All or Nothing: Issues Surrounding the Measurement and Analysis of Frequency of Use Data

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Background
The ‘all or nothing’ nature of drug use in treatment-seeking populations represents a potential pitfall for researchers who use frequency of use as a measure of treatment efficacy. The standard statistical tests, such as analysis of variance or regression, are predicated on the assumption that outcomes are distributed normally. Frequency-of-use data is often distributed bimodally, hence analysis with standard tests may lead to incorrect conclusions concerning treatment effectiveness. Using data from a real clinical trial, we outline a series of steps that can provide more robust inference of bimodal frequency of use data.

Step 1: Parametric Analysis – Figure 1
We analysed frequency-of-use data from a randomised controlled trial testing the efficacy of a tetrahydrocannabinol agonist (nabiximols) for treating cannabis dependence against placebo. A longitudinal mixed-effects regression was performed, testing the between-group differences in number of days’ use of illicit cannabis in the previous 28 days at four time points: baseline, 4, 8, and 12 weeks.

Step 2: Assumption Tests – Figures 2a and 2b
A histogram (2a) revealed this variable to be distributed bimodally. The extent of departure from normality was confirmed by a Quantile-Quantile plot (2b). Two approaches were used to address this problem (Steps 3 and 4).

Step 3: Dichotomisation – Figure 3
We calculated a ‘percentage-change-from-baseline score’ and then transformed this into a binary ‘≥50% reduction in days’ use’ versus ‘<50% reduction’, which also favoured the Nabiximols group (p=0.029).

Step 4: Non-Parametric Analysis – Figure 4
A non-parametric longitudinal analysis, using the ‘nparLD’ package in R, indicated the time curves for the treatment groups were not parallel (p=0.003), matching the results from the parametric analysis.

Discussion
When frequency of use variables are distributed bimodally, judicious use of assumption tests, transformation, and non-parametric techniques can be used to strengthen the credibility of the results from standard statistical tests.

Disclosure of interest: Study drugs (nabiximols and placebo) were provided free of charge by GW pharmaceuticals.

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1 Bhardwaj et al. 2018 2 Yoguchi et al., 2012