

Use of Therapeutic Hypothermia in ICU

Reference No:

Introduction

Therapeutic hypothermia is the process of altering a patient's core temperature to achieve a beneficial goal.

The evidence base for the indicated use of therapeutic hypothermia spans many conditions and continually changes. It should not be used in those patients where no supportive evidence is available. At present, the consensus is that Royal Derby Hospital does not routinely use therapeutic hypothermia in the care of post cardiac arrest patients.

This document remains as a practical guide for the management of a patient where a Consultant Intensivist's decision has been taken to utilise

Decision to induce hypothermia

This must be taken only after consultation with the admitting Intensive Care Consultant, if necessary in consultation with the admitting medical team.

Practical methods for inducing hypothermia

Whilst in list order, many of the instructions below should be carried out simultaneously.

- Keep defibrillator pads on patient as induction of hypothermia may induce further arrhythmias
- Thrombolysed if indicated. Give Aspirin. If in doubt, for cause of collapse (e.g. SAH causing ECG changes) go for CT head with 'hot' report on the way to ICU.

Cool rapidly and maintain using:

Bolus of 2 litres (or 30ml/kg LBM) of cold Hartmann's solution (4 degrees from fridge), through largest IV access available under pressure. This is the fastest way to achieve cerebral cooling and needs to be achieved before the fluid warms up.

The ICYcath central venous system gives the most predictable and controllable mechanism of heat removal. It is also very effective in avoiding rebound hyperthermia.

Where supplementary mechanisms are required e.g. during insertion or initial phase consider:

Ice packs to neck, axillae and groin.

Cooling water blanket system.

Cover with wet iced pillow case and towels, changing every 5-10minutes.

Recent experience has suggested that supplementary bladder irrigation, via urological catheter, initially with cooled irrigation saline from fridge (5 litre containers), but if unavailable or overcooling, with room temperature saline, is very effective at both cooling and maintaining hypothermia.

Infusions

Sedate propofol / fentanyl infusions. This is mainly to facilitate IPPV and prevent shivering. If persistent shivering, despite reasonable doses of sedation, use bolus Atracurium to paralyse with sedation running. Avoid continuous infusion of neuromuscular blockers, they are rarely necessary unless otherwise indicated.

Magnesium Sulphate infusion (5g over 5 hours in 50mls Normal Saline). This will help with shivering, improve rate of cooling and may have some cerebral protective function. Insulin infusion to keep blood glucose <7mmol/l

Vasoactive infusions to maintain a target MAP of about 70mmHg (arbitrary)

Thrombolysis, heparin for NSTEMI or other primary infusion therapies are not contra-indicated, but altered dose kinetics may need to be considered.

Observations/targets

Usual standards of ICU care apply, but specifically:

Continuous Core temperature: Bladder, Nasopharyngeal, oesophageal, rectal, avoid other methods.. Avoid bladder and rectal if cooling using urological irrigation!

6 hourly K (keep approx 4 to 5.5 mmol/l) and Mg (keep 1 to 1.5mmol/l)

Blood glucose 4 to 7 mmol/l

2 hourly ABG, keep pCO₂ 4 to 5.5kPa, keep pO₂ around 13kPa

Troubleshooting

Shivering

Increase sedation opiate first.
Cool and maintain at 32 degrees.
Check Mg in range 1 to 1.5mmol/l
Paralyse.

Arrhythmias

Particularly bradycardia, SVT or multiple extrasystoles
Supplement K and Mg to higher end of range.
Increase core temp within range by 0.5 degrees
Consider Amiodarone bolus and infusion
Consider Lignocaine infusion

Re-warming

However, cooling measures should remain available, with the patient, as hyperthermia is common and damaging in the 48 hours post arrest.

The rate of re-warming should be maintained at 0.25 to 0.5 degrees per hour. If this rate is exceeded all of the active cooling methods should be considered and employed to maintain this rate.

Do not stop sedation to assess until core temperature of 36 degrees achieved.

Post re-warm

Hold temperature below 37.5 degrees for next 24 hours.

Cold fluids and active cooling may again be needed.

Paracetamol (or NSAIDS) are not helpful unless there is clear sepsis with credible source.

Caution

Clinical assessment, particularly neurological disability may be altered by a period of cooling. This can be for multiple reasons including due to delayed drug metabolism. Please bear this in mind when gathering information for management and prognostication.

Audit

Please ensure that an audit record is started for all patients entered into the cooling regimen and completed when the information is available. This will allow the use prevalence and efficacy of the current equipment and guidance to be measured.

Documentation Control

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