



HospitalMD[®]


EMERGENCY | HOSPITALIST | HYBRID

insight[™]

CLINICAL EDITION FOR COMMUNITY HOSPITALS

HYPERTHERMIA

REMINDERS FOR SUMMER



LATE SUMMER CAN MEAN MORE hyperthermia cases in your ED. Hyperthermia can result from too much time in a high temperature environment (such as patients in homes with no air-conditioning), or from exercise (such as running a marathon or performing another sport in the heat). Hyperthermia is defined as a core body temperature (rectal temperature) ≥ 104 °F (40 °C). The cause is irrelevant, the physiological results are the same, and the treatment is **immediate and rapid** cooling to 102 °F.



From the Editor

Welcome to this installment of **HospitalMD insight™—Clinical Edition!** This publication is aimed to inspire and equip you to advance clinical excellence in your community hospital. I would love to hear your feedback, comments, suggestions and accolades. Please email me with any thoughts at: BNewberry@HospitalMD.com.

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Exertional heat illness is one of the leading causes of death in young athletes. Physiological effects of sustained hyperthermia can include:

- **Electrolyte or metabolic disturbances**
- **Seizures**
- **Delirium**
- **Respiratory distress**
- **Rhabdomyolysis**
- **Acute kidney injury**
- **Myocardial injury**
- **Disseminated intravascular coagulation**
- **Acute liver failure**
- **Death**

Hyperthermia is not synonymous with fever. Fever is induced by cytokine activation during inflammation and is regulated at the level of the hypothalamus. Hyperthermia is a failure of the thermal regulation system that must be rapidly reversed and the failure to do so may result in significant morbidity or mortality for the patient. Patient history is key in making this distinction. While ANY core temperature of 104 °F should be reduced, hyperthermia requires immediate intervention, preferably even before the patient's arrival to the ED. Keep in mind that hyperthermia can occur even when the outside



temperature is not that high. High humidity, exertion, exposure time, and patient condition can all be factors. If the patient meets the criteria for hyperthermia, just treat them.

Please note that if the patient has a temperature of 104 °F or greater, they DO NOT have to also have signs of neurologic injury in order for aggressive and rapid cooling to be initiated. Similarly, if a patient has an elevated temperature and a history consistent with heat injury but does not have a temperature of at least 104 °F,

they should be rapidly cooled if they have any of the following symptoms:

- **Altered mental status**
- **Seizures**
- **Evidence of end organ damage**



If you are the provider at a Summer sports event or working the sidelines of an organized sport, be sure that you have methods in place to

rapidly cool an exertional heat illness patient. Treatment is most effective if it is initiated as soon as recognized. The following steps should be initiated:

- **Activate EMS**
- **Evaluate and treat issues with airway, breathing and circulation**
- **Begin rapid cooling (immersion in ice water is best)**
- **Remove clothing and protective equipment (do not delay cooling to do this—rather remove items while cooling is being initiated)**
- **Monitor vital signs and address any issues with airway, breathing or circulation if they arise.**
- **Cease rapid cooling when core body temperature reaches 102 °F**



If immersion in ice water is not feasible, use one of these alternative methods:

- **Cold shower**
- **Dousing with cold water from a hose**
- **Move to a cool shaded area and applying cold, wet towels to as much of the body surface as possible**
- **Use ice whenever possible and replace as it melts**

Note that there is little evidence to support:

- Chilled intravenous fluids
- Gastric, peritoneal, or bladder cooling with cold lavage fluids
- Cooling blankets

A study by Lühring, et al (2016) evaluated various methods of rapid cooling to determine the most effective. The authors acknowledged that cold water immersion (CWI) is the gold standard and should be implemented whenever possible. However, since this method is not always feasible, alternative methods were investigated.

The tarp-assisted cooling with oscillation (TACO) method provided faster and more

efficient cooling than non-immersion cooling methods. Body bags work excellent for implementing the TACO method. Place the patient in an open body bag and fill the bag with water and as much ice as possible. Place a fan on the patient to increase the cooling. Once the patient's temperature reaches 102 °F, aggressive cooling can be discontinued.

There is a lot more information to learn about treating hyperthermia and exertional heat illness. Visit **Up-to Date**, [Exertional heat illness in adolescents and adults: Management and prevention](#) for more information!

Lühring, K. E., Butts, C. L., Smith, C. R., Bonacci, J. A., Ylanan, R. C., Gaudio, M. S., McDermott, B. P. (2016). Cooling Effectiveness of a Modified Cold-Water Immersion Method After Exercise-Induced Hyperthermia. *Journal of Athletic Training*. 51(11). 946-951.

HospitalMD CASE STUDY



These case studies are based on actual cases that HospitalMD providers have seen. However, details about the case, patient and outcomes have been modified in order to protect patient privacy.

THE CASE: A 62-year-old female presented to the ED for chest and left arm pain for approximately 20 minutes. She states that the pain began when she was helping her son move boxes into his new home. She had a sudden onset of chest pain that she rated as an 8/10 and lasted "a few minutes". Since that time, the pain has waxed and waned. The pain is worse with exertion. States that in the ED her pain is a 4/10 and she describes it as midsternal with an "achiness" in her left arm.

History: HTN and GERD

Meds: Metoprolol 25 mg PO qAM, Pepcid 20 mg PO qAM

VS: HR - 92, BP - 126/92, RR - 18, T - 98.4 F, PO₂ - 98% on RA

EXAM: On exam, all systems were WNL

Labs: CBC/CMP/UA/PT/INR/Troponin/D-Dimer/ECG were all returned WNL.

Imaging: CXR was WNL

Treatment: The patient was given 325mg aspirin, 1/2" nitro paste and 2mg morphine in the ED.

DISPOSITION: The provider explained to the patient that she would be held for 2 hours in order to obtain a second troponin level and have another ECG done in order to evaluate for any changes. At the 2 hour mark the ECG was normal; however, the troponin was elevated. The provider had the patient transferred to a tertiary care center for further evaluation and work up.

THE OUTCOME: The patient did well and was discharged home after going to the cath lab at the tertiary care center for a 90% blockage in the RCA.

TAKE AWAYS:

- If a patient's chest pain has lasted less than 6 hours, consider a 2 hour troponin level prior to discharge from the ED to evaluate for any changes.
- Stay alert as chest pain patients have the potential to become acutely unstable.
- Perform another ECG and/or troponin in less than two hours if the patient has worsening symptoms and you feel a shorter time interval is warranted.

CUSTOMER SERVICE TIPS:

- Be sure to explain the cardiac workup to the patient and let them know that they may be staying in the ED for an extended work up and may be transferred to another facility depending on findings in the exam and/or workup.
- Take time to discuss the risks and benefits of treatment with the patient so that they understand their choices.
- Be sure to tell the patient and family to alert hospital staff for any changes in condition so that any potential deterioration can be caught early.

NEED STROKE AND/OR TRAUMA CME?

If you work at a facility that is a designated stroke or trauma center, you have a requirement for a certain number of CME each year on these topics. These requirements are EACH YEAR. Make sure you are keeping up with these requirements AND forwarding your CME certificates to myself and Pam Callahan so that we can track this CME and have it available for facility recertification requirements. Regardless of whether or not your facility is a designated stroke or trauma center, these CMEs are beneficial. The CME certificate will specifically designate stroke/trauma CME in most cases. If not, a stroke/trauma specific topic will suffice. Below are some ways that you can obtain these CMEs. There are lots of ways to obtain these CMEs, below are just a few examples.

STROKE

Requirement: 4 CMEs **annually**
EB Medicine "[Emergency Stroke Care Series: Advances and Controversies](#)"

- Cost: \$179
- CME: 8 hours

American Heart Association
"[Acute Stroke Online Module](#)"

- Cost: \$27.50
- CME: 1.5 hours

National Stroke Association
"[Stroke Rapid Response Training](#)"

- Cost: \$20
- CME: 2 hours

TRAUMA

Requirement: 9 CMEs **annually**

ATLS

- Cost: Varies but usually around \$800-900
- CME: 17 (please note you can only count this to satisfy the requirement for one year even though your certification is for 4—so this covers you in the calendar year that the course is taken)

Advanced Emergency Medicine Bootcamp

- Cost: \$475
- CME: 2 Trauma CME (even though the entire course offers 23 CME in its entirety)

EM Crit - Trauma Compilation I

- Cost: \$79.00 (includes 2 years' worth of access)
- CME: 16

EB Medicine

- Can mix and match topics that have trauma CME designated credits [HERE](#) and you can purchase each 4 hour course and CME test as a bundle for \$49
- EB Medicine also has an 18 hour trauma course [Emergency Trauma Care: Current Topics and Controversies volume III](#) available for \$249

DOCUMENTATION



- **HPI** - Strive to always include FOUR HPI elements in your charts.
- **ROS** - Document the necessary elements in the ROS and then write or check "ALL OTHER SYSTEMS REVIEWED AND ARE NEGATIVE". This statement must be present, and the wording **MUST BE PRECISE** in order to be considered acceptable by the billing company.
- **Exam** - You must have EIGHT exam elements present for a higher level chart
- **ECG/Radiology interpretation** - If you have ordered either of these, the statement "interpreted by me" must be present in the chart. An ECG must have 3 elements and an interpretation documented and a radiology result must have an interpretation documented.
- **Critical Care Time** - If your patient qualifies for critical care, **BE SURE** to document this on the chart.
- **Procedures** - Be sure to include all pertinent details regarding procedures so that any more complex procedures (ie intermediate vs simple suture repair) can be billed at the rate that matches the true complexity of the procedure.

If you have ANY questions about the documentation of any of these things, or any other types of documentation, please don't hesitate to contact your medical director or me at: bnewberry@hospitalmd.com

DOCUMENTATION *Reminders*



DOCUMENTATION TIP - DON'T FORGET CRITICAL CARE TIME!

Critical care time must be documented in minutes on the chart. Consider that your patient may qualify for critical care documentation if any of the below apply to your care of the patient:

Medications Administered

- Abciximab (ReoPro™)
- Adenosine/ Adenocard™ (> 1 dose) Acetadote™ (N-Acetyl Cysteine), IV Aggrastat™
- Amiodarone
- Apresoline™
- Atropine
- Ativan™ IM or IV (for actively seizing pt, status epilepticus or significant agitation)
- Brethine
- Calcium Chloride or Calcium Gluconate Cardene™
- Cardizem™ (> 1 dose or drip). Corlopam™
- CroFab™
- D50W (> 1 dose)
- Diazepam for status epilepticus Diazoxide
- Diltiazem (> 1 dose or drip)
- Digibind™
- Dobutamine
- Dopamine
- Enalapril (> 1 dose)
- Epinephrine or Adrenalin
- Epinephrine SQ for anaphylaxis or severe allergic reaction
- Fenoldopan
- Furosemide (> 1 dose) Eptifibatide (Integrilin™)
- Esmolol
- Glucagon
- Haldol™ IV or IM (significant agitation with > one dose)
- Haldol™ IV or 1M one dose and additional anti-psychotics IV or 1M including
- Abilify™, Geodon™, Risperdal™ and/or Zyprexa™)
- Heparin for PE, ACS, R/O MI or admitted chest pain
- Hydralazine
- Hyperstat™
- Insulin drip with or w/out initial bolus Isuprel
- Kayexalate oral combined with IV DSO/IV insulin and/or IV calcium (for hyperkalemia)
- Lasix (> 1 dose)
- Labetalol (> 1 dose) or 1 dose with an additional anti-hypertensive Levophed
- Lidocaine (IV not subcutaneous) Lopressor™ (3 doses)
- Lorazepam (for actively seizing pt) Lovenox™ subq for PE, ACS, admitted chest pain or R/O MI
- Mannitol (Hexan™)
- Metoprolol (3 doses)
- Mucomyst (N-Acetyl Cysteine),
- Narcan™
- Natrecor™
- Neosynephrine
- Neseritide
- Nicardipine
- Nipride™
- Nitroglycerine
- Nitroprusside

DOCUMENTATION

Reminders



- Norepinephrine
- NormodyneTM
- Octreotide
- Oxytocin
- Phenobarbital for status epilepticus
- Pitocin
- Potassium (for K < 2.5)
- Procainamide
- Pronestyl
- Propanolol
- ReoProTM
- Sodium Bicarbonate
- Streptokinase
- Terbutaline
- Theophylline
- Thrombolytics (RetavaseTM, TNKaseTM)
- Tirofiban
- Trandate (3 doses)
- Tridil
- Valium (for actively seizing pt, status epilepticus or significant agitation)
- VasotecTM (> 1 dose)
- RSI (Rapid Sequence Intubation) Drugs:
- Succinylcholine (AnectineTM) Vecuronium
- Etomidate Rocuronium NorcuronTM
- Temperature (adult) > ~ 104°F
- Temperature (adult) < ~ 95°
- Heart rate/pulse (adult) > 150
- Heart rate/pulse (adult) < 40 Systolic BP (adult) > ~ 230 or < ~ 70 Diastolic BP (adult) > ~ 130 or < ~ 40 Glasgow Coma Score (GCS) < ~ 12
- O2 Sat (pulse ox) < or = 90
 - Any unstable VITAL SIGNS consistent with organ system failure

Laboratory Abnormalities

- Sodium (Na) < 120 or > 150 Potassium (K) < 2 or > 6.5
- Calcium (Ca) < 6 or > 13 mg/dl Magnesium < 1.5 or > 5 meq/ L
- Bicarbonate (CO2) < 10 or > 40 meq/L Platelet count < 20,000
- pCO2 < 20 or >60 mm Hg pO2 <60 mm Hg
- O2 Sat (pulse ox) < or = 90% pH < 7.25 or > 7.6
- Hemoglobin (Hb) < or = 6
- Troponin > 0.04 or maximum at specific lab CK MB > than or = 5%
- WBC < 2K or > 20K/μl

Vital Signs

- Respirations (adult/ child) > or = 30
- Respirations (adult/child) < 5
- Respirations (adult/ child)
- Intercostal retractions, nasal flaring, Cheyne-Stokes or tachypnea

Events and Clinical Resources

ANNUAL HEALTHSTREAM EDUCATION DEADLINE HAS PASSED!

Have you completed your HealthStream annual education? If you have not completed this, please get this done ASAP. It is very important that we have documentation of annual training on compliance topics such as EMTALA, restraint use and corporate compliance.

GET ACEP NOW

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If you have a great resource you would like added to this list, let us know!

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