

## ORGANIZATION NEWS

### Highlights From the Rehabilitation Measures Database

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# Measurement Characteristics and Clinical Utility of the Motor Evaluation Scale for Upper Extremity in Stroke Patients

Ann Van de Winckel, PhD, MSPT, PT, Linda Ehrlich-Jones, PhD, RN

Few stroke scales for upper limb movements include movement quality when assessing task completion. Assessing movement quality is important because it provides information about *how* a person accomplishes a task, including compensatory movements and joint limitations. This is essential information for the therapist to guide individualized treatment and optimize recovery.<sup>1</sup>

The Motor Evaluation Scale for Upper Extremity in Stroke Patients (MESUPES) assesses quality and quantity of upper limb daily life functional movements in stroke. Because tone, muscle contractions, and active movements are scored by a therapist, the scale is useful for people with no active arm or hand function to minimal motor impairments.<sup>2</sup> MESUPES has a MESUPES-ARM section (8 items) and a MESUPES-HAND section (9 items) and takes 5-15 minutes to complete.<sup>2</sup>

MESUPES-ARM and MESUPES-HAND have excellent inter-rater reliability,<sup>2,3</sup> internal consistency and construct validity, evaluated with Rasch Measurement Theory.<sup>2</sup> Rasch Measurement Theory converts an ordinal scale to an interval scale (measured in logits) for more precise measurement of change. The hierarchy from easy to difficult items is maintained across demographic and clinical subgroups.<sup>2</sup> Conversion from total scores for both subscales to logits to a Rasch-converted percentage score can be requested from [avandewi@umn.edu](mailto:avandewi@umn.edu). Plans are made to publish the conversion table. Both subscales have excellent convergent validity with the Modified Motor Assessment Scale and Stroke Upper Limb Capacity Scale, ranging from  $\rho=0.84-0.91$ .<sup>3,4</sup> SEM and minimal detectable change values are available.<sup>3</sup> In sum, the reliability, validity, unidimensionality of the subscales and invariance across stroke subgroups support clinical use of MESUPES in people with stroke.

This abbreviated summary provides a review of the psychometric properties of the MESUPES in people with stroke. A full review of the MESUPES and reviews of over 400 other instruments for patients with various health conditions can be found at: [www.sralab.org/rehabilitation-measures](http://www.sralab.org/rehabilitation-measures).

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This instrument summary is designed to facilitate the selection of outcome measures by clinicians. The information contained in this summary represents a sample of the peer-reviewed research available at the time of this summary's publication. The information contained in this summary does not constitute an endorsement of this instrument for clinical practice. The views expressed are those of the summary authors and do not represent those of authors' employers, instrument owner(s), the *Archives of Physical Medicine and Rehabilitation*, the Rehabilitation Measures Database or the United States Department of Health and Human Services. The information contained in this summary has not been reviewed externally.

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#### BIBLIOGRAPHY

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2. Van de Winckel A, Feys H, van der Knaap S, et al. Can quality of movement be measured? Rasch analysis and inter-rater reliability of the Motor Evaluation Scale for Upper Extremity in Stroke Patients (MESUPES). *Clin Rehabil* 2006;20:871-84.
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## Authorship

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	<b>Measure Name:</b> <b>Motor Evaluation Scale for Upper Extremity in Stroke Patients</b>		<b>Summary Author:</b> A. Van de Winckel, PhD, MS, PT & L. Ehrlich-Jones, PhD, RN													
	<b>Populations Reviewed:</b> Stroke Patients	<b>Administration Time:</b> 5-15 minutes	<b>Score (Min/Max):</b> 0-58	<b>Items:</b> 17	<b>Acronym:</b> MESUPES											
<b>Purpose and Administration Instructions:</b> The MESUPES measures <b>quality of movement performance</b> of the hemiparetic arm and hand in people with stroke. Because tone, muscle contractions, and active movements are scored, the scale is useful for people who have no active arm and hand function to minimal motor impairments. <sup>2</sup> MESUPES has 17 items, composed of The MESUPES-ARM (8 items) and MESUPES-HAND (9 items). <sup>2</sup> MESUPES takes 5-15 min to complete. <sup>2</sup>		<b>Scoring Instructions:</b> <ul style="list-style-type: none"> <li>The raw scores of the individual items are summed for MESUPES-ARM and MESUPES-HAND separately.<sup>2</sup></li> <li>Conversion of raw scores to Rasch-transformed scores can be requested at <a href="mailto:avandewi@umn.edu">avandewi@umn.edu</a>. Publication of the conversion table is planned.</li> </ul>														
<b>Training Required:</b> A training video is available on: <ul style="list-style-type: none"> <li><a href="https://www.youtube.com/watch?v=m3S2sEMF5jU">https://www.youtube.com/watch?v=m3S2sEMF5jU</a></li> </ul> Instructions are given with the scoring sheet <ul style="list-style-type: none"> <li>Van de Winckel A, et al. (2006)<sup>2</sup></li> <li><a href="https://www.stroking.ca/en/family/mesupes/">https://www.stroking.ca/en/family/mesupes/</a></li> <li><a href="https://www.sralab.org/rehabilitation-measures/motor-evaluation-scale-upper-extremity-stroke#stroke">https://www.sralab.org/rehabilitation-measures/motor-evaluation-scale-upper-extremity-stroke#stroke</a></li> </ul>		<b>Standard Error of Measurement<sup>3</sup>:</b> <ul style="list-style-type: none"> <li>SEM for MESUPES-ARM (/40) = 2.20 points</li> <li>SEM for MESUPES-HAND (/18) = 0.94 points</li> <li>SEM for MESUPES total score (/58) = 2.68 points</li> </ul>														
<b>Reliability:</b> Good to excellent inter-rater reliability <sup>2,3</sup> <ul style="list-style-type: none"> <li>ICC = 0.95-0.98</li> <li>Weighted kappa = 0.62-0.96</li> <li>Weighted percentage agreement = 85.71-98.21</li> </ul> Excellent internal consistency <sup>2</sup> <ul style="list-style-type: none"> <li>Person separation index = 0.97-0.99</li> </ul>		<b>MDC<sup>3</sup>:</b> <ul style="list-style-type: none"> <li>MDC for MESUPES total score (/58) at 95% CI = 7.43 points with the 3 outliers in the study; 4.3 points without the 3 outliers in the study</li> <li>MDC<sub>95%CI</sub> for MESUPES-ARM test (/40) = 6.10 points</li> <li>MDC<sub>95%CI</sub> for MESUPES-HAND test (/18) = 2.61 points</li> </ul>														
<b>Floor / Ceiling Effects:</b> No floor- or ceiling effect observed for the total test (min score of 0 on total score = 8/396 patients, or 0.02%; max score of 58 on total score = 12/396 patients or 0.03%) <sup>2</sup>		<b>Validity:</b> <ul style="list-style-type: none"> <li>Excellent construct validity evaluated with Rasch Measurement Theory (unidimensionality confirmed, item difficulty hierarchy stable across demographic and clinical subgroups<sup>2</sup>)</li> <li>Excellent convergent validity between MESUPES and Modified Motor Assessment Scale (MMAS) (<math>\rho=0.80-0.87</math>)<sup>3</sup></li> <li>Excellent convergent validity between MESUPES and Stroke Upper Limb Capacity Scale (SULCS) (<math>\rho=0.87-0.91</math>)<sup>4</sup></li> </ul>														
<b>Required Equipment<sup>2</sup>:</b> <ul style="list-style-type: none"> <li>Paper or digital questionnaire</li> <li>Plinth or mat</li> <li>Desk and chair</li> <li>One larger plastic bottle (20fl oz or 591 ml)</li> <li>One smaller plastic bottle (e.g. correction fluid bottle)</li> <li>Dice (1.5 x 1.5cm)</li> </ul>		<b>Cut-off Criteria:</b> <table border="1"> <thead> <tr> <th></th> <th>r</th> <th>ICC</th> </tr> </thead> <tbody> <tr> <td><b>Excellent</b></td> <td>≥ .6</td> <td>≥ .75</td> </tr> <tr> <td><b>Adequate</b></td> <td>.31- .59</td> <td>.40 - .74</td> </tr> <tr> <td><b>Poor</b></td> <td>≤ .3</td> <td>&lt; .4</td> </tr> </tbody> </table>		r	ICC	<b>Excellent</b>	≥ .6	≥ .75	<b>Adequate</b>	.31- .59	.40 - .74	<b>Poor</b>	≤ .3	< .4	<b>Abbreviations:</b> <ul style="list-style-type: none"> <li>MDC: Minimal Detectable Change</li> <li>SEM: Standard Error of Measurement</li> <li>Logit: Log-odds unit, interval level unit of measurement calculated in the probability model of the Rasch Measurement Theory. The <b>logit</b> function gives the log-odds, or the logarithm of the odds <math>p/(1-p)</math>.</li> <li>ICC: Intraclass Correlation Coefficient</li> </ul>	
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		<b>Considerations:</b> English, Dutch (Flemish), French, German, Italian, Portuguese, Spanish, Catalan and Swedish versions are available.														