01AP07-4 - Comparison between two versions of the Patient State Index® during propofol and sevoflurane anesthesia, with or without remifentanil

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Background and Goal of Study: Patient State Index® (PSI-1) (Masimo, Irvine, CA, USA) is a processed electroencephalogram (EEG) parameter that quantifies the level of EEG inhibition by anesthetic drugs. Recently, a new PSI algorithm (PSI-2) was launched with improved performance in low power EEG and reduced susceptibility to electromyography. The objective of this study was to compare PSI-1 and PSI-2 in their correlation with propofol and sevoflurane drug concentrations and with the Modified Observers Assessment of Alertness and Sedation (MOAAS) scale. We also assessed the influence of respectively 2 or 4 ng/ml effect-site concentration of remifentanil (Ce_{REMI}) on the performance.
Materials and Methods: After institutional ethics committee approval (University Medical Center Groningen, Groningen, Netherlands) we included 36 healthy volunteers, stratified per age. Each volunteer was randomly allocated to a sequence of four sessions of anesthesia with a one week interval. During one session, we administered propofol in graded effect-site concentration steps. Sevoflurane was administered in session 2 driven by end-tidal vol%. In sessions 3 and 4 steps were repeated with addition of 2 or 4 ng/ml Ce_{REMI}. At each step, a 12 minute equilibration delay was maintained before testing the MOAAS and taking a blood sample for propofol and remifentanil concentrations measurement. We collected raw frontal EEG by means of a Root® monitor and a SedLine® sensor (Masimo, Irvine, CA, USA). Post-hoc, we extracted time synchronized PSI-1 and PSI-2, and plotted both versus respectively measured propofol or sevoflurane concentration. We used non-linear mixed effect modeling to fit a sigmoidal E_{max} dose response relationship. We also plotted PSI versus MOAAS.
Results and Discussion: After modeling PSI versus concentration, PSI-2 shows reduced population variability and improved baseline stability compared to PSI-1. The E_{max} model parameters are comparable except for E_{max}, which has a wider descriptive range for PSI-2. Looking at PSI versus MOAAS, PSI-2 has a lower interindividual variability than PSI-1. Both PSI's distinguish MOAAS 5,4 and 3 better during propofol anesthesia compared to sevoflurane. This difference disappears when adding remifentanil.
Conclusion(s): PSI-2 has enhanced signal stability and a better description of the dose-response relationship. PSI-2 has therefore improved capacity as a pharmacodynamic monitor of anesthesia compared to PSI-1.