The Healthcare Cost and Utilization Project (HCUP)

Overview of the HCUP Databases

Agency for Healthcare Research and Quality
Webinar ♦ September 16, 2015
Webinar Overview

• Project Overview
• HCUP Partners
• The Making of HCUP Data
• HCUP State Databases
• HCUP Nationwide Databases
• How to Obtain HCUP Data & Access HCUP Resources
## Research Using HCUP Data

<table>
<thead>
<tr>
<th>Costs of care</th>
<th>Septicemia was the most expensive reason for hospitalization in 2012—totaling over $20 billion in aggregate hospital costs (NIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to care</td>
<td>Americans in low-income areas visit EDs at rates 90 percent higher compared to those in the highest income areas (NEDS)</td>
</tr>
<tr>
<td>Quality of care</td>
<td>Among women who delivered by cesarean section and were covered by Medicaid, 94.6 percent of discharges included a complicating condition (NIS)</td>
</tr>
<tr>
<td>Readmissions</td>
<td>For CHF, schizophrenia, and renal failure, at least 1 in 5 patients were readmitted within 30 days (SID with readmissions link)</td>
</tr>
<tr>
<td>Patient Safety</td>
<td>In 2011, the four most frequent causes of adverse drug events (ADEs) originating in the hospital were steroids, antibiotics, opiates and narcotics, and anticoagulants (SID)</td>
</tr>
<tr>
<td>Geographic variation</td>
<td>ED visits were higher in counties with fewer primary care MDs per capita (SEDD)</td>
</tr>
</tbody>
</table>
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The HCUP Partnership

State

Industry

Federal
The Agency for Healthcare Research and Quality (AHRQ) is a federal agency under the Department of Health and Human Services.
Current HCUP Data Partners

**Alaska** State Hospital and Nursing Home Association

**Arizona** Department of Health Services

**Arkansas** Department of Health

**California** Office of Statewide Health Planning & Development

**Colorado** Hospital Association

**Connecticut** Hospital Association

**District of Columbia** Hospital Association

**Florida** Agency for Health Care Administration

**Georgia** Hospital Association

**Hawaii** Health Information Corporation

**Illinois** Department of Public Health

**Indiana** Hospital Association

**Iowa** Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health and Hospitals
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi Department of Health
Missouri Hospital Industry Data Institute
Montana MHA – An Association of Montana Health Care Providers
Nebraska Hospital Association
Current HCUP Data Partners

Nevada  Department of Health and Human Services
New Hampshire  Department of Health & Human Services
New Jersey  Department of Health
New Mexico  Department of Health
New York  State Department of Health
North Carolina  Department of Health and Human Services
North Dakota  Minnesota Hospital Association
Ohio  Hospital Association
Oklahoma  State Department of Health
Oregon  Association of Hospitals and Health Systems, Office of Health Analytics
Pennsylvania  Health Care Cost Containment Council
Current HCUP Data Partners

Rhode Island  Department of Health
South Carolina  Revenue and Fiscals Affairs Office
South Dakota  Association of Health Care Organizations
Tennessee  Hospital Association
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 Services
Wyoming  Hospital Association
HCUP Partners Providing Inpatient Data

Updated 5/11/15

Inpatient Data

Non-participating Partners Providing:

DC

Partners Providing: Inpatient Data

Non-participating
HCUP Partners Providing Ambulatory Surgery & Services Data

Partners Providing:

Ambulatory Surgery & Services Data

Non-participating

Updated 5/11/15
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The Foundation of HCUP Data is Hospital Billing Data

Demographic Data

Diagnoses

Procedures

Charges

UB-04 CMS 1500
From Patient Hospital Visit to HCUP Record

ED Visit
Scheduled Admission
Transfer

Reception → Admit → Provide Care → Discharge

Patient Perspective

Data Perspective

Patient Record

Patient Record

Discharge Summary

Medical Coder

Billing Dept

Bill Generated
The Making of HCUP Data

Patient enters hospital

AHRQ standardizes data to create uniform HCUP databases

States store data in varying formats

Hospital sends billing data and any additional data elements to data organizations

Billing record created
The HCUP Data Process

• State data is mapped to a standardized HCUP format which allows for consistent data elements and values for comparison across States

• Additional data elements are added:
  ► Value-added variables – injury indicators, chronic condition indicators, procedure class
  ► Hospital characteristics – teaching status, ownership/control, bed size
  ► Diagnostic related groups and severity measures –
    o AHRQ’s Clinical Classifications Software (CCS)
    o 3M’s All Patient Refined DRGs (APR-DRGs)

• Quality checks are performed
87% of hospitals in the U.S. are community hospitals

13% Non-community hospitals (Federal (DOD/VA/IHS), psychiatric, non-federal long term care, etc.)

Source: American Hospital Association (AHA), 2013
What Are Community Hospitals?

American Hospital Association Definition:
Non-Federal, short-term, general, and other specialty hospitals, excluding hospital units of other institutions (e.g., prisons)

<table>
<thead>
<tr>
<th>Included</th>
<th>Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-specialty general hospitals</td>
<td>Long-term care</td>
</tr>
<tr>
<td>OB-GYN</td>
<td>Psychiatric</td>
</tr>
<tr>
<td>ENT</td>
<td>Alcoholism/Chemical dependency</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>Rehabilitation</td>
</tr>
<tr>
<td>Pediatric</td>
<td>DoD / VA / IHS</td>
</tr>
<tr>
<td>Public</td>
<td></td>
</tr>
<tr>
<td>Academic medical centers</td>
<td></td>
</tr>
</tbody>
</table>
What are Community Hospitals?

• HCUP generally does not receive data from non-community hospitals.
• However, if a patient is treated in a community hospital, their information is included.

### Most Frequent Principal Diagnosis

<table>
<thead>
<tr>
<th>Most Frequent Principal Diagnosis</th>
<th>Number of Discharges (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Newborns</td>
<td>3,795</td>
</tr>
<tr>
<td>2. Septicemia</td>
<td>1,133</td>
</tr>
<tr>
<td>3. Pneumonia</td>
<td>1,007</td>
</tr>
<tr>
<td>4. Osteoarthritis</td>
<td>968</td>
</tr>
<tr>
<td>5. Congestive Heart Failure</td>
<td>876</td>
</tr>
<tr>
<td><strong>Mood disorders</strong></td>
<td>847</td>
</tr>
<tr>
<td>7. Cardiac dysrhythmias</td>
<td>749</td>
</tr>
</tbody>
</table>

Source: National Inpatient Sample, 2012
HCUP Has 6 Types of Databases

- Three state-level databases
  - State Inpatient Databases (SID)
  - State Ambulatory Surgery & Services Databases (SASD)
  - State Emergency Department Databases (SEDD)

- Three nationwide databases
  - National (Nationwide) Inpatient Sample (NIS)
  - Nationwide Emergency Department Sample (NEDS)
  - Kids’ Inpatient Database (KID)
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<table>
<thead>
<tr>
<th>Database Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Inpatient Databases (SID)</td>
<td>All inpatient hospital discharge data (including those admissions that started in the ED) from participating HCUP States</td>
</tr>
<tr>
<td>State Ambulatory Surgery &amp; Services Databases (SASD)</td>
<td>Ambulatory surgery data (hospital based and some freestanding) and other outpatient services from participating HCUP States</td>
</tr>
<tr>
<td>State Emergency Department Databases (SEDD)</td>
<td>Emergency department data (treat and release) from participating HCUP States</td>
</tr>
</tbody>
</table>
What Data Elements are included in the HCUP databases?

Data Elements:

• Patient demographics (age, sex)
• Diagnoses & procedures
• Expected payer
• Length of stay
• Patient disposition
• Admission type
• Point of origin
• Admission month
• Weekend admission
Some Data Elements Vary by State

- Race/Ethnicity
- Patient county
- Patient ZIP Code
- Severity of illness
- Birthweight
- Procedure date (days from admission)
- Health plan details
- Additional expected payers
- Detailed charges
- Patient identifiers encrypted
- Physician identifiers encrypted
- Physician specialty
- Hospital identifier unencrypted
<table>
<thead>
<tr>
<th>PAY1_X</th>
<th>Description</th>
<th>PAY1 (Standardized)</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>Medicare</td>
<td></td>
<td></td>
<td>Medicare</td>
</tr>
<tr>
<td>011</td>
<td>Medicare (HMO)</td>
<td></td>
<td></td>
<td>Medicare</td>
</tr>
<tr>
<td>012</td>
<td>Medicare (Managed care - Other)</td>
<td></td>
<td></td>
<td>Medicare</td>
</tr>
<tr>
<td>013</td>
<td>Medicare (fee for service)</td>
<td></td>
<td></td>
<td>Medicare</td>
</tr>
<tr>
<td>020</td>
<td>Medi-Cal</td>
<td></td>
<td></td>
<td>Medi-Cal</td>
</tr>
<tr>
<td>021</td>
<td>Medi-Cal (HMO)</td>
<td></td>
<td></td>
<td>Medi-Cal</td>
</tr>
<tr>
<td>022</td>
<td>Medi-Cal (Managed care - Other)</td>
<td></td>
<td></td>
<td>Medi-Cal</td>
</tr>
<tr>
<td>023</td>
<td>Medi-Cal (fee for service)</td>
<td></td>
<td></td>
<td>Medi-Cal</td>
</tr>
<tr>
<td>030</td>
<td>Private Coverage</td>
<td></td>
<td></td>
<td>Private insurance</td>
</tr>
<tr>
<td>031</td>
<td>Private Coverage (HMO)</td>
<td></td>
<td></td>
<td>Private insurance</td>
</tr>
<tr>
<td>032</td>
<td>Private Coverage (Managed care - Other)</td>
<td></td>
<td></td>
<td>Private insurance</td>
</tr>
<tr>
<td>033</td>
<td>Private Coverage (fee for service)</td>
<td></td>
<td></td>
<td>Private insurance</td>
</tr>
<tr>
<td>08n, where n=0-3</td>
<td>Self-pay</td>
<td></td>
<td></td>
<td>Self-pay</td>
</tr>
<tr>
<td>--</td>
<td></td>
<td></td>
<td>5</td>
<td>No charge</td>
</tr>
</tbody>
</table>
Example: Race Detail Varies by State

<table>
<thead>
<tr>
<th>RACE_X</th>
<th>Description</th>
<th>RACE (Standardized)</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White</td>
<td>1</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>2</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hispanic</td>
<td>3</td>
<td>Hispanic</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hawaiian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Chinese</td>
<td>4</td>
<td>Asian or Pacific Islander</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Filipino</td>
<td>5</td>
<td>Native American</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Japanese</td>
<td>6</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Other Asian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Other Pacific Islander</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Native American</td>
<td>8</td>
<td>Native American</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mixed or Other</td>
<td>9</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
### HCUP State Files vs. Partner State Files

- HCUP State Files vs. Data Files received directly from the State

<table>
<thead>
<tr>
<th>HCUP State Files</th>
<th>Partner State Files</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subset of data elements</td>
<td>All data elements</td>
</tr>
<tr>
<td>Value-added data elements</td>
<td>May not have same value-added elements</td>
</tr>
<tr>
<td>Uniformly coded across the States</td>
<td>Not uniformly coded across states</td>
</tr>
<tr>
<td>Standard data quality checks</td>
<td>Variability in quality checks by state</td>
</tr>
<tr>
<td>Lag time</td>
<td>More timely</td>
</tr>
</tbody>
</table>
States Releasing Databases through HCUP Central Distributor

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

Remember:
Not all states participate in all years and for all databases
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<table>
<thead>
<tr>
<th>Database Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>National (Nationwide) Inpatient Sample (NIS)</td>
<td>Inpatient discharge data for a sample of discharges from all hospitals in SID</td>
</tr>
<tr>
<td>Kids’ Inpatient Database (KID)</td>
<td>Pediatric inpatient hospital discharge data from a sample of pediatric discharges in SID</td>
</tr>
<tr>
<td>Nationwide Emergency Department Sample (NEDS)</td>
<td>Emergency department data (treat and release &amp; admitted) from a sample of hospitals in SID and SEDD</td>
</tr>
</tbody>
</table>
The 2012 NIS was redesigned to improve national estimates with reductions in sampling error, and to enhance data confidentiality.

To highlight the design change, beginning with 2012 data, AHRQ renamed the NIS from the "Nationwide Inpatient Sample" to the "National Inpatient Sample"
2012 NIS is a Stratified Sample of Discharges from the SID

2012 State Inpatient Databases (SID)

- ~ 4,380 hospitals
- ~ 34.3M records

Strata
- U.S. Division
- Urban/Rural Location
- Teaching Status
- Ownership/Control
- Bed Size

Stratified Sample of Discharges
- *State not included in the stratum
- Within strata sort by hospital, DRG, and admission month and select 1 in 5 records

2012 National Inpatient Sample (NIS)

N = ~ 4,380 hospitals
- ~ 7.3M records
### KID is a Stratified Sample of Discharges from the SID

<table>
<thead>
<tr>
<th>2012 State Inpatient Databases (SID)</th>
<th>Stratified Sample of Discharges</th>
<th>2012 Kids' Inpatient Database (KID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 4,380 hospitals</td>
<td>• 10% uncomplicated births</td>
<td>N = ~ 4K hospitals</td>
</tr>
<tr>
<td>~ 34.3M records</td>
<td>• 80% pediatric discharges</td>
<td>~ 3M records</td>
</tr>
<tr>
<td><strong>Strata</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Uncomplicated Births</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Complicated Births</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pediatric Non-Births</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*State not included in the stratum*
About 84% of ED visits are treat-and-release

About 16% of ED visits result in a hospital stay
NEDS is a Stratified Sample of Hospitals from the SEDD and SID

Strata
- U.S. Region
- Urban/Rural Location
- Teaching Status
- Ownership/Control
- Trauma center

Stratified Sample of Discharges
*State not included in the stratum

Nationwide Emergency Department Sample (NEDS)
N = ~ 1K hospitals
~ 31M records
NIS, NEDS, KID:
Must be Weighted to Produce National and Regional Estimates
KID and NEDS: Must be Weighted to Produce National and Regional Estimates
## What Types of Care Are and Are Not Captured by HCUP?

### Included in HCUP

<table>
<thead>
<tr>
<th>Inpatient Care</th>
<th>State Inpatient Databases (SID)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National (Nationwide) Inpatient Sample (NIS)</td>
</tr>
<tr>
<td></td>
<td>Kids’ Inpatient Database (KID)</td>
</tr>
<tr>
<td>Emergency Department</td>
<td>State Emergency Department Databases (SEDD)</td>
</tr>
<tr>
<td></td>
<td>Nationwide Emergency Department Sample (NEDS)</td>
</tr>
<tr>
<td>Ambulatory Surgery &amp; Services</td>
<td>State Ambulatory Surgery &amp; Services Databases (SASD)</td>
</tr>
</tbody>
</table>

### Not Included in HCUP

- Physician office visits
- Pharmacy
- Labs/Radiology
Some Limitations Can be Addressed by Linking to Other Databases

HCUP Databases

- American Hospital Association (AHA) Annual Survey
- Health Resources and Services Administration’s (HRSA) Area Health Resource File (AHRF)
- Zip Code Files from Census or Vendor
- Medicare Cost Reports
- Trauma Information Exchange Program (TIEP)
<table>
<thead>
<tr>
<th>HCUP is…</th>
<th>HCUP is NOT…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge database for health care encounters</td>
<td>A survey</td>
</tr>
<tr>
<td>All payer, including the uninsured</td>
<td>Specific to a single payer, e.g. Medicare</td>
</tr>
<tr>
<td>Hospital, ambulatory surgery, emergency department data</td>
<td>Office visits, pharmacy, laboratory, radiology</td>
</tr>
<tr>
<td>All hospital discharges</td>
<td>Only a sample</td>
</tr>
<tr>
<td>Accessible multiple ways: raw data, regular reports, online</td>
<td>Just another database</td>
</tr>
</tbody>
</table>
## Hospital Billing Data Have Benefits and Limitations

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large number of visit records</td>
<td>Differences in coding across hospitals</td>
</tr>
<tr>
<td>Uniformity of coding</td>
<td>Limited clinical details</td>
</tr>
<tr>
<td>Routine, regular collection</td>
<td>Lack revenue information</td>
</tr>
<tr>
<td>Ease of access</td>
<td>May not include all hospitals</td>
</tr>
<tr>
<td>All-payer</td>
<td>May not show complete experience of care</td>
</tr>
<tr>
<td>Available at local, state, regional and national level</td>
<td>No data on individuals in the primary care setting</td>
</tr>
<tr>
<td>Supplemental files available to facilitate research</td>
<td></td>
</tr>
</tbody>
</table>


Summary

• Six types of HCUP databases
• Databases are based on administrative hospital data: inpatient, ED, and ambulatory surgery and services
• Available for multiple years
  ► National
    o NIS (1988-2012)
    o NEDS (2006-2012)
  ► State
    o SID (1990-2013)
    o SASD (1997-2013)
    o SEDD (1999-2013)
• Can look at breadth of health care issues
• Can be linked to external files
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The HCUP Database Process

• Processed data sent to HCUP Partners

• State databases may become available to public through:
  ► State Data Organization
  OR
  ► HCUP Central Distributor
To Purchase HCUP Data
Two Methods

Method 1
HCUP Central Distributor
www.hcup-us.ahrq.gov/tech_assist/centdist.jsp

Method 2
HCUP Partner States
www.hcup-us.ahrq.gov/partners.jsp
Step 1: Take Data Use Agreement (DUA) online training
http://www.hcup-us.ahrq.gov/tech_assist/dua.jsp

Step 2: Login or register for an account
http://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp

Step 3: Create your profile under “My Account”

Step 4: Submit online order and complete further instructions listed on the “Thank You” page

For assistance, contact the HCUP Central Distributor:

- Phone: 866-556-HCUP (4287) toll free
- Email: HCUPDistributor@ahrq.gov
Purpose of the Course:

- Emphasize the importance of data protection
- Reduce the risk of inadvertent violations
- Describe your individual responsibility when using HCUP data

Takes 15 minutes to Complete

Pricing Information
Per Data Year

Nationwide Databases (NIS, KID, NEDS)

- **NIS**: $350 (2007-2012; student price $50)
  - $160-200 (earlier years; student price $20)
- **KID**: $350 (2009 and 2012; student price $50)
  - $200 (earlier years; student price $20)
- **NEDS**: $500 (student price $75)

State Databases (SID, SASD, SEDD)

- Varies by state, database, year, and type of applicant
- $35 - $3,185
## Software Requirements of Working with the Full HCUP Files

<table>
<thead>
<tr>
<th>Software Package</th>
<th>Load Programs</th>
<th>Format Programs</th>
<th>Example Statistical Coding</th>
<th>HCUP Tools Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Stata</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SPSS</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SUDAAN</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

MS Excel and Access are NOT GOOD Options!
HCUPnet: Quick, Free Access to HCUP Data

• Free online query system
• Users generate tables of outcomes by diagnoses and procedures
• Data can be cross-classified by patient and hospital characteristics

http://hcupnet.ahrq.gov
- Find detailed information on HCUP databases, tools, and products
- Access HCUPnet
- Find comprehensive list of HCUP-related publications, database reports, and fact books
- Access technical assistance

http://www.hcupsupport.org
Visit HCUP’s Virtual Exhibit Booth

- The HCUP Virtual Exhibit Booth provides materials typically offered at the HCUP conference exhibit booths.
- Includes brochures, participation maps, an overview presentation of HCUP, and additional information that provides general project information.

http://www.hcup-us.ahrq.gov/news/exhibit_booth.jsp
Interactive Online HCUP Overview Course Available

- Provides information about HCUP data, software tools, and products
- Length 90 min

http://www.hcup-us.ahrq.gov/overviewcourse.jsp
HCUP Sample Design

- Tutorial explains the sampling strategy of the three nationwide databases – the NIS, KID, and NEDS
- Length 30 min

http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp
Load and Check HCUP Data

- Provides instructions on how to unzip HCUP data, save it on your computer, and load data into a statistical software package
- Length 20 min

http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp
Producing National HCUP Estimates

• Explains how to produce national estimates from the three nationwide databases (NIS, NEDS, KID)
• Length 45 min

http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp
Calculating Standard Errors

- Explains how to accurately determine the precision of the estimates produced from the HCUP nationwide databases
- Length 30 min

http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp
Multi-Year Analysis

• Describe problems that may arise when using multiple years of HCUP data and provides solutions for addressing these issues

• Length 30 min

http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp
Using HCUP Technical Assistance

Active Technical Assistance

• Responds to inquiries about HCUP data, products, and tools

• Collects user feedback and suggestions for improvement

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