

Are We Making a Difference in Hospital Mortality? The LPCH Experience

Paul Sharek, MD, MPH

Medical Director of Quality Management

Chief Clinical Patient Safety Officer

Lucile Packard Children's Hospital

Assistant Professor of Pediatrics

Stanford University School of Medicine

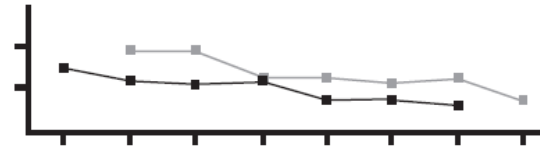


Agenda

- Background (risk factors, IHI efforts, etc)
- Data:
 - Annotated time series
 - Statistics
 - Risk adjustment
- Discussion: what is causing the improvements?
- Summary/Conclusions



Background



Innovation Series 2005

“...The alarming truth for patients in US hospitals is that the likelihood of dying is directly correlated with their choice of hospital...”

“...Analysis by the IHI using HSMRs has shown that a substantial variation in care /quality of care exists among US hospitals...”

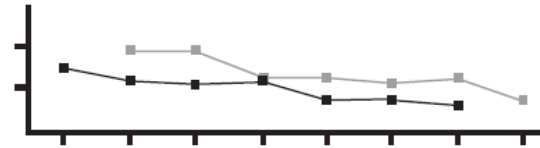
*John Whittington, MD: Director of Knowledge Management/Patient Safety Officer,
OSF Healthcare System; IHI Faculty*
Terri Simmonds, RN, CPHQ: IHI Faculty
Diane Jacobsen, MPH, CPHQ: Director, IHI

Editor: Ann B. Gordon

Lucile Packard
Hospital
AT STANFORD



Background



Innovation Series 2005

“...IHI believes that mortality can be consistently reduced through the use of a combination of evidence-based interventions...”

“...These early results, coupled with work by other IHI QI Collaboratives, literature, and a growing sense of urgency... led IHI to launch the 100,000 lives campaign in 12.2004...”

Diane Jacobsen, MPH, CPHQ: *Director, IHI*

Editor: Ann B. Gordon

Lucile Packard
Hospital
AT STANFORD



Background: IHI Focus on Mortality

Themes for Deaths in box 4

- **Planning Failures**
- **Poor Handoffs**
- **Lack of Communication and Teamwork**
- **Suboptimal Risk Assessment/Delayed Dx**
- **Adverse Events**

Comfort C

No

	3	4



Background: Recommendations from IHI

1. Implementation of best practices from the Literature that correlate with decreased mortality
2. Adoption of systems supports (such as reminders and standardization) used in high reliability organizations
3. Identification and differential treatment of High Risk Patients



Background: Recommendations from IHI Prior to 100,000 Lives Campaign

ICU

- Multidisciplinary Teams
- Shared Daily Goal Sheets
- Optimal Glucose Control
- Vent bundle
- Use Intensivists

Non-ICU

- Standardize team communications (SBAR)
- Implement RRTs
- Hospitalist program



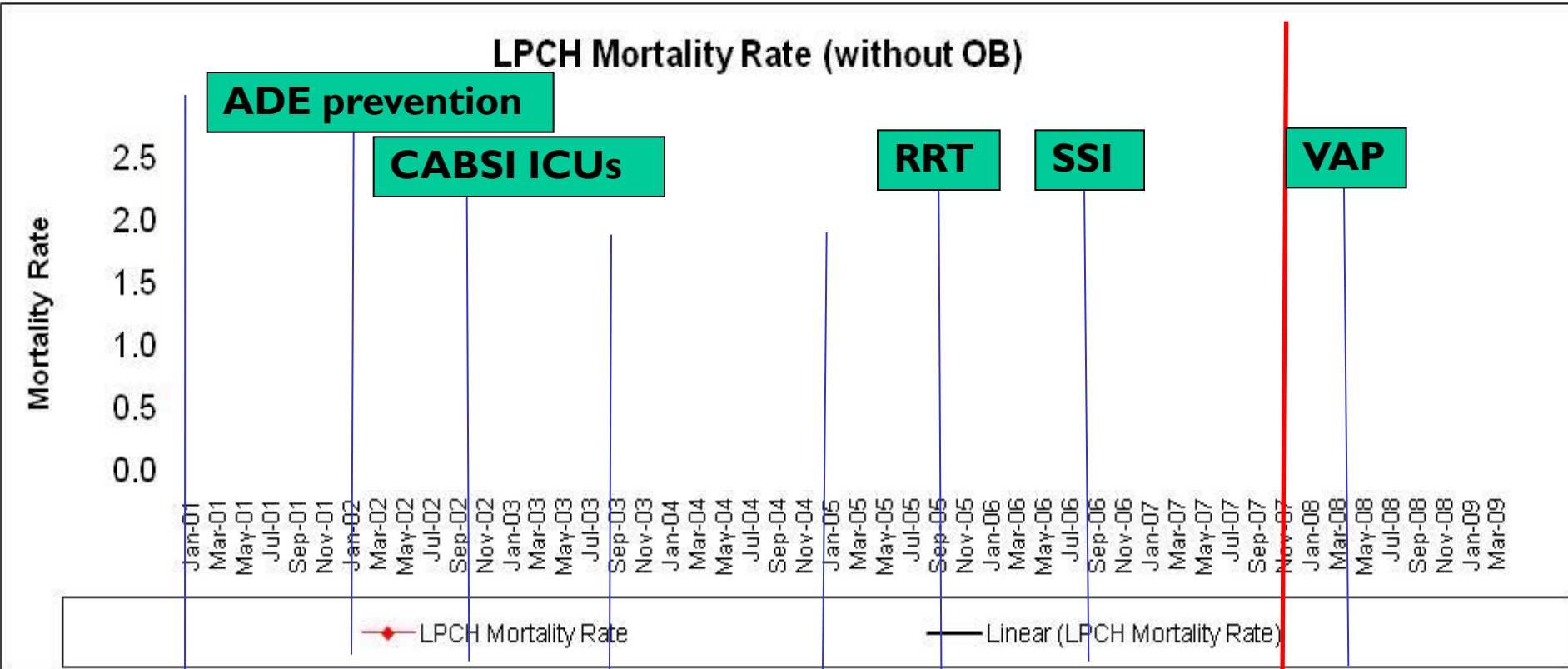
Background: 100,000 Lives Campaign (12.2004)

INSTITUTE FOR

1. Deploy **Rapid Response Teams**...at the first sign of patient decline
2. Deliver **Reliable, Evidence-Based Care for Acute Myocardial Infarction**...to prevent deaths from heart attack
3. Prevent **Adverse Drug Events (ADEs)**...by implementing medication reconciliation
4. Prevent **Central Line Infections**...by implementing a series of interdependent, scientifically grounded steps
5. Prevent **Surgical Site Infections**...by reliably delivering the correct perioperative antibiotics at the proper time
6. Prevent **Ventilator-Associated Pneumonia**...by implementing a series of interdependent, scientifically grounded steps



Results-Annotated Time Series



**Multidisciplinary teams
Intensivists**

Hospitalist

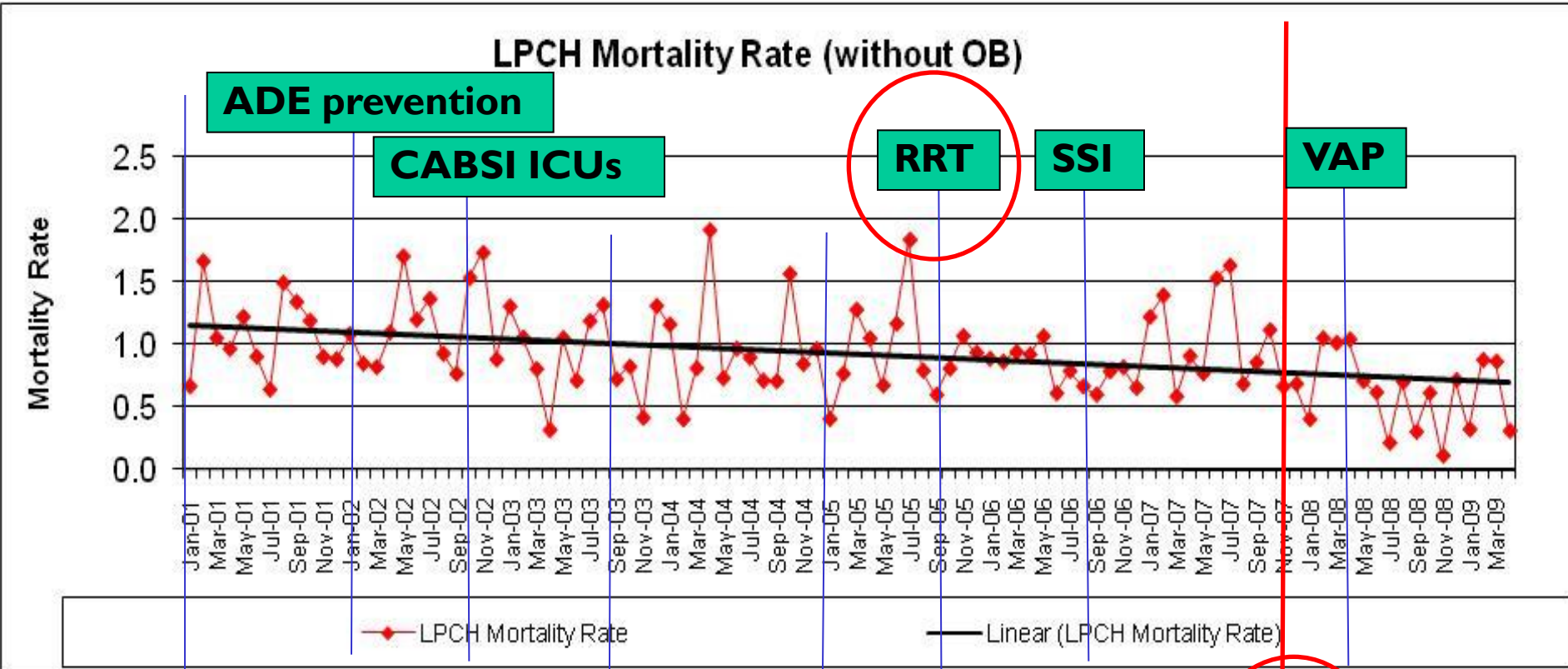
**Goal
Sheets**

SBAR

EMR



Results-Annotated Time Series



**Multidisciplinary teams
Intensivists**

Hospitalist

**Goal
Sheets**

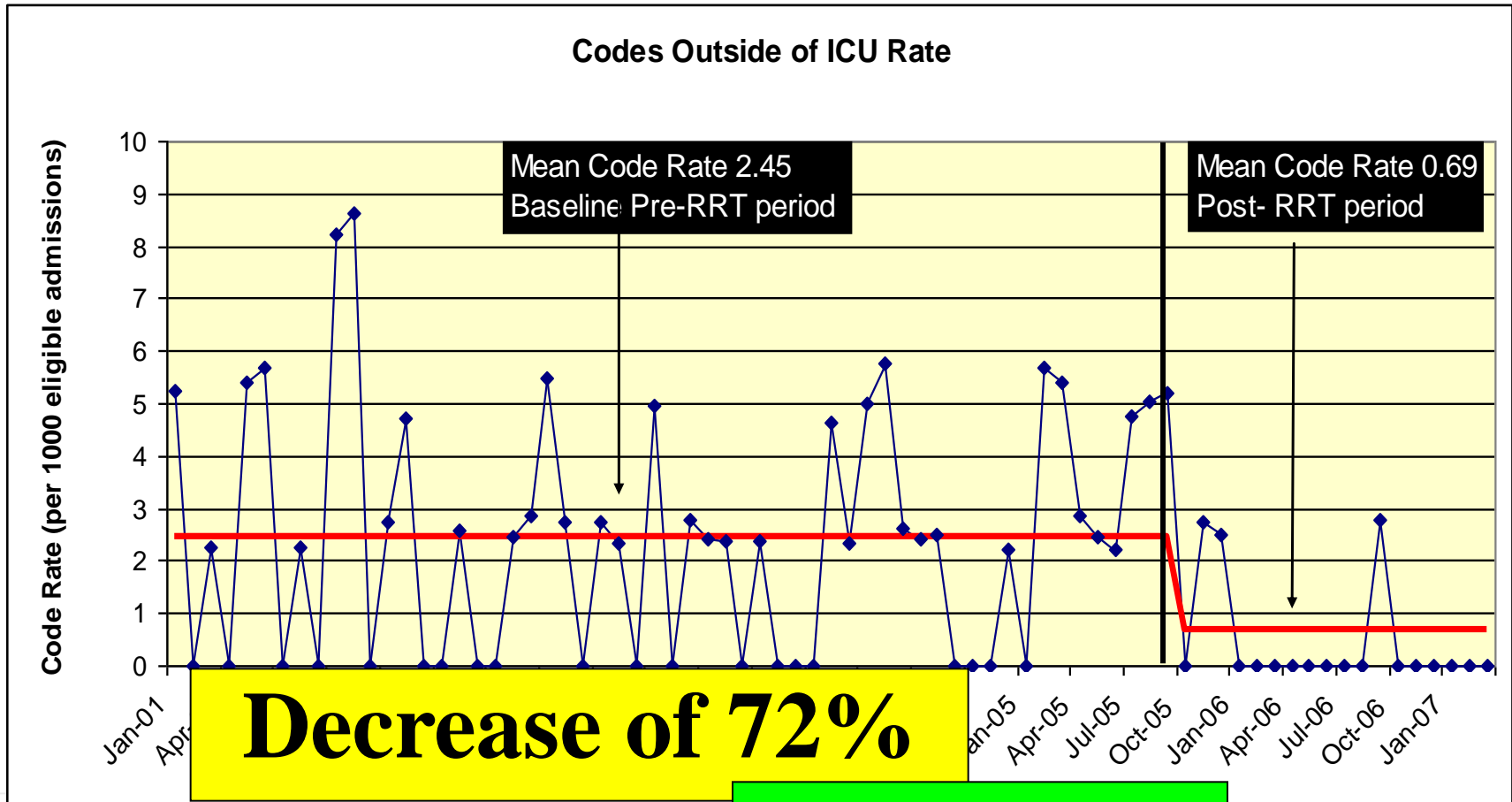
SBAR

EMR

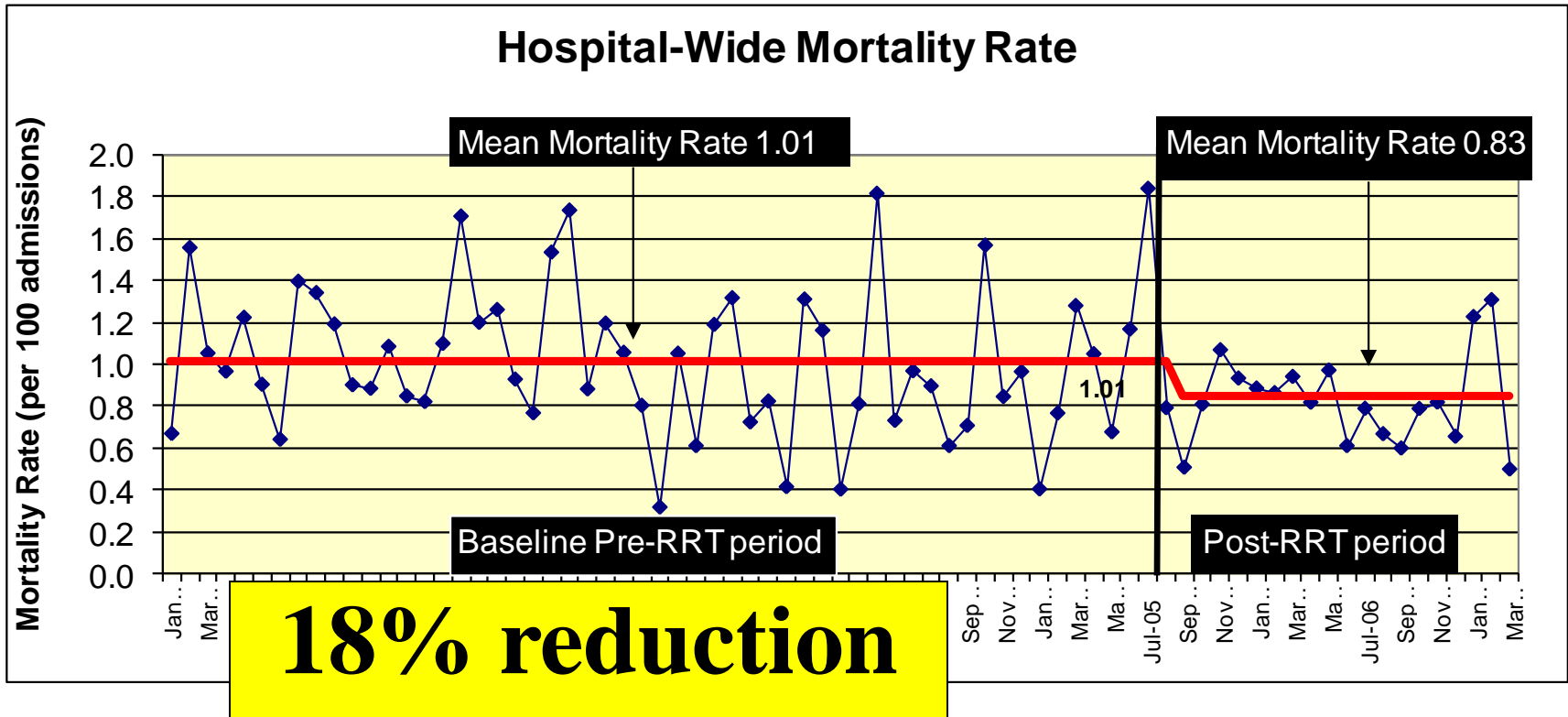


Results: Codes Outside of ICU:

Rate (per 1000 eligible admissions) after RRT implementation



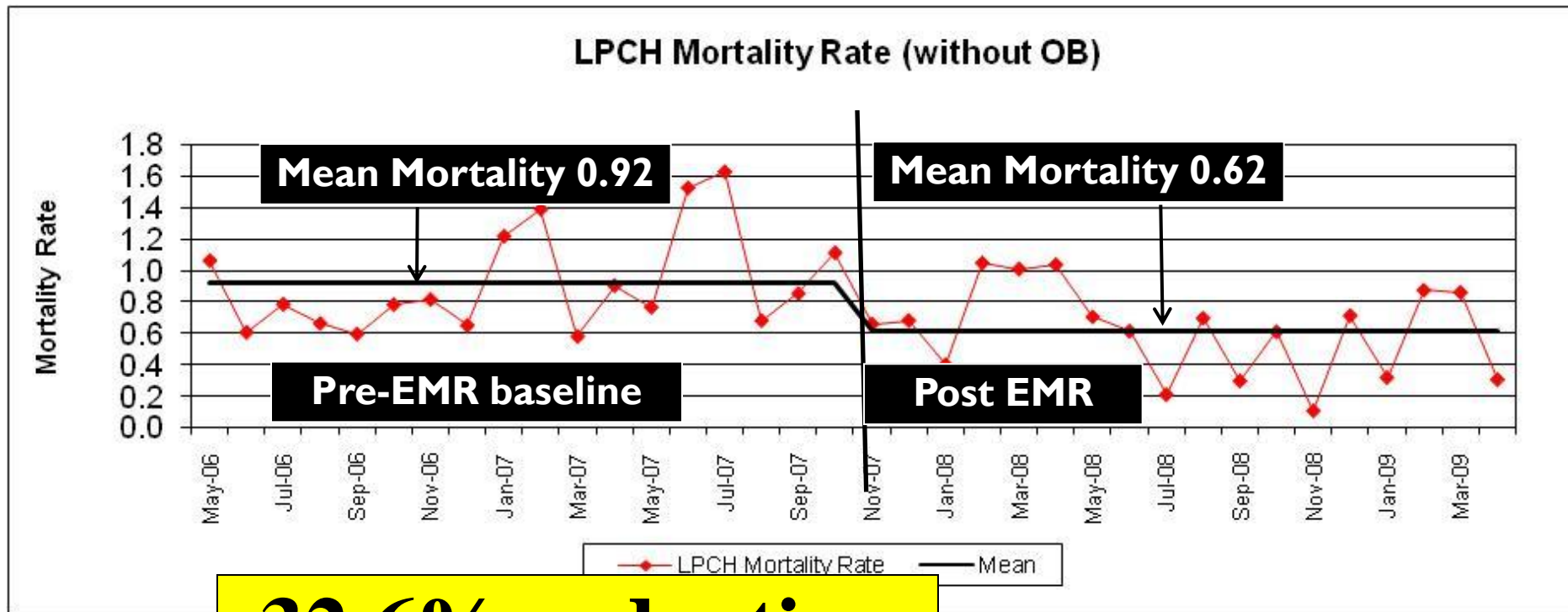
Results: Mortality Rate-Housewide After RRT implementation



$p < 0.01$



Results: Crude Mortality Rate-Housewide After EMR implementation (18 mos pre and post)



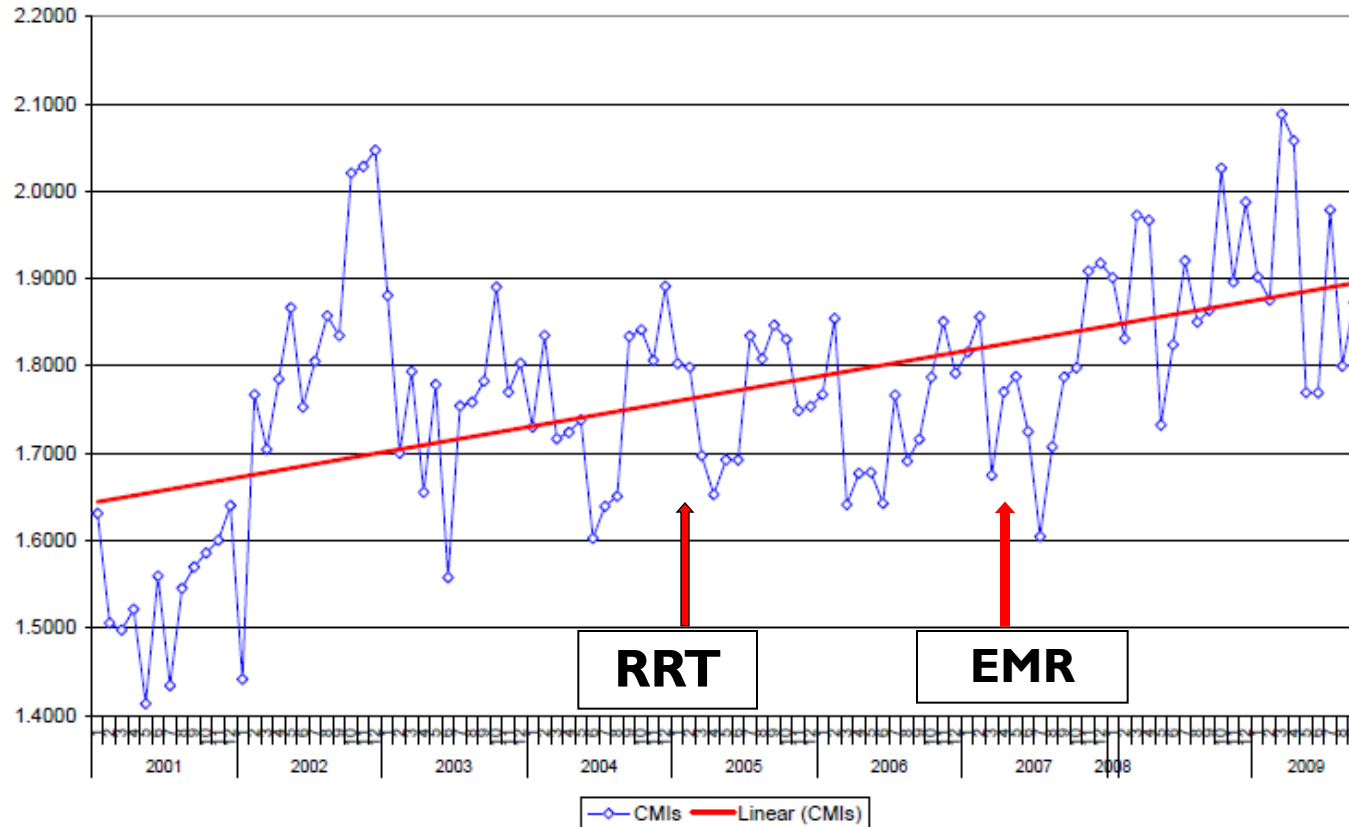
32.6% reduction

p < 0.01

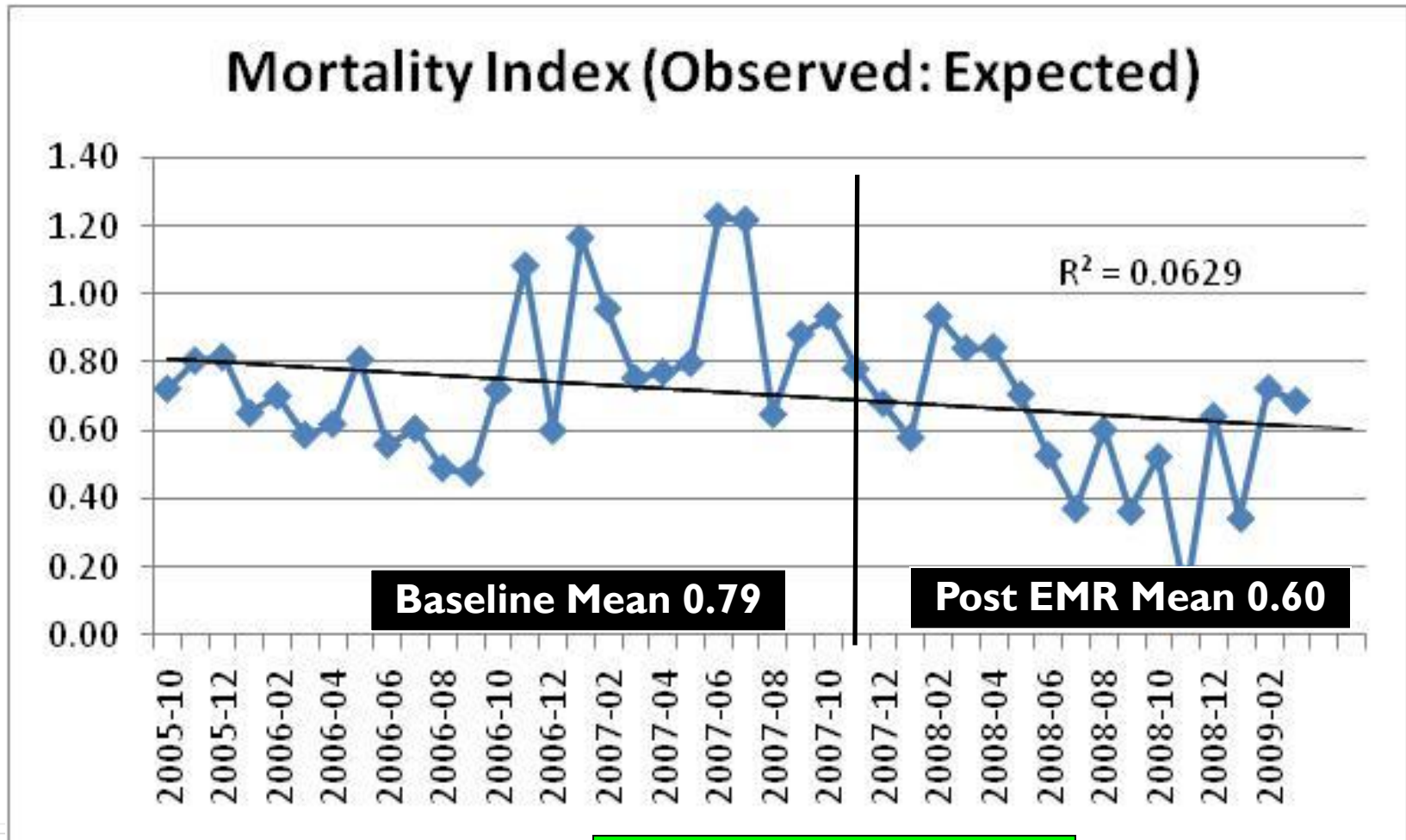


Severity of Illness at LPCH in the rise: CMI (NACHRI “Pediatrics Only”)

LPCH CMI 2000 thru May 2009



Mortality Ratios (non-OB)



p = 0.01



Effect of Risk Adjustment on Mortality Rates

- Model: ARIMA time series analysis
 - adjusts for seasonality
 - Looks for patterns NOT identified by the model (i.e. confounder impact)
 - Evaluates for linear trends (pre and post intervention)
- CMI adjusted only
 - Decrease in 0.37 deaths per 100 discharges (per month)
 - P value: < 0.0001
 - 65 lives in 18 months
- CMI + RRT adjustment
 - Decrease in 0.29 deaths per 100 discharges (per month)
 - P value 0.0031
 - 50 lives saved in 18 months!



Discussion: Reasons for Continued Mortality Decline

- Rapid Response Team implementation-clear association ✓
- Infection rate improvement?
 - CABSIs reduction slow
 - NICU successful
 - PICU/CVICU continue to struggle
 - SSI reduction successful
 - VAP work slow traction
- ADE reduction?
 - No statistically significant change since EMR implementation
 - ADE studies in pediatrics suggest rare cause of mortality



Discussion: Reasons for Continued Mortality Decline

- **Electronic Medical Record Implementation**
 - Promotes Standardization (order sets, processes)
 - Handoffs improved
 - Communication enhanced (<2% verbal order rate, legibility)
 - Real time decision support
 - Corollary orders
 - Improved Turnaround times for medications/radiology results/labs/etc



Preview: Next Generation Medication Safety

Paul's Practical Solutions to Move Toward High Reliability

Leadership

"Patient first" mantra

Organizational clarity

Mission statement

Goals/incentives aligned

Human factors integration

Fatigue, staffing ratios, labels

Culture

"patients first", collegiality,
communication, reporting

Simulation

Prepare in advance for high risk
situations

Zero defect philosophy

Defects in care not accepted as inevitable

Stop the line

Responsibility to stop dangerous processes and fix

Systems thinking

Systems and processes drive outcomes

Standardization

Checklists, boarding passes, order sets

Data driven

Data driven and evidenced based decision making

Technology: Tools for supporting ideal
processes



Conclusions

- Persistent and statistically significant decrease in Mortality rates (crude AND risk adjusted) at LPCH
- Challenging to assign causality
 - Most IHI “Big Dot” recommendations in place for many years
 - 5 of 5 best practices around 100,000 live campaign now in place
- Modeling suggests 2 inflection points critical at LPCH
 - RRT implementation
 - EMR implementation
- **EMR associated with significantly decreased mortality rates at LPCH**

