

Checklist (Protocol) for Targeted Temperature Management Post Cardiac Arrest (CCTC)

This checklist aids in achieving the primary goal of rapid cooling. The goal is to reach the target temperature as quickly as possible after ROSC. Unless the patient is GCS 15 immediately following ROSC, start cooling STAT. Continue cooling if investigations are required. Patient should not be allowed to waken or breathe spontaneously; if they do, sedation and analgesia is inadequate. This checklist covers both cooling and rewarming phases.

Central venous and arterial access should be established (for rapid administration of cold fluids, potential vasoactive/pacemaker and monitoring of the anaesthetized patient). Cooling *should not be delayed* for the insertion of a CVC/arterial line. Central line insertion is not contraindicated during hypothermia

Definitions:

T1: time point when the patient's temperature first reaches target (e.g., 34)

T24: time point 24 hours after T1; this is the end of cooling (24 hours after the patient first reached target) and onset of passive rewarming.

T32: time point 32 hours after T1 (this is the end of the passive rewarming period and onset of when active rewarming can begin if necessary).

T96: time point 72 hours after T24; the patient's core temperature should not be > 37.5 during this period.

Active Cooling Period (T1 to T24): Protocol Requirements

- Notify RRT STAT to ensure full controlled ventilation is established and non-heated humidification.
- Non-heated humidification is now part of the hypothermia orders set.
- Order target temperature (unless contraindicated, target temperature in CCTC is 32-34C).
- Quickly perform a BRIEF baseline neurological assessment including GCS, pupils, corneals, gag and cough, then PROMPTLY initiate deep sedation (do not delay cooling).
- Initiate continuous esophageal temperature monitoring via nasally inserted probe ([insertion instructions](#)). A bladder or pulmonary artery catheter can also be used for core temperature monitoring. Rectal temperature monitoring can be used temporarily but can be less accurate (particularly if stool is present). Document temperature hourly.
- Administer a liberal bolus dose of narcotic and initiate sedation. **Start cooling with cold saline immediately after administering narcotic bolus to avoid cooling delay.** Standard analgesia orders should be discontinued and replaced with BOTH analgesic and sedative orders at hypothermia protocol dosing (anaesthetic level dosing).

- **Rapidly** administer saline boluses using 250 - 500 ml bags of cold normal saline (250-500 ml bags are used to ensure solution remains cold to end of infusion).
- Repeat narcotic bolus and initiate infusions (start cooling as soon as first bolus dose is given; don't wait until infusion is started). Titrate narcotic and sedative to ensure the following:
 - No response to a tap on the forehead
 - MAAS 0
 - CPOT 0
 - No respiratory effort

Patients should NOT be allowed to waken or trigger the ventilator during cooling.

- Once above criteria are met with narcotic and sedatives, administer a bolus dose of neuromuscular blocking agent. Rocuronium is preferred (cost) unless severe renal impairment.
- Repeat neuromuscular blocking agent bolus and/or initiate an infusion if MAAS 0 and CPOT 0 *AND* patient is making respiratory effort/triggering, shivering or if target temperature remains above goal. Always treat with narcotic or sedative first to ensure anaesthetic levels of sedation.
- If triggering on the ventilator is noted or patient shows any signs of responsiveness or movement, bolus the patient with additional narcotic and increase the maintenance infusions of sedatives until deep anaesthesia is achieved. Do not allow the patient to lighten during cooling period.
- Place cooling blanket over TOP of patient. Place a light sheet between the patient and blanket (no cooling blanket under patient or directly in contact with skin).
- Wrap arms and legs in a flannelette blanket to prevent shivering and frost-bite.
- Add ice packs around neck, in axilla and groin if temperature if required.
- If temperature remains above target OR there is any other suspicion for sepsis, patient should be pan cultured. Review need for empiric antimicrobials.
- Administer ASA, antiplatelet agents, anticoagulant and/or fibrinolytics as per orders for Acute Coronary Syndrome.
- If patient has an acute STEMI, Code STEMI should be activated. Cooling is not a contraindication to coronary intervention.
- Send TSH for patients who are spontaneously hypothermic at admission.
- Identify the time point when temperature first reaches target (e.g., 34). This will be T1.
- **Maintain target temperature range for 24 hours (T24) after T1 achieved.**

SEIZURE MONITORING

- Initiate CEEG (for all patients on hypothermia protocol). Continue during cooling and early rewarming period (order should be obtained to discontinue).
- Consult Neurocritical care (Monday to Friday) if seizure activity is suspected or myoclonus observed. As of July 2018, Neurocritical care is able to view CEEG information from UH (but not from outside the hospital). If you identify something concerning on the CEEG, identify the exact time of the event to help NCC isolate the CEEG in full disclosure.
- If seizures are suspected in the evening or weekends, consult Neurology on call.
- Although not 100% reliable, an SEF of < 4 may be an indicator that sedation is adequate.
- The preferred treatment for myoclonus is valproate. CCTC physicians may order the first dose but Neurology or Neurocritical care consultation is required for ongoing approval.
- Note that neuromuscular blocking agents are not anticonvulsants but they can mask detection of a seizure.

MONITORING AND NURSING CARE

- Bradycardia is common, especially if 32-34 C target. Bradycardia does not require treatment if the patient's blood pressure is adequate.
- Maintain MAP target (for cerebral perfusion pressure). Research findings have not confirmed the best blood pressure target. BP targets should be determined in consultation with the physician and consider patient's comorbidities and baseline blood pressure.
- Ensure that ECG and any pacemaker cables do not come in contact with wet linen
- Continue with routine turning and skin care during cooling period. Monitor ECG during turning for myocardial irritability. Do not place cooling blanket under patient (increases pressure injury risk).
- For neurological vital signs, monitor pupils and CEEG changes only until cooling period ends (pupils should work when neuromuscular blocking agents are in use).
- Monitor for signs of frostbite/dusky circulation.
- Keep eye lids closed at all times and provide lacrilube **ointment** per order.
- If anti-arrhythmics are required, amiodarone is the usual first line agent.
- Initiate enteral feeding upon admission. Small bowel placement is preferred due to motility effects of hypothermia. If a gastric tube is in place, initiated gastric feeding at 10 ml/hr (elevated HOB).
- Initiate DVT and GI prophylaxis as per standard care.
- If patient is difficult to cool or there are any other signs/risk factors for possible sepsis, culture patient at admission and review need for empiric antimicrobial therapy.

REWARMING

Passive Rewarming Period (T24 until T32): Start 24 hours after target temperature was first achieved)

The current electronic orders recommend stopping analgesics/sedatives at 2 hours post T24. This is based on a therapeutic temperature target of 36C. For patient's cooled below 36C, discontinue the order to stop analgesics at 2 hours and place a new communication order to "Rewarm by Protocol" (below):

- Stop neuromuscular blocking agents
- Continue with narcotic and sedative infusions
- Stop any active cooling and apply dry linen (e.g., ice packs, cooling blanket)
- Monitor and prevent shivering during rewarming; treat with PRN sedatives and neuromuscular blockade if required until temperature returns to normal
- Allow temperature to passively increase during the next 8 hours (passive rewarming phase).
- Continue with narcotics and sedatives until temperature is > 36C.
- Discontinue continuous infusions of sedatives and narcotics and convert to PRN once temperature reaches 36C if there are no signs of shivering, seizure activity or agitation (review sedation plan with physician).

Active Rewarming Period (Initiate at T32): Start 8 hours after onset of passive rewarming if temperature remains < 35.5C.

- Initiate warming blanket if temperature is < 35.5C
- If temperature remains less than 36C at T32, review sedation/analgesia administration goals with physician
- Continue to monitor core temperature and turn warming blanket off once temperature reaches 36C
- Monitor for seizures and treat if indicated
- Administer PRN analgesics and sedatives as required
- Watch for rebound shivering during rewarming and treat with PRN narcotics and sedatives if required
- Keep temperature below 37.5C**
- Obtain order for acetaminophen if required

Fever Prevention Period (T24 to T96): Continue for 72 hours after the end of active cooling period.

- Turn warming blanket off if temperature is > 36
- Keep temperature below 37.5C
- If temperature exceeds 37.5, initiate acetaminophen and notify MD.
- Consider need to culture and/or treat with antimicrobials.
- Initiate cooling blanket if required to keep temperature below 37.5C

Other Orders

- Continue CEEG until order received to discontinue
- Review with team the need for Neuro Critical Care Consult
- If a gastric feeding was initiated via NG, replace with small bore feeding tube per protocol (unless patient is eating).

BM Revised July 11, 2018, July 3, 2019

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