Using HCUP Resources for Pediatric Safety Surveillance

Kids’ Inpatient Database (KID)
Nationwide Emergency Department Sample (NEDS)
AHRQ Quality Indicators

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Healthcare Cost and Utilization Project (HCUP)

The Largest Collection of Multi-Year, All-Payer, Encounter-Level

Inpatient
Emergency Department
Ambulatory Surgery

Hospital-Based Administrative Data
HCUP Partners Providing 2009 Inpatient Data

95% of all hospital discharges

Key:
- Participating
- Non-participating
AHA definition of community hospitals: Non-Federal, short-term, general, and other specialty hospitals, excluding hospital units of other institutions (e.g., prisons)

Includes these hospitals
- Multi-specialty general hospitals
- OB-GYN
- ENT
- Orthopedic
- Pediatric
- Public
- Academic medical centers

Excludes these hospitals
- Long-term care
- Psychiatric
- Alcoholism/Chemical dependency
- Rehabilitation
- DoD / VA / IHS
The Foundation of HCUP is Billing Data (UB-04, CMS 1500)

Patient demographics (age*, sex)
Diagnoses & procedures (ICD-9-CM)
Expected payer
Length of stay
Patient disposition (e.g. death†)
Admission source & type
Admission month
Weekend admission

* Age in months in the KID
† In-hospital death; no verification of cause
Some Data Elements Vary by State

- 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‡
- Hospital identifier unencrypted

* Limited to certain states; files available to link readmissions, revisits
† Limited to fewer states
‡ Limited to a few states
The Making of HCUP Data

1. Patient enters hospital
2. Hospital sends billing data and any additional data elements to Data Organizations
3. States store data in varying formats
4. AHRQ standardizes data to create uniform HCUP databases
5. Billing record created
It all begins with …
**HCUP State Databases**

- **State Inpatient Databases (SID)**
  - All inpatient hospital discharge data (including those admissions that started in the ED) from participating HCUP States

- **State Emergency Department Databases (SEDD)**
  - Emergency department data (treat and release) from participating HCUP States
HCUP National Databases are Sampled from State Databases

State Inpatient Databases

- Nationwide Inpatient Sample (NIS)
- Kids' Inpatient Sample (KID)

State Emergency Department Databases

- Nationwide Emergency Department Sample (NEDS)
NIS is a Stratified Sample of Hospitals from the SID

5 NIS Strata

U.S. Region

Urban/Rural

Teaching Status

Ownership/Control

Bed Size

State is NOT included as a stratum

Stratified Sample of Hospitals

State Inpatient Databases

N = ~ 4K hospitals

~ 32M records

Nationwide Inpatient Sample

N = ~ 1K hospitals

~ 8M records
KID is a Stratified Sample of Discharges from the SID

3 Strata

Uncomplicated Births

Complicated Births

Pediatric Non-Births

State Inpatient Databases

N = ~ 4K hospitals

~ 6M records

Kids’ Inpatient Database

N = ~ 4K hospitals

~ 3M records

State is NOT included as a stratum

10% stratified sample of uncomplicated births

80% stratified sample of other pediatric discharges
NEDS is a Stratified Sample of Hospitals from the SEDD and SID

SED&D SEDD & SID
N = ~ 2K Hospital-based EDs
~ 64M ED visits

5 NEDS Strata

SEDD & SID
N = ~ 2K Hospital-based EDs
~ 64M ED visits

SEDD & SID
N = ~ 2K Hospital-based EDs
~ 64M ED visits

Similar to the NIS and KID Strata: State is NOT included as a stratum

Stratified Sample of Hospitals

5 NEDS Strata

U.S. Region

Urban/Rural

Teaching Status

Ownership/Control

Trauma

Nationwide Emergency Department Sample

N = ~ 1K Hospital-based EDs
~ 26M ED visits
NIS, NEDS, KID: Must be Weighted to Produce National and Regional Estimates
# Hospital Billing Data Have Benefits and Limitations

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Limitations</th>
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<tbody>
<tr>
<td>Large sample size (rare events, specific subgroups)</td>
<td>Differences in coding across hospitals</td>
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<tr>
<td>Uniformity of coding</td>
<td>No data on individuals outside of hospital system</td>
</tr>
<tr>
<td>Routine, regular collection</td>
<td>No linkage to EMR</td>
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<tr>
<td>Ease of access</td>
<td>Does not include complete episode of care</td>
</tr>
<tr>
<td>Charge and cost info</td>
<td>May not include all hospitals</td>
</tr>
<tr>
<td>All-payer</td>
<td>Lack revenue information</td>
</tr>
<tr>
<td>Available at local, state, regional, national level</td>
<td>Limited clinical details; no growth/development data</td>
</tr>
<tr>
<td>Supplemental files available (e.g., link hospital stays, ED visits)</td>
<td>Limited info on history</td>
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</tbody>
</table>
What information is available through ICD-9-CM codes?

- **Gestational age**
  - 765.21 Less than 24 weeks
  - 765.22 24 weeks
  - 765.23 25-26 weeks ...
  - 765.29 37 or more weeks

- **Low birth weight**
  - 765.11 preterm infant less than 500 grams
  - 765.12 500-749 grams
  - 765.13 750-999 grams ...
  - 765.19 2500 grams and over
Poisoning by drugs, medicinal and biologic substances (960-979), e.g.,

- 960.0 by penicillin
- 963.0 by antiallergic and antiemetic agents
- 965.4 by aromatic analgesics
- 969.0 by antidepressants
- 969.4 by benzodiazapines
- 979.4 by measles vaccine

But does not document:

- therapeutic use
- dose
- schedule
- formulation
- route of administration
- lot number
- concomitant meds (unless also a cause of poisoning)
ICD-9-CM information –
External cause of injury codes

Drugs, medicinal and biologic substances causing adverse effects in therapeutic use (E930-E949), e.g.,

- E930.5 due to cephalosporins
- E932.0 due to adrenal cortical steroids
- E935.2 due to other opiates and narcotics
- E945.7 due to antiasthmatics

But does not document:

- therapeutic use
- dose
- schedule
- formulation
- route of administration
- lot number
- concomitant meds (unless also a cause of poisoning)
Suicide and self-inflicted poisoning (E950.0-.5), e.g.,

- E 950.0 due to analgesics, antipyretics or antirheumatics
- E950.3 due to tranquilizers and other psychotropic agents
- E950.4 due to other specified drugs and medicinal substances
Complications of surgical and medical care (996-999), e.g., mechanical complication of:

- 996.02 heart valve prosthesis
- 996.1 nervous system device, implant or graft
- 996.49 internal orthopedic device, implant or graft

But does not document:

- Specific device
- Make or model
ICD-9-CM information (cont’d)

Infection and inflammatory reaction due to internal prosthetic device, implant or graft, e.g., infection of:

- 996.62 vascular device, implant or graft
- 996.1 nervous system device, implant or graft
- 996.49 internal orthopedic device, implant or graft

But does not document:

- Specific device
- Make or model
Other complications of medical care, e.g.,

- **415.11** Iatrogenic pulmonary embolism
- **512.1** Iatrogenic pneumothorax
- **518.4** Postop pulmonary edema
- **518.7** Transfusion-related acute lung injury
- **593.3** Postop stricture of ureter
- **995.4** Anesthetic shock
- **997.1** Cardiac complications (e.g., heart failure during or resulting from procedure)
- **997.3** Respiratory complications (e.g., pneumonia resulting from procedure)
- **997.5** Urinary complications

*But provides no more specific information*
Other complications of medical care, e.g.,

- 998.11 Hemorrhage complicating a procedure
- 998.2 Accidental puncture or laceration
- 998.4 Foreign body accidentally left during a procedure
- 998.5 Postoperative infection
- 999.4 Anaphylactic shock due to serum
- 999.6 ABO incompatibility reaction

But provides no more specific information
Additional E codes

Misadventures to patients during surgical and medical care (E870-E876), e.g.,

- E870.0 Accidental cut, puncture, perforation, or hemorrhage during surgical operation
- E876.8 Other specified misadventures during medical care

But provides no more specific information
AHRQ Quality Indicators (QIs)

- Developed through contract with UCSF-Stanford Evidence-based Practice Center & UC Davis
- Use existing hospital discharge data, based on readily available data elements
- Incorporate a range of severity adjustment methods, including APR-DRGs* and comorbidity groupings

* All Patient Refined - Diagnosis Related Groups
AHRQ Quality Indicators

Inpatient QIs
- Mortality
- Utilization
- Volume

Prevention QIs
- Avoidable Hospitalizations /
- Other Avoidable Conditions

Pediatric QIs
- Neonatal QIs

Patient Safety QIs
- Complications, Unexpected Death
**Pediatric Quality Indicators (PDIs)**

- **Inpatient Indicators**
  - Accidental puncture and laceration
  - Pressure ulcer
  - Foreign body left in after procedure
  - Iatrogenic pneumothorax in non-neonates
  - Pediatric heart surgery mortality
  - Pediatric heart surgery volume
  - Postoperative hemorrhage or hematoma
  - Postoperative respiratory failure
  - Postoperative sepsis
  - Transfusion reaction
  - Central venous catheter-related bloodstream infection
Area-Level Indicators

- Asthma admission rate
- Diabetes short-term complication admission rate
- Gastroenteritis admission rate
- Perforated appendix admission rate
- Urinary tract infection admission rate
Inpatient Indicators

- Iatrogenic pneumothorax in neonates
- Neonatal mortality
- Central line bloodstream infection in neonates
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Label</th>
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<th>Label</th>
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<tr>
<td>PDI 1</td>
<td>Accidental Puncture or Laceration</td>
<td>PDI 7</td>
<td>Pediatric Heart Surgery Volume</td>
</tr>
<tr>
<td>PDI 2</td>
<td>Decubitus Ulcer</td>
<td>PDI 11</td>
<td>Postoperative Wound Dehiscence</td>
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<tr>
<td>PDI 3</td>
<td>Foreign Body</td>
<td>PDI 13</td>
<td>Transfusion Reaction</td>
</tr>
<tr>
<td>PDI 5</td>
<td>Iatrogenic Pneumothorax</td>
<td>NQI 3</td>
<td>Blood Stream Infection in Neonates</td>
</tr>
<tr>
<td>PDI 6</td>
<td>Pediatric Heart Surgery Mortality</td>
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Over half of the US has access to a public report in their state that uses the AHRQ QIs.
Welcome to HCUPnet

HCUPnet is a free, online 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.

- National Statistics on All Stays
- National Statistics on Children
- National Statistics on Mental Health Hospitalizations
- National and State Statistics on Hospital Stays by Payer - Medicare, Medicaid, Private, Uninsured
- State Statistics on All Stays
- Quick National or State Statistics
- Statistics on Emergency Department Use
- Quick State Statistics on All ED Visits
- Hospitals Like Mine (Beta Version)
- Statistics on U.S. Hospitals

http://hcupnet.ahrq.gov
<table>
<thead>
<tr>
<th><strong>HCUPnet...</strong></th>
<th><strong>CAN PRODUCE...</strong></th>
<th><strong>CANNOT PRODUCE...</strong></th>
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<td>More complicated queries</td>
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<tr>
<td>Sample size calculations</td>
<td>Multivariate analyses</td>
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<tr>
<td>Trends information</td>
<td>Statistics involving certain variables</td>
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<tr>
<td>Rank ordering of diagnoses and procedures</td>
<td>Statistics that may violate confidentiality (patient-, provider-, hospital-level data)</td>
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<tr>
<td>Significance testing</td>
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QUESTIONS?

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