It is recognised that the number of new cases (incidence) of retinopathy of prematurity (ROP) varies considerably between different intensive care neonatal units, even those with similar characteristics in terms of the equipment and clinical staff available. Whilst there may be several other reasons for this, one reason we can be certain about is that there are differences in newborn care practices between units. Routinely implementing standard interventions that are known to prevent ROP will improve outcomes.

Preventing ROP before delivery
A course of steroids, given to mothers likely to give birth prematurely, improves survival and reduces the complications of prematurity, including ROP. Antenatal steroids should be routine for mothers likely to give birth to a baby of less than 35 weeks’ gestation.

Risk factors for ROP
In addition to ROP, preterm babies can have other serious complications, including changes in the brain, chronic lung disease, and severe infection of the gut. Interventions and better care practices which aim to prevent one problem, for example infection, frequently also reduce the incidence of another, such as ROP.

The main risk factor for ROP is prematurity, but this is difficult to prevent. However, other factors such as exposure to too much oxygen, infection, and poor weight gain after birth also increase the risk. Controlling these factors requires high quality neonatal care, which can be summarised as POINTS of Care:

• Pain control
• Oxygen management
• Infection control
• Nutrition
• Temperature control
• Supportive care

Before describing how these risk factors can be controlled during a baby’s stay in the neonatal unit, it is important to understand the following:

• How to deliver and monitor oxygen levels in the blood
• How to prevent ROP immediately after preterm birth

Delivering and monitoring oxygen levels
Oxygen saturation (SpO₂) is a measurement of the proportion of haemoglobin in arterial blood that is carrying oxygen. The air we breathe is 21% oxygen and – in healthy adults – this is enough to ensure that all the haemoglobin in the arterial blood is carrying oxygen (i.e., an SpO₂ of 100%). SpO₂ can be measured at any age using a pulse oximeter. For preterm babies,
Intervention Explanation

**Antenatal corticosteroids** for preterm births (< 35 weeks’ gestation) 
Reduces mortality, the severity of respiratory distress and other complications

**Delay clamping the umbilical cord** by 30–60 seconds in vigorous preterm infants 
Decreases some complications (IVH, NEC) and reduces the need for blood transfusion

**Keep preterm babies warm.** Use a plastic bag or occlusive wrapping (Figure 2, p. 54) 
Maintaining normal temperature (36.5–37.2 °C) reduces the risk of severe ROP and other complications

**Gentle respiratory management** 
This avoids injury to the lungs. Most newborns are not pink at birth. If they are breathing well, the colour will improve in 5–10 minutes

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**Preventing ROP in the neonatal unit:**

**POINTS of Care**

There are a number of low-cost, effective practices that can reduce the risk of ROP. Many of these ‘POINTS of Care’ (see below and in Table 3, overleaf) help to keep babies stable and reduce wide fluctuations in blood oxygen levels so that extra oxygen is not needed.

**Pain** makes babies unstable. It can increase the need for oxygen and worsen respiratory distress. See Table 3.

**Oxygen.** The World Health Organization recommends that for preterm babies with a gestational age of less than 32 weeks, the SpO₂ should be not be lower

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**Table 1 Labour ward and delivery room interventions**

| Intervention                                      | Explanation                                      |
|--------------------------------------------------|--------------------------------------------------|
| **Antenatal corticosteroids** for preterm births (< 35 weeks’ gestation) | Reduces mortality, the severity of respiratory distress and other complications |
| **Delay clamping the umbilical cord** by 30–60 seconds in vigorous preterm infants | Decreases some complications (IVH, NEC) and reduces the need for blood transfusion |
| **Keep preterm babies warm.** Use a plastic bag or occlusive wrapping (Figure 2, p. 54) | Maintaining normal temperature (36.5–37.2 °C) reduces the risk of severe ROP and other complications |
| **Gentle respiratory management** | This avoids injury to the lungs. Most newborns are not pink at birth. If they are breathing well, the colour will improve in 5–10 minutes |

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**Table 2 Target oxygen saturation levels (SpO₂) in preterm infants during the first 10 minutes after birth**

| Time after birth | Oxygen saturation* (range) |
|------------------|----------------------------|
| 2 min            | 55–75%                     |
| 3 min            | 65–80%                     |
| 4 min            | 70–85%                     |
| 5 min            | 80–90%                     |
| 10 min           | 85–95%                     |

*The proportion of haemoglobin in arterial blood that is carrying oxygen
“Making sure preterm babies receive high quality care requires experienced nurses who do not have to look after too many babies.”

Table 3 Neonatal care best practices

| Intervention                                      | Explanation                                                                 |
|--------------------------------------------------|-----------------------------------------------------------------------------|
| Pain: Avoid and prevent painful episodes          | Reduce unnecessary painful procedures. Anticipate pain and prevent it by swaddling and use of oral sucrose or glucose |
| Oxygen management                                 | Ensure that the oxygen saturation is between 89% and 94%                     |
| Infection control                                 | Apply infection control procedures, including hand washing by all             |
| Nutrition: Improved nutrition with breast milk    | Use mothers’ own breast milk but provide extra protein and calories          |
| Temperature control                               | Keep the baby warm from immediately after birth, by wrapping, using a hat and keeping the baby in an incubator, or under a warmer |
| Supportive care                                   | Includes good positioning of the baby in an incubator or cot and the use of kangaroo care |
| Other: Minimise blood transfusions                | Reduce blood sampling and the volume of blood taken. Blood transfusions have been linked with ROP |

Providing better neonatal care requires team work between different health professionals (doctors, nurses, allied health workers) and working closely with parents and health authorities.

All units should have agreed protocols for important aspects of newborn care. These should be based on the best evidence available, i.e., from high quality clinical trials and systematic reviews. Good data collection methods are also needed in order to monitor trends and compare outcomes with similar neonatal units. Sharing information and best practices is easier if several units establish formal networks.

Making sure that preterm babies receive high quality care requires experienced nurses who do not have to look after too many babies. Ideally, one experienced neonatal nurse should not look after more than two sick infants. Working with parents is also very important (pp 60–61). There are many neonatal practices which can reduce the risk of severe ROP and so prevent blindness.

Further reading

Darlow BA, et al. Setting up and improving retinopathy of prematurity programs: interaction of neonatology, nursing and ophthalmology. Clin Perinatol 2015;42:215-27
Travers CP, et al. Exposure to any antenatal corticosteroids and outcomes in preterm infants by gestational age: prospective cohort study. Brit Med J 2017;356:1039
Lyu Y, et al. Association between admission temperature and mortality and major morbidity in preterm infants born at fewer than 33 weeks’ gestation. JAMA Pediatr 2015;e150277
Ellisbury OL, et al. A multifaceted approach to improving outcomes in the NICU: the Pediatric 100,000 babies campaign. Pediatrics 2016;137:e20150389

World Health Organization recommendations

World Health Organization: WHO recommendations on interventions to improve preterm birth outcomes. Geneva: World Health Organization, 2015, 98 pp. http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/preterm-birth-highlights/en/

World Health Organization. Oxygen therapy for children. Geneva: World Health Organization, 2016, 57 pp. http://www.who.int/maternal_child_adolescent/documents/child-oxygen-therapy/en/