

Validating and Grouping Diagnosis Codes

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Presentation Goals & Context

Goals

- ▶ Cover basic concepts about diagnoses and codes
- ▶ Share some examples
- ▶ Provide useful, accessible references

My Background

- ▶ I am a statistician with 2 decades of experience analyzing Medicare data
- ▶ Experience includes
 - ▶ HCFA's hospital mortality analyses and reports
 - ▶ Medicare data support for AHCPH's PORTs and clinical practice guidelines
 - ▶ identifying the costliest and most common Medicare conditions
 - ▶ CMS' Chronic Condition Warehouse

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Definitions

Disease

- ▶ an abnormal condition of an organism that impairs bodily functions (en.wikipedia.org/wiki/Disease)

Nosology

- ▶ a branch of medicine that deals with classification of diseases. Diseases may be classified by cause, mechanism by which the disease is caused, organ system impaired, or by symptom (en.wikipedia.org/wiki/Nosology)

Diagnostics

- ▶ the process of identifying a medical condition or disease by its signs, symptoms, and from the results of various diagnostic procedures.

Diagnosis

- ▶ the conclusion reached through the diagnostic process (en.wikipedia.org/wiki/Diagnosis)

Changes—Historical

Over the centuries as science has progressed, nosology and diagnostics have expanded

Diagnostic Method	Disease
symptoms	migraine
signs	epilepsy
gross anatomy	aortic aneurysm
bacteriology	staphylococcal bacteremia
histology	prostate carcinoma
clinical chemistry	hypothyroidism
cytogenetics	trisomy 18 syndrome
molecular biology	familial hypercholesterolemia

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Changes—Contemporary

Diseases continue to develop & evolve

- ▶ HIV disease, SARS, Avian flu pandemic?

Knowledge of disease continues to expand

- ▶ In FY07, there were 1,087 new entries and 8,449 changes to a database that contains diseases with a genetic component
(www.ncbi.nlm.nih.gov/Omim/disupdates.html)

Diagnostic tests continue to improve

- ▶ Prostate cancer antigen-2 (EPCA-2) test provides better sensitivity and specificity than prostate specific antigen (PSA) test

Interoperable medical terminology standards developed

- ▶ Consolidated Health Informatics Initiative
(www.hhs.gov/healthit/chiinitiative.html)

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Challenges—Disease

Progression

- ▶ Natural history
- ▶ Stages

Sequential Causality

- ▶ An example

Condition
low-density lipoprotein receptor gene mutation ~→
hypercholesterolemia ~→
atherosclerosis ~→
myocardial infarction ~→
pulmonary edema ~→
hypoxemia ~→
confusion

Comorbidities are conditions that exist at the same time as the primary condition in the same patient

(www.cdc.gov/nchs/datawh/nchsdefs/comorbidities.htm)

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Challenges—Diagnostics

Symptoms of some diseases overlap particularly during their early stages

- ▶ Some diagnoses are made by ruling out other diagnoses

Some diseases can only be definitely diagnosed after death

- ▶ e.g., Alzheimer's Disease
(www.nlm.nih.gov/medlineplus/ency/article/000760.htm#Causes, incidence, and risk factors)

Guided by the patient's symptoms and conditions

- ▶ generally not comprehensive
- ▶ many are not exhaustive
- ▶ some are not definitive

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Challenges—Diagnostics (continued)

Limited or imprecise description of symptoms

- ▶ patients with impaired cognitive capabilities
- ▶ patients with minimal health education

Errors and inconsistent results

- ▶ false positives and negatives
- ▶ lack of intra- and inter-rater reliability

Multiple conditions

Rare diseases

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Overview

For over 2 decades, CMS has specified that claim diagnoses be reported using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes

The ICD-9-CM codes are

- ▶ extensions of the ICD-9 codes developed by the World Health Organization (WHO)
- ▶ maintained by the National Center for Health Statistics (NCHS) and CMS
- ▶ updated annually

The annual publications for these codes are

- ▶ organized into 17 chapters, two supplementary classifications, and four appendices
- ▶ available at ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/ICD9-CM/

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Structure—Chapters

For claim diagnoses, CMS uses the 13,677 codes in the chapters and supplementary classifications (referred to as V & E)

#	Title	#	Title
1	Infectious	11	Pregnancy
2	Neoplasm	12	Skin
3	Endocrine	13	Musculoskeletal
4	Blood	14	Congenital
5	Mental	15	Perinatal
6	Nervous system	16	Symptom & sign
7	Circulatory	17	Injury
8	Respiratory	V	Health status
9	Digestive	E	External cause
10	Genitourinary		

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Structure—Subchapter and below

The 19 chapter equivalents are partitioned into 151 subchapters which are partitioned into 1,201 3 digit codes See Appendix E of the annual publications (Note, 3 digit E codes are 4 characters long)

The hierarchical partitioning stops with the 3 digit codes e.g., see the 5th digit subclassifications in the annual publications

To ensure completeness and accommodate some coarseness, ICD-9-CM includes categories labeled NEC (not elsewhere classifiable) and NOS (not otherwise specified)

Some conditions require an ordered sequence of codes e.g., type II diabetic cataract should be coded 250.50 366.41 where 250.50 indicates the cause, type II diabetes with ophthalmic manifestation, and 366.41 indicates the specific manifestation, diabetic cataract

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Codes are left justified and leading zeros are significant

Chapter codes are numeric, 3-5 digits long, and may contain a period between the 3rd and 4th digits

V codes start with a V followed by 2-4 digits and may contain a period between the 2nd and 3rd digits

E codes start with an E followed by 3-4 digits and may contain a period between the 3rd and 4th digits

The diagnosis code fields in CMS' IT systems should not contain periods

Machine readable code tables for FY03–FY08 are at www.cms.hhs.gov/ICD9ProviderDiagnosticCodes/06_codes.asp

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General Observations

Diseases have many, varied attributes including: acute, chronic, catastrophic, congenital, iatrogenic, and infectious

Diseases can be grouped by common attributes or groups of common attributes

Common attributes can be determined from external sources such as medical literature and databases; some can be determined from the data

Some groupings target specific conditions; others include all conditions

Groupings tailored for a project are ideal, but generally require significant resources including an interdisciplinary team to develop and maintain

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Clinical Classification Software (CCS)

AHRQ has developed and maintains CCS which includes tools for clustering patient diagnoses into a manageable number of clinically meaningful categories

Documentation for the 2008 version is available at www.hcup-us.ahrq.gov/toolssoftware/ccs/CCSUsersGuide.pdf

CCS 2008 can be used for data from January 1980 through September 2008

It includes single- and multi-level classification systems for diagnoses

The single level system has 289 mutually exclusive categories, most of which are clinically homogeneous

The web page is www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp

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Chronic Condition Warehouse (CCW)

For CMS' CCW, ResDAC developed algorithms to identify the following 21 chronic conditions

AMI	Heart Failure
Alzheimer's Disease	Hip/Pelvic Fracture
Alzheimer's & Dementia	Ischemic Heart Disease
Atrial Fibrillation	Osteoporosis
Cataract	Rheumatoid & Osteo- arthritis
Chronic Kidney Disease	Stroke & TIA
COPD	Female Breast Cancer
Depression	Colorectal Cancer
Diabetes	Prostate Cancer
Glaucoma	Lung Cancer
	Endometrial Cancer

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The algorithms are available in Appendix A of the CCW User Manual at http://65.117.255.59/downloads/CCW_User_Manual.pdf

Algorithm features include

- ▶ a preceding time period when the beneficiary was eligible for claim-based services
- ▶ number and type of claims during the period
- ▶ procedure codes used for claim inclusion
- ▶ claim-exclusion criteria
- ▶ a subsequent period for diagnostic refinement
- ▶ algorithms based on published literature; see www.resdac.umn.edu/CCW/ccw_docs/CCW_Algorithm_Definitions_References_ResDAC_072006.xls

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Patient counts for the conditions are available at
[http://65.117.255.59/downloads/data_tables/
CCW Web site Table B.1.pdf](http://65.117.255.59/downloads/data_tables/CCW%20Web%20site%20Table%20B.1.pdf)

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ICD-10-CM

- ▶ adoption included in CMS IT Strategic Plan 2007, www.cms.hhs.gov/InfoTechGenInfo/Downloads/ITStrategicPlan.pdf
- ▶ has been developed, reviewed, and field tested, www.cdc.gov/nchs/about/otheract/icd9/abtcd10.htm
- ▶ has 5 times more Dx codes than ICD-9-CM and includes files to assist mapping from ICD-9-CM, www.cdc.gov/nchs/about/otheract/icd9/icd10cm.htm

ICD-11

- ▶ WHO has started developing ICD-11, extranet.who.int/icdrevision/help/docs/ICDRevision.pdf
- ▶ plan to include linkages to standardized health care terminologies such as SNOMED-CT, www.nlm.nih.gov/research/umls/Snomed/snomed_faq.html

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