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TMS for Suicidal Crisis in Active Duty SMs

NCT03014362

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Statistical analysis

Primary analysis

The primary analysis compared rates of change in current suicide ideation (BSI-C) score over the intervention phase in the TMS versus sham group. A linear mixed effects model was used to analyze as the dependent variable the BSI-score at each of the 8 post-baseline sessions. The model included fixed effects for treatment group, time (treatment session (continuous)), treatment-by-time interaction; a random intercept for subject and random slope with time; and BSI-C score at baseline, gender, age at baseline and diagnosis of depression as covariates. Restricted maximum likelihood estimation was used with an unstructured covariance structure for the random effects. The Kenward-Roger approximation was used to estimate degrees of freedom. Analyses were performed separately among the intent-to-treat (ITT) population of all subjects who were randomized, and the per-protocol population of "completers", defined as subjects who completed all sessions of treatment with the scheduled number of pulses per session.

Secondary analyses

Secondary analyses compared changes from baseline in the secondary outcomes of BSI-C score and BSI total score at the final session and over follow up (1-, 3- and 6- month visits), in the treatment versus control group in the ITT population. Mixed models for repeated measures (MMRM) were used to analyze as dependent variables the change from baseline in each outcome (BSI-C score and BSI total score) at each visit. The models included fixed effects for treatment, visit (categorical), treatment-by-visit interaction; a random effect for subject; and baseline score for the outcome measure (BSI-C or BSI total), gender, age at baseline, and diagnosed depression as covariates. Restricted maximum likelihood estimation was used with an unstructured covariance structure and degrees of freedom were estimated with the Kenward-Roger method. Least square means for change in each outcome from baseline were compared by treatment group for each visit using contrast t-tests, with p-values corrected for comparisons at multiple time points using Bonferroni adjustment. Analyses were repeated for the additional secondary outcomes PHQ-9, PCL-5, and SF-36 scores at the final session and over follow up. All mixed model analyses were performed in R (Vienna, Austria) using the lme4 package (Bates et al., 2015). All significance tests were two-sided with a significance threshold of 0.05.

Exploratory analyses

Exploratory analyses evaluated changes in BSI-C score and BSI total score from baseline to the final session, and from baseline to final (6- month) follow up, by treatment group and within patient subgroups defined by presence of severe depression at baseline ($\text{PHQ-9} \geq 20$) in the ITT population. Change scores were compared by treatment group within patient subgroups using two-sample t-tests or Wilcoxon tests as appropriate to the score distributions.