Examining Disparities in Access to Breast and/or Ovarian Cancer Genetic Risk Assessment in “High Incidence Counties” versus “High Usage Counties”

Jillian N. Schrager, MPH – Cancer Genomics Epidemiologist
Michigan Dept. of Health and Human Services
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SchragerJ@Michigan.gov
(517) 373-2929
BRCA and Hereditary Breast and Ovarian Cancer Syndrome

- Hereditary Breast and Ovarian Cancer Syndrome (HBOC) will account for ~5-10% of all breast and 18-24% of all ovarian cancers

- **BRCA1 & 2:** “BReast CAncer 1 and 2” Genes
  - Code for tumor suppressor proteins
  - Dominant pattern of inheritance; Affected parent has 50% chance of passing gene mutation onto offspring

- Pathogenic **BRCA** mutations confer increased lifetime risk of certain cancers
  - Breast Cancer = 40-80%
  - Ovarian Cancer = 11-40%

- Estimated 1 in 300 to 1 in 500 individuals will have a pathogenic **BRCA** mutation

Sources:
NCCN Criteria for HBOC Genetic Risk Assessment (2016)

- Personal History
  - Known familial mutation in cancer susceptibility gene (i.e. BRCA)
  - Breast cancer at a young age (≤ 50 y.o.)
  - Triple negative breast cancer diagnosed at 60 y.o. or younger
  - Multiple primary HBOC-related cancers
  - Breast cancer at any age, and
    - ≥ 1 close blood relative with breast cancer at young age, or
    - ≥ 1 close blood relative w/ invasive ovarian cancer at any age
    - ≥ 2 close blood relatives w breast cancer and/or pancreatic cancer
    - From a population at increased risk
  - Male breast cancer
  - Ashkenazi Jewish Heritage w/ breast, ovarian, or pancreatic cancer at any age
  - Ovarian Cancer at any age
NCCN Criteria, Cont.

- Family History; close relative with any of the following:
  - Known familial mutation in cancer susceptibility gene
  - Multiple HBOC primaries in single individual
  - ≥ 2 individuals with breast cancer primaries on same side of family with at least one diagnosed ≤ 50 y.o.
  - Ovarian cancer
  - Male breast cancer
- First or second degree relative with breast cancer ≤ 45 y.o.
- Personal and/or family history of ≥ 3 HBOC-related cancers (e.g. breast, pancreatic, prostate, colon, endometrial, etc.)
- Guidelines are ever-evolving

Website: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp#genetics_screening
Data Sources

- MDHHS BRCA Clinical Network Database
  - Funded through multiple CDC cooperative agreements
  - Unique to Michigan
  - Reporting on all BRCA-related counseling visits conducted by board-certified genetics professionals in MI
    - 18 contributing institutions – including one telecounseling service (Informed DNA)
  - Visit information consists of de-identified data on patient demographics, BRCA genetic testing, surgical procedures, personal and family history of cancer

- Michigan Cancer Surveillance Program (MCSP)
  - MI’s cancer registry
  - Contains data on all cancer cases across the state
  - MDHHS Cancer Genomics requests case data for key cancers implicated in hereditary cancer syndromes, including breast and ovarian cancer
Analysis Objectives

• MDHHS Cancer Genomics aims to increase genetic services utilization for individuals meeting referral criteria

• Examine patient demographics in BRCA Clinical Network database

Variables:
  • Year of Initial Visit
  • Dichotomous Race (White/Black only)
  • Ashkenazi Jewish heritage
  • Known Familial Mutation Status
  • Referring Physician
  • Insurance providers

• Compare demographics between two sub-populations:
  • “High Usage Counties” (HUC)
  • “High Incidence Counties” (HIC)
Methods

High Incidence Counties:
- 12 counties identified by prior analysis of MCSP data:
  - Highest Age-Adjusted Incidence of Breast Cancer at a young age, 1998-2007:
    - Emmet, Manistee, Grand Traverse, Leelanau, & Mason
  - Highest Age-Adjusted of Ovarian Cancer, 2006-2010:
    - Alpena, Huron, Newaygo, Midland, Berrien, Saginaw, & Bay
  - BRCA database participants with zip code of residence in these counties included in this group

High Usage Counties:
- Analysis run on initial patient visits in BRCA database by zip code
- High Usage Counties composed of zip codes accounting for top 10% of patient visits by volume:
  - Oakland, Wayne, & Washtenaw
- BRCA database participants with zip code of residence in these counties included in this group

- Pearson Chi-square tests used to evaluate statistical dependence between sub-group designation and demographic characteristics
- Analysis completed using SAS 9.2® software
Geographic Distribution of “High Incidence Counties” and “High Usage Counties”

N_{total} = 1,458
HIC, N = 380
HUC, N = 1,078

*Italics denote high OC incidence vs. BC at young age

= Clinic location
= High Incidence Counties:
  Breast Cancer at young age
= High Incidence Counties:
  Ovarian Cancer
= High Usage Counties
Visit Year Distribution, 2008-2012

Initial Patient Visits by Calendar Year, 2008-2012

- 2008: 10.0% (HIC), 16.1% (HUC)
- 2009: 12.4% (HIC), 20.1% (HUC)
- 2010: 12.6% (HIC), 17.1% (HUC)
- 2011: 24.5% (HIC), 20.9% (HUC)
- 2012: 40.5% (HIC), 25.8% (HUC)
Racial Differences in Genetic Counseling Visits

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<tbody>
<tr>
<td>HIC Black</td>
<td>8%</td>
<td>2%</td>
<td>31%</td>
<td>4%</td>
</tr>
<tr>
<td>HIC White</td>
<td>92%</td>
<td>98%</td>
<td>69%</td>
<td>96%</td>
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Source: U.S. Census QuickFacts, 2010
### Ashkenazi Jewish Heritage and Known Familial Mutation Status

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<tr>
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<th>High Incidence Counties</th>
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<th>High Usage Counties</th>
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<th>X²</th>
<th>p</th>
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<tbody>
<tr>
<td>Ashkenazi Jewish (AJ)</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
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<tr>
<td>No</td>
<td>374</td>
<td>98.42</td>
<td>819</td>
<td>75.79</td>
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<td>Yes</td>
<td>6</td>
<td>1.58</td>
<td>259</td>
<td>24.03</td>
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<tr>
<td>Known Familial mutation (KFM)</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
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<tr>
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<td>954</td>
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<td>63</td>
<td>16.58</td>
<td>124</td>
<td>11.50</td>
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</table>

- Core Jewish population in MI exists in Wayne, Oakland, and Macomb counties
- AJ = 1.9% of overall population in Metro Detroit
- AJ = 7.5% in BRCA Clinical Network Database
- Overall proportion of KFM in BRCA Clinical Network Database = 12.03%
## Results: Insurance Providers

<table>
<thead>
<tr>
<th></th>
<th>High Incidence Counties</th>
<th>High Usage Counties</th>
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<th>( p )</th>
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<tr>
<td><strong>Top 5 Insurers</strong></td>
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<tr>
<td>Aetna</td>
<td>30</td>
<td>12.71</td>
<td>30</td>
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<td>Blue Care Network</td>
<td>12</td>
<td>5.08</td>
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<td>Blue Cross Blue Shield</td>
<td>153</td>
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<td>526</td>
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<td>HAP</td>
<td>105</td>
<td>12.46</td>
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<td>Priority Health</td>
<td>31</td>
<td>13.14</td>
<td>42</td>
<td>4.98</td>
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<tr>
<td>Uninsured</td>
<td>10</td>
<td>4.24</td>
<td>7</td>
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<td><strong>Medicare</strong></td>
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<td>935</td>
<td>86.73</td>
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<td>Yes</td>
<td>53</td>
<td>13.95</td>
<td>143</td>
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<td><strong>Medicaid</strong></td>
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<tr>
<td>No</td>
<td>361</td>
<td>95.00</td>
<td>1,066</td>
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<td>Yes</td>
<td>19</td>
<td>5.00</td>
<td>12</td>
<td>1.11</td>
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Notes: The \( X^2 \) values are significant at \( p < 0.0001 \).
Conclusions

• Results of the current analysis:
  • show an increase in BRCA-related genetic counseling over time for HIC and HUC
    • Aligned with HealthyPeople2020 Genomics Objective
    • Highlight importance of determining barriers and facilitators to access to genetic counseling for populations at highest risk
• Other data sources are being used to conduct additional surveillance activities
• Long-term CDC project objective: reduce the incidence and mortality of hereditary cancers, including breast and ovarian cancer
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Please contact me with any additional comments/questions:

Email: SchragerJ@Michigan.gov
Phone: 517–373-2929