Factors Affecting the Utilization of Glaucoma Diagnostic Testing Among Medicare Enrollees Residing in Washington, D.C. and Detroit, Michigan

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BACKGROUND

- The 2010 American Academy of Ophthalmology’s primary open-angle glaucoma Preferred Practice Pattern (PPP) recommends that patients have a visual field (VF) test and optic nerve head evaluation at least annualy3.
- Research in the 1980s and 90s showed that: Non-whites had a lower rate of VF testing in the year prior to having glaucoma surgery2.
- The observed rate of glaucoma surgery among black patients was 45% lower than the expected rate and this varied by geographic region of the U.S.1.
- Healthy People 2010 and 2020, the U.S. national health priorities, included reducing disparities in vision care and improving access to care among their goals.
- We sought to determine whether the magnitude of racial and geographic disparities in glaucoma care has changed since the implementation of the Healthy People initiatives.

PURPOSE

We sought to evaluate the presence of community-level variation in glaucoma testing in Detroit and Washington, DC.

METHODS

Data Source:
- Medicare 20% sample, 2008-2013
- Nationally representative sample
- Captures all diagnoses (ICD-9-CM codes) and all diagnostic and therapeutic procedures (CPT-4 codes)
- Data also available on: patient age, sex, and race
- Median household income for communities was extracted from American Community Survey

Inclusion & Exclusion Criteria:
- All individuals age ≥ 65 years in fee-for-service Medicare with new or pre-existing open-angle glaucoma (OAG)
- Continuous enrollment in the plan for at least two years
- Residence in the Washington D.C. or Detroit, MI combined statistical area (CSA) community

Assessing Variation in Care:
- We identified utilization of visual fields (VF), fundus photography (FP), optical coherence tomography (OCT) and no testing over the 24 months following the first coded OAG diagnosis
- We assessed variation in utilization of glaucoma testing by county, as well as by age, race, sex, median household income, and comorbid diabetes (DM)

Analysis:
- Multivariable logistic regression assessed the odds of receiving glaucoma testing
- Covariates in model: age at first recorded OAG diagnosis, sex, race, median household income, and diabetes diagnosis

RESULTS

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Washington D.C.</th>
<th>Detroit, MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample, n, %</td>
<td>13,211 100%</td>
<td>9,458 100%</td>
</tr>
<tr>
<td>Female</td>
<td>7,455 56%</td>
<td>5,885 62%</td>
</tr>
<tr>
<td>Non-White</td>
<td>8,443 70%</td>
<td>6,804 72%</td>
</tr>
<tr>
<td>African American</td>
<td>3,045 25%</td>
<td>2,404 25%</td>
</tr>
<tr>
<td>Other race</td>
<td>623 5%</td>
<td>230 2%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5,343 44%</td>
<td>5,221 55%</td>
</tr>
<tr>
<td>Age (mean, SD)</td>
<td>77.2 7.7</td>
<td>77.7 7.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geographic characteristics</th>
<th>Washington D.C.</th>
<th>Detroit, MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>N geographic units</td>
<td>40</td>
<td>545</td>
</tr>
<tr>
<td>Enrollees per geographic unit</td>
<td></td>
<td>545</td>
</tr>
<tr>
<td>Minimum</td>
<td>22</td>
<td>111</td>
</tr>
<tr>
<td>Q1</td>
<td>76</td>
<td>4</td>
</tr>
<tr>
<td>Median</td>
<td>129</td>
<td>311</td>
</tr>
<tr>
<td>Q3</td>
<td>322</td>
<td>1,418</td>
</tr>
<tr>
<td>ZCTAs, ZIP-code tabulation area</td>
<td></td>
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</tr>
</tbody>
</table>

| Variation in Glaucoma Testing in Washington, D.C. | | 
| VF Testing | Fundus Photo | OCT | No testing |
| Female | 1.02 (0.93-1.12) | 1.00 (0.92-1.08) | 0.99 (0.89-1.09) | 0.99 (0.89-1.10) |
| Black | 0.87 (0.73-0.93) | 0.94 (0.85-1.05) | 0.94 (0.84-1.05) | 1.05 (1.00-1.10) |
| Other race | 0.82 (0.70-1.00) | 1.03 (0.94-1.12) | 1.02 (0.97-1.07) | 1.27 (1.12-1.43) |
| Age at OAG dx (per year) | 0.94 (0.83-0.95) | 0.90 (0.80-0.99) | 0.94 (0.83-0.97) | 0.97 (0.93-1.01) |
| DM | 0.92 (0.85-1.00) | 1.23 (1.15-1.34) | 0.90 (0.82-1.00) | 0.99 (0.89-1.10) |
| Income (per $1000) | 0.95 (1.01-1.02) | 1.00 (1.00-1.00) | 1.00 (1.00-1.00) | 1.00 (1.00-1.00) |

Study Strengths:
- Large sample size, nationwide cohort, longitudinal data (not cross-sectional)
- All enrollees have medical insurance and thus access to eye care and testing should not vary due to insurance status

Study Limitations:
- Possibility of misdiagnosis or misclassification
- Unable to quantify testing prior to plan entry
- Analyses were restricted to patients with a single type of insurance, so results may not be generalizable to patients with other forms of insurance or to those without medical insurance
- Did not consider factors like the number of eye care providers in different communities

Conclusions:
- More research is needed to better understand how race and affluence impact glaucoma care at the community level, the impact of disparities in glaucoma care on patient outcomes, and how to tailor approaches to reducing disparities to the unique circumstances of particular communities
- Despite the Healthy People 2010 and 2020 initiatives, there continue to be significant racial and geographic disparities in glaucoma care

DISCUSSION

Key Findings:
- Despite possession of health insurance, the likelihood of undergoing glaucoma testing among patients with OAG in Washington D.C. and Detroit was influenced by: Race, Income, Age, Community of residence
- In both the Washington D.C. and Detroit CSAs: VF testing rates varied from around 60% in some counties to 90% in others
- OCT rates varied from a low of around 50% up to nearly 90% in other counties
- There is variation between adjoining ZCTAs in the likelihood of not receiving ZCTAs testing.

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REFERENCES