Screening Examination of Premature Infants for Retinopathy of Prematurity

Release Date
· 2006
Guideline Developer
· Section on Ophthalmology, American Academy of Pediatrics, American Academy of Ophthalmology and American Association for Pediatric Ophthalmology and Strabismus
INTENDED AUDIENCE
Users
· All pediatricians who care for these at-risk preterm infants
Care Setting
· Pediatric inpatient and/or ambulatory
TARGET POPULATION
Inclusion Criterion
· Low birth weight preterm infants
Exclusion Criterion
· Term infants

KNOWLEDGE COMPONENTS

DEFINITIONS

RECOMMENDATION: 1. Candidates for retinal screening exams

Conditional:	1.1 Infants with a birth weight of less than 1500 g or gestational age of 30 weeks or less (as defined by the attending neonatologist)
	Decision Variable: Birth Weight **Value:** < 1500 g **Decision Variable:** Gestational Age **Value:** <= 30 weeks **Action:** Perform retinal screening examination **Reason:** To detect ROP. **Evidence Quality:** Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial. **Recommendation Strength:** Recommendation Strength = A, "Good evidence to support a recommendation for use." **Logic:** If (Birth Weight <= 1500 g OR Gestational Age <=30 weeks) THEN perform retinal screening **Reference:** 1. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: preliminary results. Arch Ophthalmol. 1988;106: 471–479

Reference: 2. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: ophthalmological outcomes at 10 years. Arch Ophthalmol. 2001;119:1110–1118

Conditional: 1.2 Birth weight between 1500 and 2000 g or gestational age of more than 30 weeks with an unstable clinical course, including those requiring cardiorespiratory support and who are believed by their attending pediatrician or neonatologist to be at high risk, should have retinal screening examinations performed after pupillary dilation using binocular indirect ophthalmoscopy to detect ROP.

Decision Variable: Birth Weight
Value: > 1500 AND < 2000 g
Decision Variable: Gestational Age
Value: > 30 weeks
Decision Variable: Unstable clinical course
Value: TRUE
Description: "unstable clinical course, including those requiring cardiorespiratory support and who are believed by their attending pediatrician or neonatologist to be at high risk"Somewhat ambigous with "including" - does it = the cardio support OR high risk only?
Decision Variable: Requiring cardiorespiratory support
Value: TRUE
Decision Variable: High risk
Value: TRUE
Description: Who are believed by their attending pediatrician or neonatologist to be at high risk
Action: Should have retinal screening examinations
Reason: To detect ROP
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use."
Logic: If ((Birth Weight > 1500 g AND Birth Weight < 2000 g) AND Gestational Age > 30 weeks) AND (Unstable clinical course OR Requiring cardiorespiratory support OR High risk) Then Should have retinal screening examinations
Reference: 1. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: preliminary results. Arch Ophthalmol. 1988;106: 471–479
Reference: 2. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: ophthalmological outcomes at 10 years. Arch Ophthalmol. 2001;119:1110–1118

RECOMMENDATION: 2. Who performs retinal screening examinations

Imperative:	2.1 The International Classification of Retinopathy of Prematurity Revisited should be used to classify, diagram, and record these retinal findings at the time of examination.
	Directive: "The International Classification of Retinopathy of Prematurity Revisited"9 should be used to 9 classify, diagram, and record these retinal findings at the time of examination. **Evidence Quality:** Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial. **Recommendation Strength:** Recommendation Strength = A, "Good evidence to support a recommendation for use." **Reference:** 9. International Committee for the Classification of Retinopathy of Prematurity. The International Classification of Retinopathy of Prematurity revisited. Arch Ophthalmol. 2005;123:991–999
Imperative:	2.2 Skills and documentation
	Directive: Retinal examinations in preterm infants should be performed by an ophthalmologist who has sufficient knowledge and experience to enable accurate identification of the location and sequential retinal changes of ROP.

RECOMMENDATION: 3. Schedule for retinal examination

Conditional:	3.1. 22 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 22 weeks **Action:** Initial retinal exam at 31 weeks postmenstrual or 9 weeks chronologic **Evidence Quality:** NOTE: "This guideline should be considered tentative rather than evidence-based for infants with a gestational age of 22 to 23 weeks because of the small number of survivors in these gestationalage categories."Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial1. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: preliminary results. Arch Ophthalmol. 1988;106: 471–4792. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: ophthalmological outcomes at 10 years. Arch Ophthalmol. 2001;119:1110–111813. Reynolds JD, Hardy RJ, Kennedy KA, Spencer R, van Heuven WA, Fielder AR. Lack of efficacy of light reduction in preventing retinopathy of prematurity. Light Reduction in Retinopathy of Prematurity (LIGHT-ROP) Cooperative Group. N Engl J Med. 1998;338:1572–1576 any required treatment.

	Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use." **Logic:** If Gestational Age = 22 weeks Then Initial retinal exam at 31 weeks postmenstrual or 9 weeks chronologic
Conditional:	3.2. 23 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 23 weeks **Action:** Initial retinal exam at 31 weeks postmenstrual or 8 weeks chronologic **Evidence Quality:** Same as 3.1 **Recommendation Strength:** Same as 3.1 **Logic:** If Gestational Age = 23 weeks Then Initial retinal exam at 31 weeks postmenstrual or 8 weeks chronologic
Conditional:	3.3. 24 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 24 weeks **Action:** Initial retinal exam at 31 weeks postmenstrual or 7 weeks chronologic **Evidence Quality:** NOTE: "This guideline should be considered tentative rather than evidence-based for infants with a gestational age of 22 to 23 weeks because of the small number of survivors in these gestationalage categories."Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial1. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: preliminary results. Arch Ophthalmol. 1988;106: 471–4792. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: ophthalmological outcomes at 10 years. Arch Ophthalmol. 2001;119:1110–111813. Reynolds JD, Hardy RJ, Kennedy KA, Spencer R, van Heuven WA, Fielder AR. Lack of efficacy of light reduction in preventing retinopathy of prematurity. Light Reduction in Retinopathy of Prematurity (LIGHT-ROP) Cooperative Group. N Engl J Med. 1998;338:1572–1576 any required treatment. **Recommendation Strength:** Recommendation Strength = A, "Good evidence to support a recommendation for use." **Logic:** If Gestational Age = 24 weeks Then Initial retinal exam at 31 weeks postmenstrual or 7 weeks chronologic
Conditional:	3.4. 25 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 25 weeks **Action:** Initial retinal exam at 31 weeks postmenstrual or 6 weeks chronologic **Evidence Quality:** Same as 3.3

	Recommendation Strength: Same as 3.3 **Logic:** If Gestational Age = 25 weeks Then Initial retinal exam at 31 weeks postmenstrual or 6 weeks chronologic
Conditional:	3.5 26 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 26 weeks **Action:** Initial retinal exam at 31 weeks postmenstrual or 5 weeks chronologic **Evidence Quality:** Same as 3.3 **Recommendation Strength:** Same as 3.3 **Logic:** If Gestational Age = 26 weeks Then Initial retinal exam at 31 weeks postmenstrual or 5 weeks chronologic
Conditional:	3.6. 27 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 27 weeks **Action:** Initial retinal exam at 31 weeks postmenstrual or 4 weeks chronologic **Evidence Quality:** Same as 3.3 **Recommendation Strength:** Same as 3.3 **Logic:** If Gestational Age = 27 weeks Then Initial retinal exam at 31 weeks postmenstrual or 4 weeks chronologic
Conditional:	3.7. 28 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 28 weeks **Action:** Initial retinal exam at 32 weeks postmenstrual or 4 weeks chronologic **Reason:** Same as 3.3 **Evidence Quality:** Same as 3.3 **Logic:** If Gestational Age = 28 weeks Then Initial retinal exam at 32 weeks postmenstrual or 4 weeks chronologic
Conditional:	3.8. 29 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 29 weeks **Action:** Initial retinal exam at 33 weeks postmenstrual or 4 weeks chronologic **Evidence Quality:** Same as 3.3 **Recommendation Strength:** Same as 3.3 **Logic:** If Gestational Age = 29 weeks Then Initial retinal exam at 33 weeks postmenstrual or 4 weeks chronologic
Conditional:	3.9. 30 weeks Gestational Age
	Decision Variable: Gestational Age **Value:** 30 weeks **Action:** Initial retinal exam at 34 weeks postmenstrual or 4 weeks chronologic **Evidence Quality:** Same as 3.3 **Recommendation Strength:** Same as 3.3

Logic: If Gestational Age = 30 weeks Then Initial retinal exam at 34 weeks postmenstrual or 4 weeks chronologic

Conditional: 3.10. 31 weeks Gestational Age

Decision Variable: Gestational Age
Value: 31 weeks
Action: Initial retinal exam at 35 weeks postmenstrual or 4 weeks chronologic
Evidence Quality: Same as 3.3
Recommendation Strength: Same as 3.3
Logic: If Gestational Age = 31 weeks Then Initial retinal exam at 35 weeks postmenstrual or 4 weeks chronologic

Conditional: 3.11. 32 weeks Gestational Age

Decision Variable: Gestational Age
Value: 32 weeks
Action: Initial retinal exam at 36 weeks postmenstrual or 4 weeks chronologic
Evidence Quality: Same as 3.3
Recommendation Strength: Same as 3.3
Logic: If Gestational Age = 32 weeks Then Initial retinal exam at 36 weeks postmenstrual or 4 weeks chronologic

RECOMMENDATION: 4. Follow-up examinations

Conditional: 4.1. 1 week or less follow-up

Decision Variable: Stage 1 ROP
Value: TRUE
Decision Variable: Stage 2 ROP
Value: TRUE
Decision Variable: Stage 3 ROP
Value: TRUE
Decision Variable: Zone I
Value: TRUE
Decision Variable: Zone II
Value: TRUE
Action: 1-week or less follow-up
Reason: To detect ROP
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use."
Logic: If ((Stage 1 ROP OR Stage 2 ROP) AND Zone I) OR (Stage 3 ROP AND Zone II) Then 1-week or less follow-up
Reference: 14. Reynolds JD, Dobson V, Quinn GE, et al. Evidence-based screening criteria for retinopathy of prematurity: natural history data from the CRYO-ROP and LIGHT-ROP studies. Arch Ophthalmol. 2002;120:1470–1476

Conditional: 4.2. 1 to 2 week follow-up

	Decision Variable: Immature vascularization **Value:** TRUE **Decision Variable:** Zone I **Value:** TRUE **Decision Variable:** Zone II **Decision Variable:** Stage 2 ROP **Value:** FALSE **Decision Variable:** Regressing ROP **Action:** 1- to 2-week follow-up **Reason:** To detect ROP **Evidence Quality:** Same as 4.1 **Recommendation Strength:** Same as 4.1 **Logic:** If (Immature vascularization AND Zone I AND ROP = FALSE) OR (Stage 2 ROP AND Zone II) OR (Regressing ROP AND Zone I) Then 1 to 2 week follow-up
Conditional:	4.3. 2 week follow-up
	Decision Variable: Stage 1 ROP **Value:** TRUE **Decision Variable:** Zone II **Value:** TRUE **Decision Variable:** Regressing ROP **Value:** TRUE **Action:** 2-week follow up **Reason:** To detect ROP **Evidence Quality:** Same as 4.1 **Recommendation Strength:** Same as 4.1 **Logic:** If (Stage 1 ROP AND Zone II) OR (Regressing ROP AND Zone II) Then 2-week follow up
Conditional:	4.4. 2 -3 week follow-up
	Decision Variable: Immature vascularization **Decision Variable:** Stage 1 ROP **Decision Variable:** Stage 2 ROP **Decision Variable:** ROP **Decision Variable:** Regressing ROP **Decision Variable:** Zone III **Action:** 2 -3 week follow-up **Reason:** To detect ROP **Evidence Quality:** Same as 4.1 **Recommendation Strength:** Same as 4.1 **Logic:** If (Immature vascularization AND Zone II AND ROP = FALSE) OR ((Stage 1 ROP OR Stage 2 ROP) AND Zone III) OR (Regressing ROP and Zone III) Then 2 -3 week follow-up
Imperative:	Presence of plus disease
	Directive: The presence of plus disease (defined as dilation and tortuosity of the posterior retinal blood vessels, see

below) in zones I or II suggests that peripheral ablation, rather than observation, is appropriate.14
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use."
Reference: 14. Reynolds JD, Dobson V, Quinn GE, et al. Evidence-basedscreening criteria for retinopathy of prematurity: natural historydata from the CRYO-ROP and LIGHT-ROP studies. Arch Ophthalmol. 2002;120:1470–1476

RECOMMENDATION: 5. New considerations for ablative care

Conditional: Ablative treatment initiated

Decision Variable: Zone I

Description: Special care must be used in determining the zone of disease. The number of clock hours of disease may no longer be the determining factor in recommending ablative treatment. T

Decision Variable: Zone II

Description: Special care must be used in determining the zone of disease. The number of clock hours of disease may no longer be the determining factor in recommending ablative treatment. T

Decision Variable: ROP

Decision Variable: Plus Disease

Description: Plus disease is defined as a degree of dilation and tortuosity of the posterior retinal blood vessels as defined by a standard photograph.1,9 1,9

Decision Variable: Stage I

Decision Variable: Stage 2

Decision Variable: Stage 3

Action: Ablative treatment

Description: Treatment should generally be accomplished, when possible, within 72 hours of determination of treatable disease to minimize the risk of retinal detachment.

Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use."
Logic: If (Zone I =TRUE AND ROP = TRUE AND (Stage I OR Stage 2 OR Stage 3) AND Plus Disease =TRUE) OR (Zone I AND ROP AND NOT (Stage I OR Stage 2 OR Stage 3) AND Plus Disease =FALSE) OR (Zone II = TRUE and (Stage I OR Stage 2) AND Plus Disease =TRUE) Plus Disease Stage I Stage 2 Stage 3 Then Ablative treatment

Reference: Early Treatment for Retinopathy of Prematurity CooperativeGroup. Revised indications for the treatment of retinopathy ofprematurity: results of the early treatment for retinopathy ofprematurity randomized trial. Arch Ophthalmol. 2003;121:1684–1694Quote: Recommendation Strength = A, "Good evidence to support a recommendation for use." Practitioners involved in the ophthalmologic care of preterm infants should be aware that the retinal findings that require strong consideration of ablative treatment were revised recently according to the Early Treatment for Retinopathy of Prematurity Randomized Trial study.7 The finding of threshold ROP, 7 as defined in the Multicenter Trial of Cryotherapy for Retinopathy of Prematurity, may no longer be the preferred time of intervention.

Imperative: Practitioners involved in the ophthalmologic care of preterm infants should be aware that the retinal findings that require strong consideration of ablative treatment were revised recently according to the Early Treatment for Retinopathy of Prematurity Randomized Trial study.

Directive: Practitioners involved in the ophthalmologic care of preterm infants should be aware that the retinal findings that require strong consideration of ablative treatment were revised recently according to the Early Treatment for Retinopathy of Prematurity Randomized Trial study.
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.1. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Multicenter trial of cryotherapy for retinopathy of prematurity: preliminary results. Arch Ophthalmol. 1988;106: 471–4797. Early Treatment for Retinopathy of Prematurity Cooperative Group. Revised indications for the treatment of retinopathy of prematurity: results of the early treatment for retinopathy of prematurity randomized trial. Arch Ophthalmol. 2003;121: 1684–16949. International Committee for the Classification of Retinopathy of Prematurity. The International Classification of Retinopathy of Prematurity revisited. Arch Ophthalmol. 2005;123:991–999
Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use."

RECOMMENDATION: 6. The conclusion of retinal screening exams

Conditional: 6.1 Exam conclusion finding 1

Decision Variable: Zone III
Value: TRUE
Decision Variable: Previous ROP
Decision Variable: Zone I

Decision Variable: Zone II
Action: Conclusion of acute retinal screening examinations.
Action: If there is examiner doubt about the zone or if the postmenstrual age is less than 35 weeks, confirmatory examinations may be warranted.
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Recommendation Strength: Recommendation Strength = A, "Good evidence to support a recommendation for use."
Logic: If (Zone III =TRUE) AND NOT (Previous ROP = TRUE AND (Zone I = TRUE OR Zone II = TRUE) Then Conclusion of acute retinal screening examinations. If there is examiner doubt about the zone or if the postmenstrual age is less than 35 weeks, confirmatory examinations may be warranted.
Reference: 14. Reynolds JD, Dobson V, Quinn GE, et al. Evidence-based screening criteria for retinopathy of prematurity: natural history data from the CRYO-ROP and LIGHT-ROP studies. Arch Ophthalmol. 2002;120:1470–1476

Conditional: 6.2 Exam conclusion finding 2

Decision Variable: Full retinal vascularization
Value: TRUE
Action: Conclusion of acute retinal screening examinations.
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Recommendation Strength: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.
Logic: If Full retinal vascularization =TRUE Then Conclusion of acute retinal screening examinations.
Reference: 15. Repka MX, Palmer EA, Tung B. Involution of retinopathy ofprematurity. Cryotherapy for Retinopathy of PrematurityCooperative Group. Arch Ophthalmol. 2000;118:645–659

Conditional: 6.3 Exam conclusion finding 3

Decision Variable: Postmenstrual age
Value: = 45
Description: GA + CA = 45 weeks
Decision Variable: Prethreshold disease
Value: If (Stage 3 ROP AND Zone 2) OR (ROP AND Zone 1)
Decision Variable: ROP
Decision Variable: Worse ROP
Description: Needs to be defined
Action: Conclusion of acute retinal screening examinations.
Evidence Quality: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial.

	Recommendation Strength: Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial. **Logic:** If Postmenstrual age ??? 45 weeks AND NOT ((Stage 3 ROP AND Zone II) OR (ROP AND Zone I) OR ("Worse" ROP) Then Conclusion of acute retinal screening examinations. **Reference:** 15. Repka MX, Palmer EA, Tung B. Involution of retinopathy ofprematurity. Cryotherapy for Retinopathy of PrematurityCooperative Group. Arch Ophthalmol. 2000;118:645–659
Conditional:	6.4 Exam conclusion finding 4
	Decision Variable: Regressing of ROP **Action:** Conclusion of acute retinal screening examinations. **Evidence Quality:** Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial. **Recommendation Strength:** Evidence Quality = I, "Evidence from >=1 properly randmoized, controlled trial. **Logic:** If Regression of ROP = TRUE Then Conclusion of acute retinal screening examinations. **Reference:** 14. Reynolds JD, Dobson V, Quinn GE, et al. Evidence-based screening criteria for retinopathy of prematurity: natural history data from the CRYO-ROP and LIGHT-ROP studies. Arch Ophthalmol. 2002;120:1470–147615. Repka MX, Palmer EA, Tung B. Involution of retinopathy of prematurity. Cryotherapy for Retinopathy of Prematurity Cooperative Group. Arch Ophthalmol. 2000;118:645–659

RECOMMENDATION: 7. Communication with the parents

Imperative:	7.1. Parents should be aware of ROP examinations and should be informed if their child has ROP, with subsequent updates on ROP progression.
	Evidence Quality: No citations included in this section. **Recommendation Strength:** No citations included in this section.
Imperative:	7.2. The possible consequences of serious ROP should be discussed at the time that a significant risk of poor visual outcome develops.
	Evidence Quality: No citations included in this section. **Recommendation Strength:** No citations included in this section.
Imperative:	7.3. Documentation of such conversations with parents in the nurse or physician notes is highly recommended.
	Evidence Quality: No citations included in this section. **Recommendation Strength:** No citations included in this section.

RECOMMENDATION: 8. Systems recommendations

Imperative:	If hospital discharge or transfer to another neonatal unit or hospital is contemplated before retinal maturation into zone III has taken place or if the infant has been treated by ablation for ROP and is not yet fully healed, the availability of appropriate follow-up ophthalmologic examination must be ensured, and specific arrangement for that examination must be made before such discharge or transfer occurs.

ALGORITHM: