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## Disability assessment in the Google Maps era: a pilot study

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(Article begins on next page)

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**Objectives:** since ambulation is mostly important for human beings, we investigated whether Google Maps (GM) application may improve walking disability assessment, through the example of Multiple Sclerosis (MS), in which disability evaluation is heavily influenced by gait disturbances.

**Design:** multicenter observational single blind study to assess the agreement of perceived, GM and actual maximum walking distance (MWD)

**Setting:** six MS centers

**Participants:** 243 patients with MS (pwMS). Inclusion criteria: diagnosis of MS (McDonald 2010); Expanded disability status scale (EDSS)  $\leq 6$ ; mental functional system  $\leq 1$ , diseases duration (DD)  $\geq 1$  year. Exclusion criteria: ongoing MS relapse, recent steroid treatment, conditions influencing ambulation.

**Main outcome measures:** perceived ambulation score (pAS) and perceived EDSS (pEDSS) was estimated. We then assessed in a blinded way the GM AS (gmAS) and the GM EDSS (gmEDSS). In 75 pwMS we acquired an actual MWD to assess the actual AS (actAS) and the actual EDSS (actEDSS). Fatigue severity scale (FSS), patient health questionnaire (PHQ-9) and Patient Determined Disease Steps (PDDS) were collected.

**Results:** pEDSS and gmEDSS were coincident in 169/243 (69.55%) pwMS. In 74/243 (30.45%) were different (higher/lower). These three groups were significantly different for DD ( $p = 0.007$ ) and for FSS and PHQ-9 ( $p = 0.0001$ ). Multinomial logistic model applied to evaluate whether demographic and clinical data might have influenced the belonging to the group of pwMS with pEDSS congruent with gmEDSS (unchanged group) or pwMS with pEDSS different from gmEDSS (changed group). Progressive phenotype were more likely to belong to the changed group than relapsing-remitting phenotype (OR = 2.50, 95% CI 1.002 - 6.22,  $p = 0.049$ ). The pEDSS and the actEDSS were coincident in 45.3% of pwMS. gmEDSS and the actEDSS were coincident in 57.3%

**Conclusions:** GM app is a more accurate method to measure MWD especially in patients with moderate disability.

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