



CHALLENGES & OPPORTUNITIES IN CURATING LARGE ADMINISTRATIVE & CLINICAL DATASETS FOR RESEARCH USE

**VIREC'S EFFORTS TO ADVANCE
VA INFORMATICS AND RESEARCH
PROJECTS**

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AGENDA

1. INTRODUCTION TO THE VA
2. RESEARCH IN THE VA
3. VA DATA ENVIRONMENT/EHR MODERNIZATION
4. OPPORTUNITIES AND CHALLENGES
5. VIREC'S ROLE IN THE DATA LANDSCAPE
6. PARTNERING WITH VIREC & THE VA

VIREC



INTRODUCTION TO THE DEPARTMENT OF VETERANS AFFAIRS



SCALING SERVICES ACROSS THREE SEPARATE ENTITIES

U.S. Department of Veterans Affairs

Comprised of 3 organizations to address the unique needs of our nations Veterans

Veterans Benefit Administration

The Veterans Benefits Administration (VBA) provides a variety of benefits and services to Servicemembers, Veterans, and their families.

National Cemetery Administration

The National Cemetery Administration (NCA) provides burial services in a VA national cemetery to all members of the armed forces and Veterans who have met minimum active-duty service requirements.

Veterans Health Administration

The Veterans Health Administration is America's largest integrated health care system, providing care at 1,298 health care facilities, including 171 medical centers and 1,113 outpatient sites of care of varying complexity (VHA outpatient clinics)



Veterans Health Administration

Over the years....

- Established as a national program in 1930
- Early pioneer of the electronic health record
- Major reforms starting in 1990's including
 - investments in electronic health record
 - shift from emphasis on inpatient and specialty care to emphasis on primary care
- Contains 9M Veterans enrolled in the VA health care system.

Evolved Healthcare Delivery Model

- Personalized Care
- Proactive and Patient-Driven
- Team-based Primary Care
- Evidence-Based
- Prevention / Population Health
- Data-Driven



Learning Healthcare System

Learning Healthcare System

“science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral byproduct of the delivery experience.”

VA RESEARCH



VA | U.S. Department
of Veterans Affairs

**IMPROVING THE LIVES OF VETERANS AND ALL AMERICANS THROUGH
HEALTH CARE DISCOVERY AND INNOVATION**

VA Office of Research & Development



Health Services Research

Evaluates the **effectiveness of clinical procedures or practices and processes of care** in the "real world."

Compares **VA outcomes, cost, and quality of care** among VA sites or between VA and non-VA providers

Evaluates **utilization patterns and costs** associated with practice patterns, interventions, policy changes, etc.

Develops and evaluates **new measures and methods** for use in health services research.

Focuses on **implementing research findings into practice.**

Looks at **variations in care** (e.g., ethnic, cultural, provider, geographic based) and their determinants

Examines **organization, management, and leadership** in health care

VA DATA ENVIRONMENT



VA | U.S. Department
of Veterans Affairs

BIG DATA ENVIRONMENTS PULL DATA FROM A VARIETY OF SOURCES

VA data is continuously collected in the context of healthcare operations and delivery



Clinical Care
(Electronic Health Record)



VA Care in the Community



Healthcare Operations, Costs, Enrollment, Utilization



Patient Generated Data



Research & Quality Improvement Data



CPRS

Computerized Patient Record System

- Front end for most data collected in clinical care and care delivery
- Provides an interface for data entry and viewing of EHR



VistA

Veterans Health Information Systems & Technology Architecture

- Backend storage of data; integrated system of software applications
- VistA “system” is actually 130 separate instances

CPRS/VistA system has been used in the VA since the 1980s and has evolved to suit Veteran-specific care with heavy local customization.

VA data is entered in CPRS and other systems and curated into various data sources. These sources are commonly used for QI, research, or informatics projects.

CDW

Corporate Data Warehouse

National repository of relational data from **the EHR** and several other VHA **clinical and administrative** systems.

VA
Mill

VA Millennium

VA's new EHR (a commercial Cerner system) that includes a user interface and backend database for data storage analogous to VistA.

PBM

Pharmacy Benefit Management

National database containing details and extensive information about all **prescriptions** dispensed within VHA systems.

VA/CMS

VA Medicare & Medicaid

Data acquired from the **Centers for Medicare and Medicaid Services** (CMS) and United States Renal Data System (USRDS) specific to Veterans.

MCA

Managerial Cost Accounting

Data source providing **activity-based cost information** and clinical information.



VA's New EHR System



ELECTRONIC HEALTH RECORD
MODERNIZATION

- VA has begun a decade-long transition to the commercially developed Cerner EHR
- First instance of VA Millennium went live at the Mann-Grandstaff VA Medical Center (Spokane, WA) in October 2020
- Rollout is expected to continue in 2023 completing in ~2030
- New EHR = new data



OPPORTUNITIES AND CHALLENGES



VA | U.S. Department
of Veterans Affairs

BALANCING DEMAND

Strengths of VA Data

- Size/Volume - largest integrated healthcare system in US, with 20 years of data of longitudinal data on 24 million patients
- Breadth/Scope of data – includes clinical data, assessment tools, administrative etc.
- Timely – some data available in almost real time
- Can be linked to external data (i.e., CMS, NDI, DoD)
- Data created for VHA operations can also be used for research

Challenges & Limitations

- Data landscape can be complicated – multiple sources for similar data elements; likely to get more complicated with EHRM
- Analyses may not be generalizable to general population
 - Mostly male, sicker than average, Veteran-prevalent conditions (PTSD, mental health, traumatic brain injury, limb loss)
- Not all Veterans enrolled in VHA
- Many Veterans also receive care outside VHA
- Some data elements are less reliably available, e.g., income, education

Striking a Balance



This is where VIReC comes in...

Building a community of
efficient data users



VIReC'S ROLE IN THE DATA LANDSCAPE



VA | U.S. Department
of Veterans Affairs

RESEARCHER'S GUIDE TO VA DATA

www.virec.research.va.gov

VIREC is...

- one of four Health Services Research and Development Service (HSR&D) Resource Centers established in 1998 to service the VA research community.
- a key resource providing information, training and other services to support the use of VA data. We accomplish this by:
 - **Developing Education & Data Documentation Resources**
 - **Disseminating Data Knowledge**
 - **Strengthening VA Data Capacity**



About Us

The VA Information Resource Center (VIREC) supports the effective use of data by VA's analytic and informatic communities to transform Veteran health and health care as part of a learning health system.

VIReC Functions and Expertise

Continuum of initiatives supporting research data needs



Data Availability & Access Policy



Data Knowledge & Documentation



Education & Dissemination



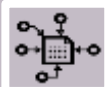
HelpDesk & Knowledge-Sharing



Liaisons within Data Ecosystem



Provisioning & Oversight of CMS Data



VA REDCap Data Collection & Management

How does VIReC Support Research, Informatics or other Data Needs?

VIReC assists a variety of users at different points of their project lifecycle:

- Navigate the VA Data Landscape
- Prepare to Access the Data
- Understand Data Contents and Nuances with the Data
- Stay Abreast of New Data or Updates in a Changing Data Environment

Navigate the VA Data Landscape



**LOCATE
RESOURCES
ABOUT VA DATA**



**BROWSE
COMMONLY USED
VA DATA SOURCES**



**EXPLORE SPECIFIC
TOPIC AREAS**



**VIEW PRESENTATIONS
ABOUT VA DATA AND
ITS USE**

VIReC Supported Websites

The screenshot shows the public-facing website for the VA Information Resource Center (VIReC). The header includes navigation links for Health, Benefits, Burials & Memorials, About VA, Resources, News Room, Locations, and Contact Us. The main content area features a large graphic with silhouettes of people and icons representing research and data. Below this, there are sections for 'Who We Are', 'Announcements', and 'Upcoming Events'. A search bar is visible on the left side.

www.virec.research.va.gov

- Public-facing
- VIReC overview
- Publications, Cyberseminars & events

The screenshot shows the intranet for the VA Information Resource Center (VIReC). The header features the VIReC logo and the word 'INTRANET'. The main content area includes a search bar, a navigation menu, and several sections: 'Data Issues Brief, September 2017', 'Upcoming Cyberseminars', 'New from VIReC', and 'VIReC Resources'. There are also links to 'Data Sources', 'Data Access', 'Tools & Applications', 'Resources', 'Training', 'Policy & Admin', and 'Support'.

vawww.virec.research.va.gov

- VA network only
- Resources for working with data
- News & new resources – home

The screenshot shows the VHA Data Portal website. The header includes the Department of Veterans Affairs logo and the text 'VHA Data Portal'. The main content area features a search bar, a navigation menu, and several sections: 'Welcome to the VHA Data Portal', 'Upcoming Events', 'New Data User', 'Research', and 'Operations & Quality Improvement'. There are also links to 'Data Sources', 'Data Access', 'Tools & Applications', 'Resources', 'Training', 'Policy & Admin', and 'Support'.

vawww.vhadataportal.med.va.gov

- VA network only
- Collaborative with NDS, VINCI, & HERC
- Data source & access information

Locate resources about VA data

View Presentations about VA Data and its use in Research

- Database & Methods
- Corporate Data Warehouse
- Using Data & Information Systems in Partnered Research
- Research & EHR Synergy
- Good Data Practices Miniseries
- VIREC CMS Data Miniseries


<https://www.virec.research.va.gov/Resources/Cyberseminars.asp#Upcoming>

VIREC The Researcher's Guide to VA Data
VA Information Resource Center

VIREC Home
About Us
VIREC Resources
Cyberseminars
Data Issues Brief
HSRData-L Listserv
Information About VA Data
Publications
Reports
Research User Guides
Summary Documentation
Tutorials
VA REDCap Project
VA/CMS Data for Research Project
Support
Research in the VA

VIREC » VIREC Cyberseminars

VIREC Cyberseminars



Cyberseminar Series

VIREC hosts several cyberseminar series to provide expert discussion and guidance on key issues related to using VA data for research.

- Database & Methods
- New!** Research & EHR Synergy
- Using Data & Information Systems in Partnered Research
- Good Data Practices
- Corporate Data Warehouse (CDW)
- Clinical Informatics
- Innovations in Healthcare Informatics

VIREC cyberseminars are supported by the Health Services Research and Development Service (HSR&D) Center for Information Dissemination and Education Resources (CIDER).

Upcoming Seminars

Register for an upcoming session by selecting register from the table below or by accessing the HSR&D Cyberseminar Catalog.

Date/Time*	Presentation	Series	Presenter(s)	Register
9/29/2021 12:00 pm	A Ground-Level View of EHR Modernization and Research	Research & EHR Synergy	Klote, M Souden, M	Register
10/4/2021 1:00 pm	Meet VIREC: The Researcher's Guide to VA Data Use	Database and Methods Seminar	Souden, M	Register
10/12/2021 3:00 pm	Using Medicare data to Study COVID-19	VIREC CMS Data Mini-Series	de Groot, K	Register

*All sessions are listed in Eastern time.

Cyberseminar Archive
VIREC cyberseminars are available as on-demand, archived presentations from the HSR&D Archive.
[View Archive](#)

Search VIREC's Site

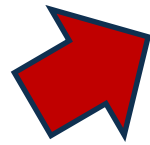
HSR&D
Health Services Research and Development Service

Information for Veterans

Browse Commonly Used VA Data Sources



<http://vaww.vhadatportal.med.va.gov/DataSources/DataSourcesOverview.aspx>
(VA Intranet)



The screenshot shows the VHA Data Portal website. At the top is a dark blue navigation bar with white text for "Data Sources", "Data Access", "Tools & Applications", "Resources", "Training", "Policy & Admin", and "Support". The "Data Sources" link is circled in red. Below the navigation bar is a light blue sidebar menu listing various data sources, including "Data Sources Overview", "ADUSH Enrollment File", "Bereaved Family Survey", "CAN Scores", "CART Program Data", "CDW", "COVID-19 Shared Data Resource", "DAVINCI", "eQM Data", "HERC Cost Data", "Homeless Registry", "LCSDP Cohort", "MCA (formerly DSS) NDEs", "MCA (formerly DSS) Web Reports", "Medical SAS Inpatient & Outpatient Data Sets", "NPCD", "OMOP CDW Data", "PACT Implementation Index (PI2)", "PSSG Geocoded Enrollee Files", "PTF", "RAI/MDS", "Traumatic Brain Injury", "USVETS Data", "VA/CMS Data", "VASQIP Data", "VETSNET", "VINCI NLP Output LVEF", "Vital Status File", and "VSSC Web Reports". The main content area has a white background and is titled "Data Sources Overview". It contains an "Overview" section with text explaining that in VA, the term "data sources" is used to describe specific bodies of data such as inpatient data, electronic health records, mainframe SAS data sets, and the Corporate Data Warehouse (CDW). It also defines a data source as where the data comes from or a place to access data for a project or study, listing examples like data reports, data sets, data files, databases, data warehouses, and data repositories. Below this is a "Data Sources" section with text instructing users to click a data source from the list below to view a brief description and link to more information, and to use the "Expand All" button to view all data sources and links to their pages. The "Expand All" button is a small white box with a black border and the text "Expand All". Below the text is a list of data sources, including "Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files", "Austin Information Technology Center (AITC) Mainframe", "Beneficiary Identification & Records Locator System (BIRLS) Death File", "Bereaved Family Survey (BFS) Database", "Care Assessment Need (CAN) Scores", "Clinical Assessment, Reporting, and Tracking (CART) Program Data", "Corporate Data Warehouse (CDW)", "COVID-19 Shared Data Resource", "DAVINCI (DoD-VA Health Data)", "Health Economics Resource Center (HERC) Cost Data", and "Homeless Registry".

Explore Specific Topic Areas

Data Topics

VIREC provides information and guidance on using data to address various topics related to research. Select a data topic from the list below to view a brief description and link information about each topic.

+ Expand All

- + Accuracy of Death Dates
- + Cause of Death
- + Comorbidity
- + Cost of Care
- + Data Quality
- + Emergency Department & Urgent Care Encounters
- + Electronic Health Record Modernization (EHRM) & Implications for Data
- + Geocoded Data
- + VA-Health and Retirement Study (HRS) Data
- + Home Telehealth
- + ICD-10 Implementation
- + Laboratory
- + Long Term Care
- + Mortality Data
- + Nursing
- + Patient Satisfaction
- + Pharmacy
- + Polytrauma
- + Preparatory to Research
- + Priority Groups
- + Race & Ethnicity
- + VA Care in the Community
- + Veteran Homelessness
- + Veteran Income Data
- + Veteran Statistics
- + VISTA
- + Vital Status Ascertainment
- + Women Veterans' Health Data

<https://vaww.virec.research.va.gov/Intro/Working-with-VA-Data.htm>

(VA Intranet)

Prepare to Access the Data



**APPLY FOR
ACCESS TO VA
DATA**



**REQUEST MEDICARE
& MEDICAID DATA
FOR VETERANS**



**LEARN HOW TO WORK
WITH THE
CORPORATE DATA
WAREHOUSE (CDW)**



**VA REDCAP FOR
PRIMARY DATA
COLLECTION &
MANAGEMENT**

Apply for Access to VA Data

Department of Veterans Affairs
VHA Data Portal

Home About Us Contact Us FAQ Report Broken Link

Data Sources **Data Access** Tools & Applications Resources Training Policy & Admin Support

<http://vaww.vhadataportal.med.va.gov/DataAccess/DataAccessOverview.aspx>

(VA Intranet)

Data Access Overview

Operations Access
Preparatory to Research Access
Research Access
Veterans Service Officers Access

Data Access

Overview

VHA grants access to data and information systems based on how the data will be used. Different types of data access granted (e.g., direct access, data extracts, read-only views) depend on the purpose of the request.

How do I request data for research and operations purposes?

VHA maintains patient health information and other data used for a variety of purposes, such as healthcare quality improvement, program evaluation, and research. Select a category below to learn more about data access or consult the [Research vs Operations Decision Tool](#) for additional guidance.

- Operations Access:** VHA employees and contractors require access to data and information systems for operations assessments, operational reporting, auditing, planning, forecasting, and general administrative purposes.
- Research Access:** VHA researchers with VA approved research protocols require access to data and information systems to conduct research.
- Preparatory to Research Access:** VHA researchers preparing research proposals require access to data and information systems to determine the feasibility of a proposed study and to demonstrate its significance.

How do I request data access for Veteran Service Organization representatives?

Authorized VSO representatives require read-only access to electronic health records to help determine the eligibility of Veterans for VA benefits. Visit the [Veteran Service Organization Representative Access](#) page for instructions for submitting a data access request.

Resources

- The following resources provide information on determining whether a VHA operations activity constitutes research:
 - [Research vs Operations Decision Tool](#)
 - [Program Guide 1200.21: VHA Operations Activities That May Constitute Research](#) (Jan 2019)

Department of Veterans Affairs
VHA Data Portal

Data Sources Data Access Tools & Applications Resources Training Policy & Admin Support

Data Access > DART Request Process

DART Research Request Process

Overview Submitting a Request Documents & Forms Request Metrics Resources

Overview

The Data Access Request Tracker (DART) Research Request Process is for requesting permission to access VHA data for approved research projects. Visit the [Preparatory to Research Access](#) page to learn about requesting data when preparing a research funding application or protocol.

Which data sources can I request?

Many, but not all data sources and tools can be requested through DART. Here is a list of those that are available for request. Select a data source for a description of its contents and tips for requesting access.

- ADUSH Enrollment Files
- Bereaved Family Survey (BFS) Database
- BiRLS Death File
- Care Assessment Need Score (CAN Score)
- Corporate Data Warehouse (CDW)

Request Medicare & Medicaid Data for Veterans



VIREC Home

About Us

VA/CMS Data for Research

VHA Data Portal

New Users of VA Data

FAQs

Acronym Lookup

HelpDesk

Report Broken Link

How are we doing?



The screenshot shows the VIREC INTRANET website. At the top, there is a search bar with the text "Search All VA Web Pages" and a "Search" button. Below the search bar, the main heading is "VA/CMS Data for Research". On the left side, there is a navigation menu with links for "VA/CMS Data Home", "About Us", "Updates", "Publications", "Education", "FAQs", and "Help". The main content area is divided into three columns. The first column is titled "What is VA/CMS Data?" and contains a paragraph explaining that VA acquires data from the Centers for Medicare and Medicaid Services (CMS) and the United States Renal Data System (USRDS). The second column is titled "CMS & USRDS Data for VA Research" and contains a list of links for "Learn About the Data", "Medicare", "Medicaid", "USRDS", "Patient Assessment", "HEDIS", "MCBS", "Provider", and "VA/CMS Match Indicator File". The third column is titled "Data Requests & Requirements" and contains links for "Pre-Request Consultations", "Request Process", "Continuing Use", "Terminating Use", and "Regulations".

<https://vaww.virec.research.va.gov/VACMS/Requests/Overview.htm>

Learn How to Work with the Corporate Data Warehouse

New to
using
CDW?

Data Documentation

Expand each type of documentation below to view these resources

+ Expand All

+ Getting Started with CDW

+ Factbooks

+ The Researcher's Notebook




+ Statistical Snapshot

+ Domain Layout & Descriptions

+ Data Contents, Discrete Frequencies, Record & Null Count

Getting Started with CDW

These cyberseminars are designed to help new CDW users with understanding the nature of relational data, becoming familiar with CDW structure and logic, finding documentation of CDW content, and knowing what to expect when first viewing CDW data in SQL Server Management Studio (SSMS) software.

Resources	Resource
CDW: A Conceptual Overview	
CDW: Locating Its Documentation	
Getting the Information You Need From CDW: SQL Starter Language	
Querying CDW Metadata Views	
Building Your Dataset in CDW: Joining Tables within a Domain	
Getting CDW Back Together: Joining CDW Tables (Continued)	
Data Management in SQL: Selected Intermediate SQL Skills	

<https://vaww.virec.research.va.gov/CDW/Documentation.htm> (VA Intranet)

Email virec@va.gov to be notified of new CDW products and seminars.

Primary Data Collection & Management



Learn More:

<http://vaww.virec.research.va.gov/REDCap/Overview.htm>

(VA Intranet)

VIREC INTRANET

Search All VA Web Pages [v] Search [x] Open Advanced Search

VA INFORMATION RESOURCE CENTER (VIREC)

VIREC Home
About Us
VA/CMS Data for Research
VHA Data Portal
New Users of VA Data
FAQs
Acronym Lookup
HelpDesk
Report Broken Link
How are we doing?

VA Research Electronic Data Capture (REDCap)

[Launch VA REDCap Application](#)

Overview

REDCap was created in 2004 at Vanderbilt University to support data collection for research. VA REDCap is the free, open source, web-based version of this application.

Getting Started with VA REDCap

Request an account by filling out a [VA REDCap Ticket](#).

Review the [VA REDCap Guidelines](#) to learn about the responsibilities of VA REDCap account holders.

Watch these introductory webinars.

- [VA REDCap 101](#) provides examples of how VA REDCap is being used to support research, quality improvement, and operations projects.
- [Survey Data Collection Using VA REDCap](#) focuses on how VA REDCap can be used to support surveys that are administered on paper, verbally, or electronically.

Still not sure where to start? Contact VIRECREDCapSupport@va.gov for more information about using VA REDCap.

Learning Resources

- VIREC's [VA REDCap Learning Resources](#) include links to self-paced learning materials and information on upcoming training events.
- VA REDCap Hour is an open question and answer time with members of the VA REDCap support team. We meet every Thursday from 3-4pm Eastern Time on Microsoft Teams. [Click here to join the meeting.](#)
- Visit our [FAQs page](#) for answers to commonly asked questions about using VA REDCap.
- Visit Vanderbilt's [Project REDCap website](#) to learn more about the software, including [online tutorials](#) on getting started and guidance on using the application and its functionality. Note: Some of the functionality described, such as the REDCap Mobile App, is not available for use at the VA.

VA REDCap Support Team

VIREC's VA REDCap Support Team grants new accounts and helps VA REDCap users troubleshoot any issues with their projects. Here are a few ways to contact the team.

- Submit a [Request Ticket](#) online.
- Email us at VIRECREDCapSupport@va.gov.
- Call us at (708) 202-2413.

Understand Data Contents and Nuances with the Data



**UNDERSTAND DATA
ELEMENTS AND
FORMAT**



**METHODS AND
TECHNICAL
DOCUMENTATION**



**INDIVIDUALIZED
SUPPORT (HELPDESK)**

Understand Data Contents and Structure

VA INFORMATION RESOURCE CENTER (VIREC)

VIREC Home
About Us
VA/CMS Data for Research
VHA Data Portal
New Users of VA Data
FAQs
Acronym Lookup
HelpDesk
Report Broken Link
How are we doing?

CDW Documentation

Overview

VIREC provides documentation on select Corporate Data Warehouse (CDW) production domains. CDW documentation is designed to help new and seasoned users better understand the structure and contents of the CDW. It might be necessary to review a combination of resources to fully understand the complexities of the CDW and data use environment.

Sign-up for VIREC product news and updates. Email the VIREC [HelpDesk](#) to receive notification of VIREC's new CDW products and product updates.

How are we doing? Take our [short survey](#) to share your thoughts about the CDW resources below. We value your feedback.

Data Documentation

Expand each type of documentation below to view these resources.

[+ Expand All](#)

- CDW - Started with CDW**
- Factbooks**
- The Researcher's Notebook**
- Statistical Snapshot**
- Domain Layout & Descriptions**
- Data Contents, Discrete Frequencies, Record & Null Counts**

Learn About CDW

- Overview
- Data Transition to CDW
- Documentation
- FAQs

General Resources

- Data Access
- Data Sources
- Data Tools
- Data Topics
- Products & Services
- Special Projects

VIREC Home | VA/CMS Home | VHA Data Portal | VA R&D Home | VA HSR&D Service | Viewers | Sitemap | Contact Us

VA Intranet Home | About VA | Organizations | Locations | Section 508 Accessibility | No Fear Act

Reviewed/Updated Date: January 12, 2021

<https://vaww.virec.research.va.gov/CDW/Documentation.htm>
(VA Intranet)

Factbooks

CDW Factbooks provide descriptions of tables, columns, and values in select CDW Domains sourced from VistA and include domain-specific SQL "starter language" and sample SQL code.

Note: Factbooks with CDW Millennium after the domain include the most up-to-date information for VistA data as well as associated data from the VA Millennium EHR. Visit the [Electronic Health Record Modernization \(EHRM\) & Implications for Data Users](#) page to learn more about the Cerner data environment, Millennium data, and how to access and use these data.

Domain	Factbook
ADR Enrollment	
Allergy	
Appointment	
NEW! Bene Travel	
Consult	
CPRS Orders	
Health Benefits Request	
Health Factor	
Immunization - CDW Millennium	
Immunization	
Inpatient	
Inpatient Fee Lodger	
LabChem	
Mental Health	
MVI	
Non-VA Meds	
Outpatient	
Patient	
Patient Associated	
Patient Enrollment (with EWL)	
Pharmacy Patient	
Purchased Care Authorized	
Purchased Care Service	
Purchased Care Unauthorized	
Staff Release	
Vital Sign	



VIReC Product Spotlight

CDW Factbooks
provide detailed
descriptions of
tables, columns,
and values in
select CDW
domains

Factbook

VIReC Factbook

*Corporate Data Warehouse (CDW)
VA Millennium
Immunization 2.1 Domain
April 2021*



Part 2. Introduction to Immunization 2.1 Domain

VistA-based Data

CDW is a relational database organized into a collection of data domains. Domains represent logically or conceptually related sets of data tables. Domain themes generally indicate the application in the VistA electronic health record system from which most of the data elements in the domain come (e.g., VistA Case or

Part 3. Clinical and Technical Context

VistA Data Management/Security

According to the VistA Metadata Repository [3], a VHA Directive mandates the lock down of the Immunization Dimension File using Data Standardization (DS). Additions, edits or deletions will only be completed by Enterprise Reference Terminology (ERT) using the Master File Server (MES) provided by Common Services (CS).

Part 4. Table and Column Descriptions

Part 4 provides descriptions of tables and selected columns in the Immunization Domain. The name of each table is presented in large font with a description of its general content immediately following. After each table description, selected columns within that table are described as indicated below.

Content of Column Descriptions

Column: Name of column

Part 5. Primary and Foreign Key Connections Query

Once you have been granted access to CDW data, this query can be used to generate an up-to-date list of primary and foreign keys associated with this domain.


```
SELECT [FKSchemaName]
       [FKViewName]
       [FKViewFieldName]
       [FKViewVersion]
```

Part 6. Example SQL Code for Data Exploration

This section contains a simple question that may be answered by applying basic SQL queries to the data in this domain; it does not involve other domains.

1. How many immunizations were given at Mann-Grandstaff VA Medical Center for Hepatitis B in the past year?
2. What are the most commonly reported reactions to a COVID-19 vaccine in the VA?

Methods & Technical Documentation

 **VIReC Resources**

[Meet VIReC, The Researcher's Guide to VA Data:](#)
Learn about us, our products, and how to navigate our web environments.

[Learn about VA data:](#)

- [+ Data Sources](#)
- [+ Data Topics](#)
- [+ Data Tools](#)

[VA/CMS Data for Research Project:](#) Data custodian for CMS and USRDS data for VA research.

[Factbooks:](#) Describe tables, columns, and values in select CDW Domains.

[Research User Guides:](#) Detailed information on select data sources, including variable descriptions.

[The Researcher's Notebook:](#) Practical information on using data from researchers in the field.

[Cyberseminars:](#) Expert discussion and guidance on key issues related to using VA data.

[Data Reports:](#) Technical reports, data investigations, and data quality updates.

[Summary Information:](#) Current and historical information about dataset variables, counts, and frequencies.

[Publications:](#) A complete list of peer reviewed articles and journal supplements published by VIReC.

<https://vaww.virec.research.va.gov/Notebook/Overview.htm>
(VA Intranet)

Current Issues

How are we doing? Take our [short survey](#) to share your thoughts about *The Researcher's Notebooks* below. We value your feedback.

Note: Notebooks that utilize Millennium data include an "M" in the issue number.

#	Notebook	Author	View PDF
23M	NEW! Identifying Immunizations Administered Pre-and Post-Cerner EHR Transition	Jones, L Culbreath, C Gonsoulin, M	
22M	Using PowerForms to Explore Cerner Millennium Data (Part II)	Jones, L Culbreath, C Arnold, N	
21M	Using PowerForms to Explore Cerner Millennium Data (Part I)	Culbreath, C Jones, L	
20	Community Care Data: Comparison of Claims in the CDW FBCS Domain and PIT Domain	Arnold, N	
19	Community Care Data: Comparison of FBCS Domain and Purchased Care Domain Data	Arnold, N	
18	Exploring Relationships between Procedure and Diagnosis Data in the CDW Outpatient Domain	Jones, L Culbreath, C	
17	Overview of Three Community Care Data Sources	Arnold, N	
16	Matching VA Identifier to DoD Identifier: PatientICN to EDIPI Using CDW's MVI Domain	Gonsoulin, M Jones, L	
15	Exploring the Three Procedure Tables in the CDW Inpatient Domain	Gonsoulin, M Culbreath, C	
14	Identifying Encounters in CDW by Clinic Location versus Provider Type	Gonsoulin, M Jones, L	
13	Defining a Cohort with a Diagnosis & Medication: Using CDW to identify VA outpatients with a diagnosis of Rheumatoid Arthritis who are taking Etanercept	Gonsoulin, M Joseph, AM Culbreath, C	
12	UPDATED! Identifying CLC Stays in CDW	Scott, WJ Gonsoulin, M Ramanathan D Intrator, O	
11	Procedure Codes in VHA: Use of Inpatient ICD Procedure vs Outpatient CPT Codes	Wagner, T Lachance, M	

VIReC Product Spotlight

The Researcher's Notebook lays out methodological approaches to working with CDW data

The Researcher's Notebook

The Researcher's Notebook series describes methodological approaches to working with VA data. Co-authored with researchers from the VA, the series provides a potential set of logic appropriate for that point in time. Readers should assess the appropriateness of the data use, representing a potential set of logic appropriate for that point in time. Readers should assess the appropriateness of the data use, representing a potential set of logic appropriate for that point in time.

Exploring Relationships between Procedure and Data in the CDW Outpatient Domain

Introduction

This notebook is the first of a series that explores relationships between procedure and data in the CDW Outpatient Domain. In Part I of this series, we aim to broadly characterize the types of data patterns we observe while working with records from the Output.VProcedure, Output.VDiagnosis and Output.VProcedureDiagnosis tables. These tables store records linked to procedures performed during patient encounters, and diagnoses related to the procedures, respectively [6]. Each procedure record can be connected to an encounter in the Output.Visit table. Future notebooks in the series will further delineate and clarify the data patterns identified in this notebook (e.g. ICD/CPT codes).

For encounter records in the Output.Visit table, there are eight potential data patterns that can be associated with the associated procedures and diagnoses found in the Output.VDiagnosis, Output.VProcedure and Output.VProcedureDiagnosis tables (see Table 1). Using a sample of encounters from the Output.Visit table, we determine the number of diagnosis, procedure and procedure diagnosis records that link to each encounter to identify which data patterns exist in our sample. In Table 1, a "0" indicates that no records were found, and a "#" indicates that at least one record was populated. For example, encounters that link to at least one procedure record, and zero procedure diagnosis records have a data pattern of "# Diagnostics, 0 Procedure Diagnoses".

Table 1. Potential Patterns of Diagnosis and Procedure Data for Encounter Records in the Output.Visit Table

1.	0 Diagnoses, # Procedures, # Procedure Diagnoses
2.	# Diagnoses, 0 Procedures, # Procedure Diagnoses
3.	# Diagnoses, # Procedures, 0 Procedure Diagnoses
4.	0 Diagnoses, 0 Procedures, # Procedure Diagnoses
5.	0 Diagnoses, # Procedures, 0 Procedure Diagnoses
6.	# Diagnoses, 0 Procedures, 0 Procedure Diagnoses
7.	# Diagnoses, # Procedures, # Procedure Diagnoses

Step 1 | Identify Tables and Columns of Interest

Table 3 contains a list of tables and columns used to capture the topic of interest. The primary keys from Output.VDiagnosis, Output.VProcedure and Output.VProcedureDiagnosis will be used to determine the number of diagnosis, procedure and procedure diagnosis records that are populated for encounter records pulled from Output.Visit. The need to link diagnosis, procedure and procedure diagnosis records to encounter records requires the inclusion of the VisitSID column from each of these tables. The VisitDateTime column from these tables will be used to filter the data to a selected timeframe. Additionally, ServiceCategory and EncounterType from Output.Visit will be used to filter the data to a selected timeframe.

Step 2 | SQL Code

Note, the SQL code for this notebook excluding text and results can be found in Appendix A.

Step 2.1 Reducing Large Fact Tables and Creating a Cohort of Encounters

This step has two main purposes:

1. Reduce large fact tables containing patient encounter records (Output.Visit), diagnosis records

The Patient.Patient table is joined to Output.Visit (specified in the FROM clause) by linking the PatientSID foreign key from Output.Visit to the PatientSID primary key from Patient.Patient. The WHERE clause filters records from Output.Visit to exclude Historical Events (ServiceCategory 'E') and to exclude encounter records that link to test patients (as indicated by the Patient.Patient table's CDWPossibleTestPatientFlag column). The WHERE clause also filters records from Output.Visit to only include those within a specified encounter VisitDateTime range.

Step 2.3 Identifying Patterns of Procedure and Diagnosis Data

Using the tallied data from Step 2.2 above, this step determines the number of encounters (if any) from the #Encounters temp table that display each of the 8 procedure/diagnosis data patterns shown in Table 1 above.

In the SELECT statement, using the #Tallies temp table specified in the FROM clause, CASE is used to re-

Conclusion

This notebook identifies broad patterns of encounter-related procedure and diagnostic data that users may observe when working with the Output.VProcedure, Output.VDiagnosis and Output.VProcedureDiagnosis tables in the Outpatient Domain. Using a sample of VA encounters from Output.Visit with VisitDateTime entries between 09/01/2019 and 09/07/2019, we identified five of eight potential data patterns. Encounters with at least one diagnosis, at least one procedure, and zero procedure diagnoses were most prevalent in our sample, whereas encounters with at least one diagnosis, and zero procedures and procedure diagnoses were least prevalent. There were no encounters with a procedure diagnosis that did not also have at least one procedure performed. There were also no encounters with zero diagnoses and at least one procedure diagnosis. Excluding ancillary services/occasions of service decreased the frequency of encounters in all identified data patterns. The highest frequency of ancillary services was among encounters with zero diagnoses and procedure diagnoses, and at least one procedure performed.



VIReC Product Spotlight

Researcher's Notebook: Millennium Data Discovery series provides guides to data collected in the Cerner EHR



The Researcher's Notebook Millennium Data Discovery

The Researcher's Notebook: Millennium Data Discovery series provides a guide to electronic health record (EHR). As VA transitions to this new EHR, the series introduces datasets. It also provides more advanced descriptions of methodological approaches, elaborates on a nuance of data use, representing a potential set of logic appropriate to adapt the logic and steps provided to their specific context and use of the data.

Identifying Immunizations Administered in Cerner EHR Transition

Introduction

This notebook provides two potential methods for identifying immunizations administered in the CDW Warehouse (CDW) Immunization domain that were administered before the Cerner EHR transition. The methods applied use data from a station that was transitioned to Cerner EHR.

In the first method, pre-transition immunization records are pulled from CDW Millennium data. CDW Millennium data contains data collected in the Millennium EHR at Cerner-transition. CDW Millennium data model structure with the exception of light transition conventions (e.g. addition of surrogate IDs (SIDs), addition of display labels to camel case, etc.).

In the second method, both pre-transition and post-transition immunization records are pulled from CDW database. CDWWork3 consists of all CDW Vista data, stored alongside CDWWork2 Millennium data. CDWWork3 is mapped to the CDW data model. Hence, it is often referred to as the "converged data model".

Additional information about immunization data in the CDW Vista, CDW Millennium and CDWWork3 environments is available in VIReC's VA Millennium Immunization Factbook [1].

CDWWork and CDWWork2 Method

Step 1 | Tables and Columns of Interest

Tables 1 and 2 contain lists of CDWWork and CDWWork2 tables and columns used in the demonstration. Main columns include those that appear in the query SELECT statement, linking keys include primary and foreign key columns that are used for joining tables together, and filtering columns are those that appear in query filtering logic.

Step 2 | SQL Code

CDW Vista Data

```
/*Pulling immunizations from CDW Vista data*/
DROP TABLE if exists #ImmunizationsVista
SELECT b.ImmunizationSID
,c.ImmunizationName
,a.VisitSID
,a.VisitDateTime
,b.Sta3n
,e.StaPa
INTO #ImmunizationsVista
FROM CDWWork.Outpat.Visit as a
INNER JOIN CDWWork.Immun.Immunization as b ON
a.VisitSID = b.VisitSID
AND (b.VisitDateTime >= CONVERT (DATETIME2(0), '2020-09-01') AND b.VisitDateTime <= CONVERT
(DATETIME2(0), '2021-01-31'))
AND b.Sta3n IN('668')
INNER JOIN CDWWork.Dim.ImmunizationName as c ON
c.ImmunizationNameSID = b.ImmunizationNameSID
INNER JOIN CDWWork.Patient.Patient as d ON
a.PatientSID = d.PatientSID
INNER JOIN CDWWork.Dim.Institution as e ON
a.InstitutionSID = e.InstitutionSID
WHERE (a.VisitDateTime >= CONVERT (DATETIME2(0), '2020-09-01') AND a.VisitDateTime <= CONVERT
(DATETIME2(0), '2021-01-31'))
AND a.Sta3n IN('668')
AND d.CDWPossibleTestPatientFlag <> 'Y';
```

CDWWork3 Method

Step 1 | Identify Tables and Columns of Interest

Table 1 contains a list of tables and columns used in the demonstration that follows. Main columns include those that appear in the query SELECT statement, linking keys include primary and foreign key columns that are used for joining tables together, and filtering columns are those that appear in query filtering logic.

Step 2 | SQL Code

```
/*Pulling immunizations from CDWWork3 that were administered at station 668 during
VisitDateTime range 9/1/20 to 1/31/21. The output from the query is stored in a temporary table called
#ImmunizationsConverged.
Note, to prepare for a site's transition to Cerner, historical Vista data from that site are migrated into
CDWWork3*/
DROP TABLE if exists #ImmunizationsConverged
SELECT b.ImmunizationSID
,c.ImmunizationName
,a.VisitSID
,a.VisitDateTime
,b.Sta3n
,e.StaPa
INTO #ImmunizationsConverged
FROM CDWWork3.Outpat.Visit as a
INNER JOIN CDWWork3.Immun.Immunization as b ON
a.VisitSID = b.VisitSID
AND (b.VisitDateTime >= CONVERT (DATETIME2(0), '2020-09-01') AND b.VisitDateTime <= CONVERT
(DATETIME2(0), '2021-01-31'))
AND b.Sta3n IN('668')
INNER JOIN CDWWork3.Dim.ImmunizationName as c ON
c.ImmunizationNameSID = b.ImmunizationNameSID
INNER JOIN CDWWork3.Patient.Patient as d ON
a.PatientSID = d.PatientSID
INNER JOIN CDWWork3.Dim.Institution as e ON
a.InstitutionSID = e.InstitutionSID
WHERE (a.VisitDateTime >= CONVERT (DATETIME2(0), '2020-09-01') AND a.VisitDateTime <= CONVERT
(DATETIME2(0), '2021-01-31'))
AND a.Sta3n IN('668')
AND d.CDWPossibleTestPatientFlag <> 'Y';
```

Conclusion

In this notebook, we provide two potential methods for identifying immunizations administered before and after the Cerner EHR transition using, 1) CDW Vista data and CDW Millennium data, and 2) converged Vista-Millennium data. Immunizations administered post-Cerner transition (i.e., those recorded in Millennium EHR) have a Sta3n = 200. The methods applied use data from a station that was transitioned to Cerner EHR.

Appendix A: SQL Code

Use of the methods in this appendix require access privileges for CDWWork2 and/or CDWWork3.

```
/*Pulling immunizations from CDW Vista data*/
DROP TABLE if exists #ImmunizationsVista
SELECT b.ImmunizationSID
,c.ImmunizationName
,a.VisitSID
,a.VisitDateTime
,b.Sta3n
,e.StaPa
INTO #ImmunizationsVista
FROM CDWWork.Outpat.Visit as a
INNER JOIN CDWWork.Immun.Immunization as b ON
a.VisitSID = b.VisitSID
AND (b.VisitDateTime >= CONVERT (DATETIME2(0), '2020-09-01') AND b.VisitDateTime <= CONVERT
(DATETIME2(0), '2021-01-31'))
AND b.Sta3n IN('668')
INNER JOIN CDWWork.Dim.ImmunizationName as c ON
c.ImmunizationNameSID = b.ImmunizationNameSID
INNER JOIN CDWWork.Patient.Patient as d ON
a.PatientSID = d.PatientSID
INNER JOIN CDWWork.Dim.Institution as e ON
a.InstitutionSID = e.InstitutionSID
WHERE (a.VisitDateTime >= CONVERT (DATETIME2(0), '2020-09-01') AND a.VisitDateTime <= CONVERT
(DATETIME2(0), '2021-01-31'))
AND a.Sta3n IN('668')
AND d.CDWPossibleTestPatientFlag <> 'Y';
```



Data Review

VIReC Data Reviews examine VA-relevant data to support quality improvement analyses. Each issue explores various data sets located, and addresses topics such as data quality and data access.

Laboratory Tests in Millennium

Introduction

This review looks at laboratory tests in Millennium Corporate Data Warehouse (CDW). Analyses of laboratory tests are presented. These tests are commonly modified to obtain data on other laboratory tests.

Background

Laboratory tests begin with an order in Millennium recorded as clinical events and are associated with an encounter. Each test may be associated with an encounter, and each will have a unique ID to the same encounter. Further information on Millennium laboratory tests is available in the [Millennium Laboratory Tests](#) report.

Clinical events may be linked together via an event hierarchy in Millennium. The parent event set, and event sets link together one to many events. Laboratory tests are linked to the 'Lab View' parent event set. The event sets linked to the 'Lab View' parent event set are:

- Allergy Testing
- AP Specimens
- Blood Bank

VIReC Data Reviews examine VA-relevant data to support their use in VA research, evaluation, and quality improvement analyses.

Table 1. Laboratory Events Most Commonly Recorded in Millennium for Station 668 June 29, 2021

Parent Event Description	Event Set Description	Event
Lab View	Chemistry	Creatinine Level
Lab View	Chemistry	eGFR Non-AA

HDL and LDL Tests

The 'Lab View' event hierarchy included 95 laboratory tests containing the character strings 'HDL', 'LDL' or 'lipoprotein'. Only 10 of these tests had values recorded in Millennium on June 29, 2021. Table 2 contains these tests with the Logical Observation Identifiers Names and Codes (LOINC) code, normal low, normal high, result units, topography, and number of the tests. Code for the analyses of the HDL and LDL tests is in [Appendix B](#).

LOINC is a universal standard for identifying medical laboratory and clinical test results. The LOINC codes in Table 2 were validated at [LOINC.org](#) [3].

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HbA1c Tests

The 'Lab View' event hierarchy contained 11 laboratory tests containing the character strings 'A1c', and two of these tests had values recorded in Millennium on June 29, 2021. Table 9 contains these tests with the LOINC code, normal low, normal high, result units, topography, and number of the tests. The 'QSTV' in the name of the 'Hemoglobin A1c QSTV' test references an external lab, Quest, that performed the test. Code for the analyses of the HbA1c tests is in [Appendix C](#).

Table 10 contains the minimum, maximum, and average result values for HbA1c tests. The American Diabetes Association provides the following criteria in interpreting the results of an HbA1c test [6]:

- Below 5.7% is normal.

Appendix A: SQL Code to List Lab View Event Hierarchy and Identify Commonly Recorded Events

```

/*****
List Event Sets Connected to Lab View Parent Event
*****/
select EventSet
from CDWork2.NDimMill.EventSet
where ParentEventSet = 'Lab View'
order by 1;

/*****
List Lab View Event Set Hierarchy
*****/

select distinct
cv.CodeValueDescription as [Parent Event Description],

```


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In This Issue...

<p>VIREC News & Updates</p> <ul style="list-style-type: none"> VIREC Welcomes New Team Member First Factbook on CDW Millennium Data New Factbook for CDW ADR Enrollment Domain New Researcher's Notebook on Millennium Data New Data Review Product Series Resources on Medicare Data for Veterans with COVID-19 New Resources on Veteran Income Data Updated Historical Information for MCA Stop Codes <p>EHRM in Action</p> <ul style="list-style-type: none"> EHR Modernization Rollout Updates for Data Users VIREC Resources for Working with Cerner Millennium Data Researcher Guidance for Funding Applications Research & EHR Synergy Cyberseminar Series Data Education from OEHRM New JLV Widget Provides Imaging from VA Cerner Systems 	<p>Visit the VHA Data Portal</p> <ul style="list-style-type: none"> New Resource on Electronic Quality Measures Data <p>Cyberseminars</p> <ul style="list-style-type: none"> Upcoming Presentations Archived Presentations <p>Training & Resources</p> <ul style="list-style-type: none"> Dimensions for VA: A New Research Analytics & Expertise-Locator Tool BISL CDW Insights Trainings are Back Research Regulation Toolkits from ORPP&E Pyramid Analytics New User Trainings from BISL VINCI Education <p>Upcoming Conferences</p> <ul style="list-style-type: none"> AMIA 2021 Annual Symposium D&I 2021 Virtual Conference AMIA 2022 Informatics Summit <p>HSRData Listserv</p> <ul style="list-style-type: none"> Recent Topics <p>Tip of the Month</p>
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