VOLUME 30 • NUMBER 99 • 2017

Community Eye Health Journal



Preterm baby being screened for ROP using indirect ophthalmoscopy. VIETNAM
CREDIT HANH PHAM, ORBIS INTERNATIONAL, #MAKEVISIONCOUNT PHOTO COMPETITION

Retinopathy of prematurity: it is time to take action



Clare Gilbert
Professor of International Eye Health and Co-director: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.



Hannah Blencowe
Assistant Professor: London School of Hygiene & Tropical Medicine, UK.

Retinopathy of prematurity affects babies born preterm: before 37 weeks of gestation. Unless these babies are carefully managed, they can become visually impaired or blind. But there is hope: the condition can be prevented and treated.

Every year, an estimated 15 million babies are born preterm (normal gestation is 37–42 weeks).[1] Approximately 20,000 of these babies will become blind from retinopathy of prematurity (ROP) every year, and an additional 12,300 will be left with visual impairment.[2]

Countries with the highest number of preterm births are India, China, Nigeria, Pakistan and Indonesia. East Asia, South East Asia, and the Pacific are the regions with the highest number of preterm babies who survive, and the highest number who develop visual loss from ROP (Figure 1).[2] However, all regions of the world are now affected.

For almost 80 years, it has been known that preterm infants can become blind from ROP: it was first described in the United States of America as retrolental fibroplasia. The main risk factors have also been known for a long time. Urgent laser treatment has now been shown to be effective, and screening and treatment programmes have reduced blindness in children from ROP in many high-income countries. So why is ROP an important cause of blindness in children in many low- and middle-income countries? There are four main reasons.

1 Increased services for sick and preterm infants mean that many more preterm babies are now surviving.

Continues overleaf ➤



About this issue

More neonatal services worldwide means that more babies are surviving, including those born preterm. Sadly, many of these babies will go blind from retinopathy of prematurity. But there is hope: ROP can be prevented and treated. In this issue, we offer up-to-date information and guidance for each member of the clinical team involved in the care of preterm babies, including neonatologists, nurses, and ophthalmologists, and emphasise the importance of involving parents in every aspect of their child's care. We hope that you will be inspired to share this knowledge within your team and with others in the neonatology unit and thereby help to save the sight of many young children.

Contents

45 Retinopathy of prematurity: it is time to take action
Clare Gilbert and Hannah Blencowe

49 How does ROP develop?
Andrea Molinari, Dan Weaver and Subhadra Jalali

50 Preventing sight-threatening ROP: a neonatologist's perspective
Ashok Deorari and Brian A Darlow

53 Preventing sight-threatening ROP: the role of nurses in reducing the risk
Ana Quiroga and Sarah Moxon

55 Classifying retinopathy of prematurity
Andrea Molinari, Dan Weaver and Subhadra Jalali

57 Screening for ROP
Graham Quinn and Clare Gilbert

59 Treating ROP: how and when
Graham Quinn and Clare Gilbert

60 Involving the parents of preterm babies
Julie Flanagan, Erika Maka and Cristina Nitulescu

62 Following up children born preterm
P Vijayalakshmi and Clare Gilbert

65 TRACHOMA: Reaching remote Amazonian communities to eliminate trachoma
Julian Trujillo Trujillo, Tim Jesudason and Girija Sankar

66 Test your knowledge and understanding

67 Picture quiz

67 Announcements and resources

68 KEY MESSAGES

Prematurity is responsible for 18% of under-5 mortality worldwide[3], and governments have been motivated to address this by increasing the availability of neonatal services.

2 The quality of the neonatal care babies receive can be less than ideal in some areas, which increases the risk of the severe, sight-threatening stages of ROP.

3 Not all preterm infants at risk of ROP are screened, or screening is inadequate, and so babies requiring treatment are not identified.

4 Urgent laser treatment, which is highly effective in most cases, may not be delivered in time, or it may not be adequately delivered.

Which babies are most at risk?

In the womb, the developing fetus is in a stable, warm, quiet, and dark environment, and is suspended in fluid and therefore able to move. Nutrients and oxygen are continuously supplied via the umbilical cord. Replicating this level of stability in babies who are 'born too soon' is a great challenge.

The following babies are at risk of ROP:

- Babies who are extremely premature, i.e., born more than 8 weeks early with a gestational age of less than 32 weeks. These babies are most at risk: the more preterm the baby, the greater the risk.
- Babies with a gestational age of 32–36 weeks (4–8 weeks premature), if they receive poor neonatal care.
- Babies who have a low birth weight (<1,500 g).
- Babies with a higher birthweight, if they receive poor neonatal care.
- Babies who are given too much oxygen and for too long (high blood oxygen levels damage the developing blood vessels in the retina).

The risk of ROP is increased by:

- Inadequate nutrition with poor weight gain during the first few weeks of life.
- Infection during the first few weeks.
- Anything that makes babies unstable: pain, poor temperature control and not keeping the baby comfortable and supported in the cot or incubator.

Community Eye Health Journal
VOLUME 30 • NUMBER 99 • 2017

International Centre for Eye Health

VISION 2020 THE RIGHT TO SIGHT

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

IAPB

Editor
Elmien Wolvaardt
editor@cehjournal.org

Consulting editor for Issue 99
Clare Gilbert
Clare.gilbert@lshtm.ac.uk

Editorial assistant
Anita Shah
anita.shah@lshtm.ac.uk

Editorial committee
Nick Astbury
Matthew Burton
Sally Crook
Allen Foster
Clare Gilbert
Hannah Kuper
Fatima Kyari
Janet Marsden
Priya Morjaria
G V Murthy
Daksha Patel
Noela Prasad
Babar Qureshi
Serge Resnikoff
Richard Wormald
David Yorston

Regional consultants
Hannah Faal (AFR)
Kovin Naidoo (AFR)
Wanjiku Mathenge (AFR)
Van Lansingh (AMR)
Andrea Zin (AMR)
Ian Murdoch (EUR)
Janos Nemeth (EUR)
GVS Murthy (SEAR)
R Thulsiraj (SEAR)
Babar Qureshi (EMR)
Mansur Rabiu (EMR)
Leshan Tan (WPR)
Hugh Taylor (WPR)

Proofreader Caroline Thaung
Design Lance Bellers
Printing Newman Thomson

CEHJ online
Visit the *Community Eye Health Journal* online. All back issues are available as HTML and PDF.
Visit: www.cehjournal.org

Online edition and newsletter
web@cehjournal.org

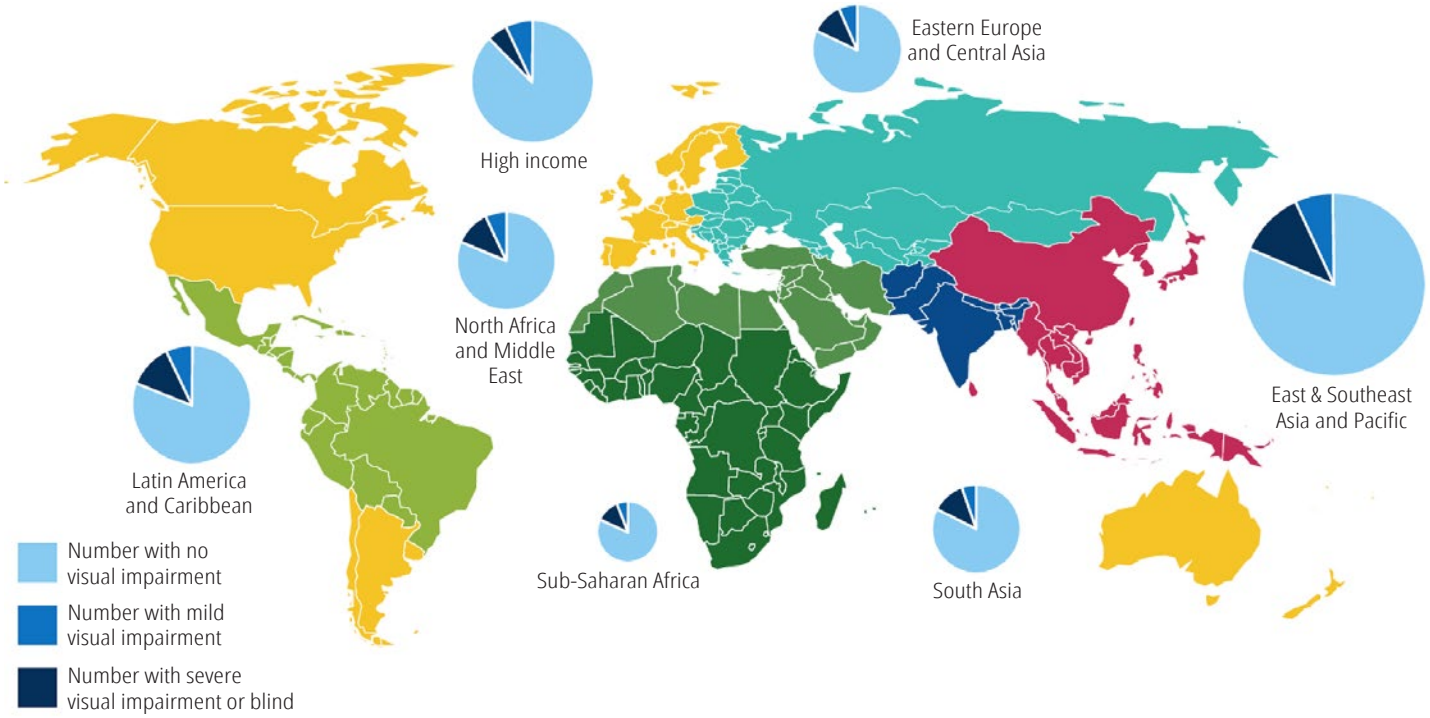
Please support us
We rely on donations/subscriptions from charities and generous individuals to carry out our work. We need your help.

Subscriptions in high-income countries cost UK £100 per annum.

Contact Anita Shah
admin@cehjournal.org

or visit our website:
www.cehjournal.org/donate

Figure 1 Number of preterm infants who survived in 2010 without visual impairment, with visual impairment, and blind. From Blencowe *et al.*[1]



Exposure to postnatal risk factors is higher in neonatal units where:

- Staff members are inadequately trained.
- There are too few staff members.
- There is inadequate equipment to deliver and monitor oxygen.
- Mothers are not encouraged to play a role in caring for and giving their babies breast milk.

How can visual loss be prevented?

Premature birth is very difficult to predict or control, but good neonatal care, screening, and urgent laser treatment can reduce the number of infants who become blind or visually impaired.

The articles on pp. 50–54 explain how doctors and nurses can reduce the risk of ROP using the POINTS of Care system: controlling **pain**, careful use of **oxygen**, preventing **infection**, improving **nutrition** by offering babies breast milk, good **temperature** control and **supportive** practices to keep babies comfortable and stable, such as kangaroo care.

Screening for ROP is needed to detect babies who develop the serious, sight-threatening stages of ROP (pp. 57–58). Screening is usually conducted by an experienced ophthalmologist in the neonatal unit, using indirect ophthalmoscopy. Who to screen, and when to screen, depends on many factors, including the quality of the neonatal care provided. Where care is suboptimal, bigger, more mature babies should be screened as they can also develop sight-threatening ROP.

Since ROP is not present at birth, but develops during the first few weeks of life, the first screening examination should take place no later than 30 days

Continues overleaf ➤

Subscriptions
Readers in low- and middle-income countries receive the journal free of charge. Send your name, occupation, and postal address to the address below. French, Spanish, and Chinese editions are available. To subscribe online, visit **www.cehjournal.org/subscribe**

Address for subscriptions
Anita Shah, International Centre for Eye Health, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK.
Tel +44 (0)207 958 8336
Email admin@cehjournal.org

Correspondence articles
We accept submissions of 800 words about readers' experiences.
Contact Anita Shah:
correspondence@cehjournal.org

Published by the International Centre for Eye Health, London School of Hygiene & Tropical Medicine.

Unless otherwise stated, authors share copyright for articles with the Community Eye Health Journal. Illustrators and photographers retain copyright for images published in the journal.

Unless otherwise stated, journal content is licensed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial purposes, provided that the copyright holders are acknowledged.

ISSN 0953-6833

Disclaimer
Signed articles are the responsibility of the named authors alone and do not necessarily reflect the views of the London School of Hygiene & Tropical Medicine (the School). Although every effort is made to ensure accuracy, the School does not warrant that the information contained in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the School in preference to others of a similar nature that are not mentioned. The School does not endorse or recommend products or services for which you may view advertisements in this Journal.

The *Community Eye Health Journal* is sponsored by:

The Queen Elizabeth Diamond Jubilee Trust
Conrad N. Hilton Foundation
cbm
LIGHT FOR THE WORLD
orbis
iTi International Trachoma Initiative
Sightsavers
The Fred Hollows Foundation

after birth. Follow-up screening is often needed, and may be done after the baby has been discharged from the neonatal unit. Each country must decide which screening criteria apply to their setting.

All babies who develop the sight-threatening stages of ROP must be treated urgently: within 48–72 hours.

Follow-up of all preterm babies is important, as they are at greater risk of other conditions which can lead to visual loss (pp. 62–64). These are more common if the baby had ROP, particularly if treatment was given. The commonest condition is refractive error, including myopia, which can be severe and develop before the age of 12 months. Strabismus and cerebral visual impairment are also more common than in children born at term.

New developments

There have been several new and important developments. These include the recognition that care of preterm babies during the first hour after birth is extremely important (this has been called the 'first golden hour'). Kangaroo care, where the baby is placed securely on the chest of their mother or father (see below), can also play an important role in keeping preterm babies stable. New imaging systems for ROP are likely to change the way screening is undertaken, and new treatments for ROP are also being investigated. All of these topics are discussed in more detail in this issue.

What can eye care providers do?

Nurses, neonatologists, ophthalmologists and parents all play a vital role in reducing the risk of ROP. However, in many low- and middle-income countries, lack of awareness about ROP is an issue, as it is not yet included in many training curricula, including those for paediatricians and ophthalmologists. There is also lack of awareness among the general population.

Ophthalmologists can visit the neonatal unit in the hospital, or a unit nearby, to find out whether preterm babies are admitted and survive, and whether babies are being screened for ROP. If not, they could set up a service (after being adequately trained).[4,5]

Ophthalmologists and optometrists can play an active role in following up infants and children who were born preterm to detect and manage refractive errors and other conditions, such as strabismus (pp. 62–64).

To improve awareness of ROP, eye care providers can distribute copies of relevant articles in this issue to colleagues, including obstetricians, midwives, neonatologists, neonatal nurses, paediatricians, ophthalmologists, and optometrists. The images are also helpful for educating parents.

Some infants with the advanced stages of ROP may retain a proportion of useful residual vision and will benefit from low vision services. Others may be completely blind. Since blindness of early onset can lead to developmental delay, these children should be referred for rehabilitation.

Summary

A lot is now known about ROP in terms of the risk factors, which babies are most at risk and the natural history. In ROP there is only a very narrow time window in which to detect and treat babies who have the sight-threatening stages of ROP, i.e., within the first few weeks and months of life. Long-term follow up is essential. Many different people can play a role in preventing blindness and visual impairment from ROP and its long term complications Those providing low vision and rehabilitation services can help to improve children's future quality of life. Parents can play a critically important role at all stages of care.

References

1 March of Dimes, PMNCH, Save the Children, WHO. Born Too Soon: The Global Action Report on Preterm Birth. Eds CP Howson, MV Kinney, JE Lawn. World Health Organization. Geneva, 2012.

2 Blencowe J, Lawn JE, Vazquez T, Fielder A and Gilbert C. Beyond newborn survival: Paper 3. Preterm associated visual impairment and estimates of retinopathy of prematurity at regional and global level for 2010. Pediatr Res 2013;54:36–49.

3 Levels & Trends in Child Mortality. Report 2015. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation.

4 Jalali S, Anand R, Kumar H, Dogra MR, Azad R, Gopal L. Programme planning and screening strategy in retinopathy of prematurity. Indian J Ophthalmol 2003 Mar;51(1):89–99.

5 Darlow B et al. Setting up and improving retinopathy of prematurity programs. Clin Perinatol 2013 40:215-227.

Did you know?

Sharing the articles in this issue can help to raise awareness of ROP. Copying and reuse of journal articles and images for such purposes is not only permitted, but encouraged. Online copies of all articles are available free of charge from **www.cehjournal.org** and high-resolution images are available (also free of charge) from **www.flickr.com/photos**

Kangaroo care

Kangaroo care helps to recreate an ideal environment for preterm infants. The infant is placed against the skin on the chest of the mother or father and held in place with a wrap. This can start as soon as the baby is stable, even if they have a medical condition. It can be intermittent or continuous.

Kangaroo care helps to keep babies stable and warm, increases maternal breast milk production and encourages breast feeding. This improves weight gain and growth which lowers the risk of mortality; there is also a lower risk of infection.

Kangaroo care promotes bonding between parents and their child and can help to reduce parental depression.

Some neonatal units have a dedicated ward for kangaroo care. Parents and their babies go there after leaving intensive care and before they are ready to go home.

The World Health Organization (WHO) has produced a practical guide to kangaroo care which is available from this link: **http://tinyurl.com/kangarooMC**

Evidence about the effectiveness of kangaroo care to reduce mortality and morbidity in preterm infants is available from: **https://www.ncbi.nlm.nih.gov/pubmed/27552521**



BIJU RAJU

Ophthalmologist Biju Raju gave his son kangaroo care. Dr Raju screened (and treated) his son for ROP, despite initial protests from the neonatology team. INDIA

How does ROP develop?



Andrea Molinari
Pediatric Ophthalmologist: Hospital Metropolitano, Av. Mariana de Jesus Oe-8, Quito, Ecuador.



Dan Weaver
Pediatric Ophthalmologist: Billings Clinic, Billings, Montana, USA.



Subhadra Jalali
Deputy Director: Newborn Eye Health Alliance (NEHA) and Director, Quality: LV Prasad Eye Institute, Hyderabad, India.

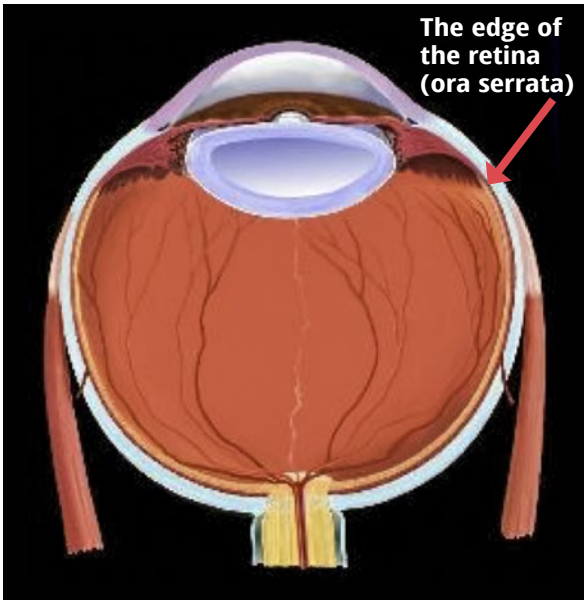
Retinopathy of prematurity can develop when babies are born before their retinal blood vessels are fully formed.

In babies who are born at full term (between 37 and 42 weeks of gestation), the retinal blood vessels are fully developed and reach the edge of the retina: the ora serrata (Figure 1).

In babies who are born preterm (before 37 weeks), the retinal blood vessels are not fully formed and do not reach the ora serrata (Figure 2). If a preterm baby is examined a week or so after birth, it is possible to see whether the blood vessels are mature and have reached the ora serrata, or whether they are immature; i.e., the peripheral retina is not vascularised. If babies receive good neonatal care, the retinal blood vessels continue to grow normally. If the neonatal environment is not ideal, particularly if oxygen levels have been higher or more variable than they should be, the retinal blood vessels stop growing. A visible line or a ridge then forms and the blood vessels may start to multiply (proliferate) abnormally. The visible line, ridge and proliferating blood vessels are all signs of retinopathy of prematurity (ROP). See Figure 3.

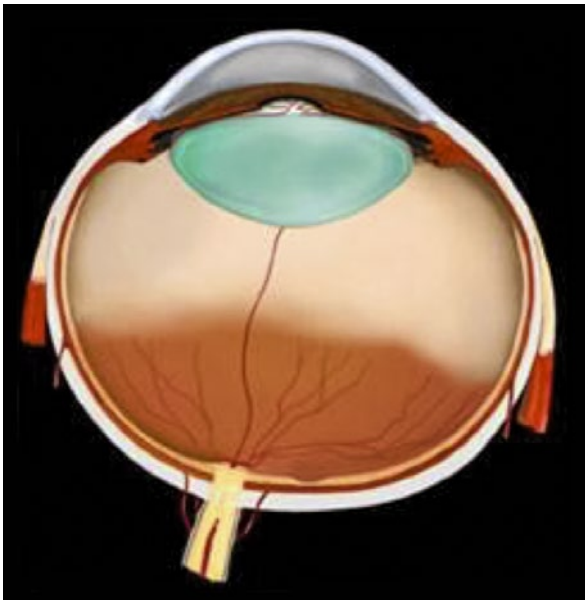
In 5–10% of premature babies, ROP progresses and can lead to retinal detachment (Figure 4). This causes irreversible blindness, often in both eyes.

Figure 1 In the full-term eye, the retinal blood vessels are fully developed



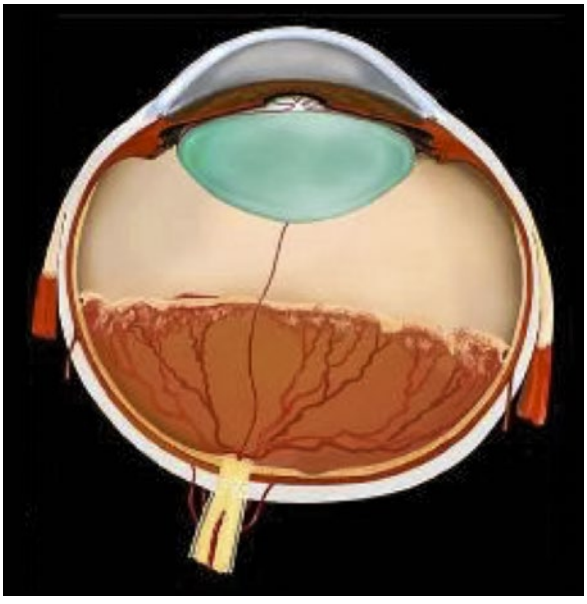
VISION RESEARCH ROPARD FOUNDATION WWW.VRRF.ORG

Figure 2 In the preterm eye, the retinal blood vessels are not fully developed



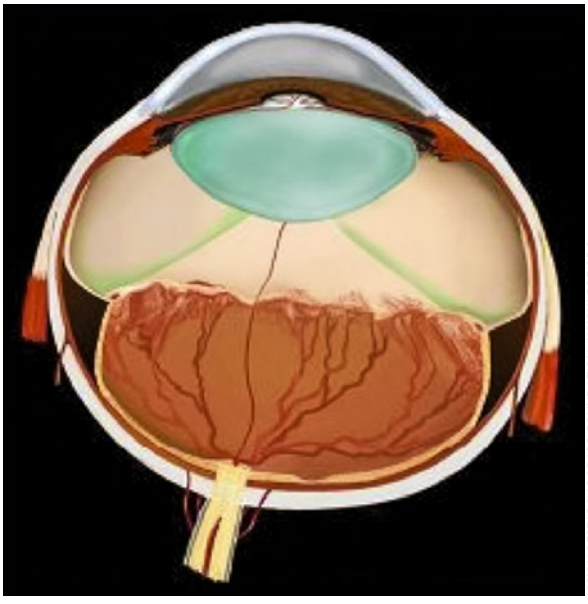
VISION RESEARCH ROPARD FOUNDATION WWW.VRRF.ORG

Figure 3 ROP occurs at the junction between the vascularised and unvascularised retina



VISION RESEARCH ROPARD FOUNDATION WWW.VRRF.ORG

Figure 4 Advanced ROP with partial retinal detachment



VISION RESEARCH ROPARD FOUNDATION WWW.VRRF.ORG

Preventing sight-threatening ROP: a neonatologist's perspective



Ashok Deorari
Professor: Department of Paediatrics, WHO Collaborating Centre for Training and Research in Newborn Care), All India Institute Of Medical Sciences, New Delhi, India.



Brian A Darlow
Emeritus Professor of Paediatrics: University of Otago, Christchurch, New Zealand.

Neonatal care during the first hours and weeks of life determines a preterm baby's chances of avoiding retinopathy of prematurity and its complications. Oxygen management and low-cost interventions make all the difference.



PLAN CANADA WWW.PLANCANADA.CA

Supportive care practices, such as kangaroo care, are central to the management of infants who are at risk of ROP.

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.

If preterm babies cannot be breastfed, they can be given small amounts of breast milk by cup.



GLOBAL HEALTH MEDIA WWW.GLOBALHEALTHMEDIA.ORG

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:

- **P**ain control
- **O**xygen management
- **I**nfection control
- **N**utrition
- **T**emperature control
- **S**upportive 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

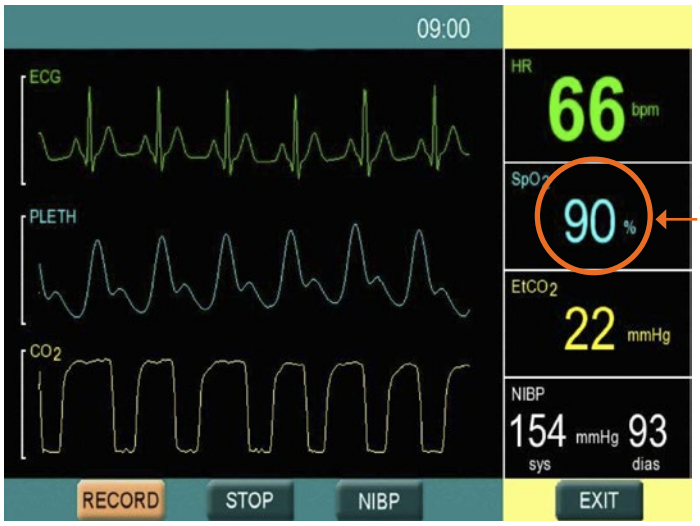
Oxygen saturation (SpO_2) is a measurement of the proportion of haemoglobin in arterial blood that is carrying oxygen. The air we breathe is 21% oxygen and – in healthy adults – this is enough to ensure that all the haemoglobin in the arterial blood is carrying oxygen (i.e., an SpO_2 of 100%). SpO_2 can be measured at any age using a pulse oximeter. For preterm babies,

Figure 1 A pulse oximeter is attached to a preterm baby's foot



© NAPOCSKA/SHUTTERSTOCK

Figure 2 The oxygen saturation is expressed as a percentage (90%)



the probe is usually attached to the foot (Figure 1). The SpO_2 level is shown on a display monitor (Figure 2).

In the womb, a baby's SpO_2 is less than 100%; it is usually around 50–70%. This is entirely normal. After birth, the SpO_2 in a healthy baby increases gradually to around 100% at 10 minutes.

If the saturation is lower than it should be at any time during neonatal care, additional oxygen can be given at varying concentrations. This is called supplemental oxygen. In preterm babies, an SpO_2 of 95–100% can damage developing blood vessels in the retina, leading to ROP, and can damage the lungs and brain. A low SpO_2 can also lead to brain damage. Careful administration and oxygen monitoring from immediately after birth are therefore essential in preterm babies. Alarms on the monitor should be set so that they sound if the SpO_2 levels are too high (95% or above) or too low (88% or less). This alerts the neonatal team so that they can address the problem as quickly as possible.

Preventing ROP during the first hour after preterm birth

The first hour of life has been called the 'golden hour' because several low-cost interventions greatly improve outcomes (Table 1). These include delayed clamping of the umbilical cord, keeping babies warm, and gentle respiratory support. Protocols are essential so that staff can work as a co-ordinated team. Routine resuscitation of term and moderate-to-late preterm babies begins with gentle ventilation with a bag and mask, using air.

Preterm infants <32 weeks should receive ventilation with a bag and mask and 30% oxygen, modifying the concentration of oxygen given to meet time-specific oxygen saturation targets (Table 2). Giving 100% oxygen is not necessary for most preterm babies. Ideally, there should be equipment to mix air and oxygen (blenders) in the delivery room. If the baby is not breathing well, or the heart rate is dropping, the concentration of oxygen given can be increased to 100% and then reduced as soon as possible.

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 SpO_2 should be not be lower

Continues overleaf ➤

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

Table 2 Target oxygen saturation levels (SpO_2) 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

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

than 89% and not higher than 94% (the upper limit is 94% to prevent ROP). This means that the alarms on the monitors should be set at 88% and 95% so that they will sound if the oxygen saturation goes below or above this recommended range. Pulse oximeters are easy to use. They should be used for all preterm infants receiving supplemental oxygen. If there is not enough equipment to monitor oxygen levels in all babies, priority should be given to those who are unwell, those being handled, and those being given higher concentrations of supplemental oxygen.

Infection can be reduced by hand washing (or alcohol rubs after an initial wash) on entering the NICU and before and after handling each baby. This must be practiced by all. Measures to reduce skin breakdown, sterile techniques for intravenous lines, and careful use of antibiotics all reduce infection. Having an infection control team, headed by a senior nurse, is often beneficial.

"Making sure preterm babies receive high quality care requires experienced nurses who do not have to look after too many babies."

Nutrition. Good nutrition and growth are essential for short- and long-term outcomes. There are many benefits of feeding preterm babies their own mother's breast milk, including lower rates of ROP. For babies below 1,000 g intravenous feeding may also be required.

Temperature control. Both high and low temperatures make babies unstable and can increase the need for oxygen. It can also worsen respiratory distress.

Supportive care practices are those which keep babies comfortable and stable, including kangaroo care and ensuring that babies' limbs are supported (pp. 53–54).

General aspects

In high-income countries, changes in how services for preterm infants are organised have improved the survival of preterm babies and reduced complications, including severe ROP. These include developing centres of excellence for the sickest preterm babies and better care of babies while they are being transported to or between neonatal units.

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 2013;40:215-27

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;169:e150277

Ellsbury DL, et al. A multifaceted approach to improving outcomes in the NICU: the Pediatrix 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/**

Preventing sight-threatening ROP: the role of nurses in reducing the risk



Ana Quiroga
Neonatology Technical Advisor: National Ministry of Health and Director of Postgraduate Neonatal Nursing: Austral University, Buenos Aires, Argentina.



Sarah Moxon
Research Fellow: Maternal, Adolescent, Reproductive and Child Health (MARCH) Centre, London School of Hygiene & Tropical Medicine, London, UK.

Neonatal nurses have frequent contact with preterm babies and their parents. By providing high quality care, nurses play an essential role in preventing retinopathy of prematurity.



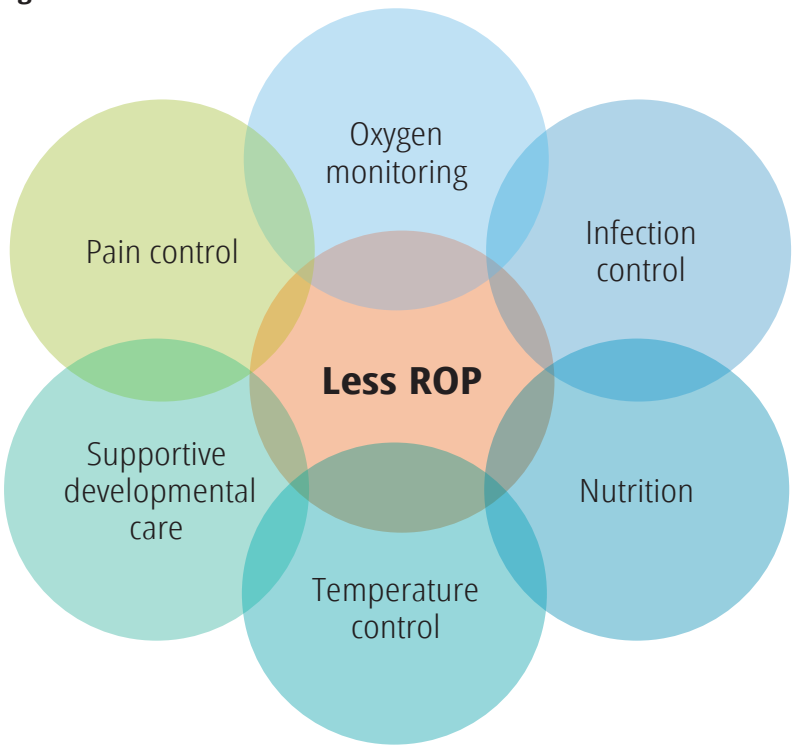
© GERTFRIK/123RF

Figure 1 Positioning babies so they are comfortable and supported reduces stress and promotes normal neuromuscular development.

Skilled neonatal nurses play a central role as part of the multi-disciplinary neonatal team caring for preterm newborns. However, neonatal nursing is not a recognised profession in many countries, and nurses face significant challenges in providing high quality neonatal care.

Nurses can help to prevent ROP by focusing on reducing risk factors and through the day-to-day care they deliver. These are highlighted below using the POINTS of Care system (Figure 2).

Figure 2 The POINTS of Care to reduce ROP



Pain control

Procedures such as taking blood, setting up drips, or inserting a nasogastric tube are painful and can destabilise preterm babies. Painful procedures should be kept to a minimum, and pain can be reduced by giving the baby oral sucrose solution or a dummy (pacifier) to suck on before the procedure. For very painful procedures, systemic analgesics can be used.

Oxygen monitoring

All nurses working in the neonatal unit are responsible for monitoring oxygen saturation using pulse oximeters, which is the standard of care for every newborn receiving supplemental oxygen (pp. 50–52). Nurses are responsible for ensuring that the concentration of oxygen is optimum by setting the alarms on oxygen monitors and responding quickly when they sound. Alarms must be set at 88% and 95% so that they sound if a baby's oxygen saturation falls below 89% or rises above 94%. Maintaining oxygen saturation within the targets recommended requires 24-hour care and a high level of awareness of the dangers of oxygen saturations that are too high or too low. Oxygen, compressed air, blenders, flowmeters, oxygen humidifiers, pulse oximeters, and monitors are essential items.

Infection control

Preterm babies are much more susceptible to infection than adults and are less able to combat it. Early-onset infection (within 48 hours of birth) is usually acquired during delivery. Late-onset infection is more common and is acquired through cross-infection within the neonatal unit. The key to preventing late-onset infection is hand washing on entering the unit and before and

Continues overleaf ➤

Figure 3 Placing a preterm baby in a plastic bag after birth is effective at maintaining normal body temperature



BRIAN DARLOW

after caring for every baby. This also applies to visitors and ophthalmologists. Other measures to prevent infection include careful skin preparation before taking blood or putting up a drip, ensuring that toys or other objects are not left in the cot, and avoiding the use of broad-spectrum antibiotics. Infection can also be reduced by keeping the neonatal unit clean and not sharing equipment, such as stethoscopes, between babies. Babies that are cared for by their mother and fed her breast milk have their gut colonised by helpful rather than harmful organisms.

Nutrition

Good nutrition is essential for the normal growth and development of preterm babies and helps to reduce the risk of infection and ROP. Preterm babies, like all other babies, need calories from fats and carbohydrates, protein, minerals and vitamins. The best food for preterm babies is their mother's own breast milk. If they are too immature to breast feed, breast milk can be given in very small amounts, within days of birth, using a small spoon, cup, or bottle. Mothers can express and store their milk in a refrigerator in the unit. Breast milk can be fortified with additional nutrients, or babies can be fed standard infant formula feeds. Intravenous nutrition is required for babies who are too immature or sick for oral feeding.

Temperature

Preterm babies are not able to shiver if they become cold. They compensate by consuming more oxygen, which increases their oxygen requirements. Nurses can control the surrounding environment by avoiding drafts, using incubators, or by using hats and warmed cots. Plastic bags can also be used (Figure 3). Kangaroo care (continuous and prolonged skin-to-skin contact with the mother or father – see p. 48), is a nurse-led intervention which helps preterm babies to maintain their temperature within the normal range.

Supportive developmental care

When preterm babies become stressed, their heart rate, respiratory rate and blood pressure all rise; this can lead to fluctuating oxygen saturations. Nursing care can reduce stress by reducing noise and bright lights and by positioning babies so they are comfortable and their limbs are supported (Figure 1). Nurses can reduce the number of times they disturb babies by grouping procedures together and allowing longer periods when babies are pain free, comfortable and able to sleep. Kangaroo care also helps to keep babies stable and warm, increases maternal breast milk production, encourages breast feeding, and promotes bonding between parents and their child.

Avoiding blood transfusions and anaemia

Blood transfusion is a risk factor for ROP and unnecessary blood transfusions should be avoided. Anaemia in premature newborns is often exacerbated by taking too much blood for laboratory tests, too often. The smallest babies suffer the greatest proportional blood loss. Nurses are responsible for monitoring and limiting blood taking so that it is for critical tests only. When around 10% of total blood volume is used for blood tests, senior staff should be alerted.

Before and during screening

Neonatal nurses are responsible for preparing preterm babies for screening, preparing the equipment needed, and caring for the babies during screening. Dilating eye drops should be administered one hour before screening is due to ensure the pupils are well dilated. During screening, the infant should be wrapped securely and given sucrose solution or a pacifier to reduce pain. Nurses are experienced at positioning babies and can minimise head movement so that screening can be done as quickly as possible, particularly if the baby is unstable or sick. Nurses should also monitor the vital signs (heart rate, oxygen saturation, etc.) throughout the procedure and ensure that the baby is stable afterwards.

Challenges

Neonatal units in many low- and middle-income countries often have too few trained nurses. Many nurses have not had specialist training. Even in settings where nurses are trained, high staff turnover and rotation is common, leading to critical skills gaps and a lack of mentoring. Nurses cannot provide quality care if they do not have the right equipment and if there are no written policies and guidelines on safe oxygen use, for example. These factors disempower nurses and make it difficult for them to play a critical advocacy and leadership role in the planning, management, and day-to-day delivery of high quality neonatal care.

Summary

Nurses play a critically important role in preventing ROP. In countries where neonatal care is relatively new, nurses may not know about ROP nor appreciate how much they can to do prevent blindness from ROP in the babies they are caring for. As eye care professionals, we can educate them about ROP by adapting our teaching approach to match their levels of knowledge and experience.

Further reading

WHO; UNICEF. Every Newborn: An action plan to end preventable newborn deaths. Geneva: World Health Organisation 2014. Available from: **http://www.healthynewbornnetwork.org/hnn-content/uploads/Every_Newborn_Action_Plan-ENGLISH_updated_July2014.pdf**

Classifying retinopathy of prematurity



Andrea Molinari
Pediatric Ophthalmologist: Hospital Metropolitano, Av. Mariana de Jesus Oe-8, Quito, Ecuador.



Dan Weaver
Pediatric Ophthalmologist: Billings Clinic, Billings, Montana, USA.



Subhadra Jalali
Director: Newborn Eye Health Alliance, (NEHA) and Director, Quality: LV Prasad Eye Institute, Hyderabad, India.

Knowing how to classify retinopathy of prematurity is essential as it provides information on the prognosis and guides decision making about screening and treatment.

It is important to classify retinopathy of prematurity (ROP) in each eye, at each screening session. Doing so makes it possible to screen babies consistently and to make decisions about whether further screening is required and when, or whether laser treatment or surgical management is needed. The International Committee for the Classification of ROP[1] has classified it using the following criteria:

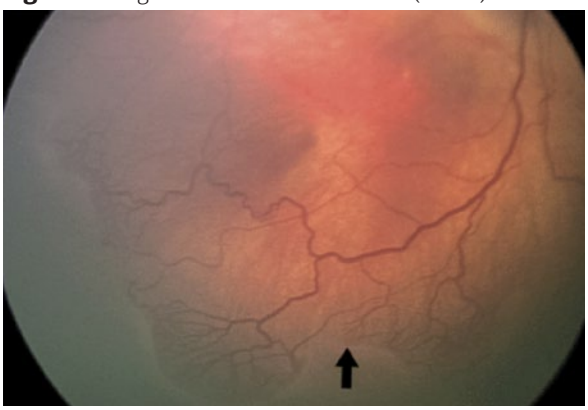
1 The severity of the ROP
2 The zone in the retina where ROP is found
3 The extent of the ROP
4 Whether the retinal blood vessels are dilated and/or tortuous (pre-plus or plus disease)
5 Whether aggressive posterior ROP is present

The severity of the ROP

ROP can develop when the immature retinal blood vessels have not reached the edge of the retina, known as the ora serrata.

- **Stage 1 ROP: Demarcation line.** A whitish line is visible between the normally vascularised retina and the peripheral retina in which there are no blood vessels (Figure 1)
- **Stage 2 ROP: Visible ridge.** The demarcation line develops into a ridge, with height and width, between the vascular retina and peripheral retina (Figure 2).
- **Stage 3 ROP: Blood vessels in the ridge.** Blood vessels grow and multiply (proliferate) and are visible in the ridge (Figure 3).
- **Stage 4 ROP; Sub-total retinal detachment.** Vitreoretinal surgery may be indicated (Figure 4).
- **Stage 5 ROP: Total retinal detachment.** No treatment is usually possible (Figure 5).

Figure 1 Stage 1 ROP: Demarcation line (arrow)



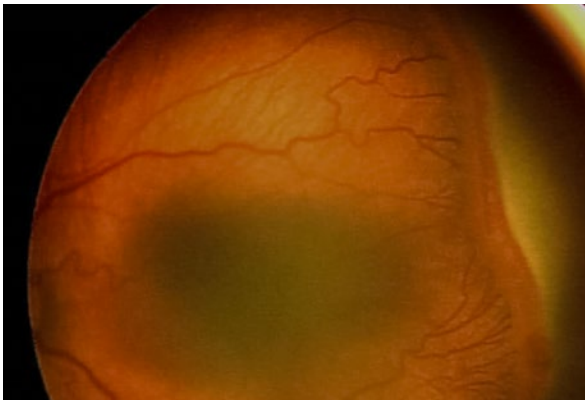
LYON DW AND WARREN DF. REVIEW OF OPTOMETRY 2006(143):12

Figure 2 Stage 2 ROP: The demarcation line becomes a ridge with both height and width



BOOST-NZ

Figure 3 Stage 3 ROP: Abnormal blood vessels grow and multiply within the ridge



DAI. AUKLAND DISTRICT HEALTH BOARD

Figure 4 Stage 4 ROP: Sub-total retinal detachment



ICEH

Figure 5 Stage 5 ROP: Total retinal detachment. Parents may notice this as something white in the eyes

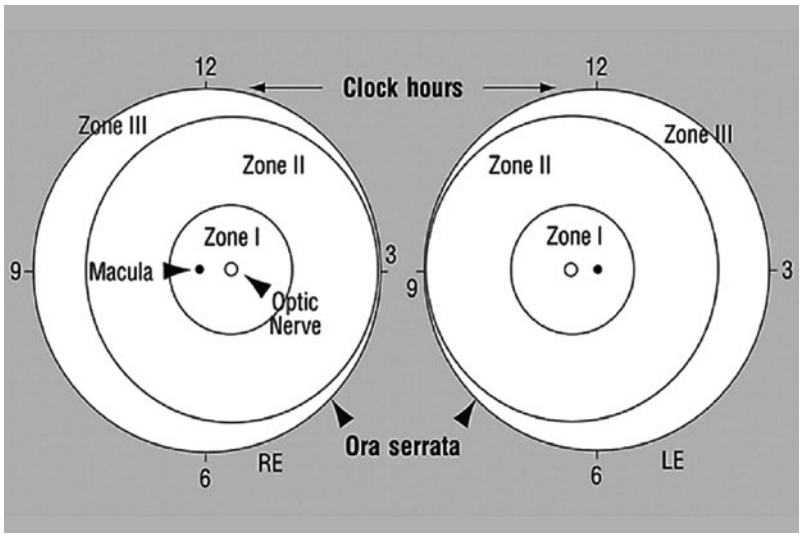


SUBHADRA JALALI

Reference

1 International Committee for the Classification of Retinopathy of Prematurity. The International Classification of Retinopathy of Prematurity revisited. Arch Ophthalmol. 2005;123(7): 991-9.

Figure 6 The three zones of ROP



FLECK BW AND MCINTOSH N. NEOREVIEWS JAN 2009;10(1):E20-E30

The zones in the retina where ROP is found

The three zones of ROP are centred on the optic disc (Figure 6).

- Zone I is the small circle of retina around the optic disc. The radius of the circle is twice the distance from the macula to the centre of the optic disc
- Zone II is the ring-shaped section of the retina surrounding zone I, which extends to the ora serrata on the nasal side
- Zone III is a crescent-shaped area of temporal retina.

ROP in zone I is more likely to progress and become severe than ROP in zones II or III.

The extent of the ROP

The extent of disease is recorded as clock hours, in twelve 30° or 1-hour sections (Figure 6). The clock hours recorded are the total clock hours involved, not just the contiguous sectors.

The presence of plus disease

In plus disease, retinal arterioles and venules near the optic disc are dilated and tortuous. In pre-plus disease the changes are less pronounced, or may not affect all the blood vessels (Figure 7).

Figure 8 Aggressive posterior ROP (in zone I)



ICEH

The presence of aggressive posterior ROP (AP-ROP)

Aggressive posterior ROP (AP-ROP) is nearly always in zone I. The proliferating blood vessels are flat and difficult to see, and plus disease is always present (Figure 8).

NOTE: It is very important to recognise AP-ROP as it can progress extremely quickly to retinal detachment. Treatment should be given within 48 hours.

How the classification can be used

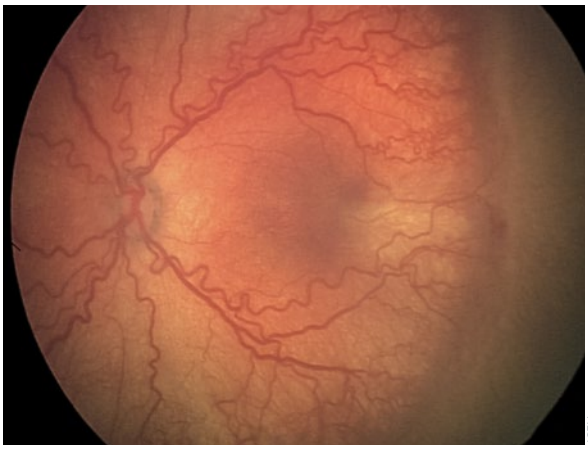
Classification of ROP guides decision making about screening and treatment. For example:

- If immature retinal vessels are present, screening should be repeated
- If ROP is in zones II or III (further away from the optic disc) and is at stage 1 or 2, without any plus disease, the prognosis is good and the ROP is likely to resolve without treatment. Repeat screening is required in 1–2 weeks.
- If ROP is in zone I, or if it is Stage 3 with plus disease, or aggressive posterior ROP is present, urgent treatment is needed as the disease is very likely to progress to retinal detachment.

Scarring after ROP

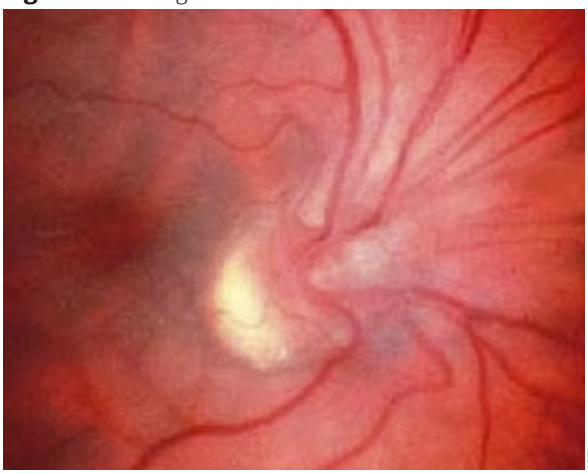
Untreated ROP can sometimes heal with scarring in the peripheral retina and vitreous. This distorts the retina, leading to macular dragging or retinal folds. These signs are not included in the International Classification of ROP, but can be associated with loss of vision (Figure 9).

Figure 7 Plus disease: dilated and torturous veins



ICEH

Figure 9 Scarring after ROP



ICEH

Screening for ROP



Graham Quinn
Professor Emeritus of Ophthalmology: The Children's Hospital of Philadelphia, Wood Center, Philadelphia, USA.



Clare Gilbert
Professor of International Eye Health and Co-director: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.

Screening babies for ROP is very important. Unless ROP is detected early and promptly treated, it can lead to blindness and permanent visual impairment. This article describes who to screen, when and where to screen, how to screen, and what to do next.

Why is screening needed?

Treatment for severe ROP is usually successful in preserving vision as long as treatment is given on time by an experienced ophthalmologist. The purpose of screening is to identify babies who need urgent treatment.

How and where should screening be done?

Most screening for ROP is undertaken by an ophthalmologist, using indirect ophthalmoscopy (Figure 1).



PHFI

Figure 1 Ophthalmologist screening for ROP using indirect ophthalmoscopy

Babies who are in-patients in the neonatal unit must be screened in the unit. Babies who need further screening after discharge can be bought back to the unit for screening or they can be screened in the eye department.

Over the last few years, wide-field digital imaging systems, instead of indirect ophthalmoscopy, have also been used for screening. The retinal image can be captured by an ophthalmologist, a trained nurse, or a technician (Figure 2). However, an experienced ophthalmologist must always be available to interpret the images.

Figure 2 Screening using a RetCam, which uses a probe placed gently on the eye



The screening results for each eye must be classified according to the criteria set up by the International Committee for the Classification of ROP (see pp. 55–56).

Which babies should be screened?

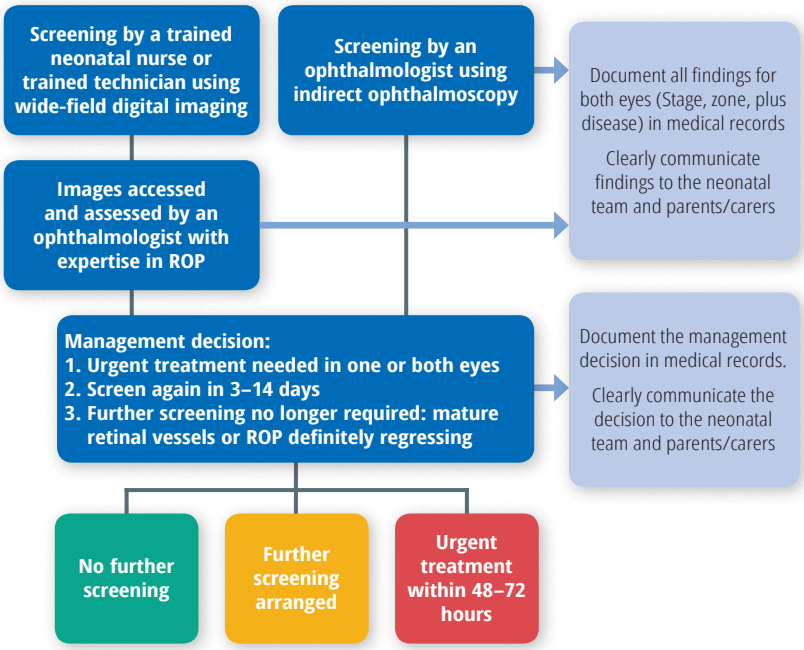
This is an important question. Which babies are at risk of severe ROP varies considerably. For example, in units where neonatal care is less than ideal, bigger, more mature babies can still develop severe ROP.

Several countries have national guidelines indicating which babies should be screened. These usually include a combination of birth weight (BW) and gestational age (GA). Some countries, such as the United States of America, include additional 'sickness criteria' alongside BW and GA. In neonatal units providing very high quality care, only the most preterm babies are at risk of developing ROP and therefore need to be screened.

- In the United Kingdom, babies with BW of <1,250 g, or a GA of 31 weeks or less, must be screened.
- In the United States of America, the screening criteria are a BW of 1,500 g or less, or a GA of 30 weeks or less. Infants with a BW between 1,500 g and 2,000 g should also be screened if they have had an 'unstable clinical course.'

Continues overleaf ➤

Figure 3 Screening options for ROP and the information to be documented and communicated



- In China, a middle-income country, the criteria are BW <2,000 g or GA <34 weeks. Compared with the UK and USA, older and bigger babies in China are considered to be at risk of developing ROP.

Ideally, studies need to be done in each country to determine which babies should be included in a screening programme.

Whichever criteria are used, it is the responsibility of the neonatologist to identify which babies should be screened, and a neonatal nurse should prepare the babies for screening (p. 54).

When screening should start

Preterm babies are not born with ROP; it only develops during the first few weeks after birth.

It is useful to have guidelines for the timing of the first screening which are easy to implement, particularly in settings where information on GA is unreliable.

Figure 4 Indications for urgent treatment from the Early Treatment of ROP Trial

		Stage 1	Stage 2	Stage 3
Zone I	No plus disease			
	With plus disease			
Zone II	No plus disease			
	With plus disease			
Zone III	No plus disease			
	With plus disease			
	Aggressive posterior ROP			

Repeat screening

Urgent treatment (within 48–72 hours)

For example, screen by 30 days of life. If the baby is very premature, or has been very sick or received a lot of oxygen, earlier screening should be considered. Current thinking suggests screening between 21 and 25 days of life, but more research is needed. If a baby eligible for screening is to be discharged or transferred to another neonatal unit before the first screening, they should be screened before discharge or transfer.

Understanding the findings of screening

- In eyes where the retinal blood vessels can only be seen in zone I at the first screening, about half will go on to develop ROP needing treatment.
- If the retinal blood vessels have reached zone II at the first screening, ROP needing treatment is unlikely.
- If mature vessels can be seen in zone III, ROP needing treatment is rare.

Making decisions

At each examination, a management decision needs to be made, based on the eye with the most advanced ROP (Figure 3).

The possible management decisions are:

1 Urgent treatment.
2 Further screening is needed (see below).
3 No further screening is needed as the retinal blood vessels are mature, or ROP is regressing in both eyes.

If urgent treatment is needed, this must be delivered within 48 to 72 hours. If further screening is needed, the date of the next screening examination must be documented and explained to parents. Figure 4 shows which babies need urgent treatment.

Repeat screening

Findings at the first examination determine when the next screening should take place.

- If the retinal vessels are immature and there is no ROP, follow-up screening can be conducted 1–2 weeks later.
- If there is Stage 1 ROP in zone II with no plus disease, repeat screening in 1 week.
- If there is Stage 2 ROP in zone II with plus disease, urgent treatment is needed.

Documenting and communicating findings and management decisions

It is very important that accurate records are kept for all babies who have been screened for ROP. This will help to ensure that babies are screened at the right time and that follow-up screening is done as and when needed. If a baby is not screened when they should have been, they are more likely to become visually impaired or blind. At each screening, document all findings for both eyes (immature retinal vessels, stage, zone, plus disease, aggressive posterior, ROP is regressing). Note whether treatment or further screening is needed, and when.

Finally, ensure that all information is shared with the neonatal team and the parents. ROP is a complex disease with long-term consequences and requires a team effort (see pp. 60–61).

Treating ROP: how and when



Graham Quinn
Professor Emeritus of Ophthalmology: The Children's Hospital of Philadelphia, Wood Center, Philadelphia, USA.



Clare Gilbert
Professor of International Eye Health and Co-director: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.

Laser treatment of ROP is highly effective. However, special care should be taken when treating preterm or newborn infants, and long-term follow-up is essential. There are also new treatments on the horizon, particularly in cases where laser treatment is not possible or has failed.



BIJU RAJU

Ophthalmologist checks whether ROP treatment has been successful. INDIA

Indications for treatment

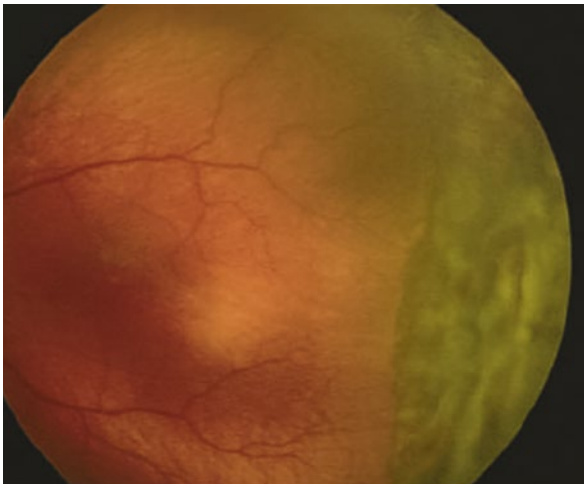
The Early Treatment of Retinopathy (ROP) trial (ET-ROP)[1] clearly showed that earlier laser treatment gives better results than waiting until 'threshold disease' develops. The ET-ROP indications for treatment use a combination of zone, stage and whether plus disease or aggressive posterior ROP is present (Figure 4, pp. 58).

ROP in zone I has the worst prognosis and so requires treatment at an earlier stage than ROP in zone II or III. The presence of plus disease also indicates a poorer prognosis. Eyes with plus disease and aggressive posterior ROP also have a poorer prognosis.

Laser treatment

The mainstay of treatment for severe ROP is peripheral retinal photocoagulation, delivered by laser. Only the avascular retinal periphery should be treated. The laser burns should be light and almost confluent (Figure 1). Laser treatment requires a trained and highly skilled ophthalmologist.

Figure 1 Photocoagulation pattern for ROP. The burns should be almost confluent.



HOUSTON SK, WYCOFF CC ET AL. 2011

Treatment is painful and should be given under topical anaesthesia with or without sedation, or under general anaesthesia. It is essential that the infant is monitored closely during treatment. A neonatologist or trained neonatal nurse must be present.

Babies should be followed up closely after treatment (after 1 week initially) to ensure that the ROP is regressing and that treatment of the peripheral retina is complete, with no skip areas (areas of untreated retina).

Further treatment should be given if the ROP is not regressing, including to skip areas.

Other treatment

Agents which block vascular endothelial growth factor (VEGF), which stimulates new vessel growth, are being explored as a treatment for ROP.[2] Although these agents, which are given by intravitreal injection, can give rapid short-term resolution of ROP, there are concerns about the long-term complications in the eye and possible systemic complications. For this reason, anti-VEGF agents are only recommended when laser treatment is not possible (i.e., the baby is too sick, the pupils do not dilate, or there is intravitreal haemorrhage) or when extensive laser treatment has failed. Parents should be fully informed about the risks before treatment and must give their consent.

Follow-up after treatment

All babies treated for ROP should have long-term follow-up visits to detect and manage the eye conditions which frequently develop in these children (pp. 62–64).

Reference

1 Good WV and the Early Treatment for Retinopathy of Prematurity Cooperative Group. Final results of the Early Treatment for Retinopathy of Prematurity (ETROP) randomized trial. Trans Am Ophthalmol Soc. 2004;102: 233-48.

2 Klufas MA, Chan RV. Intravitreal anti-VEGF therapy as a treatment for retinopathy of prematurity: what we know after 7 years. J Pediatr Ophthalmol Strabismus. 2015;52(2):77-84.

Involving the parents of preterm babies



Julie Flanagan
Retinopathy of Prematurity Screening Co-ordinator: Newborn Intensive Care Unit, St Marys Hospital, Central Manchester University Hospitals NHS Foundation Trust, Manchester, UK.



Erika Maka
Ophthalmologist and Paediatric Ophthalmologist: Semmelweis University, Maria Str. 39, Budapest, Hungary.



Cristina Nitulescu
Senior ophthalmologist: Oftapro Ophthalmology Clinic and Institute for Mother and Child Health, Bucharest, Romania.

The prevention, detection and treatment of ROP is a team responsibility. Parents are important members of the team and their involvement is essential in ensuring optimal visual outcomes.



NAZANIN ZAHRA HOSEINPOUR

Thanks to excellent teamwork between parents and the medical team, a child with complications of ROP can now see well. IRAN

In the hospital, neonatologists, paediatricians, ophthalmologists, nurses and other allied health professionals are all involved in the care, screening and treatment of a baby with ROP. In such a busy clinical setting, it is easy to forget that parents are also important members of the team.

The role of parents must not be underestimated.[1] Not only can they help to prevent ROP in the clinic, they are also responsible for bringing their child back for screening and treatment appointments. Without parents' active involvement, ROP can have devastating consequences.

Good communication is at the centre of developing positive and productive relationships with parents, and it must start from the day a preterm infant is admitted to the neonatal unit. The members of the medical team can involve parents by communicating clearly and simply about the care their baby needs and how the parents can help. This builds a relationship of trust. It also helps parents to feel part of the team and to understand the important role they can play.

The art of good communication

Parents of preterm infants are likely to be very anxious: they are in an unfamiliar environment and the health of their child can change rapidly. They may have other children or dependants at home and may not be able to spend much time in the neonatal unit. Parents often blame themselves for their child's condition and can feel helpless.

All our communication should be kind and understanding. Talk *with* parents and not *at* them. It is important to find out what they already know about prematurity, vision and the eye as this can provide the basis for communication. Simple, clear language is very important, so that what we say is understandable. Ask whether parents have any questions, and allow plenty of time for them to respond. Information may have to be repeated several times and may also change as the situation changes and the parents learn more, or are asked to do more.

Answering all questions without hesitation enhances parents' trust. We should let parents know that they can ask questions and can express their worries and concerns at any time. Empathy, listening and patience are essential in good communication, as is good eye contacta. Wait until a parent has finished before you reply; interrupting can prevent parents from asking important questions or sharing important information with the medical team. Parents like to know the simple truth.

There are also practical things parents can do to help. Supportive care practices such as kangaroo care and feeding babies breast milk (pp. 50–54) not only improve health outcomes in preterm babies, but also involves the parents in a very positive way.

The parents' perspective

When the medical team's focus is on ensuring the survival of a preterm baby, it may be quite difficult to see the situation from a parent's perspective. Admission to a neonatal intensive care unit makes parenting very difficult: tubes, monitors and incubators can get in the way of the normal bonding between parent and child. Family-centred or family-integrated care (**http://familyintegratedcare.com**) is an approach that has been developed to enable parents to have the close interaction and contact they need with their infant[1]; this also includes kangaroo care and feeding babies breast milk (from the breast or using a cup).

Supportive care practices and approaches can change the relationship between the medical team and parents by emphasising – to both parents and the team – the importance of working together. Many studies report significant improvement in clinical outcomes as a consequence of adopting these practices.[2,3] Studies have shown that parents who are more aware of their child's medical condition, and who are engaged in their care while in the neonatal intensive care unit, have more positive attitudes and are more likely to bring their infant back for follow-up.[4,5]

Educating parents and increasing their awareness about ROP should start weeks before the first screening appointment is planned. Parents need to be given time to absorb the information and to ask questions or express their concerns, and do so at their own pace. Nurses are ideally placed to start talking to parents about the potential complications of prematurity, including ROP and other visual complications (pp. 62–64). It is important to take into account the amount of information each parent wants at any specific time. Appointing an experienced nurse as an ROP co-ordinator can further enhance nurse-parent

communication.[6] When it is time for ROP screening, a nurse or neonatologist who knows the parents well can introduce the ophthalmologist, as this builds trust.

For many infants, ROP screening starts in the neonatal unit but continues after they have been sent home with their parents. Parents need to understand the importance and the timing of screening so that they will bring their child back at the right time. They also need to know that laser treatment, if needed, cannot be delayed. Infants who have had treatment need regular follow-up visits to ensure that the treatment has been successful in the short term, and to detect and manage complications in the longer term (pp. 62–64). The active engagement of parents can, therefore, make all the difference between success and failure in preserving their child's vision.

Supporting communication

Written and visual materials can help to support verbal communication. Posters which use simple language and clear images can be used to explain the importance of ROP screening, and that treatment may be needed. (Note: The images in this issue can be used for posters and other educational materials, except if there is a copyright notice. Visit **www.flickr.com/communityeyehealth** to download high-resolution images.)

If parents are given a booklet when their baby is admitted, ensure that ROP is mentioned. This provides a gradual introduction to ROP in the first few days after admission.

Each unit should have a parent information booklet about ROP which parents can read themselves and which staff can use as the basis of education and counselling. The booklet should use simple terminology and provide consistent information which the team can refer back to if required. Highlight the fact that the risk of ROP can be reduced and that treatment (if needed) is usually successful.

Cover the following topics:

- What is ROP and why does it occur?
- How common is ROP?
- How is ROP detected?
- What should we expect during and after an eye examination?
- Will my child need treatment?
- What happens if my baby is unwell?
- Where can I find out more? (with websites if appropriate)
- Contact details for members of the neonatal team or the ophthalmologist



PHFI

Figure 1 An ophthalmologist explains to the mother the importance of screening a preterm baby.

Images of the normal retina and the retina with ROP can be a very useful way to educate parents about ROP.

Systems to support parental involvement

The ophthalmologist is the best person to communicate the findings of screening to parents, accompanied by a member of neonatal team whom the parents already know (usually a nurse). The ophthalmologist should explain what the findings mean using clear, non-technical language (Figure 1). The nurse can provide additional information if the parents have questions or concerns after the ophthalmologist has left the unit.

Maintaining good medical records of the findings of screening, the management decision, and any follow-up (see p. 58), is essential. Note whether parents were informed personally about the findings and what happens next. Good medical records also enhance team communication. The consultant neonatologist or paediatrician is responsible for co-ordinating follow-up screening, either in the neonatal unit or the eye department after discharge. This responsibility can be delegated to the ROP nurse co-ordinator, if one is in post, or a nurse.

If a baby is to be discharged from the unit before ROP screening has been completed, it is crucial that the first follow-up appointment is made before the family leaves. The neonatal team must have the correct contact details for the family, i.e., their address and two up-to-date mobile numbers, so that they can be reminded about about the next appointment and contacted immediately if they do not attend for screening or treatment.

Give parents the following information:

- The appointment date, time and place (which may be in the unit or in the hospital where the ophthalmologist works)
- Who to contact if there are problems
- Details about transport assistance or reimbursement of costs for travel, if appropriate
- Information about the consequences of late screening and the potential risk of blindness if screening does not take place.

This must be written in the child's medical records and in the discharge summary (which the parents keep).

In conclusion, good communication is an art which can be improved. It supports parental involvement, which in turn contributes to good medical care and better outcomes for a baby with ROP.

References

1 Ho LY, Faia LJ and Trese MT. Safety Net for ROP Management. Expert Review of Ophthalmol. 2014:327–331.

2 Wigert H, Blom M, Bry K. Parental experiences of communication with neonatal intensive-care unit staff: an interview study. BMC Pediatr 2014;14: 304.

3 O'Brien K, Bracht M, Macdonell K et al. A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. BMC Pregnancy and Childbirth 2013; 13(Suppl 1): S12.

4 Vinekar A, Jayadev C, et al. Improving follow-up of infants during retinopathy of prematurity screening in rural areas. Ind. Paed. 2016(53): S151–S154.

5 Mousavi SZ, Karkhaneh R, Roohipoor R, et al. Screening for retinopathy of prematurity: the role of educating the parents, Iran J Ophthalmol 2010: 22(2):13–18.

6 Coats, DK and Reddy, AK (2009). Retinopathy of prematurity. In: Pediatric Ophthalmology: Current Thought and A Practical Guide (pp. 375–386). Springer Berlin Heidelberg.

Following up children born preterm



P Vijayalakshmi
Chief, Paediatric Ophthalmology & Strabismus, Aravind Eye Care System, Madurai, Tamil Nadu, India.



Clare Gilbert
Professor of International Eye Health and Co-director: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.

Babies born preterm, particularly those who have been treated for retinopathy of prematurity, are at greater risk of other eye conditions. Examining these children again, at the right time, can save their sight.



A six-year-old girl with stage 5 ROP in her right eye. Her left eye can see 6/60 after vitrectomy for stage 4b ROP and cataract surgery. INDIA

Preterm babies, and newborns who are unwell, are now surviving at higher rates globally than ever before. This is the result of expansion and improvement in services for sick and preterm babies. However, preterm birth is associated with a range of complications, including retinopathy of prematurity (ROP), and preterm infants are at a far higher risk of disabilities – including blindness – than healthy, full-term babies.[1] Clinicians, together with low vision and rehabilitation specialists, can play a key role in reducing visual impairment and promoting normal development in this group of children.

The most common visual complications of prematurity are ROP and cerebral visual impairment (CVI), secondary to brain damage. CVI is associated with developmental delay and cerebral palsy. All preterm babies are at increased risk of refractive errors, particularly myopia, astigmatism, anisometropia (different refractive errors in each eye), and strabismus.[2,3] All of these conditions increase with increasing prematurity. Some babies, particularly those who have been treated for ROP with laser, can develop cataract and glaucoma. The consequences of ROP can also lead to scarring and distortion of the retina, with loss of vision (Figure 1).

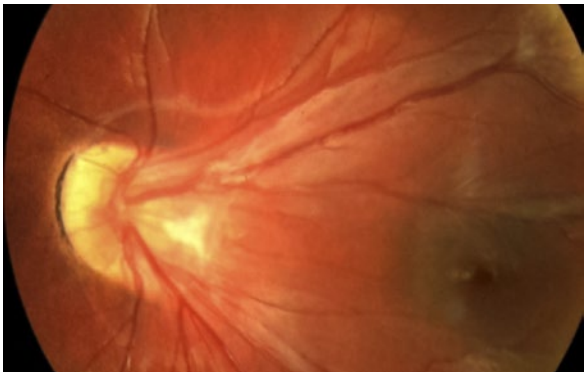
Refractive errors

In children who were born preterm, refractive errors have an early age of onset. It is important that any refractive errors are detected and managed properly in order to prevent amblyopia. However, it is important to bear in mind that the refractive status of the eyes changes dramatically over the first few years of life as the eyes grow, with most children's eyes becoming emmetropic (no refractive error) by the time they are 5–6 years old. It is thought that peripheral laser treatment for ROP, or the ROP itself, may interfere with these processes, leading to refractive errors.

Myopia

Preterm babies are more likely to develop myopia than full term babies, even if they did not develop ROP. This is usually relatively low myopia, which develops at around the age of 4–5 years (the blue line in Figure 2). Babies who have developed any degree of ROP are at a higher risk than those who did not, and the myopia may be more severe and have an earlier onset (green line). Babies who have been treated for ROP using laser are at greatest risk, and may develop high myopia within a few months of treatment (orange line). Their myopia can progress rapidly before it stabilises (Figure 2).

Figure 1 Scarring and distortion of the retina is one of the consequences of ROP.



ICEH

Figure 2 The risk and age of onset of myopia in children born preterm, depending on whether they developed ROP and whether they were treated for it

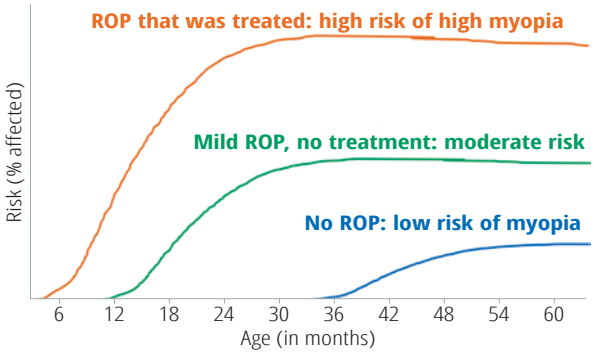


Table 1 Ocular complications of preterm birth and suggested timing of first examination

Preterm baby with ...	What to look for	Level of risk	Timing of first and subsequent examinations
No ROP	Myopia	Low	At 2 years of age and annually thereafter
ROP, but no laser treatment needed	Myopia, astigmatism, strabismus	Moderate	At 1 year of age and annually thereafter
ROP, treated with laser	High myopia, astigmatism, strabismus, CVI, anisometropia	High	At 3 months of age and every 3–4 months to 2 years of age; then every 6 months to 6 years; and annually thereafter

Astigmatism due to anisometropia

Astigmatism (due to an irregularly shaped cornea) and anisometropia are common, particularly following ROP treatment. Both can lead to amblyopia, which can be bilateral, if not detected and treated early. Treatment involves spectacle correction and daily intermittent occlusion of the better-seeing eye, with frequent follow-up visits.

Strabismus

Strabismus (squint) is less common than refractive errors and may occur either in isolation or with a refractive error. Children with cerebral palsy following preterm birth are more likely to have strabismus. The degree of misalignment can vary over time, making the decision whether and when to operate more difficult than in children who were born at term.[3]

Cerebral visual impairment and other eye conditions

Cerebral visual impairment should be suspected if the parents report that their child does not seem to see normally in the absence of any obvious ocular cause (although optic atrophy often accompanies CVI).

Cataract and glaucoma can develop either spontaneously or following treatment for ROP. The management of cataract and glaucoma in infants born preterm is extremely challenging, with glaucoma having a poor prognosis.

Assessing and following up young children born preterm

It is recommended that all children who were born preterm are assessed by an ophthalmologist, particularly children who were treated for ROP and those with mild ROP which did not require treatment. However, there are no agreed guidelines for when this should be done. Table 1 gives some suggestions. At both initial and follow-up visits, consider the following:

- Is the child developing normally?
- Does the child seem to have normal vision?
- Is strabismus or nystagmus present?
- Does the retina look normal/healthy?
- Is there a significant refractive error?
- Are there any other eye problems, such as cataract?

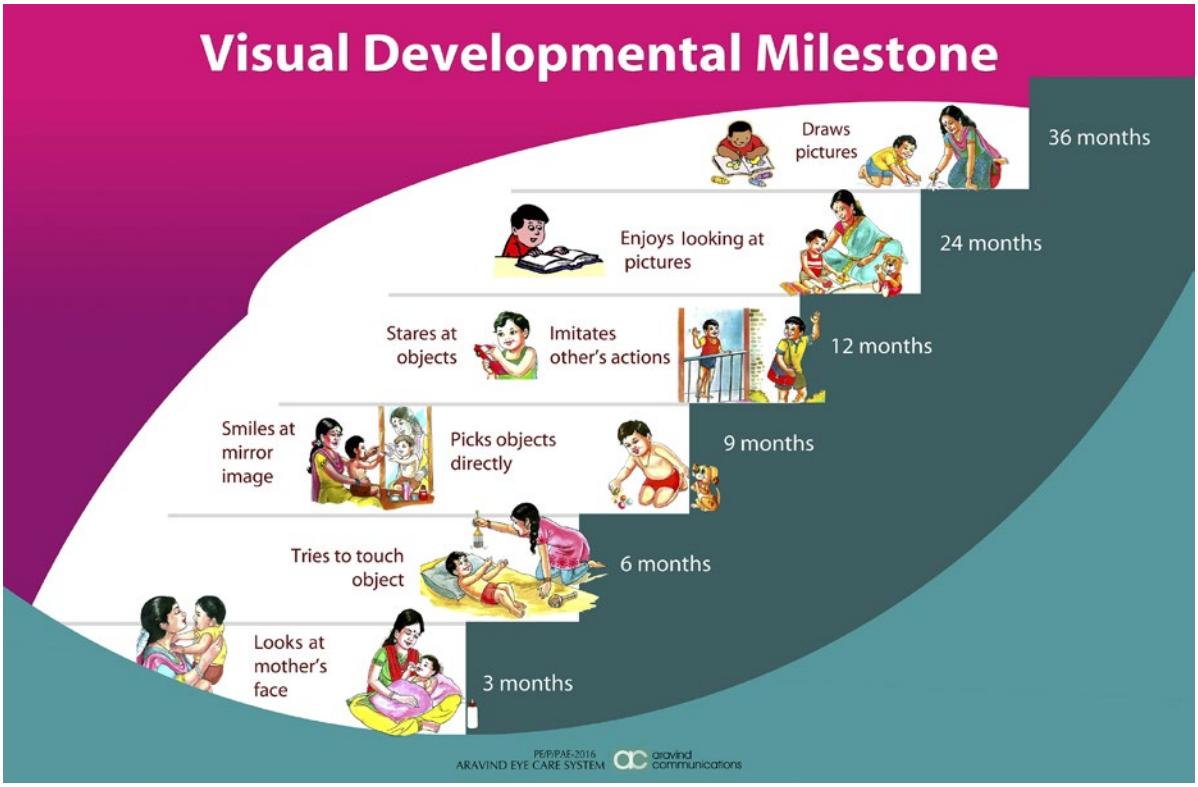
Many parents believe that children born preterm develop more slowly than babies born at term. This is not the case in uncomplicated prematurity, and so it is important to assess the child's overall development (Table 2). Children born preterm are more likely to have

Continues overleaf ➤

Table 2 Developmental milestones for children aged three months to 5 years

3 months	7 months	1 year	2 years	3 years	4 years	5 years
Begins to develop a social smile	Enjoys social play	Enjoys initiating play with others	Walks alone	Climbs well	Goes upstairs and downstairs without support	Swings, climbs, hops and somersaults
Raises head and chest when lying on the stomach	Transfers objects from hand to hand	Reaches sitting position without assistance	Points to objects or pictures when they are named	Turns book pages one at a time	Draws circles and squares	Says name and address
Watches faces intently	Ability to track moving objects improves	Bangs two objects together	Begins make-believe play	Uses 4 to 5 word sentences	Tells stories	Can count 10 or more objects
Smiles at the sound of your voice	Responds to own name	Responds to simple verbal requests	Demonstrates increasing independence	Sorts objects by shape and colour	Co-operates with other children	Likes to sing and dance
	Finds partially hidden objects					

Figure 3 At every appointment, check whether children are achieving their expected visual milestones



global developmental delay (i.e., affecting all aspects of motor, social and cognitive development), or cerebral palsy, cognitive disability or autism. These children need to be identified early and referred for specialist care, for example to a developmental paediatrician or physiotherapist.

Measuring visual acuity in young children is extremely difficult, but their visual functioning can be assessed using visual development milestones (Figure 3). Children who are irreversibly visually impaired or blind should be referred for vision rehabilitation.

Ocular alignment and eye movements should be assessed, and dilated examination of the retina and optic disc should be performed. Measure IOP and axial length when needed.

NOTE: Refraction should be performed with cycloplegia. If refraction is unreliable, consider refraction with atropine cycloplegia, under general anaesthesia.

Prescribing and dispensing spectacles for young children

As a young child's visual world is near, it is not necessary to prescribe for, or fully correct, all simple myopia.

Table 3 Prescribing guidelines for young children born preterm

	3–18 months	18 months onwards
Prescribe if ...	Sphere more than ±5D and/or Cylinder ≥2.5D and/or Anisometropia >1.5D	Sphere more than ±3D and/or Cylinder ≥2.5D and/or Anisometropia >1.5D
Prescribe on an individual basis if ...	Sphere less than ±5D and Cylinder less than 2.5D and Anisometropia less than 1.5D	The refractive error is the same on two consecutive visits, two months apart

Suggestions for prescribing at different ages are shown in Table 3, which should be tailored to the individual child.

Young children do not have a well-formed bridge to their nose, and they require small frames and accurate centration of the lenses. The arms of the frame should fit around the ears, or the arms can be tied behind the child's head. Light, plastic lenses should be used.

Counselling parents

Parents may be shocked and upset when they hear that their small child needs to wear spectacles or needs occlusion. This is particularly true for parents of babies who have been treated for ROP as they will already have had many anxieties and hurdles to overcome. Careful and repeated counselling is required to ensure that parents fully understand the need for their child to wear spectacles, that frequent follow-up will be required and the spectacles may need to be replaced.

Summary

Children born preterm can have a range of complications which can impact on their development and the rest of their life. Successful management and the best possible outcome depends upon recognising and treating any problems as early as possible.

References

1 Beligere N, Perumalswamy V, Tandon M, Mittal A, Floora J, Vijayakumar B, Miller MT. Retinopathy of prematurity and neurodevelopmental disabilities in premature infants. Semin Fetal Neonatal Med. 2015 Oct;20(5):346–53.

2 Fielder A et al. Impact of retinopathy of prematurity on ocular structures and visual functions. Arch Dis Child Fetal Neonatal Ed. 2014;0:F1–F6.

3 Vijayalakshmi P., Kara T. and Gilbert C. Ocular Morbidity Associated With Retinopathy of Prematurity in Treated and Untreated Eyes: A Review of the Literature and Data From a Tertiary Eye-care Center in Southern India. Indian Peds 2016 53: Supplement 2:137–142.

Reaching remote Amazonian communities to eliminate trachoma



Julian Trujillo Trujillo
Group Coordinator for the Integral Management of Emerging, Re-emerging and Neglected Diseases: Ministry of Health and Social Protection of Colombia.



Tim Jesudason
Communications Specialist: International Coalition for Trachoma Control, London, UK.



Girija Sankar
Assistant Director of Programs & Communications: International Trachoma Initiative Atlanta, USA.

Worldwide, many indigenous peoples are at risk of developing trachoma, a bacterial eye disease that disproportionately affects the world's poorest communities. In Colombia's remote Amazonian districts, trachoma is still endemic amongst many of the indigenous communities that live there.

The remoteness of these communities often means they have limited access to formal health care services, which makes trachoma elimination very challenging. However, extraordinary new efforts by Colombian health authorities to tackle trachoma have shown that great progress can be made if there are adequate resources, co-ordination and local engagement.



JULIAN TRUJILLO TRUJILLO

Community members being checked for trachoma in Mitu, Vaupés District. COLOMBIA

Maximising efficiency

From 2012–2016, the Colombian Ministry of Health researched and created maps showing where trachoma was most prevalent in its Amazonian districts. This was needed to identify all people at risk of trachoma, and to understand where resources had to be allocated. Reaching indigenous communities in the Amazonian districts presented major logistical challenges and required substantial resources due to the contrasting landscapes and limited travel routes. Sometimes, flights had to be chartered; at other times, boats had to be carried along trails where rapids or waterfalls interrupted river travel routes.

Once the mapping work was complete and the Government understood the scale of the trachoma burden, the next challenge was to figure out the best way to deliver treatment in these hard-to-reach areas. To maximise efficiency, program managers developed an 'integrated package' of interventions. Alongside the distribution of antibiotics for trachoma, health workers also distributed treatments for soil-transmitted helminths. Because under-developed areas are frequently burdened by a number of diseases that thrive in areas with poor access to clean water and sanitation, Colombian health authorities also established intercultural dialogue to educate the communities about the relationship between personal hygiene and good health. This integrated approach delivered treatment and education to over 400 Amazonian communities, significantly improving health in these communities while maximising the impact of resources.

Tailored programming

Innovative programming approaches were needed in order to deal with the great cultural diversity among the indigenous communities. Community structures, languages, levels of education, migration patterns, environmental conditions and attitudes to health interventions all differed vastly from village to village, and programme staff encountered over 50 different languages throughout the region. Many indigenous communities also live semi-nomadic lifestyles and frequently cross international borders, making prevention, treatment and surveillance programmes difficult to implement and maintain.

In order to tackle these challenges, health workers from the same or nearby districts were recruited and trained, wherever possible. This helped programme staff to gain a better understanding of local cultures and any migration patterns that might affect planned health care programmes. The health workers could also readily translate information into the local language, which increased trust between programme staff and community leaders, thereby increasing community confidence in programme interventions.

Colombian health authorities are also developing working relationships with neighbouring countries and their health authorities in order to overcome the challenges posed by migration. National programme managers meet regularly to discuss trachoma elimination strategies at major events such as the World Health Organization (WHO) Pan-American Health Organization regional meeting, where experiences are shared and relevant courses of action are decided. This regional collaboration has had a positive impact on cross-border interventions and has led to new initiatives, including mapping for trachoma and soil-transmitted helminths in Peru along the Amazonian basin, near the border with Brazil and Colombia.

Going forward

Despite recent progress, Colombia has more to do to in order to eliminate trachoma as a public health problem by 2020. Around 180,000 people are still at risk of trachoma in remote and hard-to-reach parts of the country. The good news is that Colombia's experience shows that tailoring programmes to fit the needs of indigenous people works. With adequate resources, extensive context-specific planning, extended timeframes and strong consultation with a range of stakeholders, from village chiefs to foreign health departments, programmes can improve health among indigenous communities.

Test your knowledge and understanding

This page is designed to help you to test your own understanding of the concepts covered in this issue, and to reflect on what you have learnt.



CLARE GILBERT

Preterm baby being given unmonitored supplemental oxygen (via the blue tube). The baby is very pink and hyper-oxygenated. This increases the risk of ROP and must be avoided.

We hope that you will also discuss the questions with your colleagues and other members of the eye care team, perhaps in a journal club. To complete the activities online – and get instant feedback – please visit **www.cehjournal.org**

Tick ALL that are TRUE

Question 1

Which of the following factors can increase the risk of for ROP during the first 4 weeks of life?

- ☐ **a** Infection
- ☐ **b** Poor weight gain after birth
- ☐ **c** Oxygen saturations that are above 95%
- ☐ **d** Gestational age of 36 weeks or above
- ☐ **e** Low body temperature

Question 2

Screening for retinopathy of prematurity

- ☐ **a** The ophthalmologist should identify which babies should be screened
- ☐ **b** The first screening should take place as soon as the neonatologist says the baby is well enough
- ☐ **c** An ophthalmologist should visit the unit every two weeks to screen
- ☐ **d** Babies with plus disease should be screened again in a week
- ☐ **e** Screening is usually undertaken using an indirect ophthalmoscope

Question 3

Treatment of ROP

- ☐ **a** Laser treatment is painful
- ☐ **b** ROP in zone 3 has a worse prognosis than ROP in zone 1
- ☐ **c** The laser spots should be confluent
- ☐ **d** Stage 2 ROP in zone 2 with plus disease should be treated
- ☐ **e** After treatment, babies should be seen again in 4 weeks

Question 4

Follow-up of babies who developed ROP

- ☐ **a** Babies who have been treated for ROP have more complications than babies who had ROP that did not need treatment
- ☐ **b** Strabismus should be operated on as soon as it is detected
- ☐ **c** High myopia can occur within a few months of laser treatment
- ☐ **d** Occlusion therapy may be required to prevent or treat amblyopia
- ☐ **e** Children born preterm may be developmentally delayed

ANSWERS

1. a, b, c and e are true. Gestational age of less than 36 weeks is a risk factor.
2. a, c, and d are true. Zone 1 ROP has a worse prognosis, and babies should be seen within 1–2 weeks of laser to ensure that the disease is regressing.
3. e is true. The neonatologist should identify which babies need to be screened, and screening must be done before 30 days after birth. An ophthalmologist should visit the unit once a week, and all babies with plus disease require treatment.
4. a, c, d, e are true. In children with strabismus who were born preterm, the degree of misalignment can vary so the decision about when to operate is more difficult.

Picture quiz



CLARE GILBERT

Tick ALL that are TRUE

Question 1 What could be done to improve the care of this preterm baby?

- ☐ **a** Monitor blood oxygen saturation
- ☐ **b** Kangaroo care
- ☐ **c** Feed the baby with the mother's breast milk
- ☐ **d** Support the baby's limbs
- ☐ **e** Keep the baby cool

Question 2 How is ROP classified?

- ☐ **a** Aggressive posterior ROP
- ☐ **b** 5 zones
- ☐ **c** 5 stages
- ☐ **d** Posterior ROP
- ☐ **e** 3 zones

Question 3 Screening for ROP

- ☐ **a** Can be done at any time as long as the baby is stable
- ☐ **b** Can cause the baby stress
- ☐ **c** Is never needed after the baby is discharged from the neonatal unit
- ☐ **d** Should include babies at risk even if they are sick
- ☐ **e** Should be done by 30 days after birth

Question 4 Follow-up of children born preterm

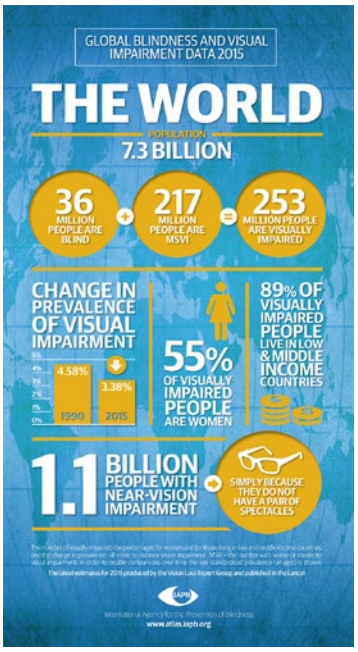
- ☐ **a** Refractive errors are uncommon after laser treatment for ROP
- ☐ **b** Babies less than 12 months of age should not be given spectacles
- ☐ **c** Some preterm babies are developmentally delayed
- ☐ **d** A normal eye examination means the child can see normally
- ☐ **e** Strabismus is easy to manage

ANSWERS

1. a, b, c and d are true. Premature babies need to be kept warm; a plastic bag can be used immediately after birth (see p. 54).
2. a, c and e are true.
3. b, d and e are true. Babies who are premature or low birthweight should ideally be screened by 30 days of life.
4. c is true. After laser treatment, a high degree of myopia can develop within a few months of treatment, while they are still infants (<12 months of age). Low degrees of myopia do not need to be treated immediately, but high myopia should be treated to prevent amblyopia. Strabismus can be difficult to manage because it can change over time.

IAPB Vision Atlas

The IAPB Vision Atlas was launched on World Sight Day 2017. It contains the latest data on prevalence and causes of blindness and visual impairment by region and country, as well as projections to 2020 and 2050. It also includes the success indicators (e.g., cataract surgical coverage, number of eye health personnel) needed to achieve the WHO Global Action Plan. To find out more, please visit: **http://atlas.iapb.org**. This infographic is available for free download from **http://tinyurl.com/IAPB-atlas**



IAPB

Affordable spectacles

VisionSpring is a US-based non-governmental organisation that provides affordable, high-quality, and durable spectacles to organisations and institutions that serve people who live on less than US $4 per day. They are seeking partners who would be interested in starting a community eye care outreach programme in their local area, and can also provide affordable spectacles to existing outreach activities. Read more on **www.visionspring.org**

Courses

MSc Public Health for Eye Care, London School of Hygiene & Tropical Medicine

Fully funded scholarships are available for Commonwealth country nationals. The course aims to provide eye health professionals with the public health knowledge and skills required to reduce blindness and visual disability. For more information visit **www.lshtm.ac.uk/study/masters/mscphec.html** or email **romulo.fabunan@lsthm.ac.uk**

Free online courses

ICEH Open Education for eye care programme offers a series of online courses in key topics in public health eye care. All the courses are free to access. Courses: Global Blindness, Eliminating Trachoma, Ophthalmic Epidemiology Basic Principles (1) and Application to Eye Disease (2). More free courses coming! Certification also available. For more information visit **http://iceh.lshtm.ac.uk/oer/**

Subscriptions

Contact Anita Shah
admin@cehjournal.org

Subscribe to our mailing list
web@cehjournal.org or visit
www.cehjournal.org/subscribe

Visit us online
www.cehjournal.org
www.facebook.com/CEHJournal
https://twitter.com/CEHJournal

Next issue



The next issue of the *Community Eye Health Journal* is our **100th issue** and celebrates the first 30 years of our work.

Key community eye health messages

Babies born before 36 weeks (preterm) are at risk of retinopathy of prematurity (ROP)



© GERTFRIK/123RF

- The more preterm they are, the greater the risk
- Poor neonatal care increases the risk, even in less premature babies

It is possible to prevent ROP from causing visual impairment and blindness. This requires:



© NAPOCSKA/SHUTTERSTOCK

- High quality neonatal care. If there is not enough equipment to safely deliver and monitor oxygen, this must be strongly advocated for
- Screening: All babies at risk must be screened before 30 days after birth
- Treatment: Laser treatment should be given urgently, with confluent spots
- Follow-up: All children born preterm are at risk of visual impairment and must be followed up by an ophthalmologist and/or optometrist

Parents are important members of the eye care and neonatal team



PHFI

- Involve parents in the day-to-day care of the baby and encourage kangaroo care
- Keep parents informed of the need for screening and the results of screening, and the need for urgent treatment, if required
- Ensure parents understand the need for follow-up visits