

Title

The Effects of Ship Motion on the Sleeping Patterns of Crewmembers aboard a High Speed Naval Vessel

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Introduction

Sleep of crewmembers aboard high speed Naval vessels may be disrupted by the unusual conditions caused by ship motion. The sleep debt that accumulates in such conditions has major implications for the safety and performance of the crew. The current study was conducted on the HSV-2 SWIFT to determine what factors contribute to sleep quality of its crew. The relationship between sleep and motion was of particular interest.

Methods

Data were collected over a 14-day Atlantic transit which included a 7-day sea-keeping trial. There were 19 participants (48% of the crewmembers) in the study. They were given a questionnaire at the beginning and ending of each watch rotation. The questionnaire included questions about motion sickness, amount of sleep, subjective sleepiness, and light exposure. Amount and quality of sleep and overall activity were evaluated by wrist activity monitors (actigraphy) and by self-reported sleep log.

Results

Do not like—need some better numbers—an average crewmembers received...Sleep deficit was evident (25% to 38% of the participating crew depending on optimal sleep basis). The cumulative deficit was increasing by time although ship's schedule was relatively decreased workload. Factors significantly interfering in crew's sleep, was a) noise from within the berthing compartments, originating from other crew members in the compartment or from outside space, b) the need to use the restroom, c) ship's motion.

Sleep fragmentation was significantly related to ship's motion. Disrupted sleep was especially evident during periods of rough weather or when the ship was travelling at high speeds (what speed??).

Predicted performance calculated using the Fatigue Avoidance Scheduling Tool (FAST) over the initial seven-day period of the study faster than the increase during the following six-day decreased workload period.

A significant portion of wakefulness periods were extended (42% larger than 16 hours and 8% larger than 20 hours).

Conclusion

Over the study period, sleep debt continued to accrue in the crewmembers. It was evident that ship motion due to high speed and sea state significantly influence sleep quality. However, other factors that almost certainly affect sleep quality in the ship berthing spaces remain to be explored. The decline in predicted effectiveness of crewmembers coupled with an increased workload caused by reductions in crew size raises the question of safety and acceptable performance during periods of extended operations.