

2014 VIREC Database and Methods Cyberseminar Series

# Applying Comorbidity Measures Using VA and CMS (Medicare/Medicaid) Data

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## Presented by:

James F. Burgess, Jr., PhD, Center for Healthcare  
Organization and Implementation Research, VA Boston

With assistance from Denise Hynes, MPH, PhD, RN  
and Thomas Weichle, MS, VIREC, VA Hines

# Session Objectives

At the end of this session, the participant will be able to:

- Name 4 sources of comorbidity information in VA and CMS data
- Identify 3 common data elements used in measuring comorbidities
- Recognize important measurement issues encountered when using administrative data to assess comorbidities
- Avoid common pitfalls in using VA and CMS (Medicare/Medicaid) data together to assess comorbidities

# Roadmap

## This session will:

- **Focus on use of VA and CMS data to obtain information for comorbidity measurement**
- **Build on previous seminars, e.g.,**
  - *Assessing VA Health Care Use: Inpatient*
  - *Assessing VA Health Care Use: Outpatient*
  - *Measuring Health Services Use in VA and Medicare*
  - *Measuring Outpatient Pharmacy Use in VA*

# Roadmap

## This session will not:

- Discuss theoretical or statistical issues related to accounting for comorbidities in health research
- Examine in detail specific comorbidity indices or scales

# Session Outline

- **Overview**
- **Finding Comorbidity Information in VA and CMS Data**
- **Using Administrative Data to Assess Comorbidities: Important Measurement Considerations**
- **Case Study: Example of VA Study that Used VA and/or Medicare Data to Construct Comorbidities**
- **Where to Go for More Help**

# Session Outline

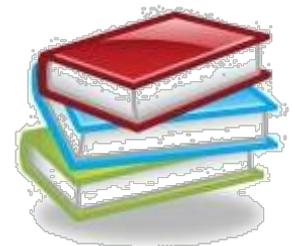
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# Comorbidity

- **A concomitant but unrelated pathological or disease process<sup>1</sup>**
- **Several variations on this concept have emerged<sup>2</sup>**

<sup>1</sup> American Heritage Medical Dictionary

<sup>2</sup> Valderas, JM, Starfield, B, Sibbald, B, et al., Defining Comorbidity: Implications for Understanding Health and Health Services. *Ann Fam Med*. 2009 July; 7(4): 357–363.



# Comorbidities

- **Important component in evaluating**
  - Clinical outcomes
  - Resource use (e.g., costs)
  - Quality of care
- **May be conceptualized/ operationalized as**
  - Predictor
  - Covariate/confounder
  - Moderator
  - Dependent variable



# Examples of research questions requiring information on comorbidities

## ■ Comparative effectiveness studies

- *Is chemotherapy more effective than radiotherapy in the treatment of endometrial cancer?*

## ■ Healthcare disparities

- *Do comorbidities explain race/ethnic disparities in kidney transplants?*

## ■ Healthcare quality

- *Are VA patients more likely than those in FFS Medicare to receive recommended screening tests?*

## ■ Healthcare costs / Provider productivity

- *Who provides more cost-effective care for diabetes – endocrinologists, nephrologists or general internists?*

# Sources of Comorbidity Information in Administrative Data

- **Workload (VA) or claims (Medicare, Medicaid) data** for diagnosis and procedure codes
- **Pharmacy data** for medications specific to a disease/condition
- **Lab data** for laboratory results indicating a condition
- **Other**, e.g., program enrollment records

# Audience Poll

## (Heidi convert to poll)

- **Rate your experience with using administrative data to capture comorbidities.**
  - Novice
  - Some experience
  - Expert

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# Administrative Data Sources for Comorbidity Information

## ■ Diagnosis and Procedure Codes

- VA workload data
  - Medical SAS Datasets
  - Fee Basis Files
- Medicare claims
  - Institutional Standard Analytic Files (SAFs)
  - Non-Institutional SAFs
  - Institutional Stay Level File (MedPAR)
- Medicaid claims
  - Medicaid Analytic Extract (MAX) Files



# Administrative Data Sources for Comorbidity Information (cont'd)

## ■ Medications



– Pharmacy data

- e.g., oral hypoglycemics, insulin indicate diabetes
- VA PBM, DSS
- Medicare Part D claims
- Medicaid Prescription Drug claims



## ■ Laboratory Results

– DSS Laboratory Results NDE

- e.g., elevated glycohemoglobin indicates diabetes

– Not available in Medicare data

## ■ Other

– e.g., condition-focused program enrollment

# Types of Diagnosis Codes



- **ICD-9-CM Diagnosis Codes<sup>1</sup>**
  - International Classification of Diseases, Ninth Revision, Clinical Modification
  - Admitting code - patient's initial diagnosis at the time of admission
  - Primary/principal codes - conditions chiefly responsible for the visit/admission
  - Secondary codes - conditions affecting services provided
  - Line item code - diagnosis supporting procedure/service on the non-institutional claim

<sup>1</sup> <http://www.cdc.gov/nchs/icd.htm>

# Types of Procedure Codes

- **ICD-9-CM procedure codes**
  - Used for inpatient services in VA, institutional inpatient Medicare claims, and inpatient and other services in Medicaid claims
- **CPT<sup>®</sup> procedure codes<sup>1</sup>**
  - Current Procedural Terminology
  - Used for outpatient services in VA
  - Used for inpatient and other services in Medicaid claims



<sup>1</sup> <http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/cpt.shtml>

# Types of Procedure Codes (cont'd)

## ■ HCPCS (Healthcare Common Procedure Coding System) Codes<sup>1</sup>

- Used in Medicare/Medicaid billing
- Level 1: CPT<sup>®</sup> codes (services & procedures)
- Level 2: Used to identify products, supplies, and services not included in the CPT codes (e.g., ambulance service & durable medical equipment)

<sup>1</sup> <http://www.cms.hhs.gov/MedHCPCSGeninfo/>



# VA Diagnosis and Procedure Codes

	Principal Admitting Diagnosis Code	Primary Diagnosis Code	Secondary Diagnosis Codes	ICD-9 Procedure Codes	CPT Procedure Codes
Inpatient Main	X	X	X		
Inpatient Bedsection	X	X	X		
Inpatient Procedure	X	X		X	
Inpatient Surgery	X	X		X	
Outpatient Visit					
Outpatient Event		X	X		X
Inpatient Encounters		X	X		X

# VA Fee Basis Diagnosis and Procedure Codes

	<b>Discharge Diagnosis Codes</b>	<b>Secondary Diagnosis Codes</b>	<b>ICD-9 Procedure Codes</b>	<b>CPT Procedure Codes</b>
<b>Inpatient</b>	X	X	X	
<b>Inpatient Ancillary</b>	X*			X
<b>Outpatient</b>	X			X

\*Beginning FY2009

# Medicare Diagnosis and Procedure Codes

	<b>Admitting Diagnosis Code</b>	<b>Primary Diagnosis Code</b>	<b>Secondary Diagnosis Codes</b>	<b>ICD-9 Procedure Codes</b>	<b>HCPCS Procedure Codes</b>
<b>MedPAR</b>	X		X	X	
<b>Inpatient</b>	X		X	X	X
<b>SNF</b>	X		X	X	X
<b>Outpatient</b>		X	X		X
<b>Hospice</b>		X	X	X	X
<b>Home Health</b>		X	X		X
<b>Carrier</b>		X	X		X
<b>DME</b>		X	X		X

# Medicaid Diagnosis and Procedure Codes

	Principal Diagnosis Code	Secondary Diagnosis Codes	ICD-9 Procedure Codes	CPT Procedure Codes	HCPCS Procedure Codes
<b>Other Services</b>	X	X	X*	X*	X*
<b>Inpatient</b>	X	X	X*	X*	X*
<b>Long Term Care</b>	X	X			

**\*Procedure coding system variable (ICD-9, CPT-4, or HCPCS) accompanies the procedure code variables**

# Pharmacy Data

- **Potential value in using pharmacy-based measure versus ICD-based measures**
  - When diagnosis information is not available
  - Stable chronic conditions not occasioning provider visit (e.g., hypertension, epilepsy)
  - Conditions for which the treatment regimen is set and time-limited (e.g., TB)



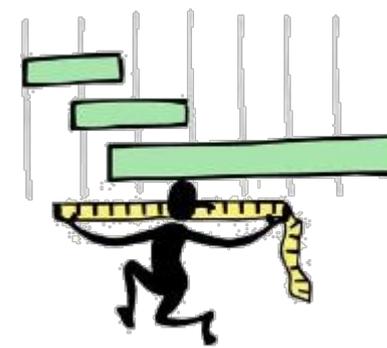
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- Where to Go for More Help

# Important Measurement Considerations

## ■ Comorbidities vs. comorbidity burden or summary risk measure

- Are specific conditions of interest?
- Summary measures
  - Provide one number—the score, simplifying the analysis
  - Allows for parsimony in statistical regression models
- Influences data that can be used and conditions to be identified



# Important Measurement Considerations

## ■ What conditions or condition groups to capture

- Depends on
  - Population
  - Objective (e.g., case-mix adjustment)
  - Outcome (e.g., mortality? post-stroke rehab? expenditures?)
- Data availability - inpatient, outpatient, or both
  - (e.g., See Klabunde 2000; Wang, 2000)



# Important Measurement Considerations

- What conditions to capture
- Exclude 'rule-out' diagnoses



- Operational definition: Any diagnosis that *does not* meet the following criteria<sup>1</sup>
  - Appears at least once on a record/claim for inpatient care, or
  - Appears on at least two records/claims for outpatient care with visit/claim dates at least 30 days apart.

<sup>1</sup> Klabunde CN, Harlan LC, Warren JL. Data sources for measuring comorbidity: a comparison of hospital records and Medicare claims for cancer patients. *Med Care* 2006; 44: 921-28

# Important Measurement Considerations

- What conditions to capture
- Exclude 'rule-out' diagnoses
- Identify *clinician-assigned* diagnoses
  - Avoid clinical laboratory, diagnostic imaging (radiology, x-ray), and other ancillary test/service events; DME/prosthetics; telephone encounters
  - VA – stop codes
  - Medicare – DME File, Physician Specialty codes, Claim type code, BETOS, Place of Service codes



# Important Measurement Considerations

## Identifying Non-Clinician-Assigned Diagnoses

### ■ Examples of VA Clinic Stop codes used to identify claims for exclusion

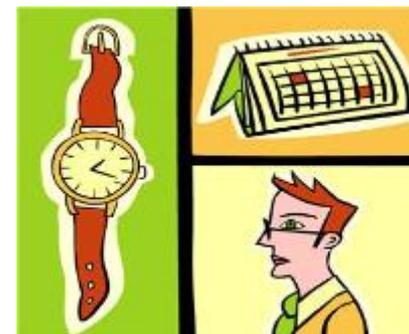
- X-ray 105
- Laboratory 108
- Telephone 103, 147, 178 (and others)

### ■ Examples of Medicare Provider Specialty codes used to identify claims for exclusion

- Diagnostic radiology 30
- Mammography screening center 45
- Clinical laboratory 69

# Important Measurement Considerations

- What conditions to capture
- Exclude 'rule-out' diagnoses
- Identify clinician-assigned diagnoses
- Measurement time period –
  - Active diagnoses
  - Temporal relationship between comorbidity measurement and outcome measurement
  - Anchor
    - Date
    - Event



# Important Measurement Considerations

## Special Challenges

- Measuring functional status
- Measuring severity of disease
- Undiagnosed conditions

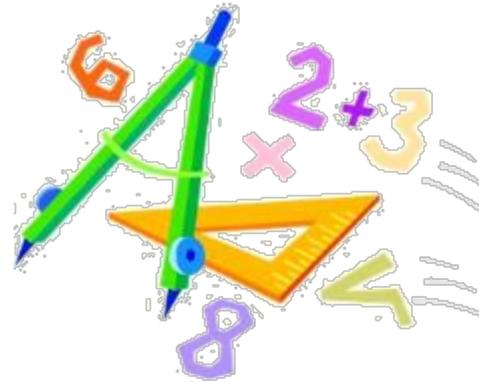


# Important Measurement Considerations

- **Comorbidity measurement using administrative (i.e., electronic health record) data is tied to healthcare use**
  - Without a healthcare encounter, there is no record generated, diagnosis recorded.
  - Health services obtained outside the VA will generate procedure and diagnosis codes not available in VA data (except in the case of fee-basis care).
  - More frequent users of care will have more opportunities for diagnoses made and recorded.

# Analytic Strategies in Comorbidity Measurement Using Administrative Data<sup>1</sup>

- Ordinal
- Weighting
- Categorical



<sup>1</sup> Lash TL, Mor V, Wieland D, Ferrucci L, Satariano W, Silliman RA. Methodology, design, and analytic techniques to address measurement of comorbid disease. *J Gerontol A Biol Sci Med Sci.* 2007;62(3):281-285.

# Commonly Used Comorbidity Measures Using Administrative Data

- **ACG**

- **Charlson**

- Deyo-Charlson
- Romano adaptation

- **Elixhauser**

- **Quan (Charlson and Elixhauser methods – 2005 Medical Care)**

- **HCC/DCG**

- **Functional Comorbidity Index**

- **RxRisk**

- **Others**



# Charlson Comorbidity Index

- Developed to predict mortality
- 19 chronic conditions
- Each has a weight
- Score = sum of weights
- Extended/adapted by Deyo, Romano independently



# ICD-9-CM vs. ICD-10

- Quan, Hude, Vijaya Sundararajan, Patricia Halfon, Andrew Fong, Bernard Burnand, Jean-Christophe Luthi, L. Duncan Saunders, Cynthia A. Beck, Thomas E. Feasby, and William A. Ghali. "Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data." *Medical care* (2005): 1130-1139.
- ICD-9-CM and ICD-10 algorithms for Charlson and Elixhauser (Quan version) yielded similar results

# HCC / DCG Method

- **Developed to predict costs**
- **15,000 ICD-9 diagnosis codes put into**
  - 185 buckets of homogeneous conditions
- **Homogeneous condition categories (buckets) arranged hierarchically**
  - Within single organ system
  - Patients falling into more than one bucket in organ system assigned to one with highest resource use
- **HCC/DCG risk scores calculated**

# Pharmacy Data

- **Example: VA-based version of RxRisk (Chronic Disease Score)**
  - Includes 45 chronic disease categories identified through prescription data
  - See Sloan KL, et al. Construction and characteristics of RxRisk-V: a VA-adapted pharmacy-based case-mix instrument. *Med Care* 2003; 41(6): 761-74



# Combining VA and CMS Data to Measure Comorbidities

- **Pitfall #1: Not using both data sources**
- **Differing incentives to record complete information**
- **Dates-of-service issues may impact measurement time period**
  - VA and Medicare inpatient care: exact diagnosis date usually not captured
  - Medicare: some services billed periodically, e.g., home health
- **Multiple types of codes**

# Importance of Complete Data

## ■ Incomplete health status information

– Byrne, et al. 2006<sup>1</sup>

*Effect of using information from only one system for dually eligible health care users*

– **Objective:** Determine whether all diagnoses and total illness burden of patients who use both the VA and Medicare health care systems can be obtained from examination of data from only one of these systems

– **Calculated risk scores** using VA only, Medicare only, and both VA and Medicare data

<sup>1</sup> Byrne MM, Kuebeler M, Pietz K, Petersen LA. Effect of using information from only one system for dually eligible health care users. *Med Care*. 2006; 44(8):768-773

# Importance of Complete Data

Byrne, et al., 2006

- On average for a given patient who used both VA and Medicare services, more diagnoses were recorded in Medicare (~13–15) than in the VA system (~8) for dual users.
- On average only 2 diagnoses were common to both the VA and Medicare.
- Medicare data alone accounted for approximately 80% of individuals' total illness burden, and VA data alone captured one-third of the total illness burden.
- The ratio of RRSs when calculated using Medicare and VA separately was approximately 2.4.

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# Case Study

French DD, Margo CE, Campbell RR.

Comparison of complication rates in veterans receiving cataract surgery through the

Veterans Health Administration and

Medicare. *Med Care.* 2012; 50(7):620-626.



# Case Study:

## Comparison of Secondary Surgery Rates Controlling for Comorbidities

French, et al. (2012)

**Background:** This study questioned whether something intrinsic to the health care delivery system can have an effect on the rate of surgical complications.

**Objective:** To compare the rates of secondary surgeries after cataract extraction for patients having surgery provided through VA or Medicare.

**Note:** Comorbidity indicators as predictor variables

**Sample:** Veterans  $\geq 65$  years old who received outpatient cataract surgery during CY2007

# Case Study:

## Comparison of Secondary Surgery Rates Controlling for Comorbidities

French, et al. (2012)

### ■ Comorbidity data

- Medicare, VA, and Fee Basis
- Outpatient

### ■ Comorbidity measurement

- Measurement period: CY2007
- Clinically relevant ocular comorbidities identified using ICD-9 codes
  - Pseudoexfoliation of lens capsule
  - Glaucoma/ocular hypertension

# Case Study:

## Comparison of Secondary Surgery Rates Controlling for Comorbidities

French, et al. (2012)

### ■ Comorbidity measurement (cont'd)

- Medically relevant comorbidities identified using ICD-9 codes based on a modified Charlson Comorbidity Index<sup>1</sup>
  - Myocardial infarction
  - Congestive heart failure
  - Cerebrovascular disease
  - Chronic respiratory disease
  - Diabetes
  - Cancer
  - Moderate or severe liver disease
  - Renal failure
  - Prostatic hyperplasia



<sup>1</sup> Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis.* 1987;40(5):373-383

# Case Study:

## Comparison of Secondary Surgery Rates Controlling for Comorbidities

French, et al. (2012)

### ■ Results-Comorbidity Indicators

- Comorbidities were prevalent in both groups. Patients in the Medicare cataract surgery group had greater proportions of cancer, chronic respiratory disease, prostatic hyperplasia, and congestive heart failure.

### ■ Limitation

- Exclusion criteria were applied from 2005 forward, which could miss diagnoses that existed before that time and were never updated in the electronic medical record.

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# VIREC Help

## ■ VIREC Web site

<http://www.virec.research.va.gov>

- Information on VA data sources and how to access data
- Documentation on most commonly used VA datasets, i.e., Medical SAS Datasets, DSS Clinical National Data Extracts, CDW, and VA CMS data available through VIREC
- A tutorial providing step-by-step guidance on the construction of a comorbidity index.

# VIReC Help (cont'd)

## ■ HSRData Listserv

- Join at the VIReC Web site
- Discussion among >650 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?**

# Upcoming Seminar

## *Improving Mortality Ascertainment Using the VA Vital Status Dataset*

July 14<sup>th</sup>, 2014, 1pm ET

Elizabeth Tarlov, PhD, RN