

**THE BEDS STUDY:
A NEW APPROACH TO SLEEP ASSESSMENT IN THE CLINICAL SETTING**

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Purpose: The purpose of this study is to compare measures of the bispectral index (BIS) to sleep states derived from standard polysomnography (PSG) monitoring. Sleep deprivation in hospitalized patients is a poorly investigated phenomenon. This is particularly true within the confines of the intensive care unit. The paucity of research-based nursing interventions to promote sleep may be due in part to the difficulty in assessing the quality and quantity of sleep in the clinical setting. PSG is the current gold standard for sleep assessment, but is burdensome, limiting its feasibility in the clinical setting. The BIS monitor provides a signal processed value which represents the level of entropy in cortical activity and is being used in the operating room and ICU to monitor the level of consciousness during sedation and anesthesia. From previous work it is hypothesized that BIS values will be highest during stage awake and lowest during stage 3 & 4 NREM, and BIS values will increase during stage REM.

Method: Ten healthy subjects, 20 years and older, will be recruited. PSG monitoring will be performed using standard methods (Rechtschaffen & Kales, 1968). BIS monitoring will be done according to manufacturer recommendations. Subjects will sleep in a sound-proof, climate controlled room, the data will be collected in an adjoining room. Subjects will be studied at various times throughout the day to facilitate obtaining records that include all states of sleep. Each 30 second epoch of the sleep PSG will be scored as being either NREM (stage 1-4) or REM. We classified periods of awake as either (1) quiet awake which occurs prior to sleep onset and (2) awakening, indicating any period awake following sleep onset. BIS data will be synchronized with the PSG, divided into 30 second epochs and compared to the PSG state scores. BIS values range from 0-100 with higher values corresponding with increased cortical activity.

Findings: The study is currently in the data collection phase, we report data from the first six subjects (3M, 3F; age 25 to 47). The median BIS value for quiet awake was 87.7 ± 20.3 . The median BIS values for awakenings, stages 1-4 NREM, and REM were 82.1 ± 21.7 , 78.3 ± 25.7 , 65.7 ± 26.6 , 53.6 ± 26.6 , 38.9 ± 31.4 , 75.9 ± 18.3 respectively.

Discussion: The general trend in mean BIS values in the current findings is consistent with the hypothesis. However, the large ranges in BIS values will likely prohibit drawing exact relationships between PSG sleep stages and exact BIS values. If BIS values are demonstrated to be a reliable indicator of the quantity and quality of sleep in normal healthy subjects in a controlled environment then it becomes reasonable to proceed to testing the BIS monitor as a sleep assessment tool in other subjects, conditions, and clinical settings. Further analysis will investigate correlates of BIS and PSG monitoring during sleep stages and periods of arousal, as well as patterns and transitions during sleep. Information from this study could support the use of BIS monitoring as a sleep research tool in the clinical setting.

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