CENTRAL OHIO TRAUMA SYSTEM
SUDDEN CARDIAC ARREST COMMITTEE

SAMPLE PROTOCOL FOR CENTRAL OHIO PREHOSPITAL PERSONNEL REGARDING THERAPEUTIC HYPOTHERMIA FOR SUDDEN CARDIAC ARREST VICTIMS

PURPOSE

This sample protocol is intended to serve as a guideline to Central Ohio EMS agencies that establish or are considering establishing prehospital protocols for the provision of mild therapeutic hypothermia for the care of victims of sudden cardiac arrest (SCA).

BACKGROUND

The International Liaison Committee on Resuscitation (ILCOR) advisory statement issued in 2003 states:

> "Unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest should be cooled to 32-34°C for 12-24 hours when the initial rhythm was ventricular fibrillation"[1].

Evidence providing the basis for the recommendations regarding provision of mild hypothermia for unconscious adult patient with spontaneous circulation after out-of-hospital cardiac arrest derives mainly from two key randomized trials published in the New England Journal of Medicine in 2000 [2, 3].

In 2005, the American Heart Association (AHA) Guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) were issued[3]. These guidelines ratified the earlier ILCOR statement. The AHA Guidelines for CPR and ECC state:

> "Unconscious adult patients with return of spontaneous circulation (ROSC) after out-of-hospital cardiac arrest should be cooled to 32°C to 34°C (89.6°F to 93.2°F) for 12-24 hours when the initial rhythm was VF (Class IIa). Similar therapy may be beneficial for patients with non-VF arrest out-of-hospital or for in-hospital arrest (Class IIb). Hemodynamically stable patients with spontaneous mild hyperthermia (>33°C [91.5°F]) after resuscitation from cardiac arrest should not be actively rewarmed"[3].

To date, all hospitals in Franklin County and others in Central Ohio counties have protocols for *induced* or *therapeutic* hypothermia in select patients who experience a SCA. Similar protocols are in place at many hospitals across the U.S, and multiple EMS agencies are following suit (see Attachment A).

The Central Ohio Trauma System's Sudden Cardiac Arrest Committee was asked to draft this sample protocol at the request of local EMS providers interested in exploring the benefits of induced hypothermia, and as an aid for establishing agency-specific SCA-therapeutic hypothermia standard operating protocols. The intended outcomes of this work are enhanced patient care and an increase in functional survivability among SCA patients in Central Ohio.

ASSUMPTIONS

The following assumptions contributed to the drafting of this sample EMS procedure.

- Therapeutic hypothermia is a standard of care endorsed by experts in the field of SCA[1-5].
- Therapeutic hypothermia established in the prehospital environment may improve patient survivability and functional outcomes after SCA[3, 7].
- Therapeutic hypothermia is for a select group of SCA survivors[1, 4].
- Prehospital therapeutic hypothermia protocols permit the EMS provider to initiate the intentional cooling of post-arrest victims while in the field and/or en route to the hospital. However rapid transport of SCA victims should never be delayed due to the induction of prehospital hypothermia.
- This sample protocol is intended to serve only as a guideline. Establishment of therapeutic hypothermia protocols by EMS agencies should be done with agency experts and medical director oversight.
- Post-SCA-induced hypothermia is not without risks. Complications of hypothermia can include coagulopathies, infection and death[2].

PREHOSPITAL CONSIDERATIONS: ELIGIBLE PATIENTS/INCLUSION CRITERIA

The following clinical indicators determine which patients are candidates for prehospital therapeutic hypothermia.

- Patient is an adult defined for medical care purposes as $\geq$ 16 years of age *(NOTE: The Austin [TX] and Orange County [NC] EMS protocols include all ages[8, 9]);* AND
- Patient has a non-traumatic etiology of SCA; AND
- Patient has ROSC, regardless of blood pressure; AND
- Patient remains comatose (GCS < 8 and/or no purposeful response to pain); AND
- Patient is intubated (may be intubated post-ROSC); AND
- Patient is not pregnant *(NOTE: One case study describes a successful outcome in pregnancy[10]);* AND
- EMS agency is taking patient to a hospital that has the capability to continue post-SCA therapeutic hypothermia; AND
- EMS is without suspicion that patient is experiencing accidental hypothermia with a core temperature at or below 34 degrees Celsius (93.2 degrees Fahrenheit). In this instance, EMS should not start prehospital therapeutic hypothermia, nor should they attempt to actively rewarm the patient prior to emergency department evaluation.

PREHOSPITAL PROCEDURES

The following procedures shall be done by EMS Providers initiating prehospital therapeutic hypothermia.

- Ensure patient meets inclusion criteria.
- Keep patient uncovered.
- Rapidly administer up to 2 liters of chilled (1°-4°C) .9% sodium chloride (NS) via rapid IV infusion (method for cooling fluid optional) into peripheral vein(s). IO administration is acceptable as needed.
- Place cold packs if available on patient's neck, bilateral axilla and groin. Under garments may be left in place.
- Monitor for shivering. If patient is shivering, administer benzodiazepine of choice. Use paralytics per agency protocol.
- Transport to hospital without delay.

RECURRENT LOSS OF PULSE

In the event that the patient experiences a recurrent cardiac arrest after therapeutic hypothermia has been initiated, there is no need to discontinue cooling. Maintain cooling as SCA protocols are initiated.

COMMUNICATION WITH THE RECEIVING HOSPITAL

Communicate rapidly with the receiving emergency department that therapeutic hypothermia has been initiated. Document the following on the run sheet or in the electronic medical chart:

- That the induced hypothermia protocol was initiated
- The time that the induced hypothermia protocol was initiated
- The amount of cold fluid that was infused
- The time cold packs were applied and to which sites

INTER-FACILITY TRANSPORT BY AIR OR GROUND

Occasionally surviving SCA patients may be transported between facilities. If the patient is undergoing therapeutic hypothermia therapy, the following should be kept in mind:

- The transporting team should ensure that the receiving hospital is notified that the patient is receiving hypothermia therapy prior to transport.
- The therapeutic hypothermia initiation time should be documented in transport information so that the receiving hospital knows when to discontinue therapy.
- Currently, there are no devices on the market for confirming core body temperature during transport. Use of ice packs during inter-facility transport in a patient who is already at 33.5°C (92.3°F) may decrease core temperature below a safe range.

ENDNOTES

[1] Nolan JP, Morley PT, Vanden Hoek TL, Hickey RW. Therapeutic hypothermia after cardiac arrest. An advisory statement by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation. *Resuscitation.* 2003: 57; 231-235.

[2] Hypothermia After Cardiac Arrest Sturdy Group. Mild Therapeutic Hypothermia to improve the neurologic outcome after cardiac arrest. *N Engl J Med.* 2002: 346; 549-556.

[3] Bernard S, Buist M, Monteiro O, Smith K. Induced hypothermia using large volume, ice-cold intravenous fluid in comatose survivors of out-of-hospital cardiac arrest: a preliminary report. *Resuscitation.* 2003: 56; 9-13.

[4] 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation.* 2005; 112: IV-1-IV-203. Part 7.5: Post-resuscitation Support. *Circulation.* 2005: 112; IV-84-IV-88.

[5] Bernard SA, Gray TW, Buist MD, Jones BM, Silvester W, Gutteridge G. Smith K. Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. *N Engl J Med.* 2002: 346 (8); 557-563.

[6] Hachimi-Idrissi S, Crone L, Huygens L. The effect of mild hypothermia and induced hypertension on long-term survival rate and neurological outcome after asphyxial cardiac arrest in rats. *Resuscitation.* 2001: 49: 73-82.

[7] Kim F, Olsufka M, Lingstreth WT, Jr., et al. Pilot randomized clinical trial of prehospital induction of mild hypothermia in out-of-hospital cardiac arrest patients with rapid infusion of 4 degrees C normal saline. *Circulation.* 2007: 115; 3064-70.

[8] *Post-resuscitation with Cooling.* Care Protocol. City of Austin/Travis County EMS System (Texas). Received via e-mail April 4, 2008 from Jeff Hayes, BS, LP. Chief of Staff, Office of the Medical Director, City of Austin/Travis County EMS System.

[9] *Post-resuscitation Protocol 27.* August 2006. Also, *Post-Resuscitation Procedure 35* August 2006. Provided by Jane Brice, PhD, Associate Professor, Emergency Medicine. University of North Carolina Hospitals (Chapel Hill, NC) & Orange County EMS. As of April 25, 2008.

[10] Rittenberger JC, Kelly E, Jang D, et al: Successful outcome utilizing hypothermia after cardiac arrest in pregnancy: A case report. *Crit Care Med.* 2008: 36; 1354-1356.

ADDITIONAL REFERENCES

City of Columbus (OH) Division of Fire. Standard Operating Procedures. *Induced Hypothermia.* SOP No. 07-02-29, Vol-CH-Cat.Sub. Effective date 01/01/08.

Ohio Revised Code, § 4765.01, which specifies a standardized age for pediatric trauma patients as those < 16 years of age; the same age grouping may be applicable to SCA patients.

Therapeutic hypothermia after cardiac arrest: an advisory statement by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation. *Circulation.* 2003: 108; 118-21.

COTS SUDDEN CARDIAC ARREST COMMITTEE MEMBERS

The following COTS Sudden Cardiac Arrest Committee members contributed to the creation of these regional guidelines. Membership on COTS Sudden Cardiac Arrest Committee is open to any interested persons in Central Ohio.

Lyn Nofziger, EMTP, Upper Arlington Fire Department, *Co-Chair ;***Michael Sayre, MD,** The Ohio State University Medical Center, *Co-Chair*; **Nancie Bechtel, RN**, Central Ohio Trauma System; **Barb Burdette, RN,** Doctors Hospital West; **Mary Ann DelAguaro, RN,** Grant Medical Center; **Sandy Gill, RN,** Columbus Public Health; **Al Gora, MD,** Mount Carmel West; **Sonya Howard, RN,** Mount Carmel St. Ann's; **Mark Huckaby, EMTP,** Grant Medical Center; **Dave Keseg, MD,** Columbus Fire Department; **Lisa Koser, RN,** The Ohio State University Hospital East; **Shawn Koser, EMTP,** Columbus Fire Department; **Vince Papa**, PhD, EMTP, Norwich Township Fire Department; **Kelly Roese, RN,** Riverside Methodist Hospital; **Tim Tilton, EMTP, Fire Chief,** Whitehall Fire Department; **Robert Whalen, RN,** Dublin Methodist Hospital; **Lynn White, MS**, The Ohio State University Medical Center; and **Paul Zeeb, MD,** Mount Carmel Health System

APPROVED by the COTS Sudden Cardiac Arrest Committee on November 3, 2008.

APPROVED by the COTS Board of Trustees on _____.

EMS AGENCIES WILLING TO SHARE SCA-THERAPEUTIC HYPOTHERMIA PROTOCOLS

City of Austin/Travis County (TX) EMS System. Contact is Jeff.Hayes@ci.austin.tx.us as of April 4, 2008.

City of Columbus (OH) Division of Fire. Standard Operating Procedures. *Induced Hypothermia.* Contact is kosers@columbus.gov as of April 1, 2008.

City of Houston (TX) Fire Department. http://www.hfdmd.org. Contact is David.Persse@cityofhouston.net as of April 11, 2008.

Knoxville (TN) Fire Department EMS. Contact is PObrien@mc.utmck.edu as of April 9. 2008.

University of North Carolina Hospitals (Chapel Hill, NC) & Orange County EMS. *Post-resuscitation Protocol 27.* August 2006. Also, *Post-Resuscitation Procedure 35* August 2006. Contact is brice@med.unc.edu as of April 21, 2008.

Pittsburg (PA) EMS. Contact is Mark.Pinchalk@city.pittsburgh.pa.us as of April 10, 2008.

Wake County EMS (Raleigh, NC). As available April 1, 2008 from http://wakeems.com.

RECENT NATIONAL MEDIA COVERAGE OF SCA-THERAPEUTIC HYPOTHERMIA

Cooling therapy helps people survive cardiac arrest. *WRAL News* (2008, Feb 14). (WRAL.com). As available 04/15/08 from www.wakeems.com/blog/?cat=6 (Wake County Emergency Medical Services, Raleigh, NC).

Cooling protection makes a difference for Bill's player. *CNN* (2007, Oct 14). As available 04/15/08 from www.wakeems.com/blog/?cat=6 (Wake County Emergency Medical Services, Raleigh, NC).

Hypothermia induced prehospital shown feasible, safe in resuscitated cardiac arrest. *WebMD*. (2007, June 4). http://bcbsma.medscape.com/viewarticle/557722. As available 04/09/08.

Arctic Sun apparatus for induced hypothermia. *Medivance, Inc*. (2008, March10). As available April 20 from http://www.medivance.com/.

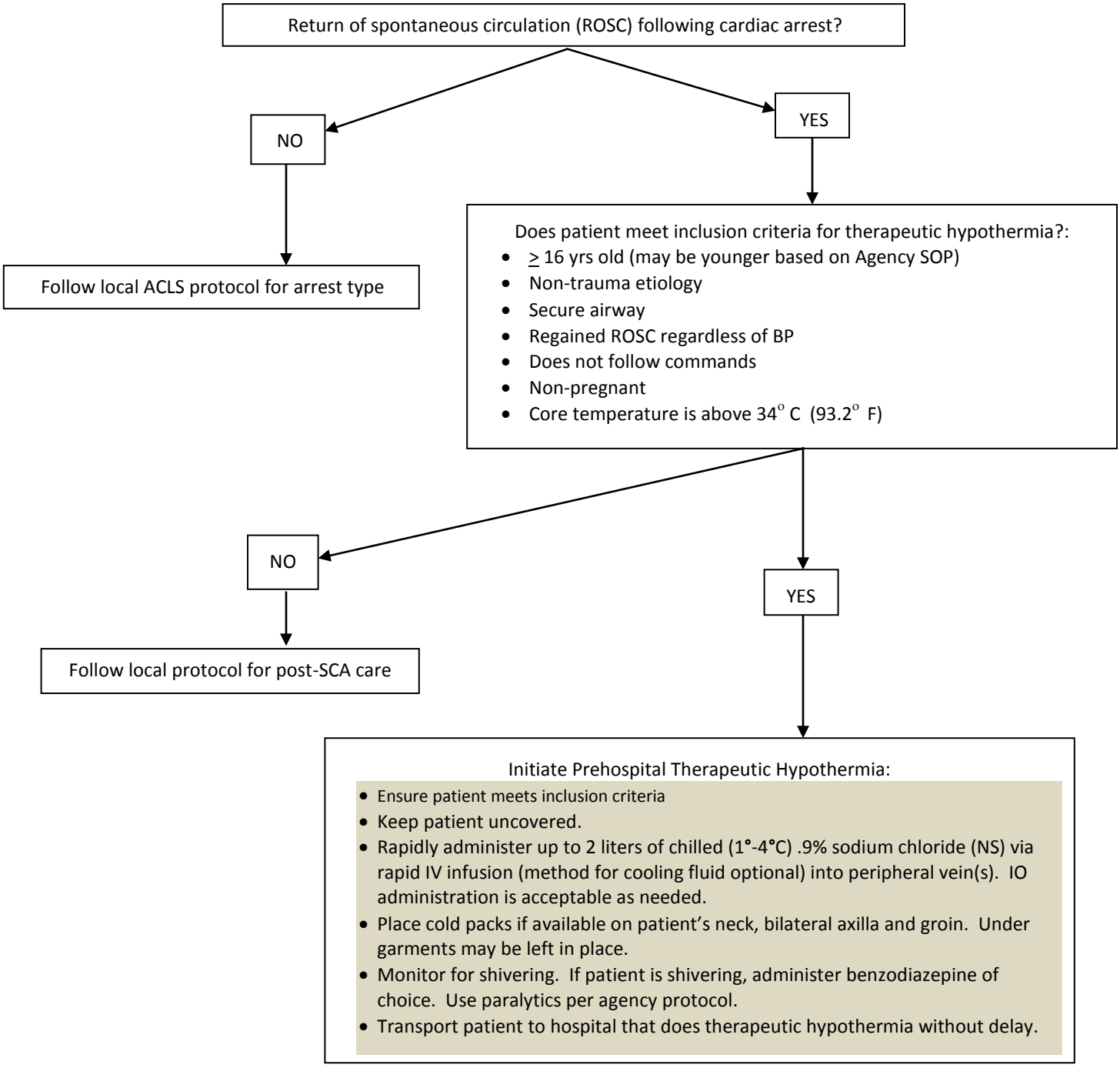
Reference to Wake's therapeutic hypothermia protocol: *Men's Health* (2007, February 17). As available 04/15/08 from www.wakeems.com/blog/?cat=6 (Wake County Emergency Medical Services, Raleigh, NC).

To treat the dead: the new science of resuscitation is changing the way doctors think about heart attacks and death itself. *Newsweek* (2007, May 7). As available 04/15/08 from www.wakeems.com/blog/?cat=6 (Wake County Emergency Medical Services, Raleigh, NC).

To treat cardiac arrest, doctors cool the body: brain-saving technique carries little risk, but most cities, hospitals aren't using it. *USA Today* (2006, December 11; front page). . As available 04/21/08 from http://pqasb.pqarchiver.com/USAToday/results.html?st=advanced&QryTxt=wake+county+EMS+cooling&sortby=REVERSE_CHRON&datetype=0&frommonth=04&fromday=01&fromyear=1987&tomonth=04&today=20&toyear=2008&By=&Title=&Sect=ALL&x=22&y=12

Attachment C

CENTRAL OHIO TRAUMA SYSTEM
SUDDEN CARDIAC ARREST COMMITTEE
ALGORITHM FOR EMS THERAPEUTIC HYPOTHERMIA



NOTE: Induced hypothermia should be initiated asap as appropriate, but should NEVER delay transport!