2020-05-27

0175 Light Improves Alertness and Mood During the Sleep Inertia Period Following Slow Wave Sleep

Hilditch, C.J.; Feick, N.H.; Wong, . .R; Bathurst, N.G.; Flynn-Evans, E.E.

Oxford University Press

Sleep, Volume 43, Issue Supplement_1, April 2020, Pages A69A70
http://hdl.handle.net/10945/69351

0173

SPRING FORWARD, FALL BACK: INCREASED PATIENT SAFETY-RELATED ADVERSE EVENTS FOLLOWING THE SPRING TIME CHANGE

Kolla, B. Coombes, B. J. Morgenthaler, T. I. Mansukhani, M. P.
Mayo Clinic, Rochester, MN.

Introduction: "Spring forward," the start of daylight savings time (DST) reduces sleep opportunity by an hour. The resulting sleep deprivation in healthcare workers can increase the potential for medical errors. We examined the change in patient safety-related adverse events (AEs) following the time change in both spring and fall.
Methods: Self-reported AEs that occurred 7 days prior to and following the spring and fall time changes for years 2010–2017 in a large healthcare organization were ascertained. AEs likely resulting from human errors were identified. The change in the number of AEs (all AEs or restricted to those resulting from human error) following the spring and fall time change were modeled using negative binomial mixed models using a random effect to correct for non-independent observations in consecutive.
Results: Over the 8 year period, there were more AEs (all and human) in the 7 days following the change in time both in spring (All: 2812 V. 2699; Human: 1902 V. 1625) and fall (All: 3207 V. 3007; Human: 2189 V. 2087). However, the only statistically significant increase was for the estimated 18% increase in human errors following time change in spring (95% CI: 6% to 34%; p = 0.004). The 18% AE increase in spring was also significantly greater than the 5% increase in AE in fall (p = 0.018).
Conclusion: There is a significant increase in human error related AEs following the "spring forward" clock change which can jeopardize patient safety. Based on safety considerations, DST might best be eliminated; alternatively, policy makers and healthcare organizations should evaluate measures to mitigate the increased risk during this period.
Support: NA

0174

EXAMINING CIRCADIAN DISADVANTAGES IN THE NATIONAL BASKETBALL ASSOCIATION'S PLAYOFFS

Pradhan, S.[1] Gregory, K.[2] Alton, D.[1] Chachad, R.[4] Flynn-Evans, E. E.[2]
[1]Menlo College, Atherton, CA, [2]NASA Ames Research Center, Moffett Field, CA, [3]Menlo College, Atherton, CA, [4]University of California, San Francisco, San Francisco, CA.

Introduction: Prior research on travel in the National Basketball Association's (NBA) regular season has shown that teams journeying west relative to their home base face circadian disadvantages for evening games, while those traveling east have advantages. The current study extends previous research by examining these effects within the NBA playoffs. We hypothesized that teams would have a greater circadian advantage during eastward compared to westward travel.
Methods: In 2013, the NBA implemented a 7-game series playoff structure, in which teams play an alternating home/away 2-2-1-1-1 format. Data for all 499 postseason games played during the 2013–14 to 2018–2019 seasons were collected from Basketball-Reference and FiveThirtyEight. We investigated the impact of direction of travel based on home base city (same time zone, westward, eastward) and time zones traveled on game outcomes, Elo rating differences (i.e., a team quality metric based on wins and losses), win probability, and team scoring.
Results: Teams had lower win probabilities following 3-hour westward than same time zone and all eastward travel, while 3-hour eastward travel related to higher probabilities of winning compared to same time and all westward travel ($p < .001$, $d > .95$). Teams travelling westward with 2-hour time changes lost significantly more games than those experiencing 1-hour westward ($p = .04$, $OR = 2.45$), 1-hour eastward ($p = .05$, $OR = 2.34$), and 3-hour eastward changes ($p = .02$, $OR = 4.68$). Scoring was significantly higher following eastward travel compared to both westward ($p = .001$, $d = 0.60$) and same time zone travel ($p = .003$, $d = 0.44$). There were no differences in team quality based on direction of travel or number of time zones traveled, and game outcomes based on overall direction of travel ($p > .05$).
Conclusion: Direction and magnitude of travel were related to win probability, team scoring, and game outcomes, whereby teams travelling eastward and within the same time zone gained an advantage over those travelling westward. Adjustment to travel and time changes appear to influence in-game performances and outcomes in the NBA playoffs.
Support: None

0175

LIGHT IMPROVES ALERTNESS AND MOOD DURING THE SLEEP INERTIA PERIOD FOLLOWING SLOW WAVE SLEEP

Hilditch, C. J.[1] Feick, N. H.[1] Wong, L. R.[1] Bathurst, N. G.[1] Flynn-Evans, E. E.[2]
[1]Fatigue Countermeasures Lab, SJSU Research Foundation, Moffett Field, CA, [2]Fatigue Countermeasures Lab, NASA Ames Research Center, Moffett Field, CA.

Introduction: Waking from sleep, especially slow wave sleep (SWS), is associated with reduced alertness known as sleep inertia. Light improves alertness during sleep deprivation and circadian misalignment. In this study, we assessed the efficacy of light to improve alertness and mood immediately after waking from SWS.
Methods: Twelve participants kept a sleep schedule of 8.5 h for 5 nights and 5 h for one night prior to the overnight laboratory visit (confirmed by actigraphy). Participants went to bed at their scheduled habitual bedtime in the laboratory and were monitored by standard polysomnography. After at least 5 min of SWS, participants were awoken and exposed to either red ambient light (control) or blue-enriched bright light (light) for 1 h. During this time, participants completed a subjective scale of alertness (Karolinska Sleepiness Scale, KSS) and visual analogue scales (VAS) of mood at 2 min, 17 min, 32 min, and 47 min after waking. Following this sleep inertia measurement period, all lights were turned off and participants were allowed to return to sleep. They were then awoken again from their subsequent SWS period and exposed to the opposite condition (control or light). A linear mixed-effects model with fixed effects of condition, time, and condition*time and a random effect of participant was used to determine the impact of light across the testing period. An average of baseline responses (pre-sleep) was included as a covariate.
Results: Compared to the control condition, participants exposed to blue-enriched bright light reported feeling more alert (KSS: $F_{1,77}=4.955$, p=.029; VAS_{alert}: $F_{1,77}=8.226$, p=.005), more cheerful ($VAS_{cheerful}$: $F_{1,77}=8.615$, p=.004), less depressed ($VAS_{depressed}$: $F_{1,77}=4.649$, p=.034), and less lethargic ($VAS_{lethargic}$: $F_{1,77}=5.652$, p=.020).
Conclusion: Exposure to blue-enriched bright light immediately after waking from SWS may help to improve subjective alertness and mood. Future analyses will explore whether these findings extend to effects on cognitive performance.
Support: Naval Postgraduate School Grant. NASA Airspace Operations and Safety Program, System-Wide Safety Project.