



Pilot Questionnaire to Characterize Neck Pain Related to Forward Helmet Center of Gravity (U.S. Air National Guard)

Anthony M. “Brutus” Turner, MPH

711 HPW/USAFSAM/FHS

Operational Epidemiologist

Disclosure Information

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Anthony Turner

- I have no financial relationships to disclose.
- I will not discuss off-label use and/or investigational use in my presentation.
- 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.










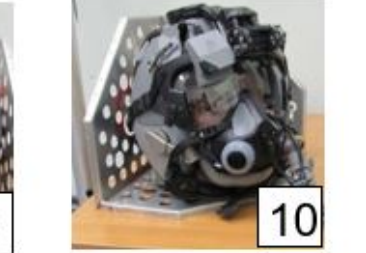
BLUF

- Neck pain is a significant factor impacting pilot performance and quality of life
- Neck pain in fighter pilots has been the subject of a great deal of research; however, no comprehensive solution space has been determined
- A questionnaire was developed within the Aeromedical Research Support Division of USAFSAM to better characterize the issue within the fighter population, as well as provide solution spaces that are currently being deployed



Legacy Helmet Weights

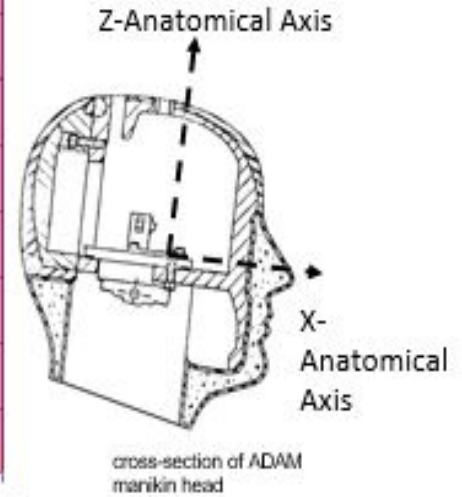
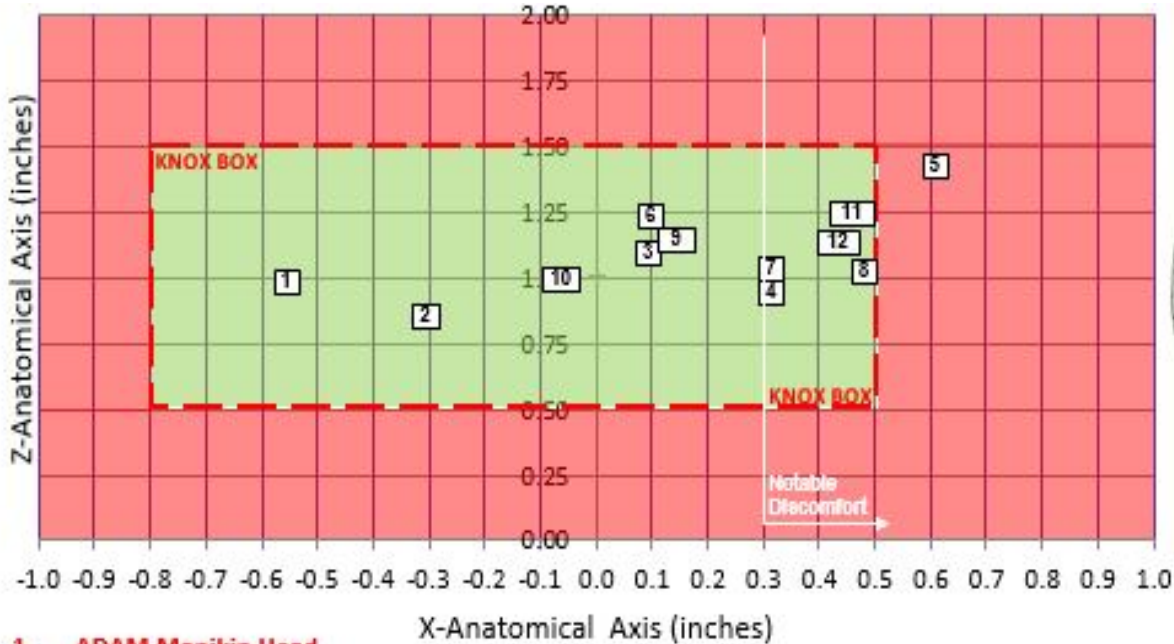
All weights include O2 mask with ~3" hose (0.6 lb)

<p>ADAM</p>  <p>1</p> <p>9.34 lb (4.25 kg)</p>	<p>HGU-55/P</p>  <p>2</p> <p>2.67 lb (1.21 kg)</p>	<p>w/ AN/AVS-9 NVGs</p>  <p>3</p> <p>4.31 lb (1.96 kg)</p>	<p>PNVG (4-tube)</p>  <p>4</p> <p>4.88 lb (2.22 kg)</p>	<p>PNVG Stowed</p>  <p>5</p> <p>4.88 lb (2.22 kg)</p>
<p>JHMCS (Day) <i>2" HVI Cable</i></p>  <p>6</p> <p>4.33 lb (1.97 kg)</p>	<p>JHMCS (Night) <i>w/ AN/AVS-9 & SIV</i></p>  <p>7</p> <p>4.81 lb (2.19 kg)</p>	<p>JHMCS (Night) <i>w/ PNVG & SIV</i></p>  <p>8</p> <p>5.21 lb (2.37 kg)</p>	<p>HMIT (Day) <i>12" HVI Cable</i></p>  <p>9</p> <p>4.77 lb (2.17 kg)</p>	<p>HMIT (Night) <i>12" HVI Cable - "No NVGs"</i></p>  <p>10</p> <p>3.95 lb (1.80 kg)</p>

Not pictured Modern USAF Fighter Aircraft helmets:
GenII = 4.93 lb; GenIII = 5.13 lb (includes partial O2 mask)

* AN/AVS-9 NVGs add 1.1 lb; PNVGs add 1.5 lb

Center of Gravity Plots



1. ADAM Manikin Head
2. HGU-55/P, Mask
3. HGU-55/P, Mask, AN/AVS-9 NVGs
4. HGU-55/P, Mask, PNVGs
5. HGU-55/P, Mask, PNVGs Stowed
6. JHMCS (Day – with HMD), Mask, 2" HVI Cable
7. JHMCS (Night – no HMD), 49/49 NVGs, Step-in Visor, 2" HVI Cable
8. JHMCS (Night – no HMD), PNVGs, Step-in Visor, 2" HVI Cable
9. HMIT (Day), Mask, 12" HVI cable
10. HMIT (Night), Mask, 12" HVI cable – NO NVGS
11. GenII, Mask
12. Gen III, Mask

Knox Box Center of Gravity Criteria:
 helmet weight limit = 4 lb for B-52 seat
 helmet weight limit = 5 lb for ACES II seat
 CGX: -0.8 to 0.5 in
 CGZ: 0.5 to 1.5 in
 (with respect to the ADAM manikin head's anatomical coordinate system)

The Questionnaire

PILOT QUESTIONNAIRE

The purpose of this questionnaire is to characterize the prevalence and types of fighter-ops related neck pain, describe the effect (if any) on operators and identify treatment modalities that are or are not effective.

Role: Pilot WSO Other Gender:

Age: Height (inches): Weight (pounds):

1) On average, how often do you exercise?

2) On average, how often do you focus on neck strength training?

3) On average, how often do you focus on back strength training?

4) Total Flying Hours within last 90 days (Approx)

5) Total **NUMBER** of sorties within the last 90 days (Approx)

6) Please provide best estimate of **NUMBER** of medium G sorties (4-5 G's pulled) within last 90 days

7) Please provide best estimate of **NUMBER** of High G sorties (>5 G's pulled) within 90 days

8) Current Airframe

A-10	<input type="checkbox"/>
F-15	<input type="checkbox"/>
F-16	<input type="checkbox"/>
F/A-18	<input type="checkbox"/>
F-22	<input type="checkbox"/>
F-35	<input type="checkbox"/>
F-38	<input type="checkbox"/>
T-38	<input type="checkbox"/>

9) Career Flying Hours in Each Airframe (est.)

A-10 Hrs	<input type="text"/>	F-15 Hrs	<input type="text"/>
F-16 Hrs	<input type="text"/>	F/A-18 Hrs	<input type="text"/>
F-22 Hrs	<input type="text"/>	F-35 Hrs	<input type="text"/>
F-38 Hrs	<input type="text"/>	Other	<input type="text"/>

10) Have you experienced neck pain while flying in the last 90 days? Yes No

10a) If you answered 'Yes' to question 10, how many sorties within the last 90 days have been associated with neck pain due to flying?

11) Have you ever experienced neck pain related to flying? Yes No

12) If you have ever experienced neck pain related to flying, rate **typical** severity (0= no pain, 10= worst possible pain)

13) If you have ever experienced neck pain related to flying, rate severity of the **worst** instance of neck pain (0= no pain, 10= worst possible pain)

14) Have you ever reported any neck pain or discomfort to the flight surgeon? Yes No

15-21) When experiencing neck pain during sorties, to what extent do you experience the following (Mark with an X. Select one option per question)

	None (0)	Slightly (1)	Somewhat (2)	Moderately (3)	Extremely (4)	I Don't Know/Not Sure
15) Severity of neck pain increases during flight						
16) Range of Motion diminished						
17) Limited mobility looking over right shoulder						
18) Limited mobility looking over left shoulder						
19) Pain radiates to different parts of the body						
20) Numbness and tingling in the neck/shoulders/arms						
21) Weakness in the neck/shoulders/arms						

22) Have you ever been DNF due to neck pain? Yes No

23) Have you ever taken yourself off of the flying schedule due to neck pain? Yes No

24) What type of helmet were you using when you experienced neck pain (Select all that apply, press CTRL for multiple selection)

HGU-55/P
HGU-55/P ANAVS+NWGs
HGU-55/P P/WG
HGU-55/P P/WGs Slowed
HGU-55/P JHMCS (Day with HMD)
HGU-55/P JHMCS (Night no HMD) 4949 NWGs, Slap-in Visor
HGU-55/P JHMCS (Night no HMD) P/WGs, Slap-in Visor
HGU-55/P HMT (Day)
HGU-55/P HMT (Night)
JSP Gen II
JSP Gen III

24a) Please provide any additional comments regarding ASE impact on your neck pain:

25-32) When you have experienced neck pain during sorties; to what degree have the following impacted the mission: (Mark with an X. Select one option per question)

	None (0)	Slightly (1)	Somewhat (2)	Moderately (3)	Extremely (4)	I Don't Know/Not Sure
25) Limits my ability to turn head						
26) Defensive BFM more difficult						
27) Tough to Check-6						
28) Unable to maintain sight picture in BFM						
29) Increased difficulty in ejection under G						
30) Movement restricted during High G						
31) More conservative tactics, not optimally performing the jet						
32) Less productive sorties due to pain						

33) Apart from the impact listed in questions 25-32, has your neck pain ever affected mission performance? Yes No

34) If you answered 'Yes' to Question 33 describe how neck pain affected the mission.

35) Which of the following have provided relief from your neck pain? (Select all that apply, press CTRL for multiple selections)

Time/Rest
Mobicin/Ibuprofen/Alleva/Naproxen/Other NSAIDs
Home/Gym Stretching
Formal physical therapy
Massage
Acupuncture
Chiropractic Manipulation
Osteopathic Manipulation
Heracotics
Muscle Relaxers
Surgery
Other (Please specify in box 35a ->)

35a) Other items providing relief:

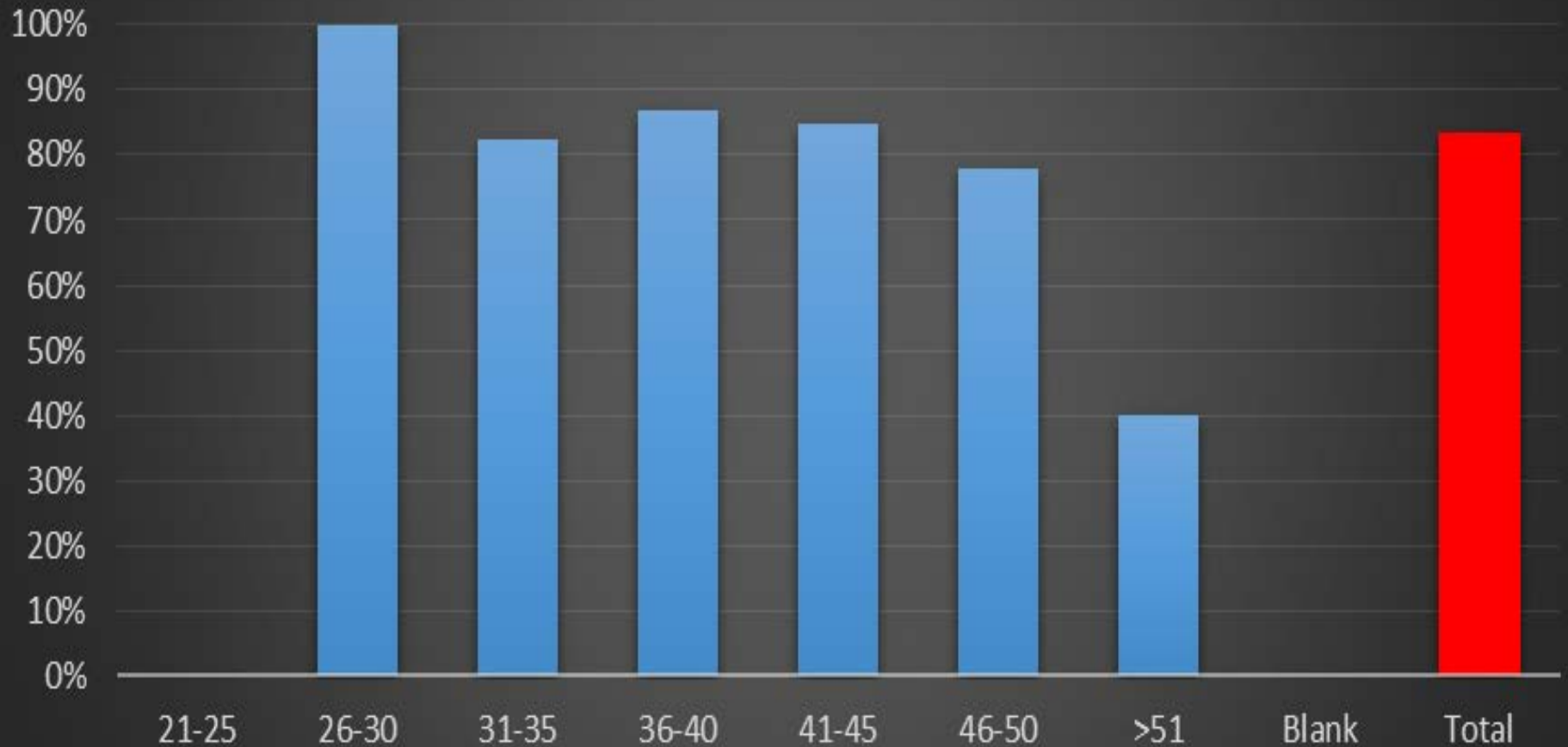
36) Has your neck pain related to flying ever affected lifestyle (off-duty)? Yes No

37) Are you aware of other pilots seeking treatment for their neck pain outside of the Air Force Medical Service? Yes No

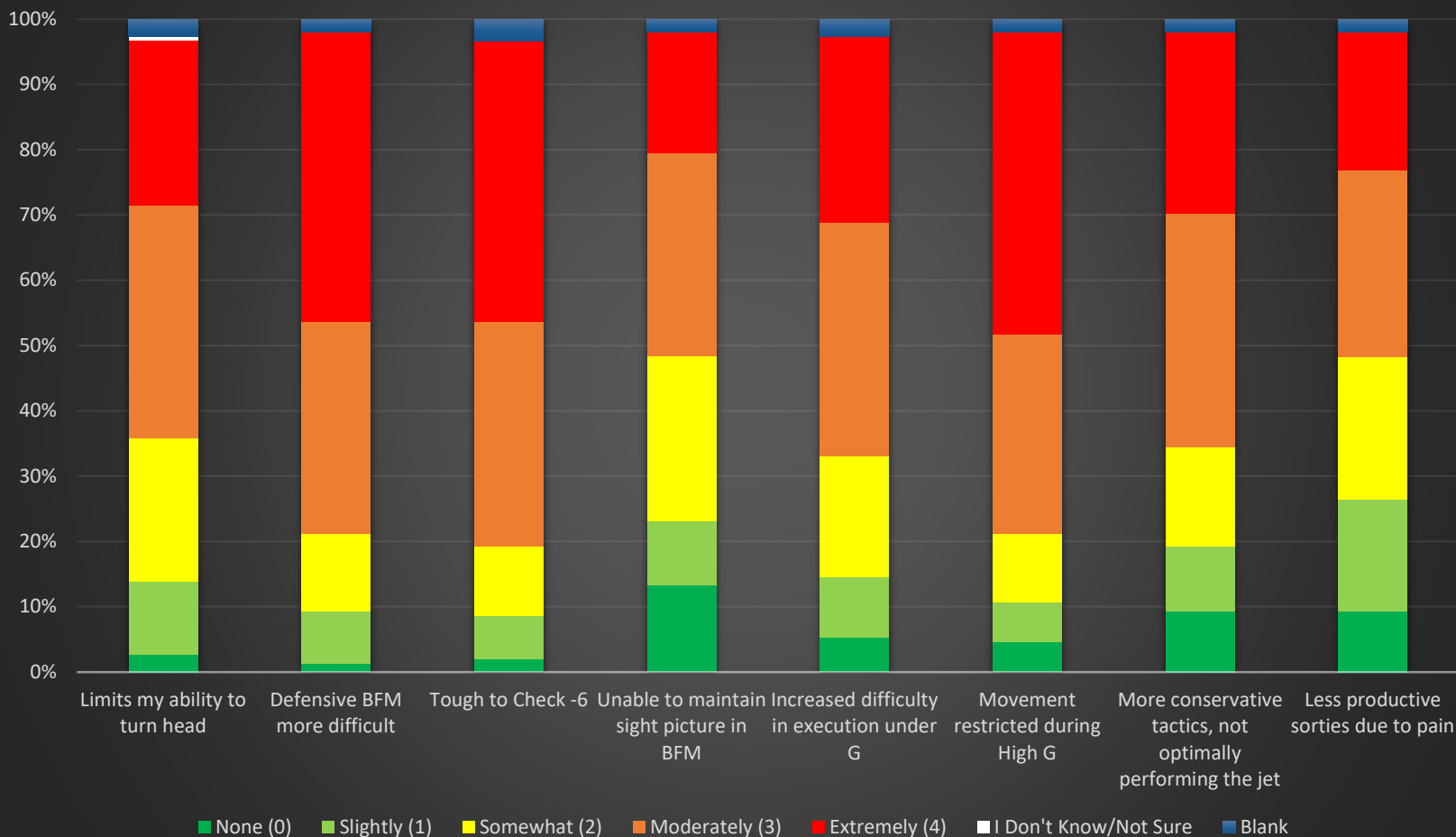
38) If you answered 'Yes' to question 37, please describe treatment and perceived efficacy.

39) Please provide any additional comments on the characteristics, causes, and treatments of your neck pain. Please include treatments that did and did not provide relief of symptoms.

Neck Pain by Age

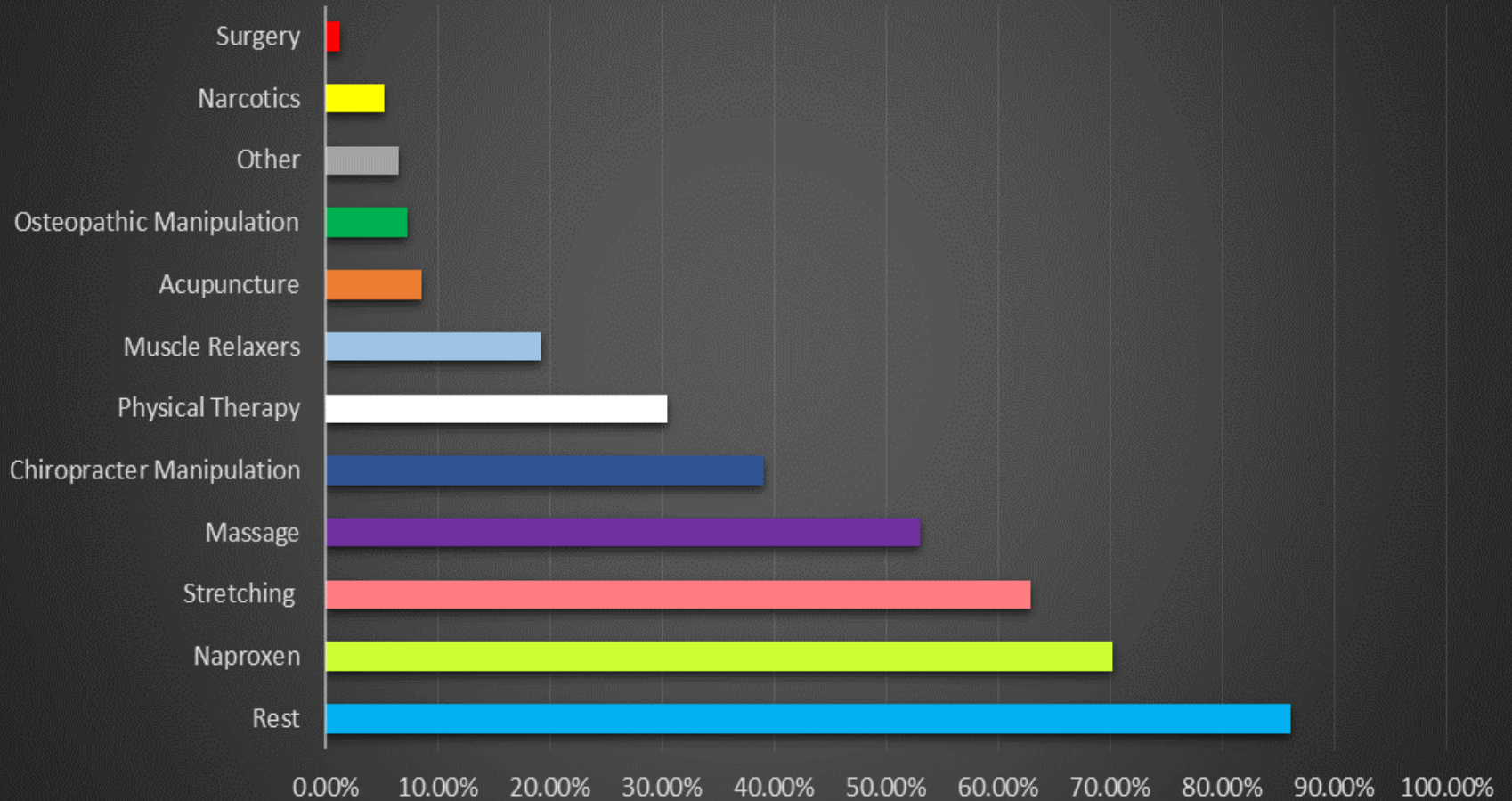


Of Respondents: Mission Impact of Neck Pain

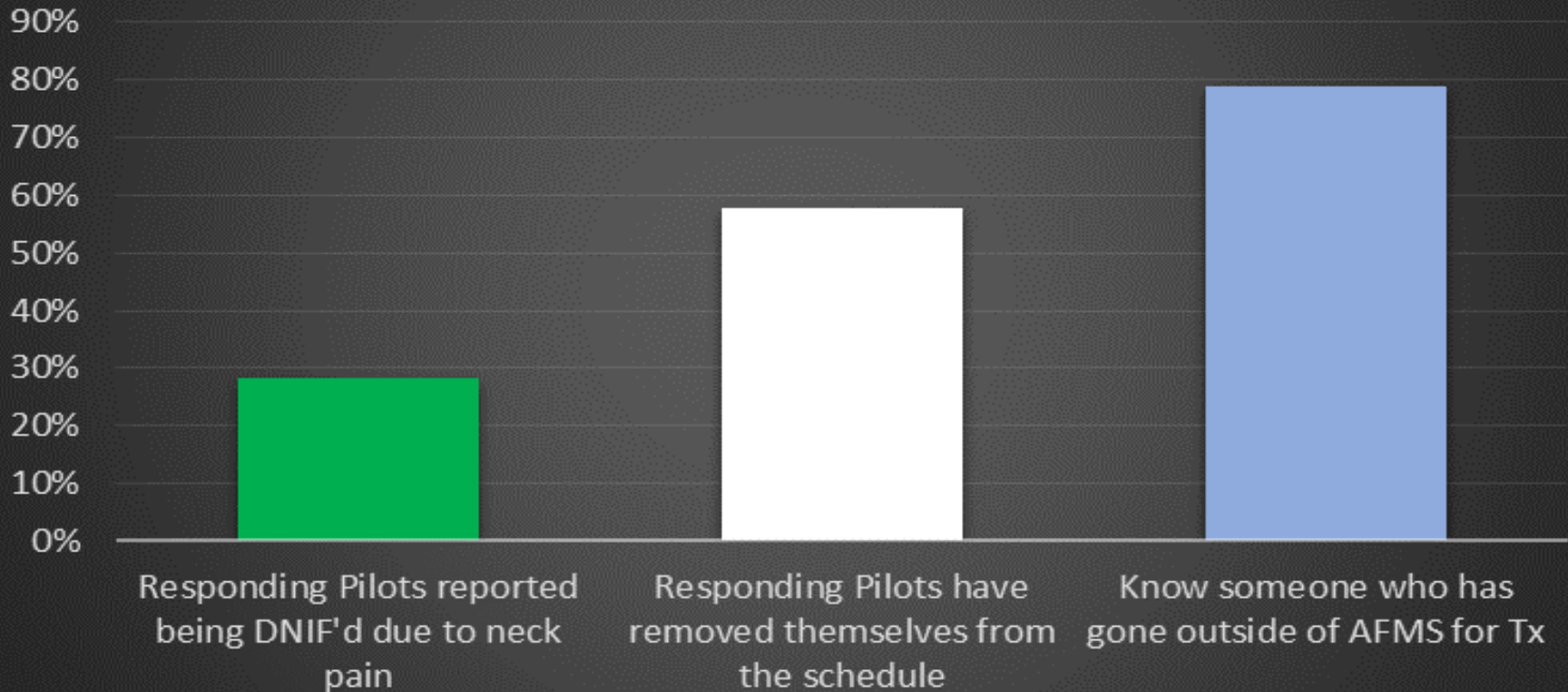


- Have had to KIO missions completely due to neck pain and inability to continue the mission
- I will maneuver the aircraft differently or not wear JHMCS (which is giving up a huge tactical edge even though I should because I know it will hurt my neck)
- Do a circle circle fight instead of a 2 circle fight, or not execute 9k setup for perch BFM if CT flying

Pilots Reporting Improvement with Various Treatment (Fraction of All Pilots)

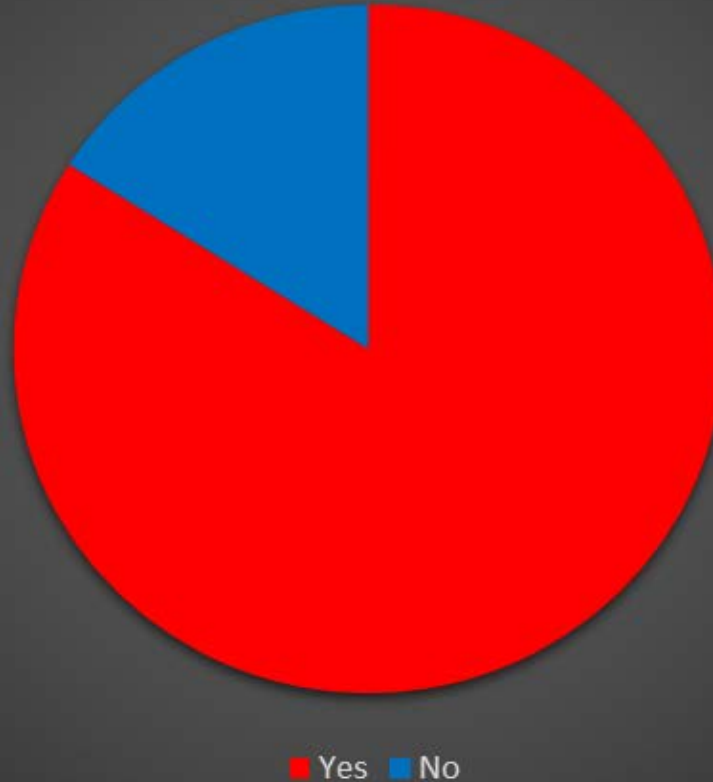


Pilot Availability



- Out of our own pockets to get chiropractors to work on us; stim machines also
- I have heard of pilot going to chiropractors that are not covered with Tri-Care
- Most pilots in the squadron use several types of treatment outside military treatment facilities due to fear of being grounded

Has Neck Pain Impacted Off-Duty Lifestyle



- Some pilots have sought treatment through chiropractors, sports trainers, and massage therapy
- I used to pay for my own massage and my back/neck never felt better; the problem with physical therapy is that by the time you get the appointment it has probably been 2 months since the pain got bad. WE NEED ONGOING CARE AVAILABLE AT THE SQUARON!!!

Questions?