DATA VALIDATION

North Campus Research Complex

February 8, 2011

Objectives

- Review multi-center validation analysis
- Outline proposal to improve validation feedback
- Discuss data definition updates

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Multi-Center Validation Analysis Overview

- 5 centers
- March 30, 2010 - November 16, 2010
- 4841 Variables

- Criteria
  - ISS > 24 and no complications and hospital days > 1
  - Length of stay > 14 days and no complication or mortality
  - Age > 64 and no comorbidities
  - Mechanical ventilator days > 7 and no pneumonia
  - Motor GCS = 1 and no complications and hospital days > 1
  - ISS <16 and mortality

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Types of Disagreement

Error Type	Definition
0	No disagreement
1	Validator identified variable, registrar did not
2	Validator and registrar identified variable, but disagreed with answer
3	Registrar identified variable, validator did not

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Overall Variable Error Breakdown

Variable	Rate %	Type 1	Type 2	Type 3
Operation	48.9	23	0	0
Admit PTT	46.8	21	1	0
Admit PLT	42.6	17	3	0
Admit INR	42.6	18	1	1
ICU Days	38.3	11	6	1
Units PRBC Total	34.0	13	3	0
ISS	31.9	0	15	0
Intubation Location	25.5	9	3	0
Units FFP Total	21.3	7	2	1
Units RBC 0-24 hrs	21.3	9	1	0
Units FFP 0-24 hrs	19.1	6	2	1
HTN requiring Rx	19.1	5	0	4

Overall Variable Error Breakdown Excluding Custom Data Points

Variable	Rate %	Type 1	Type 2	Type 3
ICU Days	38.3	11	6	1
ISS	31.9	0	15	0
HTN requiring Rx	19.1	5	0	4
Primary E-Code	19.1	0	9	0
First ED Temperature	14.9	0	7	0
Max Chest AIS	14.9	1	5	1
Disposition	14.9	0	7	0
Max Extremity AIS	12.8	2	4	0
Max External AIS	12.8	4	1	1
Max Head/Neck AIS	10.6	0	4	1
ED/Hospital GCS Total	10.6	0	5	0
First ED GCS Verbal	10.6	1	4	0
First ED SBP	10.6	0	5	0

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Complication Error Breakdown

Variable	Rate %	Type 1	Type 2	Type 3
Pneumonia	6.4	3	0	0
Unplanned Intubation	4.3	0	0	2
C. Difficile Colitis	4.3	2	0	0
Incisional SSI/Deep	4.3	1	0	1
Organ/Space SSI	4.3	2	0	0
UTI	4.3	2	0	0
MI	4.3	1	0	1
Systemic Sepsis	4.3	2	0	0

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Feedback Improvement Goals

- Growth in areas of common weakness for all centers
- Education in areas specific to each center
- Confirmation of accordance with process measures
- Increase sampling of areas of low incidence

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Focus Variables

- Multicenter analysis
  - Intubation location
  - Ventilator days
- Center Specific
  - UTI
  - Sepsis
  - ARF
- Process Measures
  - DVT
  - IVC filter
  - ICP monitor
  - OR
- Low Sample Size
  - PNA
  - PE

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DEFINITION UPDATES

Deleted Variables

- Comorbidities
  - Atrial fibrillation
  - Pregnancy
  - Seizure disorder
- Laboratory Data
  - Platelet count
  - PTT
  - INR
- Complications
  - Wound disruption
  - Abdominal fascia left open
  - Abdominal compartment syndrome
  - Enterocutaneous fistula
  - C. diff colitis

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New Variables

- Comorbidities
  - Current smoker
  - Functionally dependent health status
  - Obesity
  - Angina w/in 1 month
  - Revascularization / Amputation for PVD
  - Congenital anomalies
  - Prematurity
- Procedures / OR
- Outcomes / Complications
  - Primary method of payment
  - Drug / EtOh withdrawal syndrome
  - Graft / prosthesis / flap failure
  - Catheter-related blood stream infection
  - Osteomyelitis
  - Unplanned return to OR
  - Unplanned return to ICU
  - Other

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New Variable Clarifications

- Functionally dependent health status
  - The patient requires some assistance from another person for activities of daily living. ADLs include: bathing, feeding, dressing, toileting, and mobility.
- Obesity
  - Body Mass Index of 40 or greater
- Not applicable vs. other complications
  - Not applicable: no complications at all
  - Other: post-injury complications that required treatment, but not on NTDS list

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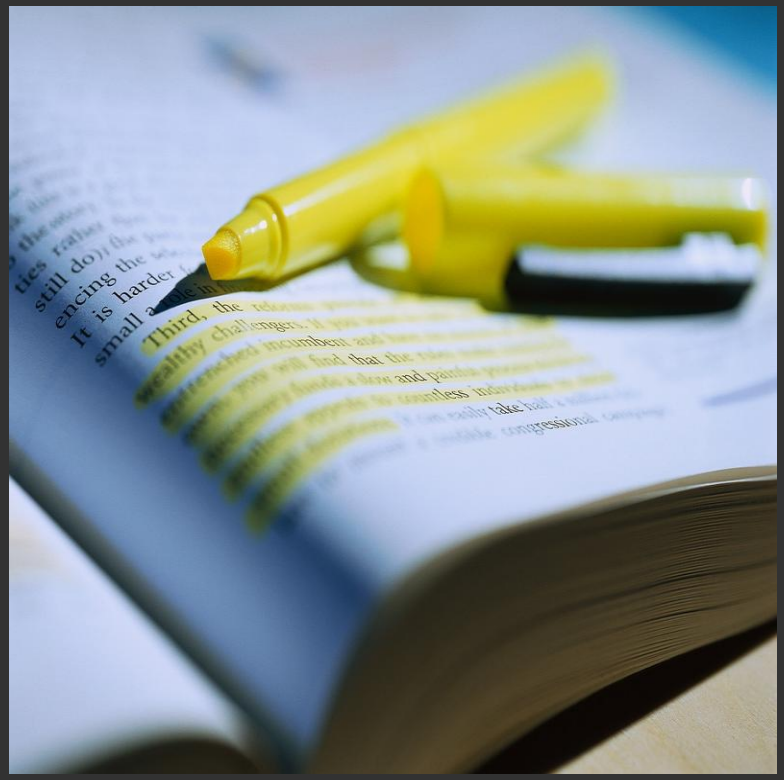
Changed Variable Highlights



- GCS Assessment Qualifiers
- ED Discharge Disposition
- Signs of Life
- AIS 2005
- Diabetes Mellitus
- Respiratory Disease
- MI
- Ascites

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QUESTIONS?

Reminder reports due February 14, 2011

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Administrative Duties

DUA

- Status

IRB

- Exempt status - IRB not required for MTQIP
- May still be required by individual hospital IRB

TQIP

Enrollment

- MTQIP enrollees

Training

- Feb 9th
- 8am-2pm
- Intended Audience:
  - TPM
  - Registrars

CQI Index Measures

Measure	Weight	Measure Description	Points Earned
#1	20	Timeliness of data • On time 3 of 3 times • On time 2 or 3 times • On time <2 of 3 times	 20 10 0
#2	15	Site Visit/Audit • Completed • Not completed	 15 0

CQI Measures

Measure	Weight	Measure Description	Points Earned
#3	15	Timely completion of data use agreement & TQIP enrollment • By 1/1/11 • By 2/1/11 • By 3/1/11 • After 3/1/11	15 10 5 0

CQI Measures

Measure	Weight	Measure Description	Points Earned
#4	25	Meeting Participation- clinician lead • All Meetings • 2 of 3 Meetings • 1 of 3 Meetings • Did not participate	 25 10 5 0
#5	25	Meeting Participation – program manager and registrar (average) • All Meetings • 2 of 3 Meetings • 1 of 3 Meetings • Did not participate	 25 10 5 0

Site QI Projects

- Share Best Practices
- Everybody does something great
- Share it

Innovation In Performance Improvement:

Use of External Benchmarks to Improve Performance

Jeff Young, MD, FACS
Senior Associate Chief Medical Officer for Quality
Director, Trauma Center
Professor of Surgery
University of Virginia Health System

What is PI?

- Many view it as a burden
  - An exercise they carry out to satisfy site visitors
  - Paperwork and meetings
  - Chasing down people to attend
  - Making sure minutes look good
  - Making sure sign-in sheets don’t get lost
  - Boring

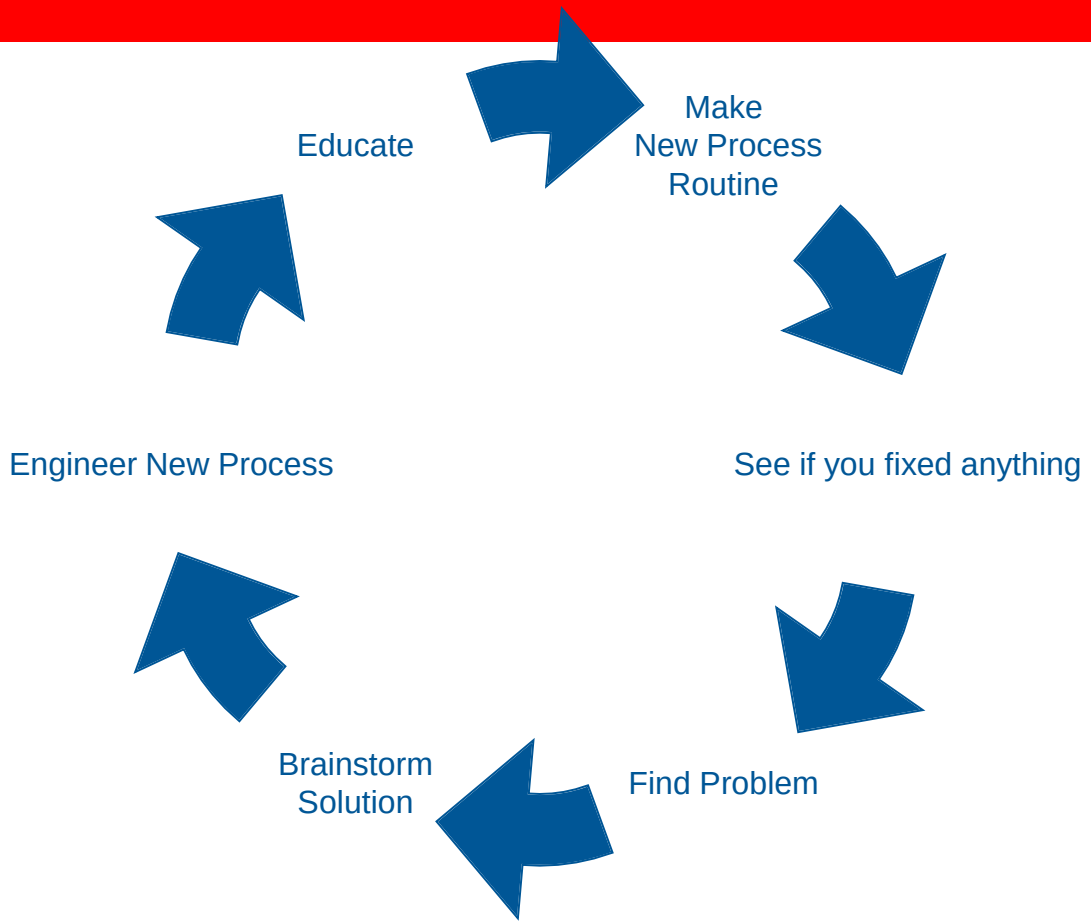
PI

- Much of this is our fault
  - We never really engaged people in what PI really should be or what it could be
  - Good PI is much more like engineering than medicine
    - Figuring out how things work
    - Looking for the key factors that affect performance
    - Discovering how to put the right part in the right place to make things work better

Mechanics of PI

- Leadership
  - Can and should be collective, not just one person
- Finding problems
  - People should feel comfortable to report problems
    - Need a mechanism to do this efficiently
  - Filters to look at frequent processes
  - Looking at potential system failures
    - Mortality is important but near misses could be more important
- Fixing problems and making sure they stay fixed

Mechanics of PI



Typical PI System

- Review your deaths
- Look at things when things blow up
  - Bad outcome
  - Near miss
  - Angry service
  - Angry TMD

Deaths and Preventability

- The way we have demanded that deaths be characterized may actually be harmful to PI
  - If there are people to be blamed then go ahead and blame them, but don't let that get in the way of learning lessons from cases
- Many programs spend time arguing about the preventability of a death, when it is usually irrelevant

Preventability

- Also our ability to determine preventability is VERY inexact
  - Usually a WAG
  - If its so inexact why make it such an essential part of the process?
- Much easier for people to accept opportunities for improvement
  - Though this can still be inexact

Preventability and Opportunities for Improvement

- Either a case has OFI's or it doesn't
  - It is often easier to accept that there is an OFI than it is to classify something as a preventable death
- Just saying something is preventable or non-preventable doesn't increase or decrease the burden of finding problems and fixing them

Examples

- 79 year old admitted to ED after fall, has large SDH with 1 cm midline shift, GCS 3, left pupil blown
  - Patient seen by neurosurgery, felt to be hopeless and care withdrawn
  - Simple, non-preventable death

Example

- But patient waited 55 minutes for initial CT
- FFP was ordered but not administered for 75 minutes
- Patient not intubated on arrival despite meeting indications for intubation
  - Intubated in scanner following sat drop
- ALL ARE OFI's, all could be glossed over if you only look at preventability

Example

- If this was a 20 year old with a smaller subdural would we have lost the patient?
- Unless everyone was dragging their feet from the beginning (which they shouldn't have been) the care was sub-par
- If this was your mother or father would you have been happy with the way their treatment unfolded?

Example

- Should use every case as an opportunity to find problems in your system
- This is why on site visits the first cases I look at are the non-preventable death file
  - It tells you how robust their PI system is
  - Tells you about their focus and desire to find problems

Fixing Problems:
Do you have a system?

PI System and Ability to Fix Problems

- A lot at this point depends on the organization of your system
  - If your care delivery is mostly random (EM attendings, surgery attendings, and residents do not handle the same situation similarly) you will spend a great deal of time looking at cases, because each case will be different
    - No two patients with splenic injury will be handled the same
  - Fixing the system in this situation is hard but not impossible

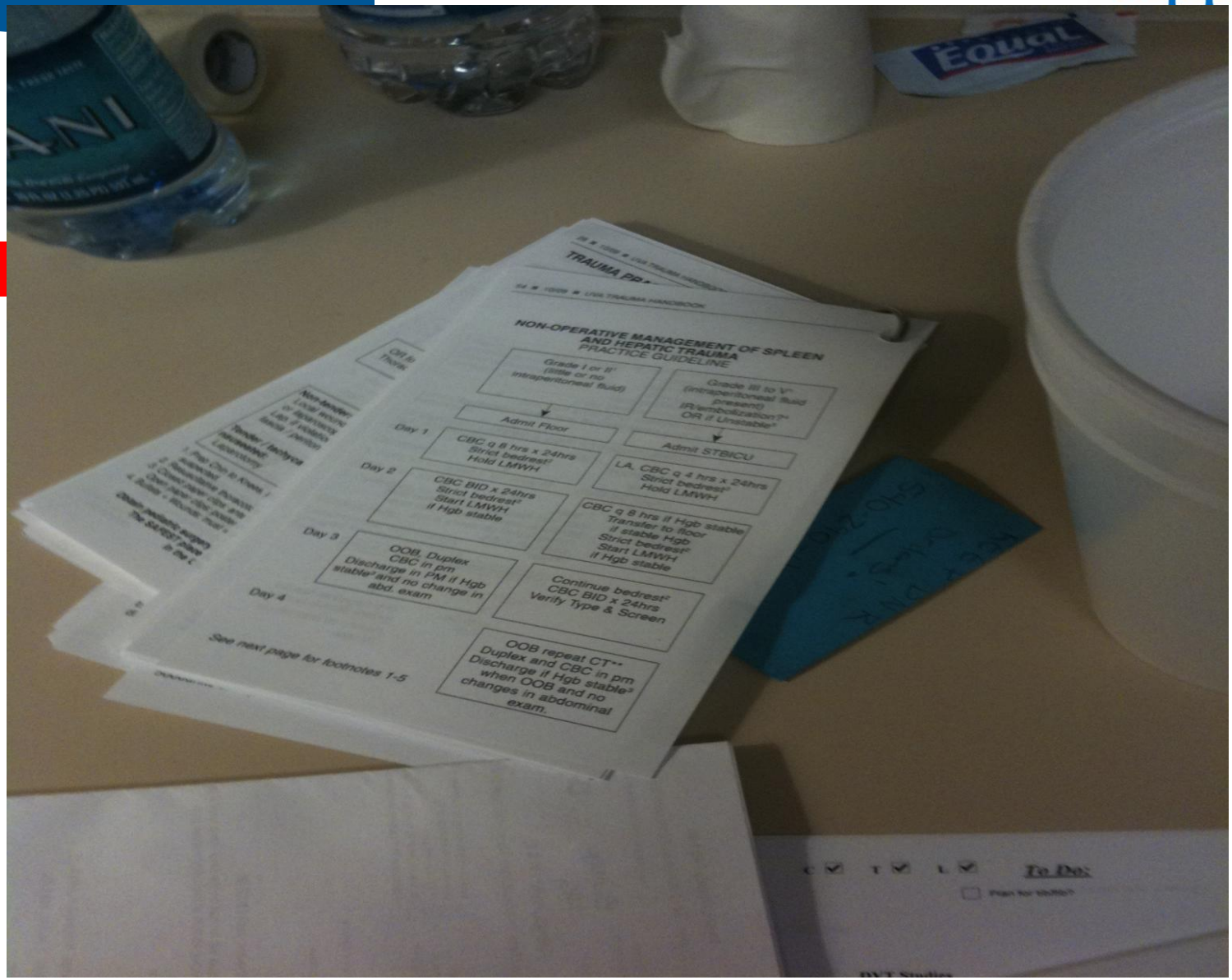
Typical PI Process

- Next level
  - Control of routine processes of your system
  - *A guideline is just a tool to measure variation*
    - *Brent James, MD*
  - So creation of guidelines helps you measure variation
    - Without that tool, you will have difficulty fixing things (since if you fix one type of case, you wont fix the next)
    - Only if cases are being handled in a consistent manner, can you carry out change that will affect groups of patients

Guidelines

- *"If three professors sitting in a room with coffee at 2pm cant figure out how to take care of a type of patient, how can a resident figure it out in the middle of the night?"*
- Does not mean you regiment every aspect of care
  - You control variation of those things that really don't need to vary (likely over 90% of decisions)
  - Leave *controlled* judgment for the other 10%
    - People can improvise within set parameters of escalation and good practice


STICU
Quality
Note-
book
FY
2004
STICU
Quality
Notebook
FY
2002-2003
Volume 1
CARLOS
227-1278


NON-OPERATIVE MANAGEMENT OF SPLEEN AND HEPATIC TRAUMA
PRACTICE GUIDELINE
Grade I or II
(little or no intraperitoneal fluid)
Grade III to V
(intraperitoneal fluid present)
IR embolization
OR if Unstable
Admit Floor
Admit STBICU
Day 1
CBC q 8 hrs x 24hrs
Strict bedrest
Hold LMWH
LA, CBC q 4 hrs x 24hrs
Strict bedrest
Hold LMWH
Day 2
CBC BID x 24hrs
Strict bedrest
Start LMWH
if Hgb stable
CBC q 8 hrs if Hgb stable
Transfer to floor
if stable Hgb
Strict bedrest
Start LMWH
if Hgb stable
Day 3
OOB, Duplex
CBC in pm
Discharge in PM if Hgb stable and no change in abd. exam
Continue bedrest
CBC BID x 24hrs
Verify Type & Screen
Day 4
OOB repeat CT
Duplex and CBC in pm
Discharge if Hgb stable when OOB and no changes in abdominal exam.
See next page for footnotes 1-5
To Do:

Controlling Variation

- Create guidelines that people accept
  - Consensus not unanimity
  - Sometimes you have to dictate, especially if no one will engage in the process
- Get it out and educate
  - Single email is useless
- Reinforce the guidelines every day
  - “When did the lactate clear?”
  - “Was the neck CTA normal?”
  - “Is Optho on board?”
  - “What did spine say?”

Coaching the Guidelines

- Rex Ryan vs. Mike Shanahan
  - Is it better to be loved or feared?
    - Little of both
  - Is perfect care the goal?
    - Maybe
    - But you need to choose those things you think are ABSOLUTELY ESSENTIAL to safe care and have zero tolerance for missing those
    - As far as the others, I think you need to encourage and teach, but not everything has equal importance

Variation

- Until you control your variation, don’t even look at outside benchmarks
  - Other than to tell you your care is sub-par
  - If its shows your care is great, you are one lucky program
- If you cant deal with things in a consistent manner, you cant make changes
  - Must control variation first
  - Its just common sense

The Beauty of External Benchmarking

- Lots of people and programs think they are awesome
  - For no tangible reason other than that is what they think
- When you get to the bottom of a lot of quality problems, you find an inflated sense of performance at the center
  - That's why people don't listen to criticism
  - Its why they don't take a hard look at what they do
  - Its why they say all external data is "wrong"

Starting with Probability of Survival

- It introduces your program to the concept of *expected* outcomes
  - How are they derived?
  - What factors contribute to the metric?
  - Where do we stack up?
- Provides a useful entry into much more robust external benchmarking

External Benchmarking

- Where can you start?
  - NTDB
    - Not yet providing enough specific risk adjusted outcomes to benchmark
  - TQIP
  - The Literature

SMARTT

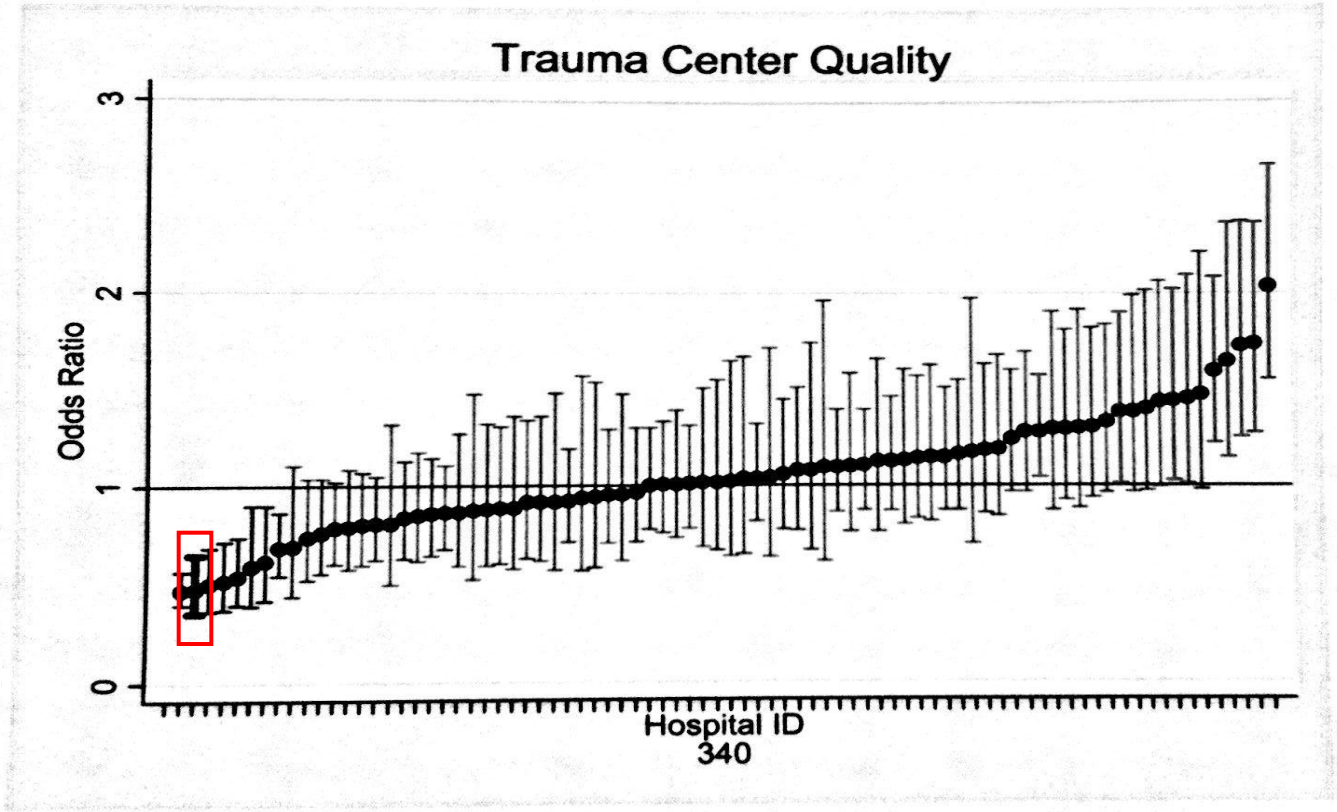
- The Survival Measurement and Reporting Trial for Trauma
  - Uses NTDB data
  - Includes 125 centers and provides annual report on risk-adjusted mortality
  - Results blinded
  - Excellent trauma mortality probability model
    - Developed by Turner Osler
    - Uses 5 most severe injuries augmented with age, gender, mechanism, motor GCS, SBP, and transfer status

SMARTT

- Provides data on
  - Overall trauma center quality
  - Blunt trauma
  - GSW trauma
  - MVC trauma
  - Pedestrian trauma
  - Very low risk patients
  - Very high risk patients

SMARTT 2006

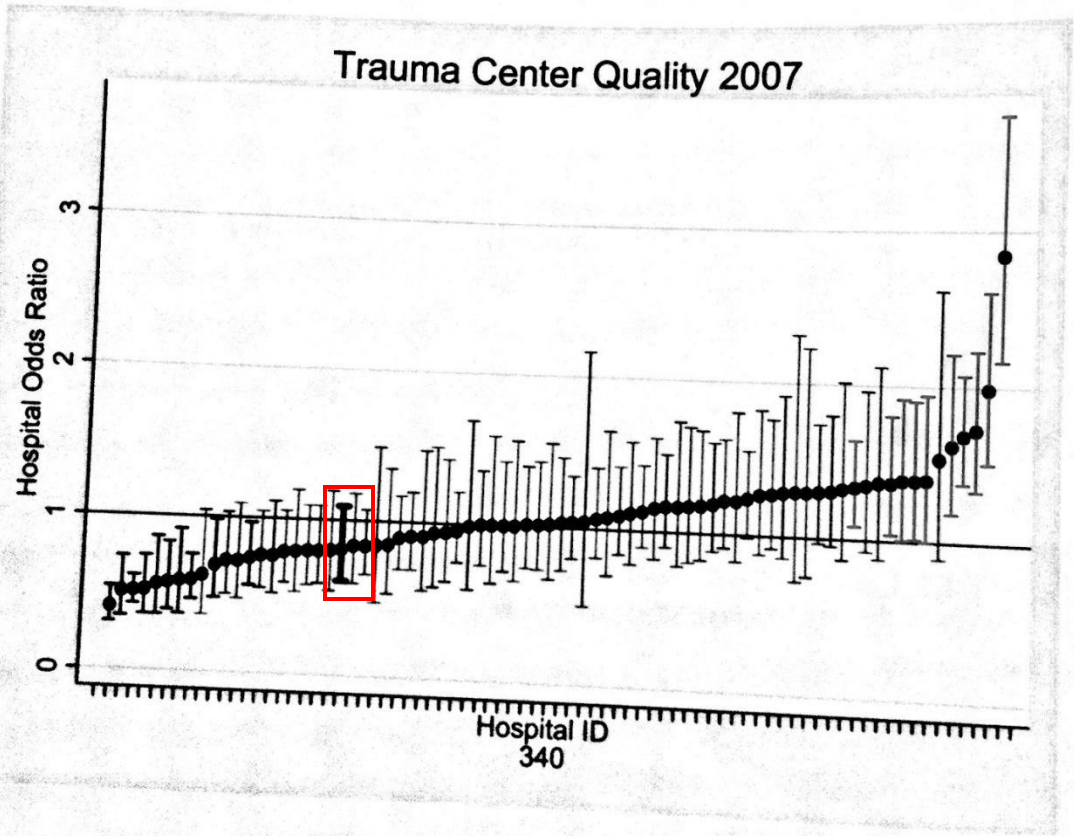
Figure 1. Hospital Odds Ratio based on all Trauma Cases.



Vertical bars represent the 95% confidence interval. Hospitals whose quality is below

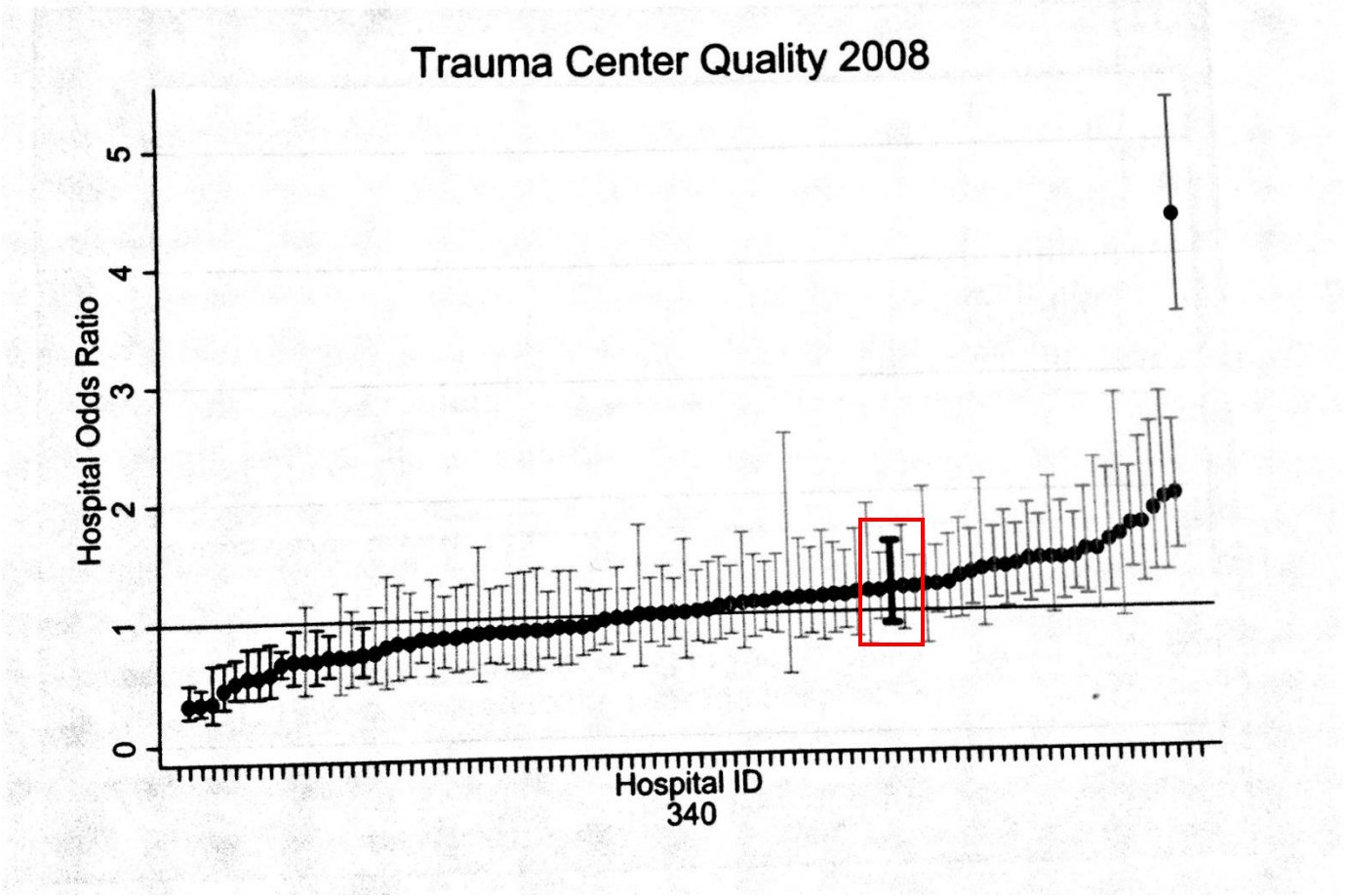
SMARTT 2007

Figure 1. Hospital Odds Ratio based on all Trauma Cases.



Vertical bars represent the 95% confidence

SMARTT 2008


Trauma Center Quality 2008
Hospital Odds Ratio
0
1
2
3
4
5
Hospital ID
340

External Benchmark - SMARTT

Happy initially, grew less happy

Changes in program over time period

- 2006 – Program had been under one surgeons direction and 95% of all trauma critical care provided by same person for 12 years
- July, 2007
  - Second trauma surgeon joins program

University Health System Consortium

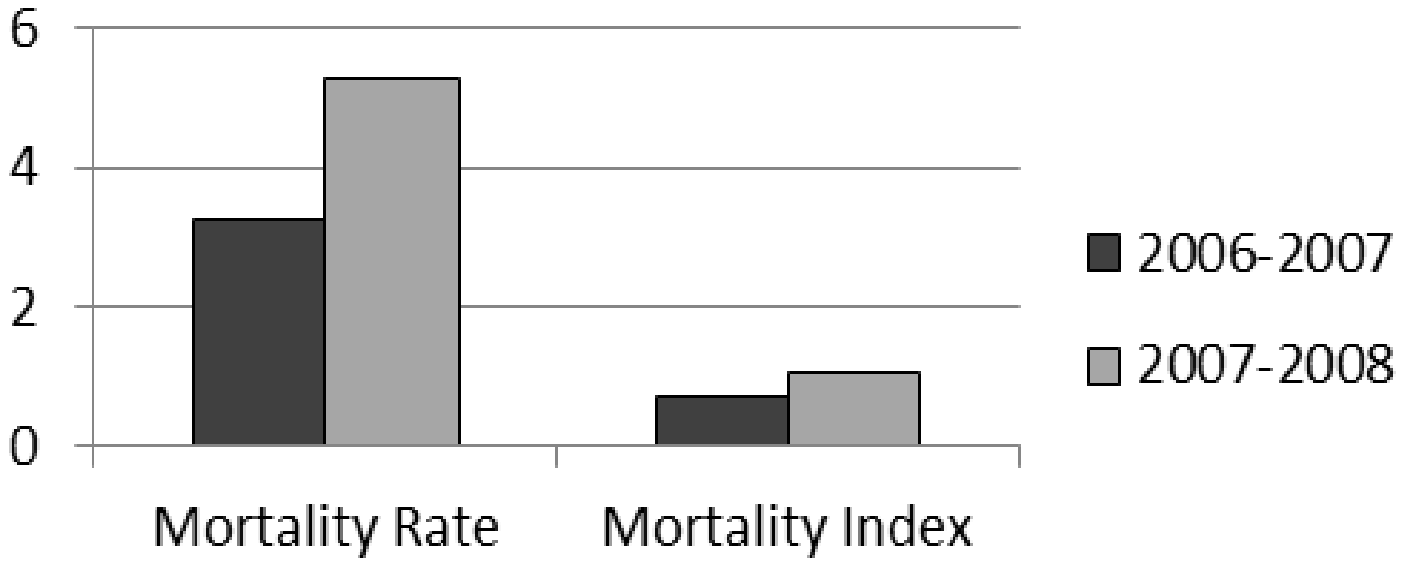
- Group of teaching hospitals associated with medical schools
- Robust risk adjustment system based on the patients in their database
- Robust query system
- Can see what other places are doing and can drill down to individual physician and patient

Analysis

We examined nationally benchmarked outcomes from the 24 months elapsed since the arrival of the second surgeon and compared trauma registry data from June, 1999 - June, 2007 (time period #1) to data from July, 2007- June, 2009 (time period #2). Our hypothesis was that outcomes in time period #2 would improve compared to time period #1.

What Happened

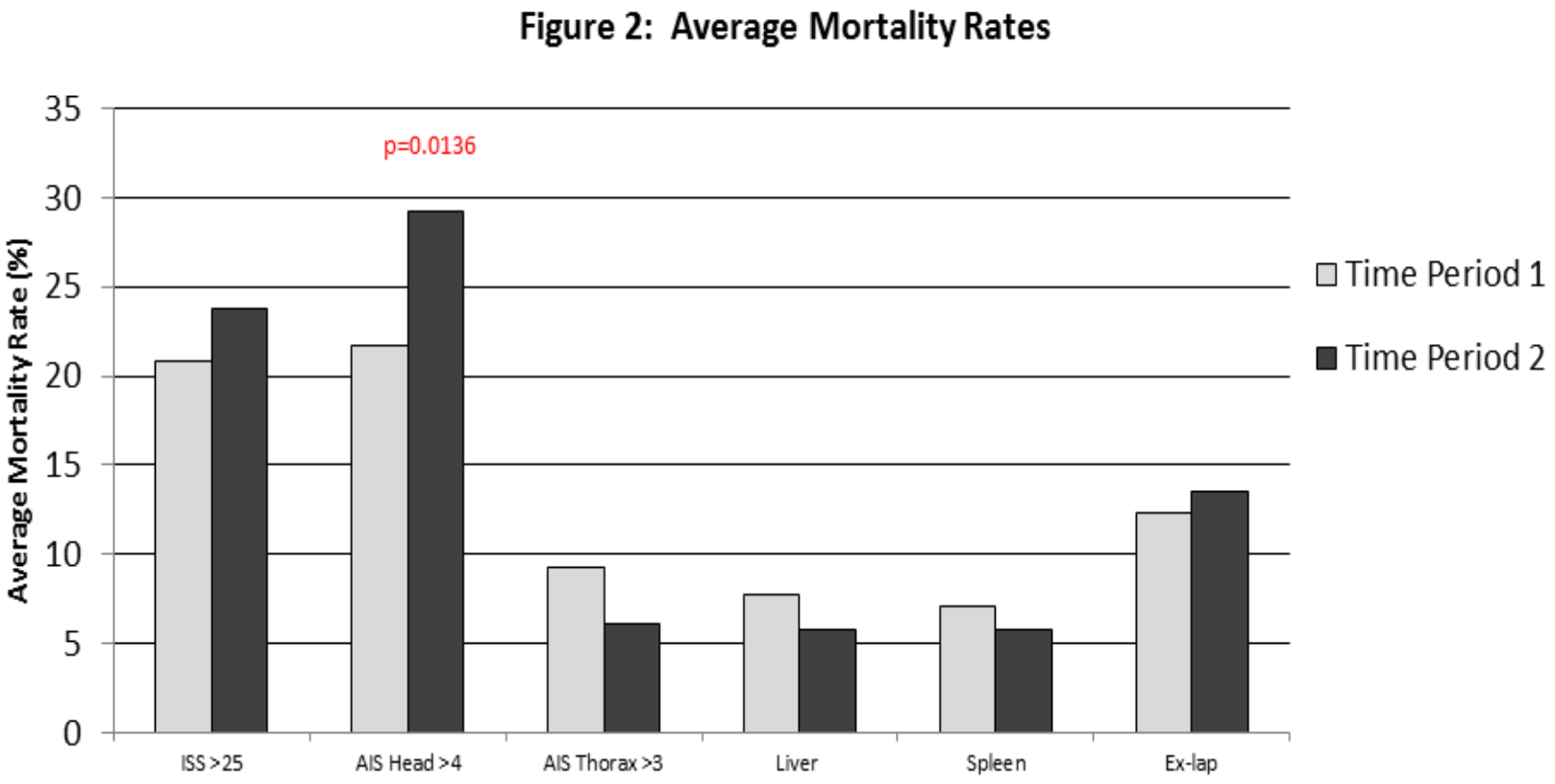
Figure 1: Mortality Rate and Mortality Index 2006-2007 Compared With 2007-2008



How We Figured Things Out

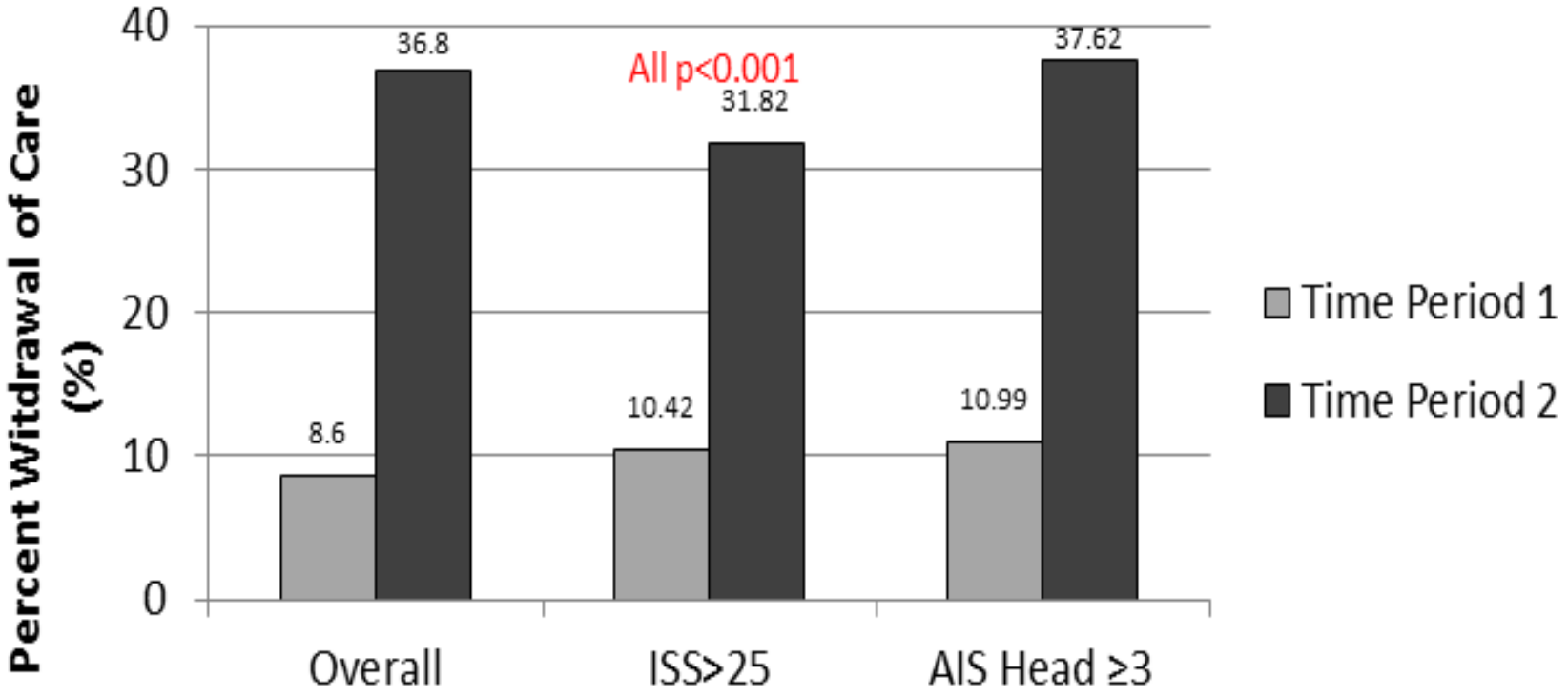
- Used the registry, TQIP, and chart review
- Looked at all factors
  - Presence in ED for resuscitations
  - Age of deaths, overall age of population
  - Average ISS, ICU days, hospital days
  - ISS>25
  - Age >65
  - Spleen and Liver injuries
  - Thoracic AIS >=3
  - Head AIS 4 or 5
  - Emergency abdominal or chest procedures
  - Penetrating and blunt

What we found



Analysis

Figure 3: Withdrawal of Care Comparison Between Time Period 1 and Time Period 2

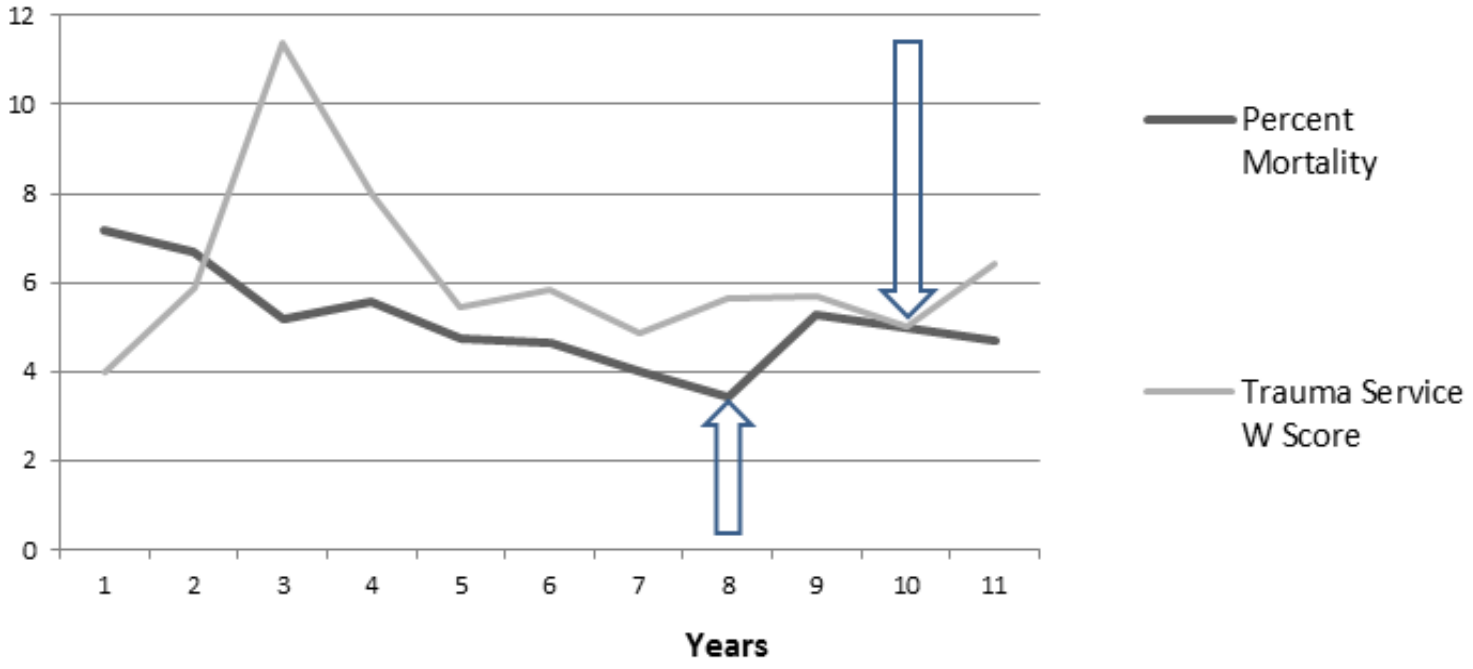


What we found

- In the 8 years prior to 2007, 22 trauma service patients had care withdrawn, in 2007 and 2008 – 27 patients had care withdrawn
- No change in protocols or guidelines
- New surgeon handled family meetings himself, Surgeon #1 allowed residents to do it
  - Residents are less comfortable asking for withdrawal of care
  - More families chose to withdraw care after family meetings with Surgeon #2
- No other real changes found

Withdrawal of Care

Figure 4: Percent Mortality and Trauma Service W-Score During 11 Years From 1999 to 2010



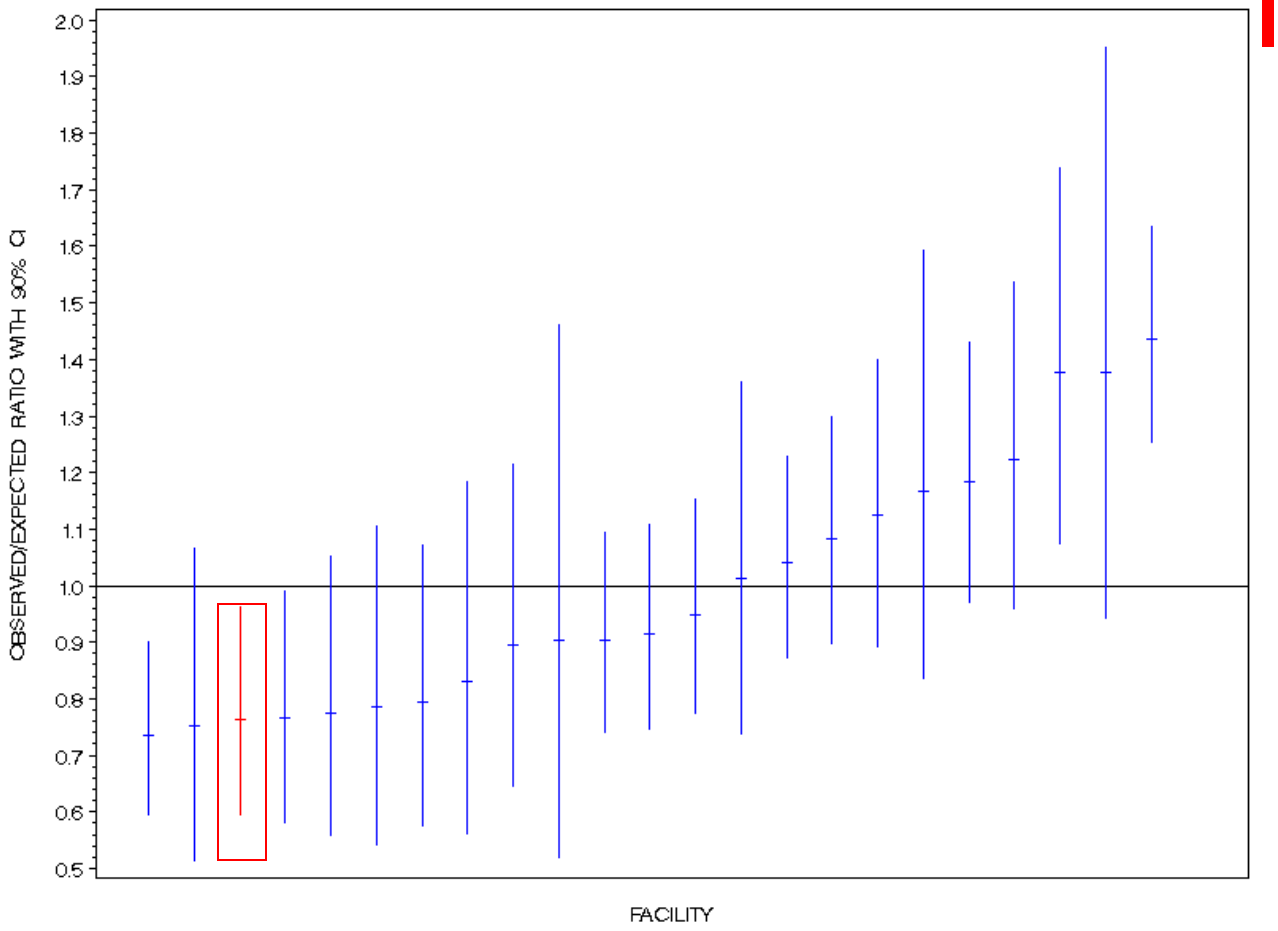
Meaning

- Cause of increase in MI complex
  - Which process is more appropriate?
  - Not associated with bad care or bad decision making
  - Without external benchmarking, could have over-reacted and made changes that would have had additional consequences
  - Just by bringing this cause to programs attention, MI returned to previous values (0.6-0.8)

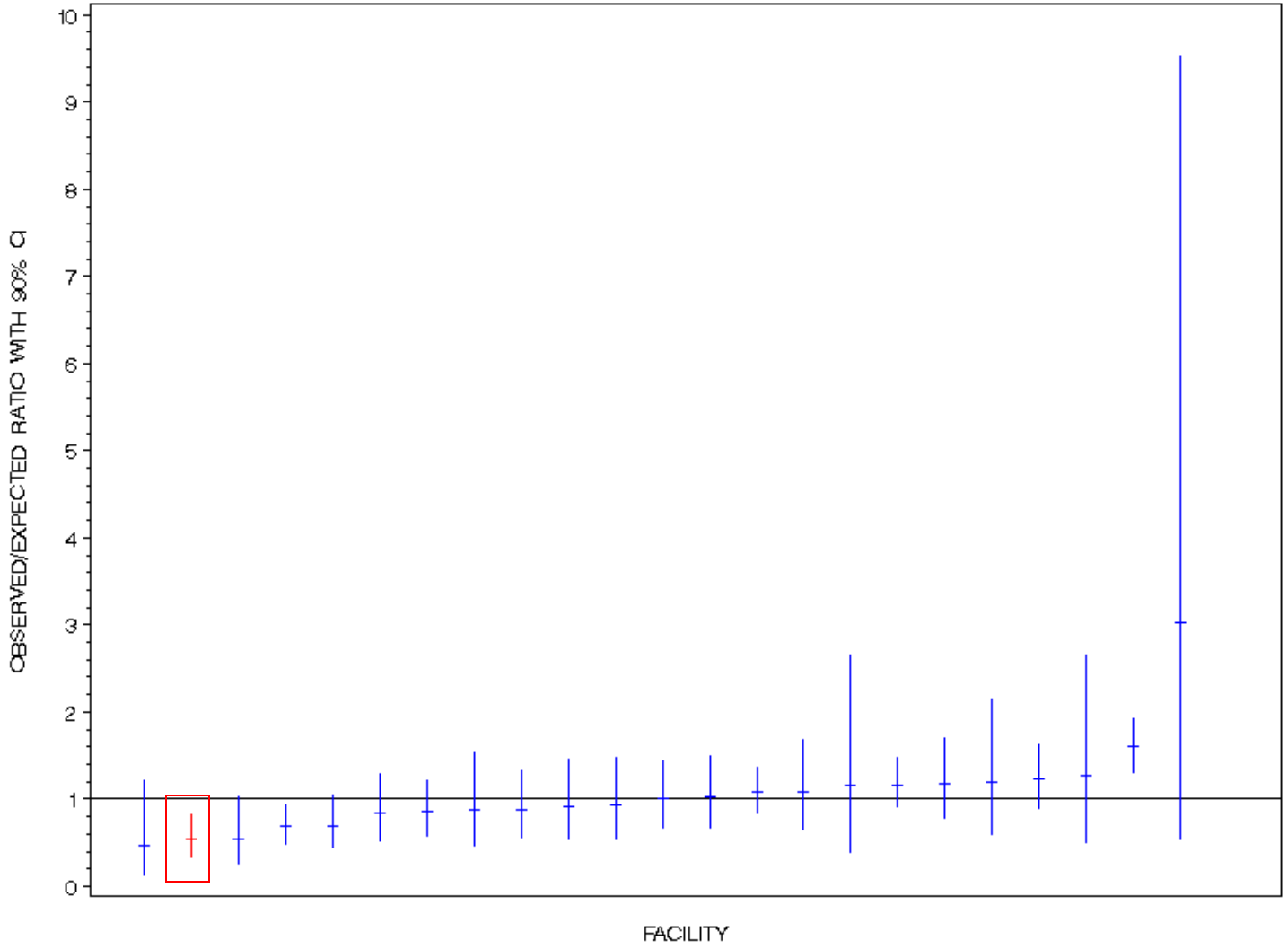
TQIP

- We are part of the initial TQIP group of institutions
- Received a yearly report benchmarking our performance against the group of top US level 1 trauma centers
- Also requested several specific queries

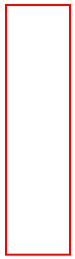
Risk Adjusted Mortality All Patients Admitted 2007



Blunt Multisystem Injury 2007



Blunt Single System Injuries



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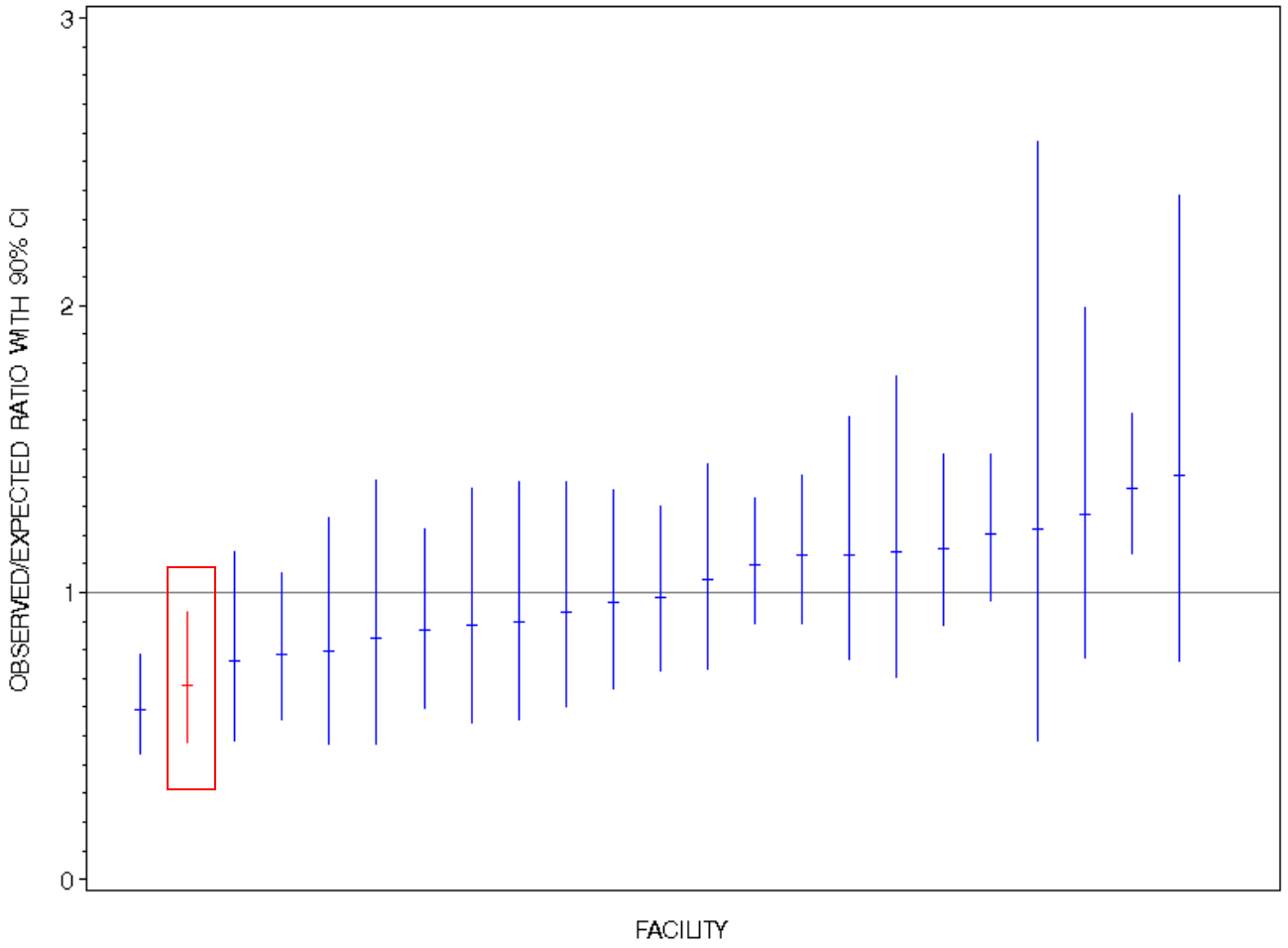
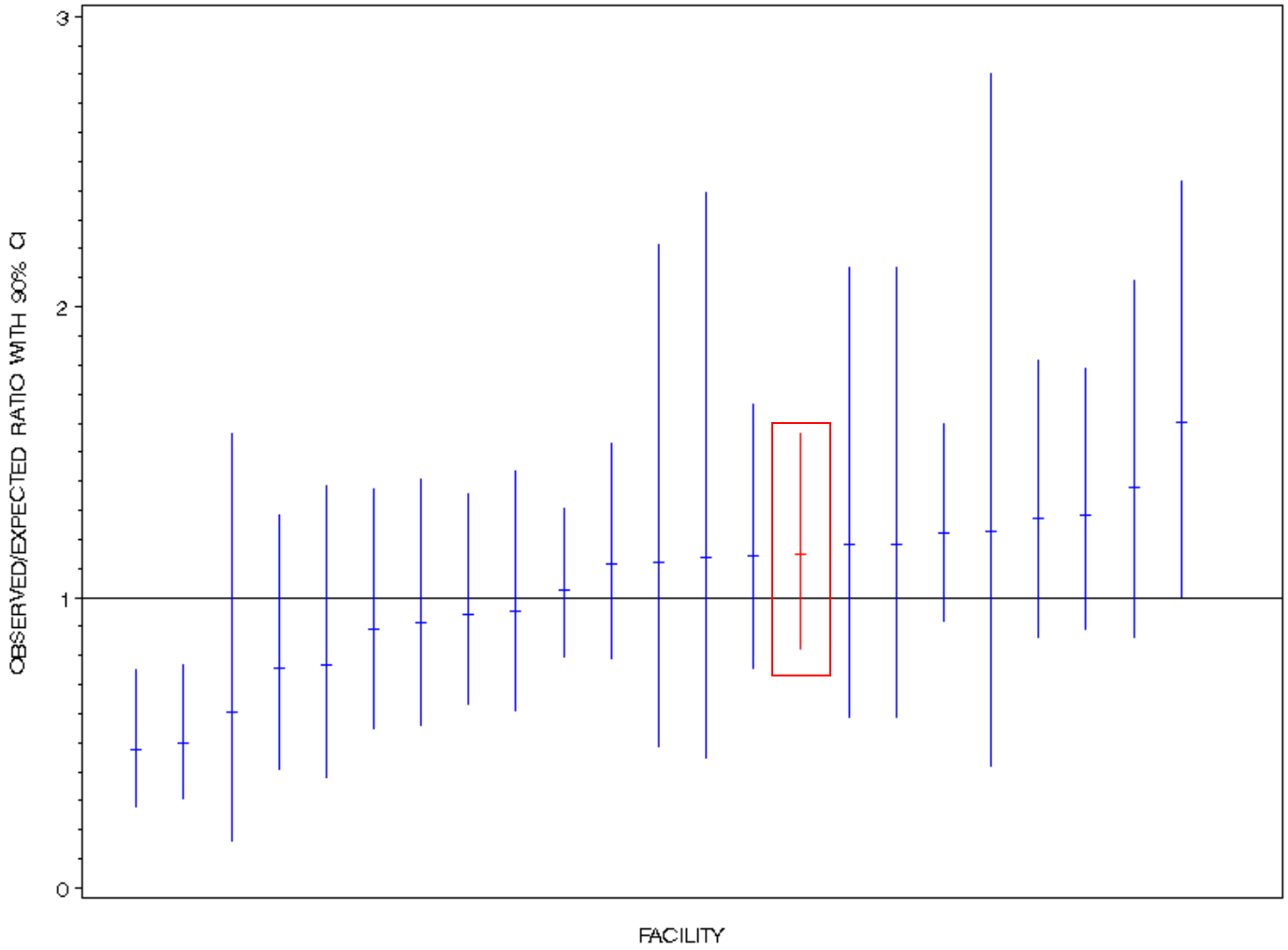
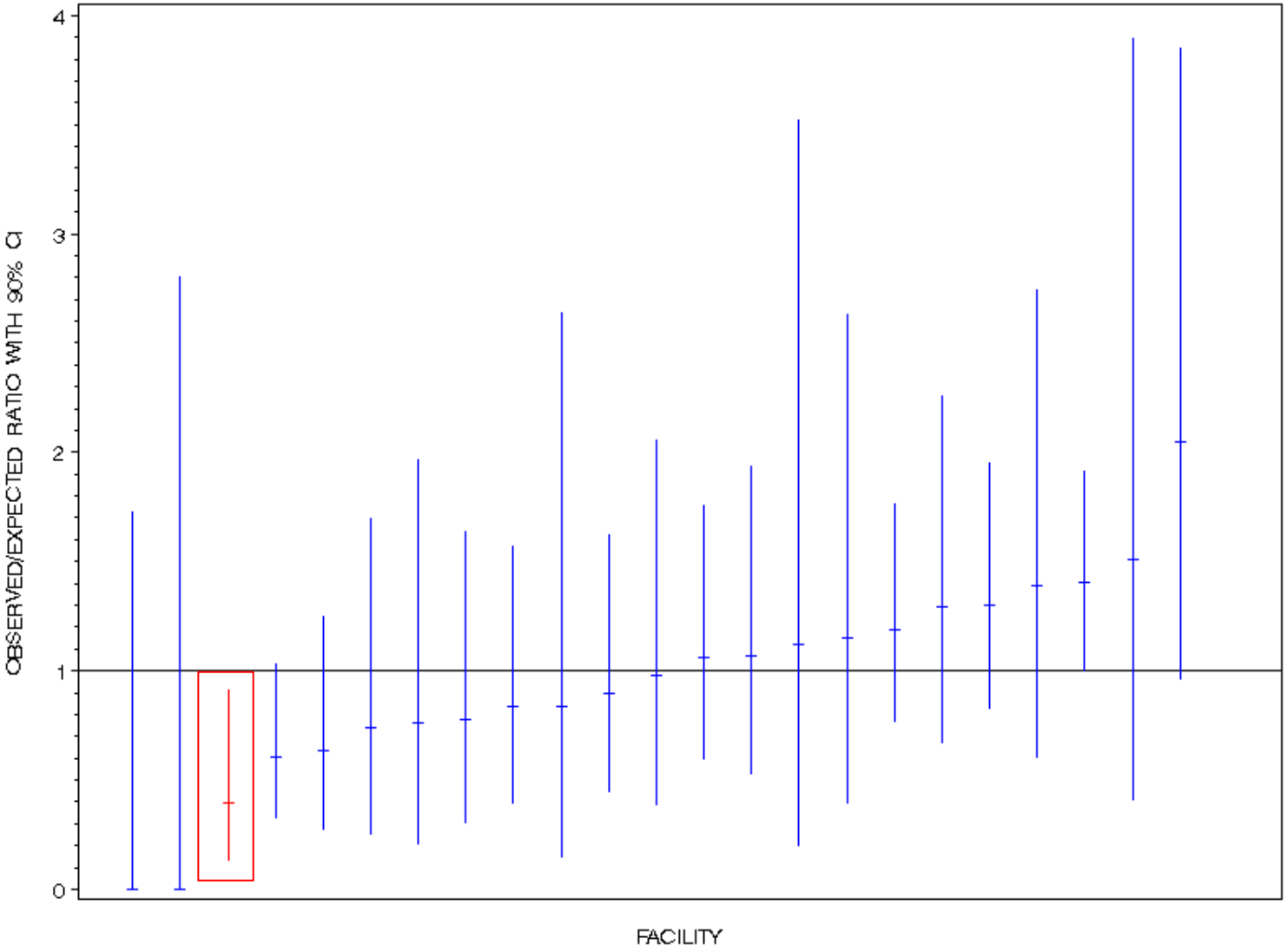


Isolated TBI



Hypotension

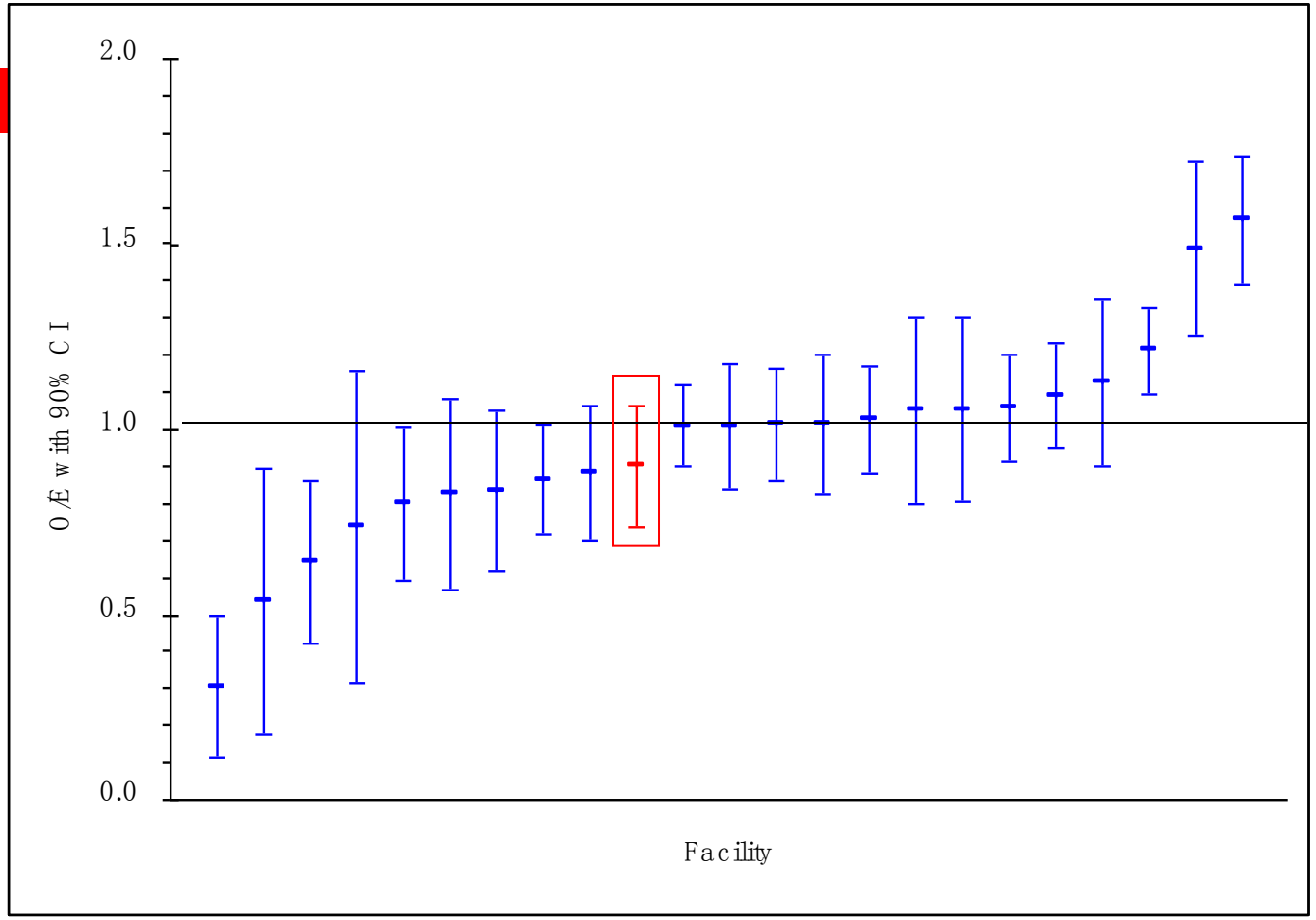


Analysis

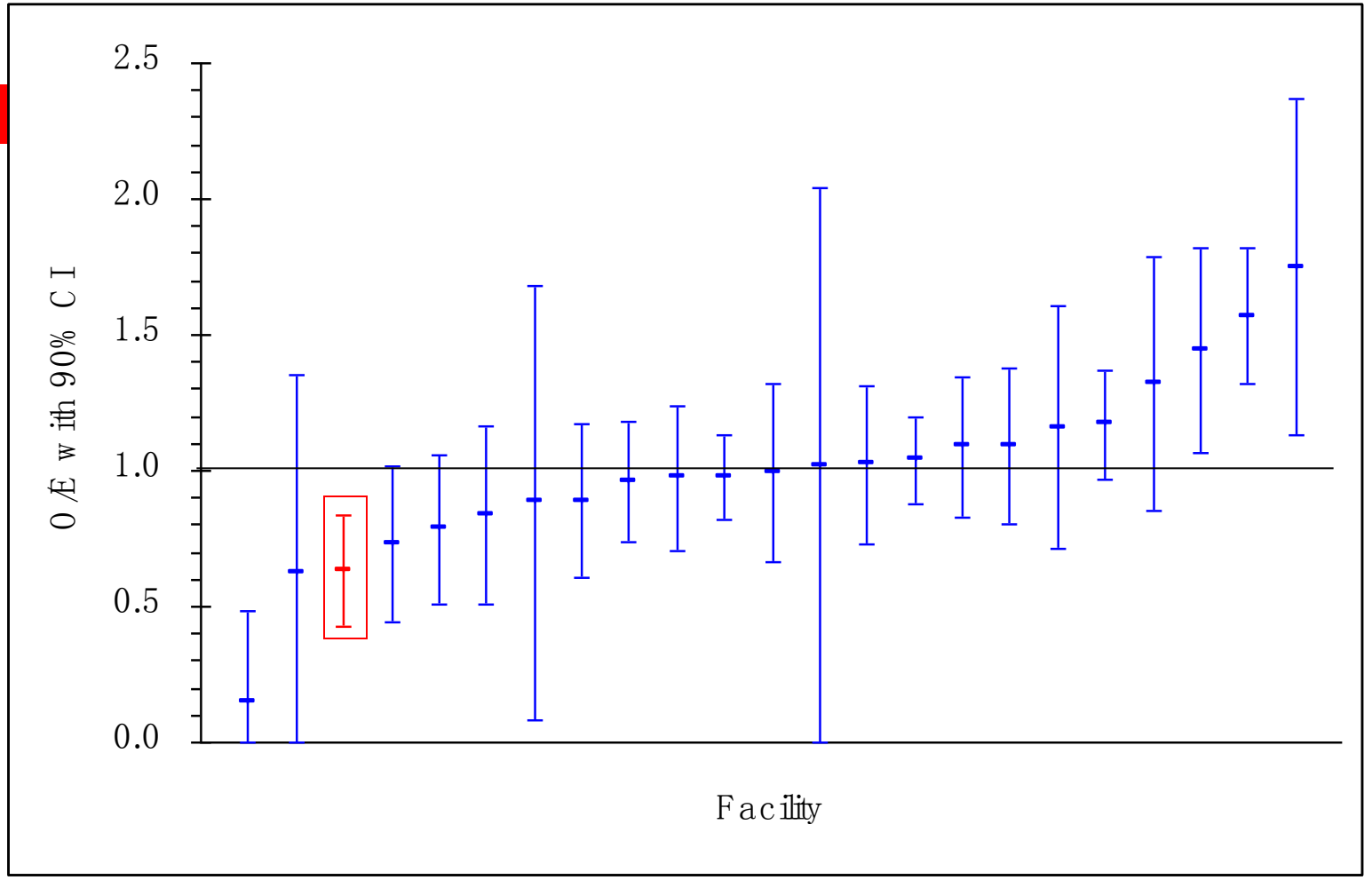
- Felt pretty good about things
- Opportunities for improvement in TBI
- Didn’t know what to make about lower rank in blunt single system injuries, but did not make any changes based on this.

Next TQIP Report
2008 Patients

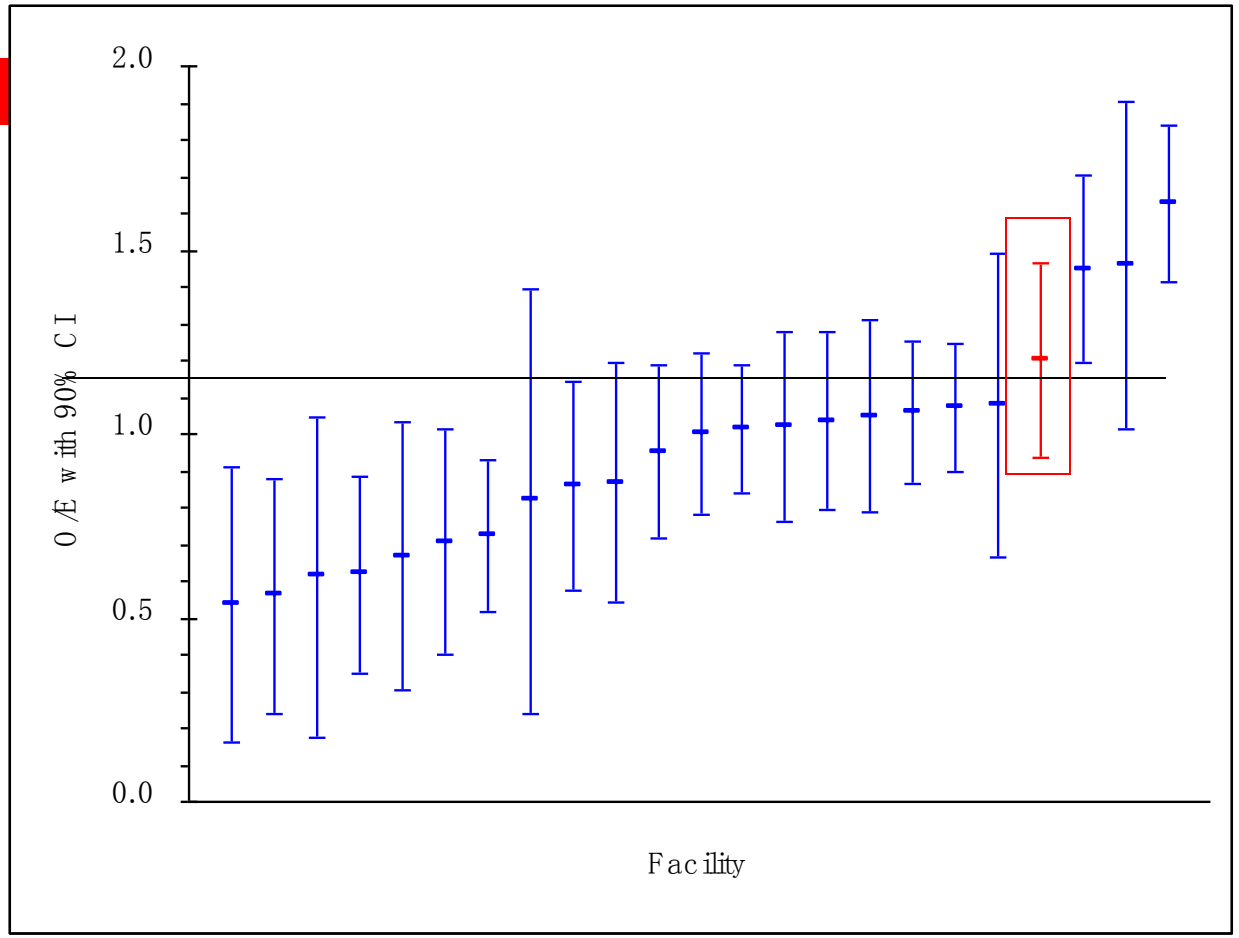
Overall Mortality



Blunt Multisystem Injuries



Blunt Single System Injuries



Not where we want to be

Analysis

- Had maintained ranking in most areas EXCEPT blunt single system injuries
- Undertook massive PI in investigation
  - Asked TQIP to help us identify which patients were in this group
  - Reviewed all of these patients charts
  - Presented at service PI meetings

What We Found

- Who are they?
  - Elderly patients with head and facial injuries from ground level falls or low speed MVC's
  - Not usually trauma alerted
  - Often admitted without trauma surgery involvement
    - Seen by neurosurgery and either admitted to neurosurgery or medicine
  - Care often withdrawn in first 72 hours

Further Examination

- Even though there were patients with severe intracranial injuries that were unsurvivable from the beginning, there was a fair percentage of patients with initially reasonable CCT, that went on to decompensate over 48 hours
- Often classified as non-preventable death on review
  - 80 year old patient on Coumadin with large SDH who goes on to withdrawal of care

Examination

These patients often had opportunities for improvement

- Slow workup
  - Not activations, 3 hours to get head CT, etc.
- Inadequate resuscitation
- Delayed intubation
- Delayed administration of blood products and correction of coagulopathy
- Unaggressive neurosurgical response

Conclusion was the 15-20% of these deaths were potentially preventable with aggressive focus

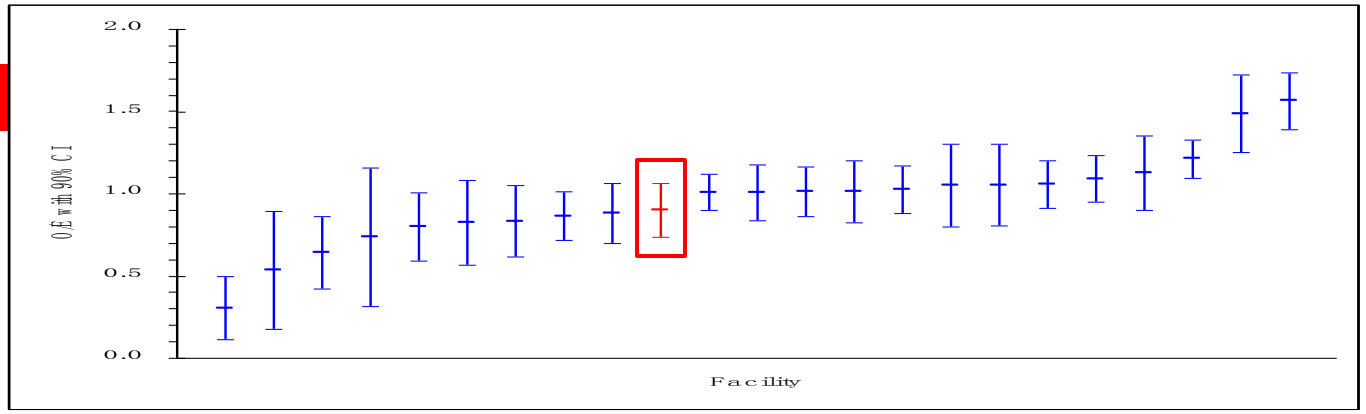
Actions

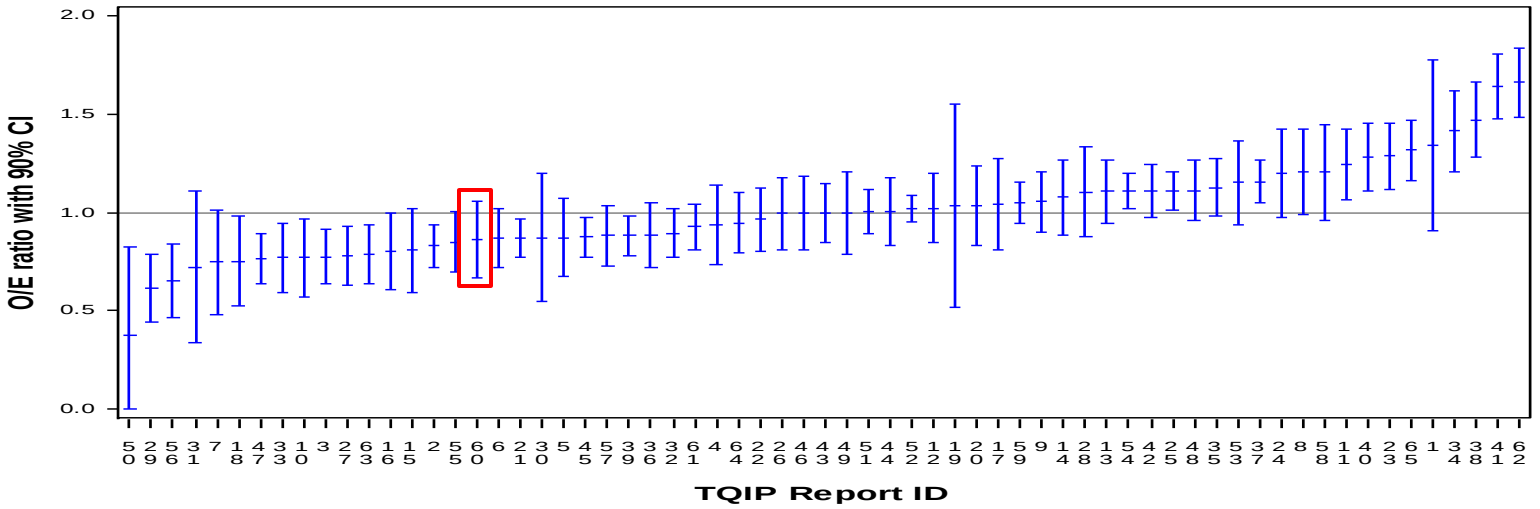
- Need to activate these patients to get system involved
- Need to get trauma service involved early
  - Neurosurgery and medicine were not terribly interested in this population
- Need to do what we can in first 24-48 hours, if after that neuro exam does not improve, then withdrawal can be broached with family

Actions

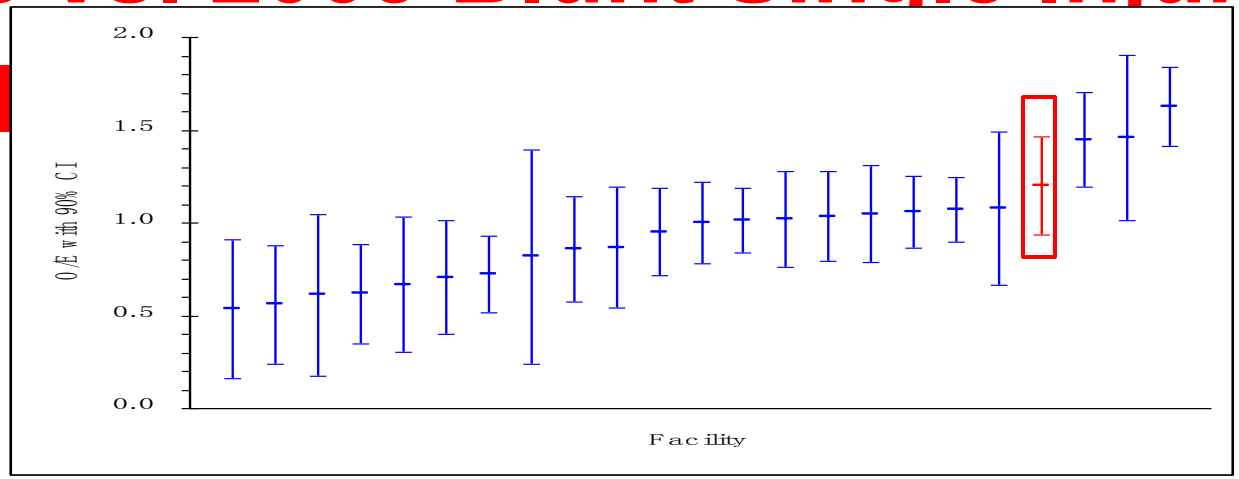
- “Gamma” alert
  - ED response with trauma chief resident
  - Alert moniker insures they will be pushed through radiology
  - Trauma service involved from beginning
  - Includes these patients, and patients with severe mechanism but no physiologic derangement

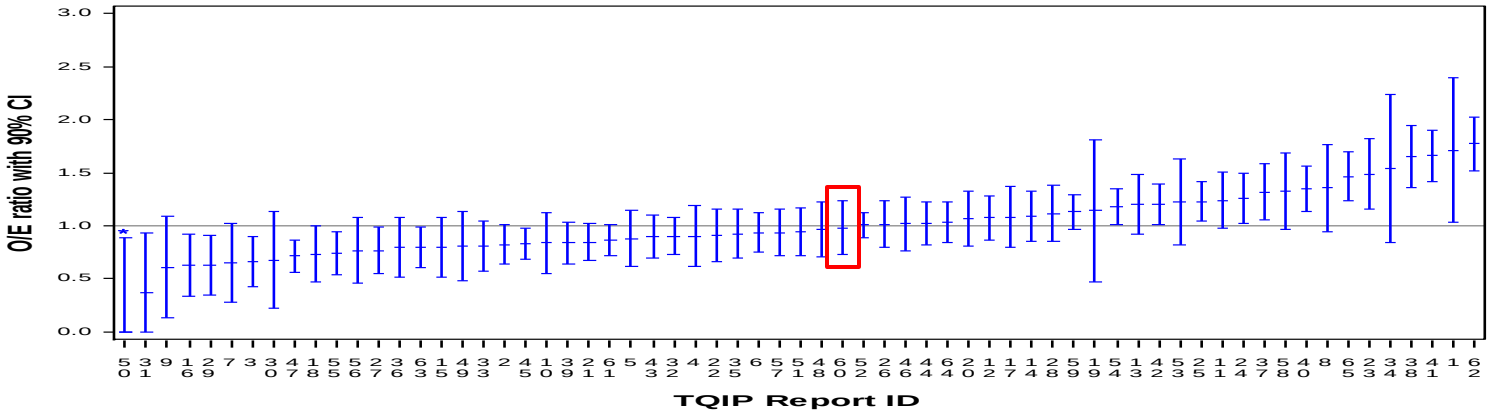
2008 vs. 2009 Overall Mortality



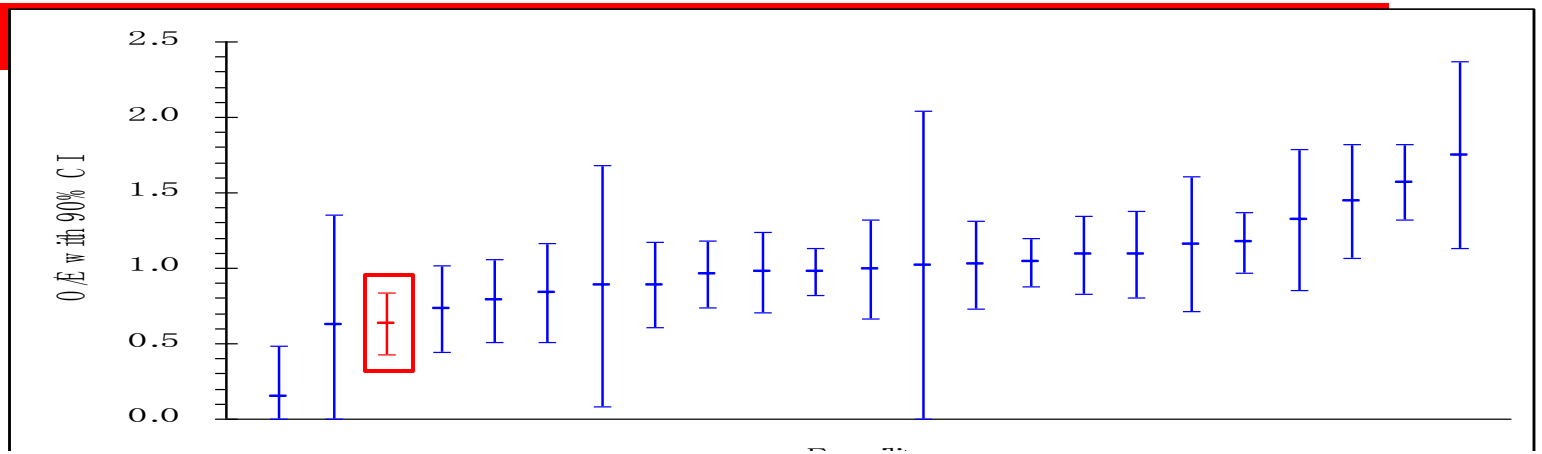


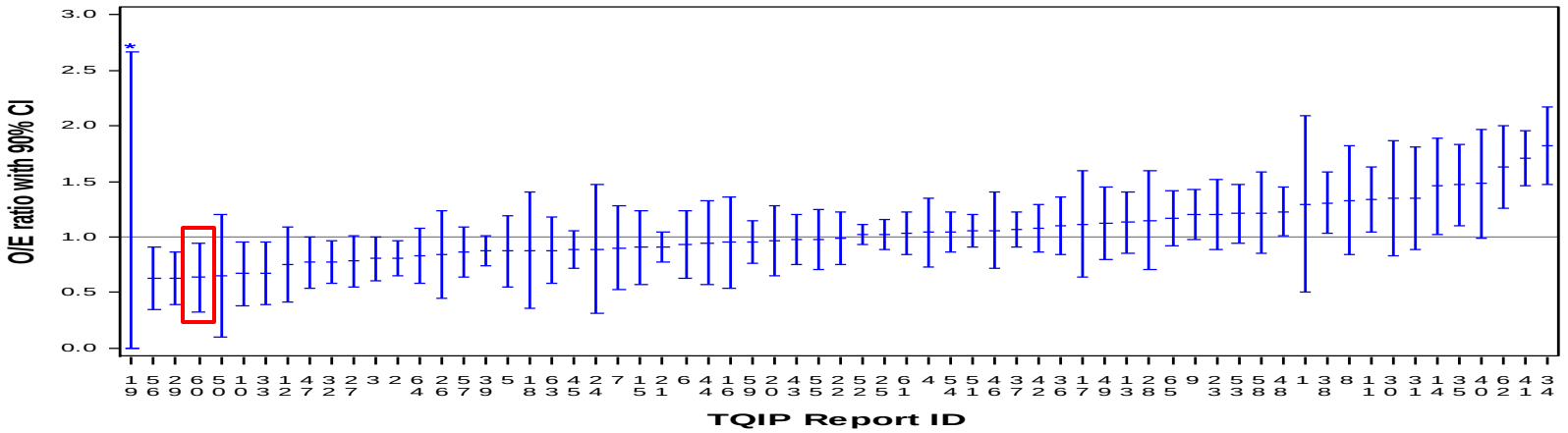
2008 vs. 2009 Blunt Single Injury





2008 vs. 2009 Blunt Multisystem





Moral of the Story

- You cant reliably make positive change without control of the variability in your practice
- Once you've controlled variability, how do you know your are performing at a high level? – Using external benchmarking
  - But even without external benchmarking, you can compare yourself to yourself over time

Moral of the Story

- Once you've identified an opportunity for improvement, you need to understand data well enough to know what factors you need to look at
- Once you've found a problem, and cleared the noise from the signal, you can really begin performance improvement, and know that you've done something that will positively impact outcomes.

External Benchmarking

- Few of these changes would have been possible with only internal examination
  - You just cant know where the state of the art is moving without looking outside
- External benchmarking is essential, once your house is for the most part in order
- These were very interesting PI projects that engaged our entire program

Data Driven Surgical Quality Improvement: Beyond M&M

J.H. Patton
MTQIP
February 8, 2011

What is Surgical QI?

- Quality/Safety/Regulatory
  - Sentinel Events
    - When a sentinel event occurs, the accredited organization is expected to conduct a timely, thorough and credible root cause analysis; develop an action plan designed to implement improvements to reduce risk; implement the improvements; and monitor the effectiveness of those improvements.
  - RCA
    - Root Cause Analysis: A structured process for identifying the causal or contributing factors underlying adverse events, adverse outcomes, or other critical events
  - Creating/Amending Policies & Procedure
    - Match current practice- Joint Commission and CMS hold hospital's accountable for their own policy/procedure
    - New policies/procedures are not always a cure for process improvement it may be as simple as a need for re-education

What is Surgical QI?

- Departmental
  - Surgical M&M
    - Educational sessions
    - More focused on personal rather then system improvement
  - Grand Rounds
    - More education
    - May occasionally be dedicated to Quality Improvement and outcomes data
  - NSQIP

What is Trauma QI?

- Trauma Registry
  - Data, Data analysis?
- Trauma Program Manager
  - Project Management, Planning
- Multi-specialty Peer Review Committee
  - Error Analysis: Deaths, Audit Filters
- Institutional Trauma Committee
  - Change Agent? Communication Mechanism?
- NTDB
  - Benchmarks

Basic Elements of QI

- Data Collection
- Data Analysis
- Error Analysis
- Process Improvement

Basic Elements of QI

	Registries	Peer Review	Quality Improvement
Data Collection	+	-	+
Data Analysis	+/-	-	+
Error Analysis	-	+	+
Process Improvement	-	+/-	+

Basic Elements of QI

	Registries	Peer Review	Quality Improvement
Data Collection	+	-	+ TQIP +
Data Analysis	+/-	-	
Error Analysis	-	+	+ PIPS +
Process Improvement	-	+/-	

Basic Elements of QI

	Registries	Peer Review	Quality Improvement
Data Collection	+	Who	+
Data Analysis	+/-	-	+
Error Analysis	-	+	+
Process Improvement	-	+/-	+

Basic Elements of QI

	Registries	Peer Review	Quality Improvement
Data Collection	+	-	+
Data Analysis	+/-	What	+
Error Analysis	-	+	+
Process Improvement	-	+/-	+

Basic Elements of QI

	Registries	Peer Review	Quality Improvement
Data Collection	+	-	+
Data Analysis	+/-	-	+
Error Analysis	-	Why	+
Process Improvement	-	+/-	+

Basic Elements of QI

	Registries	Peer Review	Quality Improvement
Data Collection	+	-	+
Data Analysis	+/-	-	+
Error Analysis	-	+	+
Process Improvement	-	How	+

QI: Data Collection

- Who are the patients?
  - Registries
    - Chart Abstraction
    - Specific Elements
  - Self Reporting
    - M&M
  - Administrative Data
    - Delayed, Poor Quality

Identification of Surgical Complications and Deaths: An Assessment of the Traditional Surgical Morbidity and Mortality Conference Compared with the American College of Surgeons-National Surgical Quality Improvement Program

Matthew M Hutter, MD, MPH, Katherine S Rowell, MS, MHA, Lynn A Devaney, RN, Suzanne M Sokal, MSPH, Andrew L Warshaw, MD, FACS, William M Abbott, MD, FACS, Richard A Hodin, MD, FACS

Table 1. Postoperative Morbidity and Mortality Rates from the General Surgical Services at the Massachusetts General Hospital (July 1, 2002, to June 30, 2003)

	M&M conference		NSQIP		
	n	%	n	%	p Value
Total major cases	5,905		1,439	24	
Morbidity (% with morbidity)	380	6.4	416	28.9	< 0.0001
Mortality (% with mortality)	53	0.9	28	1.9	0.001

Rates are presented as determined either in traditional morbidity and mortality (M&M) conference, or by a National Surgical Quality Improvement Program (NSQIP) nurse-reviewer.

Identification of Surgical Complications and Deaths: An Assessment of the Traditional Surgical Morbidity and Mortality Conference Compared with the American College of Surgeons-National Surgical Quality Improvement Program

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Table 2. Postoperative Occurrence Rates Stratified by Different Groupings of Complications

Occurrences, complication group	M&M conference (n = 5,905)		NSQIP (n = 1,439)		p Value
	n	%	n	%	
Wound	71	1.2	104	7.2	< 0.0001
Respiratory	58	1.0	120	8.3	< 0.0001
Urinary	34	0.6	70	4.9	< 0.0001
Central nervous system	4	0.1	11	0.8	< 0.0001
Cardiac	32	0.5	24	1.7	< 0.0001
Other	181	3.1	87	6.0	< 0.0001
Total	380	6.4	416	28.9	< 0.0001

Rates are presented as determined either in traditional Morbidity and Mortality (M&M) conference, or by a National Surgical Quality Improvement Program (NSQIP) nurse-reviewer.

QI: Data Analysis

- What is the problem?
  - Standard Reports
  - Ad Hoc Reports
  - Data Tracking (Run Charts)
  - Risk Adjustment
  - Benchmarking

ORIGINAL ARTICLE

Health Care Reform at Trauma Centers—Mortality, Complications, and Length of Stay

Shahid Shafi, MD, MPH, Sunni Barnes, PhD, David Nicewander, PhD, David Ballard, MD, PhD, MSPH, Avery B. Nathens, MD, PhD, Angela M. Ingraham, MD, Mark Hemmila, MD, Sandra Goble, MS, Melanie Neal, MS, Michael Pasquale, MD, John J. Fildes, MD, and Larry M. Gentilello, MD

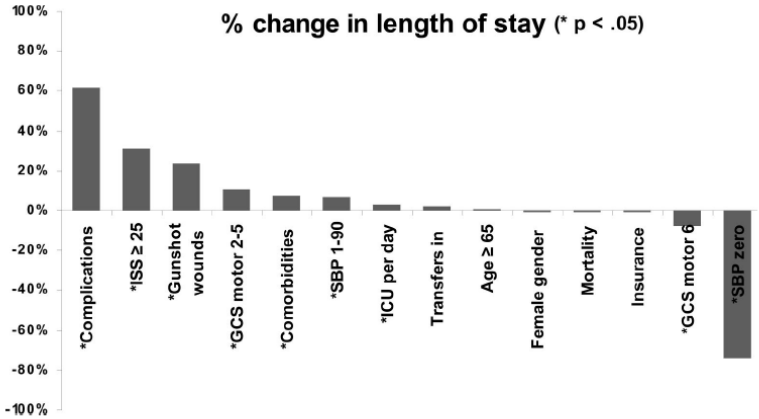

Figure 3. Predictors of length of stay. SBP, systolic blood pressure; ISS, Injury Severity Score; GCS, Glasgow Coma Scale intensive care unit.

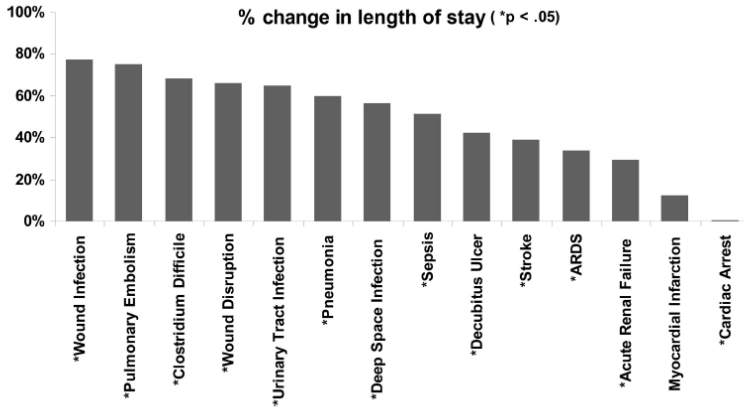

Figure 4. Relative impact of specific complications on LOS. ARDS, acute respiratory distress syndrome.

Detection of adverse events in surgical patients using the Trigger Tool approach

F A Griffin,[1] D C Classen[2]

Table 1 Triggers for Surgical Trigger Tool (initial testing)

T1	Unplanned return to surgery
T2	Unexpected change in procedure
T3	Unplanned intensive care unit admission
T4	Body mass index (BMI) >28
T5	Intubation or reintubation in PACU
T6	Unplanned *x* ray
T7	Transfusion of red blood cells or blood first intraoperative or first 24 h postoperatively
T8	Overnight stay of ambulatory patient
T9	Cardiac/pulmonary arrest
T10	Intraoperative or postoperative death
T11	Mechanical ventilation >24 h
T12	Intraoperative medications
T13	Positive blood culture
T14	Deep vein thrombosis/pulmonary embolism
T15	Increased troponin level
T16	Readmission within 30 days
T17	Change of anaesthesia
T18	Consult in PACU
T19	Complication (any)
T20	Pathology report normal or unrelated to diagnosis
T21	Insertion of central or a-line mid-procedure or in PACU
T22	Intraoperative time >6 h
T23	Unplanned organ removal, injury, repair
T24	Other (for adverse events uncovered that do not "fit" a trigger. Any adverse event can be placed under this "Other" trigger.)

PACU, postanaesthesia care unit.

QI: Error Analysis

- Why is there a problem?
  - Need Standardized Taxonomy and Tracking
  - Provides focus for where to start

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doi:10.1016/j.jss.2008.02.051

ASSOCIATION FOR ACADEMIC SURGERY, 2008

A Report Card System Using Error Profile Analysis and Concurrent Morbidity and Mortality Review: Surgical Outcome Analysis, Part II

Anthony C. Antonacci, M.D., S.M., F.A.C.S.,*,†,‡,§,[1] Steven Lam, B.S., P.A.,‡ Valentina Lavarias, R.N.,‡ Peter Homel, Ph.D.,§ and Roland A. Eavey, M.D., S.M., F.A.C.S.[¶]

*Weill Medical College of Cornell University, New York, New York, †Christ Hospital, Jersey City, New Jersey, ‡Lenox Hill Hospital, New York, New York, §Beth Israel Medical Center, New York, New York, and [1]Pediatric Otolaryngology Service, Department of Otolaryngology, Massachusetts Eye and Ear Infirmary, Department of Otology and Laryngology, Harvard Medial School, Boston, Massachusetts

Submitted for publication January 5, 2008

TABLE 3

Delineation of Error, 2005

	2005			2005	
	Study grp	Deaths		Study grp	Deaths
Diagnosis			Communication/supervision		
Error Dx	53.8%	50.00%	Error communication	100.0%	100.0%
Delay in Dx	7.7%	37.50%	Error signout	0.0%	0.0%
Inappropriate test	0.0%	0.00%	Error consent	0.0%	0.0%
Failure to act on test	23.1%	0.00%	Lack supervision	0.0%	0.0%
Inadequate preop W/U	15.4%	12.50%	Interpersonal conflict	0.0%	0.0%
Judgment			Miscellaneous		
Error judgment	50.0%	42.86%	Equipment failure	25.0%	50.00%
Inappropriate indication	7.1%	28.57%	Inadequate supplies	75.0%	50.00%
Failure prophylaxis	7.1%	0.00%	Near miss	0.0%	0.00%
Failure monitoring	7.1%	0.00%	Medication error	0.0%	0.00%
Failure follow/up	28.6%	28.57%	Inadequate credentials	0.0%	0.00%
Technique					
Error Rx/perfomance	63.0%	100.00%			
Incorrect procedure	7.4%	0.00%			
Inappropriate technique	11.1%	0.00%			
Avoidable delay	11.1%	0.00%			
Omission of care	7.4%	0.00%			

ORIGINAL ARTICLE

Development of an Online Morbidity, Mortality, and Near-Miss Reporting System to Identify Patterns of Adverse Events in Surgical Patients

Karl Y. Bilimoria, MD, MS; Thomas E. Kmiecik, PhD; Debra A. DaRosa, PhD; Amy Halverson, MD; Mark K. Eskandari, MD; Richard H. Bell Jr, MD; Nathaniel J. Soper, MD; Jeffrey D. Wayne, MD

Table 2. Error Grade and Class by Primary Category of Adverse Event

	No. (%)												
	Anesthesia	Biliary	Cardiac	Endocrine	GI	GU	Hematologic	Infectious	Miscellaneous	Neurologic	Pulmonary	Systems	Vascular
Error class													
Error in diagnosis	0	0	3 (3.9)	0	15 (6.9)	2 (6.3)	3 (1.7)	2 (1.3)	1 (3.1)	2 (5.6)	2 (2.3)	4 (17.4)	2 (2.1)
Error in judgment	2 (20.0)	0	9 (11.8)	0	14 (6.5)	6 (18.8)	8 (4.6)	9 (5.6)	4 (12.5)	3 (8.3)	11 (12.5)	2 (8.7)	3 (3.2)
Error in technique	4 (40.0)	8 (88.9)	1 (1.3)	2 (50.0)	90 (41.5)	7 (21.9)	96 (54.9)	48 (30.0)	16 (50.0)	12 (33.3)	23 (26.1)	1 (4.3)	52 (54.7)
Nature of disease	3 (30.0)	1 (11.1)	61 (80.3)	2 (50.0)	98 (45.2)	16 (50.0)	68 (38.9)	100 (62.5)	9 (28.1)	19 (52.8)	50 (56.8)	12 (52.2)	36 (37.9)
Systems error	1 (10.0)	0	2 (2.6)	0	0	1 (3.1)	0	1 (0.6)	2 (6.3)	0	2 (2.3)	4 (17.4)	2 (2.1)
Error grade													
I: Non–life-threatening noninvasive treatment	3 (30.0)	1 (11.1)	7 (9.2)	1 (25.0)	65 (30.0)	18 (56.3)	27 (15.4)	57 (35.6)	10 (31.3)	6 (16.7)	9 (10.2)	3 (13.0)	11 (11.6)
II: Potentially life-threatening noninvasive treatment	1 (10.0)	0	28 (36.8)	2 (50.0)	18 (8.3)	6 (18.8)	18 (10.3)	16 (10.0)	2 (6.3)	15 (41.7)	27 (30.7)	5 (21.7)	11 (11.6)
III: Any complication with invasive treatment	6 (60.0)	7 (77.8)	14 (18.4)	1 (25.0)	124 (57.1)	8 (25.0)	120 (68.6)	75 (46.9)	20 (62.5)	3 (8.3)	37 (42.0)	7 (30.4)	67 (70.5)
IV: Permanent disability	0	0	1 (1.3)	0	1 (0.5)	0	0	0	0	6 (16.7)	0	2 (8.7)	2 (2.1)
V: Death	0	1 (11.1)	26 (34.2)	0	9 (4.1)	0	10 (5.7)	12 (7.5)	0	6 (16.7)	15 (17.0)	6 (26.1)	4 (4.2)

Abbreviations: GI, Gastrointestinal; GU, genitourinary.

Table 3. Error Class According to Error Grade

	No. (%)				
	I: Non–Life-Threatening Noninvasive Treatment	II: Potentially Life-Threatening Noninvasive Treatment	III: Any Complication With Invasive Treatment	IV: Permanent Disability	V: Death
Error in diagnosis	3 (1.4)	4 (2.7)	25 (5.1)	1 (8.3)	3 (3.4)
Error in judgment	13 (6.0)	19 (12.8)	31 (6.3)	1 (8.3)	7 (7.9)
Error in technique	60 (27.5)	39 (26.2)	252 (51.5)	1 (8.3)	8 (9.0)
Nature of disease	138 (63.3)	86 (57.7)	175 (35.8)	8 (66.7)	68 (76.4)
Systems error	4 (1.8)	1 (0.7)	6 (1.2)	1 (8.3)	3 (3.4)

Transforming the Morbidity and Mortality Conference into an Instrument for Systemwide Improvement

Jamie N. Deis, MD; Keegan M. Smith, MD; Michael D. Warren, MD;
Patricia G. Throop, BSN, CPHQ; Gerald B. Hickson, MD; Barbara J. Joers, MHSA, CHE;
Jayant K Deshpande, MD, MPH

Table 3. Factors contributing to adverse outcome

Factor	% Cases
Communication: e.g., inadequate handoffs; incomplete clinical information	64
Coordination of care: e.g., involving multiple services and/or care sites	36
Volume of activity/workload: e.g., increased clinical volume and/or perception of workload	18
Escalation of care: e.g., delay or failure to involve more senior physician or nurse	14
Recognition of change in clinical status: e.g., delay or failure to recognize changing clinical signs and/or symptoms	14

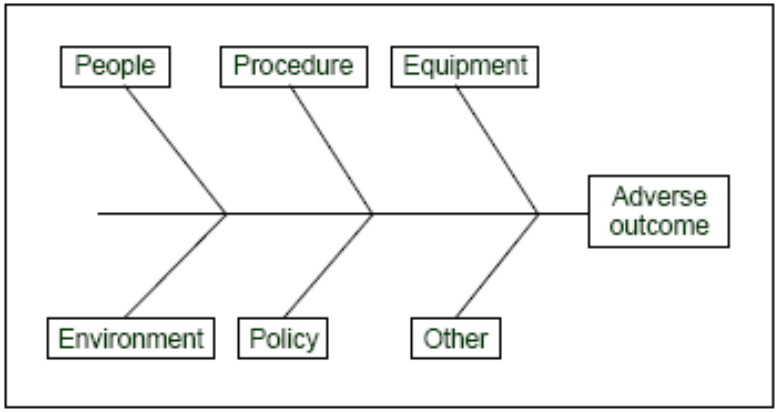


Figure 1. Ichikawa ("fishbone") cause-and-effect diagram.

The Journal of **TRAUMA**® *Injury, Infection, and Critical Care*

Patient Safety in Trauma: Maximal Impact Management Errors at a Level I Trauma Center

Rao R. Ivatury, MD, FACS, Kelly Guilford, BS, RN, Ajai K. Malhotra, MD, FACS, Therese Duane, MD, FACS, Michel Aboutanos, MD, FACS, and Nancy Martin, MS, RN

Table 2 Patient Safety Net Event Taxonomy in Trauma With Maximal Impact (Mortality): Type

Communication	Patient Management	Clinical Performance
Questionable 3	Resuscitation Questionable: 35 (airway 11, breathing 1, circulation 23) Questionable OR/ ICU care: 32 Missed injuries: 9	Questionable: Diagnosis: 11 Treatment: 31 Both: 34

Table 3 Patient Safety Net Event Taxonomy in Trauma With Maximal Impact (Mortality): Domain

Setting	Phase	Staff
Outside hospital: 1	Prehospital: 7	
Prehospital: 6	Initial assessment and resuscitation: 30	EMS: 6
Emergency department: 23	Secondary survey and tests:10	Physicians: 76
Operating room: 11	ICU care: 24	Nursing: 2
PACU: 2	Post ICU phase: 5	
Intensive care unit: 24		
Nursing floor: 5		
Others 4		

Table 4 Patient Safety Net Event Taxonomy in Trauma With Maximal Impact (Mortality): Cause

System	Human
2	Skill based 6 Rule based 65 Both 3

QI: Process Improvement

- How are we going to fix the problem?
  - Loop Closure
    - Counseling
    - Policies
    - Guidelines
    - Forms

QI: Process Improvement

- How are we going to fix the problem?
  - Loop Closure
    - Counseling
    - Policies
    - Guidelines
    - Forms

•Not PI

Patterns of Errors Contributing to Trauma Mortality

Lessons Learned From 2594 Deaths

Russell L. Gruen, MD, PhD, Gregory J. Jurkovich, MD, Lisa K. McIntyre, MD, Hugh M. Foy, MD, and Ronald V. Maier, MD

TABLE 2. Major Patterns of Errors Contributing to Trauma Mortality

Error Patterns	Cases (n)	%
Hemorrhage control		
Delayed control of abdominal/pelvic hemorrhage	10	15.6
Delayed control of intrathoracic hemorrhage	6	9.4
Failure to rewarm and/or correct coagulopathy	2	3.1
Airway management		
Unsuccessful intubation and delayed surgical airway	5	7.8
Failure to secure or protect airway	5	7.8
Management of unstable patients		
Unduly long initial operative procedure in unstable patient	5	7.8
Inappropriate interhospital transfer of unstable patient	2	3.1
Unstable patient sent to CT scanner	2	3.1
Procedures		
Complication of intravascular lines	4	6.3
Complication of feeding tubes	3	4.7
Retained intraoperative foreign body	1	1.6
Prophylaxis		
Inadequate DVT/PE prophylaxis	4	6.3
Inadequate GI ulcer prophylaxis	2	3.1
Inadequate physical restraint	1	1.6
Missed or delayed diagnoses		
Intracranial hemorrhage	2	3.1
Intraabdominal injury	2	3.1
Pericardial tamponade	1	1.6
Septicemia	1	1.6
Hyperkalemia	1	1.6
Other		
Overresuscitation with fluids	3	4.7
Other poor management decisions	2	3.1

A

Error group	1996	1997	1998	1999	2000	2001	2002	2003	2004
Uncontrolled thoracic hemorrhage	●	●●●	●			●			
Interhospital transfer of unstable pt	●●								
Complications of feeding tubes		●	●						●
Retained foreign body in OR				●					

B

Error group	1996	1997	1998	1999	2000	2001	2002	2003	2004
Delayed OR/angio control of hemorrhage		●● ●●	●	●	●●●			●	
Failure to rewarm +/- correct coagulopathy					●	●			
Airway loss during oro-tracheal intubation	●		●	●				●	●
Unprotected airway in vulnerable patient	●●		●			●●			
Lengthy operation in unstable patient		●					●	●	●●
Unstable patient to CT scanner					●				●
Complications of procedures			●			●		●●	
Inadequate VTE prophylaxis	●	●			●			●	
Inadequate GI prophylaxis						●			●
Over-resuscitation with fluid							●●		●

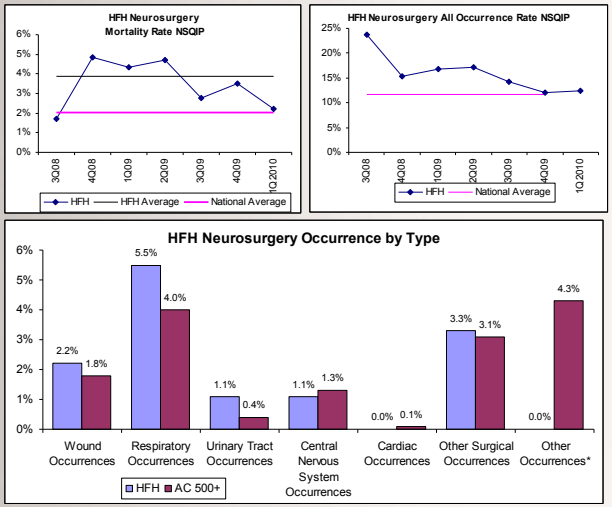
QI Needs Assessment

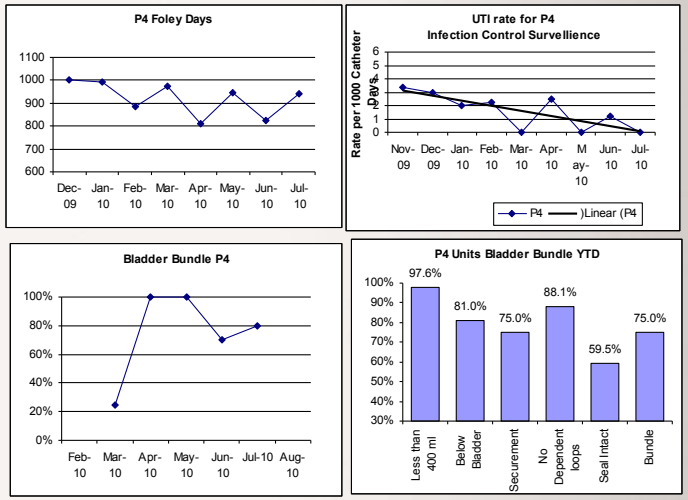
- What we need:
  - Reliable data, Data Analysis (TQIP)
  - Error Analysis, Tracking
  - Data Sharing
  - Strategic Improvement Plan (Change)
  - Multidisciplinary Project Management
  - Communication

Is this your Data?

Organizing Your Data Mess

- First Rule of Data to Monitor Processes
  - Track data over time!
  - If it is not a run chart then ask to see it as a run chart!





Systematic Review of Information

- Outside agency required measures
- Dashboards (regularly updated measures related to key projects and day to day operation)
- Deep dives into topics. Where results are not what are desired take the time to understand process and drivers of the outcomes.
- Listen to Gripes

Three Nolan Questions

- What are you trying to accomplish?
- What ideas do you have that might lead to an improvement?
- How will you know the change is an improvement?

Process

- Deep dive into the data
  - Identify opportunities
- Share the data
  - Explain what it means, where it comes from, why its important
    - Surgical Grand Rounds
      - Quarterly session devoted to Quality Improvement
    - Surgical Services/Anesthesia/ED
      - Promote “team”
    - Hospital Administration
- Identified interested stakeholders/champions
  - Bring everyone to the table
  - Collaborative Process Improvement

Goals of Surgical QI

- Define objectives for a quality plan
- Define stakeholders in surgical quality and their roles
- Apply strategies for engagement, for improvement and for sustaining quality efforts
- Identify best practices

Team goals

- Establish transparency
  - Data dissemination
    - Successes and “opportunities”
- Develop process improvement plan for opportunities
- Increase communication
  - Safety Checklists
  - Meetings, Newsletters

Project Leadership

- Process Design
  - Suggest methods for PI (PDSA, Six Sigma, Lean, Homemade)
  - Identify which method will be used
  - Determine measurable goals
    - Let the team come up with the improvement effort based on your data (even though you know what it should be coach toward your pre-determined goal) this will help to create “buy-in”
  - Identify resources to be utilized
    - External: ACS, IHI, IOM, AHA, NPSF, AORN, ANA etc.
    - Internal resources: quality dept, risk management, nursing councils, education depts, pharmacy, anesthesia quality, data analysts etc.

Project Leadership

- Process Design (Con't)
  - Assign tasks to all team members (homework)
  - Meet often in the beginning of the process to ensure project is progressing
  - Track progress
  - Summarize and provide feedback to the team

Methods to Improve 1

- Understand Your Current Process
  - Apply tools to understand your current process and identify opportunities
    - Flow diagrams, value stream map, define
    - Gemba walk, observation
    - Process measures
  - Develop possible changes and test.
  - Trial on a small scale if possible

Methods to Get Started

- Fix the Issues
  - Start small one project at a time “low hanging fruit” - pilot a project
  - Copy best practice
    - Don’t waste time reinventing the wheel
    - Almost always has to be customized for local issues
  - Find out what works - utilize resources
- Give The Team Faith
  - Emphasize success
  - Communicate results

How to Implement Surgical QI

Pre-work (preparation phase)

- Organize your data in a clear concise fashion
  - Display charts/graphs that are understandable to the audience
  - Present “good” and “not so good data”
- Identify the improvement effort ahead of time

How to Implement Surgical QI

Pre-work (preparation phase)

- Perform a total assessment of your hospital's or health systems resources
  - Clinical performance specialists roles
  - Quality improvement specialists
  - Pharmacy
  - Infection Control
  - Nursing
  - Committees that have approval authority
    - Identify what processes have to go where and who has to sign off on them

How to Implement Surgical QI

Pre-work (preparation phase)

- Identify Stakeholders
  - Who needs to be at the table (leadership, MDs, Admin, Nursing etc)
  - Who is accountable
  - Determine the champion of the project
    - May need more than one

How to Implement Surgical QI

Work Phase

- You need a facilitator
  - Invite the stakeholders to a meeting
    - It is important to have the support of administration
  - Run the meeting with the assistance of the champion of the project
    - Set the agenda have a mission and goal for the initial meeting

How to Implement Surgical QI

Work Phase

- Identify a liaison to multiple departments
  - Dept of Surgery and Sub-specialties, Anesthesia, Nursing, Pharmacy, Quality etc.
  - Break down the silos

Team Building

- Right People
- Right Time
- Responsibility with Authority

Communicate, Communicate and Communicate Some More

- Identify what are we trying to communicate
  - Message- factual, short, concrete and simple for all audiences to achieve a basic understanding of PI
  - Use a variety of methods to communicate
  - Keep everyone on the same page
  - Do not send mixed messages
  - Know your project

Staying Focused in a World of Organized Chaos

- Create a vision
  - Review organizational mission, vision and values to ensure consistency
  - Engage others to validate or modify
  - Publish the vision, post the vision, review the vision regularly
  - Ensure leadership team is on board
  - Share with physician leaders

Staying Focused Continued

- Use the strategic plan to guide your daily work
  - Review regularly to monitor progress
  - Revise - situations change and the strategic plan needs to evolve as the department does
  - Publish and engage frontline staff in accomplishing the goals
  - Document your progress and share the information!
  - Celebrate the accomplishments!

Strategic Improvement: Change

- The Institute for Healthcare Improvement (IHI) uses a simple mantra to describe the essential elements for strategic improvement: Will, Ideas, and Execution.
- You have to have the *will* to improve, you have to have *ideas* about alternatives to the status quo, and then you have to make it real — *execution*.

10 Reasons Execution Fails

- Poor communication
- Impact of change underestimated
- Lack of leadership
- Lack of executive sponsor
- Project management lacking
- Insufficient planning
- Inadequate resources allocated
- Technical knowledge insufficient
- Lack of rationale for need to change
- Consultants not managed closely

Strategies to Success

- Build the case for change
- Secure executive buy-in and support
- Develop a road map
- Communicate the plan (map)
- Empower others to act
- Start small, deliver early and frequently
- Spread and add value
- Monitor / evaluate progress
- Share the story

“…better is not a number, soon is not a time; trying is having granted yourself permission to fail…”