

UK screening of retinopathy of prematurity guideline

March 2022

Summary of recommendations



British Association of
Perinatal Medicine



UK screening of retinopathy of prematurity guideline: Summary of recommendations

Royal College of Paediatrics and Child Health in collaboration with
Royal College of Ophthalmologists and British Association of Perinatal Medicine

March 2022

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This document should be referenced as:
Royal College of Paediatrics and Child Health. UK screening of retinopathy of
prematurity guideline: Summary of recommendations, March 2022.

Executive summary

Retinopathy of prematurity (ROP) is one of the few causes of childhood visual disability, which is largely preventable. Many extremely preterm infants will develop some degree of ROP, although in the majority of cases this never progresses beyond mild disease which resolves spontaneously without treatment. A small proportion develop potentially severe ROP, which can be detected through retinal screening. If untreated, severe disease can result in visual impairment and, consequently, all infants at risk of sight-threatening ROP (ST-ROP) should be screened.

This evidence-based guideline for the screening of ROP was developed by a multidisciplinary guideline development group (GDG) of the Royal College of Paediatrics & Child Health (RCPCH). The guideline was produced according to the RCPCH standards for guideline development¹. A separate guideline on the treatment of ROP has been developed by the Royal College of Ophthalmologists (RCOphth).

The most significant change from the 2008 Guideline is that the gestational age screening criterion has been lowered to less than 31 weeks (i.e., up to and including 30 weeks and 6 days). The birthweight criterion of less than 1501g has not been changed. In addition, the guideline provides 25 evidence-based recommendations and 15 good practice points. Recommendations are graded according to the strength of the evidence underpinning them. The service configuration good practice points (GPP) are a consensus of the GDG.

This guideline has been produced specifically for use within the UK and supersedes the previous guideline². It will not be applicable in countries where more mature infants are at risk of ST-ROP³.

All the recommendations are included in this summary. The [full guideline](#) should be consulted for complete details of the guideline methodology in Appendices A, B, C and D. Appendix E presents an algorithm for ophthalmic criteria for screening and treatment and Appendix F presents a standardised sheet for recording screening examination results, while Appendix G presents suggestions for the role of an ROP coordinator and Appendix H provides a parent/carer information leaflet on screening for ROP.

All the documents are available on the websites of the [RCPCH](#) the [RCOphth](#) and the British Association of Perinatal Medicine www.bapm.org.

1. Royal College of Paediatrics and Child Health. *Setting standards for the development of clinical guidelines in paediatrics and child health*, 5th edition. April 2020.

2. The Royal College of Ophthalmologists, Royal College of Paediatrics and Child Health, British Association of Perinatal Medicine, et al. *Guideline for the Screening and Treatment of Retinopathy of Prematurity*. 2008.

3. Gilbert C., Fielder A., Gordillo L., et al. Characteristics of infants with severe retinopathy of prematurity in countries with low, moderate, and high levels of development: Implications for screening programs. *Pediatrics* 2005; 115(5): e518-525.

Summary of recommendations

ROP screening recommendations

Screening criteria:

All infants less than 31 weeks' gestational age (GA) (up to and including 30 weeks and 6 days) OR less than 1501g birth weight should be examined to screen for the presence of Retinopathy of prematurity (ROP) (one criterion to be met for inclusion). [Evidence level: High (Grade: B)].

Time of first examination:

For infants born before 31+0 weeks' GA, the first ROP examination should be performed between 31+0 and 31+6 weeks' postmenstrual age (PMA), or at 4 completed weeks' postnatal age (PNA) (28 – 34 days), whichever is later. [Evidence level: High (Grade: B)].

For infants born from 31+0 weeks' GA, the first ROP examination should be performed at 36 weeks' PMA or 4 completed weeks' PNA (28 – 34 days), whichever is sooner. [Evidence level: High (Grade: B)].

When to consider referral:

Refer infants for treatment when criteria have been met:

- zone I with plus disease and with any stage of ROP
- zone I without plus disease but with stage 3 ROP
- zone II with plus disease and with stage 3 ROP (zone II stage 2 with plus disease is borderline for treatment and may be treated or re-examined in one week or less) (note: plus disease should be present in at least two quadrants)

Discuss with treating ophthalmologist within when referral warranted ROP is present:

- Any pre-plus or plus disease in two or more quadrants in any zone.
- Any zone I or posterior zone II disease.
- Any stage 3 disease in any zone. [Evidence level: High (Grade: B)].

Subsequent examinations:

After the first ROP screening, if treatment is not required re-examine at least weekly when:

- the vessels end in zone I or posterior zone II with or without any stage of ROP; OR
- there is any plus or pre-plus disease; OR
- there is stage 3 ROP in zone II or III

until the criteria for treatment or two weekly examination or termination have been reached. [Evidence level: High (Grade: B)].

After first ROP screening, if treatment is not required and criteria for weekly examination are not present, re-examine at least every two weeks when:

- the vessels end in mid or anterior zone II or in zone III; AND
- there is no plus or pre-plus disease; AND
- there is no ROP or stage 1 or 2 ROP

until the criteria for treatment or weekly examination or termination of screening have been reached. [Evidence level: High (Grade: B)].

Delayed examination:

Only in rare circumstances, consider postponing the examination or performing a limited examination without an eyelid speculum and scleral indenter, when an infant is exceptionally unstable.

- This decision should be made at consultant/senior level, and the rationale, its implications, and next steps in screening should be discussed with parents/carers and recorded in the infant's medical records.
- Reschedule the next examination no later than one week beyond the intended examination. [Evidence level: Low (Grade: D)].

Termination of screening:

For infants without ROP, continue examinations until vascularisation has extended into zone III – as a guide, this is unlikely to have occurred prior to 36 completed weeks' postmenstrual age (36+0 weeks). If there is uncertainty about the zone, consider a further confirmatory examination two weeks later. [Evidence level: High (Grade: B)].

For infants with any stage ROP, consider discontinuing screening examinations when any of the following characteristics of regression are detected on at least two consecutive examinations:

- partial resolution progressing towards complete resolution
- change in colour of the ridge from salmon pink to white
- growth of vessels through the demarcation line. [Evidence level: High (Grade: B)].

Preparation for examination

Preparation of the eye:

Use a mydriatic combination of phenylephrine 2.5% and cyclopentolate 0.5%. Instil one drop of each drug in two doses, five minutes apart, one hour prior to examination to achieve effective mydriasis in preparation for ROP screening.

Tropicamide 0.5% may be used as an alternative to cyclopentolate 0.5%, noting that it has a shorter duration of action. [Evidence level: High (Grade: B)].

Pain relief:

Use proxymetacaine 0.5% or oxybuprocaine 0.4% as topical anaesthesia just prior to examination when an eyelid speculum is to be used. [Evidence level: High (Grade: B)].

Comfort care during examination:

Consider using a combination of care techniques to comfort the infant during eye examination, as per local guidance. These may include the use of nesting or swaddling, non-nutritive sucking, administration of expressed breast milk, and/or oral sucrose solution. [Evidence level: Moderate (Grade: B)].

Parents/carers should be offered the opportunity to be present during the examination and to facilitate comfort care. [Evidence level: Moderate (Grade: B)].

Considerations during examination:

Keep ROP screening examinations as short as possible as they have short-term effects on an infant's blood pressure, heart rate and respiratory function.

For examinations undertaken as an outpatient, ensure appropriate neonatal resuscitation equipment and a health professional trained in paediatric basic life support are available in the examination area.

If infants are unstable during an outpatient examination a period of observation is necessary before discharge home.

Discuss with parents/carers the results of the screening, the next steps and that their baby may be unsettled after the examination. [Evidence level: Moderate (Grade: D)].

Screening examination techniques:

Binocular indirect ophthalmoscopy (BIO) and wide-field digital retinal imaging (WFDRI) can be used as examination techniques to screen for ROP.

As examination of the peripheral retina may be limited using WFDRI, either the final screening examination should be performed using BIO or screening should be continued for a longer period until the criteria for termination have been met (WFDRI only). [Evidence level: Moderate (Grade: B)].

Use of eyelid speculum and scleral indenter:

The periphery of the retina should be adequately examined. When using binocular indirect ophthalmoscopy, this may be facilitated using an eyelid speculum and scleral indenter. Be aware the indenter is used to gently rotate the eye, not to indent the sclera. [Evidence level: High (Grade: B)].

Equipment sterilisation:

Sterilise all reusable instruments and disinfect lenses as per hospital policy and manufacturers' guidance or use single-use instruments. [Evidence level: High (Grade: B)].

Recording the results of a screening examination:

Record ophthalmological findings of each ROP examination in the infant's medical records, including detailed information on:

- extent of vascularisation by zone in the absence of ROP
- zone and stage of ROP
- extent of ROP stage in clock hours
- presence and extent in quadrants of any pre-plus or plus disease
- name of the examiner
- date of the next examination or discharge from screening. [Evidence level: Low (Grade: D)]

Informing parents/carers about screening:

Discuss with parents/carers the need for ROP screening and provide parents/carers with access to written information (the Parent/Carer Information Leaflet) with enough time before the examination to allow for questions. [Evidence level: Low (Grade: D)].

Record in the infant's medical records that this information has been given and by whom.

When screening is not complete at the time of discharge, ensure parents/carers are given an outpatient appointment prior to hospital discharge and inform them about the risk of not detecting progression of ROP if appointments are missed.

When screening is complete, ensure parents/carers are informed about the potential for development of refractive errors and/or strabismus later in childhood. [Evidence level: Low (Grade: D)].

Long-term follow-up after screening or treatment:

Monitor all infants with treated ROP at a frequency dictated by the clinical condition (see ROP Treatment Guideline). [Evidence level: Low (Grade: D)].

Service configuration recommendations

Workforce:

Each neonatal Operational Delivery Network (ODN) should ensure, in liaison with local ophthalmology services, that robust arrangements are in place for competent screening and treatment of infants at risk of ROP. Arrangements for ophthalmology cover during planned and unplanned leave should be in place to ensure an uninterrupted service. [GDG consensus (GPP)].

Each neonatal unit should have an identified consultant ophthalmologist with responsibility for screening and deputy/deputies with appropriate knowledge, skill, and competency. [GDG consensus (GPP)].

Each neonatal ODN should have a standard operating procedure for arranging safe and timely treatment, either on-site or transfer to another unit when required. [GDG consensus (GPP)].

Protocol:

All units providing care for infants at risk of ROP should have a written protocol on ROP screening, treatment and the management of infants who need to be transferred to another neonatal unit for treatment. [GDG consensus (GPP)].

The protocol should use the National Screening and Treatment Guidelines as the foundation for local practice and should include:

- roles and responsibilities of key personnel involved in scheduling ROP first screening examinations and follow-up appointments, in particular for those transferred or discharged from the unit before screening has commenced
- roles and responsibilities of those personnel involved in ROP treatment (including the consultant neonatologist, ROP coordinator and screening/treating ophthalmologist)
- contact details for key personnel involved in the ROP service
- record-keeping, use of information leaflets, stores, equipment and its maintenance
- standard operating procedures and audit recommendations for assessment of the quality of service. [GDG consensus (GPP)].

Responsibility for transfers, home discharge and arranging outpatient screening:

For infants transferred to another neonatal unit either before ROP screening begins or when screening has been started but not completed, it is the responsibility of the referring neonatal team to ensure that the receiving unit is aware of the need to start or continue ROP screening. [GDG consensus (GPP)].

For infants discharged home before screening is complete, the first follow-up outpatient appointment should be confirmed, and the details of the location and timing provided to parents/carers before hospital discharge. The importance of attending outpatient appointments should be explained and attendance facilitated as appropriate. [GDG consensus (GPP)].

Communications on failure to attend outpatient screening:

For missed outpatient appointments, parents/carers should be contacted by telephone and then by letter to rearrange the appointment which should be within one to two weeks, depending on clinical concerns. When necessary, community support should be explored to assist parents/carers in attending appointments. [GDG consensus (GPP)].

Telephone and written communications should be recorded in the infant's medical records. [GDG consensus (GPP)].

Responsibilities for record-keeping for inpatient examination:

Neonatal units should keep a record of all infants that require ROP review and the arrangements for their follow-up. [GDG consensus (GPP)].

Screening status and the need for further examinations should be recorded and highlighted in all transfer letters so that screening can continue. [GDG consensus (GPP)].

Recording of the status of ROP should be documented on a form (paper or electronic) that is compatible with the International Classification of ROP and there should be ready access to past records showing the previous status of ROP. [GDG consensus (GPP)].

Facilities and equipment:

Provision and maintenance of an appropriate venue and equipment required for the safe delivery of ROP screening (both inpatient and outpatient), including monitoring and resuscitation, is the responsibility of the department in which the activity occurs. [GDG consensus (GPP)].

Ophthalmologists' work commitment:

Ophthalmologists undertaking regular ROP screening, and their deputies, should have this work included in their job plan. [GDG consensus (GPP)].

Ophthalmologists' expertise and training:

Consultant ophthalmologists who undertake ROP screening must have the appropriate knowledge, skill and competency to perform the examination and be able to identify ROP disease that requires treatment and must ensure that their skills are current and maintained. [GDG consensus (GPP)].

ROP screening examinations

Checklist

ROP screening examination criteria:

- All infants <31 weeks' gestational age (up to and including 30 weeks and 6 days), OR
- All infants <1501g birthweight

Timing of first screen differs according to GA:

Gestational age	Age at first screen (weeks*)	
	Postmenstrual age	Postnatal age
22	31	9
23	31	8
24	31	7
25	31	6
26	31	5
27	31	4
28	32	4
29	33	4
30	34	4
31 (BW<1501g)	35	4
32 (BW<1501g)	36	4
33 (BW<1501g)	36	3
34 (BW<1501g)	36	2
35 (BW<1501g)	36	1

*completed weeks (i.e., 22 = 22+0 to 22+6).

Before first ROP examination :

Inform parent/carers about the screening and give written information with enough time before the examination to allow for questions (copies of the Parent/Carer Information Leaflet from www.rcpch.ac.uk/ROP).

During examination:

Consider comfort care (e.g. the use of nesting or swaddling, non-nutritive sucking, administration of expressed breast milk, and/or oral sucrose solution) in combination with pain relief.

After the screening examination:

Record ophthalmic findings and date of next screening examination (or need for discharge) in infant's medical records.

If examination is postponed for any reason, record the decision made at consultant/senior level and ensure the screening is rescheduled within a week.

Transfer / discharge check list:

- If the infant is transferred or discharged before the first ROP examination, ensure the need for screening is included in the discharge/transfer letter.
- If the infant is transferred or discharged before the ROP screening is complete, the ROP status and arrangements for further examinations must also be recorded in the discharge/transfer letter.
- For infants discharged home, make an appointment for the next screening examination before the infant leaves hospital.
- Ensure parents/carers are aware of the importance of attending outpatient screening examinations.

Algorithm for ophthalmic observations

Observations at each screening examination should determine the appropriate course of action. The ICROP revisited definition of zones of the retina, stage of disease and pre-plus should be used.

Presence of ROP	No		Less Severe						More Severe					
ROP zone or vessel location	II	I	II or III	II or III	I	I	II or III	II or III	II or III	II	II	I	I	A-ROP
ROP Stage	-	-	1 or 2	1 or 2	1 or 2	1 or 2	3	3	ANY	2	3	3	ANY	ANY
Plus/ Pre-plus disease	-	-	None	Pre-plus	None	Pre-plus	None	Pre-plus	Plus	Plus	Plus	None	Plus	Plus
Screening Frequency	Every 2 weeks	Every week	Every 2 weeks	Every week	Every week	At least weekly	Every week	At least weekly	At least weekly	At least weekly	Not applicable			
Contact network treater	No	No	No	No	No	Yes (Discuss*)	No	Yes (Discuss*)	Yes (Possibly treat**)	Yes (Possibly treat**)	Yes (Treat)			
When to treat (if required)									48 – 72 hours			Within 48 hours		
When to discontinue screening	If no ROP observed: Vessels progressed to zone III or infant >36+0 weeks PMA		If ROP observed at any time, discontinue screening when characteristics of regression are observed on 2 successive examinations: - partial resolution progressing towards complete resolution - change in colour of the ridge from salmon pink to white - growth of vessels through the demarcation line											
Notes: Posterior Zone II (as defined by ICROP3) should be regarded as equivalent to Zone I. Plus disease should be present in 2 or more quadrants; Plus disease limited to one quadrant should be regarded as pre-plus. *Discuss: phone discussion with network treater (and share images if available). **Possibly treat: phone discussion with network treater (and share images if available) with a view to probable transfer of infant for possible treatment.														

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Published by RCPCH March 2022



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