The Epidemiology of Pediatric Retinal Injuries Presenting to Emergency Departments in the United States

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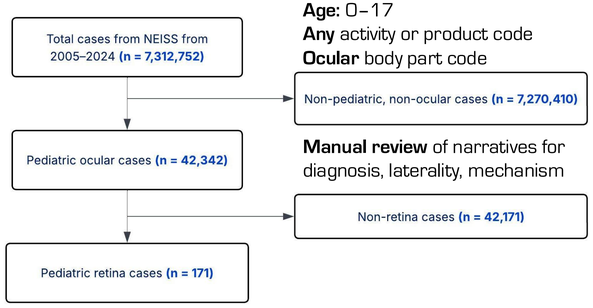
INTRODUCTION

- Pediatric ocular trauma is a significant public health concern, estimated **163,431 ED visits annually**
- Retinal injuries carry substantial risk for permanent vision loss, with trauma implicated in **40–53%** of pediatric RDs and the macula detached on presentation in 66% of cases, limited functional recovery despite surgery

OBJECTIVE

To describe the epidemiology, injury mechanisms, and outcomes of pediatric retinal injuries presenting to EDs in the US from 2005–2024.

METHODS



Age: 0–17
Any activity or product code
Ocular body part code

Manual review of narratives for diagnosis, laterality, mechanism

Temporal Trends: Spearman's Correlation and linear regression

Developmental Transitions in Injury Mechanism: Multivariable logistic regression

RESULTS

Figure 1. Annual Weighted Estimates of Pediatric Retinal Injuries from 2005–2024

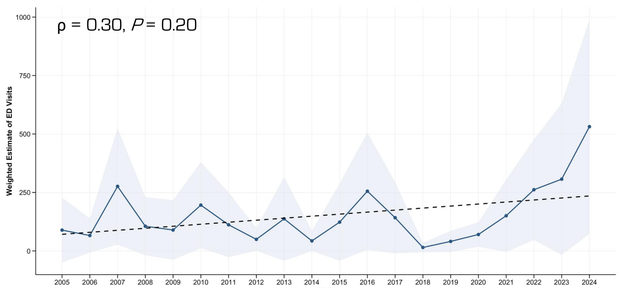


Figure 2. Monthly Weighted Estimates of Pediatric Retinal Injuries from 2005–2024

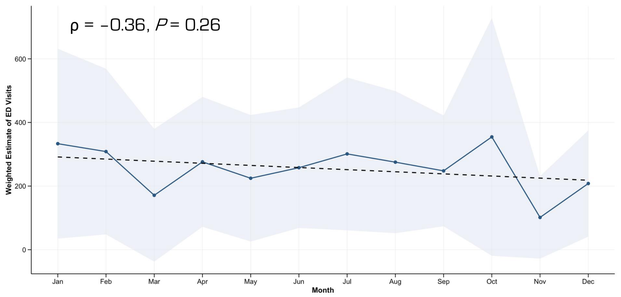


Figure 3. Frequency of Retinal Injuries or Observations

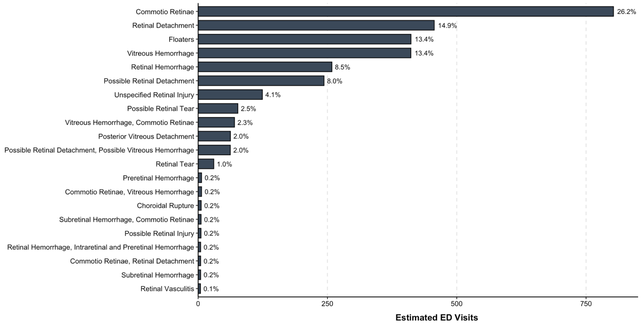


Figure 4. Mechanism of Injury

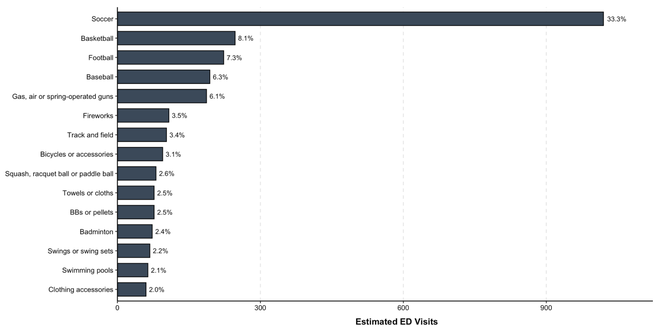


Figure 5. Age and Sex Distribution of Pediatric Retinal Injuries

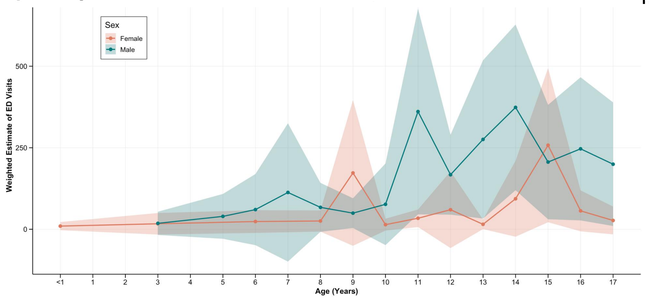
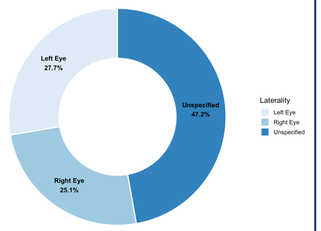


Figure 6. Laterality of Injuries



Summary of Results

1. **171 unweighted cases** representing an estimated **3060 ED visits nationwide** over 20 years
2. No significant trends in annual incidence or seasonal variation
3. Retinal injuries were **commotio retinae** (26.2%), **RD**(14.9%), **vitreous hemorrhage** (13.4%), and findings of **floaters** (13.4%)
4. **Soccer** was the leading mechanism (33.3%), followed by **basketball** (8.1%), **football** (7.3%), and **baseball** (6.3%)
5. **Demographic Data:**
   a) **72.8% of injuries occurred in males**, peak incidence in those aged 10–14 (45.6%) (mean age 12.5 ± 3.2 years)
   b) Among injuries with documented laterality, most were **unilateral** (left 28.6%, right 24.1%)
6. **Developmental shift in injury mechanism** was observed (*P*=0.008): injuries in ages 0–4 were **exclusively domestic-based** (household items, toys, furniture), whereas sports predominated among young children and adolescents
7. **Multivariable logistic regression:**
   a) **Younger age was an independent predictor of hospital admission or transfer** (aOR 0.75 per year of age; 95% CI 0.66–0.85; *P*=0.0002)
   b) Advancing age was an independent predictor of **sports-related** retinal injury (aOR 1.39 per year of age; 95% CI 1.11–1.74; *P*=0.007)
   c) Age, sex, & mechanism were not associated with injury

DISCUSSION

1. Injury mechanisms shift with age, supporting **age-stratified prevention** — home safety counseling in early childhood → protective eyewear as children enter organized athletics
2. ED-based surveillance likely **underestimates the true burden**, as milder presentations frequently bypass EDs for outpatient ophthalmologic care
3. Despite overall decline in pediatric ocular trauma, retinal injury incidence has remained **relatively stable** over 20 years, suggesting current prevention efforts have inadequately addressed this vision-threatening subset