

Early care of the preterm infant – current evidence

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Abstract

The quality of care delivered in the immediate aftermath of delivery is crucial in determining short and long term outcomes for babies, especially in those born at less than 28 weeks gestation. From parental counselling and team preparation prior to delivery, to delivery suite management and early care on the neonatal unit, each element plays an important role. Good team working, excellent communication, and a focussed and logical approach are essential. This article gives an overview of the key considerations to be incorporated in to this period, and reviews the latest evidence base behind recommendations including thermoregulatory support, delayed cord clamping, oxygen supplementation, PEEP versus intubation, and the role of surfactant.

Keywords counselling; delivery rooms; golden hour; premature birth; resuscitation; surfactant; thermoregulation

Introduction

An impending extreme preterm delivery presents significant challenges to obstetric and neonatal teams. There is increasing evidence that the quality of care delivered in the immediate aftermath of extreme preterm delivery directly impacts on both mortality and short and long-term outcomes such as intraventricular haemorrhage (IVH), retinopathy of prematurity (ROP) and bronchopulmonary dysplasia (BPD). This article reviews the evidence behind these strategies that constitute “early care” or ‘the Golden Hour’ of neonatal medicine in those born at less than 28 weeks.

Before birth

The focus of this article is the approach to care of babies immediately *after* birth, however there are several important considerations to be made in those instances of threatened preterm delivery where there is time to prepare. This includes counselling for parents and families of what may happen in the event of preterm delivery, including a discussion of the risks and benefits of a trial of intensive care. Clinicians in the UK draw on guidance from the British Association of Perinatal Medicine and the Nuffield Council for Bioethics regarding resuscitation

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decisions for those born around the limit of viability of life, and whilst recognising the individuality of each case, should have local, regional and national outcome data available for reference.

Place of delivery

Extreme preterm deliveries are relatively uncommon. As such, National guidance in the UK is that delivery should take place in a tertiary centre with an appropriate level of skill and experience amongst midwifery, obstetric and neonatal teams. There are a some studies that have shown that survival of extreme preterm infants is higher in those delivered in tertiary or neonatal intensive care units rather than district general or local neonatal units. Improvement is seen in terms of fetal, delivery room and early neonatal outcomes, and survival is greatest in those tertiary centres with highest activity levels. However, in utero transfer will not always be possible, and each maternity unit should have a policy in place to allow provision of effective neonatal resuscitation and stabilisation, and coordination of early neonatal transfer where appropriate.

Antenatal corticosteroids

Administering corticosteroids to mothers prior to premature delivery has had a substantial impact upon neonatal morbidity and mortality. The most recent reviews show an overall reduction in neonatal death, as well as IVH, Necrotising enterocolitis (NEC), and respiratory distress syndrome (RDS). The greatest benefit is observed in infants born between 1 and 7 days after receiving corticosteroids. No adverse effects to either mother or baby have been identified, and current Royal College of Obstetricians and Gynaecologists guidance recommends either betamethasone 12 mg given intramuscularly in two doses, or dexamethasone 6 mg given intramuscularly in four doses. Whilst the evidence for any benefit is less clear for those born before 26 weeks, routine administration of corticosteroids for threatened preterm delivery should be routine down to 24 weeks, with the decision to offer steroids below this taken at a senior level, on a case-by-case basis. There is a paucity of evidence to inform us on the risk/benefit of repeat courses of antenatal steroids, but RCOG guidance does advocate consideration of a single rescue course in pregnancies where the initial course was given before 26 weeks.

Preparation

A checklist of pre-delivery procedures should be available locally to guide the team and promote more efficient early newborn care, an example is shown in [Table 1](#).

Delivery suite management

If the provision of resuscitation and intensive care for an extremely preterm infant has been deemed appropriate, all equipment that could potentially be needed for resuscitation and stabilisation should be available and checked to ensure good working order. Consideration should be given to cord clamping, thermoregulation, and early respiratory management.

Delayed cord clamping

Traditionally, clamping and cutting of the umbilical cord within a few seconds of delivery was felt to be advantageous to the newborn, partly due to the misconstrued assumption that prompt

Example Nursing and medical checklist for expected extreme preterm delivery

Nursing preparation prior to delivery

Liaise with colleagues and define roles including identifying nurse who will care for admission
 Prepare Intensive care space, including ventilator, suction and catheters, and monitors with attachments all ready and working
 ITU Incubator set up and pre-warmed to 37 °C and set humidity to 90%
 Transport incubator pre-warmed

 Emergency trolley checked and available
 Anticipated infusion fluids and drugs available ready to run through aseptically

Medical preparation prior to delivery

Notify Consultant Neonatologist/Paediatrician and delegate roles for delivery and admission

 Review maternal notes and ensure antenatal steroids have been administered

 Discuss management plan for birth and outcome with parents where time allows
 Prepare trolleys for IV access including umbilical lines
 Check ventilator settings
 Check resuscitaire (including pressure and oxygen settings, suction, pulse oximeter, hat and plastic bag) and emergency equipment on delivery suite

Table 1

resuscitation was often required. Evidence now suggests that early cord clamping can be detrimental, impairing physiological transition and increasing the risk of haemodynamic compromise and poor clinical outcomes. Studies in newborn lambs have shown that delaying cord clamping until after ventilation is established improves cardiovascular function by increasing pulmonary blood flow before the cord is clamped. This stabilises cardiac output, and leads to a smoother cardiovascular transition. Consequently, human trials have considered the effect of promoting placental transfusion strategies, namely; delayed umbilical cord clamping (DCC), where clamping usually take place around 60–180 seconds after delivery, or umbilical cord milking (UCM), whereby the infant is held below the level of the mother and a section of the cord is ‘milked’ toward the infant for a few seconds prior to clamping. Evidence suggests higher haematocrits, lower need for blood transfusions, and reduced incidence of NEC and IVH in those in whom placental transfusion is promoted. However, almost all of these studies look at term or moderately preterm infants, with little evidence for the most extreme preterm deliveries (where up to 2/3 of the fetoplacental circulation may be in the placenta at the time of delivery), where concerns over hypothermia, delayed respiratory assistance, polycythaemia and hyperbilirubinaemia have led to a more cautious approach. Currently, trials are assessing the feasibility of DCC/UCM and administering PEEP whilst the extremely preterm infant is still attached to the placenta. At the moment however, a pragmatic approach would be to aim to delay clamping by at least 45–60 seconds, providing the infant can be kept warm and no immediate resuscitation is required.

Thermoregulation

Preterm infants have a high surface area, lack brown adipose tissue, and at 26 weeks have transepidermal losses around six times higher than those born at term due to a poorly keratinised stratum corneum. Not surprisingly therefore, heat is quickly lost

by evaporation of amniotic fluid, conduction (body touching cooler surfaces), convection (cool surrounding air), and radiation. The dangers of this have been known for 50 years, but thermoregulation is still often given low priority. The Epicure study found that 40% of infants at 21–25 weeks gestation had an admission temperature less than 35 °C, which was independently associated with increased mortality, and in 2003 the Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) observed that mortality was higher in those with an admission temperature less than 36 °C. Other studies have shown that for every 1 °C below 36 °C on admission, mortality increases by 28%. Several strategies to reduce heat loss are routinely employed:

- Delivery room temperature – the WHO recommends that delivery room temperatures be at least 25 °C, and they should be free from draughts from open doors and windows and fans. Studies have shown that by maintaining these targets, admission temperatures are improved.
- Plastic wraps or bags – extreme preterm infants should be placed straight in to a polythene bag or wrap, without drying, up to the level of the shoulders, and placed on top of warmed towels and under a radiant heat source. This strategy should significantly reduce evaporative, radiant and conductive losses. Vohra showed a median temperature increase of 1.9 °C when infants less than 28 weeks were placed in a plastic bag without drying, and a Cochrane meta-analysis has also shown that heat loss is prevented in this group. Presently, no studies have been powered sufficiently to demonstrate an effect of this approach on mortality or other clinical outcomes, but routine employment of this approach is recommended.
- Hats and transwarmers – there is evidence supporting the use of polyethylene or woollen, but not stockinette caps, in preventing heat loss, and these should be placed on to the newborn head as quickly as possible after delivery.

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