TOP KNIFE FIGHTER SURGEON COURSE

173 Fighter Wing Kingsley Field Oregon

RSV-3A
HUMAN PERFORMANCE
SUSTAINMENT

Criterion Referenced Objectives

- Describe the impact of fatigue on Air Force operations
- Describe strategies to combat fatigue, to include non-pharmacologic and pharmacologic

Overview

- The problem
- Fatigue
- Sleep
- Circadian Rhythm
- Nutrition
- Strategies
- Pharmacology
- Take home points



- 18 hours awake = blood alcohol of 0.05%
- 24 hours awake = blood alcohol of 0.10%
- Fatigue listed present in 234 of 1837 Class A mishaps 1972-2000
 - Causal in 18
 - Major contributor in 8
 - Minor contributor in 102

- AF personnel face fatigue-inducers regularly
 - Night work
 - Cross time zones
 - Stress of operations
- Results in poor performance
 - Slowed reaction time
 - Increased errors
 - Irritability

- CONOPS Continuous Operations
 - Operations continue over 72 hours
 - Individual may work a shift and be relieved
 - Shifts may change, conflict with circadian rhythm
 - Sleep can be intermittent, broken, unrestorative

- SUSOPS Sustained Operations
 - Individual works over 72 hours
 - Work continues until it is finished
 - Sleep deprivation
 - Ground warfare



Performance – A Wrinkle

- Vietnam Naval Aviators
 - Carrier landings improved at night after 22 days of combat flying
- Operation Desert Shield/Desert Storm
 - LSO scores same or improved as operations progressed
- Lesson: Despite fatigue, performance in inherently arousing situations is better than in boring

Fatigue

- Physical Fatigue
 - Unable to continue to work because of intense or prolonged work
 - Sleep loss
 - Noise or heat stress
 - Poor nutrition or hydration
 - Hypoxia
 - Poor physical condition
 - Change in work/rest schedule

Fatigue

- Mental fatigue
 - Boredom from repetitive, nonphysical tasks
 - Can be induced in minutes
 - Anxiety
 - Apprehension
 - Stress



Fatigue

- First indicator of unit fatigue can be a change in everyone's sense of humor
- Poor communication
- Increased irritability

- Slow wave sleep (SWS)
 - Stages 3-4
 - High amplitude slow waves on EEG
 - Replenishment of neurotransmitters and removal of waste products
 - Onset in approximately 60 minutes
 - Arousal from SWS difficult (sleep inertia high)
 - Naps and sleeps try to avoid waking during SWS

- Combat nap
 - Less than 40 minutes
 - Strategy is to awaken before first SWS
 - Some restoration
 - Less difficulty awakening
 - Provide 2-4 hours useful activity
 - Can help for up to 2-3 days

- Short sleep
 - 3-4 hours
 - Extends past SWS
 - Performance improves4-10 hours
 - Anecdotes indicate
 crews can function 4-5
 days



- Easiest to initiate twice a day early afternoon and just before normal bed time
- Mid afternoon nap helps prep for night shift
- 3 hour sleep midafternoon more effective than evening
- Sleep cannot be preloaded; but fatigue is
- Continuous better than fragmented sleep
- Resting on a bed isn't sleeping
- Need 6-8 hours/day for SUSOPS

- Try to sleep the same time daily, including weekends
 - Same routine (clothes, darkness, background noise, temperature) helps when different time or location
- Avoid heavy exertion 4 hrs before sleep
- Alcohol worsens sleep duration and quality
- Caffeine interferes with sleep
- Avoid large meals 2 hours before bed

Crew Rest

- Officially 12 hour minimum prior to mission
 - Allows 2 hours before and after uninterrupted sleep
- 24 hours is poor timing
 - Sends crews back to work when they should begin rest period
 - 16 or 36 hour crew rest superior

Circadian Rhythm

- Averages 25 hours
- Biological clock rest daily to 24 hours
 - Light/dark cycle, sleep, meals, activity, clocks
- CONOPS, SUSOPS, and crossing time zones all force changes
- Jet lag Crossing 4+ time zones
- Shift lag Transition day to night shift most difficult

Jet Lag – East

- Body adaptation
 - 40 min/day
 - Reduced total sleep duration upon arrival
- Seek daylight/bright light exposure early to advance sleep onset prior to travel
 - Between 0300 and 0700 for day workers in originating time zone
 - Get advanced daylight exposure first 3 days especially upon arrival to advance body clock
 - By third day, daylight exposure as soon as awaken

Jet Lag – West

- Body adaptation
 - 60 min/day
 - Fatigue earlier than usual in day upon arrival
- Seek daylight/bright light exposure early to advance sleep onset prior to travel
 - Between 2000 and 0300 for day workers in originating time zone
 - Get prolonged daylight exposure of 1-3 hours to delay sleep onset

Shift Lag

- Physical and mental adaptation to sudden change in work schedule lags behind
- Most difficult changing day to early morning or night
 - Two weeks continuous nights required to adjust body cycle from day shift
 - One week to adjust back to day shift
 - Single period of night work better tolerated than
 3-4 consecutive

Shift Lag

- Permanent night shift
 - Avoid daylight in morning after night mission
 - Avoid daylight before bedtime
 - Schedule sleep onset 0400-sunrise
 - Avoid daylight until 1200
 - Work outside in afternoon

Shift Lag

- Temporary night shift (1-3 days)
 - Short sleep immediately after midnight shift
 - Short sleep before next midnight shift
 - Upon awakening from second sleep (prior to work), need daylight exposure



Nutrition and Performance

- No magic bullet
- Adequate nourishment
 - Don't skip meals if avoidable; if unavoidable, snack
 - Balanced diet best
- Hydration
 - Don't dehydrate to avoid the piddle pack
- Caffeine in moderation
- All dietary supplements should be approved by the flight surgeon

Strategies

- Wing level
 - Wing/CC should recognize everyone else will get tired first
 - CO's will fatigue from planning/ground duty prior to initiating ops
 - Minimize unnecessary last minute changes
 - Allow units to commit to day or night ops when able

Strategies

- Squadron Level
 - Be on the lookout for change in dynamics,
 especially a loss in sense of humor
 - Plan rest periods
 - Make people sleep, away from squadron when able, combat naps when unable
 - Schedule more time for sleep if necessary during day; it's more difficult to sleep during day

Strategies

- Flight Surgeon
 - Be a resource
 - To be a resource, you have to know the aircrew
 - To know the aircrew you have to spend time with them inside and outside the aircraft
 - You are an "out" for an aviator who needs to rest but wants to save face
 - Know your Go and No-Go pills

Pharmacology

- Go Pills
 - Dexedrine
 - Modafinil
- Ground trials and informed consent
- Use is voluntary, approved by FS and wing/CC
- Operational use documented and reported to MAJCOM/SG

Pharmacology

- No Go Pills
 - Temazepam
 - Zaleplon
 - Zolpidem
- Ground trials and informed consent

Pharmacology

- Verbal DNIF for 6 hrs before resume duties after each No Go pill
- Max 7 consecutive days, not to exceed 20 days/60 day period
- Not authorized for use during routine training missions

Take Home

- Operating with fatigue is operating impaired
- Strategic use of naps can ameliorate fatigue
- Plan for jet lag and shift lag to minimize impact
- Pharmacology helps for aviators and special operators
- Be a resource for your line commanders and operators
- Next slide for quiz instructions

- Go to quiz
- Enter your answers on the <u>answer sheet</u>
- Print only one answer sheet for entire course
- Press ESC to go back to main menu