



## Velocity Dependent Measure of Spasticity (VDMS) – User Manual

The Velocity Dependent Measure of Spasticity (VDMS) is an ordinal scale to measure and quantify spasticity of the muscle groups of the upper and lower extremities. The assessment measures the International Classification of Functioning Disability and Health category: body function b7350. Validity and reliability of the VDMS are available for children and youths from the age of four to 18 years, with neuromotor disorders. Nevertheless, the test can be applied even in younger children with neuromotor disorders, with adaptations of the test position and also procedure.

- Practicability:** To test all defined muscle groups of the lower and upper extremities takes 12 minutes. No special equipment is needed.
- Reliability:** The interrater reliability of the VDMS is 'substantial' to 'almost perfect' (Gwet's alpha one: 0.66-0.99, n=45). The test-retest reliability is 'almost perfect' (Gwet's alpha one: 0.83-1.00, n=42).<sup>1</sup>
- Validity:** Detecting spasticity with the described test procedure was found to be 'moderate' to 'good'.<sup>2</sup>
- Responsivity:** Not tested to date

### Test procedure

The child lies in supine on a flat surface. A pillow supports the head, and a knee roll or a convoluted towel (depending on the length of the legs) is placed under the knees. The tested limb is supported against gravity, without touching the tested muscle groups. The muscle groups are tested from proximal to distal.

1. Two slow movements are applied throughout the full range of motion (slow stretch applied in 4 to 5 seconds for both movement)
2. Two fast movements are applied throughout the full range of motion (fast stretch applied in less than one second for both movements)
3. The two fast movements are repeated, after a pause (at least 5 seconds) to feel the resistance of the tested muscle group
4. Rating of the level of spasticity with the VDMS categories, which is, the perceived difference of the resistance during the fast versus the slow, passive stretch.















### **Categories    Definition Velocity Dependent Measure of Spasticity (VDMS)**

<b>No</b>	No increase in resistance throughout the whole passive range of motion when applying fast, passive stretch compared to slow, passive stretch <i>'No' means the perceived resistance is the same for fast, passive stretch and slow, passive stretch</i>
<b>Mild</b>	A slightly increased resistance through less than one-third of the passive range of motion when applying fast, passive stretch compared to slow, passive stretch <i>'Mild' means fast, passive stretch can be applied easily, but an increased resistance compared to slow passive stretch is perceived</i>
<b>Moderate</b>	A moderately increased resistance through more than one-third and less than two-thirds of the passive range of motion when applying a fast, passive stretch compared to slow, passive stretch <i>'Moderate' means fast passive stretch can be applied only with more effort; a clearly increased resistance compared to the slow, passive stretch is perceived</i>
<b>Severe</b>	A severely increased resistance through more than two-thirds of the passive range of motion by applying a fast, passive stretch compared to slow passive stretch <i>'Severe' means fast, passive stretch is difficult to perform, the perceived resistance is high</i>















<sup>1</sup> Marsico et al., 2021: Velocity dependent measure of spasticity: Reliability in children and juveniles with neuromotor disorders

<sup>2</sup> Marsico et al., 2016: Hypertonia Assessment Tool: Reliability and Validity in Children With Neuromotor Disorders; Jethwa, et al., 2010: Development of the Hypertonia Assessment Tool (HAT): A discriminative tool for hypertonia in children.

Velocity Dependent Measure of Spasticity (VDMS) – Score sheet – upper limbs

Starting position	Ending position	Muscle group	Left side	Right side
		Shoulder adductors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Elbow flexors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Elbow extensors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Forearm pronators	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Forearm supinators	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Wrist flexors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Wrist extensors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Velocity Dependent Measure of Spasticity (VDMS) – Score sheet – lower limbs

Starting position	Ending position	Muscle group	Left side	Right side
		Hip adductors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Hip extensors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Hip flexors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Knee flexors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Knee extensors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Plantar flexors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Dorsal extensors	<input type="checkbox"/> No <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>