FM622-5 Stress Management
Appendix A

Sleep Deprivation

This sleep guidance is provided by the Walter Reed Army Institute of Research, and supported by extensive research. This guidance is based on current research as of September, 2007. Unit sleep plans should be based on this guidance.

OVERVIEW

A-1. Sleep is a biological need, critical for sustaining the mental abilities needed for success on the battlefield. Soldiers require 7 to 8 hours of good quality sleep every 24-hour period to sustain operational readiness. Soldiers who lose sleep will accumulate a *sleep debt* over time that will seriously impair their performance. The only way to *pay off* this debt is by obtaining the needed sleep. The demanding nature of military operations often create situations where obtaining sleep may be difficult or even impossible for more than short periods. While essential for many aspects of operational success, sheer determination or willpower cannot offset the mounting effects of inadequate sleep.

A-2. Therefore, sleep should be viewed as being as critical as any logistical item of resupply, like water, food, fuel, and ammunition. Commanders need to plan proactively for the allocation of adequate sleep for themselves and their subordinates.

A-3. Individual and unit military effectiveness is dependent upon initiative, motivation, physical strength, endurance, and the ability to think clearly, accurately, and quickly. The longer a Soldier goes without sleep, the more his thinking slows and becomes confused, and the more mistakes he will make. Lapses in attention occur and speed is sacrificed in an effort to maintain accuracy. Degradation in the performance of continuous work is more rapid than that of intermittent work.

A-4. Tasks such as requesting fire, integrating range cards, establishing positions, and coordinating squad tactics are more susceptible to sleep loss than well-practiced, routine physical tasks such as loading magazines and marching. Without sleep, Soldiers can perform the simpler and/or clearer tasks (lifting, digging, and marching) longer than more complicated tasks requiring problem-solving, decision-making, or sustained vigilance. For example, Soldiers may be able to accurately aim their weapon, but not select the correct target. Leaders should look for erratic or unreliable task performance and declining planning ability and preventive maintenance not only in subordinates, but also in themselves as indicators of lack of sleep

A-5. In addition to declining military performance, leaders can expect changes in mood, motivation, and initiative as a result of inadequate sleep. Therefore, while there may be no outward signs of sleep deprivation, Soldiers may still not be functioning optimally.

SLEEPING IN THE OPERATIONAL ENVIRONMENT

A-6. For optimal performance and effectiveness, 7 to 8 hours of good quality sleep per 24 hours is needed. As daily total sleep time decreases below this optimum, the extent and rate of performance decline increase.

A-7. Basic sleep scheduling information for planning sleep routines during all activities (predeployment, deployment, precombat, combat, and postcombat) is provided in Table A-1. Basic sleep environment information and other related factors are provided in Table A-2.

Table A-1. Basic sleep scheduling factors

FACTOR	*EFFECT*
Timing of Sleep Period	• Because of the body's natural rhythms (called "circadian" rhythms), the best quality and longest duration sleep is obtained during nighttime hours (2300-0700). • These rhythms also make daytime sleep more difficult and less restorative, even in sleep-deprived Soldiers. • Advancing sleep times (such as earlier in the evening) impairs the ability to fall and stay asleep. • This is why eastward travel across time zones initially produces greater deficits in alertness and performance than westward travel.
Duration of Sleep Period	• **IDEAL** sleep period equals 7 to 8 hours of continuous and uninterrupted nighttime sleep each and every night. • **MINIMUM** sleep period—There is no minimum sleep period. Anything less than 7 to 8 hours per 24 hours will result in some level of performance degradation.
Napping	• Although it is preferable to get all sleep over one sustained 7 to 8 hour period, sleep can be divided into two or more shorter periods to help the Soldier obtain 7 to 8 hours per 24 hours. Example: 0100-0700 hours plus nap 1300-1500 hours. • Good nap zones (when sleep onset and maintenance is easiest) occur in early morning, early afternoon, and nighttime hours. • Poor nap zones (when sleep initiation and maintenance is difficult) occur in late morning and early evening hours when the body's rhythms most strongly promote alertness. • Sleep and *rest* are not the same. While *resting* may briefly improve the way the Soldier feels, it does not restore performance the way sleep does. • There is no such thing as *too much sleep*—mental performance and alertness always benefit from sleep. • Napping and sleeping when off duty are not signs of laziness or weakness. They are indicative of foresight, planning, and effective human resource management.
Prioritize Sleep Need by Task	• **TOP PRIORITY** is leaders making decisions critical to mission success and unit survival. Adequate sleep enhances both the speed and accuracy of decision-making. • **SECOND PRIORITY** is Soldiers who have guard duty, who are required to perform tedious tasks such as monitoring equipment for extended periods, and those who judge and evaluate information. • **THIRD PRIORITY** is Soldiers performing duties involving only physical work.
Individual Differences	• Most Soldiers need 7 to 8 hours of sleep every 24 hours to maintain optimal performance. • Most leaders and Soldiers underestimate their own total daily sleep need and fail to recognize the effects that chronic sleep loss has on their own performance.

Table A-2. Basic sleep environment and related factors

Ambient Noise	• A quiet area away from intermittent noises/disruptions is **IDEAL**. • Soldiers can use earplugs to block intermittent noises. • Continuous, monotonic noise (such as a fan or *white noise*) also can be helpful to mask other environmental noises.
Ambient Light	• A completely darkened room is **IDEAL**. • For Soldiers trying to sleep during daytime hours, darken the sleep area to the extent possible. • Sleep mask/eye patches should be used if sleep area cannot be darkened.
Ambient Temperature	• Even small deviations above or below comfort zone will disrupt sleep. • Extra clothing/blankets should be used in cold environments. • Fans in hot environments (fan can double as source of white noise to mask ambient noise) should be used.
Stimulants (Caffeine, Nicotine)	• Caffeine or nicotine use within 4 to 6 hours of a sleep period will disrupt sleep and effectively reduce sleep duration. • Soldier may not be aware of these disruptive effects.
Prescription Sleep-Inducing Agents (such as: Ambien®, Lunesta®, and Restoril®)	• Sleep inducers severely impair Soldiers' ability to detect and respond to threats. • Sleep inducers should not be taken in harsh (for example, excessively cold) and/or unprotected environments. • Soldiers should have *nonwork* time of at least 8 hours after taking a prescribed sleep inducer.
Things That do not Improve or Increase Sleep	• Foods/diet—no particular type of diet or food improves sleep, but hunger and thirst may disrupt sleep. • Alcohol induces drowsiness but actually makes sleep worse and reduces the duration of sleep. • Sominex®, Nytol®, melatonin, and other over-the-counter sleep aids induce drowsiness but typically have little effect on sleep duration and are, therefore, of limited usefulness. • Relaxation tapes, music, and so forth may help induce drowsiness but they do not improve sleep.

MAINTAINING PERFORMANCE DURING SUSTAINED OPERATIONS/CONTINUOUS OPERATIONS

A-8. Cold air, noise, and physical exercise may momentarily improve a Soldier's feeling of alertness, but they do not improve performance.

A-9. The only countermeasures that effectively improve performance during sleep loss are stimulants (caffeine and prescription stimulants including Dexedrine® and Provigil®). However, these countermeasures are only effective in restoring performance for short periods (2 to 3 days), and they do not restore all aspects of performance to normal levels. Caffeine is just as effective as the prescription stimulants.

CAFFEINE COUNTERMEASURE

A-10. Pharmacological countermeasures such as caffeine are for **short-term use only (2 to 3 days) and do not replace sleep**.

A-11. Caffeine occurs in varying content in a number of drinks, gums, and nonprescription stimulants:

- 12 ounces (oz) caffeinated soda: 40 to 55 mg.
- No-Doz®: 1 tablet: 100 mg.
- Vivarin®: 1 tablet/caplet: 200 mg.
- Caffeine gum (StayAlert®): 1 piece: 100 mg.
- Jolt® cola: 71 mg.
- Red Bull® Energy Drink (8.3 oz): 80 mg.

Note: liquids will increase urine output, which may result in interrupted sleep. To avoid this, caffeine should be ingested in pill, tablet, or other nonliquid forms.

A-12. Sleep loss effects are most severe in the early morning hours (0600—0800). Countermeasures against sleep loss, such as caffeine, are often required and are very effective during this early morning lull.

A-13. Table A-3 below summarizes advice on using caffeine to maintain performance when there is no opportunity for sleep. Clock times provided are approximate and can be adapted to individual circumstances.

Table A-3. Using caffeine under various conditions of sleep deprivation

Condition Under Which Caffeine Is Used	***Guidelines for Use***
Sustained Operations (No Sleep)	• 200 milligrams (mg) starting at approximately midnight. • 200 mg again at 0400 hours and 0800 hours, if needed. • Use during daytime hours only if needed. • Repeat for up to 72 hours.
Night Shifts with Daytime Sleep	• 200 mg starting at start of nighttime shift. • 200 mg again 4 hours later. • Last caffeine dose: No sooner than 6 hours before sleep (for example, last dose at 0400 hours if daytime sleep is anticipated to commence at 1000 hours).
Restricted Sleep	• 200 mg upon awakening. • 200 mg again 4 hours later. • Last caffeine dose: No sooner than 6 hours before sleep.

SLEEP RECOVERY

A-14. Ultimately, the Soldier must be allowed recovery sleep. Following a single, acute (2 to 3 days) total sleep loss, most Soldiers will usually recover completely if allowed a 12-hour recovery sleep period, preferably during the night.

A-15. Following chronic, restricted sleep during continuous operations, Soldiers may need several days of 7 to 8 hours nightly sleep to fully recover.

WORK SCHEDULES

A-16. Usual work schedules are 8 hours on/16 hours off. Sixteen hours off allows enough time to attend to maintenance duties, meals, personal hygiene, and so forth, while still obtaining 7 to 8 hours of sleep.

A-17. To the extent possible, commanders should attempt to consolidate their own and Soldiers' off-duty time into a single, long block to allow maximum sleep time. If the usual 8 hours on/16 hours off schedule are not possible, the next best schedule is 12 hours on/12 hours off. In general, 12 hours on/12 hours off is superior to 6 hours on/6 hours off, and 8 hours on/16 hours off is superior to 4 hours on/8 hours off. This is true because time off is consolidated into a single, longer block.

A-18. **On/off shifts should total 24 hours**. Shifts that result in shorter or longer *days* (such as 6 hours on/12 hours off—an 18-hour day) will impair Soldier alertness and performance.

NIGHT SHIFT WORK

A-19. In general, Soldiers will not adapt completely to night shift work, even if they are on a fixed night shift.

A-20. To protect Soldiers' daytime sleep, the commander should not attempt to schedule briefings, meals, and Soldiers' routine maintenance duties during the Soldiers' sleep time.

A-21. Caffeine can be used during the night shift to improve performance.

A-22. Morning daylight exposure in night shift workers coming off shift should be avoided by wearing sunglasses from sunrise until the Soldier commences daytime sleep.

TIME ZONE TRAVEL

A-23. Trying to *preadapt* sleep and performance to a new time zone by changing sleep/wake schedules ahead of time to fit the new time zone is of little benefit.

A-24. During travel, Soldiers should not be awakened for meals (for example, while in flight to a new location). This sleep time should be protected.

A-25. After deploying to a new time zone, sleep and performance will not adapt for several days. During this time, Soldiers might also experience gastrointestinal disturbances and find it difficult to fall asleep and stay asleep at night.

A-26. When reaching the new time zone, Soldiers should—

- **Immediately conform to the new time zone schedule (**for example, for those on day work, sleep only at night).
- **Avoid daytime naps**. Sleeping during the day will make it more difficult to sleep that night and to adapt to the new time zone.
- **Use caffeine during the day** (morning and only through early afternoon) to help maintain performance and alertness.
- **Stay on a fixed wake-up and lights-out schedule, t**o the extent possible.

SPECIFIC SLEEP LOSS EFFECTS

A-27. Sleep loss makes the Soldier more susceptible to falling asleep in an environment with little stimulation (such as guard duty, driving, or monitoring of equipment). This is especially important when considering tasking sleep deprived Soldiers for guard duty during evening and early morning shifts. Leaders should be aware that putting Soldiers on guard duty who are sleep deprived or in a sleep deficit places those Soldiers at high risk of falling asleep while conducting this mission-critical duty. Commanders should consider the level of their Soldiers' sleep deprivation when establishing guard duty rosters. When significant sleep loss exits, leaders should consider altering the length of duty or manning guard posts with *teams* of two or more to maximize security efforts.

A-28. Even in high tempo environments, sleep loss directly impairs complex mental operations such as (but not limited to)—

- **Orientation with friendly and enemy forces** (knowledge of the squad's location).
- **Maintaining camouflage, cover, and concealment**
- **Coordination and information processing** (coordinating firing with other vehicles and dismounted elements).
- **Combat activity** (firing from bounding vehicle, observing the terrain for enemy presence).
- **Force preservation and regrouping** (covering disengaging squads and conducting reconnaissance).
- **Command and control activity** (directing location repositioning, directing mounted defense, or assigning fire zones and targets).

A-29. Soldiers suffering from sleep loss can perform routine physical tasks (for example, loading magazines and marching) longer than more complex tasks (for example, requesting fire and establishing positions), but, regardless of the Soldier's motivation, the performance of even the simplest and most routine task will eventually be impaired.

A-30. With long-term (weeks, months) chronic sleep restriction, mood, motivation, and initiative decline. The Soldier may neglect personal hygiene, fall behind on maintaining equipment, be less willing to work or less interested in work, and show increased irritability or negativity.

A-31. Sleep-deprived commanders and Soldiers are poor judges of their own abilities.

A-32. Sleep loss impairs the ability to *quickly* make decisions. This is especially true of decisions requiring ethical judgment. If given enough time to think about their actions, Soldiers will tend to make the same decision when sleep deprived that they would make when fully rested. However, when placed in a situation in which a snap judgment needs to be made, such as deciding to fire on a rapidly approaching vehicle, sleep deprivation may negatively impact decision making.

DETERMINING SLEEP LOSS IN THE OPERATIONAL ENVIRONMENT

A-33. Sleep can be measured by having Soldiers keep a sleep log, but compliance is likely to be very low and reliability is poor.

A-34. The best way to evaluate a Soldier's sleep status is to observe his behavior. Indications of sleep loss include, but are not limited to increased errors, irritability, bloodshot eyes, difficulty understanding information, attention lapses, decreased initiative/motivation, and decreased attention to personal hygiene.

A-35. Sleep loss can be confirmed by asking the obvious question: "When did you sleep last and how long did you sleep?" or "How much sleep have you gotten over the last 24 hours?" The commander or leader should direct this question not only to his Soldiers, but to himself as well.

A-36. Sleep-deprived Soldiers may be impaired despite exhibiting few or no outward signs of performance problems, especially in high tempo situations. The best way to ensure that soldiers are getting enough sleep is for leaders to establish schedules that provide at least 7 to 8 hours of sleep in 24 hours.

COMMON MISCONCEPTIONS ABOUT SLEEP AND SLEEP LOSS

A-37. It is commonly thought that adequate levels of performance can be maintained with only 4 hours of sleep per 24 hours. In fact, after obtaining 4 hours of sleep per night for 5 to 6 consecutive nights a Soldier will be as impaired as if he had stayed awake continuously for 24 hours.

A-38. Another misconception is that Soldiers who fall asleep at inappropriate times (for example, while on duty) do so out of negligence, laziness, or lack of willpower. In fact, this may mean that the soldier has not been afforded enough sleep time by his unit leaders.

A-39. It is common for individuals to think that they are less vulnerable to the effects of sleep loss than their peers either because they *just need less sleep* or because they are better able to *tough it out*. In part, this is because the Soldier who is sleep deprived loses the self-awareness of how his performance is impaired. Objective measures of performance during sleep loss in such persons typically reveal substantial impairment.

A-40. Some individuals think that they can *sleep anywhere* and that they are such *good sleepers* that external noise and light do not bother them. However, it has been shown that sleep is invariably lighter and more fragmented (and thus less restorative) in noisy, well-lit environments (like the tactical operations center). Sleep that is obtained in dark, quiet environments is more efficient (more restorative per minute of sleep).

A-41. Although it is true that many people habitually obtain 6 hours of sleep or less per night, it is not true that most of these people only *need* that amount of sleep. Evidence suggests that those who habitually sleep longer at night tend to generally perform better and tend to withstand the effects of subsequent sleep deprivation better than those who habitually obtain less sleep.