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

The Problem

- 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

The Problem

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

The Problem

- 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

The Problem

- 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

Sleep

- 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

Sleep

- 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

Sleep

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

Sleep

- 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

Sleep

- 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 answer sheet
- Print only one answer sheet for entire course
- Press ESC to go back to main menu