INTERNATIONAL JOURNAL OF MEDICAL SCIENCE AND PUBLIC HEALTH RESEARCH
IJMSPHR
EST.2020

TYPE Original Research
PAGE NO. 01-13

Beyond Survival: Long-Term Ocular Outcomes in Retinopathy of Prematurity and The Importance of Emotional Intelligence in Competency-Based Neonatal Ophthalmic Care

OPEN ACCESS

SUBMITTED 08 January 2025
ACCEPTED 06 February 2026
PUBLISHED 01 March 2026
VOLUME Vol.07 Issue03 2026

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Abstract: Background: Retinopathy of prematurity (ROP) has become one of the most significant preventable causes of childhood visual morbidity in the era of improved neonatal survival. The scientific literature has established that ROP is not limited to an acute retinal vascular event in infancy, but is also associated with later refractive errors, altered ocular biometry, macular changes, and variable long-term visual function. At the same time, medical education literature increasingly emphasizes that emotionally intelligent, competency-based clinical practice is essential in complex, high-stakes care environments. Despite this, the long-term ophthalmic literature on ROP and the professional competency literature on emotional intelligence in medicine are rarely examined together.

Objective: This article develops an integrative theoretical analysis of the relationship between long-term visual and biometric outcomes in ROP and the emotional-intellectual competencies required for high-quality neonatal ophthalmic care. It argues that optimal ROP management depends not only on timely screening and treatment but also on emotionally intelligent communication, competent judgment, follow-up discipline, and interprofessional coordination.

Methods: A text-based integrative review methodology was applied using only the supplied references. The literature was grouped into four analytical domains: childhood blindness and ROP burden; retinal vascular

development, screening, treatment, and long-term ocular outcomes; competency-based medical education and entrustment; and emotional intelligence in medicine, nursing, leadership, and decision-making. The review then synthesized these domains into a unified interpretive framework.

Results: The literature indicates that ROP contributes substantially to long-term visual burden through persistent refractive, structural, and functional effects, even after treatment success in infancy (Fielder et al., 2015; Good et al., 2010; Kaur et al., 2021; Lee et al., 2018). Treatment modality influences later outcomes, particularly refractive and biometric development (Geloneck et al., 2014; Chen & Chen, 2020; Yang et al., 2013). The emotional intelligence literature suggests that self-awareness, empathy, emotional regulation, teamwork, and judgment are highly relevant to medical practice, especially in emotionally charged and high-stakes settings (Arora et al., 2010; Mayer et al., 2016; Lerner et al., 2015; Johnson, 2015). These capacities align strongly with the demands of ROP screening, treatment decision-making, parent counseling, and long-term follow-up.

Conclusion: ROP should be understood not only as a retinal disease but as a longitudinal developmental and professional-care challenge. Future ROP programs and neonatal ophthalmic training models should integrate long-term outcome science with competency-based education and emotional intelligence development to improve patient-centered visual care.

Keywords: Retinopathy of prematurity, emotional intelligence, neonatal ophthalmology, refractive outcomes, competency-based medical education, visual development, clinical decision-making.

1. Introduction: Retinopathy of prematurity occupies a uniquely important position in pediatric ophthalmology and neonatal medicine because it reflects the price of survival in extremely vulnerable infants. As neonatal intensive care has improved and more premature babies survive, medicine has simultaneously inherited the responsibility to protect those children from conditions that emerge precisely because of their developmental immaturity. Among such conditions, ROP remains one of the most clinically significant because it can lead to lifelong visual impairment, yet is also one of the most preventable causes of blindness when screening, diagnosis, treatment, and follow-up are performed competently and consistently (Harrell & Brandon, 2007; Shukla et al., 2020). This dual character of ROP—both preventable and potentially devastating—makes it a major test of healthcare systems, clinical training, and professional judgment.

The broad context of childhood blindness helps illuminate why ROP deserves sustained attention. Goggin and O'Keefe (1991), in their national survey of childhood blindness in the Republic of Ireland, demonstrated the importance of studying childhood visual impairment as a public health issue rather than merely as an isolated clinical event. Childhood blindness is not only a medical diagnosis. It is a lifelong developmental condition that affects learning, sensory integration, motor development, psychosocial participation, educational opportunity, and family functioning. Within this larger public health landscape, ROP is especially important because it arises in a high-risk but clearly identifiable neonatal population and is amenable to planned intervention when healthcare systems function appropriately (Goggin & O'Keefe, 1991; Harrell & Brandon, 2007; Shukla et al., 2020).

ROP, however, is too often described in overly narrow terms. It is sometimes presented simply as a retinal vascular disease that occurs in premature infants and is treated when screening reveals threshold severity. Such descriptions are not false, but they are incomplete. They fail to capture the developmental, structural, and long-term nature of the condition. The references provided for this article strongly support a broader view. McLeod et al. (2006) showed that fetal retinal vasculature initially develops by vasculogenesis, underscoring that normal retinal development follows an ordered prenatal timetable. Premature birth interrupts that process, and ROP emerges within this interruption. It follows that ROP is not just a disease imposed on a complete eye. It is a developmental disturbance occurring in an incompletely developed ocular system. This distinction is critical because it explains why the consequences of ROP often extend far beyond the acute neonatal period.

The later visual history of children with ROP supports this broader understanding. Fielder et al. (2015) demonstrated that ROP affects ocular structures and visual functions over time. Good et al. (2010), reporting final visual acuity outcomes from the Early Treatment for Retinopathy of Prematurity Study, emphasized that long-term vision is a central endpoint. O'Connor et al. (2006) showed changes in refractive state and eye size in children of very low birth weight. Theng et al. (2000), Donzis et al. (1984), Gordon and Donzis (1985), Ehrlich et al. (1995), Yang et al. (2013), McLoone et al. (2006), Kaur et al. (2021), Lee et al. (2018), Chen and Chen (2020), Farvardin et al. (2022), and Zeng et al. (2022) collectively show that the visual future of these children includes altered refractive development, biometric differences, macular variation, strabismus risk, and

persistent visual consequences. This means that ROP care cannot ethically or scientifically end with successful retinal treatment in infancy. Longitudinal ophthalmic care is part of the disease itself.

A second major issue concerns treatment modality. The clinical literature has increasingly compared laser-based approaches and intravitreal anti-vascular endothelial growth factor interventions. Geloneck et al. (2014) reported a randomized comparison of refractive outcomes after bevacizumab monotherapy versus conventional laser treatment. Lee et al. (2018), Vujanović et al. (2017), and Chen and Chen (2020) further examined long-term structural, refractive, and optical consequences following anti-VEGF or laser-based treatment. These studies suggest that the question "Was the retina treated successfully?" is too narrow. A more complete question is: "What kind of eye, what kind of vision, and what kind of developmental visual trajectory followed treatment?" The literature thus encourages a shift from acute event thinking to developmental outcome thinking.

At the same time, the supplied references include a second body of literature that appears at first to belong to an entirely different academic area: emotional intelligence, medical education, leadership, assessment, professional success, academic performance, decision-making, and nursing or student well-being. Arora et al. (2010) reviewed emotional intelligence in medicine through the context of ACGME competencies. Mayer et al. (2016) clarified the ability model of emotional intelligence. Johnson (2015) argued for the importance of emotional intelligence in medical education. Lerner et al. (2015) demonstrated the relationship between emotion and decision-making. McQueen (2004) addressed emotional intelligence in nursing work. Allen et al. (2012) connected emotionally intelligent leadership with integrative and process-oriented practice. A set of cross-sectional studies examined emotional intelligence among medical students and residents in different contexts, including Kerala, Baghdad, Palestine, Chennai, and Shiraz, as well as broader links to academic performance, general health, and professional development (Todres et al., 2010; Chew et al., 2013; George et al., 2022; Mohammed & Mohammed, 2020; Sundararajan & Gopichandran, 2018; Vasefi et al., 2018; Ewaiwe et al., 2020).

The presence of these references is not accidental. Their inclusion points toward a deeper question: what kind of professional capabilities are needed in high-stakes neonatal ophthalmic care? ROP is not managed by technical knowledge alone. Screening must occur within narrow time windows. Classification must be accurate. Treatment must be delivered in a way that reflects both urgency and judgment. Parents must be informed without being abandoned emotionally. Follow-up must be emphasized repeatedly because failure to return can be devastating. Teams must coordinate across neonatology, ophthalmology, nursing, and outpatient systems. These are not merely technical tasks. They are emotionally, ethically, and organizationally demanding forms of professional action. Thus, ROP care offers an excellent context in which to explore the practical relevance of emotional intelligence and competency-based formation.

This observation reveals a major literature gap. On one side, the ophthalmic literature richly documents disease biology, treatment, and long-term outcomes, but generally gives less explicit attention to clinician emotion, parent communication, leadership, or educational competence. On the other side, the emotional intelligence literature in medicine discusses empathy, self-awareness, judgment, academic achievement, and leadership, but rarely applies these directly to neonatal ophthalmology or ROP. This separation is artificial from the standpoint of real-world care. In practice, a baby with ROP encounters not only a disease pathway but a care pathway. The quality of that care pathway depends heavily on the competence and emotional functioning of the professionals involved.

ROP therefore provides a powerful case study for integrated thinking. It is a condition in which biology, time, emotion, technology, and communication intersect. The infant is physiologically fragile. The parents are often anxious and overwhelmed. The retinal findings may evolve quickly. The treatment decision may carry long-term refractive implications. The follow-up burden may continue for years. A care model that ignores emotional intelligence risks treating ROP as a purely technical matter. A care model that ignores developmental outcome science risks being compassionate but clinically incomplete. What is needed is integration.

This article argues that long-term visual outcomes in ROP and emotional intelligence in neonatal ophthalmic care should be studied together as parts of a unified professional-developmental framework. The scientific management of ROP requires not only procedural and diagnostic expertise but also emotionally intelligent communication, reflective judgment, interprofessional reliability, and continuity-focused care. These features align closely with competency-based medical education, which emphasizes observable capability, entrustment, and assessment rather than passive knowledge acquisition alone (Modi et al., 2015).

The goal of the present article is therefore to generate a full, publication-ready theoretical research article based

strictly on the provided references. It does not introduce new empirical data and does not claim to replace condition-specific trials or educational intervention studies. Instead, it develops an integrative conceptual synthesis with direct clinical and educational relevance. The article proceeds through a detailed methodology, results, discussion, and conclusion, and maintains continuous academic structure in accordance with the user's constraints.

The central thesis is straightforward but important: ROP should be understood as a long-term developmental eye disorder whose optimal management depends on both biomedical excellence and emotionally intelligent competency. Better outcomes for premature infants require more than timely laser or anti-VEGF treatment. They require clinicians and care systems that can think developmentally, communicate clearly, assess risk responsibly, and sustain follow-up through professional judgment and emotional competence.

2. Methodology

This article employs an integrative theoretical review methodology based exclusively on the references provided. The purpose of the methodology is not to aggregate numerical data across homogeneous studies, but to develop a conceptually coherent and publication-ready analysis from diverse but related literatures. The reference set is interdisciplinary. It includes pediatric ophthalmology, neonatal screening guidance, retinal developmental science, long-term biometric and refractive studies, medical education, competency-based assessment, emotional intelligence theory, leadership research, academic performance studies, and nursing scholarship. Because these sources differ widely in design, aim, and outcome type, a standard meta-analytic approach would be inappropriate. An integrative review is therefore the most suitable method because it allows the synthesis of heterogeneous evidence into a unified interpretive framework.

The first methodological step was thematic classification of the references. Four major clusters were identified. The first cluster consisted of sources on childhood blindness, ROP disease process, screening, and classification. This included Goggin and O'Keefe (1991), Harrell and Brandon (2007), and Shukla et al. (2020). These works were used to establish the clinical significance of ROP and the public health necessity of organized screening and operational pathways.

The second cluster included developmental, structural, and long-term ophthalmic studies. These comprised McLeod et al. (2006), Donzis et al. (1984), Gordon and Donzis (1985), Ehrlich et al. (1995), Theng et al. (2000), O'Connor et al. (2006), Fielder et al. (2015), Good et al. (2010), Yang et al. (2013), McLoone et al. (2006), Kaur et al. (2021), Farvardin et al. (2022), Lee et al. (2018), Chen and Chen (2020), Vujanović et al. (2017), and Zeng et al. (2022). These references were used to build the article's developmental-outcome framework, showing that ROP is associated with long-term changes in visual acuity, refraction, biometric components, and macular or optical structure.

The third cluster comprised treatment and treatment-comparison studies, especially those contrasting laser therapy and anti-VEGF approaches, or documenting long-term outcomes after intervention. Geloneck et al. (2014), Farvardin et al. (2022), Yang et al. (2013), McLoone et al. (2006), Lee et al. (2018), Chen and Chen (2020), and Vujanović et al. (2017) were especially important here. These sources allowed the article to analyze not only whether treatments work acutely, but how their consequences extend into later childhood.

The fourth cluster consisted of emotional intelligence, competency-based education, and professional formation references. These included Modi et al. (2015), Arora et al. (2010), Johnson (2015), Mayer et al. (2016), Lerner et al. (2015), McQueen (2004), Allen et al. (2012), Romanelli et al. (2006), García-Sancho et al. (2014), and multiple cross-sectional studies on emotional intelligence among medical students or doctors, such as Todres et al. (2010), Chew et al. (2013), George et al. (2022), Mohammed and Mohammed (2020), Sundararajan and Gopichandran (2018), Puliyakkadi et al. (2019), Ewaiwe et al. (2020), Vasefi et al. (2018), Vadivel (2019), EG et al. (2016), and Kumar et al. (2016). Informal or supplementary references, including the self-assessment resources and IBM SPSS software, were treated more cautiously and were used only as peripheral contextual materials rather than central theoretical authorities.

The second methodological step involved formulating an integrative research problem. Because the references clearly span two distinct but potentially related domains, the article asked: How can long-term ocular outcomes in retinopathy of prematurity be understood alongside the emotional and competency demands placed on clinicians involved in neonatal ophthalmic care? This problem formulation allowed both biomedical and professional-capacity literature to contribute meaningfully to one analytic whole.

The third step involved close reading and extraction of core concepts from each source. In the ophthalmic literature, the extracted concepts included childhood blindness burden, vasculogenesis, retinal immaturity, screening urgency, visual acuity, refractive

development, corneal curvature, strabismus, ocular biometry, macular structure, treatment modality, anti-VEGF effects, and laser-associated long-term consequences. In the medical education and emotional intelligence literature, the extracted concepts included empathy, emotional regulation, academic performance, decision-making, leadership, communication, general health, aggression regulation, competency-based assessment, and entrustment.

The fourth step involved identifying bridging concepts capable of linking the two literatures without forcing artificial equivalence. The primary bridging concepts were development, longitudinality, clinical judgment, communication under uncertainty, family-centered care, follow-up reliability, entrustment, and vulnerability-sensitive professionalism. These concepts were chosen because they recur implicitly or explicitly across both literatures. ROP is developmental and longitudinal. Emotional intelligence and competency-based education are concerned with how clinicians think, respond, decide, and communicate across uncertain and vulnerable situations. These shared concerns create a legitimate basis for synthesis.

The fifth step involved layered interpretation. The article does not claim that emotional intelligence directly determines retinal outcomes in a simple causal way. Such a claim would not be supported by the provided references. Instead, it argues for a mediated relationship. Disease biology and treatment affect ocular outcomes directly. Professional competencies, including emotionally intelligent behaviors, affect care quality indirectly through screening reliability, decision timing, parent communication, team functioning, and follow-up continuity. This model preserves clinical realism and avoids overstatement.

The sixth methodological step involved contextual caution. Most ROP studies in the reference list are condition-specific clinical investigations. By contrast, most emotional intelligence studies involve medical students, residents, doctors, or health professionals broadly, rather than neonatal ophthalmologists specifically. Therefore, the emotional intelligence findings were used as theoretically relevant professional evidence rather than as direct ROP-specific proof. This distinction is important for scholarly integrity.

The seventh step involved synthesizing the findings into four analytic questions that structure the article's results and discussion. First, what does the ophthalmic literature show about the long-term developmental consequences of ROP? Second, how do treatment modalities influence refractive and structural outcomes? Third, what does competency-based literature suggest about the demands of safe ROP care? Fourth, how can emotional intelligence theory and evidence deepen understanding of neonatal ophthalmic professionalism?

This methodological design has several strengths. It respects the user's instruction to rely strictly on the provided references. It enables an original article despite the mixed nature of the source list. It preserves the specificity of the ophthalmic literature while making disciplined use of the educational and emotional intelligence literature. Most importantly, it generates a conceptually rich framework that could inform both clinical thinking and professional training.

The methodology also has limitations. First, the analysis is interpretive rather than statistical. Second, the emotional intelligence literature is broader than ophthalmology and is therefore transferred into the ROP context by analogy and professional reasoning rather than direct condition-specific experimentation. Third, the review is limited to the provided references and does not claim exhaustive literature coverage. Fourth, some references, such as self-assessment materials or software citations, are peripheral and cannot bear heavy conceptual weight. These limitations do not undermine the article's purpose, but they define it accurately: this is an integrative theoretical study aimed at conceptual clarity and professional insight.

3. Results

The integrative review produced several major findings. These findings reveal that ROP is not only a retinal disease of infancy but also a long-term developmental eye condition, and that the professional care it requires is closely aligned with the capacities described in competency-based and emotional intelligence literature.

The first major finding is that ROP contributes to the burden of childhood visual loss not simply through blindness in its most severe forms, but through a spectrum of long-term visual morbidity. Goggin and O'Keefe (1991) situate childhood blindness as a significant national concern, and although not all childhood visual impairment is due to ROP, their work establishes the importance of early-life visual disorders as a public health issue. Harrell and Brandon (2007) show that ROP involves a disease process that is classifiable and treatable, which means its later consequences are not random but linked to the success or failure of organized neonatal ophthalmic care. Shukla et al. (2020) reinforce this by emphasizing operational guidelines, especially in contexts where improving neonatal survival increases the importance of systematic screening programs. The resulting interpretation is that ROP belongs not only to

ophthalmology, but also to preventive public health and health-system performance.

The second major finding is that fetal retinal vascular development provides a fundamental biological basis for understanding both the occurrence and the persistence of ROP-related sequelae. McLeod et al. (2006) demonstrate that the initial fetal human retinal vasculature develops by vasculogenesis. This emphasizes that the premature retina is developmentally unfinished at birth. The relevance of this finding is profound. If retinal vascularization is interrupted by premature delivery, then ROP should be understood as a disease of developmental interruption rather than a simple isolated lesion. This understanding helps explain why treated ROP may still leave children with altered ocular structures or visual function years later. Developmental disruption can echo through later growth.

The third major finding is that the long-term consequences of ROP extend into multiple domains of ocular structure and function. Fielder et al. (2015) explicitly show that ROP influences ocular structures and visual functions. Good et al. (2010) demonstrate that final visual acuity remains an important measurable outcome long after the neonatal period. This reinforces a critical point: neonatal retinal survival is only one milestone. The child's later visual life remains shaped by the disease. The significance of this finding lies in its challenge to episodic models of care. If long-term acuity and function matter, then ophthalmic follow-up must extend conceptually and clinically beyond acute treatment.

The fourth major finding is that prematurity and ROP are both associated with altered refractive development. Gordon and Donzis (1985) show that refractive development of the human eye follows a developmental process rather than occurring randomly. Donzis et al. (1984) reveal corneal curvature features in premature infants, indicating that prematurity is associated with altered optical components early in life. Ehrlich et al. (1995) further illuminate infant myopia development longitudinally. O'Connor et al. (2006) show change of refractive state and eye size in very low birth weight children. Theng et al. (2000) document refractive errors and strabismus in premature infants with and without ROP, which suggests that both prematurity and ROP affect later visual alignment and refractive profiles. Together these studies indicate that the visual future of preterm children is deeply tied to developmental eye growth and that ROP adds an additional layer of risk.

The fifth major finding is that measurable refractive and biometric abnormalities can be identified early, including within the first year of life. Kaur et al. (2021) show that preterm refraction and ocular biometry differ in children with and without ROP during the first year. This is an important clinical observation because it implies that long-term divergence is not merely a late school-age phenomenon. The trajectory is already taking shape early in infancy. This supports a proactive follow-up approach. Waiting until the child is older to consider refractive or biometric consequences may miss opportunities for timely monitoring and amblyopia prevention.

The sixth major finding is that laser-treated ROP is associated with persistent long-term refractive and biometric consequences. McLoone et al. (2006) report long-term refractive and biometric outcomes following diode laser therapy. Yang et al. (2013) examine long-term biometric optic components after diode laser-treated threshold ROP at 9 years of age. Farvardin et al. (2022) describe long-term visual and refractive outcomes after argon laser treatment. Zeng et al. (2022) further study developmental characteristics of the eye after laser surgery for ROP. These studies do not imply that laser treatment is ineffective. On the contrary, laser remains a major sight-saving intervention. But they do show that acute treatment success does not restore ocular development to a fully typical path. The long-term eye remains marked by the combined history of prematurity, disease, and intervention.

The seventh major finding is that anti-VEGF-based treatment introduces a different long-term outcome profile that may be advantageous in some refractive respects but complex in others. Geloneck et al. (2014) found that bevacizumab monotherapy and conventional laser treatment resulted in different refractive outcomes, suggesting that treatment choice may influence later ametropia burden. Vujanović et al. (2017) report refractive outcomes after anti-VEGF therapy, while Lee et al. (2018) examine macular structure, optical components, and visual acuity after intravitreal bevacizumab or laser treatment. Chen and Chen (2020) extend this analysis to foveal microvasculature, optical biometry, and refractive error. The overall implication is that treatment selection should not be evaluated purely in terms of immediate retinal regression. Long-term ocular structure and refractive burden must also be part of the decision matrix.

The eighth major finding is that visual outcome must be interpreted more broadly than simple acuity measurements. Good et al. (2010) make acuity central, but other studies show that acuity alone does not capture the entire visual consequence profile. Theng et al. (2000) include strabismus, Lee et al. (2018) include macular structures and optical components, and Chen

and Chen (2020) include microvasculature and biometry. This means that long-term assessment in ROP survivors should ideally include structural, refractive, alignment, and functional considerations rather than relying on one endpoint. This is especially important because some children may have relatively acceptable acuity yet still face significant refractive correction needs or binocular vision issues.

The ninth major finding is that organized screening and treatment programs depend heavily on operational reliability and clinician competence. Shukla et al. (2020) emphasize operational guidelines in India, reflecting the practical reality that ROP care is not self-executing. Harrell and Brandon (2007) similarly make clear that disease classification, screening schedules, and treatment timing matter profoundly. These findings show that ROP programs are vulnerable to human-system failure: delayed identification, missed follow-up, misclassification, or poor communication can all undermine outcomes. This means that competency in ROP is not abstract. It is directly tied to preventable harm.

The tenth major finding is that competency-based medical education offers a useful framework for conceptualizing safe ROP care. Modi et al. (2015) highlight competency-based medical education, entrustment, and assessment, emphasizing that clinicians should be judged by demonstrable ability rather than only knowledge possession. Applied to ROP, this finding implies that training must evaluate whether a clinician can reliably identify disease stage, appreciate urgency, choose or recommend treatment responsibly, communicate with families, and ensure continuity. ROP is therefore a condition in which entrustment is particularly meaningful. A trainee should not be considered ready for independent practice in this area merely because they know the classification system theoretically. They must demonstrate consistent applied competence.

The eleventh major finding is that emotional intelligence is strongly relevant to medical performance, judgment, and interaction, and these domains are directly relevant to ROP care. Mayer et al. (2016) define emotional intelligence through the ability model, which includes perceiving, understanding, using, and managing emotions. Arora et al. (2010) link emotional intelligence to ACGME-related competencies in medicine. Johnson (2015) argues that emotional intelligence is crucial in medical education. Lerner et al. (2015) demonstrate that emotion shapes decision-making itself, not merely how people feel after decisions. McQueen (2004) emphasizes the significance of emotional intelligence in nursing work. Taken together, these sources suggest that emotional intelligence is not a soft, optional attribute but an important part of clinical functioning in complex environments.

The twelfth major finding is that emotionally intelligent practice likely matters in ROP because the condition involves vulnerable patients, distressed families, and longitudinal uncertainty. The emotional intelligence literature included in the reference set is not specific to ophthalmology, but it is highly relevant. Todres et al. (2010), Chew et al. (2013), George et al. (2022), Mohammed and Mohammed (2020), Sundararajan and Gopichandran (2018), Ewaiwe et al. (2020), Vasefi et al. (2018), Vadivel (2019), EG et al. (2016), and Kumar et al. (2016) collectively show that emotional intelligence varies among medical learners and professionals, and that it is associated with academic, general health, or professional outcomes. In ROP settings, where clinicians must discuss risk, uncertainty, repeated follow-up, and possible long-term limitations with families already burdened by prematurity, these capacities become particularly relevant.

The thirteenth major finding is that emotion regulation and interpersonal competence influence teamwork and leadership in ways that are highly applicable to neonatal ophthalmic settings. Allen et al. (2012) link emotionally intelligent leadership to process-oriented leadership development. García-Sancho et al. (2014) show that emotional intelligence relates inversely to aggression-related tendencies. Romanelli et al. (2006) position emotional intelligence as a predictor of academic or professional success. These findings suggest that emotionally intelligent clinicians may contribute to smoother team coordination, more constructive communication, and less friction in high-pressure care settings. Since ROP care commonly involves neonatologists, ophthalmologists, nurses, technicians, and outpatient staff, leadership and teamwork matter significantly.

The fourteenth major finding is that ROP care should be conceptualized as a long-term, multi-stage care pathway rather than a one-time intervention. The ophthalmic literature clearly shows longitudinal consequences, and the educational literature supports the importance of competencies that sustain longitudinal care, including judgment, communication, and emotional steadiness. This integrated view suggests that the quality of a clinician's interaction with parents during screening, treatment counseling, discharge, and follow-up instructions may be just as consequential to final outcome as technical excellence in the procedure itself.

The fifteenth and most integrative finding is that long-term visual outcomes in ROP are shaped within a

competence ecology. Disease severity and treatment are central, but outcomes are also influenced by whether the care system includes emotionally intelligent communication, competent clinical judgment, well-structured follow-up, and entrustable professionals. The references do not support a simplistic causal claim that emotional intelligence alone improves retinal outcomes. However, they strongly support the broader claim that emotionally intelligent, competency-based care is likely to improve the care processes upon which long-term ROP outcomes depend.

4. Discussion

The findings of this study support a major rethinking of how ROP is conceptualized in both clinical and educational terms. Traditionally, ROP has often been framed as a subspecialty problem of diagnosis and treatment. A baby is screened, disease is classified, intervention is performed if necessary, and the acute retinal stage becomes the dominant concern. The present synthesis suggests that this model is too narrow. ROP must instead be understood as a developmental condition with long-term ocular consequences that unfold within a complex professional-care environment. In such an environment, technical expertise remains indispensable, but it is not sufficient on its own.

A first discussion point concerns the difference between saving vision and optimizing visual development. These two goals are related but not identical. Laser therapy or anti-VEGF treatment may successfully control acute retinal disease, thereby preventing blindness or severe structural loss. Yet the studies reviewed here show that refractive error, eye growth, macular configuration, and later visual function may still remain abnormal (Good et al., 2010; Fielder et al., 2015; Yang et al., 2013; Lee et al., 2018; Kaur et al., 2021). This means that the language of "success" in ROP care must be broadened. A narrow definition of success risks over-celebrating anatomical control while underestimating the child's later functional and refractive needs. A more complete definition would include long-term surveillance, visual rehabilitation, refractive correction, and family preparedness for ongoing care.

A second discussion point concerns treatment choice and its ethical complexity. The comparative literature on laser and anti-VEGF treatment suggests that clinicians are not simply choosing between two equally neutral paths to retinal regression. They are choosing among different developmental futures. Geloneck et al. (2014), Lee et al. (2018), and Chen and Chen (2020) imply that modality affects later refractive and structural outcomes. This does not mean one treatment is universally superior. Rather, it means clinicians must weigh immediate efficacy, long-term refractive considerations, recurrence risk, follow-up burden, and the clinical setting's capacity for prolonged surveillance. Such choices are value-laden as well as technical. They require not only knowledge but judgment.

This is where emotional intelligence becomes especially relevant. Judgment in medicine is never purely abstract. Decisions are made under uncertainty, time pressure, parental emotion, and professional accountability. Lerner et al. (2015) show that emotion affects decision-making, while Mayer et al. (2016) and Arora et al. (2010) suggest that the ability to regulate and understand emotion is part of competent professional behavior. In a condition such as ROP, where treatment decisions may have long-term implications and where families may be frightened or confused, emotionally intelligent decision-making may support clearer reasoning and better communication.

A third discussion point concerns the family as part of the outcome pathway. In many medical conditions, the outcome depends heavily on biological progression and therapeutic intervention. In ROP, that is certainly true, but follow-up adherence also plays a critical role. If parents do not understand the seriousness of return visits, if discharge communication is vague, or if care teams fail to reinforce long-term risks, then preventable deterioration or unmanaged refractive problems may follow. Although the supplied references do not directly study parental adherence, the logic of the clinical literature makes the issue unavoidable. ROP is not a self-limiting episode that can be forgotten once treatment is done. It is a condition that demands family engagement across time. Therefore, clinician communication becomes part of the therapeutic chain.

Emotionally intelligent communication is especially important here. The neonatal context is emotionally saturated. Families of preterm infants are often coping with prolonged hospital admission, survival anxiety, guilt, uncertainty, and overwhelming information. Under such conditions, the way clinicians explain ROP matters enormously. A technically correct but emotionally blunt explanation may not produce understanding. A compassionate but imprecise explanation may produce false reassurance. High-quality ROP care therefore requires a synthesis of accuracy and empathy. This is precisely the kind of professional competence to which emotional intelligence literature speaks (Johnson, 2015; McQueen, 2004; Allen et al., 2012).

A fourth discussion point concerns competency-based medical education. Modi et al. (2015) emphasize that

competency-based education is not about exposure alone; it is about whether a learner can be entrusted with real responsibility. ROP provides an excellent test case for this model. Screening interpretation requires precision. Timing matters greatly. Parent counseling requires both information and emotional sensitivity. Treatment selection may require nuanced reasoning. Follow-up planning demands systems awareness. In other words, ROP competence is multi-dimensional. It includes diagnostic recognition, procedural knowledge, decision timing, communication, and continuity management. Such competence cannot be assumed merely from textbook learning or even from procedural observation.

This suggests that ROP training should include structured entrustment frameworks. A trainee should be assessed not only on whether they can identify "plus disease" or memorize treatment indications, but also on whether they can explain the condition clearly to parents, recognize uncertainty honestly, collaborate with neonatology colleagues, and manage their own emotional responses when confronting high-risk clinical situations. Competency in such an area is not reducible to isolated skill performance. It is a whole-professional capability.

A fifth discussion point concerns the place of emotional intelligence in specialist medicine. Emotional intelligence is sometimes treated as a general or even peripheral topic in medical education, more relevant to professionalism courses than to high-specialization domains. The present synthesis suggests the opposite. In highly specialized fields like neonatal ophthalmology, emotional intelligence may be especially important because the technical work occurs under high relational and ethical pressure. A pediatric ophthalmologist treating ROP is not simply executing retinal expertise. They are working at the edge of neonatal survival, parental fear, long-term disability prevention, and repeated follow-up demands. In such contexts, self-awareness, empathy, emotional regulation, and interpersonal clarity are not ornamental traits. They are instruments of safe care.

A sixth discussion point concerns the interdisciplinary nature of ROP care. The disease is often introduced as an ophthalmic problem, but the care pathway depends on neonatologists identifying eligible infants, nurses supporting examinations and treatment logistics, ophthalmologists providing accurate screening and decisions, and outpatient teams sustaining follow-up. McQueen (2004) reminds us that emotional intelligence matters in nursing work, and Allen et al. (2012) emphasize emotionally intelligent leadership processes. These insights matter because teamwork breakdown can affect ROP outcomes just as surely as diagnostic error can. A delayed referral, unclear communication, or poorly coordinated discharge can undermine the effectiveness of even the most skilled retinal treatment. Thus, emotionally intelligent teamwork should be understood as part of the infrastructure of high-quality ROP care.

A seventh discussion point concerns the problem of long-term uncertainty. Some of the most difficult aspects of ROP care arise not during the immediate screening decision, but during later counseling. What should parents be told about the future? The studies reviewed show that visual acuity, refraction, structural development, and biometric outcomes may vary over time (Good et al., 2010; O'Connor et al., 2006; Lee et al., 2018; Farvardin et al., 2022). This means clinicians must communicate probabilistically, not absolutely. Such communication is difficult. It requires helping parents understand that acute improvement does not always mean normal visual development, while also avoiding fatalistic or unnecessarily frightening language. Emotional intelligence is especially relevant in these moments because clinicians must balance truthfulness, hope, uncertainty, and trust.

An eighth discussion point concerns measurement and evidence. The emotional intelligence literature itself is heterogeneous. Some studies use self-assessment, some use ability frameworks, and some are exploratory. This raises an important caution. It would be inappropriate to assume that emotional intelligence can be reduced to one score that predicts clinical excellence. The present article does not make that claim. Instead, it uses the emotional intelligence literature to support a broader professional argument: the capacities commonly grouped under emotional intelligence—such as empathy, self-regulation, awareness of emotion, and effective interpersonal functioning—are clearly relevant in high-stakes neonatal care. In other words, the practical importance of these capacities does not depend entirely on perfect measurement consensus.

A ninth discussion point concerns developmental justice. Premature infants who survive neonatal illness already begin life at biological disadvantage. If, in addition, they receive fragmented screening, inconsistent follow-up, or poor communication from clinicians, the resulting visual burden becomes not only medical but systemic. ROP is therefore an issue of fairness in care delivery. Every preventable missed screen, avoidable delay, or poorly communicated follow-up instruction represents a lost opportunity in a child whose future visual development is still open to influence. This moral dimension strengthens the case for competency-based and emotionally intelligent practice.

A tenth discussion point concerns the educational role of reflective practice. Since emotional intelligence is not merely an inborn trait but can be discussed, reflected on, and potentially strengthened, ROP training may benefit from simulation and reflective supervision. For instance, trainees could practice not only retinal classification but also family counseling scenarios, communication of long-term risk, and management of uncertainty. The references provided do not directly test such interventions, but the combined logic of competency-based education and emotional intelligence scholarship strongly supports their relevance (Modi et al., 2015; Johnson, 2015; Arora et al., 2010).

An eleventh discussion point concerns leadership and systems design. Allen et al. (2012) describe emotionally intelligent leadership as process-oriented and integrative. In ROP programs, leadership matters because services must be organized, timelines protected, and follow-up systems enforced. An emotionally intelligent leader in neonatal ophthalmology or neonatology may be better equipped to build collaborative culture, respond constructively to errors or near-misses, and maintain family-centered priorities even under resource pressure. Thus, the article's implications go beyond individual clinicians to service organization.

A twelfth discussion point concerns the future of neonatal ophthalmic education. Current training models may already teach disease classification, retinal imaging interpretation, and treatment methods. Yet the literature reviewed here suggests that such training should be expanded. Future-ready ROP education should include the developmental science of the preterm eye, long-term refractive and biometric implications of treatment, parent counseling under uncertainty, emotional self-regulation, interprofessional communication, and entrustment-based assessment. The child with ROP does not need a narrowly technical expert alone; the child needs a clinician whose expertise includes developmental understanding and emotionally intelligent care.

This study has important limitations. First, it is based strictly on the provided references and therefore does not incorporate the full global literature on ROP, pediatric ophthalmology, or emotional intelligence. Second, the integration between ROP outcomes and emotional intelligence is conceptual rather than based on direct ROP-specific trials measuring clinician emotional intelligence. Third, some emotional intelligence studies are cross-sectional or exploratory, which limits causal interpretation. Fourth, the article does not present original data. Nonetheless, these limitations are consistent with the nature of the task. The article's contribution lies in conceptual integration and theoretical expansion, not in claiming final empirical closure.

The future scope of research is substantial. Empirical studies could examine whether communication quality and clinician emotional competence influence parental adherence to ROP follow-up. Training interventions could test whether simulation-based counseling and reflective supervision improve neonatal ophthalmology trainees' readiness for independent practice. Comparative program studies could evaluate whether ROP services that explicitly integrate family-centered communication and competency-based assessment achieve better long-term adherence or visual outcomes. Research could also explore whether emotionally intelligent leadership correlates with stronger screening program reliability in neonatal units.

In summary, the discussion leads to one overarching conclusion: ROP care is a scientific, developmental, and professional challenge all at once. Its optimal management demands more than retinal expertise. It demands a form of clinical practice capable of preserving vision while guiding families through uncertainty, long-term follow-up, and the developmental consequences of extreme prematurity.

5. Conclusion

Retinopathy of prematurity should be understood as a longitudinal developmental disorder of the premature eye rather than as a short-lived retinal problem confined to the neonatal period. The literature reviewed in this article demonstrates that ROP and its treatments are associated with later refractive error, biometric variation, structural changes, and variable visual function extending into childhood and beyond (Fielder et al., 2015; Good et al., 2010; O'Connor et al., 2006; Kaur et al., 2021; Lee et al., 2018; Farvardin et al., 2022). The child's visual future is therefore shaped by a combination of prematurity, disease severity, treatment modality, and ongoing ophthalmic follow-up.

At the same time, the article has argued that these biomedical realities unfold within a professional care environment that demands much more than technical proficiency. Screening reliability, diagnostic accuracy, treatment timing, parent counseling, follow-up reinforcement, interprofessional coordination, and emotionally regulated decision-making are all central to high-quality ROP care. The emotional intelligence and competency-based medical education literature strongly suggests that these capacities are not peripheral to medicine but integral to competent clinical practice (Arora et al., 2010; Modi et al., 2015; Mayer et al., 2016; Johnson, 2015).

The central contribution of this article has been to bring

these domains together. Long-term ocular outcomes in ROP cannot be fully understood if care is imagined as purely biological. Nor can professional competence in neonatal ophthalmology be fully understood if it is reduced to technical skill without emotional and communicative dimensions. Better ROP outcomes will likely depend on integrating both: rigorous developmental eye science and emotionally intelligent, entrustable clinical care.

Future neonatal ophthalmic programs and training systems should therefore move toward an integrated model. Such a model would teach not only how to identify and treat ROP, but also how to communicate risk clearly, support distressed families, think longitudinally about visual development, and cultivate the emotional and judgment capacities necessary for ethically responsible care. In the final analysis, preserving sight in premature infants requires not only excellent treatment of the retina, but excellent formation of the professionals entrusted with that treatment.

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