Myasthenia Gravis Impairment Index (MGII)
Administration Manual - MGNet Clinical Trial Outcome Measure Working Group

Introduction:

The MGII is a measure of disease severity based on the signs and symptoms of myasthenia gravis. It was developed using a patient-centered approach, and followingcurrent guidelines for outcome measure development, incorporated patient input throughout the different development phases.

The MGII has 22 patient reported items, administered as a questionnaire, and 6 examination items, performed by a rater. Scores are presented in a sum of all items for a total score, but also as an ocular and a generalized sub-score.

MGII Questionnaire, Administration Instructions:

The patient should be provided with the MGII questionnaire form that includes instructions for self-completion. The patient should complete the MGII without evaluator input or guidance. Similarly, no family members or other visit attendeesshould provide input to the patient on how to answer the items.

Evaluator Review:
The evaluator should review the MGII questionnaire once the patient has completed the form.

• If any MGII questionnaire item is not completed by the patient, inquire whether the omission was intentional or not. If omitted in error, then ask the patient to complete.

• If a patient asks for clarification about a question, please simply remind the patient to answer questions based on the impact of their MG-related symptoms. Do not help the patient to tease apart relative contributions from MG and non-MG causes.

Scoring instructions are detailed in page 4.

MGII- Examination Instructions

- Pyridostigmine needs to be held for at least 12 hours prior to these assessments, whereas long-acting (extended release) formulations should be held for at least 24 hours. The time and amount of the last dose taken should be recorded.
- If the QMG-R assessment has already been performed, the item scores for arm, leg and neck endurance can be calculated from the QMG-R, provided exact endurance times are recorded. Importantly, item score cut-offs are not the same between the QMG-R and MGII.
- If the QMG-R has not been performed, please refer to the instructions for testing arm, leg and neck endurance in the QMG-R manual. The instructions for performing these assessments in the MGII and QMG-R are the same, only the scoring is different. Make sure to record the endurance time.

1. Diplopia:

Ask the patient to follow your finger in all primary directions (up, down, right and left). Ask the patient if they have diplopia in any direction, including in primary gaze. Record the number of gaze directions where diplopia is present. This is not a fatigability test, so no need to hold gaze once patient has reported on presence or absence of diplopia.

A patient with monocular vision will score 0 in this item. A patient with severe restriction of extraocular movements will score 0 if they do not report diplopia.

2. Ptosis:

Ask the patient to hold their gaze upwards, for up to 60 seconds, and record the time to develop ptosis (in seconds). A patient with clear ptosis at baseline (i.e. lid touching the pupil) will score 2 points in this item, and no sustained upgaze test is needed.

3. Lower Facial Strength:

Ask the patient to blow air into their cheeks and hold it against resistance. You can provide cues such as "like blowing a balloon".

4. Arm Endurance:

Transfer endurance **time** from QMGS-R. Record the time for the **best** performing arm (right or leg) on the MGII scoring sheet. Note that the scoring ranges are different for the QMGS-R and the MGII.

If QMGS-R has not been performed, then refer to the separate QMGS-R instructions.

5. Leg Endurance:

Transfer endurance **time** from QMGS-R. Record the time for the **best** performing leg (right or leg) on the MGII scoring sheet. Note that the scoring ranges are different for the QMGS-R and the MGII.

If QMGS-R has not been performed, then refer to the separate QMGS-R instructions.

6. Neck Endurance:

Transfer endurance time from QMGS-R. Note that the scoring ranges are different for the QMGS and the MGII.

If QMGS-R has not been performed, then refer to the separate QMGS-R instructions.

MGII- Scoring Instructions

- The MGII can be summarized as a total score and also as 2 sub-scores, reflecting an Ocular and a Generalized domain.

- The total score is the raw sum of all the items, including the clinical examination (E) and the patient-reported (PR) questionnaire.

- The ocular score is calculated by summing 8 items reflecting ocular impairments. These items are: PR items 1 to 6 and examination items 1 and 2.

- The generalized score is calculated by adding PR items 7 to 22 and examination items 3 to 6.

- The scoring sheet provided can be used for manually calculating sub-scores and can help visualize how items are summed. For larger datasets, we can provide an R script for calculating the sum-scores and imputing missing data.

Missing Data:

- If 2 boxes are marked, count the response indicating more severity. If a mark is placed outside of a box, count the response closer to the mark. If the mark is in the middle of two boxes, count the response indicating higher severity.

- For missing answers, impute the average score for the other items in the same domain or region (ocular or generalized).

Important: We consider the total sum-score reliable when there are ≤3 items missing (<10% missing responses). On the validation and responsiveness studies (n>200), less than 5% of patients had more than 3 missing items, so this scenario is infrequent.