Managing Emergencies
In Mass Participation Events:
Medical Triage and Algorithms

2011 Marine Corps Marathon Symposium

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MCM COLLAPSED ATHLETE ALGORITHM

ATHLETE COLLAPSES DURING OR AFTER EVENT

ASSESS RESPONSIVENESS

NO SHOCK/CPR INDICATED

RETURN TO ALGORITHM

SHOCK/CPR INDICATED

ASSESS VS (RECTAL TEMP) CV & RESP SUPPORT AS NEEDED

TRANSPORT TO ER

EXIT TO EMERGENCY CARDIAC CARE ALGORITHM

BRIEF HISTORY AND PHYSICAL VITAL SIGNS + RECTAL TEMP
CONSIDER: i-STAT® Na+, Glucose

ALTHETE WITH IDENTIFIABLE MEDICAL CONDITION

Y

INITIATE IMMEDIATE AND APPROPRIATE ACTION
CONSIDER: HYPOGLYCEMIA, HYPONATREMIA, CRAMPING, CHEST PAIN PROTOCOLS

N

RECTAL TEMP

>104° F/40° C

EXIT TO HYPERTHERMIA ALGORITHM

Y

RECTAL TEMP 97° F/36° C TO 104° F/40° C

EXIT TO EXERCISE-ASSOCIATED COLLAPSE ALGORITHM

N

RECTAL TEMP <97° F/36° C

EXIT TO HYPOTHERMIA ALGORITHM

Y
II. MCM EMERGENCY CARDIAC CARE ALGORITHM  
(BLS SETTING WITH AED)

- PERSON COLLAPSES  
- POSSIBLE CARDIAC ARREST  
- ASSESS RESPONSIVENESS

UNRESPONSIVE

- ACTIVATE EMS  
- CALL FOR DEFIBRILLATOR OR AED  
- PRIMARY SURVEY (ABCD)  
- A OPEN AIRWAY  
- B ASSESS BREATHING

NOT BREATHING

- B--GIVE TWO SLOW BREATHS  
- C--ASSESS PULSE

NO PULSE

- C--START CHEST COMPRESSIONS WITH VENTILATION†  
- D--ATTACH AED (DEFIBRILLATOR)

PULSE

- RESCUE BREATHING*  
- CHECK PULSE Q 2 MINUTES

TRANSPORT TO ER

CONTINUOUS CYCLES OF CPR AND RHYTHM ASSESSMENT UNTIL RETURN OF PULSE AND RESPIRATIONS OR RELIEVED BY EMS PERSONNEL

SHOCKABLE RHYTHM

- (VF/VT)  
- SHOCK ONCE

RESUME CPR FOR 5 CYCLES (< 2 MINUTES)

ASSESS VS (RECTAL TEMP) CV & RESPIRATORY SUPPORT AS NEEDED TRANSPORT TO ER

NON-SHOCKABLE RHYTHM

- NON-VF/VT  
- ASYSTOLE OR PEA

RESTORATION OF RHYTHM AND BP

RESUME CPR FOR 5 CYCLES (< 2 MINUTES)

*ADULT RESCUE BREATHING RATE: 1 BREATH EVERY 5-6 SECONDS  
†ADULT CPR: 30 COMPRESSIONS PER 2 VENTILATIONS  
COMPRESSION RATE = 100/MINUTE  
COMPRESSION DEPTH = 2” WITH FULL CHEST RECOIL  
(2005 American Heart Association Guidelines)
III. MCM EXERCISE-ASSOCIATED COLLAPSE ALGORITHM

PATIENT WITH PROBABLE EXERCISE-ASSOCIATED COLLAPSE

✓ OBVIOUS SIGNS OF DEHYDRATION
✓ MARKED MS CHANGES

SUPINE WITH LEGS ELEVATED 12 - 24 INCHES ABOVE THE HEART

IV ACCESS, CONSIDER 1 LITER NS AS INDICATED
LABS: SODIUM, GLUCOSE

TREAT/TRIAGE ANY IDENTIFIED SODIUM/GLUCOSE ABNORMALITIES

REASSESS IN 15-20 MINUTES:
- SUPINE HR, BP
- RECTAL TEMP
- MENTAL STATUS

ORAL REHYDRATION
- SUPINE WITH LEGS ELEVATED 12 - 24 INCHES ABOVE THE HEART

REASSESS IN 15-20 MINUTES:
- SUPINE HR, BP
- RECTAL TEMP
- MENTAL STATUS

T > 102°F/39°C
SBP < 110
HR > 100
MS CHANGES

CONSIDER IV ACCESS + 1 LITER D5NS
SUPINE WITH LEGS ELEVATED 12 - 24 INCHES ABOVE THE HEART
LABS: SODIUM, GLUCOSE
INITIATE IMMEDIATE COOLING MEASURES AS APPROPRIATE

CONSIDER ER TRANSFER
- INITIATE IMMEDIATE COOLING MEASURES AS APPROPRIATE
- CONSIDER 1 MORE LITER NS IF SERUM SODIUM IS NORMAL
- IF AVAILABLE, CONSIDER ODANSETRON 4MG IV OR 8 MG ODT FOR PERSISTENT NAUSEA/VOMITTING

OBSERVE AND MANAGE AS APPROPRIATE
- CONSIDER ER TRANSFER FOR FAILURE TO MEET CRITERIA FOR DISCHARGE WITHIN 1 HR

CRITERIA FOR DISCHARGE:
- PT ABLE TO AMBULATE ON OWN POWER
- NORMAL MENTAL STATUS
IV. MCM HYPERThERMIA ALGORITHM

RECTAL TEMP ≥ 104°F/40°C
LOSS OF THERMOREGULATORY CONTROL
EVIDENCE OF ACUTE ORGAN DYSFUNCTION

- RAPID EXTERNAL COOLING
- IV NS 1-2 LITERS (OBTAIN BLOOD CHEMISTRY SAMPLES)
- CORE TEMPERATURE MONITORING (Q 3 MIN RECTAL TEMPERATURE OR INDWELLING RECTAL THERMISTOR)

CONTINUOUS VITAL SIGN REASSESSMENT
CONTINUOUS COOLING INTERVENTIONS

T ≤ 102°F/39°C

STOP COOLING TREATMENT
MONITOR FOR TEMPERATURE REBOUND OR HYPOTHERMIC OVERSHOOT

PERSISTENT MENTAL OBSTUNDATION

- Y
- N

SEVERE RHABDOMLYOLYSIS EVIDENT
NEED FOR ONGOING IV HYDRATION

- Y
- N

RELEASE WITH EXERCISE RESTRICTIONS & PRECAUTIONS REGARDING RHABDOMYOLYSIS

ASSESS FOR HYPOGLYCEMIA, HYPONATREMIA OR OTHER ETIOLOGY FOR CNS ALTERATION & TREAT ACCORDINGLY

ALL TEMPERATURES ARE RECTAL!

- RAPID COOLING OPTIONS: ICE BATH IMMERSION, WHOLE BODY ICE MASSAGE, CONTINUOUS DOUSING WITH ICE WATER &/OR ICE WATER-SOAKED SHEETS. FANS IF AVAILABLE. CONSIDER COOLED IV FLUIDS. STOP COOLING WHEN TEMPERATURE DROPS BELOW 101 - 102.

- IVF: NS 2L BOLUS UNLESS SIGNS OF OVER-HYDRATION OR CHF (THEN NS @ KVO RATE); REASSESS ON-GOING IVF NEEDS FROM CLINICAL RESPONSE, URINE OUTPUT, AND LABS. COOLED FLUIDS FOR HEAT CASUALTY.

- IMMEDIATE Na, Gluc, K +/- Cr, BUN, Cl & Hct (e.g. i-Stat®); TREAT HYPOGLYCEMIA AND HYPONATREMIA PER PROTOCOLS.

- IF RHABDOMYOLYSIS SUSPECTED, NEED CPK, BMP, AST, ALT, LDH, Uric Acid & UA w/ Micro IF AVAILABLE.
V. MCM HYPOTHERMIA ALGORITHM

PATIENT PRESENTS WITH SUSPECTED COLD INJURY

INITIAL THERAPY FOR ALL PATIENTS:
1. REMOVE WET CLOTHING
2. PREVENT FURTHER HEAT LOSS (BLANKETS, MOVE TO WARMER ENVIRONMENT)
3. OBTAIN CORE TEMPERATURE
4. AVOID ROUGH MOVEMENTS/PATIENT HANDLING
5. ASSESS CARDIAC RHYTHM

PRIMARY SURVEY (ABC’s) CHECK PULSE

PULSE PRESENT

WHAT IS THE CORE TEMPERATURE?

95° F/35° C TO 97° F/36° C

95° F/35° C TO 97° F/36° C

INITIATE PASSIVE EXTERNAL REWARMING

<86°F/30°C

<86°F/30°C

IMPROVED?

Y

N

SIGNIFICANT HYPOTHERMIA EFFECTS?

CONSIDER WARM FLUIDS** +/- WARMEr IV NS

N

Y

PASSIVE EXTERNAL REWARMING DISCHARGE WHEN INDICATED

REASSESS IN 15-20 MINUTE: IMPROVED?

TRANSPORT TO EMERGENCY ROOM

NO PULSE

• DEFIBRILLATE
• SECURE AIRWAY
• VENTILATE WITH WARMED OXYGEN
• ESTABLISH IV ACCESS
• INFUSE WARMED NS

*THIS ALGORITHM IS INTENDED FOR THE FIELD MANAGEMENT OF COLD INJURIES IN THE SETTING OF MASS PARTICIPATION EVENTS
** IF OBTUNDED, NO ORAL FLUIDS.
VI. MCM EXERCISE-ASSOCIATED MUSCLE CRAMPS ALGORITHM

INITIAL TREATMENT PROTOCOL
- Vital signs/rest on cot
- Consider i-STAT® Serum Sodium
- Gentle massage/passive stretching/icing/appropriate cooling/oral rehydration
- Administer oral salt / high sodium food
- Observation for 20 minutes

CRAMPS RESOLVED?

N → SECONDARY TREATMENT PROTOCOL
- Check i-STAT® Serum Sodium
- Start IV: Bolus 1-2 liters normal saline
- Monitor vital signs; if vitals not stabilizing or cramps not responding consider transport
- If recalcitrant and meds available, consider MgSO4 2-3 gms added to 1 liter IV bag or Valium 5 to 10 mg slow IVP

Y → DISCHARGE AS APPROPRIATE

1. An i-STAT serum sodium should be considered for patients with severe systemic cramping, or cramping associated with neurologic complaints such as persistent numbness or tingling. These symptoms may be clues to hyponatremia.

2. Oral rehydration fluid should be a fluid of choice; however, an electrolyte solution such as Gatorade, or a salty broth, should be encouraged.

3. Oral salt ingestion if no contraindications. May empty small packet or ½ tsp salt on tongue then chase with water/sports drink (repeat PRN). Try salted chips, pretzels, crackers. May try electrolyte tabs (often have low sodium content)
VII. MCM CHEST PAIN ALGORITHM

CHEST PAIN: SUGGESTIVE OF ISCHEMIA

IMMEDIATE ASSESSMENT:
✓ VITAL SIGNS
✓ OXYGEN SATURATION
✓ IV ACCESS
✓ 12 LEAD ECG

IMMEDIATE TREATMENT:
⇒ OXYGEN
⇒ ASPIRIN
⇒ NITROGLYCERIN
⇒ HELP! ACTIVATE EMS!

IMMEDIATE GENERAL TREATMENT
- ACTIVATE EMS
- OXYGEN: 4L/MIN BY MASK OR CANNULA
- ASPIRIN: 325 MG TABLET SHOULD BE ADMINISTERED (CHEWED)
- NITROGLYCERIN: ONE SUBLINGUAL TABLET (0.03 TO 0.04 MG) SHOULD BE ADMINISTERED AND MAY BE REPEATED TWICE AT 5 MINUTE INTERVALS. SYSTOLIC BP SHOULD BE GREATER THAN 90-100 MM HG.
VIII. MCM HYponatremia Algorithm

HYponatremia Suspected:
Normothermic; Feels and looks bad;
+/- Mental Status changes;
Persistent cramping or N/V; Weight gain; Swelling.

Marked Mental Status changes, Coma, or Seizures?

Normal Mental Status or Only Mild Confusion
Check Baseline i-Stat Sodium

Brotb, Salted Crackers
Consider IV NS KVO

Repeat i-Stat in 30 Minutes

Sodium > 125

Symptoms Resolved

Reassess & Treat Accordingly; Discharge or Transport to ER as Appropriate

Discharge

Sodium < 125

i-Stat Sodium Level

Clinically Wet:
HX Large Fluid Intake
Eye Mucosa Wet
No Orthostasis
Weight Increased

Sodium > 125

3% Saline
1cc/kg or 100 cc over 10 - 15 min

SymptomsResolved

Reassess & Treat Accordingly; Discharge or Transport to ER as Appropriate

Discharge

Sodium > 130

ConsideR REPEAT DOSING OF 3% Saline

Symptoms Resolved

Stabilize & Transport to ER

Sodium > 130

Consider Repeat Dosings of 3% Saline

Symptoms Resolved

Discharge

Sodium < 125

Clinically Dry:
HX Heavy Sweating & Poor Fluid Intake
Eye Mucosa Dry
Orthostatic Weight Decreased

3% Saline
1cc/kg or 100 cc over 10 - 15 min
or
NS 1-2 Liter Bolus if Certain No Fluid Overload

Symptoms Resolved

Reassess & Treat Accordingly; Discharge or Transport to ER as Appropriate

Discharge

Consider Hyponatremia but Carefully Assess for Other Potential Causes of Symptoms and Treat Accordingly
IX. MCM HYPOGLYCEMIA ALGORITHM

SIGNS/SYMPTOMS OF HYPOGLYCEMIA AND/OR KNOWN DIABETIC

VITAL SIGNS + FINGER STICK (FS) GLUCOSE

FS<55mg/dl

ASSESS RESPONSIVENESS

CONSCIOUS AND ORIENTED

BRIEF H&P VITAL SIGNS +/- IV ACCESS MONITOR

ORAL GLUCOSE 15-30 gm OBSERVE 10 TO 15 MINUTES

FS >55 mg/dl AND ASYMPTOMATIC

REPEAT ORAL GLUCOSE CHALLENGE OBSERVE 10 TO 15 MINUTES

FS >55 mg/dl AND ASYMPTOMATIC

START D5NS TRANSPORT TO ER

ALTERNED MENTAL STATUS WITHOUT SEIZURE

BRIEF H&P PROTECT ABC’s OXYGEN IV ACCESS MONITOR

1 AMP (25gm) D50W START D5NS RECHECK FSG IN 15 MINUTES

FS > 55 mg/dl AND IMPROVING MS

FS >55 mg/dl AND IMPROVING MS

Y

N

REPEAT 1 AMP D50W TRANSPORT TO ER

UNCONSCIOUS +/- SEIZURE

BRIEF H&P PROTECT ABC’s OXYGEN IV ACCESS MONITOR

GLUCAGON 1mg SC/IM START D5NS or D10W TRANSPORT TO ER

EVALUATE AND TREAT AS INDICATED

OBSERVE AND MANAGE AS APPROPRIATE

ENCourage PO INTAKE AND DISCHARGE WHEN STABLE