

Effect of Level I Trauma Call on Orthopaedic Attending Sleep Behavior and Physiologic Recovery: A Prospective Longitudinal Study

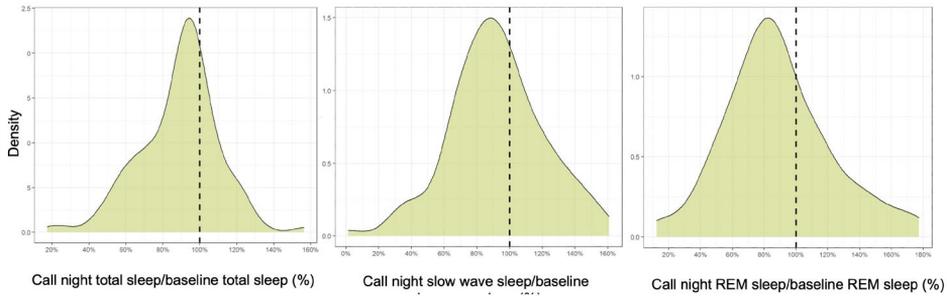
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Purpose: The effect of home orthopaedic call on surgeon sleep has not been quantified despite known negative impacts of poor sleep on cognition, fine motor skills, and decision-making. The purpose of this study is to prospectively quantify the impact of attending physician home call on sleep performance (total sleep, slow wave sleep [SWS], rapid eye movement [REM] sleep) and cardiac recovery metrics (heart rate variability [HRV]). HRV measures time variance in between heartbeats, reflecting sympathetic/parasympathetic system balance: low HRV has been previously shown to reflect fatigue and impaired cognition. We hypothesized that home call would impair all sleep parameters, that HRV would decrease post-call (reflecting poor recovery), and that sleep patterns would rebound the night after call to compensate for poor call sleep.

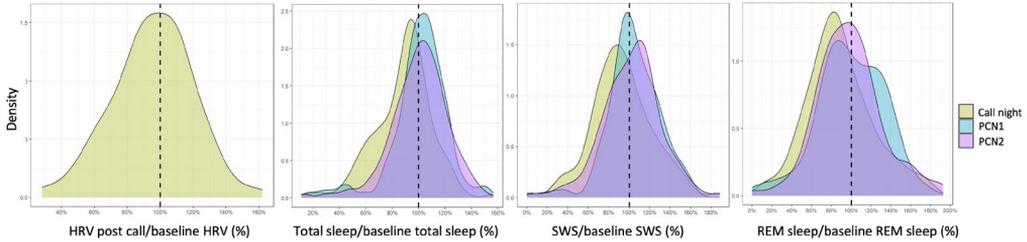
Methods: 12 orthopaedic attendings taking call (trauma, spine, hand, pediatrics; Level I academic trauma hospital; full time in-house residents) wore WHOOP 3.0 straps (previously validated = polysomnography). A total of 124 call nights were prospectively recorded June to December 2021 and matched with physiologic data to compare baseline sleep (the average of ~200 non-call nights per attending) to sleep performance on call. Total sleep, SWS, REM sleep, and HRV were recorded for all nights. "Poor" sleep was defined as <80% of baseline individual sleep based on prior literature.

Results: Total sleep, SWS, and REM sleep were all decreased on call. A notable shift from baseline occurred in all sleep parameters, suggesting sleep was impacted in a predominance of call experiences. 30.0% of attendings had poor total sleep on call nights. 30.6% of call nights recorded poor SWS, and 41.9% of call nights recorded poor REM sleep (Fig. 1). Most call nights resulted in decreased HRV; 25% of calls resulting in next-day HRV below 80% of baseline. Sleep and HRV improved on subsequent nights, with only 12% of surgeons below 80% of baseline HRV on post-call day 2. Sleep performance in all categories rebounded on PCN1 (post-call night 1) and PCN2 (Fig. 2).

Conclusion: Orthopaedic surgeon sleep performance and recovery is significantly affected by taking Level I call. Most importantly, deep sleep and REM sleep are specifically impacted via decreased HRV post-call. Sleep and recovery metrics appear to improve toward baseline on subsequent nights. These observed physiologic effects of home call deserve consideration regarding surgeon health, compensation, and patient safety.



Call night total sleep/baseline total sleep (%) Call night slow wave sleep/baseline Call night REM sleep/baseline REM sleep (%)
 Figure 1: Attending call night total sleep, SWS, and REM sleep are all decreased compared to baseline, as seen by left-shift. Dashed line represents scaled baseline (100%).



HRV post call/baseline HRV (%) Total sleep/baseline total sleep (%) SWS/baseline SWS (%) REM sleep/baseline REM sleep (%)
 Figure 2: HRV is decreased after a night on home call, as shown by the left shift from baseline. Total sleep, SWS, and REM sleep all show a recovery towards baseline on PCN1 and PCN2. Dashed line represents scaled baseline (100%).