"Sleep and Psychomotor Performance during Commercial Ultra-Long-Range Flights"

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Abstract

The amount and quality of sleep that flight crew are able to obtain on board the aircraft is considered to be a critical issue for designing safe ultra-long range operations. The present study was conducted as part of the Ultra-Long-Range (ULR) validation process undertaken by the Singapore ULR task force (CAAS, SIA, ALPA-S). The primary aim of this study was to accurately determine the quantity and quality of sleep flight crew were able to obtain during in-flight rest opportunities.

Data were collected on 8 ULR return flights between Singapore and Los Angeles from 41 flight crew (median age 43.66 years). Sleep was recorded during all in-flight sleep episodes using the Embla A10 ambulatory recorder (Medcare™). Performance was measured 3 or 4 times in flight using the Psychomotor Vigilance Task (PVT).

On the SIN-LAX sector (average flight time 15.45 hrs), flight crew obtained an average of 2.8 hours sleep, and on the LAX-SIN sector (average flight time 17.07 hrs) 3.4 hours of sleep. The sleep obtained in flight was predominantly Non-REM stages 1 and 2 and sleep efficiency was similar on both the SIN-LAX and LAX-SIN sectors (72% and 74% respectively). The division of scheduled rest opportunities, utilization of these, and the total amount of sleep obtained was dependent on the position of the flight crew member (Command or Relief crew). Although all flight crew involved in the study slept at least once on each sector, there was a great deal of variability in the amount of sleep obtained between individuals (a minimum of 47.5 minutes and a maximum of 5.5 hours). There was a trend for psychomotor performance to slow progressively across flights. Although there were differences between the average amount of sleep that Command and Relief crew obtained in flight, there were no statistically significant differences in their PVT performance. This may reflect limitations of the PVT in this setting.

These findings demonstrate that the arrangement of in-flight rest has direct implications for both the amount of time flight crew will spend trying to sleep and the actual amount of sleep obtained.

Main Points

- Flight crew obtained approximately 3 hours sleep during a ULR sector, yet had over twice this time available for sleep.
- The arrangement of in-flight rest has direct implications for both the amount of time flight crew will spend trying to sleep and the actual amount of sleep obtained.

A copy of Dr. Leigh Signal's biographical information and presentation slides are provided in Appendix B.