Risk-taking in junior doctors working night shifts in intensive care

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Sleep deprivation impairs executive function, information processing, visual-spatial perception, psychomotor skills and, importantly, affects clinical performance[1]. Alternating day and night shifts causes circadian misalignment, compounding these deficits[2]. Risk taking, although causally linked to sleep deprivation[3], has not been reported in doctors working night shifts.

We studied risk taking in 12 healthy junior doctors (below consultant level) working 3-4 consecutive 13h night shifts in neurological and paediatric ICUs[4]. Participants were tested at lunchtime before the first night shift and between 8:30-10:00 am after the last shift. Randomised testing order controlled for practice effects. Eleven participants (9 male); aged 26-36y, completed two computerised tasks at each time point: the *Balloon Analogue Risk Task (BART) and the Attention network task (ANT)* ***Error! Bookmark not defined.***. Wilcoxon-signed rank tests in SPSS v22 (Armonk, NY: IBM Corp) and 95% confidence intervals (CI) for the difference between medians in Confidence Interval Analysis (CIA) software (version 2.2.0) were used in the analysis. The study was approved by the Faculty of Medicine Ethics Committee, University of Southampton.

Participants showed a significant increase in risk taking on the BART (pre-shift median=38.5, post-shift median=45.0; difference between medians with 95% CI=11.4 (3.1 to 20.9); p=0.021). (Figure 1). There were no differences in change in BART scores by gender. There was no significant change in ANT scores (see online supplement, below), noteworthy as attention is sensitive to sleep deprivation, indicating that risk taking may be particularly vulnerable to night shift exposure.

What are the professional implications of risk taking? Junior doctors are less risk averse than senior peers and confidence levels in decision-making remain intact during sleep deprivation[5]. Higher levels of risk-taking, without compensatory reduction in confidence, increase the likelihood of clinical error, particularly in an ICU where rapid decisions are necessary. What of the personal consequences? Of 1,135 UK doctors surveyed online, 41% of reported falling asleep whilst driving home after a night shift[5]. Junior doctors may suffer double jeopardy on the roads as risk taking behaviours increase vulnerability to road traffic accidents

Risk-taking behaviour in junior doctors after ICU night shifts has potentially serious implications for professional practice and personal wellbeing and deserves further study.

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ONLINE SUPPLEMENT

Description of measures:

Computerised Balloon Analogue Risk Task[1]

This 10 minute task presents the participants with a risky choice associated with rewards and losses (points of monetary value). Participants 'gamble' by blowing up a balloon, the more inflated the balloon, the higher the reward, but the greater the chance of the balloon rupturing and rewards being lost. Performance is based on the adjusted average number of pumps on unexploded balloons, with higher scores indicating greater risk-taking propensity. The BART has been shown to relate to real world risk taking in other settings[2].

Attention network task [3]

This computerised task tests three attention domains:

1. Alerting: initiating a state of alertness and concentration.
2. Orienting: selecting information from sensory stimuli.

3. Executive Control: resolving conflict between relevant and irrelevant stimuli.

Participants fixate on a central cross and make a speeded manual response to classify the direction (left or right) of a target arrow that is flanked by two pairs of distractor arrows (flankers). 'Alerting' measures changes in reaction time (time taken to determine the direction of the middle arrow) following cues that signal the temporal onset of a target stimulus, 'orienting' is assessed by changes in reaction time following cues that signal the spatial location of target stimuli, and 'executive control' is assessed by the extent to which reaction times to central arrow targets are impaired by distractor flanker arrows. Higher alerting and orienting scores reflect improved functioning of these networks whereas a high executive score reflects poorer executive performance (i.e. greater difficulty inhibiting distractors

Results

Attention Network Task

There were no significant changes in ANT domain scores: Alerting (pre-shift median=12.1, post-shift median=12.2; difference between medians with 95% CI=3.6 (-31.2 to 30.7); p=0.722); Orienting (pre-shift median=51.7, post-shift median=34.4; difference between medians with 95% CI=-13.8 (-37.7 to 5.5); p=0.110); Executive Control (pre-shift median=78.0, post-shift median=82.7; difference between medians and 95% CI=-2.9 (-56.1 to 16.7); p=0.929).

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