



Background

- Vision loss from diabetic retinopathy (DR), the leading cause of blindness impacting a third of diabetics over forty¹, is 95% preventable if detected early.
- Teleophthalmology provides easier access to early evaluation within the primary care setting.^{2,3}
- Understanding the risk factors associated for vision impairment and DR is important to support the development of teleophthalmology programs.

Objective

To determine the demographic and systemic health risk factors that are associated with worsening visual acuity (VA) and the development of DR in a population of patients with diabetes evaluated by teleophthalmology.

Methods

- Cross-sectional review of data from adult patients with diabetes evaluated in the University of Rochester's "Tele-I-Care" program from 5 urban safety-net primary care clinics.

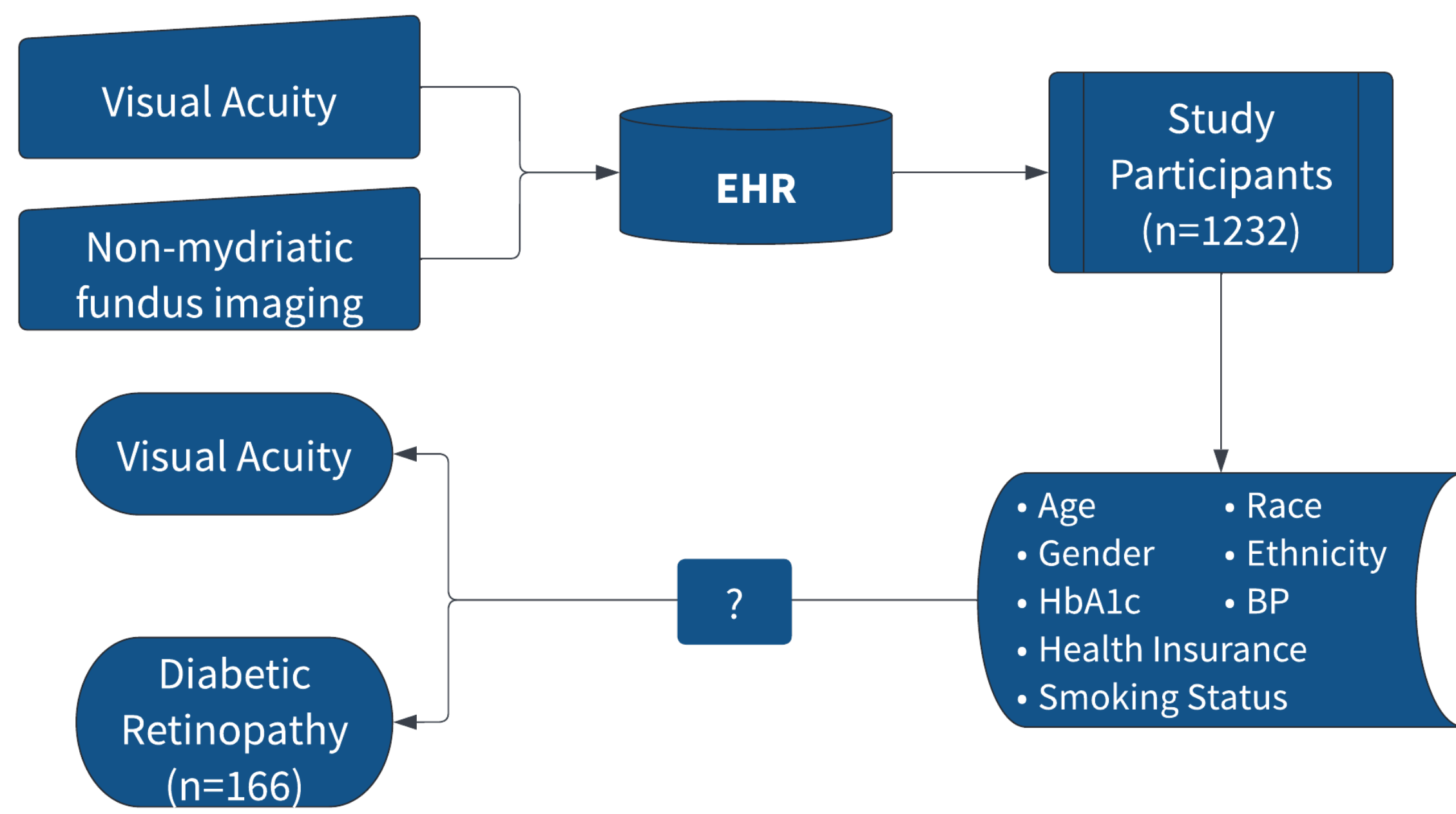


Figure 1 | Data collection and analysis flowchart

- The association between demographic and systemic health factors and VA and DR was examined by ANOVA and Chi-Square, respectively.
- Multivariate linear, logistic regression, and spearman tests were used to relate VA and DR as a function of significant predictor independent variables and determine odds ratios.
- Variance of Inflation test was utilized to assess multicollinearity of independent variables.
- LogMAR values refer to the minimum angle of resolution and are a standardized measure of visual acuity.

Results

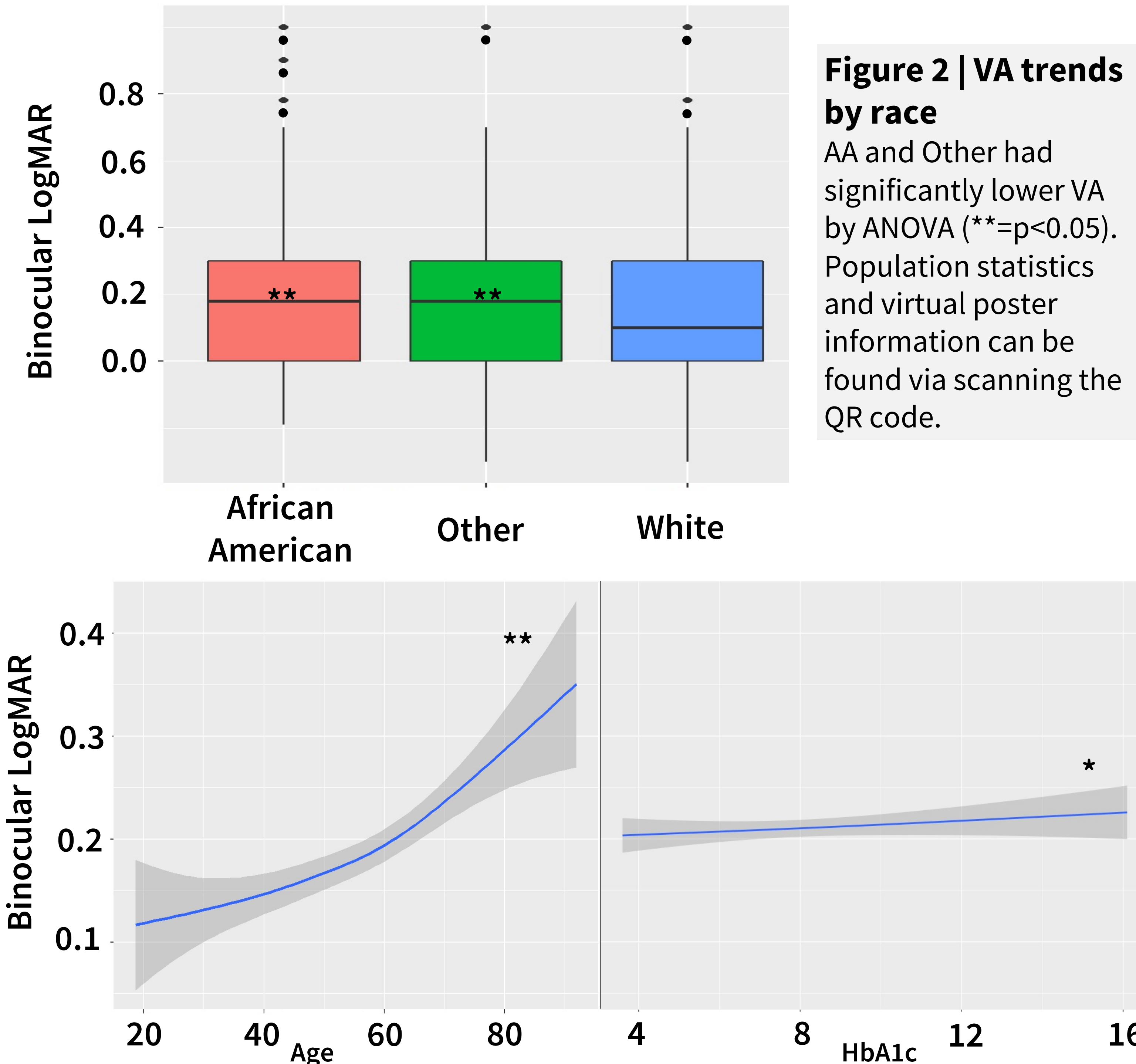


Figure 3 | Linear regression of VA by age and HbA1c
There were significant differences in VA based on age and HbA1c but not DR status or grade, insurance, or smoking status by ANOVA. (* p<.05; ** p<.005)

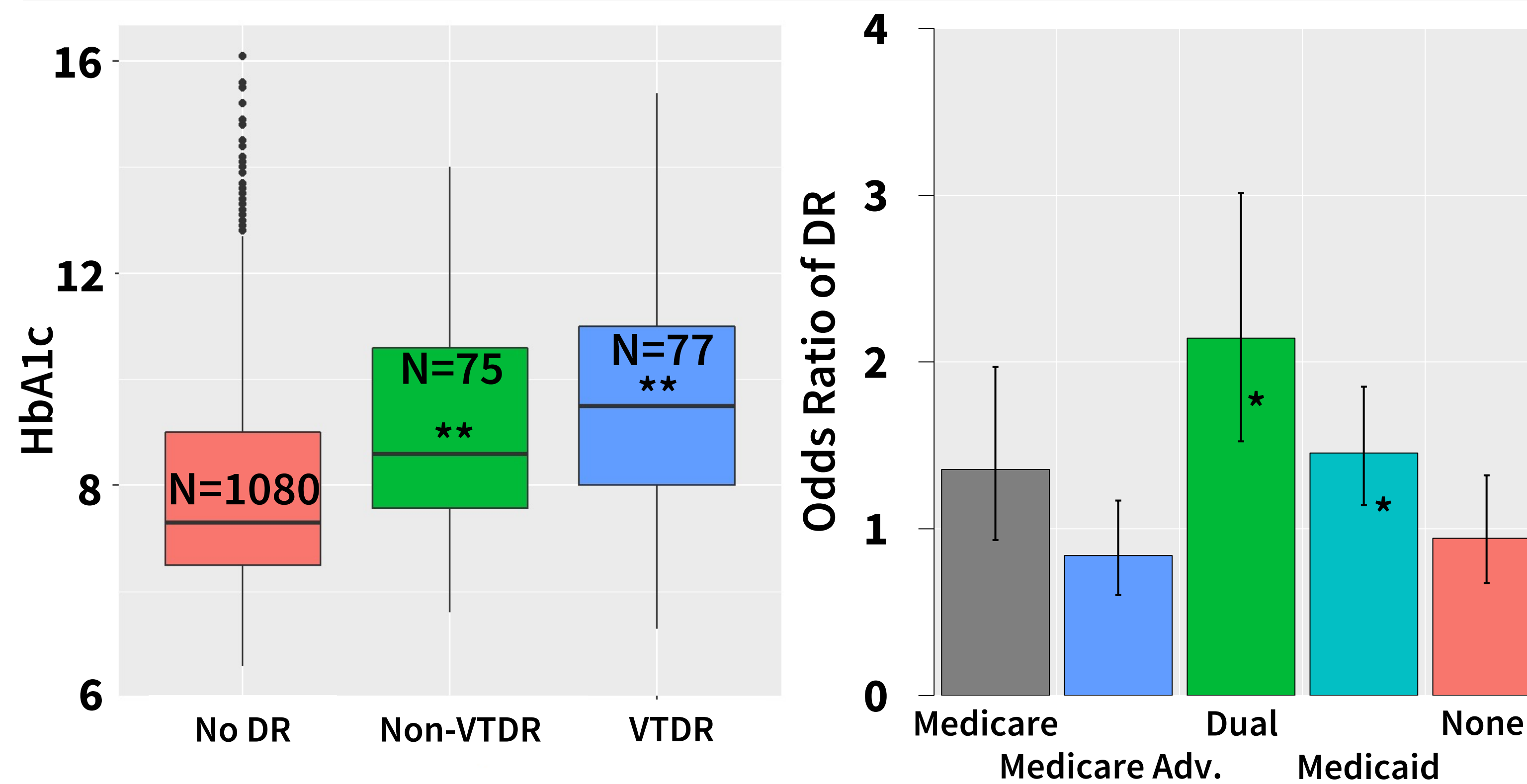


Figure 4 | HbA1c and insurance status are associated with DR and VTDR
13.5% of those evaluated with teleophthalmology had DR, akin to rates at the state level. Only higher HbA1c and having both Medicare-Medicaid ("dual") or Medicaid insurance (compared to commercial payors) were associated with increase odds for DR. Vision-Threatening DR (VTDR) is defined as severe non-proliferative diabetic retinopathy (NPDR) and worse (PDR) or any grade of DR with evidence of diabetic macular edema. (* p<.05; ** p<.005)

Results

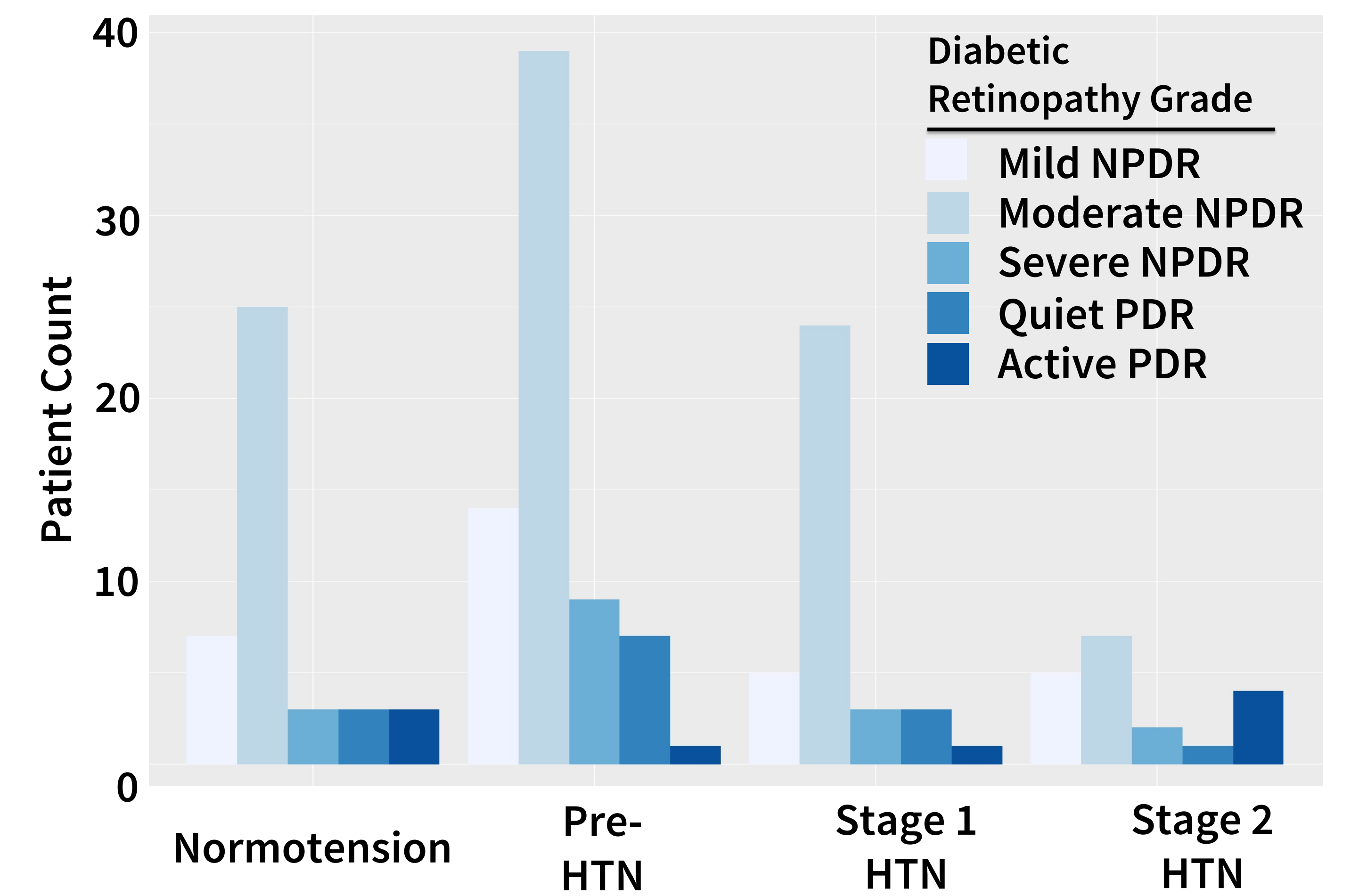


Figure 5 | DR Grade patient counts by hypertension (HTN) category
Chi square analysis revealed significant association of Stage 2 Hypertension (HTN) with both moderate non proliferative diabetic retinopathy (NPDR; * p<.05) and active proliferative DR (PDR; ** p<.0005).

Conclusions

- Modifiable risk factors such as HbA1c and BP have a high association with DR and VTDR, highlighting the importance of health behavior counseling and adequate disease management for risk reduction.
- Nonmodifiable risk factors such as race play a role in VA. This may reflect broader health inequities and suggest the continued need for such teleophthalmology programs.
- The relationship between poor VA and high HbA1c could be due to the microangiopathic sequelae of DR. However, smoking status was not associated with DR status, hypertension category, or visual acuity.
- DR, including vision threatening DR, often exists silently without worsening visual acuity. Thus, annual eye exams are critical for identifying and treating visually significant disease.

References

- Centers for Disease Control and Prevention. National Diabetes Statistics Report website. <https://www.cdc.gov/diabetes/data/statistics-report/index.html>. Accessed 04/07/2022.
- Ramchandran, R. S., Yilmaz, S., Greaux, E., & Dozier, A. (2020). Patient perceived value of teleophthalmology in an urban, low income US population with diabetes. PLoS one, 15(1), e0225300. <https://doi.org/10.1371/journal.pone.0225300>
- The sensitivity and specificity of single-field nonmydratric monochromatic digital fundus photography with remote image interpretation for diabetic retinopathy screening: a comparison with ophthalmoscopy and standardized mydratric color photography¹

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