UNIVERSITY OF Southampton

Risk-taking in junior doctors working night shifts in intensive care: a pilot study.

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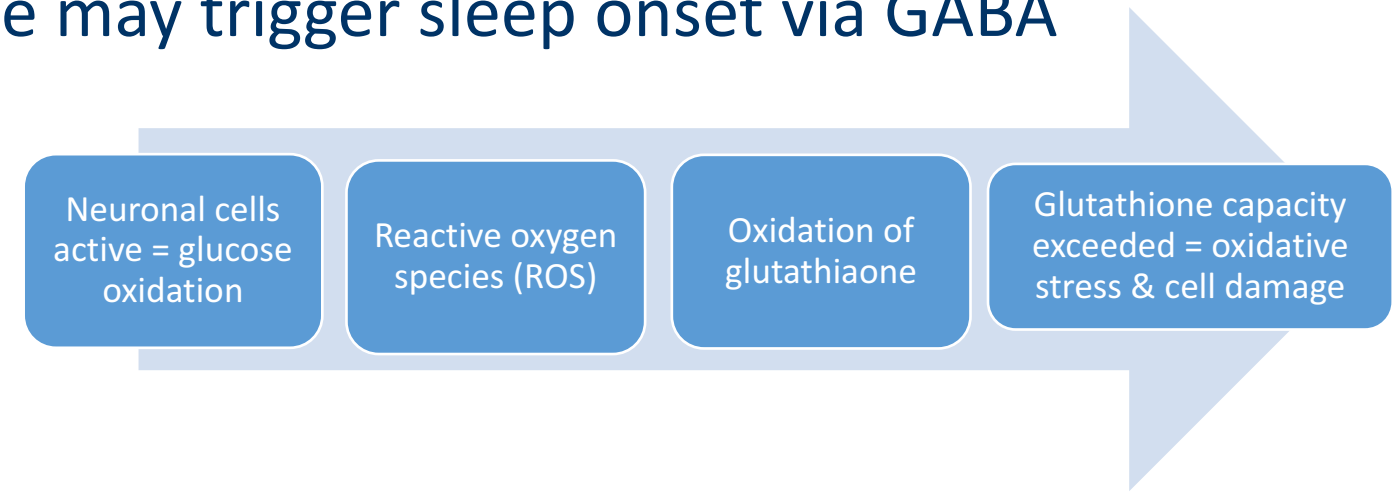
Why do we sleep? …..a bit of neuroscience

- Over the day glutathione mops up ROS - indeed oxidised glutathione may trigger sleep onset via GABA



- Lack of this free-radical scavenger is associated with neuronal cell death. Rats die within 2 weeks of absolute sleep deprivation
- Sleep replenishes glutathione supplies = brain detox!

We also sleep to hardwire learning

- SWS slow oscillations (~0.75 Hz) facilitate hippocampal sharp-wave ripples and thalamo-cortical spindles
- These 'spindle–ripple events' are thought to promote integration of reactivated hippocampal memory information into the neocortex

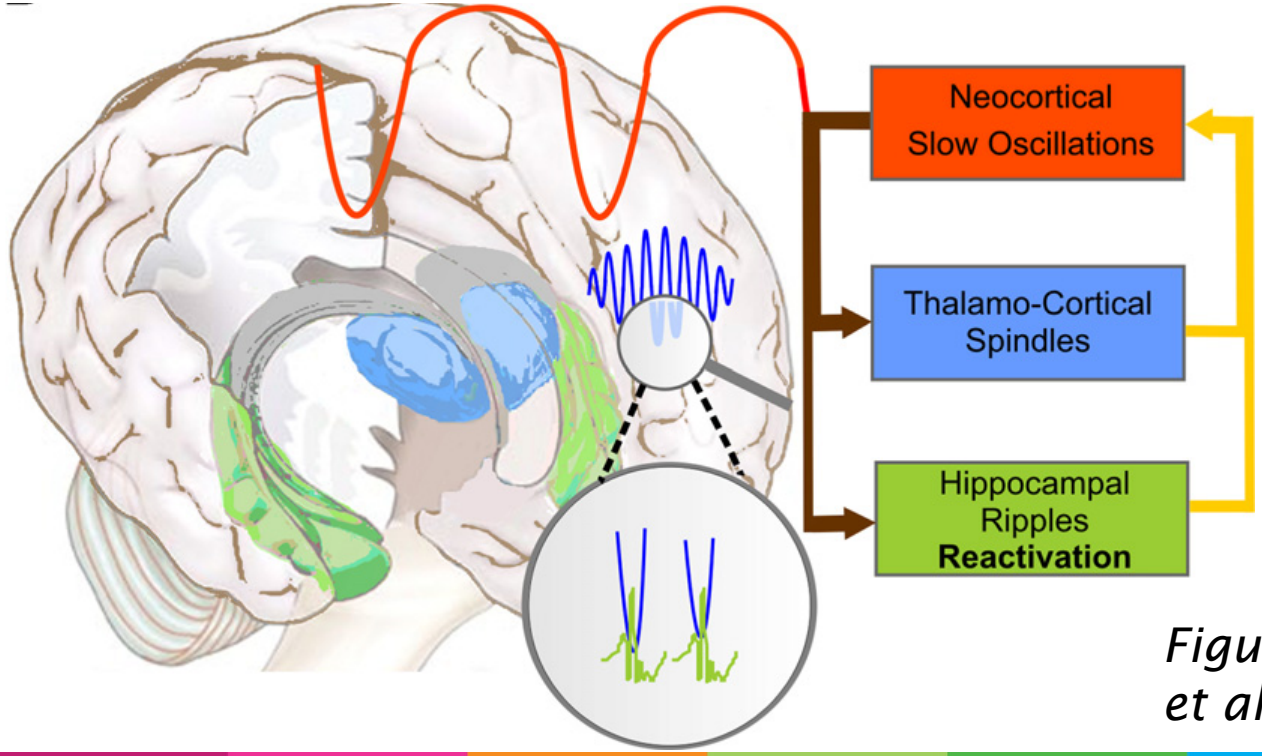


Figure from Wilhelm et al. (2012)

Passing MRCPCH

Bad idea

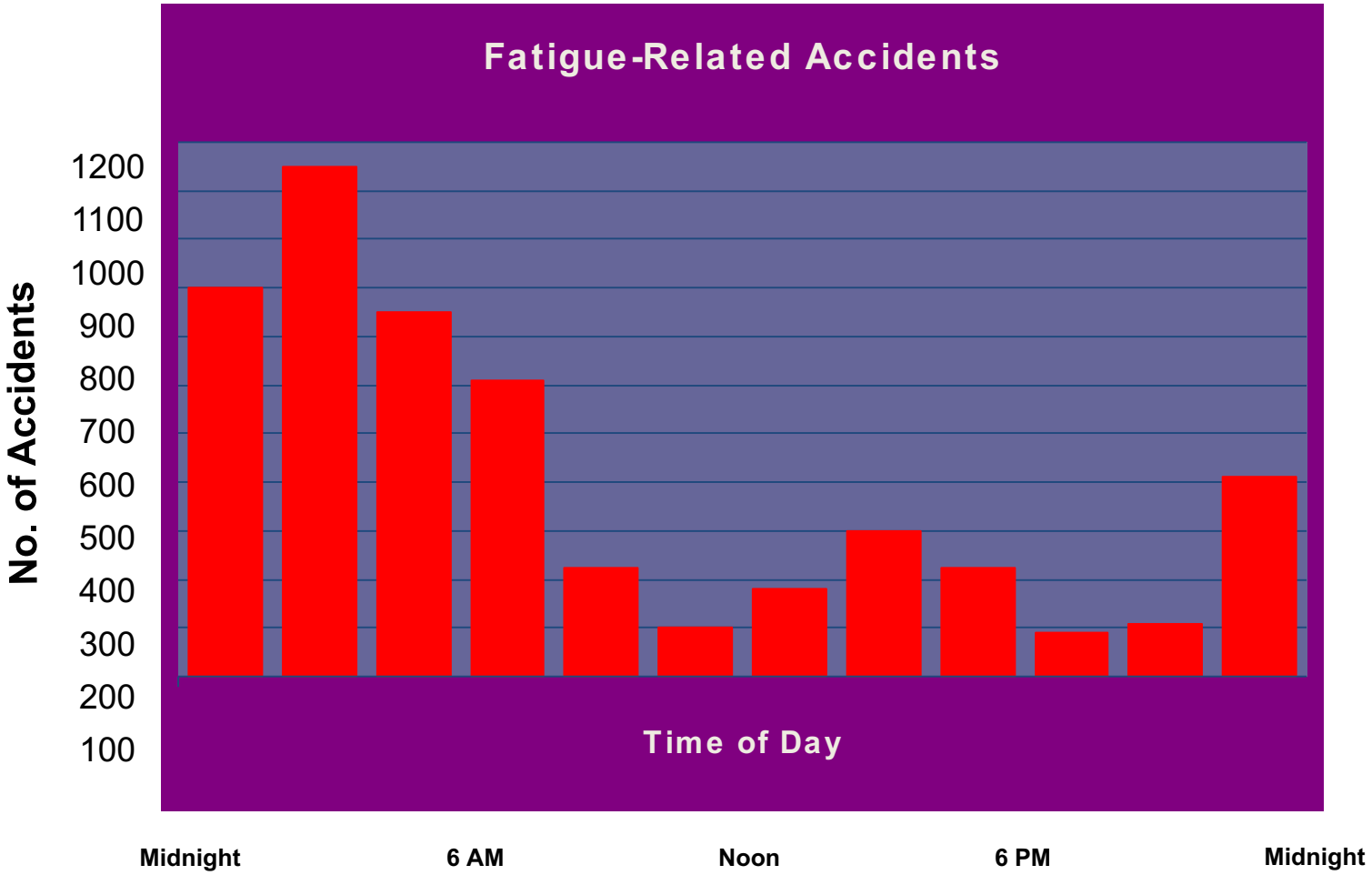
Good idea

al performance when doctors are sleep deprived?

Impaired cognitive performance

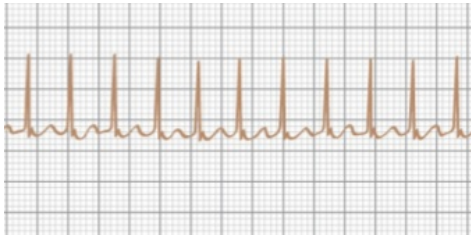
- PFC susceptible = executive function: purposeful, goal directed behaviour
- Information processing
- Visual-spatial perception
- Psychomotor skills
- **Importantly, meta-analysis confirms that these impairments lead to impaired clinical performance**

Time of day and performance



Double jeopardy: fatigue plus circadian misalignment

- Shift work exacerbates the problem.
- Night shifts alternating with day shifts result in circadian misalignment
- Worsens deficits in alertness and cognitive performance
- Junior doctors working night shifts take longer to make clinical decisions and problem solve, e.g in interpreting an ECG, response time and accuracy fall off as task complexity increases



Why study RISK?

- Defined as an individual's propensity to take a course of action which may have undesirable consequences
- More common in young and less experienced doctors
- Causally linked to sleep deprivation in other settings it has not previously been studied in relation to medical shift work

Risk-taking in junior doctors working night shifts. Intensive Care Medicine. 2017. DOI: 10.1007/s00134-016-4671-2

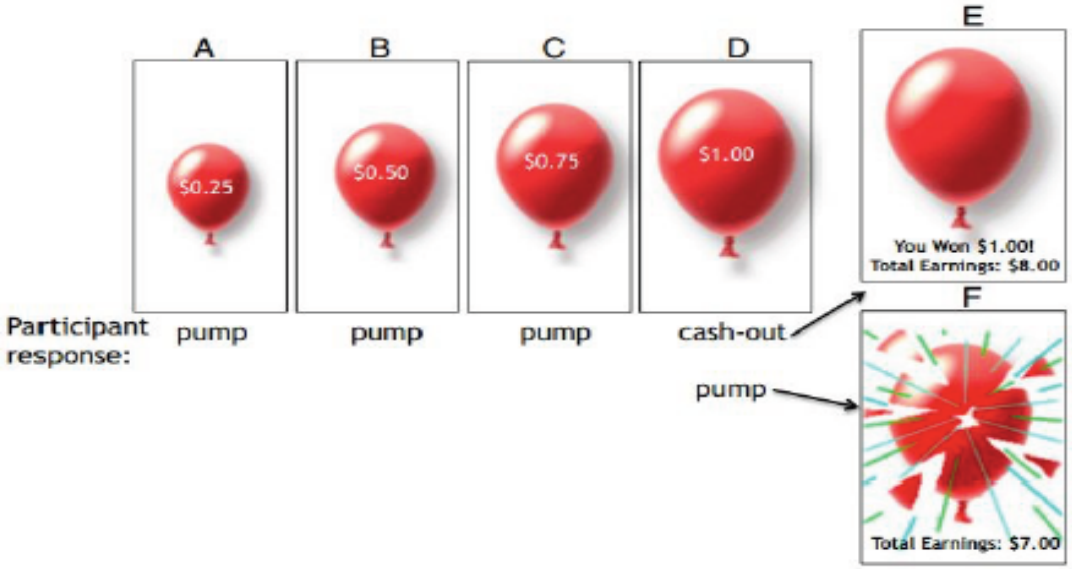
- 12 juniors working 3-4 x 13h night shifts in UHS neuro ITU & PICU
- Studied lunchtime before shifts & 08:30-10:00 after the last shift
- Practice effects controlled for by randomisation of testing order

Computerised tasks

Attention network task (ANT): tests **Alerting:** initiating alertness & concentration, **Orienting**: selecting information from sensory stimuli, **Executive Control**: resolving conflict between relevant & irrelevant stimuli.

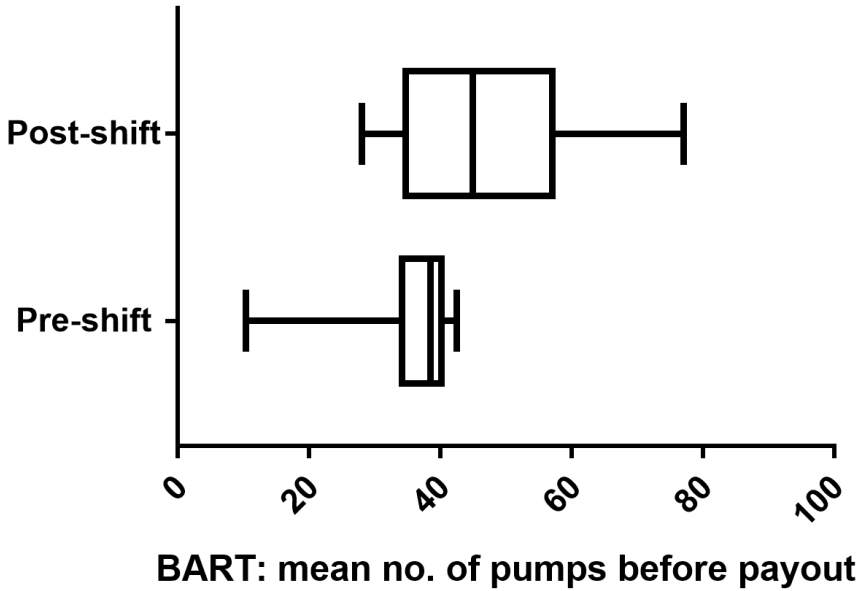
Balloon Analogue Risk Task (BART):10 min. task = risky choice with rewards and losses

- Higher scores = greater risk-taking propensity.
- Relates to real world risk in other settings.



BART scores before and after night shifts

- Sig. increase in risk taking (pre-shift median=38.5 - post-=45.0; p=0.021)
- No differences by sex (9M) or marital status (6 married).
- **No sig. changes in ANT scores**
  As attention is sensitive to sleep loss this implies that RISK taking is <u>particularly</u> vulnerable.



Conclusions

- Night shifts in juniors in ICU increases risk-taking behaviour in an experimental paradigm (one that relates to real world risk taking in other settings)
- Past research reported that confidence in decision-making not affected by sleep loss - risk-prone behaviour, without a protective loss in confidence, could synergistically increase likelihood of serious clinical error
- Risk-taking behaviour in junior doctors following shift work in intensive care has potentially serious implications for professional practice and personal wellbeing and deserves further study (Fiona Hignett planning to research a simulation risk paradigm)

Questions?

Useful references

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