C4.1: Actigraphy and Patient Movement: Testing a New Application

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Introduction: Accurately measuring levels of agitation in the critically ill is essential. To optimize titration of sedatives and improve patient outcomes, an objective method of patient response to sedation must be developed. Although originally developed to evaluate sleep, actigraphy, which measures acceleration movement, integrating degree and intensity of motion, in numerical form, can also measure continuous physical activity, i.e. agitation level. The purpose of this study was to evaluate actigraphic data during a variety of simulated subject movements in adult volunteers to differentiate actigraphic results among patient behavior states.

Method(s): Thirty adults were tested (excluding those with neuromuscular disorders, decreased levels of movement, or severe sensory limitations). An actiwatch was placed on the wrist and
ankle of the volunteer. After demonstration, the volunteers simulated behavior for each state (calm, restless, agitated) for 10 minutes. Subjects were visually monitored and all subject movement (head, torso, extremities) was documented. For every one second interval, the proportional integrating method of the Actiwatch was used to determine the rectified area under the signal sensor curve. Mixed-effects modes were used to compare the mean response (actigraphic or movement counts) among the three states.

**Results:** Subjects had a mean age of 34.7 (SD = 14.1), 60% were female. Total movement was significantly different among states \( p < .0001; \) calm (0.50, 95%CI=0.45, 0.54), restless (2.21, 95%CI=2.14,2.29) agitated (3.84, 95%CI=3.75,3.94). Mean actigraphic measures were significantly different among states for both arm \( p < .0001; \) calm (7.5, 95% CI=0.7, 14.9), restless (30.3, 95% CI=22.8, 37.7) agitated (55.4, 95%CI=48.0, 62.8) and leg \( p < .0001; \) calm (4.2, 95%CI=-3.3, 11.6), restless (20.0, 95%CI=12.6,27.5), agitated (39.8, 95%CI=32.4, 47.3).

**Discussion & Conclusions:** Three distinct states of movement were successfully simulated. Actigraphic data can provide an objective indicator of patient activity over a variety of patient behavior states and these data may offer a standard for comparison for these movement states. However, actigraphic counts in calm subjects in this study were much less than published values in sedated critically ill patients.

**Abstract History:**

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