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PURPOSE

- **Amblyopia** can lead to irreversible loss of vision without timely monitoring and treatment.
- Previous work examined general pediatric no-show risk¹ and explored associations between **social determinants of health (SDoH)** and first follow-up after initial amblyopia visits³.
- We extended previous work to **predict** amblyopia **patients at risk of** delay or loss to follow-up at the first or subsequent follow-ups.

METHODS

- Data consisted of **newly diagnosed amblyopia patients** seen at Casey Eye Institute in **2021 and 2022** with a suggested follow-up time of <6 months after initial visit (demographics in Tab. 1).
- Cohort selection and follow-up (Fig. 1) were identified using **natural** language processing methods on visit notes.

Table 1. Demographic characteristics of 896 patients in cohort.

Characteristic	Value	Characteristic	Value	Characteristic	Value
Race		Ethnicity		Insurance Commercial: N (%)	538
White: N (%)	568 (66.4%)	Non-Hispanic: N(%)	530 (62.0%)		(63.09
Declined: N (%)	111 (13.0%)	Hispanic: N (%)	189 (22.1%)	Area Deprivation Index (ADI)	
Unknown: N (%)	62 (7.3%)	Declined: N (%)	84 (9.8%)	Median	33
Asian: N (%)	50 (5.8%)	Unknown: N (%)	52 (6.1%)	Range	3-97
Black: N (%)	38 (4.4%)	English proferred: N (%)	775 (90 6%)	Distance from clinic (miles)	
American	17 (2.0%)		//3 (90.078)	Modian	17 73
Indian/Alaska		Age (years) <1: N (%)	101 (11.8%)		1/./2
Native: N (%)		1-2: N (%)	248 (29.0%)	Range	0.44-2
Hawaiian/Pacific	9 (1.1%)	3-5: N (%)	190 (22.2%)	Suggested 1 st follow-up	
Islander: N (%)		>5: N (%)	316 (37.0%)	(days)	
Sex Male	464 (51.8%)			Median	91
				Range	1-183

- We ran logistic regression models on all data and gradient boosting machine (GBM) models² with 5-fold cross validation for two tasks:
 - **1.** Given completed initial visit, predict loss or delay at 1st followup (Fig. 2).
 - 2. Given completed initial visit and 1st follow-up, predict loss at 2nd or 3rd follow-up (Fig. 3).
- We calculated **odds ratios** and p-values for logistic regression models (Tab. 2). Using Bonferroni correction, a cut-off of $\alpha = 0.002$ was used to determine statistical significance.
- We evaluated GBM model **performance** using accuracy, sensitivity, specificity, and positive predictive value (Tab. 3).
- We also calculated **feature importance** in the GBM models (Fig. 4).

Predicting loss and delay to follow-up of amblyopia patients



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1.003

NA

NA

<0.001*

Delay before 1st follow-up in days

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Model	Acc	Sens	Spec	PPV
1. Given completed initial visit, predict loss <i>or delay</i> at 1 st follow-up	0.671	0.637	0.680	0.349
2. Given completed initial visit and 1 st follow-up, predict loss at 2 nd or 3 rd follow-up	0.662	0.540	0.715	0.453

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DISCUSSION

SDoH indicators at both the patient-level (language preference, race, ethnicity, commercial insurance) and community-level (ADI) did not **reach significance.** Many were close, and some had high feature importance in GBM models.

Generally, clinical experience factors (whether seen in the Vancouver clinic where patients schedule appointments as they leave, suggested length of 1st follow-up in days) and **patients' previous activity** (cancellations, delay of 1st follow-up) were significantly associated with whether patients were a loss or delay to follow-up.

It remains difficult to predict loss to follow-up. Future work will include adding more features (e.g., amblyopia type, visual acuity) and testing other models.

CONCLUSIONS

• This model is a first attempt at the important aim of identifying amblyopia patients at risk of delayed care or loss to follow-up, in order to develop interventions and prevent vision loss.

These results lead us towards **interventions** with patients who **initially** have cancellations and appointment delay, and towards considering changing scheduling protocol of other clinics to mirror the Vancouver clinic.

KEY REFERENCES

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