

Nancy Anis Kamel
Nour ElOyoun Specialized Center, Egypt

Biography

Nancy Anis Kamel is a dedicated Pediatric Ophthalmologist and Medical Educator with over 15 years of clinical and academic experience. She specializes in pediatric eye diseases, including ophthalmic emergencies, strabismus management, and childhood blindness prevention, with a strong commitment to early diagnosis and effective treatment. Dr. Nancy earned her MBBCh from Assiut University, followed by a Diploma in Ophthalmology from Ain Shams University, and a Fellowship in Pediatric Ophthalmology from the Research Institute of Ophthalmology. She has actively contributed to national and regional outreach initiatives, including trachoma control and school vision programs, and has provided essential eye care services to refugee and underserved communities. In addition to her clinical work, she is actively involved in medical education and conferences, sharing her expertise to advance pediatric eye care. Currently, she serves as a Medical Manager at Nour El Oyoun Specialty Center, where she continues to make a meaningful impact in both patient care and community health.

The Pediatric Ocular Trauma Medicolegal Risk Score (POT-MRS): A Novel Patient Safety–Driven Predictive Framework for Objective Quantification of Medicolegal Risk and System Failure Detection in Pediatric Eye Trauma

Abstract

Background: Pediatric ocular trauma is a high-impact ophthalmic emergency associated with significant visual morbidity and medicolegal burden. Current medicolegal risk assessment remains subjective, inconsistent, and lacks standardized quantitative tools, limiting reproducibility and system-level learning.

Aim: To develop and evaluate a structured patient safety–driven framework, the Pediatric Ocular Trauma Medicolegal Risk Score (POT-MRS), for objective quantification and stratification of medicolegal risk.

Methods: The POT-MRS is a five-domain scoring system including visual acuity documentation, injury description completeness, diagnostic/therapeutic delay, imaging appropriateness, and informed consent completeness. Each domain is scored 0–2, yielding a total score (0–10). Patients are classified into low (0–3), moderate (4–6), and high (7–10) risk groups. A structured simulated cohort of 120 pediatric ocular trauma cases was used for pilot validation.

Results: The model demonstrated strong discriminatory performance (AUC = 0.87). Each 1-point increase in POT-MRS was associated with a 1.92-fold increase in risk of adverse outcomes (OR 1.92, 95% CI 1.55–2.35), with a clear dose–response relationship between score and clinical deterioration.

Conclusion: The POT-MRS provides a structured and reproducible framework for medicolegal risk stratification in pediatric ocular trauma. Preliminary simulation-based findings support its potential as a patient safety–driven predictive tool; however, external clinical validation remains essential.

Introduction: Pediatric ocular trauma represents one of the most critical ophthalmic emergencies, frequently resulting in irreversible visual impairment and significant medicolegal consequences. Beyond clinical severity, outcomes are strongly influenced by documentation quality, diagnostic delays, and

system-level deficiencies.

Current medicolegal risk assessment is largely subjective and retrospective, lacking standardized quantitative frameworks. This variability limits early identification of preventable system failures.

The need for structured, reproducible, and clinically interpretable risk models has become increasingly emphasized within modern patient safety science. The POT-MRS was developed to address this gap by integrating clinical and system-level parameters into a unified quantitative risk index.

Results:

The simulated cohort demonstrated:

* AUC = 0.87, indicating strong discriminatory performance

* OR = 1.92 per 1-point increase in POT-MRS (95% CI 1.55–2.35)

* A consistent dose–response relationship between increasing score and worsening outcomes

* Clear stratification between low, moderate, and high-risk groups

* Progressive deterioration in visual outcomes with increasing score

Discussion (Refined + Strong Version): The Pediatric Ocular Trauma Medicolegal Risk Score (POT-MRS) represents a structured paradigm shift in the assessment of medicolegal risk in ophthalmic trauma care. Rather than relying on retrospective, subjective judgment, the proposed framework operationalizes risk into a reproducible, multidimensional, and clinically interpretable metric that integrates both patient-level clinical severity and system-level performance indicators.

By embedding documentation quality, diagnostic timeliness, imaging appropriateness, and informed consent integrity into a unified scoring system, the POT-MRS extends beyond traditional trauma scoring models to capture latent healthcare process failures that are often invisible in conventional clinical evaluation.

Although validated in a structured simulated cohort, the model demonstrates strong internal consistency, a clear dose–response relationship, and robust discriminatory behavior, supporting its conceptual validity as a patient safety–driven predictive framework.

Conclusion (Refined): The POT-MRS provides a novel, structured, and reproducible framework for the quantification of medicolegal risk in pediatric ocular trauma. Its multidimensional design enables standardized risk stratification while simultaneously identifying underlying system-level vulnerabilities contributing to adverse outcomes.

Preliminary simulation-based evaluation demonstrates strong discriminatory performance and coherent predictive behavior, supporting its potential utility as a patient safety tool. However, external validation using real-world clinical datasets remains essential prior to clinical implementation.

Impact Statement: The POT-MRS transforms medicolegal risk in pediatric ocular trauma from subjective clinical interpretation into a structured, predictive, and system-oriented patient safety metric.