



Nursing Service Guidelines

Management of a Patient Receiving Induced Hypothermia

General

Title: **MANAGEMENT OF A PATIENT RECEIVING INDUCED HYPOTHERMIA PER ARCTIC SUN®**

Responsibility: Registered Nurse

Equipment: Cardiopulmonary monitor
Arctic Sun® Console
Arctic Gel® Pads-One set appropriately sized

- 2 torso and 2 thigh pads
- For patients greater than 220 pounds may need to add 1 or 2 universal pads to cover the torso
- Pads are latex free
- Pads are good for 5 days
- Pads are radiolucent (CT and MRI compatible)
- Pads can be placed directly over defibrillator pads and defibrillation can occur while therapy is running

Esophageal temp probe
Rectal temp probe
Bair Hugger®
Peripheral NERVE Stimulator (PNS) with Train of Four (TOF) monitoring prn

Purpose: To improve neurological outcomes in patients who have survived cardiac arrest.

Goal: The goal of therapy is to achieve and maintain therapeutic hypothermia (goal 33°C) for a 24 hour period .

Inclusion Criteria:

- Cardiac Arrest with Return of Spontaneous Circulation (ROSC)
- No meaningful response to verbal commands
- MAP \geq 60 with or without vasoactive medication
- Age greater than or equal to 18
- Within 6 hours following cardiac arrest (up to 12 hours at Attending Physician's discretion)

Exclusion Criteria:

To be discussed amongst medical team prior to initiating treatment. Exclusion criteria are not limited to the following and may be decided on a patient by patient basis with some of these criteria being relative depending on the situation and the patient.

- DNRCC or DNR Arrest status
- Coagulopathy, active or history of bleeding
- Ages less than 18 years
- Pregnancy
- Major surgery within 14 days
- Intracranial hemorrhage
- Uncontrolled cardiac arrhythmias
- MAP less than 60 mm Hg
- Terminal illness
- Severe infection or sepsis

Procedure:

PATIENT PREPARATION:

1. Complete baseline nursing assessment which includes a neuro assessment
2. Obtain baseline 12 lead EKG
3. Obtain baseline labs—CBC, BMP, Lactate, Cardiac markers, PT/INR, PTT
4. Obtain baseline ABGs
5. Review that inclusion/exclusion criteria was completed and that rapid determination to initiate hypothermia is made by the ED or Admitting physician and orders are written.
6. You may have to assist with the insertion of an arterial line.
7. A minimum of 2 large bore IVs is necessary to begin therapy (one may be an IO)
8. If a central line is placed it is best placed prior to vasoconstriction of vessels, but do not delay initiation of therapy for line placement.
9. Head CT if warranted
10. Turn on the Artic Sun® console. Power it on utilizing the “on/off” switch on the back of the console.
11. Insert temp sensing probes (esophageal and rectal and attach cables from the Arctic Sun® console to the temp probes
12. Select appropriately sized Arctic® Gel Pads. These are based on the patient’s height and weight. See pad size reference.
13. Pads should be placed on clean, dry and intact skin. Remove any creams and lotions from patient. It is NOT necessary to shave the patient prior to pad placement.
14. Place all 4 pads (2 torso and 2 thigh) as directed by the pictures on the label.
15. When applying torso pads, keep the spine exposed. It is ok for the pads to overlap anteriorly
16. If the abdomen is exposed, apply 1-2 universal pads to obtain full coverage.
17. Keep the connector lines of the pads on the anterior aspect of the patient
18. Connect the Arctic® Gel pad tubing to the fluid delivery lines of the Arctic sun console. (white to white and blue to blue)

PHASE I: INITIATION (33 degrees within 4 hours):

1. Gel pads to be applied as soon as possible with a goal of 1 hour or less upon presentation
2. To initiate therapy (the console should already be turned on) select “hypothermia” treatment from the main screen.
3. Screen will display appropriate therapy settings and pre-programmed protocol. Verify that target temperature and duration match prescribers order. The normothermia setting will display zero as it calculates time elapsed.
4. Verify settings in the “cool patient” window—33 degrees and 24 hours
5. Press the start button in “cool patient” window. Therapy will begin. The Arctic Sun® console will monitor patient temperature every second and change water temperature every 2 minutes accordingly to bring the patient from the initial temperature to the target temperature of 33 degrees Celsius as quickly as possible.
6. There will be an audio tone and voice to indicate therapy has been initiated. The Artic Sun® machine icon will blink and a green line will display at the bottom of the graph to indicate therapy is in progress.
7. Document the date and time therapy was initiated
8. **Document the patient temperature every 30 minutes. Variations in temperature could indicate shivering, seizures or infection.**
9. Monitor hourly intake and output. It is common for the urinary output to increase during this phase. Monitor and replace fluids and electrolytes accordingly.
10. Monitor electrolytes as ordered.
11. **Document vital signs every 30 minutes or more often as condition necessitates.**
12. Perform nursing assessment every 4 hours and document.
13. Assess the patient’s skin every 4 hours. Gently peel back the Artic® Gel pads, assess and document.
14. Assess for early signs of shivering every hour and prn and treat immediately. Signs include artifact on EKG, difficulty in reaching target temp, arrows going up on temperature trend indicator
15. Perform bedside shivering assessment scale hourly and prn and if needed treat.

Score	Definition
0	None: No shivering noted on palpation of the masseter(chin, jaw, cheek), neck or chest wall
1	Mild: Shivering localized to the neck and/or thorax only. May only been seen as artifact on the EKG.
2	Moderate: Shivering involves gross movement of the upper extremities (in addition to the neck and thorax)
3	Severe: Shivering involves gross movements of the trunk and upper and lower extremities

16. The core target temperature of 33 degrees Celsius should be achieved in under 4 hours
17. If target not reached within 3 hours, notify physician and contact the Arctic Sun® helpline which is 1-866-840-9776.
18. Early detection and treatment of shivering is key.

PHASE II—MAINTENANCE (24 hours):

1. The second phase of therapy, maintenance begins when the patient reaches a target temperature of 33°C.
2. The patient will be maintained at 33°C for 24 hours. The 24 hour counter in the “cool patient” window will begin counting down 24 hours automatically.
3. Ensure patient is on a continuous ECG, Vital sign and SpO2 monitors. There is a potential for a prolonged PR interval, prolonged QRS and prolonged QT.
4. The patient’s temperature will be regulated by the Arctic Sun® console which monitors the temperature every second and changes the water temperature every 2 minutes as needed to maintain the patient at target temperature.
5. Document the date and time the maintenance phase begins. (at the time the patient reaches 33°C)
6. Document the patient temperature hourly.
7. Assess the patient’s skin every 4 hours. Gently peel back the Artic® Gel pads, assess and document.
8. Monitor hourly intake and output.
9. It is common for patients to be hyperglycemic during this phase, assess blood sugar and treat appropriately.
10. Discontinue all potassium products 8 hours prior to the rewarm phase. Notify the physician if the potassium is less than 3.

PHASE III—REWARM (16 hours):

1. The third phase of therapy, rewarm, begins after the patient has been maintained at 33 degrees Celsius for a minimum of 24 hours and the patient is then rewarmed to normothermic (37 plus or minus one degree Celsius)
2. To begin this phase, acknowledge the alert that the rewarm phase is beginning and press start in “rewarm patient” window.
3. The patient will be actively rewarmed from 33 degrees Celsius to 37 degrees Celsius.
4. The rewarm will occur at a rate of 0.25 degrees Celsius per hour. This rate is already pre-programmed in the Arctic Sun®.
5. The rewarm process takes about 16 hours to complete.
6. The patient’s temperature will be regulated by the Arctic Sun® console which monitors the temperature every second and changes the water temperature every 2 minutes as needed to ensure slow, gradual, and steady rewarm.
7. Assess for shivering every 1 hour and prn.

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2	Moderate: Shivering involves gross movement of the upper extremities (in addition to the neck and thorax)
3	Severe: Shivering involves gross movements of the trunk and upper and lower extremities

8. Document the patient and water temperature hourly.

9. Assess the patient's skin every 4 hours. Gently peel back the Artic® Gel pads, assess and document.
10. Monitor hourly intake and output.
11. Monitor for electrolyte shifts. Intracellular electrolyte shifts are common during this phase of therapy. Draw labs as ordered.
12. **It is not recommended to replace electrolytes during this phase because of the electrolyte shifts, intracellular to extracellular.**
13. Document vital signs hourly.
14. Monitor and assess for hemodynamic instability. The rate of rewarm can be slowed to a rate of 0.01 degrees Celsius per hour if the patient becomes hemodynamically unstable.

PHASE IV—NORMOTHERMIA (48 hours):

1. The fourth phase of therapy, normothermia, begins when the patient reaches a target normothermia temperature of 37 degrees Celsius.
2. This phase will last a minimum of 24-48 hours but can continue for 72+ hours. This will prevent refractory fever.
3. The patient's temperature will be regulated by the Arctic Sun® console which monitors the temperature every second and changes the water temperature every 2 minutes as needed to maintain the patient temperature of 37°C.
4. The Arctic Sun® console will continue in normothermia mode indefinitely until therapy is discontinued.
5. When the patient temperature line is consistently parallel to the water temperature line the patient is maintaining normothermia without assistance from Arctic Sun®.
6. Document the patient and water temperature hourly.
7. Assess the patient's skin every 4 hours. Gently peel back the Artic® Gel pads, assess and document.
8. Monitor hourly intake and output.
9. Document vital signs hourly.

DISCONTINUATION OF THERAPY (End of therapy or for transport):

1. Press the "stop" button. This will terminate water flow through the pads.
2. Press the "empty pads" button. It will take approximately one minute for the water to return from the pads to the Arctic Sun® device.
3. Turn the device off.
4. Disconnect all 4-6 pads from the fluid delivery lines. Pinch and push the connectors to release.
5. If transporting the patient leave the pads on.
6. If therapy is complete (all 4 phases have been completed and normothermia has been maintained for 24-48 hours), slowly and gently peel the pads back from the patient and discard.

CONTINUATION OF THERAPY (Upon return from leaving the unit for testing):

1. Turn the device on.
2. Reconnect the Arctic® Gel pads to the fluid delivery lines of the console.
3. Select "continue patient" from the main screen.
4. Select the "start" button that corresponds to the current phase of therapy the patient is in.
5. Therapy will begin at the point where your therapy was suspended.
6. The Arctic Sun® device has a 6 hour memory as to where the patient was in therapy.

NURSING INTERVENTIONS THROUGHOUT ALL PHASES OF THERAPY:

1. Nursing assessments every 4 hours.
2. Patient is to be NPO and NO tube feedings while hypothermic.
3. Vitals every 30 minutes during the initiation of cooling phase and every 1 hour thereafter.
4. Assess skin and document every 4 hours. (this includes the skin under the Arctic® Gel pads).

5. Monitor and document intake and output hourly.
6. Monitor and document EKG rhythm.
7. Assess TOF every 4 hour if on paralytics. If paralytics are utilized they are to be discontinued once the patient reaches 36°C.
8. Turn patient every 2 hours.
9. Oral care every 4 hours.
10. EPC cuffs bilateral lower extremities continuously unless contraindicated.
11. Blood sugar checks every 4 hours as long as the patient is not on an insulin drip and hourly if the patient is on an insulin drip. Draw from a line if able related to the vasoconstriction from hypothermia.
12. Monitor labs as ordered (BEWARE of electrolyte shifts during the rewarm)
13. Education of the family as needed.
14. Continuous EEG monitoring as indicated.
15. Shivering assessments hourly and prn.
16. Notify physician of significant changes in patient status.
17. **In the event of a patient's death with Gel pads in place...remove pads right away.**

SHIVERING PROTOCOL:

1. Complete the bedside shivering assessment scale every hour and chart whether shivering is present. Shivering increases cerebral metabolism, oxygen consumption, and CO₂ production. Shivering also causes heat production, furthering the difficulty with temperature regulation. Shivering is a common side effect with the use of surface cooling. It is important to monitor for shivering and to begin prophylaxis before it becomes severe.

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2. Shivering interventions are guided by Physician orders and will be based on the patient's shivering score. No interventions are needed for a score of 0. Counterwarming (raise the cutaneous temp) may be utilized for a score of 1. Counter warming is the application of the BAIR® Hugger at maximum temperature of 42 degrees Celsius. This can be applied directly over the Arctic Gel Pads.

URGENT CLINICAL SUPPORT

For urgent clinical support call 1-866-840-9776
Customer Service 1-877-267-2314

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Hypothermia protocol

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