



Descriptive Epidemiology of U.S. Air Force Aviators Referred for Evaluation of Obstructive Sleep Apnea

Lt Col Dara Regn, Maj Melissa Gear, Jared Haynes, Rosalinda Alvarado
U.S. Air Force School of Aerospace Medicine, March 2019

Disclaimer

- The views expressed are those of the author and do not necessarily reflect the official policy or position of the Air Force, the Department of Defense, or the U.S. Government.

Epidemiology of Obstructive Sleep Apnea

Obstructive Sleep Apnea (OSA)

- Characterized by repeated episodes of upper airways obstruction during sleep
- Causes significant disruption in sleep through apnea-related asphyxias
- Prevalence of OSA in general worldwide population 9%-38%
 - 10% to 17% in U.S. adult population
 - Increases with age and body mass index (BMI)
 - Male > female
 - Underdiagnosed/undertreated
- Increasing prevalence rates may be associated with increasing BMI in population, as well as increase testing, and changes in disease definitions
- Associated with medical comorbidities and performance decrement
 - Higher rates of motor vehicle accidents in those with OSA



OSA in the U.S. Military

Impacts operational readiness, performance, and wellbeing

- Encounters for OSA in U.S. military personnel increased 517% from 2005 to 2014
- 30,000 incident cases in U.S. military in 2013
- Greatest increases in:
 - Men
 - >40 yr old
 - Black race
 - Senior officer
 - Army personnel
- OSA often comorbid with other sleep disorders
 - High rate of comorbid insomnia
- Increased enlistment BMI associated with increased risk of developing OSA during career
- Limited information on military aircrew
 - 5.2% of waivers in Army aviators



OSA in the U.S. Air Force



U.S. AIR FORCE

- OSA is disqualifying for all flying classes
 - FCI/IA, II, RPA, III, MOD, GBC
- Mod or severe OSA requiring CPAP & incompletely treated OSA → I-RILO
- Initial dx work-up, Wilford Hall, 88th Med Group or academic laboratory
- FC II (except FS) with documented sleep d/o → Aeromedical Consultation Service (ACS) evaluation
- No waiver potential for FCI

*** While OSA does not limit the majority of USAF assignments, evaluation and continued monitoring of aviators through the waiver process are very important to prevent untreated OSA and its complications.*

Ref: USAF Waiver Guide

Untreated OSA can lead to:

Cardiac complications

- Hypertension
- Cardiac arrhythmias
- Pulmonary hypertension
- Right-sided congestive heart failure

Neurocognitive Deficits

- Memory
- Attention
- Executive tasks
- Increase risk for depression



Aeromedical risk

- Sudden incapacitation
- Disruption in duties
- Progression to cardiac or neurologic complications



❖ Untreated OSA in the aviator can severely impact the mission

USAF Waiver Recommendation Requirements

1. Effective therapy documented on repeat polysomnogram (PSG)
 - RDI <5
2. Resolution of sleep-related symptoms
3. Demonstrate excellent compliance
 - CPAP usage 90% nights, ≥ 5 h per night
 - Compliance data for 30 days
4. Pass Maintenance of Wakefulness Test (MWT) at ACS
5. Neuropsych testing at ACS for severe OSA



Benutzer:DL5MDA [Public domain], from Wikimedia Commons

Case 1 – Compliance Misinterpretation



- 39-yr-old male U-2 pilot, >5000 h
- 2018: presented with sleep complaints, poor concentration ESS=10/24
- PSG showed mild OSA (AHI 8.7/h, RDI 9.0/h)
- 30-day compliance report Oct 2018 showed:
 - Excellent compliance (100% nights, 6 h 26 min on average)
 - Good control, AHI 1.8/h, ESS=0/24
- **HOWEVER, MISUNDERSTOOD compliance instructions**
 - Thought he just needed to wear for 30 days, then only before flying
 - Average usage before ACS evaluation – 1 h/ night, 16% of nights >4 h
 - When using CPAP 1x week, ESS is 6/24, Insomnia severity index = 9/28
 - Failed first MWT, sleeping at 37 min
 - DNIF, to return after continued CPAP compliance

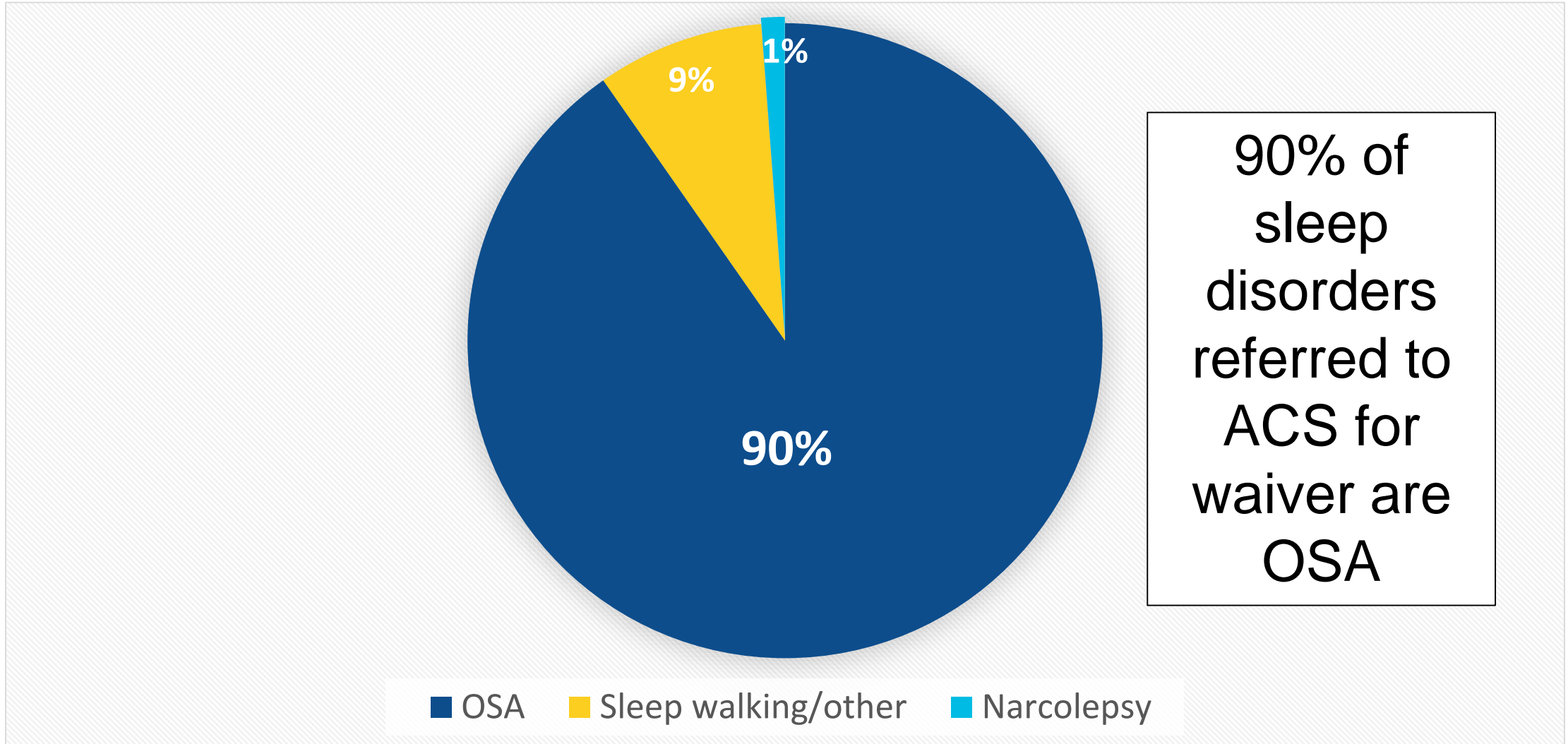
***** Appointment instructions for all ACS OSA evaluations state to reinforce the requirement for continued use of CPAP to the member.***

Case 2 – Severe OSA with Neurocog Deficits



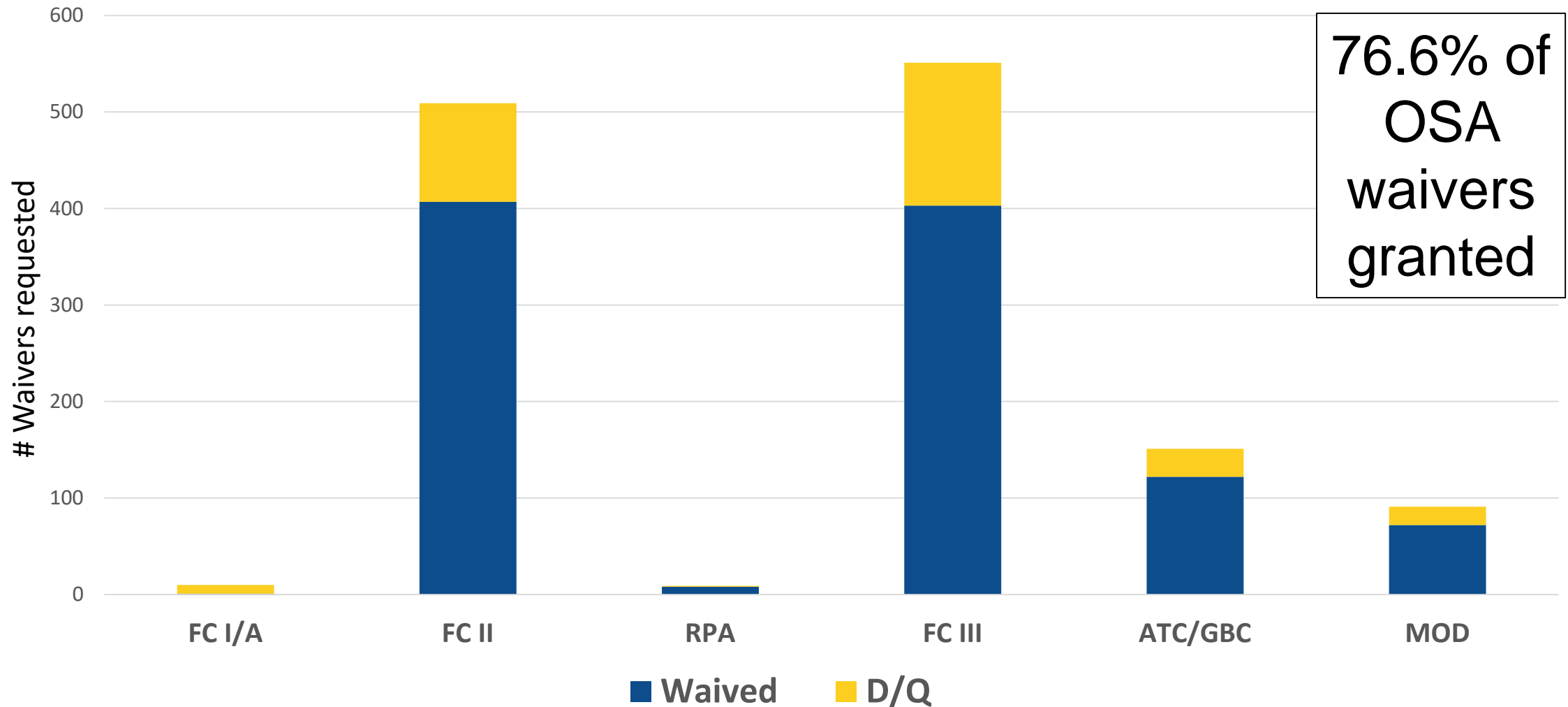
- 47-yr-old male E-8 pilot, >4000 h
- Has been evaluated 4 times by ACS for severe OSA with cognitive deficits
- First PSG in 2010, dx OSA, elected to have UPPP, sleep worsened after surgery
- Repeat PSG in 2011 dx moderate OSA – RDI=23/h, O2 nadir 87%, started on CPAP
- Evaluated by ACS in 2012, controlled/compliant with CPAP, MWT negative
 - BUT: Neuropsych testing revealed deficits consistent with OSA – DNIF
 - ↓ attention, planning, abstraction, and processing speed
- With increased CPAP compliance and overall sleep time, neuropsych deficits improved to the point of being waiverable for 3 yr
- Reassessed by ACS in 2015 – excellent compliance (near 100%) – neuropsych deficits improved
 - waived x 3 yr
- Reassessed by ACS 2018 – excellent compliance (100%, avg 7 h 24 min)
 - PSG – AHI 100.4/h, O2 to 85%, sleep efficiency 70%, MWT neg dx severe OSA
 - Neuropsych testing stable from 2015 – recommend 3-yr waiver

Sleep Disorders Submitted for Waiver

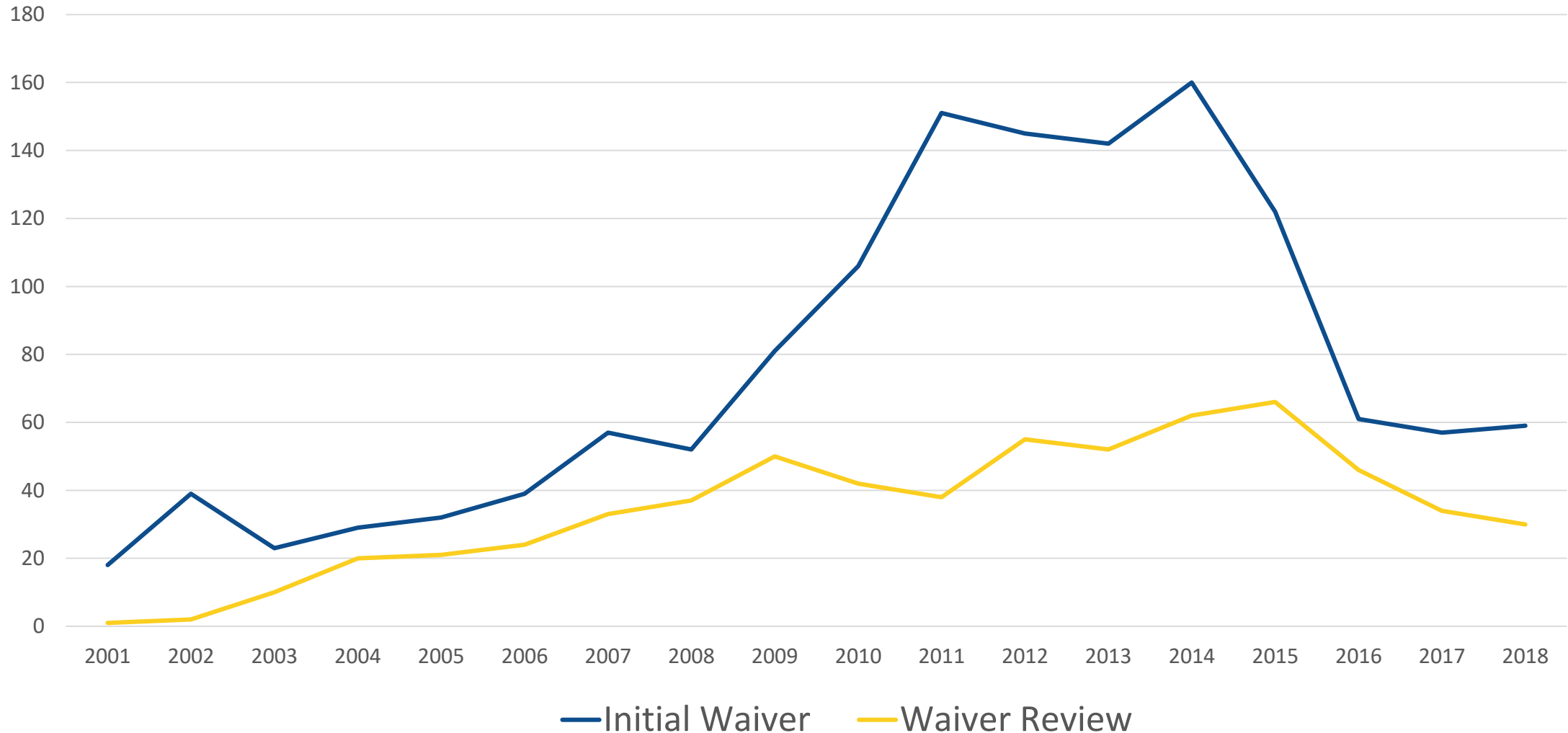


Ref: USAF Waiver Guide, AIMWTS data through 2017

Aircrew Waivers by Flying Class through 2017 (n=1312)



Number of Aircrew Waiver Evaluations Including OSA (2001-2018)



Ref: Analysis of AIMWITS data

Analysis of Sleep Medicine Clinic/ACS Patients

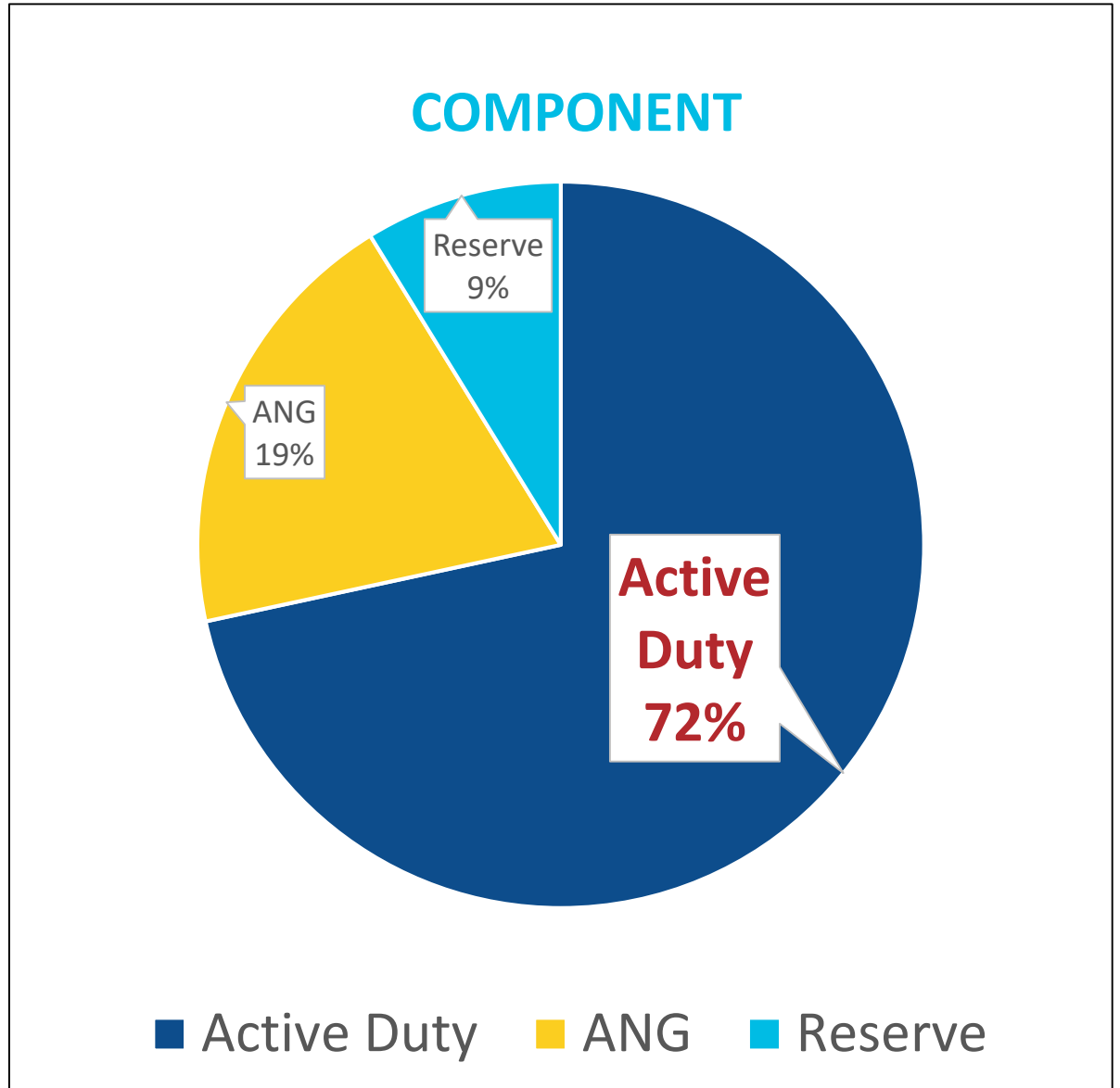
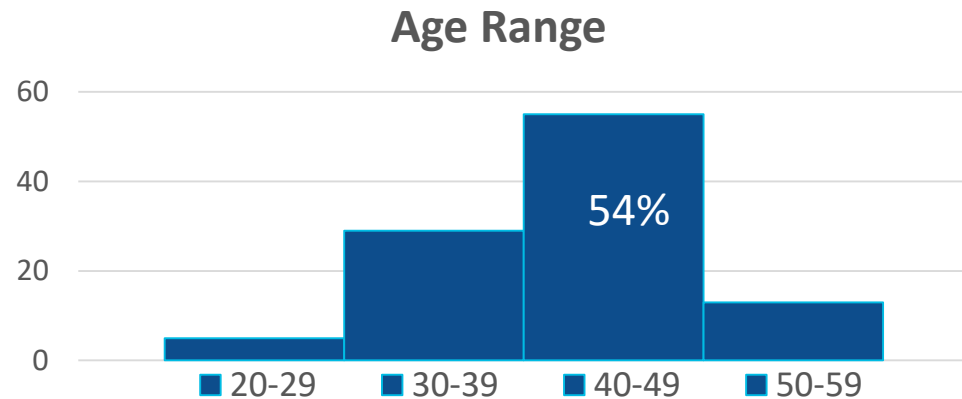
Methods



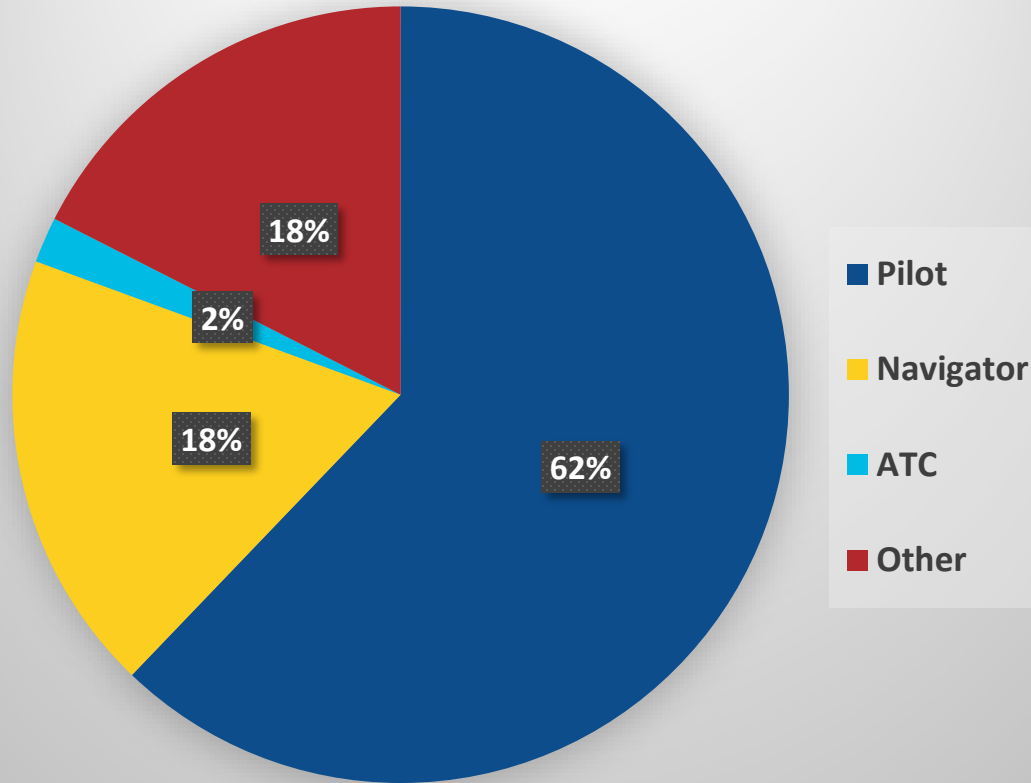
- Retrospective chart review
- Examine sleep medicine clinical records and PSG data of members referred to the ACS at Wright-Patterson Air Force Base for evaluation of OSA from 2009-2018
- Charts consisted of focused medical record, PSG results, questionnaires, and compliance data
- The research protocol was reviewed and approved by the AFRL Institutional Review Board

Demographics (n=103)

- 100% male
- 88% Caucasian
- Mean age = 42 ± 6.8 yr
- 90% had BMI in overweight/obese range
 - 46% obese
 - Mean BMI = 29.2 ± 3.8 kg/m²

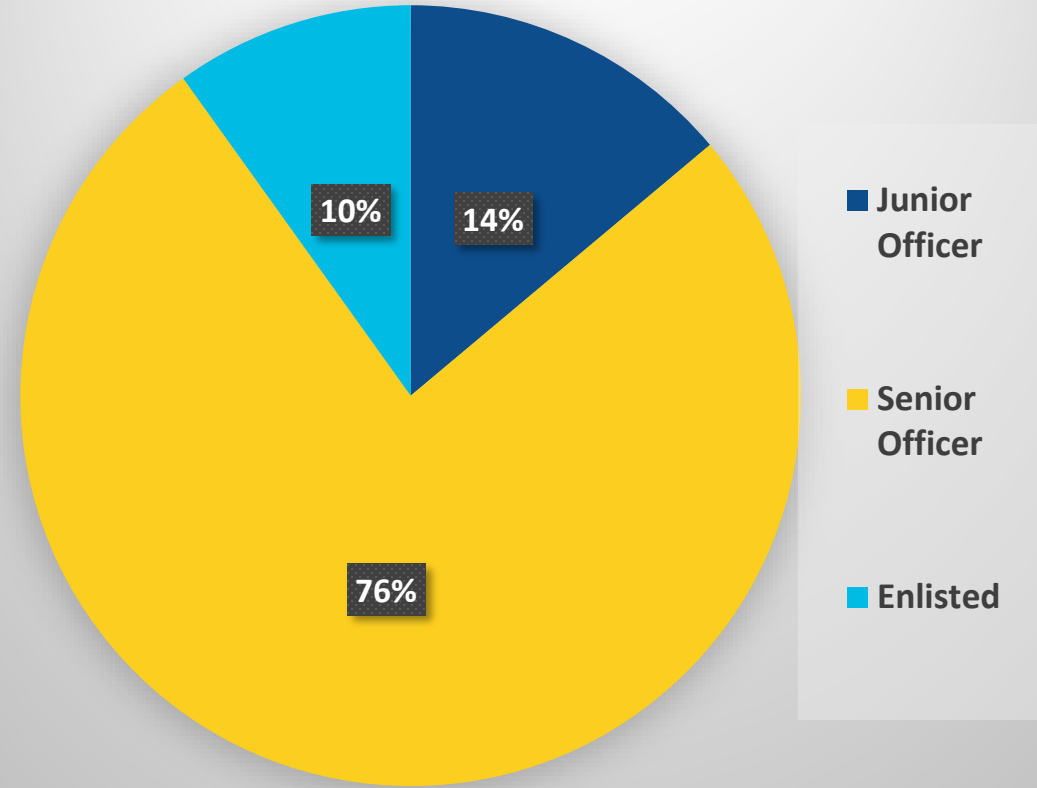


AERODUTY



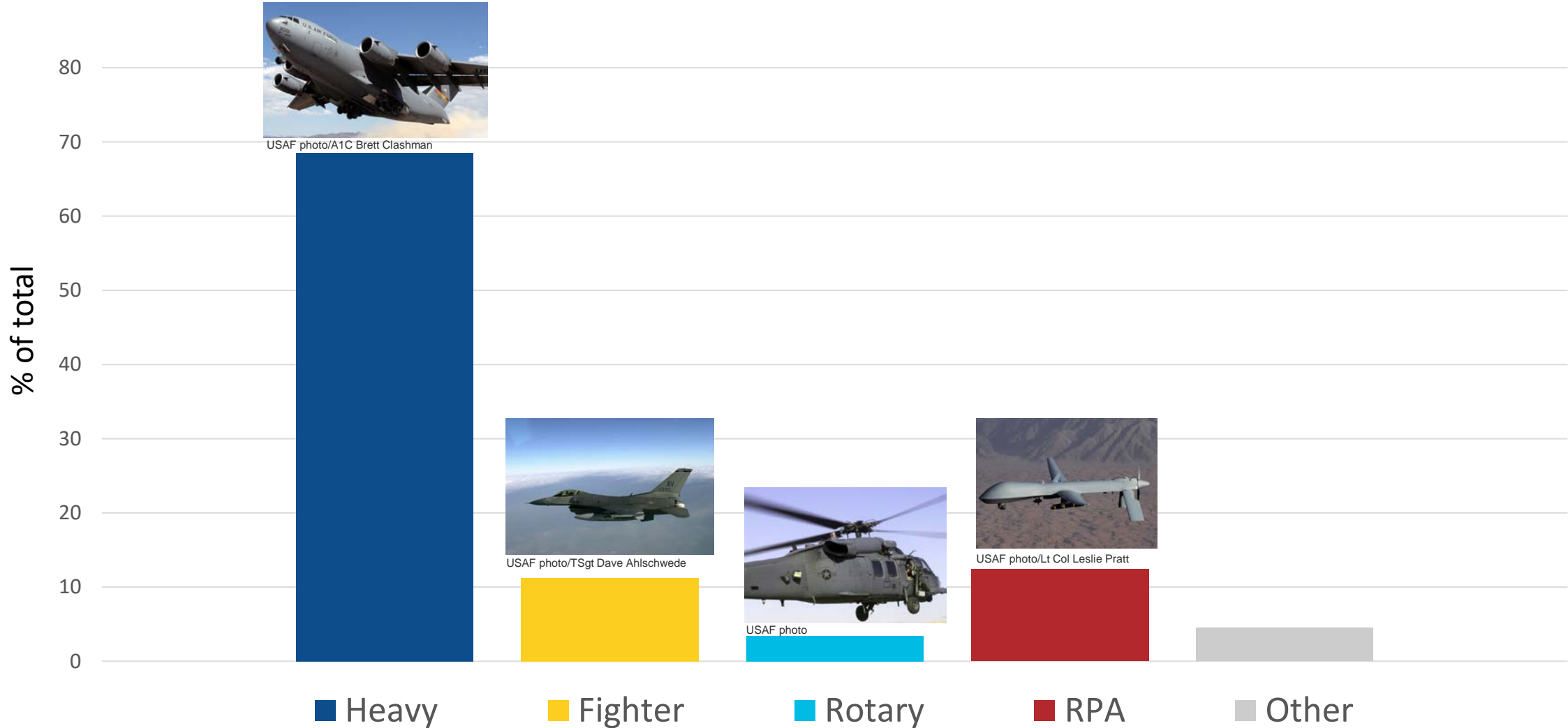
• 62% Pilots

RANK

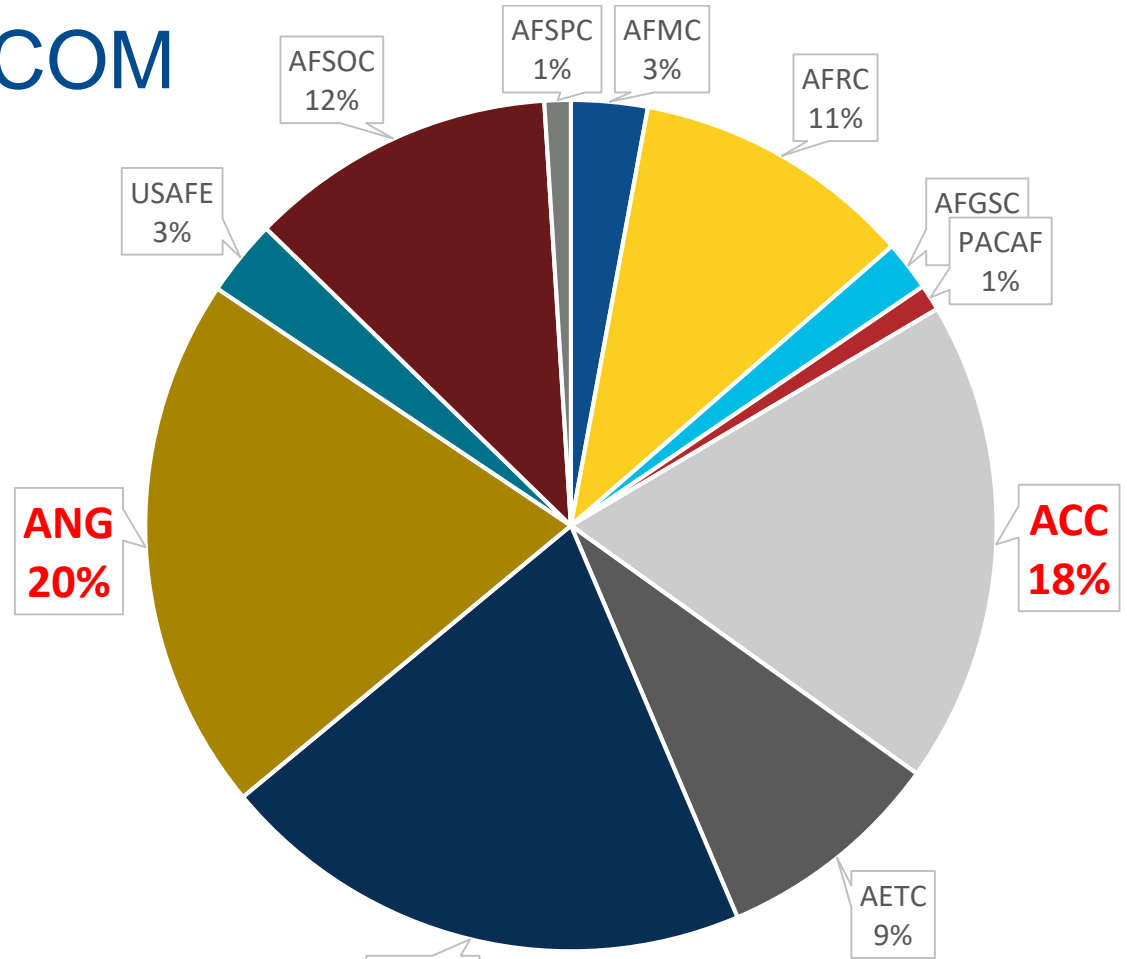


• 76% Senior Officers

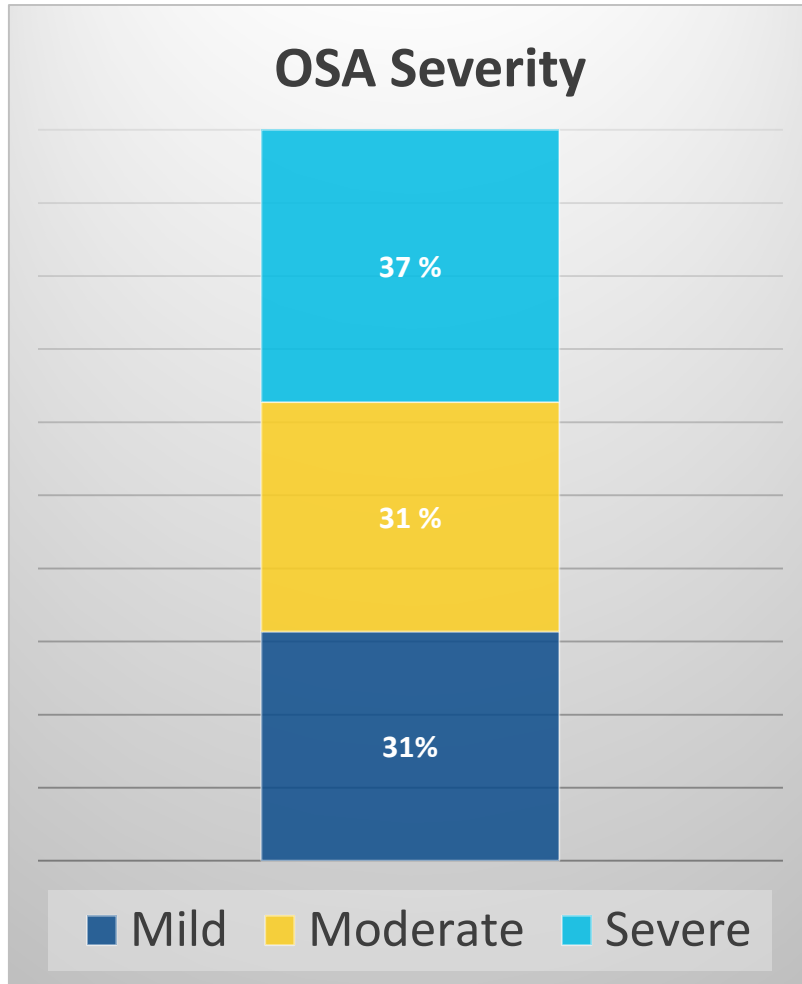
Primary Aircraft Type of Pilots Referred for OSA (n=64)



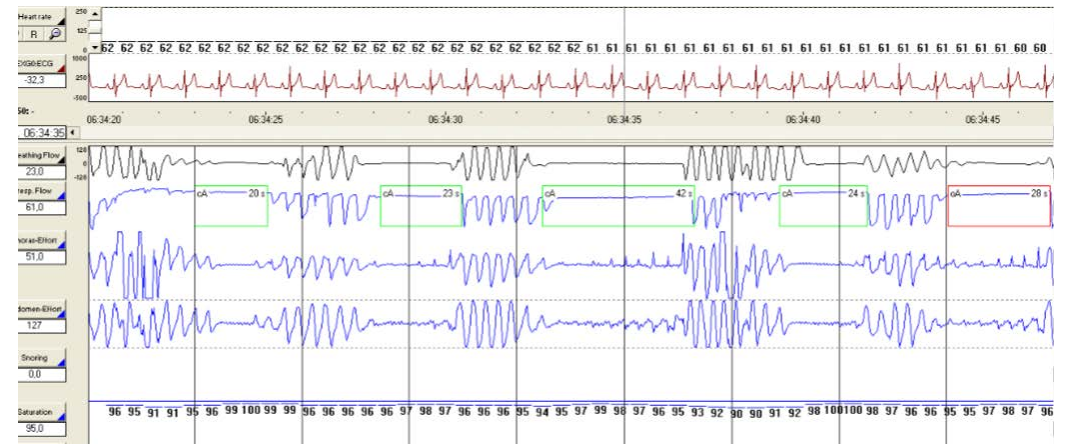
Referral by MAJCOM



Polysomnogram Data (n=103)



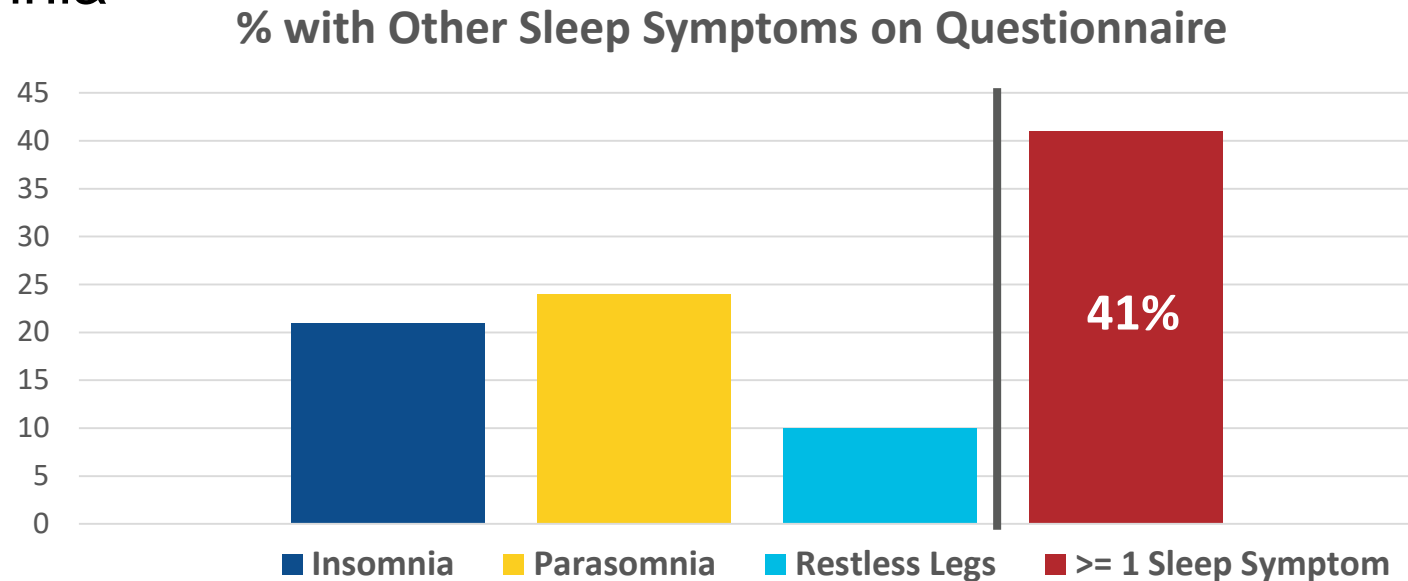
- Mean RDI = 29.1 ± 24.9 per hour
- Mean oxygen nadir = $87.7\% \pm 4.4\%$



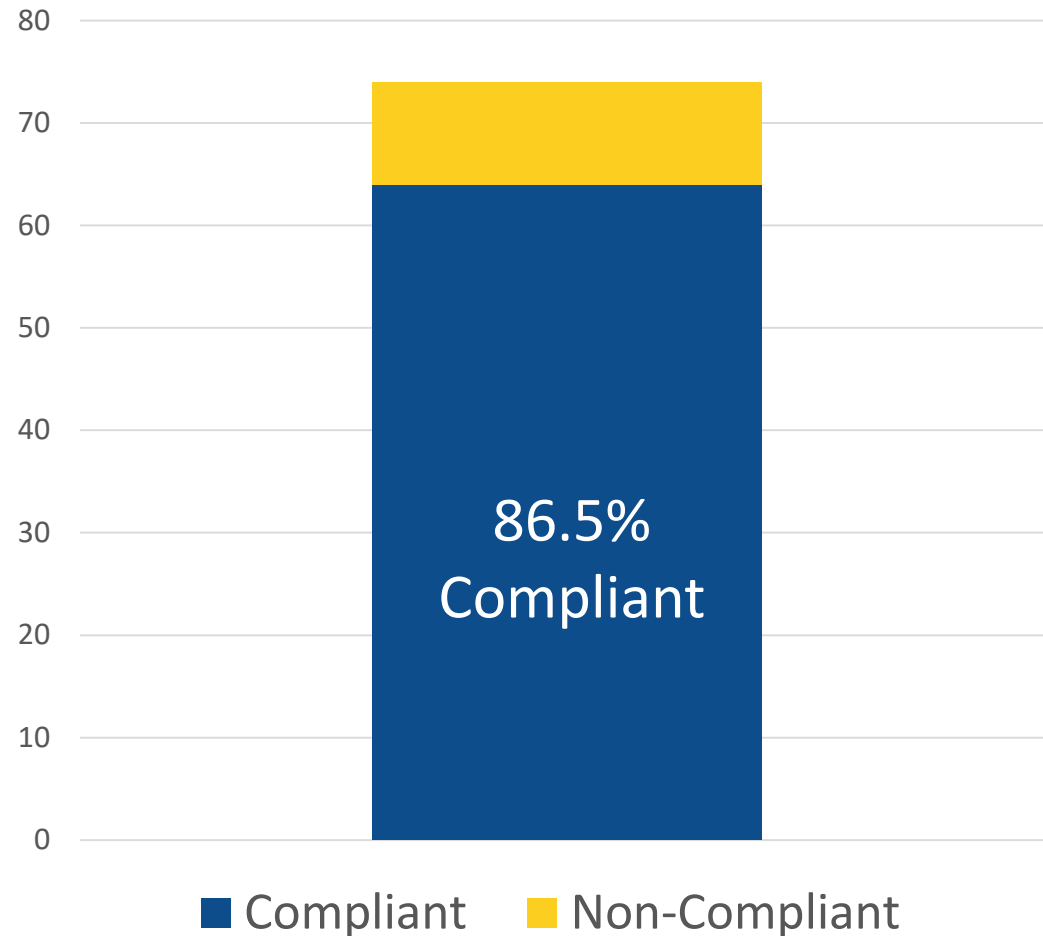
Eumetaxas [CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>)], via Wikimedia Commons

Comorbid Sleep Symptoms (n=81)

- 41% had subjective symptoms of at least one other sleep disorder including:
 - Parasomnias
 - Restless leg syndrome
 - Insomnia



CPAP Compliance Data (n=74)



DATA

- Sample of aviators referred to ACS
- Demographics representative of overall sample
- Average nightly use = 6 h 36 min \pm 68 min
- Mean data days = 60 \pm 43
 - Wide variation of data due to differences in days required

- *CPAP usage 90% nights*
- *≥ 5 h per night*
- *Compliance data for 30 days*

Discussion

Key Points

- Majority of aviators referred to ACS for OSA are:
 - Male
 - Caucasian
 - Active duty
 - Senior officers
 - Pilots
 - Heavy aircraft
 - From ACC, AMC, ANG
 - Age
 - BMI > Normal
- 86% are compliant with CPAP when referred to ACS
- Highlights the need for electronic data collection (questionnaires, sleep studies)



Limitations

- Questionnaires contained subjective data
- Not all PSGs were completed at Wright Patt/88th Med Group – variability in diagnostics
- Small sample size due to availability of data
- Change in CPAP compliance requirements over time period



Further Research

- Larger sample size/review of AIMWTS data
- Electronic collection of survey data, sleep scales
- Analysis of comorbid conditions among those waived for OSA
- Further analysis of association of demographic characteristics with:
 - Diagnosis of OSA
 - Severity of OSA
 - Compliance
- Comorbidity with other sleep disorders, medical conditions



Pre-Selection UPT class 2019

Thank you!

Questions?