

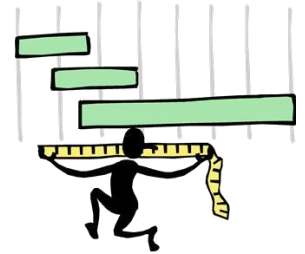
Types of Procedure Codes (cont'd)

- HCPCS (Healthcare Common Procedure Coding System) Codes¹
 - Used in Medicare/Medicaid billing
 - Level 1: CPT[®] 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)

¹ <http://www.cms.gov/Medicare/Coding/MedHCPCSGenInfo/index.html>

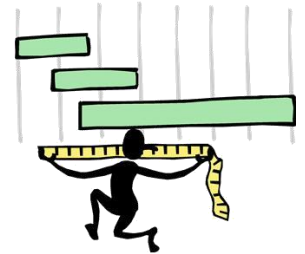


What conditions or condition groups to capture?



- 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)

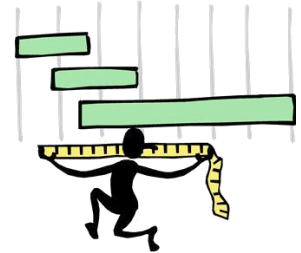
What conditions to capture?



Identify *clinician-assigned* diagnoses

- Avoid clinical laboratory, diagnostic imaging (radiology, x-ray), and other ancillary test/service events; DME/prosthetics; telephone encounters
- VA – MCA (formerly DSS) Primary Stop Codes
- Medicare – DME File, Physician Specialty codes, Claim type code, BETOS, Place of Service codes

Exclude 'rule-out' diagnoses

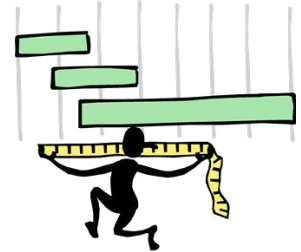


Operational definition: Any diagnosis that ***does not*** meet the following criteria¹

- 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
- Most common approach, but could have reasons for doing things differently

¹ 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

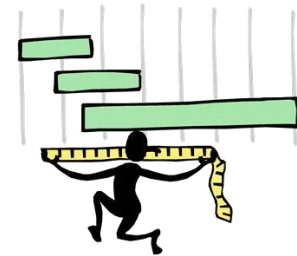
Identifying Non-Clinician-Assigned Diagnoses



- Examples of VA Stop Codes used to identify records for exclusion
 - X-ray 105
 - Laboratory 108
 - Telephone 103, 147, 178 (and others)

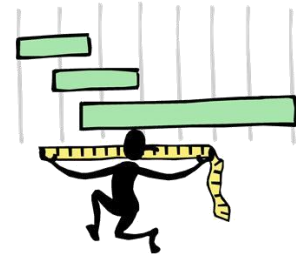
- Examples of Medicare Provider Specialty codes used to identify claims for exclusion
 - Diagnostic radiology 30
 - Mammography screening center 45
 - Clinical laboratory 69

Measurement time period



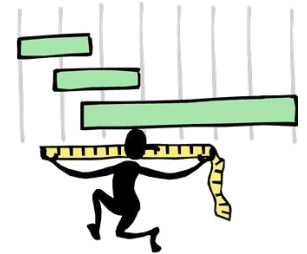
- Active diagnoses
- Temporal relationship between comorbidity measurement and outcome measurement
- Anchor
 - Date
 - Event

Special Challenges



- Measuring functional status
- Measuring severity of disease
- Undiagnosed conditions
 - You need to have an encounter with a provider in order to have an identifiable diagnosis

Comorbidity measurement using administrative data

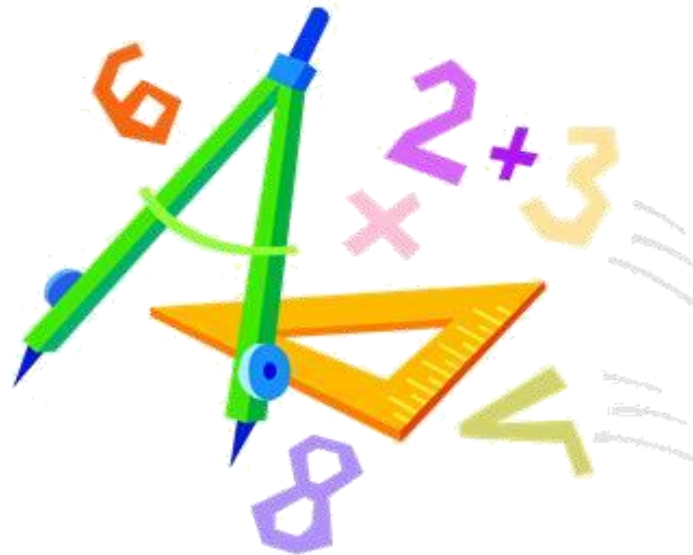


i.e., electronic health record -- data is tied to healthcare use

- In VA: no healthcare encounter -> no record generated -> no diagnosis recorded
- Non-VA data sources, other than those in Non-VA Medical Care [formerly Fee Basis], may generate procedure and diagnosis codes not available in VA data
- More frequent use of healthcare -> more opportunities for diagnoses made and recorded

Analytic Strategies in Comorbidity Measurement Using Administrative Data¹

- Ordinal
- Weighting
- Categorical



¹ 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

- Charlson
 - Deyo-Charlson
 - Romano adaptation
- Quan (Charlson and Elixhauser methods – 2005 Medical Care)
- Elixhauser
- HCC/DCG
- RxRisk
- Nosos
- ACG
- Functional Comorbidity Index
- 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



Charlson vs. Elixhauser (Quan)



- ICD-9-CM and ICD-10 algorithms for Charlson and Elixhauser (Quan version) yielded similar results
- 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

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 within an organ system assigned to one with highest resource use
- HCC/DCG risk scores calculated

Nosos and CMS V21 Measures



- VA developed tailored solution built off of D_xCG (HCC) Risk Solutions model
- CMS V21 based on the CMS 189 HCC Prospective Risk Model
- Nosos¹ from Greek for “Chronic Disease” adds VA specific registry and other factors to the CMS V21 model and generates prospective/concurrent models
- Models with SAS datasets² and programs³ available

¹See: Todd Wagner, presentation, *Risk Adjustment for Cost Analyses: Development and Implementation of the V21 and Nosos Systems* February 18, 2015 HERC Health Economics Seminar

²SAS datasets available for FY2006-2014 at \\vhacdwap15\RiskScores

³SAS Programs available on VINCI SAS Grid at /data/ops/OPES_CMSHCCV21/nososmacros

Why Nosos?

- VA specific and validated improvements to base CMS V21 model
- Adds VA relevant demographics, including VA priority
- Employs VA Registries (e.g. Spinal Cord Injury, PTSD, Hepatitis C, Transplant, ESRD, Homeless)
- Uses 26 of the 29 PBM Drug Classes (the ones commonly used in VA)
- Employs 46 Rosen psychiatric condition categories

Pharmacy Data

VA Chronic Disease Score



VA-based version of RxRisk

- 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



Main Pitfall: **Not** using both data sources

Issues:

- Differing incentives to record complete information
- Differing 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
- Differing types of codes used

Importance of Complete Data



Incomplete health status information: **Byrne**, et al. 2006¹
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

¹ 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 (Medicare more severe).
- The ratio of RRSs when calculated using Medicare and VA separately was approximately 2.4.

Case Study: Pugh, et al. (2014)

- Results
 - 6 Comorbidity clusters (Latent Class Analysis) were identified
 - PCT (Polytrauma Clinical Triad) + Chronic Disease
 - PCT alone
 - Mental Health + Substance Abuse
 - Sleep, Amputation, Chronic Disease
 - Pain, Moderate PTSD
 - Relatively Healthy
- Limitation: Data do not reflect non-VA care or diagnoses received in non-VA settings, probably very significant in this younger population.

Summary

- Selecting the right method always depends on the research questions and the conceptual role of comorbidities affecting your particular study
- There is no one-size-fits-all approach!!!
- You want to consider pros and cons of particular approaches you are considering carefully
- Make sure you understand the frailty and possible inconsistencies in coding from the data you use...
- So think about the data generating process of your data, does it come solely from the VA (so you have VA registries, e.g.) or are you combining with Medicare or Medicaid data? Why are you using the data you are using?

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**

Comorbidity Resources

- Tutorial providing step-by-step guidance on constructing a comorbidity index
 - <http://vaww.virec.research.va.gov/Tutorials/CALC-CCI/Tutorial-CALC-CCI-CY15.pdf> (VA Intranet only)
- “Risk Adjustment for Cost Analyses: The Development and Implementation of a New System” (HERC Cyberseminar)
 - http://www.hsrcd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=933
- Risk Adjustment: Guide to the V21 and Nosos Risk Score Programs
 - <http://www.herc.research.va.gov/include/page.asp?id=technical-report-risk-adjustment> (HERC Website)
- ICD-10 Transition
 - <http://vaww.virec.research.va.gov/ICD-10/Overview.htm> (VA Intranet only)

VIReC Resources

- VIReC Website
 - <http://vaww.virec.research.va.gov> (VA Intranet only)
 - Provides Information on VA data sources and how to access data
 - Documentation on most commonly used VA datasets, i.e., Medical SAS Datasets, MCA Clinical National Data Extracts, CDW, and VA/CMS Data available through VIReC
- HSRData Listserv
 - Join at the VIReC Website
 - Discussion among >1140 data stewards, managers, and users
 - Past messages in archive (VA Intranet)
- VIReC HelpDesk
 - VIReC staff will answer your question and/or direct you to available resources on topics
 - VIReC@va.gov
 - (708) 202-2413

