SUBJECT:	**ADULT POST CARDIAC ARREST TARGETED TEMPERATURE MANAGEMENT PROTOCOL**	**Policy No.:**	**B870**
		Supersedes:	**October 2017**
		Revision Date:	**March 2022**
		Page:	**1 of 4**

PURPOSE:

To define a process to ensure safe and consistent practice when inducing Targeted Temperature Management (TTM), previously known as Therapeutic Hypothermia.

SCOPE:

Intensive Care Unit (ICU)

GENERAL INFORMATION:

Increased brain temperature contributes to ischemic brain damage in patients surviving cardiac arrest secondary to ventricular fibrillation or ventricular tachycardia. Several clinical studies have demonstrated that such damage can be mitigated by lowering brain temperature by a few degrees, therefore, improving outcomes. TTM also seems to benefit patients who survive cardiac arrest secondary to asystole and pulseless electrical activity (PEA). The different phases of TTM are as follows:

- **Induction Phase:** Begins when temperature management therapy has been initiated
- **Maintenance Phase**: Begins once target temperature is reached (33-36 °C) and is then maintained for 12-24 hours
- **Re-warming Phase**: Begins at the end of the maintenance phase and continues until the target temperature is reached 37°C.
- **Targeted Temperature Management System**: An active treatment that tries to achieve and maintain a specific body temperature in a person for a specific duration of time to improve health outcomes during recovery after a period of stopped blood flow to the brain. Cooling systems include specialized external cooling or intravascular cooling devices.
    - Other Cooling Measures:
        - Chilled IV fluids (0.9% NS) per provider order
        - Ice Packs (neck, axilla, groin, torso, head)
        - Cooling Blanket

I. PATIENT SELECTION

A. Inclusion Criteria:

1. Age 18 and older.
2. Cardiac arrest with the return of spontaneous circulation (ROSC) within sixty minutes following ventricular fibrillation, ventricular tachycardia, PEA, or asystole.

3. Persistent coma post-cardiac arrest: No meaningful response to verbal commands. Time from ROSC to initiation of hypothermia within 6 hours

B. Contraindications:

1. There are no known medical contraindications to TTM with a goal temperature of 36 degrees Celsius.
2. Core temperature below 30 degrees Celsius
3. Patients with advanced directives proscribing aggressive care

C. Relative Contraindications – the decision to induce hypothermia in patients with the following conditions will be at the discretion of the physician.

1. Pregnancy
2. Patients under 18 years of age
3. CPR for more than 60 minutes
4. Pre-existing coma
5. Severe hemorrhage or known coagulopathy (DIC, INR >1.7, platelets <50k). Hypothermia may impair the coagulation system.
6. Hyperkalemia
7. QT prolongation (>450ms)
8. Intracranial hemorrhage Non-contrast head CT recommended
9. History of recent major surgery within 14 days.
10. Severe Sepsis/Septic Shock or cardiogenic shock, refractory to fluid resuscitation and vasopressors.
11. Known terminal illness with comfort care planned
12. Delays longer than 6 hours from ROSC to cooling

D. GOAL:

1. A temperature between 33-36 degrees Celsius is selected and maintained for 12-24 hours

E. NURSING PROCEDURE

1. Inform family or patient surrogate about the decision to begin induction of TTM and provide education, informed consent is not necessary
2. Start cooling measures as soon as possible to achieve maximum benefit. Ideally, begin within 2 hours of ROSC but no later than 6 hours
3. Administer chilled Sodium Chloride 0.9% as ordered, and apply external cooling blankets and ice packs to the neck, axilla, groin, torso, and head
4. Notify the Respiratory Care Practitioner (RCP) to manage the patient according to physician orders
5. Administer sedatives as ordered prior to neuromuscular blocking agents
6. Administer neuromuscular blocking agents as ordered and monitor appropriately (Refer to Policy B878 – Adult ICU Neuromuscular blocking agents)
7. Monitor vital signs every 15 minutes until the goal temperature is reached
8. Once the goal temperature is reached, document core body temperature every 30 minutes
9. Assess skin at a minimum of every 4 hours
10. Assess Train-of-Four to the goal of 1-2 twitches
11. Assess for shivering using the Bedside Shivering Assessment Scale (BSAS) and document

hourly

12. Notify the Physician if:
    a) Bradycardia: heart rate less than 50 beats per minute
    b) Mean arterial pressure less than 65 with a maximum dose of vasopressors
    c) Unable to control shivering (BSAS 1 or higher).
    d) Seizure activity
    e) Arrhythmias
    f) Abnormal lab results
    g) Signs of aspiration
    h) Unable to reach goal temperature after 2 hours of cooling.

F. PHYSICIAN PROCEDURE:

1. Notify family and/or patient surrogate about the decision to start TTM
2. Complete the Therapeutic Hypothermia Targeted Temperature Management orders
3. Intubate the patient if not already done
4. Consider insertion of an arterial line for continuous blood pressure monitoring and frequent laboratory test
5. Consider insertion of a central venous catheter to assess the intravascular volume and central venous saturation
6. Neurology consult is recommended
7. Continuous EEG monitoring is recommended
8. Consider a dietary consult

G. REWARMING: At 24-48 hours post TTM

1. The re-warming phase is critical as peripheral vasculature starts to dilate after vasoconstriction induced by hypothermia. Hypotension and hyperkalemia are frequent complications during this critical phase.
2. Discontinue paralytic agents if in use.
    a) Wean off Propofol titrating down the infusion by 5 mcg/Kg/hour every 10 minutes if indicated. (Wean off other sedatives as ordered by the physician.)
    b) Document temperature and BSAS hourly
    c) Vital signs every 15 minutes during rewarming
    d) Recommended temperature rise: not more than 0.25 degrees C per hour
    e) Monitor electrolytes and blood sugar levels as ordered
    f) Maintain normothermia for 48 hours after rewarming

H. BEDSIDE SHIVERING ASSESSMENT SCALE (BSAS)

- 0 – None: No shivering
- 1 – Mild: Shivering localized to neck/thorax, may be seen only as artifact on ECG or felt by palpation
- 2 – Moderate: Intermittent involvement of the upper extremities and +/- thorax
- 3 – Severe: Generalized shivering or sustained upper/lower extremity shivering

REFERENCES:

1. Arrich J. Holzer M et al; Hypothermia for neuroprotection in adults after cardiopulmonary resuscitation (2016).
2. American Heart Association. (2015). HIGHLIGHTS of the 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
3. Callaway et al. (2015) Part 8: Post cardiac arrest care: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation, 132, S465-S482
4. Elmer, J., Walls, R. M., & Grayzel, J. (2022, February 07). Initial assessment and management of the adult post-cardiac arrest patient. Retrieved from Up to Date: https://www.uptodate.com/contents/initial-assessment-and-management-of-the-adult-postcardiacarrestpatient?search=targeted%20temperature%20management&source=search_result&selectedTitle=1~125&usage_type=default&display_rank=1
5. Scirica, B.M. (2013). Therapeutic hypothermia after cardiac arrest. Circulation, 127, 244-250.

RW:MC:al

Reviewed by: Critical Care Committee June 2014, July 2017, March 2022
P&T Committee August 2014, August 2017
MEC and EC approved 10/7/2014; 10/10/2017