NICE National Institute for Health and Care Excellence

NICE guidance

Therapeutic hypothermia with intracorporeal temperature monitoring for hypoxic perinatal brain injury

HealthTech guidance
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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account, and specifically any special arrangements relating to the introduction of new interventional procedures. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Contents

This guidance replaces IPG347.

1 Recommendations

1.1 Current evidence on the safety and efficacy of therapeutic hypothermia with intracorporeal temperature monitoring for hypoxic perinatal brain injury is adequate to support the use of this procedure in carefully selected neonates provided that normal arrangements are in place for clinical governance, consent and audit (see section 2.5.1 for comments on selection).

1.2 This procedure should only be carried out in units experienced in the care of severely ill neonates, by staff who have been specifically trained in the use of therapeutic hypothermia.

1.3 NICE encouraged clinicians to enter details about all neonates undergoing this procedure into the UK TOBY cooling register.

2 The procedure

2.1 Indications and current treatments

2.1.1 Hypoxic perinatal brain injury is caused by a decrease in the amount of oxygen supplied to an infant's brain close to the time of birth. Surviving infants may develop hypoxic-ischaemic encephalopathy and other organ damage, which can lead to severe, lifelong disability or death.

2.1.2 Hypoxic perinatal brain injury is characterised by fetal distress and is associated with acidosis. Diagnosis includes clinical examination, paired umbilical arterial and venous blood gas analysis and amplitude-integrated electroencephalography.

2.1.3 Hypoxic perinatal brain injury is traditionally treated with supportive care only, since no specific pharmacological agents or interventions have been shown to prevent the neuronal damage that perinatal hypoxia causes.

2.1.4 This procedure is usually carried out on infants with a gestational age of 36 weeks or more and this is reflected in the published literature.

2.2 Outline of the procedure

2.2.1 In therapeutic hypothermia the infant is cooled to between 33°C and 35°C, with the aim of preventing further neuronal loss in the days following the hypoxic injury.

2.2.2 Hypothermia is usually induced by cooling the whole body with a blanket or mattress (or sometimes by cooling the head only with a purpose-made cap). Intracorporeal temperature is continuously monitored, using a rectal or nasopharyngeal thermometer, as a proxy for brain temperature.

2.2.3 Treatment is started as soon as possible after diagnosis, usually within 6 hours of birth, and continued for approximately 72 hours. The infant is then slowly warmed

to normal body temperature.

2.3 Efficacy

Sections 2.3 and 2.4 describe efficacy and safety outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the overview.

2.3.1 A systematic review of 10 randomised controlled trials (RCTs) that included 1,320 infants in total reported a lower risk of death in cooled infants (whole body or head) in the first 18 months of life than in infants treated by standard care (relative risk [RR] 0.78; 95% confidence interval [CI] 0.66 to 0.93; follow-up not stated). In 3 of these RCTs with 18-month follow-up (767 infants in total) the combined risk of death and severe disability was significantly lower in cooled infants compared with infants treated by standard care (RR 0.81; 95% CI 0.71 to 0.93) and cooling increased survival with normal neurological function compared with standard care (RR 1.53; 95% CI 1.22 to 1.93) at 18-month follow-up.

2.3.2 An RCT of 325 infants treated by whole body cooling or standard care reported survival without neurological abnormality in 44% (71 out of 163) and 28% (45 out of 162) of infants respectively at 18-month follow-up (RR 1.57; 95% CI 1.16 to 2.12). Among the surviving infants, there was a lower rate of cerebral palsy in those treated by cooling (28% [33 out of 120] versus 41% [48 out of 117]; RR 0.67; 95% CI 0.47 to 0.96).

2.3.3 An RCT of 234 infants treated by head cooling or standard care reported death or severe neurodevelopmental disability at 18-month follow-up in 55% (59 out of 108) and 66% (73 out of 110) of infants respectively (odds ratio 0.61; 95% CI 0.34 to 1.09). In the systematic review, the 3 RCTs with a total of 767 infants reported that the rates of severe disability and cerebral palsy in surviving infants were significantly lower in the cooled infants than infants treated by standard care at 18-month follow-up (RR 0.71; 95% CI 0.56 to 0.91 and RR 0.69; 95% CI 0.54 to 0.89, respectively).

2.3.4 The Specialist Advisers listed key efficacy outcomes as improvement in survival without neurological impairment, reduction in severe disability, improvement in

Motor and Psychomotor Development Index scores and reduction in cerebral palsy.

2.4 Safety

2.4.1 An RCT of 208 infants reported a higher incidence of hypocalcaemia in cooled infants than in those treated by standard care (27% [28 out of 102] and 19% [20 out of 106] respectively; p values not reported).

2.4.2 In the RCT of 234 infants, 1 cooled infant (who died of other causes) had skin breakdown and local haemorrhage under the cooling cap. A case report described fat necrosis in an infant treated by whole body cooling using ice packs applied to the skin. At 9 months the infant had asymptomatic firm nodules with no calcification present. In another case report, an infant treated by whole body cooling using a water-filled mattress developed sclerema on the area of the back that was in contact with the cooling mattress at 3-week follow-up; this resolved without scarring after 3 months.

2.4.3 The Specialist Advisers considered theoretical or anecdotal adverse events to include metabolic disturbances, blood hyperviscosity syndrome, increased infections, and seizures during rewarming if it is carried out too quickly.

2.5 Other comments

2.5.1 The Committee noted the uncertainties and difficulties in selecting neonates for this procedure. Specifically, they noted the lack of evidence for using the procedure in neonates with less severe hypoxic brain injury, and the difficulties in deciding not to use the procedure for neonates whose degree of brain injury or comorbidities are too severe to expect survival without severe neurological deficit.

Update information

Minor changes since publication

January 2026: Interventional procedures guidance 347 has been migrated to HealthTech guidance 221. The recommendations and accompanying content remain unchanged.

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Endorsing organisation

This guidance has been endorsed by Healthcare Improvement Scotland.