### Assessment Overview

#### Assessment Area

**ICF Domain:**  
Body Function & Structures  
**Subcategory:**  
Neuromusculoskeletal & Movement-Related Functions & Structures  
**Subscales (domains):**  
- Sensation  
- Strength  
- Prehension

#### Summary

The Graded Redefined Assessment of Strength, Sensibility and Prehension (GRASSP) is a clinical impairment measure that incorporates three domains vital to upper limb function: sensation, strength, and prehension. It is a multimodal test comprising 5 subtests for each upper limb: dorsal sensation, palmar sensation, strength, prehension ability and prehension performance. The GRASSP results in 5 numerical scores that provide a comprehensive profile of upper-limb function.

#### You Will Need

**Length:**  
- Sensation: 3 dorsal locations and 3 palmar locations for each hand  
- Strength: 10 arm and hand muscles for each arm  
- Prehension: 3 grasping tasks; 6 prehension tasks for each arm  

**Equipment:**  
GRASSP kit and manual muscle test equipment

**Scoring:**  
Scores for tasks in each section are summed for each subscale score. There is no total score.

**Training:**  
Reading the GRASSP manual is recommended.

#### Availability

The GRASSP may be purchased here: [http://www.grassptest.com](http://www.grassptest.com)

### Assessment Interpretability

#### Minimal Clinically Important Difference

Not established in SCI

#### Statistical Error

**Standard Error of Measurement:**  
- Strength: Right=1.8, Left=1.9  
- Sensation: No data available  
- Prehension ability: R=0.6, L=0.6  
- Prehension performance: R=2.5, L=1.8

**Minimal Detectable Change:**  
- Strength: Right=5.1, Left=5.3  
- Sensation: No data available  
- Prehension ability: R=1.8, L=1.7  
- Prehension performance: R=7.0

#### Typical Values

**Mean (SD) Scores:**  
- Strength: Right=24.3 (13), Left=25.1 (13.5)  
- Dorsal Sensation: R=6.5 (3.2), L=6.7 (3.1)  
- Palmar Sensation: R=7.1 (3.6), L=7.2 (3.3)  
- Prehension ability: R=4.9 (4.5), L=5.1 (4.3)  
- Prehension performance: R=15.6 (9.6), L=14.7 (8.9)
<table>
<thead>
<tr>
<th>L=4.9</th>
<th>(Kalsi-Ryan et al. 2012; n=72, chronic traumatic tetraplegia, mean time since injury (SD)=7.6 (6.1) years)</th>
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# Measurement Properties

## Validity – Moderate to High

*Moderate to High* correlation between the GRASSP subtests, SCIM-self care, & ASIA UEMS:

**At 1 month post-injury:**
- Strength & SCIM-self-care = 0.78
- Strength & ASIA UEMS = 0.95
- Sensation & SCIM-self-care = 0.63
- Prehension performance & SCIM-self-care = 0.85

**At 12 month post-injury:**
- Strength & SCIM-self-care = 0.82
- Strength & ASIA UEMS = 0.88
- Sensation & SCIM-self-care = 0.56
- Prehension performance & SCIM-self-care = 0.82

*Moderate to High* predictive validity:

ROC analysis AUC = 0.71-0.86

(Velstra et al. 2015; n=74, 51 males, acute tetraplegia, 16-40 days post-injury)

**Number of studies reporting validity data:** 7

## Reliability – High

*High* Test-retest Reliability for all domains of the GRASSP:

ICC = 0.86-0.98

(Kalsi-Ryan et al. 2012; n=45, chronic traumatic tetraplegia)

*High* Inter-rater Reliability for all domains of the GRASSP:

ICC = 0.84-0.96

(Kalsi-Ryan et al. 2012; n=72, chronic traumatic tetraplegia, mean time since injury (SD)=7.6 (6.1) years)

**Number of studies reporting reliability data:** 2

## Responsiveness

**Floor/Ceiling Effect:**
- Not established in SCI

**Effect Size:**

*Between 1-12 months post-injury:*

- Strength: 1.48
- Sensation: 0.64
- Prehension ability: 0.99
- Prehension performance: 1.03

(Velstra et al. 2015; n=74, 51 males, acute tetraplegia, 16-40 days post-injury)

**Number of studies reporting responsiveness data:** 2