Barriers to eye care among participants of a mobile eye clinic

Tosha Zaback\textsuperscript{1}, Kousanee Chheda\textsuperscript{2}, Rong Wu\textsuperscript{3}
Mitchell Brinks\textsuperscript{1}

\textsuperscript{1}Casey Eye Institute, Oregon Health & Science University, Portland, OR
\textsuperscript{2}UConn Health, Farmington, CT
\textsuperscript{3}Biostatistics Center, Connecticut Institute for Clinical and Translational Science, UConn Health, Farmington, CT
Presenter Disclosures

Authors have no relationships to disclose
Acknowledgements

Supported by grant P30 EY010572 from the National Institutes of Health (Bethesda, MD), and by unrestricted departmental funding from Research to Prevent Blindness (New York, NY).
The impact of visual impairment

• Chronic visual conditions accounted for ~$139 billion of national costs in 2013
• Visual impairment can lead to life dissatisfaction, disability, and decreased physical activity
• Between 10.7% to 32.1% of visually impaired individuals are depressed
The Casey Eye Institute Outreach (CEIO) Program

- Volunteer-run mobile clinic that provides screening and on-site comprehensive eye exams for adults in Oregon
- *Partner agencies*: FQHC, medical and social service agencies, health and wellness centers
CEIO Program Counties Served
Eye Health Screening Programs

At-risk individuals identified for screening

Diagnostic testing performed by volunteers

Pass/Fail assigned to individual

Fails Referred to Eye Care Provider (~50%)

Definitive exam conducted

Definitive exam conducted

Traditional Eye Health Screening Program

CEI Program Eye Health Screening Program Utilizing On-site Eye Care Provider
Background

• Rural northeastern US data (2011-2014): TLEE was an average of 7.1 years prior to screening
• Ohio data (2009-2011): 39% last received a dilated eye exam 10+ years prior
• *Possible barriers*: race/ethnicity, gender, health insurance coverage, history of diabetes, subjective/measured visual acuity
Question

What are potential initial barriers to seeking eye care based on quantitative data (time since last eye exam (TLEE))?
Exclusion criteria: Screenings prior to 10/08/14, under 18 yo, pregnant, repeat participants
Statistical Analysis

- **Predictor Variables**: Race/ethnicity, Insurance, Location, Diabetic History etc.
  - Categorical Variables
- **Outcome Variable (1)**: Having eye exam history (yes/no)
  - Initial bivariate analysis: Chi-Square Test
  - Further analysis: Logistic Regression Modeling (controlling for age)
- **Outcome Variable (2)**: TLEE
  - Right-Skewed data $\rightarrow$ Log-transformation
  - Linear Regression Modeling (controlling for age)
- $p < 0.05$ was considered statistically significant
American Academy of Ophthalmology (AAO) Recommendations

| Group   | Preventive eye exam frequency (y) |
|---------|-----------------------------------|
| 40-54 yo| 2-4                               |
| 55-64 yo| 1-3                               |
| 65+ yo  | 1-2                               |
| Diabetics| ≤1                                |
Notable Results
### Race/ethnicity assoc. with having eye exam history

| Race/Ethnicity          | History of Eye Exam (N=1344) | No History of Eye Exam (N=261) | p     |
|-------------------------|------------------------------|--------------------------------|-------|
|                         | n   | %       | n   | %   |       |
| **Race/Ethnicity**      |     |         |     |     | <0.0001 |
| Caucasian               | 505 | 96.4    | 19  | 3.6 |     |
| Hispanic                | 349 | 65.1    | 187 | 34.9|     |
| AI/AN                   | 231 | 98.3    | 4   | 1.7 |     |
| Black                   | 39  | 86.7    | 6   | 13.3|     |
| Asian                   | 70  | 86.4    | 11  | 13.6|     |
| Multiethnic/Other       | 97  | 77.0    | 29  | 23.0|     |
| Unknown/Unreported      | 53  | N/A     | 5   | N/A |     |

Compared to Caucasians, the age-controlled OR for Hispanic participants having eye exam history is 0.08 (95% CI [0.05, 0.14]).
### Insurance assoc. with having eye exam history

| Health Insurance    | History of Eye Exam (N=1344) | No History of Eye Exam (N=261) | p   |
|---------------------|-------------------------------|--------------------------------|-----|
|                     | n | %  | n   | %  |
| None                | 434 | 71.4 | 174 | 28.6 |
| Public              | 593 | 94.1 | 37  | 5.9  |
| Private             | 88  | 91.7 | 8   | 8.3  |
| Unknown/Unreported* | 229 | N/A  | 42  | N/A |

**p < 0.0001**

Compared to the uninsured, the age-controlled OR for participants with:

- public insurance having eye exam history is 5.14 (95% CI [3.50, 7.53])
- private insurance having eye exam history is 4.12 (95% CI [1.94, 8.75])
Large percentage of Caucasians had a longer TLEE

| Race/Ethnicity       | Years since Last Eye Exam | Ln(Years Since Last Eye Exam) |  
|----------------------|---------------------------|---------------------------------|-------|
|                      | (0,1] % | (1,2] % | (2,3] % | (3,4] % | (4,10] | 10+ % | Mean ± Std Dev | P Value (Age adjusted) |
| Caucasian            | 19.6    | 19.8    | 11.9    | 8.5     | 26.7    | 13.5  | 1.21 ± 1.09 | <0.0001               |
| Hispanic             | 28.1    | 20.9    | 17.5    | 8.0     | 19.8    | 5.7   | 0.87 ± 1.09 | <.0001                |
| AI/AN                | 45.0    | 22.5    | 10.4    | 5.6     | 12.6    | 3.9   | 0.45 ± 1.16 | <.0001                |
| Black                | 48.7    | 18.0    | 7.7     | 5.1     | 12.8    | 7.7   | 0.57 ± 1.21 | 0.0056                |
| Asian                | 45.7    | 17.1    | 7.1     | 7.1     | 21.4    | 1.4   | 0.43 ± 1.29 | <.0001                |
| Multiethnic/Other    | 43.3    | 17.5    | 10.3    | 6.2     | 13.4    | 9.3   | 0.65 ± 1.36 | <.0001                |
Less than 50% of participants with diabetes had eye exams within the past year

| History of Diabetes (y) | Years since Last Eye Exam | Ln(Years Since Last Eye Exam) | P Value (Age adjusted) |
|-------------------------|---------------------------|-----------------------------|------------------------|
|                         | (0,1] % | (1,2] % | (2,3] % | (3,4] % | (4,10] % | 10+ % | Mean ± Std Dev |
| None                    | 25.0    | 20.4    | 12.4    | 7.8     | 24.6     | 9.9   | 9.9 ± 1.01   |
| Yes [1-5]               | **46.9**| 19.6    | 8.4     | 6.3     | 14.0     | 4.9   | 4.9 ± 0.63   |
| Yes 5+                  | **43.5**| 20.8    | 13.4    | 7.4     | 11.1     | 3.7   | 3.7 ± 0.47   |

Compared to participants w/o diabetes, the age-controlled OR for participants with:

- 1-5y of diabetes diagnosis having eye exam history is **1.17 (95% CI [0.74, 1.86])**
- 5+ y of diabetes diagnosis having eye exam history is **1.99 (95% CI [1.20, 3.31])**
Other results

• No significant association between subjective or measured visual acuity, having eye exam history, and TLEE

• No significant association between location, having eye exam history, and TLEE
Next steps

• Improving eye care access for Hispanics
• Integrating TLEE as a variable for future eye care disparity research
  – Caucasians
  – Individuals with diabetes
References

• Crews JE, Chou CF, Zack MM, et al. The association of health-related quality of life with severity of visual impairment among people aged 40-64 years: Findings from the 2006-2010 behavioral risk factor surveillance system. *Ophthalmic Epidemiol.* 2016;23(3):145-153

• Zhang X, Bullard KM, Cotch MF, et al. Association between depression and functional vision loss in persons 20 years of age or older in the united states, NHANES 2005-2008. *JAMA Ophthalmol.* 2013;131(5):573-581.

• Casten RJ, Rovner BW, Tasman W. Age-related macular degeneration and depression: A review of recent research. *Curr Opin Ophthalmol.* 2004;15(3):181-183.

• Skalicky S, Goldberg I. Depression and quality of life in patients with glaucoma: A cross-sectional analysis using the geriatric depression scale-15, assessment of function related to vision, and the glaucoma quality of life-15. *J Glaucoma.* 2008;17(7):546-551.

• Wittenborn J, Rein D. Cost of vision problems: The economic burden of vision loss and eye disorders in the united states. *Ophthalmology.* 2013;120:1728-1735.

• Institute of Medicine. Unequal treatment: confronting racial and ethnic disparities in health care. 2002 Oct 2;94(8):666-668.

• Friedman DS, Cassard SD, Williams SK, Baldonado K, O'Brien RW, Gower EW. Outcomes of a vision screening program for underserved populations in the united states. *Ophthalmic Epidemiol.* 2013;20(4):201-211.
Questions?