Too Tired to Learn?
Exploring the effects of fatigue on learning

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Why should we care?

*Educators: think about how and when you provide training*

*Clinicians: think about your performance and learning*

*Everyone: advocate for safe working hours*

Scientists now say lack of sleep is linked to chronic health problems, including Alzheimer’s disease.

*Oh, no! My health!*

*I better stay up and research this!*
Findings

Sleep Deprivation in Resident Physicians, Work Hour Limitations, and Related Outcomes: Review of the Literature

TOTAL SLEEP DEPRIVATION IMPAIRS DECISION MAKING THAT REQUIRES UPDATING BASED ON FEEDBACK

STATE OF THE ART

What Are the Effects of Sleep Deprivation and Fatigue in Surgical Practice?

Adverse Effects of 24 Hours of Sleep Deprivation on Cognition and Stress Hormones
Working Memory

• WMC = ability to retain and manipulate information or sensory input in order to perform multiple tasks.
  – combination of attention, concentration and short term memory

• Sleep is essential to memory consolidation --> deprivation results in decreased WMC
Working Memory

• Study: Doctors in Call month (30hr shift) vs Non call month (both 80h/wk).
• Weekly WMC conducted with subjective sleepiness score pre and post
Working Memory

- Sleepiness at test time significantly associated with
  - poorer performance,
  - reduced speed
  - increased errors
    - mathematical,
    - accuracy
    - speed
Mood

- Sleep deprivation is a stressor
  - Induces pro-inflammatory cascade
  - Raises levels of stress hormones
- Associated with increased substance use
Mood

• Feedback blunting:
  – In sleep deprived states, we care less about getting it wrong
  – This affects our ability to modify our practice to get better outcomes
Executive functions:

- Reduction in flexibility and creativity of thought processes
- Increase in risk-taking
  - pursuit of gain rather than avoidance of loss
- Reversion to protocol-driven decision making and familiar processes
Dose-Dependent effects of sleep loss

- randomised trial of 8h, 6h and 4h sleep deprivation over 14 days as well as sustained 3 nights total sleep deprivation (88 hours awake). Lab conditions.
- Assessed against:
  - psychomotor vigilance task (attention/concentration)
  - working memory task (recall)
  - cognitive throughput task (processing information)
  - scale of self-assessed sleepiness (to compare subjective fatigue with objective results)

Quick poll:
DOSE-DEPENDENT EFFECTS

- Attention
- Cognitive throughput
- Self-rated sleepiness
- Working memory
- Cognitive throughput

Graphs showing changes in PVT lapses, SSS sleepiness score, DSST correct responses, and SAST throughput over days of sleep restriction.
AFTER YEARS OF WORK, OUR TEAM HAS UNCOVERED YET ANOTHER DEVASTATING SIDE-EFFECT OF SLEEP DEPRIVATION.

THINKING OTHER PEOPLE CARE ABOUT HOW MUCH SLEEP YOU GOT LAST NIGHT

Questions?
References


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