Overcoming Barriers to Apply New Discoveries in EM

Richard M Ruddy, MD
Division of Emergency Medicine
Cincinnati Children’s Hospital
Medical Center
Objectives

• Review the barriers to health care improvement.
• Demonstrate the impact of measurement to give us evidence to make changes
  - Quantitative
  - Qualitative
• Discuss implementation tools
  - Improvement science
  - Learning Health Care system
Barriers to Implementation

• “We learned it the “right” way
• There is a culture in hospitals that may lean towards the way to do things
• The media may influence parents or us to want “tests” or antibiotics
• We are anxious about change (and not all early adopters)
• The reimbursement system may not reward us
RSI, CPR, shock, ARF

High risk conditions

Communication

Evidence-based care

Process, time, other

RSI
- Follow process
- RSI success safely

Team leader
- High use of mental model
- 360 feedback

Sepsis
- Reliable sepsis path use
- Attention to abnormal VS

Testing
- Low use of CT if very low risk
- Low CXR in asthma discharged

Safe
- Low rate of 48 return admitted
- No pattern of missed diagnosis

Comm
- Reliable hand off (PCP, ED)
- Reliable bedside rounding
Institute of Medicine

- Crossing the Quality Chasm
- Performance Measurement
- Emergency Care for Children: Growing Pains
- Future of Emergency Care: Change the Outcome
- Cincinnati Children's
The Quality of Ambulatory Care Delivered to Children in the United States

Rita Mangione-Smith, M.D., M.P.H., Alison H. DeCristofaro, M.P.H., Claude M. Setodji, Ph.D., Joan Keesey, B.A., David J. Klein, M.S., John L. Adams, Ph.D., Mark A. Schuster, M.D., Ph.D., and Elizabeth A. McGlynn, Ph.D.
• Our goal is to provide the best acute care possible

• A 3 step process
  - The first step toward achieving quality is convening expert members across the healthcare industry, including patients to define quality with uniform standards and measures that apply to the many facets of care patients receive
  - Second, information gleaned from measuring performance is reported and analyzed to pinpoint where patient care falls short
  - Third, caregivers examine information about the care they are providing and use it to improve

**Measure. Report. Improve.**
% “right care”

Red – Acute
Orange – Chronic
Green - Preventative

Red: 67%
Orange: 53%
Green: 41%

ARTICLE

Quality of Care for Common Pediatric Respiratory Illnesses in United States Emergency Departments: Analysis of 2005 National Hospital Ambulatory Medical Care Survey Data

Jane F. Knapp, MD, Stephen D. Simon, PhD, Vidya Sharma, MBBS, MPH

Departments of *Pediatrics and †Medical Research, Children’s Mercy Hospitals and Clinics, Kansas City, Missouri

The authors have indicated they have no financial relationships relevant to this article to disclose.

What’s Known on This Subject
Evidence exists for the optimal treatment of asthma, bronchiolitis, and croup in children. It is not known how well this evidence has been translated into practice in US EDs.

What This Study Adds
This is the first study to apply systematically developed performance indicators for the US ED care of children with common respiratory illnesses.

Pediatrics 2008;122;1165-1170

ORIGINAL ARTICLE

Benchmarks for the Emergency Department Care of Children With Asthma, Bronchiolitis, and Croup

Jane F. Knapp, MD,* Matthew Hall, PhD,† and Vidya Sharma, MBBS, MPH*

Pediatr Emer Care 2010;26: 364-369
## Pediatric Hospital Benchmarks
### 2007 Data For 30 Hospitals

<table>
<thead>
<tr>
<th>Condition</th>
<th>Indicator</th>
<th>CHCA Mean Performance</th>
<th>Benchmark</th>
<th># of Hospitals at or Above Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>• Steroid use</td>
<td>68%</td>
<td>79.8%</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>• X-ray use</td>
<td>29.1%</td>
<td>19.8%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>• Antibiotic use</td>
<td>4.3%</td>
<td>1.5%</td>
<td>3</td>
</tr>
<tr>
<td>Bronchiolitis</td>
<td>• Antibiotic use</td>
<td>4.7%</td>
<td>1.8%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>• X-ray use</td>
<td>36.7%</td>
<td>19.6%</td>
<td>2</td>
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<tr>
<td>Croup</td>
<td>• Steroid utilization</td>
<td>85.8%</td>
<td>93.1%</td>
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<tr>
<td></td>
<td>• X-ray utilization</td>
<td>9.3%</td>
<td>4.0%</td>
<td>1</td>
</tr>
</tbody>
</table>
Asthma, Bronchiolitis and Croup: ED Quality Indicators

The dot equals national performance of all EDs from NHAMCS
The brackets represent variation among children’s hospitals
Aim – Determine the barriers & supports to MDI use in the PERC EDs; Determine factors associated with early adopters

- Case study of 9 Canadian EDs – unit of analysis was the ED
- Results – aspects of the MDI/Neb, parent, effectiveness, cost
- Early adopters found the same issues as late.
A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

Alex B. Haynes, M.D., M.P.H., Thomas G. Weiser, M.D., M.P.H.,
William R. Berry, M.D., M.P.H., Stuart R. Lipsitz, Sc.D.,
Abdel-Hadi S. Breizat, M.D., Ph.D., E. Patchen Dellinger, M.D.,
Teodoro Herbosa, M.D., Sudhir Joseph, M.S., Pascience L. Kibatala, M.D.,
Marie Carmela M. Lapitan, M.D., Alan F. Merry, M.B., Ch.B., F.A.N.Z.C.A., F.R.C.A.,
Krishna Moorthy, M.D., F.R.C.S., Richard K. Reznick, M.D., M.Ed., Bryce Taylor, M.D.,
and Atul A. Gawande, M.D., M.P.H., for the Safe Surgery Saves Lives Study Group*

ABSTRACT
Participating Hospitals

- Prince Hamzah Hospital, Amman
- St Stephen’s Hospital, New Delhi
- Univ of Washington Medical Center, Seattle
- St Francis Designated District Hospital, Ifakara
- Philippine General Hospital, Manila
- Toronto General Hospital, Toronto
- St Mary’s Hospital, London
- Auckland City Hospital, Auckland
# Safe Surgery Check List

<table>
<thead>
<tr>
<th>Safe Surgery Check List</th>
<th>PRE-INTERVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine intra-operative oximetry monitoring</td>
<td>6/8</td>
</tr>
<tr>
<td>Oral confirmation of patient’s name and surgical site in OR</td>
<td>2/8</td>
</tr>
<tr>
<td>Routine prophylactic antibiotics in OR</td>
<td>5/8</td>
</tr>
<tr>
<td>Plan for IV access for cases of high blood loss</td>
<td>0/8</td>
</tr>
<tr>
<td>Formal team briefing /debriefing</td>
<td>0/8</td>
</tr>
</tbody>
</table>

Haynes: NEJM 2009
Results

• “did I think the checklist would make much of a difference in my cases?”
  “No”

• NEJM
  – Death rate – dropped from 1.5% to 0.8%
  – Inpatient complications – reduced from 11% to 7% afterwards

• “the week I wrote this – 3 cases where it made a difference”
Current Health Care Model

The Path to Continuously Learning Health Care in America
Figure. The 3T’s Road Map

T indicates translation. T1, T2, and T3 represent the 3 major translational steps in the proposed framework to transform the health care system. The activities in each translational step test the discoveries of prior research activities in progressively broader settings to advance discoveries originating in basic science research through clinical research and eventually to widespread implementation through transformation of health care delivery. Double-headed arrows represent the essential need for feedback loops between and across the parts of the transformation framework.

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Clinical / KT Research Loops

Knowledge Translation Loop:
- Barriers
  - Assess barriers to knowledge translation
- Effectiveness
  - Identify gaps in KT evidence through SRs; evaluate KT methods through cluster RCTs
- Dissemination
  - Widespread dissemination of clinical and KT findings
- Diffusion
  - Natural diffusion of research in the real world (non-research setting)
- Evaluation
  - Assess outcomes in the real world

Clinical Research Loop:
- Burden of Illness
  - Determine health status using health status indicators
- Aetiology or Causation
  - Identify and assess possible causes of burden illness
- Efficacy
  - Identify gaps in evidence through SRs; evaluate treatment options through RCTs
- Community Effectiveness
  - Assess benefit/harm ratio of potentially feasible interventions and estimate reduction of burden
- Efficiency
  - Determine relationships between costs and effects of treatment options

The SQUIRE (Standards for QUality Improvement Reporting Excellence) guidelines for quality improvement reporting: explanation and elaboration

G Ogrinc,1 S E Mooney,2 C Estrada,3 T Foster,4 D Goldmann,5 L W Hall,6 M M Huizinga,7 S K Liu,8 P Mills,9 J Neily,10 W Nelson,11 P J Pronovost,12 L Provost,13 L V Rubenstein,14 T Speroff,15 M Splaine,10 R Thomson,17 A M Tomolo,16 B Watts19

• **SQUIRE statement** is set of checklist of 19 statements authors should consider when writing a formal paper on QI

  • Title abstract
  • Intro
  • Methods

• Results
• Discussion
• Other

*Qual Saf Health Care 2008;17(Suppl 1):i13–i32.*
Introducing Quality Reports

Alex R. Kemper, Virginia A. Meyer and Lewis R. First

DOI: 10.1542/peds.2010-2835

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://www.pediatrics.org/cgi/content/full/127/1/187

Introducing Quality Reports

Nearly a decade has passed since the Institute of Medicine released its landmark report Crossing the Quality Chasm, which called for a redesign of the health care system to deliver care that is safe, effective, patient-centered, timely, efficient, and equitable. The importance of engaging in this process is underscored by the requirement that pediatricians now participate in quality-improvement activities to maintain board certification. Unfortunately, opportunities to share the results of well-designed quality-improvement projects, regardless of their success, have been limited. This is a critical missed opportunity for spreading innovation. Recognizing this need, this month we introduce a new section in Pediatrics: Quality Reports, under the direction of assistant editor Alex Kemper, MD. This section will feature reports of the implementation and outcomes of quality-improvement projects. In addition to providing insight about improving care delivery, we hope that these reports stimulate our readers to address quality-improvement issues within their own practices. Furthermore, we believe that publishing these reports will both increase scholarly productivity around quality improvement for children’s health and improve the rigor brought to the conduct of quality-improvement projects.

Implementation science, or the study of improving quality through changes in programs or processes, is a rich and rapidly developing area of scientific inquiry. Our new Quality Reports section will focus...
What are we trying to accomplish?

How will we know that a change is an improvement?

What change can we make that will result in improvement?
KEY DRIVER DIAGRAM: Therapeutic Reliability

- **AIM**
  - By February 2011, increase % of patients with fever and line who receive their first antibiotic within 90 minutes of ED arrival from 28% to 90%

- **GLOBAL AIM**
  - Enhance “Therapeutic Reliability” of ED care by providing effective, timely and safe care to patients

- **KEY DRIVERS**
  - Rapid identification and segmentation of eligible patients
  - Treatment team knows the correct therapy
  - Treatment team reliably implements the correct therapy
  - Correct supplies, equipment, space and personnel readily available
  - Improvement Culture: Staff are aware of, accept and participate in the treatment plan
  - Patient and families are aware of, accept and participate in the treatment plan

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- Key
  - Dotted box = Placeholder for future additions
  - Green shaded = what we're working on right now

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KEY DRIVER DIAGRAM: Therapeutic Reliability

**Initial Date:** 07-01-2010
**Revised:** 12-12-2010

**KEY DRIVERS**

- Rapid identification and segmentation of eligible patients
- Treatment team knows the correct therapy
- Treatment team reliably implements the correct therapy
- Correct supplies, equipment, space and personnel readily available
- Improvement Culture: Staff are aware of, accept and participate in the treatment plan
- Patient and families are aware of, accept and participate in the treatment plan

**INTERVENTIONS (Reliability level)**

- Standardized Identification (Level 2)
  - StatLine Operator confirmation at time of referral; standard pager template
- Standardized Care (Level 2)
  - Oncology referral checklist
  - ED referral Smartphrase
  - Epic Order Sets
- Team communication of accountability for roles, responsibilities and plan (Level 2)
  - Team page at patient referral
- Patients informed
  - Reminder by oncology at time of referral
  - Family advisory council brochure
- Supply cart to collect all specimens, access lines and antibiotics
- Awareness of performance (Level 1)
  - Feedback reports and ED dashboards
  - ED QI board with posted results

**GLOBAL AIM**

- Enhance “Therapeutic Reliability” of ED care by providing effective, timely care to patients

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PDSA Ramp Planning Tool

**TEST 1**
What: Data needed to Rx
Who (population): fever, CVC
Where: ED, clinic
When: call
Who executes: Oncology team

**TEST 2**
What: Standard data collection
Who (population): FLN
Where: ED
When: Time of referral
Who executes: Clerk, onc fellow, ED MD

**TEST 3**
What: EPIC smart phrase
Who (population): FLN
Where: ED
When: Referral
Who executes: EPIC team, ED team, design,

**TEST 4**
What: Order set
Who (population): FLN
Where: ED
When: Call
Who executes: ED referral MD
## Tests of Change

<table>
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<tr>
<th>(PDSA Name)</th>
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<tbody>
<tr>
<td>Objective</td>
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### Population

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<td>Do</td>
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<tr>
<td>Study</td>
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<tr>
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<table>
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<td>Do</td>
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<tr>
<td>Study</td>
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<tr>
<td>Act</td>
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</tbody>
</table>
Results

- Statistical Process Control (SPC) Chart (g-chart)

UCL = 109 days
Mean = 27 days

Change the outcome

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Evidence-Based Care

- Background – Practice variation on EBGs was very high with 30-50% following the practice for common conditions in early 2000’s
- Aim – To deliver 95% of children with common conditions with EB Guidelines care by the parameter of their diagnosis
  - Use education, measurement & order sets to help standardize practice, give outcomes to providers
Percentage of ED Base Patients
Provided Evidence Based Care for the Following Conditions of Focus
Asthma, Bronchiolitis, Fever of Uncertain Source, Acute Gastroenteritis, & Pneumonia

July 2007 - Sinusitis removed as a condition of focus July 2011
- Changed ED Asthma measure to % of patients receiving >1 albuterol who received steroids in ED
- Removed the Fever measure for patients over 3 months of age
December 2011 - Revised appropriate meds for CAP

Created by Kate Rich, James M. Anderson
Center for Health Systems Excellence

change the outcome
Use of Quality-Improvement Methods to Improve Timeliness of Analgesic Delivery

Percent of Patients Seen in the ED with Acute Long Bone Fractures Who Receive Narcotic Medications within 45 Minutes of Arrival (Excludes Transfers from Other Facilities)

- 90%
- 100%
- 50%
- 60%
- 70%
- 80%
- 90%

Patients

Percent of Patients with Pain Management as “Excellent”

Iyer et.al, Pediatrics 2011;127:e219-e225
Improving the Quality of Emergency Care

The 6 Domains of the Institute of Medicine

- Safe
- Effective
- Family Centered
- Efficiency
- Equity
- Timely

(change the outcome)
Types of Interventions

- Reduce variation

- Improve a specific outcome (with modestly complex process)
• Desaturation in 33% of patients
• Number of patients between patients with desaturation = 1
• Significant process variation
Aim

- To increase the median number of patients between patients experiencing desaturation during emergency department RSI from 1 to 3 over six months
**SMART AIM**

Increase the median number of patients experiencing desaturation during emergency department RSI from 1 to 3 over six months

**GLOBAL AIM**

To provide the safest emergency department airway management possible

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**KEY DRIVERS**

- Optimal oxygen reservoir
- Effective gas exchange
- Limited ineffective ventilation
- Minimized oxygen consumption
- Staff adherence to standard approach
- Team-level situational awareness
Interventions
Video Laryngoscope
Key Process Measures

• Use of checklist (  )

• Pre-oxygenation > 3 minutes (✓ ,)

• Correct laryngoscopist ( ✓ , ,)

• Video laryngoscope used ( ✓ , ,)

• Laryngoscopy attempt ≤ 45 seconds ( ✓ ,)

• EtCO2 confirmation within 20 seconds ( ✓ ,)
Patients between laryngoscopy attempt duration failure

(failure = attempt > 45 secs)
Historical proportion
33%

Intervention proportion
16%

6% if all process measures are completed
Definitions

• *Diagnostic accuracy* – The acute care delivery system designed to assist in determining diagnoses & best therapy for undifferentiated illness (safely, effective, timely but no waste)

• *Therapeutic Efficiency* – The acute care delivery system designed to get *timely, effective, safe treatment* to known children with conditions requiring acute care
Improve RX of FLN patients with fever & central line

- **Background** – Time to antibiotics for all oncology & BMT patients in the ED was longer than acceptable. After testing in clinic, a multi-disciplinary team came together to try improvement science to fix the system in the ED.

- **Aim** – reduce the time to antibiotics for FLN patients with fever to > 90% under an hour
  
  - Multiple PDSAs included referral (decision support), orders entered before arrival, room reservation, team huddle implemented over a year

Alessandrini et al: PAS Plenary 2011
Improve RX of FLN patients with fever & central line

Median Time from Arrival to Medication Received for FLN eligible patients only
N=642

Date of last encounter in subgroup(# of encounters)

- median time to med
- CL
- Goal

Cincinnati Children's
Next steps

• Maintain the gain over time

• Increase the % of similar critical patients getting an intervention in more timely fashion

• Understand and remove the distractions to providers
Segment the Outcomes

• Improvement in
  - Time to steroid in asthma
  - Time to IV fluid in DKA
  - Time to antibiotic in newborn
  - Time to ultrasound in testicular pain

• Not improvement –
  - Time to pain control in migraine
  - Time to pain management in SS disease
Theoretical Model

• ED staff have too many distractions (has an impact on safety and efficiency)

• *Theorem 1* – designing a system of similar patient streams (i.e. known condition / standard therapy) may improve delivery to larger high risk population AND remove distractions from groups of providers.
  - Testing two systems – open rooms vs. no rooms
  - Will the delivery system at back end require formal integration?
Improving the Quality of Emergency Care

The 6 Domains of the Institute of Medicine

- Safe
- Effective
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- Equity
- Timely
Types of Research – Intermountain Health

1. Rapid impact on care delivery performance (best medical result at lowest necessary cost)
   a. internally funded—patient care dollars
   b. publication, external grant funding = “icing on the cake”

2. Investigator-initiated research
   a. traditional academic model
   b. external grant funding

3. Collaborations with external investigators
   a. multicenter trials
   b. local universities
   c. requires an internal “champion”

4. Industry-based groups (pharma, device manufacturers)

5. “Research” done by affiliated medical
Improve Care Now

Improving Outcomes with a Learning Health System

- Patients and Families
- Clinicians
- Identify Uncertain Management Practices
- Multi-stakeholder Informed Research
- Comparative Effectiveness Research
- EHRs: Patient-Reported Data Biospecimens
- Registry Database
- Registry Applications
- Standardize Care Process
  - Reduce Variability in Care
  - Customize Care to Patient Needs
- Identify Gaps in Care
- Point of Care Learning Engine

Forrest
In a learning health care system, research influences practice and practice influences research.

**EVALUATE**
Collect data and analyze results to show what works and what doesn’t.

**IMPLEMENT**
Apply plan in pilot and control settings.

**DESIGN**
Design care and evaluation based on evidence generated here and elsewhere.

**ADJUST**
Use evidence to influence continual improvement.

**DISSEMINATE**
Share results to improve care for everyone.

**INTERNAL AND EXTERNAL SCAN**
Identify problems and potentially innovative solutions.
Organizational Conditions that Support Learning

• Time allotted to exploration, discovery & learning

• A physical & social environment that allows one to be a “student”

• Core values that appreciate learning in its own right and encourage curiosity, knowledge & discovery
The learning organization – in Healthcare
• Understand your “system” by measurement
  – Processes, delivery of evidence, outcomes
• Use improvement tools to narrow the “gap”
  – Give the team the performance
  – Give the provider their own performance
• Build the team’s capacity to make change
  – All providers who are in the workforce contributes to the outcome – MDs, Nurses, Clerical, Admin
Questions