use when only a limited number of skills are addressed, such as through wheelchair modifications or training. The numerator is the number of skills that are met and the denominator is the number of goals set. The formula below is based on a simple yes/no score for each skill, but alternative scoring (e.g. yes/partially/no) can be used. The GAS at baseline is 0% by definition. Possible percentage scores after intervention range from 0-100%.

Goal Attainment Score = \( \frac{\text{number of goals met}}{\text{number of goals set}} \times 100\% \)

Special Purpose Scores (optional): Any subset of individual skills may be selected for a calculated subtotal percentage score. For instance, the scores for individual skill levels (i.e. Basic, Intermediate and Advanced) can be calculated. Other examples are a score that deals only with skills that might be appropriate for foot-propellers of manual wheelchairs or a blended score that reflects the combined efforts of a wheelchair user and a caregiver. If the WST is being used with a highly skilled person or group, there may be a ceiling effect (scores near 100%). In such a situation, the WST can be extended in ways that allow change to be detected. For instance, a skill or group of skills can be timed. Alternatively, skills can be carried out in combination (e.g. wheelie turn in place on a soft surface). The criteria can be made more difficult (e.g. turning in place in a 1.0-m-square space instead of a 1.5-m-square one). Any such modifications should be documented so that the results can be interpreted.

3.18 WST Test Report

There is one WST Form for each of the 5 versions of the WST. The WST Form may be completed by hand or be generated by software. The completed WST Form includes identifying data, the scores for individual skills, the calculated score, comments and the skills (if any) for which the subject would be interested in receiving training.
4. THE WHEELCHAIR SKILLS TEST QUESTIONNAIRE (WST-Q)

The relationship between the WST and the WST-Q has been reported in the literature (see http://www.wheelchairskillsprogram.ca/eng/publications.php). The correlation between the total WST and WST-Q scores has been found to be high, although the WST-Q scores are slightly higher. The WST and WST-Q each have advantages and limitations, summarized in Table 4.

Table 4. Comparison of WST and WST-Q

<table>
<thead>
<tr>
<th>Consideration</th>
<th>WST</th>
<th>WST-Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to administer</td>
<td>~30 minutes</td>
<td>~10 minutes</td>
</tr>
<tr>
<td>Obstacles needed</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Space needed</td>
<td>~1000 square feet</td>
<td>None</td>
</tr>
<tr>
<td>Induces a training effect</td>
<td>Probable (~5%)</td>
<td>None known</td>
</tr>
<tr>
<td>Can assess capacity (can do)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Can assess confidence</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can assess performance (does do)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Simulated vs real setting</td>
<td>Simulated usually</td>
<td>Real</td>
</tr>
<tr>
<td>Affected by missing equipment</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Likelihood of failing a skill on a technicality</td>
<td>Occasional</td>
<td>None</td>
</tr>
<tr>
<td>Degree of specificity of settings</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Possibility of a testing error</td>
<td>Occasional</td>
<td>Rare</td>
</tr>
<tr>
<td>Can be administered by phone</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can be administered by mailed questionnaire</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can be administered on-line</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can be completed by proxy</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Requires ability to follow instructions</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Requires ability to communicate</td>
<td>No</td>
<td>Yes (unless proxy)</td>
</tr>
<tr>
<td>Potential to misrepresent functional level</td>
<td>Low</td>
<td>Slightly greater</td>
</tr>
<tr>
<td>Provides detail about how the skills are performed</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Risk of injury</td>
<td>Minimal</td>
<td>None</td>
</tr>
<tr>
<td>Total scores</td>
<td>Slightly lower</td>
<td>Slightly higher</td>
</tr>
</tbody>
</table>

The advantages of the WST-Q include that it requires less time, equipment and space to perform, it does not appear to induce much of a training effect (like the WST seems to do), it avoids a training-to-the-test effect, it allows one to assess confidence and performance as well as capacity (in the terms of the International Classification of Functioning, Disability, and Health [ICF]), it is more realistic (relating as it does to the subject’s own setting), it is not subject to limitations due to missing equipment (e.g. a battery charger) at the time of testing, subjects are not likely to fail a skill on a technicality (e.g. a wheel slightly over a line), the settings are less specifically defined and the WST-Q may be the only option for situations in which objective testing is impractical or impossible (e.g. during telephone interviews). The WST-Q can be administered by phone, postal questionnaire or on-line. It can be completed by a proxy. There is no risk of injury.
The limitations of the WST-Q are that the tester must rely on the subject’s ability to understand the questions and to communicate valid answers. This limitation can be offset by having a proxy (e.g. a caregiver) who knows the subject well or a translator assist in providing the answers. There is potential for the subject to overestimate or underestimate his/her capacity and performance. The WST-Q does not provide any detail about how the skills are performed, limiting its usefulness as a guide to intervention (e.g. by altering the wheelchair set-up or by training).

The complementary benefits of the WST and WST-Q can be captured by using them in combination – “Can you do it? How confidently? How often? Show me how”.

### 4.1 Indications

As for the WST, for clinical purposes, the WST-Q can be used early in the course of a rehabilitation program as a diagnostic measure, especially to determine which (if any) skills might be addressed during the rehabilitation process. By repeating the test on completion of the rehabilitation phase (or later during follow-up), the WST can be used as an outcome measure. The WST may also be used for program evaluation, to answer research questions and to assist in wheelchair design.

### 4.2 Contraindications

The WST-Q is only valid if the subject (or proxy) is able to communicate. As a screening procedure, the tester should ask the potential subject about information (e.g. date of birth, diagnosis, length of time using a wheelchair and time up in the wheelchair each day) that can be confirmed by chart review, the nursing staff or family members.

### 4.3 Time Limits

There is no upper time limit for the WST-Q. Rests are permitted but are usually unnecessary because the average time to complete the WST is only about 10 minutes. If the testing is conducted on more than one day, the tester should document the dates.

### 4.4 General Template for WST-Q Individual Skill Questions

For individual skills, the initial question is about capacity. The capacity question, answer options and definitions are summarized in Table 5. A score for this question is mandatory for each skill.

<table>
<thead>
<tr>
<th>Capacity question: “Can you do it?”</th>
<th>Answer</th>
<th>Score</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>I can safely do the skill, by myself, without any difficulty.</td>
<td></td>
</tr>
<tr>
<td>Yes with difficulty</td>
<td>1</td>
<td>Yes, but not as well as I would like.</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>I have never done the skill or I do not feel that I could do it right now.</td>
<td></td>
</tr>
<tr>
<td>Not possible with NP</td>
<td>NP</td>
<td>My wheelchair does not have the parts to allow this skill. (This</td>
<td></td>
</tr>
</tbody>
</table>
this wheelchair option is only presented for skills where such a score is a possibility.)

Testing error TE When answers have not been recorded (e.g. inadvertently or because the test subject did not understand the question).

The next question about each individual skill is about confidence. Confidence in one’s ability is an important determinant of the extent to which wheelchair skills are actually used in everyday life. The answer options and definitions are summarized in Table 6. The confidence questions are optional and may be skipped if an assessment of confidence is not one of the purposes of the questionnaire.

**Table 6. Confidence Question, Answer Options and Definitions for Each Skill**

<table>
<thead>
<tr>
<th>Confidence question: “How confident are you?”</th>
<th>Answer</th>
<th>Score</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully confident</td>
<td>2</td>
<td>As of now, I am fully confident that I can do this skill safely and consistently.</td>
<td></td>
</tr>
<tr>
<td>Somewhat confident</td>
<td>1</td>
<td>As of now, I am somewhat confident that I can do this skill safely and consistently.</td>
<td></td>
</tr>
<tr>
<td>Not at all confident</td>
<td>0</td>
<td>As of now, I am not at all confident that I can do this skill safely and consistently.</td>
<td></td>
</tr>
</tbody>
</table>

If the answer to the capacity question for a skill is “no”, the score on the confidence question is automatically 0. If the score for capacity is NP, then NP is automatically the score for confidence. If there has been a TE for the capacity question, the confidence score is TE by definition.

The next question about each individual skill is about performance. The answer options and definitions are summarized in Table 7. The performance questions are optional and may be skipped if an assessment of performance is not one of the purposes of the questionnaire.

**Table 7. Performance Question, Answer Options and Definitions for Each Skill**

<table>
<thead>
<tr>
<th>Performance question: “How often do you do it?”</th>
<th>Answer</th>
<th>Score</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>2</td>
<td>Whenever I need or want to do so.</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>1</td>
<td>Sometimes when I need or want to, sometimes not.</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>0</td>
<td>Never or less often than once a year.</td>
<td></td>
</tr>
</tbody>
</table>

WST-Q performance is related to WST-Q capacity, but is also related to personal factors (e.g. age, confidence) and the environment (e.g. weather, architectural barriers, opportunity). Additionally, some skills (e.g. folding/unfolding the wheelchair or getting from the ground to the wheelchair) may not need to be performed frequently. Total capacity percentage scores tend to exceed total performance percentage scores. The converse could occur – for instance, if a subject had a number of skills for which the capacity scores were “pass with difficulty” but these skills were always performed when necessary. Also, if a wheelchair user had an
acute injury (e.g. a fractured wrist), he/she might be unable to perform a skill currently that
he/she had always performed in the past. However, there is no guarantee in such a
circumstance that the wheelchair user will ever get back to the earlier level of performance.
Therefore, for the purposes of the WST-Q, if the capacity score for an individual skill is 0,
the performance score for that skill is also automatically 0. If the score for capacity is NP,
then NP is automatically the score for performance. If there has been a TE score for the
capacity question, the performance score is automatically TE.

If the purpose of the WST-Q includes being able to provide an overall score for each skill
and in total, a composite score can be calculated. The composite score is the sum of the
capacity, confidence and performance scores (i.e. a range of 0-6 for individual skills and 0-
100% for total percentage scores).

As for the WST, at the beginning of the WST-Q, if it is decided by the tester or subject that
one purpose of the WST-Q is to identify potential training goals then, before the assessment
of individual skills, the subject is asked if there are any specific wheelchair skills on which
he/she would be interested in receiving training. After the capacity, confidence and
performance questions have been answered (regardless of the scores recorded) and if an
assessment of training goals is one of the purposes of the assessment, the final question for
each skill is about training goals. The goal question, answer options and definitions are
summarized in Table 8.

<table>
<thead>
<tr>
<th>Question: “Is this a training goal?”</th>
<th>Possible Answers</th>
<th>What This Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>I am interested in receiving training for this skill.</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>I am not interested in receiving training for this skill.</td>
<td></td>
</tr>
</tbody>
</table>

On completion of the assessment of individual skills, the subject is asked if there are any
other skills on which he/she would be interested in receiving training.
4.5 Scoring Algorithm for Individual Skill Questions

The algorithm for the individual skill questions is shown in the Figure below.

4.6 Calculated Scores

The total scores for capacity that can be calculated from the WST-Q data are identical to those for the WST described earlier. Additionally, for the WST-Q total confidence, performance and composite scores can also be calculated as follows:

Total Confidence Score = \frac{\text{sum of individual skill scores}}{\left[ \text{number of possible skills} - \text{number of NP scores} - \text{number of TE scores} \right] \times 2} \times 100\%

Possible percentage scores range from 0-100%.

Total Performance Score = \frac{\text{sum of individual skill scores}}{\left[ \text{number of possible skills} - \text{number of NP scores} - \text{number of TE scores} \right] \times 2} \times 100\%
Possible percentage scores range from 0-100%.

Total Composite Score = \frac{\text{sum of individual skill composite scores}}{([\text{number of possible skills} - \text{number of NP scores} - \text{number of TE scores}] \times 6) \times 100%}

Possible percentage scores range from 0-100%.

4.7 Options for How the WST-Q May be Administered

There are a variety of acceptable ways in which the WST-Q can be administered and recorded. The WST-Q may be tester administered in-person or by telephone with the tester reading the questions and recording the answers. If a tester is involved, he/she may explain a question if it is not understood by the subject. The tester may also use follow-up questions to reassure him/herself about the validity of the answers provided (i.e. a semi-structured interview).

Alternatively the WST-Q may be self-administered (e.g. in a postal or on-line questionnaire) with the test subject or proxy reading the questions and recording the answers. For the paper version of the WST-Q, the person administering the questionnaire may record the answers either on the WST-Q script or on the WST-Q Report Form.

A computer-assisted version of the WST-Q for desk-top computers and tablets is available, links to which are provided on the website. The tester or test subject records the answers on the computer or tablet. The advantages of this approach are that instances of missing data and transcription errors are minimized. Also, it requires less time to complete the WST-Q in this way because the computer uses the scoring algorithm automatically.

The WST-Q and WST can be administered together. For each individual skill, the questions about capacity, confidence, performance and goals can be followed by a demonstration of that skill. Alternatively, the WST can be administered after the WST-Q is completed.

4.8 WST-Q Report Form

There is one WST-Q Report Form for each of the 5 versions of the WST-Q. The WST-Q Report Form may be completed by hand or be generated by software. The completed WST-Q Report Form includes identifying data, the scores for individual skills, the calculated score(s), comments and the skills (if any) for which the subject would be interested in receiving training.
5. WHEELCHAIR SKILLS TRAINING

The Wheelchair Skills Training Program (WSTP) represents the Wheelchair Skills Program developers’ attempts to combine the best available evidence on motor skills learning (“process”) with the best available evidence on how to perform specific skills (“content”).

The optimum way to perform and teach each wheelchair skill may vary depending upon the characteristics of the learner, the wheelchair being used and the setting. However, the WSTP training protocol uses training methodology based on the literature. Research evidence regarding the safety and efficacy of WSTP training can be found at http://www.wheelchairskillsprogram.ca/eng/publications.php. Although much further study is needed, in all of the studies to date, WSTP training has been found to be safe, practical and to result in significantly greater improvements in wheelchair skills than standard care. There is also research evidence in the literature for some of the specific skills (e.g. basic propulsion technique, transfers, inclines, curbs and wheelies) but not for all skills.

5.1 General Background on Motor Skills Learning

Education can address one or more of three domains – knowledge, skills and attitudes. All three are relevant to wheelchair skills training. However, in this section of the Manual, we will focus primarily on motor skills learning.

The issues presented in this section of the Manual are based on the extensive motor-skills-learning literature (over 500 English-language papers published each year) and on our own experience. This section is not intended to be a treatise for researchers. It is our attempt to synthesize the aspects of this literature that are most relevant to the learning of wheelchair skills. We have attempted to express these principles in language that the average educated, but not necessarily professional, trainer and learner might understand. Although there is a great deal of scientific evidence underlying these principles, the principles themselves are fairly simple. Trainers and/or learners who understand and apply the principles will be more effective than those who do not. In addition to the general principles summarized in this section, more specific “training tips” are included with the individual skills later.

5.2 What is a “Motor Skill”?  

A motor skill is one that is voluntary, observable, has been learned and has a goal. Motor skills have been classified on the basis of the size of the muscle groups involved (gross versus fine), on the basis of whether they are discrete tasks or more continuous ones and on the basis of how stable the environment is (open versus closed).

5.3 The Learning Process  

In the course of learning a new motor skill, the learner progresses through stages. This is sometimes referred to as the “learning continuum”. Early in the process, success may be partial, inconsistent or only possible in a familiar setting. As learning progresses, preliminary success is eventually achieved (skill acquisition), consistency within training sessions improves, success carries over into subsequent sessions (skill retention) and the learner is able to use the skill in more diverse settings (skill transfer). Ultimately, the skill may become
autonomous, requiring little or no conscious effort. The time course of motor learning includes an initial period of rapid improvement, sometimes followed by a plateau that may be followed by additional gains. The shape of the motor-learning curve is not a straight line and may be punctuated by abrupt transitions from novice to skilled coordination patterns.

There is a distinction between aspects of the learning process that are in the form of facts and ideas (sometimes called the “declarative”, “cognitive” or “explicit” system) versus those that relate to the actual performance of the skill (sometimes called the “procedural”, “motor skill” or “implicit” system). Each can be acquired without the other. If both are acquired, this need not be in a fixed order. The two can assist or interfere with each other. Attempting to consciously control motor actions can disrupt optimal performance. Skills learned implicitly through a discovery approach appear to be more robust under pressure. Healthy learners can sometimes engage explicit (conscious) and implicit (automatic) motor control simultaneously without deterioration of control compared to either alone.

People who have acquired expertise in performing a motor skill have some characteristics in common. For instance, they have greater awareness of their situations and better ability to anticipate changes in the environment. They are better able to exclude intrusions on their attention and to remain focused on the task. Their motor performances are less affected by stress and fatigue.

5.4 Assessment of Wheelchair Skills

Periods of formal evaluation (e.g. using the WST and/or WST-Q before and after training, and at follow-up) can be useful. In addition to the assessment measures mentioned earlier in the General Assessment section, there are a variety of parameters that provide evidence of learning due to practice. Examples of such parameters are increased speed, improved consistency, improved adaptability to other settings, improved economy of movement and improved ability to detect and self-correct errors. Ongoing assessment by the trainer is important. What the trainer can do to facilitate the learning process varies continuously. We suggest that a training log be used by the trainer and/or learner to track the training process.

5.5 Goal Setting

From the baseline WST or WST-Q assessment, skills may be identified that are not performed as safely, effectively or efficiently as they might be. Generally, only 5-10 goals should be identified at the beginning of a series of training sessions. The goal may be from the Wheelchair Skills Program skill set – a full skill, a part of a skill, a variation of a skill – or any other skill that is important to the learner. Goal pursuit is related to the learner’s beliefs about him/herself and the task (confidence or self-efficacy). The learner may need help in coming to a decision about the goals of training because he/she may not initially recognize the functional benefits of acquiring a new skill. Additionally, a decision needs to be made as to whether it is feasible for the person to learn this skill. This is a judgment call and requires a good understanding of the learner’s health and circumstances. If in doubt, it is recommended that the learner be given an opportunity to learn the skill. If progress is not being made, a learner can decide to abandon that skill. The trainer can assist the learner in coming to this decision.
Goals should be brief, specific, significant, achievable in the training time available and observable (a measureable action item). A broad participation-level goal (e.g. to go shopping) can be broken down into the constituent skills that make it up.

The following are examples of good WSTP goals:

- Roll 100 m in 2 minutes, using no more than 100 pushes.
- Get the wheelchair up a 2cm curb.
- In the wheelie position, roll forwards 10 m.
- Get from the wheelchair to the floor and back within 60 seconds.
- Come down a flight of 10 stairs backwards, using one hand-rail.

The following are examples of poor goals from the perspective of WSTP training (and why):

- Go shopping at the mall (too broad, needs to be more specific).
- Reduce by 10% the number of pushes needed to roll 10 m (not significant).
- Complete a full marathon (may not be achievable in the training time available).
- Spend more time with my friends (not a wheelchair skill and not easily observable).
- Understand the importance of preventing pressure sores (not an action item).

Involving the learner in the goal-setting process can have a positive effect on motivation. However, the trainer has the right to refuse to provide training on any skill that he/she does not believe to be safe and feasible. The goals should be monitored and may be revised as training progresses. The goals may be formalized to allow a Goal Attainment Score (see earlier) to be calculated that can be used to track progress and quantify outcomes. A poster on Setting Goals is available at [http://www.wheelchairskillsprogram.ca/eng/posters.php](http://www.wheelchairskillsprogram.ca/eng/posters.php). It is intended to be printed and posted in the training area.

### 5.6 Individualize the Training Process

Motor-learning principles generally apply almost equally well to elite athletes and to those who have severe disabilities. However, there is benefit to tailoring the training process to the learner. Learning-style preferences exist and should be respected whenever possible. Training can sometimes take the form of a problem-solving exercise, attempting to answer the question “For this learner, with this wheelchair, in this context, what would be the safest and most effective way to perform this task?” For another wheelchair user or another wheelchair, a different solution may be appropriate.

Inability to perform a skill may be due to a variety of limiting factors, alone or in combination. Limiting factors may be intrinsic (e.g. impairments such as cognitive limitations, weakness, pain, shortness of breath, limited range of motion, spasticity, poor coordination or movement disorders) or extrinsic (e.g. a faulty wheelchair part, poor seating support or poor lighting). The trainer should attempt to identify remediable limiting factors and seek to have them addressed.

Motor-skills learning can be affected by personal characteristics. A trainer who understands these differences will be able to reassure learners who might be progressing more slowly than
others. For instance, males learn some skills faster than females. Although learning capacity is greater early in life and the young learn motor skills more rapidly and with less practice, aged people can acquire new motor skills well. Very young children learn better by practicing parts of skills but whole-skill practice works better by about the age of 10. Children acquire skills faster, perform them better and are more engaged when using scaled equipment. Motor learning may be affected by emotion or fatigue.

Neurological conditions may affect motor-skills learning. The impairments (e.g. motor weakness, spasticity, sensory loss, coordination, balance, perceptual problems) may affect how a skill should be optimally performed and the ease with which learning can occur.

Specific neurological disorders may also need to be taken into consideration, for instance:

- For people with stroke, the post-stroke brain has heightened sensitivity to rehabilitation early but this phenomenon declines somewhat with time. The extent of improvement is related to the intensity of training, but high doses of training may not be well tolerated early after the stroke. Explicit information disrupts skill acquisition even more than usual in people who have had strokes affecting the basal ganglia. For people with language impairments, it may be helpful to use nonverbal cues and feedback rather than verbal ones.
- People with multiple sclerosis may have greater susceptibility to high environmental temperatures and fatigue more easily.
- People with Alzheimer’s disease can learn and retain new motor skills. Implicit-learning strategies and demonstration appear to be particularly useful for such people. Consistent practice conditions may work better than variable ones.
- For people with dementia, there is some evidence of superior learning of problem-solving tasks with the help of cues (errorless learning) vs trial-and-error learning.
- People with Parkinson’s disease can learn new motor skills. Rhythmic auditory cues can be helpful for them. Although less helpful for healthy people, paying conscious attention to motor tasks can be useful for people with Parkinson’s disease. Consistent practice conditions may work better than variable ones.
- Medicated patients with schizophrenia may have difficulties with the consolidation of skills.
- For children with cerebral palsy, a 100% feedback schedule is more effective than an intermittent one.

### 5.7 Structure of Training

There are a variety of ways in which the safety, effectiveness or efficiency of training can be enhanced. The motor learning principles in this chapter can be thought of as the trainer’s “instructional tool kit” with specific tools to be used as needed. Training can take place anywhere (e.g. in the hospital, community or the learner’s environment). Training can take place in an ad-hoc format, seizing teaching opportunities as they present themselves (e.g. during community outings); although this approach has much to commend it after the individual skills have been learned, it is unlikely that such challenges will present themselves in the order that would be most helpful to optimize learning. In the clinical setting, it can be
helpful to provide more structure (e.g. scheduled sessions with lesson plans). At the beginning of a training session, a warm-up can have a number of benefits. For instance, moderate intensity aerobic exercise improves motor skill acquisition. Sample lesson-templates for initial and subsequent sessions can be found in Appendix 1.

5.8 Training in Pairs or Groups
To permit an individualized approach, we recommend that the ratio of trainers to learners be 1:1 or 1:2, although ratios as low as 1:20 can be successful. Training in pairs or groups is practical, cost-effective and has educational merit. The optimum group size depends on the goals but more than eight people in a group can lead to fewer interactions and lower satisfaction. Group training can permit group discussions and problem-solving. Learners can serve as models for each other, both for how and how not to perform a skill. Whenever possible, it is desirable to select groups on the basis of roughly similar skill level. Learners in groups should be reminded that skill capability is affected by a number of factors (e.g. age, sex, impairments and wheelchair type), so they should not compare their progress with that of others. For individuals with low self-efficacy, collaborative training with a more experienced partner aids skill acquisition. To function well, groups may need to reach an explicit agreement on the group process (e.g. avoiding the use of cell phones during the session) and consequences (e.g. singing a song) for breaking the group rules.

5.9 Motivation
Motor-skills learning is enhanced if the learner is motivated to learn. The trainer can help to motivate the learner by making the learning meaningful and rewarding. Game-based exercises can help to create and maintain interest. Children especially may learn best through play, rather than through formal training on a skill-by-skill basis. Working in either cooperation or competition with other learners can enhance motivation.

Whenever possible, the trainer should explain how the learner will benefit by learning a new skill. Training should be relevant to the learner and his/her context. In addition to the long-term benefits of training, there may be short-term benefits, such as the social interaction during the training sessions, the pleasure that some people get from challenging themselves or improving on a test. Without creating anxiety, the trainer should let the learner know that he/she will be assessed at the end of the training period, because this is known to have a positive effect on skill acquisition. Encouragement and positive feedback from the trainer or fellow learners can be powerful incentives as well. Rewards significantly enhance long-term retention of motor learning. The trainer should not be reluctant to challenge the learner to try ever more difficult but potentially achievable skills.

Learning, self-efficacy and affect are better when the learner perceives him/herself as having a choice (e.g. “do you want to start at that end of the line of pylons or at this end?”), “would you prefer to wheel across the yellow or the green mat?”). Autonomy is also important in deciding when and for how long to practice.

5.10 Demonstration
Demonstration is one of the most powerful motor skills learning tools. The demonstrator may
be the trainer, a model or a peer. Demonstration may be in-person or on a video. The Pictures and Videos section of the WSP website (http://www.wheelchairskillsprogram.ca/eng/specific_skills.php) contains numerous video clips that can be used. The demonstrator should ideally be skilled, but this is not a necessity. One approach is to use an expert model to provide an accurate template of the movement, followed by less successful models. If the model is at a similar level to the learner (e.g. in a group setting), the learner can learn from the feedback provided to the model.

If the learner is unfamiliar with the skill to be practiced, the demonstration should occur before practice begins. Otherwise, the demonstration can be used as part of the feedback provided to the learner. The demonstration may be repeated as often as needed. The trainer should briefly describe important elements of the skill or provide attention-directing cues, as part of the demonstration. The trainer should focus on what to do rather than what not to do, at least until the learner has had an opportunity to try the skill several times.

Observation alone can result in learning but has limits if not followed by physical practice. Demonstration is most effective for a novel task and less effective when refining a skill. When demonstrating a skill, the trainer should put equal emphasis on the movement and the outcome.

### 5.11 Verbal Instructions

Using the terminology of the motor learning literature, “instructions” are generally provided before practice, as distinct from “feedback” that is provided afterwards. Providing explicit instructions before task practice can be detrimental so instructions should be used with caution. Learners have a limited capacity to attend – the trainer should not overwhelm the learner with the quantity of information. Instructions are more likely to be of help for advanced learners (e.g. instructions regarding anticipation and decision making). The length of time between the instructions and actual practice should be minimized. Preferably, instructions should be given in combination with a demonstration. Learning is enhanced by instructions that portray the task as a learnable skill versus one that is based on inherent ability.

As for the content of instructions, some general examples follow:

- Speed and accuracy are inversely related. If both are desirable, the learner will do better to start with accuracy and build speed later. An instruction may be to “take your time, it’s not a race”.

- The trainer may provide instructions about what to look for in the environment that might affect performance. For instance “Pay attention to the lip at the bottom of the ramp”.

- The trainer may provide a framework, an organization or a way of thinking about a skill. An instruction may be “Think of the right rear wheel of your wheelchair as the face of a clock and start with your hands at 11:00 o’clock”.

WSP 4.3 originally approved for distribution and use: November 6, 2015
• Analogy learning has been found to be helpful. For instance, during the rolling forward skill, an instruction may be “Coast between pushes just as you would between strokes when paddling a canoe”.
• The trainer may provide verbal cues – short, precise words or phrases that direct attention or prompt movements. For instance, when attempting to get a manual wheelchair over a threshold from a stationary start, the trainer may ask the learner to “pop” (popping the casters over the threshold) then “lean” (leaning forward to help get the rear wheels over). The trainer should limit the number of cues to those that are most critical. It can be helpful to have the learner verbalize the cues prior to attempting the skill and during the attempt. As noted earlier, for people with dementia, there is some evidence of superior learning of problem-solving tasks with the help of cues versus trial-and-error learning.

5.12 Focus of Attention
Early in training, the trainer may need to have the learner focus on specific actions or processes (e.g. “lean forward”), if a crucial error has been identified. However, the research literature suggests that, when most individuals engaged in motor learning tasks concentrate on movements themselves, the conscious intervention in the control processes results in poor performance and learning. People with Parkinsonism may be an exception to this general rule.

As the skill becomes more automatic, more advanced learners tend to do better if they focus on the overall goal or outcome of the skill performance (e.g. “get up the incline onto the platform”). This phenomenon is better documented in adults than for children. Although automatic performance is ideal, even experts may find it necessary from time to time to focus attention on an aspect of a skill that requires it.

5.13 Imagery
There is evidence that imagery or mental practice can be helpful in the acquisition of motor skills. Imagery can be assigned as homework. Imagery can focus on what the learner would see during the performance of a skill, with internal or external perspectives (i.e. seeing through one’s own eyes versus seeing oneself as though watching another person). Alternatively, imagery can focus on what the person might feel (e.g. limb position, external forces) during a skill performance. Most studies have used verbal live or recorded imagery instructions, have been performed with the eyes closed and have used an internal perspective with a kinesthetic focus. On average, participants in such studies practiced for about 15 minutes at a time, 3 times a week for a total of about three hours. Even a short nap after motor imagery helps.

Imagery can also be used for motivational purposes (e.g. visualizing performing with confidence and ease). Imagery can be used in advance, to prepare to perform a skill, or after the attempt, to reinforce a well-performed trial. Imagery is not as effective as physical practice but it is better than no practice. Used in combination with physical practice, imagery is almost as effective as physical practice alone, so it may be a useful strategy when there are factors that prevent physical practice (e.g. bad weather, lack of spotter availability, a sore
shoulder). Imagery has a greater effect on closed skills (ones that are always the same) than open ones. Imagery is less useful for a novel task than a familiar one.

5.14 Feedback

Types of feedback. Implicit learning through intrinsic feedback (e.g. from what the learner can see, hear or feel) is useful and may be all that is needed. Feedback can be augmented in a variety of ways (e.g. by watching oneself in a mirror, by watching a video of one’s performance, by receiving biofeedback or by receiving feedback from a trainer). Augmented feedback is generally an effective tool for enhancing learning (e.g. by better participation, faster skill acquisition). However, augmented feedback is not always needed and it can hinder learning if the learner becomes dependent on it. The ultimate goal of skills learning is for the performer to be able to perform the skill without augmented feedback.

Feedback content. The trainer should be supportive and encouraging, even to the extent of slightly exaggerating how well the learner is doing in comparison with others at a similar stage of training. Such “bogus” positive feedback can have positive effects on skill acquisition, self-efficacy and affect. However, the trainer should be accurate with respect to feedback content. It is counterproductive to tell a learner that his/her performance was successful if it was not. Most people learn at least as well from their failures as from their successes.

When learning wheelchair skills, feedback from the trainer about the success or failure of an attempt at a skill (“knowledge of results”) is usually unnecessary, for two reasons. First, the result is usually self-evident. Second, if the learner is failing repeatedly, he/she may get discouraged by repeated statements about failure.

Another form of feedback is the provision of information about how the skill was performed (“knowledge of performance”). Ideally, such feedback should be directed at what the trainer suggests the learner should try differently (“prescriptive knowledge of performance”), in order to achieve a safer or more effective result. Before providing prescriptive knowledge of performance, it can be useful to ask the learner about his/her perceptions about the problem and intended solutions. The objective is to develop a learner who is an independent problem-solver. If the learner does not self-diagnose the problem correctly, the trainer should identify the most critical error and suggest what might be done to correct this problem.

Pointing our errors is more effective than noting what the learner is doing correctly (although the latter is important for motivation). It can be useful to have learners attempt skills in inappropriate ways (e.g. rolling across a soft surface while leaning forward, causing the casters to sink into the surface), to help them better understand why a suggestion is being made. Qualitative feedback is fine early in training (e.g. “you need to pop your casters higher”). Later, quantitative feedback (e.g. “you need to pop your casters about 2 cm higher”) may be better. Feedback can be more effective if it directs the performer’s attention away from his or her own movements and to the effects of those movements. The perceived expertise of the trainer (e.g. as evidenced by a demonstration of the skill being learned) affects the perceived usefulness of the feedback provided.
Timing of feedback. The optimum frequency for knowledge of results feedback (if any is needed) is affected by the difficulties of the task – the more difficult the task, the higher the frequency of feedback can be without interfering with skill acquisition.

When providing knowledge of performance feedback, the trainer needs to exercise judgment and to be attuned to the chemistry of the training session. The trainer should offer feedback statements no more often than after every second attempt. Autonomy can be provided (“let me know when you would like some feedback”). An exception to this is if a learner performs in an unsafe manner and does not appear to be aware of it; the trainer should point this out as soon as possible. The trainer should let the learner know that the absence of feedback means that the performance was adequate for the current stage of learning. This gives the learner an opportunity to problem-solve on his/her own. It also decreases repetitive feedback statements, especially in the case of more advanced skills when it can take time for the learner to overcome a problem. A common error is for the trainer to spend too much time talking and not enough time allowing the learner to practice.

The feedback schedule is especially important for wheelchair users who have cognitive or behavioral impairments. A self-controlled feedback schedule (i.e. letting the learner ask for feedback) is generally preferable. The trainer should gradually reduce the frequency of feedback statements as time goes on. The feedback weaning schedule may need to be more gradual for children. As the fading process leads to less and less frequent feedback, the trainer should summarize a series of attempts rather than focusing only on the most recent attempt. This technique can also be used when working with a group, providing feedback that deals with a problem several of the group members are encountering.

Trainers should be aware of the principles of behavior modification, which have similarities to the principles of motor learning. Positive reinforcement (e.g. an encouraging remark) increases the likelihood of a behavior (or skill) being performed, whereas negative reinforcement (or no reinforcement) has the opposite effect. Initially, the trainer’s tolerance for the learner’s errors should be broad, but the “bandwidth” of acceptable performance is gradually narrowed as learning proceeds. Behaviorists refer to this as “shaping” a behavior. Intermittent positive reinforcement, at irregular intervals, is the ideal reinforcement schedule for sustaining behaviors.

Feedback can be provided during the skill attempt. This is more practical for continuous skills (e.g. rolling a long distance), but there is a danger that this may interfere with the learner’s attention to intrinsic feedback. Providing the feedback after the skill is usually preferable. The trainer should wait a few seconds before providing feedback to allow intrinsic processes to work first. Before beginning the next trial, the trainer should allow the learner some time to plan the next attempt. Any augmented feedback should be followed by an opportunity to practice.

Improvements in communication technology has made it possible for the learner and trainer to interact when separated in space (“remotely”) and time (“asynchronously”). For instance, a
learner in one part of the world who is having difficulty with a skill can send a video-
recording of his/her technique to a trainer in another part of the world and receive feedback at
a later time that is convenient for the trainer. That feedback can be considered later, at a time
convenient to the learner. The learner is not limited to an interaction with a single trainer but
can seek input from anyone willing to provide it.

5.15 Specificity of Practice
If a learner wants to improve his/her ability to perform a task, the task itself should be
practiced. Cross-training may help to develop fitness, but is of limited use for the
development of motor skills. However, there is mounting evidence, for a broad range of
motor skills, that training in simulated situations can enhance skill performance in real-life
situations. Practice should be as specific as possible with respect to the task itself and the
context in which it is to be performed. If the goal is for the learner to be able to conduct the
task in diverse settings, then that is what should be practiced. If a wheelchair user has more
than one wheelchair (e.g. powered and manual) – because different wheelchairs are used in
different settings – he/she should be trained in the use of both.

5.16 Amount of Practice
For motor skills to be learned well, they need to be practiced. If a learner is switching from
an old to a new coordination pattern, it may take 200 or more practice trials to achieve the
change. During the transition, there may be numerous errors, which the learner may find
frustrating and discouraging. The amount of practice needed may be much greater (up to 50-
fold) for people with injury or disease of the brain.

The “over-learning” strategy (a term that should not be confused with “too much learning”) has a positive effect on skill retention. Over-learning means continuing to practice (by 50-
200%) beyond the amount needed for initial success. This can be done right away or during
additional practice sessions later. However, more practice is not always better – as the saying
goes “practice does not make perfect, perfect practice does”. Also, there may be a point of
diminishing returns. More than 4-6 hours of practice a day is unlikely to be productive. If
errors begin to occur due to fatigue or frustration, it is probably wise to take a break. For
simple tasks, continued practice may actually cause performance to diminish. The literature
on wheelchair-skills training suggests that substantial improvements can be made on a group
of skills with as little as 2-3 hours of formal training spread over several sessions, but that the
target for the clinical setting should probably be higher (e.g. 10-12 hours) if the situation
allows. There is no strong evidence as yet regarding the optimum “dose” of wheelchair skills
training.

Although it is not necessary to be an expert to perform a skill in a safe and useful manner, to
achieve true expertise at a skill (as a professional athlete, musician or an assembly-line
worker may exhibit) may require several hours of practice per day for periods of 10 years or
more. There is some evidence to support that millions of repetitions and 10,000 hours of
practice may be required for true expertise. Intervals of weeks or months between training
are not barriers to learning. As little practice as 6 minutes a month has been shown to be
effective. Self-control of the amount of practice and of the practice schedule has been shown
to be superior to control by others.

5.17 Facilitate Retention
Although a learner may be able to “acquire” a skill during a practice session, it is not
uncommon for the learner to fail to perform the skill adequately at the next session. This is a
failure of skill “retention”. The objective of wheelchair-skills training is long-term retention
(i.e. for months and years). For practical purposes, successful performance after such brief
intervals as 3 days may need to be accepted as evidence of at least short-term retention, but
long-term retention is the goal. The literature on the retention of wheelchair skills is limited
but there is evidence to date that skills are retained for periods of a year or more.

There are conditions within and following a practice session that affect whether training on a
new skill will be retained. To improve the likelihood of “consolidation”, the trainer (and
other members of the rehabilitation team) should avoid the introduction of other new skills
during the 4-6 hour period following practice. Newly acquired skills may be abolished by
subsequent practice of a different novel skill within four hours (retrograde interference),
especially if the competing task involves the same muscles and movement direction.
Similarly, learning one skill can interfere with the subsequent learning of the second skill
(antegrade interference). The extent of this interference is related to the duration of the earlier
task learning. Performance saturation during training helps consolidation.

Ideally, the learner should sleep before the next training session. Although not always
practical, a nap of as little as 40 minutes immediately post-training reduces the susceptibility
to interference and results in earlier consolidation. At the subsequent session, the learner may
even perform better than at the previous session, without any intervening physical practice.
This is sometimes referred to as “off-line learning”. Sleep affects some types of skills more
than others (sequence-specific skills less so). Sleep is of most benefit to skills that were the
most difficult before sleep. Learning by observation and mental imagery is also enhanced by
sleep. Anticipated rewards can enhance off-line learning during sleep.

Consolidation begins as a fragile state (one that is susceptible to interference) and progresses
over time to a stabilized state. Off-line, a skill becomes less vulnerable to interference
(stabilization) and improves in performance (enhancement). During subsequent practice, the
consolidated memory can become unstable and susceptible to improvement
(“reconsolidation”) or deterioration. Older adults have greater susceptibility to interference
and less off-line gains in motor skills.

5.18 Variability of Practice
Most wheelchair skills are of little use if they can only be performed in highly controlled
settings. The purpose of wheelchair skills training is for the learner to use the skill in a
variety of settings in his/her life (skill “transfer”). Once a skill is initially acquired and
retained, the learner should practice it in different contexts to promote such skill transfer.
Diversification may include alterations of the environment (e.g. surface, lighting conditions,
time of day, ambient temperature), variations in how the skill is performed (e.g. faster,
slower, while multi-tasking) or variations in the learner’s state (e.g. with fatigue, anxiety, altered focus of attention). Expanding the scope of training to include a few or many skills in combination (e.g. moving turns on soft surfaces) or in sequence (as might occur while playing a game or going on a community outing) can be very helpful.

To enhance skill retention and transfer, random practice of a group of skills that have already been acquired is generally better than consistent (“blocked”) practice, especially for open versus closed skills. However, there will be more errors during random practice. The two approaches are not mutually exclusive. For instance, it may be reasonable to begin with consistent practice and to progress to serial practice of a few skills followed by random practice of those skills. The approach may vary depending upon the personal characteristics of the learner (e.g. children and the elderly do better with less variability and fewer distractions).

The WSTP approach is to make sure that the learner can do each of the basic skills in at least one of the safe and effective methods available (e.g. turning around a corner by pushing harder on the outside hand-rim). To help with skill retention and transfer, we also encourage trying suitable variations (e.g. adding the drag turn to the learner’s repertoire) and using the skill in combinations (e.g. a drag turn at the bottom of a ramp). Games can be used to help the learner use the skills in a more automatic fashion, as he/she focuses on the outcome of the game rather than on performing the individual skill.

After maximizing the ability of wheelchair users and caregivers to perform the representative set of individual skills that make up the Wheelchair Skills Program, towards the end of training these skills can be combined in the various combinations and permutations that make up real life. The Wheelchair Skills Program skills are the building blocks whereas the real-life activities are the structures that can be built with these units. As part of any such community outings, the learner should be encouraged to plan the route that will be taken — the shortest route is not necessarily the easiest.

Real-life activities provide opportunities to identify challenges requiring intervention and opportunities to learn wheelchair skills as the challenges are encountered (“teachable moments”). However, the order in which such real-life challenges occur is random and inconsistent with a more structured approach in which the sequence of skills learned can be helpful.

5.19 Distribution of Practice

Practice may be condensed (“massed”) or spread over several sessions (“distributed”). In a rehabilitation center, practice may be organized as brief individual and/or group sessions at regular intervals (e.g. 30 minutes, 1-5 times a week for 2-4 weeks). Sessions might include a warm-up, some time on skills already acquired but requiring further practice, a period during which instruction is received on the principal new skill that is the focus of the session, and a cool-down activity. When the learner has demonstrated the ability to do so safely, the trainer should encourage the learner to practice between formal sessions. Whenever feasible, it is recommended that wheelchair-skills training be spread over a series of brief sessions instead
of one long one. Brief practice periods are less likely to conflict with other therapy sessions or to fatigue the learners. For wheelchair users who are elderly, who are unfit or who have a number of co-morbidities, even a brief session can be fatiguing or cause overuse injury.

One alternative model is to conduct training in and around the learner’s home. Another model for learners living in the community is to hold periodic group training courses (e.g. for 1-2 hours, weekly, for several weeks). Another alternative is a skill “camp” (e.g. all day for 1-5 days) in a central location or on a circuit basis. The single-training-session format is commonly used for workshops when training trainers. However, the use of such an approach can cause even highly motivated learners to lose focus and become fatigued. In addition to such problems, this approach may lead to poor retention and consolidation.

The research literature suggests that, for the types of skills that wheelchair users and caregivers need, it is generally less effective to carry out a large amount of training in a condensed manner than it is to spread the training out over a longer period that permits rest and consolidation of what has been learned. However, too much time between practice sessions can allow the learning to decay if the skill has not yet been acquired and consolidated. Beyond this, there is little research evidence to suggest that one of the models noted above is vastly superior to another, so the choice of model(s) can be based on local considerations.

5.20 Whole versus Part Practice
For skills that consist of a sequence of sub-skills, initially it can be helpful to break the skill down into its components (segmented “motor chunks”). For instance, the stationary wheelie skill can be broken down into three phases – take-off (getting onto two wheels), maintaining balance on two wheels and landing (returning to the condition of having all four wheels on the ground). The goal, of course, is to build up to the point that the whole skill can be practiced as a unit.

There are some variations on this strategy. For instance, the learner can combine whole- and part-skill practice by focusing attention on different aspects of the skill even though performing the entire skill. If the skill is to be segmented, a progressive approach, from start to finish, is generally preferred because it eventually becomes whole-skill practice. However, the order in which the segments are practiced is not critical. “Chunking” is less often useful for the elderly. Chunking may impair motor skill acquisition, if learners could have taken advantage of cues related to an earlier chunk.

5.21 Simplification and Progression
For many wheelchair skills, it is possible to begin with a simpler and less difficult version of the skill. Reducing errors during initial practice attempts may encourage a more implicit method of learning. The learner can master the simpler task before progressing to the ultimate skill level that is the goal of training. For many wheelchair skills, the simpler version may be useful itself, even if the more difficult levels cannot be learned. For instance, getting the wheelchair up a low curb is a useful skill and also a step toward getting up a high curb. Another example is to learn the wheelie skill in a high-rolling-resistance setting before
progressing to a low-rolling-resistance one. This strategy for learning the stationary wheelie has the advantage of reducing the amount of forward-backward movement of the rear wheels needed to maintain balance. This reduces demands on the learner’s attention. It also eliminates a degree of freedom (forward-backward movement of the rear wheels). Reducing the degrees of freedom is a strategy that has been observed to be used by beginners learning non-wheelchair skills.

Other examples of progression are adding speed to a task, doing the task in a more challenging environment, adding a second task, reducing the amount of assistance provided by an assistant and reducing the proximity of the spotter. Specific examples of simplification and progression can be found later in the training-tips sections for individual skills. Some of these strategies are similar to those used to increase the variability of practice, with the goal of skill transfer.

In many cases, more difficult skills will build on methods learned in performing simpler but similar skills. For instance, the ability to get over a threshold requires most of the techniques needed when later learning to get up a curb. The order of individual skills listed in Table 2 reflects this. As noted earlier, this systematic approach may seem to be conceptually incompatible with the community-outings approach whereby the learner and trainer make forays into the community (e.g. to the corner store) and learn about barriers as they are encountered. However, the two approaches can be used in a complementary fashion, using an initial community outing to help identify skills that require further training and to provide motivation, followed by a systematic process to improve upon those skills, followed by additional community outings to provide variety to the training experiences that encourage skill transfer.

Although a learner can perform a wheelchair skill with any safe and effective method, different methods may be more suitable for some individuals or some situations. For instance, for the “turns while moving forwards” skill as performed by a user of a manual wheelchair who propels the wheelchair with two hands, the basic method is to push harder on the hand-rim of the rear wheel on the outside of the turn. However, for the wheelchair user with good arm function and a wall leading to an opening into which the person wishes to turn, the turn can be accomplished more readily, with less reduction in speed and with less demand on the shoulders if the wheelchair user performs a “drag turn”. To do so, the wheelchair user drags the arm along the wall to slow the wheelchair on one side and carry out the turn.

### 5.22 When the Caregiver is the Learner

A skill that may not be feasible for a wheelchair user to perform alone may be possible with the assistance of a bystander or caregiver. The training can be directed at the wheelchair user, the caregiver or the two functioning together. The relationship between a wheelchair user and a caregiver is important. The wheelchair user’s needs and preferences should take precedence whenever possible. The wheelchair user may need some help in learning how to ask for help, how to direct the nature of any assistance and how politely to decline offers of unwanted help.
There are some general considerations when caregivers are the learners. There are ways for caregivers to relate well to wheelchair users. For instance, the caregiver should be instructed to seek permission before taking any actions, to speak clearly, to address the wheelchair user from the front and at eye level whenever possible, and to consider the wheelchair as an item of the wheelchair user’s personal property. The caregiver should be cautioned to avoid applying excessive force to the wheelchair user and to avoid sudden movements. The caregiver should always provide the wheelchair user with cues concerning what he/she intends to do before attempting a skill. When the caregiver is successfully trained, the caregiver can serve as a spotter, so the caregiver should be instructed in how to perform in this capacity. The caregiver may also serve as a motivator and trainer (e.g. during practice by the wheelchair user between formal training sessions with the primary trainer). A caregiver can assist with powered wheelchairs in ways similar to manual wheelchairs, even though the powered wheelchair is heavier and bulkier. For instance, with a rear-wheel-drive wheelchair, a caregiver can push down on the back of the wheelchair to unload the casters or to add traction to spinning drive wheels. The caregiver can push a powered wheelchair forwards, to assist with overcoming resistance. In addition to these general points, caregiver issues related to specific skills are dealt with later, when those skills are discussed.
6. INTRODUCTION TO SAFETY ISSUES

6.1 General
Wheelchair use can be dangerous. Each year, 5-18% of wheelchair users experience injuries related to wheelchair use. Of the injuries that are of at least moderate severity, about two-thirds are related to tip-over accidents and/or falling from the wheelchair. Wheelchair users and caregivers are also at risk of chronic injuries, for instance due poor ergonomic technique.

Improving a person’s wheelchair skills may not reduce the likelihood of injury. Providing people with an appropriately set-up wheelchair and helping them acquire the abilities and confidence that they need to get around in their communities may, counterintuitively, increase the risk of a tip or collision.

Nevertheless, the goal of wheelchair skills training is for the learner to be able to perform skills safely, effectively and efficiently. Safety includes both the safety of the wheelchair user and the safety of others. If there are two or more ways for a learner to perform a skill and one is considerably safer to perform than the other, the trainer should encourage the learner to use the safer technique. For some learners and some skills that cannot be performed in a consistently safe manner, the most successful outcome of training will be if the learner recognizes that the skill should not be attempted without assistance. A probationary period of supervision may be appropriate before coming to a decision that a person is acceptably safe to use a wheelchair independently.

Because Wheelchair Skills Program participants are assessed and trained in wheelchair skills with which they may be unfamiliar, participation in assessment and training activities can be dangerous. This section deals with issues affecting safety during these activities. The focus is on the types of risks that can occur and how the spotter can minimize them without unduly interfering with the activity.

Although the safety of Wheelchair Skills Program personnel (i.e. spotters, testers and trainers) and bystanders is also a concern, this section primarily addresses the safety of the wheelchair user. Although there are a wide range of safety concerns associated with wheelchair use (e.g. hand scrapes, overuse injuries), this section deals only with the major acute risks that a spotter might reasonably be expected to address (e.g. wheelchair tips and falls from the wheelchair).

The best way to spot a skill may vary, depending upon the spotter, the wheelchair user, the wheelchair and the setting. The material provided in this Manual, although based on our experiences with Wheelchair Skills Program activities, represents only the consensus opinions of the Wheelchair Skills Program developers. There is no scientific evidence of which we are aware on the best way to spot wheelchair skills.

6.2 What is a spotter?
A spotter is a person who acts to reduce the likelihood of injury to another person who is performing an activity, without unnecessarily interfering with the performance of that activity.

6.3 Who can function as a spotter?
The spotter may be a member of the Wheelchair Skills Program personnel. Spotter skills can also be useful as wheelchair users go about their everyday activities with friends, family members and caregivers. Wheelchair users may need to instruct a bystander or passerby on how to best spot a skill that the wheelchair user finds difficult or hazardous.

6.4 Equipment and Supplies for the Spotter
The following equipment is recommended:

- **Spotter strap:** A spotter strap is used to assist the spotter in controlling a manual wheelchair during skills during which there is the risk of a rear tip or of the wheelchair running away (e.g. down an incline). The necessary requirements of a spotter strap are a means of attaching one end of the strap to the wheelchair, a loop or handle for the spotter’s hand at the other end and sufficient tensile strength to withstand high loads (equivalent to 200 kg or more). One design for such a strap can be found at http://www.wheelchairskillsprogram.ca/eng/spotters.php. Alternatives (e.g. a piece of rope, a dog leash) are equally acceptable if they meet the criteria above.

For a wheelchair with an X-shaped cross-brace, the spotter strap is attached where the brace members intersect, to avoid any lateral movement of the strap. The low attachment point of the spotter strap helps to resist forward movement of the rear wheels (“submarining”) during a rear tip. For a rigid-frame wheelchair, the spotter strap is placed near the midline of a lower frame member or camber tube, but additional means (e.g. tape) may be needed to keep the strap from sliding to one side. If a knapsack is present or if there are other wheelchair parts (e.g. to provide rigidity to the backrest or to allow the backrest to be folded forwards), the path of the spotter strap should be as close to the backrest as possible.

The length of the spotter strap should be adjusted so that it is long enough to allow the spotter to stand upright with the elbow flexed 30-60° from full extension for most skills but short enough that the spotter can be sufficiently close to the wheelchair to intervene. The spotter should hold the hand loop or handle with the palm up and the loop or handle across the palm at the base of the fingers, not just across the fingers themselves or around the wrist. The spotter strap should be held ready, but without tension in the strap, because tension can affect the performance of some skills. When not in use, the hand loop or handle can be hung out of the way over a push-handle or other wheelchair part.

- **Seat belt:** For any skills during which there is a risk of the subject pitching or sliding forward out of the wheelchair, a seat belt is recommended. If the subject’s wheelchair is not equipped with one, one may be provided by the Wheelchair Skills Program personnel for training. The wheelchair user may decline to use the seat belt, after being
instructed in its availability. A seat belt should not be provided by Wheelchair Skills Program personnel for WST testing purposes if the subject does not ordinarily use one because this would alter the natural state that is being assessed.

- Injury preparedness: A first aid kit should be available, in the event that an injury occurs. Also, a means of communication should be available in the event that the Wheelchair Skills Program personnel require assistance to deal with an injury.

### 6.5 Obtaining the Subject’s Permission to be Spotted
Wheelchair users with advanced skills perform most of the skills in their daily lives without spotters. Such users may be offended by being spotted unnecessarily. Also, they may be legitimately concerned that inappropriate intervention by a spotter could interfere with the performance of a skill, thereby causing injury.

However, during the initial WST assessment, a spotter is mandatory, at least to the extent of the spotter positioning him/herself where he/she could intervene if necessary. During subsequent Wheelchair Skills Program activities, the tester or trainer may permit the subject to waive the spotter, if the tester or trainer is convinced that the subject will not be placed at undue risk by making this decision. It is the subject’s right to refuse to be spotted. Indeed, to spot without the subject’s permission could be considered a form of assault. However, if the Wheelchair Skills Program personnel believe that the subject’s decision to waive a spotter is inappropriate, the personnel should not permit the subject to participate in Wheelchair Skills Program activities.

### 6.6 Spotter Warnings to Subject
The spotter should let the wheelchair occupant know whenever he/she is or is not in place – the phrases “spotter on” and “spotter off” (with a corresponding pat on the shoulder if in a noisy environment) are useful shorthand means of communicating this information, having explained to the subject what the phrases mean on the first occasion that they are used.

### 6.7 Ensuring Safety During Wheelchair Skills Program Activities
A spotter should be present for any formal Wheelchair Skills Program activities. The tester or trainer should not permit the subject to attempt or complete any task that he/she has reason to believe that the subject will be unable to complete without risk. For some skills (specified later in the section on individual skills), the tester or trainer should ask the subject about whether the subject feels able to perform the skill. For such skills, if the subject believes that he/she would be able to perform the skill, the tester or trainer should then inquire about the intended method to be used. If an unsafe method is described, the tester or trainer should not permit the attempt of that skill in the way described. Despite these precautions, as a general rule, the tester or trainer should try to avoid preemptively disqualifying the subject and should allow him/her to attempt a skill.

Injuries can also occur between skill attempts, while the wheelchair is being moved from one skill site to another or even at rest (e.g. while the spotter steps away to take a phone call). It is
the spotter’s responsibility to pay close attention to the subject both during and between skill attempts.

6.8 When the Spotter Should Intervene
The spotter should always intervene to prevent a complete tip of the wheelchair, a complete fall from the wheelchair or a runaway. The spotter should generally not interfere with minimal transient tips (self-limited by definition) that are inadvertent or may even be necessary for the completion of some skills (e.g. getting up a curb). For risks other than tips and falls, it is the Wheelchair Skills Program personnel’s responsibility to stop any skill attempt as soon as it is clear that it is unsafe or about to become unsafe. The Wheelchair Skills Program personnel should provide feedback to a subject if he/she uses potentially unsafe methods.

6.9 Extent of Spotter Intervention
The spotter should not intervene to any greater extent than is necessary to ensure that a serious injury is prevented. The extent of spotter intervention may consist of a warning to a subject to stop or change the approach being used, minor physical contact from the spotter (even if the subject is able to complete the trial) or full intervention (e.g. if the subject requires the spotter to prevent him/her from potentially injuring him/herself). If there is significant intervention by Wheelchair Skills Program personnel during a session, the extent of intervention and the reason for it should be recorded. Note that a spotter may occasionally intervene inappropriately. If this is a minor intervention, that neither hinders nor helps the subject, it can be ignored.

6.10 Stopping a Wheelchair Skills Program Session
If a wheelchair user persists in potentially unsafe activities, despite the warnings of the Wheelchair Skills Program personnel, the personnel should stop the session and take whatever steps are necessary to ensure safety (e.g. contacting the nursing or security staff). This decision will usually be made by the tester or trainer. However, the spotter (if someone other than the tester or trainer) has the right to refuse to participate further, if he/she is concerned about the safety of the subject or personnel.

6.11 Injury Determinants
The likelihood and nature of injury varies depending on the wheelchair user and/or caregiver, the wheelchair and the nature of the skill being attempted. For instance, a wheelchair user who has poor vision, poor judgement or who is a risk-taker by nature is more likely to be injured than one without these characteristics. Similarly, some wheelchairs are less stable than others. Although this can be an advantage when attempting skills that require the front wheels to be popped off the surface, the trade-off is that such wheelchairs are at a greater risk of an unintentional rear tip.

6.12 Common Types of Risks and How to Prevent Them
There are several types of common incidents that can cause injury. Those that require spotter intervention and a general approach to preventing them will be described in this section. Risks during specific individual skills and an approach to preventing them will be described in the section on individual skills. Other less acute or less serious injuries (e.g. pinches,
scrapes and jarring) are difficult to prevent, because they occur without sufficient time for intervention. These can best be dealt with by training the subject in how to avoid such risks.

- **Rear tips:** A rear tip occurs when the pitch of the wheelchair exceeds the rear stability limit to the extent that the wheelchair user cannot save him/herself and the wheelchair falls backwards. This may occur while the wheelchair is stationary or moving. If the wheelchair user lets go of the rear wheels during a rear tip, the wheelchair will roll quickly forwards while tipping backwards. The forward movement is called “submarining”.

For most skills that pose a risk of a rear tip, the spotter should be positioned behind the wheelchair with one hand holding a spotter strap (if a manual wheelchair). The spotter may stand in a lunge position (with the forward foot on the opposite side to the hand holding the spotter strap) and close enough to the backrest so that, if the subject tips backwards, the spotter can rest the wheelchair on his/her forward thigh for additional support. When using this spotting technique during a skill that requires the spotter to be elevated above the subject or learner (e.g. when descending a curb or incline in the forwards direction) the spotter may use a longer spotter strap to reduce any forward bending that could injure the spotter’s back. If the spotter catches the subject but cannot return the wheelchair to its upright position, the spotter should inform the subject and then slowly lower the wheelchair backwards to the ground. Once the wheelchair is on the ground and the subject is safe and as comfortable as possible, the spotter may need to seek additional help to return the wheelchair to the upright position.

It is also possible to resist a rear tip from the front, for instance when practicing the stationary wheelie skill. The spotter may be positioned just to the side of the front wheels with a hand near the subject’s leg or a part of the wheelchair that will not come off if downward and backwards force is applied to it. When a rear tip occurs, the spotter can push down and backwards on the leg or wheelchair part to resist the tip and forward movement of the wheelchair.

For many of the skills, the rear anti-tip devices of a manual wheelchair need to be repositioned or removed. While the rear anti-tip devices are inactivated, the Wheelchair Skills Program personnel need to be particularly attentive to the risk of a rear tip-over. At the end of the session, the Wheelchair Skills Program personnel should restore the rear anti-tip devices to their original positions, unless the subject has progressed to the stage where they can be abandoned.

- **Forward tips and/or falls:** A forward tip occurs when the pitch of the wheelchair exceeds the forward stability limit to the extent that the wheelchair tips forward. This may occur while the wheelchair is stationary or moving. The tip may be partial, but sufficient to allow the wheelchair occupant to slide or fall forward out of the wheelchair. In some instances, such as during a sudden deceleration, the subject or learner may slide or fall forward out of the wheelchair without any tip. When there is
a risk of a forward tip/fall and the wheelchair is stationary, the spotter should be positioned in front of and just to one side of the wheelchair. If there is a risk of a forward tip/fall and the wheelchair is moving forward, the spotter may be positioned behind the wheelchair with one hand in front of (but not touching) the wheelchair user’s shoulder to prevent a forward tip/fall. However, this can be distracting to the subject and it can be difficult to react quickly enough from this position. A seatbelt can be useful, but there are limitations to its use during some Wheelchair Skills Program activities. If a second spotter is available, he/she can be positioned to limit the extent of a forward tip or fall.

- **Sideways tips/falls:** A sideways tip occurs when the pitch of the wheelchair exceeds the sideways stability limit to the extent that the wheelchair tips sideways. This may occur while the wheelchair is stationary or moving. The spotter should be positioned to the side to which the tip/fall is expected to occur.

- **Combination tip/fall risks:** Tips and falls do not always occur in the pure rear, forward or sideways directions. For instance, when descending an incline with one footrest elevated and the other lowered, a combined forward and sideways tip may occur when the lowered footrest strikes the ground at the bottom of the incline-level transition. Another combination possibility is when different risks present themselves sequentially. For instance, during an attempt to get over a threshold while moving, there is the risk of a rear tip when the wheelchair user attempts to pop the casters high enough to clear the threshold. If the casters do not clear the threshold, the sudden deceleration of the wheelchair can cause a forward tip or fall. When such combination risks are present, the spotter should choose a position where all risks can be minimized. This position will vary, depending upon the skill being attempted and the wheelchair set-up. A seat belt or second spotter can be helpful in such situations.

- **Runaways:** A runaway occurs when the wheelchair user loses control of the wheelchair (e.g. when descending an incline) and is unable to bring it to a stop before an injury-causing collision occurs. To prevent the runaway of a manual wheelchair, the spotter should be positioned behind the wheelchair holding a spotter strap. If the wheelchair user loses control, the spotter should pull back on the spotter strap or grasp the push handle to bring the wheelchair to a controlled stop. During the resulting deceleration, the spotter should be alert to the possibility that the subject may fall forward out of the wheelchair, and should position the other hand on the front of the shoulder. A seatbelt or second spotter can be helpful in such situations. Powered wheelchairs or scooters can also runaway if the controls are accidentally activated (e.g. by being caught in loose clothing).

- **Injury due to contact with a wheelchair part:** Pinches can occur when a part of the subject’s body becomes caught in a wheelchair part (e.g. when opening a folded
Injury can also occur if a body part is dragged over or rubbed against a sharp wheelchair part (e.g. the under-surface of a flipped-up footrest). Also, during some activities (e.g. curb ascent) that require the manual wheelchair user to push forcefully on the hand-rims, the backs of the thumbs may get abraded by the wheel locks. During incline descent with a manual wheelchair, the wheelchair user’s hands slowing the wheelchair by friction on the hand-rims can experience friction burns or lacerations due to sharp burrs on the hand-rims.

- **Injuries due to contact with the environment**: When exposed parts of the wheelchair user’s body (e.g. hands, feet or head) strike or get pinched by objects in the environment (e.g. doors or walls), injury may occur. The lower limb can be injured if the wheelchair moves forward with the foot planted on the surface. This is most likely to occur when the foot catches on the ground (e.g. at an incline-level transition, or when negotiating obstacles or level changes). Examples of injuries are hyper-flexion sprain of the knee or fracture of the tibia or femur due to a knee being forcibly flexed beyond its available range.

- **Jarring**: Sudden jarring forces can be experienced when the wheelchair decelerates suddenly (e.g. when rolling into a threshold or dropping off a curb).

- **Over-exertion injuries**: If subjects over-exert themselves when attempting skills with which they are unfamiliar or are incapable of performing, they may experience overuse injuries (e.g. affecting the shoulder or back). Similarly, subjects with limited exercise tolerance due to medical conditions (e.g. of heart or lung) may cause themselves harm by over-exertion.

- **Poor ergonomic technique**: Subjects are at risk of acute or chronic injuries due to poor ergonomic technique (e.g. folding the wheelchair with a bent and twisted back).

### 6.13 Dealing with Injuries

Despite the best precautions, injuries occasionally occur. Once a tip or fall has occurred, unless this has occurred in a dangerous location (e.g. a city street), there is usually no urgency in getting the wheelchair user back into the upright wheelchair. The Wheelchair Skills Program personnel can take the necessary time to see if the wheelchair user has been injured, to assess for wheelchair damage and to formulate a plan. The Wheelchair Skills Program personnel may need to administer first aid (e.g. cleaning and covering an abrasion). Personnel should have a plan for dealing with any emergency that is beyond their expertise.

### 6.14 Special Considerations When a Caregiver is Spotted

If a caregiver is the subject, he/she is expected to behave in a manner that is safe for both the wheelchair occupant and him/herself. The spotter in such situations should remain close enough to intervene if the caregiver fails to exercise due caution. A spotter strap held by the spotter is not practical when spotting a caregiver, because this would interfere with the caregiver’s performance.
6.15 Special Considerations for Powered Wheelchairs and Scooters

For powered wheelchairs and scooters, the spotter’s primary strategy is to be in a position where the power can be turned off and, if that fails, to take over the controller (e.g. joystick). For some powered mobility devices, a remote device may be available that allows the Wheelchair Skills Program personnel or caregiver to intervene by slowing or stopping the wheelchair when a potentially dangerous situation arises. The spotter should also be alert to impending tips or falls. A spotter strap is not a practical solution. A second spotter can be helpful in such situations.

6.16 Risks Involved in Specific Skills

The nature of the skill being attempted should alert the spotter to the types of injuries that might occur. The section on individual skills describes the most common types of risks that should be watched for by the spotter and the usual starting position for the spotter.
7. INDIVIDUAL SKILLS

This section is organized by individual skills, in the order listed in Table 2. For each skill in this section, the following headings are used:

- **Versions applicable**: For which of the five Wheelchair Skills Program versions (Table 1) this skill is applicable.

- **Skill level**: The skill level for this skill (i.e. Basic, Intermediate or Advanced).

- **Description**: A brief general description of the skill.

- **Rationale**: The reason why this skill has been included in the Wheelchair Skills Program skill set.

- **Prerequisites**: If the ability to perform an earlier skill is necessary for this skill to be assessed or trained.

- **Spotter considerations**: If other than the general instructions regarding safety discussed earlier, these are mentioned here, in particular the starting position for the spotter and common risks requiring spotter intervention. These considerations are primarily for manual wheelchairs operated by their users but may be adapted for the other versions of the Wheelchair Skills Program.

Wheelchair Skills Test (WST)

- **WST equipment**: Suggested equipment (other than the wheelchair) and set-up (if any) for the WST. Equivalent alternatives may be used. Whenever a “line” is mentioned, it does not need to be visible to the test subject. It may be some other indicator, such as a mark on the floor, a doorway or a coffee cup on the floor.

- **WST starting positions**: If other than the general starting positions described earlier, the starting positions of the wheelchair user, the wheelchair and the tester are described. These positions may need to be altered, depending upon the subject’s approach to the skill. When a spotter strap is mentioned, this only applies to the version of the WST for manual wheelchairs operated by their users.

- **WST instructions to subject**: An example of the language that the tester might use in directing the completion of the skill. Also, any actions by the tester are noted here. If success on screening questions (“Can you do it?”，“How do you do it?”) is a strongly recommended pre-condition to attempting the skill, it is noted here.

- **WST capacity criteria**: The scoring criteria are noted here if there are any beyond the general scoring criteria described earlier. It is also noted here whether success or
failure on a related easier skill (e.g. inclines of different slopes) may result in an automatic fail without needing to actually attempt the skill.

- **Special considerations**: If the descriptions up to this point for this skill require any special considerations based upon which of the five versions of the WST is being performed (Table 1), these are noted here.

**Wheelchair Skills Training**

- **General training tips**: Tips that apply to most or all of the subsequent sections for this skill.

- **Special considerations**: If the training tips up to this point for this skill require any special considerations based upon which of the five versions of the WSTP is being performed (Table 1), these are noted here.
7.1 MOVES CONTROLLER AWAY AND BACK

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject moves the controller (e.g. joystick) of a powered wheelchair or scooter away from its usual operating position and then returns it to its original position.

Rationale
- This skill is useful when the controller is in the way for some activities (e.g. approaching a table, feeding, transfers). Some wheelchair users may need to move the controller in order to change the modes or speed. Mounts can vary (e.g. midline flip up, swing away, permanent mounting).

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Beside the wheelchair, on the side of the controller.
- Risks requiring spotter intervention:
  - Runaway.
  - Many units have scissor-like mechanisms that can pinch fingers or clothing.

Wheelchair Skills Test (WST)

Equipment
- None.

Starting positions
- Wheelchair: Controller in its usual operating position and the power off.

Instructions to subject
- “Move the controller out of the way.”
- “Return the controller to its usual position.”
Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - Within the limits of the controller design, the controller should be moved sufficiently out of the way so that it would not interfere with closely approaching a table of the same height as the controller.
  - On restoring the controller to the operating position, it should be secured in this position, to the extent possible.
- A “not possible” score can be awarded for this skill because some wheelchairs do not have this feature.

Special considerations for manual wheelchairs operated by users (Version 1)

- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)

- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- The controller for a scooter is usually in the midline, on top of the tiller, between the two handles. For many scooters, the tiller can be unlatched and tilted towards or away from the user, to ease transferring onto and off of the scooter.

Wheelchair Skills Training

General training tips

- Adjustment tips:
  - When attempting to initiate the move away portion of the skill, it is usually necessary to overcome some initial resistance. The amount of force needed can sometimes be adjusted.
  - Adding a loop to the controller may allow users with limited hand function to independently move the controller.
- The controller should be moved sufficiently out of the way that it would not interfere with approach to a table or to another surface during a transfer.
- Progression:
  - To avoid runaway, the power should be turned off while this skill is initially being
practiced.

- Training should begin with moving the controller away then moving the controller back.
- The skill should eventually be used functionally, such as when approaching a table.

Special considerations for manual wheelchairs operated by users (Version 1)

- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)

- The force applied to the controller may need to be applied in a specific location and direction. This location can be identified in a way that it can be better seen (e.g. with a piece of colored tape) or felt (e.g. with a piece of velcro).
- When moving the controller out of the way, it should not be placed in a position that would make it impossible for the wheelchair user to restore it to its original position.
- If the controller changes its orientation (e.g. by 90°) when it is moved out of the way, the wheelchair user needs to take this into consideration if activating the joystick in this position to avoid driving in an unintended direction.

- Variations:
  - If the wheelchair user has poor hand control, he/she can use a large, gross motor movement to move the controller. Using the side of the arm or hand along with shoulder movement may allow the controller to be moved independently.
  - The powered wheelchair can be slowly driven at an angle against a fixed external object (e.g. a desk top) to help indirectly push the controller out of the way.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- The controller for a scooter is usually in the midline, on top of the tiller, between the two handles.
- For many scooters, the tiller can be unlatched and tilted towards or away from the user, to ease transferring onto and off of the scooter.
7.2 TURNS POWER ON AND OFF

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject turns the power of a powered wheelchair or scooter on and off.

Rationale
- The functions of the powered wheelchair require power. However, when the wheelchair is not being used for position changes or mobility, the power should be turned off when sitting in the wheelchair doing other activities. Otherwise, an article of clothing (e.g. the cuff of a sleeve) can catch on the joystick and unintentionally drive the wheelchair into a person or object. Turning the power off also better maintains the battery charge.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Beside the wheelchair, on the side of the controller.
- Risks requiring spotter intervention: Runaway.

Wheelchair Skills Test (WST)

Equipment
- None.

Starting positions
- Wheelchair: Power on or off, whichever is the case when the skill assessment begins.
- Scooter: Key in the ignition.

Instructions to subject
- The order is not important as long as both actions are assessed.
- “Turn the power on.”
- “Turn the power off.”
Capacity criteria

- As for the general scoring criteria.

Special considerations for manual wheelchairs operated by users (Version 1)
- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- There is no need for the scooter user to remove and replace the key in the ignition.

Wheelchair Skills Training

General training tips

- Adjustment tips:
  - A longer lever for the on/off switch will reduce the force required but increase the arc through which the lever must be moved.
  - The location of the on/off switch can vary greatly and may have an impact on independence.
  - Alternative switches can be used for on/off functions (e.g. toggle, depression switch, auxiliary switch).
  - Alternative locations (e.g. head, foot, thigh) can be used for the on/off switch to improve access.

Special considerations for manual wheelchairs operated by users (Version 1)
- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)
- The joystick should be in a neutral position before the controller is turned on.
- Turning the controller off while the wheelchair is being operated will bring it to a sudden stop. This can be useful when a sudden stop is needed or if the wheelchair begins to behave erratically.
- Variations:
• Rolling the hand onto and off the on/off switch may reduce the need for fine finger
dexterity.
• Using larger movements and body parts may allow users to switch toggle levers on
and off independently, if fine motor control is not available.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• On/off switches may be located on an attendant control unit that can be attached to the
wheelchair or operated remotely. Depending on the control method used by the
wheelchair user, it may be necessary to turn the controller on before the attendant control
can be operated.
• The attendant control overrides that of the wheelchair user.

Special considerations for scooters operated by users (Version 5)
• Turning the power on and off is usually done using a key that can be removed.
• Most scooter users have good upper-limb function. However, for those who do not, the
key can be built up to make it easier to grasp and turn.
• Many scooter users leave the key in its receptacle when the power is off. However, to
lessen the likelihood of theft when the scooter is left alone, the scooter user may wish to
remove the key. If so, removing the key and reinserting it should be practiced.
7.3 SELECTS DRIVE MODES AND SPEEDS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject operates the controller of a powered wheelchair or scooter to switch between drive modes and speeds and then returns to the original setting.

Rationale
- Most powered wheelchairs and some scooters provide an opportunity for the user to operate the wheelchair in different modes and speeds. The controller settings that are most appropriate for driving slowly in tight quarters are different from the settings that would work best when driving longer distances outdoors or when ascending low curbs.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Beside the wheelchair, on the side of the controller.
- Risks requiring spotter intervention: Runaway.

Wheelchair Skills Test (WST)

Equipment
- None.

Starting positions
- Wheelchair: Controller in operating position and turned on.

Instructions to subject
- "Put the wheelchair controller into each of the drive and speed settings that you can, one at a time."
- "Put your chair back into the original drive mode/speed”.
- For wheelchairs that have separate controls for the mode and speed settings, if the subject
demonstrates one but not the other, he/she may be prompted without penalty (e.g. “Are there any other ways to adjust the speed or power of the wheelchair?”).

**Capacity criteria**
- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - If the wheelchair has both adjustable modes and speeds, the subject must be able to handle both for a pass.
  - A “not possible” score can be awarded for this skill because all wheelchairs do not have this capability.
- Note that some controllers may appear to have capabilities that the wheelchair cannot perform.

**Special considerations for manual wheelchairs operated by users (Version 1)**
- Not applicable.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- Not applicable.

**Special considerations for powered wheelchairs operated by users (Version 3)**
- None.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
- None.

**Special considerations for scooters operated by users (Version 5)**
- Most scooters have some form of speed control on the tiller (e.g. in the form of a dial), in addition to the lever mechanism that provides moment-by-moment speed control.
- Some scooters have different modes or programs for different operating conditions.
- If the scooter has other operating features (e.g. horn, turn indicators, lights) that are controlled on the “dashboard” of the tiller, the scooter user does not need to be able to operate them to receive a “pass” score.

**Wheelchair Skills Training**

**General training tips**
- **Adjustment tips:**
  - The type of mode switch used will have an impact on success for some users.
  - In some wheelchairs, the mode and speed controls are separate.
  - A controller with the easiest access will be most appropriate for people with cognitive or physical limitations (e.g. three vs. five drive modes, toggle vs. dial for speed control).
  - Although the manufacturer may provide a representative set of mode settings, the dealer and/or therapist may adjust the settings with a programmer to make them
as ideal as possible for the user. These settings can be altered later, as skill improves. For many powered wheelchairs, it is possible to independently select the maximum speed, acceleration and deceleration in different directions as well as the sensitivity to joystick deflections.

- The order of drive modes (e.g. 1, 2, 3 and 4) may be different from one wheelchair to the next. For instance, some users may prefer to have the order reflect progressively increasing speed whereas other users may wish to order the modes to those from the most often to the least often used. Through programming, the dealer and/or therapist can reduce the number of steps to get to the most commonly used drive modes or speeds.

- The wheelchair user should be able to see or hear an indication of the mode and speed status.

- The process of changing modes may be quite specific. For instance, a switch may need to be activated to make mode selection available, followed by movement of the joystick to the right to move from one mode to the next, followed by movement of the joystick forward to select or use that mode.

Special considerations for manual wheelchairs operated by users (Version 1)

- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)

- The user should be trained to select different mode and speed settings for different skills.

  Progression:

  - If the powered wheelchair has other operating features (e.g. horn, turn indicators, lights), the trainer should make sure that the user can operate them.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- Commonly, faster speeds are possible by turning the speed dial clockwise and slower speeds by turning the dial counter-clockwise. These may be graphically illustrated (e.g. with a turtle on the left and a rabbit on the right).

- If the scooter has other operating features (e.g. horn, turn indicators, lights) that are controlled on the “dashboard” of the tiller, the trainer should make sure that the user can operate them.
7.4 DISENGAGES AND ENGAGES MOTORS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject disengages and engages the motors of a powered wheelchair or scooter.

Rationale
- Disengaging the motors allows the wheelchair to be pushed manually without power (e.g. if the battery is dead). This may not be feasible for some wheelchair users due to the characteristics of the wheelchair user and/or the wheelchair.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Beside the wheelchair, on the side that the subject leans toward.
- Risks requiring spotter intervention: Fall from wheelchair if the subject is a wheelchair user or fall if the subject is a caregiver.

Wheelchair Skills Test (WST)

Equipment
- None.

Starting positions
- Wheelchair: The power should be on and the motors engaged.
- Subject: The subject may get out of the wheelchair to perform this task, but no sitting surface other than the floor or ground may be used.

Instructions to subject
- “Disengage the motors of the wheelchair, so that the wheelchair can be pushed by hand.”
- “Engage the motors”.

WSP 4.3 originally approved for distribution and use: November 6, 2015
Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - The tester can confirm that the motors have been disengaged by checking that the wheelchair can be rolled a short distance by pushing on it.
  - The tester can confirm that the motors have been engaged by checking that the wheelchair cannot be rolled.

Special considerations for manual wheelchairs operated by users (Version 1)
- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)
- For some powered wheelchairs, the power may need to be turned off for the wheelchair to be easily pushed. Failure to do so may result in either a “pass with difficulty” or “fail” score depending upon the difficulty that the tester experiences in moving the wheelchair.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training

General training tips

- The power should be turned off before the motors are disengaged. The wheelchair may be harder to push if the power is on, even if the motors are disengaged.
- Depending on the type of wheelchair, rolling the wheelchair slightly when disengaging the motors may ease the lever into the disengaged position. Some chairs are more difficult than others to push when disengaged.
- Various makes and models have different methods of disengaging the motors.
- For most powered wheelchairs, there are two motors that need to be separately disengaged and engaged.
- Caution should be observed when disengaging the motors on an incline because the wheelchair may roll unintentionally and be difficult to stop.

Special considerations for manual wheelchairs operated by users (Version 1)
- Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- Not applicable.
Special considerations for powered wheelchairs operated by users (Version 3)

- It may be possible to perform this task while seated in the wheelchair although it may be necessary to remove the armrests or use a reaching aid.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- Good ergonomic principles should be used when engaging and disengaging the motors. The caregiver’s knees should be bent and the back kept straight. In many cases, a foot can be used to perform the task.

Special considerations for scooters operated by users (Version 5)

- Various makes and models have different methods of disengaging the motor.
7.5 OPERATES BATTERY CHARGER

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Caregivers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td>Caregivers</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject operates the battery charger of a powered wheelchair or scooter, setting it up for charging and returning it to the original condition.

Rationale
- Powered wheelchairs and scooters utilize battery power. The battery needs to be charged regularly, as often as daily. The battery charger is usually a separate equipment item, often left where the wheelchair is stored overnight. Some are small and light enough to be carried in a knapsack. Some powered wheelchairs have on-board chargers that allow greater flexibility to users when they are working properly but leave the user without a chair if the charger needs to go to the supplier for repairs.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Beside the wheelchair, on the side towards which the subject leans.
- Risks requiring spotter intervention: Electrical shock, fall from the wheelchair if the subject is a wheelchair user, fall if the subject is a caregiver.

Wheelchair Skills Test (WST)

Equipment
- The battery charger.

Starting positions
- Wheelchair: Facing the battery charger and at least 0.5 m away from it. The battery charger should be plugged into the power source.
- Subject: The subject may be out of the wheelchair to perform this task and may sit on
another surface if there is one available at the charging station used. However, if the
subject gets out of the wheelchair, he/she must do so independently.

**Instructions to subject**
- “Set up the wheelchair so that the battery can be charged.”
- “Restore the wheelchair to its original condition.”

**Capacity criteria**
- As for the general scoring criteria, with the clarifications below.
  - If the battery charger is not available where the WST is being performed, a “testing
error” (TE) score should be awarded and the reason for this should be noted in the
  Comments section.

**Special considerations for manual wheelchairs operated by users (Version 1)**
- Not applicable.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- Not applicable.

**Special considerations for powered wheelchairs operated by users (Version 3)**
- None.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
- None.

**Special considerations for scooters operated by users (Version 5)**
- For some scooters, the battery may need to be removed from the scooter to be charged.

**Wheelchair Skills Training**

**General training tips**
- **Adjustment tips:**
  - If the battery needs to be replaced, a manufacturer-approved model should be used.
    Failure to do so could cause damage to the battery. The type of battery needed to
    start an automobile’s combustion engine is different from the slow-discharge type
    needed for a powered wheelchair. Sealed gel batteries are preferable to those with
    liquid acid that can leak if the battery or wheelchair is tipped over.
  - If the learner has visual or sensory impairments that affect the orientation of the
    charger cable and charger port, then bright labels or tactile feedback (e.g. a patch
    of Velcro) can be used to help line up the two components.
  - The life expectancy of a battery is about 3 years. If a battery is not lasting a full
day of typical use on a full charge, it may need to be replaced.
• The user’s manual for the wheelchair may need to be consulted for wheelchair-specific elements of this skill.
• The charger port on the wheelchair is usually near the controller or under the seat. Some wheelchairs have both.
• To avoid electrical shocks, the subject should avoid using the battery charger in a wet environment or where liquids may be spilled on it.
• Manufacturers recommend that the battery should not be charged in a room with people present, because there is a risk of explosion with some batteries. This recommendation is difficult to comply with for a wheelchair user acting alone, unless the wheelchair user has a second means of mobility.
• Both the wheelchair and charger should be turned off when being connected to each other and the power source. Then the power on the charger (if not automatic) should be turned on.
• If the charger cannot be turned off, it is generally better to plug the charger into the wheelchair before plugging it into the wall, to avoid electrical arcing at the charger port.
• The length of time required to charge a battery can vary depending upon the type of charger and the nature of the battery.
• If the battery charger is capable of charging different batteries (e.g. 6 and 12 volts), the subject should ensure that the appropriate setting is used.
• A battery with a slightly low charge may function reasonably well on smooth level surfaces but may be insufficient to get the wheelchair over obstacles.
• After the battery has been fully charged, it is best to turn the charger off, unplug the charger and disconnect it from the battery. Although most batteries cannot be overcharged, the life of the charger can be shortened by allowing it to repeatedly activate in response to slight drops in battery charge.
• There is no need to wait for a deep discharge of the battery before recharging.
• It is a good idea to charge a battery on a regular basis, at a frequency that usually prevents the battery from dropping below a 50% charge.
• Chair storage in a climate-controlled environment is best. Extremes of heat or cold are not good for the battery.

Special considerations for manual wheelchairs operated by users (Version 1)
• Not applicable.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)
• None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• None.

Special considerations for scooters operated by users (Version 5)
• The charger port on the scooter may be on the tiller.
7.6 ROLLS FORWARDS SHORT DISTANCE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject moves the wheelchair forwards a short distance on a smooth level surface.

Rationale
- Forward rolling is a skill used during many wheelchair activities. The short distance is intended to simulate moving about indoors or the distance involved when crossing a two-lane street. Most bouts of wheelchair use are relatively short but occur many times a day.

Prerequisites
- None.

Spotter considerations
- Spotter starting position:
  - If a manual wheelchair, the spotter should be behind the wheelchair, holding onto the spotter strap with one hand.
  - If a powered wheelchair, the spotter should be beside the wheelchair on the side of the controller.
- Risks requiring spotter intervention:
  - If a manual wheelchair, rear tip when accelerating.
  - If a powered wheelchair, runaway or collision.

Wheelchair Skills Test (WST)

Equipment
- A smooth level surface, 1.5 m wide and 10 m long.
- Starting and finishing lines at 0 and 10 m.
- Space at least 1.5 m before the starting line and beyond the finishing line.
- Means of recording time to the nearest second.

Starting positions
• Wheelchair: Stationary, facing the starting line, with the front-wheel axles behind it.

Instructions to subject
• ”Move the wheelchair forward over the finish line without going outside of the boundaries (indicate them).”
• The tester should indicate where he/she wishes the subject to stop on completion of the skill rather than emphasizing the finish line. Otherwise, the subject may misinterpret the instruction to mean that he/she is supposed to stop just short of the line rather than beyond it. Subjects who stop short of the finish line may be prompted, without penalty, to continue until the axles are over the finish line.

Capacity criteria
• As for the general scoring criteria, with the clarifications below.
  • Any safe forward propulsion method is acceptable.
  • The end of the task is when the front-wheel axles cross the finish line and the subject comes to a controlled stop.
  • A “pass” should be awarded if:
    • If the wheelchair gently slides along or glance off a lateral barrier as long as there is no injury.
  • A “pass with difficulty” may be awarded if:
    • The subject takes more than 30 seconds to cover the 10 m distance. Timing this skill provides a means of identifying whether the subject would be able to get across a street quickly enough to be safe (e.g. when traffic flow is controlled by lights). Although there is considerable variability, most traffic signals provide at least 30 seconds for a full cycle.
    • A “fail” score is awarded if a wheel strays outside the lateral boundaries.

Special considerations for manual wheelchairs operated by users (Version 1)
• If the subject strays too close to a wall, it is acceptable for the subject to avoid injuring his/her fingers by pushing off the wall to correct direction.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• None.

Special considerations for powered wheelchairs operated by users (Version 3)
• None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• None.

Special considerations for scooters operated by users (Version 5)
• None.

Wheelchair Skills Training
General training tips

- **Adjustment tips:**
  - The distribution of weight on the front and back wheels can be adjusted in some wheelchairs. This has effects on the stability of the wheelchair, traction and rolling resistance.
  - If the wheelchair user experiences difficulties maintaining a straight direction, the problem may be due to a wheelchair part (e.g. a flat tire) or something rubbing on a wheel (e.g. a seat belt).

- When first attempting to move forwards, the direction in which any swivel casters are trailing can lead to some initial resistance to movement or lateral deviation as movement begins. The subject can reposition the casters in the appropriate direction before setting out. Learning how to reposition the casters is a technique that is useful for a number of skills. To reposition the casters, the wheelchair should be moved short distances in a manner that causes the casters to swivel (e.g. forwards, then left, than backwards, then right).

- The subject should maintain attention in the direction of travel, avoiding distractions to either side but remaining alert to potential hazards.

- Stopping is an important part of this skill. It should be possible to stop the wheelchair at will, on command and in response to obstacles.

**Progression:**

- Speed and accuracy are inversely related. It is advisable to begin movement skills with adequate accuracy before increasing the speed.
- The subject can practice stopping progressively closer to an obstacle, but without touching it. This can include progress from a tall obstacle that can be seen no matter how close the person is to it (e.g. a door), to one that is lost to sight as the user gets closer (e.g. a line on the floor).

**Variations:**

- The subject can experiment with different speeds.
- The subject can experiment with how rapidly the wheelchair can be brought to a stop.
- A strip of bubble wrap can be used for the wheelchair to straddle, providing audible feedback if a straight path is not followed.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- Each propulsion cycle includes propulsion and recovery phases.
- Two-hand-propulsion pattern:
  - **Adjustment tip:**
    - The wheelchair parts and their set-up can affect propulsion. For instance, the rear-wheel axle should be directly under or slightly ahead of the acromion process of the shoulder when the wheelchair user is sitting upright at rest.
fingers should be able to touch the axle of the rear wheel. When the hands are on the hand-rims of the rear wheels at top dead center, the elbow should be not be too straight or bent. These adjustments will allow the wheelchair user to have the hands in contact with the hand-rims in a manner that permits optimal propulsion as described below.

- The friction between the hands and the hand-rims can be increased by the use of gloves, high-friction covering on the hand-rims or surgical tubing wrapped in a spiral fashion around the hand-rims.

- **Propulsion phase:**
  - During the propulsion phase, the hands should initially match the speed of the moving wheels to avoid excessive impact loading.
  - The wheelchair user should avoid overly vigorous accelerations that could cause the wheelchair to tip over backwards.
  - To propel the wheelchair straight forwards, the wheelchair user should grasp the hand-rims and push evenly with both hands. He/she should not wrap the thumbs around the hand-rims, but point them forward.
  - The wrists should generally be in a roughly neutral orientation, avoiding the extremes of range.
  - To improve friction, if necessary, the wheelchair user can rest the palms of the hands on the tires in addition to using the hand-rims.
  - The wheelchair user should lean forwards as the elbows are extended, to get more contact time between the hands and the hand-rims and to reduce the chance of a rear tip. This is the first example of a skill that can benefit by leaning. Because the weight of most wheelchair users is large relative to the weight of the wheelchair, leaning can have a major effect on the relative weight on the different wheels. Leaning affects the stability of the wheelchair, traction and rolling resistance. Leaning is a strategy used often in the later skills.
  - To minimize shoulder strain and be mechanically efficient, the wheelchair user should try to push with long, slow strokes, allowing the wheelchair to coast where possible.
  - Hand positions can be illustrated by having the wheelchair user imagine the right rear wheel as the face of a clock; the initial and final contact positions for the wheel might then be referred to as 11:00 and 2:00 o’clock. This “three-hour time period” corresponds to a contact angle of 90°.
  - To maintain a straight direction during the coast between pushes, the wheelchair user may need to push harder on the side towards which the wheelchair is deviating or use the fingers on the hand-rim to apply friction on the other side. Although it is possible to coast for several meters from a single push, a cadence of about 1 push per second is commonly used, at least in part to maintain directional control.

- **Recovery phase:**
• A recovery path for the hands below the hand-rims is usually recommended for wheelchair users propelling for any distance on smooth level surfaces.

• After releasing the hand-rims at the end of the propulsive phase, the arms can be allowed to swing in a relaxed pendular fashion below the hand-rims (the “semi-circular” recovery pattern) back towards where the propulsive phase will begin for the next propulsive cycle. (The hands need to move slightly outward as well as backwards, to avoid contact with the rear wheels.) To reinforce the desired path of the hands, the trainer can ask the wheelchair user to touch the rear-wheel axles during each recovery phase (like a “choo-choo train”). This allows the hands to make initial contact with the hand-rims while moving upward, reducing any impact.

• An additional reason to reach back during the recovery phase and to use long strokes is to exercise the shoulder retractor muscles and maintain shoulder retraction range. This may help to offset the tendency for manual wheelchair users to become round-shouldered due to muscle imbalance and loss of flexibility.

• Wheelchair users with weak or insensitive hands may prefer to slide their hands back along the hand-rims (the “arc” recovery pattern), rather than letting go at the end of the propulsive phase, but any friction will cause some braking to occur. Short strokes with arc recoveries may be appropriate for propelling short distances in confined spaces when fine control is needed.

• **Stopping:** When stopping, the rate of slowing can be controlled by how hard the hand-rims are gripped. The hand-rims should run through the wheelchair user’s hands. While stopping, the hands should be in the 1:00 o’clock position. If the wheelchair user stops too quickly, the wheelchair user may fall forward out of the wheelchair or tip over forwards. To prevent this, the wheelchair user should lean back whenever he/she is required to stop quickly.

• **Variations:**
  - The wheelchair user can see how far he/she can roll on a single push.
  - The wheelchair user can see how quickly he/she can cover a distance.
  - The wheelchair user can see how quickly he/she can stop on command.
  - The wheelchair user can try propelling with one hand at a time.
  - The wheelchair user can push an empty wheelchair with one hand, steering with the empty wheelchair.
  - The wheelchair user can try propelling with one hand on alternating sides (e.g. as when carrying a coffee).
  - The wheelchair user can try to straddle a strip of bubble wrap while coasting, without bursting any bubbles.
  - The wheelchair user can try to straddle objects of various heights and widths (e.g. using a few bricks) to better understand the clearance under the wheelchair.
  - The wheelchair user can pull another occupied wheelchair (with the second
wheelchair user holding onto the wheelchair in front) behind him/her (another "choo-choo train" analogy).

- After weaving around objects, it is important to remember to return to the proper propulsion/recovery pattern. An easy, multi-skill activity is to weave through cones and then transition into a few pushes in a straight line before returning to the cones.

- Hemiplegic-propulsion pattern:
  - **Note:** Hemiplegia due to stroke is used as a representative example of a condition for which foot propulsion can be useful. Wheelchair users with other impairments may find foot propulsion useful as well.

- **Adjustment tip:**
  - The height of the seat should be low enough to allow the full foot to be on the ground when it is directly below the knee.
  - The wheelchair user should wear shoes that do not fall off, that provide protection for the foot and that provide good traction.

- **Propulsion phase:**
  - If only the sound-side arm is used, the wheelchair will deviate to the weaker side.
  - The wheelchair user propels the wheelchair with the sound-side leg to both propel and steer the wheelchair, with or without the assistance of the sound-side arm.
  - There is no need to synchronize the cadence of the hand and foot. Indeed, once moving, some wheelchair users just use the foot to maintain forward movement.
  - The propulsion phase for the leg begins with the knee relatively extended, pushing down on the floor with the heel, and then flexing the knee under the seat to pull the wheelchair forward.
  - The propulsion phase for the arm is the same as that described above for two-hand propulsion.

**Recovery phase:**
- At the end of the propulsion phase for the leg, the foot is lifted off the ground, and the knee is extended.
- The recovery phase for the arm is the same as that described above for two-hand propulsion.

- **Stopping:**
  - The wheelchair user may use the hand and foot to stop.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- If there is only one footrest, because the wheelchair user uses one arm and one leg to self-
propel the wheelchair, the unsupported foot can be crossed over the supported one.

Special considerations for powered wheelchairs operated by users (Version 3)

- **Adjustment tips:**
  - For this skill and later moving skills, when it is possible to program the wheelchair modes (e.g. with respect to speed, torque and deceleration), the trainer may wish to use a mode that is safest and most likely to be effective when training begins.
  - When set in the slowest speed, there may be a time lag between when a joystick is moved and when the action occurs. This can lead to overcorrection while steering the wheelchair.
  - Non-proportional drives (on/off) are just as dependent on proper programming as proportional drives, if not more so. Set-up of non-proportional drives can be graded to include more or less cognitive and physical loads depending on the user’s needs and abilities.
  - If the wheelchair user’s hand slips off the joystick or control is poor, a different shape for the joystick may be appropriate (e.g. U-shape versus ball-shape).
  - Powered wheelchairs may be rear-wheel, front-wheel or mid-wheel drive. The drive configuration will affect the path of the wheelchair and the ease with which the wheelchair can be kept moving in a straight line. For instance, a front-wheel-drive wheelchair tends to be more difficult to keep moving forward in a straight line; some wheelchairs have built-in compensation for this problem.

- This is the first powered wheelchair skill involving movement of the powered wheelchair in a drive mode. With powered wheelchairs, although there are a number of input devices that can be used to control the wheelchair, we have used the term “joystick” because it is the most common device used. Displacing the joystick in a direction will cause the wheelchair to move in that direction. If the controller is of the proportional-control type, the farther the joystick is moved from its rest position, the faster the wheelchair will move in that direction. If the joystick is of the proportional-control type, the user should move it forwards gradually to achieve a smooth start. It may take some practice for the wheelchair user to use the joystick in a proportional way – an exercise may be for the wheelchair user to see how slowly he/she can move.
  - Progression:
  - The subject can practice moving the joystick in an open space and progress to
more enclosed ones.

- The subject can begin at responsive but low torque settings and progress to
different modes.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

- When the caregiver is first learning to handle a powered wheelchair, it is preferable to do
so with the wheelchair unoccupied, to avoid injury to the wheelchair user.
- Some wheelchairs permit the wheelchair to be operated by a caregiver behind the
wheelchair, which is the preferred position.
- For this and other moving skills, the caregiver may operate the wheelchair by using the
same joystick that the wheelchair user does. Where space permits, this should be done
with the caregiver standing beside the wheelchair and facing forward. In some situations
(e.g. going through a narrow opening), the caregiver may need to stand in front of the
wheelchair. The caregiver in this situation should be careful not to drive the wheelchair
over his/her own feet.
- Standing behind the wheelchair and leaning forward to reach the joystick is not generally
recommended.
- Sitting on the wheelchair user’s lap to operate the joystick is not generally recommended.

**Special considerations for scooters operated by users (Version 5)**

- The handles on the tiller control the orientation of the front wheel for steering purposes.
- Lever mechanisms on the handles usually control forwards vs backwards direction and
moment-to-moment speed.
- A dial on the tiller controls the general speed setting (high vs low) depending upon the
circumstances.
7.7 ROLLS BACKWARDS SHORT DISTANCE

Version applicability

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td>Manual</td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td>Powered</td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject moves the wheelchair backwards a short distance on a smooth level surface.

Rationale
- Backward rolling is a skill used during many wheelchair activities. However, a short distance is usually all that is necessary, unless overcoming high rolling resistance (e.g. on a soft surface or ascending an incline using foot propulsion).

Prerequisites
- None.

Spotter considerations
- Spotter starting position:
  - Behind the wheelchair, holding onto the spotter strap (if a manual wheelchair).
- Risks requiring spotter intervention:
  - Rear tip when stopping.
  - Collision with fixed or moving objects.

Wheelchair Skills Test (WST)

Equipment
- A smooth level surface, 1.5 m wide and 2 m long.
- Starting and finishing lines at 0 and 2 m.
- Space at least 1.5 m before the starting line and beyond the finishing line.

Starting positions
- Wheelchair: The back of the wheelchair facing the starting line and the rear-wheel axles behind it.

Instructions to subject
• "Move the wheelchair backwards over the finish line (indicate it) without going outside of these boundaries (indicate them)."

• Subjects who stop short of the finish line may be prompted, without penalty, to continue until the rear-wheel axles are over the finish line.

**Capacity criteria**

• As for the general scoring criteria, with the clarifications below.

• A “pass” should be awarded if:

  • Any safe backward propulsion method is acceptable.
  • The end of the task is when the rear-wheel axles cross the finish line and the subject comes to a controlled stop.
  • If a solid barrier is used on either side, the subject may slide along or glance off the barrier.

• Comments only:

  • The subject fails to look backwards over the shoulders to monitor that the path is clear. Although this is important in everyday life, in the WST situation the subject usually backs up into a space that he/she has just moved forwards through in the forward direction and has reason to believe is free of obstacles.

**Special considerations for manual wheelchairs operated by users (Version 1)**

• None.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

• None.

**Special considerations for powered wheelchairs operated by users (Version 3)**

• None.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

• None.

**Special considerations for scooters operated by users (Version 5)**

• None.

**Wheelchair Skills Training**

**General training tips**

• If backing up immediately follows rolling forward, then the casters will be trailing backwards. As the backing up begins, there may be some initial resistance and directional instability as the casters move into the forward-trailing position. The casters can easily be repositioned by moving them in a circular path.

• The learner should proceed slowly and look over both shoulders regularly to avoid obstacles and collisions.

• Directional stability is more difficult to maintain when backing up a rear-wheel-drive
wheelchair. This may lead to a sinuous path, with a series of deviations and over-corrections (“fish-tailing”). This may not be apparent when wheeling backwards for a short distance like the 2 m used for the WST, so a longer distance (e.g. 5 m) should be used for training purposes. Slowing down will make it easier for the subject to steer.

- Variations:
  - Bubble wrap can be placed behind a moving rear wheel without the subject’s knowledge to provide audible feedback that shoulder checks are needed.

Special considerations for manual wheelchairs operated by users (Version 1)
- In many ways, the technique is the opposite of what is used for rolling forwards (as dealt with in the previous skill).

- Two-Hand-Propulsion Pattern:
  - To propel the wheelchair straight backward, the wheelchair user should reach forward, grasp the hand-rims and pull evenly backwards.
  - Some wheelchair users with very weak arms (e.g. people with tetraplegia) may find it more effective to make contact under the hand-rims with the palms up. Others may prefer to place both hands on the backs of the wheels (about 11:00 o’clock, using the clock analogy) with the arms straight and the shoulders shrugged. Then, the wheelchair user can lean back and use the body weight to push down on the wheels.
  - Unlike forward rolling, it is not easy to coast backwards without deviating to one side or the other. Therefore, the length of the strokes is usually shorter when rolling backwards.
  - Because the distances are usually short, there is no need to use long propulsion strokes or to recover the hands below the hand-rims.
  - To avoid tipping over backwards when stopping, the wheelchair user should avoid grabbing the wheels suddenly and should lean forward slightly.

- Variations:
  - As for the “rolls forwards a short distance” skill.

- Hemiplegic-propulsion pattern:
  - As for the “rolls forward a short distance” skill, except the sequence for the leg is to first flex the leg, push down on the floor with the foot enough to ensure good traction, then push the wheelchair backwards by straightening the leg.
  - As above for two-hand propulsion.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- The caregiver needs to do regular shoulder checks to avoid collisions or obstacles.

Special considerations for powered wheelchairs operated by users (Version 3)
- Adjustment tip:
  - The programming of a powered wheelchair is separate for the forwards and
backwards directions. It is possible that a wheelchair that has not been
programmed correctly could have difficulty backing up unless the speed control is
adjusted upward.

- To move backwards, the wheelchair user pulls the joystick backwards.
- If the wheelchair is fitted with a rear-view mirror, this lessens the need to turn around to see where the wheelchair is going.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- As for the “rolls forwards a short distance” skill, the handles on the tiller control the orientation of the front wheel for steering purposes, lever mechanisms on the handles control forwards vs backwards direction and moment-to-moment speed, and a dial on the tiller controls the general speed setting (high vs low) depending upon the circumstances.
7.8 TURNS IN PLACE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level

- Basic.

Description

- The subject turns the wheelchair around to the left and right to face in the opposite direction, while remaining within a confined space.

Rationale

- Turning around in tight spaces is a common challenge for wheelchair users. The type of wheelchair and its dimensions affect the ease with which this skill can be performed.

Prerequisites

- None.

Spotter considerations

- Spotter starting position: Near the wheelchair.
- Risks requiring spotter intervention: No common risks.

Wheelchair Skills Test (WST)

Equipment

- Smooth level surface and a 1.5 m square, marked out by lines on the floor. Solid barriers should not be used unless they are low enough to permit any footrests or anti-tip devices to pass over them.

Starting positions

- Wheelchair: In the center of the square, facing one side of the square.

Instructions to subject

- “Keeping the wheelchair within this square (indicate it), turn the wheelchair around until you are facing the opposite direction.”
- “Now turn the chair in the other direction (indicate it) until you are back where you started.”
• It may be helpful if the tester touches the subject’s shoulder on the side to which the subject is being asked to turn.

• If the subject has turned, but has not yet turned fully, he/she may be prompted to continue without penalty.

**Capacity criteria**

• As for the general scoring criteria, with the clarifications below.

• A “pass” should be awarded if:
  
  • The subject turns at least 160° in each direction.
  
  • Any turning method (e.g. in the wheelie position for a manual wheelchair) is acceptable.

  • All parts of the wheelchair and subject that touch the ground must remain within the square. However, it is permissible for parts of the wheelchair user’s body or wheelchair (e.g. a foot on a footrest) to extend beyond the lines.

**Special considerations for manual wheelchairs operated by users (Version 1)**

• None.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

• None.

**Special considerations for powered wheelchairs operated by users (Version 3)**

• None.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

• None.

**Special considerations for scooters operated by users (Version 5)**

• Because of the way that scooters turn, a three-point turn will usually be necessary to stay within the boundaries.

• Larger outdoor scooters will usually fail this skill.

**Wheelchair Skills Training**

**General training tips**

• **Adjustment tips:**
  
  • The ease of making a turn in a tight space depends on the overall length and width of the occupied wheelchair, the distance between the wheels and how free the casters or steering wheels are to swivel.

  • The rear anti-tip devices for some wheelchairs increase the overall length of the wheelchairs. Adjusting or removing them may decrease the radius of the turning circle.
• The footrests of some wheelchairs increase the overall length of the wheelchairs, so a larger turning circle is required. Removing the footrests may make it easier to turn around in close quarters. If the footrests are removed, it is important to avoid injuring the feet by bumping them or running over them with a wheel. If elevated footrests are lowered, the turning circle will be smaller.

• If a wheelchair is in the tilted or reclined position, the turning circle radius may be larger.

• It may be helpful for the learner to shuttle forwards and backwards – e.g. forward turn to the left, backward turn to the right, repeating as necessary – to stay inside the designated space, turning part of the way with each cycle. The longer the chair, the more likely it is that this will be necessary.

• Progression:
  • The subject should start with small angular changes of the wheelchair and progress to larger ones.
  • The subject should start with a larger space in which to turn and progress to smaller ones.
  • The subject should start at a slow speed, focusing on accuracy (staying within the designated boundaries).

Special considerations for manual wheelchairs operated by users (Version 1)

• Two-hand-propulsion pattern:
  • To make the turn more tightly, the wheelchair user should pull back on one wheel, while pushing forward on the other. In such a case, the vertical axis of rotation for the turn is midway between the drive wheels. It may take a few cycles to complete the turn.

• Progression:
  • The “snap turn” is a more advanced version of the skill. To perform it, the wheelchair user positions one hand well forward and the other well back. Then, in a single uninterrupted motion, the wheelchair user “snaps” the wheelchair around, letting the hand-rims slide through the fingers until the wheelchair reaches the desired angle. Depending upon the rolling resistance of the surface, the wheelchair may continue to spin in a circle until wheel or hand-rim friction brings the wheelchair to a stop.

• Variations:
  • The skill may be performed in the wheeie position. This minimizes the turning footprint and the corresponding size of the support surface needed, even though the above-ground space needed (i.e. the turning circle) will not diminish to the same extent.
  • When turning around in confined spaces, it can be helpful for the wheelchair user to push or pull on external objects rather than using the hand-rims.
  • Game: Ask the learner to pretend that his/her feet are the hour hand of a clock facing up from the floor and see how quickly and accurately he/she can respond
to times that the trainer calls out (e.g. from a starting position of 12:00 o’clock, turn to 3:00 o’clock).

- **Hemiplegic-propulsion pattern:**
  - To turn to the side away from the stronger hand, the wheelchair user should push forward on the hand-rim and push sideways toward the stronger side with the foot.
  - To turn toward the stronger hand the wheelchair user should pull back on the hand-rim and push sideways toward the weaker side with the foot.
  - The wheelchair user may reach across to the opposite wheel with the stronger hand.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- To turn in a tight space, the caregiver should pull back on one push-handle, while pushing forward on the other.
- The caregiver should stand close to the back of the wheelchair if space is limited. If a knapsack prevents this, it can be temporarily removed and placed in the wheelchair user’s lap.
- This skill can be performed in the caregiver-assisted wheelie position.

**Special considerations for powered wheelchairs operated by users (Version 3)**
- **Adjustment tips:**
  - Adjusting the speed, acceleration and deceleration for turning will affect the overall turning of the chair.
  - The location of the drive wheels and seating configurations has an impact on the turning radius of the system.
  - The closer the drive wheels are to the loaded wheelchair’s center of gravity, the easier it is to turn in place by simply moving the joystick straight to the left or right. The vertical axis of rotation for such a turn is midway between the drive wheels.
  - If the drive wheels are well forward or back, the casters will swing more widely so that a series of to-and-fro motions may be needed to stay within the designated boundaries.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
- None.

**Special considerations for scooters operated by users (Version 5)**
- Because the drive wheels are not independent and because of the limited angle through which the tiller can turn for most scooters, a scooter cannot turn in place in the same way that manual and powered wheelchairs can.
- The tightness of the turn is also affected by the length of the wheelbase.
- When maneuvering in tight spaces, the speed setting should be reduced.
7.9 TURNS WHILE MOVING FORWARDS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject turns the wheelchair to the left and right while moving forwards.

Rationale
- Moving turns are often necessary to avoid obstacles or to change direction.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Behind the wheelchair, holding onto the spotter strap (if a manual wheelchair), unless the subject has safely performed the “rolls forward a short distance” skill, in which case the spotter needs only to be nearby.
- Risks requiring spotter intervention: Rear tip when accelerating.

Wheelchair Skills Test (WST)

Equipment
- 1.5 m wide level surface with a 90° turn. Solid barriers (preferred) or lines may be used to define the lateral limits.
- At least 2 m space before and beyond the corner.

Starting positions
- Wheelchair: Facing the corner, with the front-wheel axles at least 0.5 m from the corner.

Instructions to subject
- “Move the wheelchair forward and turn around this corner (indicate it).”
- “Now do the same thing, turning in the other direction.”
- Subjects who stop short of the finish line may be prompted, without penalty, to continue.
Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - The endpoint is when the wheelchair is around the corner, 90° from its original orientation and with the leading wheel axles at least 0.5 m from the corner.
  - The subject may touch (or even use) the walls.
  - If lines are used to define the lateral limits, it is permissible for parts of the wheelchair user or wheelchair (e.g. a foot on a footrest) to extend beyond the lines, as long as the wheels or feet on the floor stay within the prescribed limits.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training

General training tips

- For most wheelchairs (but not scooters), the ability to turn is made possible by casters. Casters are wheels that are free to swivel around a vertical axis. The location of the casters (front vs back) will affect the nature of the turn.
- The path of the wheelchair parts (e.g. footrests) will differ depending upon the characteristics of the wheelchair (i.e. whether the chair has rear-wheel, mid-wheel or front-wheel drive). As a general rule when turning, the vertical axis for the turn is midway between the drive wheels, so the farther away from this axis that a wheelchair part or body part is, the greater the circumference through which it will swing.
- When turning around an object (e.g. a corner wall) that the wheelchair is close to, the turn should not begin until the axle of the near-side drive wheel has reached the object.
- When driving a rear-wheel-drive wheelchair toward a 90° turn into a narrow opening, when space is available the wheelchair user should stay as far as possible away from the wall on which the opening is found. This is analogous to parking a car between two other cars in a crowded parking lot.
• If the approach path is narrow but the opening is wide, approaching the corner close to the wall is preferable, watching closely that the axle of the near-side rear wheel is slightly beyond the corner before turning sharply.

• With a front-wheel-drive wheelchair, there is less of a problem steering a path close to the wall.

• If maneuvering around a series of fixed obstacles that are widely spaced, a useful strategy is to use a path that takes the drive wheels close to the obstacles. If the obstacles are closer together, the wheelchair may need to be driven farther away from each obstacle to have sufficient room in which to complete the turn.

• The subject should clearly understand the difference between the size of the turning circle (that is affected by parts, such as footrests, that stick out above the ground) and the size of the turning footprint (that only includes the chair or body parts that touch the ground).

• The footrests can be moved out of the way in tight spaces to reduce the radius of the turning circle.

• The user should be especially careful not to catch the feet on an immovable external object – if the foot stops and the chair continues to turn, a serious injury can result.

• Three-point turns (e.g. using an opening like a doorway to turn around and go back in the opposite direction) can be carried out by making the first turn into the opening while moving forward followed by a backward turn in the opposite direction. Alternatively, the initial turn into the opening can be backwards (after rolling past the opening), followed by a forward turn in the opposite direction.

• Progression:
  • The subject should start with small changes of direction (e.g. around widely spaced pylons) and progress to more closely spaced ones.
  • The subject should start with loose (large-radius) turns and progress to tight (small-radius) ones.
  • When beginning training around full 90° corners, learners may find it easier to break a turn down into its segments – driving straight, turning, then driving straight again, rather than following a smooth curved path.

• Variations:
  • When using the moving-turns skill in real-life settings, the subject should obey the rules of the road at corners – he/she should slow down if the path around the corner cannot be seen, he/she should stay to the right (if that is the convention in the country in which the training is taking place) and he/she should not cut the corner.

**Special considerations for manual wheelchairs operated by users (Version 1)**

• Two-hand-propulsion pattern:
  • When ready to turn, the wheelchair user should slow down the inside wheel and/or push harder on the outside wheel. Slowing down the inside wheel results in a tighter turn, but causes the wheelchair to slow down. Pushing harder on the outside wheel causes the wheelchair to speed up. The decision on the relative speeds of the two wheels depends on how tight a turn is needed and safety considerations.
Variations:
- The floor space needed with all four wheels on the floor is greater than that of a wheelchair in the wheelie position.
- While coasting in a straight line, the wheelchair user can experiment with the effect that rotating the outstretched arms from side to side has on direction – swinging the arms to one side causes the wheelchair to turn to the other side.
- The fixed environment can be used to assist with turning. Timing, intensity, direction and location of the forces applied to the wall are important features of success. Using the environment minimizes the need to slow down. If the learner is having difficulties, the skill can be simplified by having the trainer push the wheelchair towards the corner while the wheelchair user has the wall-side hand in the ready position and the opposite hand on the lap.
  - In the “drag” turn, the wheelchair user drags a hand, in a rear position, along the wall to turn toward the wall and around the corner.
  - In the “push-off” turn, the wheelchair user uses a hand, in a forward position, to push away from the wall.

Hemiplegic-propulsion pattern:
- The wheelchair user should use the foot to help steer.
- It is easier to turn away from the sound (unaffected) side than toward it.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- The caregiver should push harder with the push-handle on the outside of the turn and pull back slightly on the inside handle.
- The caregiver should be careful to avoid having the wheelchair user’s hands or feet hit any barriers.
- The wheelie position can be used to turn in tight spaces.

Special considerations for powered wheelchairs operated by users (Version 3)
- The path of the wheelchair is affected by whether the wheelchair is rear-wheel, mid-wheel or front-wheel drive. The general rule of paying attention to the axle of the near-side drive wheel applies.
- If the leading wheels are the drive wheels (i.e. a front-wheel-drive wheelchair), the trailing casters may swing wide of the path and may strike the wall on the far side, depending upon the radius of the turn.
- If the wheelchair is about to collide with the corner, the wheelchair user should not reach out to fend off with the hands or feet – this is ineffective and may cause injury. The body parts should be kept within the protective envelope of the wheelchair.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.
Special considerations for scooters operated by users (Version 5)

- Some scooters have 3 wheels and some have 4. All other things being equal, a 3-wheeled scooter will corner better but will be more vulnerable to sideways tips.
- Unlike powered wheelchairs, the drive wheels do not operate independently. Steering the scooter is related to the orientation of the front wheel(s), controlled by the handles of the tiller.
- Because most scooters are rear-wheel-drive, turning is similar to driving a car, an analogy that may be useful.
- Because most scooters have long wheelbases in comparison with other wheelchairs and because there are usually limits to how far the handles can be turned, scooters cannot turn as tightly as other wheelchairs.
7.10 TURNS WHILE MOVING BACKWARDS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td>Manual</td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td>Powered</td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject turns the wheelchair to the left and right while moving backwards.

Rationale
- Moving turns are often necessary to avoid obstacles or to change direction. However, for most wheelchair users, such turns are usually required less often in everyday life than moving turns in the forwards direction.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Behind the wheelchair, holding onto the spotter strap (if a manual wheelchair), unless the subject has safely performed the “rolls backwards a short distance” skill, in which case the spotter needs only to be nearby.
- Risks requiring spotter intervention: Rear tip when stopping, collision.

Wheelchair Skills Test (WST)

Equipment
- As for the “turns while moving forwards” skill.

Starting positions
- Wheelchair: The back of the wheelchair facing the corner, with the rear-wheel axles at least 0.5 m from the corner.

Instructions to subject
- “Move the wheelchair backwards and turn around this corner (indicate it).”
- “Now do the same thing, turning in the other direction.”
- Subjects who stop short of the finish line may be prompted, without penalty, to continue.
Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - The endpoint is when the wheelchair is around the corner, 90° from its original orientation and with the leading wheel axles at least 0.5 m from the corner.
  - If lines are used to define the lateral limits, it is permissible for parts of the wheelchair user or wheelchair (e.g. a foot on a footrest) to extend beyond the lines, as long as the wheels or feet on the floor stay within the prescribed limits.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training

General training tips

- As for the “turns while moving forwards” skill.

Special considerations for manual wheelchairs operated by users (Version 1)
- As the “turns while moving forwards” skill.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As the “turns while moving forwards” skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- Although operation of the joystick is fairly intuitive when performing turns while moving forwards (e.g. if one wishes to turn to the right, the joystick is moved to the right), it can be difficult to get used to performing moving turns in the backwards direction. It can be helpful to remember that the left-right direction in which the joystick should be displaced should be the direction in which the wheelchair user wishes his/her knees to move. For instance, when making a backward turn to the left, the knees will move to the right, so that is the direction toward which the joystick should be displaced.
Special considerations for powered wheelchairs operated by caregivers (Version 4)
- As for Version 3.

Special considerations for scooters operated by users (Version 5)
- Having a mirror attached to a handle can be useful when driving straight back but is of less use when turning – as one backs up and turns to the right, the mirror looks to the left.
7.11 MANEUVERS SIDEWAYS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject maneuvers the wheelchair sideways to the left and right parallel to an object.

Rationale
- Repositioning the wheelchair sideways in a tight space is commonly necessary to get closer to or farther away from objects (e.g. a bed or table).

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Near the wheelchair.
- Risks requiring spotter intervention: No common risks.

Wheelchair Skills Test (WST)

Equipment
- Target lateral barrier or line.
- A line 10 cm from the target.
- Means to limit the extent of forward-backward movement to 1.5 m. If these limits are solid barriers, they must be low enough that any footrests or anti-tip devices can pass over them. A strip of bubble wrap can be used to provide audible feedback to the tester that the wheels have gone beyond the limits of the space available.
- Note that the same set-up can be used to test sideways maneuvering to left and right by simply turning the wheelchair to face in the opposite direction between the two attempts.
- Alternatively, and more simply, the end position for the first attempt can be the starting position for the second attempt.

Starting positions
- Wheelchair: Parallel to the target with the closest wheel at least 0.5 m from it.
Instructions to subject

- “Get this wheel (indicate the one closest to the target) as close as you can to this wall/line (indicate it), using the space available (indicate the forward-backward limits).”
- Repeat after getting the other side of the wheelchair into the starting position.
- If the wheelchair is close to the desired finish position, but not quite there (too far away or at too great an angle), it is permissible to prompt the subject without penalty (e.g. “Can you get a little closer?” or “Can you straighten out the wheelchair?”).

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - The most lateral aspect of the wheelchair is moved to within 10 cm of the target. For manual wheelchairs, the most lateral aspect of the wheelchair will usually be the rear-wheel hand-rim. For powered wheelchairs, this will usually be the drive wheel. The wheelchair may touch the target.
  - On completion, the fore-aft axis of the wheelchair must not be at an angle of >20 degrees from the wall.
  - The parts of the wheelchair or subject in contact with the ground must stay within the 1.5 m forward-backward limits, but other parts of the wheelchair or subject (e.g. feet on footrests) may extend beyond these limits without penalty.
  - It is permissible for the subject to move farther away from the target to allow an approach from the front or back, as long as the wheelchair does not go beyond the 1.5 m separating the front and rear barriers.

Special considerations for manual wheelchairs operated by users (Version 1)

- Most subjects will use to-and-fro motions (as in parallel parking a car), but “bunny hopping” or rocking (from the wheels on one side to those on the other) is permitted.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- The caregiver’s feet need to stay within the available space.

Special considerations for powered wheelchairs operated by users (Version 3)

- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- The caregiver’s feet need to stay within the available space.

Special considerations for scooters operated by users (Version 5)

- Larger outdoor scooters will usually fail this skill.

Wheelchair Skills Training

General training tips
- **Adjustment tip:**
  - The length of the wheelchair can sometimes be minimized through setup (e.g. by moving the axles forward).

- The subject needs to be aware of the widest and longest points of the wheelchair.

- The trainer may use the analogy of parallel parking a car (although without being able to pull forward ahead of the opening as one would do in a car), if the subject has had such experience.

- If the space available is limited, the subject may need to shuttle the wheelchair forwards and backwards a number of times to get into the desired position, moving more to the side with each attempt.

- **Progression:**
  - The subject should start with ample forwards-backwards room in which to maneuver and gradually decrease the space available. Strips of bubble wrap can be used to provide audible feedback regarding the forwards and backwards limits.
  - The subject should start with small sideways steps and progress to larger ones.
  - The subject should start at a slow speed, focusing on accuracy (staying within the designated boundaries), increasing the speed within the limits of accuracy.
  - The subject may perform the skill in the wheelie position when that skill has been learned.

- **Variations:**
  - The subject may mimic parallel parking a car, pulling forward ahead of the target opening, then backing into the opening.
  - The subject may use the sideways-maneuvering technique to negotiate to the other side of a barrier with a gap in it (e.g. two bolsters in a parking lot) that is too narrow to drive straight through but is low enough from the ground to allow clearance between the wheels. It may be possible to move one pair of wheels through the gap at a time, transiently straddling the obstacles with one pair of wheels on either side of the obstacles and the wheelchair parallel with the obstacles. The wheelie position can be very helpful in performing this skill.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- **Two-hand-propulsion pattern:**
  - **Variations:**
    - An alternative for the wheelchair user with good upper-body strength and coordination is to use the “bunny-hop” method. To do so, the wheelchair user hops the rear wheels to the side by shifting the body weight in the desired direction and pulling up on the rear wheels to have them move in the same direction. The wheels do not need to get fully off the ground to be successful. This is most useful when space is very limited. Initially, the wheelchair user can get used to just hopping up and down, with no sideways movement. If the hands holding onto the hand-rims are not at the top dead center, the rear
wheels will rotate when they become unloaded. This can be prevented by applying the brakes.

- A similar effect can be created by rocking the wheelchair from side to side. The wheelchair user should lean hard in the direction that he/she wishes to move and return more gently to the upright position.

- **Hemiplegic-propulsion pattern:**
  - No special considerations.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- The caregiver should generally not attempt to lift the occupied wheelchair sideways. However, it may be possible to use the “wheelbarrow” approach. To do so, the wheelchair user leans forward to unload the rear wheels, being careful not to tip over or fall from the wheelchair. Then the caregiver may be able to slightly lift the rear wheels and move them sideways in small increments.

- The caregiver should be careful that the wheelchair user’s arm or hand is not caught between the lateral barrier and the rear wheel.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- **Adjustment tip:**
  - A mirror attached to the wheelchair can be used to provide visual feedback on the position of the chair with respect to the rear barrier.

- The strategies for front-wheel-drive and rear-wheel-drive wheelchairs are somewhat different. For instance, when maneuvering away from a wall that is very close, it is helpful to move the casters away from the wall first.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

- None.

**Special considerations for scooters operated by users (Version 5)**

- **Adjustment tip:**
  - A mirror attached to a tiller handle can be used to provide visual feedback on the position of the chair with respect to the rear barrier.

- Because of the long wheelbase of most scooters, it is often not possible to move sideways when the amount of space is very limited but the skill should still be practiced in larger spaces.
7.12 REACHES HIGH OBJECT

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject reaches up to touch a high object.

Rationale
- A combination of upward and sideways or forward reaching is often needed when reaching for a light switch, elevator button or cupboard. This skill is not included in the caregiver skill set because it is not a challenge for most caregivers.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Near the wheelchair, on the side towards which the subject leans (if any).
- Risks requiring spotter intervention:
  - Forwards or sideways tip or fall when reaching, leaning or standing up.
  - Forward fall or tip due to standing on footrest.

Wheelchair Skills Test (WST)

Equipment
- Target about 2.5 cm in diameter and 1.5 m above the floor.

Starting positions
- Wheelchair: Facing the target with the front-wheel axles at least 0.5 m away.

Instructions to subject
- "Touch the target (indicate it). You may move your wheelchair."

Capacity criteria
As for the general scoring criteria, with the clarifications below.

A “pass” should be awarded if:
- The subject reaches up under control, touches the target and then resumes the normal sitting position.
- The subject may use either hand.
- A reaching aid may be used, if it is carried by the subject.
- If the subject chooses to remove or reposition parts of the wheelchair (e.g. the footrests) to improve the reach (e.g. by standing), this is permitted as long as the subject can remove and replace the parts independently. After touching the target, the subject may be prompted, without penalty, to restore the wheelchair to its original state.
- A wheelchair with a stand-up or seat-elevation feature may be used, as long as the subject can operate it independently.
- The subject may get out of the wheelchair to perform this skill.

A “pass with difficulty” score should be awarded if:
- The wheelchair user chooses to stand to accomplish the task and does not lock the brakes or clear the footrests away. Not providing a fail score is in recognition that some wheelchair users can accomplish the task in a careful and safe manner without these precautions.

A “fail” score should be awarded if:
- Generally, if a wheelchair user attempts to stand with a foot on a footrest, the spotter should intervene and a “fail” score should be awarded. However, some wheelchairs (e.g. those with the footrests behind the casters) may allow the skill to be safely performed in this way.
- If the wheelchair user stands up without locking the brakes and the wheelchair rolls backwards far enough to cause a fall.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- Not applicable.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training
General training tips

- Adjustment tip:
  - Chair height and the overall length of the wheelchair can have impacts on the wheelchair user’s ability to reach objects, depending upon the methods used.
  - The wheelchair should be positioned to take advantage of the subject’s reach, strength and balance.
  - Reaching and leaning reduce stability, putting the wheelchair user at risk of falling out of the wheelchair or, if in a manual wheelchair, tipping the wheelchair over.
  - The learner may use a reaching aid, but should carry it with him/her.
  - For a person with weak trunk muscles, to avoid falling in the direction that he/she is leaning, he/she should hook the non-reaching arm behind the push handle or hold onto the armrest or wheel.
  - To help right him/herself in the chair after reaching for the object, the wheelchair user can pull on the opposite armrest or wheel.
  - If the armrest on the side to which the wheelchair user wishes to reach is moved out of the way, it allows the wheelchair user to bend further sideways.
  - The wheelchair user needs to exercise caution when reaching across the body, especially when reaching for or picking up something (e.g. a heavy object on a high shelf, hot coffee, a knife) that could injure the user if it were spilled or dropped onto the lap. Also, bending and twisting at the same time can cause back injury.

- Variations:
  - If the wheelchair user is reaching for a light and unbreakable object from a high shelf, he/she can use an improvised reaching aid (e.g. a rolled up magazine or a cane) to help to move the object off the shelf and catch it. In a store, when an object is out of reach, an object (e.g. a cereal box) on a lower shelf can be used to ease the desired object off the higher shelf so it can be caught.

Special considerations for manual wheelchairs operated by users (Version 1)

- Adjustment tip:
  - Caster locks can be helpful to keep the casters oriented in the correct direction (trailing in the direction of lean).
  - To be safer when leaning or bending forwards, the wheelchair user can move the footrests out of the way and place the feet on the floor.
  - If standing up, the wheelchair user should first apply the brakes and clear the footrests out of the way. If the wheelchair user stands up on the footrests, a forward tip is likely unless the footrests are behind the front wheels. If standing, the wheelchair user should keep one hand on the wheelchair to keep from falling.
  - It is sometimes easier to approach the target backwards, but the wheelchair user needs to be careful not to reach too far and tip the wheelchair over.
  - If the wheelchair user chooses to lean forward to accomplish the task, he/she should make sure the casters are trailing forward to decrease the likelihood of tipping forwards.
When the casters are trailing forwards, they lie ahead of the portion of the wheelchair frame to which they are attached, as is the case when the wheelchair is rolled backwards. This is a good opportunity to teach the wheelchair user about how to swivel the casters into different directions if it has not been covered earlier in training. Caster swivel control is a skill that will be useful for later skills. To swivel the casters 180° in a tight space requires that a combination of forward-backward and left-right forces be applied to the casters. As an exercise, the trainer can ask the learner to point the casters at targets or to pretend the caster is the hour hand on a clock (\textquotedblleft Set your caster to 3:00 o\’clock\textquotedblright). Alternatively the trainer can ask the learner to swivel the casters around an object (e.g. a coin) on the floor without touching it.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- Not applicable.

**Special considerations for powered wheelchairs operated by users (Version 3)**
- If the wheelchair can be repositioned (e.g. with respect to tilt, recline or seat height), this may be helpful. For instance, if the wheelchair user’s balance is good and his/her feet can be placed on the floor, the wheelchair user can move to the front of the seat and obtain help in rising from the tilt mechanism.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
- Not applicable.

**Special considerations for scooters operated by users (Version 5)**
- When getting out of the scooter, the scooter user should keep at least one hand on the scooter for balance if that is an issue.
7.13 PICKS OBJECT FROM FLOOR

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject picks a small object up from the floor.

Rationale
- Objects that need to be picked up from the floor or ground vary from those as small and light as a coin or a piece of paper to those as bulky and heavy as a young child.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Near the wheelchair, on the side towards which the subject leans (if any).
- Risks requiring spotter intervention:
  - Forwards or sideways tip or fall when reaching, leaning or standing up.
  - Forward fall or tip due to standing on footrest.

Wheelchair Skills Test (WST)

Equipment
- Object about the size of a paperback book (dimensions about 5 cm x 10 cm x 10 cm and weighing less than 0.2 kg) placed flat on the floor. Any object of roughly equivalent size and weight may be used.

Starting positions
- Wheelchair: Facing the target with the front-wheel axles at least 0.5 m away.

Instructions to subject
- “Pick up the object (indicate it). You may move your wheelchair.”
Capacity criteria
- As for the general scoring criteria, with the clarifications below.
- As for the “reaches a high object” skill except:
  - The finishing position is with the object in the lap or in the hand and the wheelchair user sitting upright. The subject may use either hand.

Special considerations for manual wheelchairs operated by users (Version 1)
- When bending or stooping to pick up the object, the caregiver may place the non-reaching hand on the wheelchair for balance.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- The power may be on or off. However, the spotter should intervene if he/she is concerned that the subject is about to move the wheelchair in a way that might result in the fingers being run over by the wheels.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- When bending or stooping to pick up the object, the caregiver may place the non-reaching hand on the wheelchair for balance.

Special considerations for scooters operated by users (Version 5)
- Scooter users often get out of the scooter to pick up objects. This is safer than leaning from the seat, due to the high center of gravity and the possibility of a sideways tip.
- When bending or stooping to pick up the object, the scooter user may place the non-reaching hand on the wheelchair for balance.

Wheelchair Skills Training

General training tips
- See some of the general training tips for the “reaches a high object” skill.
- The wheelchair user should use one hand on the wheelchair or thigh to help with balance and the other hand to pick up the object.
- For a wheelchair user with weak trunk muscles, to reach the ground he/she should move the arms to the thighs one at a time, and then to the feet, placing the chest on the thighs.
- Turning the object on its side may help to get a better grip.
- To make it easier to pick up the object, the wheelchair user may pull the object up against one of the wheels so that it does not move.
- If a wheelchair user has weak pinch strength, increasing the friction between the fingers and the object (e.g. by wearing gloves or wetting the fingers with saliva) can help to prevent dropping the object.

Special considerations for manual wheelchairs operated by users (Version 1)
• **Variations:**
  - A moving pick-up can be accomplished if the wheelchair user holds the object against the bottom of the rear wheel with one hand as the wheelchair rolls forward, then both hands can be used to grasp the object when it rotates to the top of the wheel.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- To pick a dropped object off the ground, the caregiver may maneuver the wheelchair so that he/she can keep one hand on the wheelchair, for balance and control. Then, the caregiver can crouch and pick up the object with the other hand.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- If the wheelchair can be repositioned (e.g. with respect to tilt, recline or seat height), this may be helpful.
- There is a danger of unintentionally rolling a wheel over the fingers or pinching the fingers between the drive wheel and fender. The safest approach is to first position the wheelchair, shut off the power, then pick up the object.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

- As for manual wheelchairs operated by caregivers.

**Special considerations for scooters operated by users (Version 5)**

- Scooter users most often stand and get out of the scooter to pick up objects. This is safer than leaning from the seat, due to the high center of gravity and the possibility of a sideways tip.
- When getting out of the scooter, the scooter user should keep at least one hand on the scooter for balance.
7.14 RELIEVES WEIGHT FROM BUTTOCKS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject relieves weight from both buttocks, although not necessarily at the same time.

Rationale
- Weight relief is important for comfort and the prevention of pressure sores. Ideally, such relief should be performed often (e.g. every 20 minutes) and for prolonged periods of time (e.g. 2 minutes). However, for the purposes of assessment and training, a duration of a few seconds is considered representative of the subject’s capability. This skill is not applicable for scooter users, most of whom can stand and sometimes walk short distances.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Near the wheelchair, on the side towards which the subject leans (if any).
- Risks requiring spotter intervention: Forwards or sideways tip or fall when leaning.

Wheelchair Skills Test (WST)

Equipment
- None.

Starting positions
- Wheelchair user: In wheelchair, sitting upright.

Instructions to subject
- “Take the weight off your bottom. Hold your position until I tell you to stop.”
• If a subject chooses to lean to one side, the tester may prompt the subject “Now to the other side” without penalty.

Capacity criteria
• As for the general scoring criteria, with the clarifications below.
• A “pass” should be awarded if:
  • Weight is relieved for 3 seconds.
  • While the weight is being relieved, the tester should be able to easily slide a hand between pressure-sensitive areas (the ischial tuberosities, coccyx and greater trochanters) and the wheelchair or cushion. However, placing a hand into the pressure-sensitive areas is ordinarily not required for the WST and this should only be done with the permission of the subject. The tester must make his/her best judgment about the extent of the pressure relief achieved.
  • It is permissible for the wheelchair user to stand up, to bridge (lifting the buttocks by extending the legs, pushing the feet on the footrests or floor), to lean side to side or to lean forward to relieve pressure. If the wheelchair can be tilted or reclined to 30° or more, this is considered a pass, even though this is not as effective a means of pressure relief as leaning. The technique used should be recorded in the Comments section.
  • If the subject leans, he/she must lean forward or to both sides and needs to recover independently (e.g. using push-handles or armrests).
  • If the subject’s wheelchair is fitted with an alternating pressure cushion, the tester needs to be convinced by palpation that there is adequate relief under the pressure points.
• A “pass with difficulty” should be awarded if:
  • The subject uses the “push-up” technique. The push-up method, applying forces to the armrests or seat to lift the buttocks straight up, requires more force than some of the alternative methods. Over time, this may have adverse effects on the wheelchair user’s wrists and shoulders. Also, this technique is difficult to maintain for the recommended length of time.
• A testing error” score should be awarded if:
  • The tester is uncertain about the extent of weight relief and the subject refuses to permit the tester to perform a manual check.

Special considerations for manual wheelchairs operated by users (Version 1)
• It is permissible to do a tilt rest (see training section below) against a wall or other surface to meet the 40° criterion.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• The caregiver is only expected to assist the wheelchair into and out of the weight-relieving position and to prevent any tips or falls.

Special considerations for powered wheelchairs operated by users (Version 3)
• None.
Special considerations for powered wheelchairs operated by caregivers (Version 4)

- The caregiver is only expected to assist the wheelchair into and out of the weight-relieving position and to prevent any tips or falls.

Special considerations for scooters operated by users (Version 5)

- Not applicable.

Wheelchair Skills Training

General training tips

- It is generally suggested that a wheelchair user relieve pressure from the buttocks often (e.g. every 20 minutes) and for prolonged periods (e.g. 2 minutes). However, many wheelchair users have remained free of pressure ulcers with far less stringent regimens.
- If using any of the leaning methods, the extent of weight relief is proportional to the extent of the lean.
- With the forward leaning method, the trunk can be rested on the thighs. Further unloading can be achieved by grabbing the footrests and pulling on them. Getting back upright from the forward-bent position can be a challenge for some wheelchair users. The hands can be walked up the thighs until an armrest or the backrest can be reached to allow the person to pull him/herself the rest of the way. Leaning on a table is a strategy that may be helpful for wheelchair users who have difficulty in getting back to the upright position after leaning forward onto the thighs. It may be socially inconvenient to use the full forward-leaning technique in some circumstances. A more moderate forward lean, with the forearms resting on the thighs, may be adequate.
- Side leaning or shifting the weight onto one buttock can also be effective, for those who cannot lean forward and recover or in situations when the wheelchair user might find it inconvenient to lean forward. The armrests or rear wheels can be used to push or pull on. As was the case for leaning forwards, the wheelchair user can lean on a table.
- After a weight-relief maneuver, the wheelchair user’s buttocks should be gently repositioned on the seat rather than dropping back into place.

Variations:

- Bridging, tilt and recline are alternative methods that may be adequate for some wheelchair users. If tilt or recline are used, the greater the extent of tilt or recline the better. Anything less than 30° is probably inadequate.
- Standing up is effective, but if it is done using a stand-up wheelchair feature, there may be new pressure areas to consider related to how the wheelchair user is supported in the upright position. Standing on the footrests is generally not recommended, although it can be safe if the footrests are not too far forward and/or the casters are oriented in the forward-trailing position.
- Transferring out of the wheelchair (e.g. onto a bed), where the wheelchair user can lie on his/her side or front is also effective.
As noted above in the WST criteria, push-ups are not recommended because of the high loads on the upper limbs (that may contribute to overuse symptoms) and because they cannot be sustained for long.

Special considerations for manual wheelchairs operated by users (Version 1)

- The leaning techniques can cause tips in the direction towards which the wheelchair user is leaning.
- If leaning forward fully, the casters should be in the forward trailing position to increase forward stability.
- A wheelie can be used to achieve tilt but the extent of tilt is usually much less than what is needed.
- The tilt rest position (with brakes locked and the wheelchair leaning against a wall or curb) may permit sufficient rear tilt. This position can be achieved in different ways:
  - Pull-back technique: The wheelchair user positions the wheelchair close to the object (e.g. a sofa or wall) that he/she intends to lean against. Some trial and error may be needed to select the correct distance from the object; it is better to start too close to the wall than too far from it. The brakes are applied and are checked to ensure that they are functioning. The wheelchair user then reaches back and pulls on the external object to tilt the wheelchair back just beyond the balance position, so that they wheelchair rests back against the object.
  - Wheelie technique: The wheelchair user achieves the wheelie position with the back of the wheelchair facing the object that will be leaned against. The wheelchair is then rolled back in the wheelie position until the rear wheel or backrest of the wheelchair (for low and high objects respectively) contacts the object. Then the wheelchair is tilted back slightly further and the brakes are applied, one at a time. The wheelchair user must not let go of both wheels at the same time or the rear wheels will roll rapidly forward (“submarining”) and a rear tip will occur.
  - When returning from the tilt-rest to the upright position, the wheelchair user should leave the brakes on and tilt forward by leaning or by pushing against the object being leaned against.
  - Resting on the rear anti-tip devices may permit sufficient rear tilt but can result in a rear tip. With a spotter in place behind the wheelchair resting on the rear anti-tip devices, the wheelchair user can lean and rock backwards to see if the wheelchair tips over; if so, this technique should not be used.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- A caregiver can assist in a variety of ways, such as reminding the wheelchair user of the need to unload the buttocks or by assisting the wheelchair user in getting into or recovering from the unloaded position.
- A caregiver can sit behind the wheelchair and tilt the wheelchair backwards to rest against the caregiver and provide pressure relief. To prevent the rear wheels from rolling forwards, the brakes (wheel locks) should be applied. This is a variation of the tilt-rest skill.
Special considerations for powered wheelchairs operated by users (Version 3)

- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- Not applicable.
7.15 OPERATES BODY POSITIONING OPTIONS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Basic.

Description
- The subject changes body position (i.e. tilts, reclines, elevates seat, elevates legrests and/or uses the sit-to-stand feature) using the available options of a wheelchair and then restores the wheelchair to the original position.

Rationale
- Wheelchairs capable of variable body positions or postures are used for a variety of reasons, including pressure relief, comfort, to enhance breathing, postural control, stability, to enhance transfers, to help overcome some obstacles, to facilitate bladder management, to reduce spasticity or to reduce edema. Not all wheelchairs have body-positioning options.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Beside the wheelchair, in a position where it is possible to intervene. This position may vary depending upon the option being used.
- Risks requiring spotter intervention: Runaway, damage to body parts from the wheelchair mechanism or the external environment.

Wheelchair Skills Test (WST)

Equipment
- None.

Starting positions
- Wheelchair: In whatever position the person is in so as not to demonstrate the skill while getting into a standard position.
Instructions to subject

- “Show me how your wheelchair allows you to change body positions.”
- “Bring the wheelchair back into the original position.”
- If there are other positioning options that have not been demonstrated, the tester may prompt the subject without penalty (e.g. “Are there any other options that you can show me?”).

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if the subject successfully and safely changes body position in all of the ways possible for the wheelchair and returns to the original position.
  - A “not possible” score can be awarded for this skill because not all wheelchairs have this capability.

Special considerations for manual wheelchairs operated by users (Version 1)

- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- None.

Special considerations for powered wheelchairs operated by users (Version 3)

- Note that some wheelchairs have apparent controls for which the wheelchair is not actually equipped.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- Some scooters allow the seat back to be reclined, slid forward and backward and/or rotated to the side or back. If such options exist, the scooter user must be able to operate them to receive a “pass” score.

Wheelchair Skills Training

General training tips

- Before changing position or restoring the wheelchair to the original position, the person performing the action should check that there is room behind the wheelchair and above the knees to change the position without damaging the environment, the wheelchair, the contents of a knapsack, the user or a bystander.
- For wheelchair users with limited trunk balance, to reduce the likelihood of falling forward, 5-10° of tilt or recline is usually adequate at rest or when driving.
- Depending upon the positioning mechanism, the extent of forward and rear stability may differ in the new position. This should be taken into consideration when in a situation
where reduced stability could be unsafe (e.g. proceeding forward up an incline in the tilted position) or when it might be helpful to alter the weight distribution between the front and rear wheels (e.g. to increase traction or reduce the tendency for smaller-diameter wheels to sink into a soft surface).

- If the wheelchair allows both tilt and recline, it is advisable to tilt first and then recline. When returning to the upright position, it is advisable to return from the recline position before recovering from the tilt position. This reduces the tendency for the wheelchair user to slide forward on the cushion.
- For wheelchairs that have stand-up and recline features, reclining the wheelchair user before standing him/her up may be preferable to standing up from the sitting position.
- **Progression:**
  - For the wheelchair user to adjust to a position change may involve starting with a small position change and progressing to the full desired change.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- None.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- When first tilting or reclining a chair, the caregiver should be aware of the force that may be required to ‘catch’ the person at the desired angle. The set-up and design of the tilt or recline mechanism influence the amount of weight supported by the caregiver.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- **Adjustment tip:**
  - Programming by the dealer and/or therapist should be considered to allow the wheelchair user to get into the desired position with as few steps as possible (e.g. using a preset position of 45º of tilt).
  - The wheelchair user needs to have access to the controller when in the altered position.

- For safety, some powered wheelchairs will prevent the wheelchair from being driven while in extreme positions. Powered wheelchairs may slow down or stop if the user attempts to operate them in unsafe circumstances (e.g. driving up a steep incline forward with the seat fully tilted back).
- Some seats can be turned to the side, allowing the powered wheelchair to be driven “sideways”, such as along a table.
- Some seats can be turned completely backwards, essentially converting a rear-wheel-drive wheelchair into a front-wheel-drive one and vice versa.
- When reversing the direction of the positioning option (e.g. from tilt back to tilt forward), it may be necessary to pause briefly with some controllers.

- **Progression:**
  - If the rate of position change can be programmed, it is advisable to begin with a slow rate and progress to a faster one. This will provide more time in which to ensure that the
wheelchair user is adjusting to the new position and that there are no body parts that are at risk of being injured.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- Some scooters allow the seat back to be reclined, slid forward and backward and/or rotated to the side or back. If such options exist, they are usually carried out manually.
7.16 LEVEL TRANSFER

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level

- Basic.

Description

- The wheelchair user transfers from the wheelchair to another surface about the same height as the wheelchair seat and back again.

Rationale

- A transfer is a commonly used skill to move between the wheelchair and a chair, bed, tub, toilet, car or other surface. The level wheelchair transfer should only be considered a representative transfer. More difficulty may be experienced when transferring to and from other surfaces or heights.

Prerequisites

- None.

Spotter considerations

- Spotter starting position: Usually in front of the wheelchair and slightly to one side, close enough to catch the subject if he/she falls and to prevent the wheelchair from rolling or sliding away or tipping. The spotter may ask the subject where it would be best to stand, given the subject’s previous experiences.

- Risks requiring spotter intervention:
  - Forwards or sideways tip or fall when reaching or standing.
  - Rear tip when sitting back down in the wheelchair after a standing-pivot transfer.
  - Fall between the wheelchair and bench if the wheelchair rolls or slides away.
  - In the course of a standing pivot transfer, tripping over the footrests and falling.

Wheelchair Skills Test (WST)

Equipment

- The following transfer surface is suggested (although any equivalent one is acceptable): a
bench with a padded flat surface, no backrest and no armrests. The sitting surface should be at least 1.0 m wide, at least 0.5 m deep and 45-47 cm high. The bench legs should have rubber on their undersurfaces or other means to prevent the surface from moving.

- A transfer board (a piece of wood or plastic with bevelled edges) should be made available for subjects who ordinarily use one. The subject may use his/her own equipment (if carried).

Starting positions
- Wheelchair user: Seated in the wheelchair, and oriented in the chair as if he/she is ready to propel the chair (e.g. feet on footplates, if used).
- Wheelchair: Facing the bench and at least 0.5 m from it.
- The transfer board should be on the transfer bench within the subject’s reach.

Instructions to subject
- Success on screening questions (“Can you do it? How?”) is strongly recommended before the subject is allowed to proceed to the objective testing of this skill.
- “Transfer from the wheelchair to the bench (indicate it).”
- “Transfer back into the wheelchair.”
- If, during the transfer, the subject is sitting on the target surface with the transfer board under him/her, it is permissible to prompt the subject to “move the transfer board away from you” without penalty.
- After transferring back into the wheelchair, the subject may be prompted, without penalty, to restore the armrests or footrests.

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if:
    - The wheelchair user is able to independently and safely set up the wheelchair for the transfer, transfer to and from the bench and restore the wheelchair to its operational condition.
    - Any safe and independent transfer technique is acceptable.
    - The transfer is not considered complete until the subject is off the transfer board.
    - The wheel locks (commonly known as “brakes”), if any, may or may not be used.
    - If armrests need to be detached or moved out of the way for the transfer, after transferring back into the chair, the armrest must be restored to the original position.
    - If the wheelchair user’s arm is secured to the arm support he/she must independently release and later replace his/her arm in the original position and state.
    - Although recommended, the subject need not clear the footrests if the transfer can be effectively and safely completed without doing so. After transferring back into the chair, the footrests and feet should be as they were prior to the transfer.
    - If a positioning belt is intended for independent use and is fastened around the wheelchair user at the beginning of the test, then the subject is expected to be able to undo it and fasten it again after transferring back into the wheelchair. If the wheelchair is equipped with a positioning belt, but the wheelchair user is not using
it, the subject is not required to be able to use it.

- If the subject needs to reposition the unoccupied wheelchair between the transfer out of the wheelchair and the transfer back into it, the subject must do so him/herself.

- A “pass with difficulty” score should be awarded if:
  - During a standing-pivot transfer, a 270° turn is used instead of using the shortest possible rotation.
  - The buttocks scrape significantly over the rear wheel or brake extension during a sideways transfer.
  - The lower limbs scrape over a footrest.
  - Poor ergonomic technique is used.

- A “fail” score should be awarded if:
  - The subject is the wheelchair user and the screening questions indicate that assistance is always required. There is no need to proceed to objective testing.
  - The subject falls onto the transfer bench and cannot get up without help.
  - The wheelchair user has a rear-closing seat belt or other restraint that is not intended for independent use, this is usually considered an automatic fail, unless the WST is being used to assess caregiver function.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- The caregiver may receive physical assistance from the wheelchair user in performing the skill because it is not a reasonable expectation that a single caregiver could carry out this skill alone without additional equipment.

Special considerations for powered wheelchairs operated by users (Version 3)
- The controller may be on or off. Although the transfer is likely to be safer with the power off, the subject may need to move the wheelchair during the transfer and may not be able to control the power when not sitting in the wheelchair.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- The caregiver may receive physical assistance from the wheelchair user in performing the skill because it is not a reasonable expectation that a single caregiver could carry out this skill alone without additional equipment.

Special considerations for scooters operated by users (Version 5)
- If the scooter seat can be swivelled to the side or back, this may be done.

Wheelchair Skills Training

General training tips
- There are a number of transfer techniques and surfaces to which a wheelchair user may wish to transfer. The methods described here are representative, but by no means
comprehensive. Which type of transfer will be most suitable for a wheelchair user and/or
caregiver will depend on a number of factors. An experienced clinician should make this
determination. A thorough discussion of these options is beyond the scope of this
Manual.

- The learner should be careful to avoid catching his/her catheter or other collection
devices when transferring.
- The height of the starting and target surfaces should be adjusted, to the extent possible,
such that the target surface is slightly lower.
- The path between the starting and finishing surfaces should be cleared of any obstacles.
- The wheelchair should be positioned as close as possible to the other surface, with the
casters oriented in a way that enhances stability in the direction of transfer.
- The footrests should be cleared away (if possible).
- The wheel locks should be applied.
- The wheel locks of any other wheeled surface (e.g. bed) should be applied.
- The comments below generally apply to the transfer out of or into the wheelchair, but
will be described as though the transfer is out of the wheelchair. Transfer into the
wheelchair is generally the same except that, once the wheelchair user is back in the
wheelchair, he/she should restore the footrests fully and put the feet back on them. The
wheelchair user should also make sure that any removed or repositioned wheelchair parts
(e.g. armrests, footrests, cushion, seat belt) are in the same position that they were before
he/she left the wheelchair.

- **Sideways transfer:**
  - This is sometimes called a “sliding” transfer but actual sliding is not recommended
    (to avoid shear forces or injury to the buttocks).
  - People using sideways transfers tend to lead with the weaker or more painful arm.
    However, if the arms are fairly symmetrical, alternating the leading and trailing arms
    allows them to share the stresses.
  - The wheelchair user should move the armrest (if any) out of the way on the bench
    side.
  - The wheelchair user should remove the wheel-lock extension (if any) on the bench
    side.
  - The feet should be supported on the floor if the footrests can be easily moved out of
    the way. If the footrests cannot be moved, it is acceptable to leave one or both feet on
    the footrests as long as forward tipping does not occur during the transfer. In addition
to an actual tip, when the rear wheels become unloaded the wheel locks become
ineffective and the rear wheels may move sideways. This is less likely to cause a
problem in wheelchairs that have the footrests behind the casters and will not happen
if caster swivel locks (if any) are applied. In considering where to place the feet, the
wheelchair user should try to avoid situations in which the feet are not free to swivel
when the buttocks are moved to the new surface – this could lead to a torsion injury
of the lower leg.
  - The wheelchair user should move forwards on the seat, to avoid such obstacles to
    sideways movement as the rear wheels.
- To get the transfer board (if using one) under the buttock, the wheelchair user should lean away from it.
- The wheelchair user should push down on the transfer board and wheelchair to unload the buttocks.
- The wheelchair user should avoid fully extending the fingers and wrists, allowing the fingers to wrap around the edge of the target sitting surface. This avoids overstretching the joints and tendons, which may be of importance for people with tetraplegia who use a tenodesis effect (whereby active wrist extension causes passive finger flexion if the tendons are of appropriate length). Keeping the wrists in a neutral position also functionally lengthens the arms, making it easier to get the buttocks off the sitting surface.
- The wheelchair user should keep the leading hand just far enough away from the body to allow room for the buttocks to land on the target surface, but no farther. The trailing hand should be close to the body.
- The wheelchair user should shift sideways towards the target surface, in a single large movement or several smaller ones.
- If possible, the wheelchair user should lean well forward ("nose over toes"). During the actual transfer from this position, the hips and the head move in opposite directions. For instance, if the wheelchair user wishes to move the buttocks up and to the right, the head should move down and to the left. This technique reduces the forces needed from the arms.
- Once the buttocks are fully supported by the target surface, the wheelchair user should remove the transfer board. The wheelchair user should lean away from it to do so.
- Note: It is not recommended that the wheelchair user place his/her feet on the bed or bench before independently attempting to move the buttocks sideways. Hamstring tightness will prevent the wheelchair user from being able to flex the hips adequately.

- **Standing pivot transfer:**
  - This is one of the most common types of transfer. The person stands fully upright from the original surface, pivots in place until his/her buttocks face the target surface, then sits down.
  - Wheelchair users with hemiplegia using standing-pivot transfers tend to transfer to their stronger sides.
  - The wheelchair user should leave the armrests in place.
  - The wheelchair user should move forward on the seat before beginning the transfer.
  - The wheelchair user should try to flex the knees to get the feet under the body, in preparation for the sit-to-stand phase of the transfer. During the transfer, the hips should be flexed.
  - To avoid the need for turning through a greater arc than necessary when pivoting, the wheelchair user should turn the back towards the bench rather than away from it.
  - The wheelchair user may use the armrest to help maintain balance while transferring.
  - If a wheelchair user with hemiplegia can only transfer back into the wheelchair with the strong side leading, he/she will need to move the wheelchair to the other side.
Variation:
- The crouching transfer is like the standing-pivot transfer, except that the knees and hips are not fully extended. The wheelchair user may need to move the armrest and the brake extension (if any) out of the way on the bench side. The wheelchair user should stay low, and not try to stand up fully. However, the buttocks need to be high enough to clear any obstacles (e.g. the armrest or rear wheel). The hips and the head move in opposite directions as for the sideways transfer.

Forward transfer:
- When transferring straight-on (e.g. for a person with amputations of both legs above the knees), the wheelchair user should pull the wheelchair as close as possible to the transfer bench and at right angles to it.
- A transfer board may be used.
- The arm-rests should be left in place. If the arm-rests are desk-length, in some wheelchair designs they may be reversed to provide better support as the wheelchair user moves from the wheelchair to the new surface.
- Wheelchair users who have used the forward transfer method to transfer out of the wheelchair may be able to enter the wheelchair in the forward direction and then turn around, if their amputation residual limbs are short enough. Alternatively, they can back onto the wheelchair seat.

Progression:
- Once the basic transfer is mastered, it should be practiced with different target surfaces, at different relative heights. The “gets from ground to wheelchair” skill discussed later is an extreme example of a transfer.

Special considerations for manual wheelchairs operated by users (Version 1)
Wheel locks:
- Prior to the actual transfer, the learner should apply the wheel locks (if any). If the rear wheel is able to turn with the wheel lock applied, the wheel lock may need to be adjusted or the tire may need to be pumped up, if it is pneumatic. If strength is a limiting factor to applying the wheel locks, the wheelchair user may use wheel-lock extensions.
- A wheelchair user with weak trunk muscles can avoid falling forward during wheel-lock handling, by hooking an arm around a push handle or holding onto an armrest or wheel.
- To apply a push-to-lock wheel lock, the wheelchair user grasps the handle of the wheel lock and pushes it towards the front of the wheelchair until firmly in place.
- To apply a pull-to-lock wheel lock, the wheelchair user pulls the handle backward until firmly in place.
- Retractable wheel locks are ones that can be positioned completely out of the way when they are not in use, so the wheelchair user does not scrape his/her hands on them during wheelchair propulsion. They are most often found on rigid-frame wheelchairs. To apply a retractable scissor wheel lock, the wheelchair user pulls or pushes the handle in the appropriate direction until firmly in place.
To release wheel locks, the subject should reverse the action used to apply them. For a retractable scissor wheel lock, the subject should fold the wheel lock fully out of the way. For wheelchairs that are equipped with them, caster swivel locks can be used to help maintain caster orientation.

Armrests:
- Generally, it is easier to reposition the armrests than it is to remove them completely.
- To move the armrests away, any of the following options can be used, depending upon the armrest design:
  - For a flip-up armrest, the learner should unlock the front of the armrest from the receptacle and lift the front of the armrest so that it flips behind the chair back.
  - For a swing-away armrest, the learner should lift the armrest up slightly to disengage it and then swing it horizontally to the rear far enough to clear the backrest posts.
  - To completely remove an armrest, the learner should unlock whatever locks are necessary. There may be ones at both the front and back of the armrest. The learner should lift the armrest straight up so that the armrest is detached from the chair. If the armrest is height-adjustable, the wheelchair user should be careful not to just remove the elevating arm pad.
  - For a wheelchair with a tray (e.g. for a person with hemiplegia), the subject should first flip the tray away or slide it forwards to detach it.
- To restore the armrests:
  - With some armrest designs, it is easy to unintentionally reverse left and right. To avoid this, the subject should be encouraged to follow a routine with respect to where the armrests are placed when removed.
  - The subject should reverse the process for moving the armrests away.
  - The subject should make sure the armrest posts are lined up with the receptacles before locking them.
  - The subject should check to make sure the armrests are locked in place by pulling up on them.

Footrests:
- The subject should clear the footrests out of the way prior to a transfer, whenever possible. It may be easier to do so before moving the wheelchair into its final position.
- Before moving the footrests out of the way, the subject should first remove the feet from the footrests. A person with weak hands may need to use both hands or an extended wrist under the knee to lift the leg. If one leg is stronger, it may be used to assist in lifting the weaker leg. Later, after restoring the footrests, the subject should put the feet back on the footrests.
- To move a swing-away footrest out of the way, the subject should unlock the footrest. Locking mechanisms vary from wheelchair to wheelchair. The subject should swing the footrest completely out of the way. Some footrests swing away to the side and others to the middle. To replace the footrest, the subject should push the footrest back towards the
front of the wheelchair until it clicks into place. The subject should check that it is locked in place by pulling on it.

- To completely remove the footrests, the subject may need to first swing the footrest away. The subject should then pull up on the footrest. The subject should pay attention to how the footrest was attached to the chair to simplify restoring it later. To replace the footrest, the subject may need to start in the swung-out position, line up the post or pins with the hole(s) and put the footrest back in place. The subject should then swing the footrest back to the front.

- Some wheelchairs do not allow the footrests to be swung away or removed, but it may be possible to flip the foot-plates up. The subject should pull the foot-plates up until they are fully vertical. To do so on some wheelchairs, it may be necessary to push the heel loops (if any) forward. To replace the footrests, the subject should push the foot-plates down. The learner should push the heel loops back into place, if they were displaced earlier.

- To raise an elevating footrest, the subject should grasp it near the end and lift it to the desired position. This requires less force if the leg is not on the leg-rest. To lower the footrest, the subject should support its weight, and hold the position lock open while lowering the footrest. The position lock is often located at the top of the leg-rest (near the knee).

- For a wheelchair user with weak trunk muscles, to reach the footrests, the arms can be moved to the thighs one at a time, and then to the feet, until the chest is resting on the thighs. To get back into the upright position, the stronger arm can be hooked over the push handle or armrest and the body pulled up through elbow flexion and wrist extension.

- If possible, the subject should position the wheelchair so that the casters are trailing in the direction of the transfer to reduce the likelihood of the wheelchair tipping in that direction. To achieve this position, the subject should finish the wheelchair positioning with a slight movement away from the direction of the transfer.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- General

  - This section only deals with transfers for wheelchair users who require minimal assistance to perform the final movement between the wheelchair and the bench. If the caregiver must perform the majority of the effort, or if a mechanical lift is needed, additional training by experienced rehabilitation professionals is needed. This is outside the scope of this Manual.

  - The caregiver should be attentive to the position of the wheelchair user’s arms to avoid injuring them during the transfer.

  - The caregiver should inquire as to whether the wheelchair user has ever experienced falls and, if so, in which direction. This may help the caregiver to know how best to provide assistance.

  - Care should be paid to good back ergonomics for the caregiver:

    - The feet should be shoulder-width apart for balance.
    - The caregiver should avoid bending the back and twisting at the same time.
    - The caregiver should bend his/her knees and keep the rest of his/her
body straight to avoid injury to the back.

- The caregiver should keep the wheelchair user close to the caregiver (vs arms straight).
- The caregiver should involve the wheelchair user as much as possible.
- The caregiver should use aids (e.g. transfer belt, transfer board, mechanical lift) as needed.
- The caregiver should use the help of other people, if help is needed. One option is for one caregiver to be behind the wheelchair user, reaching under the upper arms to grasp the wheelchair user’s forearms that have been crossed in front of the body. The second caregiver is positioned in front of or to the side of the wheelchair and lifts the legs from behind the knees.
- The wheelchair user should not hold the caregiver around the neck.
- If the wheelchair user is falling, it may be necessary for the caregiver to lower him/her to the floor rather than risk injury to the caregiver.
- If it is necessary for the caregiver to move the unoccupied wheelchair to the other side, the caregiver may leave the brakes on. Using the push handles at the rear of the wheelchair, the caregiver should lift the rear wheels slightly off the floor and push or pull the wheelchair on the casters (the “wheelbarrow” method). This will save time, avoid strain on the back and ensure that the brakes are applied when the wheelchair user transfers back into the wheelchair. Because the only wheels on the floor are the casters, the wheelchair can be moved straight sideways.

- Sideways transfers:
  - It may be necessary to perform the transfer in steps.

- Standing Pivot Transfers:
  - To assist the wheelchair user in getting from sitting to standing, the caregiver should stand or sit in front of the wheelchair or stand to one side.
  - The caregiver should apply an assisting force to the wheelchair user’s body, near the hips. The caregiver should not pull on the wheelchair user’s arms.
  - The caregiver may use a transfer belt around the wheelchair user’s waist.
  - The caregiver may need to use his/her knees to keep the wheelchair user’s knees from buckling, by blocking them.
  - Once standing, the caregiver should ask the wheelchair user to pivot, turning the back, in the shortest possible route, towards the bench.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- Positioning (e.g. tilt, recline, seat height, seat swivel) may be useful while preparing the wheelchair for the transfer.
- The power should generally be turned off while the transfer is being performed.
- Although not the only consideration, if all other factors are equal, it will be easier to make a sideways transfer toward the non-joystick side.
• The controller may need to be moved out of the way for a sideways transfer.
• If the wheelchair user is using a standing-pivot transfer, with the feet on the ground the tilt mechanism of the wheelchair can be used to assist in lifting the buttocks if the wheelchair user has moved well forward on the seat.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
• If a mechanical lift is being used, it can be helpful to put the seat in the tilted position to assist in ensuring that the wheelchair user is properly positioned in the sling.
• If a mechanical lift is being used, after the wheelchair user has been lifted sufficiently, it may be easier to drive the wheelchair backwards out from under the wheelchair user rather than moving the lift.

**Special considerations for scooters operated by users (Version 5)**
• The tiller handles can be an asset while transferring if the scooter user needs assistance for balance. However, the amount of force applied to them should be minimal because they may swivel into a different position.
• The handles can get in the way if the tiller is turned to the side towards which the scooter user is transferring.
7.17 FOLDS AND UNFOLDS WHEELCHAIR

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔️</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔️</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject folds or takes apart the unoccupied wheelchair to make it as small as possible, and then restores it to its original condition.

Rationale
- For transport or storage, the size or weight of the wheelchair may need to be reduced. This can be done by folding the wheelchair. Removal of the rear wheels or other parts is a useful way to further diminish the size and weight of the wheelchair. For the purposes of the Wheelchair Skills Program, this skill is considered “not applicable” for powered wheelchairs and scooters, even though some parts of some models may be readily foldable or removable.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Near the subject, on the side towards which the subject leans (if any).
- Risks requiring spotter intervention:
  - Forward tip or fall while reaching.
  - Pinching fingers between folding or rotating parts.
  - Injury to lower leg or foot due to dropping wheelchair parts.

Wheelchair Skills Test (WST)

Equipment
- Surface for the subject to sit on, if needed.

Starting positions
- Wheelchair user: Seated or standing beside the wheelchair.
• Wheelchair: In the same position and condition as immediately after the wheelchair user had transferred out of it. If the subject has removed some wheelchair parts (e.g. an armrest or footrest) as part of the transfer out of the wheelchair and restores the wheelchair to its original state after transferring back into it, the tester may consider these actions as part of the “folds and unfolds wheelchair” skill.

**Instructions to subject**

• Note: This skill is usually assessed with the “level transfer” skill, while the wheelchair user is out of the wheelchair.
• “Fold the wheelchair as tightly as you can or take it apart, as if you were going to store it.”
• “Put the wheelchair back together and open it so that you can get back into it.”

**Capacity criteria**

• As for the general scoring criteria, with the clarifications below.
• A “pass” should be awarded if:
  • The wheelchair is folded or taken apart such as to reduce the dimensions of the wheelchair as much as possible without tools. If the wheelchair is incompletely folded or taken apart, it is acceptable to prompt the subject without penalty (e.g. “Can you get it a little tighter or smaller?” or “What if it was still too big or heavy?”).
  • If wheelchair components or accessories (e.g. cushion, rigid seat, backrest, knapsack, footrests) need to be removed to achieve the smallest dimension, this should be done.
  • For a rigid wheelchair with a backrest that folds forward, the backrest canes and the seat rails should be as close to parallel with each other as is mechanically possible. If the cushion prevents this, the tester may prompt the subject by asking “Can you get this folded more tightly?”, but the tester must not suggest the solution of removing the cushion.
  • The rear wheels should be removed if this can be done without tools (i.e. if they are of the quick-release type). If the rear wheels are not removed spontaneously by the subject, he/she may be prompted to do so without penalty (e.g. “Do the rear wheels come off? Can you show me?”).
  • It is acceptable for the subject to use the foot to help fold and unfold the wheelchair.
  • For the unfold component of the skill, the wheelchair should be opened fully.
  • If the wheelchair is incompletely restored to its original condition, it is permissible, without penalty, to cue the subject by inquiring “Is the wheelchair in the same condition that it was in before you folded it?”
  • After putting the rear wheels back on the frame, the subject should check that they are firmly in place by pulling on them.
• A “pass with difficulty” should be awarded if:
  • The test subject puts a contoured cushion in backwards, because of the potential for causing a pressure sore.
• A “fail” score should be awarded if:
  • The subject does not know that the wheelchair folds or that the rear wheels are removable without tools.
The wheelchair has been opened in a way that precludes full use of the wheelchair (e.g. by tangling a seatbelt strap in a way that will cause it to rub on a wheel, or seat rails not sitting in rail saddles). The tester should correct the problem before the wheelchair user gets back into the wheelchair.

- A “not possible” score can be awarded for this skill because not all wheelchairs have this capability.
- A “testing error” score can be awarded for this skill if the “level transfer” cannot be achieved independently and the tester is unable to assist the wheelchair user out of the wheelchair.

**Special considerations for manual wheelchairs operated by users (Version 1)**
- For a wheelchair with a spotter strap around a cross-brace, the strap may be removed by the tester, without penalty, to permit the wheelchair to fold fully.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- None.

**Special considerations for powered wheelchairs operated by users (Version 3)**
- Not applicable.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
- Not applicable.

**Special considerations for scooters operated by users (Version 5)**
- Not applicable.

---

**Wheelchair Skills Training**

**General training tips**
- The subject should pay attention to each item as he/she removes or alters it, to ensure that he/she will be able to reassemble the chair later.

- **Fold wheelchair:**
  - The subject should remove anything that may prevent folding (such as the cushion, rigid seat, backrest or knapsack).
  - To remove a rigid seat or backrest, the subject may need to release restraining devices.
  - For rear wheels that can be removed without tools, there is usually a release mechanism at the center of the axle, a button or lever that needs to be depressed. If the wheel does not come off easily, the subject should check to be sure the wheel lock is not on and that the rear wheel is off the ground.
  - To fold a cross-braced wheelchair (one that becomes narrower from side to side when folded), the subject should first clear the footrests (e.g. by flipping them up, swinging them away or removing them).
To fold a cross-braced wheelchair more easily, the subject should position the wheelchair so that he/she is on one side of it. The subject should then tip the chair slightly towards him/herself so that the wheels on the side away from him/her are off the ground. This eliminates the friction of the far-side rear wheels on the ground and allows gravity to assist in folding the wheelchair. The subject should then pull the seat or seat rails upwards, with one or both hands, to fold the chair.

For a rigid-frame wheelchair with a fold-down back, although the frame cannot be folded, the subject can often make the chair easier to transport by folding down the back. The learner may need to release any restraining devices before he/she can do so.

The push-handles of some wheelchairs can be folded to further reduce the wheelchair dimensions.

After folding the wheelchair, if the wheelchair does not have a latch mechanism to prevent the wheelchair from opening while it is being lifted, it may be helpful to use a strap.

When lifting a folded wheelchair for which the rear wheels cannot be removed, injury can occur if the unlocked rear wheels are grasped, because the frame will be free to rotate.

Unfold Wheelchair:

- Generally, the subject should reverse the steps used to fold the wheelchair and in roughly reverse order (e.g. starting by putting the rear wheels back and finishing with putting the cushion back in place).
- If the rear wheels have been removed, they should be replaced. It may be necessary to push the quick-release plunger to allow the axle to get into the housing. To check that the axle is fully seated, the plunger should be out and it should not be possible to pull the rear wheel off. Some tires have a directional tread pattern (more rolling resistance in one direction than the other). If so, the left and right wheels should not be considered interchangeable.
- The subject should be careful not to tangle the seatbelt (if any) under the seat.
- To get the process of opening a cross-braced wheelchair started, the subject can lift the rear wheels off the ground and separate the push-handles.
- The subject usually needs to push the seat rails back down into the starting position. The subject should keep the fingers on top of the rails to prevent them from being pinched.
- For wheelchairs with backrests that fold forward, the backrest may lock in the folded position, necessitating a release of the locking mechanism to unfold the backrest.
- The subject should remember to put the cushion back on the seat properly before transferring back into the chair.

Progression:

- Once the learner is able to fold and unfold the wheelchair, he/she can progress toward full use of this skill by putting the folded wheelchair up on the transfer
bench and into his/her vehicle. Variations in the designs of the wheelchair and vehicle preclude a thorough discussion of this in this Manual.

Special considerations for manual wheelchairs operated by users (Version 1)
• Variations:
  • The advanced wheelchair user may be able to remove and replace rear wheels while seated in the wheelchair by leaning sideways (e.g. in a doorway) or forwards (tipping the wheelchair onto the footrests).

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• None.

Special considerations for powered wheelchairs operated by users (Version 3)
• Although generally not applicable, some powered wheelchairs can be folded or reconfigured without tools for storage or transportation. If that is the case and doing so is a goal of the subject, training should be provided.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• As for Version 3.

Special considerations for scooters operated by users (Version 5)
• As for Version 3.
7.18 GETS THROUGH HINGED DOOR

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject opens, passes through and closes a hinged door that opens away from the subject, then repeats the task in the opposite direction (with the door opening towards the subject).

Rationale
- Wheelchair users frequently encounter such hinged doors or gates. Although there are a variety of door types, this is considered a representative skill.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Near the wheelchair, on the side towards which the subject leans (if any).
- Risks requiring spotter intervention:
  - Forward or sideways tip or fall due to reaching and pulling on the door handle.
  - Pinching the fingers between the door and the frame.

Wheelchair Skills Test (WST)

Equipment
- Door ~81cm wide, preferably with no resistance to opening.
- Preferably a lever handle >10 cm in length and 75-90 cm above the floor.
- Preferably no threshold (because this is evaluated separately later).
- There should be enough space (preferably at least 1.5 m square), on both sides of the door, to allow the subject to maneuver.

Starting positions
- Wheelchair: Facing the closed door with the front wheels at least 0.5 m from it.
Instructions to subject

- "Open the door, move the wheelchair through it and close the door behind you."
- “Now, go back through the door the other way.”
- The order of performing the two components of this skill test is not important.
- If the subject leaves the door slightly ajar, he/she may be prompted, without penalty, to finish closing it.

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - The skill in each direction is completed when the door closes firmly.
  - The subject may close the door by reaching back for it. Alternatively, the subject may proceed away from the door and then turn around and come back to close it.
- A “fail” score should be awarded if:
  - A finger pinch seems likely between the door and the frame. The spotter should intervene to prevent injury.

Special considerations for manual wheelchairs operated by users (Version 1)

- The subject may use the door-frame to assist in passing through the door.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- None.

Special considerations for powered wheelchairs operated by users (Version 3)

- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- None.

Wheelchair Skills Training

General training tips

- Adjustment tips:
  - For doors in the wheelchair user’s own environment, attaching something (e.g. a handle or piece of rope) in the middle of the door can make closing easier.
  - Having a roller on the outer corner of the wheelchair’s footrest can be useful when using the footrests to apply force to a door.
- Although the footrests can be useful to help push doors open or closed, this method should not be used on glass doors that might break.
If using the footrests to apply a force to a door, it is best to approach the door at a slight angle toward the side that will open. This ensures that it is the outer corner of the footrest that contacts the door and not the feet.

The feet often extend out beyond the footplates, so care needs to be taken to avoid injury.

If there is a threshold in the doorway, the principles for dealing with such an obstacle can be found in the later section on the “gets over threshold” skill.

For a door that opens away from the wheelchair, the wheelchair user can begin the skill by positioning the wheelchair directly in front of the door. For a door that opens towards the wheelchair, the wheelchair user should position the wheelchair to the side of the door to allow room for it to be swung open without striking the wheelchair or a body part.

Once a self-closing door has been opened enough to allow the wheelchair to proceed through it, the widest part of the wheelchair can be used to prevent the door from closing. To avoid scraping the door, the wheelchair user can use his/her hand or elbow to push the door open briefly to allow progress.

While moving past the door, the wheelchair user should be careful to avoid catching any clothing or body parts on the door handle or the surface of the door if it is rough.

To close a door that opens towards the wheelchair, after passing through it, there are several options (if the door does not close by itself):

- The wheelchair user may gently swing the door closed behind him/her, moving the wheelchair quickly through the door and out of the way.
- The wheelchair user may turn around once through the doorway, reach forward and pull the door towards him/her while backing away.
- The wheelchair user may go through the door backwards, pulling the door with him/her.
- The wheelchair user should not put his/her fingers between the door and door-frame for any longer than necessary because they may get pinched when the door closes.
- Reaching over the back of the wheelchair to close the door is effective, but there is risk of a rear tip in a manual wheelchair.

To close a door that opens away from the wheelchair after passing through it, there are several options (if the door does not close by itself):

- The wheelchair user can swing the door closed.
- The wheelchair user can turn the wheelchair around and push the door closed with the footrests.
- The wheelchair user can back up to close the door using the rear wheel or other wheelchair part to push on the door.

Progression:

- Judging the width of doorways relative to wheelchair dimensions can require practice. To avoid damage to the hands, wheelchair or door frame, it can be useful to attempt getting through progressively more narrow openings using objects that are not firmly fixed (e.g. pylons). Bubble wrap can be used to provide audible feedback.
The subject should start with a door that does not close on its own and progress to one that does. The trainer can reduce or add resistance to door opening by applying forces with his/her hand.

**Variations:**

- The learner can experiment with negotiating the door in the forwards or backwards directions.
- Game: There are many variations in the ways doors open and close, alone or in sequence with other doors. Also a variety of door handles exist. A game that provides opportunities to practice these variations is to have a “door scavenger hunt”, seeing how many different combinations and permutations can be found and successfully managed in a period of time.
- Game: To get used to the relative widths of the wheelchair and doorways, the user can attempt to get between two obstacles that are lightweight and movable enough that injury is not a concern. The distance between the obstacles can be varied and they can be approached at progressively greater speeds.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- **Two-hand-propulsion pattern:**
  - The door-frame can be used to help propel the wheelchair user through the door (the “slingshot” method). To do so, the wheelchair user reaches forward and places one hand on the door frame and the other on the door or the door frame on the other side. Then, by pulling with both hands, the wheelchair is moved through the opening. This has the advantage of keeping the hands from being injured by bumping or scraping them between the door frame and the wheelchair.
  - To open a door that opens away from the wheelchair more easily, the wheelchair user can turn sideways in front of it. This allows the wheelchair user to get closer to the door and to resist the tendency of the wheelchair to roll backward when the door is pushed. Alternatively, the wheelchair user can hold onto the door-frame with one hand, as the door is pushed with the other. This is more likely to be necessary if the door resists opening.
  - To open a door that opens towards the wheelchair more easily, the wheelchair user should push on the door-frame with the hand farthest from the hinge to open the door more easily with the other hand. Turning the wheelchair sideways will also prevent the wheelchair being pulled forward as the wheelchair user pulls on the door.
  - The wheelchair user may keep one hand on the door handle and use the other hand to push both wheels, one at a time. This is slow and awkward but may be effective for some wheelchair users.

- **Variations:**
  - If there is a threshold or level change in the door opening, it may be helpful to use the door frame to help provide the forces needed to proceed.
  - For a doorway that is too narrow for the wheelchair to pass through, an option is
for the wheelchair user to transfer from the wheelchair on one side of the door to a regular chair on the other, fold the wheelchair to get it through the door and then transfer back into it. Other alternatives include removing both rear wheels and resting on the rear anti-tip devices or transport wheels to get through the door. For wheelchairs that fold from side to side, some wheelchair users can partially fold the wheelchair and sit on an armrest.

- For a door that opens away from the wheelchair and that is latched with a bar mechanism that will open when a force is applied to it, the wheelchair user can approach the door without slowing down. At the last moment, the wheelchair user can lean and reach forward with one or both hands and use momentum to open the door. The feet should not strike the door. This should be practiced at slow speeds initially.

- **Hemiplegic-propulsion pattern:**
  - Using one hand to cross over from one wheel to the other can be helpful to keep the wheelchair straight while getting through a door.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- Before pushing a wheelchair through any type of door or narrow space, the caregiver should make sure that the wheelchair user’s hands or elbows are not extending beyond the sides of the wheelchair where they could be injured.
- The caregiver should keep part of his/her body between the door and the wheelchair user.
- The skill can be accomplished by moving the wheelchair through the door forwards or backwards.
- For a narrow doorway, one option is for the caregiver to remove one rear wheel. With the wheelchair user leaning the other way and the caregiver supporting the push-handle, it may be possible to get through the door on three wheels.
- For a door that opens away from the wheelchair, the caregiver should open the door, grasp the push handles at the rear of the wheelchair and push or pull the wheelchair through the doorway. When the wheelchair and caregiver are completely out of the way, the caregiver should close the door.
- For a door that opens towards the wheelchair, if there is room the caregiver should angle the wheelchair away from the door on the side that will open.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- When applying a force to open a door toward a powered wheelchair, it may be easier to simply grasp the door handle with the hand on the side away from the joystick and then back the wheelchair up, rather than doing all of the work with the arm.
- Unlike with a manual wheelchair, the force of a self-closing door does not require the user to brace himself/herself with the other hand on the door frame or to turn sideways to prevent the wheelchair from being moved unintentionally.
- For a person with hemiplegia, it is impossible for the sound arm to simultaneously hold the door lever and control the joystick. It may be necessary to complete the task in several small steps.
• Because of the risk of injury and because overcoming the force of a self-closing door mechanism is not a problem, it is not recommended that momentum be used to open doors with latch mechanisms.

• If the powered wheelchair is about to collide with the door or door frame, the wheelchair user should not reach out to fend off with the hands or feet – this may be ineffective and may cause injury. The body parts should generally be kept within the protective envelope of the wheelchair.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• This can be an awkward task, because the caregiver’s position is dictated by both the need to have access to the joystick and the door.

Special considerations for scooters operated by users (Version 5)
• The width of some scooters may make it difficult to get them through narrow openings.
• The length of some scooters can make it difficult to reach door handles, making it necessary for the scooter user to get off the scooter. When getting off the scooter, the user should keep at least one hand on the scooter for balance. The scooter user should not operate the scooter while standing because the movement may cause a fall.
7.19 ROLLS LONGER DISTANCE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject moves the wheelchair a longer distance on a smooth level surface. This may be done in the forwards or backwards direction.

Rationale
- The ability to manage longer distances allows wheelchair users to get around in the community (e.g. getting from a parking lot to an office or getting around inside a store). Subjects who are able to move their wheelchairs short distances may not be able to roll longer distances due to the additional endurance or attention required.

Prerequisites
- "Rolls forward short distance" skill.

Spotter considerations
- Spotter: If the subject has already safely performed the appropriate shorter-distance skill (forward or backward), the spotter only needs to be nearby.
- Risks requiring spotter intervention:
  - As for the appropriate shorter-distance skill (forward or backward).
  - Because speeds are usually faster if the skill is being performed in a smooth open space, the higher momentum can cause greater injury or damage if there is a collision with a fixed or moving obstacle.

Wheelchair Skills Test (WST)

Equipment
- A smooth level surface at least 1.5 m wide and 50-100 m long is ideal. Using multiple laps of a shorter distance is permissible, but it is preferable for the straight stretches to be at least 25 m in length, to minimize the number of turns. A curved path may be used.
- Space at least 1.5 m before the starting line and beyond the finishing line.
Starting positions
- Wheelchair: Leading wheel axles facing and behind the starting line.

Instructions to subject
- “Move the wheelchair to the finish line (indicate it or the number of laps).”
- If the subject moves outside the boundaries of the corridor to avoid a collision (e.g. during the “avoids moving obstacles” skill that is usually tested in conjunction with the “rolls longer distance” skill), he/she may be prompted, without penalty, to return to the corridor boundaries and to continue with the “rolls longer distance” skill.

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
- Generally as for the “rolls forward short distance” skill except:
  - A “pass” score may be awarded if:
    - The subject propels the wheelchair backwards.
  - A “pass with difficulty” should be awarded if:
    - The subject develops symptoms of over-exertion.
  - A “fail” score should be awarded if:
    - the subject has failed the “rolls forwards short distance” skill if a forward propeller or if the subject has failed the “rolls backwards short distance” skill if a backward propeller.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training

General training tips
- As for the “rolls forwards short distance” or “rolls backwards short distance” skill, depending upon the direction used.
- The wheelchair user should keep the wheelchair away from dangers like walls or drop-offs, especially if the subject is one who regularly pulls or drifts to one side.
• **Progression:**
  - Start at a slow speed and increase as tolerated.
  - Start in a smooth level indoor space and progress to the outdoor setting.

• **Variations:**
  - To work on directional control, the learner can follow a wall or sidewalk edge while trying to stay within an arm’s reach.

**Special considerations for manual wheelchairs operated by users (Version 1)**

• **Adjustment tip:**
  - If tire pressure is low, more effort will be needed.
  - Solid tires roll better on smooth surfaces but are less comfortable than pneumatic tires on rough ground.

• Endurance may be a limiting factor if the wheelchair user is poorly conditioned.
• This is a good opportunity to ensure that good propulsion technique is being used.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

• None.

**Special considerations for powered wheelchairs operated by users (Version 3)**

• **Adjustment tips:**
  - For the mode used for longer distances, the controller setting can be adjusted by the therapist or dealer to one that permits more speed and less sensitivity. Also, the deceleration distance should be increased so that a sudden stop does not cause the wheelchair user to fall or tip forward.

• The subject should alter the controller mode and speed settings to the ones most appropriate for the task.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

• None.

**Special considerations for scooters operated by users (Version 5)**

• The scooter user can set the speed control so that he/she can proceed at the desired speed with the lever fully pushed or pushed part-way depending upon user’s preference.
• The stiff suspension of most scooters can lead to some bouncing over rough surfaces such as sidewalk cracks.
7.20 AVOIDS MOVING OBSTACLES

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- While moving, the subject or learner avoids moving obstacles approaching from different directions.

Rationale
- In addition to stationary obstacles (dealt with in earlier skills), wheelchair operators must avoid moving obstacles (e.g. other wheelchair users, pedestrians) to avoid injury to themselves or others.

Prerequisites
- The “rolls forward short distance” skill is a pre-requisite if this skill is carried out in the forward direction and the “rolls backwards short distance” skill is a pre-requisite if this skill is carried out in the backwards direction.

Spotter considerations
- Spotter starting position: As for the “rolls longer distance” skill.
- Risks requiring spotter intervention: Forwards or sideways tip or fall due to a sudden stop or turn.

Wheelchair Skills Test (WST)

Equipment
- Corridor or pathway as for the “rolls longer distance” skill. Although this skill is usually assessed with the “rolls longer distance” skill, a subject need not be able to pass the “rolls longer distance” skill to be tested for and pass the “avoids moving obstacles” skill. A shorter distance (e.g. 10 m) can provide the opportunity to assess this skill.
- An unoccupied manual wheelchair or equivalent for the tester to push. Although using his/her body as the moving obstacle is permitted, the tester is not expected to endanger him/herself.
Starting positions
- As for the “rolls longer distance” skill.
- Tester: the tester stands behind the unoccupied wheelchair that is being used as the moving obstacle, holding the push-handles, near the pathway but not in it. The tester should be able to see the approaching subject.

Instructions to subject
- “Avoid bumping into anyone or anything that gets in your way.”
- The tester waits until the wheelchair gets close. Then, moving at a normal walking speed, the tester pushes the unoccupied wheelchair forwards at a right angle into the path of the subject’s wheelchair and stops. The tester times his/her movement to provide the subject with 2-3 seconds to avoid a collision. The distance away when the tester begins to move will need to be greater if the subject is moving quickly. This moving-obstacle challenge is done again later, from the other side. If a collision appears to be imminent, the tester should take evasive action.

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if:
    - The subject avoids any contact with the moving obstacle without the tester needing to take evasive action.
    - The subject may avoid contact by stopping, slowing down and/or changing direction.
  - A “pass with difficulty” should be awarded if:
    - The subject has minimal but insignificant contact (i.e. insufficient to potentially cause injury to the wheelchair occupant or another person).
  - A “fail” score should be awarded if:
    - If the subject fails the “rolls forwards short distance” skill.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.
Wheelchair Skills Training

General training tips

- This skill builds on the earlier skills that involve stopping and turning.
- The subject should be alert to the moving environment while the wheelchair is moving.
- If a hallway is clear enough to permit it, it may be advisable to drive in the middle of the hallway, to avoid collisions with people unexpectedly coming around corners or out of doors.
- The subject should obey driving conventions (the “rules of the road”), with respect to altering course to one side (to the right in North America) when approaching others, use of horn or verbal warnings, overtaking and slowing down when approaching others or blind intersections.
- Sudden stops or changes of direction can lead to the wheelchair user falling forward or to the side in the wheelchair.

Progression:

- The subject should start with a single moving obstacle moving slowly at a consistent speed, seen well in advance, to obstacles moving more rapidly and unpredictably, with less warning (e.g. actual pedestrian traffic in a crowded setting).
- The subject should start with moving obstacles that approach from right angles and progress to ones coming from different angles, including overtaking and being overtaken.
- The subject should start slowly and progressively increase the speed of propulsion.

Variations:

- Different moving obstacles can be used (e.g. a rolled ball, a swinging pendulum).

Special considerations for manual wheelchairs operated by users (Version 1)

Progression:

- Sudden stops can transfer weight forward onto the casters, allowing the unloaded rear wheels to skid.
- The wheelchair user can practice both quick stops (leaning back and grabbing both hand-rims firmly) and swerves (leaning toward the direction of turn and grabbing one hand-rim firmly).
- Some highly skilled wheelchair users can induce a controlled wheelie by throwing the trunk backwards while coasting quickly forwards. The goal is to overshoot the balance point and then grasp the hand-rims firmly to stop the wheelchair and prevent a rear tip. With a different amount of force applied to the two hand-rims, a rapid turn can be made.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

Adjustment tip:
• Secure push handles are important for this skill.

• Sudden changes in speed or direction can cause the wheelchair user to fall forward or to the side. The caregiver should use good spotting techniques, reaching forward or to the side with a hand to stabilize the wheelchair user.

**Special considerations for powered wheelchairs operated by users (Version 3)**

• **Adjustment tip:**
  
  • Adjusting the deceleration settings at top speeds is important for this skill. However, the higher the deceleration distance, the more planning is required to avoid the obstacle.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

• None.

**Special considerations for scooters operated by users (Version 5)**

• The high speed that is possible with some scooters, combined with the high center of gravity and narrow wheelbase can make the scooter vulnerable to sideways tips during sudden turns.
7.21 ASCENDS SLIGHT INCLINE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject moves the wheelchair from a level surface up a slight incline to another level surface.

Rationale
- Inclines are encountered frequently in the natural and built environments. For instance, a 5° (~1:12) grade meets the current building codes for ramps in North America.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Behind the wheelchair, holding onto the spotter strap (if a manual wheelchair).
- Risks requiring spotter intervention if moving forwards up the incline:
  - Rear tip when initially accelerating.
  - Forward tip or fall due to deceleration when striking the lower floor-incline transition.
  - Hyper-flexion injury of the lower limb at the lower floor-incline transition.
  - Rear tip while ascending the incline.

Wheelchair Skills Test (WST)

Equipment
- Incline at least 2.5 m long and at least 1.5 m wide.
- A lip and a handrail on both sides of the incline are desirable to prevent injuries but handrails should not be used in the performance of the skill.
- The incline should end at the upper end on a level surface or platform that is large enough for wheelchairs of all types, caregivers and WST personnel to turn around safely (2.0 m² or more is recommended). A lip around the open edges of the platform is recommended.
• There should be little or no lip at the lower junction of the floor and incline. The ability to
overcome such obstacles is tested elsewhere.

Starting positions
• Wheelchair: On the level at the bottom of the incline, with the leading wheels of the
wheelchair facing the incline and at least 0.5 m away. Some subjects may need to start
farther away if they need to use momentum to get up the ramp. This is the subject’s
choice but the tester should not suggest this solution.

Instructions to subject
• “Move the wheelchair up the ramp, without using the ramp handrails.”

Capacity criteria
• As for the general scoring criteria, with the clarifications below.
  • The subject may use any type of propulsion, in the forward or backwards direction.
  • A “pass” score should be awarded if:
    • All wheelchair parts are completely off the incline at the top.
    • The handrails are not grasped and no wheel goes outside the lateral boundaries of
      the incline, although the subject or wheelchair may make contact with the ramp
      lips or rails without penalty.
  • A “pass with difficulty” should be awarded if:
    • The footrests or rear anti-tip devices make enough contact with the surface at the
      lower transition to significantly interfere with progression.
    • A significant transient wheelchair tip occurs.
    • A foot catches on the floor as the wheelchair continues to move forward, without
      injury.
    • The subject exhibits over-exertion symptoms due to unaccustomed exercise.
    • The thumb is injured to a minor degree by the brakes during forward thrusts.

Special considerations for manual wheelchairs operated by users (Version 1)
• The subject may use any type of propulsion (e.g. arm and leg, feet only, forward or
  backward).

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• None.

Special considerations for powered wheelchairs operated by users (Version 3)
• None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• None.

Special considerations for scooters operated by users (Version 5)
• None.
Wheelchair Skills Training

General training tips

- Some of these training tips also apply to incline descent and to inclines of different degrees.
- The steeper the incline, the greater is the likelihood of problems due to scraping the footrests or anti-tip devices at the transition between the lower end of the incline and the level landing area.
- If the drive wheels are uphill, they become relatively unloaded. This can cause loss of traction so that propulsion, braking and directional control become difficult. If traction is lost to the extent that the wheels spin or the wheelchair begins to slide, the wheelchair user should lean toward the affected wheels. If this is insufficient, then the wheelchair should be turned around so that the drive wheels are downhill. It is best to turn around on the level but, if that is not possible, the wheelchair user should lean uphill during the turn.
- Edges and drop-offs at the sides of the incline or at the sides of the platform at the top of the incline should be avoided to prevent injury.
- Momentum can be used to ascend short inclines by approaching at speed. However, if the wheelchair user strikes the floor-ramp transition too quickly, he/she may tip the wheelchair forward or fall forward out of the wheelchair.

Progression:
- The subject should start with the wheelchair stationary at the lower end of the incline and progress to a moving approach.
- The subject should start with a minimal incline and proceed to more extreme ones.

Variations:
- Inclines with different surfaces, such as grass, cobblestone or loose rock.
- Stopping and steering on the incline.
- If a ramp is wide enough, the wheelchair user can steer back and forth across the incline (“slalom” or “zig-zag”), to decrease the apparent slope. Pylons can be set up to provide a path for the wheelchair to follow. The more turns used, the lower the effective slope (but the greater the distance travelled). Although a slalom path up a steep incline will reduce the effective slope, it will introduce an element of side-slope (dealt with later in the “rolls across side-slope” skill).

Special considerations for manual wheelchairs operated by users (Version 1)

- Adjustment tips:
  - A heavy knapsack will reduce rear stability. It can be moved to the lap (although this may limit forward lean) or footrests.
  - At the lower transition, either ascending or descending, the clearance of footrests can create problems.
  - If the rear anti-tip devices are too low, this can cause rear-wheel “float” whereby the rear wheels are not in contact with the surface (because the wheelchair is suspended...
between the casters and anti-tip devices) and are therefore unable to be used for propulsion or braking.

- “Grade aids” (or “hill holders”) may be used. These are attachments that, when activated, allow the rear wheels to roll forwards but not backwards. These devices allow the wheelchair user to rest on the incline without rolling back. The wheelchair user should apply them before he/she starts up the incline.

- Some wheelchairs have gears that permit inclines to be handled more easily.

**Two-hand-propulsion pattern:**

- When negotiating the incline-floor transition at the lower end, during either ascent or descent, the wheelchair user should be careful not to catch an unsupported foot, as this could lead to a hyper-flexion injury of the knee.

- When getting the casters onto the bottom of an incline, it may be necessary to transiently tip the wheelchair (“popping” the casters) if the footrests are low and to reduce the sudden braking that occurs at the transition.

- Some wheelchair users use a rocking action to get the casters over the initial lip.

- The wheelchair user should lean forward as he/she goes up the ramp to apply more force to the hand-rims and to avoid tipping backwards. The need for forward lean increases as the slope increases. In addition to a consistent forward lean, it can be helpful to lean forwards a little more with each push to apply greater forces to the hand-rims.

- If the wheel locks are not of the retractable type, forward leaning can result in injury to the backs of the thumbs if the wheelchair user is not careful.

- It may be necessary to use shorter propulsive strokes than on the level, to avoid rolling backwards between strokes.

- The recovery path of the hands at the end of the propulsive stroke may be more like an arc (following the hand-rim) than a loop (below the hand-rim) for this skill.

- If the wheelchair user gets tired part of the way up the incline, he/she should turn the wheelchair to the side and rest. This can be done without applying the wheel locks.

- If the wheelchair starts to roll backward, instead of grasping both hand-rims (that might cause a rear tip), the wheelchair user can grab one. As the other wheel rolls backward, this will turn the wheelchair across the slope.

**Variations:**

- Alternating hands during propulsion may help to prevent roll-back.

- If using a slalom path up the incline, the wheelchair user will generally turn uphill (e.g. 90°) at the end of each traverse to go back the other way. However, if this is not possible due to limitations of strength or stability, the turn may be downhill (e.g. 270°). Although a little height up the incline is lost, the additional speed during the turn provides momentum to assist in regaining the loss.

- As a learning exercise, it may be helpful to have the wheelchair user try to ascend the incline (with a spotter) without leaning forwards.

- The wheelchair user may use the ramp handrails if available.
• Hemiplegic-propulsion pattern:
  • It is usually easier for a wheelchair user with hemiplegia (who propels the wheelchair with one arm and one leg) to go up the incline backwards. Whenever rolling resistance is encountered (including when ascending inclines), foot propellers find it easier to push backwards than to pull forward with the feet.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• If the wheelchair user has hemiplegia, the caregiver can put the weak foot on the other footrest to avoid it getting caught on the transition.
• To push the wheelchair forwards up an incline, the caregiver should bend the knees and lean towards the wheelchair. The caregiver should not use his/her knee to apply pressure to the backrest.

Special considerations for powered wheelchairs operated by users (Version 3)
• A small lip on the side of an incline may be sufficient to prevent a manual wheelchair from accidentally going over the edge, but a powered wheelchair can go over such a lip more easily.
• Most powered wheelchairs can handle 5° with ease, at least from the perspective of having enough power to manage the slope.
• Altering the position of the wheelchair seat (i.e. with respect to tilt, recline, seat height) may be helpful to improve stability or alter the weight distribution on the wheels (e.g. for more traction).
• The tilt or leg-elevation functions can be used to avoid scraping the footrests at the lower incline transition.

• Progression:
  • The subject may begin training with the controller in a low setting but programming that provides more power and torque may be needed for success.
  • The user may need to change to a different drive mode to get up the incline.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• If the space is narrow and the caregiver must operate the wheelchair from in front, the caregiver should be careful not to run over his/her own toes.
• If the wheelchair does not have a headrest and if the wheelchair user is having difficulty maintaining an upright head position while ascending an incline, the caregiver can support the head with a hand.

Special considerations for scooters operated by users (Version 5)
• None.
7.22 DESCENDS SLIGHT INCLINE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject moves the wheelchair from a level surface down a slight incline to another level surface.

Rationale
- As for the “ascends slight incline” skill.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: If the wheelchair is to move forwards down the incline, the spotter should be behind the wheelchair, holding onto the spotter strap (if a manual wheelchair) with one hand and the other hand in front of the wheelchair user’s shoulder. If using two spotters, one spotter should be behind the wheelchair, holding onto the spotter strap and the second spotter should be in front of and beside the wheelchair to resist a forward tip or fall. A removable seat belt may be used if there is concern about the subject falling forward from the wheelchair.
- Risks requiring spotter intervention:
  - Rear tip if performed in the wheelie position.
  - Forward tip or fall due to deceleration when striking the lower incline-floor transition.
  - Hyper-flexion injury of the lower limb at the lower incline-floor transition.
  - Runaway leading to collision or tip-over.
  - Hand injuries to the wheelchair user due to friction burns or lacerations due to hand-rim irregularities if the wheelchair is allowed to descend too rapidly.
  - Thumb injury on the wheel locks if the wheelchair user grabs the hand-rims when they are rolling too quickly because the hands can get pulled forward into the wheel locks by the wheels.
Equipment
- As for the “ascends slight incline” skill.

Starting positions
- Wheelchair: All wheels are on the level surface at the top of the incline with the leading wheels of the wheelchair facing the incline and at least 0.5 m away.

Instructions to subject
- “Move the wheelchair down the ramp, without using the ramp handrails. Keep the wheelchair under control.”

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if:
    - All wheelchair parts are completely off the incline at the bottom.
    - The handrails are not grasped and no wheel goes outside the lateral boundaries of the incline, although the subject or wheelchair may make contact with the ramp lips or rails without penalty.
    - The subject is under control during the full descent, including the transition to level ground.
  - A “pass with difficulty” should be awarded if:
    - The subject catches the foot on the floor as the wheelchair continues to move forward, without injury.

Special considerations for manual wheelchairs operated by users (Version 1)
- The subject may use any type of propulsion (e.g. arm and leg, feet only, forward or backward).
- The wheelie position may be used for descending all or part of the incline.
- It is permissible for the subject to use the bottoms of the shod feet as brakes.
- A “pass with difficulty” should be awarded if:
  - The subject sustains mild friction burns of the hands.
  - There is minor thumb injury on the brakes because the hands get pulled forward into the brakes by the wheels.
  - The subject drags the bottoms of unshod feet to slow the wheelchair by friction between the feet and floor.
  - The subject drags the toes, even if the feet are shod.
- Comment only: The subject uses the wheel locks as rolling brakes (e.g. by partially or repeatedly applying them).

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.
Special considerations for powered wheelchairs operated by users (Version 3)

- Disengaging the motors and letting the wheelchair roll down the ramp is not considered a safe method.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- None.

Wheelchair Skills Training

General training tips

- A smooth straight controlled descent in the forwards direction is the basic method.
- The subject should proceed slowly to maintain control and should be prepared to stop at any time. It is easier to maintain speed control than to regain it after it has been lost.
- There are many similarities to the “ascends slight incline” skill.

Special considerations for manual wheelchairs operated by users (Version 1)

- Two-hand-propulsion pattern:
  - Adjustment tip:
    - Appropriate and controllable friction between the hands and hand-rims is important to carrying out this skill safely and effectively. Gloves are helpful. The type of coating (if any) on the hand-rims affects friction, as do hand-rim size and shape. A quick and inexpensive way to increase the friction of a hand-rim is to spiral-wrap it with rubber tubing.
    - The wheelchair user should keep his/her weight back, to maintain good traction on the rear wheels and to avoid forward tips or falls.
    - To slow down or steer, the wheelchair user should hold the hands still at the 1:00 o’clock position and let the hand-rims slide through his/her fingers. It is generally better to provide continuous friction than to use a jerky grasp-and-release method. However, the grasp-and-release method may be useful to minimize the heat that builds up through friction, grasping either with both hands at the same time or alternating from one to the other.
    - If the wheelchair starts to roll too quickly and the incline is wide enough, instead of grasping both hand-rims to stop, the wheelchair user can grab one, turning across the slope.
  - Variations:
    - If a ramp is wide enough, the wheelchair user can slalom down it by letting the hand-rim of one wheel at a time slide through the fingers. By descending using the slalom method, the apparent slope of the incline is lessened. Also, this
technique may prevent the hands from overheating due to sustained friction. To provide the subject with a clear indication of how turning can be controlled while descending an incline, the trainer can ask the subject to roll straight down an incline for a short distance, then grab one hand-rim – a dramatic turn will result. This can be repeated with more gradual applications of force on the hand-rim to progress toward smooth controlled turns in either direction. Downhill-turning tendency (see “gets across side-slope” skill later) can be used to advantage when the wheelchair user wishes to turn downhill. Leaning forwards will accentuate the tendency and ease the turn.

- Caution should be used when using the wheel locks as moving brakes. This is not a commonly recommended method.
- The wheelchair user may use the handrails of the incline, if available.
- If the wheelchair user has weak trunk muscles and a tendency to fall forwards when facing downhill on inclines, he/she may feel more comfortable descending the incline backwards. The backwards approach may also be used if, when descending forwards on a steeper incline, the wheelchair user experiences loss of traction due to the unloading of the uphill wheels. When going downhill backwards, the wheelchair user should lean uphill to reduce the likelihood of tipping over backwards. As with any time the wheelchair is moving backwards, it is important to proceed slowly with frequent shoulder checks and to avoid sudden stops that can cause rear tips.
- Using a wheelie is effective but will be discussed later under the section on “descends steep incline in wheelie position” skill section.

- Hemiplegic-propulsion pattern:
  - The wheelchair user can proceed forwards down the incline, using the foot to slow down.
  - The wheelchair user needs to be cautious that the foot does not get caught under the chair at the lower incline-floor transition.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- Adjustment tip:
  - The push-handles should be checked to ensure that they will not pull off.

- The basic method is in the forward direction with all four wheels on the incline.
- The caregiver holds the push-handles firmly and allows the wheelchair to roll down the ramp while controlling the speed.
- The caregiver avoids sudden stops and slows down as he/she reaches the bottom transition to level ground.
- The caregiver can put one hand on the wheelchair user’s shoulder to prevent a forward fall and also to steer the wheelchair as the wheelchair will tend to twist if only one push-handle is held.

- Variations:
• The forward descent can be performed in the wheelie position. This is useful on steep inclines, to prevent the wheelchair user from falling forwards. However, this method may require the caregiver to bend too far forwards, which may strain the back.

• Another method is to descend backwards. This ensures that the wheelchair does not run away from the caregiver and that the wheelchair user does not fall forward. The caregiver should look over the shoulder for obstacles.

Special considerations for powered wheelchairs operated by users (Version 3)

• Altering the position of the wheelchair seat (i.e. with respect to tilt, recline, seat height) may be helpful to improve stability, alter the weight distribution on the wheels (e.g. for more traction) or ensure footrest clearance at the lower transition. However, some wheelchairs do not permit the wheelchair to be driven when the positioning options exceed a threshold.

• Training should begin with the controller in a low setting.

• In a powered wheelchair, unlike a two-hand-propelled manual one, only one hand is needed to control speed and direction. The other arm can be hooked around the backrest or push-handle to prevent falling forward onto the lap.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

• If the space is narrow and the caregiver must operate the wheelchair from in front, the caregiver should be careful not to run over his/her own toes.

Special considerations for scooters operated by users (Version 5)

• None.
7.23 ASCENDS STEEP INCLINE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Advanced.

Description
- The subject moves the wheelchair from a level surface up a steep incline to another level surface.

Rationale
- Inclines with slopes greater than the standard recommended value are encountered frequently in the natural and built environments. The appropriate technique for a steep incline may differ somewhat from that used for a lesser slope.

Prerequisites
- “Ascends slight incline” skill.

Spotter considerations
- As for “ascends slight incline” skill.

Wheelchair Skills Test (WST)

Equipment
- As for “ascends slight incline” skill, except that the incline has a 10° slope.

Starting positions
- As for “ascends slight incline” skill.

Instructions to subject
- “Move the wheelchair up the ramp, without using the ramp handrails.”

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
  - As for “ascends slight incline” skill.
  - A “fail” score should be awarded if the subject fails the “ascends slight incline” skill.
Special considerations for manual wheelchairs operated by users (Version 1)

- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- None.

Special considerations for powered wheelchairs operated by users (Version 3)

- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- None.

Wheelchair Skills Training

General training tips

- As for the “ascends slight incline” skill.

- Progression:
  - Although only 5° and 10° inclines are mentioned specifically in this Manual, for learners and wheelchairs capable of handling steeper inclines, it is reasonable to attempt these under the supervision of a trainer, even if only to help the subject recognize the limits of what is possible for him/her with that wheelchair.

Special considerations for manual wheelchairs operated by users (Version 1)

- As for the “ascends slight incline” skill.

- As the steepness of the incline increases, the wheelchair user leans farther forward and the initial contact with the hand-rims moves forward. The propulsion contact angle diminishes (although the duration of the push phase remains similar) and the force increases. The recovery phase becomes faster and an arc recovery pattern (back along the hand-rims) may be used.

- For very steep inclines, some wheelchair users will go up backwards in the wheelie position. This requires considerable skill and strength. The uphill movement is initiated by allowing the wheelchair to fall (“dip”) partially backwards, followed by a strong pull backwards on the hand-rims to re-achieve balance a short distance up the slope. A variation on this is for a caregiver to assist by using a piece of wood placed just downhill from the rear wheels and moving the wood uphill each time the rear wheels move uphill. The wheelchair user can then rest against this “wheel chock” while repositioning the hands for the next cycle.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the “ascends slight incline” skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- As for the “ascends slight incline” skill.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- As for the “ascends slight incline” skill.

Special considerations for scooters operated by users (Version 5)
- As for the “ascends slight incline” skill.
- Most scooters have adequate power to get up even steeper inclines.
- Scooters may have difficulty at the upper incline-level transition due to inadequate clearance (“break-under angle”) between the front and back wheels.
- Scooters may have difficulties at the lower incline-level transition if any rigid rear anti-tip devices cause the rear wheels to “float” off the surface. Approaching with a little extra speed may help, but the stiff suspension of many scooters may cause the scooter user to bounce off the seat causing a loss of control.
7.24 DESCENDS STEEP INCLINE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Advanced.

Description
- The subject moves the wheelchair from a level surface down a steep incline to another level surface.

Rationale
- As for the “ascends steep incline” skill.

Prerequisites
- “Descends slight incline” skill.

Spotter considerations
- As for “descends slight incline” skill.

Wheelchair Skills Test (WST)

Equipment
- As for “ascends steep incline” skill.

Starting positions
- As for “descends slight incline” skill.

Instructions to subject
- As for “descends slight incline” skill.

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
  - As for “descends slight incline” skill.
  - A “fail” score should be awarded if the subject fails the “descends slight incline” skill.
Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training

General training tips
- As for the “descends slight incline” skill.

Special considerations for manual wheelchairs operated by users (Version 1)
- As for the “descends slight incline” skill.
- The descent in the wheelie position is dealt with in a later skill.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the “descends slight incline” skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- As for the “descends slight incline” skill.
- When stopping while descending a steep incline, moving the joystick into reverse or turning the power off may work better than simply bringing the joystick to the resting neutral position.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- As for the “descends slight incline” skill.

Special considerations for scooters operated by users (Version 5)
- As for the “descends slight incline” skill.
7.25 ROLLS ACROSS SIDE-SLOPE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔️</td>
</tr>
<tr>
<td>2</td>
<td>Manual</td>
<td>Caregivers</td>
<td>✔️</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔️</td>
</tr>
<tr>
<td>4</td>
<td>Powered</td>
<td>Caregivers</td>
<td>✔️</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔️</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject moves the wheelchair across a slight side-slope without turning downhill or uphill significantly, then repeats the task in the opposite direction.

Rationale
- Side-slopes (or cross-slopes) are frequently encountered in built and natural environments. Sidewalks, for instance, are usually sloped 2% (1:50) toward the street to allow water to run off. Steeper grades are also often found (e.g. where sidewalks cross driveways). The yaw axis of a wheelchair (i.e. turning towards the left or right) is between the drive wheels. If the combined center of gravity of the wheelchair and user is ahead of the drive wheels (as is usually the case with rear-wheel-drive wheelchairs), the wheelchair will tend to turn downhill on a side-slope (downhill turning tendency). If the combined center of gravity of the wheelchair and user is behind the drive wheels (as is usually the case with front-wheel-drive wheelchairs), the wheelchair will tend to turn uphill on a side-slope (uphill turning tendency).

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Slightly behind and downhill from the wheelchair.
- Risks requiring spotter intervention: Sideways tip or fall downhill.

Wheelchair Skills Test (WST)

Equipment
- Incline of 5°, at least 2 m long (in the line of progression) and at least 1.5 m wide.
- At least an extra 1.5 m before the starting line and beyond the finishing line.
- Start and finish lines perpendicular to the line of progression.
- Means of monitoring if any of the downhill wheels drift or turn downhill by greater than
10 cm from the starting position. The slope-level transition can be used, or any line parallel to it.

**Starting positions**

- Wheelchair: with the brakes off, and all wheels on the sloped surface, oriented in the line of progression across the slope. The downhill drive wheel is positioned 10 cm up the slope from the line used to detect if the wheelchair has turned or drifted downhill. The axles of the leading wheels must be behind the starting line. The casters should be trailing appropriately for the direction of travel so that there is no initial deflection of the wheelchair due to the casters realigning themselves.

**Instructions to subject**

- “Move the wheelchair across the slope to the finish line (indicate it) without letting the wheels turn downhill below the line (indicate it).”
- “Now do the same thing in the other direction.”

**Capacity criteria**

- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if:
    - The leading wheels cross the finish line.
    - Any path may be used as long as no downhill wheel crosses the line 10 cm downhill from the starting position.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- None.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- The caregiver’s feet need not remain above the line being avoided because the caregiver’s usual position relative to the wheelchair is slightly downhill to the wheelchair.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- A front-wheel-drive wheelchair will tend to self-steer uphill instead of downhill, but there is no penalty for this if the wheelchair is able to complete the 2 m in the space available without any downhill wheel (e.g. a rear caster) in contact with the surface moving below the line.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

- None.

**Special considerations for scooters operated by users (Version 5)**

- None.

---

Wheelchair Skills Training
General training tips

- The extent of downhill- or uphill-turning tendency is directly proportional to how far the combined center of gravity of the wheelchair and occupant is in front of or behind the drive wheels. The person operating the wheelchair can take steps to minimize this distance by repositioning the center of gravity (e.g. by leaning, tilting or reclining).
- If there is room to do so on a path, the person operating the wheelchair should stay away from the downhill edge of a side-slope to avoid veering off the path.

- Variation:
  - Slowly turning the wheelchair 360° in place on a side-slope will provide a good sense of how downhill-turning tendency affects the wheelchair at different angles.

- Progression:
  - Although only a 5° side-slope is mentioned specifically in this Manual, for subjects and wheelchairs capable of handling steeper inclines, it is reasonable to attempt these under the supervision of a trainer, even if only to help the subject recognize the limits of what is possible for him/her with that wheelchair.

Special considerations for manual wheelchairs operated by users (Version 1)

- Adjustment tip:
  - Moving the rear axles of a rear-wheel-drive wheelchair forward reduces the downhill-turning tendency.

- Side-slopes require significantly more energy to push across.
- The wheelchair user should lean backwards to keep the weight away from the casters.
- Although downhill-turning tendency can make it difficult to proceed in a straight line across a side-slope, if the subject leans forward appropriately, this tendency can be used to facilitate turns on inclines.

- Two-hand-propulsion pattern:
  - To avoid turning downhill, the wheelchair user should push harder on the downhill wheel.
  - Different push frequencies may be used for the two hands. For instance, when moving across a side-slope with the right side downhill, the right hand may push 2-3 times for every 1 push on the left.
  - When pushing longer distances, route planning can be used to avoid overuse on one side. For instance, part of the journey can be carried out on the right-hand sidewalk (where the left side is downhill) and part of the journey on the left-hand sidewalk.
  - In some cases, the uphill hand may be used exclusively for braking (to minimize downhill-turning tendency) rather than for assisting with propulsion.
  - Shorter stokes may need to be used to keep the wheelchair moving straight.
• On steep cross-slopes, problems (e.g. loss of uphill-wheel traction, lateral tip-over, folding of the wheelchair) may arise due to the lack of weight on the uphill wheel. These problems can be minimized by leaning uphill.

• As noted earlier under the “descends slight incline” skill, downhill-turning tendency can be used to advantage when the wheelchair user wishes to turn downhill. Leaning forwards will accentuate the tendency and ease the turn.

• Variations:
  ▪ A useful learning experience to demonstrate the downhill-turning tendency is to have the wheelchair user lean forward, to illustrate how the downhill-turning tendency increases.
  ▪ If there is an uphill wall that can be used, the wheelchair user can drag the uphill hand on the wall behind the rear axle to counteract the downhill-turning tendency. This is analogous to the drag turn discussed earlier.
  ▪ In the wheelie position facing across a slope, there is no downhill-turning tendency, because the center of gravity is between the rear wheels.

• Hemiplegic-propulsion pattern:
  ▪ Some users may choose to go backwards with the sound side downhill rather than forwards with the sound side uphill, to help manage the downhill-turning tendency.
  ▪ When learning the skill in the forward direction, it may be less frustrating to cross the side-slope with the sound side downhill first; this will tend to counteract rather than aggravate the downhill-turning tendency.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• To resist the downhill-turning tendency while pushing the wheelchair across a side slope, the caregiver needs to push harder on the downhill push-handle and pull back on the uphill push-handle.
• For a steeper slope, the caregiver may choose to use the wheelie position.
• If the wheelchair user is in a tilt-in-space or reclining wheelchair, tilting or reclining the wheelchair can be used to get the center of gravity farther back.

Special considerations for powered wheelchairs operated by users (Version 3)
• Although a rear-wheel-drive wheelchair will tend to turn downhill (analogous to a manual wheelchair), a front-wheel-drive wheelchair will tend to turn uphill.
• Many powered wheelchairs are equipped with automatic correction of downhill/uphill-turning tendency on side-slopes.
• If there is no automatic correction, the wheelchair user should aim slightly away from the expected deviation (i.e. aim uphill for a rear-wheel-drive wheelchair and downhill for a front-wheel-drive wheelchair).
• If the wheelchair user is in a tilt-in-space or reclining wheelchair, tilting or reclining the wheelchair can be used to get the center of gravity over the drive wheels.
Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- On steeper side-slopes, sideways tips are possible due to the relatively narrow base width and high center of gravity of some scooters.
### 7.26 ROLLS ON SOFT SURFACE

#### Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

#### Skill Level
- Intermediate.

#### Description
- The subject moves the wheelchair a short distance on a soft surface.

#### Rationale
- There are many soft surfaces (e.g. carpet, dirt, grass, gravel, sand or snow) with increased rolling resistance. Propulsion is more difficult on such surfaces because the wheels tend to sink into the surface, especially wheels that are narrow or of small diameter.

#### Prerequisites
- None.

#### Spotter considerations
- Spotter starting position: Behind the wheelchair, holding onto the spotter strap with one hand (if a manual wheelchair).
- Risks requiring spotter intervention:
  - Rear tip when accelerating.
  - Overuse injury due to the additional forces needed.

#### Wheelchair Skills Test (WST)

#### Equipment
- Pathway that includes a soft surface at least 2.0 m long and 1.5 m wide.
- There should be an additional 1.5 m of soft surface before the starting line and 1.5 m beyond the finishing line.
- Options for the soft surface include a gym mat (5 cm thick), gravel (medium-grade, 5-6 cm deep), sand (fine grain, 5-6 cm deep), indoor/outdoor carpet over 5 cm open-cell foam or equivalent.
- Note that some sand and gravel pits have lips that make it difficult to get into and out of them. It is the 2 m of soft surface that is the focus of this skill, not the entry and exit.
Starting positions

- Wheelchair: Fully on the soft surface with the leading wheel axles behind the starting line.

Instructions to subject

- “Move the wheelchair over the finish line (indicate it).”

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if:
    - The leading wheel axles are beyond the finish line.
    - All techniques are permitted, such as forward or backward approaches.
    - During the course of any single attempt, a subject may use different approaches.

Special considerations for manual wheelchairs operated by users (Version 1)

- The wheelchair user may use the feet.
- Transiently popping the casters off the soft surface is an effective strategy.
- Rolling forwards in the full-wheelie position is also effective.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- None.

Special considerations for powered wheelchairs operated by users (Version 3)

- The wheelchair user may use the wheelchair’s body positioning options (e.g. tilt, recline, leg-rest elevation) to reduce the weight on the smaller wheels.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- None.

Wheelchair Skills Training

General training tips

- Adjustment tip:
  - The diameter, width and shape of the wheels and tires will affect the extent to which they sink into the soft surface.

- When approaching a section of soft or irregular terrain, the wheelchair user should look ahead and plan a route that will minimize difficulties.

- When moving from a smooth level surface onto a soft surface, the wheelchair will decelerate, so it may be necessary to slow down (or pop the casters, if in a manual wheelchair) when approaching such a transition.
To minimize rolling resistance, reducing the weight on the small wheels (casters) and increasing the weight on the drive wheels is a helpful strategy.

When proceeding across a soft or rough surface, it is easiest to move forwards in a straight line, because if the casters sink into the soft surface they will be less free to swivel should the user wish to change direction.

If one drive wheel is spinning, the wheelchair user should shift his/her weight in the direction of the slipping wheel to increase the traction.

For rear-wheel-drive wheelchairs, it may be easier to lead with the larger wheels (i.e. in the backwards direction). The larger-diameter wheels make it easier to get started. The casters will trail backwards and the resulting longer wheelbase may help as well.

Variations:

- A variety of surfaces (e.g. sand, thick carpet, foam, a gym mat, gravel) provide similar, but not identical, experiences.
- If the surface is too soft to proceed over, a mat or other materials can be laid down over it. If an assistant is available, long distances can be covered by picking up the mat behind the wheelchair and moving it to the front, proceeding forward in a step-wise fashion.

Special considerations for manual wheelchairs operated by users (Version 1)

Adjustment tips:

- This is the first of several skills for which it is of benefit to pop the casters off the surface or to perform a full wheelie. Any adjustment that lowers the rear stability of the wheelchair (e.g. moving the axles of the rear wheels forward) will make it easier to pop the casters.
- It may be necessary to reposition the rear anti-tip devices to allow the wheelchair to be tipped backwards sufficiently to transiently pop the casters. To reposition most rear anti-tip devices, the subject will need to press a button or release mechanism on the wheelchair frame that locks the anti-tip device in place. The subject should note the position of the anti-tip devices, so that he/she will be able to restore them later. Then, the subject can either reposition the anti-tip devices so that they face upwards or remove them altogether. To restore the anti-tip devices, the subject should simply reverse the steps. Note that whenever the rear anti-tip devices have been inactivated, the wheelchair user is at increased risk of a rear tip. The spotter should be vigilant to spot the wheelchair user closely until the wheelchair user becomes used to this new condition. Even if the rear anti-tip devices are left in place, the wheelchair user should not rely on them to prevent rear tipping because they might sink into a soft surface.
- If the wheelchair has elevating footrests, it will be easier to pop the casters if the footrests are lowered.

Two-hand-propulsion pattern:

- The forward approach to negotiating soft surfaces is preferred because the wheelchair user can see where he/she is going.
- The wheelchair user should use long slow strokes to keep the wheels from slipping in...
loose surfaces.

- Because there is more rolling resistance on soft surfaces, more force is required by the wheelchair user.

- Leaning forward slightly may help the wheelchair user to apply more force to the hand-rims and to prevent the additional force from causing a rear tip. However, keeping as much weight as possible on the rear wheels (i.e. leaning backward) will improve traction and keep the front wheels from digging into the soft surface. The wheelchair user should experiment with the extent of trunk lean to find the optimum (the “sweet spot” between too much and too little).

- As noted above under Adjustment tips, this is the first in a series of skills for which popping the casters off the surface is useful or necessary. Such caster pops are a good option for the wheelchair user, lifting the casters off the surface during each push, but letting them touch the surface as the hands recover for the next push.

- During a caster pop, the longer the hands remain on the hand-rims, the farther forward the wheelchair will move with the casters off the surface. This can be thought of as analogous to taking a series of walking “steps” across the surface; a few long steps are preferable to many short steps.

**Progression:**

- For wheelchair users who are unfamiliar with caster pops, it can be a useful exercise to practice such pops on a smooth firm surface. The emphasis is on pushing the hand-rims forwards but more forcefully than to simply roll forwards and less forcefully than is needed to achieve a full wheelie position.

**Variations:**

- As a learning exercise, the wheelchair user should try the skill while leaning forward and backward to different extents, to find the optimum position for him/her.

- If using the full wheelie position (a good option, but one that requires more skill), the wheelchair user needs a strong forward ‘dip’ to get going. If the casters touch the surface during the dip, the wheelchair user can lean forward slightly. This allows the casters to lift off further during the wheelie and provides better clearance during the dip.

**Hemiplegic-propulsion pattern:**

- Rolling on soft surfaces with the hemiplegic-propulsion pattern (one arm and one leg) is easier in the backward direction, because there is less rolling resistance with the large rear wheels than the smaller casters. Also when pushing backwards with the foot, the casters become slightly unloaded which makes it easier to move them.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- To proceed in the forward direction, it may be necessary for the caregiver to lean forward to apply the extra force needed.

- The caregiver should not use his/her knee against the backrest of the wheelchair to apply
more force because this may be uncomfortable for the wheelchair user (if the backrest is flexible) or dislodge a rigid removable backrest.

- Variations:
  - The caregiver may find it easier to pull the wheelchair backward.
  - The caregiver may find it easier to tip the wheelchair back into the full wheelie position, so that almost all of the weight is on the rear wheels. The wheelchair can be pushed forward or pulled backwards in the wheelie position. If there is very high rolling resistance, pulling may be more effective. However, pushing forward has the advantage that the caregiver can see where he/she is going. This is the first of many skills for which it may be useful for the caregiver to be able to transiently pop the casters from the ground briefly or to get into the full wheelie position. The caregiver should always let the wheelchair user know before he/she tips the wheelchair backwards. To tip the wheelchair backwards, the caregiver should use one foot on a tipping lever if any (an extension of the wheelchair frame, to which the rear anti-tip device may be attached) while pulling backwards with the hands on the push handles. For the full wheelie position, the caregiver should tip the wheelchair back far enough so that it is balanced over the rear wheels. How far back the chair needs to be tipped will vary depending on the wheelchair user and the wheelchair. To land after the assisted wheelie, the caregiver should slowly allow the casters to return to the floor using a foot on the tipping lever to help slow the landing.

### Special considerations for powered wheelchairs operated by users (Version 3)

- If possible and necessary, the wheelchair user should adjust the controller setting to one that provides more torque.
- Positional control (e.g. tilt, recline) can alter the weight distribution between the front and rear wheels. It is easier to proceed on a soft surface if more of the weight is on wheels with larger diameter. Clearance for the feet can also be affected by this change.
- On soft or irregular terrain, there is an optimal speed that is fast enough to maintain forward movement but not so fast that the motion is uncomfortable or leads to a loss of control.
- Maintaining a steady speed is preferable to a series of stops and starts.
- On a “bottomless” soft surface (e.g. sand, gravel or mud), if the drive wheels are allowed to spin, the wheelchair may dig itself into a hole that it can be difficult to get out of without assistance.

### Special considerations for powered wheelchairs operated by caregivers (Version 4)

- With a rear-wheel-drive wheelchair, a caregiver can push down (or stand) on the back of the wheelchair to unload the casters and add traction to spinning wheels. The caregiver can also push forward, to assist with overcoming resistance. Alternatively, the front of the wheelchair can be lifted or pulled on. The converse is true for a front-wheel-drive wheelchair.

### Special considerations for scooters operated by users (Version 5)
• None.
7.27 GETS OVER THRESHOLD

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject moves the wheelchair over a threshold.

Rationale
- Wheelchair users often encounter obstacles (e.g. door thresholds) that they may not be able to simply roll over. Alternative strategies may be needed. For example, a manual wheelchair user might need to pop the casters over the obstacle whereas a powered wheelchair user might need to change the mode setting to one with more power.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: If using a single spotter, he/she should be behind the wheelchair, holding onto a spotter strap with one hand (if a manual wheelchair) and the other hand in front of the wheelchair user’s shoulder. If using two spotters (as is recommended), the second spotter should stand to one side of the level change. A removable seat belt can prevent the wheelchair user from falling from the wheelchair.
- Risks requiring spotter intervention:
  - Rear tip when accelerating to pop casters from the surface (if a manual wheelchair).
  - Forward tip or fall if the casters strike the threshold.

Wheelchair Skills Test (WST)

Equipment
- Threshold 2 cm high, 1.5 m wide and 10 cm across (in the line of progression), rectangular in cross-section (i.e. a vertical front face without a bevel).
- The threshold should be secured so that it can withstand horizontal forces.
Starting positions

- Wheelchair: Facing the threshold with the leading wheels at least 0.5 m from it.

Instructions to subject

- “Get your wheelchair over the threshold.”

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
  - A “pass” should be awarded if:
    - All parts of the wheelchair have passed beyond the threshold.
  - A “pass with difficulty” should be awarded if:
    - There is significant jarring.
    - There is loss of control due to bouncing off the seat.
    - There is unintended hyper-flexion of the lower limb without injury.

Special considerations for manual wheelchairs operated by users (Version 1)

- The wheelchair user is permitted to use his/her feet or stand to get over the threshold.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- The caregiver may request assistance from the wheelchair user during this skill, in the form of having the wheelchair user lean backwards or forwards at the caregiver’s direction, to facilitate the different stages of the skill.

Special considerations for powered wheelchairs operated by users (Version 3)

- The wheelchair user may use the wheelchair’s body positioning options (e.g. tilt, recline, leg-rest elevation) to reduce the weight on the smaller wheels.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- None.

Wheelchair Skills Training

General training tips

- Adjustment tip:
  - Rear anti-tip devices may need to be repositioned or removed to permit caster pops (for manual wheelchairs).
  - Rear anti-tip devices may cause the drive wheels to “float” (i.e. with the weight being distributed on the casters and the anti-tip devices, unloading the drive wheels).
  - Footrests or anti-tip devices may contact the threshold before the wheels do, making it impossible to negotiate the threshold in that direction without repositioning the
wheelchair parts concerned.

- A seat belt may be useful for higher thresholds to prevent falling out of the wheelchair while the seat is tilted forwards.
- Wheelchairs with large-diameter leading wheels are able to roll over higher obstacles than those with small-diameter wheels.
- Wheelchairs with longer wheelbases are less likely to tip forwards as the rear wheels surmount higher thresholds.

- If the wheelchair gets hung up due to insufficient horizontal clearance (wheelbase), the learner may be able to escape by backing up slightly; this will swings the casters from the rear-trailing position to the side- or forward-trailing one, where there is more space between the front and rear wheels.

- **Progression:**
  - The subject should start with low thresholds and progress to higher ones. Obstacles with a height of 10 cm or greater are negotiable in the right wheelchair. Before attempting to negotiate a high obstacle, the subject should be aware of how much clearance exists between the wheels, to avoid getting hung up on the obstacle.

- **Variations:**
  - Leading with the larger-diameter wheels may be helpful.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- This is the first of a series of skills (including “gets over a gap”, “ascends a low curb” and “ascends a high curb”) for which the ability to pop the casters in a specific location and move forwards are very helpful.

- **Forward Approach, Stationary Method:**
  - The wheelchair user should approach the obstacle and stop with the casters 5-10 cm before reaching the threshold, to avoid striking the casters on the vertical section of the threshold.
  - This method is comprised of two steps: “pop” and “lean”. They can be verbalized as they are performed, as cues.
  - The wheelchair user first briefly pops the casters from the floor, just high enough to clear the threshold. To do so using the two-hand propulsion method, the wheelchair user applies forward forces of moderate intensity to the hand-rims. After the casters land beyond the threshold, the wheelchair user should lean forward to help power the rear wheels over the threshold. Some rocking may be needed.
  - Once the rear wheels are on top of the obstacle, the wheelchair user should lean back to decrease the likelihood of a forward tip or fall out of the wheelchair.

- **Forward Approach, Momentum Method:**
This method is comprised of three steps: “coast”, “pop” and “lean”. As for the stationary method, the cues can be verbalized as they are performed.

The wheelchair user should initially approach at a slow speed. It is simpler to pop the casters when moving slowly. Also, if the wheelchair user fails to pop the casters for long enough to clear the threshold, the sudden stop will be less jarring at a slow speed.

The wheelchair user should not lean forward to look at the feet when he/she approaches the obstacle, because that increases the weight on the casters. In timing the caster pop, the wheelchair user needs to understand where the casters are (often below the knees, not under the feet). A mirror placed to the side of the obstacle can be used to provide feedback.

In preparation to pop the front wheels while the wheelchair user moves forward, the wheelchair user briefly coasts to allow correct placement of the hands when he/she is at the proper distance from the gap. The correct position is when the hands are ready to grasp the hand-rims, behind top dead centre (11:00 o’clock on the right wheel, using the clock analogy). Then, the wheelchair user should accelerate the chair even faster than it is coasting, by using a stroke of moderate force that is powerful enough to pop the casters from the surface.

Once the casters have landed beyond the threshold and the rear wheels strike the threshold, the wheelchair user should lean forward and propel the rear wheels to bring the rear wheels over the obstacle.

When moving forwards over a threshold, some advanced wheelchair users prefer to allow the rear wheels to reach the surface beyond the threshold before having the casters land on the surface. However, when initially learning the skill, it is preferable if the casters land beyond the threshold before the rear wheels strike the obstacle. This will be especially useful in later skills (e.g. ascending curbs) to avoid “caster “slap”. Caster slap occurs when the casters are brought forcefully down onto the surface by the deceleration that occurs when the rear wheels strike an obstacle with the casters in the air.

Progression:

To practice getting the timing correct without the fear of having the casters strike the threshold, the wheelchair user may practice propelling the wheelchair forward and transiently popping the casters at a predetermined point on the floor. This can be a line on the floor or a strip of bubble wrap. The horizontal distance over which the casters need to be off the floor can be gradually increased.

The subject should start with the stationary approach then progress to the momentum method.

For learners experiencing difficulties in coordinating the sequence of the three components of the skill (coast, pop and lean), it may be useful to practice them in segments before putting the segments together.
Variations:

- The wheelchair user may find it easier to back over a low obstacle. The wheelchair user should approach the obstacle slowly, because a sudden stop can cause a rear tip. As the wheelchair user approaches the obstacle backwards, he/she should lean forward to unload the rear wheels and further reduce the likelihood of a rear tip. Using the foot on the floor can give the wheelchair user additional power to get over the obstacle. The wheelchair user pulls the wheelchair straight backward by applying equal force to both wheels. Otherwise, the casters may turn and catch sideways on the obstacle. Once the rear wheels are over the threshold, the wheelchair user should lean back enough to unload the casters as they reach the obstacle, but not so much as to cause a rear tip.

- The wheelchair user can use a full wheelie for the entire skill or only until the rear wheels strike the threshold.

- The hands-free version of the skill is useful because the wheels may be spinning too quickly for the hands to catch up with them (e.g. coming down a hill). However, this is an advanced skill. Some wheelchair users can flex the hips, keeping the body upright. Although actively leaning back into the backrest at the intended moment will also pop the casters off the ground, there is an increased risk of the wheelchair user tipping over backwards and the body will not be well positioned for the forward lean needed during the second half of this skill. The hands-free version of the skill can be difficult to spot.

- As noted earlier for the “maneuvers sideways” skill, to get beyond a pair of obstacles (e.g. concrete parking bolsters) that are too close to wheel between, it may be possible to move one wheel (or pair of wheels) through the gap at a time, transiently straddling the obstacles with one wheel (or pair of wheels) on either side of the obstacles and the wheelchair parallel with the obstacles. The wheelie position can be very helpful in performing this skill. As when parallel parking a car, it can be helpful if the wheelchair user begins the maneuver by backing the rear wheel through the opening.

Hemiplegic-propulsion pattern:

- The backwards approach (as described above) is useful whenever high rolling resistance is encountered, as the threshold represents.

Variations:

- The threshold can be approached in the forwards direction, using the foot/feet to pop the casters. While popping the casters, at the same time the wheelchair user should roll the wheelchair forward so that the casters land on the floor beyond the threshold.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- The caregiver may request assistance from the wheelchair user during this skill, in the form of having the wheelchair user lean backwards or forwards at the caregiver’s direction, to facilitate the different stages of the skill.
Special considerations for powered wheelchairs operated by users (Version 3)

- Positional control (e.g. tilt, recline) can be used to alter the weight distribution of the chair and to provide footrest clearance.
- Smooth continuous forward movement is often the most successful method of traversing a threshold.
- Depending upon the size of the threshold, it may be necessary to switch drive modes to have the necessary wheel torque.
- If the powered wheelchair has come to a stop against the threshold, as extra force is applied to the threshold, the casters may suddenly pop up. The wheelchair user should not apply any more force than is needed and should reduce the force applied to the joystick as soon as possible.
- Getting the larger drive wheels over the threshold is usually easier than getting the smaller caster wheels over. Leaning away from the casters will unload them and make it easier to get them over.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- None.

Special considerations for scooters operated by users (Version 5)

- If there is insufficient ground clearance between the front and rear wheels, the scooter may get hung up on a high threshold.
- Approaching the threshold with a little extra speed may help. However, if the scooter user approaches the threshold too quickly, the stiffness of the suspension may cause the scooter user to bounce off the seat and lose control of the scooter.
7.28 GETS OVER GAP

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject moves the wheelchair over a gap across the line of progression.

Rationale
- A gap in surface support is a commonly encountered barrier (e.g. due to a rut in the road, a water channel or a space between a subway platform and the subway train). Small gaps, that only affect one wheel at a time, may be jarring but are not usually major obstacles. In this section, we will be considering only gaps that are as wide as the wheelchair. Small-diameter wheels such as casters can drop into such gaps, causing a sudden deceleration that can tip the wheelchair over forwards or lead to the wheelchair user falling out of the wheelchair. Even if no tip or fall occurs, it can be difficult to get the wheelchair out of the gap.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: If using a single spotter, he/she should be behind the wheelchair, holding onto a spotter strap with one hand (if a manual wheelchair) and with the other hand in front of the wheelchair user’s shoulder. If using two spotters (as is recommended), the second spotter should stand to one side of the gap. A removable seat belt can prevent the wheelchair user from falling from the wheelchair.
- Risks requiring spotter intervention:
  - Rear tip when accelerating to pop casters from surface (if a manual wheelchair).
  - Forward tip or fall if the casters roll or drop into the gap.

Wheelchair Skills Test (WST)

Equipment
- Smooth level surface 1.5 m wide, with at least 1.5 m before and after the gap.
• The gap should be ~5 cm deep, the full width of the path and 15 cm across (in the line of progression).
• If a gap is not readily available, one can be easily simulated. For instance, two folding tables (with the legs folded) or two gym mats can be put close together.

**Starting positions**
• Wheelchair: Leading wheels at least 0.5 m in front of the gap.

**Instructions to subject**
• “Get your wheelchair over the gap (indicate it).”

**Capacity criteria**
• As for the general scoring criteria, with the clarifications below.
• A “pass” score should be awarded if:
  • All components of the wheelchair are on the level surface beyond the gap.
• A “pass with difficulty” score should be awarded if:
  • There is significant jarring.
  • There is any loss of control due to bouncing off the seat.
  • There is unintended hyper-flexion of the lower limb without injury.

**Special considerations for manual wheelchairs operated by users (Version 1)**
• The wheelchair user is permitted to use his/her feet or stand to get over the gap.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
• As for “gets over threshold”.

**Special considerations for powered wheelchairs operated by users (Version 3)**
• The wheelchair user may use the wheelchair’s body positioning options (e.g. tilt, recline, leg-rest elevation) to reduce the weight on the smaller wheels.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
• None.

**Special considerations for scooters operated by users (Version 5)**
• None.

---

**Wheelchair Skills Training**

**General training tips**
• **Adjustment tip:**
  • The diameter of the wheels affects the size and depth of gaps that can be overcome.
• The best approach is to avoid gaps, steering around them or straddling them.
The wheelchair user may approach the gap squarely or obliquely.

If the casters drop into the gap and they turn sideways (a common problem if the wheelchair is moved forwards and backwards repeatedly in an attempt to get the casters out of the gap), it can be very difficult or impossible to proceed without assistance.

**Progression:**
- The subject should start with a slow speed and add speed.
- The subject should start with small shallow gaps and progress to more challenging ones.

**Variations:**
- As long as 3 wheels are supported at any time, the wheelchair will usually remain upright. That being the case, an oblique approach to a gap (e.g. 30-45° from the line of progression so that only one wheel is unsupported at a time) is a useful strategy. The wheelchair user should keep his/her weight away from the unsupported wheel.

Special considerations for manual wheelchairs operated by users (Version 1)
- This skill builds on the caster popping practice done in the “rolls on soft surface” skill earlier.
- See the “gets over a threshold” skill.
- The square approach is useful to include in training because the method used is part of a step-wise sequence leading towards the ascent of level changes and curbs.
- When popping the casters over a long gap, the wheelchair user can use the full wheelie position or perform a transient pop with two pushes, the second push while the casters are still in the air.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- The caregiver may proceed in the forward direction, using the transient caster pop or full wheelie method.
- After the rear wheels are in the gap, the casters can be lowered to the surface beyond the gap. Then the wheelchair user is asked to lean forward and the wheelchair is rolled out of the pot-hole.

**Variations:**
- The backward direction may be easier for the caregiver. If this technique is used, the rear wheels of the wheelchair can be lowered into the pothole, then the wheelchair tipped into a wheelie position to be pulled out of the pothole on the rear wheels.

Special considerations for powered wheelchairs operated by users (Version 3)
- **Adjustment tip:**
  If the casters are rounded on their sides (i.e. ball-shaped), they will better resist the tendency to get caught sideways.
Positional control (e.g. tilt, recline) can be used to get the weight over the drive wheels and improve traction.

If the gap cannot be managed in the oblique direction or avoided but appears to be negotiable straight-forwards, it is best to proceed at a slow speed but a steady pace because the momentum may help bounce the wheels over the gap.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

If the casters get stuck sideways in the gap, the caregiver may need to stand on the back of the wheelchair to tilt the chair enough to get the casters out of the gap. If the wheelchair user cannot operate the joystick enough to help, a second caregiver may be needed. The motors may need to be disengaged to allow the wheelchair to be pushed out of the gap.

Special considerations for scooters operated by users (Version 5)

None.
7.29 ASCENDS LOW CURB

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level

- Intermediate.

Description

- The subject gets the wheelchair up a low curb.

Rationale

- Level changes (e.g. curbs, steps, home entries, uneven sidewalk sections) are common obstacles in the natural and built environments.

Prerequisites

- None.

Spotter considerations

- Spotter starting position: For this and later curb-handling and stairs skills, the spotter strap is of little use if a sideways tip or fall occurs. If using a single spotter, he/she should be behind the wheelchair, with both hands close to the push-handles (if any). If using two spotters (as is recommended), the second spotter should stand to one side of the level change. A removable seat belt can prevent the wheelchair user from falling from the wheelchair.

- Risks requiring spotter intervention:
  - Rear tip when accelerating to pop casters from surface (if a manual wheelchair).
  - Forward tip or fall if casters strike the curb.
  - Sideways tip if one wheel gets up onto the upper level before the other.

Wheelchair Skills Test (WST)

Equipment

- The pathway on the lower level leading to the curb should be at least 1.5 m wide and at least 3 m long, for subjects who use a moving approach. The pathway on the upper level leading from the curb edge should be at least 1.5 m wide and at least 1.5 m long.

- The curb should be 5 cm high.

- The nosing of the curb should be gently rounded.
• Bracing or weighting may be needed to prevent the curb from moving when struck by the wheelchair.

Starting positions
• Wheelchair: All wheels are on the level surface below the curb, facing the curb and at least 0.5 m from it. If the subject uses a moving approach, the subject may choose to begin farther away.

Instructions to subject
• “Get the wheelchair up on the curb.”

Capacity criteria
• As for the general scoring criteria, with the clarifications below.
• A “pass” score should be awarded if:
  • All wheels are on the top surface, with the wheelchair user seated upright in the wheelchair.
  • The subject may remove the footrests and reposition the rear anti-tip devices but must be able to do so independently.
  • The wheelchair user may get out of the wheelchair to accomplish the task, if he/she can do so safely.
  • Curb-climbing aids may be used if the wheelchair is equipped with these devices, but the subject must be able to activate and inactivate the aids independently.
• A “pass with difficulty” should be awarded if:
  • There is significant jarring.
  • There is any loss of control due to bouncing off the seat.
  • There is unintended hyper-flexion of the lower limb without injury.

Special considerations for manual wheelchairs operated by users (Version 1)
• A “pass with difficulty” should be awarded if:
  • There is a minor thumb injury due to contact with the brakes.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• The caregiver may request assistance from the wheelchair user during this skill, in the form of having the wheelchair user lean backwards or forwards at the caregiver’s direction, to facilitate the different stages of the skill.
• A “pass with difficulty” should be awarded if:
  • If a caregiver uses poor ergonomic technique (e.g. lifting rather than rolling the wheelchair up onto the upper level).

Special considerations for powered wheelchairs operated by users (Version 3)
• The wheelchair user may use the wheelchair’s body positioning options (e.g. tilt, recline, leg-rest elevation) to reduce the weight on the smaller wheels.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
Special considerations for scooters operated by users (Version 5)

- None.

Wheelchair Skills Training

General training tips

- As for the “gets over threshold” skill, the footrests, anti-tip devices and clearance between the wheels may affect the ability to negotiate level changes.
- It may be necessary to reposition or remove the footrests or rear anti-tip devices.
- This skill is similar to and builds on the previous ones, specifically the soft surface, threshold and gap skills.

- Progression:
  - The subject should start with a minimal level change and progress to higher ones.
    - It is useful to have a 10 cm curb as an intermediate height between the low (5 cm) and high (15 cm) curbs.
  - For subjects and wheelchairs capable of handling curbs higher than 15 cm, it is reasonable to attempt these under the supervision of a trainer, if it can be done safely.

Special considerations for manual wheelchairs operated by users (Version 1)

- Two-hand-propulsion pattern:
  - This skill is similar to the “gets over threshold” and “gets over gap” skills in that it can be approached with stationary and momentum methods.
  - It is slightly more challenging to deal with the rear wheels than the preceding skills because the tilted position due to having the casters on top of the curb moves more weight to the back of the wheelchair. This shift of weight is present until the rear wheels are all the way up on the upper level.
  - In the stationary approach, if the wheelchair user has difficulty getting the rear wheels up onto the upper level, the wheelchair user should roll the wheelchair backwards until the front wheels are almost off the edge of the curb. This has two effects. First, it reverses the caster trail, thereby reducing the extent of rear tip (because the caster stems are no longer vertical). This provides a greater safety margin between the resting position and the rear tip-over threshold, so the wheelchair user can push harder without tipping over. Second, because the rear wheels have been backed slightly away from the edge, a small amount of momentum can be used. Before backing the rear wheels away from the curb edge, the wheelchair user should place his/her hands on the hand-rims in the position where the most force can be applied. The hands should remain on the hand-rims as the rear wheels are backed away from the curb, ensuring that the hands and trunk will be optimally placed when moving forwards again. When the rear wheels strike the curb, the wheelchair user should lean forward and push the rear wheels...
up onto the upper level. The forward lean should be timed to coincide with when
the rear wheels contact the curb.

- As noted earlier, with the momentum method, the wheelchair user should ensure
the casters are on the upper surface (rather than in the air) before the rear wheels
hit the lip of the curb. If the casters are still in the air, the energy from the forward
pitch caused by the collision of the rear wheels with the obstacle will be expended
in noisily bringing the casters down on the upper level (“caster slap”) rather than
bringing the rear wheels up onto the upper level.

**Variations:**
- The wheelchair user might find it easier to attempt to ascend the 5 cm curb
  backwards.
- The wheelchair user may use the external environment if available (e.g. door frame or
  street pole).

**Hemiplegic-propulsion pattern:**
- The wheelchair is backed up until the rear wheels contact the obstacle. Then, leaning
  forward to unload the rear wheels, the foot is used to push the rear wheels up the level
  change. Then the wheelchair user sits upright and pushes down on the foot on the
  floor or top of the curb to bring the casters up to the upper level.

### Special considerations for manual wheelchairs operated by caregivers (Version 2)

- To ascend a level change forwards, the caregiver should put the wheelchair into the full
  or partial wheelie position to get the casters onto the upper level. Then, the caregiver
  should roll the chair forwards until the rear wheels touch the vertical edge of the level
  change. Then the caregiver should ask the wheelchair user to lean forward to reduce the
  weight on the rear wheels. The caregiver then applies a forward and upward force on the
  push handles or some other rigid part of the wheelchair to help the rear wheels roll up
  onto the upper level. Once on the upper level, the wheelchair user may sit upright again.

**Variations:**
- For a small level change, the caregiver can bring the wheelchair up the curb
  backwards. If the level change is large enough, the caregiver may need to tip the
  wheelchair into the full wheelie position (to avoid tipping the wheelchair user
  forward out of the wheelchair) and pull the wheelchair up onto the upper level.
  The caregiver should step well away from the edge of the level change before
  lowering the casters. The caregiver should not use this technique for a large level
  change, because he/she would need to bend forward too far and might injure
  his/her back.

### Special considerations for powered wheelchairs operated by users (Version 3)

- Positional control (i.e. tilt, recline) can be used to alter the weight distribution on the
  wheels and to provide footrest clearance.
- Smooth continuous forward movement is often the most successful method of ascending a
• Depending upon the height of the curb, it may be necessary to switch drive modes to have the necessary wheel torque.

• If the powered wheelchair has come to a stop against the curb, as extra force is applied to the threshold, the casters may suddenly pop up. The wheelchair user should not apply any more force than is needed and should reduce the force applied to the joystick as soon as possible.

• Getting the larger drive wheels up the curb is usually easier than getting the smaller caster wheels up. Leaning away from the casters will unload them and make it easier to get them over.

• Variation:
  • In some instances, especially with a rear-wheel-drive wheelchair, it may be easier to ascend the level change in the reverse direction.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• None.

Special considerations for scooters operated by users (Version 5)
• If there is insufficient ground clearance between the front and rear wheels, the scooter may get hung up on the edge of the curb.

• Approaching the low curb with a little extra speed may help to mount the curb. However, if the scooter user approaches the curb too quickly, the stiffness of the suspension may cause the scooter user to bounce off the seat and lose control of the scooter.
7.30 DESCENDS LOW CURB

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
</tbody>
</table>

Skill Level
- Intermediate.

Description
- The subject gets the wheelchair down a low curb.

Rationale
- As for the “ascends low curb” skill.

Prerequisites
- None.

Spotter considerations
- Spotter starting position:
  - If the wheelchair user uses the forward direction, simply rolling off the low curb, the spotter may simply stand on the lower level close enough to intervene if the wheelchair tips forward or the wheelchair user falls from the wheelchair. A removable seat belt can prevent the latter.
  - If the task is performed forwards in the wheelie position, the spotter should be behind the wheelchair, with one hand close to each push-handle (if a manual wheelchair). If a second spotter is available, he/she should be on the lower level or a seat belt should be used.
  - If the wheelchair user uses the backwards technique, the spotter should be standing on the lower level with the hands positioned near the push-handles (if a manual wheelchair).
- Risks requiring spotter intervention:
  - Rear tip if performed backwards or forwards in the wheelie position.
  - Forward tip or fall from the wheelchair if the task is performed by rolling forward off the curb.
  - Sideways tip if one wheel drops off the upper level before the other.

Wheelchair Skills Test (WST)
Equipment
- As for “ascends low curb” skill except, because many subjects can descend level changes from a higher level than they can ascend, some alternative means (e.g. an incline) of getting to the upper level is recommended. The tester can help get the wheelchair to the upper level.

Starting positions
- Wheelchair: All wheels are on the level surface above the curb edge, facing the edge, with the leading wheels at least 0.5 m away from it.

Instructions to subject
- “Get the wheelchair down to the lower level.”

Capacity criteria
- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - All wheels are on the lower level, the wheelchair user is seated upright in the wheelchair and the wheelchair is free to roll away (i.e. not hung up on the footrests or rear anti-tip devices).
- Any technique is permitted.
- The wheelchair user may get out of the wheelchair to accomplish the task, if he/she can do so safely.
- The subject may remove the footrests and reposition the rear anti-tip devices but must be able to do so independently.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- The caregiver may request assistance from the wheelchair user during this skill, in the form of having the wheelchair user lean backwards or forwards at the caregiver’s direction, to facilitate the different stages of the skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- None.

Special considerations for scooters operated by users (Version 5)
- None.

Wheelchair Skills Training
General training tips

- For a small curb, forwards or backwards are both appropriate approaches.
- The wheelchair may be able to simply roll forwards off the upper level. This is less of a problem for wheelchairs with long wheelbases.
- It may be as safe and effective to go off the lip at a moderate or full speed as it is to go slowly.

Special considerations for manual wheelchairs operated by users (Version 1)

- **Two-hand-propulsion pattern:**
  - The forwards approach is convenient and allows the subject to watch for traffic.
  - Variations:
    - If the footrests catch on the ground or there is the danger of a forward tip or fall from the wheelchair, the wheelchair user may use the backwards approach. Learning the backwards approach will be helpful when advancing to higher curbs. The wheelchair user should line the rear wheels up with the edge of the curb. The wheelchair user should lean as far forward as possible (chest on lap), and reach forward on the hand-rims. The wheelchair user should move backwards very slowly and let the rear wheels roll evenly down off the upper level under control. Once the rear wheels are on the lower level, the wheelchair user can sit more upright if this is possible without tipping over backwards. The wheelchair user should avoid braking suddenly when the rear wheels land on the lower level because this can induce a rear tip; keeping the wheelchair moving backwards reduces the likelihood of this problem. If the wheelchair can be brought to a stop with the rear wheels on the lower level and the casters on the upper level, the wheelchair user can turn to the left or the right to get the casters off the upper level without scraping the footrests – by the time the second caster rolls off the edge, the footrests are beyond the edge. Alternatively, the wheelchair user can use the full-wheelie position to move backwards away from the curb.
    - Approaching the curb edge in the forward direction, the wheelchair user can transiently pop the casters as they reach the curb edge.
    - The wheelchair user can use the full-wheelie position. This is discussed in more detail later in the section on the “descends high curb in wheelie position” skill.

- Hemiplegic-propulsion pattern:
  - The wheelchair is moved forward to the edge of the curb. Then, leaning backwards to avoid a forward tip or falling out of the wheelchair, the foot is placed on the surface below the curb. The wheelchair is moved slowly forwards until the rear wheels are on the surface below the curb.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• In the forwards direction, the caregiver may slowly push the wheelchair off the upper level, allowing the casters to gently land on the lower level, followed by the rear wheels. It is dangerous for the caregiver to use this technique for medium or large level changes – the wheelchair user may tip forward out of the wheelchair or the footrests may dig in and prevent a smooth descent.

• Variations:
  • To descend a level change backwards, the caregiver should turn the wheelchair around so that the rear wheels go off the edge first. The caregiver should stand close behind the wheelchair and on the lower level. The caregiver should align the rear wheels so that they are both on the edge of the upper level. The caregiver then asks the wheelchair user to lean forward to reduce the weight on the rear wheels. Controlling the movement of the chair, the caregiver should slowly and evenly roll the rear wheels down onto the lower level, avoiding any jarring. Leaning the caregiver’s torso against the backrest is acceptable. Once the rear wheels are on the lower level, the caregiver may need to tip the wheelchair back into the wheelie position to avoid the footrests scraping on the upper level. Alternatively, the caregiver can turn the chair sideways to prevent the footrests from getting caught.
  • Approaching the curb edge in the forward direction, the caregiver can tip the wheelchair back into the full wheelie position and lower the rear wheels to the lower level. The caregiver should be careful about the extent to which his/her back is flexed. However, this technique has the advantage of allowing continuous progression along a street, with the eyes facing any dangers in traffic. The caregiver should not attempt to descend the level change backwards with the wheelchair in the wheelie position because, at greater heights, this causes severe jarring of the wheelchair and its occupant.

Special considerations for powered wheelchairs operated by users (Version 3)
• None.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• None.

Special considerations for scooters operated by users (Version 5)
• If there is insufficient ground clearance between the front and rear wheels, the scooter may get hung up on the edge of the curb.
7.31 ASCENDS HIGH CURB

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔️</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔️</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level

- Advanced.

Description

- The subject ascends a high curb.

Rationale

- As for the “ascends low curb” skill. Although curb cuts (“pedestrian ramps”) are now commonplace in many parts of the world, curbs or large level changes are still commonly encountered. This skill is not applicable for most powered wheelchairs and scooters because of the difficulty and danger involved.

Prerequisites

- “Ascends low curb” skill.

Spotter considerations

- As for “ascends low curb” skill.

Wheelchair Skills Test (WST)

Equipment

- As for “ascends low curb” skill except 15 cm high.

Starting positions

- As for “ascends low curb” skill.

Instructions to subject

- “Get the wheelchair up on the curb.”

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- As for “ascends low curb” skill.
- A “fail” score should be awarded if the subject has failed the “ascends low curb” skill.
Special considerations for manual wheelchairs operated by users (Version 1)

- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- As for “ascends low curb” skill.
- A “pass with difficulty” score should be awarded if:
  - The caregiver fails to have the wheelchair user lean forward while rolling the rear wheels forward up the curb.
  - The caregiver lifts rather than rolls the wheelchair to the upper level.
  - The caregiver pulls the wheelchair up the curb backwards in the wheelie position, which is ergonomically unsound due to the amount of forward trunk flexion and high forces required unless the wheelchair user is light and the caregiver is strong.

Special considerations for powered wheelchairs operated by users (Version 3)

- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- Not applicable.

Special considerations for scooters operated by users (Version 5)

- Not applicable.

Wheelchair Skills Training

General training tips

- As for the “ascends low curb” skill.

  Progression:
  - The subject should begin with the stationary method and a small curb height.
  - The subject should gradually increase the height of the curb until it becomes difficult to get the rear wheels up on top of the curb.
  - The subject should then change to the momentum approach with a small curb height and gradually increase the height.
  - The subject should reduce the distance available for the approach.

  Variations:
  - The subject should perform the skill in a setting that includes an element of side-slope on the approach. This requires the wheelchair user to anticipate the amount of downhill-turning tendency that will occur during the coast phase of the skill.

Special considerations for manual wheelchairs operated by users (Version 1)

- As for the “ascends low curb” skill, for both two-hand-propulsion and hemiplegic-propulsion patterns.
Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the “ascends low curb” skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.
7.32 DESCENDS HIGH CURB

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level

- Advanced.

Description

- The subject gets the wheelchair down a high curb.

Rationale

- As for the “descends a low curb” skill. The appropriate technique for a high curb differs in some respects from that used for a lower curb height. This skill is not applicable for most powered wheelchairs and scooters because of the difficulty and danger involved.

Prerequisites

- “Descends low curb” skill.

Spotter considerations

- Spotter starting position:
  - Behind the wheelchair, with the hands near the push-handles of the wheelchair.
  - For the forward-wheelie approach, if using two spotters, the second spotter should stand beside and below the curb. A removable seat belt may be helpful.
- Risks requiring spotter intervention:
  - Rear tip if performed backwards or in the forward direction in the wheelie position.
  - Forward tip or fall if performed by rolling forward off the level change (not generally recommended unless the wheelbase is long).
  - Sideways tip if one wheel drops off the upper level before the other.
  - Serious jarring if a caregiver attempts to bring the wheelchair off the curb backwards in the wheelie position.

Wheelchair Skills Test (WST)

Equipment

- As for “ascends high curb” skill.

Starting positions
• Wheelchair: The leading wheels at least 0.5 m from the curb edge.

Instructions to subject
• Screening questions (“Can you do it? How?”) are strongly recommended before the subject is allowed to proceed to the objective testing of this skill. If a method is described that may not be unsafe but that the tester has concerns about from the perspective of being able to spot the skill in a manner that is safe for both the subject and personnel, the tester may allow the subject to choose another method without penalty.
• “Get the wheelchair down the curb.”

Capacity criteria
• As for the general scoring criteria, with the clarifications below.
• Except as noted below, as for the “descends low curb” skill.
• A “fail” score should be awarded if:
  • On the screening questions, the subject is unable to describe an acceptable method of performing the skill.
  • The subject fails the “descends low curb” skill.
  • The subject is about to allow one wheel to drop off the upper level before the other. The tester or trainer should intervene to prevent completion of such an attempt.

Special considerations for manual wheelchairs operated by users (Version 1)
• None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
• Except as noted below, as for the “descends low curb” skill.
• It is permissible for a caregiver to use the wheelie position to lower the wheelchair in the forwards direction.
• A “pass with difficulty” score should be awarded if:
  • There is significant jarring due to an uncontrolled drop of the wheels to lower level.
  • If the caregiver fails to have the wheelchair user lean forward while rolling the rear wheels backwards down the curb.
• A “fail” score should be awarded if:
  • A caregiver attempts to bring the wheelchair off the curb backwards in the wheelie position. The tester should intervene.

Special considerations for powered wheelchairs operated by users (Version 3)
• Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
• Not applicable.

Special considerations for scooters operated by users (Version 5)
Wheelchair Skills Training

General training tips
- As for the “descends low curb” skill.

Special considerations for manual wheelchairs operated by users (Version 1)
- Two-hand-propulsion pattern:
  - The backwards approach (see the “descends low curb” skill) is simple and generally safe if the wheelchair has adequate rear stability. For this skill, it is especially important to practice with a spotter until it has been mastered.
  - Variations:
    - The forward curb descent in the wheelie position is dealt with later in the “descends high curb in wheelie position” skill section.
    - The forward, transient-wheelie method is an advanced skill especially from this height. As for this variation described earlier for the “descends low curb” skill, the wheelchair user approaches the curb edge squarely with all four wheels on the surface and pops the casters as they reach the edge. This is similar to the technique used to pop the casters for the “gets over threshold” and “gets over gap” skills. The extent of the caster pop should be sufficient to allow the rear wheels to land on the lower level at about the same time or slightly before the casters land. This method requires good timing and skill, but is a natural way to maintain forward progression and to watch for traffic. It can be difficult to spot, so two spotters are recommended.

- Hemiplegic-propulsion pattern:
  - As for the “descends low curb” skill.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the “descends low curb” skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.
7.33 PERFORMS STATIONARY WHEELIE

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Caregivers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Caregivers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level
- Advanced.

Description
- The subject achieves the wheelie position (balancing on the rear wheels), maintains it for a period of time and brings the casters back to the floor.

Rationale
- The stationary wheelie is a foundation skill for a number of functional skills that can be best performed in the full wheelie position, skills such as descent of a steep incline or descent of a high curb. The stationary wheelie position can also be used to avoid postural problems that can cause neck strain from looking up. This skill is not applicable for most powered wheelchairs and scooters.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: Usually the spotter stands behind the wheelchair holding onto a spotter strap. However, the skill can also be spotted from a position in front and to one side of the wheelchair, with a hand ready to apply a downwards and backwards force to the wheelchair user’s knee or a fixed part of the wheelchair.
- Risks requiring spotter intervention: Rear tip if the subject overshoots on take-off or loses balance.

Wheelchair Skills Test (WST)

Equipment
- As for the “turns in place” skill.

Starting positions
- Wheelchair: In the center of the square.
Instructions to subject

- “Get the wheelchair into the wheelie position and hold it until I tell you to stop. Keep the rear wheels within the box (indicate it)."
- After 30s, "Come down now."

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- A “pass” should be awarded if:
  - The subject achieves the wheelie position and holds this position in a controlled manner for 30 s while all wheels that are in contact with the floor remain within the square.
  - After 30 s, a controlled return to the upright position is made. The subject must wait for the instruction to bring the casters back to the floor before doing so. The casters must land inside the square.
  - It is permissible to use the feet to achieve the wheelie position but not to maintain it.
- A “pass with difficulty” should be awarded if:
  - An aided-wheelie is used (casters off the floor, balanced on rear anti-tip devices).
  - There is significant jarring because the subject lands too vigorously.

Special considerations for manual wheelchairs operated by users (Version 1)

- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- There is no need for the caregiver to maintain the wheelie for 30 s as long as the tester is satisfied that the caregiver has achieved the balance position correctly and is capable of maintaining it.

Special considerations for powered wheelchairs operated by users (Version 3)

- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- Not applicable.

Special considerations for scooters operated by users (Version 5)

- Not applicable.

Wheelchair Skills Training

General training tips

- Adjustment tips:
  - As was noted earlier with respect to adjustments that make it easier for the wheelchair casters to be transiently popped from the surface, the wheelchair type and set-up influence the ease with which the wheelchair can be tipped backward into the full wheelie position. It is easier to achieve the wheelie position in a
wheelchair that is less stable to begin with; this can be achieved by moving the rear axle position forward.

- If rear anti-tip devices do not allow the wheelchair to be tipped back far enough, they need to be adjusted out of the way or removed. Even for rear anti-tip devices that do permit a wheelie to be performed, they may not be sufficiently stable to prevent a full rear tip. To check this, the tester or trainer can tip the occupied wheelchair until it is resting on the rear anti-tip devices. With a spotter behind the wheelchair, the wheelchair user should try to tip the wheelchair over backwards, by reaching and leaning backwards; if the wheelchair does not tip over, then the rear anti-tip devices can be considered effective.

Special considerations for manual wheelchairs operated by users (Version 1)

- The description that follows is for people using two hands for propulsion, but people who only have the use of one arm can perform wheelies in a similar way.
- The subject should be cautioned that most people require a total of 45-60 minutes of practice, spread over 2-3 sessions, to acquire and retain this skill.
- The sequence of phases trained is not critical. It is acceptable to start with the balance phase before proceeding to the take-off phase, but we have described the more natural sequence below.

Take-Off Phase:

- The learner will already have learned how to transiently pop the casters from the surface in earlier skills. It may be useful to review caster popping before proceeding to the full wheelie take-off.
- It may be useful to use simulation, having the trainer tip the wheelchair back into the balance position, to give the wheelchair user a sense of how much tilt will be needed.
- If properly timed and the wheelchair is appropriately set up, the wheelchair user should require little force to achieve take-off.
- For the wheelie take-off, many wheelchair users roll backwards slowly, then quickly forwards. This method is very effective and is to be preferred when the wheelchair user wishes to perform a wheelie without moving forwards at all. If using this method, the wheelchair user should start with the hands near the top center of the wheel (i.e., ~1:00 o’clock, using the clock analogy). The wheelchair user should try not to pause between rolling back and pushing quickly forward, otherwise he/she may not tip backwards as easily.
- The method of only rolling the wheels forward is preferred because it can be used while the wheelchair is moving forwards (as is occasionally necessary). The hands will need to start farther back on the wheels (i.e., ~11 o’clock) and slightly more force will be needed by the wheelchair user than for the backwards-forwards method.
- The forwards motion that is common to both methods can be thought of as an action to get the base of support (the rear wheels) under the center of gravity (located near the lap).
- Some wheelchair users may find it easier if they lean back into the backrest to cause or help with the initial rear tip. However, skilled wheelie performers can achieve the
wheelie position while maintaining an upright body position. Leaning forwards is a natural tendency but will make it more difficult to achieve take-off.

- Whichever method is used, the wheelchair user should progressively pop the casters higher and higher until he/she can tip backwards far enough to reach and slightly overshoot the wheelie balance point. Once past the balance point, the wheelchair user should then pull back on the hand-rims to prevent tipping too far and to return to the balance point.

- If the wheelchair user is overshooting the balance point too vigorously, a learning exercise is for him/her to practice popping the casters up onto a small object (~5cm high).

- If the wheelchair user is having difficulty getting tipped far enough backwards to reach the balance point, he/she should push forward more forcefully. An alternative is to start the take-off with the casters uphill or on a small level change although there needs to be room for the rear wheels to roll forward. If the problem is fear of tipping over backwards, the wheelchair user can pop back onto the spotter then progress to a self-save (flexing the neck and trunk while pulling back vigorously on the hand-rims to bring the casters back to the floor). Once the learner is able to tip backwards far enough to be caught by the spotter, in subsequent attempts he/she should gradually reduce the amount of overshoot until it is possible to self-save without the spotter’s assistance.

- Although take-off can usually be achieved with a single push, if the wheelchair has not been tilted back far enough with the first push, a second push before the casters return to the floor may be successful.

- Once the learner can consistently perform the wheelie take-off, attention should be shifted to the balance phase.

- **Balance Phase:**
  - The wheelchair user does not need to use much force to maintain balance. It is preferable for the wheelchair user to keep a light grip on the wheels. It should be possible for the wheelchair user to slide the hands forwards and backwards on the hand-rims.
  - The wheelchair user should try to relax and remember to breathe.
  - During the early learning stage, some wheelchair users find it useful to isolate the variations of pitch from those of rear-wheel displacement (i.e. using the motor-learning principle of reducing the degrees of freedom). This can be done by reducing the extent to which the rear wheels can move (e.g. obstacles such as bricks or pieces of wood in front of and behind the rear wheels). If the wheelchair is well set up and the wheelchair user has adequate strength, he/she may be able to push forward hard enough to tilt the wheelchair into the balance position. Otherwise, the trainer can tip the wheelchair back to the balance point while the wheelchair user rests his/her hands in the lap. For a wheelchair that is difficult for the trainer to tip backwards (e.g. due to a low backrest, absence of push-handles, absence of tipping levers or excessive stability), the trainer can pull backwards on the upper anterior chest with one hand or forearm or alternatively lift a forward section of the
wheelchair frame. The trainer then turns over control to the wheelchair user by having the wheelchair user grasp the hand-rims. The trainer should then take his/her hands off the wheelchair and wheelchair user – it can be confusing to have two people attempt to maintain balance at the same time – and let the learner know (“It’s all you now”).

- Once the wheelchair user is in control with the rear wheels blocked, learning exercises include: i) having the wheelchair user experiment with the extent of tip (more and less than the ideal balance point, where the force to maintain position is minimal), ii) leaning forward (which increases the amount of tip needed to be at the ideal balance point), iii) using only two fingers and a thumb of each hand on the hand-rims, iv) sliding the hands backwards and forwards on the hand-rims to find the ideal position, v) holding on with only one hand while waving the other and/or vi) closing the eyes.

- Once these variations are mastered at the high rolling-resistance level, the barriers in front of or behind the rear wheels can be moved a few cm away by the wheelchair user or trainer. This allows a small amount of forwards and backwards movement of the rear wheels. At either extreme of movement, the wheelchair user can lean against the barriers. Once the wheelchair user is familiar with this, the barriers can be moved progressively farther away and removed.

- Once the wheelchair user has become comfortable with not spending too much time leaning on the barriers, the wheelchair can be moved to a surface with medium rolling resistance (e.g. on 5 cm of foam). Here the take-off and balance phases can be combined. The soft surface allows the learner to perform a “slow-motion” wheelie.

- Once this is mastered, the wheelchair can be moved to a low rolling-resistance surface (e.g. a tile floor).

- Once a basic wheelie can be performed on a low rolling-resistance surface, the learner can refine his/her skill by becoming familiar with and practicing the two balance strategies that have been reported in the scientific literature:

  - **Proactive balance strategy:** In this strategy, analogous to balancing a meter stick on a finger, the wheelchair user keeps the wheels moving forwards and backwards over a small area. The wheelchair user should try to move the hands only between the 12:00 and 1:00 o’clock positions. This will allow a safety margin, so that the wheelchair user can react to a loss of balance in either direction. If the wheelchair user wants the wheels to move farther than the intermediate hand position permits, the hand-rims can be allowed to slide through the grip. It may be helpful to time the movement of the rear wheels to the breathing pattern while using the proactive balance strategy.

  - **Reactive balance strategy:** The reactive balance strategy is analogous to the step strategy used in standing balance – if a standing person is pushed forwards or backwards hard enough that he/she would otherwise fall, the person steps forward or backwards to bring the base of support under the displaced center of gravity. If the wheelchair user begins to tip
too far forward, he/she should roll the rear wheels forward to return to the balance point (“when you fall forward, push forward”). If the wheelchair user imbalances backwards, he/she should roll the rear wheels backwards to re-establish balance (“when you fall back, pull back”). Even if past the point of no return and a full rear tip is imminent, the preferred strategy to minimize injury due to striking the back of the head on the ground is for the wheelchair user to pull backwards forcefully on the hand-rims and flex the neck until the back hits the ground. Although some authorities advise wheelchair users to use one or both hands on the knees during a rear fall, to prevent the knees from striking the wheelchair user in the face, our view is that “a broken nose is preferable to a broken skull”. Rear falls will be practiced later as part of the “gets from ground into wheelchair” skill. The reactive balance strategy will be used later, to deliberately move the wheelchair forwards when beginning the “descends high curb in wheelie position” and “descends steep incline in wheelie position” skills.

- **Landing Phase:**
  - To land, the wheelchair user pulls back on the wheels, or leans forward to gently bring the front wheels to the ground.

- **Progression:**
  - Once the full wheelie can be performed with the spotter nearby, the wheelchair user can practice performing the stationary wheelie with variations (e.g. with the spotter progressively farther away, with low lighting, while multi-tasking).

- **Variations:**
  - During the balance phase, the wheelchair user can lean forwards or place a knapsack on the lap or footrests to increase the caster height needed for the wheelie position. The wheelchair user can practice this by placing the casters on different height targets (e.g. pylons, steps).

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- As noted earlier in the “rolls on soft surface” skill, to achieve a caregiver-induced wheelie, the caregiver should pull back on the push-handles, with one foot pushing down on a tipping lever, to tip the wheelchair back to the balance point.
- Once in the wheelie balance position, only minimal force is needed by the caregiver to maintain balance.
- To lower the wheelchair to the horizontal position, the caregiver should put one foot on the tipping lever at the back of the wheelchair to keep the wheelchair from pitching forwards too abruptly.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- Not applicable.
Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.
7.34 TURNS IN PLACE IN WHEELIE POSITION

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level
- Advanced.

Description
- In the wheelie position, the subject turns the chair in place, both to the left and right.

Rationale
- Wheelchair users often encounter situations in which they need to perform a wheelie to make a tight turn. The area needed on the support surface (the “footprint”) is less in the wheelie position than when all wheels are on the surface.

Prerequisites
- “Performs a stationary wheelie” skill.

Spotter considerations
- Spotter starting position: Behind the wheelchair, holding onto the spotter strap.
- Risks requiring spotter intervention: Rear tip if the wheelchair user overshoots on take-off or loses balance.

Wheelchair Skills Test (WST)

Equipment
- As for the “performs stationary wheelie” skill.

Starting positions
- As for the “performs stationary wheelie” skill.

Instructions to subject
- “Get the wheelchair into the wheelie position.”
- “Now, keeping the chair within this square (indicate it), turn the wheelchair around until it is facing the opposite direction.”
- “Now turn the chair in the other direction (indicate it) until it is back where you started.”
Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- As for the “turns in place” and “performs stationary wheelie” skills, except as below.
- The subject is permitted to return the casters to the floor between the turns to the left and right.
- A “fail” score should be awarded if:
  - The subject fails the “performs stationary wheelie” skill.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- The caregiver must keep his/her feet within the boundaries, as for the “turns in place” skill.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.

Wheelchair Skills Training

General training tips

- This skill is a combination of the “turns in place” and “performs stationary wheelie” skills.
- Although the footprint for a wheelie turn in place is small, the space needed above the ground may be as least as great as with all wheels on the ground. The subject should be careful not to let the elevated feet hit any external object.

Special considerations for manual wheelchairs operated by users (Version 1)
- As for the “turns in place” and “performs stationary wheelie” skills.
  - Progression:
    - The wheelchair user should begin with small angular displacements around the yaw axis (the vertical axis between the two rear wheels) that do not require that the hands be repositioned.
    - The wheelchair user should then progress to larger displacements that require the hands to be repositioned, using several steps to get all the way around to 180°.
    - Some wheelchair users may be able to get all of the way around to 180° (or beyond) in a single movement (the so-called “snap turn”) by allowing the hand-rims to slide through the fingers.
    - The wheelchair user can practice on progressive smaller areas of support.
- The wheelchair user can practice on a soft surface.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the “turns in place” and “performs stationary wheelie” skills.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.
7.35 DESCENDS HIGH CURB IN WHEELIE POSITION

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level

- Advanced.

Description

- In the wheelie position, the subject descends a high curb in the forwards direction.

Rationale

- Large level changes (e.g., curbs, steps) are common obstacles for wheelchair users. Using a wheelie to descend a level change in the forwards direction allows the wheelchair user to maintain forward movement and to see any dangers that may lie ahead. Also, the wheelie position prevents the footrests from making contact with the lower level, which can decelerate the wheelchair and cause a forward tip or fall from the wheelchair.

Prerequisites

- “Performs stationary wheelie” skill.

Spotter considerations

- Spotter starting position:
  - For a single spotter behind the wheelchair, if no seat belt is used one of the spotter’s hands should be placed near a push-handle and the other hand in front of the wheelchair user’s shoulder.
  - For a single spotter behind the wheelchair, if a seat belt is used, both of the spotter’s hands may be placed near the push-handles of the wheelchair.
  - If using two spotters, the second spotter should stand beside and below the curb.
- Risks requiring spotter intervention:
  - Rear tip.
  - Forward tip or fall.
  - Sideways tip if one wheel drops off the upper level before the other.

Wheelchair Skills Test (WST)

Equipment

- As for the “descends high curb” skill.
Starting positions

- As for the “descends high curb” skill.

Instructions to subject

- Screening questions (“Can you do it? How?”) are strongly recommended before the subject is allowed to proceed to the objective testing of this skill.
- “Get your wheelchair into the wheelie position.”
- “Now, staying in the wheelie position, move forwards down the curb under control.”

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- Generally, as for the “descends high curb” and “performs stationary wheelie” skills.
- A “pass” should be awarded if:
  - The subject achieves a controlled wheelie on the upper level, approaches the curb by moving forward in this position and then lowers the rear wheels to the lower level under control with the rear wheels striking the floor before the casters.
  - A transient caster pop may be used instead of a full wheelie, as long as the casters do not strike the floor before the rear wheels.
- A “fail” score should be awarded if:
  - The subject fails the “performs stationary wheelie” skills.

Special considerations for manual wheelchairs operated by users (Version 1)

- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- None.

Special considerations for powered wheelchairs operated by users (Version 3)

- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- Not applicable.

Special considerations for scooters operated by users (Version 5)

- Not applicable.

Wheelchair Skills Training

General training tips

- This skill is a combination of the “descends high curb” and “performs stationary wheelie” skills.

Special considerations for manual wheelchairs operated by users (Version 1)
As for the “descends high curb” and “performs stationary wheelie” skills.

The forward full-wheelie method is the preferred method for the descent of a large level change, but it requires good wheelie skills. The wheelchair user should get into the wheelie position away from the edge of the level change. The wheelchair user should roll forward to the edge of the curb in the wheelie position, staying as square as possible to the edge.

To move forward on the level above the incline in the wheelie position, the wheelchair user should allow the wheelchair to begin to fall (“dip”) slightly in the direction in which he/she wishes to move, and then should roll the rear wheels in the same direction to catch up. This is like the reactive balance strategy described in the “stationary wheelie” skill, but the initial imbalance is intentional. It may be easier to begin with very small steps forwards.

When moving forwards or backwards in the wheelie position, to initiate the dip, the wheelchair user can move the head or lean slightly in the direction that he/she wishes to move. Alternatively, the wheelchair user can initiate the dip by pushing the wheels slightly in the opposite direction. The wheelchair user should be encouraged to take his/her time to achieve control and to move slowly. The wheelchair user should grip the wheels lightly, giving a light push on the wheels to move them forwards, letting the hand-rims slide through the fingers. In catching the rear wheels up to the center of gravity after the dip, there is no need for the wheelchair user to catch up completely. By undershooting slightly, the wheelchair user can initiate the next dip.

After initiating the forward dip to move the rear wheels over the edge of the curb, the wheelchair user should quickly slide the hands backwards from the 1:00 o’clock to the 11 o’clock position (clock analogy), so that he/she can firmly grip the hand-rims long enough for the rear wheels to drop all the way to the lower level. As slowly as possible, the wheelchair user should lower the rear wheels from the upper to the lower level, pulling backwards to slow the descent. The wheelchair user should let the rear wheels hit the lower level before the casters. As soon as the rear wheels touch the ground, the momentum should bring the casters down, but the wheelchair user should lean forwards as well.

**Progression:**
- Moving forwards in the wheelie position should be practiced first on a level surface away from the curb, proceeding up to a line that represents the top of the curb. A strip of bubble wrap can be used to provide audible feedback as to when the line is reached.
- As a learning exercise, the forwards and backwards “dip-and-roll” processes can be practiced against resistance (e.g. on a soft surface, up an incline, over a threshold or up a 5 cm curb). The dip needs to be accentuated in such circumstances.
- The skill should be practiced first on a low curb, increasing the height of the curb as skill and confidence increase.

**Variation:**
- The wheelchair user can land on the lower level and maintain the wheelie position rather than allowing the casters to land, either maintaining balance or leaning back.
against the curb rise. This is useful where there is little space for the casters to land, such as on a series of widely spaced stairs.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**
- As for the “descends high curb” and “performs stationary wheelie” skills.

**Special considerations for powered wheelchairs operated by users (Version 3)**
- Not applicable.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
- Not applicable.

**Special considerations for scooters operated by users (Version 5)**
- Not applicable.
7.36 DESCENDS STEEP INCLINE IN WHEELIE POSITION

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>manual</td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level

• Advanced.

Description

• In the wheelie position, the subject descends a steep incline.

Rationale

• Descending a steep incline in the forward direction in the wheelie position lessens the problem of loss of traction (affecting braking and control) when the uphill wheels become unloaded. This technique also reduces the likelihood of forward tips or digging the footrests into the floor at the transition between the bottom of the incline and the level surface. For very steep inclines, this technique may be the only way to get down the incline without tipping over.

Prerequisites

• “Performs stationary wheelie” skill.

Spotter considerations

• As for “descends steep incline”.

Wheelchair Skills Test (WST)

Equipment

• As for “descends steep incline”.

Starting positions

• As for “descends steep incline”.

Instructions to subject

• “Get your wheelchair into the wheelie position.”
• “Now, staying in the wheelie position, move down the ramp under control, and stop when you reach the floor at the bottom.”
Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- Generally, as for the “descends steep incline” and “performs stationary wheelie” skills.
- A “pass” should be awarded if:
  - The subject achieves the wheelie position on the platform above the incline, proceeds down the incline with the chair under control and brings the wheelchair to a stop in the space available at the bottom of the ramp. The casters may be brought to the surface as soon as the rear wheels have reached the level surface.
- A “fail” score should be awarded if:
  - The subject fails the “performs stationary wheelie” skills.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- None.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.

Wheelchair Skills Training

General training tips
- This skill is a combination of the “descends steep incline” and “performs stationary wheelie” skills.

Special considerations for manual wheelchairs operated by users (Version 1)
- The wheelchair user usually achieves the wheelie position on the level at the top of the incline.
- Then he/she moves forward onto the incline.
- When initially moving onto the incline, the wheelchair user may be startled to feel as though the wheelchair is tilting farther backwards.
- Once on the incline, facing downhill, the wheelchair user should let the hand-rims run smoothly through the hands to control the wheelchair’s speed, direction and pitch angle. Letting the hand-rims run more quickly through the hands will allow the wheelchair to pitch (tilt) farther back. Slowing the rate at which the hand-rims slide through the fingers
will cause the wheelchair to pitch forward.

- The subject should have the casters touch down shortly after the rear wheels reach the level surface at the bottom of the incline.

**Progression:**

- Moving forwards and backwards in the wheelie position will already have been practiced for the “descends high curb in the wheelie position” skill.
- Some people find it easier to perform this skill on steep inclines than slight inclines.
- If the learner is having difficulties advancing the wheelchair from the level section onto the incline, he/she may find it easier to get into the wheelie position while already on the incline, facing sideways (see variation below) and then turn the wheelchair downhill.

**Variations:**

- As for “descends steep incline” skill (e.g. steering a slalom path, starting and stopping).
- When stopped facing downhill in the wheelie position, the sensation is similar to that felt while leaning back on a barrier, as when learning the balance phase of the “performs stationary wheelie” or the “tilt rest” skill.
- The subject can achieve wheelie take-off while on the incline. This is useful when an unexpected obstacle is encountered. If the wheelchair user is facing downhill, more force is needed for take-off (because the wheelchair is pre-tilted in the wrong direction) and the wheelchair may accelerate rapidly downhill.
- On steep or slippery inclines, or if the wheelchair has too much rear stability, there may not be enough rear-wheel traction to allow wheelie take-off while facing downhill. In such situations, the wheelchair can be turned so that it is facing across the hill or even uphill. This will place more weight on the rear wheels and avoid runaway. Once in the wheelie position, a wheelie turn-in-place will allow the wheelchair user to proceed down the incline.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- As for the “descends steep incline” and “performs stationary wheelie” skills.
- Descending an incline forward in the wheelie position is comfortable for the wheelchair user with no risk of falling out. Also, the caregiver has the advantage of being able to see where he/she is going.

Special considerations for powered wheelchairs operated by users (Version 3)

- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- Not applicable.

Special considerations for scooters operated by users (Version 5)

- Not applicable.
7.37 GETS FROM GROUND INTO WHEELCHAIR

Version applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td>✔</td>
</tr>
</tbody>
</table>

Skill Level
- Advanced.

Description
- The wheelchair user gets from the ground into the wheelchair.

Rationale
- This skill is useful when recovering from a fall or from an occasion when the wheelchair user is on the ground for another reason.

Prerequisites
- None.

Spotter considerations
- Spotter starting position: If there is a single spotter, he/she should be near the wheelchair, in a position to prevent the wheelchair from tipping over or to prevent the subject from falling to the ground. If two spotters are used, one spotter should focus on the wheelchair user and the other spotter on preventing the wheelchair from sliding or rolling away. However, the second spotter should not touch the wheelchair unless it is necessary to intervene.
- Risks requiring spotter intervention: Rear, forwards or sideways tip or fall.

Wheelchair Skills Test (WST)

Equipment
- Smooth level surface. It is permissible to use a thin mat to protect the skin and to avoid dirt.
- No external aids (e.g. the transfer bench or stairs) may be used.

Starting positions
- Wheelchair user: Seated or lying on the ground, out of the wheelchair. If the transfer to the ground cannot be achieved independently, the tester can assist the wheelchair user out of the wheelchair.
• Wheelchair: Within reach, with the brakes unlocked.

**Instructions to subject**

• Screening questions (“Can you do it? How?”) are strongly recommended before the subject is allowed to proceed to the objective testing of this skill.

• “Get into the wheelchair.”

**Capacity criteria**

• As for the general scoring criteria, with the clarifications below.
• Any effective and safe technique is permitted.
• A “pass” should be awarded if:
  • The subject gets onto the wheelchair seat, ready to roll away. If the subject removes the seat cushion as part of his/her technique, it is required that the cushion be picked up but it is not necessary to get the cushion back under the buttocks. This is in recognition that the wheelchair user is usually able to go to another sitting surface and transfer out of the wheelchair to replace the cushion. The “level transfer” was assessed earlier.
• A “fail” score should be awarded if:
  • The subject does not describe a safe and effective method.
• A “testing error” score may be awarded if the transfer to the ground cannot be achieved independently or with the assistance of the tester.

**Special considerations for manual wheelchairs operated by users (Version 1)**

• None.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

• The caregiver may receive assistance from the wheelchair user in performing the skill. This is an exception to the general rule that the wheelchair user should not assist when the caregiver is being assessed alone because it is not a reasonable expectation that a single caregiver could carry out this skill alone.

**Special considerations for powered wheelchairs operated by users (Version 3)**

• None.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

• None.

**Special considerations for scooters operated by users (Version 5)**

• None.

Wheelchair Skills Training

**General training tips**

• To get from the wheelchair to the ground, the trainer may assist, using a lift if available.
If it is a feasible goal of the wheelchair user to be able to independently get to the ground, then the steps described below for getting from the ground to the wheelchair can be reversed.

- After a fall, unless there is some immediate danger, the wheelchair user and/or caregiver should take time to assess whether there has been any injury or damage to the wheelchair or occupant before getting back into the wheelchair.

- There are a number of techniques that wheelchair users can use to get safely back into their wheelchairs from the ground, the variations reflecting differences in the nature of the wheelchair users’ impairments and wheelchair characteristics. Only a few of the more commonly used techniques will be described. There is no available literature as yet supporting the superiority of one technique over the others. The trainer and wheelchair user may wish to try the variations before selecting the one that will be used in most circumstances.

**Special considerations for manual wheelchairs operated by users (Version 1)**

- **Fall practice:**
  - Getting from the wheelchair onto the ground is an opportunity to practice and/or discuss safe falls.
  - Generally, regardless of the fall direction, the wheelchair user should not reach out towards the ground with an arm because even an otherwise minor arm injury can have major functional consequences for a person who uses that arm for mobility and transfers. However, some wheelchair users with low backrests, long arms and good flexibility can prevent full rear or sideways tips with a gentle push on the ground.
  - Rear falls can be safely practiced. The trainer should first lower the wheelchair user onto an elevated gym mat, with the wheelchair user’s neck flexed and hands pulling on the hand-rims. Failure to hold onto the hand-rims will result in the rear wheels of the wheelchair rolling rapidly forward (“submarining”). The wheelchair user can then progress to real falls onto an elevated mat, the height of which can be progressively lowered. As described earlier, if a rear fall seems imminent the wheelchair user should flex the neck and pull backwards as forcefully as possible on the hand-rims. In addition to preventing submarining, the rate of rear tip will be decreased and the arms will act as shock absorbers when the wheelchair strikes the floor. Immediately after hitting the ground, the wheelchair user can use the hands or forearms to prevent the knees from striking the face.
  - There is no safe and practical way of which we are aware to practice forward or sideways falls. However, they should at least be discussed. During a forward fall, the wheelchair user should twist to one side and try to roll sideways after striking the ground, protecting the head with the hands. During a sideways fall, the wheelchair user should lean away from the direction of tip, pulling vigorously on the uphill armrest or hand-rim.

- **Out-of-wheelchair approach for getting from the ground to the wheelchair:**
  - First, the wheelchair should be righted, the casters should be oriented so that they are trailing forwards, the wheel locks should be applied and, unless they will be used as
an intermediate sitting surface, the footrests should be moved out of the way if possible.

- The wheelchair user should be in the sitting position in front of the wheelchair, with the hips and knees flexed as much as possible.
- The wheelchair user can use the seat cushion to increase the height of the floor and to lower the height of the wheelchair seat. After getting up onto the seat, the cushion can be placed back under the buttocks by rolling to a transfer surface that is the same height as the wheelchair seat and transferring out of the wheelchair.
- The wheelchair user sitting sideways at the front of the wheelchair can lift the buttocks with one arm on the seat and one on the ground. This approach is similar to a sideways level transfer (discussed earlier). Moving the head in the direction opposite to the direction to the hips is useful (i.e. move the head down when moving the hips up). This technique can also be performed with the wheel locks off. As the wheelchair user lifts the buttocks off the floor, he/she can simultaneously pull the wheelchair under the buttocks.

- Variations:
  - The wheelchair user with his/her back facing the front of the wheelchair can lift the buttocks with both arms on the seat or front rigging at the same time. The footrests can be used as an intermediate level between the ground and the wheelchair seat, if they are wide enough and if sitting on them does not tip the wheelchair forwards.
  - The wheelchair user can move progressively from the floor to a foot stool, a bench and finally to the wheelchair seat. The number of steps can be gradually reduced.
  - Some wheelchair users may find it easier to face the wheelchair, getting up onto the knees before moving up to the seat level and twisting into the forward-facing position.
  - If the wheelchair user has the use of his/her legs, he/she can use the wheelchair to help get up onto his/her feet, then pivot and sit down.
  - If there is another stable object nearby (e.g. a chair or low table), the wheelchair user can put one hand on the object and the other hand on the wheelchair seat.

- Stay-in-wheelchair approach:
  - Some wheelchair users are able to right themselves while remaining in the wheelchair.
  - To train someone to perform this technique, the wheelchair user can start on a surface partway between seat height and the ground, with the wheelchair on its back (as would be the case after practicing a fall backwards onto an elevated mat, as described above).
  - The wheelchair user should pull on the rear wheels to get the buttocks firmly against the wheelchair seat.
  - The wheelchair user may let the knees bend over the front of the seat.
  - The wheel lock should be applied on the side of the stronger arm.
- The wheelchair user turns the trunk to the other side and uses the forward (stronger) hand to grab the hand-rim of the rear wheel on the unlocked side, with the hand as far forwards as possible.
- The wheelchair user then reaches with the other hand to the surface on which the backrest of the wheelchair rests.
- The wheelchair user simultaneously and vigorously pushes with the floor hand and pulls with the hand-rim hand. This step is repeated as necessary, moving the floor hand progressively forwards on the surface and the hand-rim backwards until upright.

**Special considerations for manual wheelchairs operated by caregivers (Version 2)**

- The caregiver can assist the wheelchair user by helping to position and stabilize the wheelchair.
- The caregiver should try to avoid bending and twisting his/her back at the same time and should lift with bent knees.
- If tipping the wheelchair upright from the fully rear-tipped position, locking the brakes will keep the wheelchair from rolling forwards (submarining).
- A single caregiver may have difficulty in performing this skill without the help of the wheelchair user and/or a second caregiver. A mechanical lift or a team of people are recommended when lifting from the floor.
- If the caregiver is large and strong and the wheelchair user is light, the caregiver may be able to safely lift the wheelchair user from the side, with one arm around the back and under the arms and the other arm under the bent knees.
- If there are two caregivers, they may pick up the wheelchair user together. This can be done in two ways.
  - One option is to have one caregiver behind the wheelchair user, holding the wheelchair user’s arms by reaching under the upper arms and grasping the folded forearms. The other caregiver lifts with his/her hands behind the wheelchair user’s knees.
  - The other option is for the two caregivers to be on opposite sides of the wheelchair user, each with one arm under one of the wheelchair user’s arms and around the back and the other arm under the wheelchair user’s bent knees.
- If a third caregiver is available, he/she can help with the legs or manage the wheelchair. In some circumstances, it may be practical to move the wheelchair under the lifted wheelchair user rather than moving the wheelchair user to the wheelchair.

**Special considerations for powered wheelchairs operated by users (Version 3)**

- If falling backwards in a powered wheelchair, the wheelchair user should tuck the chin and pull himself/herself vigorously forward using the armrests or seat.
- After a fall, the power should be turned off. The power should be off while the getting-up skill is being practiced.
- Those involved should check to be sure that there is no spilled battery acid.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**

WSP 4.3 originally approved for distribution and use: November 6, 2015
Special considerations for scooters operated by users (Version 5)

None.
7.38 ASCENDS STAIRS

Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

Skill Level
- Advanced.

Description
- The wheelchair user and the wheelchair get from the bottom of a set of stairs to the top.

Rationale
- Although alternative means of getting from a lower to a higher level are often present (e.g. using a ramp or elevator), stairs may sometimes be the only option. Although exceptional manual wheelchair users can accomplish this skill alone while sitting in the wheelchair, it is not recommended due to the ergonomic arm stresses involved. Getting out of the wheelchair or using caregivers to assist with stair ascent is a more reasonable approach. This skill is not applicable to most powered wheelchairs and scooters.

Prerequisites
- None.

Spotter considerations
- Spotter: If a single spotter is used, he/she should be below the wheelchair with one hand near or holding a fixed part of the wheelchair and the other hand on a stair handrail. If holding a wheelchair part, it is important to avoid assisting or interfering with the performance of the task unless deliberately intervening. If two spotters are available, one should be above and one below the wheelchair.
- Risks requiring spotter intervention:
  - Forward or rear tip or fall.
  - Runaway down the stairs.

Wheelchair Skills Test (WST)

Equipment
- There should be at least 3 stairs, with the following approximate dimensions – 18 cm rise, 28 cm run/tread and width of at least 1.2 m. (In describing a set of stairs, one refers to the horizontal and vertical dimensions as the “run” and “rise” respectively.) Although 3 stairs
are not many, they are representative of the skills needed for a full flight of steps.

- Rails should be available on both sides, at a height above the steps of about 90 cm. The rails should extend horizontally beyond the upper and lower stair boundaries by 30 cm or more.
- The set of stairs should end at the upper end on a level surface or platform that is at least 2 m square. A lip around the open edges of the platform is recommended.
- No external aids (e.g. stair lift) may be used.

Starting positions
- Wheelchair: Facing the stairs at least 0.5 m from the bottom stair.

Instructions to subject
- Screening questions (“Can you do it? How?”) are strongly recommended before allowing the subject to proceed with objective testing.
- “Get yourself (if the wheelchair user is the subject) and the wheelchair up the stairs.”

Capacity criteria
- Any effective and safe technique is permitted, as long as at least 3 stairs are completed.

Special considerations for manual wheelchairs operated by users (Version 1)
- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the general scoring criteria, with the clarifications below.
- The caregiver may receive assistance from the wheelchair user in performing the skill.
- A “pass with difficulty” should be awarded if:
  - The caregiver over-exerts him/herself.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.

Wheelchair Skills Training

General training tips
- Alternative routes (e.g. ramps or elevators) to get to the upper level should be sought wherever possible.
- With the exception of the initial preparation for the first step and concluding the task after ascending the last step, the same technique is used for each step.
• Safety is of particular importance, given the consequences of a loss of control.

Special considerations for manual wheelchairs operated by users (Version 1)

• There are a variety of methods, the choice of which depends upon the characteristics of the wheelchair user (e.g. strength, flexibility, ability to use the legs) and the stairs.

• Out of wheelchair, on buttocks:
  • A buttocks protector is a good idea.
  • The wheelchair should be positioned next to the stairs, in a way similar to how the wheelchair would be positioned for the “level transfer” skill.
  • The wheelchair user transfers from the wheelchair to the 2nd or 3rd step, usually using a standing-pivot or a crouch-pivot method. The stair handrail may be used.
  • The wheelchair may be brought up to the top the stairs by the wheelchair user or by an assistant. If bringing the wheelchair up the stairs himself/herself, the wheelchair user should pull the wheelchair up by facing it downhill, and tipping it back fully. The wheelchair user should push straight down with one hand on the wheelchair’s push-handles that are resting on a step, to keep the wheelchair from rolling or sliding down the stairs.
  • As the wheelchair user moves up each step, he/she should flex the neck and hips and push down with the arms and feet to bring the buttocks up and back onto the next higher step. Then the hands, feet and wheelchair are moved up to the next step.
  • At the top of the stairs, a stool is helpful as a half-way step to the wheelchair seat. Otherwise, this final phase is the same as for the “gets from ground into wheelchair” skill.

• Variations:
  • Out of wheelchair, on hands and knees:
    • As for the buttocks approach above, but facing up the stairs and using a crawling action.
  • In wheelchair:
    • Although this technique is not recommended for wheelchair users acting alone because of the long-term consequences of the stresses placed on the shoulders, the following tips are provided for the exceptional wheelchair user who wishes to acquire this skill for the unusual occasion when it would be helpful.
    • The rear anti-tip devices (if any) should be repositioned to allow the rear wheels to contact the first stair and to permit the wheelchair to tip backwards sufficiently.
    • The starting position is with the wheelchair user in the wheelchair, with the seat belt (if any) on.
    • The wheelchair should be backed up to the lowest step, closest to the handrail on the side of the stronger arm.
The wheelchair user reaches back as far as he/she can with the stronger arm and grabs the handrail with the palm facing up.

By pulling on the handrail, the wheelchair user tilts the wheelchair back but not too far. The location of the combined center of gravity of the wheelchair user and the wheelchair is a key factor. If the center of gravity is behind the rear-wheel axles, the rear wheels will tend to submarine (i.e. move away from the vertical portion [the “rise”] of the step) if not prevented by the wheelchair user’s or caregiver’s hands on the hand-rims. If the center of gravity is in front of the rear-wheel axles, the rear wheels will tend to move backwards, towards the vertical portion of the step (which is where they need to be to roll the rear wheels up the step).

The wheelchair user uses the hand on the stair handrail to pull while using the other hand on the hand-rim (starting well forward) to roll the rail-side wheel up the step.

Because both hands are acting on the same side of the wheelchair, the wheelchair will tend to turn toward the hand-rail. The wheelchair should be squared-up (both rear wheels against the step rise) before each new stair is attempted.

At the top of the stairs, the casters should not be brought down until there is surface to support them.

**Progression:**

- It is useful to have stairs with a variety of runs and rises to permit gradual progression. The wheelchair user can use a curb first, if there is a rail beside it, as an example of a single step.
- It is reasonable to start with the caregiver-assisted versions of this skill. Caregivers can apply upward rolling forces to one or both rear wheels to assist in getting up the stair and to prevent the rear wheel on the side away from the hand-rail from moving away from the stair rise.

- If the staircase is curved, there is more “run” on the outside of the curve, so it will be easier on the outside.
- Escalators that are wide enough and are not excessively steep can be safely managed in a manual wheelchair. Permission should be obtained before practicing on escalators in public places. To ascend an escalator, the wheelchair user approaches the lower end in the forwards direction slowly, grasps both or one moving hand-rail and allows the wheelchair to be pulled onto the escalator. The wheelchair will settle itself into a stable position. The wheelchair user should lean forward until on the level at the top. The major difficulty comes at the top, where there is usually a lip that will stop the wheelchair or cause it to tip forwards. To prevent this, the wheelchair user should lean well back without tipping the wheelchair over, still holding onto the hand-rails. A spotter at the top can help to pop the casters over the lip until the wheelchair user has mastered this on his/her own.
Special considerations for manual wheelchairs operated by caregivers (Version 2)

- As for the section above, in many respects.

  **Wheelchair user in the wheelchair:**
  - If more than one caregiver is involved, as should usually be the case, the wheelchair user or one of the caregivers should by agreement take the lead in coordinating the timing (e.g. to the count of “ready, set, go” for each step).
  - The starting position is with the wheelchair user in the wheelchair, with the seat belt (if any) on. It can be helpful to remove the footrests.
  - The wheelchair should be backed up to the lowest step with the rear wheels firmly against the step rise.
  - The wheelchair user may place his/her hands on the rear wheels or the stair handrails, assisting to the extent possible but keeping his/her hands out of the way of the caregiver’s hands.
  - Although not recommended because of the stresses involved, a single strong caregiver can help a light wheelchair user in a light wheelchair up stairs from behind (uphill), tipping the wheelchair back beyond the balance point and rolling it up one step at a time.
  - Alternatively, if only a single caregiver is available and the wheelchair user is able to assist, then the caregiver can provide some of the needed force from downhill (e.g. rolling the non-rail-side wheel up the step while the wheelchair user pulls on the stair handrail with one hand and the rail-side hand-rim with the other hand) as described above in Version #1.
  - With two caregivers, one of the caregivers can be positioned uphill and pull on the push-handles while the other caregiver is below and pushes on the wheelchair frame.
  - If the wheelchair user cannot physically assist much, ideally there should be three caregivers available. One caregiver positions him/herself above, pulling on the push-handles, but not too forcefully because the awkward positioning could lead to injury of the caregiver’s back. This uphill caregiver is turned slightly to one side, with one foot on the stair above the rear wheels and the other on the next higher stair. The primary role of the uphill caregiver is to control the degree of rear tilt, which should be ahead of the balance point as noted earlier. The uphill caregiver can tell where the center of gravity is relative to the balance point by whether the push-handles are pushing back or pulling forwards (as they should be). If the wheelchair has a low backrest or no push-handles, one hand can be placed on the wheelchair user’s upper anterior chest to control the extent of tilt.
  - The two downhill caregivers are below the wheelchair. Each uses the inside hand (closest to the mid-line of the wheelchair) to hold the frame of the wheelchair, not a part (e.g. a footrest) that could come off. The outside hand is placed on the hand-rim of the rear wheel and is used to roll the wheel up onto the next step. The outside hand begins at about the horizontal position and moves up to the vertical position.
• **Wheelchair user out of the wheelchair:**
  • The caregiver can assist by merely spotting and/or bringing the wheelchair up the stairs. For the latter, the caregiver proceeds backwards up the stairs with the tipped empty wheelchair facing downhill.

• **Variations:**
  • The caregiver can carry the wheelchair user “piggy-back” style, with the wheelchair user on the caregiver’s back. The wheelchair user holds onto the caregiver with his/her arms over the caregiver’s shoulders. The caregiver holds onto the wheelchair user’s bent knees.
  • A strong caregiver can carry the wheelchair user “fire-fighter” style with the wheelchair user facing the caregiver and the hips flexed over one of the caregiver’s shoulders. The caregiver secures the wheelchair user by wrapping his/her arm around the wheelchair user’s knees.
  • Two caregivers can share the load, either front and back or by creating a “seat” of their interlocked hands as described earlier in the “gets from ground into wheelchair” skill.

**Special considerations for powered wheelchairs operated by users (Version 3)**
• Not applicable.

**Special considerations for powered wheelchairs operated by caregivers (Version 4)**
• Not applicable.

**Special considerations for scooters operated by users (Version 5)**
• Not applicable.
7.39 DESCENDS STAIRS

 Versions applicable

<table>
<thead>
<tr>
<th>Version</th>
<th>Wheelchair Type</th>
<th>Subject Type</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Powered</td>
<td>Wheelchair user</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Caregivers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Scooter</td>
<td>Wheelchair user</td>
<td></td>
</tr>
</tbody>
</table>

 Skill Level

- Advanced.

 Description

- The wheelchair user and the wheelchair get from the top of a set of stairs to the bottom.

 Rationale

- As for the “ascends stairs” skill. Although there is still a potential for injury due to a fall, descent is much less strenuous than ascent. Many wheelchair users who cannot ascend stairs independently can descend them. This skill is not applicable to most powered wheelchairs and scooters.

 Prerequisites

- None.

 Spotter considerations

- Spotter starting position:
  - If the wheelchair user is proceeding independently down the stairs in the backwards direction, the spotter should be behind the wheelchair with the hands near the push-handles.
  - If the wheelchair user is proceeding independently down the stairs in the forwards direction, at least two spotters should be involved. One or two spotters should be below the wheelchair with at least one of each spotter’s hands near a fixed front part of the wheelchair to resist tipping or runaway. The downhill spotters’ other hands may be used to grasp a stair hand-rail. The uphill spotter should be above the wheelchair with the hands near the push-handles to react to forward or backwards tips or runaway.
- Risks requiring spotter intervention:
  - Forward or rear tip or fall.
  - Runaway down the stairs.

 Wheelchair Skills Test (WST)
Equipment

- As for the “ascends stairs” skill.
- Because it is often possible to descend stairs that cannot be ascended, an alternative means (e.g. a ramp, lift or test personnel) should be available to get the wheelchair and user to the top of the stairs.
- External aids (e.g. stair lift) may not be used.

Starting positions

- Wheelchair: Facing the top of the stairs, with the leading wheels at least 0.5 m from the edge of the top stair.

Instructions to subject

- Screening questions (“Can you do it? How?”) are strongly recommended before the subject is allowed to proceed to objective testing.
- “Get yourself (if the wheelchair user is the subject) and the wheelchair down the stairs.”

Capacity criteria

- As for the general scoring criteria, with the clarifications below.
- Any effective and safe technique is permitted, as long as at least 3 stairs are completed.
- A “pass with difficulty” should be awarded if:
  - There is excessive jarring as the wheelchair moves from stair to stair.
- A “testing error” score should be awarded if it is not possible to get the wheelchair to the top of the stairs.

Special considerations for manual wheelchairs operated by users (Version 1)

- None.

Special considerations for manual wheelchairs operated by caregivers (Version 2)

- A “pass with difficulty” should be awarded if:
  - The caregiver over-exerts him/herself.

Special considerations for powered wheelchairs operated by users (Version 3)

- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)

- Not applicable.

Special considerations for scooters operated by users (Version 5)

- Not applicable.

Wheelchair Skills Training

General training tips

- As for “ascends stairs”.
Special considerations for manual wheelchairs operated by users (Version 1)

- **Out of the wheelchair, on the buttocks or on hands and knees:**
  - The procedure is the reverse of the “ascends stairs” skill.

- **In the wheelchair:**
  - The safest method is facing up the stairs. The wheelchair user grabs one or both stair rails, leans forward enough to keep the casters from lifting off, lowers the rear wheels down one stair, then slides the hands down the rail. The trainer should alert the wheelchair user that this method can be noisy, because the casters and/or footplates bang down each stair; this can be minimized by not leaning too far forward.
  - If the footrests interfere with smooth progression down the stairs and they can be removed, this may be done. The feet are unlikely to be injured as they slide gently from step to step, especially if shoes are worn.

- **Variations:**
  - A variation for the use of two hands on the same rail is for the wheelchair user to turn the trunk towards the rail and reach farther downhill with the rail-side arm. This reduces the load on the casters and helps to prevent the wheelchair from turning on the stair.
  - Another option is to face up the stairs as above, but use one hand on the stair hand-rail and the other hand on the hand-rim of the wheelchair. If only a single rail is available, this technique can prevent the tendency of the non-rail-side wheel to roll away from the stair riser.
  - In the full wheelie position, the wheelchair user can descend forwards, one step at a time. This is possible if there is an adequate horizontal distance (run) on each step. The wheelchair user drops down one step at a time as for the “descends high curb in wheelie position” skill. The difference is that the casters cannot land after the rear wheels do. The wheelchair user instead balances on the rear wheel or, more simply, allows the wheelchair to tilt back after the rear wheels land on the step such that the rear wheels push against the step rise (analogous to the “tilt rest” skill) before proceeding to the next step. This should be practiced on a single curb first.
  - In the full wheelie position, the wheelchair user can descend forward continuously rather than stopping on each step. However, this method is difficult to spot. It is only recommended for a short flight of stairs and when no handrails are available. The wheelchair user approaches the top step as in the previous technique. The difference is that the wheelchair cannot be brought to a stop on each stair. In this technique, the wheelchair user treats the stairs like an incline, with the rear wheels skimming the edges of the steps. If the wheelchair user is going to fall, it is best to fall backwards, not forwards.
  - Using a transient caster pop, the wheelchair user can descend forward
continuously rather than stopping on each step. This method is similar to
the previous one except that the wheelchair is moving forwards as it
reaches the edge of the top step. The wheelchair user pops the casters just
before the casters reach the drop off. As for the previous technique, the
wheelchair user treats the stairs like an incline.

- Descending an escalator is similar to ascending an escalator as described
  above in the “ascends stairs” skill. The wheelchair user approaches the
  upper end of the escalator backwards, grasps the hand-rails of the escalator
  and allows the wheelchair to be pulled onto the escalator. While
descending the wheelchair user leans forwards enough to keep the casters
from lifting off the stair. At the bottom, although there is a lip, it usually
presents little difficulty because it is first struck by the rear wheels, the
large diameter of which allows the relatively unloaded rear wheels to
easily roll over.

Special considerations for manual wheelchairs operated by caregivers (Version 2)
- As for the “ascends stairs” skill, but in the reverse direction.

Special considerations for powered wheelchairs operated by users (Version 3)
- Not applicable.

Special considerations for powered wheelchairs operated by caregivers (Version 4)
- Not applicable.

Special considerations for scooters operated by users (Version 5)
- Not applicable.
8. GAMES

In the section on individual skills, we have referred to some variations and activities that can be used as means of encouraging varied practice and providing motivation for people learning wheelchair skills. In the section that follows, we have provided more detail on some structured games that are suitable for individuals or small groups. Although we recognize the importance of organized sports, we have not provided descriptions of structured wheelchair sports (e.g. wheelchair basketball, wheelchair rugby, track and field), because this is beyond the scope of this Manual. Depending upon the skill of the participants and the game, spotters may be needed. Note that some of the games or their variations are based around competition and may not be of interest to all participants.
### 8.1 Line Game

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheelchair type</strong></td>
<td>• Manual or powered</td>
</tr>
<tr>
<td><strong>Equipment and set-up</strong></td>
<td>• Line grid on floor. Many gyms already have court lines outlined on the floor for participants to follow but, if not, a grid can be easily made using tape.</td>
</tr>
<tr>
<td></td>
<td>• Name cards.</td>
</tr>
<tr>
<td><strong>Instructions</strong></td>
<td>• Participants propel along the lines on the floor. When participants meet each other on a line they must turn around and propel in the opposite direction.</td>
</tr>
<tr>
<td><strong>Skills reinforced</strong></td>
<td>• Rolling forwards and backwards, moving turns, turns in place, spatial awareness.</td>
</tr>
<tr>
<td><strong>Variations</strong></td>
<td>• As an ice breaker, have participants introduce themselves when they meet, give each other high fives, shake hands or wave.</td>
</tr>
<tr>
<td></td>
<td>• Participants are each given a bingo style sheet with questions in each block such as ‘brown eyes’, or ‘birthday in April’ or ‘likes to play basketball’ etc. When participants meet they must match their new partner with one of the ‘bingo’ blocks and cross it off. The first person to get five blocks in a row wins.</td>
</tr>
<tr>
<td></td>
<td>• When participants meet, instead of turning around, they propel backwards away from their partner until they can turn off down another line, at which point they can propel forwards again.</td>
</tr>
</tbody>
</table>
### 8.2 Traffic Lights

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• 3 colored balloons or signs (green, yellow, red)</td>
</tr>
<tr>
<td>Instructions</td>
<td>• Participants propel wherever they wish in the space provided and at intervals a volunteer or trainer holds up one of the three balloons/signs. Each balloon/sign represents a different instruction. For example red = stop immediately, yellow = Go slowly and green = Go quickly around the room. When the sign is held up participants must immediately follow the new instructions.</td>
</tr>
<tr>
<td>Skills reinforced</td>
<td>• Rolling forwards, moving turns (all directions), spatial awareness, stopping.</td>
</tr>
</tbody>
</table>
| Variations                          | • Trainer shouts out instructions or uses a whistle.  
• Ask participants to propel backwards.  
• The last person to stop is disqualified.  
• Use music and encourage participants to go quickly or slowly depending on the speed of the music. When the music stops so must the participants. |
### 8.3 Gears

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
</tbody>
</table>
| Equipment and set-up                | • Line markings or pylons  
                                   | • Mark off the room into three different areas or zones |
| Instructions                        | • Participants are instructed to move as slowly as possible through the first area, at a medium speed through the second area and as quickly as possible in the final area. |
| Skills reinforced                   | • Rolling forwards, speed control, braking |
| Variations                          | • The same game, but in the backwards direction. |
### 8.4 What time is it Mr. Wolf?

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• None.</td>
</tr>
<tr>
<td>Instructions</td>
<td>• The participants are lined up beside each other at the baseline on one side of the room and Mr Wolf is on the other side of the room, facing away from the participants.</td>
</tr>
<tr>
<td></td>
<td>• The participants together shout ‘What time is it Mr. Wolf?’</td>
</tr>
<tr>
<td></td>
<td>• Mr. Wolf’s response corresponds to how many pushes they can give in an attempt to catch the wolf while his/her back is turned. (Example, if Mr. Wolf says that it is 3 o’clock each participant can move as far as they are able with 3 pushes).</td>
</tr>
<tr>
<td></td>
<td>• If Mr. Wolf says that “It’s dinner time!” all participants must turn around and propel to the opposite side of the gym without being caught by Mr Wolf.</td>
</tr>
<tr>
<td>Skills reinforced</td>
<td>• Rolling forwards, stopping, turns in place, avoiding moving obstacles.</td>
</tr>
<tr>
<td>Variations</td>
<td>• See next game (12.5)</td>
</tr>
</tbody>
</table>
### 8.5 Red Light, Green Light

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• None</td>
</tr>
</tbody>
</table>

**Instructions**
- Participants line up at one end of the gym.
- One participant is chosen as “it” and waits at the opposite end of the gym.
- “It” turns his/her back to the rest of the group and calls “green light”, at which point all participants begin to propel forward.
- “It” can then call red light at any point and turn around quickly. When red light is called all participants must freeze.
- If “it” catches anyone moving when he/she turns around that person has to go back to the other end of the gym and start again.
- The goal is to tag “it” while his/her back is turned to become the new “it”.

**Skills reinforced**
- Rolling forwards, stopping, turns in place.

**Variations**
- When “it” calls red light and turns around all participants must turn around to face the opposite direction and then freeze.
- For more advanced players, when “it” calls red light all participants must perform a wheelie. The first person to fall out of the wheelie is “out” (disqualified). The last person “out” becomes the new “it”.

---

WSP 4.3 originally approved for distribution and use: November 6, 2015
### 8.6 Follow the Leader

| Suggested minimum number of players | 3 |
| Wheelchair type | • Manual or powered |
| Equipment and set-up | • None. |
| **Instructions** | • A leader is chosen who is responsible for leading the group around the space provided (indoor or outdoor). This leader can perform different skills that the rest of the group tries to copy. |
| **Skills reinforced** | • Potential to cover all skill groups depending on leader. |
| **Variations** | • Having more than one group going at once is a good way to divide participants up by skill level. |
### 8.7 Trains

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested minimum number of players</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Wheelchair type</strong></td>
<td>• Manual or powered</td>
</tr>
<tr>
<td><strong>Equipment and set-up</strong></td>
<td>• Flags or equivalent.</td>
</tr>
<tr>
<td><strong>Instructions</strong></td>
<td>• Participants form at least two ‘trains’ of three or more people and move around the room with each wheelchair as close as possible to the wheelchair in front of it. Different trainers stand around the room with a flag or other sign. When a flag is raised by a trainer, the trains must propel towards the person holding the flag. The first train to reach the ‘station’ wins that round and the wheelchairs change order.</td>
</tr>
<tr>
<td><strong>Skills reinforced</strong></td>
<td>• Rolling forwards; speed control, spatial awareness, stopping, moving turns.</td>
</tr>
<tr>
<td><strong>Variations</strong></td>
<td>• For manual wheelchairs, the first wheelchair in each train pulls the wheelchairs behind it, with the occupant of the wheelchair behind holding onto the push-handle of the wheelchair in front.</td>
</tr>
</tbody>
</table>
## 8.8 Slalom

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheelchair type</strong></td>
<td>• Manual or powered</td>
</tr>
</tbody>
</table>
| **Equipment and set-up**            | • Start and finish lines about 5 m apart.  
• Lines and/or walls about 2 m apart on each side to limit how widely the wheelchair can go on either side of the slalom course.  
• Obstacles – at least 4 items to turn around, such as pylons, chairs, paper cups or stones – set up in a line with about 1.2 m between them. |
| **Instructions**                    | • Participant(s) must propel around the obstacles beginning in a prescribed direction (e.g. to the left of the first obstacle) as quickly as possible without touching or displacing the obstacles. |
| **Skills reinforced**               | • Rolling forwards, stopping, spatial awareness, moving turns. |
| **Variations**                      | • Try different positions for the obstacles for example closer together, closer to one wall or line, following a curved path.  
• Make the course more competitive by counting the number of obstacles displaced and/or measuring the time from the start to the finish line.  
• Try the course backwards.  
• The same game, but on an incline – up, down or across. |
### 8.9 Orienteering

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>- Manual or powered</td>
</tr>
</tbody>
</table>
| Equipment and set-up               | - Plan a route outdoors. The route could include obstacles such as different surfaces, cross slopes, curbs, pot holes, inclines and level changes depending on the skill level of the group.  
- Photo clue book.  
- A congratulations sign is placed at each landmark, along with instructions to look at the next photo clue in their book. |
| Instructions                       | - In small groups (twos or threes) participants use photo clues to navigate the route. Each photo shows a landmark that the participants can find (e.g. a tree, a bench etc). |
| Skills reinforced                  | - Depending on the route used, any combination of skills could be reinforced. |
| Variations                         | - When each new clue is found participants can collect objects or cards which could be put together at the end.  
- Organize different skill level courses so that different routes can be assigned depending on the varying abilities of the groups.  
- To make this activity more competitive or to be able to assess improvement in ability and skill, performance through the course could be timed. |
| **8.10 Go Fish** |  
|-----------------|--------------------------|
| Suggested minimum number of players | 1 |
| Wheelchair type | Manual or powered |
| Equipment and set-up | - Various small objects – pens, magazines, paper clips, coins, coffee cups, peanuts.  
- Container to hold the objects after they are picked up.  
- Surfaces on which to place the objects – chairs, tables, shelves, floor.  
- Objects are placed on the surfaces around the room. |
| Instructions | The participant moves around the room picking up the objects and placing them in the container on his/her lap. When completed, the participant brings the container to the finish point. |
| Skills reinforced | Rolling, turning, sideways maneuvering, reaching. |
| Variations | - Have participants pick up objects in a certain order. For example picking up the highest objects first or the lowest objects first. Or only objects of a certain color or shapes.  
- Hide peanuts or a similar sized object around the room, split participants into teams. The team with the most peanuts at the end of a certain time period wins. |
### 8.11 Circle Game

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
</tbody>
</table>
| Equipment and set-up                 | • Space about 5 m square.  
|                                      | • Participants form a circle, facing the center. |
| Instructions                         | • When a participant’s name is called by the trainer he or she moves clockwise around the circle until returning to his/her place. |
| Skills reinforced                    | • Rolling forwards, stopping, spatial awareness, speed control, moving turns. |
| Variations                           | • Cat and Mouse: One participant (the cat) propels around the outside of the circle. As they do so they tag another participant (the mouse) in the circle and the two race in opposite directions around the circle. The last person to return to the original spot is now the ‘cat’. |
### 8.12 Relay Race

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheelchair type</strong></td>
<td>• Manual or powered</td>
</tr>
</tbody>
</table>
| **Equipment and set-up**            | • Batons (any object will do).  
|                                    | • Cones (or equivalent obstacle to turn around). |
| **Instructions**                    | • Divide participants into groups. Each group lines up at one end of the room. When the trainer shouts ‘go’ the first participant in each group races to the other end of the hall, makes a turn around a cone and returns to his/her group, passing the baton to the next participant. The first group finished wins. |
| **Skills reinforced**               | • Rolling forward, moving turns, reaching. |
| **Variations**                      | • Instead of going around a cone have participants perform a skill (e.g. wheelie, 360-degree turn in place, circling the cone twice) once they reach the opposite end of the room.  
|                                    | • Instead of returning to the back of the group when a participant finishes the relay, he/she passes the baton to the next person and then follows behind him/her (as in follow the leader). This continues until the whole group is led by the final participant around the course.  
|                                    | • A series of stations can be spread out at each of which a task must be performed (e.g. picking an object off the floor and placing it on a chair, doing a weight shift for 3 seconds, pouring a cup of water). |
### 8.13 Shrinking Space

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested minimum number of players</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Wheelchair type</strong></td>
<td>• Manual or powered</td>
</tr>
<tr>
<td><strong>Equipment and set-up</strong></td>
<td>• Cones (or equivalent obstacles)</td>
</tr>
<tr>
<td><strong>Instructions</strong></td>
<td>• A line of cones is placed close to a wall. Each participant attempts to pass between the cones and the wall without touching either. Each time a participant completes this successfully the cones are moved closer to the wall.</td>
</tr>
<tr>
<td><strong>Skills reinforced</strong></td>
<td>• Rolling forward or backwards, spatial awareness (a good way for participants to learn exactly what gap they can manage in their wheelchair).</td>
</tr>
</tbody>
</table>
| **Variations**           | • Do it backwards.  
                          | • See how quickly participants can get through the space by timing them. |
### 8.14 What’s Your Clearance?

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheelchair type</strong></td>
<td>• Manual or powered</td>
</tr>
<tr>
<td><strong>Equipment and set-up</strong></td>
<td>• Objects that can be used to create barriers of increasing widths and heights, for instance by placing them side by side or stacking them. Pieces of wood or bricks are examples. To start the game, a low and narrow obstacle is set up.</td>
</tr>
<tr>
<td><strong>Instructions</strong></td>
<td>• Each participant attempts to pass over the obstacle with the object passing between the wheels without the wheels touching the object. Each time a participant completes this successfully the width and/or the height of the obstacle is increased.</td>
</tr>
<tr>
<td><strong>Skills reinforced</strong></td>
<td>• Rolling forward or backwards, spatial awareness (a good way for participants to learn exactly what clearance they have under their wheelchairs).</td>
</tr>
</tbody>
</table>
| **Variations** | • Sheets of bubble wrap as obstacles are useful to provide audible feedback that a wheel has gone over the obstacle.  
• Do it backwards.  
• For manual wheelchairs, permit the wheelchair user to use a transient or full wheelie to eliminate the front wheels from consideration.  
• To add an element of competition, participants can be “out” (disqualified) if they are unable to get over the obstacle without touching it. |
### 8.15 Case Open and Shut

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• A building or structure with different types and styles of doors.</td>
</tr>
<tr>
<td></td>
<td>• A route description.</td>
</tr>
<tr>
<td>Instructions</td>
<td>• Participants are given a route to a series of different doors, returning to the starting point when finished.</td>
</tr>
<tr>
<td>Skills reinforced</td>
<td>• Opening and closing a variety of doors.</td>
</tr>
<tr>
<td>Variations</td>
<td>• To avoid crowding and delays, teams of 2-3 participants can be routed to the doors in different orders or at intervals (staggered start).</td>
</tr>
<tr>
<td></td>
<td>• This game can be turned into an orienteering exercise by providing only directions to the next door, where the next set of directions will be posted.</td>
</tr>
</tbody>
</table>
### 8.16 Stormy Seas

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>- Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>- None.</td>
</tr>
</tbody>
</table>

**Instructions**
- Each participant is given membership to a category of fish (e.g. starfish, shark or octopus).
- Participants line up against a wall at one end of the room.
- One participant (the fisherman) positions himself/herself in the middle of the room and yells out one of the above categories. When their category is called, the participants must try to get across the room to the other wall without being caught by the fisherman. If tagged, a participant must stop where he/she was caught and he/she becomes seaweed. The seaweed’s job is similar to the fisherman’s except seaweed cannot move.
- If the fisherman yells “stormy seas”, all participants try to get to the other side of the room no matter their category.

**Skills reinforced**
- Rolling forwards, moving turns, stopping, spatial awareness.

**Variations**
- When a participant is caught he/she becomes an ‘island’ in the sea (rather than seaweed), creating a passive obstacle for the remaining participants to negotiate.
### 8.17 Simon Says

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• None.</td>
</tr>
<tr>
<td>Instructions</td>
<td>• A leader is chosen who instructs the group to perform certain skills. The participants should only perform the skill when the leader says “Simon Says” before the instruction. If participants perform a skill when the leader has not said “Simon Says”, that participant is out. The last participant in the game wins.</td>
</tr>
<tr>
<td>Skills reinforced</td>
<td>• Potential to cover all skill groups.</td>
</tr>
<tr>
<td>Variations</td>
<td>• Simon Says Mix Up: Participants must do the opposite of what ‘Simon’ instructs. For example if Simon says turn to the right participants must turn to the left. If they do what Simon says and not the opposite they are out.</td>
</tr>
</tbody>
</table>
### 8.18 Reverse Limbo

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• Obstacles of various heights.</td>
</tr>
</tbody>
</table>
| Instructions                        | • Participants take turns getting over the obstacle until everyone has completed the task.  
• The obstacle is then replaced with a higher obstacle.  
• Participants are eliminated when they can no longer get over the obstacle, and the game continues until only one participant is left. |
| Skills reinforced                   | • Getting over obstacles of various heights. |
| Variations                          | • Regular limbo: having an obstacle like a broom handle or rope that can be progressively lowered from an initial position about head-high. |
### 8.19 Garbage-Can Basketball

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
</tbody>
</table>
| Equipment and set-up                | • Ball (any size).  
|                                     | • Basket (can be a garbage can or waste basket on a chair). |
| Instructions                        | • To begin create two teams each with an equal number of participants.  
|                                     | • Participants are only permitted to carry the basketball for the time it takes them to complete two pushes (if using a manual wheelchair, or equivalent time if using a powered wheelchair) at which point they must either pass the ball to a team member or bounce it on the ground.  
|                                     | • Points are scored by getting the ball in the garbage can. |
| Skills reinforced                   | • Rolling forwards, moving turns, turns in place, spatial awareness, speed control. |
| Variations                          | • Break the game down into its components. Have participants practice bouncing and throwing the ball with a partner. Or practice how to carry the ball for two pushes and then quickly bounce it. Add a quick turn on the end (i.e. push, bounce, fast turn).  
|                                     | • Practicing throwing skills by sitting in a circle and passing the ball around. Each time that the ball is passed around the circle without dropping on the floor get participants to make the circle bigger by giving one push backwards. Then try again.  
|                                     | • Practice shooting. Change the height of the net, increasing the height as the participant’s skill improves. |
### 8.20 Beach Ball Chaos

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• Beach balls</td>
</tr>
<tr>
<td>Instructions</td>
<td>• A variation on dodge ball, this game can be played as a team or individually. Place one or more balls on the floor and have participants hit the balls with their hand towards members on the other team. Participants must maneuver around balls or block the ball with their hands to avoid the wheelchair getting hit. If the wheelchair is hit by the ball, the participant is frozen until another member of their team high-fives them.</td>
</tr>
<tr>
<td>Skills reinforced</td>
<td>• Moving obstacles, reaching</td>
</tr>
</tbody>
</table>
| Variations                          | • Once a participant is tagged, he/she can be required to come to the back of the court and perform a designated wheelchair skill.  
• Place two pylons at each end of the room about 2 m apart to create goals. The team that scores the greatest number of goals wins. |
### 8.21 Horse

<table>
<thead>
<tr>
<th>Suggested minimum number of players</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair type</td>
<td>• Manual or powered</td>
</tr>
<tr>
<td>Equipment and set-up</td>
<td>• None.</td>
</tr>
<tr>
<td>Instructions</td>
<td>• Players are numbered and remain in order. Player #1 performs a skill that he/she thinks is possible but that others might find difficult. Starting with Player #2, each player must successfully complete that same skill. If a player is not able to complete the skill, that player is given sequential letters from the word ‘HORSE’. Once a player has all the letters to spell HORSE, he/she is disqualified. Once everyone has tried Player #1’s skill, Player #2 presents a different skill and the game continues in the same fashion until there is only one player remaining.</td>
</tr>
<tr>
<td>Skills reinforced</td>
<td>• Any combination of skills.</td>
</tr>
</tbody>
</table>
| Variations                          | • Words that are longer (e.g. WHEELCHAIR) or shorter (e.g. PIG) can be used.  
• Player #1 describes a situation without demonstrating it (e.g. “get your wheelchair through the door with your eyes closed”), to avoid providing clues as to how the skill is accomplished. |
Appendix 1
LESSON PLANS

Before each WSTP session, the trainer should have a plan for how each session will be conducted as well as a plan for the series of sessions. The lesson plans will be affected by whether the training will be 1-on-1 or in a group, by the group size, by the group makeup (diagnoses accounting for wheelchair use, skill level), by session specifics (e.g. the number, frequency and duration of sessions), by the training facilities and by the number of trainers and spotters available.

The sample lesson plans below are general templates for one-on-one training in sessions scheduled for 30 minutes following an intake session of 40 minutes.

**Intake Session (40 minutes)**

**A. Welcome (2 minutes)**
- Explain purpose of this and subsequent sessions
- Obtain informed consent to proceed

**B. Perform an intake assessment (25 minutes)**
- Document demographic, clinical and wheelchair-experience data
- Identify any contraindications for testing or training
- Document wheelchair specifications
- Wheelchair skills assessment (WST-Q and/or WST)

**C. Goal setting (5 minutes)**
- From the intake assessment and discussion with the learner, identify and record a set of relevant and potentially achievable training goals

**D. Begin training (5 minutes)**
- Begin work on an initial goal so that the learner goes away with at least one skill to practice before the next session.

**E. Closing (3 minutes)**
- Describe the nature of subsequent sessions
- Schedule the next session
- Assign homework
- Answer any questions that the learner may have
- Provide strong encouragement
- Complete any final documentation of the session

* Times are rough guidelines only
Subsequent Sessions (30 minutes)

A. Welcome and Warm-Up (5 minutes)
- Check status: Any new health concerns since the last session? Any after-effects from the last session? Any practice since the last session? Any wheelchair changes?
- Review the goals and planned activities for the current session
- Questions and answers
- Warm-up activity

B. Practice skills that have already been acquired but that need work (10 minutes)
- Random order, but begin with less stressful ones until the learner is warmed up
- Variety of settings
- Trainer role: provide structure, safety, minimal feedback
- This portion of the session can also serve to provide conditioning, if the sessions are scheduled often enough to serve in that capacity (i.e. at least 3 times a week)
- Games can be a fun way to carry out this stage of the session

C. Practice a skill that has not been acquired yet (10 minutes)
- Trainer role: provide structure, safety, instructions, demonstration and feedback

D. Closing (5 minutes)
- Questions and answers
- Plan next session content
- Assign homework
- Schedule next session
- Complete any final documentation of the session
Appendix 2

Sample Outline for a Series of Group Training Sessions

Introduction
This sample outline is intended to assist trainers working with groups of 5-10 participants, all of whom are using two-hand wheelchair propulsion. The syllabus has been structured to be used over a period of 6 sessions, each lasting one hour. A general template begins on the next page.

The content should be adjusted depending upon the skill level of the participants and the local setting. This sample outline is intended to be used in combination with other materials found earlier in this Manual and on the Wheelchair Skills Program website.

Prior to any training sessions, for the purposes of this example, it is assumed that each participant has already been seen individually to perform an intake assessment that includes the following elements:

- Record contact information (phone numbers, email address, next-of-kin)
- Document demographic, clinical and wheelchair-experience data
- Identify any contraindications for training
- Document wheelchair specifications
- Wheelchair skills assessment (WST-Q and/or WST)
- Identify and record a set of relevant and potentially achievable training goals

It is also possible to obtain most of this intake information in a group setting. However, if the WST is to be used as an outcome measure, the WST should not be performed as a group because witnessing others may affect the participant’s technique.
General Session Template that Applies to All Sessions Unless Otherwise Specified

Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary.
- Ensure that participants and training personnel know the session date, time and location.
  (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSP Manual
  - Review on-line videos of the skills to be covered
  - If the session being prepared for is the 1st session:
    - Signage directing participants to the arrival area.
  - If the session being prepared for is the final session:
    - Evaluation forms for the participants to complete.
    - Report cards.
    - Certificates.
    - Humorous prizes.

The Actual Training Session

A. Arrival of participants (5 minutes)

- Greet participants as they arrive
- If this is the 1st session:
  - Direct participants to where they should hang up their coats and knapsacks
  - Let them know that an air pump and tools are available for urgent maintenance
  - Each participant picks up his/her name tag, clipboard with goal list attached and pen or pencil

B. Session Opening (10 minutes)

- Call to order: Form a circle (“huddle”)
- Introductions (mostly at 1st session but at subsequent sessions if there are any new people in attendance)
• Record attendance
• At 1st session, achieve consensus on rules and post them on the wall for reference purposes:
  o Attend all sessions (notify trainer if unable to attend for some reason – provide trainer contact information)
  o Be on time for sessions
  o Turn off cell phones during sessions
  o During huddles or explanations, only one person taking at a time
  o Do not attempt any skill that you are not sure that you can do safely without a spotter
  o Agree on a penalty for rule violation (e.g. sing a song or do a dance)
• Check for any participant status changes since the last session (the intake session, in the case of the 1st session):
  o Any after-effects from the last training session (for sessions #2-6)?
  o Any practice carried out (encourage)?
  o Any wheelchair changes?
  o Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)
• Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.
• Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate
• Explain the planned activities for the current session
• Warm-up activity:
  • An activity designed to warm up the muscles, heart and lungs.
  • The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  • A game (see Games section of the WSP Manual) can be a fun way to carry out this activity.

C. Practice “Old” Skills (15 minutes)
• Explain or remind participants of the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
• Generally using a random order for practicing the old skills is ideal, but it is acceptable to begin with less stressful ones before proceeding to more difficult ones
• Practice old skills in a variety of settings and using a variety of methods
• For the old-skill practice, the trainer provides structure and safety, keeping feedback to a minimum
• Individualize the difficulty level to the extent possible

D. Practice “New” Skills (ones that have yet to be acquired or perfected) (15 minutes)
• This section of the session may carry over from one session to the next
• The trainer should focus on a single skill or series of a few related skills
• When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
• Trainer role: provide structure, safety, instructions, demonstration and feedback

E. Warm-Down Activity (10 minutes) (Optional if pressed for time)
• An activity designed to reduce any tension or frustration from working on the new skills
• As for the warm-up activity, the activity should include some skills that have already been learned
• A game can be a fun way to carry out this activity
• Moving outside the regular training area (e.g. outside) can be useful

F. Closing (5 minutes)
• Form a circle (“huddle”)
• Answer any questions that the learners may have
• Summarize the key points about the “new” skills covered earlier in the session
• If it is not the final session:
  o Have each participant review his/her training goals, revising them if appropriate
  o Remind participants and training personnel of the date, time and location for the next session
  o Strongly encourage participants to practice their skills (with a spotter if needed) before the next session
• If it is the final session:
  o Review any arrangements for obtaining a post-training assessment of wheelchair skills (e.g. using the WST-Q or WST), preferably a minimum of 3 days after the final training session
  o Congratulate participants on their participation and achievements
  o Have participants complete an evaluation form on the training sessions
  o Distribute report cards and certificates
  o Award prizes – preferably some small trinket for each participant with a humorous reason (e.g. “For the best spotter scare”, “For the best uphill slalom”, “For the fastest downhill sprint”, “For the wobbliest wheelie without falling”).
  o Thank training personnel for their efforts
• Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
• Complete any final documentation of the session
Session #1

Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary.
- Ensure that participants and training personnel know the session date, time and location. (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSP Manual
  - Review on-line videos of the skills to be covered
  - Signage directing participants to the arrival area.

The Actual Training Session

A. Arrival of participants (5 minutes)

- Greet participants as they arrive
- Direct participants to where they should hang up their coats and knapsacks
- Let them know that an air pump and tools are available for urgent maintenance
- Each participant picks up his/her name tag, clip-board with goal list attached and pen or pencil

B. Session Opening (10 minutes)

- Call to order: Form a circle (“huddle”)
- Introductions
- Record attendance
- Achieve consensus on rules and post them on the wall for reference purposes:
  - Attend all sessions (notify trainer if unable to attend for some reason – provide trainer contact information)
  - Be on time for sessions
  - Turn off cell phones during sessions
  - During huddles or explanations, only one person taking at a time
Do not attempt any skill that you are not sure that you can do safely without a spotter
Agree on a penalty for rule violation (e.g. sing a song or do a dance)

- Check for any participant status changes since the intake session:
  - Any after-effects from the last session?
  - Any wheelchair changes?
  - Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)

- Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.

- Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate

- Explain the planned activities for the current session

- Warm-up activity:
  - An activity designed to warm up the muscles, heart and lungs.
  - The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  - A game (see Games section of the WSTP Manual) can be a fun way to carry out this activity.
  - Activity: __________________________________________________________

C & D. Practice Skills (30 minutes)

- Because this is the 1st session, there are no skills that have been previously covered in training (i.e. no distinction between “old” and “new” skills).
- Explain to participants the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
- Individualize the difficulty level to the extent possible
- The trainer should focus on a single skill or series of a few related skills
- When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
- Trainer role: provide structure, safety, instructions, demonstration and feedback
- List of skills to be covered (see table later).

E. Warm-Down Activity (10 minutes) (Optional if pressed for time)

- An activity designed to reduce any tension or frustration from working on the new skills
- As for the warm-up activity, the activity should include some skills that have already been learned
- A game can be a fun way to carry out this activity
- Moving outside the regular training area (e.g. outside) can be useful
- Activity: __________________________________________________________
F. Closing (5 minutes)

- Form a circle (“huddle”)
- Answer any questions that the learners may have
- Summarize the key points about the “new” skills covered earlier in the session
- Have each participant review his/her training goals, revising them if appropriate
- Remind participants and training personnel of the date, time and location for the next session
- Strongly encourage participants to practice their skills (with a spotter if needed) before the next session
- Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
- Complete any final documentation of the session
Session 2

Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary
- Ensure that participants and training personnel know the session date, time and location. (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSTP Manual
  - Review on-line videos of the skills to be covered

The Actual Training Session

A. Arrival of participants (5 minutes)
- Greet participants as they arrive

B. Session Opening (10 minutes)
- Call to order: Form a circle (“huddle”)
- Introductions (as a reminder mostly but also if there are any new people in attendance)
- Record attendance
- Remind participants of the posted consensus on rules
- Check for any participant status changes since the last session:
  - Any after-effects from the last training session?
  - Any practice carried out?
  - Any wheelchair changes?
  - Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)
- Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.
- Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate
- Explain the planned activities for the current session
- Warm-up activity:
  - An activity designed to warm up the muscles, heart and lungs.
  - The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  - A game (see Games section of the WSTP Manual) can be a fun way to carry out this activity.
  - Activity: _______________________________________________________________

C. Practice “Old” Skills (15 minutes)
- Explain or remind participants of the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
- Generally using a random order for practicing the old skills is ideal, but it is acceptable to begin with less stressful ones
- Practice old skills in a variety of settings and using a variety of methods
- For the old-skill practice, the trainer provides structure and safety, keeping feedback to a minimum
- Individualize the difficulty level to the extent possible
- List of old skills (see table later)

D. Practice “New” Skills (ones that have yet to be acquired or perfected) (15 minutes)
- This section of the session may carry over from one session to the next
- The trainer should focus on a single skill or series of a few related skills
- When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
- Trainer role: provide structure, safety, instructions, demonstration and feedback
- List of new skills (see table later)

E. Warm-Down Activity (10 minutes) (Optional if pressed for time)
- An activity designed to reduce any tension or frustration from working on the new skills
- As for the warm-up activity, the activity should include some skills that have already been learned
- A game can be a fun way to carry out this activity
- Moving outside the regular training area (e.g. outside) can be useful
- Activity: _______________________________________________________________

F. Closing (5 minutes)
- Form a circle (“huddle”)
- Answer any questions that the learners may have
- Summarize the key points about the “new” skills covered earlier in the session
- Have each participant review his/her training goals, revising them if appropriate
- Remind participants and training personnel of the date, time and location for the next session
- Strongly encourage participants to practice their skills (with a spotter if needed) before the next session
- Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
- Complete any final documentation of the session
Session 3

Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary
- Ensure that participants and training personnel know the session date, time and location. (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSTP Manual
  - Review on-line videos of the skills to be covered

The Actual Training Session

A. Arrival of participants (5 minutes)
- Greet participants as they arrive

B. Session Opening (10 minutes)
- Call to order: Form a circle (“huddle”)
- Introductions (as a reminder mostly but also if there are any new people in attendance)
- Record attendance
- Remind participants of the posted consensus on rules
- Check for any participant status changes since the last session:
  - Any after-effects from the last training session?
  - Any practice carried out?
  - Any wheelchair changes?
  - Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)
- Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.
- Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate
- Explain the planned activities for the current session
- Warm-up activity:
  - An activity designed to warm up the muscles, heart and lungs.
  - The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  - A game (see Games section of the WSTP Manual) can be a fun way to carry out this activity.
  - Activity: __________________________________________________________

C. Practice “Old” Skills (15 minutes)
- Explain or remind participants of the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
- Generally using a random order for practicing the old skills is ideal, but it is acceptable to begin with less stressful ones
- Practice old skills in a variety of settings and using a variety of methods
- For the old-skill practice, the trainer provides structure and safety, keeping feedback to a minimum
- Individualize the difficulty level to the extent possible
- List of old skills (see table later)

D. Practice “New” Skills (ones that have yet to be acquired or perfected) (15 minutes)
- This section of the session may carry over from one session to the next
- The trainer should focus on a single skill or series of a few related skills
- When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
- Trainer role: provide structure, safety, instructions, demonstration and feedback
- List of new skills (see table later).

E. Warm-Down Activity (10 minutes) (Optional if pressed for time)
- An activity designed to reduce any tension or frustration from working on the new skills
- As for the warm-up activity, the activity should include some skills that have already been learned
- A game can be a fun way to carry out this activity
- Moving outside the regular training area (e.g. outside) can be useful
- Activity: _______________________________________________________________

F. Closing (5 minutes)
- Form a circle (“huddle”)
- Answer any questions that the learners may have
- Summarize the key points about the “new” skills covered earlier in the session
- Have each participant review his/her training goals, revising them if appropriate
- Remind participants and training personnel of the date, time and location for the next session
- Strongly encourage participants to practice their skills (with a spotter if needed) before the next session
- Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
- Complete any final documentation of the session
### Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary
- Ensure that participants and training personnel know the session date, time and location. (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSTP Manual
  - Review on-line videos of the skills to be covered

### The Actual Training Session

#### A. Arrival of participants (5 minutes)

- Greet participants as they arrive

#### B. Session Opening (10 minutes)

- Call to order: Form a circle (“huddle”)
- Introductions (as a reminder mostly but also if there are any new people in attendance)
- Record attendance
- Remind participants of the posted consensus on rules
- Check for any participant status changes since the last session:
  - Any after-effects from the last training session?
  - Any practice carried out?
  - Any wheelchair changes?
  - Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)
- Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.
- Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate
- Explain the planned activities for the current session
• Warm-up activity:
  • An activity designed to warm up the muscles, heart and lungs.
  • The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  • A game (see Games section of the WSTP Manual) can be a fun way to carry out this activity.
  • Activity: __________________________________________________________

C. Practice “Old” Skills (15 minutes)
• Explain or remind participants of the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
• Generally using a random order for practicing the old skills is ideal, but it is acceptable to begin with less stressful ones
• Practice old skills in a variety of settings and using a variety of methods
• For the old-skill practice, the trainer provides structure and safety, keeping feedback to a minimum
• Individualize the difficulty level to the extent possible
• List of old skills (see table later).

D. Practice “New” Skills (ones that have yet to be acquired or perfected) (15 minutes)
• This section of the session may carry over from one session to the next
• The trainer should focus on a single skill or series of a few related skills
• When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
• Trainer role: provide structure, safety, instructions, demonstration and feedback
• List of new skills (see table later).

E. Warm-Down Activity (10 minutes) (Optional if pressed for time)
• An activity designed to reduce any tension or frustration from working on the new skills
• As for the warm-up activity, the activity should include some skills that have already been learned
• A game can be a fun way to carry out this activity
• Moving outside the regular training area (e.g. outside) can be useful
• Activity: _______________________________________________________________

F. Closing (5 minutes)
• Form a circle (“huddle”)
• Answer any questions that the learners may have
• Summarize the key points about the “new” skills covered earlier in the session
• Have each participant review his/her training goals, revising them if appropriate
- Remind participants and training personnel of the date, time and location for the next session
- Strongly encourage participants to practice their skills (with a spotter if needed) before the next session
- Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
- Complete any final documentation of the session
Session 5

Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary
- Ensure that participants and training personnel know the session date, time and location. (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSTP Manual
  - Review on-line videos of the skills to be covered

The Actual Training Session

A. Arrival of participants (5 minutes)

- Greet participants as they arrive

B. Session Opening (10 minutes)

- Call to order: Form a circle (“huddle”)
- Introductions (as a reminder mostly but also if there are any new people in attendance)
- Record attendance
- Remind participants of the posted consensus on rules
- Check for any participant status changes since the last session:
  - Any after-effects from the last training session?
  - Any practice carried out?
  - Any wheelchair changes?
  - Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)
- Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.
- Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate
- Explain the planned activities for the current session
- **Warm-up activity:**
  - An activity designed to warm up the muscles, heart and lungs.
  - The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  - A game (see Games section of the WSTP Manual) can be a fun way to carry out this activity.
  - Activity: __________________________________________________________

**C. Practice “Old” Skills (15 minutes)**
- Explain or remind participants of the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
- Generally using a random order for practicing the old skills is ideal, but it is acceptable to begin with less stressful ones
- Practice old skills in a variety of settings and using a variety of methods
- For the old-skill practice, the trainer provides structure and safety, keeping feedback to a minimum
- Individualize the difficulty level to the extent possible
- List of old skills (see table later).

**D. Practice “New” Skills (ones that have yet to be acquired or perfected) (15 minutes)**
- This section of the session may carry over from one session to the next
- The trainer should focus on a single skill or series of a few related skills
- When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
- Trainer role: provide structure, safety, instructions, demonstration and feedback
- List of new skills (see table later)

**E. Warm-Down Activity (10 minutes) (Optional if pressed for time)**
- An activity designed to reduce any tension or frustration from working on the new skills
- As for the warm-up activity, the activity should include some skills that have already been learned
- A game can be a fun way to carry out this activity
- Moving outside the regular training area (e.g. outside) can be useful
- Activity: _______________________________________________________________

**F. Closing (5 minutes)**
- Form a circle (“huddle”)
- Answer any questions that the learners may have
- Summarize the key points about the “new” skills covered earlier in the session
- Have each participant review his/her training goals, revising them if appropriate
- Remind participants and training personnel of the date, time and location for the next session
- Strongly encourage participants to practice their skills (with a spotter if needed) before the next session
- Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
- Complete any final documentation of the session
Session #6 (Final)

Advance Preparation by the Trainer

- Confirm that the space has been booked, if necessary.
- Ensure that participants and training personnel know the session date, time and location. (It is a good idea to remind participants and training personnel of the upcoming session if it will be more than a week since the previous session.)
- Obtain, prepare or review materials needed for every session:
  - List of participants and their contact information
  - Attendance sheet
  - Documentation of intake data for each participant
  - Clip-board and pen or pencil for each participant
  - Pencil sharpener
  - List of goals for each participant
  - Name tags for participants and training personnel
  - Whistle or other noise maker for calling attention
  - Air pump for tires
  - Tool kit for urgent repairs or adjustments
- Obtain, prepare or review any materials needed for this specific session:
  - Review the appropriate sections of the WSTP Manual
  - Review on-line videos of the skills to be covered
  - Evaluation forms for the participants to complete.
  - Report cards.
  - Certificates.
  - Humorous prizes.

The Actual Training Session

A. Arrival of participants (5 minutes)
- Greet participants as they arrive

B. Session Opening (10 minutes)
- Call to order: Form a circle (“huddle”)
- Introductions (if there are any new people in attendance)
- Record attendance
- Remind participants of the posted consensus on rules

- Check for any participant status changes since the last session:
  - Any after-effects from the last training session?
  - Any practice carried out?
  - Any wheelchair changes?
  - Any new health concerns? (Invite participants to speak to you privately, before beginning the warm-up activity.)
- Review the general purpose of the training sessions – to improve specific wheelchair skills in order to prevent injury and overcome environmental barriers.
- Have each participant independently review his/her overall goals for the series of training sessions, revising them if appropriate
- Explain the planned activities for the current session
- Warm-up activity:
  - An activity designed to warm up the muscles, heart and lungs.
  - The activity should include some skills that have already been learned or, if the 1st session, skills that the trainer knows from the intake assessments that all participants can perform.
  - A game (see Games section of the WSTP Manual) can be a fun way to carry out this activity.
  - Activity: ________________

C. Practice “Old” Skills (15 minutes)
- Remind participants of the rationale for practicing skills that have already been learned – need practice to refine them, build efficiency, explore various ways to perform them and generalize them to different settings
- Generally using a random order for practicing the old skills is ideal, but it is acceptable to begin with less stressful ones
- Practice old skills in a variety of settings and using a variety of methods
- For the old-skill practice, the trainer provides structure and safety, keeping feedback to a minimum
- Individualize the difficulty level to the extent possible
- List of old skills (see table later)

D. Practice “New” Skills (ones that have yet to be acquired or perfected) (15 minutes)
- This section of the session may carry over from one session to the next
- The trainer should focus on a single skill or series of a few related skills
- When introducing a new skill, the trainer should explain the rationale for the skill, demonstrate how it is done, then ask each participant to attempt the skill (either all at the same time or sequentially, depending upon the skill and the setting).
- Trainer role: provide structure, safety, instructions, demonstration and feedback
- List of new skills (see table later)

E. Warm-Down Activity (10 minutes) (Optional if pressed for time)
- An activity designed to reduce any tension or frustration from working on the new skills
- As for the warm-up activity, the activity should include some skills that have already been learned
- A game can be a fun way to carry out this activity
- Moving outside the regular training area (e.g. outside) can be useful
- Activity: __________________________________________
F. Closing (5 minutes)

- Form a circle ("huddle")
- Answer any questions that the learners may have
- Summarize the key points about the "new" skills covered earlier in the session
- Have each participant review his/her training goals and document the extent to which they were achieved
- Review any arrangements for obtaining a post-training assessment of wheelchair skills (e.g. using the WST-Q or WST), preferably a minimum of 3 days after the final training session
- Strongly encourage participants to practice their skills (with a spotter if needed) in the future
- Identify how participants can access further training, should they wish to pursue it
- Congratulate participants on their participation and achievements
- Have participants complete an evaluation form on the training sessions
- Distribute report cards and certificates
- Award prizes – preferably some small trinket for each participant with a humorous reason (e.g. “For the best spotter scare”, “For the best uphill slalom”, “For the fastest downhill sprint”, “For the wobbliest wheelie without falling”).
- Thank training personnel for their efforts
- Retrieve materials (name tags, clip-boards, pens or pencils) from the participants
- Complete any final documentation of the session and series of sessions
### Overview Schedule of “Old” and “New” Skill Coverage

<table>
<thead>
<tr>
<th>Individual Skills</th>
<th>Session #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Rolls forwards short distance</td>
<td>New</td>
</tr>
<tr>
<td>2. Rolls backwards short distance</td>
<td>New</td>
</tr>
<tr>
<td>3. Turns in place</td>
<td>New</td>
</tr>
<tr>
<td>4. Turns while moving forwards</td>
<td>New</td>
</tr>
<tr>
<td>5. Turns while moving backwards</td>
<td>New</td>
</tr>
<tr>
<td>6. Maneuvers sideways</td>
<td>New</td>
</tr>
<tr>
<td>7. Reaches high object</td>
<td>New</td>
</tr>
<tr>
<td>8. Picks object from floor</td>
<td>New</td>
</tr>
<tr>
<td>9. Relieves weight from buttocks</td>
<td>New</td>
</tr>
<tr>
<td>10. Operates body positioning options</td>
<td>New</td>
</tr>
<tr>
<td>11. Level transfer</td>
<td>New</td>
</tr>
<tr>
<td>12. Folds and unfolds wheelchair</td>
<td>New</td>
</tr>
<tr>
<td>13. Gets through hinged door</td>
<td>New</td>
</tr>
<tr>
<td>14. Rolls longer distance</td>
<td>New</td>
</tr>
<tr>
<td>15. Avoids moving obstacles</td>
<td>New</td>
</tr>
<tr>
<td>16. Ascends slight incline</td>
<td>New</td>
</tr>
<tr>
<td>17. Descends slight incline</td>
<td>New</td>
</tr>
<tr>
<td>18. Ascends steep incline</td>
<td>New</td>
</tr>
<tr>
<td>19. Descends steep incline</td>
<td>New</td>
</tr>
<tr>
<td>20. Rolls across side-slope</td>
<td>New</td>
</tr>
<tr>
<td>21. Rolls on soft surface</td>
<td>New</td>
</tr>
<tr>
<td>22. Gets over threshold</td>
<td>New</td>
</tr>
<tr>
<td>23. Gets over gap</td>
<td>New</td>
</tr>
<tr>
<td>24. Ascends low curb</td>
<td>New</td>
</tr>
<tr>
<td>25. Descends low curb</td>
<td>New</td>
</tr>
<tr>
<td>26. Ascends high curb</td>
<td>New</td>
</tr>
<tr>
<td>27. Descends high curb</td>
<td>New</td>
</tr>
<tr>
<td>28. Performs stationary wheelie</td>
<td>New</td>
</tr>
<tr>
<td>29. Turns in place in wheelie position</td>
<td>New</td>
</tr>
<tr>
<td>30. Descends high curb in wheelie position</td>
<td>New</td>
</tr>
<tr>
<td>31. Descends steep incline in wheelie position</td>
<td>New</td>
</tr>
<tr>
<td>32. Gets from ground into wheelchair</td>
<td>New</td>
</tr>
<tr>
<td>33. Ascends stairs</td>
<td>New</td>
</tr>
<tr>
<td>34. Descends stairs</td>
<td>New</td>
</tr>
</tbody>
</table>