



GUIDELINE 13.9

AFTER THE RESUSCITATION OF A NEWBORN INFANT

DOCUMENTATION OF RESUSCITATION

For clinical and medicolegal reasons the observations, interventions and times during neonatal resuscitation must be fully documented.

The Apgar scores quantify and summarise the response of the newborn infant over the first few minutes of life.^{1,2} The Apgar score is assessed and recorded at exactly 1 and 5 minutes after birth and then sequentially every 5 minutes until the heart rate and breathing are normal. Interventions for depressed infants should not await Apgar scoring [Class A, expert consensus opinion].

CONTINUING CARE OF THE NEWBORN INFANT AFTER RESUSCITATION

Once adequate ventilation and circulation have been established, the infant who has required resuscitation remains at risk and should be assessed in an intensive or special care nursery where monitoring, appropriate evaluation and care can be provided.^{3,4} An infant who has experienced perinatal compromise or has ongoing respiratory distress may have dysfunction or delayed perinatal adaptation of brain, heart, gastrointestinal tract, kidneys or other organs. Fluid balance and nutrition should be monitored carefully for the first few days.

Cardiorespiratory management

Usually, any infant who has been intubated and ventilated for resuscitation should not be extubated until the infant is in a neonatal unit and has been carefully assessed. This assessment should include oxygen saturation, heart rate, respiratory rate and pattern monitoring, blood glucose measurement and blood gas analysis as indicated. Blood pressure should be documented.

Blood glucose management

Blood glucose level should be checked soon after resuscitation.^{3,4} Infants who require resuscitation are more likely to develop hypoglycaemia. Although no exact threshold level at which outcomes worsen has been identified, maintaining a blood glucose level above 2.5 mmol/L for infants who have required resuscitation is unlikely to cause harm [Class B, expert consensus opinion]. A glucose infusion of 4-6 mg/kg/min will usually be sufficient.

Large bolus doses of glucose (>100-200 mg/kg) should be avoided (1 ml of 10% glucose contains 100 mg) [Class B, expert consensus opinion].

Antibiotics

The need for resuscitation can be a consequence of the onset of sepsis. Very soon after resuscitation, consideration should be given to the need for relevant investigations and antibiotic treatment.

Induced Hypothermia for Hypoxic Ischaemic Encephalopathy (HIE)

There is increasing evidence that inducing hypothermia in infants with evolving moderate to severe hypoxic ischaemic encephalopathy may reduce the degree of brain injury in some [LOE I⁵⁻⁹]. Any infant who is considered a candidate for therapeutic hypothermia should be discussed promptly with a neonatologist, and plans should be made for admission to a neonatal intensive care unit [Class A, expert consensus opinion]. Cooling should be conducted under carefully defined protocols, consistent with those used in the randomized, controlled trials, i.e. commence within 6 hours after birth, cool to 33-34°C, continue for 72 hours and re-warm gradually, monitor for known adverse effects of cooling, and plan long term follow-up for all treated infants [Class A, expert consensus opinion]. Whole body and selective head cooling are both effective. Although there are insufficient data to recommend a preferred method, whole body cooling can be initiated without specialized equipment.¹⁰

Stabilisation and Transfer

It is well established that wherever possible, babies who are likely to require neonatal special or intensive care should be born at a centre that can provide an appropriate level of care [Class A, expert consensus opinion]. Babies born elsewhere who require intensive or special care should be transferred [Class A, expert consensus opinion]. Early consultation should be undertaken to discuss management and arrange transport or retrieval [Class A, expert consensus opinion].

CONTINUING CARE OF THE FAMILY

Regardless of the outcome, witnessing the resuscitation of their baby is distressing for parents. Every opportunity should be taken to prepare parents for the possibility of a resuscitative effort when it is anticipated and to keep them informed as much as possible during and certainly after the resuscitation. Whenever possible, information should be given by a senior clinician. Early contact between parents and their baby is important.

Difficult resuscitations are also stressful for the staff involved, regardless of seniority, and efforts should be made to debrief after such events.

REFERENCES

1. Apgar V, James LS. Further observations on the newborn scoring system. *Amer J Dis Child* 1962;104:419-28.
2. Casalaz DM, Marlow N, Speidel BD. Outcome of resuscitation following unexpected apparent stillbirth. *Arch Dis Child Fetal Neonatal Ed* 1998;78:F112-F5.
3. Kattwinkel J, Perlman JM, Aziz K, et al. Special Report--Neonatal Resuscitation: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Pediatrics* 2010.
4. Richmond S, Wyllie J. European Resuscitation Council Guidelines for Resuscitation 2010 Section 7. Resuscitation of babies at birth. *Resuscitation* 2010.
5. Gluckman PD, Wyatt JS, Azzopardi D, et al. Selective head cooling with mild systemic hypothermia after neonatal encephalopathy: multicentre randomised trial. *Lancet* 2005;365:663-70.
6. Shankaran S, Laptook AR, Ehrenkranz RA, et al. Whole-body hypothermia for neonates with hypoxic-ischemic encephalopathy. *N Engl J Med* 2005;353:1574-84.
7. Eicher DJ, Wagner CL, Katikaneni LP, et al. Moderate hypothermia in neonatal encephalopathy: efficacy outcomes. *Pediatr Neurol* 2005;32:11-7.
8. Azzopardi DV, Strohm B, Edwards AD, et al. Moderate hypothermia to treat perinatal asphyxial encephalopathy. *N Engl J Med* 2009;361:1349-58.
9. Jacobs S, Hunt R, Tarnow-Mordi W, Inder T, Davis P. Cooling for newborns with hypoxic ischaemic encephalopathy. *Cochrane Database Syst Rev* 2007:CD003311.
10. Inder TE, Hunt RW, Morley CJ, et al. Randomized trial of systemic hypothermia selectively protects the cortex on MRI in term hypoxic-ischemic encephalopathy. *J Pediatr* 2004;145:835-7.