

## DATABASE & METHODS CYBERSEMINAR SERIES

FY24 Session 8:

# An Introduction to VA Pharmacy Data: Sources and Uses for Medication Information

May 6, 2024

Hosted by  **VIReC**

**Tim Anderson, MD MAS**, Health Services Researcher & Core Faculty Member,  
VA Center for Health Equity Research and Promotion (CHERP), VA Pittsburgh  
Healthcare System

**Bonnie Paris, PhD**, Project Manager for VA Information Resource Center (VIReC)  
ase & Methods Series



# DATABASE & METHODS CYBERSEMINAR SERIES

*Informational seminars to help VA researchers  
access and use VA databases.*

## Sessions cover...

- VA data sources & data access systems
- Application of VA data to research and quality improvement questions
- Limitations of secondary data use
- Resources to support VA data use



# UPCOMING DATABASE & METHODS SESSIONS

First Monday of the month | 1:00pm-2:00pm ET

Date	Topic
6/3/24	Using CDW Data to Conduct a Research Study for SQL Beginners
7/1/24	Applications for Joint Longitudinal Viewer (JLV) in Research: Introduction
7/15/24	Applications for Joint Longitudinal Viewer (JLV) in Research: Day to Day Uses
9/9/24	Automated Reporting of Large Database Research Methods (specifically Propensity Score Methods) for Studying Treatment Effects and Side Effects

Visit the [VIReC Database & Methods Cyberseminar](#) page for more information & registration links.

Visit [HSR's VIReC Cyberseminar Archive](#) page to watch previous sessions.

Where can I  
download a  
copy of the  
slides?



## SAMPLE EMAIL

### A Practical Approach to Working with VA-Purchased Community Care Data

Thursday, October 13, 2022

2:00 PM | (UTC-04:00) Eastern Time (US & Canada) | 1 hr

Please download today's slides

~~Please click here for today's live captions~~

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More ways to join:

Join from the webinar link

<https://veteransaffairs.webex.com/veteransaffairs/j.php?>

## Poll #1:

*What is your primary **role** in projects using VA data?*

- Investigator, PI, Co-I
- Statistician, methodologist, biostatistician
- Data manager, analyst, or programmer
- Project coordinator
- Other – please describe via the chat function



## Poll #2:

*How many years of experience working with VA data?*

- None – I'm brand new to this!
- One year or less
- More than 1, less than 3 years
- At least 3, less than 7 years
- At least 7, less than 10 years
- 10 years or more



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Database & Methods Series



# Session roadmap

- Introduction
- In-depth example of pharmacy research using VA data
- Commonly used pharmacy data sources
- Resources



*By the end of this session, attendees will be able to:*

- Understand basic content and organization of key VA pharmacy data
- Appreciate the value of non-VA data sources to measure pharmacy use
- Know where to find resources about VA pharmacy data



# How has VA Pharmacy Data been used in Research?

## Cohort Identification

- Which patients are taking a given medication?

## Trends in Medication Use

- Which medications are being used to treat a given condition?
- How has use changed over time? Impact of policy changes?



## Utilization and Quality

- How does VA perform on quality measures related to medication management?
  - Are medications being prescribed appropriately?
  - What is the adherence to therapy for a given medication?

## Drug Safety and Outcomes

- Post-approval drug outcome and comparative effectiveness studies



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  - Resources



## Our Group's Research

**Objective:** To assess the prevalence and clinical outcomes of changes made to older adults' home antihypertensives during hospitalization.



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### Research

#### Intensification of older adults' outpatient blood pressure treatment at hospital discharge: national retrospective cohort study

BMJ 2018 ; 362. doi: <https://doi.org/10.1136/bmj.k3503> (Published 12 September 2018)

Cite this as: BMJ 2018;362:k3503

Timothy S Anderson , primary care research fellow<sup>1</sup>, Charlie M Wray, assistant professor<sup>2</sup>, Bocheng Jing, data analyst<sup>3</sup>, Kathy Fung, data analyst<sup>3</sup>, Sarah Ngo, research assistant<sup>3</sup>, Edison Xu, research assistant<sup>3</sup>, Ying Shi, data analyst<sup>3</sup>, Michael A Steinman, professor<sup>4</sup>

#### Abstract

**Objectives** To assess how often older adults admitted to hospital for common non-cardiac conditions were discharged with intensified antihypertensive treatment, and to identify markers of appropriateness for these intensifications.

**Design** Retrospective cohort study.

**Setting** US Veterans Administration Health System.

**Participants** Patients aged 65 years or over with hypertension admitted to hospital with non-cardiac conditions between 2011 and 2013.

**Main outcome measures** Intensification of antihypertensive treatment, defined as receiving a new or higher dose antihypertensive agent at discharge compared with drugs used before admission. Hierarchical logistic regression analyses were used to control for characteristics of patients and hospitals.

**Results** Among 14 915 older adults (median age 76, interquartile range 69-84), 9636 (65%) had well controlled outpatient blood pressure before hospital admission. Overall, 2074 (14%) patients were discharged with intensified antihypertensive treatment, more than half of whom (1082) had well controlled blood pressure before admission. After adjustment for potential confounders, elevated inpatient blood pressure was strongly associated with being discharged on intensified antihypertensive regimens. Among patients with previously well controlled outpatient blood pressure, 8% (95% confidence interval 7% to 9%) of patients without elevated inpatient blood pressure, 24% (21% to 26%) of patients with moderately elevated inpatient blood pressure, and 40% (34% to 46%) of patients with severely elevated inpatient blood pressure were discharged with intensified antihypertensive regimens. No differences were seen in rates of intensification among patients least likely to benefit from tight blood pressure control (limited life expectancy, dementia, or metastatic malignancy), nor in those most likely to benefit (history of myocardial infarction, cerebrovascular disease, or renal disease).

**Conclusions** One in seven older adults admitted to hospital for common non-cardiac conditions were discharged with intensified antihypertensive treatment. More than half of intensifications occurred in patients with previously well controlled outpatient blood pressure. More attention is needed to reduce potentially harmful overtreatment of blood pressure as older adults transition from hospital to home.





## Our Group's Research

**Objective:** To assess the prevalence and clinical outcomes of changes made to older adults' home antihypertensives during hospitalization.



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**Conclusions** One in seven older adults admitted to hospital for common non-cardiac conditions were discharged with intensified antihypertensive treatment. More than half of intensifications occurred in patients with previously well controlled outpatient blood pressure. More attention is needed to reduce potentially harmful overtreatment of blood pressure as older adults transition from hospital to home.

### JAMA Internal Medicine | Original Investigation

#### Clinical Outcomes After Intensifying Antihypertensive Medication Regimens Among Older Adults at Hospital Discharge

Timothy S. Anderson, MD, MAS, MA; Bocheng Jing, MS; Andrew Auerbach, MD; Charlie M. Wray, DO, MS; Sei Lee, MD; W. John Boscardin, PhD; Kathy Fung, MS; Sarah Ngo, MLIS; Molly Silvestrini, BA; Michael A. Steinman, MD

**IMPORTANCE** Transient elevations of blood pressure (BP) are common in hospitalized older adults and frequently lead practitioners to prescribe more intensive antihypertensive regimens at hospital discharge than the patients were using before hospitalization.

**OBJECTIVE** To investigate the association between intensification of antihypertensive regimens at hospital discharge and clinical outcomes after discharge.

**DESIGN, SETTING, AND PARTICIPANTS** In this retrospective cohort study, patients 65 years and older with hypertension who were hospitalized in Veterans Health Administration national health system facilities from January 1, 2011, to December 31, 2013, for common noncardiac conditions were studied. Data analysis was performed from October 1, 2018, to March 10, 2019.

**EXPOSURES** Discharge with antihypertensive intensification, defined as receiving a prescription at hospital discharge for a new or higher-dose antihypertensive than was being used before hospitalization. Propensity scores were used to construct a matched-pairs cohort of patients who did and did not receive antihypertensive intensifications at hospital discharge.

**MAIN OUTCOMES AND MEASURES** The primary outcomes of hospital readmission, serious adverse events, and cardiovascular events were assessed by competing risk analysis. The secondary outcome was the change in systolic BP within 1 year of hospital discharge.

**RESULTS** The propensity-matched cohort included 4056 hospitalized older adults with hypertension (mean [SD] age, 77 [8] years; 3961 men [97.7%]), equally split between those who did vs did not receive antihypertensive intensifications at hospital discharge. Groups were well matched on all baseline covariates (all standardized mean differences <0.1). Within 30 days, patients receiving intensifications had a higher risk of readmission (hazard ratio [HR], 1.23; 95% CI, 1.07-1.42; number needed to harm [NNH], 27; 95% CI, 16-76) and serious adverse events (HR, 1.41; 95% CI, 1.06-1.88; NNH, 63; 95% CI, 34-370). At 1 year, no differences were found in cardiovascular events (HR, 1.18; 95% CI, 0.99-1.40) or change in systolic BP among those who did vs did not receive intensifications (mean BP, 134.7 vs 134.4; difference-in-differences estimate, 0.6 mm Hg; 95% CI, -2.4 to 3.7 mm Hg).

**CONCLUSIONS AND RELEVANCE** Among older adults hospitalized for noncardiac conditions, prescription of intensified antihypertensives at discharge was not associated with reduced cardiac events or improved BP control within 1 year but was associated with an increased risk of readmission and serious adverse events within 30 days.



# Identifying med changes at specific points

- **Traditional pharmacoepidemiology studies focus on “new-users”**
  - Great for isolating medication effects
  - **Does not always reflect real world practice**



# Identifying med changes at specific points

- **Traditional pharmacoepidemiology studies focus on “new-users”**
  - Great for isolating medication effects
  - **Does not always reflect real world practice**
  
- **To identify changes to medication regimens requires 3 steps**
  1. Identifying baseline medication use
  2. Defining what constitutes a change
  3. Establishing time windows for changes

# Identifying baseline medication use

- Can we use pharmacy claims to identify an active medication list?
  - Not so easy
  - Need to account for intermittent dosing, imperfect adherence, stockpiling
  - Is a medication discontinued or skipped?

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- Can we use pharmacy claims to identify an active medication list?
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  - Is a medication discontinued or skipped?
- Can we use EHR data to identify an active medication list?
  - Automated med lists are often out of date
  - Clinic medication lists may only reflect meds managed by that clinician
  - What is the gold standard?

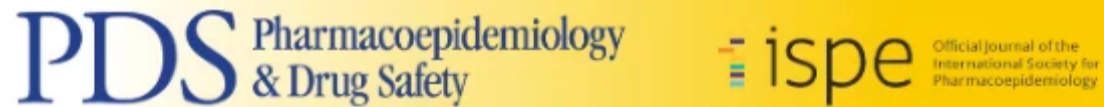
# Identifying baseline medication use

- We sought to find a gold standard.
- We did not find one, but we learned a lot.



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REVIEW

## A systematic review of methods for determining cross-sectional active medications using pharmacy databases

Timothy S. Anderson  Edison Xu, Evans Whitaker, Michael A. Steinman

First published: 13 February 2019 | <https://doi.org/10.1002/pds.4706> | Citations: 5



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**PDS** Pharmacoepidemiology  
& Drug Safety

ispe Official journal of the  
International Society for  
Pharmacoepidemiology

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### KEY POINTS

- Use of pharmacy databases to examine patients' medication use at specific time points is increasing, but few prior studies have systematically examined the validity of pharmacy database methods for establishing cross-sectional active medication lists.
- Pharmacy database algorithm sensitivity ranged from 48% to 93% for fixed look-back period approaches and 35% to 97% for medication-on-hand approaches.
- Interpretation of reported performance was limited by use of different nonpharmacy comparison metrics and lack of comparison of different pharmacy database approaches within study cohorts.
- There remains an urgent need for rigorous validation studies comparing pharmacy database approaches within and across study cohorts to establish best practices and improve the accuracy of measurement of cross-sectional active medication use.





# Identifying baseline medication use

## Two common approaches

### 1. Fixed look-back

- 30 days vs 90 days

### 2. Medication on-hand

- Legend duration
- Fill provided sufficient supply to last to index date

### 3. Consider grace periods

- Fixed # days
- % of days supplied



**FIGURE 2** Comparison of common approaches for establishing active medications at a fixed time point.

In the above diagram, grey bars represent days supplied by medication fills in hypothetical refill patterns for three medications prescribed to a patient. The index gap (IG) is the period between the last day supplied by the most recent fill and the index date. Medication A has an index gap of 0 days, medication B has an index gap of 70 days, and medication C has an index gap of 10 days. Two common approaches to establishing an active medication list are demonstrated as follows:

# We sought to validate our own approach

- Compared VA PBM pharmacy fill data to a “criterion standard” of inpatient medication reconciliation notes at time of hospital admission
- Determined test characteristics of 12 algorithms for baseline use
- Focused on 11 chronic cardiac and diabetes medications
- Chart review of 207 patients

## ORIGINAL ARTICLES

### Comparison of Pharmacy Database Methods for Determining Prevalent Chronic Medication Use

Anderson, Timothy S. MD, MAS, MA<sup>1,†</sup>; Jing, Bocheng MS<sup>1,5</sup>; Wray, Charlie M. DO, MS<sup>1</sup>; Ngo, Sarah MLIS<sup>1,5</sup>; Xu, Edison BS<sup>1,5</sup>; Fung, Kathy MS<sup>5,6</sup>; Steinman, Michael A. MD<sup>1,5</sup>

[Author Information](#) ⓘ

Medical Care: October 2019 - Volume 57 - Issue 10 - p 836-842



# Algorithms for Baseline Use

Approach	Requirements for Prevalent Medication Use
Fixed look-back period approaches	
A	1 fill required in the 30 d before the index date
B	1 fill required in the 90 d before the index date
C	1 fill required in the 180 d before the index date
D	1 fill required in the 365 d (1 y) before the index date
E	2 fills required in the 180 d before the index date
F	2 fills required in the 365 d (1 y) before the index date
Medication-on-hand approaches	
G	Index date falls within the period from the most recent preceding fill date for a drug through the [fill date+days supply]
H	Index date falls within the period from the most recent preceding fill date for a drug through the [fill date+days supply+a 30-day grace period]
I	Index date falls within the period from the most recent preceding fill date for a drug through the [fill date+days supply+a 60-day grace period]
J	Index date falls within the period from the most recent preceding fill date for a drug through the [fill date+days supply+a 90-day grace period]
K	Index date falls within the period from the most recent preceding fill date for a drug through the [fill date+(110% of the days supply)]
L	Index date falls within the period from the most recent preceding fill date for a drug through the [fill date+(125% of the days supply)]

## Key Findings:

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## Key Findings:

### 1. Best-performing algorithms included

- A. 180-day fixed look-back period approach (sensitivity, 93%; specificity, 97%; PPV, 89%)
- B. Medication-on-hand approach with a 60-day grace period (sensitivity, 91%; specificity, 97%; PPV 91%).

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## Key Findings:

### 1. Best-performing algorithms included

- A. 180-day fixed look-back period approach (sensitivity, 93%; specificity, 97%; PPV, 89%)
- B. Medication-on-hand approach with a 60-day grace period (sensitivity, 91%; specificity, 97%; PPV 91%).

### 2. Commonly used simple algorithms such as defining prevalent medications to include any medications filled in the prior year or only medications filled in the prior 30 days, performed less well.





# Key Caveats

## 1. Consider when you can't track medications

- Non-VA pharmacies
- Over-the-counter medications
- Recent inpatient or nursing home stay

Population	Approach C: Fixed Look-back Period Duration of 180 d				Approach I: Medication-on-Hand with 60-Day Grace Period			
	Sensitivity	Specificity	PPV	NPV	Sensitivity	Specificity	PPV	NPV
All patients (N = 207)	91 (88–93)	96 (95–97)	86 (83 to 89)	98 (97–98)	89 (86–92)	97 (96–98)	89 (86–92)	97 (96–98)
Patients with evidence of receiving medications from a non-VA pharmacy (N = 8)*	53 (27–77)	94 (86–98)	69 (39–91)	89 (80–95)	53 (28–77)	94 (86–98)	69 (39–91)	89 (80–95)
Patients with hospital discharge or skilled nursing facility stay in preceding 30 d (N = 28)*	77 (63–88)	93 (89–96)	68 (54–79)	95 (92–98)	73 (59–84)	95 (91–97)	73 (59–84)	95 (91–97)
Primary analysis: patients without evidence of receiving medications from a non-VA pharmacy and without hospital discharge or skilled nursing facility stay in preceding 30 d (N = 174)	93 (90–95)	97 (96–97)	89 (86–92)	98 (97–98)	91 (88–94)	97 (96–98)	91 (88–94)	97 (96–98)



# Key Caveats

## 1. Consider when you can't track medications

- Non-VA pharmacies
- Over-the-counter medications
- Recent inpatient or nursing home stay

Our studies were limited to veterans with >80% care in VA, focused on prescription drugs, excluded those with acute stay in 30 days before hospitalization

Population	Approach C: Fixed Look-back Period Duration of 180 d				Approach I: Medication-on-Hand with 60-Day Grace Period			
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# Key Caveats

2. We focused on chronic daily pill medications, cannot extrapolate our findings to other medications:
  - Intermittent use (PRN) e.g. analgesics and anxiolytics
  - Injections (insulin)
  - Over-the-counter medications

# Key Caveats

2. We focused on chronic daily pill medications, cannot extrapolate our findings to other medications:
  - Intermittent use (PRN) e.g. analgesics and anxiolytics
  - Injections (insulin)
  - Over-the-counter medications
3. These approaches may not apply to other pharmacy databases (e.g. Medicare Part D)
  - Key difference is more frequent use of 90-day fills & mail order pharmacy in VA

# To identify changes to medication regimens requires:

## 2. Defining what constitutes a change.

- Answer will vary by study
- Interested in medication classes or unique medications?
- Types of changes (from easiest to hardest to implement)?
  - A. New starts
  - B. Dose increase/decrease
  - C. Discontinuations

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  - C. Discontinuations

### **Our research question –**

Are antihypertensives changed during hospitalization?

Focused on class differences:

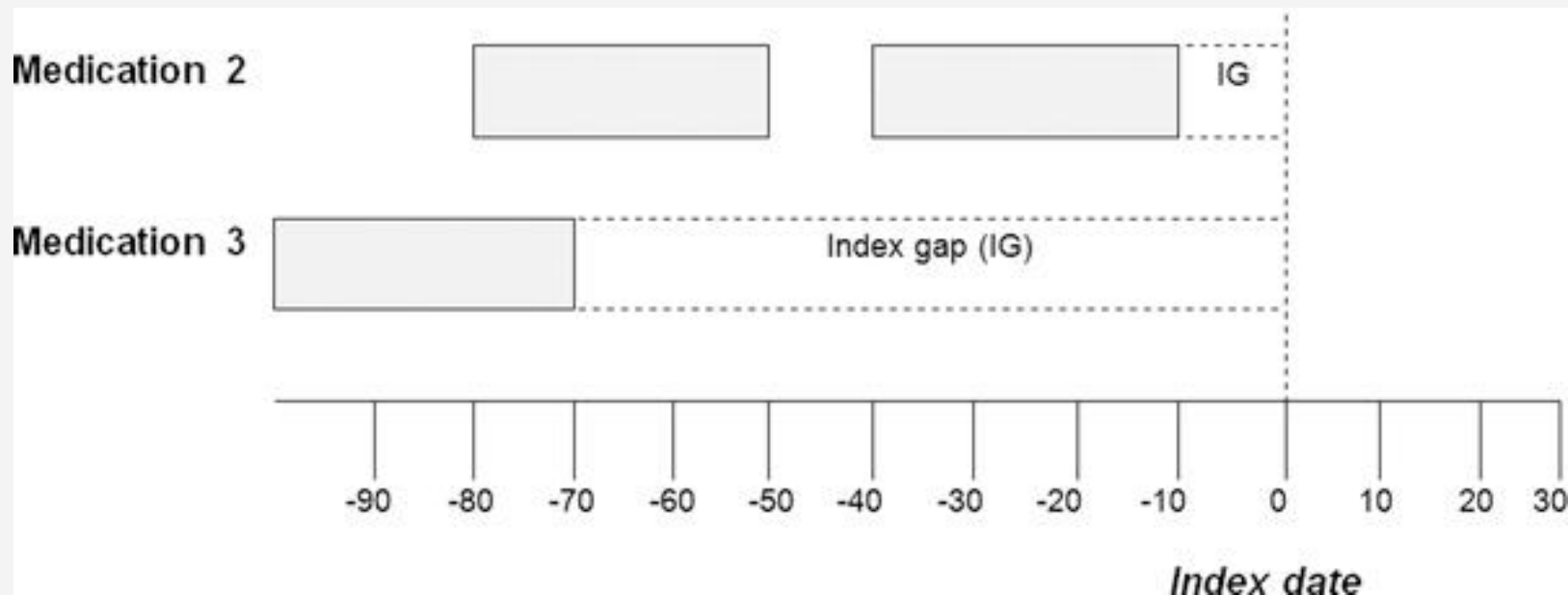
- Identified 7 target antihypertensive classes base on VA class codes
- Measured new med starts and dose changes >20%
- Did not feel we could look at stops; no way to be sure hospital was reason for stop



# Defining what constitutes a change

Pharmacy databases do not tell you precisely when a medication is stopped...

- Med 2 was not stopped on day -50, but it might look like that
- Med 3 could have been stopped day -99 through -70





# To identify changes to medication regimens requires:

## 3. Establishing time window for changes

- Answer will vary by study
- We were interested in changes made at hospital discharge.
  - Could look just at fills on day of discharge?
  - However, some patients get a fill from VA pharmacy but then have a delayed discharge
  - Some patients do not fill medications for a few days after discharge
  - Some patients initial fill is from inpatient not outpatient pharmacy

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- We were interested in changes made at hospital discharge.
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  - Some patients do not fill medications for a few days after discharge
  - Some patients initial fill is from inpatient not outpatient pharmacy

After reviewing population use patterns, we settled on:  
Discharge fill = within 2 days before or after discharge

# Using these methods, we found:

JAMA Internal Medicine | [Original Investigation](#)

## Clinical Outcomes After Intensifying Antihypertensive Medication Regimens Among Older Adults at Hospital Discharge

Timothy S. Anderson, MD, MAS, MA; Bocheng Jing, MS; Andrew Auerbach, MD; Charlie M. Wray, DO, MS; Sei Lee, MD; W. John Boscardin, PhD; Kathy Fung, MS; Sarah Ngo, MLIS; Molly Silvestrini, BA; Michael A. Steinman, MD

### Research

**Intensification of older adults' outpatient blood pressure treatment at hospital discharge: national retrospective cohort study**

BMJ 2018 ; 362 doi: <https://doi.org/10.1136/bmj.k3503> (Published 12 September 2018)

Cite this as: BMJ 2018;362:k3503



1. One in seven veterans were discharged with antihypertensive intensifications during unrelated hospitalizations



# Using these methods, we found:

JAMA Internal Medicine | [Original Investigation](#)

## Clinical Outcomes After Intensifying Antihypertensive Medication Regimens Among Older Adults at Hospital Discharge

Timothy S. Anderson, MD, MAS, MA; Bocheng Jing, MS; Andrew Auerbach, MD; Charlie M. Wray, DO, MS; Sei Lee, MD; W. John Boscardin, PhD; Kathy Fung, MS; Sarah Ngo, MLIS; Molly Silvestrini, BA; Michael A. Steinman, MD

### Research

Intensification of older adults' outpatient blood pressure treatment at hospital discharge: national retrospective cohort study

BMJ 2018 ; 362 doi: <https://doi.org/10.1136/bmj.k3503> (Published 12 September 2018)  
Cite this as: BMJ 2018;362:k3503



1. One in seven veterans were discharged with antihypertensive intensifications during unrelated hospitalizations
2. Intensification was driven by inpatient blood pressure measurements, not likelihood to benefit

# Using these methods, we found:

JAMA Internal Medicine | [Original Investigation](#)

## Clinical Outcomes After Intensifying Antihypertensive Medication Regimens Among Older Adults at Hospital Discharge

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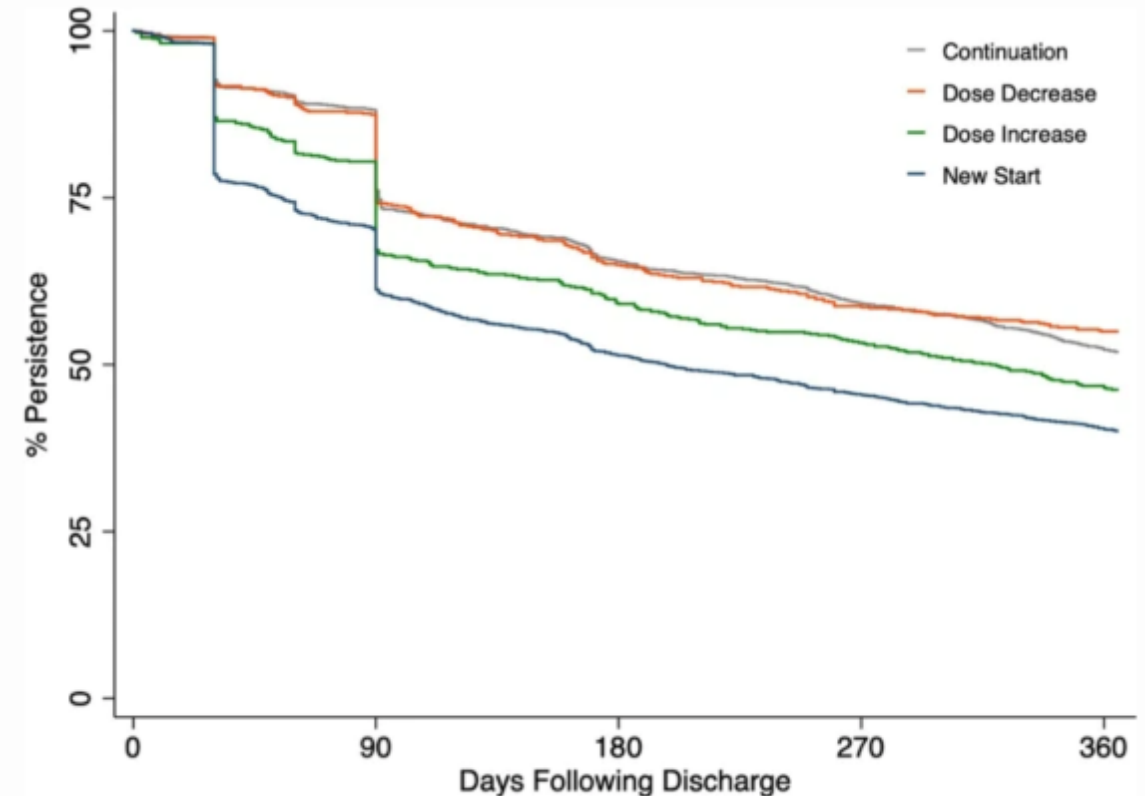
1. One in seven veterans were discharged with antihypertensive intensifications during unrelated hospitalizations
2. Intensification was driven by inpatient blood pressure measurements, not likelihood to benefit
3. Following discharge, patients receiving intensifications had higher rates of adverse events & no improvement in BP control or cardiovascular outcomes

# We've also followed up medication use

## Older Adults' Persistence to Antihypertensives Prescribed at Hospital Discharge: a Retrospective Cohort Study

Timothy S. Anderson MD, MAS [✉](#), Bocheng Jing MS, Kathy Fung MS & Michael A. Steinman MD

*Journal of General Internal Medicine* 36, 3900–3902 (2021) | [Cite this article](#)

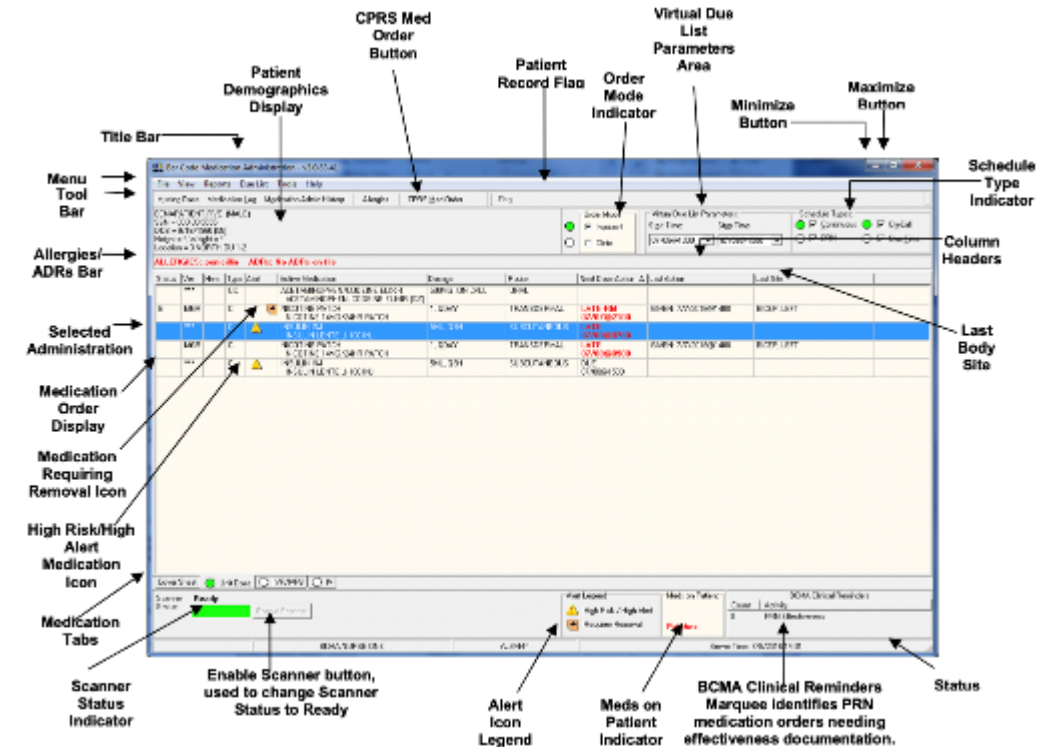


Persistence with antihypertensives intensified at hospital discharge. *Note:* Survival curves for



# What about pharmacy data during hospitalization

- Cannot use PBM data
  - Inpatient PBM includes prescriptions dispensed by an inpatient pharmacy for later use
- Can use BCMA data
  - BCMA = bar code medication administration
  - Time-stamped data for VA hospital and CLC patients
  - A bit messier than PBM
- Can link to other time-stamped hospital events (vital signs, procedures)



# Using these methods, we were able to:

Original Investigation | Less Is More

May 30, 2023

## Clinical Outcomes of Intensive Inpatient Blood Pressure Management in Hospitalized Older Adults

Timothy S. Anderson, MD, MAS<sup>1,2,3</sup>; Shoshana J. Herzig, MD, MPH<sup>1,2</sup>; Bocheng Jing, MS<sup>3,4</sup>; W. John Boscardin, PhD<sup>3,4,5</sup>; Kathy Fung, MS<sup>3,4</sup>; Edward R. Marcantonio, MD, SM<sup>1,2</sup>; Michael A. Steinman, MD<sup>3,4</sup>

[» Author Affiliations](#) | [Article Information](#)

*JAMA Intern Med.* 2023;183(7):715-723. doi:10.1001/jamainternmed.2023.1667



FREE

1. Construct a cohort of Veterans based on their in-hospital blood pressure and receipt of BP medications during the first 48 hours of hospitalization
2. Compare in-hospital outcomes of more vs less intensively treated Veterans
3. Demonstrate that receipt of intensive inpatient antihypertensive treatment was associated with a greater risk of adverse events, with highest risks for patients receiving intravenous antihypertensives





# Lots of great VA work in this area

**JOURNAL OF THE AMERICAN GERIATRICS SOCIETY** 

Clinical Investigation

**Deintensification of Diabetes Medications among Veterans at the End of Life in VA Nursing Homes**

Joshua D. Niznik PharmD, PhD , Jacob N. Hunnicutt PhD, Xinhua Zhao PhD, Maria K. Mor PhD, Florentina Sileanu MS, Sherrie L. Aspinall PharmD, MSc, Sydney P. Springer PharmD, MS, Mary J. Ersek PhD, RN, Walid F. Gellad MD, MPH, Loren J. Schleiden MS, Joseph T. Hanlon PharmD, MS, Joshua M. Thorpe PhD, MPH, Carolyn T. Thorpe PhD, MPH ... [See fewer authors](#) 

First published: 17 February 2020 | <https://doi.org/10.1111/jgs.16360> | Citations: 18

**Original Investigation** | Less Is More FREE

December 2015

**Rates of Deintensification of Blood Pressure and Glycemic Medication Treatment Based on Levels of Control and Life Expectancy in Older Patients With Diabetes Mellitus**

Jeremy B. Sussman, MD, MS<sup>1,2,3</sup>; Eve A. Kerr, MD, MPH<sup>1,2,3</sup>; Sameer D. Saini, MD, MS<sup>1,2,3</sup>; Rob G. Holleman, MPH<sup>1</sup>; Mandi L. Klamerus, MPH<sup>1</sup>; Lillian C. Min, MD<sup>1,2,3</sup>; Sandeep Vijan, MD, MS<sup>1,2,3</sup>; Timothy P. Hofer, MD, MS<sup>1,2,3</sup>

[> Author Affiliations](#) | [Article Information](#)

*JAMA Intern Med.* 2015;175(12):1942-1949. doi:10.1001/jamainternmed.2015.5110

**JOURNAL OF THE AMERICAN GERIATRICS SOCIETY** 

Clinical Investigation

**Trends in blood pressure diagnosis, treatment, and control among VA nursing home residents, 2007–2018**

Michelle C. Odden PhD , Yongmei Li PhD, Laura A. Graham PhD, Michael A. Steinman MD, Zachary A. Marcum PharmD, PhD, Christine K. Liu MD, MS, Bocheng Jing MS, Kathy Z. Fung MS, Carmen A. Peralta MD, MAS, Sei J. Lee MD, MAS ... [See fewer authors](#) 

First published: 07 May 2022 | <https://doi.org/10.1111/jgs.17821>

**Original Research** | December 2021

**Adding a New Medication Versus Maximizing Dose to Intensify Hypertension Treatment in Older Adults**

A Retrospective Observational Study

 [Correction\(s\) for this article](#) 

Carole E. Aubert, MD, MSc , Jeremy B. Sussman, MD, MS, Timothy P. Hofer, MD, MSc ,

William C. Cushman, MD , Jin-Kyung Ha, PhD, and Lillian Min, MD, MSHS  [View fewer authors](#) 

[Author, Article and Disclosure Information](#)

<https://doi.org/10.7326/M21-1456> Eligible for CME Point-of-Care

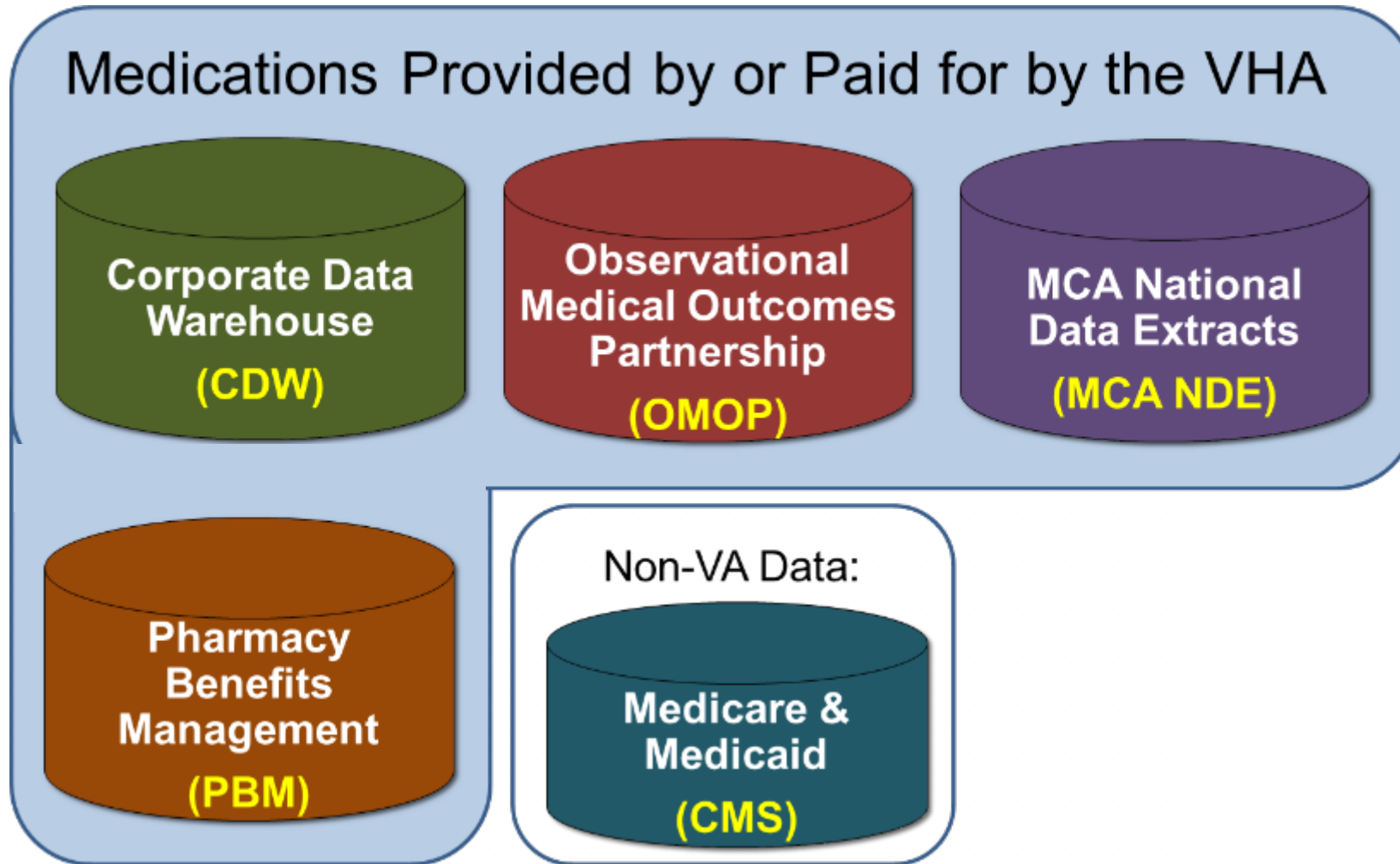


# Session roadmap

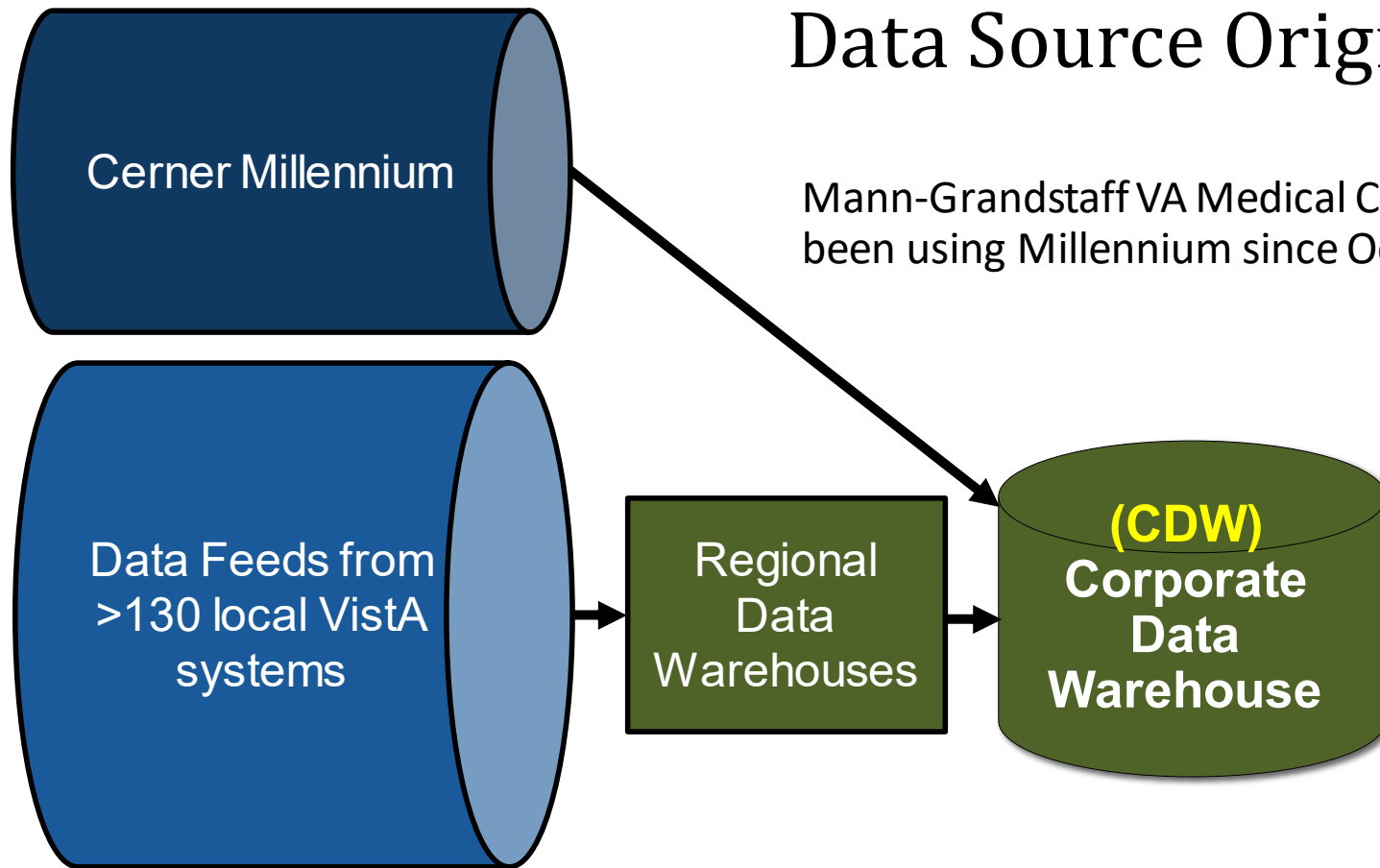
- Introduction
- In-depth example of pharmacy research using VA data
- **Commonly used pharmacy data sources**
- Resources



# Commonly Used VA Pharmacy Data Sources



# Data Source Origins

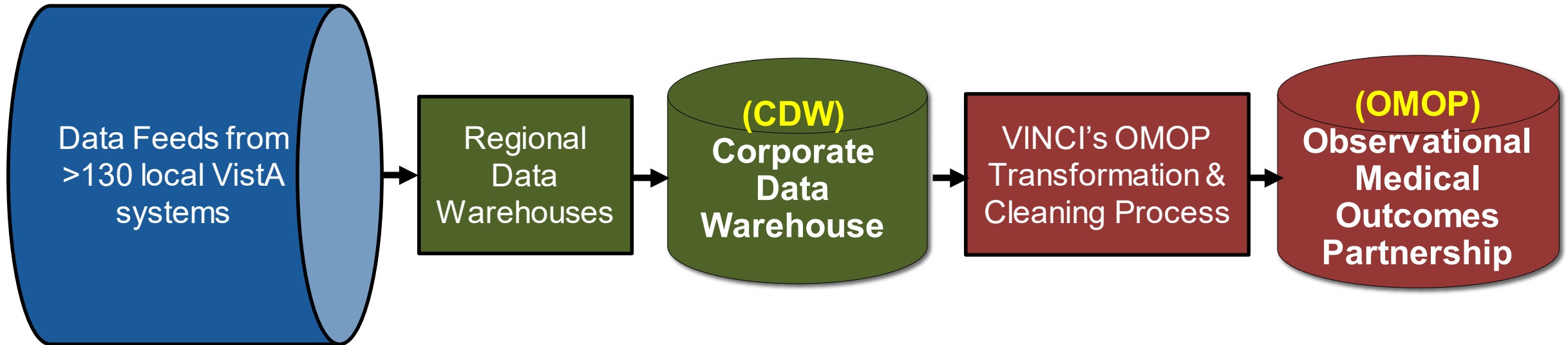


Mann-Grandstaff VA Medical Center (VAMC) in Spokane, WA, has been using Millennium since October 24, 2020.

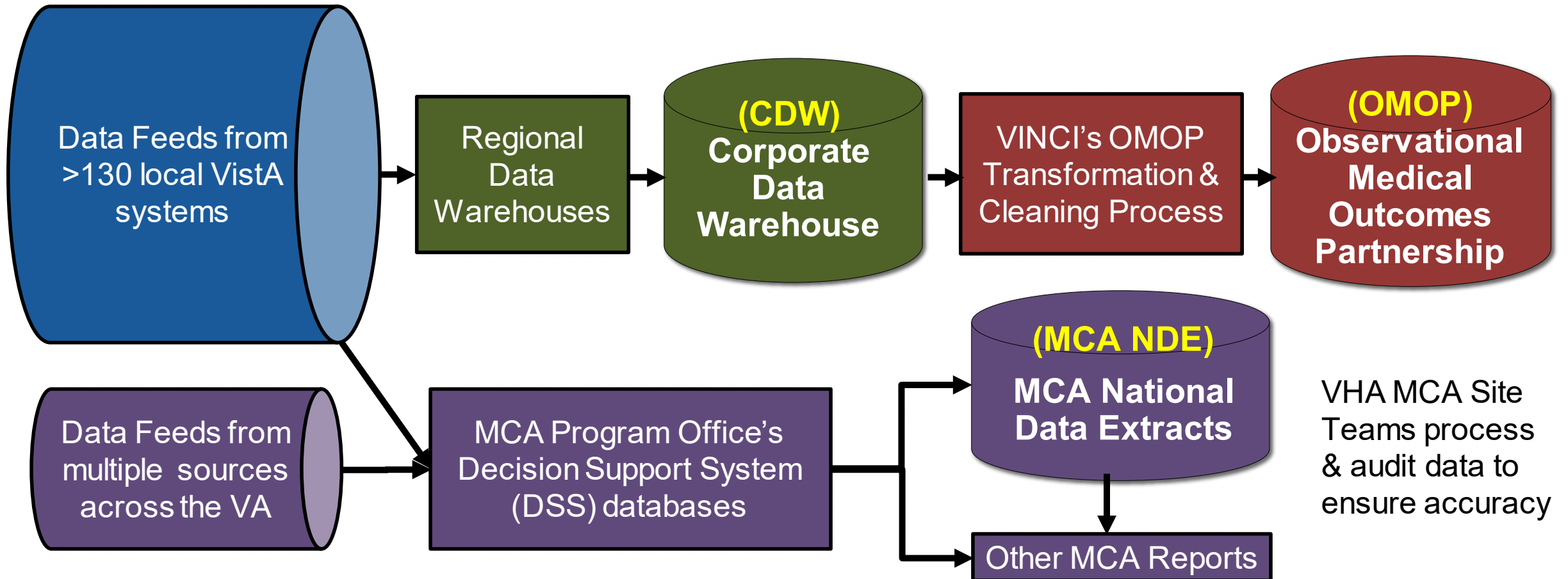
- CDWork2 interim solution, includes lightly transformed Millennium data
- CDWork3 converged Millennium and VistA data mapped as close as possible to original CDWork
- Visit <https://vaww.virec.research.va.gov/EHRM/Overview-and-Implications.htm> and <https://dvagov.sharepoint.com/sites/VHAPugResearch/RRG/SitePages/EHRM-and-research.aspx> to learn more about Cerner Millennium data for researchers



# Data Source Origins

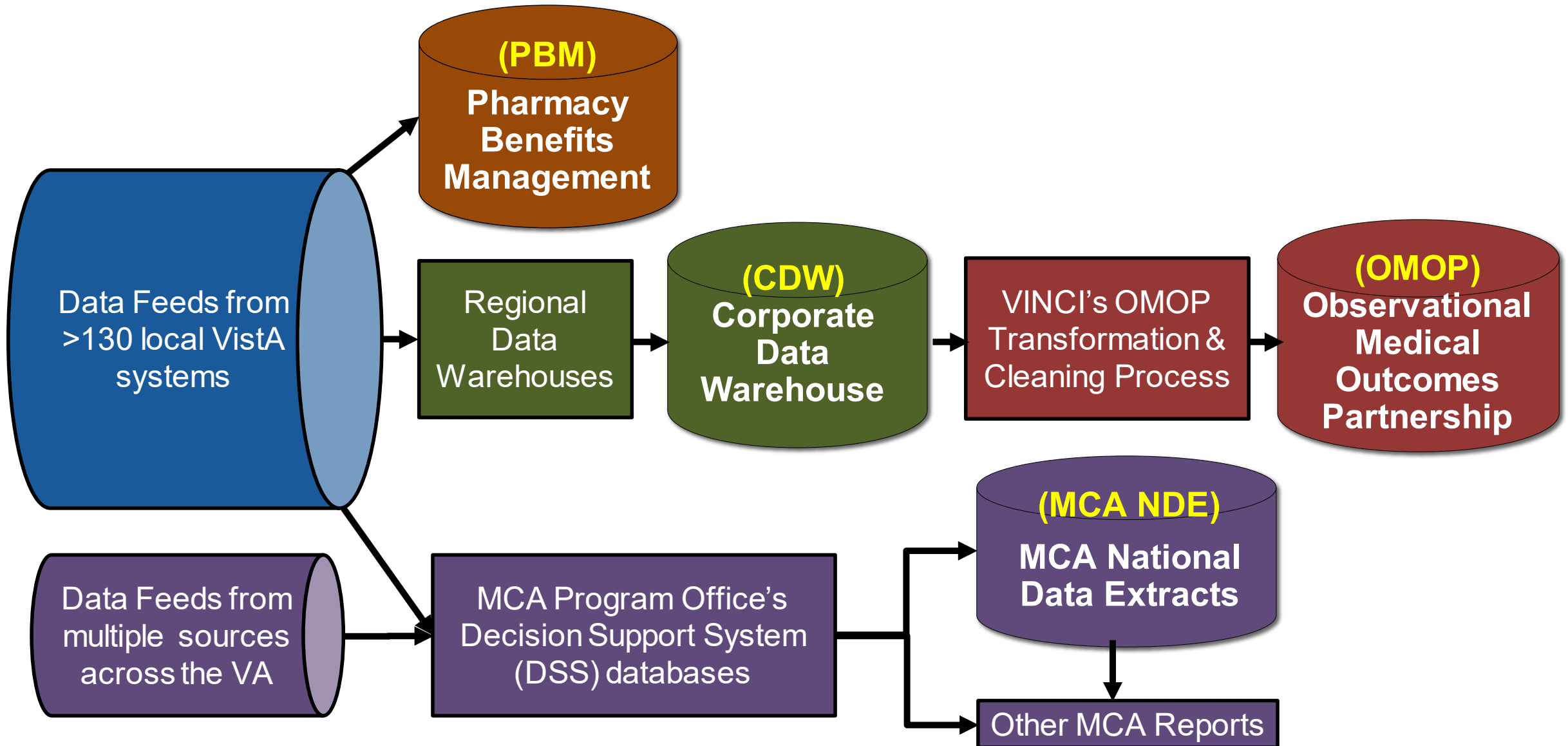


# Data Source Origins





# Data Source Origins



# Uses of VA Pharmacy Data in Research




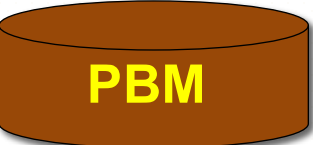









**Who?**  
**What? When?**  
**Where? Why?**







Trends in Medication Use  
Cohort Identification  
Utilization & Quality






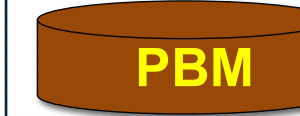
## VHA Pharmacy Data Source Comparison

<b>Who?</b>	 <b>CDW</b>	 <b>OMOP</b>	 <b>MCA NDE</b>	 <b>PBM</b>
Ordering Provider Type				
Patient Identifier 				





# VHA Pharmacy Data Source Comparison

What?	 CDW	 OMOP	 MCA NDE	 PBM
Generic Drug Name	✓	✓	✓	✓
Days Supply	✓	✓		
National Drug Code (NDC)	✓	✓	✓	✓
Directions for Use (SIG)	✓	Link to CDW	✗	✓
Total Cost to Provide Drug to Patient	✗	✗	✓	✗





## Medications Provided by or Paid for by the VHA: Which data source is best?

What?	 CDW	 OMOP	 MCA NDE	 PBM
Medication Administration Time	✓	Link to CDW	✗	✗
Directions for Use (SIG)	✓	Link to CDW	✗	✓
Total Cost to Provide Drug to Patient	✗	✗	✓	✗


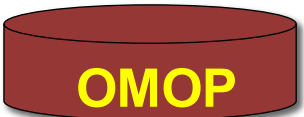

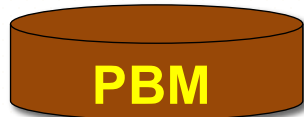
# VHA Pharmacy Data Source Comparison

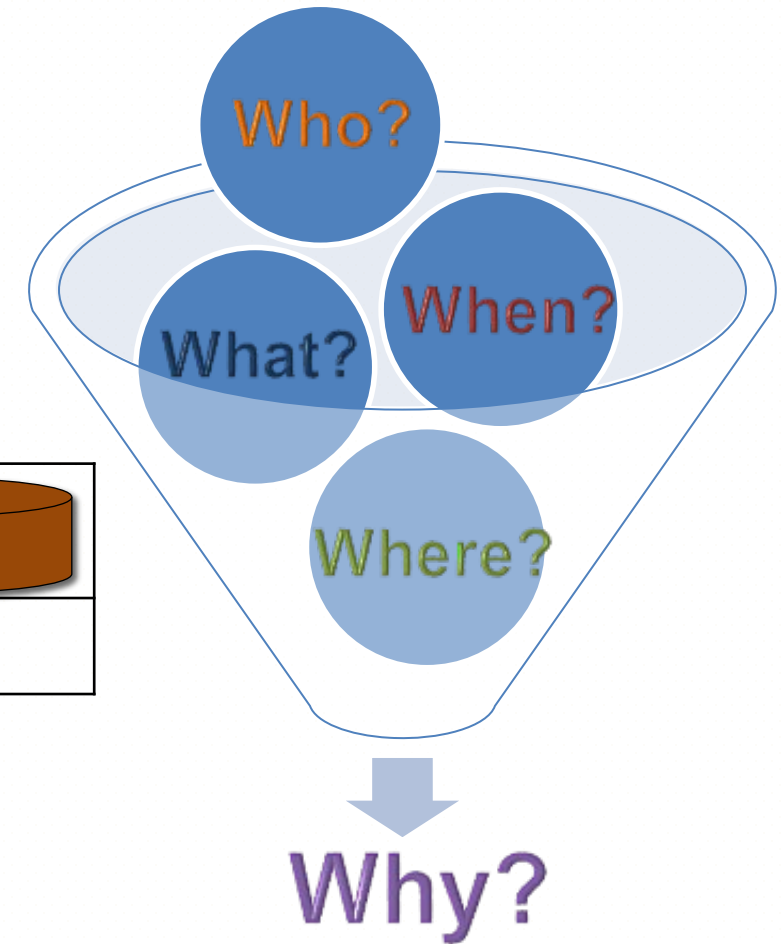
<b>When?</b>	 <b>CDW</b>	 <b>OMOP</b>	 <b>MCA NDE</b>	 <b>PBM</b>
Medication Dispensed	✓	Link to CDW	✓	✓
Medication Returned	✓	Link to CDW	✓	✓
Administration Schedule	✓	Link to CDW	✗	✓
Medication Administered	✓	Link to CDW	✗	✗

## VHA Pharmacy Data Source Comparison

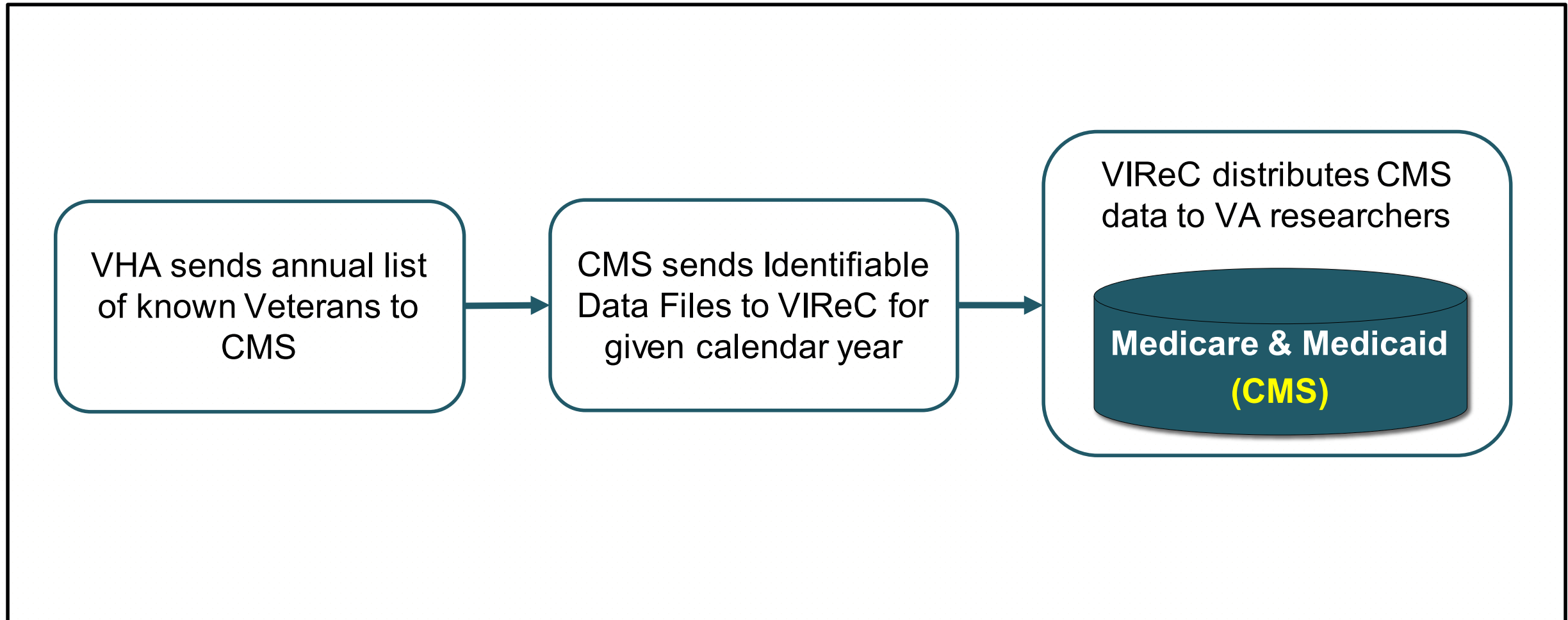
<b>Where?</b>	 <b>CDW</b>	 <b>OMOP</b>	 <b>MCA NDE</b>	 <b>PBM</b>
Consolidated Mail Out Pharmacy (CMOP) flag	✓	Link to CDW	✓	✓
Inpatient or Outpatient Care Setting	✓	✓	✓	✓
Location where patient was served (station)	✓	✓	✓	✓

# VHA Pharmacy Data Source Comparison

<b>Why?</b>	 <b>CDW</b>	 <b>OMOP</b>	 <b>MCA NDE</b>	 <b>PBM</b>
Not directly!	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>



# Medicare & Medicaid (CMS)

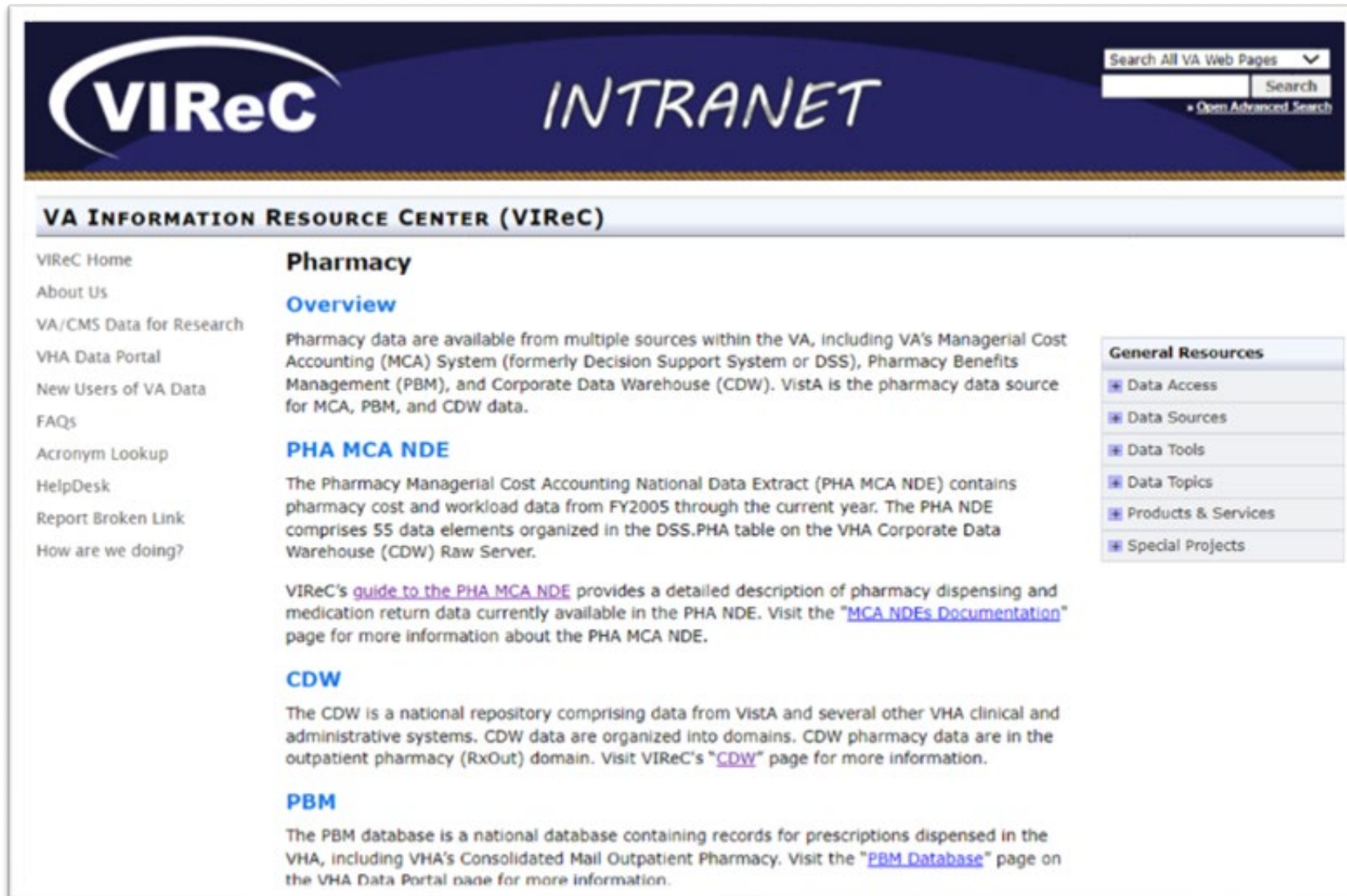




# Session roadmap

- Introduction
- In-depth example of pharmacy research using VA data
- Commonly used pharmacy data sources
- Resources





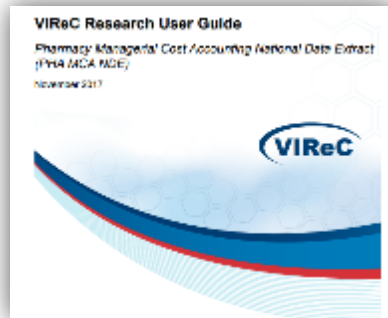
The screenshot shows the VIREC INTRANET website. At the top, there is a dark blue header with the VIREC logo on the left and the word "INTRANET" in a white, stylized font on the right. A search bar is located in the top right corner, with the text "Search All VA Web Pages" and a "Search" button. Below the header, the main content area is titled "VA INFORMATION RESOURCE CENTER (VIREC)". On the left side, there is a navigation menu with links: "VIREC Home", "About Us", "VA/CMS Data for Research", "VHA Data Portal", "New Users of VA Data", "FAQs", "Acronym Lookup", "HelpDesk", "Report Broken Link", and "How are we doing?". The main content area is titled "Pharmacy" and has a sub-section "Overview". The text under "Overview" states: "Pharmacy data are available from multiple sources within the VA, including VA's Managerial Cost Accounting (MCA) System (formerly Decision Support System or DSS), Pharmacy Benefits Management (PBM), and Corporate Data Warehouse (CDW). VistA is the pharmacy data source for MCA, PBM, and CDW data." Below this, there is a section titled "PHA MCA NDE" which explains that the Pharmacy Managerial Cost Accounting National Data Extract (PHA MCA NDE) contains pharmacy cost and workload data from FY2005 through the current year. It also mentions that VIREC's "guide to the PHA MCA NDE" provides a detailed description of pharmacy dispensing and medication return data currently available in the PHA NDE. There is a link to "MCA NDEs Documentation". Another section titled "CDW" explains that the CDW is a national repository comprising data from VistA and several other VHA clinical and administrative systems. It notes that CDW pharmacy data are in the outpatient pharmacy (RxOut) domain and provides a link to VIREC's "CDW" page. A final section titled "PBM" explains that the PBM database is a national database containing records for prescriptions dispensed in the VHA, including VHA's Consolidated Mail Outpatient Pharmacy, and provides a link to the "PBM Database" page. On the right side of the main content area, there is a "General Resources" sidebar with a list of links: "Data Access", "Data Sources", "Data Tools", "Data Topics", "Products & Services", and "Special Projects".

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

(VA Intranet)



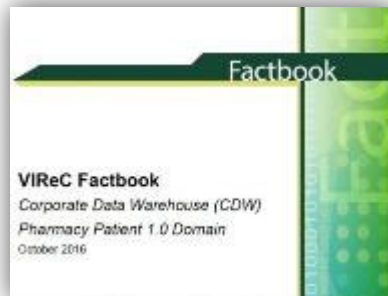
# VIReC Pharmacy Data Resources



## VIReC Research User Guide: Pharmacy MCA NDE

<https://vaww.virec.research.va.gov/RUGs/MCA-NDEs/RUG-MCA-PHA-NDE.pdf>

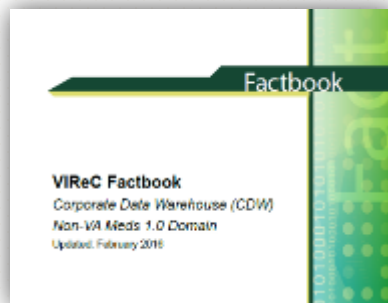
(VA Intranet)



## VIReC Factbook: CDW Pharmacy Patient 1.0 Domain

<https://vaww.virec.research.va.gov/CDW/Factbook/FB-CDW-Pharmacy-Patient-Domain.pdf>

(VA Intranet)



## VIReC Factbook: CDW Non-VA Meds 1.0 Domain

<https://vaww.virec.research.va.gov/CDW/Factbook/FB-CDW-Non-VA-Meds-Domain.pdf>

(VA Intranet)



# VHA Data Portal

The image shows a screenshot of the VHA Data Portal website. On the left, a vertical sidebar lists various data sources. A green arrow points to 'CDW', which is circled in red. A red arrow also points from 'CDW' to the 'Data Sources' tab in the top navigation menu. Below 'CDW', other items include 'COVID-19 Shared Data Resource', 'DAVINCI', 'HERC Cost Data', 'Homeless Registry', 'LCSDP Cohort', 'MCA (formerly DSS) NDEs', 'MCA (formerly DSS) Web Reports', 'Medical SAS Inpatient & Outpatient Data Sets', 'NPCD', 'OEF/OIF/OND Roster', 'OMOP CDW Data', 'PACT Implementation Index (P12)', 'PSSG Geocoded Enrollee Files', and 'PTF'. Two purple arrows point to 'MCA (formerly DSS) NDEs' and 'MCA (formerly DSS) Web Reports'. An orange arrow points to 'OMOP CDW Data'. The main content area features a header with the Department of Veterans Affairs logo and 'VHA Data Portal' text, a search bar, and a navigation menu with tabs for 'Data Sources', 'Data Access', 'Tools & Applications', 'Resources', 'Training', 'Policy & Admin', and 'Support'. The main content includes a welcome message, a 'COVID-19' section with a description of the shared data resource, and an 'Upcoming Events' section listing cyberseminars.

<https://vaww.vhadataportal.med.va.gov/Home.aspx> (VA Intranet)





# How do I request access to the data?

- Visit the VHA Data portal and click on the “Data Access” tab to learn more about the process
  - <https://vaww.vhadataportal.med.va.gov/DataAccess/ResearchAccess.aspx> (Intranet only)
- Watch the archived presentation by Linda Kok on “Navigating VA Data Access: An Overview of the Process for Requesting Permission to Use VA Data”
  - [https://www.hsrd.research.va.gov/for\\_researchers/cyber\\_seminars/archives/video\\_archive.cfm?SessionID=5222](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=5222) (Intranet only)



THANK YOU!  
Questions?



# CONTACT INFORMATION

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VA Pittsburgh Healthcare System

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## **Bonnie Paris, PhD**

Project Manager for VA Information Resource Center (VIReC)

[Bonnie.Paris@va.gov](mailto:Bonnie.Paris@va.gov)





 DATABASE & METHODS CYBERSEMINAR SERIES

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Next session:

June 3, 2024 at 1 pm Eastern

Using CDW Data to Conduct a Research Study for SQL Beginners

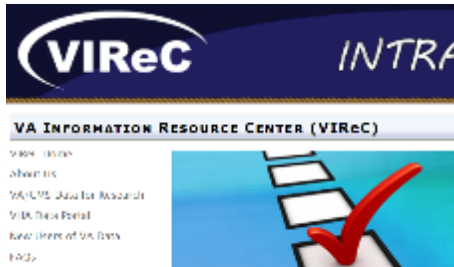


Database & Methods  
**BONUS SLIDES**



# Resources for VA Data Users

Select image to visit page



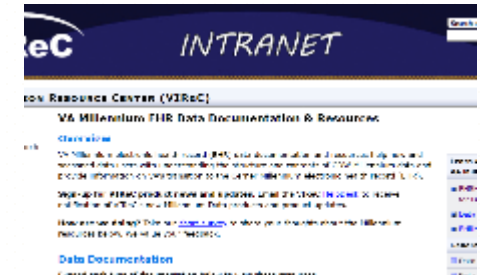
VA Information Resource Center (VIReC) (VA Intranet)



VHA Data Portal (VA Intranet)



VIReC Cyberseminars



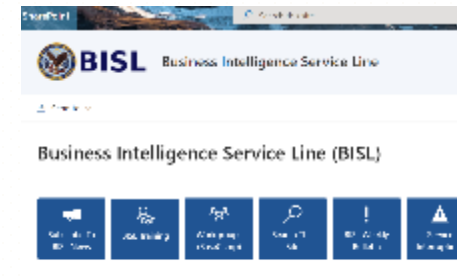
VA Millennium EHR Data Documentation (VA Intranet)



Quick Guide: Resources for Using VA Data (VA Intranet)



VA Informatics and Computing Infrastructure (VINCI) (VA Intranet)



BISL/CDW (VA Intranet)



Health Economics Resource Center (HERC) (VA Intranet)



## Questions about using VA Data?

### HSRData Listserv

- Community knowledge sharing
- ~1,800 VA data users
- Researchers, operations, data stewards, managers
- Subscribe by visiting [vaww.virec.research.va.gov/Support/HSRData-L.htm](http://vaww.virec.research.va.gov/Support/HSRData-L.htm) (VA Intranet)

### VIReC HelpDesk

- Individualized support
- Request Form: [varedcap.rcp.vaec.va.gov/redcap/surveys/?s=KXMEN77LXK](http://varedcap.rcp.vaec.va.gov/redcap/surveys/?s=KXMEN77LXK) (VA Intranet)





VA Pharmacy Data  
**BONUS SLIDES**



# VIREC Resources for CDW Data

The screenshot displays the VIREC Intranet homepage. At the top, there is a dark blue header with the VIREC logo on the left and the word 'INTRANET' in a white, handwritten-style font on the right. A search bar is located in the top right corner, with the text 'Search All VA Web Pages' and a search button. Below the header, a light blue banner reads 'VA INFORMATION RESOURCE CENTER (VIREC)'. The main content area is divided into a left sidebar with navigation links, a central main content area, and a right sidebar with additional resources.

**VA INFORMATION RESOURCE CENTER (VIREC)**

**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.

- Getting Started with CDW**
- Factbooks**
- The Researcher's Notebook**
- Statistical Snapshot**
- Domain Layout & Descriptions**

**Learn About CDW**

- Overview**
- Documentation**
- FAQs**

**General Resources**

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

**Left Sidebar Navigation:**

- 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?

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



# VIREC Resources for Electronic Health Record Modernization (EHRM) & Implications for Data Users

The screenshot shows the VIREC Intranet homepage. At the top, there is a search bar with the text 'Search All VA Web Pages' and a 'Search' button. Below the search bar is the VIREC logo and the word 'INTRANET' in a stylized font. The main content area is titled 'VA INFORMATION RESOURCE CENTER (VIREC)' and features a navigation menu on the left with links to 'VIREC Home', 'About Us', 'VA/CMS Data for Research', 'VHA Data Portal', 'New Users of VA Data', 'FAQs', 'Acronym Lookup', 'HelpDesk', 'Report Broken Link', and 'How are we doing?'. The main article is titled 'Electronic Health Record Modernization (EHRM) & Implications for Data Users' and includes an 'Overview' section. The overview text states: 'This web page is intended to support a general understanding of VA's Cerner transition process and its impact on researchers and other VA data users. It provides a high-level summary of the Cerner data environment, and the process VA will use to maintain the availability of enterprise level data during the transition. Check out VIREC's Research & Electronic Health Record (EHR) Synergy Cyberseminar Series or visit the EHRM & Research SharePoint site for information specific to the Cerner system implementation and research transition activities.' Below the overview is an 'Introduction to the EHRM' section, which begins with: 'The VA signed a contract in 2018 to fully implement a commercial electronic health record (EHR) from Cerner Corporation over a ten-year period to address long-term sustainability issues with its current Veterans Health Information Systems and Technology Architecture (Vista)/Computerized Patient Reporting System (CPRS) EHR. The contract aims to fully modernize the VA system and facilitate seamless care across all VA facilities and between VA and the Defense Health Agency by enabling access to a complete health record from a single EHR instance.' The article also mentions that the VHA provides care for millions of Veterans at more than 1,200 medical centers and outpatient institutions across the United States. On the right side of the page, there is a sidebar titled 'Learn About EHRM & VA Millennium EHR Data' with a list of links: 'Overview', 'Introduction to the EHRM', 'Understanding the Cerner Data Environment', 'Initial VA Data Migration to Cerner Environment', 'Data Syndication', 'Accessing and Using Syndicated Data', 'Data Documentation & Resources', 'Key EHRM Terms', and 'FAQs'. Below this is a 'General Resources' section with links to 'Data Access' and 'Data Sources'.

<https://vaww.virec.research.va.gov/EHRM/Overview-and-Implications.htm>  
(VA Intranet)





SharePoint

VINCIPedia VINCI Central

OMOP Academy

Updated Pages

- VINCI R Academy
- OMOP Academy
- Home
- DART Considerations
- DART FAQs

Home

- VINCI FAQs
- VINCI Linux Wiki
- MVP Phenotype Wiki
- DART Release Notes
- DART Considerations
- Requesting Elevated

**Welcome to VA OMOP Academy!**

[See latest OMOP Announcements](#)

**\*\*\*The latest OMOP data refresh was March 31, 2021 and includes CDW data from October 1, 1999 through March 12, 2021.**

This training is intended to teach you about the VA OMOP Common Data Model (CDM), the CDW data that it contains, and how to use it effectively.

The OMOP CDM defines table structures for each of the data domains in a Person and Provider-centric model. Almost all tables have foreign keys to the PERSON table and a date. This allows for a longitudinal view on all the healthcare-relevant events. In addition, Providers carrying out health care are linked to many of the events as well. Both are linked to healthcare organizations (hospitals, independent physician associations), care sites (doctor's offices, hospital departments etc.) and physical locations (addresses, station). The CDM aims to provide data organized in a way optimal for analysis rather than for the purpose of operational

**VA OMOP Support Contacts**

**Liz Hanchrow RN, MSN-** Informatics Research Nurse and VA OMOP Help Desk Concierge

**Jill Whitaker Bey, RN, BSN and Tina French, RN, CPHQ-** Nurse Informatics Data Analysts

Email: [VINCI@va.gov](mailto:VINCI@va.gov) and please put "OMOP" in the subject line so it will be routed to us quickly.

**OMOP Resources**

- [VA OMOP Documentation](#)
- [OHDSI.org](#)
- [OHDSI Documentation](#)
- [OHDSI Common Data Model Wiki](#)
- [OHDSI Video Tutorials](#)
- [Request VA OMOP access for Research using DART](#)
- New users: email [Elizabeth.Hanchrow@va.gov](mailto:Elizabeth.Hanchrow@va.gov) to be added to the VA OMOP users email list.

**OMOP Sandbox**

<https://sps.vinci.med.va.gov/prod/vincipedia/VINCIPedia/OMOP%20Academy.aspx>

(VA Intranet)



# Resources for MCA NDEs



## VIREC MCA NDEs Documentation

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



## MCAO National Data Extracts & Reporting Information

[https://vaww.dss.med.va.gov/nationalrptg/nr\\_extracts.asp](https://vaww.dss.med.va.gov/nationalrptg/nr_extracts.asp)  
(VA Intranet)



## Health Economics Resource Center (HERC)

<https://vaww.herc.research.va.gov/include/page.asp?id=managerial-cost-accounting>  
(VA Intranet)



The screenshot displays the U.S. Department of Veterans Affairs website. At the top left is the VA logo. The main header includes the text "U.S. Department of Veterans Affairs" and a search bar. A navigation menu contains links for Health, Benefits, Burials & Memorials, About VA, Resources, Media Room, Locations, and Contact Us. The breadcrumb trail reads: VA » Health Care » Pharmacy Benefits Management Services » VA National Formulary. The main heading is "Pharmacy Benefits Management Services". A left sidebar shows a "QUICK LINKS" section with buttons for Hospital Locator (with a zip code field and "Go" button), Health Programs, Protect Your Health, and A-Z Health Topics. The main content area is titled "VA National Formulary" and contains three sections: "VA National Formulary Section" with links for April 2022, by class April 2022, changes April 2022, and Urgent/Emergent March 2022; "VA Class Index Section" with a link for an Excel spreadsheet; and "Previous Changes to VA National Formulary" with links for changes by month (10-98 to 4-22), changes 10-98 to 4-22, and a drug file extract with NDC.

<https://www.pbm.va.gov/PBM/NationalFormulary.asp>  
(VA Intranet)

**VIREC INTRANET**

Search All VA Web Pages  
Search  
Open Advanced Search

**VA INFORMATION RESOURCE CENTER (VIREC)**

VIREC Home  
VA/CMS Home  
About Us  
Updates  
Publications  
Education  
FAQs  
Help

## Medicare Data Overview

**Overview**

Medicare is a federal health insurance program for people age 65 and older, people under 65 with certain disabilities, and people of all ages with end stage renal disease (ESRD). There are several types of Medicare data:

- Enrollment and Demographics:** This data is sourced from CMS's Medicare Enrollment Database (EDB) or Common Medicare Environment (CME) and includes information on Medicare Parts A, B, and D as well as managed care enrollment. Data related to Accountable Care Organizations (ACOs) are limited to a beneficiary's assignment and does not include utilization data beyond what is found in the claims files.
- Fee-for-service (FFS) claims:** Most of the Medicare data available for research are sourced from Medicare Part A (Hospital Insurance) and Part B (Medical Insurance) FFS claims submitted to CMS for reimbursement. Institutional claim files contain information from claims submitted by providers using CMS 1450 (also known as UB-04) billing form. Non-institutional claim files contain information from claims submitted by providers and suppliers using CMS 1500 billing form. Several annual summary files have been created from the FFS claims.
- Medicare Advantage (MA) encounters:** When Medicare beneficiaries are enrolled in Medicare Advantage plans, providers do not submit claims to CMS for reimbursement. However, CMS requires that Medicare Advantage Organizations submit encounter data that reflect services provided to the Medicare beneficiary.
- Part D Prescription Drug Events:** When a Medicare beneficiary enrolled in any type of Medicare Part D plan fills a prescription, the prescription drug plan sponsor (insurance company) submits Part D Prescription Drug Event (PDE) data to CMS. There are two types of Part D plans: standalone Prescription Drug Plan (PDP) for FFS enrollees, and Medicare Advantage Prescription Drug Plan (MA-PD) for MA enrollees.

**On This Page**

- Overview
- Medicare Data from VIREC
- Cohorts & Identifiers
- Data Documentation
- Resources

**General Resources**

- Learn about VA/CMS Data
- Non-Repository Data
- Provider Data
- Cohorts & Identifiers
- Requests
- Current Data Users

Part D Event (PDE) / Drug Characteristics Files	The PDE file includes all transactions covered by the Medicare prescription drug plan for both Prescription Drug Plans (PDPs) and Medicare Advantage Prescription Drug Plans (MA-PDs). The Part D Drug Characteristics file is not released as a freestanding file, but is appended to the PDE file.
Plan Characteristics Files	Information about plan type, benefit design, premium, cost of sharing and service areas of Part D plans (2006-2014) or Part C and Part D plans (from 2015).
Part D Pharmacy Characteristics Files	Information about the pharmacy identified as the source of the drug for each PDE prescription fill record.
Part D Prescriber Characteristics	Information for the prescriber identified on a PDE file record.
Part D Formulary Files	Information on how the plan covers filled prescription drugs (as described in the PDE file).
Part D Plan Election Type Beneficiary Summary Files	Identifies beneficiaries covered by the Low-Income Subsidy (LIS) program for Part D Plan enrollment.
Part D Medication Therapy Management Files	Beneficiary-level information for participants in the Part D Medication Therapy Management (MTM) program, required of CMS Part D plans. Eligible beneficiaries include those enrolled in Part D plans with multiple chronic diseases, those taking multiple Part D drugs and those likely to have expenditures exceeding a specified level as described by federal regulations.
Part D Slim File	Select variables from the Medicare PDE data, including the Drug Characteristics file. It is not linkable to the other Part D characteristics data (Formulary, Prescriber, Plan, or Pharmacy).

<https://vaww.virec.research.va.gov/VACMS/Medicare/Data.htm#MedicareData>  
(VA Intranet)

