

AMMA JOURNAL VOL 9 ISSUE 2

AUGUST 2000

Abstract from the Literature

by
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Alexander GA. Ecoterrorism and nontraditional military threats. Mil Med 2000; 165(1): 1-5.

The menace facing US service personnel from ecoterrorism and other nontraditional threats may increase as military deployments in war and peace increase, the availability of devastating biological, chemical and radioactive agents increases, and adversaries or terrorist groups become more inclined to use them. A vital concern for field medical commanders is the requirement to understand the environmental issues associated with military deployment. More important is the need to recognise potential ecological threats to deployed military troops. The Gulf War was replete with numerous documented acts of ecoterrorism. The current world crisis from terrorism dictates that we be knowledgeable of the medical consequences of weapons of mass destruction and skilled in the management of casualties. The processes of human health risk assessment of deployed soldiers and ecological risk assessments are discussed as strategies to effectively prevent or reduce the health and medical consequences of ecoterrorism.

Comment: The release of oil from Kuwaiti oil fields and the later setting fire to many oil fields are noted as examples of ecoterrorism. This article does little more than point out the potential risks to human health from pollution from radioactive (nuclear waste), biological (hospital infectious waste) or chemical (industrial chemical storage). A primer, but nothing more.

Staggers N, Leaderman AV. The vision for the Department of Defense's Computer- Based Patient Record. Mil Med 2000; 165(3): 180-185.

To meet the Department of Defense's clinical information management mission for the next century, a vision for the computer-based patient record (CPR) was needed. This article describes the generation of that vision as well as the resulting definition, characteristics and essential functions of the Department's CPR.

Comment: Well-articulated concept of what is wanted. In many areas, the technology is trying to catch up with the wish list. The requirements are on a four tiered priority structure: at the bottom, the fundamentals of documentation, results reporting and ordering/logistics. Next layer is scheduling and disease coding. Third is guidelines, quality management and utilisation management (UM). (By the way, UM is hot in the US military and is likely to become prominent here too). Last is decision support: alerts and reminders, best practice, health informatics, expert systems. Worthwhile to see where we may be in the ADF in a few more years. Care to guess how many years for the ADF to roll out an integrated, complete electronic patient record?

Howell MR, et al. The cost-effectiveness of varicella screening and vaccination in US Army recruits. Mil Med 2000; 165(4): 309- 315.

Varicella outbreaks in the US Army disrupt training, reduce readiness, and represent substantial costs. Vaccination of susceptible individuals may be cost-effective. We conducted a cost-effectiveness analysis comparing screening of all incoming recruits and vaccination of susceptible individuals at either initial entry training (IET or medical entrance processing station (MEPS). universal vaccination at IET, and no intervention. Primary health outcomes included the number of varicella cases prevented during the 8-week initial training period. The varicella

hospitalisation rate was 21.6 per 10000 per year. In 100000 recruits, 36 cases of varicella are expected at a cost of \$181000 in the absence of an intervention. Screening at IET would prevent 4 cases but would cost an additional \$3255000 more than no intervention. Screening at MEPS would prevent 3 cases and save \$521000 per case prevented during IET but would cost \$2734000 more than no intervention. Universal vaccination would prevent 2 cases but would cost \$15858000 more than MEPS screening and \$18592000 more than no intervention. These results are robust. Cost per case of varicella prevented ranged from \$390000 to \$7.9 million. Scarce prevention resources could be more cost-effectively allocated to other prevention programs.

Comment: *Varicella vaccine has recently been approved for use in Australia, some 4 years after the US. It is another vaccine that could be useful for military use. This study however strongly refutes its necessity purely based on community acquisition of infection. Varicella is not high on list of likely biological warfare agents....it certainly appears that this is one vaccine that need not be taken up any time soon in the ADF.*

Caldwell JL. The use of melatonin: An information paper. Aviat Space Environ Med 2000; 71(3): 238-244.

The use of melatonin has been a topic for debate for the past several years. Patients frequently ask their physicians about its use, and many physicians are at a loss about what to tell them. Aviators who have trouble sleeping may choose to buy melatonin and use it since it is a 'natural' substance. However, they may lack proper education about its use and the issues of concern. Flight surgeons can help educate their patients in the use of melatonin. This paper will briefly discuss the role of melatonin in humans, its effects on circadian rhythms, its sleep-inducing properties, its effects on mood and performance, and issues pertaining to safety. Flight surgeons and other physicians cannot "prescribe" melatonin, but they at least can offer information about its effects and what is not known about melatonin at this time to the aviators who may ask questions concerning this product.

Comment: *A comprehensive review of the knowledge to date on melatonin. I remain unsure of the reasoning behind the recommendation for timing of doses when travelling west. East is well explained, but not west. Strange.*

Saxton JL, Patterson FR. Comparison of sitting height measurement using three anthropometric measuring techniques. Aviat Space Environ Med 2000; 71(4): 426-429.

Accurate, reproducible anthropometric measurements are essential in the aviation community. Three methodologies were evaluated to determine how they compared with respect to variability and accuracy. One of the methods, an anthropometric chair, is currently used to screen naval aviation candidates. Another method, employing anthropometers (calipers) has been widely used for anthropometric surveys. A third method, referred to as the digital anthropometric video imaging device (DAVID). Is a computer-based technique that digitises a video image for the purpose of determining anthropometric measurements. For this comparison study, sitting height was used because of its importance to aviation and because it requires attention to both posture and measurement technique. Statistical analysis showed no statistical difference between the three methodologies.

Comment: *The arcane world of anthropometry. But its day in the sun is coming. This study merely shows that when addressing a single parameter at once, human measurement is as good as automated ones. However, what is required in assessing fit, particularly into an aircraft crew station, is multiple measurements. Someone with acceptable sitting height may be too long on hip-knee length, or Junctional reach is insufficient. Only measuring all relevant parameters as co-dependent variables will be satisfactory. That requires more sophistication than calipers.*

Parker EC, et al. Escape from a disabled submarine: Decompression sickness risk estimation. Aviat Space Environ Med 2000; 71(2): 109-114.

Individual crewmember escape from a disabled US Navy nuclear submarine has never been necessary, but remains an important contingency. Decompression sickness (DCS) is one of the foreseeable risks and a robust mathematical model of DCS incidence has been used to estimate the magnitude of this risk under a variety of escape scenarios. The model was calibrated with over 3000 well- controlled human pressure exposures, less than 2% of which simulated pressure profiles of submarine escape. For disabled submarine depths < 300 ft of seawater (fsw) and

internal submarine pressures of < 11 fsw (arguably the most likely conditions). The DCS risks are comparable to those routinely undertaken by US Navy divers less than 5%. For progressively deeper depths and especially for higher submarine internal pressures, the risk of DCS becomes much greater, including known chance of permanent disability and death. Variation from the baseline escape procedure are explored, including equipment differences, delays in exiting the submarine and changes in the oxygen content of the breathing mix.

Comment: Note the increasing use of the word 'robust'. I have long been a fan of the word. Let us hope that its currency is not devalued by overfamiliarity.

Cline AD, et al. Influence of a carbohydrate drink on nutritional status, body composition and mood during desert training. Aviat Space Environ Med 2000; 71(1): 37-44.

Background: Nutritional intake by military personnel is typically inadequate during field exercises, potentially compromising health and performance. Hypothesis: Drinking a supplemental carbohydrate (CHO) beverage will increase total caloric intake and maintain nutritional status during military training in the desert. Methods: A total of 63 volunteers were randomly assigned to one of two groups to receive either a CHO or placebo beverage with military rations during an 11-d desert field exercise. Fluid intake was ad libitum and adequate rations were provided. Blood samples were collected twice to assess nutritional status, and nutrient intake was determined with consumption data. Mood state was examined by questionnaire.

Results: Energy intake was significantly higher in the CHO group (3050 kcal/day vs. 2631 kcal/day), with additional CHO from the beverage providing energy with some compensation by reduced fat and protein intake. Intakes of energy, folacin calcium, magnesium, iron, and zinc in both groups were inadequate, with intakes significantly lower ($p < 0.05$) for calcium, magnesium and zinc in the CHO beverage group. Blood parameters of the nutritional status remained within normal ranges with no difference between groups, but significant decreases were seen in pre-albumin. No changes in mood were seen during training, nor after exposure to desert conditions.

Conclusions: The operational ration supplemented with a CHO beverage significantly increases CHO and energy intakes compared with standard rations and maintains nutritional status for short exercises. Fortification with micro-nutrients most at risk for deficient intake from foods may be needed for longer deployments.

Comment: The biggest problem of ration packs is getting people to eat the lot, particularly all the CHO provided. Novel presentations of CHO in rations are needed: CHO beverages, rather than, or supplement to, water, is a good notion. Flavoured drinks are more likely to be consumed than water alone, thus reducing the risk of dehydration, also.

Krause KM, et al. The effectiveness of ground-level oxygen treatment for altitude decompression sickness in human research subjects. Aviat Space Environ Med 2000; 71(2): 115-118.

Background: Current therapy for altitude decompression sickness (DCS) includes hyperbaric oxygen therapy and ground-level oxygen (GLO). The purpose of this paper is to describe the Air Force research Laboratory experience in the extensive use of GLO) for the treatment of altitude DCS in research subjects.

Methods: Data were collected from 2001 altitude chamber subject-exposures. These data, describing DCS symptoms, circulating intracardiac venous gas emboli and treatment procedures used were collected for each subject exposure and stored in an altitude DCS database.

Results: In the database of 2001 subject exposures, 801 subjects (40.0%) were diagnosed with altitude DCS. Subjects reporting DCS symptoms were immediately recompressed to ground level. Of the 749 subjects who received 2h GLO, 739 (98.7%) resolved completely and required no further treatment.

Conclusions: Although not an operational study, these data provide indirect support for the current USAF guidelines for the treatment of altitude DCS with GLO.

Comment: *Recompression to ground level alone resolved the symptoms in 728. Only 21 of those still symptomatic were treated with 2 hours of GW, and in all of these cases, symptoms resolved on GW. 10 of the 728 had recurrence or delayed onset of symptoms and require further treatment. The 52 who were not treated with GLO went either straight to HBO (39) or had 'other' treatment. What that 'other' was I could not find from the text.*

Gerba CP, Naranjo JE. Microbiological water purification without the use of chemical disinfection. Wilderness Environ Med 2000; 11(1): 12- 16.

Objectives. Point-of-use (POU) water treatment systems are self-contained units that can be used by recreational enthusiasts who normally obtain drinking water from untreated sources (i.e. rivers, lakes, etc.). Microbiological water purifier units are capable of removing all waterborne pathogens. The purpose of this study was to evaluate a new technology (Structured matrix) capable of microbiologically purifying the water without the use of chemical disinfectants or an external power requirement.

Methods. Each of 3 identical portable water filtration units were evaluated for their ability to remove *Klebsiella terrigena*, poliovirus type 1, rotavirus SA-11, and *Cryptosporidium parvum* oocysts. Units were operated according to the manufacturer's instructions to process 378 L of water. Each unit was challenged with test organisms after 0, 94, 190, 227, 284, 340 and 378 L had passed through it. For the 227-L and 284-L challenges, a 'worst-case' water quality (40 C, pH9 and turbidity 30 NTU) was used that contained 1500 mg/L dissolved solids and 10 mg/L humic acid. At 340-L and 378-L challenges, worst-case water quality was adjusted to pH 5.0. Units were tested after stagnation for 48 hours following passage of 190, 340 and 378 L of water.

Results. The geometric average removal exceeded 99.9999% for bacteria, 99.99% for viruses and 99.9% for *Cryptosporidium parvum* oocysts.

Conclusion. These units comply with the criteria guidelines for microbial removal under the US Environmental Protection Agency's 'Guide Standard and Protocol for testing Microbiological Water Purifiers'.

Comment. *Lifetime is 378 litres of purified water. There is no attempt to define what is the realistic lifetime, only testing apparently to the extent the manufacturers have claims for. It may be that the lifetime is much more than 378 litres. There is also no comparison of costs of this technology to other purification systems. Well worth taking a dose look at.*