Proposed Philippine Guidelines for Screening and Referral of Retinopathy of Prematurity (ROP)

Philippine Academy of Ophthalmology (PAO)
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Retinopathy of prematurity (ROP) is one of the few causes of childhood visual disability and avoidable blindness. Many extremely preterm babies will develop some degree of ROP; although in the majority, this never progresses beyond mild disease and resolves spontaneously without treatment. A small proportion will develop potentially severe ROP that can be detected through regular retinal screening. If untreated, severe sequelae can result in serious vision impairment and all the attendant social, educational, and economic implications of blindness. Hence, all babies at risk of sight-threatening ROP should be screened.

This policy statement addresses the screening and referral guidelines, with a short discussion on the management of ROP. There are 47 recommendations: 21 good practice points (GPP) and 26 evidence-based recommendations. The GPP are a consensus of the group involved in developing this Joint Statement. Each evidence-based recommendation is given a rating of its importance to the care process. The ratings of importance are divided into 3:

A – most important
B – moderately important
C – relevant but not critical

Each evidence-based recommendation is also given a rating of the strength of the best available evidence from which the recommendation was based. The ratings of the strength of evidence are divided into 3:

I – evidence is obtained from at least 1 properly conducted, well-designed randomized-controlled trial including meta-analyses of randomized-controlled trials.
II – evidence is obtained from the following:
- well-designed controlled trial without randomization
- well-designed cohort or case-control analytic studies, preferably from more than one center
- multiple-time series with or without intervention

III – evidence is obtained from the following:
- descriptive studies
- case reports
- report of expert committees/organizations

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The following are guidelines for ROP screening:

REFERRAL NETWORK ORGANIZATION

❖ All Neonatal Intensive Care Units (NICU) and hospitals without NICU's but with birthing units should have a written protocol and referral network system in place for ROP screening. The NICU/ birthing unit staff and physicians caring for premature infants should be aware of their responsibilities in this referral network system.	GPP
❖ The rotating NICU pediatric resident/ pediatrician/neonatologist will be responsible for coordinating all old and new referrals of admitted high-risk premature infants with the ophthalmologist or Department of Ophthalmology. Referrals will be done by submitting duplicate copies of the ROP screening form containing the basic information of the premature infants. These referrals will be endorsed to the ophthalmology resident or consultant on agreed days for ROP screening.	GPP
❖ After the examination, the official ROP screening form has to be accomplished by the examining ophthalmologist immediately after the examination. Duplicate forms will be accomplished - one for the patient's chart and a second for the Ophthalmology Department's or ophthalmology consultant's file.	GPP
❖ All patients who are being screened or are to be screened for ROP should have their charts marked accordingly by the NICU/birthing unit staff so as not to miss any screening schedules or patients. A logbook of infants for ROP screening and followup may be kept.	GPP
❖ The NICU nurse/pediatric resident will be responsible for ensuring that the infant's parents/guardians are aware of the infant's outpatient follow-up and its importance.	GPP
❖ The attending pediatrician and ophthalmologist will coordinate with each other in the event that a premature infant screened will require treatment.	GPP
❖ In places wherein there are no ophthalmologists in the roster of the hospital (e.g. hospitals outside Metro Manila), the NICU/birthing unit/attending pediatrician should call the ROP Hotline (PAO Secretariat 8135318, 09209133716) to inquire about the location of the nearest ROP screener in the area. The attending pediatrician is responsible for coordinating with the ROP screener.	GPP

CRITERIA FOR SCREENING

❖ All premature infants <35 weeks gestational age (GA) or birth weight (BW) <2000 grams must be screened for ROP.[1]	A;II
❖ Infants with GA ≥ 35 weeks or BW ≥2000 grams assessed by the attending pediatrician or neonatologist as having unstable clinical course should be screened for ROP.[1]	A;II

- The following risk factors in premature infants were noted to be associated with the development of ROP[2-5] and, thus, its presence should alert the pediatrician/neonatologist to refer for ROP screening:
  a. Perinatal risk factors – maternal infection during the 3rd trimester, placenta previa, poor nutrition, pre-eclampsia/eclampsia, premature rupture of membranes (PROM) ≥ 18 hours before delivery, multiple gestation
  b. Neonatal risk factors – oxygen supplementation (nasal cannula, mask, hood, CPAP or mechanical ventilation), anemia, interventricular hemorrhage, jaundice, respiratory distress syndrome, seizure, sepsis, any syndrome, blood transfusion

TIMING OF SCREENING

❖ The first examination must be performed at 2 weeks post-natal age (PNA) or at 32 weeks postconceptional age (PCA=GA + PNA), whichever comes earlier.[6]	A;II
❖ If an infant referred for ROP screening cannot be examined due to a critical systemic condition, the reasons for doing so should be clearly stated in the infant's	A;III

medical records and the examination should be rescheduled within 1 week of the intended examination.[6]	

SCREENING EXAMINATION

ROP screening pertains to retinal screening examinations performed after adequate pupillary dilation by using the following:

1. binocular indirect ophthalmoscope
2. 20D or 28D condensing lens
3. infant lid speculum
4. scleral depressor/indentor

❖ Information about ROP and the screening process should be explained to the parents and/or guardians.	GPP
❖ Oral and written consent from the parents and/or guardians should be obtained prior to screening. There must be a written order for ROP screening from the pediatrician.	GPP
❖ All examinations shall be done in the presence of the NICU nurse-in-charge or pediatric resident or pediatrician.	GPP
❖ The ideal setting for screening is under a radiant warmer in the NICU. However, stable or discharged babies may be screened in a bassinet or bed in the NICU or clinic.[6] Incubator-dependent babies can be screened within the incubator itself through the slanting wall.[4,6,7]	A;III
❖ The infant should be swaddled properly. The infant should not be fed within an hour prior to exam.[8] Preferably, the infant should be burped prior to exam.	A;II
❖ If the infant has apnea of prematurity, the infant should be closely monitored by the NICU nurse/NICU resident/pediatrician and preferably hooked to a pulse oxymeter. Stand-by oxygen and resuscitation equipment should be available.	GPP
❖ To reduce pain and discomfort of the infants, pre-treatment of the eyes with a topical anesthetic agent such as proparacaine hydrochloride 0.5% (1-2 drops, 30-60 seconds pre-exam) may be used. Other comfort care techniques such as nesting, pacifiers, oral sucrose, and so forth may also be done.[4,9-13] ROP screening exams can have short-term effects on BP, heart rate, and respiratory function and should, therefore, be kept short as possible.[4,6,14] One examination is sufficient only if it unequivocally shows the retina to be fully vascularized in both eyes.[4]	A;III
❖ It is important that the retinal periphery be seen and this is facilitated by the use of neonatal eyelid speculum, scleral depression, and pupillary dilation.	GPP
❖ Pupillary dilatation should be performed 45-60 minutes prior to screening.[15] A combination of phenylephrine 2.5% and tropicamide 0.5-1% or cyclopentolate 0.5% (if available) instilled 1 drop each eye in 2-3 doses, 5 minutes apart are suitable mydriatic regimens.[4,6,7,15] Minimizing dilating drops, wiping off excess drops on the skin and eyelids and punctal occlusion are methods to reduce systemic absorption.[6] Atropine should not be used for dilation.[7]	B;I
❖ Hand hygiene of ROP screeners is essential in reducing nosocomial infections.[14] Adequate drying and thorough rinsing is advised with alcohol-based and chlorhexidine gluconate-based hand sanitizers.	A;II
❖ Wearing of gloves are recommended for infants in the isolation area.[16]	B;II
❖ Use of sterile instruments has been recommended for all ROP exams.[4,17]	A;III
❖ Examination for ROP in preterm infants should be performed either by a pediatric ophthalmologist, retina specialist, or general ophthalmologist who has sufficient knowledge and experience to identify accurately the location and sequential retinal changes in ROP.[4,6,7,18]	A;III
❖ Classification and staging of ROP, as well as, recording of retinal findings in the	A;I

ROPWG screening form after every exam is based on the International Classification of Retinopathy of Prematurity Revisited (ICROP) study.[5]	

FREQUENCY OF SCREENING

Follow-up examinations will be recommended by the examining ophthalmologist on the basis of the retinal findings according to the International Classification of Retinopathy of Prematurity (ICROP).

❖ Follow-up examination of ≤1 week is recommended:[2,3] o vascularization ends at zone I even without ROP; o vascularization ends at posterior zone II, near the boundary of zone I; o stage 1 or 2 ROP, zone I; o stage 3 ROP, zone II; o suspected presence of aggressive posterior ROP (APROP).	A;I
❖ Follow-up examination of 1 to 2 weeks is recommended:[2,3] o vascularization ends at posterior zone II; o stage 2 ROP, zone II; o unequivocally regressing ROP, zone I.	A;I
❖ Follow-up examination of 2 weeks is recommended:[2,3] o Stage I ROP, zone II; o Immature vascularization, zone II – no ROP; o Unequivocally regressing ROP, zone II.	A;I
❖ Follow-up examination of 2-3 weeks is recommended:[2,3] o Stage 1 or 2 ROP, zone III; o Regressing ROP, zone III.	A;I

TERMINATION OF ROP SCREENING

❖ ROP screening is concluded when at least one of the following retinal findings are observed:[4] o Zone III retinal vascularization attained without previous zone I or II ROP (if there is examiner doubt about the zone or if the post conceptual age (PCA) is <35 weeks, confirmatory exams may be warranted);[4] o Full retinal vascularization in close proximity to the ora serrata for 360º (at least 1 disc area from the ora serrata);[4] o PCA of 50 weeks and no prethreshold disease (stage 3 ROP in zone II, any ROP in zone I) or worse ROP is present; o Regression of ROP.[4,19]	A;III

CRITERIA FOR TREATMENT

❖ The following retinal findings, classified as Type 1 ROP,[3] necessitate treatment within 72 hours of diagnosis.[3] o Zone I, any stage ROP with plus disease; o Zone I, stage 3 without plus disease o Zone II, stage 2 or 3 with plus disease	A;I
❖ Aggressive posterior ROP (APROP) should be treated as soon as possible, within 48 hours of diagnosis.	A;I
❖ Infants with Stage 4 and 5 ROP should be immediately referred to a vitreo-retina specialist for possible surgical management.	GPP

TREATMENT

❖ Treatment with ablation of the peripheral avascular retina is the standard of care.[2,3]	A;I
❖ Ablation of the peripheral avascular retina using laser indirect ophthal-moscope (LIO) is the first line of treatment.[3,20] Near-confluent laser burns are applied to the avascular retina. If LIO is not available, treatment with cryotherapy may be done.[2]	A;I
❖ For very aggressive ROP such as aggressive posterior ROP and zone 1 stage 3+, anti-VEGF may be used as an adjunct to LIO or as primary treatment.[21,22] However, caution is advised.	A;I
❖ Anti-VEGF may be used with caution in ROP cases with vitreoretinal membranes, such as in stage 4 and 5 ROP.[23,24]	A;III

It is the responsibility of the examining ophthalmologist who prefers not to manage infants with ROP requiring treatment to refer to the appropriate ROP specialist for treatment. In localities where infants can not avail of the services of a pediatric ophthalmologist or retina specialist, infants should be referred/transferred to centers with treatment capabilities. ROP treatment should generally be accomplished within 48-72 hours upon diagnosis of ROP requiring treatment in order to minimize the risk of visual impairment.[3,4,18]

FOLLOW UP AFTER TREATMENT

❖Infants who underwent treatment with LIO or cryotherapy should be followed up in 3-7 days to determine if additional treatment is necessary.[3,4]	A;I
❖Infants who underwent anti-VEGF treatment should be followed up until complete vascularization of the retina has been observed.[21]	A;II

TRANSFER TO ANOTHER INSTITUTION

❖If a patient is to be transferred to another hospital for further medical care, availability of ophthalmologic care in the receiving hospital should be ensured. Proper endorsement with written documentation must be carried out by the transferring pediatrician and ophthalmologist.[4,18]	A;III

OUTPATIENT CONTINUITY OF OPHTHALMOLOGIC CARE

Importance of timely follow up should be emphasized to the parents and/or guardians.

❖Prior to discharge from the hospital, the parents should receive proper instructions from the NICU nurse/resident/pediatric consultant regarding outpatient follow up. Proper documentation should be exercised.	GPP
❖The importance of follow up should be emphasized to parents. They should understand that infants with ROP have a potential for developing severe visual impairment, including blindness.	GPP
❖All communications with the parents/guardians should be diligently documented.	GPP

LONG-TERM FOLLOW UP AFTER COMPLETION OF ROP SCREENING OR TREATMENT

Late ocular sequelae of ROP such as strabismus, amblyopia, and refractive errors may occur.

❖All physicians giving care to infants with ROP should be aware that whether infants underwent treatment or not, ophthalmologic follow-up should be done within 4-6 months after discharge to screen for late onset complications.	A;III
❖Regular eye evaluation at 1 year, 2 ½ years, 4 years old, and yearly thereafter are recommended for premature infants regardless of whether or not they developed ROP.[5,25-27]	A;I

DIGITAL FUNDUS PHOTOGRAPHY AND TELEMEDICINE

The use of digital photographic retinal images that are captured and sent for remote interpretation is a developing approach to ROP screening. Digital retinal imaging is a useful tool for objective documentation of retinal findings but is not the primary method used for ROP screening.[4]

❖Binocular indirect ophthalmoscopy remains the gold standard for ROP screening.	GPP
❖Telemedicine using digital retinal imaging is an alternative to actual screening where screeners are not available.	GPP
❖Digital photographers should be trained to capture images of ROP and must have attended a comprehensive ROP fundus photography workshop.	GPP

❖ROP graders should have a mentored experience in the interpretation of digital images of ROP.	GPP

These recommendations form part of an evolving standard of care which shall be superceded by newer findings from acknowledged experts. It will also be affected by latest evidence-based statistics on incidence and risk factors.

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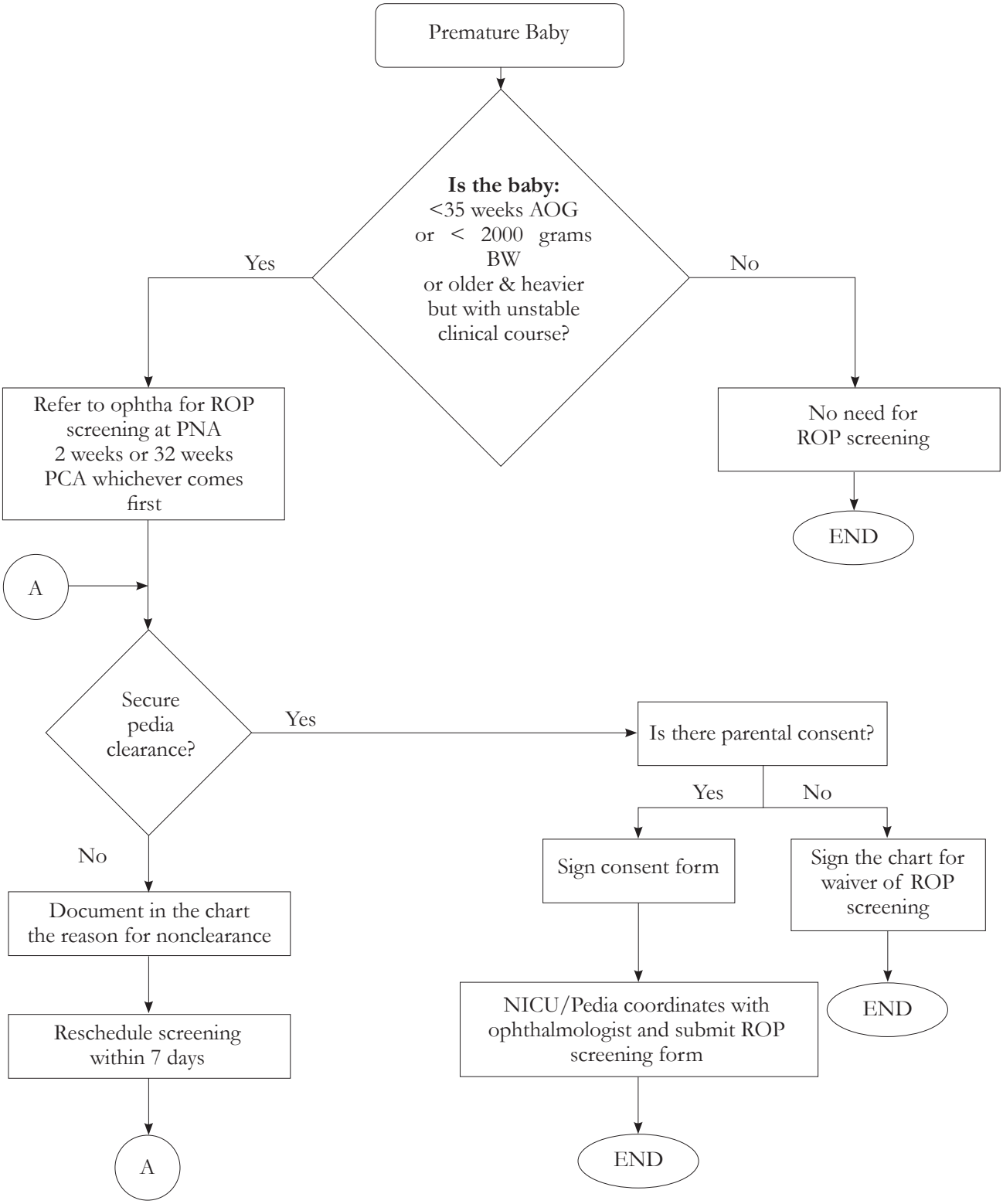
APPENDIX A: ROP REFERRAL FLOW CHART



APPENDIX B: ROP SCREENING FLOW CHART