Swiss Society of Neonatology
Schweizerische Gesellschaft für Neonatologie
Société Suisse de Néonatologie
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Patient selection and timing of ROP screening in Switzerland

Recommendations of the Swiss Society of Neonatology (2026)

Elaborated by a working group of members of the Swiss Society of Neonatology and the Swiss Society of Ophthalmology

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Summary of recommendations:

1. Patient selection

Preterm infants meeting at least one of the following criteria should be screened for ROP:

- GA < 28+0 weeks
- Birth weight < 1000g
- GA < 32+0 and at least one of the following criteria:
    - congenital tumor[1]
    - neurologic disease[2]
    - severe cardiorespiratory morbidity[3]

[1] neoplasm, malformation or syndrome with increased vasoproliferative activity (multiple hemangiomas, large capillary malformation etc.), not including patients with solitary hemangiomas
[2] IVH ≥ II°, seizures
[3] evolving BPD (supplemental oxygen for > 28 days, need for ECMO)

2. Timing

ROP screening should start

- in the week 31+0 to 31+6 weeks PMA, but
- not before 5 weeks (35 days) of chronological age

1. Background

Retinopathy of prematurity (ROP) is a vascular proliferative disorder of the retina, which exclusively develops in preterm infants due to immaturity of the retinal vascularization (1). The underlying pathophysiological mechanisms are mainly driven by a mismatch between oxygen demand and supply, which induces pathologic vascularization of the retina and may ultimately lead to retinal detachment and blindness if untreated (2).

ROP screening in preterm infants is essential for timely diagnosis and treatment of pathological retinal vascularization, thereby preventing severe complications, including potentially blinding outcomes. However, the ophthalmoscopic examination used to visualize the retina is associated with pain and stress for preterm infants, which could have negative consequences on their long-term neurodevelopment (3). Therefore, the benefit of early ROP detection must be weighed against the burden of retinal examination in fragile preterm infants.

The incidence of ROP varies worldwide, with higher rates observed in low- and middle-income countries, where more mature infants may be affected compared to high-income countries (4). These regional differences in ROP incidence highlight the need for tailored local screening criteria to avoid unnecessary stress from screening while still preventing potential blindness. This is reflected in the wide variations in screening criteria across countries, with more liberal criteria in low- and middle-income countries (5). Differences in ROP incidence have also been observed between high-income countries, with Switzerland reporting the lowest incidence (6). Adoption of published screening criteria from other countries might lead to unnecessary screening and unnecessary pain in preterm infants as well as higher workload and increased costs.

2. Classification of ROP

ROP is classified according to the “International Classification of ROP” (7), in which zone I represents the most central region surrounding the optic disc, whereas zone III corresponds to the most peripheral retinal area. The severity of pathologic abnormalities is categorized into five stages. Minor pathologies are present in stage I (demarcation line) and most extensive pathologies are seen in stage V (total retinal detachment).

ROP is diagnosed by an experienced ophthalmologist by indirect ophthalmoscopy or retinal imaging. To detect progression and severity of ROP, repeated ophthalmologic examinations are required. Screening intervals follow international recommendations of 1-2 weeks, but may be shorter or longer, depending on ROP stages, retinal vascularization and indirect signs of increased risk of aggressive ROP, such as narrow vessels, retinal hemorrhages without demarcation line.

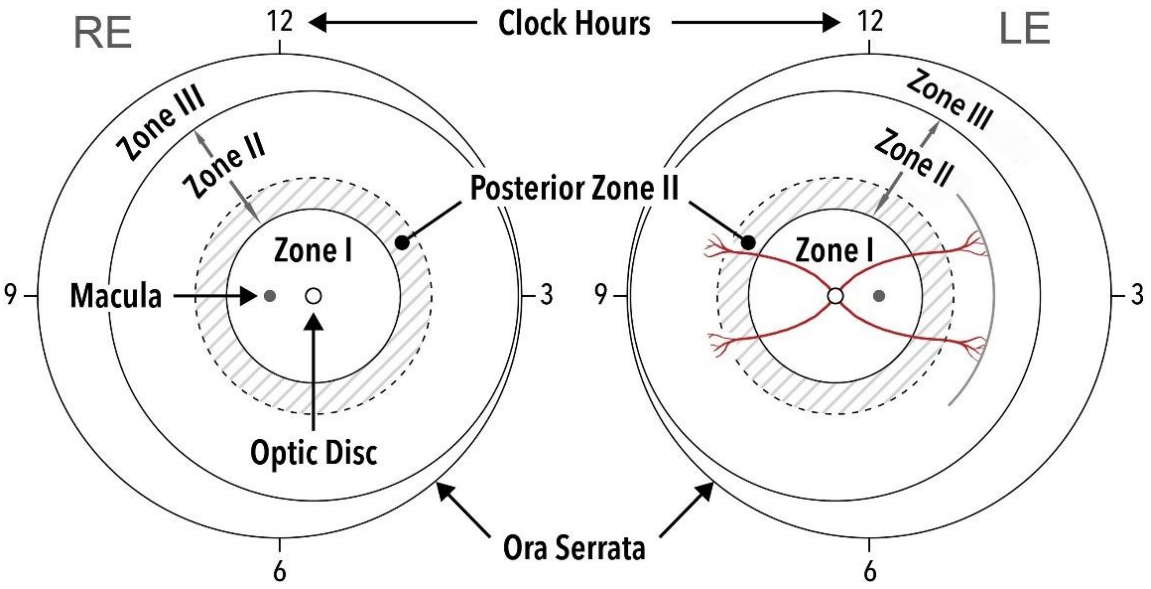

Figure 1: Classification of ROP (7)

3. Swiss data

For the development of this guideline, data from the Swiss Neonatal Network (SwissNeoNet), including all neonatal intensive care units in Switzerland certified to care for preterm infants born at a gestational age (GA) < 32 weeks or a birth weight < 1501 g, were analyzed. Detailed analyses of these data have been published previously and are available open access (8).

In brief, patients born between 2006 and 2022 were eligible for analyses. Of 15586 patients who were registered in the database, 11557 patients were born below 32 weeks, survived to discharge and were included in further analyses. Of these, 168 patients (1.5%) were treated for ROP. The incidence of ROP treatment decreased with increasing GA. ROP treatment above 28 weeks GA was minimal.

Analyses of risk factors for ROP treatment included 17 variables. corticosteroids, sex, gestational age, small for gestational age (birth weight <10th percentile), multiple birth, birth weight z-score, delivery room endotracheal intubation, surfactant treatment, days of supplemental oxygen, days of continuous positive airway pressure (CPAP), days of mechanical ventilation, intraventricular hemorrhage, congenital tumor, patent ductus arteriosus, sepsis and necrotizing enterocolitis.

Multivariable logistic regression identified six independent predictors for ROP treatment: GA, birth weight z-score, duration of supplemental oxygen, duration of mechanical ventilation, caesarean section and congenital tumor (neoplasm, malformation, or

syndrome with increased vasoproliferative activity, excluding uncomplicated infantile hemangioma) (Table 1).

	OR[1]	95% CI[1]	p-value
Gestational Age	0.46	0.40, 0.52	<0.001
Birth weight z-score	0.58	0.46, 0.73	<0.001
Supplemental Oxygen (days)	1.01	1.01, 1.02	<0.001
Mechanical ventilation (days)	1.01	1.00, 1.02	0.018
Cesarean section	1.84	1.06, 3.36	0.038
Congenital tumor	26.3	2.71, 189	0.002

Table 1: Independent risk factors for ROP treatment as identified by multivariable logistic regression analysis. [1]OR = Odds Ratio, CI = Confidence Interval

Descriptive analyses showed that all patients requiring subsequent ROP treatment would have been identified in screening if they had met at least one of the following four criteria: GA <27+0 weeks, birth weight <1000 g, intraventricular hemorrhage (IVH) ≥ II° or congenital tumor. No parameters reflecting respiratory morbidity were required to identify all patients requiring ROP treatment.

4. ROP Screening – Who

While descriptive analyses identified all patients without incorporating parameters of respiratory morbidity, multivariable logistic regression analyses revealed that duration of supplemental oxygen and duration of respiratory support were independent risk factors for ROP treatment and improved the predictive value of the model. To account for these findings, severe cardiorespiratory morbidity defined as evolving bronchopulmonary dysplasia (BPD, defined as supplemental oxygen for >28 days) or need for extracorporeal membrane oxygenation (ECMO) was included as a clinical criterion to trigger ROP screening.

In summary, ROP screening is recommended for patients meeting at least one of the following criteria:

- GA < 28+0 weeks
- Birth weight < 1000 g
- GA < 32+0 weeks with at least one of the following
    - congenital tumor[1]
    - neurologic disease[2]
    - severe cardiorespiratory morbidity[3]

[1] neoplasm, malformation, or syndrome with increased vasoproliferative activity (multiple hemangiomas, large capillary malformation, etc.), not including patients with uncomplicated infantile hemangiomas.
[2] IVH ≥ II°, seizures
[3] evolving BPD (supplemental oxygen for > 28 days, need for ECMO)

5. ROP Screening – When

Analyses show that the earliest ROP treatment occurred at 32+6 weeks postmenstrual age (PMA). The lowest chronological age at ROP treatment was 46 days. All patients requiring ROP treatment would have been detected in a timely manner if screening had started from 32+6 weeks PMA or from 48 days of life, whichever comes first.

To allow for the assessment of ROP progression and to provide a margin of safety, we suggest implementing ROP screening at least one week prior to the earliest observed ROP treatment documented in the database.

Based on data from the MNDS dataset, we recommend the first ROP screening examination in the week 31+0 to 31+6 weeks PMA, but not before 5 weeks (35 days) of chronological age.

6. Safety

Minimizing ROP screening to the greatest extent inevitably increases the risk of missing patients who require ROP treatment. Given the severe consequences of possible blindness from missed ROP treatment, safety margins are required and incorporated into this guideline. In addition, it might be reasonable to perform ROP screening beyond the minimal criteria outlined in this guideline, particularly for patients with exceptionally complicated clinical courses or multiple neonatal morbidities.

Restricting general ROP screening to patients born <28 weeks GA or with a birthweight <1000g is more stringent than any other published guideline. No other country currently recommends screening thresholds below 30 weeks GA or a birthweight <1250g.

When the screening criteria, as recommended in this guideline, were applied to the 168 patients who required ROP treatment, 164 patients met at least two criteria and only four patients fulfilled just one criterion. Of the 168 patients who received ROP therapy, only 4 patients were both, ≥27 0/7 weeks GA and > 1000 g birth weight. Characteristics of these patients are shown in Table 2.

Based on these data restricting ROP screening to the proposed criteria appears safe and may reduce the number of screening examinations by 56% (8).

GA	Birth weight (g)	Birth weight z-score	IVH grade	Oxygen (days)	CPAP (days)	mech. Ventilation (days)	Birth defect
28 + 1	1,110	-0.158	2	9	10	11	FIP, BPD, IVH, 2x LOS
28 + 3	1,080	0.115	3	0	6	23	Epilepsia Mother&Child, Outborn (Bosnia); IVH
29 + 0	1,250	0.192	1	4	5	7	Capillary malformation
30 + 1	1,530	0.503	0	10	0	10	Mesoblastic nephroma

Table 2: Characteristics of patients ≥27 0/7 weeks and >1000 g birth weight requiring ROP therapy.

GA gestational age; IVH intraventricular haemorrhage, CPAP continuous positive airway pressure, FIP focal intestinal perforation; BPD bronchopulmonary dysplasia, LOS late onset sepsis

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