

0016

CHANGES IN ALERTNESS OVER CONSECUTIVE WORKDAYS FOR INTERNAL MEDICINE INTERNS: A SECONDARY ANALYSIS OF THE ICOMPARE TRIAL

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Introduction: Little is known about the impact of cumulative workdays on medical residents' alertness. The purpose of this study was to examine changes in alertness over consecutive workdays following a day off for internal medicine interns.

Methods: This is a secondary report of a randomized non-inferiority trial of 12 internal-medicine residency programs assigned to either standard duty-hour (80h workweek/16h shifts) or flexible (80h workweek/no shift-length limit) policies. Interns were followed for 2 weeks during inpatient rotations. Each morning, alertness (number of Brief Psychomotor Vigilance Test [PVT-B] lapses) was assessed, and interns selected the type of shift worked (day-off, days, nights, beginning/ending extended overnights, or other). Sleep duration (actigraphy) was averaged each 24h day. For this analysis, interns were included if they had ≥ 1 day-off followed by at least 3 workdays, and had no flagged PVT-B results for non-adherence. To examine the longitudinal effect of consecutive workdays on alertness, a generalized linear mixed model with random intercept and slope, and Poisson distribution was used to determine the rate of PVT-B lapses for up to 4 work days following a day off, controlling work shift type, sleep duration, and policy, with sleep and shift type interaction, and linear spline to account for the change in slope after the 2nd workday.

Results: N=328 interns were included (mean age 27.8 \pm 2.2y, 49% males). Mean \pm SD number of PVT-B lapses were 3.4 \pm 4.5, 4.2 \pm 5.6, 5.3 \pm 6.6, 4.8 \pm 5.8, and 4.7 \pm 6.0, and mean \pm SD sleep duration was 9.0 \pm 1.9, 6.9 \pm 1.3, 6.5 \pm 2.1, 6.6 \pm 1.8, and 6.9 \pm 1.7 hours for a day off and workdays 1-4 respectively. Rate of lapses increased by 1.1 lapse/day from a day off to the 2nd workday ($p=0.004$; 95%CI: 1.03-1.18), and then significantly decreased from days 2-4 at a rate of 0.89 lapses/day ($p<0.0001$; 95%CI: 0.85-0.92). Patterns of change in the rate of lapses were similar to changes in sleep duration, where, from baseline, every 1h longer sleep duration was associated with 0.91 fewer PVT-B lapses ($p<0.0001$; 95%CI: 0.93-0.97).

Conclusion: Both sleep and subsequent alertness were negatively impacted when returning to work following a day off for interns in this study. After two workdays, sleep duration appeared to increase again, with observed improvements in alertness.

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0017

MURDER ON THE MIDNIGHT EXPRESS: NOCTURNAL WAKEFULNESS AND HOMICIDE RISK

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Introduction: There is a nocturnal peak in incident suicide risk after adjusting for population wakefulness (Perlis et al., 2016; Tubbs et al., 2020). This peak in risk is hypothesized to result from a series of negative changes in mood, reward processing, and executive function that occur at night and increase the propensity for dysregulated and violent behaviors. Although the unadjusted incidence of dying by homicide is elevated at night, no existing studies of time-of-day and death by violent crime have adjusted for population wakefulness.

Methods: Data from 48,486 homicide victims with a known time of fatal injury were collected from the National Violent Death Reporting System (NVDRS) for 2003-2017, tabulated by clock hour, age, sex, race, and ethnicity, and combined with population wakefulness data from the American Time Use Survey (ATUS) for the same years. Homicide counts were additionally characterized by the proportion of cases with blood alcohol level (BAL) of 0, <80mg/dl, or ≥ 80 mg/dl at autopsy and modeled using robust Poisson regression with population wakefulness entered as an offset term, thus producing hourly incident risk ratios (IRR).

Results: Homicide counts were lowest in the morning (6AM-7AM) and highest at night (10PM-11PM). After adjusting for population wakefulness, the incident risk for death by homicide was elevated between 10PM and 5AM compared to the 24-hour average, with the highest risk between 2AM (IRR: 8.25 [6.62-10.3]) and 3AM (IRR: 7.22 [6.04-8.64]). Moreover, the adjusted risk of dying by homicide was significantly greater at night for those with a BAL ≥ 80 mg/dl, such that the risk at 2AM was 13.8-fold greater than the 24-hour average (IRR: 13.8 [10.6-18.1]).

Conclusion: The risk of homicide death is higher at night after adjusting for population wakefulness and especially among those with alcohol intoxication. Although homicide victims do not choose when to die (unlike suicide victims), neurophysiological changes at night may promote risky behaviors or put victims in more dangerous circumstances than they would be otherwise. Future research should examine sociodemographic, clinical, and circadian risk factors for death by homicide, as well as examine time-of-day patterns in other violent crimes.

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0018

SLEEP DIFFICULTY AND WEEKLY SEDENTARY MINUTES

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Introduction: Decreased energy and activity may be a mechanism linking poor sleep health and cardiometabolic risk. This study aimed to examine, at the national level, whether poor sleep quality