Review of Administrative and Registry Data on Eye Health

Vision & Eye Health Surveillance System

NORC *at the* UNIVERSITY *of* CHICAGO

VISION &
EYE HEALTH
SURVEILLANCE
SYSTEM

Table of Contents

List of Exhibits

DISCLAIMER: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of NORC at the University of Chicago or the Centers for Disease Control and Prevention.

Introduction

This report provides a high-level overview of vision and eye health-related service utilization data sources that may be considered for inclusion in the Vision and Eye Health Surveillance System (VEHSS).

We include three categories of service utilization data in this review;

- Administrative claims,
- Electronic medical records/registries, and the
- Healthcare Cost and Utilization Project.

Such data may contain important information on the epidemiology of vision and eye disorders, utilization of services, access to care, and disparities therein. These data may also augment national survey data by capturing a broader scope of diagnoses and services, and provide larger samples with additional detail related to risk factors, demographic characteristics and geography. This information may also provide additional capability to identify important disparities in these outcome measures, as well as other important service-focused measures such as access to care and care outcomes.

The purpose of this review is to summarize high-level information on multiple potential data sources to assist in the:

1. Selection of data sources, the
2. Development of data indicators and outcome measures; and the
3. Consideration of future data integration approaches.

Table 1 below summarizes major data elements captured in each data source. A black dot represents what we believe to be nearly full coverage of the respective data element within the data source, while a white dot represents limited or no coverage of the data element. We found that many elements exist in part, or with important caveats, which we denote with a gray dot. These limitations are described in more detail in the following sections describing each individual data source.

We invite comment or suggestions on the selection of important data elements to consider in each data source. We will continue to update this document with additional detail as we learn more about the capabilities and limitations of each data source.

Table 1. Summary of Major Data Elements

Legend note: ● = black filled, ◐ = gray filled, ○ = open circle.

	Medicare	Medicaid	MarketScan	VSP	Military Health System	IRIS® Registry	MORE
Nationally representative	●1	○1	○	○	○	○	○
Demographics							
Age	●	●	●	●	●	●	●
Sex	●	●	●	●	●	●	●
Race	◐2	●	○	◐2	◐	●	●
Geographic identification							
State representation	●	●	◐1	◐3	◐	◐	◐
County representation	●	●	○	◐	◐	◐	◐
Patient Groups							
Age 0-65	◐3	●	●	●	●	●	●
Age 65+	●	◐	◐	●	◐1	●	●
Undiagnosed	○	○	○	○	○	○	○
Diagnosed Risk factors	●	●	●	◐	○	◐1	◐
Payer type				4			
Private medical	○	○	●	○	○	●	●
Private vision	○	○	○	●	○	●	●
Medicare	●	◐2	◐2	○	○	●	●
Medicaid	◐4	●	◐2	○	○	●	●
Other government payers	○	○	○	○	●2	◐2	●
Uninsured	○	○	○	○	○	◐	◐
Care type or setting							
Vision care	○5	◐3	●	●	●	◐3	●
Eye care	●	●	●	◐5	●	●	●
Other medical	●	●	●	○	●	○	○
Conditions							
All medical diagnoses	●	●	●	○	●	○	○
Risk factors	●	●	●	◐6	●	◐4	●
Eye/Vision diagnoses	●	●	●	●	●	●	●
Uncorrected acuity	○	○	○	○	◐	●	●
Corrected acuity	○	○	○	◐7	◐	●	●

Medicare notes:
1. Nationally representative population for ages 65 and older, but does not contain all utilization.
2. Medicare claims have limited or no race/ethnicity coverage. Race/ethnicity can be obtained in the VRDC environment for any Medicare claims that may be linked to Medicaid claims or MCBS data.
3. Includes beneficiaries <65 with disability, including blindness.
4. Medicare claims will indicate whether enrollee is dual eligible for Medicaid.
5. Medicare FFS does not cover routine vision examinations or refraction correction, except for cataract patients.

Medicaid notes:
1. Medicaid claims are representative of the Medicaid program, but important eligibility and coverage differences exist between states.
2. Medicaid will generally indicate dual eligibility with Medicare, or other insurance.
3. Medicaid coverage depends on state and age group.

MarketScan notes:
1. MarketScan claims contain private medical insurance for most states, and Medicaid claims for several states. MarketScan may be representative of select states with sufficient coverage.
2. MarketScan includes certain Medicaid and Medicare supplementary managed care plans.

VSP notes:
1. VSP has the capability to weight/control for market penetration to estimate national rates.
2. General VSP claims have limited coverage rates for race/ethnicity. VSP mobile examination lab data have full race/ethnicity coverage.
3. VSP has detail down to beneficiary and provider street address, but does not have uniform national coverage.
4. VSP claims are for vision insurance, but does contain fields on coordination of benefits.
5. VSP claims include routine vision services and limited diagnosis data from ophthalmology practice.
6. VSP claims include indicators for limited risk factors such as diabetes.
7. VSP contains the prescription, but not acuity measures.

Military Health System/Tricare notes:
1. Military Health System/Tricare data is incomplete for those older 65 who have Medicare coverage.
2. Military Health System/Tricare data does not include retirees who elect care in the U.S. Department of Veterans Affairs.

American Academy of Ophthalmology IRIS® Registry (Intelligent Research in Sight) notes:
1. IRIS Registry will include risk factors contained and recorded in ophthalmologic EHR systems, but might not contain all general health diagnoses.
2. IRIS Registry may not fully capture some government payers such as VA.
3. IRIS Registry has limited optometric coverage.
4. IRIS Registry includes major risk factors included by ophthalmologists documentation in their EHRs.

MORE notes:
1. MORE is currently under development and it is unclear which outcomes and data elements the system will ultimately be able to report.

Administrative Claims Databases

Administrative claims databases include insurance claims and payment information. Claims databases included in this review include Medicare, Medicaid, MarketScan (private medical insurance, Medicaid and Medicare managed care), VSP Inc. (vision insurance claims), and Military Health System/Tricare.

Claims systems are a primary source for utilization data, offering large sample sizes across a geographically dispersed population, identifiable at the state, county, and postal zip code level. Health insurance claims databases also may capture eye care services provided outside of the scope of ophthalmology and optometry, such as services provided by general practitioners, pediatricians and other specialists, or provided in emergency department or inpatients settings. However, a fundamental limitation of claims data is that these are principally payment records, and are based on diagnostic coding that may be driven by reimbursement concerns, and thus may or may not always accurately reflect the true medical condition.

Due to the fragmented nature of eye care coverage, no single claims database fully captures all utilization of services. For example, Medicare data is restricted to beneficiaries aged 65 and older or disabled and does not generally cover routine eye examinations nor refraction correction (although payment claims submitted to Medicare will be recorded even when not reimbursed). In addition, Medicare Fee for Service claims databases may not capture services billed to supplemental insurance or Medicare managed care plans.

MarketScan commercial claims databases may complement Medicare claims by providing service data for many patients and services not covered under Medicare FFS. This includes privately insured persons younger than age 65, as well as Medicare beneficiaries enrolled in Medicare managed care or supplemental insurance plans. However, unlike Medicare which may be considered nationally representative for the populations and services covered, MarketScan is not nationally representative on its own despite including more individual patients than Medicare claims. This is because MarketScan is based on the coverage areas of the insurance providers included in the data system. In addition, MarketScan does not capture services billed to vision insurance plans.

VSP Inc. is the nation's largest vision insurance provider and maintains claims databases for nearly 20 million patients per year. While limited to vision insurance claims for routine optometric services, this nonetheless fills in an important service gap not covered by other payers.

Medicaid claims also provide an important component of eye care service coverage in the United States. Medicaid claims cover approximately 70 million patients, many of whom are dual eligible for Medicare or private medical insurance. Medicaid claims cover Medicaid FFS and managed care claims for every state, but vision care benefits and Medicaid eligibility criteria can vary widely across states. Medicaid managed care claims for many states are also captured in MarketScan data.

The Military Health System/Tricare program covers 9.2 million beneficiaries to include active duty military, active reservists, dependents, and retirees. While limited to a self-selected population who volunteer for military service and their family members, this data source provides claims data on eye examinations and a comprehensive set of medical services for beneficiaries.

Other claims databases such as the Department of Veterans Affairs (VA) Veterans Health Administration or other government payer data were briefly considered, but the substantial difficulty and cost of analyzing these data relative to their small samples lead us to place lower priority on them. Of course, a major factor that must be considered is that no claims system will capture uninsured patients, nor any services provided pro bono or out-of-pocket.

Table 2. Highlighted Coverage Areas for Administrative Claims Databases

	Medicare	Medicaid	MarketScan	VSP	Military Health System
Nationally representative	◐	○	○	○	○
Geographic representation					
State representation	●	●	◐	◐	◐
County representation	●	●	◐	◐	◐
Patient Groups					
Age 0-65	◐	●	●	●	●
Age 65+	●	◐	◐	●	◐
Undiagnosed Patients	○	○	○	○	○
Uninsured Patients	○	○	○	◐	○
Care type and setting					
Vision services	○	◐	○	●	●
Eye care	●	●	●	◐	●
Other medical (not vision or eye)	●	●	●	○	●
Conditions					
All medical diagnoses	●	●	●	○	●
Risk factors	●	●	●	◐	●
Uncorrected acuity	○	○	○	○	◐
Corrected acuity	○	○	○	◐	◐

Medicare

Medicare data include a number of files containing claims for Medicare Part B Fee-for-Service (FFS) beneficiaries. This included approximately 30 million individuals annually. Medicare data include a number of analytic files containing FFS claims organized into files by type of care, such as carrier files (also known as the Physician/Supplier Part B claims files), outpatient files, as well as denominator files (with information on eligibility and enrollment).

Data from patients enrolled in Medicare managed care plans are not included as these claims do not include individualized claims for services. In 2018, 2.2 million Americans were enrolled in Medicare advantage plans, and a further 17.6 million had drug plans.

Medicare covers ophthalmologic services for nearly the entire US population aged 65 and older, for those younger than 65 who have received social security benefits as a result of disability for 24 months; for those who have end stage renal disease and receive dialysis or a kidney transplant; and for those who have amyotropic lateral sclerosis (ALS). Like others with a disability, persons with U.S. defined blindness (a best corrected acuity of 20/200 or worse in the better-seeing eye) become eligible for Medicare after 24 months of social security enrollment. In 2015, approximately 42.5 million out of 47.8 million Americans aged 65 and older (88.9%) were enrolled in Medicare Part B (which covers outpatient services).[1] Due to this high coverage rate, those enrolled are roughly representative of the overall population aged 65 and older. In contrast, only 9.0 million out of 273.6 million Americans ages 0 to 64 (3.3%) were enrolled in Medicare, and because these individuals are primarily eligible via disability, they are disproportionately sicker and poorer than other Americans in this age group.[2] Additionally, Medicare does not cover all services. Routine eye exams and optometry services are not covered by Medicare except in rare circumstances.

VEHSS Medicare data is based on 100% CMS research identifiable files (RIFs) accessed through the CMS Virtual Research Data Center (VRDC), including:

- Inpatient
- Outpatient
- Skilled Nursing Facility
- Hospice
- Home Health
- Carrier
- DME
- MBSF Base Beneficiary Summary File
  - MBSF Chronic Conditions segment file

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[1] Huntley-Hall, N. Profile America Facts for Features: CB17-FF.08. US Census Bureau, Economics and Statistics Administration. March 27, 2017.

[2] Kaiser Family Foundation, State Health Facts. Calculated from US Census Current Population Survey, March 2017.

- ▶ Part D Event data
- ▶ Part D Characteristics, including Drug, Pharmacy, Prescriber, and Plan characteristics

Data Source Description

- Number of patients covered per year: Approximately 30 million beneficiaries.
- Nationally representative: Yes, for ages 65+, although Medicare does not provide coverage for all services.
- Number of providers covered: All Medicare approved providers

Primary Outcome Indicators

- ▶ Vision measures: Diagnosis codes only. (e.g. myopia, presbyopia, hypermetropia, astigmatism, low vision, blindness). Self-reported visual assessment included in the MCBS may be linked within in VRDC.
- ▶ Eye Disorder Diagnoses: All diagnoses
- ▶ Eye Exams: All covered services. Medicare does not cover routine eye exams or vision correction services except for cataract patients.
- ▶ Other procedures: All Medicare covered procedures
- ▶ Costs: Payment and charge amounts

Patient Level Indicators

- Demographics: (age, sex, race/ethnicity) Age, sex. Limited race coverage. Additional race information may be available if RIF claims are linked to Medicaid or MCBS data in the VRDC.
- Geography: state, county,
- Insurance type: Medicare, Medicaid dual eligible
- Risk factors: Diagnosed risk factors including diabetes, hypertension, high cholesterol
- Socio-economic: None, except for linked claims to MCBS.

Medicaid

Medicaid data are a set of de-identified person-level data files with information on Medicaid eligibility, service utilization, diagnoses, and payments. Derived from the Medicaid Statistical Information System (MSIS), the Medicaid Analytic eXtract (MAX) contain one person summary (PS) file and four claims files. Claims files include Inpatient (IP), Long Term Care (LTC), Other Services (OT), and Prescription Drug (RX). These claims data include fee for service (FFS) claims as well as managed care encounter and premium payments. Owned by the Centers for Medicare and Medicaid (CMS), Medicaid data cover everyone enrolled in Medicaid and Children's Health Insurance Program (CHIP) from all states and DC within a given year. MAX data can link to the Medicare Enrollment Database (EDB), First Data Bank (FDB), and other databases.

Data Source Description

- Number of patients covered per year: All individuals enrolled in Medicaid and CHIP, which is approximately 70 million people currently. Individuals are included whether or not they utilized Medicaid services within a given year.
- Years available: The data are available for all states and the District of Columbia beginning with calendar year 1999, and selected states prior to 1999 due to voluntary reporting. New data are available annually and data represent a calendar year. There may be missing states each year given reporting issues.
- Nationally representative: Medicaid data is not nationally representative; however, it is representative of the Medicaid population.
- Number of providers covered: All physicians who accept Medicaid for services. Data are available to identify the servicing provider, the provider's specialty, and the billing provider.

Primary Outcome Indicator

MAX files provide detailed data about the specific service, including the service begin and end date, procedure (service) code, diagnosis codes, quantity of service, state specific servicing provider id code, provider specialty code, place of service, and uniform billing revenue code

- Vision measures: Diagnosis codes only. (e.g. myopia, presbyopia, hypermetropia, astigmatism, low vision, blindness).
- Eye Disorder Diagnoses: Uses ICD-9 and ICD-10 codes to characterize disorder diagnoses.
- Eye Exams: Procedure codes used for the principal and secondary procedures. Systems include CPT-4, ICD-9-CM, CRVS 74, CRVS 69, CRVS 64, HCPCS, ICD-10, other, NA, and unknown.
- Other procedures: Information available on the mandatory Early Periodic Screening and Diagnosis and Treatment, which includes vision screening and follow-up services to children under the age of 21.
- Costs: Cost data include total Medicaid payment, fee-for-service payment, pre-paid plan premium payment, charge amount, and total third party payment amount

Patient Level Indicators

- Demographics: Age, including birth date and data of death; Sex; Race, including five categorical race variables, the Medicaid race/ethnicity code, and the Medicare Race/Ethnicity code if applicable, and; Ethnicity.
- Geography: State, County, and Zip code.
- Insurance type: In addition to Medicaid insurance and state specific eligibility, Medicaid data provide information about Medicare and private insurance eligibility and utilization.
- Risk factors: Medicaid data can identify whether a patient is diagnosed with diabetes, hypertension, etc.
- Socio-economic: None.

Other Note-worthy Characteristics

- MAX users can access MAX data using the following operating platforms:
  - ► CMS mainframe (Cobol, SAS) – person summary and claims data
  - ► PC SAS Person Summary and Claims Data – provided by Research Data Distribution Center
  - ► MAX Website

- Limitations communicated by CMS:
  - ► Limitations related to eligibility data include: minimal information on other insurance coverage, no beneficiary name or address, other data unavailable (e.g. income, other programs), and eligibility "churning."
  - ► Limitations related to services include: data only provided during spells of eligibility, only Medicaid covered services (coverage varies by state), incomplete for duals (residual after Medicare payment), and incomplete for persons in prepaid plans
  - ► Limitations related to payments: missing some payments, incomplete for third-party payments, and drug payment amounts are prior to rebates.
  - ► Completeness
  - ► Timeliness
  - ► No provider characteristics

MarketScan

MarketScan is a family of health research databases primarily including commercial private medical insurance paid claims data. MarketScan may also include Medicare supplemental and Medicaid claims. The Centers for Disease Control and Prevention (CDC) owns a license to access MarketScan claims data, which is owned by Truven Health Analytics Inc., and brings substantial expertise and experience in analysis of MarketScan claims, including for previous vision-related prevalence estimates. MarketScan include diagnoses and procedures, insurer and patient paid amounts. There are limited demographic variables, and race is only available in MarketScan Medicaid data. Several databases can be linked by using a unique enrollee id, including enrollment files, medical records (outpatient, inpatient and prescription data), productivity management, health risk assessment, dental, and laboratory data. MarketScan does not include vision insurance claims.

Data Source Description

- Number of patients covered per year: The number of patients covered varies by year. For example, there are approximately 55 million enrollees in 2016.
- Years available: The data are available beginning with calendar year 1995 for commercial claims and encounter database. Others vary.
- Nationally representative: MarketScan is not nationally representative, but may be representative of states with higher coverage.
- Number of providers covered: Information not available.

Primary Outcome Indicators

- Vision measures: Diagnosis codes only. (e.g. myopia, presbyopia, hypermetropia, astigmatism, low vision, blindness).
- Eye Disorder Diagnoses: MarketScan uses all disorder codes to identify eye disorders.
- Eye Exams: MarketScan uses CPT and V codes to identify eye exams.
- Other procedures: MarketScan data has information on any procedures with CPT codes
- Costs: Costs are defined by paid claims from both the benefit plan and the patient.

Patient Level Indicators

- Demographics: Age, sex, limited race/ethnicity coverage (race only in MarketScan Medicaid data). Medicaid data is available from multiple un-identified states.
- Geography: State, county of employment, Metropolitan Statistical Area, region
- Insurance type: Privately insured medical other insurance including multi-state Medicaid and Medicare supplemental data
- Risk factors: MarketScan data can identify whether a patient is diagnosed with diabetes, hypertension, high cholesterol, etc.
- Socio-economic: Industry of employment. No other socio-economic indicators.

VSP Inc.

VSP Inc. is the nation's largest vision insurance provider, operating as a non-profit corporation for 60 years. Vision insurance is a specialized supplemental insurance provided through employers, commercial health plans, Medicare/Medicaid supplement plans, FEHB, tribes, or purchased individually to provide routine vision care coverage. VSP uses a web-based claims submissions system to collect and process more than 20 million claims per year. VSP maintains approximately 10 years of claims history. There are no databases linked to VSP data. Generally, VSP data includes optometric exams and procedures, diagnoses (refractive errors, eye disease, systemic disease, acute issues), vision correction utilization, prescriptions and materials dispensed, costs, provider information, and patient demographics.

Data Source Description

- Number of patients covered per year: 20+ million claims
- Years available: 10 years are available. 5 years are kept ready to access and up to 10 years are archived.
- Nationally representative: VSP processes claims in every state. However, states with small populations generally have low claim counts in any given year.
- Number of providers covered: VSP's national network is about 33,000 eye care professionals. Approximately 85% are OD's (optometrist), 15% are MD's (ophthalmologist).

Primary Outcome Indicators

- Vision measures:
  - Un-corrected acuity: Collected via ICD-9/10 code (e.g. myopia, presbyopia, hypermetropia, astigmatism, low vision, blindness).
  - Corrected acuity: Collected via prescriptive measurements (e.g. base curve rt/lt, cylinder rt/lt, axis rt/lt, add power rt/lt, distance rt/lt, horizontal prism and direction rt/lt, near rx rt/lt, optical center, pupillary distance, sphere, etc.)
  - Contrast sensitivity, visual field, or other functional measure: Collected via ICD-9/10 codes.

- Eye Disorder Diagnoses: Limited set of diagnoses.
- Eye Exams: Primarily optometric exams.
- Other Procedures: Primarily optometric procedures, prescriptions, and materials dispensed.
- Costs: Billed and paid amounts.

Patient Level Indicators

- Demographics: Age, Sex. Limited coverage of race/ethnicity except for mobile examination unit patients.
- Geography: Place of residence and provider location by ZIP code, but not uniform national coverage.
- Insurance type: Includes information on coordination of benefits.

- Risk factors: Includes self-reported diabetes, hypertension, and high cholesterol.
- Socio-economic: None.

Other Note-worthy Characteristics

- VSP maintains a fleet of three mobile eye examination clinics that provide free optometric exams and services for ~10,000 underserved, non-insured persons per year, or in response to disaster relief. These mobile exams maintain the same level of claims detail, plus additional race/ethnicity data.
  - ► These mobile examination clinics could potentially provide a mechanism for collection of detailed visual function and other measures for uninsured and underserved populations.

- VSP has developed sophisticated access-to-care metrics to identify geographic areas or populations with reduced access to care based on provider availability or possibly other metrics.
- VSP has the capability to control for market participation/penetration rates when calculating outcome prevalence rates.

Military Health System/Tricare

The Military Health System Data Repository (MDR) is the centralized data repository that captures, archives, validates, integrates and distributes Defense Health Agency (DHA) corporate health care data worldwide, including Tricare. It receives and validates data from the Department of Defense's (DoD) worldwide network of more than 260 health care facilities and from non-DoD data sources. The MDR applies data quality edits to maximize the value of DHA corporate data. It also provides online and near-line data storage and supports health care data transfers.

Analyses for VEHSS serve as the basis for the information below:

- Data type: Claims data for inpatient and outpatient services covering 2013 claims.
- Agency/who owns the data: DoD.
- General data coverage: MHS/Tricare covers ophthalmologic services for all active duty and active reservists, their family members, and military retirees. Data is incomplete for those older than 65 and who have Medicare coverage due to disability or other cause. Eligible retirees can also seek care in the United States Department of Veterans Affairs (VA) system; VA data is not covered in this dataset.
- Linked files: MDR data cannot be linked to other data sources

Data Source Description

- Number of patients covered per year: Approximately 9.2 million beneficiaries.
- Nationally representative: To the extent that our all-volunteer force and their family members are nationally representative, although Tricare does not provide coverage for all services.
- Number of providers covered: All MHS/Tricare approved providers. Specific number of providers covered not available.

Primary Outcome Indicators

- Vision measures: Diagnosis codes only. (e.g. myopia, presbyopia, hypermetropia, astigmatism, low vision, blindness).
- Eye Disorder Diagnoses: All diagnoses.
- Eye Exams: All covered services. MHS/Tricare covers routine eye exams and vision correction services for active duty members and cataract patients only.
- Other procedures: All Tricare covered procedures
- Costs: MHS Direct Care Services are at no cost to the beneficiaries. Tricare services have some cost sharing for services.

Patient Level Indicators

- Demographics: (age, sex, race/ethnicity) Age, sex. Limited race coverage.
- Geography: state, county.
- Insurance type: Tricare.

- Risk factors: Diagnosed risk factors including diabetes, hypertension, high cholesterol.
- Socio-economic: Rank category available which provides some level of socioeconomic approximation (although spouse employment, retiree/reservist employment, and personal wealth are not accounted for).

Electronic Health Records and Registries

Electronic medical record (EMR) databases and EMR registries represent an emerging data source with the potential to greatly enhance our ability to measure important health outcomes at a much higher level of detail than available in claims data. However, this level of detail comes at a cost; EMR and registry data is often more difficult to analyze than claims, and their application to vision and eye public health research is unproven. Of the two sources identified in our review, only IRIS Registry appears to have been previously used for vision or eye health-related research, while AOA MORE is still under development and has been used for Medicare quality reporting and practice improvement, but has not yet been used for research.

Despite the challenges posed by utilizing these new data resources, they bring substantial potential benefits to public health research. EMR data contain detailed diagnostic information at a level of granularity beyond that captured in diagnosis codes. While health registries such as IRIS Registry necessarily link these EMR records to diagnosis codes to ensure a common coding scheme across the different EMR systems reporting to the registry, these will presumably still offer greater detail and accuracy than diagnosis codes from claims data which may be limited or influenced by reimbursement considerations. Registry data such as IRIS Registry also contain important visual function measures not captured in diagnosis codes, such as presenting and corrected acuity levels, and potentially other visual function measures such as contrast sensitivity or visual field.

EMR and registry data also have the advantage of capturing service utilization for all patients seen in the practice, regardless of their insurance status. This may provide important information on the relative breakdown of service utilization by insurer; an important control for integrating claims data. In addition, registry data will capture care provided to uninsured patients, patients who pay out-of-pocket, and for whom no claims are generated.

Table 3. Highlighted Coverage Areas for EMR and Registry Data

	IRIS Registry	MORE
Nationally representative	○	○
Demographics		
Age/Sex/Race	●	●
Geographic representation		
State representation	◐	◐
County representation	◐	◐
Patient Groups		
All ages	●	●
Undiagnosed	○	○
Payer type		
Private medical	●	●
Private vision	●	●
Medicare	●	●
Medicaid	●	●
Other government payers	◐	●
Uninsured	◐	◐
Care type and setting		
Vision services	◐	●
Eye care	●	●
Other medical	○	○
Conditions		
All medical diagnoses	○	○
Risk factors	◐	●
Uncorrected acuity	●	●
Corrected acuity	●	●

IRIS Registry

The American Academy of Ophthalmology IRIS® Registry (Intelligent Research In Sight) is the nation's first comprehensive eye disease clinical database. The IRIS Registry enables ophthalmologists to use clinical data to improve care delivery and patient outcomes, and help practices meet requirements of the federal Merit-based Incentive Payment System (MIPS). The IRIS Registry uses HIPAA-compliant methods to collect data from patient records directly from practice's individual EMR systems on a nightly or weekly basis. The system tracks diagnosed disorders based on ICD-9/ICD-10 codes, and also includes visual acuity measures.

Data Source Description

- Number of patients covered per year: a cumulative of 44.23 million patients and 182.68 million encounters as of January 1 2018.
- Years available: Coverage begins in 2013.
- Nationally representative: Data is not probabilistically sampled, but collects data from greater than 50% of ophthalmologists so data may be considered nearly nationally representative with adjustment.
- Number of providers covered (with their EMRs): In 2016 there are 2,888 practices, 11,374 ophthalmologists, optometrists, and other providers contracted with the IRIS® Registry.

Primary Outcome Indicators

- Vision function measures:
  - ▸ Un-corrected acuity
  - ▸ Corrected acuity
  - ▸ Contrast sensitivity, visual field, or other functional measures if documented in the EHR

- Eye Disorder Diagnoses: Full set ICD-9 and ICD-10 codes, by year.
- Eye Exams: All eye care procedures are covered, defined by CPT codes
- Other procedures: See above.
- Costs: Cost data are not included; however, it could be imputed by the CPT codes.

Patient Level Indicators

- Demographics: Age, Sex, Race/Ethnicity
- Geography: State, County, Zip code of Provider
- Insurance type: Medicare, Medicaid, private medical, private vision, other government insurance, uninsured
- Risk factors: Smoking, diabetes, hypertension, high cholesterol, family history, other medical history.
- Socio-economic: None.

Other Note-worthy Characteristics

- IRIS Registry is a clinical dataset based on the electronic health record documentation, and is limited to what is documented by the clinician in the EMR. It is the only dataset that includes procedures and care for uninsured patients. IRIS® Registry also has race/ethnicity coverage based on EMR records, which generally are more complete than contained in most claims data.

AOA MORE

In June 2015 the American Optometric Association (AOA) announced the launch of the AOA Measures and Outcomes Registry for Eyecare (AOA MORE) registry. AOA MORE is the nations' first optometric-focused registry. The primary initial goals of the registry are to assist eye care practices in improving the quality of care, and to submit quality measures to the Medicare Merit Based Incentive Payment System (MIPS).

AOA MORE currently interfaces with seven EMR systems. AOA has contracted with an outside data management firm, Prometheus Research, to implement the AOA MORE registry. At this time, all EMR-based measures are housed by Prometheus Research. AOA receives de-identified summary reports of encounters at the practice level. AOA does not receive any person-level data. AOA MORE is working to allow for analysis of population-level prevalence or access to care.

- Data type: EMR-based registry.
- Agency/who owns the data: American Optometric Association. Data housed by Prometheus Research
- General data coverage: Optometric practices. MIPS quality measures, demographics for all doctors using the registry, clinical data
- Linked files: doctors/individual PIN/TIN practicing in more than one location

Data Source Description

- Number of patients covered per year: 1,215,416 in 2017
- Years available: Coverage begins in 2017
- Nationally representative: Data is not probabilistically sampled, but may be adjusted
- Number of providers covered: 1,539 physicians with the potential for over 6,000 once integration of initial 7 vendors is complete in 2018. Primary Outcome Indicators
- Vision measures: to be collected in 2017
- Eye Disorder Diagnoses: Yes
- Eye Exams: Yes
- Other procedures: Yes
- Costs: No

Patient Level Indicators

- Demographics: Age, sex, race/ethnicity
- Geography: Geographic region
- Insurance type: Yes
- Risk factors: Risk factors by diagnosis codes
- Socio-economic: No

Other Note-worthy Characteristics

AOA MORE is cloud-based, so software integration is not needed by participating doctors/practices. Further, data is not entered via manual entry which minimizes human error. Participation with AOA MORE is provided as a free benefit to AOA members.

Other Data Sources

Healthcare Cost and Utilization Project

The Healthcare Cost and Utilization Project (HCUP) is the United States' most comprehensive source of hospital data, including information on in-patient care, ambulatory care, and emergency department visits. HCUP has very limited coverage of outpatient services, other than ambulatory care provided in hospital owned clinical facilities. Thus HCUP may not capture most eye care services.

HCUP is comprised of a family of databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). The HCUP data is collected by state data organizations, hospital associations, private data organizations, and the federal government. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels. HCUP databases are built from administrative data and contain encounter-level, clinical and nonclinical information including all-listed diagnoses and procedures, discharge status, patient demographics, and charges for all patients, regardless of payer (e.g., Medicare, Medicaid, private insurance, uninsured). Certain components of outpatient care (i.e., emergency care and ambulatory surgeries and services) are captured. The specific types of ambulatory surgery and outpatient services included vary by State and data year. Limited linkages to American Hospital Association's (AHA) Annual Survey of Hospital with detailed hospital characteristics. Additional linkages may be possible.

The HCUP database includes:

- **The State Inpatient Databases (SID)**: The SID collects hospital inpatient information that can be used to investigate questions that are unique to one State or to compare data from two or more States.
- **The State Ambulatory Surgery and Services Databases (SASD)**: The SASD provides encounter-level data for ambulatory surgery and other outpatient services from hospital-owned facilities. In addition, some States provide data for ambulatory surgery and outpatient services from nonhospital-owned facilities.
- **The State Emergency Department Databases (SEDD):** The SEDD contains discharge information on all ED visits that do not result in a hospital admission.
- **The National (Nationwide) Inpatient Sample (NIS)**: The NIS yields national estimates of hospital inpatient stays and is the largest publicly available all-payer inpatient care database in the United States. The NIS is sampled from the SID.
- **The Kids' Inpatient Database (KID)**: The KID facilitates study of hospital services use, outcomes and charges for children and adolescents. It is the largest publicly available, all-payer pediatric database in the United States. The KID is also sampled from the SID.

- **The Nationwide Emergency Department Sample (NEDS)**: The NEDS enables researchers to study a broad range of conditions and procedures related to ED use and yields national estimates of emergency department (ED) visits. It includes records for patients who were either treated in the ED and released or treated in the ED and admitted to the same hospital. The NEDS is derived from the SID and the SEDD.
- **The Nationwide Readmissions Database (NRD)**: The NRD addresses the need for nationally representative information on hospital readmissions, and can be used to create national readmission rates. The NRD is drawn from the SID.

Data Source Description

- Number of patients covered per year: The HCUP State databases are "discharge-level" files. The HCUP variables for revisit analyses can be used to track sequential visits for a patient within in a state and across facilities and hospitals settings (inpatient, emergency department, ambulatory surgery) while adhering to strict privacy guidelines. However, these variables can only be used with the SID, SASD, and SEDD.
- Years available: Years available vary per database and state. See table: http://www.hcup-us.ahrq.gov/db/availability_public.jsp
- Nationally representative: Varies by database (NRD, NIS, KID, and NEDS allow for national estimates).
- Number of providers covered: Varies by database. The 2012 NIS contains a sample of discharges from all HCUP-reporting hospitals, which totaled more than 4,300 in 2012; however, the 2012 KID includes discharges from 4,179 hospitals in 44 States.

Primary Outcome Indicators

- Vision measures: None
- Eye Disorder Diagnoses: Captured as ICD-9-CM codes if a primary or secondary diagnosis.
- Eye Exams: ICD-9-CM and CPT procedure codes (depending on database and State)
- Other procedures: ICD-9-CM and CPT procedure codes (depending on database and State)
- Costs: Total charges are reported. In addition, AHRQ has created Cost-to-Charge Ratio (CCR) Files that enable the conversion of total charges — defined as what a hospital billed for services — into how much the hospital services actually cost for the NIS, KID, and SID databases.

Patient Level Indicators

- Demographics: Sex, age, and race/ethnicity, which varies by State for SEDD, SASD, and SID.
- Geography: Without access to the data, it is difficult to definitively say what geographic data is included. For some databases 'patient's residence' (large central metro, suburbs, medium or small metro, and non-metro) is captured. NIS additionally captures region of the U.S. and census division; however, state and hospital identifiers are no longer provided.
- Insurance type: HCUP is an all-payer set of databases and includes the uninsured.

- Risk factors: AHRQ has created Comorbidity software that identifies comorbidities in hospital discharge records using ICD-9-CM diagnosis codes. Currently the Comorbidity Software creates 29 variables that identify major comorbidities (e.g., congestive heart failure, HIV/AIDS) in hospital discharge records. There are two versions of the Comorbidity Software: the Comorbidity Software for ICD-9-CM and the Comorbidity Software for ICD-10-CM.
- Socio-economic: Median household income for ZIP Code is captured in the NIS, KID, and NEDS.

Other Note-worthy Characteristics

- The HCUP does not contain outpatient physician office visit data.
- Composition and completeness of data files may vary by year and from State to State.
- Some HCUP databases can be purchased from the HCUP Central Distributor; however, some state databases must be purchased directly from each state.