**PREP2 TMS Operator – Key Competencies**

This document is designed for clinicians using the PREP2 prediction tool for upper limb motor outcomes after stroke. It provides information that will support you to perform a TMS assessment and determine MEP status as part of PREP2. You will need practical training from an expert in TMS in order to develop the necessary skills.

The competencies required will be different depending on your role. Ensure that you have discussed which competencies are relevant to you with your PREP2 TMS trainer. The competencies related to PREP2 Basic are prerequisite to this competency document, and PREP2 Advanced competencies are provided in a separate document.

Agreed competencies are to be signed off by yourself and your PREP2 TMS trainer. Bring your competency document to any training sessions.

**On completion of competencies:**

Copy to be retained by employee and healthcare organisation. Once signed off, it is the responsibility of the trainee to ensure that skills are kept up to date, and opportunities to refresh skills and knowledge are sought on a regular basis.

**PREP2 Basic:**

*Trainee*: “I acknowledge that I have successfully completed the PREP2 Basic module”

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_

Date of competency sign off: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PREP2 Advanced if completed:**

*Trainee*: “I acknowledge that I have successfully completed the PREP2 Advanced module”

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_

Date of competency sign off: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PREP2 TMS Operator:**

*Organisation representative:* “I acknowledge that the trainee has successfully completed PREP2 TMS Operator training”

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_

*Trainee*: “I acknowledge that I have successfully completed PREP2 TMS Operator training and understand the training given”

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_

**Readings & Resources**

In addition to the listed readings and resources you are expected to look for some up to date literature and record this as you go.

Stinear C (2010) Prediction of motor recovery after stroke *Lancet Neurology* 9(12): 1228-32

Stinear C (2017) PREP 2: A biomarker-based algorithm for predicting upper limb function after stroke. *Annals of Clinical and translational Neurology. 4(11): 811-820.*

Stinear C. (2017) [Prediction of motor recovery after stroke: advances in biomarkers](https://www.sciencedirect.com/science/article/pii/S1474442217302831). *Lancet Neurology* 16(10): 826-36.

Smith, M. C., Ackerley, S. J., Barber, P. A., Byblow, W. D., & Stinear, C. M. (2019). PREP2 Algorithm Predictions Are Correct at 2 Years Poststroke for Most Patients. *Neurorehabil Neural Repair*, *33*(8), 635-642.

Lundquist CB, Nielsen JF, Arguissain FG, Brunner IC. (2021). Accuracy of the Upper Limb Prediction Algorithm PREP2 Applied 2 Weeks Poststroke: A Prospective Longitudinal Study. *Neurorehabil Neural Repair*, 35(1), 68-78.

Hallett M (2007) Transcranial magnetic stimulation: a primer Neuron 55(2):187-99.

Rothwell J (2007) Techniques and mechanisms of action of transcranial stimulation of the human motor cortex *Journal of Neuroscience Methods* 74:113-22.

Rossi S (2021) Safety and recommendations for TMS use in healthy subjects and patient populations, with updates on training, ethical and regulatory issues: Expert Guidelines. *Clinical Neurophysiology* 132 (1), 269-306.

Lerner A (2019) Seizures from transcranial magnetic stimulation 2012–2016: Results of a survey of active laboratories and clinics. *Clinical Neurophysiology* (https://doi.org/10.1016/j.clinph.2019.03.016)

[www.presto.auckland.ac.nz](http://scanmail.trustwave.com/?c=7264&d=zPXa2UJ9CgRjx5a7lqxPr_-xi9YtRpZU3HcO3CiImw&u=http%3a%2f%2fwww%2epresto%2eauckland%2eac%2enz)

<https://preptraining.auckland.ac.nz/>

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| --- | --- |
| **Article Reference:** | **Key points:** |
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| **Required?**  **Y or N/A** | **Competency** | **Measurement** | **Relevant self-directed learning module** | **Self-sign off & date** | **Trainer**  **Sign off & date** |
| --- | --- | --- | --- | --- | --- |
| *Required if PREP2 Advanced not completed* | Demonstrates basic knowledge of Transcranial Magnetic Stimulation (TMS) | * Can describe mechanism of action of TMS | TMS Overview  Section completed |  |  |
| TMS Overview  Final quiz passed |
| Demonstrates an understanding of screening patients for TMS | * Can describe the absolute contraindications and relative considerations to TMS * Can describe health and safety considerations for TMS operators | TMS Safety Checklist  Section completed |  |  |
| TMS Safety Checklist  Final quiz passed |
| Demonstrates ability to use TMS in practice | * Can identify and name parts of TMS and EMG equipment and their function * Can identify the components of the motor evoked potential (MEP) * See attached clinical observation records for further competency sign off | TMS for PREP2  Section completed |  |  |
| TMS for PREP2  Final quiz passed |  |  |
|  | Demonstrates ability to optimise TMS technique | * Can problem solve electromyography (EMG) issues to ensure readable traces | EMG Technique  Section completed |  |  |
| EMG Technique  Final quiz passed |
|  | Demonstrates ability to accurately determine MEP status | * Can accurately identify MEP status from EMG traces | MEP identification  Section completed |  |  |
| MEP identification:  Simple  Final quiz passed |
| MEP identification:  Challenging  Final quiz passed |

**Practical assessment - TMS Operator role**

**(Trainee to be assessed in session with PREP2 TMS trainer)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Patient name:** |  | **Diagnosis:** | | |  | **Position:** Chair / Bed |
| **Date:**  **Day post-stroke:** |  | **Age:** | | |  | **Tested:** One side / Both |
|  |  | **Gender:** | | |  | **Outcome:** MEP+ / MEP- |
| **Ward:**  **Assessor:** |  | **Day 3 SAFE:** /10  **Day 3 NIHSS:** | | |  | **Prediction: Good / Limited / Poor**  **Prediction given:** YES / NO - Plan? |
| **Present:** |  |  | | |  |  |
|  |  |  | | |  |  |
| **Competency** | | | **Yes/No** | **Comments** | | | |
| **Can screen patient for contraindications to TMS**   * Accurately completes the TMS Safety Checklist, in consultation with the patient, their family, and the patient’s clinical notes * Presents the completed checklist to the patient’s physician for consideration * Records the decision of the TMS safety screening in the patient’s clinical notes, and conveys the outcome to the patient and their family * Provides the patient and their family with an accurate and concise explanation of the TMS procedure * Provides the patient and their family with an accurate and considerate explanation of the possible prediction outcomes after TMS testing | | |  |  | | | |
| **Can record surface EMG**   * Prepares the skin appropriately * Accurately positions EMG electrodes over the target muscle(s) and reference site * Correctly connects the EMG electrodes to the EMG recording system * Correctly uses EMG system software to observe EMG activity * Can discern between acceptable and unacceptable EMG signals, and between biological and non-biological sources of noise in the signal * Can trouble-shoot to improve the quality of the EMG signal as required | | |  |  | | | |
| **Can participate in TMS testing session**   * Communicates effectively with the patient before and during the testing procedure * Safely turns on, arms and tests the TMS unit * Appropriately positions the TMS coil over the patient’s head over the area of the primary motor cortex * Uses an appropriate initial stimulus intensity * Appropriately re-positions the TMS coil in order to locate the optimal stimulation site * Increases the stimulus intensity as required in appropriate increments and with communication to the patient * Uses facilitation techniques when appropriate * Accurately evaluates whether motor evoked potentials (MEPs) can be elicited in the target muscle(s) * Monitors the patient throughout the TMS session and responds appropriately * Removes EMG electrodes and cleans patient’s skin * Disconnects, turns off and stores equipment correctly | | |  |  | | | |
| **Post-session debrief:** | | |  | **Action plan:** | | | |

Observation Sessions with PREP2 TMS trainer leading testing (3 minimum)

|  |  |  |  |
| --- | --- | --- | --- |
| **Number** | **Date** | **Trainer** | **Comments** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |

Training sessions without patient (3 minimum)

|  |  |  |  |
| --- | --- | --- | --- |
| **Number** | **Date** | **Trainer** | **Comments** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |

Supported cases with PREP2 TMS trainer – Trainee to lead (3 minimum)

|  |  |  |  |
| --- | --- | --- | --- |
| **Number** | **Date** | **Trainer** | **Comments** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |

\*Add more pages as necessary to log sessions

Independent Management Log

|  |  |  |  |
| --- | --- | --- | --- |
| **Number** | **Date** | **Present** | **Comments** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |

\*Add more pages as necessary to log sessions