Automating Safety Detection and Surveillance: The Automated Adverse Event Detection Project (AAEDP)

Eric S. Kirkendall, M.D.
Objectives

• Describe the AAEDP and its role in our safety systems at Cincinnati Children’s

• Discuss the data types and information attained via the AAEDP
  – Automated vs. Manual Collection

• Review current triggers and safety events detected by the AAEDP

• Highlight collaborative efforts involving the AAEDP
When It Began…

- Started July 2006 from CCHMC Center for Health Care Quality and Health Policy & Clinical Effectiveness

- Started as an AHRQ CERTs grant
  - Only pediatric CERTs site at this time

- Automated system meant to detect harm and inform improvement teams
  - Meant to overcome shortcomings of voluntary reporting systems
CCHMC Detection of Harm

- Safety Reporting System & SSE’s
- Never Events
- PIV’s
- GTT
- Pressure Ulcers
- AAEEDP
- CHCA ADE Tool
- Codes Outside ICU
- VAP
- SSI
- BSI
AAEDP Workflow Process...

**Report Generation**
- Clinical Data Repository queried
- Reports generated and sent to application

**Manual Investigation**
- Clinical Investigator retrieves reports
- Manually reviews reports and EHR data
- Makes manual exclusions
- Captures event characteristics
- Determines if adverse event occurred (if possible)
- Enters information/data into adverse event database

**Data Processing**
- Data Analyst compiles data, analyzes statistically
- Produces run charts, graphs, etc

**Presentation to Stakeholders**
- Output is taken to improvement and governance teams
- Create new improvement teams if necessary
Technical Aspects

• Clinical Data Repository queried
• Daily reports reside in Business Objects Infoview application
• Investigator logs into inbox, reviews and downloads report in Excel (or PDF, Word, text, etc)
• Results loaded into separate MS Access relational database (more advanced database in the works)
Log On to InfoView

Enter your user information and click Log On.
(If you are unsure of your account information, contact your system administrator.)

**Log into the system with your CCHMC network ID and password. Please select an Authentication type of Windows AD. If you do not have access or need to modify your BusinessObjects access, please complete a System Access Request Form. If you are having problems logging in, please contact the Service Desk at 6-4100.

User Name: klouh5
Password: 
Authentication: Windows AD

Log On
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Granularity of Data

- Automated periodic reports contain basic demographic information
  - Can be very granular, depending on the complexity of the query and needs of the investigator
- More advanced data (such as medical information that requires clinical judgment) is gathered manually
- Bridging the gap with more advanced queries
  - Nephrotoxin list with Acute Kidney Injury trigger
Data (continued)

• Mainly medication-related detection
  – Can get very specific drug information including dose, route of admin, formulation, concomitant meds
  – Can use graphing/synopsis functions to tie timing of medications to vital signs, other events

• Only medical device-related triggers are IV infiltrates/phlebitis and oversedation (PCA-related)
  – No specific information is gathered initially, but is available through EHR
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1st Triggers Followed

- Narcan, Flumazenil, Digibind, Vit K-Warfarin, started July 2006
- Glucose/Insulin added Dec 2006
- Hyaluronidase added Sept 2007
- Phentolamine added Feb 2008
- Glucagon, Infiltrates/Phlebitis added Feb 2008
Adverse Drug Events

Current / Reduced Monthly ADEs vs. Detection Capability Base Level (3-month Average)

Max ADEs Detected (3-Month Avg) Desired Direction

Current/Reduced Monthly ADEs Desired Direction (Relative to Level of Max ADEs Detected)

# Adverse Events

- Other
- IV Infiltration (Chart Review) (03-25-08)
- IV Infiltration (Hyaluronidase) (09-01-07)
- Hypoglycemia (Glucose Bolus) (12-08-06)
- Opiate Over-sedation (Naloxone) (07-08-06)
- Max ADEs Detected (3-month Average)

(Chart Review Started)

Naloxone Trigger Started

Glucose Trigger Started

Hyaluronidase Trigger Started

IV Chart Review Started

Adverse Drug Events

2006

2007

2008

2009
Current Triggers Followed

• **Active Improvement**
  – Narcan
  – Flumazenil
  – Digibind
  – Glucose/Insulin
  – Glucagon
  – Hyaluronidase
  – Phentolamine
  – Vit K after warfarin
  – Infiltrates/Phlebitis

• **Surveillance Only**
  – Benztropine
  – Kayaxelate
  – PACU to ICU
  – Any Transfers to Higher Level of Care
CCHMC Central Venous Catheter (CVC) Associated Laboratory Confirmed Bloodstream Infections (LCBIs)

Infections per 1000 Device Days

Updated Thru 30Jun10 by Kate Rich, Division of Health Policy & Clinical Effectiveness

Source: Infection Control Dept.
Common Demographic and Event Characteristics of Acute Kidney Injury (AKI) Automated Trigger

Common Demographic Information Collected from Patient's Chart Regarding Each Active Trigger Event:

- Medical Record Number
- Encounter Number
- DOB
- Date of Admission
- Primary Diagnosis
- Secondary Diagnosis
- Weight (Kg)
- Gender
- Ethnicity
- Date of Trigger
- Time of Trigger
- Location of Trigger occurrence
- Location of Event occurrence (i.e. Unit and whether in-hospital or not)
- Date of Event occurrence
- Time of Event occurrence
- Hospital Service Involved
- Trigger Dose if Applicable

Exclusion Criteria for Creatinine Trigger

- Any patient who has had cardiac bypass within 72 hours prior to maximum creatinine value
- Patient’s LOS (length of stay) is < 3 days
- Patient with previous history of Dialysis
- Time to Creatinine recovery (i.e. return to baseline value) is ≤ 2 days
- Minimum value of 0.5mg/dL (Leave off for now; will evaluate later after charts are reviewed…)

Additional Event Characteristics for Creatinine Trigger

- Was the patient on IV fluids prior to the increased creatinine? (yes/no)
- Was the Patient on Dialysis at any time during this admission?
- Has Patient had a BMT? This admission or a previous admission?
- Is the Patient receiving a Nephrotoxic medication? (record drug and dose and frequency)
- Are medication monitoring levels (peaks and troughs) ordered appropriately for Gentamicin, Amikacin and/or Tobramycin and Vancomycin?
- Are dosage adjustments made appropriately if needed?
- Are monitoring levels ordered again after re-adjustments to dosage?
- Post-event monitoring: Renal panels and IVFs ordered appropriately after increase in creatinine noted?
Team Members

• Clinical Investigator, Elizabeth Kloppenborg, RN
• Director, AAEDP, Eric Kirkendall, MD
• ADE Team members
  – Patient Safety Officer, Stephen Muething, MD
  – Lead Pharmacists,
  – Many others: QI specialists, Data Analysts, Project Leaders, Legal
• Higher Governance, HPCE
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Collaboration

- Local – Improvement Teams ~ Opiate Task Force
- Regional – SPS/Ohio Collaborative (more on that in a minute)
- National – AAEDC (David Stockwell at CNMC), Publications
An Ohio Pediatric Hospital
Collaborative for Patient Safety
8 Pediatric Hospitals Working Together

- Shared aspiration of making Ohio the safest place in the nation for Children’s health care

- Innovative & strategic approach to building a State-Wide Pediatric Collaborative Improvement Model

- Transparency of Data: each hospital’s willingness to share successes and failures in order to improve healthcare in Ohio for children
Ohio Children’s Hospitals
Quality Improvement Initiatives

- CABSI (NACHRI)
- MRT Code (OCHA)
- ADE (OCHSPS)
- SSI (OCHSPS)
- Bedside Care (CHCA)
- Pressure Ulcers (CHCA)
- Procedural Never Events (CHCA, 2008)
- ADE – Sustain & Spread (CHCA, 2008)
- MDRO (CHCA, 2008)
- Inpatient Throughput (CHCA, 2007)
- Eliminating Codes (CHCA)
- ED Wait Times (CHCA, 2006)
- SSI (CHCA, 2006)
- CABSI (CHCA, 2005)
- ADE-Narcotic (CHCA, 2005)
Eliminating Serious Harm in Ohio's Children’s Hospitals

Goals:
- Eliminate serious harm in Ohio’s pediatric hospitals
- Reduce the overall cost of health care in the state
- Develop ongoing learning network
- Build a sustainable state-wide infrastructure.

PLANNING PHASE

Activities:
- will building with stakeholders,
- fundraising
- formation of PSO
- action plan development
- Diagnostic evaluations at 6 remaining sites
- training of risk managers
- construction of data systems

Milestones:
- Jul 10 - Dec 10
- Jul 10 to Mar 11
- Dec 10 - Dec 12

IMPLEMENTATION PHASE

Activities:
- focus on specific SSE reduction with specific aim
- Develop state-wide error prevention behaviors and associated tools
- error prevention training for all front-line
- leadership consulting and leadership training
- Safety Coach program at all sites
- simulation training for high risk areas
- root cause analysis training and continuous learning
- action plan and “lessons learned” network
- 6 month improvement cycles on common cause areas
- Improvement Advisor Training
- Periodic site visits by SPS leadership
- Continued expansion of shared data for specific sources of harm.

Milestones:
- Jan 13 - Dec 15
- Dec 10 - Dec 12
- Jan 13 - Dec 15

EXPANSION PHASE

Activities:
- Establishing stable QI infrastructure and learning network
- Further development of QI capability at all levels
- Continued development of HRO practices at each site
- Continue 6 month improvement cycles for common causes of harm as revealed by data.
- Further develop state-wide resources for simulation training
- cementing permanent learning networks.

Milestones:
- Jan 13 - Dec 15
- Dec 10 - Dec 12

- Funding identified for Simulation Training
- Launch a new state-wide Improvement Team every 6 months
- Reliable QI infrastructure and Learning Network implemented

Solutions for Patient Safety
Questions…