Pilot Tactical Dehydration – An Operational Risk Comparable to Intoxication?

Most military pilots practice Tactical Dehydration every day, unaware of its devastating effects and symptoms, which increase the risk of aircraft incidents and accidents, even on short flights during a mildly warm day.

Dehydration results in significant decrements in physical and cognitive performance of aircrew. Each of these can occur when two percent or more of body weight is lost because of unreplaced water or water restriction, heat and/or physical exertion. A practical solution has now been approved by the USAF[xiii], and USN/ USMC[xii], however it is not being fielded.

(1) The practice of "tactical dehydration" – pilots avoiding the consumption of liquids for hours before missions, in order to avoid in-flight bladder relief, is widespread in military aviation[i]. This dehydration adversely affects G-Lock, SA and SD. Recent studies have shown that human error, i.e. G-Lock, SA and SD are identified as the major cause of military Class A mishaps even during short flights of 60 to 90 minutes, costing great loss of life and billions of dollars in lost aircraft assets to the Navy, Marines and Air Force. The supply system has a bladder relief remedy, that makes tactical dehydration unnecessary, but the Military Service safety and training organizations have not taken action. [This fact is validated by interviews with senior flight surgeons[i], physiologists, safety officers, and aviators.]

(2) The recent study on the "Effects of Dehydration on Cognitive Function of Pilots"[x] by Paul Lindseth, PhD for the Department of Aviation that was published in Military Medicine 07/2013, showed significantly poorer results; a 57% reduction in flight performance, a 26% reduction in spatial cognition, and a 17% reduction in short-term Memory Response Time tests scores for pilots who had low fluid intakes and experienced 1-3% dehydration in comparison to properly hydrated pilots.

(3) The practice of tactical dehydration affects both men and women, but particularly impacts *female av*iators.[ii] Male aviators have the difficult option of relieving their bladders in-flight into a plastic bag called a "piddle-pack" that is sealed for *disposal post-mission. Piddle packs are used by males* only as a matter of necessity; However if tactical dehydration was not a long-standing aviation tradition, the current situation would not be tolerated. The result of providing only Piddle Packs as a solution for in-flight bladder relief is that *male and female aviators practice tactical dehydration for both short and long missions.* Thirst may be the only *apparent* symptom at 2% dehydration[iii]; even though, 1-3% is sufficient to introduce significant risk of potential mission failure and aircraft loss.

(4) A Joint Staff (J-39) "Review of Effects of Heat Stress and Potential Correlation on Mishaps in the CENTCOM Theater of Operations"[iv] cited research findings that *"visual motor tracking, short-term memory, attention, and arithmetic efficiency were all impaired at 2% dehydration* [while] *4% dehydration effects a 23% increase in response time (in comparison, a .08 Blood Alcohol Content level* [legally "impaired" in all 50 states] *yields a 17% increase).* This argues that the operational risks of tactical dehydration may be greater than those of intoxication.

(5) In August, 2013 the USN/USMC[xii] and in February, 2014 the USAF[xiii] approved and authorized Safe to Fly certification of the AMXDmax® (Gen II Aircrew Wearable Advanced Mission Extender Device), a hands free, fully automated in-flight bladder relief solution for both male and female aviators. This now available practical solution [i] the AMXDmax® is available on GSA Schedule[v]. This reflects the DOD willingness to optimize equipment and overall concern for hydrating its airmen.[vi]

(6) The Naval Air Warfare Center Aircraft Division Report No. NAWCADPAX—96-268-TM "SITUATIONAL AWARENESS GUIDELINES" [xi] 6.3.4 states: Flight Gear should be compatible with personal activities such as drinking water and relief methods. If these activities require crewmember attention, some type of automation should be in place to take over key aircraft functions. The AMXDmax is fully automatic, air crew wearable solution to in-flight bladder relief allowing aircrew to remain properly hydrated at all times, without distraction.

(7) Air Force, Navy and Army safety guidance is simply not adequate. Practice is not following policy. Aviators are *only* encouraged to stay hydrated, citing *potential* performance impacts, such as reduced G-tolerance. This weak guidance to military aviators is simply not being taken seriously. [See Air Force pamphlet 11-419[vii], p 8, and Navy 'General NATOPS Manual'[viii], p 8-22.]

(8) Military Service leadership, including those directly responsible for flight safety, knows about the widespread practice of tactical dehydration. Flight surgeons and safety officers acknowledge it as a perennial issue, but no one is addressing the problem. This is a disservice to all those flying missions in Iraq and Afghanistan [NBC Nightly News - CW2 Cioci[ix] and transcript]. ..Regardless, deployed or not, this safety issue needs to be addressed by leadership. Tactical dehydration is not necessary and should not be viewed as acceptable practice.

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References:

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[i] Dr. Nicholas Davenport, CAPT USN, Command Flight Surgeon, Navy Safety Center, Aeromedical Division Code 14, [PHONE CONVERSATION with M. Griffes, Feb 2011: *Tactical dehydration is a perennial problem… no practical solution.*]

[ii] Webster, N., "To pee, or not to pee...Female aviators face a dilemma," Approach – The Navy & Marine Corps Aviation Safety Magazine, March 2003

[iii] "I Need a Drink," Aviation Safety Vortex 3/2002, Transport Canada – Aviation Safety. At http://www.tc.gc.ca/eng/civilaviation/publications/tp202-3-02-v023-3329.htm. Note quote: "*United States Army experiments on helicopter pilots clearly indicate that self-reporting is notoriously inaccurate, even at relatively early stages of dehydration. Aircrew who felt no adverse effects had clear, objective difficulty with cognitive tests.*"

[iv] *Rice, A. "Review of Effects* of Heat Stress and Potential Correlation on Mishaps in the CENTCOM Theater of Operations" Joint Staff brief, Sep 23, 2009. 703-695-2424 <alfred.rice@js.pentagon.mil> [NOT ONLINE]

[v] Aircrew Mission Extender Device (AMXD), Solicitation Number: N00019-09-P1-AS033. Description: "… *the urine collection device that provides a means of collecting urine in flight without requiring an aviator to remove their restraint system and or other protective aircrew life support equipment*. Available through GSA contract Number: V797P-4055B

[vi] "They're not Guys: New Gear to fit Female Soldiers" http://www.nj.com/newsflash/index.ssf/story/theyre-not-guys-new-gear-to-fit-female-soldiers/5523a4dd070f42d4a2292301a05a925d

[vii] Harzell, A (ed). "G-Awareness for Aircrew" Air Force Pamphlet 11-419, 1 Dec 1999 (page 8 re dehydration). At http://www.e-publishing.af.mil/shared/media/epubs/AFPAM11-419.pdf.

[viii] "NATOPS General Flight and Operating Instructions," OPNAV INST 3710.7U, Nov 23, 2009. (Dehydration guidance.) 8.3.2.16 "Dehydration" (Page 8-22). At http://www.public.navy.mil/airfor/hsl44/PublishingImages/3710.7U.pdf

[ix] Maceda, J. "Female Apache Pilot Fights Stereotype on Front Lines," NBC Nightly News for April 21, 2011 (some Web only material as well). At http://www.msnbc.msn.com/id/3032619/vp/42711081#42711081

[x] Lindseth, P.D., Lindseth, G.N. " Effects of Hydration on Cognative Functions of Pilots." Military Medicine, 178(7): 792-8. At http://aviationkowledge.wikidot/aviation:effects-of-hydration-on-cognative-function#toc2

[xi] The Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland, Report No. NAWCADPAX—96-268-TM "SITUATIONAL AWARENESS GUIDELINES" [xi] Section 6.3.4 Dated 8 January 1997 At http://

[xii] Subject: RE: Information Request for Navy consideration of the new AMXDmax Safe-To-Fly issued by USAF 06 Feb 2014
Importance: High
Sent: Tuesday, February 18, 2014 3:59 PM

We authorized the AMXDMax for USN/USMC aviation back in August of 2013.

LCDR Kimberly "Pinto" (Maryman) Littel, MSC, USN Human Systems 4.6.7.3
Branch Head Aircrew Systems Life Support Systems ISSC Lead
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[xiii] SUBJECT: Safe-to-Fly (STF) for the Advanced Mission Extender Device (AMXDmax), USAF HSD dated 2-6-2014

1. ACC/A3T accepts the associated risks and approves the use of AMXDmax for the ACC aircraft defined in the attachment. Exception: F-35 units will wait until the Joint Program Office approves the AMXDmax for use in the F-35.

2. Aircrew Flight Equipment Superintendents will ensure all applicable information is added to the appropriate lesson plans (i.e., Aircrew Flight Equipment Training, Emergency Egress, and Aircrew Chemical Defense Training (as a minimum)) before any devices are issued. Additionally, aircrew opting to use AMXDmax will be briefed on the associated risks prior to their first flight with the device.

//Signed/tab/7Mar14//
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