Measuring Outpatient Pharmacy Use in the VA Using VA Pharmacy Data

April 1, 2013

Presented by:
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Audience Poll

Have you ever used VA Pharmacy Data?
- Yes
- No

How would you rate your overall knowledge of VA Pharmacy Data?
- 1 (Never Used)
- 2
- 3
- 4
- 5 (Used Frequently, Very familiar)
Session Objectives

- How has outpatient pharmacy utilization been measured in VA studies?
- Overview of VA Pharmacy databases
- Finding information in the VA Pharmacy databases
- Examples of VA studies that have used the VA Pharmacy databases
- Where to go for more help
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How has outpatient pharmacy utilization been measured in VA studies?:

Trends in Medication Use


- Use of ESA drug over time
How has outpatient pharmacy utilization been measured in VA studies?: Medication Exposure and Outcomes


Association of a specific drug with potential adverse event
How has outpatient healthcare utilization been measured in VA studies?: Medication Adherence


- Examined adherence using info from medication refill pattern data
How has outpatient pharmacy utilization been measured in VA studies?: Medication Use


- Identified specific drug class use in nursing home patients
How has outpatient healthcare utilization been measured in VA studies?:

Cohort Identification


- Used a specific drug type to improve case identification
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Pharmacy Data Sources

- Local Databases
  - VistA
  - VISN Warehouses

- National Data Sources
  - PBM
  - DSS NDE Pharmacy SAS® Datasets
  - Corporate Data Warehouse
Pharmacy Data Sources

Other Key Pharmacy Data Sources
- DSS Product Table
- National Drug File
Audience Poll

Which national sources of VA pharmacy data have you used in the past?
- DSS NDE Pharmacy Data
- PBM Pharmacy Data
- Both
- Neither
VA Pharmacy Data Sources

VA Decision Support System (DSS)
National Data Extract (NDE) Pharmacy SAS Datasets

- Became available in 2003
- Data from FY2002 to present
- Primary source of data is VistA
- All inpatient and outpatient prescriptions dispensed by a VAMC or VA Consolidated Mail Outpatient Pharmacy (CMOP)
- Housed at Austin Information Technology Center (AITC) and directly accessible
VA Pharmacy Data Sources

VA Pharmacy Benefits Management (PBM) Database

- Available since 2000
- Data from FY1999 to present
- Primary source of data is VistA
- Contains both inpatient and outpatient prescriptions
## PBM vs. DSS

<table>
<thead>
<tr>
<th></th>
<th>PBM</th>
<th>DSS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>Drug supply cost</td>
<td>Actual cost (ACT_COST)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dispensing cost (DISPCOST)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply cost (VS_COST)</td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td>Researcher requested extract</td>
<td>Direct access</td>
</tr>
<tr>
<td><strong>Data availability</strong></td>
<td>FY1999 (Outpatient)</td>
<td>FY2002 (Outpatient &amp; Inpatient)</td>
</tr>
<tr>
<td></td>
<td>FY2004 (Inpatient)</td>
<td></td>
</tr>
<tr>
<td><strong>Directions for use</strong></td>
<td>SIG available (also components of SIG available: SCHED, UNT_DOSE, DSP_UNT)</td>
<td></td>
</tr>
</tbody>
</table>
## Key Pharmacy Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>DSS</th>
<th>PBM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days Supply</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Drug Description</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quantity</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NDC</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Medication class</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Other DSS and PBM Pharmacy Data

- **DSS Product Table**
  - Key Variables
    - IPNum, Feeder Key, Description (short and long), Drug Class
    - Feeder Key => 1\(^{st}\) 5 characters are VA product file IEN; last 12 characters are NDC
  - Available on DSS website

- **National Drug File**
  - Key Variables
    - VA_PRODUCT, FEEDER, NDF_NDC, VA_CLASS
Other CDW Pharmacy Data

- **Key Product Tables**
  - Pharmacy BCMA
    - Dispensed Drug, Medication Log, Medication Variance + Missing Dose Request
  - Pharmacy Outpatient
    - RxOutPat Prescriptions, RxOutPat Fill, RxOutPat Sig, RxOutPat Med Instructions
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Assessing Outpatient Pharmacy Use: Finding info in VA Pharmacy Datasets

Where can I find cost variables?

DSS and PBM contain different cost variables
- PBM: cost of the drug product from the supplier
- DSS:
  1) Dispensing Cost (DISPCOST): direct pharmacist labor for dispensing the prescription and the mailing costs
  2) Supply Cost (VS_COST): Drug product cost and cost of supplies used in preparing the prescription, such as bottles and labels
  3) Actual Cost (ACT_COST): Drug product cost, cost of supplies such as bottles and labels to prepare the prescription, indirect costs, and overhead
Why is the NDC for the same prescription different on the PBM record than on the DSS record?

- The NDC’s are obtained from different sources.
- Differences can result if Local Drug File has not been updated to reflect supply that was stocked when medication was dispensed.
- Different NDC’s will refer to the same drug, dosage, and strength, but may indicate a different manufacturer and/or package size.
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Assessing Outpatient Pharmacy Use: Examples of Types of Questions Addressed with Pharmacy Data

- **Cohort identification**
  - Can pharmacy data be used to identify specific groups of patients?

- **Medication utilization**
  - Recent year? Longer historical view? Does policy change impact medication use?

- **Healthcare quality**
  - Are patients being prescribed medications in accordance with quality measures?

- **Medication adherence**
  - How much of a prescribed medication are patients using?

- **Exposure to specific medications or medication classes**
  - Are specific drugs associated with better/worse outcomes?

- **Combining outpatient and pharmacy data to identify events**
  - Can we identify acute exacerbations of COPD with outpatient and prescription data?

- **Assessing comorbidity or case-mix with medication data**
How has outpatient pharmacy utilization been measured in VA studies?: Medication Exposure and Outcomes


Objective: To examine the association between antiepileptic drug (AED) receipt and suicide-related behavior (SRB) in older veterans.
January 2008, FDA released alert claiming twice risk of suicide-related behavior in patients taking antiepileptic drugs (AEDs)
  - Elderly patients were under-represented in FDA analysis

This study compares suicide-related behavior in older Veterans with and without AEDs
  - Cohort of patients age 65 years

Drugs were identified according to the generic name using VHA product variable

How was pharmacy data used?
  - Cox proportional hazards models used to compare time to event (suicide-related behavior) for patients with or without AED exposure

**Study timeline**

For Veterans 65 or older between FY04-06, Incident Exposure was:
- Initial AED (Veterans with AED)
- First VHA use (Veterans without AED)

- 12 months of prior VHA use
- 12 months without AED

Follow-up Measure:
- Suicide-related behavior

**AED exposure:** 
90,263 (4.2%)

**No AED Exposure:** 
2,056,911 (95.8%)

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Table 2. Cox Proportional Hazard Model Analysis: Relationship Between Antiepileptic Drug (AED) Exposure and Suicide-Related Behavior, Using Inverse Probability–Weighted Propensity Score to Control for Possible Confounders

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Hazard Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Incident exposure to any AED versus none</td>
<td>3.90 (2.93–5.19)*</td>
</tr>
<tr>
<td>Model 2: Incident exposure to an AED versus none</td>
<td></td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>1.19 (0.30–4.68)</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>2.56 (1.96–4.16)*</td>
</tr>
<tr>
<td>Lamotrigine</td>
<td>36.63 (15.89–84.46)*</td>
</tr>
<tr>
<td>Levetiracetam</td>
<td>8.23 (1.41–48.11)*</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>1.65 (0.40–6.74)</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>5.33 (1.55–18.34)*</td>
</tr>
<tr>
<td>Topiramate</td>
<td>6.83 (1.90–24.51)*</td>
</tr>
<tr>
<td>Valproate</td>
<td>15.44 (9.44–25.44)*</td>
</tr>
</tbody>
</table>

Oxcarbazepine, zonisamide, and pregabalin are not presented in specific drug analysis because the numbers were too small to calculate stable estimates.

*P < .05.
How has outpatient healthcare utilization been measured in VA studies?: Medication Adherence


**Objective:** To assess predictors of adherence to inhaled therapies for COPD and, for patients on multiple inhaled medications, to assess whether adherence to one class of medication predicts adherence to other classes.
Medication Adherence: 

- **Cohort consisted of patients with pulmonary function tests between January 2004 and December 2007 who**
  - Had spirometric evidence of COPD
  - Had a ReComp (medication adherence) measure for one or more COPD medications

- **Medicare adherence assessed for 3 drug classes:**
  - inhaled corticosteroids (ICS)
  - ipratropium bromide (IP)
  - long-acting beta-agonists (LABA)

- **ReComp used to measure adherence**

- **ReComp is an algorithm to measure medication adherence**
  - 1 indicates medication available to patient during all days during period of interest
  - 0 indicates no medication available to patient during period of interest

- **For Outcome Adherence**
  - ReComp ≥ 0.8 was considered adherent

- **For Baseline Adherence**
  - Poor (score: 0 to <0.20)
  - Moderate (score: ≥0.20 to <0.80)
  - Good (score: ≥0.80 to <1.0)
  - Excellent (score: 1.0).

How was pharmacy data used?

- **Baseline Adherence:**
  - ReComp 6 months before enrollment

- **Cohort Enrollment**

- **6 month follow-up period**

- **Outcome Adherence:**
  - ReComp 6 months after enrollment
# Medication Adherence:

*Huetsch et al. J Gen Intern Med. 2012*

## Table 3. Odds of Medication Adherence Based on Baseline Adherence to Different Classes of Medication

<table>
<thead>
<tr>
<th>Baseline Adherence (categorized by ReComp score)</th>
<th>Odds of ICS Adherence (95 % CI)</th>
<th>Odds of LABA Adherence (95 % CI)</th>
<th>Odds of IP Adherence (95 % CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inhaled corticosteroid</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor (0 to &lt;0.20)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Moderate (≥0.20 to &lt;0.80)</td>
<td>0.85 (0.66–1.10)</td>
<td>0.98 (0.67–1.41)</td>
<td>0.88 (0.66–1.18)</td>
</tr>
<tr>
<td>Good (≥0.80 to &lt;1.0)</td>
<td>2.87 (1.96–4.20)</td>
<td>1.87 (1.09–3.23)</td>
<td>1.21 (0.77–1.90)</td>
</tr>
<tr>
<td>Excellent (1.0)</td>
<td><strong>4.79 (3.22–7.12)</strong></td>
<td>3.30 (1.89–5.74)</td>
<td>1.88 (1.21–2.92)</td>
</tr>
<tr>
<td><strong>Long-acting beta-agonist</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.88 (0.60–1.29)</td>
<td>1.08 (0.79–1.49)</td>
<td>0.83 (0.56–1.22)</td>
</tr>
<tr>
<td>Good</td>
<td>1.84 (1.17–2.90)</td>
<td>3.61 (2.29–5.47)</td>
<td>1.06 (0.67–1.68)</td>
</tr>
<tr>
<td>Excellent</td>
<td>1.71 (1.03–2.84)</td>
<td><strong>6.60 (3.92–11.11)</strong></td>
<td><strong>1.43 (0.86–2.38)</strong></td>
</tr>
<tr>
<td><strong>Ipratropium bromide</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.85 (0.61–1.19)</td>
<td>1.49 (0.98–2.27)</td>
<td>1.38 (1.10–1.73)</td>
</tr>
<tr>
<td>Good</td>
<td>2.30 (1.46–3.61)</td>
<td>2.24 (1.27–3.94)</td>
<td>2.52 (1.81–2.50)</td>
</tr>
<tr>
<td>Excellent</td>
<td>1.41 (0.94–2.10)</td>
<td>1.82 (1.11–3.00)</td>
<td><strong>14.13 (10.00–19.97)</strong></td>
</tr>
</tbody>
</table>

*Reference group for each model is poor baseline adherence (ReComp score <0.20)*

†All models were adjusted for age, gender, race, missed clinic visits, FEV₁, occurrence of ≥1 outpatient COPD exacerbations, asthma, lung cancer, and number of medication classes

Adapted from Huetsch et al. *J Gen Intern Med. 2012*
How has outpatient pharmacy utilization been measured in VA studies?: Medication Use


**Objective:** To assess the prevalence and risk factors for antipsychotic use in older residents of VA Community Living Centers
Medication Use: Gellad et al. *Med Care.* 2012

- Antipsychotic medications are commonly prescribed to nursing home residents despite well-established adverse events.

- Cohort consisted of all residents of VA Community Living Center between 1/1/2004 and 6/30/2005 with at least VA Rx dispensing.

- Logistic regression used to identify factors associated with antipsychotic use.
How was pharmacy data used?

Pharmacy data from PBM was linked with Minimum Data Sets (MDS) and MedSAS data.

For each dispensed drug, study collected
- Start and stop date
- Medication name
- Medication strength
- Directions for use (i.e., SIG)
- Amount dispensed

To create a polypharmacy covariate for regression, identified the number of unique drugs per resident.
Resident classified based on whether there were indications for antipsychotic medications

- **Appropriate use** included patients with psychiatric diagnosis in which psychotic symptoms are prominent feature or a diagnosis of dementia and psychotic symptoms

- **Potentially inappropriate use** were remaining patients without psychiatric diagnosis or psychotic symptoms
  - With dementia
  - Without dementia

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Unadjusted OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65–74</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>75–84</td>
<td>0.95 (0.81–1.13)</td>
<td>0.77 (0.64–0.93)</td>
</tr>
<tr>
<td>Older than 85</td>
<td>0.77 (0.61–0.97)</td>
<td>0.67 (0.51–0.88)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indication by psychosis/dementia diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychotic diagnosis or symptoms</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>(potentially appropriate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dementia without psychosis</strong></td>
<td>0.98 (0.77–1.24)</td>
<td>1.10 (0.82–1.47)</td>
</tr>
<tr>
<td>(potentially inappropriate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No dementia or psychosis</td>
<td>0.20 (0.17–0.24)</td>
<td>0.25 (0.21–0.30)</td>
</tr>
<tr>
<td>(potentially inappropriate)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Gellad et al. *Med Care*. 2012
How has outpatient pharmacy utilization been measured in VA studies?: Trends in Medication Use


Objective: To examine erythropoiesis-stimulating agent (ESA) therapy in lung and colon cancer patients receiving chemotherapy from 2002 to 2008
How was pharmacy data used?

Pharmacy data was use to examine:
- Whether ESA use differed before (PRE) or after (POST) the black box warning
- Trends in ESA use over time
For lung cancer patients
- Odds of ESA use decreased 65% in the POST period

For colon cancer patients
- Odds of ESA use decreased 53% in the POST period

Adapted from Tarlov et al. *Support Care Cancer*. 2012

ESA use began to decline for both cancer groups before black box warning was issued

Adapted from Pugh et al *J Am Geriatr Soc*. 2012
How has outpatient healthcare utilization been measured in VA studies?:

Cohort Identification


Objective: To assess the utility of diagnostic algorithms, including prescriptions, to identify RA patients within VHA databases.
Cohort Identification: Ng et al. *Arthritis Care Research*. 2012

- Study sample consisted of patients having 2 outpatient visits with *rheumatoid arthritis (RA)* codes at least 2 months apart at Houston VAMC between FY99 and FY09.

- How was pharmacy data used?

- Study tested algorithms to identify RA in through VHA databases using:
  - Presence of at least 2 ICD-9 codes at least 6 months apart.
  - Use of *disease-modifying antirheumatic drugs (DMARD)* for at least 180 days.
  - ICD-9 code for RA at visit to rheumatologist.
Cohort Identification:
Ng et al. *Arthritis Care Research*. 2012

**Study design**

- To validate diagnosis of RA, study conducted chart review
- Study evaluated the positive predictive value (PPV) of the diagnostic algorithms using validation from chart review
Cohort Identification:
Ng et al. *Arthritis Care Research*. 2012

<table>
<thead>
<tr>
<th>Patient Identification Algorithm</th>
<th>PPV</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients (with or without DMARD therapy for ≥180 days)</td>
<td>30.9 (27.7–34.2)</td>
<td>NA†</td>
<td>NA†</td>
</tr>
<tr>
<td>Two RA codes (any visit)</td>
<td>40.2 (34.1–46.3)</td>
<td>47.6 (41.4–53.8)</td>
<td>68.3 (62.5–74.1)</td>
</tr>
<tr>
<td>Two RA codes with at least 1 RA code in a rheumatologist visit</td>
<td>67.3 (58.9–75.8)</td>
<td>39.3 (30.5–48.0)</td>
<td>91.5 (86.5–96.5)</td>
</tr>
<tr>
<td>Two RA codes with at least 1 rheumatology visit and with the last rheumatologist visit with an RA code</td>
<td>60.4 (55.3–65.5)</td>
<td>88.1 (84.7–91.5)</td>
<td>74.1 (69.6–78.7)</td>
</tr>
<tr>
<td>Patients with DMARD therapy for ≥180 days</td>
<td>75.0 (67.2–82.8)</td>
<td>44.6 (35.7–53.6)</td>
<td>93.3 (88.9–97.8)</td>
</tr>
<tr>
<td>Two RA codes with at least 1 RA code in a rheumatologist visit</td>
<td>91.4 (85.4–97.4)</td>
<td>38.1 (27.7–48.5)</td>
<td>98.4 (95.7–100.0)</td>
</tr>
</tbody>
</table>

PPV = positive predictive value; RA = rheumatoid arthritis; 95% CI = 95% confidence interval; DMARD = disease-modifying antirheumatic drug; NA = not applicable.

Adding DMARD therapy to the patient identification algorithm increased the PPV.

Highest PPV (91.4%) was found in patients who:
- Received DMARDs for at least 180 days
- Had an RA code from visit to rheumatologist

Adapted from Ng et al. *Arthritis Care Research*. 2012
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- Where to go for more help
VIReC Help

VIReC Webpage
http://www.virec.research.va.gov

- Information on VA data sources and how to access data

- Resource users guide for pharmacy data
VIReC Help (cont’d)

- **HSRData Listserv**
  - Join at the VIReC Web site
  - Discussion among >400 data stewards, managers, and users
  - Past messages in archive (on intranet)

- **VIReC Help Desk**
  - VIReC staff will answer your question and/or direct you to available resources on topics
  - [VIReC@va.gov](mailto:VIReC@va.gov)
  - (708) 202-2413
Questions?
Selected Recent References on VA Outpatient Pharmacy Use


Selected Recent References on VA Outpatient Pharmacy Use (cont)

Selected Recent References on VA Outpatient Pharmacy Use (cont)

Upcoming Seminar

Assessing Race and Ethnicity - May 6, 2013
Maria Mor, PhD