Using HCUP Resources for Pediatric Safety Surveillance

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

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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

[Map of the United States showing participating states in black and non-participating states in white.]

Key: Participating | Non-participating
HCUP Partners Providing 2009 Emergency Department Data

Key:
- Participating
- Non-participating

>60% of all ED visits
HCUP Focuses on Community Hospitals

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

Patient enters hospital

Billing record created

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
It all begins with …

HCUP State Databases

All inpatient hospital discharge data (including those admissions that started in the ED) from participating HCUP States

State Inpatient Databases (SID)

Emergency department data (treat and release) from participating HCUP States

State Emergency Department Databases (SEDD)
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

1. State Inpatient Databases
   - N = ~ 4K hospitals
   - ~ 32M records

2. Nationwide Inpatient Sample
   - N = ~ 1K hospitals
   - ~ 8M records

5 NIS Strata

- U.S. Region
- Urban/Rural
- Teaching Status
- Ownership/Control
- Bed Size

State is NOT included as a stratum
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

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

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

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

### Benefits
- Large sample size (rare events, specific subgroups)
- Uniformity of coding
- Routine, regular collection
- Ease of access
- Charge and cost info
- All-payer
- Available at local, state, regional, national level
- Supplemental files available (e.g., link hospital stays, ED visits)

### Limitations
- Differences in coding across hospitals
- No data on individuals outside of hospital system
- No linkage to EMR
- Does not include complete episode of care
- May not include all hospitals
- Lack revenue information
- Limited clinical details; no growth/development data
- Limited info on history
ICD-9-CM

- ICD-9-CM Diagnosis Codes
- ICD-9-CM Procedure Codes
- Included in both inpatient and outpatient databases
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)
E codes (cont’d)

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

But provides no more specific information
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
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
  - Postoperative wound dehiscence
  - 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
Neonatal Quality Indicators (NQIs)

- **Inpatient Indicators**
  - Iatrogenic pneumothorax in neonates
  - Neonatal mortality
  - Central line bloodstream infection in neonates
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<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.
HCUPnet Capabilities

HCUPnet...

**CAN PRODUCE...**
- Simple statistics
- Sample size calculations
- Trends information
- Rank ordering of diagnoses and procedures
- Significance testing

**CANNOT PRODUCE...**
- More complicated queries
- Multivariate analyses
- Statistics involving certain variables
- Statistics that may violate confidentiality (patient-, provider-, hospital-level data)
QUESTIONS?
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