Pediatric Emergency Department
Quality Improvement

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Objective

• Present ideas and examples for pediatric QI activities to initiate at Kentucky Emergency Departments
QI Barriers
QI Barriers

- Time
- Effort
- People
- Discoverable in Kentucky
- People don’t want to talk about it
- Requires willingness to change
Why Is Quality and Safety Important?

• 2000 Institute of Medicine report “To Err is Human: Building a Safer Health System” estimated between 44,000 to 98,000 people die each year due to preventable medical errors
RANK — 37th in World Health Report

39th Infant Mortality
43rd Adult Female Mortality
42nd Adult Male Mortality
36th Life Expectancy
And Falling Further Behind

# How the U.S. Health Care System Compares Internationally?

## Country Rankings

<table>
<thead>
<tr>
<th>Quality Care</th>
<th>AUS</th>
<th>CAN</th>
<th>FRA</th>
<th>GER</th>
<th>NETH</th>
<th>NZ</th>
<th>NOR</th>
<th>SWE</th>
<th>SWIZ</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Care</td>
<td>2</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>11</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Safe Care</td>
<td>4</td>
<td>7</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Coordinated Care</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Patient-Centered Care</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

## Access

<table>
<thead>
<tr>
<th>Health Expenditures/Capita, 2011**</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUS</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>$3,800</td>
</tr>
</tbody>
</table>

**Notes:**
- * Includes ties.
- ** Expenditures shown in $US PPP (purchasing power parity); Australian $ data are from 2010.

**Source:**
Why?

- Unexplained clinical variation
- Evidence based care
- Refuse to standardize
- MD autonomy
- MD focus on a single organ system, single patient, their way of doing things
- No focus on population health
Unexplained Clinical Variation

Cancer & Hospice Care

Hospital Readmission

Percent of Patients Readmitted within 30 Days of Discharge
2016 Readmission Percentages by Hospital Referral Region
Unexplained Clinical Variation

- CXR, labs, CVL care, abx, diagnoses, hand offs
- Create stable processes
- Guidelines
- Protocols/standing orders
Commercial Aviation

U.S. and Canadian Operators Accident Rates by Year

Source: Boeing, 2007 Statistical Summary, July 2008

1935 – Advent of the checklist
1945 – Fitts & Jones study of cockpit design
Naval Aviation Mishap Rate

- 776 aircraft destroyed in 1954
- 15 aircraft destroyed in 2008

USN/USMC, FY50-06

Source: www.safetycenter.navy.mil O&M Flight Mishap Rate

Nuclear Powered Submarines

- 5,500 cumulative years of nuclear reactor operations
- 127 million miles submerged (265 round trips to moon)
- Zero Reactor Accidents
- Operated by 20 year olds
Significant Events at U.S. Nuclear Plants:
Annual Industry Average, Fiscal Year 1988-2007

Significant Events are those events that the NRC staff identifies for the Performance Indicator Program as meeting one or more of the following criteria:

- A Yellow or Red Reactor Oversight Process (ROP) finding or performance indicator
- An event with a Conditional Core Damage Probability (CCDP) or increase in core damage probability (ΔCDP) of 1x10^-5 or higher
- An Abnormal Occurrence as defined by Management Directive 8.1, “Abnormal Occurrence Reporting Procedure”
- An event rated two or higher on the International Nuclear Event Scale

Source: NRC Information Digest, 1988 is the earliest year data is available.
Updated: 4/09
### Surgical Safety Checklist

**Before induction of anaesthesia**
(with at least nurse and anaesthetist)

- **Has the patient confirmed his/her identity, site, procedure, and consent?**
  - Yes
- **Is the site marked?**
  - Yes
  - Not applicable
- **Is the anaesthesia machine and medication check complete?**
  - Yes
- **Is the pulse oximeter on the patient and functioning?**
  - Yes
- **Does the patient have a:**
  - Known allergy?
    - No
    - Yes
  - Difficult airway or aspiration risk?
    - No
    - Yes, and equipment/assistance available
  - Risk of >500ml blood loss (7ml/kg in children)?
    - No
    - Yes, and two IVs/central access and fluids planned

**Before skin incision**
(with nurse, anaesthetist and surgeon)

- **Confirm all team members have introduced themselves by name and role.**
- **Confirm the patient’s name, procedure, and where the incision will be made.**
- **Has antibiotic prophylaxis been given within the last 60 minutes?**
  - Yes
  - Not applicable
- **Anticipated Critical Events**
  - **To Surgeon:**
    - What are the critical or non-routine steps?
    - How long will the case take?
    - What is the anticipated blood loss?
  - **To Anaesthetist:**
    - Are there any patient-specific concerns?
  - **To Nursing Team:**
    - Has sterility (including indicator results) been confirmed?
    - Are there equipment issues or any concerns?
  - **Is essential imaging displayed?**
    - Yes
    - Not applicable

**Before patient leaves operating room**
(with nurse, anaesthetist and surgeon)

- **Nurse Verbally Confirms:**
  - The name of the procedure
  - Completion of instrument, sponge and needle counts
  - Specimen labelling (read specimen labels aloud, including patient name)
  - Whether there are any equipment problems to be addressed

- **To Surgeon, Anaesthetist and Nurse:**
  - What are the key concerns for recovery and management of this patient?

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This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009 © WHO, 2009
Table 2. National Assessment Response Summary<sup>a</sup>

<table>
<thead>
<tr>
<th></th>
<th>All Responding EDs (N = 4137)</th>
<th>EDs by Pediatric ED Volume Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (n = 1626)</td>
<td>Medium (n = 1244)</td>
</tr>
<tr>
<td><strong>PECC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td>1966 (47.5)</td>
<td>627 (38.6)</td>
</tr>
<tr>
<td>Nurse</td>
<td>2455 (59.3)</td>
<td>899 (55.3)</td>
</tr>
<tr>
<td><strong>Physician certifications/training (board)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency medicine</td>
<td>3418 (82.6)</td>
<td>1127 (69.3)</td>
</tr>
<tr>
<td>Family medicine</td>
<td>2555 (61.8)</td>
<td>1283 (78.9)</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>791 (19.1)</td>
<td>147 (9.0)</td>
</tr>
<tr>
<td>Pediatric emergency medicine</td>
<td>604 (14.6)</td>
<td>96 (5.9)</td>
</tr>
<tr>
<td>Other</td>
<td>1116 (27.0)</td>
<td>505 (31.1)</td>
</tr>
<tr>
<td><strong>ED competency evaluations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td>1599 (38.7)</td>
<td>386 (23.7)</td>
</tr>
<tr>
<td>Nurse</td>
<td>2757 (66.6)</td>
<td>800 (49.2)</td>
</tr>
<tr>
<td>Midlevel practitioner</td>
<td>749 (18.1)</td>
<td>155 (9.5)</td>
</tr>
<tr>
<td><strong>Key processes, policies, or procedures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pediatric QI process</td>
<td>1867 (45.1)</td>
<td>528 (32.5)</td>
</tr>
<tr>
<td>Weigh children only in kilograms</td>
<td>2802 (67.7)</td>
<td>853 (52.5)</td>
</tr>
<tr>
<td>Family-centered care plan</td>
<td>2468 (59.7)</td>
<td>821 (50.5)</td>
</tr>
<tr>
<td>Pediatric disaster plan</td>
<td>1938 (46.8)</td>
<td>613 (37.7)</td>
</tr>
<tr>
<td>Pediatric mental health care</td>
<td>1825 (44.1)</td>
<td>528 (32.5)</td>
</tr>
<tr>
<td><strong>Required equipment, median (IQR), % carried</strong></td>
<td>91 (81-98)</td>
<td>87 (78-96)</td>
</tr>
</tbody>
</table>

Abbreviations: ED, emergency department; IQR, interquartile range; PECC, pediatric emergency care coordinator; QI, quality improvement.

<sup>a</sup> Unless otherwise indicated, data are expressed as number (percentage) of responding EDs.
Kentucky ED QI

QI/PI Process Includes Children

- Does your ED have a pediatric patient care-review process? (separate or integrated into the overall plan)
- Yes - only 33 out of 103 hospitals
- No = 70 hospitals

Components Included in Hospital ED Performance Improvement Plan (33)

- Development of a plan for improvement in pediatric emergency care: 72.73%
- Re-evaluation of performance using outcomes based measures: 81.82%
- Identification of quality indicators for children: 63.64%
- Collection and analysis of pediatric emergency care data: 78.79%
Importance of QI in Hospitals that see fewer Pediatric Patients

- Deficiencies in pediatric readiness in the emergency department
- Limited pediatric experience (particularly with critically ill and injured children)
- Smaller proportion of visits, less system “readiness”
- Lack of pediatric competency requirements for providers
- Weight-based dosing requiring measurement and calculation
KY KPECC criteria

• The Quality Improvement/Performance Improvement (QI/PI) plan shall include pediatric-specific indicators, and the pediatric patient care-review process must be integrated into the ED QI/PI plan. Components of the process should interface with EMS and/or other pre-hospital providers, ED, trauma, inpatient pediatric, and hospital-wide QI or PI activities.
• At a minimum, QI/PI facilitators should:
  • 1. Identify pediatric-specific indicators of good outcome.
  • 2. Collect and analyze data monthly to discover variances.
  • 3. Define plans for improvement.
  • 4. Evaluate or measure the success of the QI or PI process.
  • 5. Mechanisms should be in place to monitor professional performance, credentialing, continuing education, and clinical competencies including integration of findings from QI audits and case reviews.
BASELINE DATA
Electronic Availability of Data Elements

- Date of Visit
- Date of Birth
- Age
- Unique patient identifier (such as MRN)
- Patient Disposition
- ED arrival time
- Unique Visit identifier
- Lab test type
- Lab result available time
- CPT Evaluation and Management code
- ED discharge time
- Triage status
- Patient seen by provider time
- Weight
- ICD-9 code (all)
- CPT code (procedure code)
- Prescription(s)
- Medication name

Percent
Electronic Availability of Measures

- ED Return Visits within 48 hours resulting in admission
- ED Left Without Being Seen
- Total ED Length of Stay
- ED patients triaged using a validated pediatric triage tool
- Diagnostic Imaging Test Turn Around Time
- Laboratory Test Turn Around Time
- Measuring weight in kilograms for ED patients
- Timeliness of relievers for acute asthma exacerbations
- Systemic corticosteroids for acute asthma exacerbations
- ED Door to Provider

Percent
Emergency Department Pediatric Performance Measures Toolbox

- 11 areas of interest
- 60 performance measures
Emergency Department Pediatric Performance Measures Toolbox

- Initial Care for Every Emergency Department Patient
- Emergency Department Infrastructure and Personnel
- Patient-Centered Emergency Department Care
- Emergency Department Flow
- Pain and Sedation
- Severe Illness
- Trauma
- Respiratory Diseases
- Other Conditions
- Childhood Infections
- Quality and Safe Care for All Patients
National Benchmarking

- NACHRI ED focus group
- CHA
- VPS
- STS
- PC4
- NSQIP database
- National Ambulatory Care Reporting System
Figure 5.1.1: Unadjusted Mortality Rate by Quarter
Figure 6.1.1: Standardized Mortality Ratio (PIM 2) by Quarter
Department comparison

Effectiveness Analysis–Urology Service

Adverse Event Rate

Hospital

% Adverse Event (Actual)

A B C D E F G H I J K L M N O P
Severity of illness adjusted
Peer comparison

Comparative Performance Obstetrics/Gynecology

C-Section Rate

- Result
- Average
- UCL
- LCL

Deliveries

C-Section Rate
Keys for Quality

• Data
• Benchmarking
• Leader
• Safety overlap
• Protocol/standing orders
• Prevention programs
• Eliminate unexplained clinical variation
• Willingness to change
• Willingness for CE

Source: Langley et al. (1996)
Are Physicians Willing to Change?

Yes...

Physician Willingness to Change

84% Willing
16% Unwilling

Impact of Aetna U.S. Healthcare Intervention

FNAB versus Open Biopsy for Initial Management of Palpable Breast Mass

% Performing FNAB as First Test

<table>
<thead>
<tr>
<th>Group</th>
<th>Before FNAB Symposium</th>
<th>After FNAB Symposium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending Groups</td>
<td>39.3% *</td>
<td>51.6% **</td>
</tr>
<tr>
<td>Non-Attending Groups</td>
<td>37.7% *</td>
<td>36.1% **</td>
</tr>
</tbody>
</table>

* NS
** p < .03
• 9 member expert panel
• Top 50 conditions seen in EDs
• Literature review, expert rating, evaluation for ability to measure, adequate numbers per hospital to measure
• 14 measurable indicators with adequate numbers across all hospitals
TABLE 4  Mean Values and Distributions for Clinical Indicators Using the NACRS Data Set (2003/2004)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mean</th>
<th>Median</th>
<th>Interquartile Range (25–75)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of radiographs for ankle injury (5–19 y)</td>
<td>65.7</td>
<td>74.8</td>
<td>54.1–82.0</td>
</tr>
<tr>
<td>Rate of unplanned return visits within 24 h for asthma (1–19 y)</td>
<td>3.7</td>
<td>3.2</td>
<td>1.8–4.7</td>
</tr>
<tr>
<td>Rate of unplanned return visits within 24–72 h for asthma (1–19 y)</td>
<td>0.9</td>
<td>0.7</td>
<td>0–1.5</td>
</tr>
<tr>
<td>Rate of chest radiographs for asthma (1–19 y)</td>
<td>20.5</td>
<td>19.8</td>
<td>9.3–30.9</td>
</tr>
<tr>
<td>Rate of chest radiographs for bronchiolitis (3–24 mo)</td>
<td>42.6</td>
<td>49.1</td>
<td>20.0–64.0</td>
</tr>
<tr>
<td>Rate of chest or lateral neck radiographs for croup (3 mo to 3 y)</td>
<td>9.3</td>
<td>8.7</td>
<td>0–13.9</td>
</tr>
<tr>
<td>Rates of unplanned return visits within 24 h for croup (3 mo to 3 y)</td>
<td>2.6</td>
<td>0.8</td>
<td>0–2.9</td>
</tr>
<tr>
<td>Rates of unplanned return visits for diabetes within 72 h</td>
<td>4.0</td>
<td>0.0</td>
<td>0–7.0</td>
</tr>
<tr>
<td>Rates of unplanned return visits for fever within 72 h for patients (3–24 mo)</td>
<td>3.9</td>
<td>4.3</td>
<td>2.1–5.6</td>
</tr>
<tr>
<td>Rates of unplanned return visits for fever within 72 h (2–19 y)</td>
<td>2.6</td>
<td>2.6</td>
<td>1.2–3.8</td>
</tr>
<tr>
<td>Rates of chest radiographs for fever (2–19 y)</td>
<td>12.7</td>
<td>11.6</td>
<td>4.5–19.2</td>
</tr>
<tr>
<td>Rates of unplanned return visits within 24 h for gastroenteritis</td>
<td>1.4</td>
<td>1.3</td>
<td>0–2.4</td>
</tr>
<tr>
<td>Rates of ventilation for patients with seizures</td>
<td>6.8</td>
<td>2.0</td>
<td>0–7.0</td>
</tr>
<tr>
<td>Rates of unplanned return visits within 72 h for urinary tract infection (3–19 y)</td>
<td>2.2</td>
<td>1.8</td>
<td>0–3.4</td>
</tr>
</tbody>
</table>

N = 251,229 visits in 174 EDs.

* All rates per 100 visits for the specific condition age 0 to 19 years unless otherwise specified.
ED QI

• Compliance with guidelines, protocols and pathways
• Trauma choreography
• Simulations
• Time to CAT scan following trauma arrival
• % pts with abdominal CTs for abdominal pain
• Timeliness of imaging reads
• Accuracy of imaging reports
• Head CT for minor closed head injuries
New Jersey

Pediatric Head CT

<table>
<thead>
<tr>
<th>Level</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>&lt; 5,000</td>
</tr>
<tr>
<td>1</td>
<td>5,000 - &lt;10,000</td>
</tr>
<tr>
<td>2</td>
<td>10,000 - &lt;15,000</td>
</tr>
<tr>
<td>3</td>
<td>15,000 - &lt;20,000</td>
</tr>
<tr>
<td>4</td>
<td>20,000 - &lt;25,000</td>
</tr>
<tr>
<td>5</td>
<td>25,000 +</td>
</tr>
</tbody>
</table>
ED QI

- Appropriateness of Emergency Department triage
- ED LOS
- Appropriateness of documentation
- Timeliness of subspecialty arrival
- Return visits to Emergency Department
- Returns to Emergency Department requiring admission
- Time to abx in a febrile neonate
ED QI

- Cost/Use of diagnostics
- Mislabeled specimens
- Patient satisfaction
- Availability of the Operating Room
- Time until psychiatric evaluation
- Deaths within 48 hours of discharge
- Time to first dose of steroids in asthmatics
ED QI

• Track number of pediatric patients that leave without being seen
• Adherence to end tidal CO2 monitoring on all pediatric intubated ED patients
• Adherence to NAT ED guidelines
• Orthopedic surgeon response time
• EtOH and UDS percentage on trauma patients
ED QI

Presence of a method to identify age based abnormal pediatric vital signs
Measuring weight in kg for patients < 18 years
Door to Provider
Reducing antibiotic use in children with viral illnesses
Reducing pain in children with acute fractures
Interventions to Improve

Patient with eligible painful condition

Assess pain score

> 3

Assess contraindications (NPO, allergy, NSAID within 6 hours)

Administer ibuprofen 10 mg/kg po

Request alternative analgesic from physician
# Proportion Receiving Analgesic

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>Change (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All fracture patients</td>
<td>58.2%</td>
<td>67.8%</td>
<td>9.6% (3.1, 16.0)</td>
</tr>
<tr>
<td>Fracture patients with pain score $\geq 3$</td>
<td>63.6%</td>
<td>75.2%</td>
<td>11.6% (4.5, 18.7)</td>
</tr>
</tbody>
</table>
Transport/EMS

- Follow-up process
- Major issues – Medical Dir. of Transport
- Offer education to the center
- Every transport?
- Who calls?
- What to you do when the provider is not there?
Care Review

Medication errors
Complications
Morbidity
Mortality
Professionalism
Serious Safety Events

System Focus
How Do We Measure Value?

Value = \frac{Quality}{Cost}

Everyday we make decisions based on this equation for ourselves, our families and our patients
## Deming's Beliefs…

<table>
<thead>
<tr>
<th>Standard Company</th>
<th>Deming’s Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality is expensive</td>
<td>Quality leads to lower costs</td>
</tr>
<tr>
<td>Inspection is the key to Quality</td>
<td>Inspection is too late. If workers can produce defect-free goods, eliminate inspection</td>
</tr>
<tr>
<td>Defects are caused by workers</td>
<td>Most defects are caused by the system</td>
</tr>
<tr>
<td>Rewarding the best performers and punishing the worst will lead to greater productivity and creativity</td>
<td>Most variation is caused by the systems that judge, punish, destroy teamwork and the company</td>
</tr>
<tr>
<td>Profits are made by keeping revenue high and costs down</td>
<td>Profits are generated by loyal customers</td>
</tr>
</tbody>
</table>