PROTOCOL FOR TARGETED TEMPERATURE MANAGEMENT FOLLOWING CARDIAC ARREST

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Key Amendments

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8th October 2019	Document extended with no changes as part of Disease Management section in critical care	Dr Nick Cowley/ Dr Andy Burtenshaw

INTRODUCTION

Out of hospital cardiac arrest is common and is associated with a high rate of mortality.[1] With early ambulance treatment, about 30% of these patients have a return of spontaneous circulation and are transported to hospital. However, many patients remain comatose owing to hypoxic brain injury, and this is the leading cause of feath after hospital admission.

Over the past decade, there has been considerable interest in the use of therapeutic hypothermia, where patients are cooled to a target temperature of 32-34ºC and this temperature is maintained for 12-24 hours. This approach is based on the results of two clinical trials published in 2002.[2 3]

More recently, a larger trial compared a target temperature of 36ºC with that of 33ºC.[4] The Targeted Temperature Management (TTM) trial randomised 939 patients who remained comatose after resuscitation from out of hospital cardiac arrest at hospitals in Europe and Australia. The primary outcome measure was all cause mortality at the end of the trial. Overall, 50% of the patients in the group allocated to 33ºC for 24 hours died compared with 48% of those allocated to the 36ºC group (hazard ratio 1.06, 95% confidence interval 0.89 to 1.28; P=0.51). This clinical trial was well conducted and the conclusion was clear- patients who are comatose after resuscitation from out of hospital cardiac arrest do not benefit from lowering the body temperature to 33ºC.

Thus, the TTM trial should change practice immediately. The compelling evidence from the TTM trial is that patients who have been resuscitated from an out of hospital cardiac arrest and who remain comatose should not receive therapeutic hypothermia (32-34ºC) after admission to hospital. Instead, a temperature target of 36ºC is appropriate and much more easily achieved. Importantly, prognostication in such patients should be delayed for at least 72 hours after sedation is stopped, except in cases of brain death or early myoclonus with bilaterally absent somatosensory evoked responses.

INDICATIONS

Patients referred to ITU after cardiac arrest who have return of spontaneous cardiac output (ROSC) but remain comatose (GCS <9). This includes out of hospital and in hospital cardiac arrests of all rhythms- asystole, pulseless electrical activity (PEA), ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT) (8).

EXCLUSIONS

- Do not attempt resuscitation (DNAR) order
- Severe systemic infection
- Severe cardiogenic shock (SBP <80mm Hg despite fluid loading/vasopressors and/or inotropes/ intra-aortic balloon pump)
- Established multi-organ failure
- Severe trauma
- Pre-existing medical coagulopathy (patients given thrombolytic therapy or an anticoagulant can be cooled)
- Pregnancy
- Suspected or confirmed intracranial bleed/ stroke

COMPLICATIONS

- Shivering and catecholamine release
- Vasoconstriction
- Infection
- Coagulopathy
- Diuresis and hypovolaemia
- ↓K+, ↓Ca2+, ↓Mg2+
- ↓ Insulin sensitivity and secretion
- Pancreatitis

BACKGROUND

Current practice at Worcestershire Acute Hospitals NHS Trust (WAHT) is to follow NICE guideline IPG386 and cool patients to 32-34ºC following cardiac arrest.[5 6] The recently published TTM trial concludes that patients who have been resuscitated from an out of hospital cardiac arrest and who remain comatose should not receive therapeutic hypothermia (32-34ºC) after admission to hospital. Instead, a temperature target of 36ºC is appropriate and much more easily achieved.[3]

METHOD

Aim to reach a temperature of 36ºC within 2 hours of the return of spontaneous cardiac output (ROSC). This is achieved by using the Blanketrol III device unless the patient already has a temperature of 36°C and maintains their temperature at 36°C. Two devices have been purchased for use in the Accident and Emergency (A+E) departments and Intensive Care Units (ICUs) of the Alexandra Hospital, Redditch and the Worcestershire Royal Hospital. The Blanketrol III uses a water therapy system in cooling blankets to induce hypothermia. The Blanketrol devices and associated consumables, the '*Kool Kits'*, are stored on the ICUs but can be wheeled into the A+E departments to initiated the cooling process. It should no longer be necessary to use the complete '*Kool* Kit', a temperature of 36ºC within 2 hours of admission should be achieved by using the blanket alone and not the associated jackets and head gear.The process of cooling should be initiated as soon as ROSC occurs and the time noted. The patient's temperature should be recorded hourly during the cooling and rewarming phases and two hourly during the maintenance phases using a naso-pharyngeal temperature probe.

Sedate the patient with propofol and alfentanil and if shivering is a problem use a bolus or infusion of a neuromuscular blocking agent. Tight glycaemic control should be achieved by

following the insulin protocol. Consider giving phenytoin if evidence of seizure activity or if the patient is paralysed.

After 24 hours of cooling use the Blanketrol III device to rewarm the patient to 37ºC. Keep the Blanketrol III device on the patient for a further 48 hours to prevent hyperthermia. If hyperthermia occurs use the Blanketrol III device to maintain the patient at 37ºC.

The patient should be checked regularly for pressure sores that potentially could develop from the incorrect fitting of the *Kool Kit* garments.

The Blanketrol device can also be used to rewarm hypothermic patients.

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