MODERATED SESSION

Vision and Eye Health Surveillance System: Using National, State, and County-level Prevalence Data

Session Moderator:
Elizabeth Lundeen, PhD, MPH
Vision Health Initiative, U.S. Centers for Disease Control and Prevention

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NORC at the University of Chicago

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The Ohio State University College of Optometry
Vision and Eye Health Surveillance System
Overview and update

John Wittenborn
NORC at the University of Chicago
Background of the VEHSS project

• Consensus statements on need for surveillance
  • CDC Surveillance Expert Panel (2012)
  • National Academies of Science, Engineering & Medicine (2016)

• CDC/NORC cooperative agreements
  • 2015-2019
    • “Establish a Vision and Eye Health Surveillance System for the Nation”
  • 2019-2022
    • “Research to Enhance Vision and Eye Health Surveillance”
Major Goals of VEHSS

• Create a single platform to summarize prevalence information from multiple new and important data sources
• Create a framework to identify and organize vision and eye health indicators
• Review and validate vision and eye health indicators
• Generate new prevalence estimates for vision loss and major eye diseases that can identify trends and disparities by demographic group, risk factors, and geographic area
Expert panel

VEHSS partner group:
1. Identify and summarize data sources

• Reviewed potential data sources
  • 16 National Surveys
  • 6 Administrative claims databases
  • 2 Electronic health records registries
  • 100 Published population based studies
## Analyze Summary Prevalence Estimates

<table>
<thead>
<tr>
<th>Survey Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Community Survey (ACS)</td>
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<tr>
<td>Behavioral Risk Factors Surveillance System (BRFSS)</td>
</tr>
<tr>
<td>National Health Interview Survey (NHIS)</td>
</tr>
<tr>
<td>National Health and Nutrition Examination Survey (NHANES)</td>
</tr>
<tr>
<td>National Survey of Children’s Health (NSCH)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Claims</th>
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<tbody>
<tr>
<td>Medicare 100% Fee-For-Service RIF</td>
</tr>
<tr>
<td>VSP Global managed vision plan insurance</td>
</tr>
<tr>
<td>Medicaid MAX</td>
</tr>
<tr>
<td>MarketScan private commercial insurance</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>EHR/Registry</th>
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<tbody>
<tr>
<td>IRIS Registry</td>
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</table>
2. Define indicators

• Created an indicator categorization schema to organize over 240 specific indicators across 3 topic areas:
  1. Eye health conditions
     • Diagnosis code categories, self-reported diagnoses
  2. Visual function
     • Measured visual acuity, self-assessed vision and functional limitations
  3. Service utilization
     • Eye exams, medical treatments, low vision services, vision correction
3. Analyze VEHSS Data Sources

• Calculated prevalence of indicators from a single source
  • Uniform methodologies across data sources
  • Cross stratification by
    • demographic group (age group, race/ethnicity, sex/gender)
    • Location (national, state, county)
    • Risk factor (diabetes, hypertension, diagnosed eye disease)

• Summary estimates available on VEHSS website
Many data sources give you many answers:
4. Indicator Validation

• Assess concordance between different VEHSS indicators measured at different points of information flow in one patient population
5. Composite Estimates

• Integrating information from different indicators and data sources to produce more comprehensive estimates
• Visual Acuity Loss released in May 2021
• AMD, diabetic retinopathy and glaucoma in-progress
Composite Estimates model for prevalence of uncorrectable visual acuity loss

- Self-reported blind or difficulty seeing is a biased but highly correlated predictor of BCVA
- Variation in self-reported vision indicators used to predict prevalence of BCVA in unmeasured populations

*BCVA = best corrected visual acuity in better-seeing eye
VEHSS Website
Data Documentation Pages

Data overview
Analytic methods
Indicators analyzed
Limitations
VEHSS Data access
VEHSS Data Portal PUF access
PDF reports

Access data explorer
Data portal
Additional documentation and reports
Disorders of Optic Nerve and Visual Pathways

Disorders of Optic Nerve and Visual Pathways

Glaucome

VEHSS includes indicators for Glaucome from examination-based data including NHANES and published studies, self-reported diagnosis history from NHANES, treated cases from claims databases, and diagnosed cases from IRS Registry.

Examination-based
Examination-based glaucoma indicates the respondent had graded probably or definite glaucoma in either eye based on retinal imaging.

Examination Surveys

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Description</th>
<th>Variable name(s)</th>
<th>Years available</th>
<th>Years analyzed</th>
<th>Response options</th>
</tr>
</thead>
</table>

Published Examination Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Years</th>
<th>Location</th>
<th>Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Study (LALES)</td>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glaucoma Study</td>
<td>2003</td>
<td></td>
<td>Glaucome Among Blacks and Whites 73 years and Older: The Salisbury Eye</td>
</tr>
</tbody>
</table>
1. Selector Box: Complete all 6 dropdowns and click GO

2. Compare Box: Compare 1-2 stratification factors and click Compare

3. Filter Box: Filter data to selected groups and click Apply Filters

4. Results Panel
1. Selector Box

Selecting All available locations defaults to state level map

Selecting National or any state defaults to chart+table with compare box

Click Data Source Information to open documentation page for selected data source

Click Category Definition to open documentation page for selected indicator category
2. Compare Box:
Not available in map views
Select all years of data for trend line analyses

3. Filter Box:
Filters get reset when Compare changes
4. Results Panel

- Switch view from Map, Chart or Table (if available)
- Share Link, Data Portal and Help pages
- Click Legend Settings to change gradient scales
- Click a state to zoom, or explore all data for location
- Export formatted PDF report, or CSV table
- Zoom or reset map

Data Source: Medicare Claims

Proportion of patients who had an eye exam in selected year
By any provider type
All available locations | 2017 | Medicare (Fee for Service)
Crude Prevalence
65-84 years | Female | Hispanic, any race | Diabetes-Yes

National: 53.21% 95% CI (53.02 - 53.40)
N = 263,400

Legend:
- Data suppressed
- Data unavailable
- Quantile

Map Key:
- Above 90%
- 80.01 - 90.00
- 70.00 - 80.00
- 60.01 - 70.00
- 50.01 - 60.00
- 40.01 - 50.00
- 30.01 - 40.00
- Below 30%

Click Rescale Gradient to change gradient scales
New for 2021:

• Composite estimates of the prevalence of visual acuity loss

• County-level mapping:
  • ACS
  • Medicare claims
  • Composite estimates of vision loss
County map option is shown if user selects a state and a data source that has county-level results.

Map view selected.

State totals in header.

Click on a county for detail.
Vision and Eye Health Surveillance System Applications

Dean A. VanNasdale, OD, PhD, FAAO
Ohio State University College of Optometry

vannasdale.1@osu.edu
Demonstrating Differences Across Different Data Sources

• Public Health and Environmental Vision
  • Research clearly demonstrates significant vision health disparities

Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Public Health and Environmental Vision - VISSCI 7620
  • To make some of these disparities less abstract and to get students to use available epidemiology data, I give them multiple assignments over the course of the semester, using the VEHSS
  • As a teaching tool, I use the VEHSS to
    • Demonstrate vision impairment prevalence rates based on different demographic characteristics
    • Demonstrate geographic disparities in the prevalence of vision impairment using interactive mapping
    • Provide opportunities to work with data from different vision health surveillance sources and understand how those data are collected
    • Demonstrate the strengths and limitations of different types of epidemiology data
    • Learn to use data to advocate for vision health as a public health priority
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Data sources available in the VEHSS
  • Survey Data
    • American Community Survey, Behavioral Risk Factor Surveillance System, National Health Interview Survey, National Health and Nutrition Examination Survey, National Survey of Children’s Health
  • Electronic Health Records Registry Data
    • IRIS Registry
  • Claims Databases
    • Commercial Medical Insurance, Managed Vision Care, Medicaid MAX, Medicare Claims
  • Composite Estimates (new)

• Each may have different topics with different data that are collected through different collection methods and may be collected at different times
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • Find the Electronic Health Records and Registries section of the Vision and Eye Health Surveillance Section of the CDC’s Vision Health Initiative.
    • https://www.cdc.gov/visionhealth/vehss/data/ehr-registries/index.html

• Using information on this page, what EHR registries are currently included in the CDC VHI’s VEHSS and what EHR registries might be included in the future?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • Find the Electronic Health Records and Registries section of the Vision and Eye Health Surveillance Section of the CDC’s Vision Health Initiative.
    • [https://www.cdc.gov/visionhealth/vehss/data/ehr-registries/index.html](https://www.cdc.gov/visionhealth/vehss/data/ehr-registries/index.html)

• Using information on this page, what EHR registries are currently included in the CDC VHI’s VEHSS and what EHR registries might be included in the future?
  • Of the sources identified in our review, the IRIS® Registry is the only data source currently included in the VEHSS, although data from MORE may be included in the future.
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance
  - The background for the surveillance data is thoroughly explained for those interested in more detail.

Review of Administrative and Registry Data on Eye Health Vision & Eye Health Surveillance System

<table>
<thead>
<tr>
<th>DATE</th>
<th>PRESENTED TO:</th>
<th>PRESENTED BY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARCH 26 2018</td>
<td>Jinan Saadine, Division of Diabetes Translation,</td>
<td>John Wittenborn, Emily Phillips, David Rein,</td>
</tr>
<tr>
<td></td>
<td>Centers for Disease Control and Prevention</td>
<td>NORC at the University of Chicago</td>
</tr>
</tbody>
</table>
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • Click on the IRIS Registry link at the top of the table to access IRIS registry specific information.

<table>
<thead>
<tr>
<th></th>
<th>IRIS® Registry</th>
<th>MORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationally Representative</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age/Sex/Race</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Geographic Representation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Representation</td>
<td>Partial</td>
<td>Partial</td>
</tr>
<tr>
<td>County Representation</td>
<td>Partial</td>
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Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

**IRIS® Registry**

**IRIS® Registry at a Glance**

<table>
<thead>
<tr>
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<th>Health registry compiled from participating ophthalmology practices’ electronic medical records systems</th>
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<tr>
<td>Sample</td>
<td>Convenience sample consisting of patients visiting IRIS-participating ophthalmology practices, representing approximately 95% of US ophthalmology practices</td>
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Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • What year(s) are data available in the VEHSS for the IRIS Registry (described as Years Analyzed)?

  • As of 2018, what percentage of ophthalmologists participated in the IRIS Registry?

  • As of 2019, how many patients were contained in the IRIS Registry?

  • At the bottom of the page is a list of limitation on population surveillance using the IRIS Registry. List one potential limitation listed.
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • What year(s) are data available in the VEHSS for the IRIS Registry (described as Years Analyzed)?
    • 2016, 2017, 2018
  • As of 2018, what percentage of ophthalmologists participated in the IRIS Registry?
    • In 2018, the IRIS® Registry collected data from more than 90% of ophthalmologists nationally
  • As of 2019, how many patients were contained in the IRIS Registry?
    • More than 50 million patients (230 million encounters)
  • At the bottom of the page is a list of limitation on population surveillance using the IRIS Registry. List one potential limitation listed.
    • Rates from data are not representative of the overall population
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • At the top of the IRIS Registry page, click on the Explore Summary Data Link above the map of the United States. This will direct you to an interactive mapping tool that will allow you to visualize the geographic distribution of ocular disease in the United States from IRIS Registry data.

IRIS® Registry at a Glance

<table>
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Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • From the drop down menus at the top of the page, make sure
    • All Available Locations is selected under the Locations dropdown menu
    • EHR Registry is selected under the Type dropdown menu
    • IRIS Registry is selected under the EHR Registry dropdown menu
    • Eye Health Conditions is selected under the Topic dropdown menu
    • Age Related Macular Degeneration is selected under the Category dropdown menu
    • Annual Prevalence of Diagnosed is selected under the Indicator dropdown menu
    • Click the GO button
  • With these selections, what is the national prevalence rate of age-related macular degeneration based on IRIS Registry data?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance
  - A state map of the United States is the default display for the IRIS Registry on the VEHSS. You can also visualize the data in a chart or a table. Click on the Chart button to display a bar graph of state-specific AMD prevalence rates. Which state has the highest prevalence of vision impairment from AMD?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

**Annual prevalence of diagnosed age related macular degeneration**

All Age-related macular degeneration (AMD)
All available locations | 2018 | IRIS® Registry
Crude Prevalence

- South Dakota: 31.47%
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • You can also perform a more in-depth analysis that provides some insight into health disparities in ocular disease.
    • Under the Gender dropdown menu, select Male.

  • Click on the Apply Filters button.

  • What is the prevalence rate for AMD in males nationally?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

**Annual prevalence of diagnosed age related macular degeneration**

- All Age-related macular degeneration (AMD)
- All available locations | 2018 | IRIS® Registry
- Crude Prevalence
- Male

National: 15.32%
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • Research has shown gender disparities in vision impairment. Are data from the IRIS registry consistent with those findings?
    • Change the selection from the Gender dropdown menu to Female.

• Click on the Apply Filters button.

• What is the prevalence rate for AMD in females nationally?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

**Annual prevalence of diagnosed age related macular degeneration**

All Age-related macular degeneration (AMD)

All available locations | 2018 | IRIS® Registry

Crude Prevalence

Female

National: 16.02%
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • We have seen evidence that there are racial/ethnic disparities with respect to ocular disease. Does this hold true in the VEHSS IRIS Registry?

  • In the Category dropdown menu, change Age-related Macular Degeneration to Diabetic Eye Disease.

  • Click on the GO button.

  • What is the overall national prevalence of diabetic eye disease?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

<table>
<thead>
<tr>
<th>1. Location</th>
<th>2. Type</th>
<th>3. EHR Registry</th>
</tr>
</thead>
<tbody>
<tr>
<td>All available locations</td>
<td>EHR Registry</td>
<td>IRIS® Registry</td>
</tr>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Eye Health Conditions</td>
<td>Diabetic Eye Diseases</td>
<td>Annual prevalence of diagnosed diabetic eye diseases,</td>
</tr>
</tbody>
</table>

*Category Definition*
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance

Annual prevalence of diagnosed diabetic eye diseases
All Diabetic eye diseases
All available locations | 2018 | IRIS® Registry
Crude Prevalence

National 4.76%
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • We have seen evidence that there are racial/ethnic disparities with respect to ocular disease. Does this hold true in the VEHSS IRIS Registry?
    • Under Race/Ethnicity, select White, non-Hispanic.

• Click the Apply Filters button.

• What is the crude prevalence of diagnosed diabetic eye disease in the IRIS Registry for the White, non-Hispanic population in the United States?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

![Annual prevalence of diagnosed diabetic eye diseases](chart)

**National:** 3.99%
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Electronic Health Records and Population Health Surveillance
  • We have seen evidence that there are racial/ethnic disparities with respect to ocular disease. Does this hold true in the VEHSS IRIS Registry?
    • Under Race/Ethnicity, select Hispanic, any race.

• Click the Apply Filters button.

• What is the crude prevalence of diagnosed diabetic eye disease in the IRIS Registry for the Hispanic, any race category?
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance

![Annual prevalence of diagnosed diabetic eye diseases]

National: 8.87%
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

- Electronic Health Records and Population Health Surveillance
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Seeking Conceptual Clarity
  • Not all prevalence estimates will be the same from all of the data sources.

Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Seeking Conceptual Clarity
  • Not all prevalence estimates will be the same from all of the data sources.
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Seeking Conceptual Clarity

Crude Prevalence
National: 0.14%
95% CI (0.14 - 0.14)
Demonstrating Vision Health Disparities Using the Vision and Eye Health Surveillance System

• Using the VEHSS, we have been able to
  • Demonstrate vision impairment prevalence rates based on different demographic characteristics
  • Demonstrate geographic disparities in the prevalence of vision impairment using interactive mapping
  • Provide opportunities to work with data from different vision health surveillance sources and understand how those data are collected
  • Demonstrate the strengths and limitations of different types of epidemiology data

• Now, I hope everyone will use data from the VEHSS to advocate for vision health as a public health priority.
Thank you.

Questions?