

# Overcoming Barriers to Apply New Discoveries in EM

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

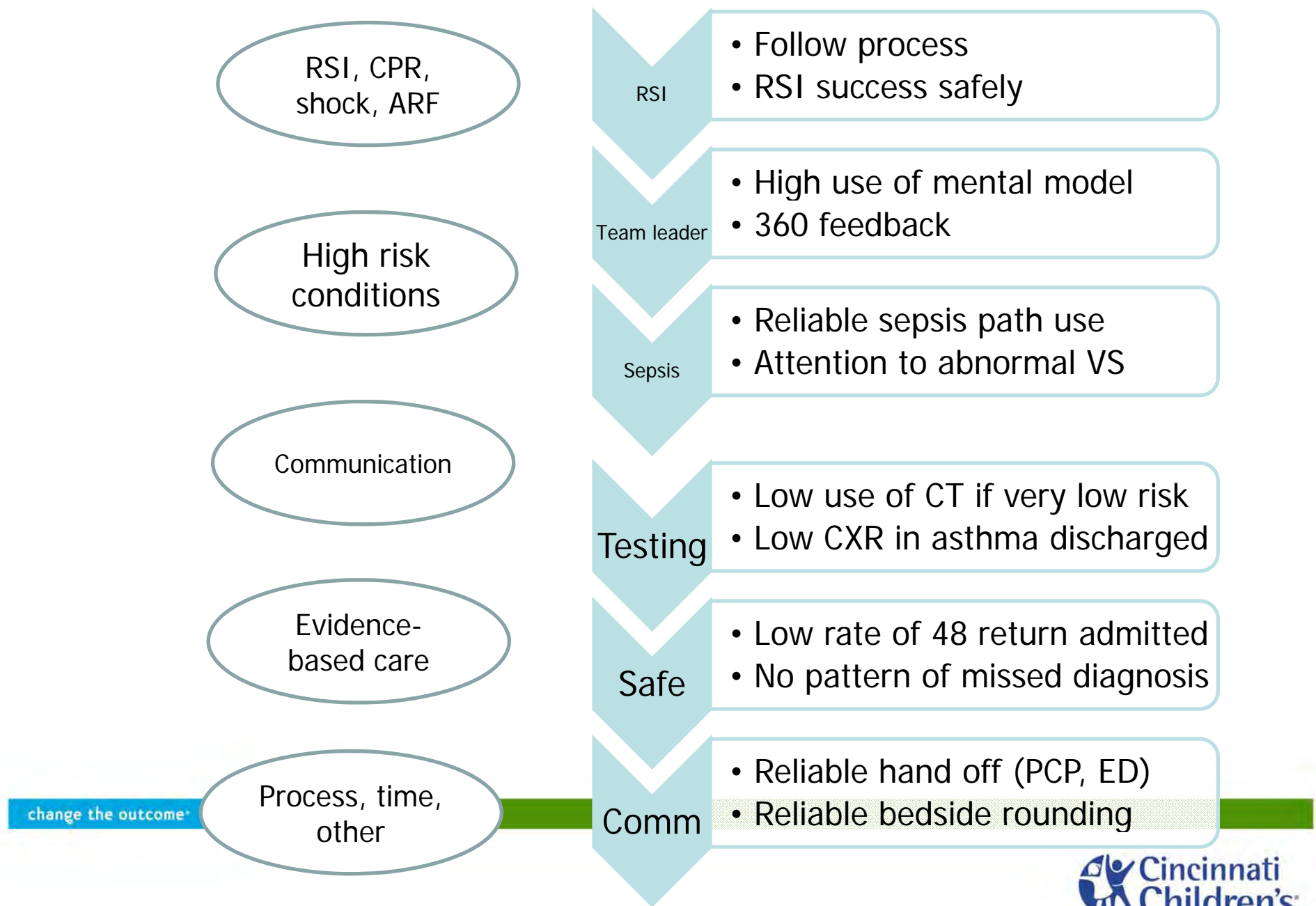
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# Objectives

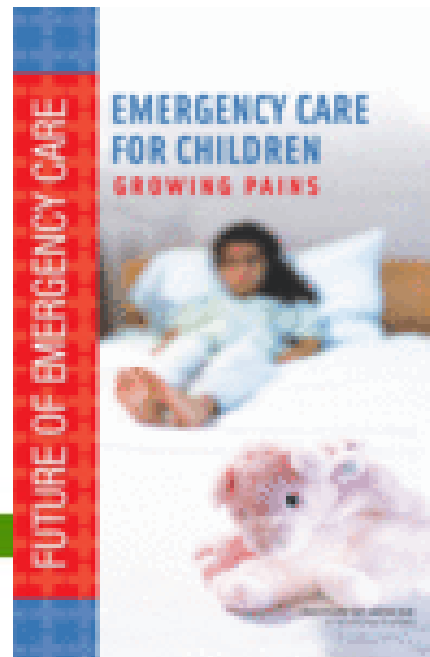
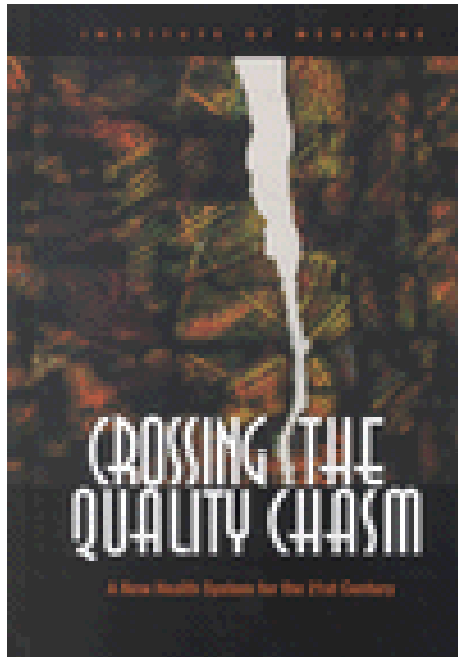
- Review the barriers to health care improvement.
- Demonstrate the impact of measurement to give us evidence to make changes
  - Quantitative
  - Qualitative
- Discuss implementation tools
  - Improvement science
  - Learning Health Care system

# 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



# Institute of Medicine



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The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

# 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.

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*N Engl J Med* 2007;357:1515-23



- 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.***



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*Performance Measurement: Accelerating Improvement, IOM 2005*



% "right care"

67%

53%

41%

Red – Acute  
Orange – Chronic  
Green - Preventative

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*N Engl J Med 2007;357:1515-23*



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<sup>a</sup>, Stephen D. Simon, PhD<sup>b</sup>, Vidya Sharma, MBBS, MPH<sup>a</sup>

Departments of <sup>a</sup>Pediatrics and <sup>b</sup>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*

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# Pediatric Hospital Benchmarks 2007 Data For 30 Hospitals

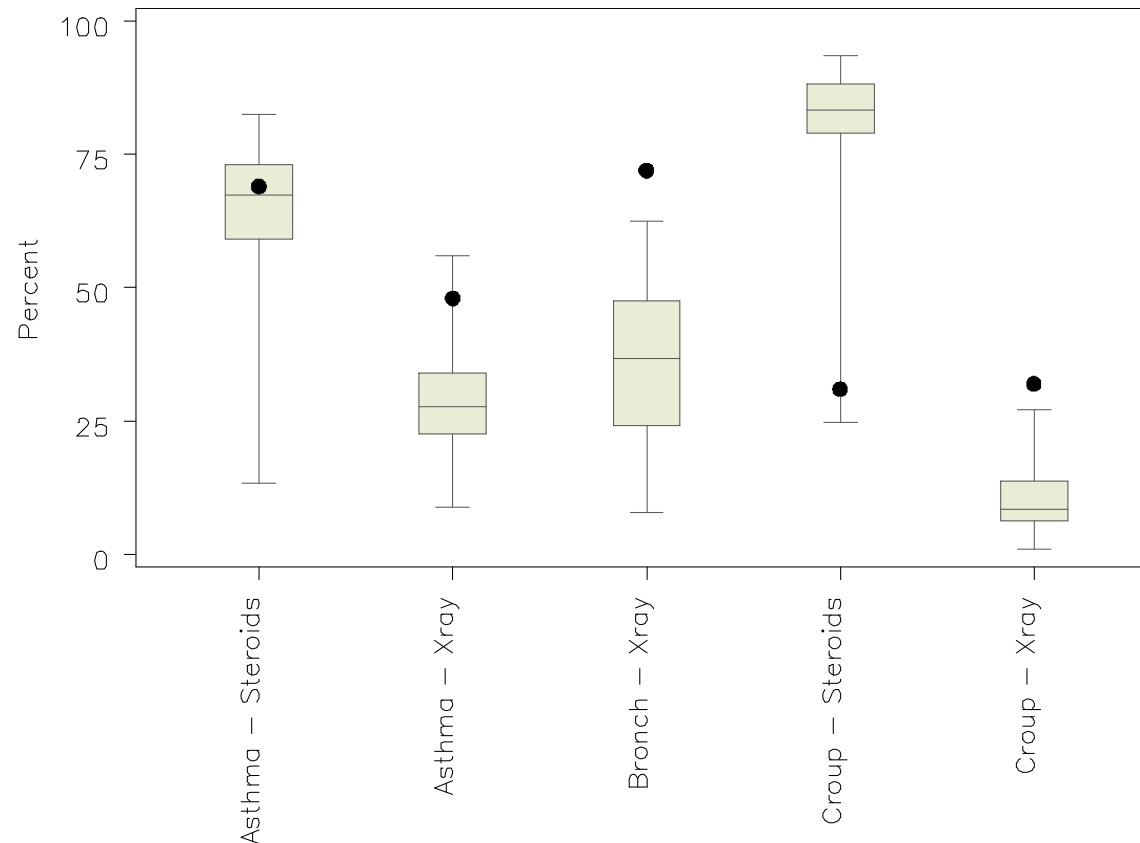
<b>Condition</b>	<b>Indicator</b>	<b>CHCA Mean Performance</b>	<b>Benchmark</b>	<b># of Hospitals at or Above Benchmark</b>
<b>Asthma</b>	•Steroid use	68%	79.8%	4
	•X-ray use	29.1%	19.8%	1
	•Antibiotic use	4.3%	1.5%	3
<b>Bronchiolitis</b>	•Antibiotic use	4.7%	1.8%	1
	•X-ray use	36.7%	19.6%	2
<b>Croup</b>	•Steroid utilization	85.8%	93.1%	2
	•X-ray utilization	9.3%	4.0%	1

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*Pediatr Emer Care 2010;26: 364-369*



## 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**

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*Pediatr Emer Care 2010;26: 364-369*



**Barriers and supports to implementation of MDI/spacer use in nine Canadian pediatric emergency departments: a qualitative study**

Shannon D Scott<sup>\*1</sup>, Martin H Osmond<sup>2</sup>, Kathy A O'Leary<sup>3</sup>, Ian D Graham<sup>4,5</sup>, Jeremy Grimshaw<sup>6,7</sup>, Terry Klassen<sup>3</sup> and the Pediatric Emergency Research Canada (PERC) MDI/spacer Study Group

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.

SPECIAL ARTICLE

## 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

THE **CHECKLIST** MANIFESTO • HOW TO GET THINGS RIGHT



**ATUL GAWANDE**

BESTSELLING AUTHOR OF  
BETTER AND COMPLICATIONS

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# 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

## PRE-INTERVENTION

Routine intra-operative oximetry monitoring	6/8
Oral confirmation of patient's name and surgical site in OR	2/8
Routine prophylactic antibiotics in OR	5/8
Plan for IV access for cases of high blood loss	0/8
Formal team briefing /debriefing	0/8

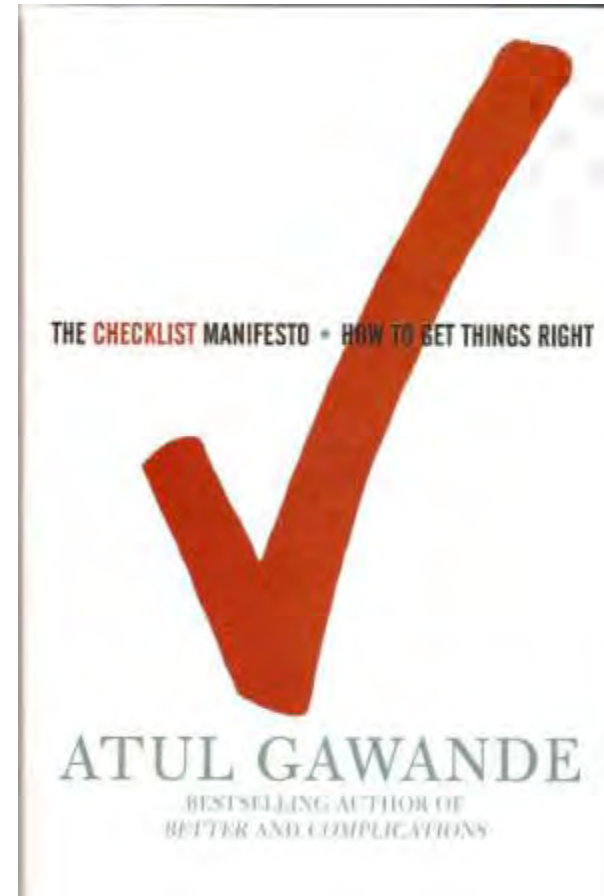
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Haynes: NEJM 2009



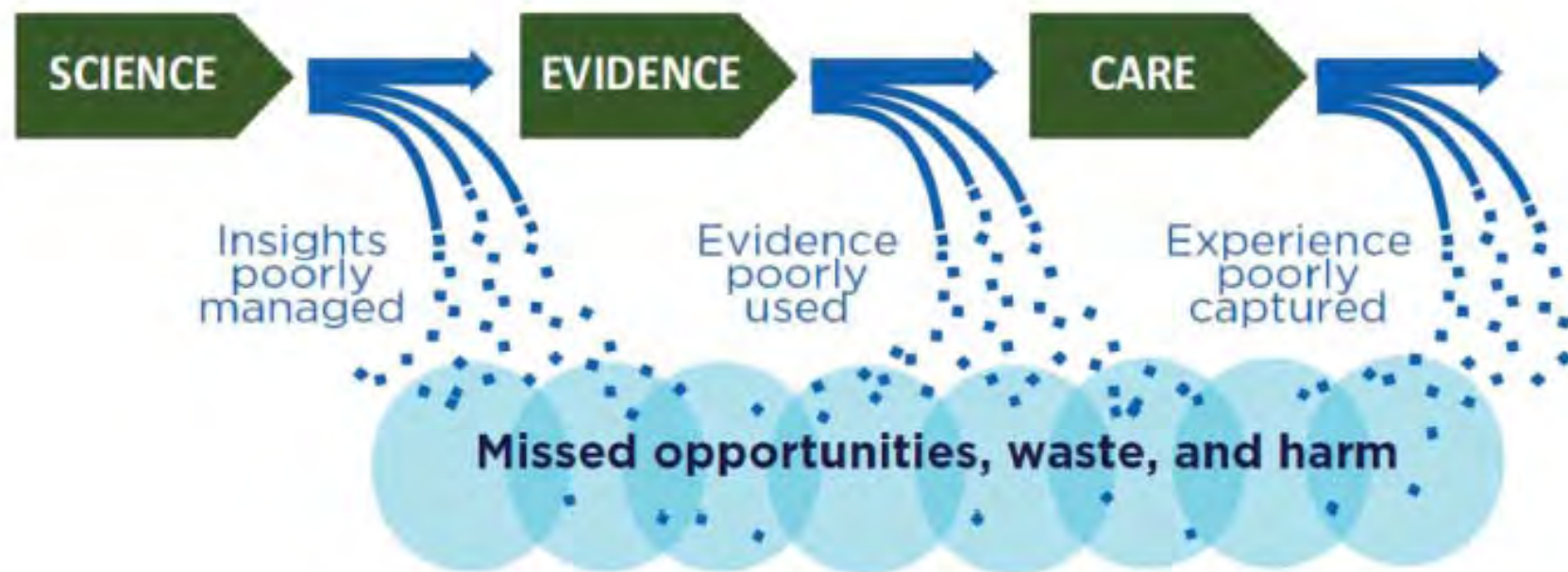
# Results

- “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



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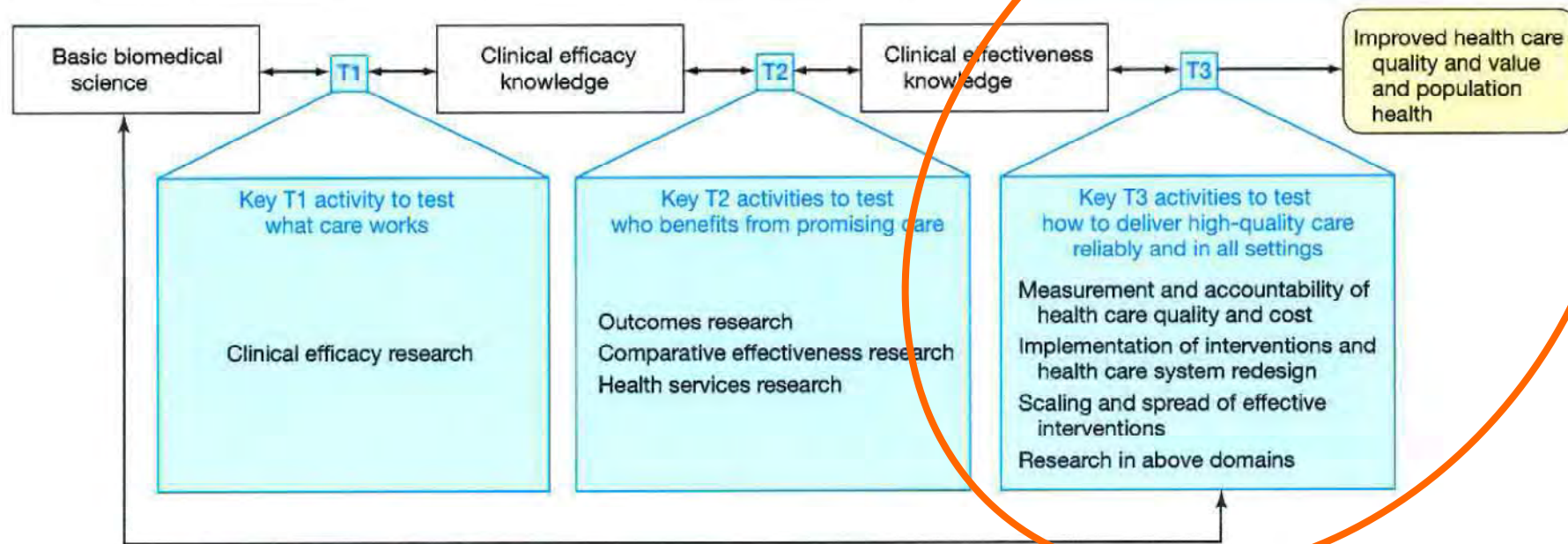
The Path to Continuously Learning Health Care in America



# Improve

## Translational Research

**Figure.** The 3T's Road Map

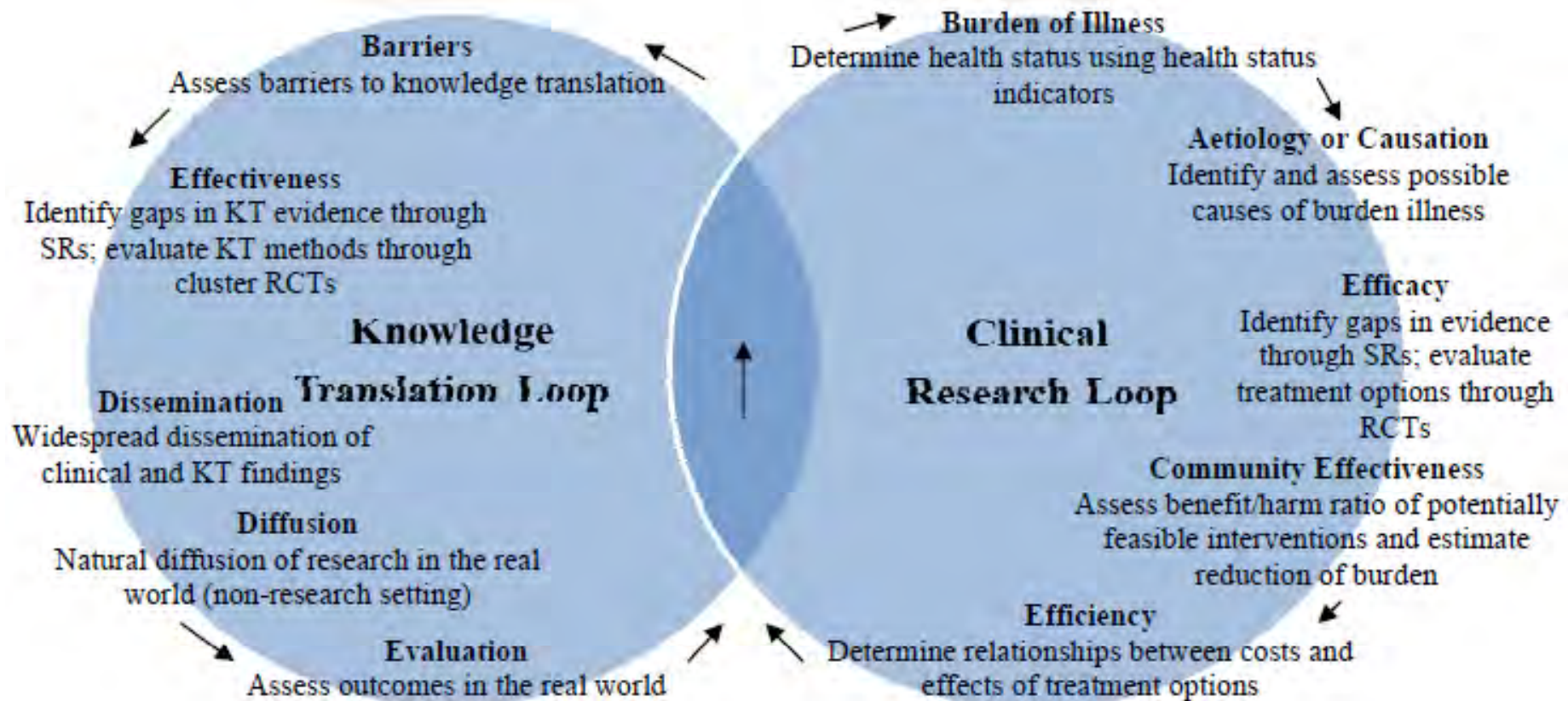


T indicates translation. T1, T2, and T3 represent the 3 major translational steps in the proposed framework to transform the health care system. The activities in each translational step test the discoveries of prior research activities in progressively broader settings to advance discoveries originating 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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–Dougherty and Conway. *JAMA*.2008;299(19):2319-2321

# Clinical / KT Research Loops



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*Implement Sci.* 2009;4:60.



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

G Ogrinc,<sup>1</sup> S E Mooney,<sup>2</sup> C Estrada,<sup>3</sup> T Foster,<sup>4</sup> D Goldmann,<sup>5</sup> L W Hall,<sup>6</sup> M M Huizinga,<sup>7</sup>  
S K Liu,<sup>8</sup> P Mills,<sup>9</sup> J Neily,<sup>10</sup> W Nelson,<sup>11</sup> P J Pronovost,<sup>12</sup> L Provost,<sup>13</sup> L V Rubenstein,<sup>14</sup>  
T Speroff,<sup>15</sup> M Splaine,<sup>16</sup> R Thomson,<sup>17</sup> A M Tomolo,<sup>18</sup> B Watts<sup>19</sup>

- *SQUIRE statement* is set of checklist of 19 statements authors should consider when writing a formal paper on QI
- Title abstract Results
- Intro Discussion
- Methods Other

# PEDIATRICS

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

**Introducing Quality Reports**  
Alex R. Kemper, Virginia A. Moyer and Lewis R. First  
*Pediatrics* 2011;127:187-188; originally published online Dec 13, 2010;  
DOI: 10.1542/peds.2010-2836

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>

COMMENTARY

## Introducing Quality Reports

**AUTHORS:** Alex R. Kemper, MD, MPH, MS,<sup>a</sup> Virginia A. Moyer, MD, MPH,<sup>b</sup> and Lewis R. First, MD, MS<sup>c</sup>

<sup>a</sup>Department of Pediatrics, Duke University, Durham, North Carolina; <sup>b</sup>Department of Pediatrics, Baylor College of Medicine, Houston, Texas; and <sup>c</sup>Department of Pediatrics, University of Vermont College of Medicine, Burlington, Vermont

Opinions expressed in this commentary are those of the author and not necessarily those of the American Academy of Pediatrics or its Committees.

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Address correspondence to Alex R. Kemper, MD, MPH, MS, Department of Pediatrics, Duke University, 2400 Pratt St, Room 0311 Terrace Level, Durham, NC 27705. E-mail: alex.kemper@duke.edu

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Nearly a decade has passed since the Institute of Medicine released its landmark report *Crossing the Quality Chasm*,<sup>1</sup> 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

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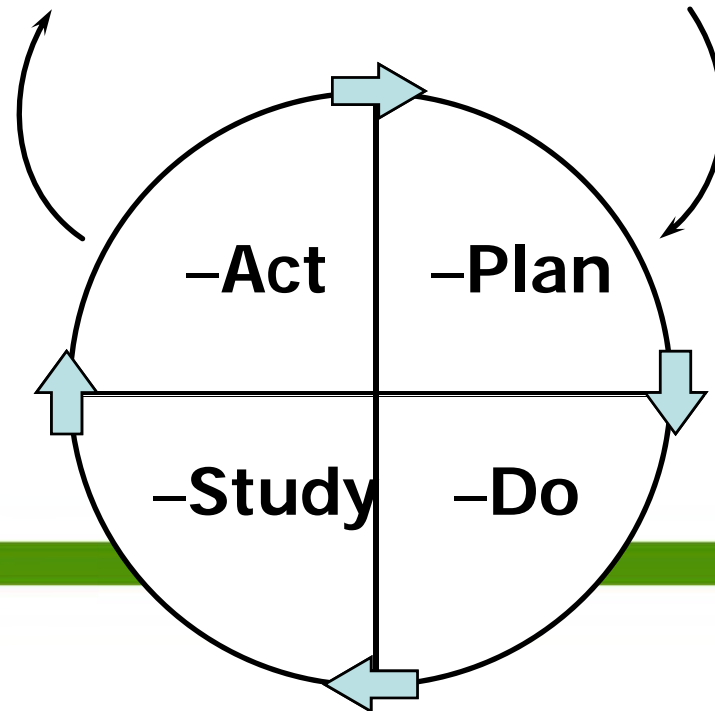
FREE

## –Model for Improvement

–What are we trying to  
–accomplish?

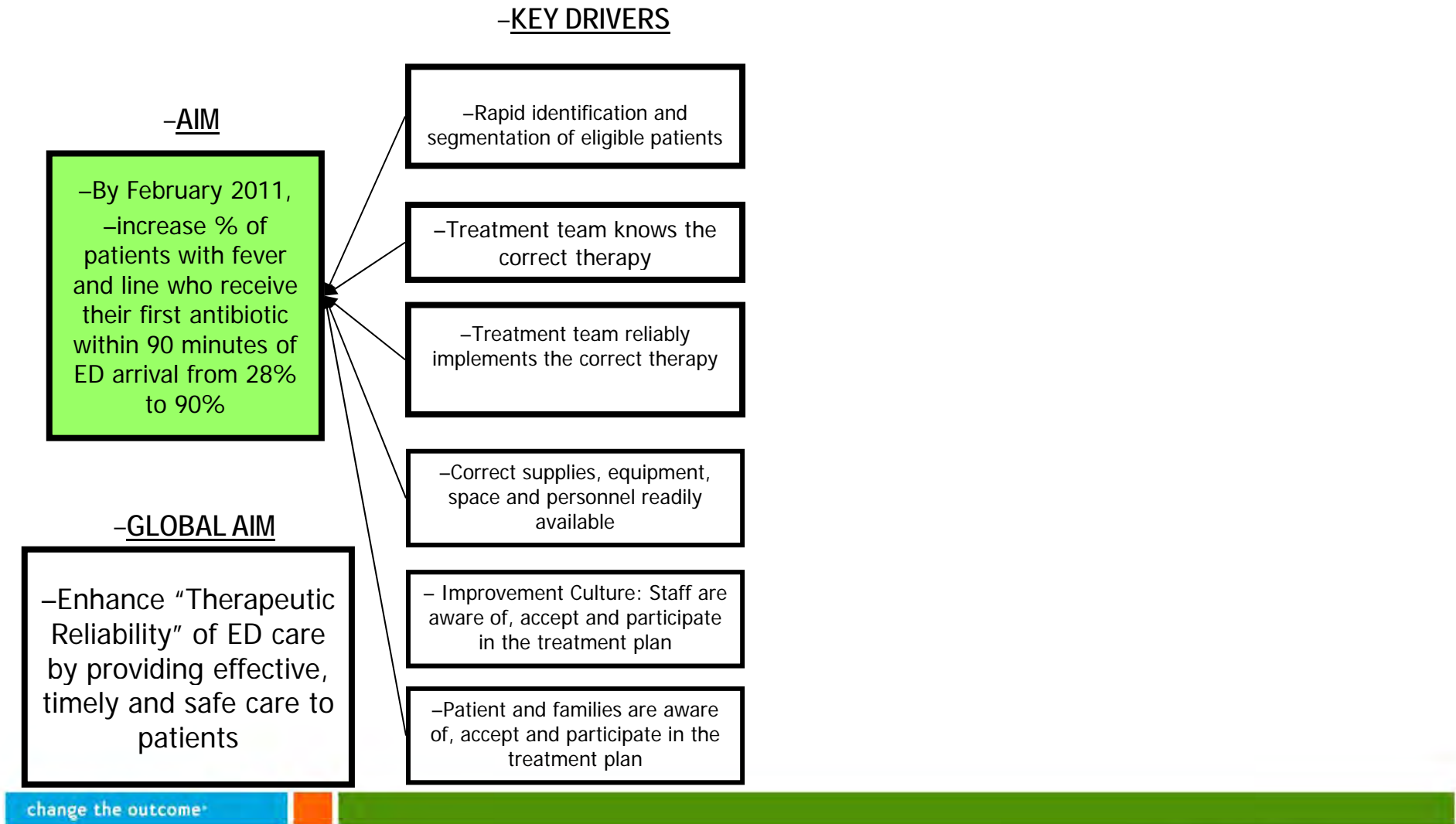
–How will we know that a  
–change is an improvement?

–What change can we make that  
–will result in improvement?



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# KEY DRIVER DIAGRAM: Therapeutic Reliability



# KEY DRIVER DIAGRAM: Therapeutic Reliability

–Initial Date: 07-01-2010

–Revised: 12-12-2010

## –KEY DRIVERS

## –INTERVENTIONS (Reliability level)

–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 care to patients

–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

–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

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–Key

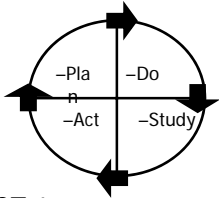
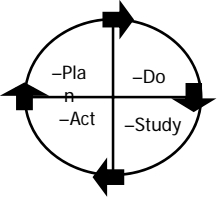
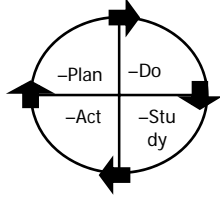
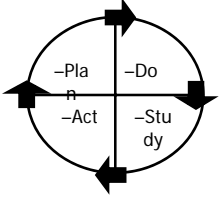

–Dotted box = Placeholder for future additions

–Green shaded = what we’re working on right now





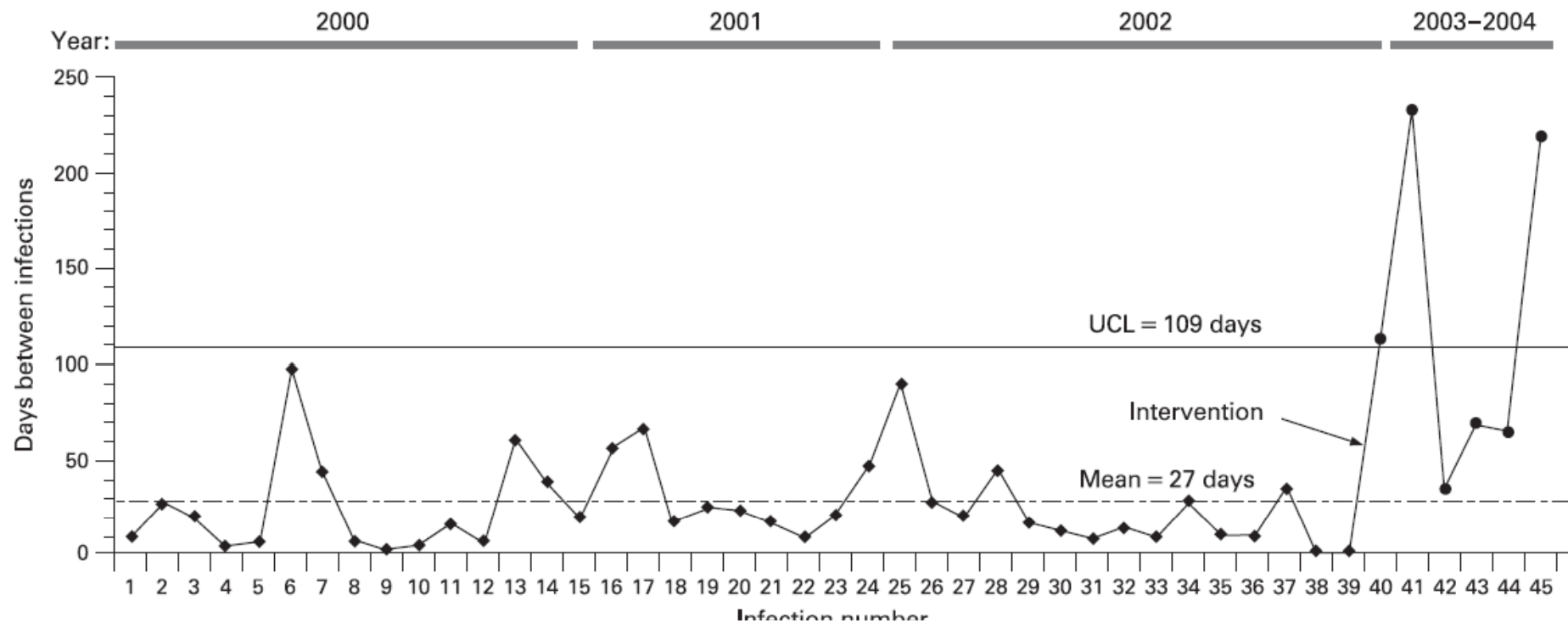
# PDSA Ramp Planning Tool

 <p><b><u>TEST 1</u></b>          What:) data needed to Rx          Who (population): fever, CVC          Where: ED, clinic          When: call          Who executes oncology team</p>	 <p><b><u>TEST 2</u></b>          What: standard data collection          Who (population): FLN          Where: ED          When: time of referral          Who executes – clerk, onc fellow, ED MD</p>	 <p><b><u>TEST 3</u></b>          What: EPIC smart phrase          Who (population): FLN          Where: ED          When: referral          Who executes: EPIC team, ED team, design,</p>	 <p><b><u>TEST 4</u></b>          What: Order set          Who (population): FLN          Where: ED          When: call          Who executes: ED referral MD</p>
<p>change the outcome*</p>			

# Tests of Change

(PDSA Name)				
Objective				
Population				
TEST CYCLE 3	Start Date:		End Date:	
Plan & Prediction				
Do				
Study				
Act				
TEST CYCLE 4	Start Date:		End Date:	
Plan & Prediction				
Do				
Study				
Act				

# Results



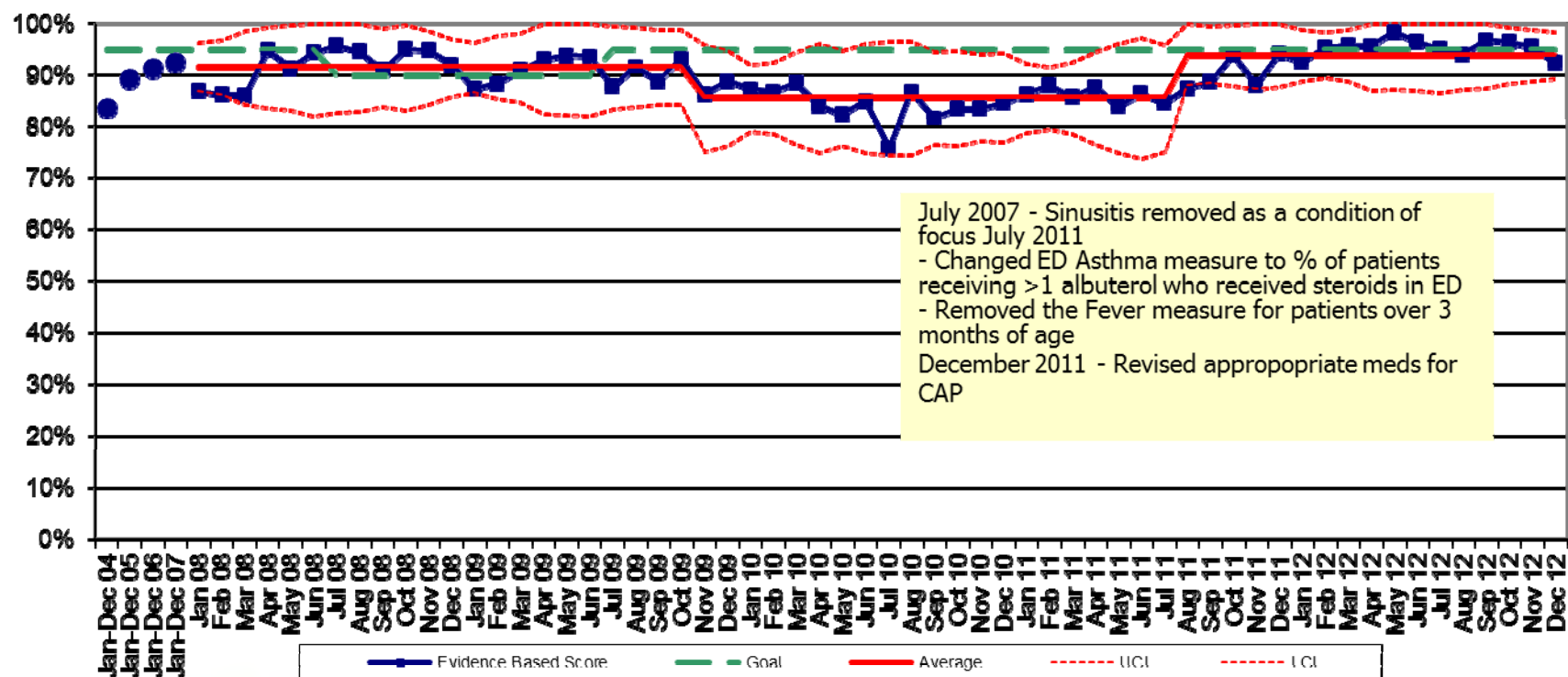
- Statistical Process Control (SPC) Chart (g-chart)

# 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**



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

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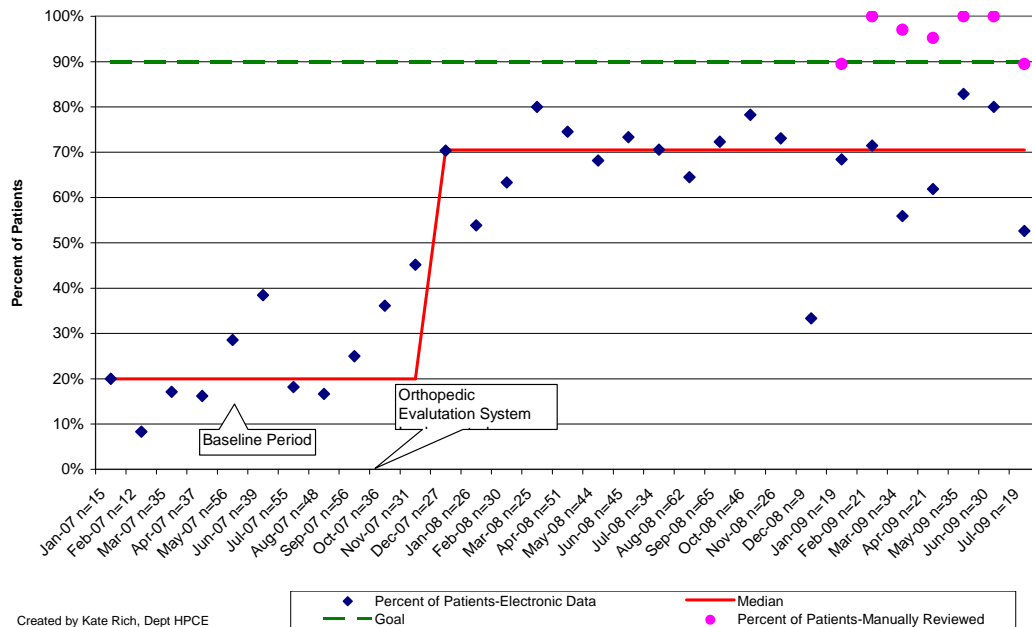


# Improve

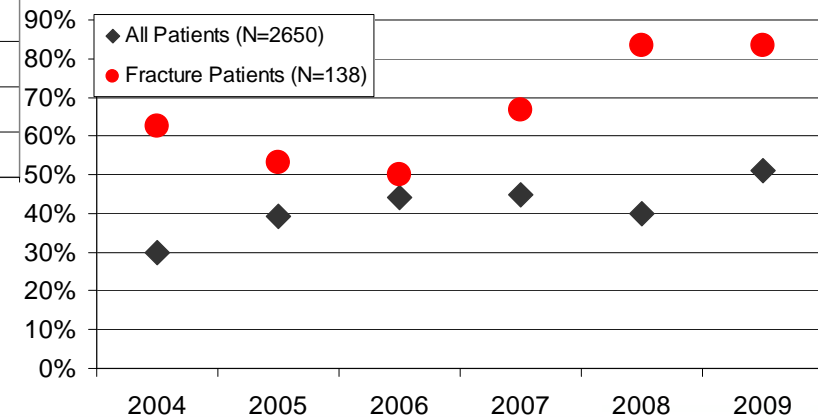
## Use of Quality-Improvement Methods to Improve Timeliness of Analgesic Delivery



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)



### -Percent of Patients Stating Satisfaction with Pain Management as "Excellent"

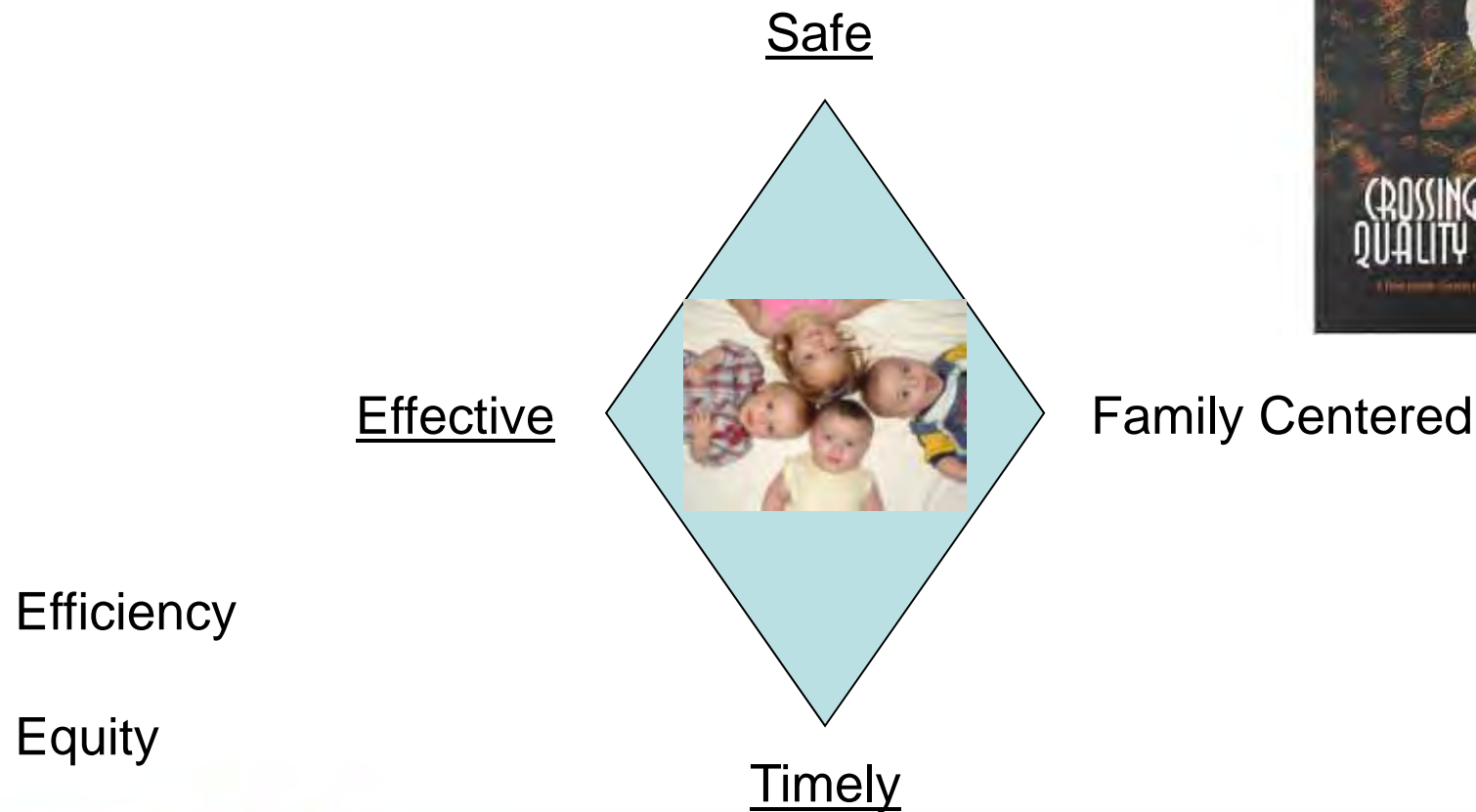


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Iyer et.al, Pediatrics 2011;127:e219-e225



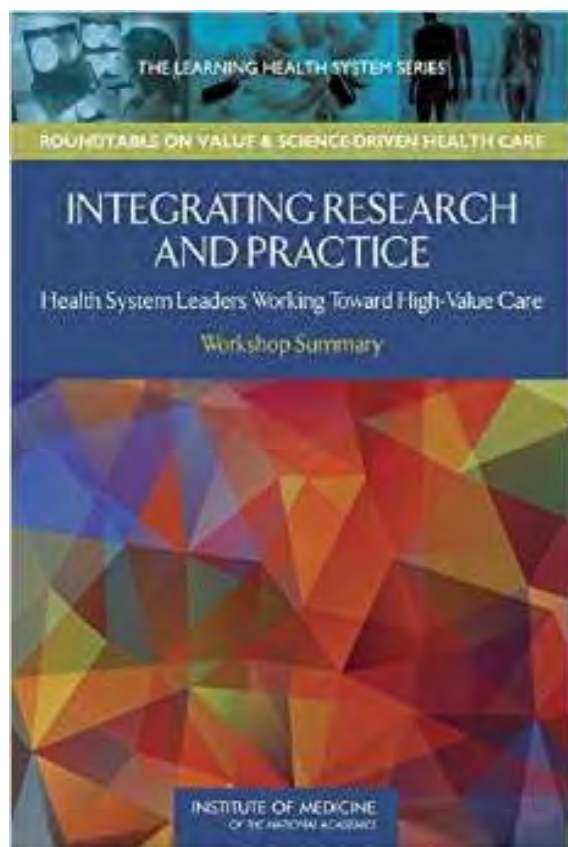
# Improving the Quality of Emergency Care



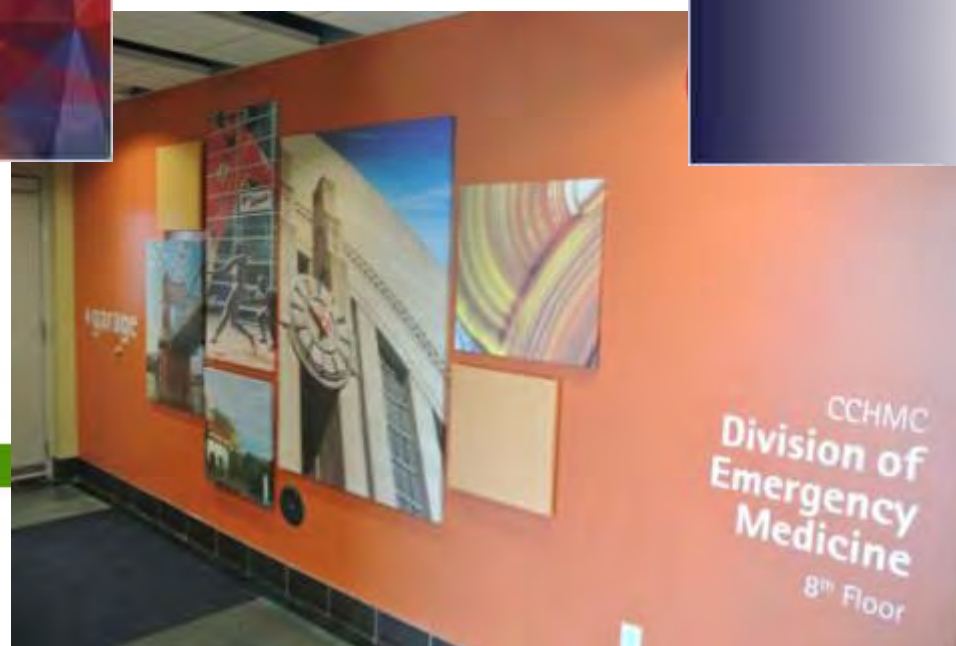
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# Types of Interventions

- Reduce variation
- Improve a specific outcome (with modestly complex process)

## Rapid Sequence Intubation for Pediatric Emergency Patients: Higher Frequency of Failed Attempts and Adverse Effects Found by Video Review

Benjamin T. Kerrey, MD, MS, Andrea S. Rinderknecht, MD, Gary L. Geis, MD, Lise E. Nigrovic, MD, MPH,  
Matthew R. Mittiga, MD

*From the Division of Emergency Medicine, Cincinnati Children's Hospital Medical Center, and the University of Cincinnati College of Medicine, Cincinnati, OH (Kerrey, Rinderknecht, Geis, Mittiga); and the Division of Emergency Medicine, Children's Hospital Boston, and Harvard Medical School, Boston, MA (Nigrovic).*

- 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 between 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

### KEY DRIVERS

Optimal oxygen reservoir \*

Effective gas exchange \*

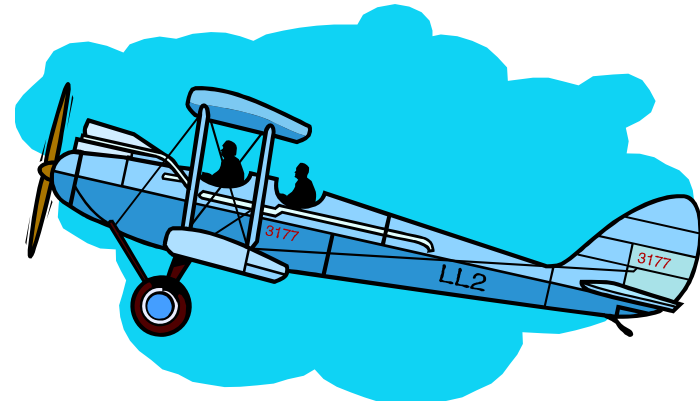
Limited ineffective ventilation \*

Minimized oxygen consumption \*

Staff adherence to standard approach

Team-level situational awareness

# Interventions



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# Video Laryngoscope




MD Viewing Screen



Laryngoscopist

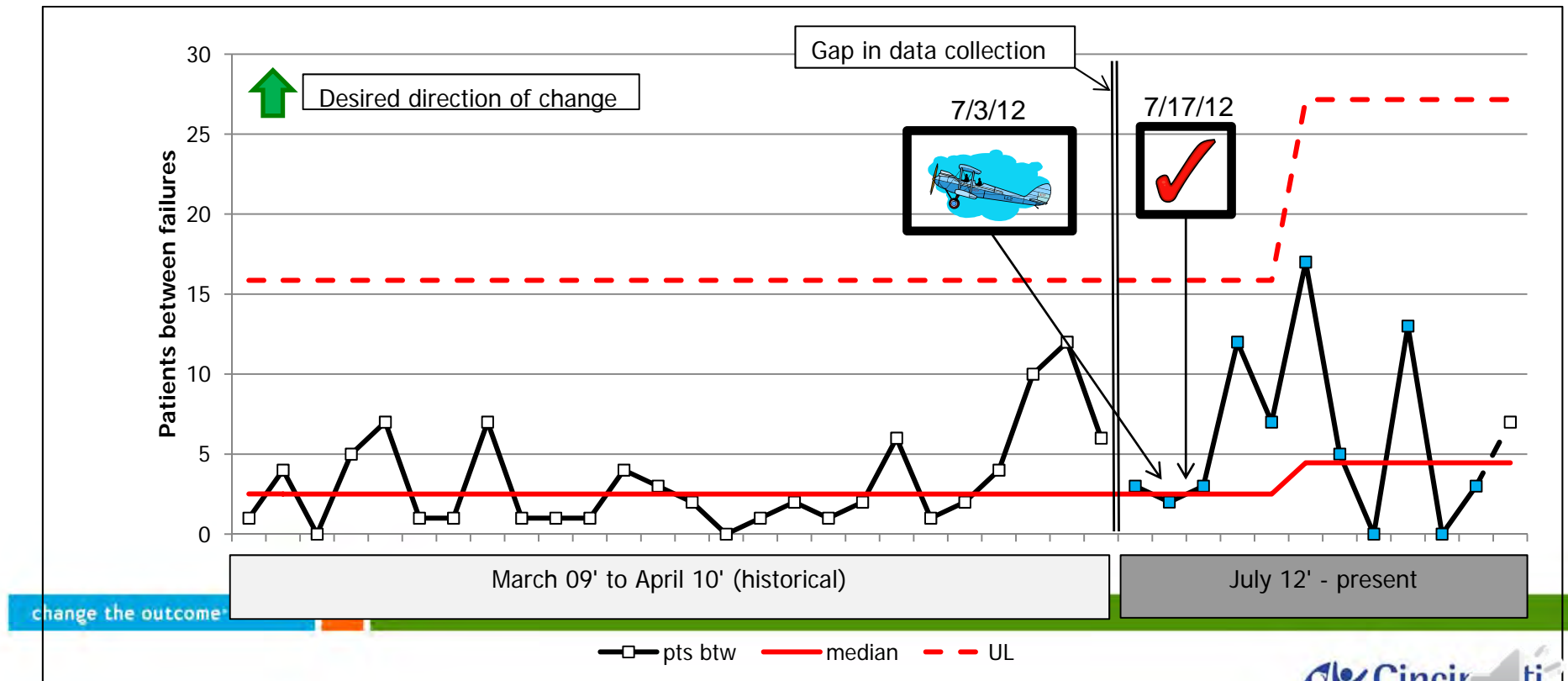
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# Key Process Measures

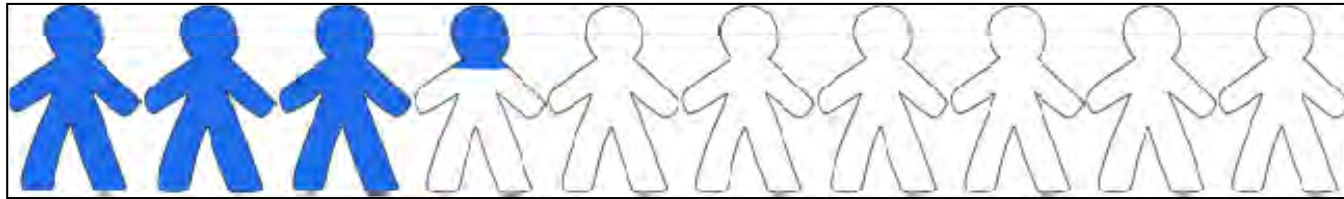
- Use of checklist (  )
- Pre-oxygenation > 3 minutes ( ✓  )
- Correct laryngoscopist ( ✓ ,  ,  )
- Video laryngoscope used ( ✓ ,  ,  )
- Laryngoscopy attempt ≤ 45 seconds ( ✓  )
- EtCO2 confirmation within 20 seconds ( ✓ ,  )

# Patients between laryngoscopy attempt duration failure

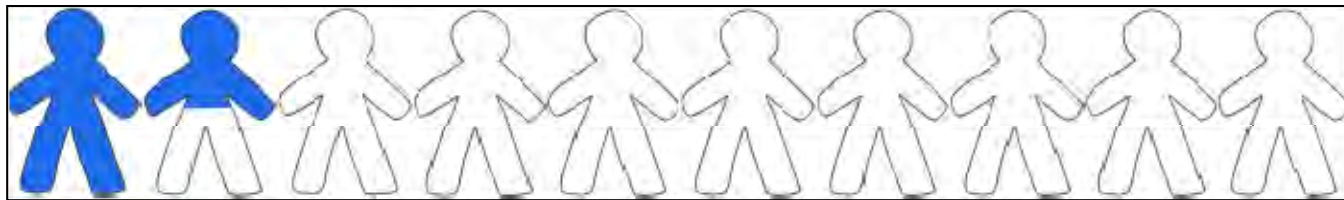
(failure = attempt > 45 secs)



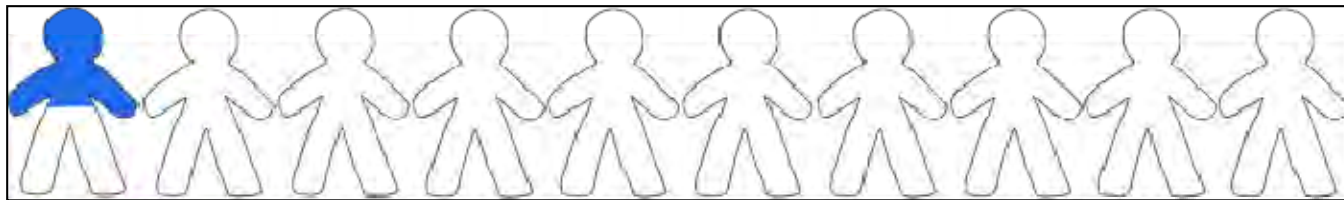




Historical proportion  
33%



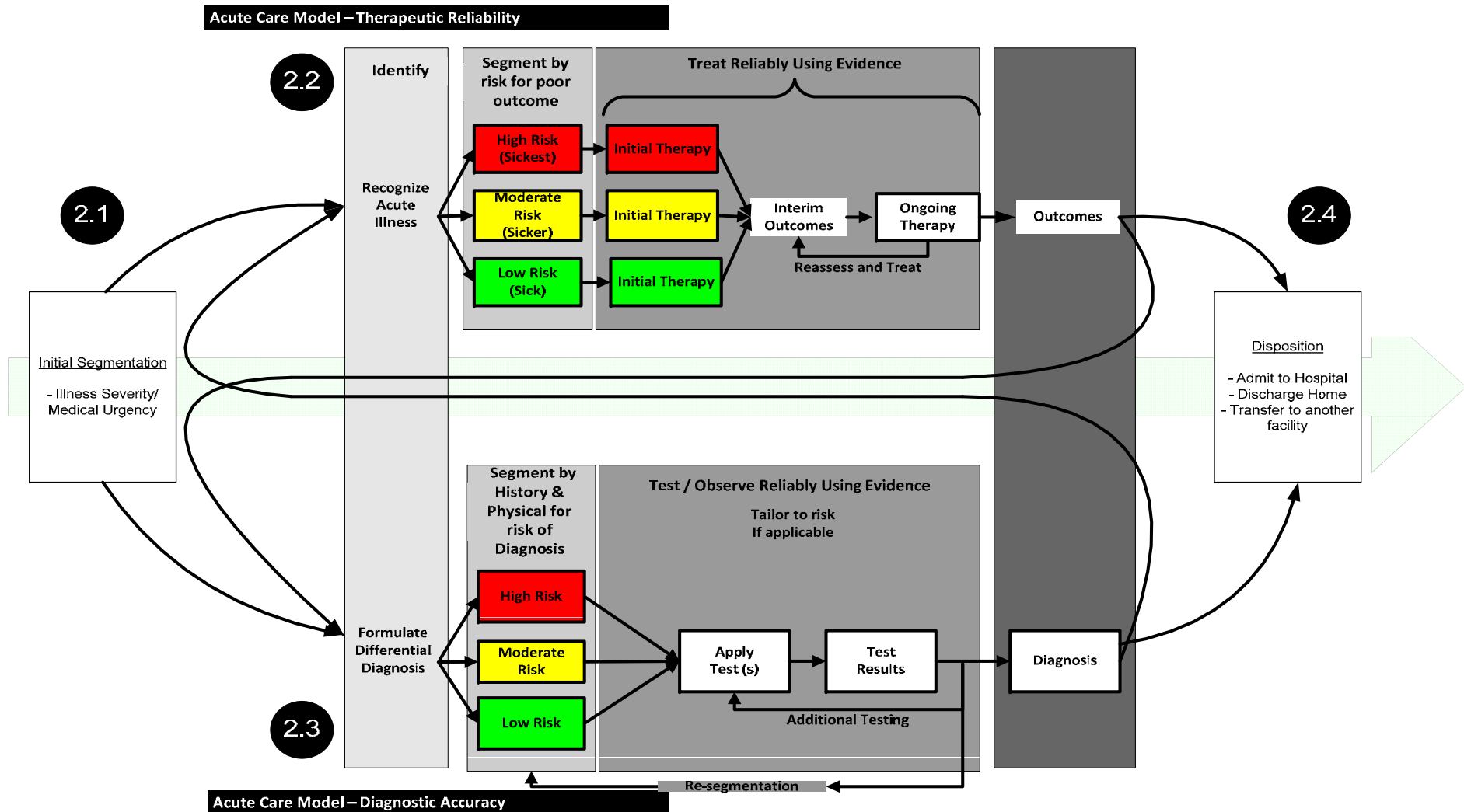
Intervention  
proportion  
16%



6% if all process  
measures are  
completed

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# The acute care model in PEM



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*Iyer, S., Reeves, S., Varadarajan, K., Alessandrini, E.A.  
The Acute Care Model. CPEM 12 (2): 91- 101, 2011 June*

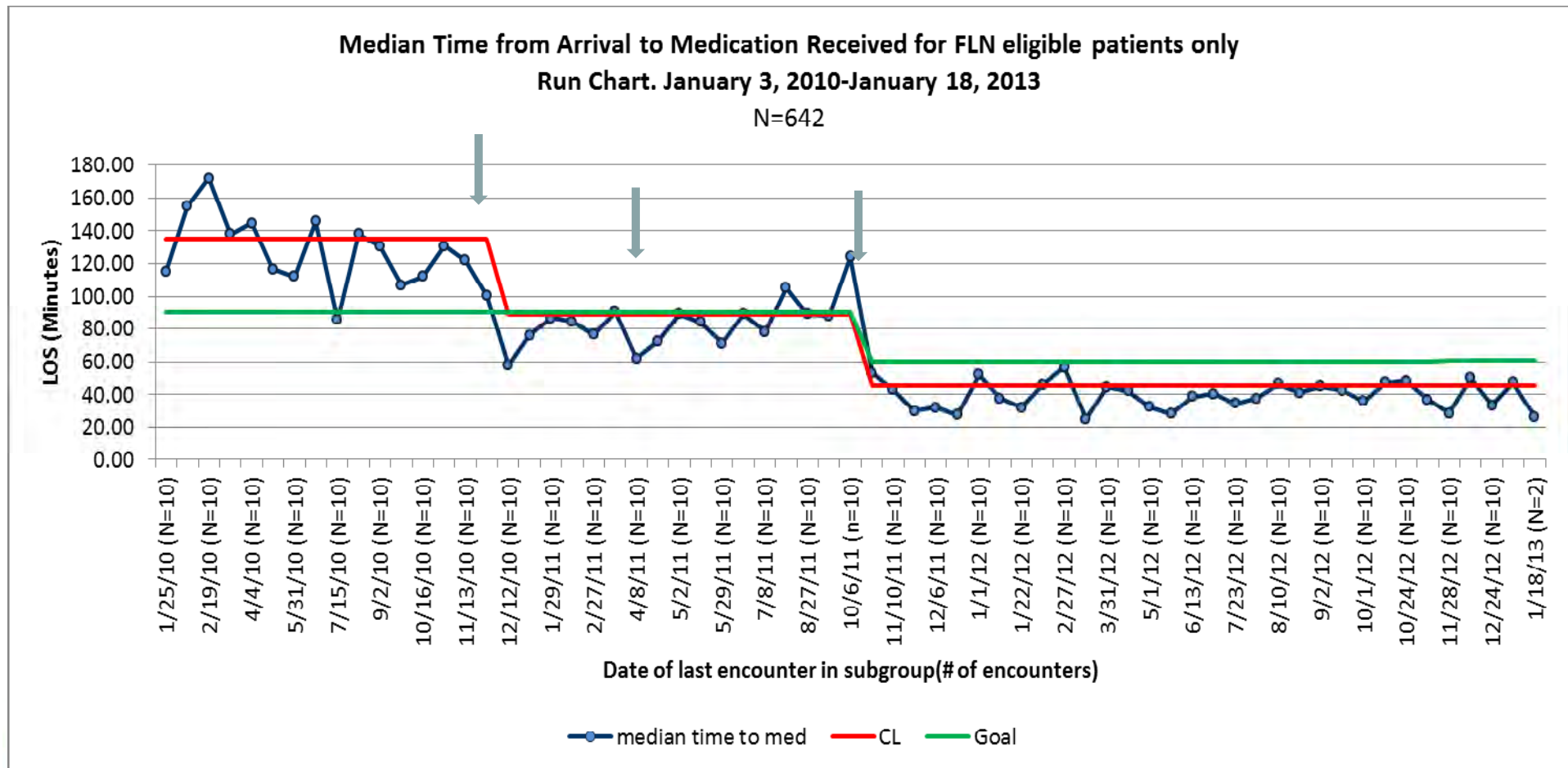
# Definitions

- *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

# Improve RX of FLN patients with fever & central line



# 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

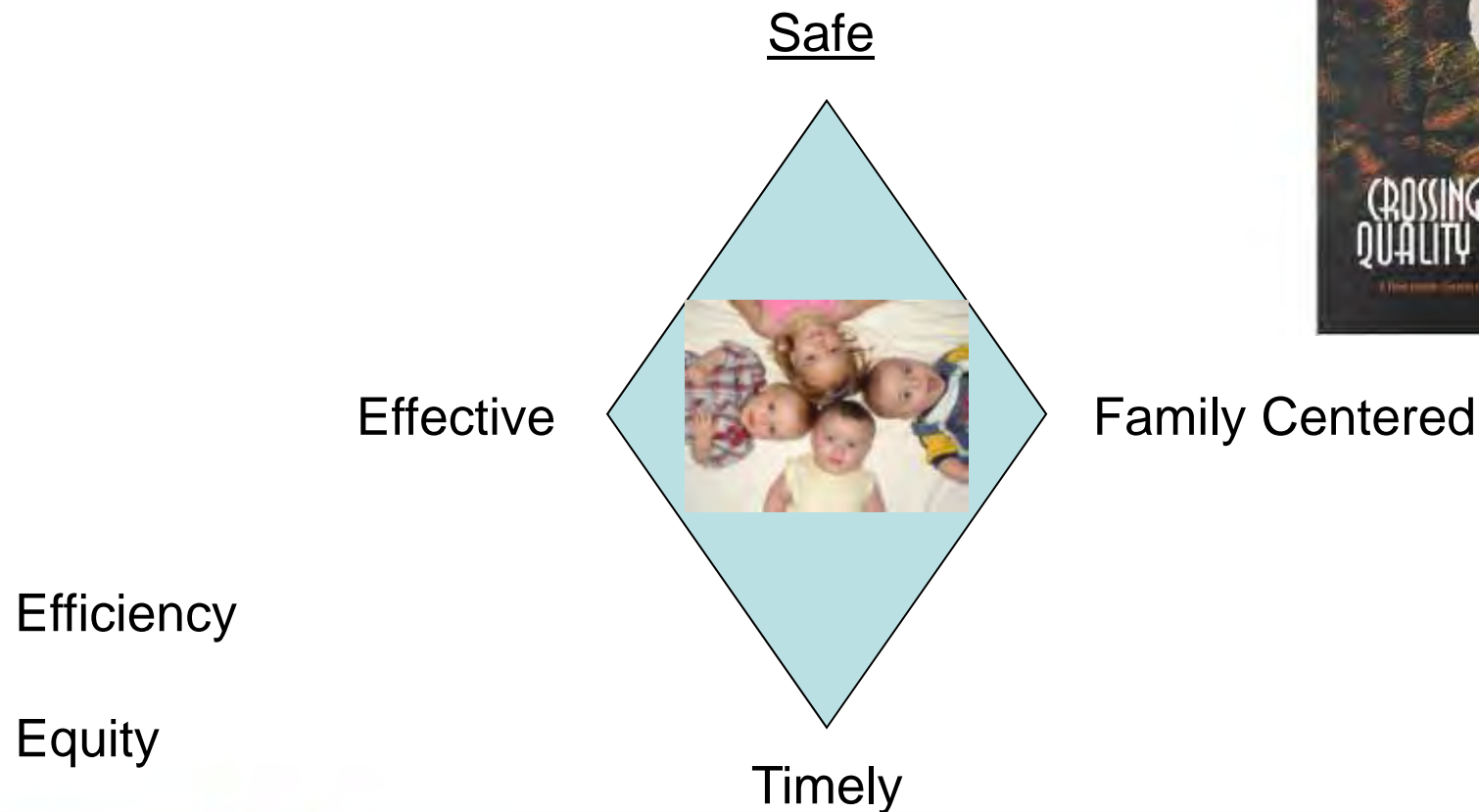
- Improvement in
  - Time to steroid in asthma
  - Time to IV fluid in DKA
  - Time to antibiotic in newborn
  - Time to ultrasound in testicular pain
- Not improvement –
  - Time to pain control in migraine
  - Time to pain management in SS disease



# 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



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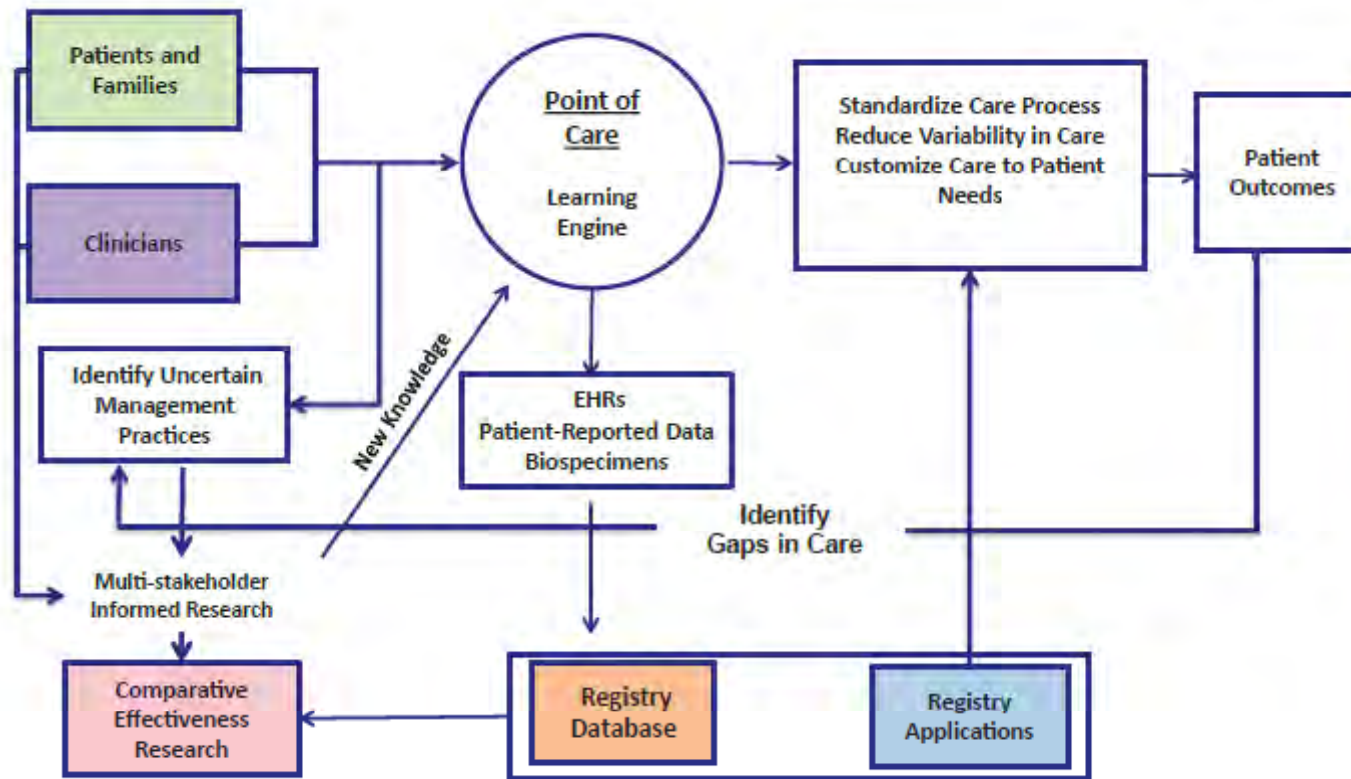


# Types of Research – Intermountain Health

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

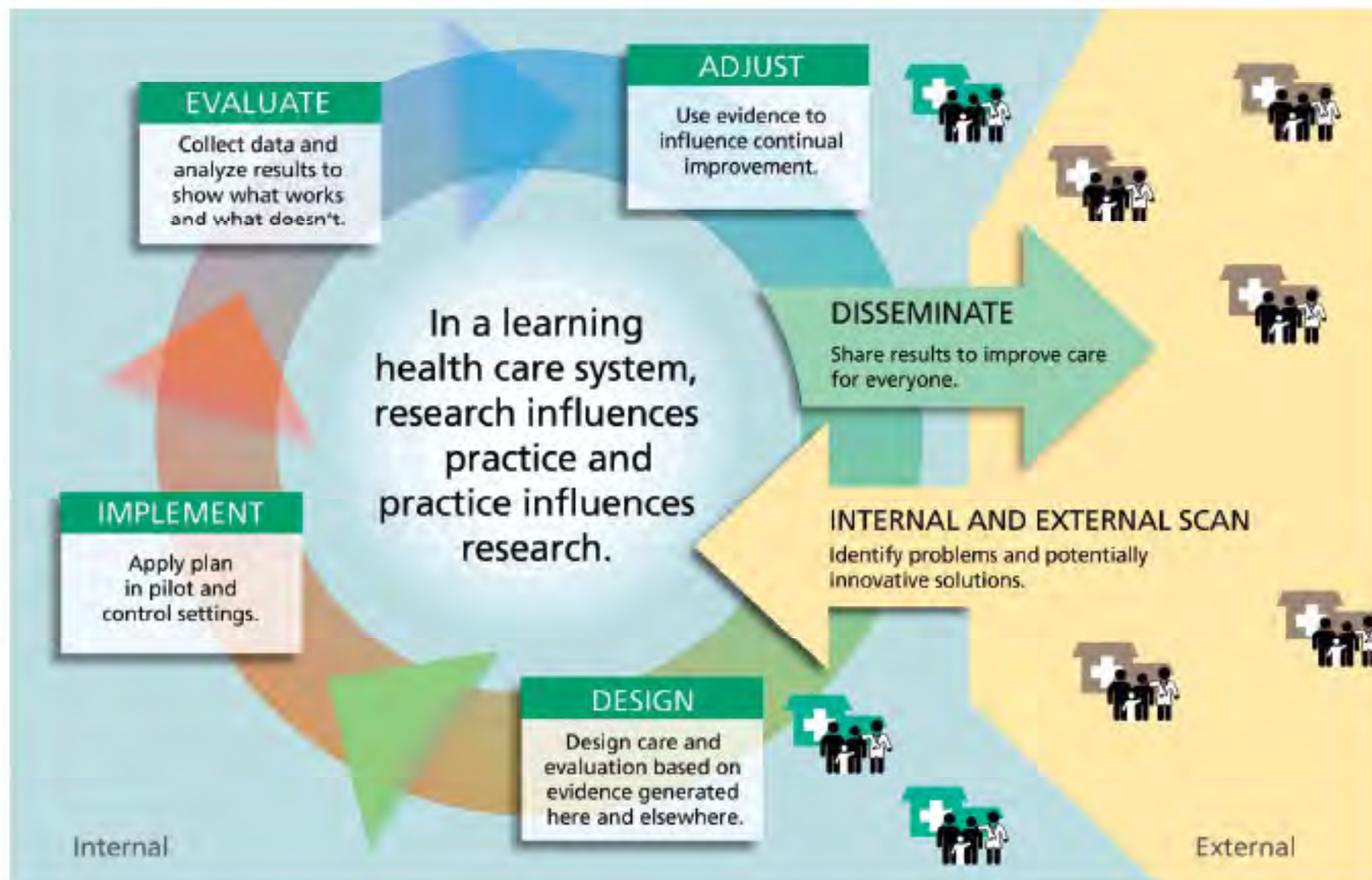
# Improve Care Now

## Improving Outcomes with a Learning Health System



change the outcome\*

# Forrest



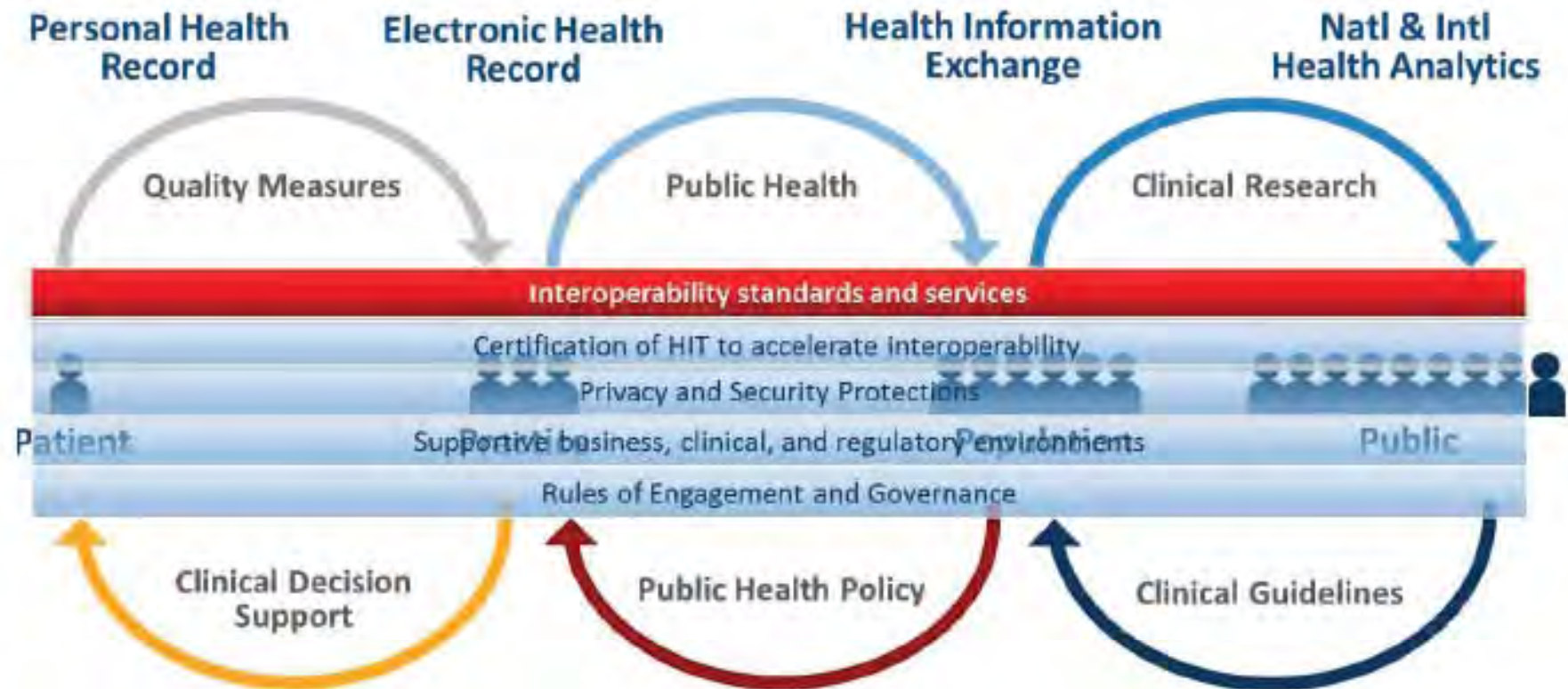
change the outcome

# 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



change the outcome\*



# Summary

- 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



change the outcome\*