

Putting the Pieces Together

Rolling up the Diagnosis and Procedure Codes into Meaningful Categories:

Application of the Clinical Classifications
Software to OSHPD Patient Data

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Before we start—some definitions

- CCS: Clinical Classifications Software
- ICD-9: International Classification of Diseases, 9th Revision
- CPT: Current Procedural Terminology (© AMA)
- AHRQ: Agency for Healthcare Research and Quality
 - HCUP: Healthcare Cost and Utilization Project (a project of AHRQ)
- ASC: Ambulatory Surgery Center



What CCS is

- Software tools for clustering patient data into a manageable number of clinically meaningful categories.
- Developed by:
 - Agency for Healthcare Research and Quality (AHRQ)
 - Healthcare Utilization and Cost Project (HCUP).
- Separate sets of codes for:
 - Diagnoses: ICD-9 diagnosis codes (inpatients and outpatients)
 - Also available: Clinical Classifications Software (CCS) for ICD-10
 - Procedures: ICD-9 procedure codes (inpatients) AND CPT codes (outpatients)
 - Also available:
 - Mental Health and Substance Abuse Clinical Classification Software (CCS-MHSA)
 - Chronic Condition Indicators
 - Comorbidity Software



Clustering Diagnosis Codes

- **Single-level CCS:** Clusters ICD-9 diagnosis codes into 280 groups.

- Example:

- CCS 2 Septicemia (except in labor)
- includes ICD-9 codes: 003.1 020.2 022.3 036.2 038.0 038.1 038.10
038.11 038.12 038.19 038.2 038.3 038.40 038.41 038.42 038.43 038.44
038.49 038.8 038.9 054.5 449. 790.7

- **Multi-level CCS:** Clusters CCS codes into 18 main groups, with further breakout.

- Example:

- Multi-level cluster 1 Infectious and parasitic diseases

- 1 Infectious and parasitic dis. CCS: 1 2 3 4 5 6 7 8 9 10
- 1.1 Bacterial infection CCS: 1 2 3 9
- 1.1.2 Septicemia (ex in labor) CCS : 2
- 1.1.2.1 Streptococcal septicemia CCS: 2 (CD-9: 038.0)
- 1.1.2.2 Staphylococcal septicemia CCS: 2 (ICD-9: 038.1 038.10
038.11 038.12 038.19)
- And so on...



Clustering Procedure Codes

- Same coding categories for CPT and ICD-9 Procedure Codes
- **Single-level CCS:** Clusters procedure codes into 231 groups.
 - Example: CCS 1 Incision and excision of CNS
- **Multi-level CCS:** CCS codes into 16 main groups.
 - Example: Multi-level cluster 1 Operations on the nervous system
 - 1 Operations on the nervous system CCS: 1 2 3 4 5 6 7 8 9
 - 1.1 Incision and excision of CNS CCS: 1
 - 1.1.1 Craniotomy and craniectomy
 - 1.1.2 Incision of cerebral meninges
 - 1.1.3 Other incision and excision of CNS
 - 1.2 Insertion; replacement; or removal of extracranial ventricular shunt CCS: 2
 - 1.3 Laminectomy; excision intervertebral disc CCS: 3
 - And so on...



Example of use: Comparing in-hospital mortality across diagnoses.

(From: Mortality in California Hospitals, OSHPD, 2007)

Table 3. In-Hospital Mortality Related to Selected Medical Conditions.					
Type of Medical Condition	Admissions		In-Hospital Deaths		
	# of Admissions	% of All Admits	# of Deaths	% of All Deaths	% of Group Died
Septicemia	69,272	1.7	14,098	16.7	20.4
Liver Disease	24,839	0.6	2,022	2.4	8.1
Stroke	84,425	2.1	6,128	7.3	7.3
Cancer	152,110	3.8	9,489	11.2	6.2
Pneumonia & Influenza (P & I)	119,444	3.0	7,733	9.2	6.5
Heart Disease	427,132	10.7	10,894	12.9	2.6
Complications of Medical Procedures & Devices	105,516	2.6	1,911	2.3	1.8
Childbirth	603,676	15.1	89	0.1	0.0
Total for Selected Conditions	1,586,414	39.7	52,364	62.0	3.3
Total for Other Principal Diagnoses	2,410,768	60.3	32,104	38.0	1.3
Total	3,997,182	100.0	84,468	100.0	2.1

Example of
use:
Comparing
inpatient
and
outpatient
procedures

(From: Patient Profile,
OSHPD, 2005)

Top 10 Procedures for Inpatient and Outpatient Encounters. California, 2005								
Principal Procedure (CCS Code)	GENERAL ACUTE CARE		ASC FREE-STANDING		ASC HOSPITAL BASED		EMERGENCY DEPARTMENT	
	F	M	F	M	F	M	F	M
Other procedures to assist delivery	239,767							
Cesarean section	163,197							
Repair of current obstetric laceration	55,651							
Hysterectomy, abdominal and vaginal	49,647							
Respiratory intubation, mechanical ventilation	35,436	39,091						
Blood transfusion	34,224	25,586						
Upper gastrointestinal endoscopy, biopsy	34,025	30,266	54,451	38,031	64,570	46,700		
Prophylactic vaccinations and inoculations	31,789	23,531						
Forceps, vacuum, and breech delivery	30,211							
Episiotomy	29,136							
Circumcision		55,094						
PTCA		38,471						
Appendectomy		23,304						
Cardiac catheterization		23,116					22,632	
Other vascular catheterization, not heart		20,415						
Colonoscopy and biopsy			151,050	130,478	124,217	107,128		
Lens and cataract procedures			80,454	52,988	65,994	44,443		
Insertion of catheter, injection to spinal canal			73,888	57,198	37,955	26,574		
OR procedures on skin and breast			27,242		18,177			
Procedures on muscles and tendons			14,104	13,879			17,542	
Excision of semilunar cartilage of knee			13,776	18,385			20,742	
Procedures on eyelids, conjunctiva, cornea			13,163	8,254				
Decompression peripheral nerve			11,781					
Other OR therapeutic procedures on joints			10,348	12,405				
Inguinal and femoral hernia repair				8,544			36,896	
Arthroplasty other than hip or knee				6,177				
Excision of skin lesion							15,268	
Lumpectomy, quadrantectomy of breast					30,977			
Cholecystectomy					22,449			
D and C after delivery					18,617			
Pathology					18,450			
Interview, evaluation, consultation								1,181,059 1,034,969
Laboratory - Chemistry and Hematology								142,021 99,541
Suture of skin and subcutaneous tissue								92,509 185,634
Traction, splints, and other wound care								78,742 95,264
Diagnostic radiology								78,115 80,593
Routine chest X-ray								49,284 45,036
Electrocardiogram								39,638 30,630
Microscopic examination								38,500 22,573
Incision and drainage (skin, subQ)								23,512 28,540
Total number of encounters	1,477,340	908,067	590,471	454,982	968,245	761,625	2,209,650	2,015,345



How to download it

- ASCII format (for SAS and SPSS users) and Stata format
- ICD-9 diagnosis and procedure codes: <http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp>
- CPT codes: http://www.hcup-us.ahrq.gov/toolssoftware/ccs_svcsproc/ccssvcproc.jsp