Administrative Data and HCUP Tools

Healthcare Cost and Utilization Project

Using Administrative Data to Answer Policy Questions

♦

December 4-5, 2008

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Introductions

H·CUP
HEALTHCARE COST AND UTILIZATION PROJECT

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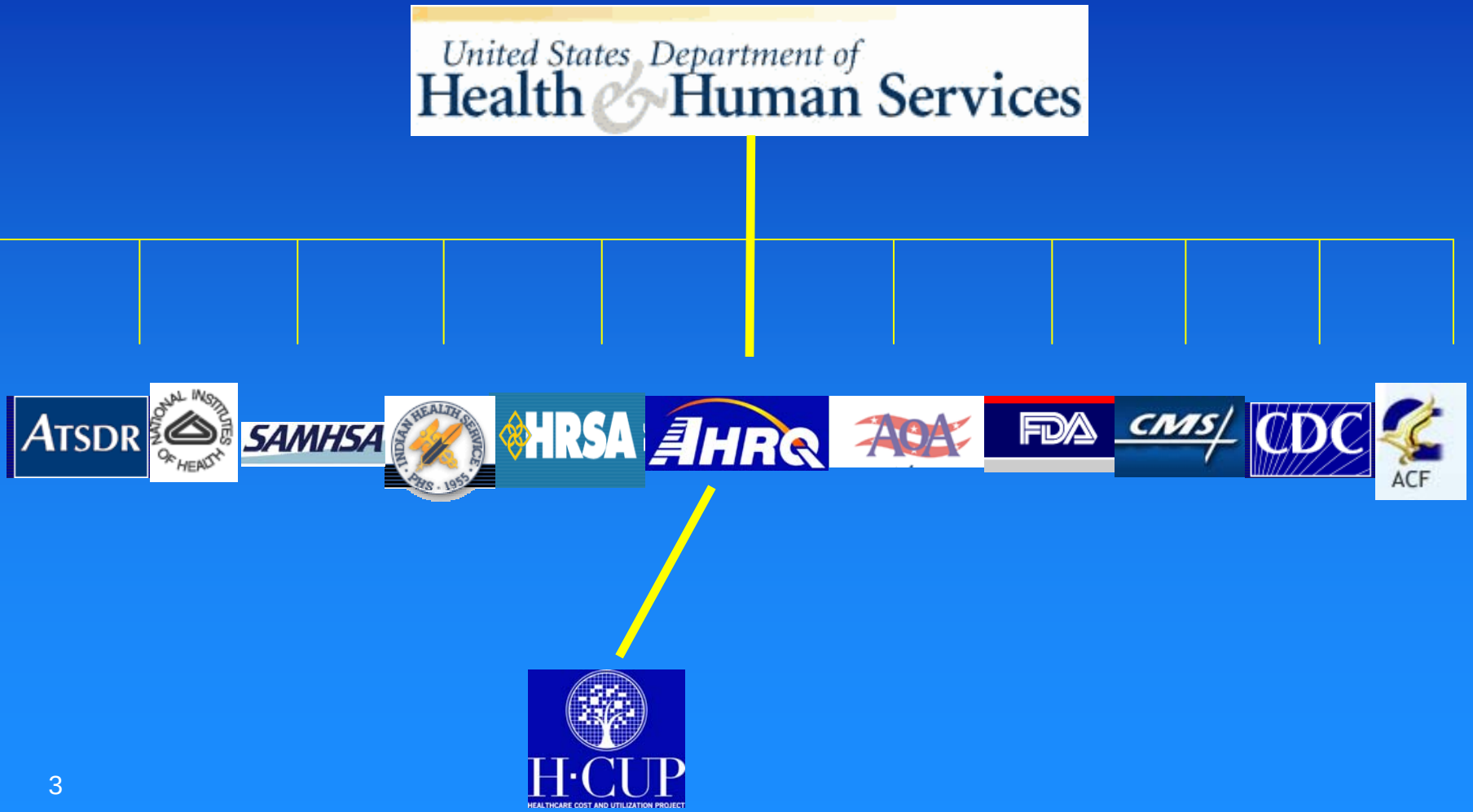
Research Medical Officer

Agency for Healthcare Research and Quality

AHRQ – Agency within DHHS



The HCUP Partnership: A Voluntary Federal-State-Private Sector Collaboration

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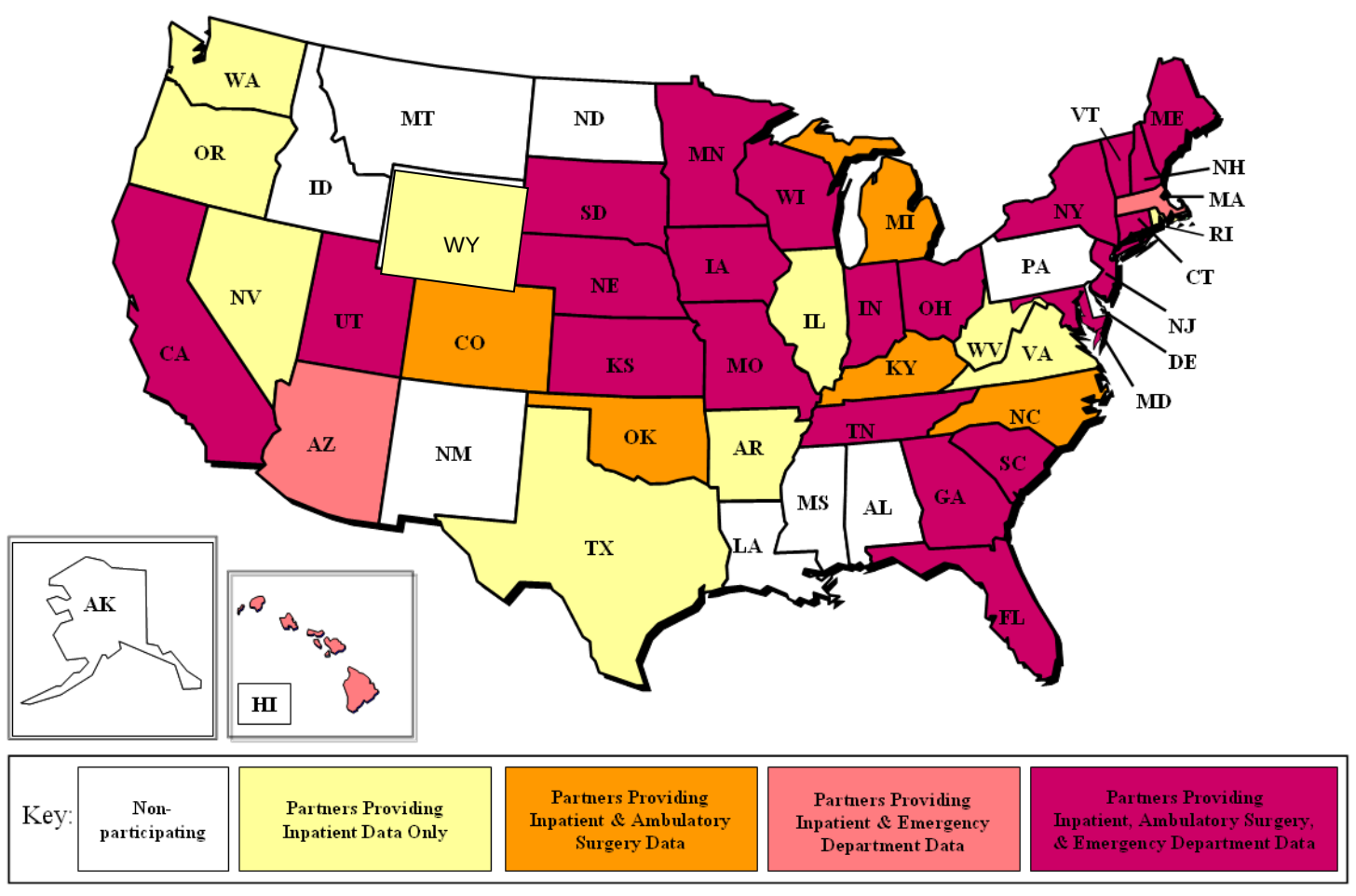

40 states

90% of all discharges

Current HCUP Partners

Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning & Development
Colorado Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital&Health Association
Iowa Hospital Association
Kansas Hospital Association

Current HCUP Partners

Kentucky Cabinet for Health and Family Services

Maine Health Data Organization

Maryland Health Services Cost Review Commission

Massachusetts Division of Health Care Finance and Policy

Michigan Health & Hospital Association

Minnesota Hospital Association

Missouri Hospital Industry Data Institute

Nebraska Hospital Association

Nevada Division of Health Care Financing and Policy, Department of Health and Human Services

New Hampshire Department of Health & Human Services

New Jersey Department of Health and Senior Services

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Current HCUP Partners

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New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oklahoma Health Care Information Center for Health Statistics
Oregon Association of Hospitals and Health Systems
Rhode Island Department of Health
South Carolina State Budget & Control Board
South Dakota Association of Health Care Organizations
Tennessee Hospital Association

Current HCUP Partners

Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health and Family Services
Wyoming Hospital Association

HCUP Is a Family of Databases, Tools, and Products

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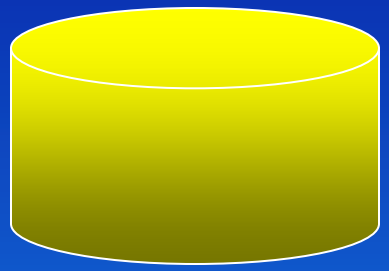
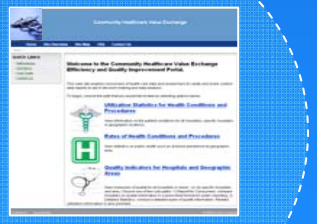


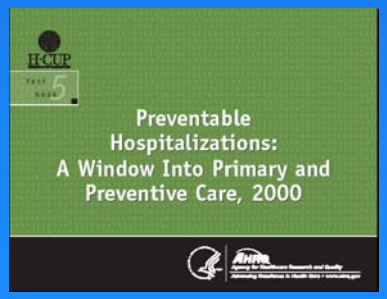
HCUP Databases

Software Tools



EQUIPS

User Support



Research Publications

Administrative Data

The Foundation of Administrative Data is Billing Data

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Demographic Data

Diagnoses
Procedures
Charges

Billing UB-04 Form

| | | |

The Flow of Inpatient Admissions

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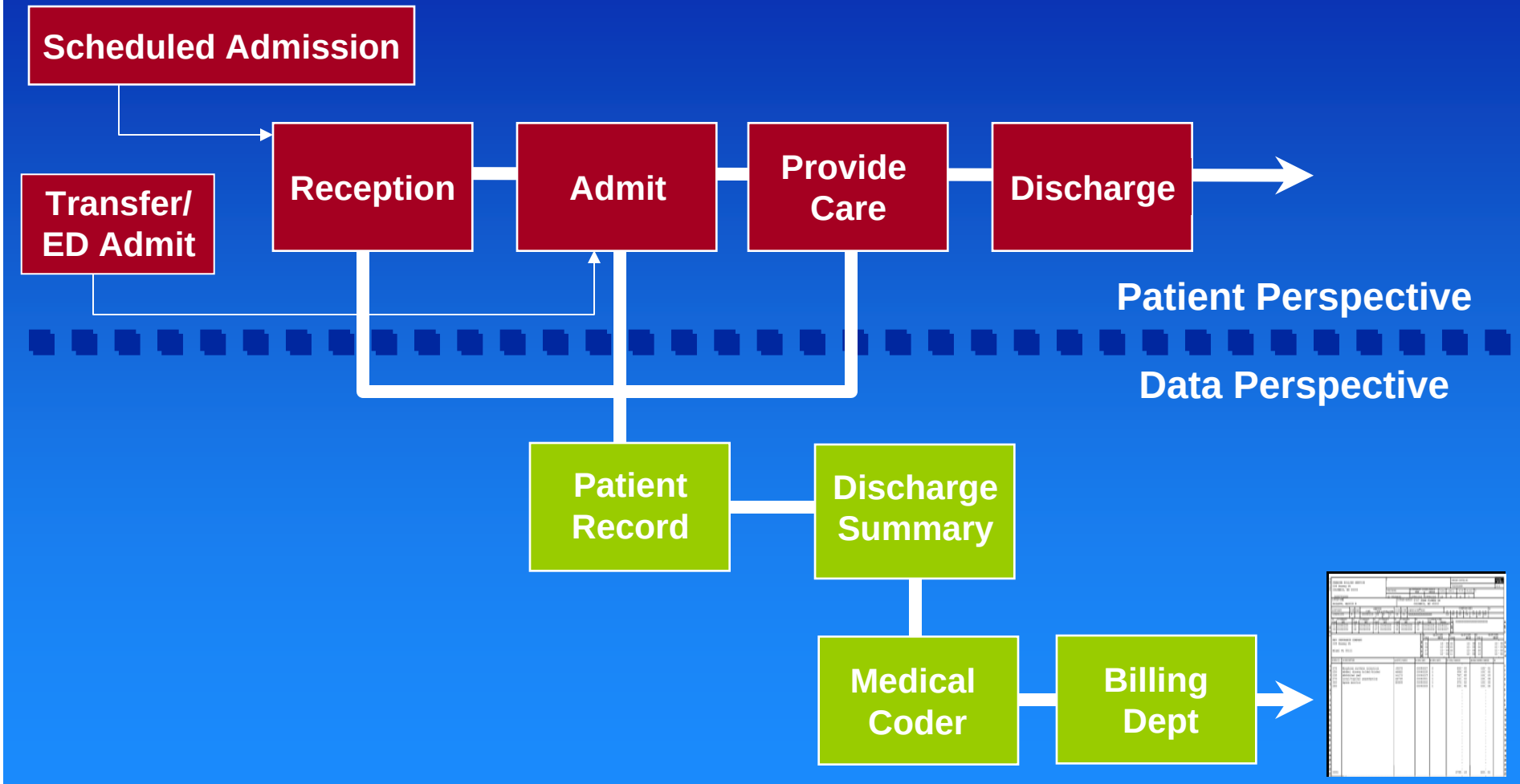
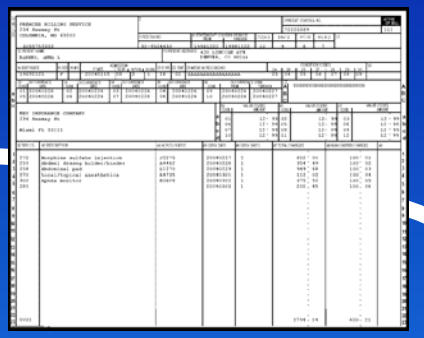


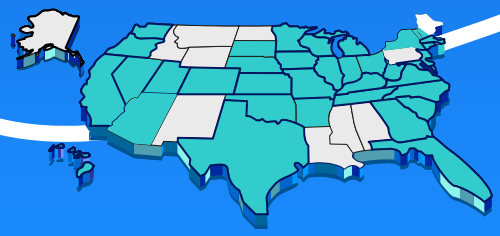
From Patient to Data

Patient enters hospital



Billing record created

Hospital sends billing data and any additional data elements to Data Organizations



States store data in varying formats

AHRQ standardizes data to create uniform HCUP databases

General File Structure for Hospital Administrative Data

- **Range of file sizes**
  - ~ 55,000 to 4.0 million records, depending on state
- **Core set of variables**
  - Generally available across most states
- **State-specific variables**
  - Vary by state
  - Allow specific analyses to be done
    - Patient race/ethnicity – to examine disparities
    - Encrypted patient identifier – to examine readmissions

What Core Data Elements Are Included in Administrative Data?

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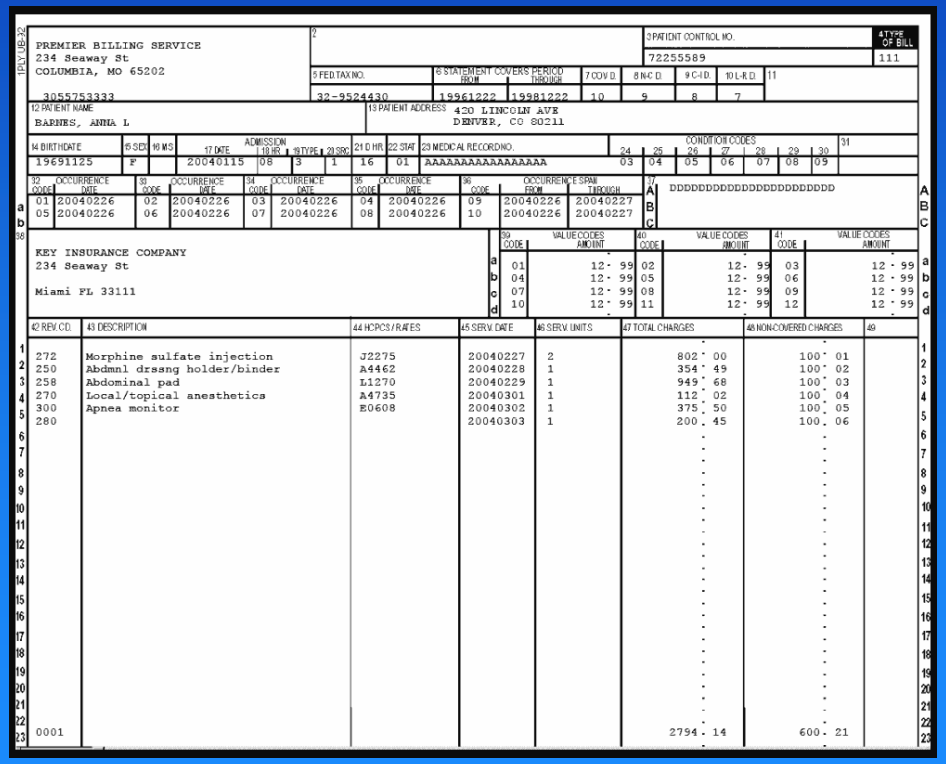
UB-04 Billing Form



| | | |

What are Some State-Specific Data Elements?

- Race/Ethnicity
- Patient county
- Patient ZIP Code
- Severity of illness
- Birthweight
- Procedure date (days from admission)
- Primary payer details
- Secondary payer
- Detailed charges
- Patient identifiers, encrypted
- Physician identifiers, encrypted
- Physician specialty

Example: Payer Detail Varies by State

PAY1_X		PAY1 (HCUP Standard)	
Value	**Description**	**Value**	**Description**
M	Medicare	1	Medicare
D	Medicaid	2	Medicaid
B	Blue Cross and Blue Shield	3	Private Insurance
I, S	Other Insurance Comp; Self Ins		
H	HMO-PPO		
P	Self-pay	4	Self-pay
Z	Free	5	No charge
W	Workers' Comp	6	Other
C	CHAMPUS		
E, N	Other Government		
L, O	Other		
3, 5, A, F, G, J, K, Y	Unknown		Missing
Other values		A	Invalid

Hospital Billing Data Have Benefits and Limitations

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Benefits

- Large sample size
- Uniformity of coding
- Routine, regular collection
- Ease of access
- All-payer
- Available at local, state, regional, national level

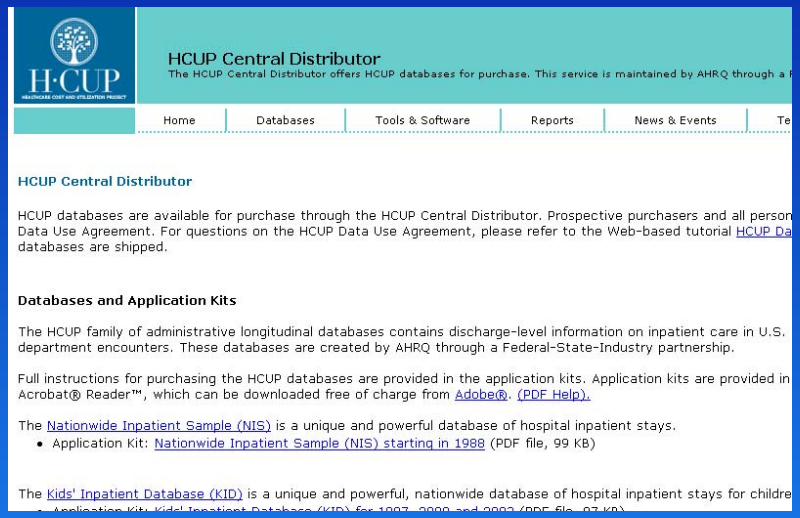
Limitations

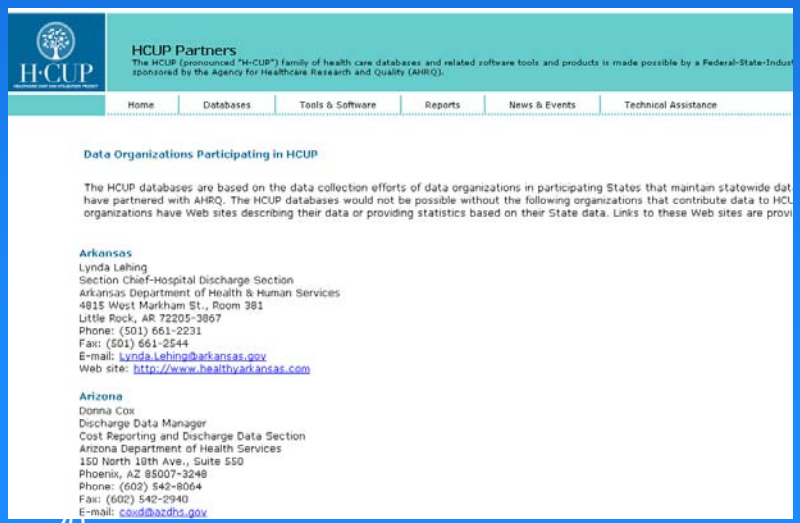
- Differences in coding across hospitals
- No data on individuals outside of hospital system
- May not show complete episode of care
- May not include all hospitals
- Lack revenue information
- Sparse clinical details

Accessing Data

- Your own state data organization can provide:
  - Most recent data
  - Data elements not released outside government
    - e.g., patient identifiers, physician identifiers, linkage variables
- To compare your data with other states:
  - Obtain HCUP-formatted, uniform files through HCUP Central Distributor
  - Obtain other states' data directly from other states
  - Can access summary statistics through HCUPnet
- National benchmarks

Obtain HCUP Data – Two Methods





HCUP Central Distributor

www.hcup-us.ahrq.gov/tech_assist/centdist.jsp

HCUP Partner States

http://www.hcup-us.ahrq.gov/partners.jsp

States Releasing SID through HCUP Central Distributor

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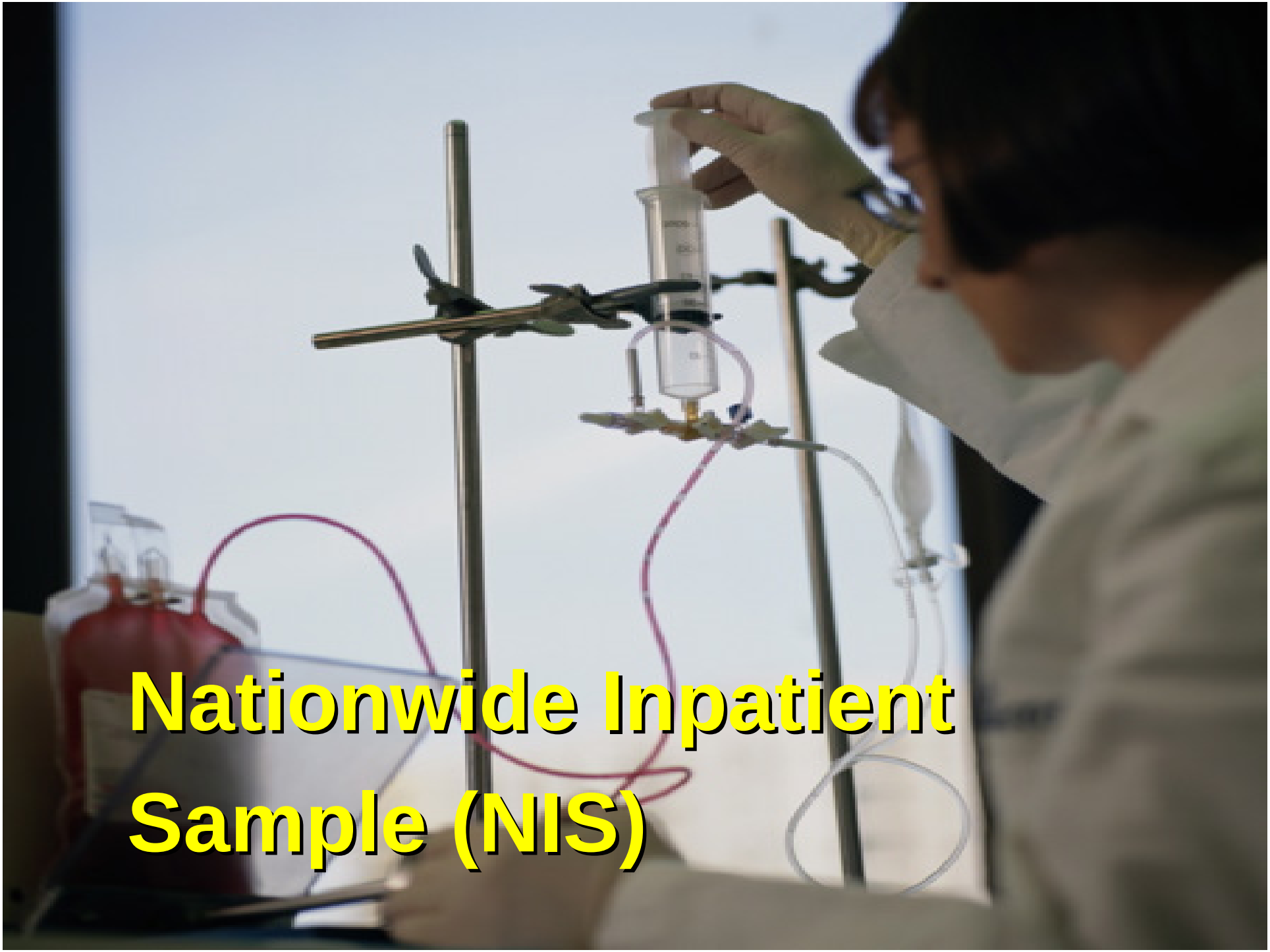
1990 – 2007*

- Arizona
- Arkansas
- California**
- Colorado
- Florida
- Hawaii
- Iowa
- Kentucky
- Maryland
- Massachusetts
- Michigan
- Nebraska
- Nevada
- New Jersey
- New York
- North Carolina
- Oregon
- Rhode Island
- South Carolina
- Utah
- Vermont
- Washington
- West Virginia
- Wisconsin

* Not all states participate in all years.

** Special application process.


Nationwide Inpatient
Sample (NIS)

What Is the Nationwide Inpatient Sample (NIS)?

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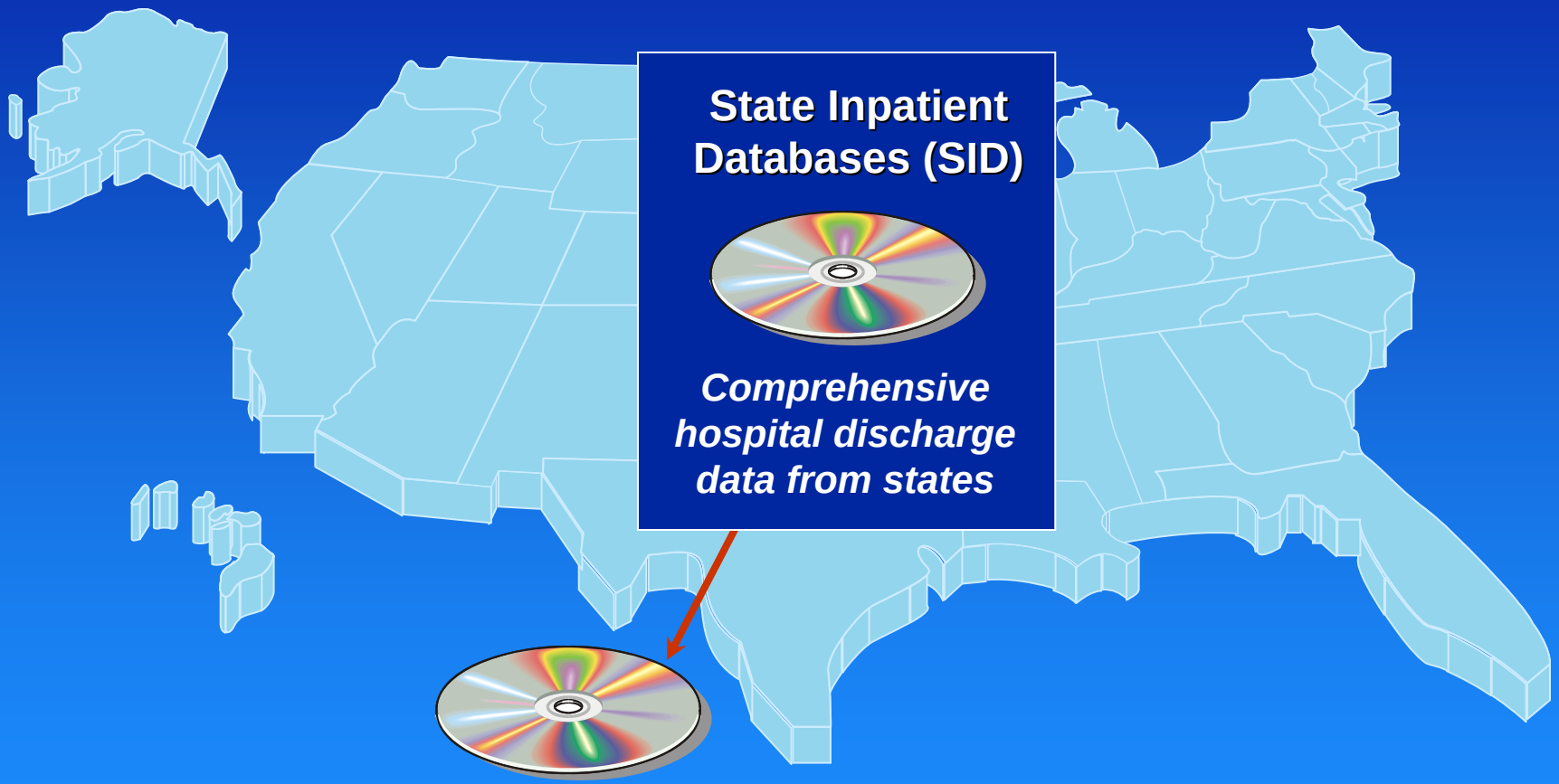
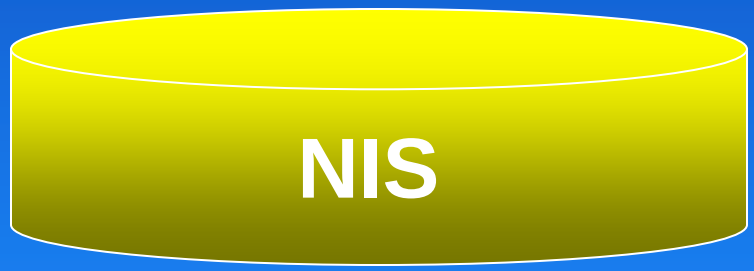


Purpose of the NIS

Allows national and regional studies of inpatient hospital utilization and charges – generates national estimates



Not recommended for state-level analyses

Statewide Data Systems Participating in NIS

Data Year	# of States	States
1988	8	CA, CO, FL, IA, IL, MA, NJ, WA
1989-1992	11	+ AZ, PA, WI
1993-1994	17	+ CT, KS, MD, NY, OR, SC
1995-1996	19	+ MO, TN
1997-1998	22	+ HI, UT, GA
1999	24	+ ME, VA
2000	28	+ KY, NC, TX, WV
2001	33	+ MI*, MN, NE, RI, VT
2002	35	+ NV, OH, SD [AZ not available]
2003	37	+ AZ, IN, NH [ME not available]
2004	37	+ AR [PA not available]
2005	37	+OK [VA not available]
2006	38	+VA

The NIS Can Be Used for Many Purposes

- Use of and charges for hospital services
- Medical practice variation
- Medical treatment effectiveness
- Quality of care and patient safety
- Impact of health policy changes
- Diffusion of medical technology

Provides national and regional benchmarks to compare your own experience

Coming Soon...
National Emergency Department Sample (NEDS)

Software Tools for Use
with Administrative Data

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HCUP Software Tools

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Clinical Classification System (CCS)
ICD-9-CM CCS
ICD-10 CCS
CPT CCS
Mental Health CCS
Comorbidity Software
Chronic Condition Indicators
Procedure Classes
Cost-to-Charge Ratios
HCUPnet

Hospital Market Structure (HMS) Flags
Utilization Flags
Quality Indicators
Prevention QIs
Inpatient QIs
Patient Safety QIs
Pediatric QIs

Number of HCUP-related Software Tools: 15

Most AHRQ HCUP Tools Can Be Applied to Any Administrative Database

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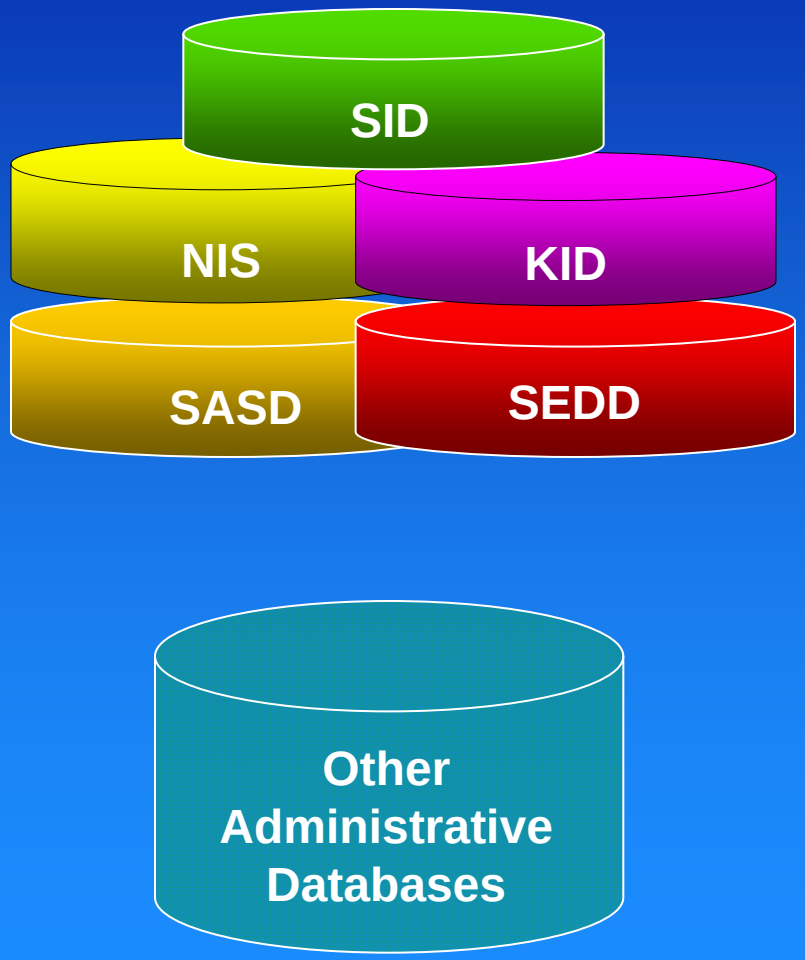


CCS Tools

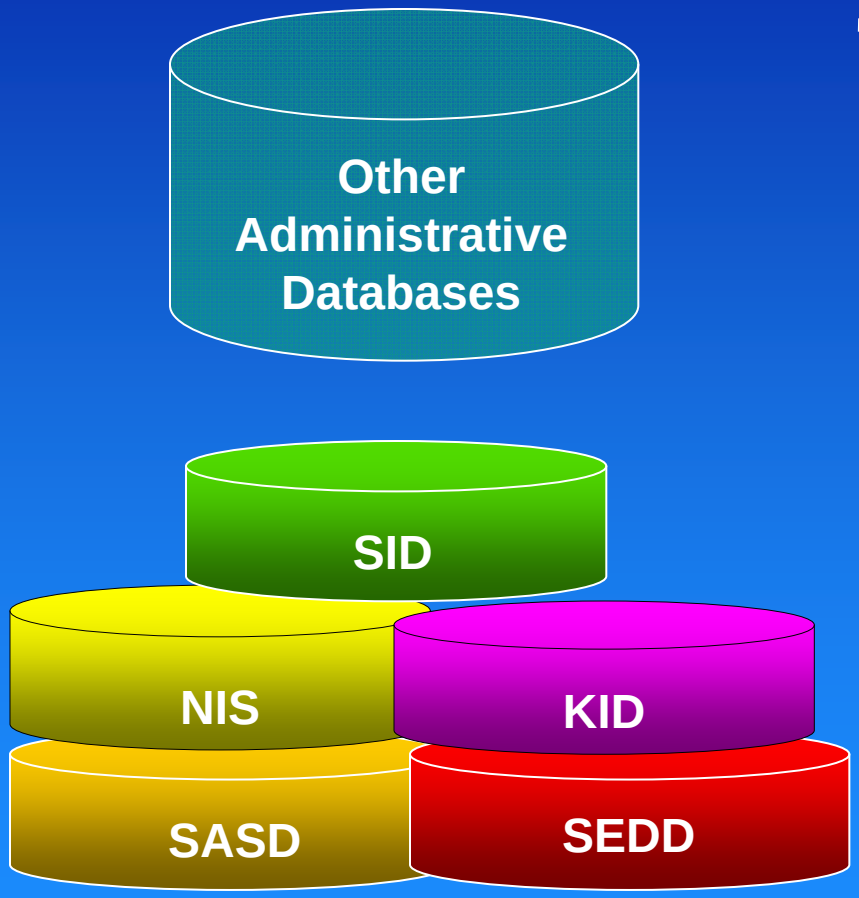
Comorbidity

Procedure Classes

Chronic Condition Indicator

AHRQ QIs

Most AHRQ HCUP Tools Aid to Summarize Data



CCS Tools

ICD-9-CM CCS

ICD-10 CCS

CPT CCS

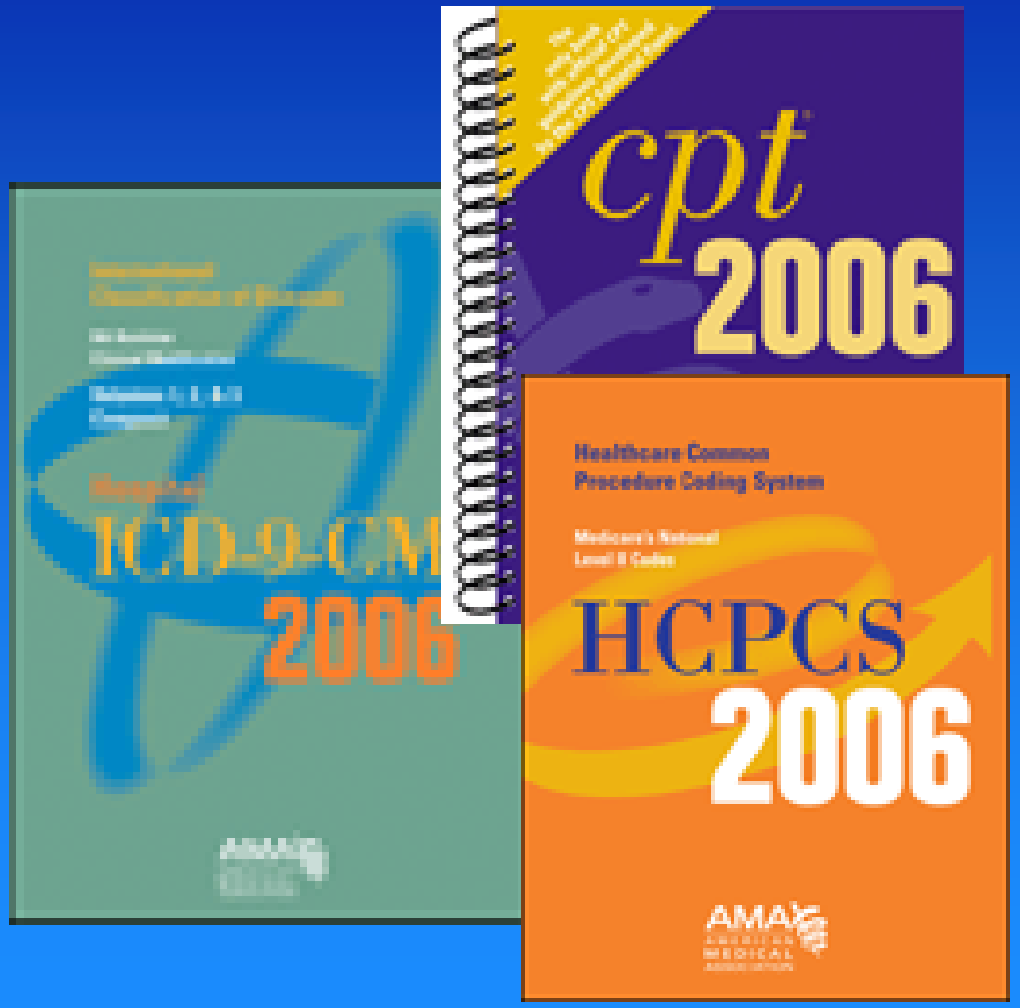
MH CCS

Procedure Classes

Chronic Condition Indicator

Most Tools Based On Medical Coding Classifications

- ICD-9-CM
- CPT
- HCPCS
- DRGs
- MDC
- CCS



Multiple Coding Systems

- ICD-9-CM
- CPT
- HCPCS

} Individual Codes

- DRGs
- MDC
- CCS

} Groupers

Which coding system is appropriate for your policy analysis?

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ICD-9-CM

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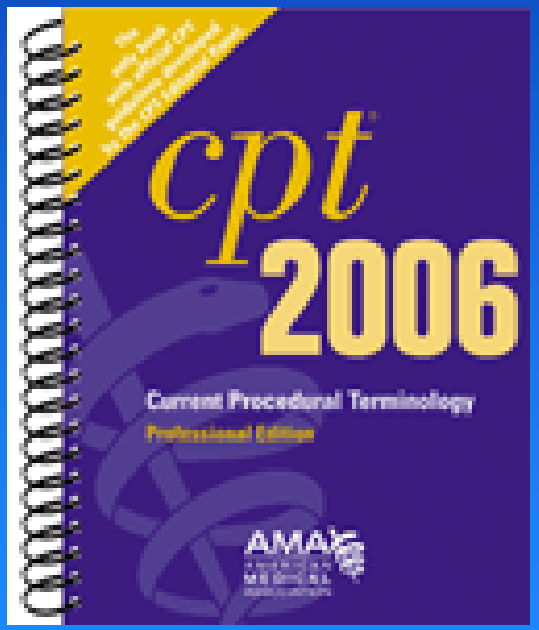
- ICD-9-CM Diagnosis Codes
- ICD-9-CM Procedure Codes
- Included in both inpatient and outpatient databases

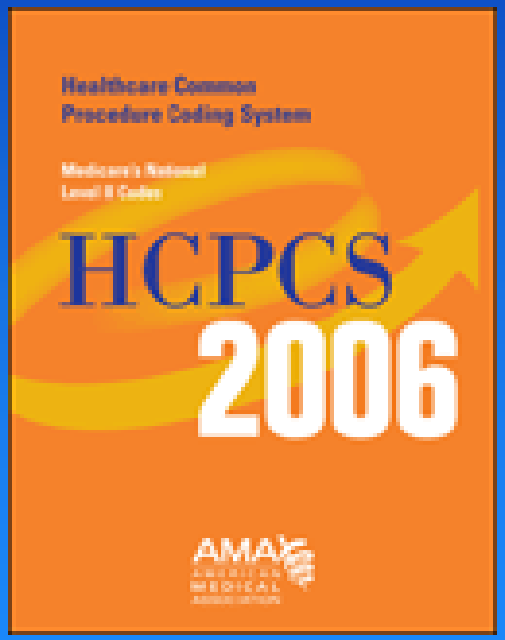
Common Procedural Coding System – CPT & HCPCS



CPT

HCPCS

Local Codes



Clinical Classifications Software (CCS)

ICD-9-CM Diagnosis Codes

12,600 Diagnosis Codes and 3,500 Procedure Codes

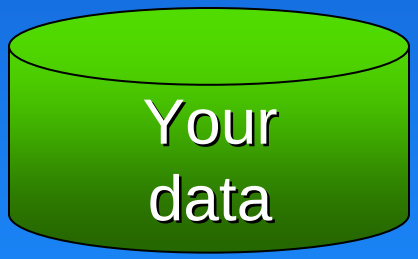
Clinical Classifications

The CCS collapses ICD-9-CM codes into a smaller number of clinically meaningful categories that can be more useful for presenting descriptive statistics than are individual ICD-9-CM codes.

CCS for ICD-9-CM

Groups ICD-9-CM codes into clinically meaningful categories

CCS for ICD-9-CM



ICD-9-CM Codes

0031 0202 0223 0362 0380 0381 03810 03811 03819 0382 0383 03840 03841 03842 03843 03844 03849 0388 0389 0545 449 7907

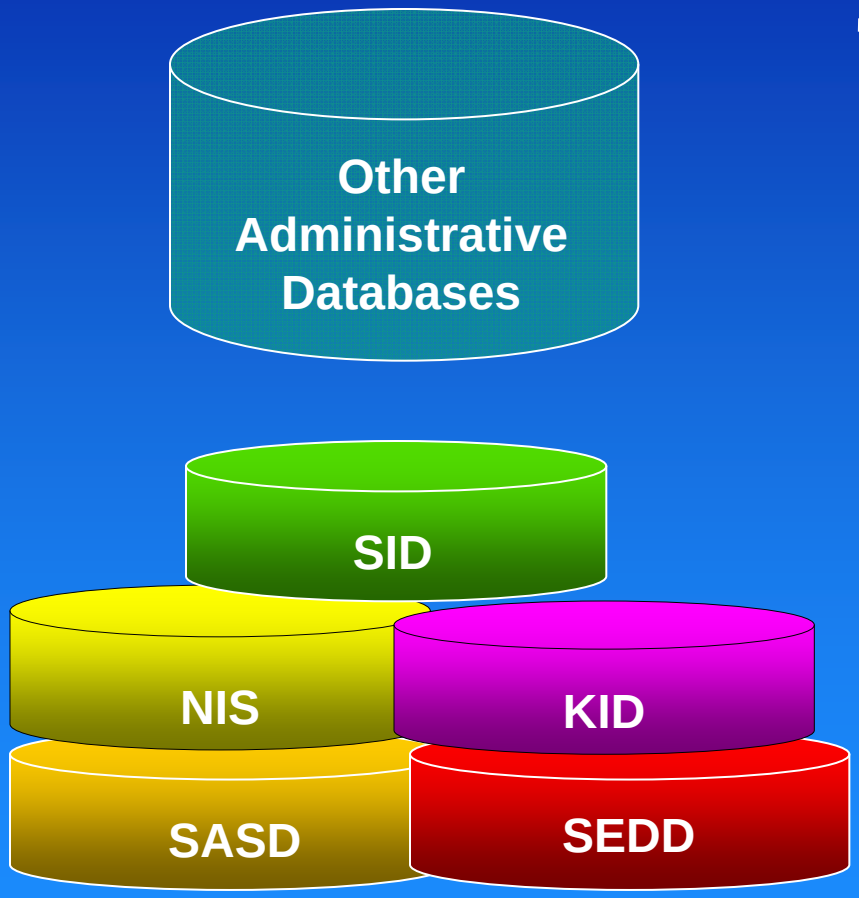
0700 0701 0702 07020 07021 07022 07023 0703 07030 07031 07032 07033 0704 07041 07042 07043 07044 07049 0705 07051 07052 07053 07054 07059 0706 07070 07071 0709 57140 57141 57149 5731 5732 5733

CCS Codes

CCS 2: Septicemia

CCS 6: Hepatitis

Most AHRQ HCUP Tools Aid to Summarize Data



CCS Tools

ICD-9-CM CCS

ICD-10 CCS

CPT CCS

MH CCS

Procedure Classes

Chronic Condition Indicator

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Kansas - 2006

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Rank	ICD-9-CM diagnosis code and name		Total number of discharges
1.	V30.00	Single Lb In-Hosp W/O Cs	27,705
2.	V30.01	Single Lb In-Hosp W Cs	11,466
3.	486	Pneumonia, Organism Nos	10,417
4.	428.0	Chf Nos (after Oct 1, 2002)	7,536
5.	414.01	Crnry Athrscl Natve Vssl	6,615
6.	654.21	Prev C-Delivery-Delivrd	4,888
7.	276.51	Dehydration	4,100
8.	786.59	Chest Pain Nec	4,057
9.	715.36	Loc Osteoarth Nos-L/Leg	3,949
10.	664.11	Del W 2 Deg Lacerat-Del	3,610

Colorado - 2006

State statistics - 2006 Colorado

Rank order of CCS principal diagnosis category

Rank	CCS principal diagnosis category and name		Total number of discharges
1	218	Liveborn	66,845
2	193	Trauma to perineum and vulva	17,261
3	195	Other complications of birth, puerperium affecting management of the mother	13,733
4	203	Osteoarthritis	13,178
5	122	Pneumonia (except that caused by tuberculosis and sexually transmitted diseases)	12,922
6	205	Spondylosis, intervertebral disc disorders, other back problems	9,639
7	108	Congestive heart failure, nonhypertensive	8,042
8	237	Complication of device, implant or graft	7,885
9	101	Coronary atherosclerosis	7,879
10	69	Affective disorders	7,311

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U.S. - 2006

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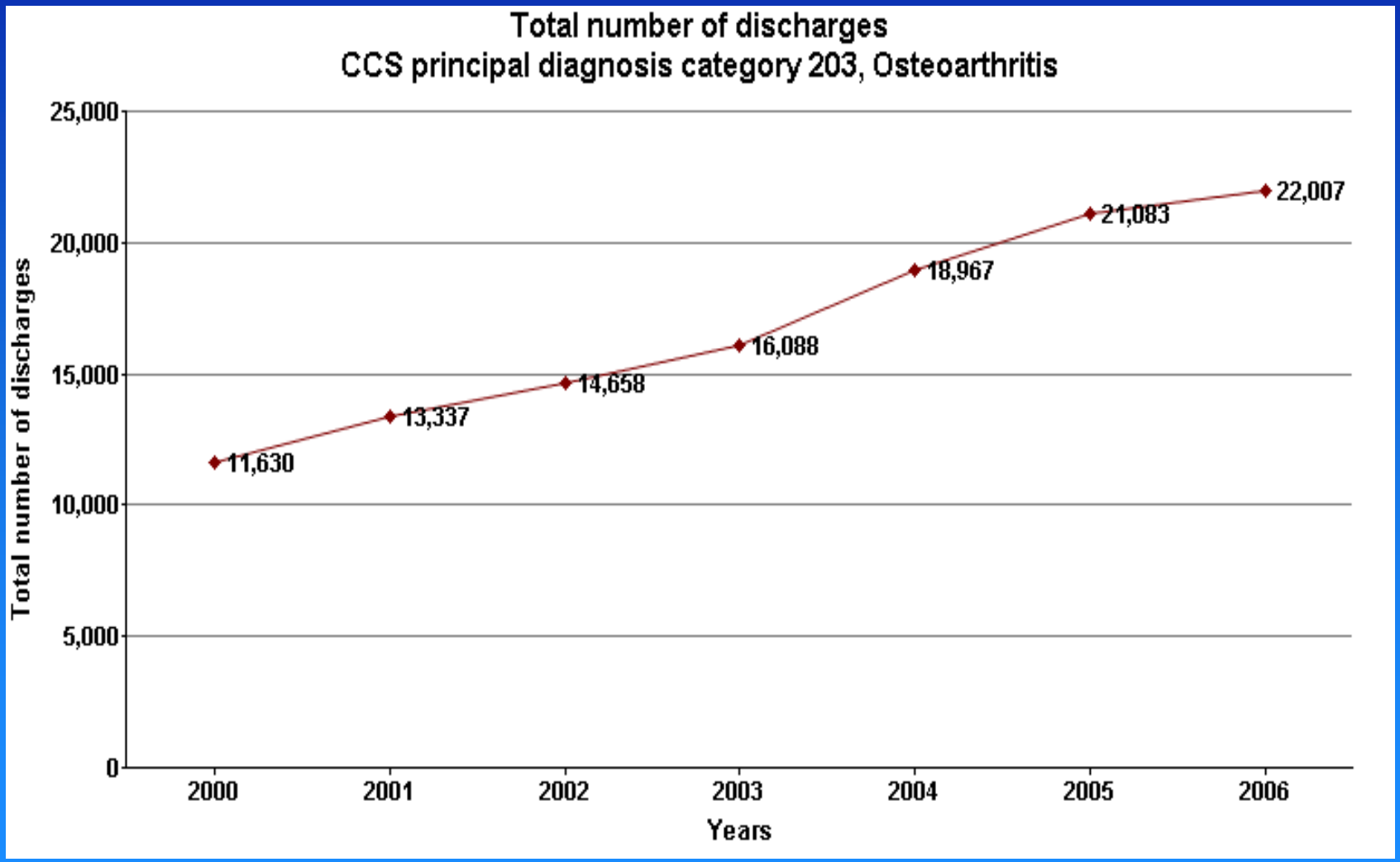
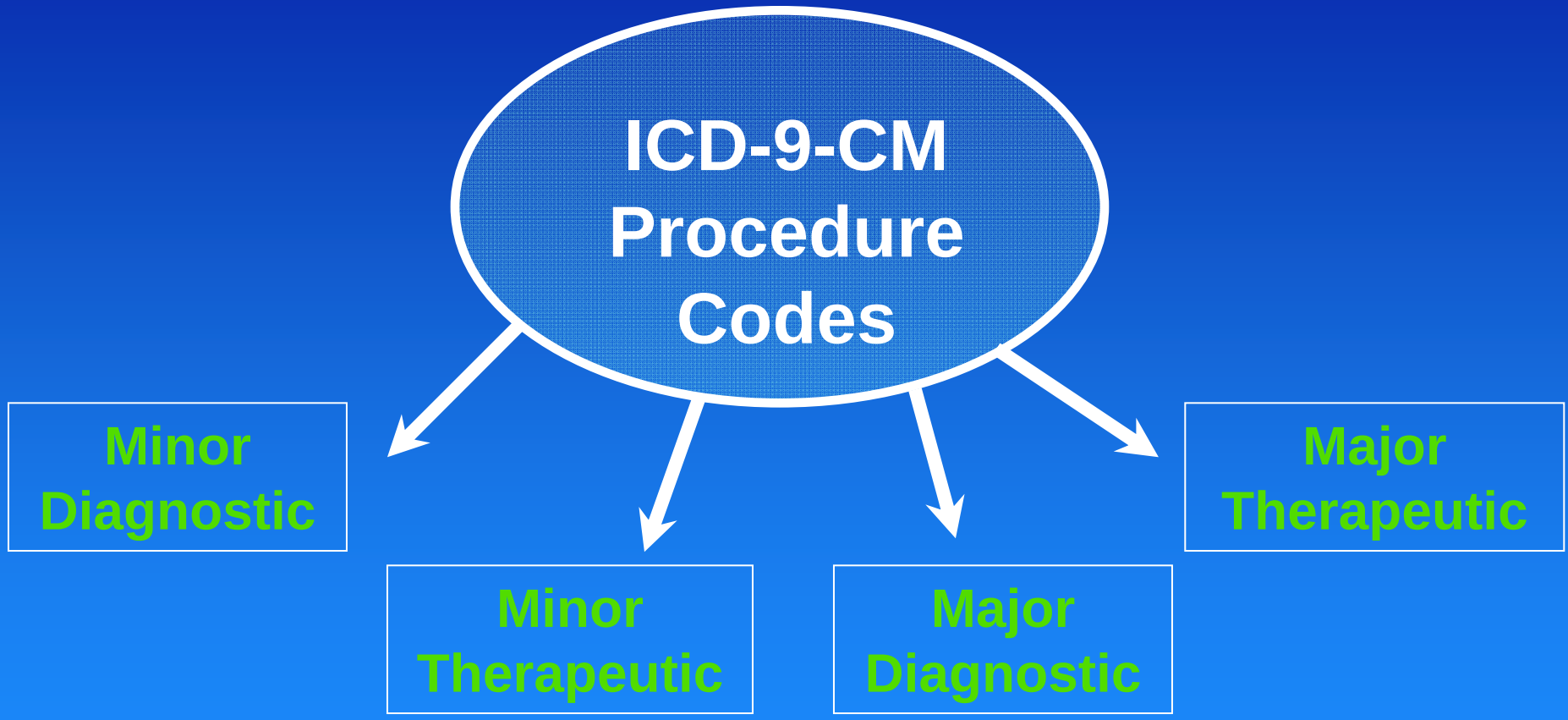
Rank	CCS principal diagnosis category and name		Total number of discharges
1.	218	Liveborn	4,288,954
2.	122	Pneumonia (except that caused by tuberculosis and sexually transmitted diseases)	1,218,467
3.	101	Coronary atherosclerosis	1,198,274
4.	108	Congestive heart failure, nonhypertensive	1,098,573
5.	102	Nonspecific chest pain	856,948
6.	193	Trauma to perineum and vulva	817,848
7.	195	Other complications of birth, puerperium affecting management of the mother	767,357
8.	106	Cardiac dysrhythmias	749,182
9.	203	Osteoarthritis	735,087
10.	100	Acute myocardial infarction	675,121

North Carolina – 2000 - 2006

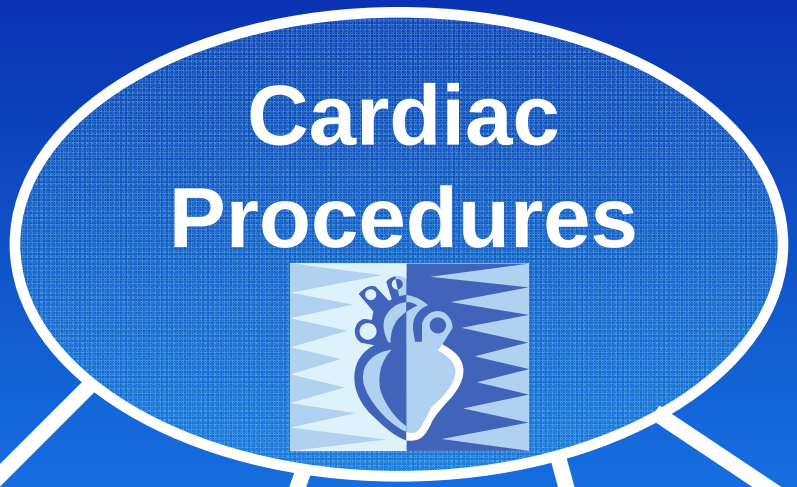


Procedure Classes



Groups ICD-9-CM Codes into One of Four Categories to Distinguish Between Diagnostic/Therapeutic Procedures

Procedure Classes



Minor Diagnostic

Electrocardiogram
(ICD-9-CM: 8952)

Minor Therapeutic

Pacemaker
(ICD-9-CM: 3778)

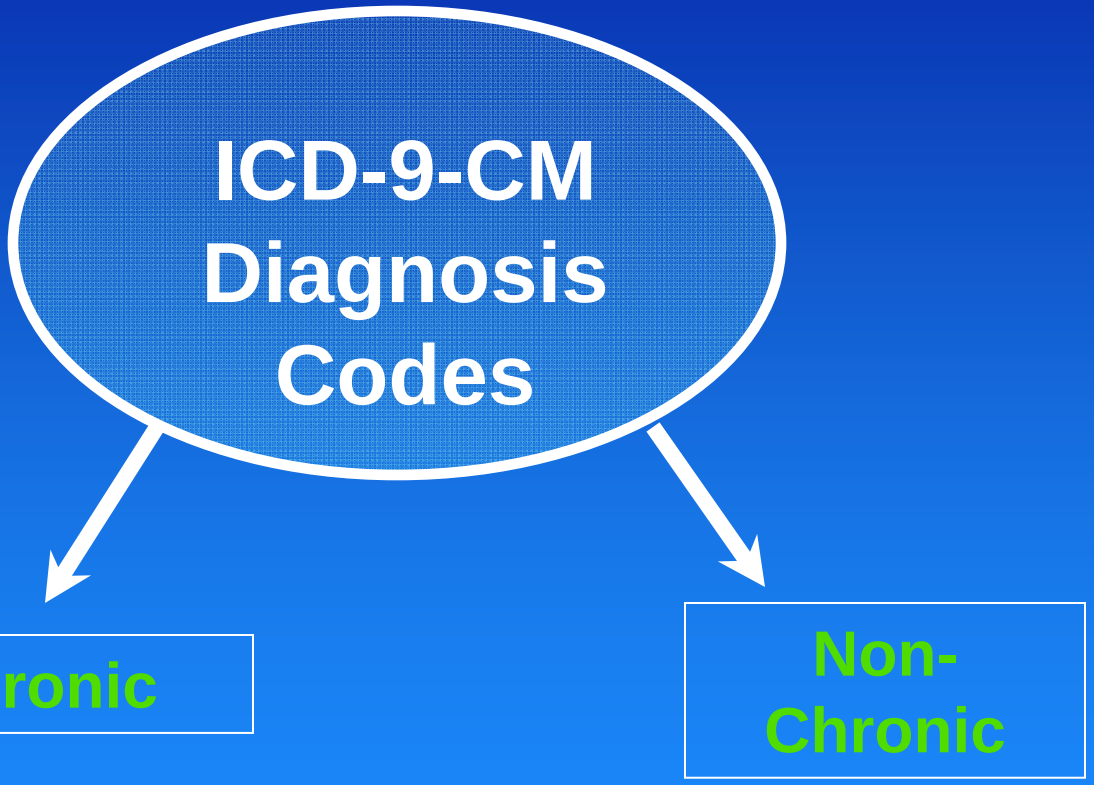
Major Diagnostic

Pericardial Biopsy
(ICD-9-CM: 3724)

Major Therapeutic

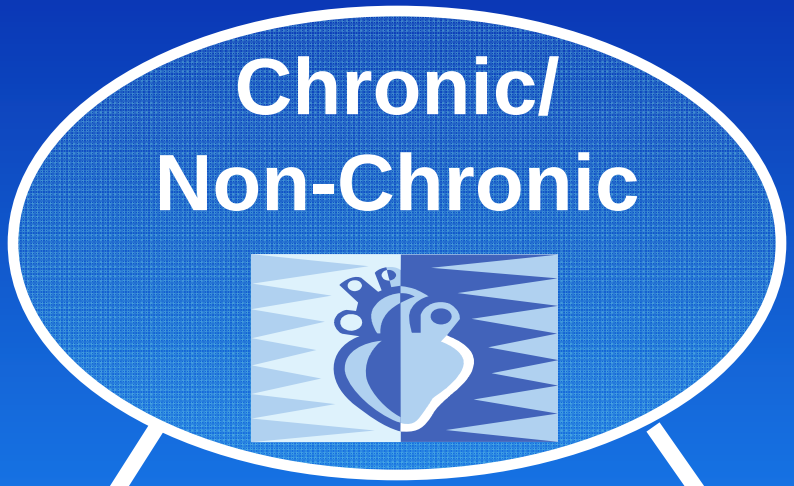
CABG
(ICD-9-CM: 3610)

Chronic/Non-Chronic Indicator



Groups ICD-9-CM Diagnosis Codes into Chronic or Non-Chronic Categories

Chronic/Non-Chronic Indicator



Chronic

Diabetes
(ICD-9-CM 25000)

Non-Chronic

Food Poisoning
(ICD-9-CM 0059)

Probability of Readmission 6 HCUP SID, 2002

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Principal condition category				
Malignant neoplasms	.394	.015	25.69**	1.482
Mental disorders	.192	.023	8.23**	1.212
Congestive heart failure	.427	.015	28.71**	1.532
Coronary atherosclerosis	.107	.018	6.09**	1.112
Pneumonia	.015	.015	1.00	1.015
Asthma or COPD	.311	.016	19.09**	1.364
Acute cerebrovascular disease	−.228	.016	13.97**	.796
Dysrhythmias	.022	.017	1.32	1.022
Acute myocardial infarction	.089	.020	4.43**	1.093
Non-specific chest pain	−.334	.020	17.12**	.716
Complication of device, graft, implant	.427	.024	18.98**	1.532
Diabetes or complications	.166	.022	7.61**	1.180
Fluid and electrolyte disorders	.241	.021	11.29**	1.272
Urinary tract infections	.034	.024	1.44	1.034
Back or intervertrebral disk disorders	−.234	.023	12.00**	.761
1 chronic condition	.479	.017	28.02**	1.614
2 chronic conditions	.686	.017	39.87**	1.985
3 chronic conditions	.796	.018	44.49**	2.216
4 chronic conditions	.890	.018	48.87**	2.436
5 chronic conditions	.952	.020	48.2**	2.591
6 chronic conditions	1.030	.020	51.03**	2.788
7+ chronic conditions	1.070	.021	51.17**	2.925

Comorbidity Software*

Comorbidity Software

ICD-9-CM Codes, DRGs on Administrative Data

30 Comorbidity Classifications

The Comorbidity Software is based on the ICD-9-CM coding scheme. This software creates about 30 variables that identify major comorbidities.

*** Elixhauser A, et al. *Medical Care*, Jan. 1998.**

Appends Indicator Flags for Each Comorbidity to Records

- Congestive heart failure → CM_CHF = 0 or 1
- Valvular disease → CM_VALVE = 0 or 1
- Pulmonary circulation disorders
- Peripheral vascular disorders
- Hypertension (uncomplicated and complicated)
- Paralysis
- Other neurological disorders
- Chronic pulmonary disease
- Diabetes without chronic complications
- Diabetes with chronic complications
- Hypothyroidism
- Renal failure
- Liver disease
- Chronic peptic ulcer disease

30 flags created and appended to each record

Appends Indicator Flags for Each Comorbidity

- HIV and AIDS
- Lymphoma
- Metastatic cancer
- Solid tumor without metastasis
- Rheumatoid arthritis/collagen vascular diseases
- Coagulation deficiency
- Obesity
- Weight loss
- Fluid and electrolyte disorders
- Blood loss anemia
- Deficiency anemia
- Alcohol abuse
- Drug Abuse
- Psychoses
- Depression

Utilization Flags

Reveals additional information about use of health care services

Utilization Flag Software

Your data

ICD-9-CM codes

+

UB-92 codes

Emergency Room

Chest X-ray / CT Scan

Intensive Care Unit

Advancing Excellence in Health Care

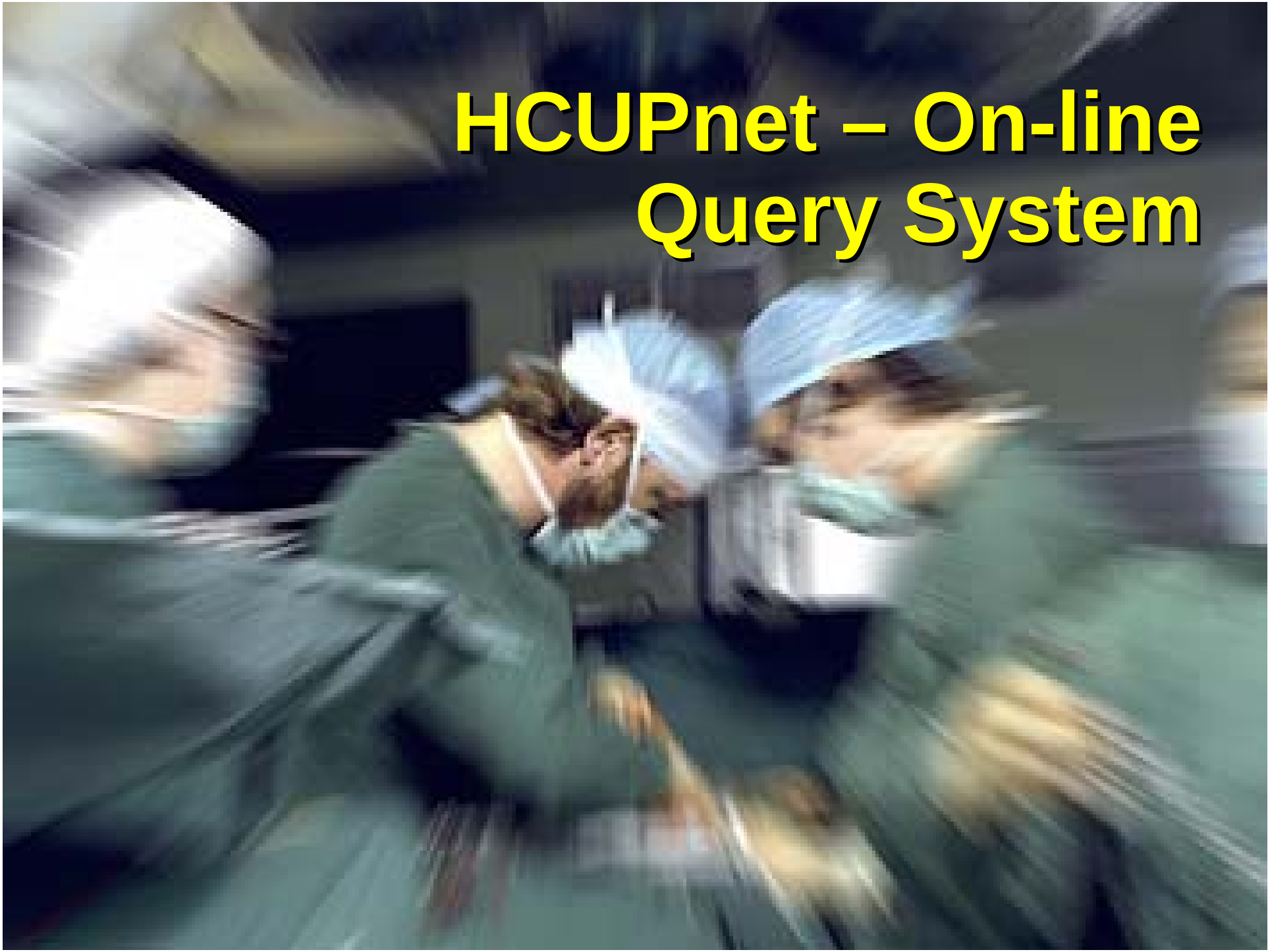
30 Utilization Flags

H·CUP
HEALTHCARE COST AND UTILIZATION PROJECT

Table 2. Utilization Flags

Accommodation	
Intensive Care Unit (ICU)	Coronary Care Unit (CCU)
Newborn Level II	Newborn Level III
Newborn Level IV	
Cardiac Services	
Cardiac Catheterization Lab	Cardiac Stress Test
Echocardiogram	Electrocardiogram (EKG)
Imaging and Diagnostic Tests	
Computed Tomography (CT) Scan	Chest X-Ray
Electroencephalogram (EEG)	Ultrasound
Magnetic Resonance Technology (MRT)	Nuclear Medicine
Devices	
Pacemaker	Other Implants
Therapeutic Services	
Lithotripsy	Occupational Therapy
Physical Therapy	Respiratory Therapy
Therapeutic Radiology and Chemotherapy	Renal Dialysis
Speech-Language Pathology	Erythropoietin (EPO)
Mental Health and Substance Abuse	Blood
Other	
Emergency Department	Observation Room
Organ Acquisition	

ICD-9-CM codes are not available for all services – there is some concern that some diagnostic procedures may be under-reported


HCUPnet – On-line
Query System

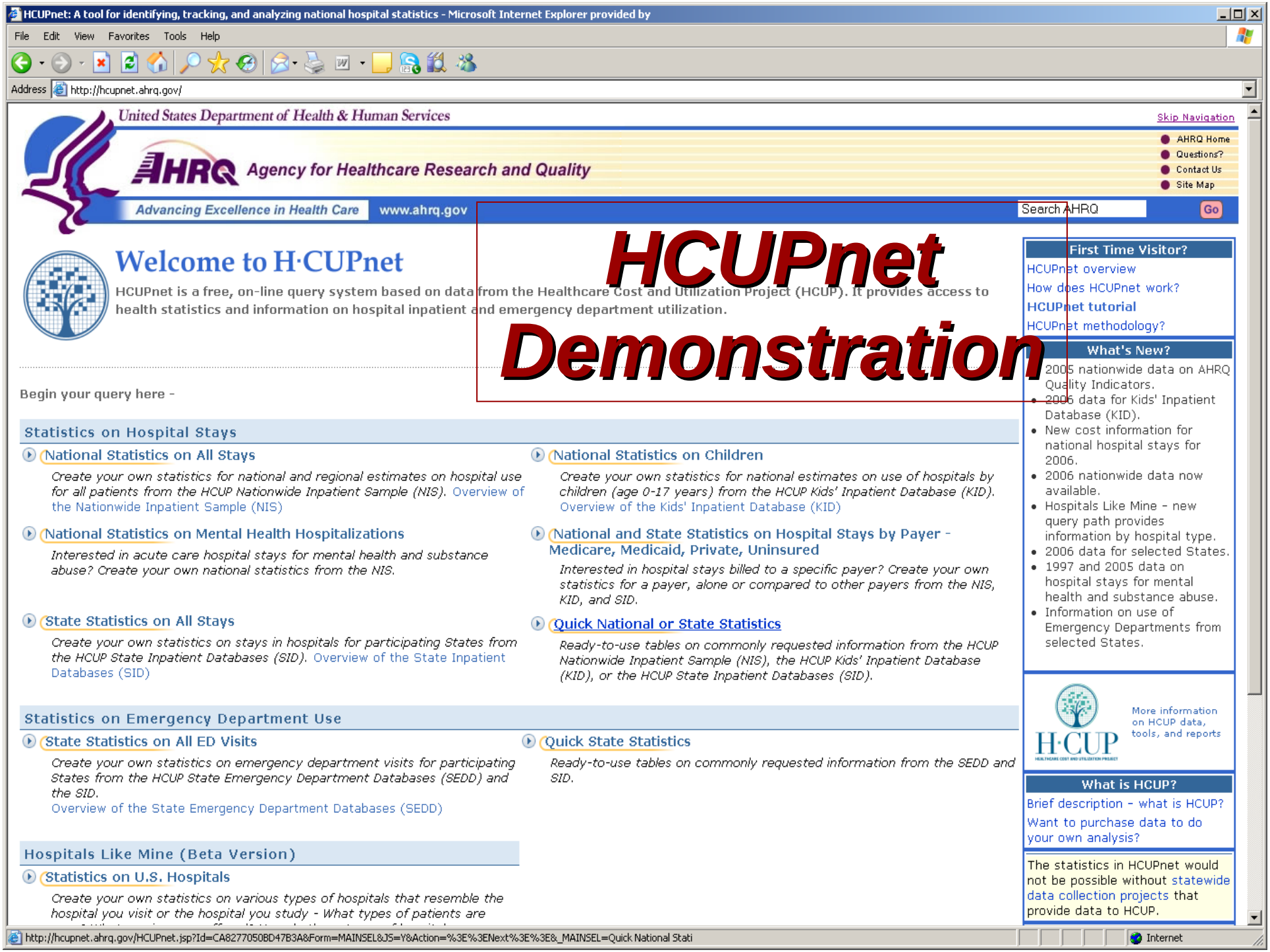
HCUPnet: Quick, Free Access to HCUP Data

- Free, interactive online query system
- Users generate tables of outcomes by diagnoses and procedures
- Data can be cross-classified by patient and hospital characteristics
- Includes national, regional, and state data (for states that choose to participate)

http://hcup.ahrq.gov/hcupnet

HCUPnet Can Answer a Variety of Questions

- What percentage of hospitalizations for children are uninsured, by state?
- What are the most expensive conditions treated in U.S. hospitals?
- What is the trend in admissions for depression?
- Will there be sufficient cases to do my analysis?
- How do my estimates compare with HCUPnet (validation)?


HCUPnet: A tool for identifying, tracking, and analyzing national hospital statistics - Microsoft Internet Explorer provided by
File Edit View Favorites Tools Help
Address http://hcupnet.ahrq.gov/
United States Department of Health & Human Services
Skip Navigation
AHRQ Agency for Healthcare Research and Quality
AHRQ Home
Questions?
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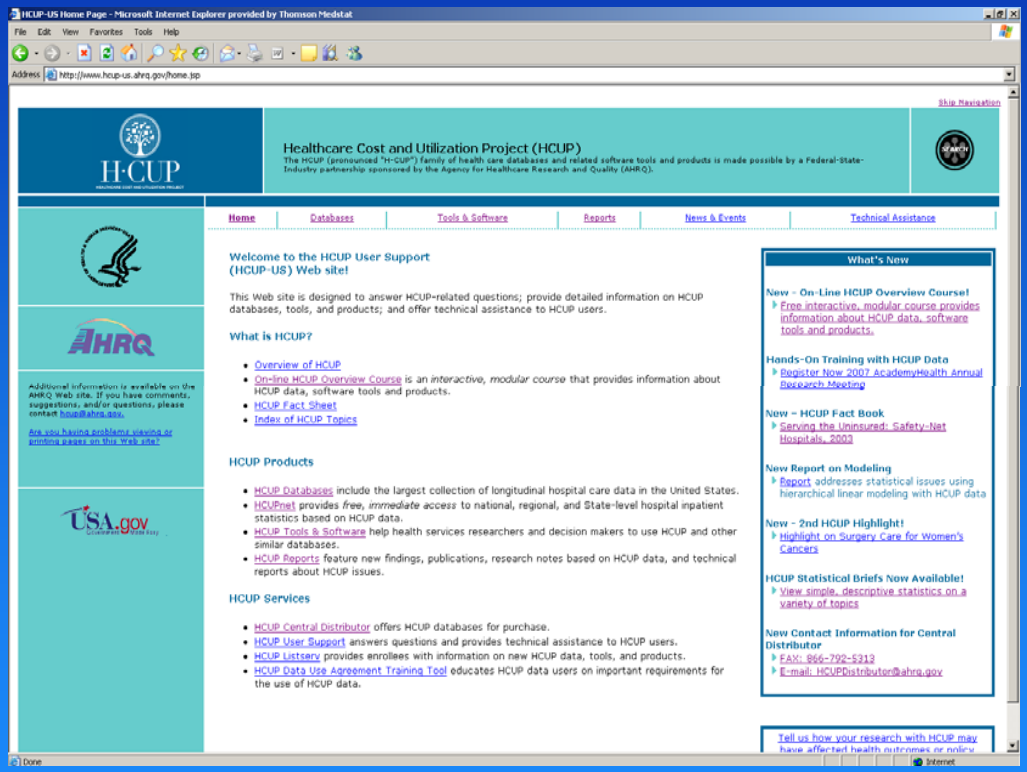
Advancing Excellence in Health Care
www.ahrq.gov
Search AHRQ
Go
HCUPnet
Demonstration
Welcome to H·CUPnet
HCUPnet is a free, on-line query system based on data from the Healthcare Cost and Utilization Project (HCUP). It provides access to health statistics and information on hospital inpatient and emergency department utilization.
Begin your query here -
Statistics on Hospital Stays
National Statistics on All Stays
Create your own statistics for national and regional estimates on hospital use for all patients from the HCUP Nationwide Inpatient Sample (NIS). Overview of the Nationwide Inpatient Sample (NIS)
National Statistics on Children
Create your own statistics for national estimates on use of hospitals by children (age 0-17 years) from the HCUP Kids' Inpatient Database (KID). Overview of the Kids' Inpatient Database (KID)
National Statistics on Mental Health Hospitalizations
Interested in acute care hospital stays for mental health and substance abuse? Create your own national statistics from the NIS.
National and State Statistics on Hospital Stays by Payer - Medicare, Medicaid, Private, Uninsured
Interested in hospital stays billed to a specific payer? Create your own statistics for a payer, alone or compared to other payers from the NIS, KID, and SID.
State Statistics on All Stays
Create your own statistics on stays in hospitals for participating States from the HCUP State Inpatient Databases (SID). Overview of the State Inpatient Databases (SID)
Quick National or State Statistics
Ready-to-use tables on commonly requested information from the HCUP Nationwide Inpatient Sample (NIS), the HCUP Kids' Inpatient Database (KID), or the HCUP State Inpatient Databases (SID).
Statistics on Emergency Department Use
State Statistics on All ED Visits
Create your own statistics on emergency department visits for participating States from the HCUP State Emergency Department Databases (SEDD) and the SID.
Overview of the State Emergency Department Databases (SEDD)
Quick State Statistics
Ready-to-use tables on commonly requested information from the SEDD and SID.
Hospitals Like Mine (Beta Version)
Statistics on U.S. Hospitals
Create your own statistics on various types of hospitals that resemble the hospital you visit or the hospital you study - What types of patients are
First Time Visitor?
HCUPnet overview
How does HCUPnet work?
HCUPnet tutorial
HCUPnet methodology?
What's New?
2005 nationwide data on AHRQ Quality Indicators.
2006 data for Kids' Inpatient Database (KID).
New cost information for national hospital stays for 2006.
2006 nationwide data now available.
Hospitals Like Mine - new query path provides information by hospital type.
2006 data for selected States.
1997 and 2005 data on hospital stays for mental health and substance abuse.
Information on use of Emergency Departments from selected States.
H·CUP
More information on HCUP data, tools, and reports
What is HCUP?
Brief description - what is HCUP?
Want to purchase data to do your own analysis?
The statistics in HCUPnet would not be possible without statewide data collection projects that provide data to HCUP.
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=CA8277050BD47B3A&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=Quick National Stati
Internet

HCUP User Support Website

- Find detailed information on HCUP databases, tools, and products
- Access HCUPnet
- Find comprehensive listing of HCUP-related publications, database reports, and fact books
- Access technical assistance



http://www.hcup-us.ahrq.gov

Using HCUP Technical Assistance

Active Technical Assistance

- Responds to inquiries about HCUP data, products, and tools
- Collects user feedback and suggestions for improvement

E-mail: hcup@ahrq.gov

Phone: (866) 290-HCUP