



C R E W E N D U R A N C E

Fatigue Management Program



A clipping from the NavyTimes newspaper. The main headline reads "3 HOURS ON 9 HOURS OFF" in large, bold letters. Below the headline is a sub-headline: "The new, better watchbill that sailors love. So why isn't every ship using it? 20". To the right of the text is a clock face showing the time as approximately 10:10. On the far right, there are several smaller headlines and images, including "HAZING? COB, XO, CO HAMMERED IN ANTI-GAY SCANDAL 16", "BATTLE 'E' TUNING/DRUM BUSTED SHIP IS NOW BEST IN CLASS 22", "DFC FAKER? NAVY CHARGES COUNTRY-SINGING RECRUITER 16", and "BACK COVER".



“Fatigue is so prevalent and such a part of our culture that we scarcely see or recognize it. It’s the big gray elephant we muscle out of the cockpit when we fly, step around when we enter the bridge, and push aside when we peer into the periscope.”

CAPT Nick Davenport, USN, MC (ret)
Former Command Physician
US Naval Safety Center



Consequences of poor sleep practices

Short-term effects

- Performance decrement (reaction time, errors)
- Decreased vigilance
- Inconsistent logical reasoning
 - Reduced short-term memory
- Negative mood
- Increased risk of injury and death
- Increase in stress hormone production

Intermediate effects

- Loss of motivation and morale
- Poor memory
- Longer time to train
- Decreased immunity
- Caffeine addiction
- Elevated mishap rates
- Failure to accomplish mission

Long-term effects

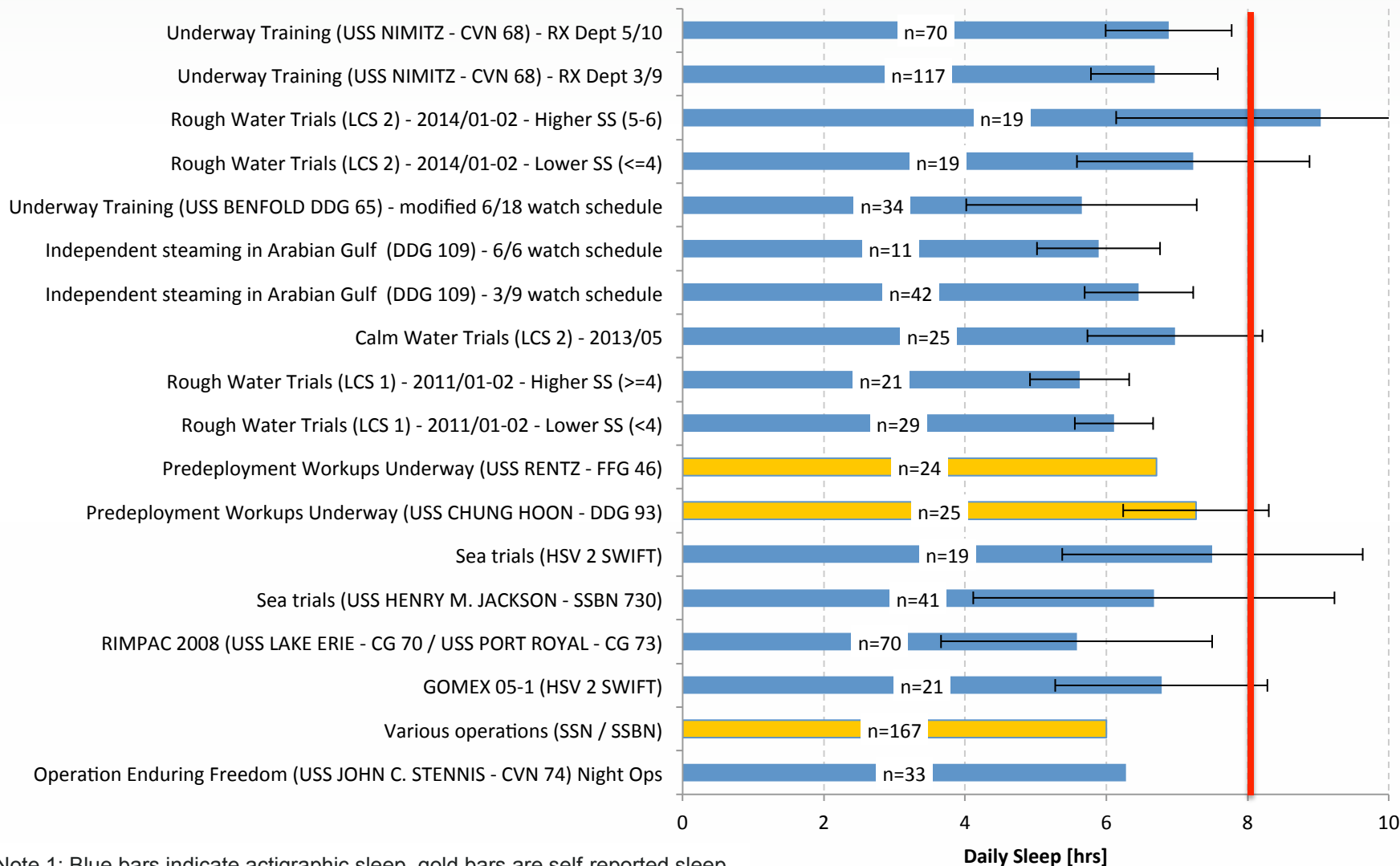
- Circadian scarring
- Metabolic disorders
- Chronic disease due to long-term sleep debt
- Inability to recruit and retain Sailors



- Sleep deprivation due to extended workdays
- Major sleep episode – often does not exist
- Split sleep – napping may or may not happen
- Fragmented sleep – poor quality
- Sleep at different times of the day
- Poor berthing compartment – habitability
- Caffeine consumption – esp. energy drinks
- Motion-induced disturbances from ship motion/
sea state



Sleep - Naval Operations



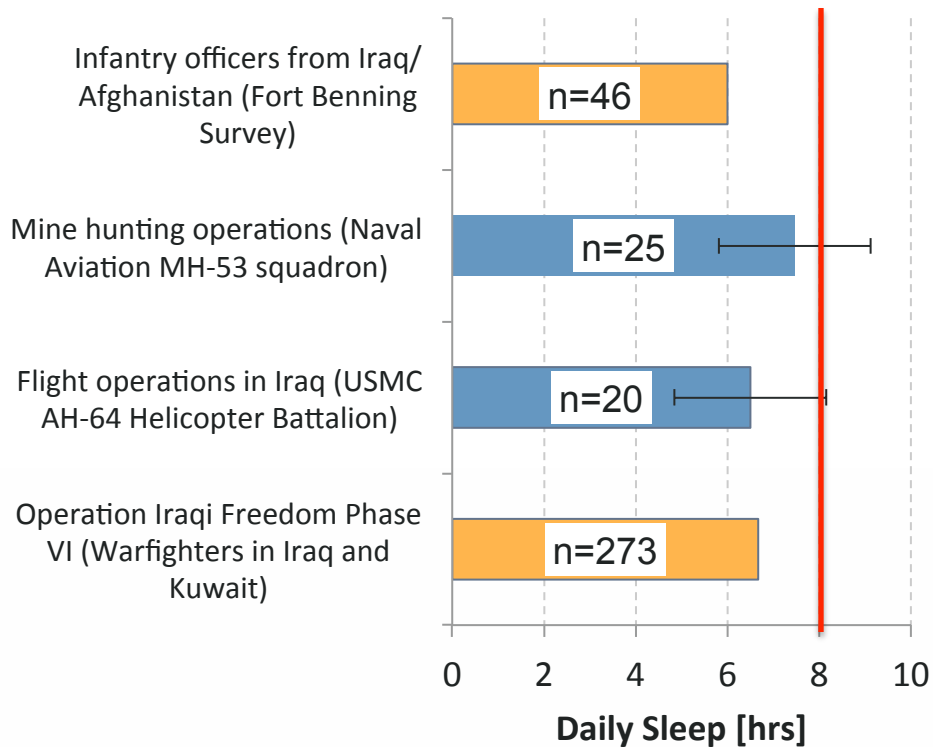
Note 1: Blue bars indicate actigraphic sleep, gold bars are self-reported sleep

Note 2: Number centered on each bar refers to study sample size

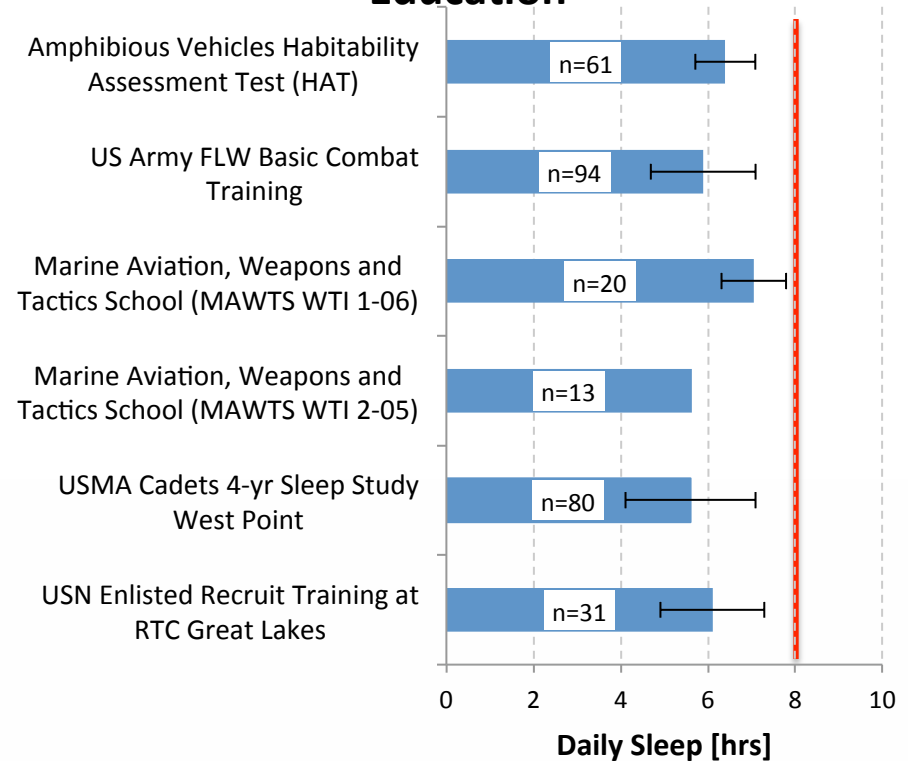
Note 3: Horizontal lines indicate one standard deviation



Sleep – Combat Operations



Sleep during Training and Education



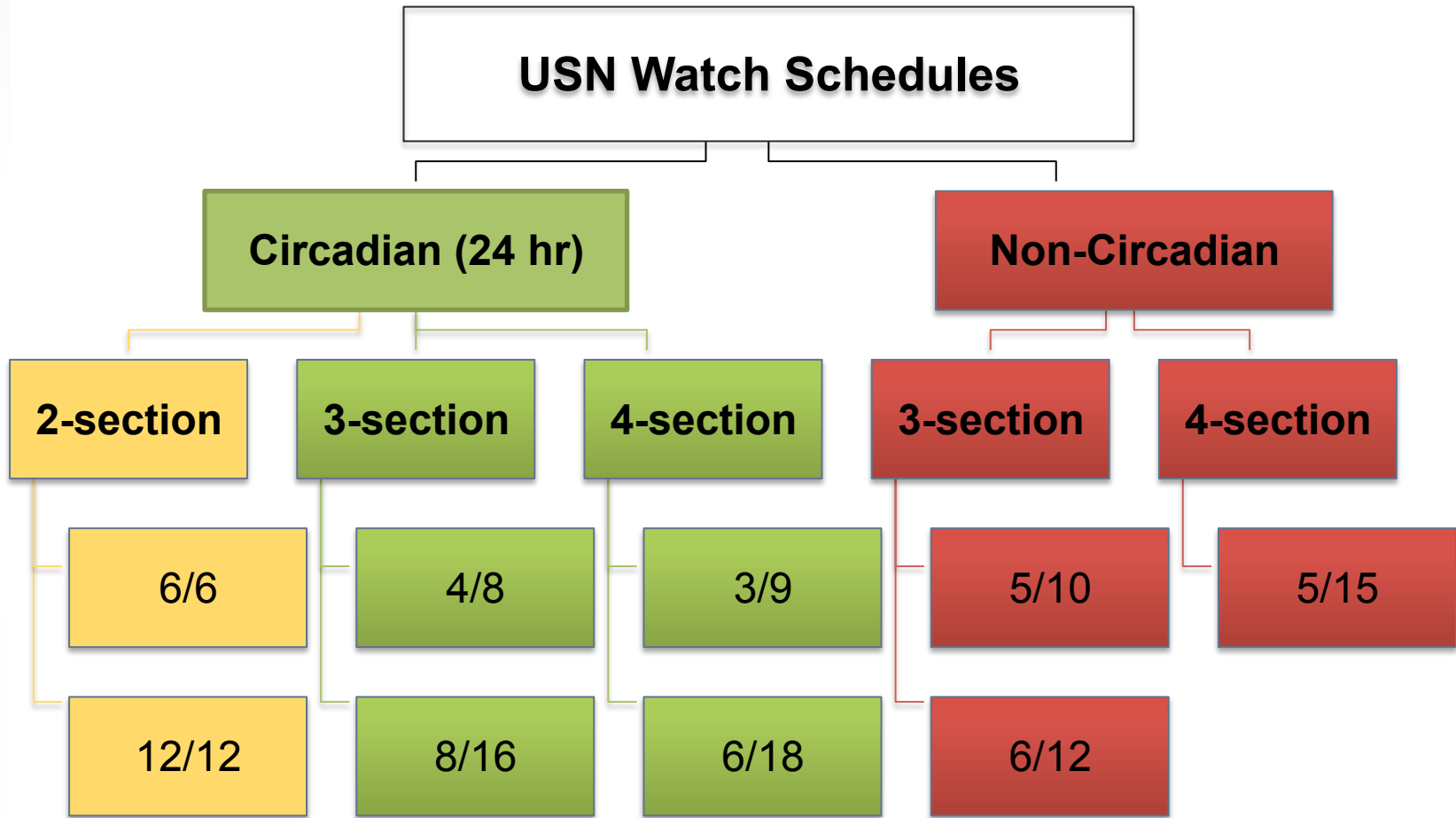
Note 1: Blue bars indicate actigraphic sleep, gold bars are self-reported sleep

Note 2: Number centered on each bar refers to study sample size

Note 3: Horizontal lines indicate one standard deviation



Common Shiftwork Schedules in the US Navy



Note:

- Work > Watch
- Workday includes more duties (up to 50% more!) than just standing watch
- Other watchbills may be implemented by commanding officer



- Focus on maintaining alert and engaged Sailors.
- Learn and understand the effects of good sleep practices.
- Use the 24-hour circadian rhythm to set the foundation.
- Build a stable daily schedule including the watch bill that maximizes rest opportunities at the same time each day.
- One size does not fit all -- consider tradeoffs.
- Get supporting analysis on your schedule before you make a final decision.

Sleep is a weapon.
A clear mind is a combat edge.



Recommendations based on studies over a 15 year period

- Give crewmembers opportunity to sleep at the same time each day.
- If 4 section watch can be supported, consider either 3-9 or fixed 6-18 schedules.
- If using a 3 section watch, consider 4-8 watchstanding schedule.
- Provide protected sleep periods for night watchstanders/ day sleepers.
- Naps are helpful, especially if not too close to major sleep period.
- Rotations should be forward, lengthening the work day rather than shortening it (for example, rotate from 03-06 to 06-09 vs midnight to 03).

Sailor Fatigue is a Safety Issue.
A clear mind is a combat edge.



- **Planning Factors**

- Type of rotation
 - Circadian is almost always better
- Length of watches
 - Shorter is usually better
- # of sections
 - More is usually better
- Rotation times
 - Cardinal points are simpler
- Direction of rotation
 - Forward is usually better
- Designated sleep times
 - Sleep at same time each day
- # Days in each rotation
 - Two weeks or more is better
- Day of turnover
 - Weekends allow flexibility
- Turnover
 - Add hours vice drastic change

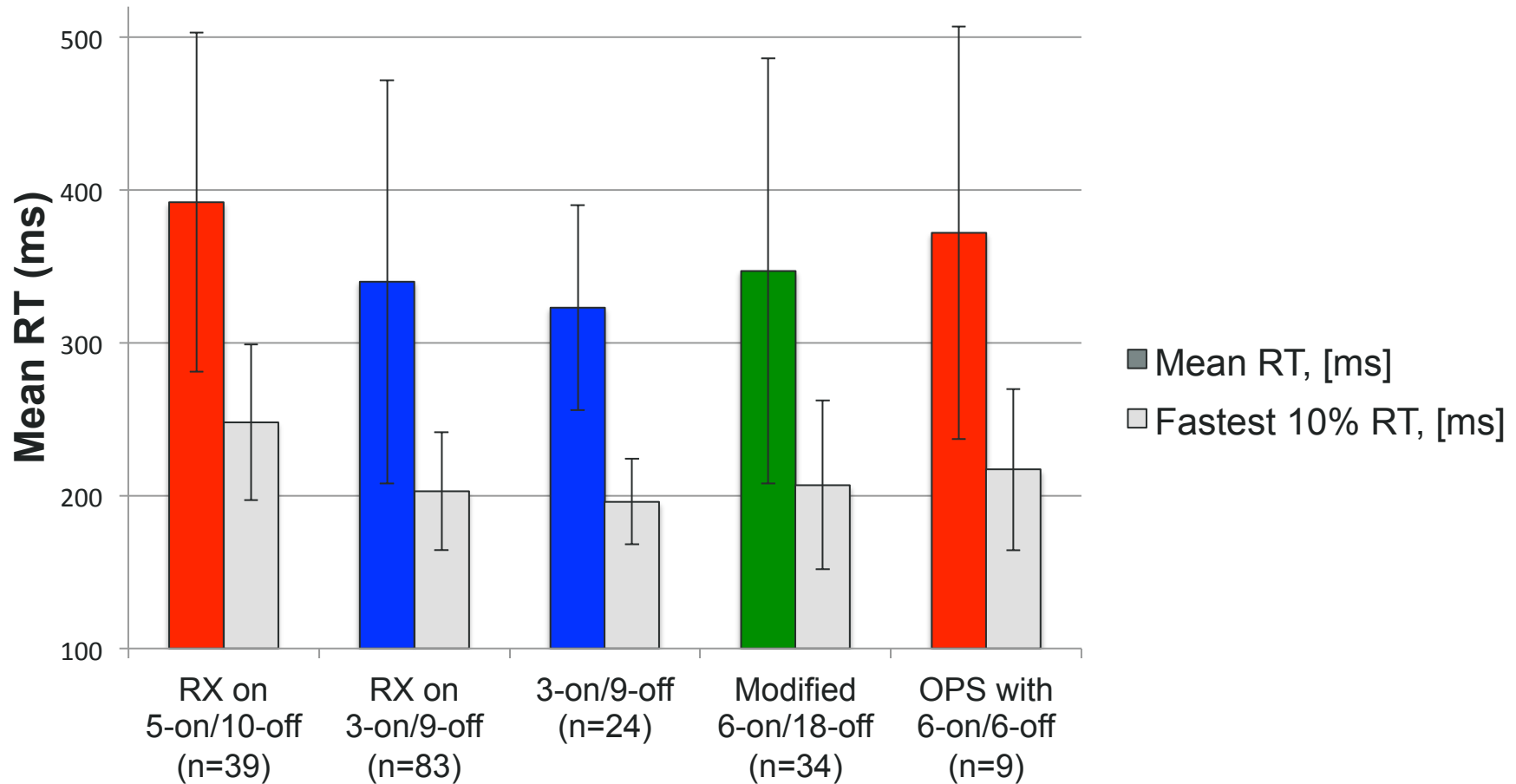
- **Constraints**

- Heat stress limitations (PHEL curves)
- Drills, briefs and debriefs
- Watch turnover SOP
- Pre-watch space/plant tours
- Watch team cohesion
- Meal hours
- Daily routine
- Berthing arrangements
- Availability of qualified personnel

**Policy and Process are Easy –
Cultural Change is Hard.**



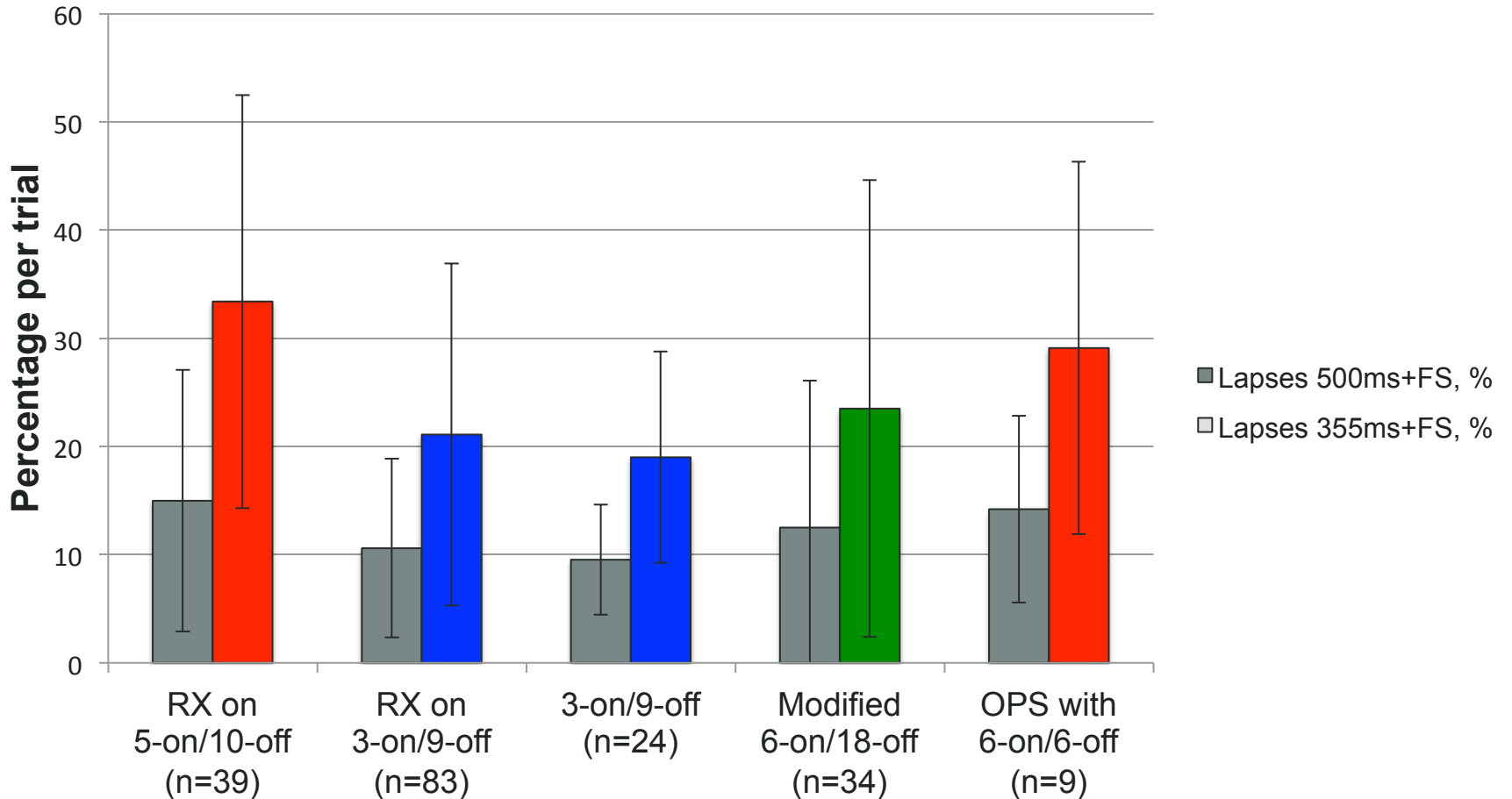
PVT reaction times in different US Navy Watch Schedules



Reaction times of USN Sailors on 3/9 schedule are significantly faster than Sailors on “5 and dime” schedule



Errors (PVT lapses + False starts) in different USN Watch Schedules



Sailors on the 3/9 have significantly fewer errors than Sailors on “5 and dime” schedule

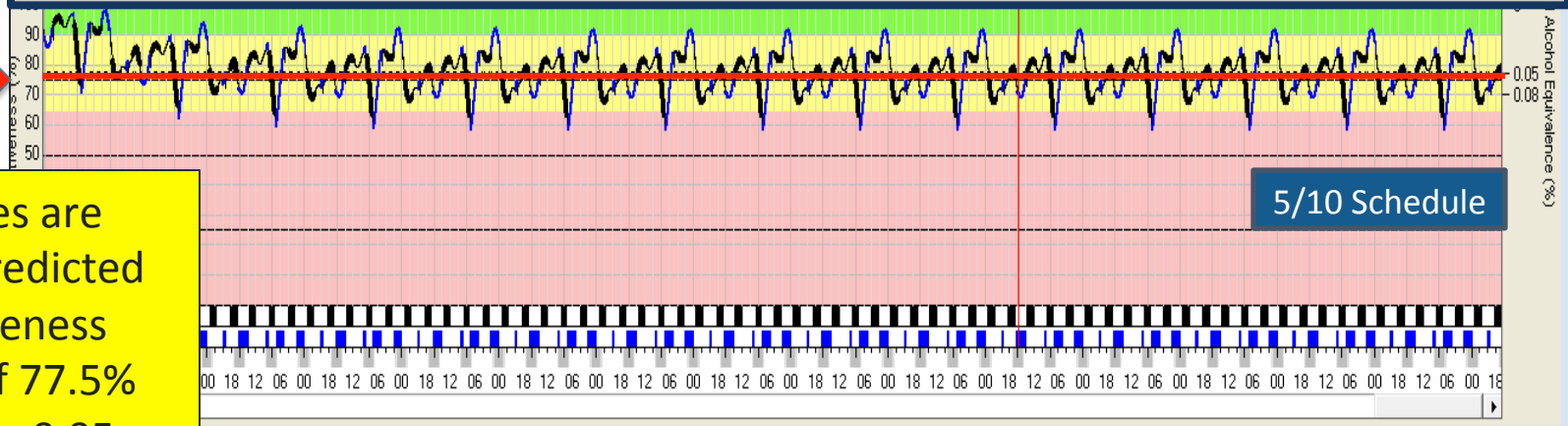


Studies: Common Threads

Fatigue Avoidance Scheduling Tool (FAST):

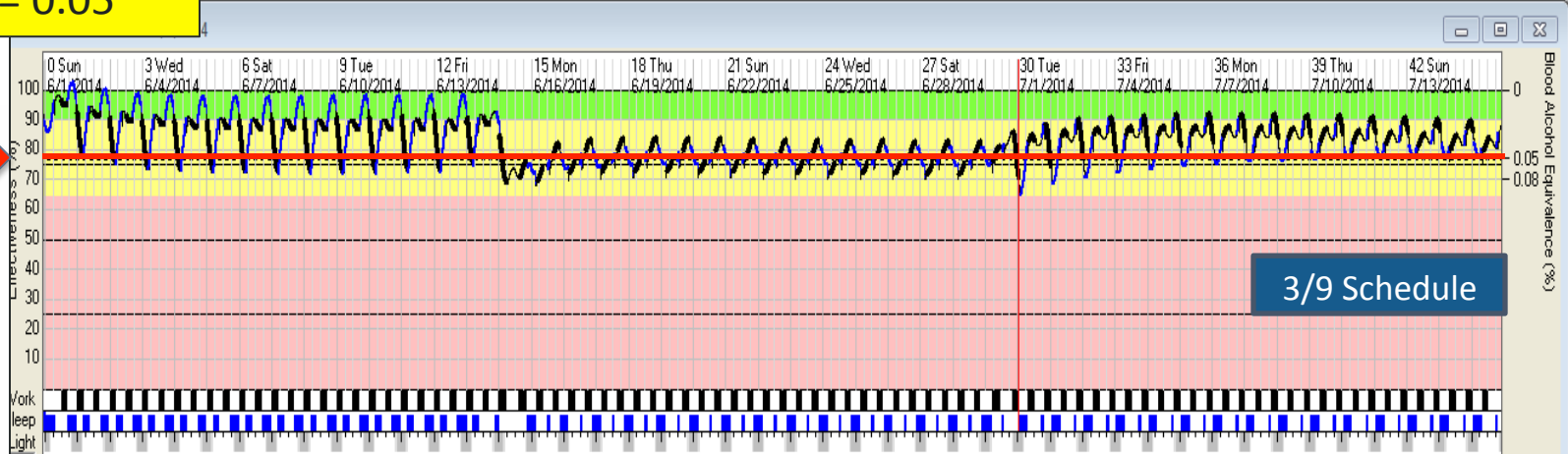
Predicts performance over time based on work-rest schedule

Overall effectiveness improves from 5/10 to 3/9



Better
↑
↓
Worse

Red lines are FAST predicted effectiveness scores of 77.5% or BAC = 0.05



Better
↑
↓
Worse

Sample 3/9 Watch Rotation

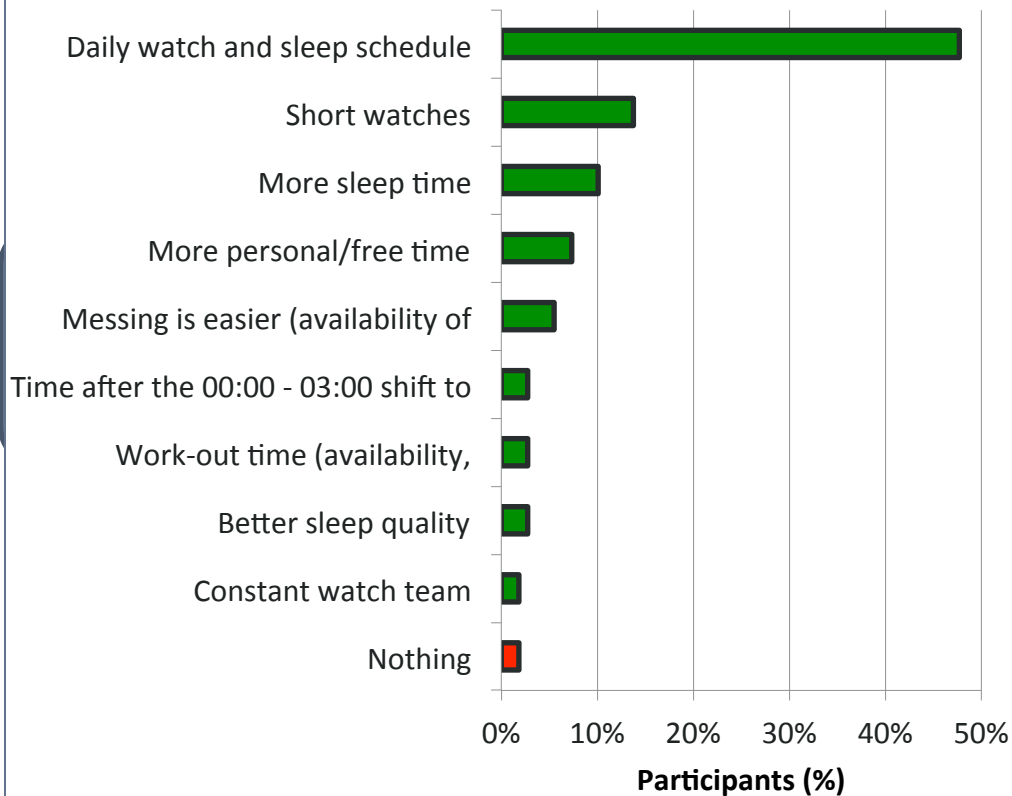


	03-06	06-09	09-12	12-15	15-18	18-21	21-00	00-03
Section 1	Watch				Watch			
Section 2		Watch				Watch		
Section 3			Watch				Watch	
Section 4				Watch				Watch



3/9 Schedule Open-ended Questions

“What did you like most about your current watch schedule” from USS NIMITZ 3/9-5/10 comparison study



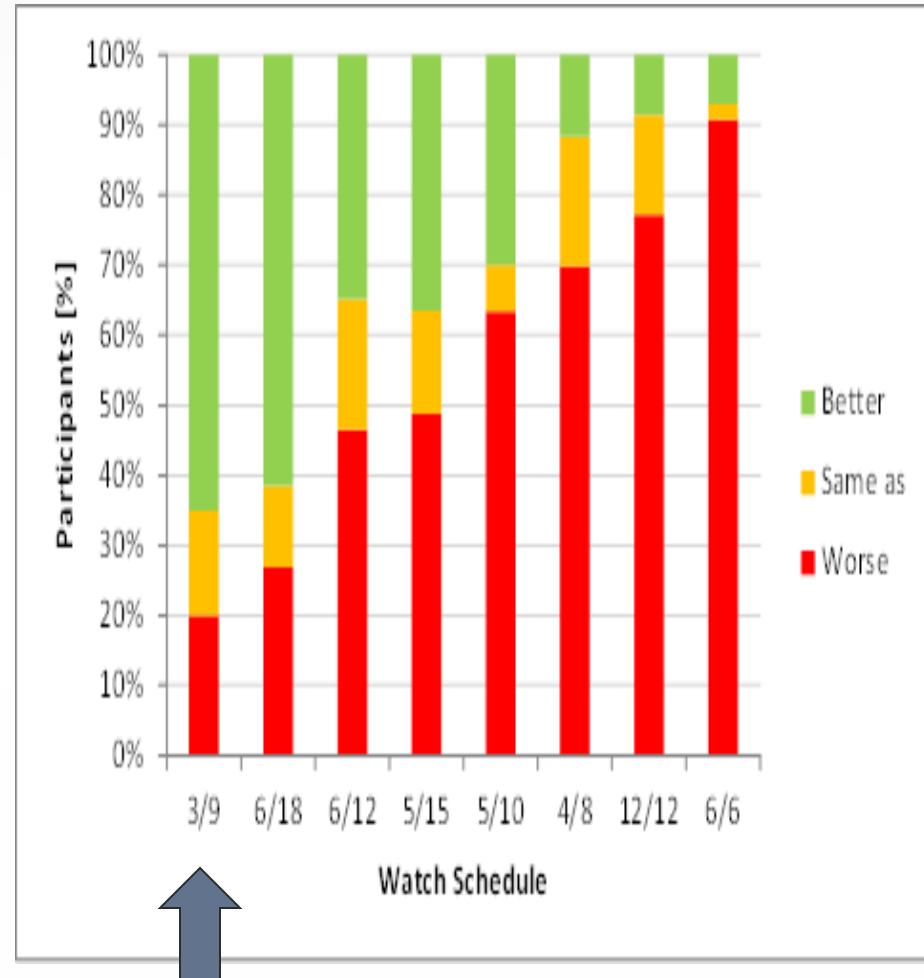
Ships that have used the 3/9

- USS TRUXTUN
- USS ROSS
- USS ROOSEVELT
- USS SAN JACINTO
- USS OSCAR AUSTIN
- USS BARRY
- USS MASON
- USS STOUT
- USS JASON DUNHAM
- USS DECATUR
- USS BENFOLD
- USS MONTEREY
- USS HARRY S. TRUMAN
- USS THEODORE ROOSEVELT
- USS NIMITZ

Overwhelming support by those commands that have implemented a Circadian watch schedule

- Not a single action but a set of proven options
 - Acknowledge benefit of circadian-based watchbills
 - *3/9, 4/8, 6/18 are all circadian rotations*
 - *4 section watch should be an attainable goal*
 - Create a schedule
 - *Build around watchstander/maintainer sleep routine*
 - *Adjust/extend mealtimes*
 - Policy
 - *Question the status quo (quarters, announcements, meetings)*
 - *Consider berthing by shift*
 - *Add physical sound/light barriers*

- Leadership must set the tone and support
 - Acknowledge the problem
 - Actively seek and reward solutions



Crew Satisfaction Survey
3/9 vs. other rotations



Worst Practices Interfering with 3/9 Effectiveness

- “We required everyone to attend quarters in the morning, regardless of what watch they had, so the 2 weeks on 00-03 was always hell.”
- “We did messing and berthing at 0800.”
- “We enforced an “all hands awake” period from 0900 to 1500 each day.”
- “We never changed meal hours so the night watches missed either dinner or breakfast.”
- “Leadership did not respect sleep periods – they would call you any time with routine questions.”
- “I was never allowed to delegate meetings or briefs, so I was not able to catch up on sleep.”



- How the NPS Crew Endurance Team can help you
 - Provide “one-stop” website for information
 - Provide Implementation Kit for Commanders
 - Evaluate proposed watch rotations for fatigue
 - Provide on-site training as requested
- How you can support the Crew Endurance Team effort
 - Advocacy - Spread the word (P-4, CO Calls)
 - Support shipboard studies
 - Assign a POC/Action Officer
 - Collaboration with other TYCOMS (Sub, Air)



Questions?

Contact information:

Nita Lewis Shattuck, Ph.D.

(831)656-2281

nlshattu@nps.edu

NPS Crew Endurance Resource Website
<https://my.nps.edu/web/crewendurance>