

# Comparison of the Timeliness of Diagnosis & Treatment of Strabismus Based on Race & Preferred Language



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## ABSTRACT

**Introduction:** Strabismus, if not treated promptly in children, can lead to permanent vision loss. Racial disparities in eye care access and visual impairment exist, particularly among racial and ethnic minorities. This study explores the impact of race, ethnicity, and language preference on the timeliness of strabismus diagnosis and treatment, as well as the rate of amblyopia.

**Methods:** We conducted a retrospective chart review of pediatric patients who underwent strabismus surgery at our institution from 2016 to 2019. We analyzed demographic data, diagnosis and surgery dates, and amblyopia presence. Statistical comparisons were made across racial/ethnic and language groups.

**Results:** The cohort (n=585) had a mean diagnosis age of 4.4 years and a mean time from diagnosis to surgery of 1.2 years. Non-White children experienced later diagnoses and surgeries compared to White children (p=0.048 and p=0.004). Patients from non-English-speaking households had later diagnoses (p=0.041) and treatments (p=0.011). However, time to surgery and amblyopia rates were similar across groups. Family history of strabismus did not affect timeliness of diagnosis or treatment.

**Conclusions:** African American and non-English-speaking children face delays in strabismus diagnosis and treatment. These findings emphasize the need for interventions addressing racial and language barriers in pediatric ophthalmology to improve equity in eye care.

## INTRODUCTION

- Strabismus can lead to permanent vision loss if not diagnosed and treated early in childhood.
- Timely intervention is crucial to prevent amblyopia (lazy eye), a common consequence of untreated strabismus.**
- Racial and ethnic disparities in access to eye care exist in the United States, **with minorities often experiencing delayed diagnosis and treatment.**
- Delays in diagnosis and treatment **can negatively affect visual outcomes and quality of life.**
- This study investigates the impact of race, ethnicity, and preferred language on:
  - Timeliness of strabismus diagnosis and treatment.**
  - Rate of amblyopia among pediatric patients.**
- We conducted a retrospective chart review of children undergoing strabismus surgery to assess if these factors **contribute to delays in care and differences in amblyopia outcomes.**

## MATERIALS AND METHODS

**Study Design:** Retrospective chart review at *Children's Hospital Colorado* (2016-2019).  
**Inclusion criteria:** Pediatric patients undergoing strabismus surgery.

**Exclusion criteria:** Adults, secondary strabismus cases, surgeries performed by external ophthalmologists.

**Data Collected:**

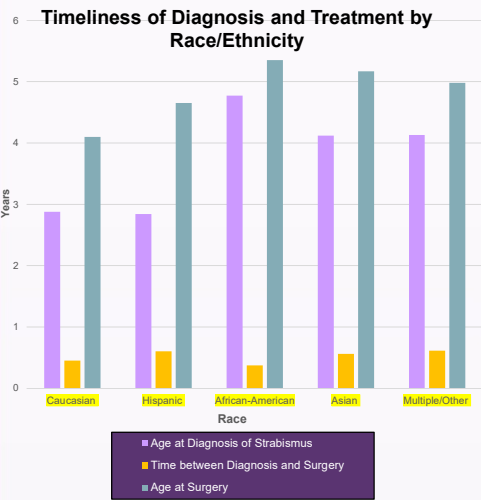
- Demographics: **Race, Ethnicity, Preferred Language, Family History**
- Clinical Data: **Age at Diagnosis, Age at Surgery, Presence of Amblyopia**

**Data Analysis:**

- Descriptive statistics, Wilcoxon rank sum, Kruskal-Wallis, Chi-square tests.
- SAS Version 9.4 for statistical analysis.
- Statistical comparison for diagnosis/treatment timing and amblyopia rates across groups.

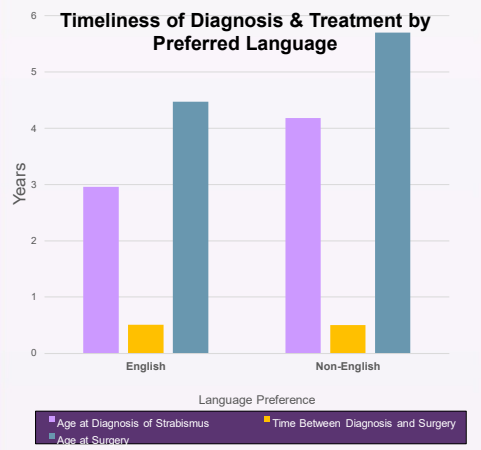
## RESULTS

Demographics, n = 585	
Sex, n (%)	
Male	272 (46.5%)
Female	313 (53.5%)
Race/Ethnicity, n (%)	
Caucasian	278 (47.5%)
Hispanic	182 (31.1%)
African-American	34 (5.8%)
Asian	26 (4.4%)
American Indian/Alaskan Native	4 (0.7%)
Multiple race/ethnicities/Other	33 (5.6%)
Not Reported	28 (4.8%)
Preferred Language, n (%)	
English	494 (84.4%)
Spanish	71 (12.1%)
Other	20 (3.4%)
Known Family History of Strabismus, n %	141 (24.1%)



**Non-White children were diagnosed and treated later than White children.**

- Median Age at Diagnosis: **White: 2.88 years vs. Non-White: 4.12 years** (p=0.0048)
- Median Age at Surgery: **White: 4.10 years vs. Non-White: 5.17 years** (p=0.004)



**Non-English-speaking children were diagnosed and treated later than English speaking children.**

- Median Age at Diagnosis: **English Speaking: 2.96 years vs. Non-English Speaking: 4.18 years** (p = 0.019)
- Median Age at Surgery: **English Speaking: 4.47 years vs. Non-English Speaking: 5.70 years** (p=0.0050)

## CONCLUSIONS

**Racial and language-based disparities exist in diagnosis and treatment timing for pediatric strabismus.**

**Possible Causes:**

- Delayed access** to specialty care.
- Language barriers** in communication and referrals.
- Differences in **healthcare utilization patterns.**

**Clinical Implications:**

- Strengthen vision screening and early referrals** in primary care settings.
- Enhance **multilingual patient educator and interpreter services.**
- Develop **policies to improve equitable access to pediatric eye care.**

## LIMITATIONS

- Single-center study**
- Small sample size:** Not fully representative of the racial/ethnic distribution of the U.S.
- Surgical-only population:** Excludes patients diagnosed but lost to follow-up, potentially underestimating amblyopia rates.
- Limited focus on language barriers:** Other factors like insurance status, transportation, and length of time in Colorado were not assessed.

## REFERENCES

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