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08 Jan 2015

From: Senior Medical Officer, Marine Special Operations School
To: Medical Department, Marine Special Operations School

Subj: ORAL REHYDRATION AND ELECTROLYTE REPLACEMENT PROTOCOL

Encl: (1) Drip Drop Oral Rehydration Solution prevention protocol

1. Situation. Exertional illness related to heat, dehydration, and electrolyte derangements are a serious concern in MARSOC operations and training. Marines and Sailors engaged in MSOS training require constant education, observation, supervision, and sometimes intervention in order to help prevent these illnesses from occurring. Effective fluid and electrolyte replacement is an efficient and cost effective method of both preventing illness and improving recovery and performance.

2. Background.

a. Exertional illness typically present with a symptom cluster that can make them difficult to distinguish in the field. This frequently results in a set of interventions that treat all three simultaneously. Specifically, intravenous fluid infusion (IVF) of isotonic crystalloids is a typical initial intervention for all three of these conditions; however, IVF is not the most cost effective or primary treatment modality for any of these three.

b. Oral rehydration solution (ORS) is both an effective treatment and prevention strategy for dehydration and electrolyte derangements. There are several factors that contribute to the effectiveness of ORS, such as: osmolarity (concentration of particles in the solution); composition (what are the materials in the solution); delivery (how does it get into the patient); and taste (which is to say, the patient's willingness to drink it). Solutions need to be relatively low osmolarity but maintain high electrolyte concentrations. Rice-based solutions are not as effective as glucose-based solutions. Individual packets of dry powder that get mixed in water are lighter, easier to issue and use, and more shelf stable than bulk packaging or gels. Many ORS formulations, like the World Health Organization (WHO) ORS has a disagreeable taste that reduces the likelihood of patient compliance.

c. Drip Drop ORS (DD-ORS) is a commercial-off-the-shelf (COTS) product with a patented proprietary formula that has: low osmolality; a glucose based solution; high sodium, potassium, and magnesium; individual packets of pre-measured dry powder; and has a very agreeable flavor that is well-tolerated. DD-ORS is also available via prime vendor procurement.

3. Discussion. An effective ORS is needed for prevention and treatment of dehydration and electrolyte derangement in ITC students. DD-ORS has been selected because of the criteria described above and will be used for ITC students during planned physical and field training events, in accordance with the activity matrix found in the enclosure. Ideally, DD-ORS would be

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used as a replacement based on actual sweat loss; however, this is impractical.

a. Sweat rates in military and competitive athletes at various levels have been measured in many settings. There is a wide range of reported sweat rate averages, from as low as 608 ml/hr to as high as 2385 ml/hr. Conditions were moderate to hot and activities included running, cycling, forced march under load, and professional sports practice. Sweat rates varied with body mass, ambient temperature, humidity, activity level, conditioning, and hydration rates. It is therefore nearly impossible to determine an accurate predictive formula for an exact estimation of sweat rate in any given athlete without individual physiologic measurements and constant environmental and activity evaluation.

b. Considering this, a reasonable approximation for military tactical athletes under otherwise normal environmental conditions (WBGT <80 deg F, flag condition white) is approximately 1000ml/hr under moderate intensity physical activity such as continuous running, slow forced march under light load, or calisthenics. This would be expected to increase by 250ml/hr-1250ml/hr as either intensity or flag condition increases.

c. DD-ORS will be used to replace estimated sweat losses at a ratio of 1 liter of DD-ORS to every 2 liters of sweat loss. The enclosure provides a ready aid for estimating this replacement amount.

d. Additionally, DD-ORS will be used as a primary treatment for dehydration and possible electrolyte derangements from exercise induced illness or acute gastroenteritis (vomiting and diarrhea). DD-ORS should be used prior to intravenous fluids in the patient is able to tolerate oral fluids.

4. Execution.

a. DD-ORS will be issued to ITC students by attending medical personnel on a daily basis based on the matrix shown in the enclosure. This may be shifted to several days at a time depending on the specific training environment and its constraints, such as at Derna Bridge, where daily access for issue is impractical.

b. Students must be instructed on proper use. One packet should be taken 20-30 minutes prior to exercise, if at all possible, and then one during the immediate recovery phase. Any additional packets given should be taken no more than one per hour. If accessible, salty snacks should also be encouraged.

c. DD-ORS will be carried by all medical personnel covering training events in order to treat patients with suspected dehydration or electrolyte derangements. Medical kits should carry 8 packets when fully stocked. One packet should be given immediately, a second packet over 30 minutes, and an additional packet each hour until clinically stable and tolerating regular oral food intake without vomiting. If tolerated, and patients have no vomiting, salty foods should also be encouraged.

5. Administration and Logistics.

a. Administration: The enclosure will be used to determine the DD-ORS needs for any training event and will also be used to record the amount of

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DD-ORS issued in order to facilitate inventory control and develop resupply plans.

b. Logistics:

(1) MARSOC Health Services Support (HSS) has provided the initial purchase of DD-ORS for ITC. Additional acquisition of DD-ORS will need to be coordinated between HSS and MSOS.

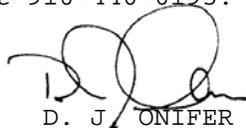
(2) DD-ORS purchase for ITC has been calculated using the following formula: 4 packages per day X 150 training days X 80 students X 2 classes per year = 96,000 sticks per year.

(3) DD-ORS will be stocked and issued by MSOS medical.

(4) Because of the risk of pilferage, large quantities of DD-ORS should not be left to open access, but should be issued by MSOS Medical personnel in coordination with the class proctor or ITC phase SNCOIC and in accordance with the enclosure.

6. Command and Signal. This policy applies to all MSOS medical personnel and shall be effective immediately. This policy will remain in effect until cancelled or superseded by a new directive from this or higher competent authority.

7. I am the point of contact for this matter and can be reached via email at dana.onifer@socom.mil or via phone at 910-440-0195.



D. J. ONIFER

Drip Drop Oral Rehydration Solution prevention protocol

Flag Condition	WBGT Index	Activity Level					
		Light		Moderate		Heavy	
		Sweat Rate	# Packets	Sweat Rate	# Packets	Sweat Rate	# Packets
White	< 82° F	750 ml/hr	1	1000 ml/hr	1	1250 ml/hr	1
Green	82-84.9° F	1000 ml/hr	1	1250 ml/hr	1	1500 ml/hr	2
Yellow	85-87.9° F	1250 ml/hr	1	1500 ml/hr	2	1750 ml/hr	2
Red	88-89.9° F	1500 ml/hr	2	1750 ml/hr	2	2000 ml/hr	2
Black	≥ 90° F	1750 ml/hr	2	2000 ml/hr	2	2250 ml/hr	3
Field Training	During field events, 1 additional packet should be added to the amount shown in the matrix for every 4 hours of activity.						

Source: FM 21-10 Field Sanitation

Wearing Body armor adds 5° F to WBGT Index

Flag Condition - Use the flag condition at the time of the event. For field events, use the flag condition that is most constant for that day.

Packets - Indicates number of packets of DD ORS to be issued **per hour** of exercise per day. One packet should be consumed 20-30 minutes prior to exercise.

Each packet should be mixed in 500ml/16 oz of potable water. Proper mixture is important for correct use. May be slightly diluted (more water) but should not be concentrated (less water). **DO NOT EAT.**

Fluid intake should not exceed 1 liter per hour or 12 liters per day.

Light Activity	Weapon Maintenance, Walking hard surface at 2.5 mph, with a 30 pound load, Guard Duty, Marksmanship training, Drill and ceremony
Moderate Activity	Running, Walking loose sand at 2.5 mph, no load, Walking hard surface at 3.5 mph with a 40 pound load, Calisthenics, Patrolling, Individual movement techniques such as low crawl, high crawl, Defensive position construction, Swimming.
Heavy Activity	Walking hard surface at >3.5 mph with > 40 pound load, Walking on loose sand at 2.5 mph

Source: FM 21-10 Field Sanitation

MEDICAL TREATMENT PROTOCOL. To treat patients with dehydration or electrolyte derangements, give one packet immediately. Give a second packet over 30 minutes. Continue to give an additional packet each hour until clinically stable and tolerating regular oral food intake without vomiting. If tolerated, and patients have

Activity Level: _____ **Flag Condition:** _____ **Duration (hrs)** _____
of Packets/hr: _____ **x Duration:** _____ **X # of personnel:** _____
= # Dispensed _____ **Initial:**