Mild Therapeutic Hypothermia (MTH) Post Cardiac Arrest: Guidelines and Audit Sheet

St George's Healthcare NHS Trust

Patient details

Name		Date of Birth		Hospital No.	
Name of most senior doctor managing patient (please print and include bleep / contact no.)					
Medical (or other) consultant under whose care patient is admitted					

Details of cardiac arrest and screening criteria for initiation of MTH

(A) Time of cardiac arrest: *known* ☐ ***OR*** *estimated* ☐ *witnessed event* ☐ ***OR*** *time found* ☐			
(B) Time cardiac compressions started: *known* ☐ ***OR*** *estimated* ☐			
(C) First cardiac rhythm recorded	VF / VT ☐	PEA ☐	Asystole ☐
(D) Time of return of spontaneous circulation (RoSC)			
Estimated downtime (D) – (A) **[Note: Prognosis v. poor if > 15minutes]**			
Cause of cardiac arrest (including explanation / rationale)			
Has treatment been initiated for the underlying cause, if so what?			
List any other information available that would influence the patient's prognosis **[If they have a terminal disease DO NOT institute MTH]**			

Exclusion criteria (seek specialist advice for pregnant and paediatric patients)

AVPU score (Alert / responds to Voice / responds to Pain / Unresponsive) **[If the AVPU is A or V DO NOT institute MTH]**	A ☐ V ☐ P ☐ U ☐
Have other causes of coma been excluded **[If NO, consider starting MTH until Dx confirmed]**	Yes ☐ No ☐
If yes, how? E.g. CT head, urine toxicology etc etc	
Are there any injuries? **[Complete a full 1º and 2º survey and document in medical notes]**	Yes ☐ No ☐
Is there any evidence, OR RISK, of internal or external haemorrhage? **[If YES, DO NOT institute MTH]**	Yes ☐ No ☐
Is the patient requiring high dose inotropes / vasopressors*? **[If YES, DO NOT institute MTH]**	Yes ☐ No ☐
What is the cause of the shock? How was this determined?	

* defined as - >0.1 mcg/kg/min epinephrine / norepinephrine to maintain a mean arterial pressure of >60mmHg, despite fluid resuscitation

Simultaneous goals of MTH

1) To minimise secondary brain injury following global ischaemia reperfusion injury
2) To provide optimal management for the cause of the cardiac arrest including (where indicated) thrombolysis +/- emergency percutaneous coronary intervention (PCI) and intra-aortic balloon counterpulsation (IABP)

Neither of these goals should be pursued at the expense of the other. It is perfectly possible to achieve both simultaneously. Both goals are time critical, that is, the maximal benefit is gained from the earliest possible achievement of the physiological targets outlined below.

Physiological targets

System	***Target***	***Notes***
Airway	Intubate	Don't forget nasogastric tube
Breathing	Mechanical ventilation PaO_2 8.0-13.0kPa (SpO_2 92-97%) $PaCO_2$ 4.5-5.5kPa	Maintain spontaneous breathing efforts if possible Avoid both hypoxia & hyperoxia [↓temp ⇒ ↓VO_2] Avoid both hypo and hyper-capnia [↓temp ↓$PaCO_2$]
Circulation	Heart rate 60-90bpm (sinus rhythm) CVP 8-12mmHg MAP 65-75mmHg $ScvO_2$ ≥75% or SvO_2 ≥70% **Expect cold diuresis and replace loses, especially electrolytes**	**Optimal treatment for cause of cardiac arrest** Initially avoid beta-blockade as hypothermia may induce problematic bradycardia. Use flow monitoring to assess fluid responsiveness, adequacy of cardiac output & oxygen delivery by trending indices of global oxygen balance (i.e. central or mixed venous oxygen saturations). **DO NOT target DO_2I >600**
Disability (& dextrose)	Minimal sedation Neuromuscular blockade Maintain blood sugar 6.0-8.0mmol/l	With propofol and alfentanil. Treat shivering with opiates first, then atracurium 50mg boluses. Run 20% dextrose @ 30ml/hr + insulin infusion as required [↓temp ⇒ ↓insulin sensitivity]. Commence NG Peptamen @ 30ml/hr.
Environment / cooling protocol	**As soon as practical insert oesophageal temperature probe for continuous monitoring.** **Target core temperature 33°C within 2 hours of admission maintained until 24 hours post cardiac arrest.** **Passively re-warm @ maximum 0.25-0.5°C/hour. Commence diclofenac infusion @ 0.04mg/kg/hr if temperature >36.5°C**	Start cooling by: - For rapid 1-2°C ↓ in temp - 10ml/kg bolus of cold (4°C) Hartmann's. Max x3. **NOT IF ≤34°C.** - Apply cooling cap, thoraco-abdominal pad, axillae and groin pads. Swap and re-freeze packs every 2 hours. If inadequate cooling achieved consider: - Neuromuscular blockade with atracurium 50mg If temp <32°C *& / OR* excessive bradycardia *OR* haemodynamic instability **THEN** re-warm to 33°C: - Remove axillae and groin pads - Reduce area covered by thoraco-abdominal pad in stages until off. Then remove cap.
Electrolytes **[Measure 6hrly]**	Na^+ 135-145mmol/l K^+ 4.0-5.0mmol/l - - - - - - - - - - - - - - Mg^{2+} > 0.8mmol/l - - - - - - -- - - - - - - Ca^{2+} 1.0-1.3mmol/l - - - - - - - - - - - - PO_4^{3-} > 0.8mmol/l pH / lactate - - - - - - - - - - - - - - - - - Cl^- -	Watch for ↓↓ on cooling & ↑↑ on re-warming **Load with 16mmols over 15mins then 4mmol/hr** *Ionised* from blood gas machine NOT *total* from lab **Expect metabolic / lactic acidosis DON'T treat.** **Minimise Cl^- loading**

Audit

Time cooling commenced		Time temperature <34°C	
% of 24 hours post arrest temperature <34°C		Time from cessation of cooling to temp. >36.5°C	

Timing and nature of definitive treatment of underlying cause of cardiac arrest	
Complications of cooling (if any)	
Neurological outcome @ 7 days post arrest	Normal ☐ Minor deficit ☐ Major deficit ☐ Dead ☐
Detail of deficit	