**Ashworth and Modified Ashworth Scale (MAS)**

### Assessment Overview

#### Assessment Area

**ICF Domain:** Body Function  
**Subcategory:** Neuromusculoskeletal & Movement-related Functions and Structures

#### Summary

The Ashworth Scale measures the effects of antispasticity drugs in individuals with multiple sclerosis (it has subsequently been adapted for other diagnoses, including SCI).

The Modified Ashworth Scale measures resistance during passive soft-tissue stretching and is used as a simple measure of spasticity in patients with lesions of the Central Nervous System.

#### You Will Need

- **Length:** 5 minutes or less (depending on muscles/joints tested)
- **Training:** Requires clinical judgment and experience with spasticity
- **Scoring:**
  - **Original Ashworth Scale:** Tests resistance to passive movement about a joint, scores range from 0-4 with 5 choices, a score of 1 indicates no resistance, 5 indicates rigidity.
  - **Modified Ashworth Scale:** Similar to the Ashworth Scale but adds a 1+ scoring category to indicate resistance through less than half of the movement, scores range from 0 (no increase in muscle tone) to 4 (affected part(s) rigid in flexion or extension, with 6 choices.

#### Availability

Video: [https://scireproject.com/videos/outcome-measures-group/](https://scireproject.com/videos/outcome-measures-group/)

### Assessment Interpretability

#### Minimal Clinically Important Difference

Not established for SCI;  
In stroke, initial change in muscle tone/spasticity in response to Botox® treatment was approximately a 1-point decrease on the MAS scale, reflecting a clinically significant improvement.  
(Shaw et al. 2010, n=333, adults with upper limb spasticity due to stroke; >1 month post-stroke)

#### Statistical Error

Not established for SCI

#### Typical Values

**Score Distributions (SD):**  
Score 0: 25.7%  
Score 1: 34.0%  
Score 2: 23.7%  
Score 3: 16.5%  
(Sherwood et al., 2000; N=97, 95 male, 62 cervical SCI; mixed injury types; 0.5-39 years post-SCI)
Measurement Properties

Validity – Low to High

**Moderate to High** correlation with Spinal Cord Assessment Tool for Spastic reflexes (SCATS):

<table>
<thead>
<tr>
<th>SCATS</th>
<th>Clonus</th>
<th>Flexion</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip</td>
<td>0.56</td>
<td>0.55</td>
<td>0.98</td>
</tr>
<tr>
<td>Knee</td>
<td>0.65</td>
<td>0.47</td>
<td>0.88</td>
</tr>
<tr>
<td>Ankle</td>
<td>0.60</td>
<td>0.40</td>
<td>0.61</td>
</tr>
</tbody>
</table>

**Moderate** correlation with Penn Spasm Frequency Scale (PSFS):

- Ashworth Hip: \( r = 0.43 \)
- Ashworth Knee: \( r = 0.43 \)
- Ashworth Ankle: \( r = 0.51 \)

(Benz et al. 2005; n=17; mixed injury types; 24-372 months post-SCI)

**Low** correlation with Spasm Frequency Scale (SFS):

\( \rho: -0.13 \) to 0.21

(Baunsgaard et al. 2016; n=31; 20 males; mean age: 48.3 ± 20.2 years, age range: 15-88 years, 17 traumatic, 14 non-traumatic)

**Moderate to High** correlation with Modified Tardieu Scale (MTS):

- \( r = 0.791 \) (Hip adductor muscles)
- \( r = 0.920 \) ( Hip extensor muscles)
- \( r = 0.539 \) (Knee extensor muscles)
- \( r = 0.562 \) (Knee flexor muscles)
- \( r = 0.864 \) (Ankle plantar flexor muscles)

(Akpinar et al. 2017; n=58; 37 males; mean age: 44±14 years, age range: 18-88 years, mixed injury)

**Number of studies reporting validity data:** 8

Reliability – Moderate to High

**Moderate** Inter-rater Reliability (for MAS):

- ICC = 0.56

(Tederko et al 2007; n=30, 23 males; mixed injury type cervical SCI; inpatient; mean time since injury = 14.1 months)

**Moderate to High** inter-rater reliability (MAS):

- Kappa: 0.531-0.774

(Akpinar et al. 2017; n=58; 37 males; mean age: 44±14 years, age range: 18-88 years, mixed injury)

**Number of studies reporting reliability data:** 8

Responsiveness

**Floor/Ceiling Effect:**

In a group of MS or SCI patients with intrathecal baclofen treatment, Ashworth scores were found to significantly decrease

(Boviatsis et al. 2005; n=22, 15 with MS, 7 with SCI; no SCI type data available; 12 males; mean time since injury = 2.71 years)

**Effect Size:**

Not established for SCI

**Number of studies reporting responsiveness data:** 4