The Michigan Trauma Quality Improvement Program

Mackinac Island, MI
May 18, 2016

M·TQIP

Disclosures

- Salary Support for MTQIP from BCBSM/BCN
  - Mark Hemmila
  - Judy Mikhail
  - Jill Jakubus
  - Anne Cain-Nielsen

Welcome/Introductions

- Guest Speakers
- Henry Ford Macomb
  - Scott Barnes
  - Chris McEachin
- McLaren Lapeer
  - Nick Nunnally
  - Ashley Brown

ACS-TQIP

- ◆ Center Report
  - ▪ Fall 2015
  - ▪ Spring 2016
- ◆ Michigan Report
  - ▪ Spring 2016
- ◆ No Invoices
  - ▪ 2015
  - ▪ 2016

Data Submission

- DI
  - Build done
- CDM
  - Build done
  - BAA
- June Submission
  - 11/1/2014 to 2/29/2016 (minimum)

MTQIP/MANS

- Meeting
  - Friday May 20, 2016 (10a – 4p)
  - Petoskey, Bay Harbor Resort
- Attendees
  - Neurosurgeons
  - TPD, TPM, MCR
- Accommodations
  - Hotel covered on Thurs night
  - Jennifer O'Gorman

Future Meetings

- Spring (Registrars and MCR's)
  - Tuesday June 7, 2016
  - Ann Arbor, NCRC
- Fall
  - Tuesday October 11, 2016
  - Ypsilanti, EMU Marriott
- Winter
  - Tuesday February 14, 2017
  - Ypsilanti, EMU Marriott

BCBSM MTQIP Performance Review
2017 CQI Hospital Performance Index

Judy Mikhail, PhD, MBA, RN

Judy Mikhail
MTQIP Program Manager
Updates
5/18/16

1. BCBSM MTQIP Performance Review
2. 2017 Hospital Performance Index

MTQIP 2015
Performance Evaluation Results

Part I

- Performed q 2 years
- Collected on the October MTQIP Meeting Evaluation
  - Surgeons/TPMs
  - Registrars/MCRs
- 4 Questions
- Response Rate
  - 80/98 (82%)

<u>Likert Scale</u>

- Strongly Agree = 5
- Agree = 4
- Neutral = 3
- Disagree = 2
- Strongly Disagree = 1

#	BCBSM Annual Fall 4 Questions	Average 4 Agree 5 Strongly Agree
1	I find value in MTQIP	4.7
2	Our hospital can only participate in MTQIP CQI with BCBSM financial support	4.5
3	The MTQIP coordinating center is a valued partner	4.7
4	BCBSM/BCN has been a reliable partner in the MTQIP CQI quality effort	4.7
	Total	4.65

MTQIP 2015
Performance Evaluation Results

Part II

- Performed q 2 years in the Fall

- Electronic evaluation sent by BCBSM

- Multiple Questions

- To MTQIP Physicians, TPMs, Registrars

- 2015 Response Rate 51%

MTQIP Evaluation 2015

Staff Scores	2013	2015	Change
Leadership & Guidance	4.3	4.6	0.3
Accessibility	4.5	4.7	0.2
Collaborative Meetings	4.1	4.5	0.4
Individual Working Group Team Meetings	4.2	4.4	0.1
Data Registry	3.9	4.3	0.4
Data Reports	3.8	4.2	0.4
On-Site Data Audits	4.7	4.5	-0.2
Facility Related Questions	3.7	4.3	0.6
BCBSM Related Questions	4.1	4.5	0.4
Overall Average Score Per CQI	**4.1**	**4.4**	**0.3**

Physician Scores	2013	2015	Change
Leadership & Guidance	4.3	4.5	0.2
Collaborative Meetings	4.0	4.2	0.2
Individual Working Group Team Meetings	4.3	4.3	0.0
Data Reports	3.9	4.1	0.2
Facility Related Questions	3.9	4.3	0.4
Overall Average Score Changes Per CQI	**4.1**	**4.31**	**0.21**

How to Leave a
Rating & Review
on
iTunes

★★★★★ Amazing
★★★★· Great
★★★·· Good
★★··· Above average
★···· Horrible
····· Average

Next
MTQIP
Eval
2017

Measure Selection

2017 PERFORMANCE INDEX

Michigan Trauma Quality Improvement Program (MTQIP)					
2017 Performance Index January 1, 2017 to December 31, 2017					
Measure	**Weight**	**Measure Description**			**Points**
#1	10	**Data Submission (Partial/Incomplete Submissions No Points)**			
		On time and complete 3 of 3 times			10
		On time and complete 2 of 3 times			5
		On time and complete 1 of 3 times			0
#2	20	**Meeting Participation-Surgeon**			
		Participated in 3 of 3 meetings			15
		Participated in 2 of 3 meetings			10
		Participated in 1 of 3 meetings			5
		Participated in 0 of 3 meetings			0
#3	15	**Meeting Participation-Clinical Reviewer or Program Manager**			10
		Participated in 3 of 3 meetings			8
		Participated in 2 of 3 meetings			5
		Participated in 1 of 3 meetings			0
		Participated in 0 of 3 meetings			
#4	5	**Meeting Participation-Registrars (All Registrars Preferred)**			
		At least 1 Registrar participated in the annual Registrar specific meeting			5
		Did not participate			0
#5	10	**Data Accuracy**	**First Validation Visit Error Rate**	**Two or >Validation Visits Error Rate**	
		5 Star Validation	0-4.5%	0-4.5%	10
		4 Star Validation	4.6-5.5%	4.6-5.5%	8
		3 Star Validation	5.6-8.0%	5.6-7.0%	5
		2 Star Validation	8.1-9.0%	7.1-8.0%	3
		1 Star Validation	>9.0%	>8.0%	0
#6	10	**Site Specific Quality Improvement Project**			
		Developed and implemented with a minimum of _?_% improvement			10
		Developed and implemented with no evidence of improvement			5
		Not developed or implemented			0
#7	10	**Weighted Mean (Red Blood Cell : Plasma Ratio) of Patients Transfused >5 Units In 1st 4 Hrs (18 mo Data)**			0-10
		10 pts: Tier 1: < 1.5			
		10 pts: Tier 2: 1.6-2.0			
		5 pts: Tier 3: 2.1-2.5			
		0 pts: Tier 4: >2.5			
#8	10	**Venous Thromboembolism (VTE) Prophylaxis Initiated Within 48 Hrs of Arrival. Trauma Service Admissions >2 day LOS (18 mo data)**			
		>50%			10
		>40%			5
		<40%			0
#9	10				10
#10	10	**Inferior Vena Cava Filter Use (Collaborative Initiative)**			
		<1.5			10
		>1.5			0
				Total (Max Points) =	100

PARTICIPATION (40%)

PERFORMANCE (60%)

Michigan Trauma Quality Improvement Program (MTQIP)
2017 Performance Index
January 1, 2017 to December 31, 2017

Measure	Weight	Measure Description	Points	
#1	10	**Data Submission (Partial/Incomplete Submissions No Points)**		PARTICIPATION (40%)
		On time and complete 3 of 3 times	10	
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#2	20	**Meeting Participation-Surgeon**		
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		At least 1 Registrar participated in the annual Registrar specific meeting	5	
		Did not participate	0	

		Data Accuracy	First Validation Visit Error Rate	Two or > Validation Visits Error Rate		
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		2 Star Validation	8.1-9.0%	7.1-8.0%	3	
		1 Star Validation	>9.0%	>8.0%	0	
#6	10	**Site Specific Quality Improvement Project**				
		Developed and implemented with a minimum of _?_% improvement			10	
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#7	10	**Weighted Mean (Red Blood Cell : Plasma Ratio) Patients Transfused >5 U 1st 4 Hrs (18 mo data)**			0-10	**PERFORMANCE (60%)**
		10 pts: Tier 1: < 1.5				
		10 pts: Tier 2: 1.6-2.0				
		5 pts: Tier 3: 2.1-2.5				
		0 pts: Tier 4: >2.5				
#8	10	**Venous Thromboembolism (VTE) Prophylaxis Initiated Within 48 Hrs of Arrival in Trauma Service Admissions with >2 day Length of Stay (18 Months Data)**				
		>50%			10	
		>40%			5	
		<40%			0	
#9	10				10	
#10	10	**Inferior Vena Cava Filter Use (Collaborative Initiative)**				
		<1.5			10	
		>1.5			0	
				Total (Max Points) =	100	

Accuracy of Data

Site Specific QI Project

Trauma Center (y-axis)

Trauma Center	Points
8	10
3	10
11	10
18	10
2	10
24	10
16	10
14	10
6	10
15	10
7	10
12	10
5	10
13	10
25	10
26	10
22	10
17	10
23	10
10	10
27	10
4	10
9	5
1	5
21	5
19	5
20	5

Points (x-axis)
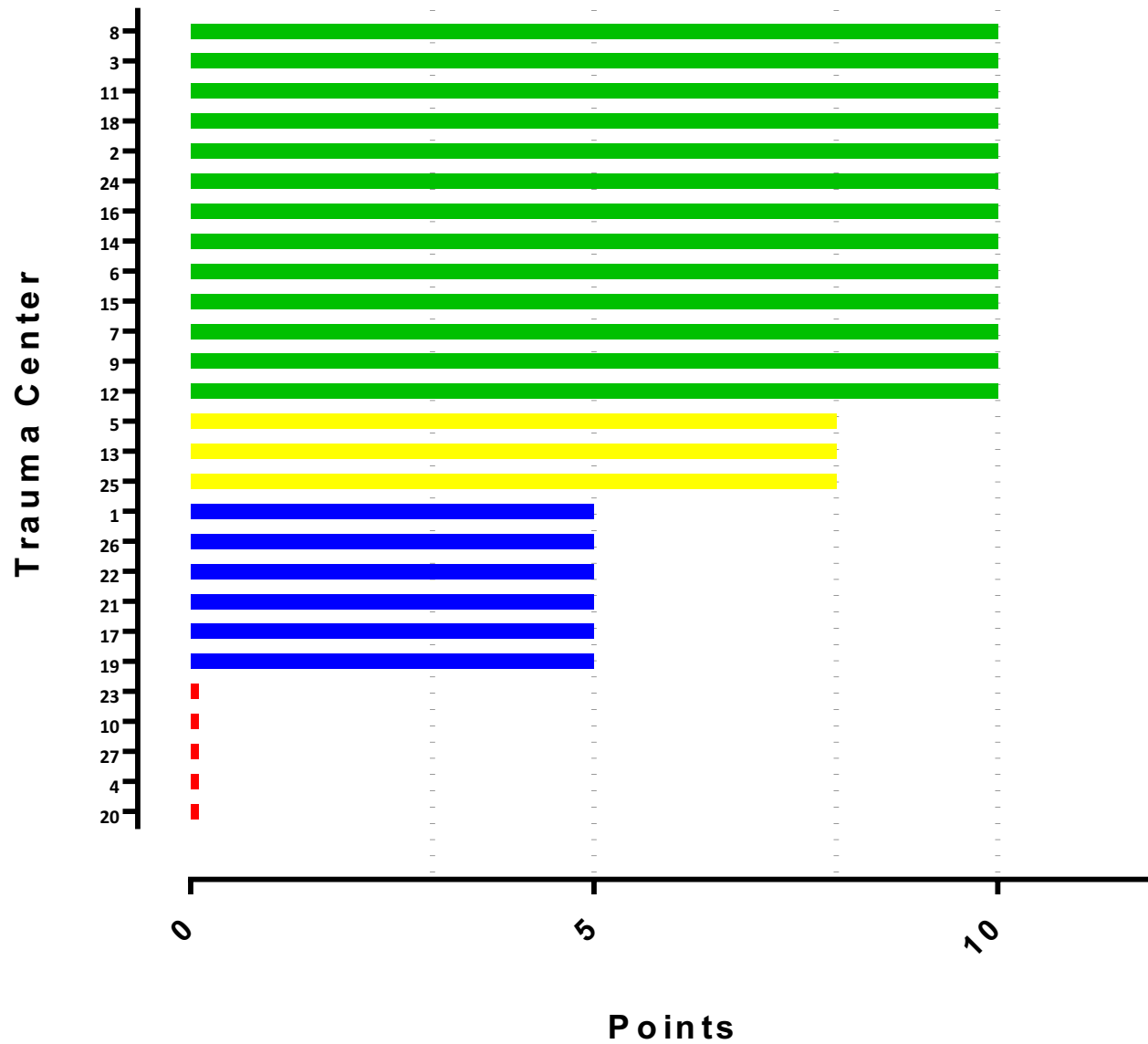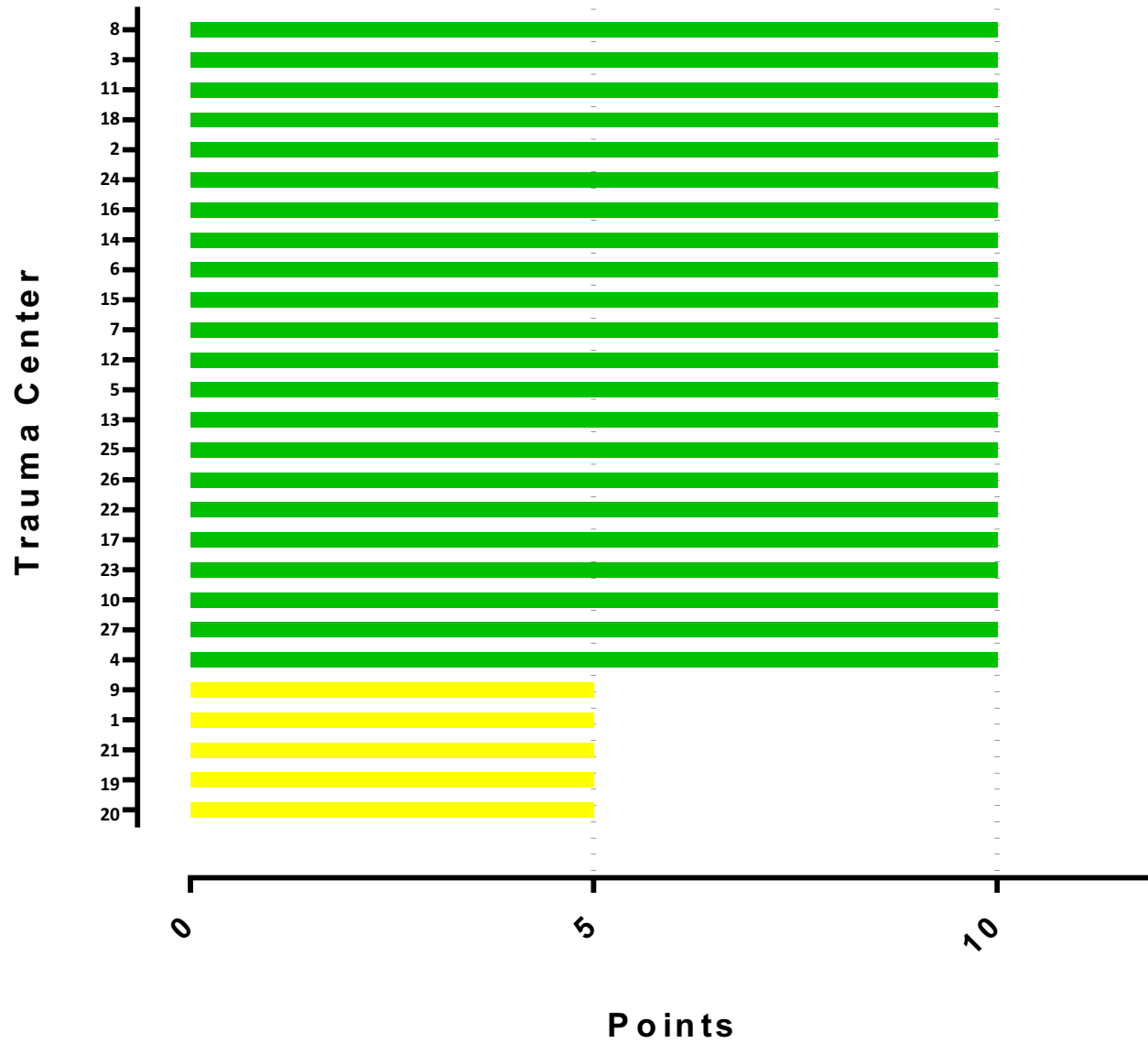
PRBC to Plasma Ratio
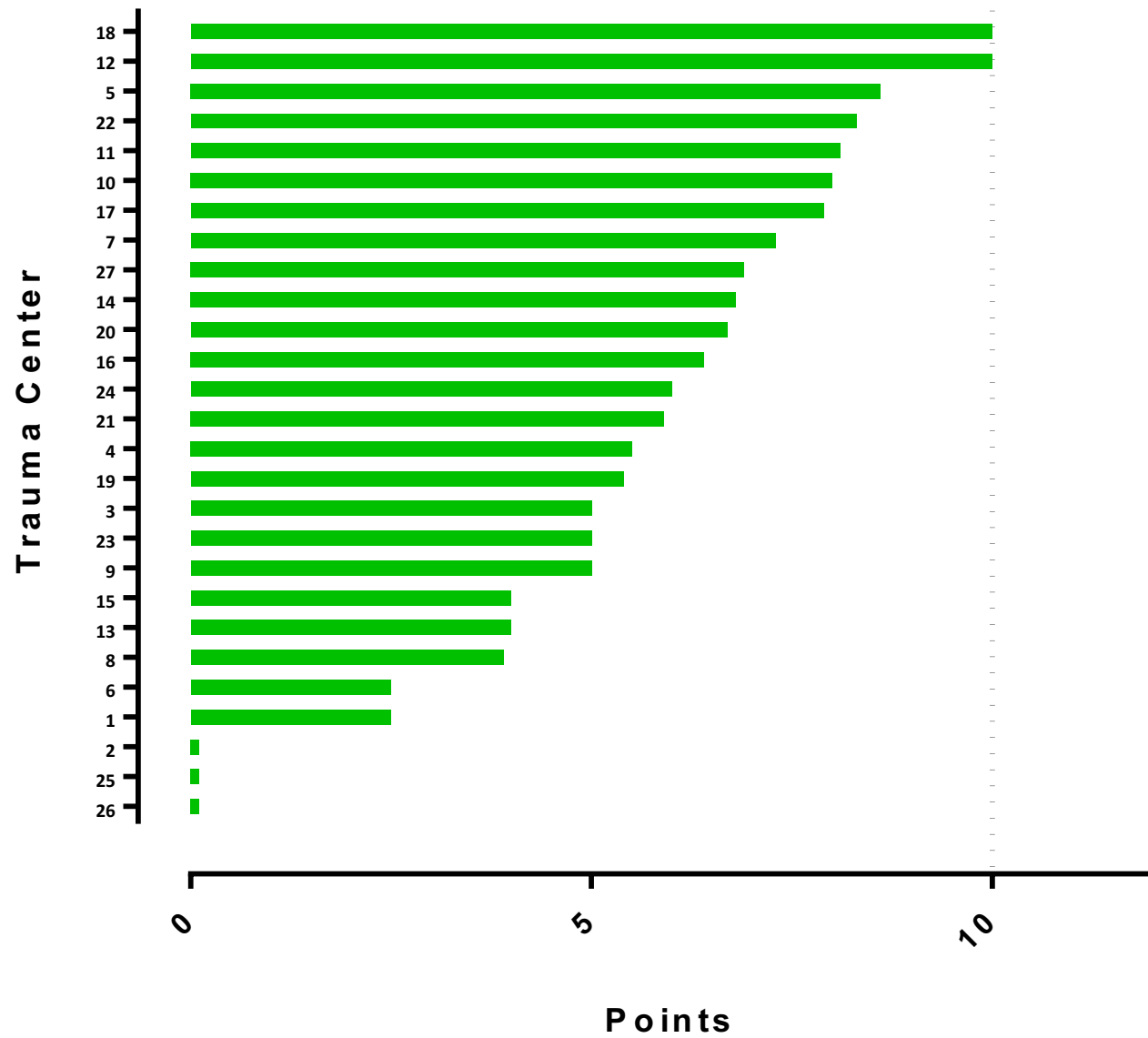
Timely VTE Prophylaxis
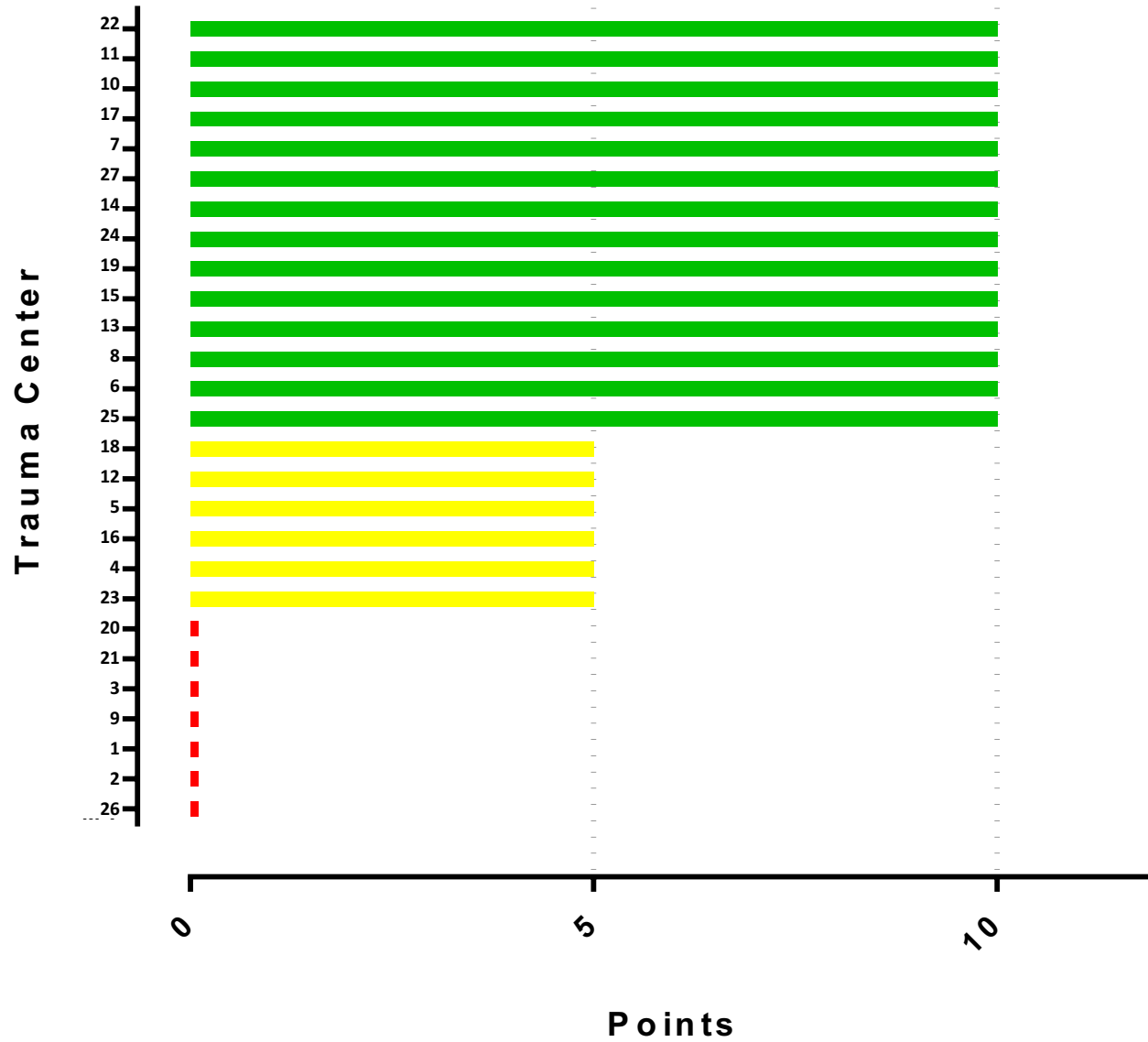
2015 CQI Score
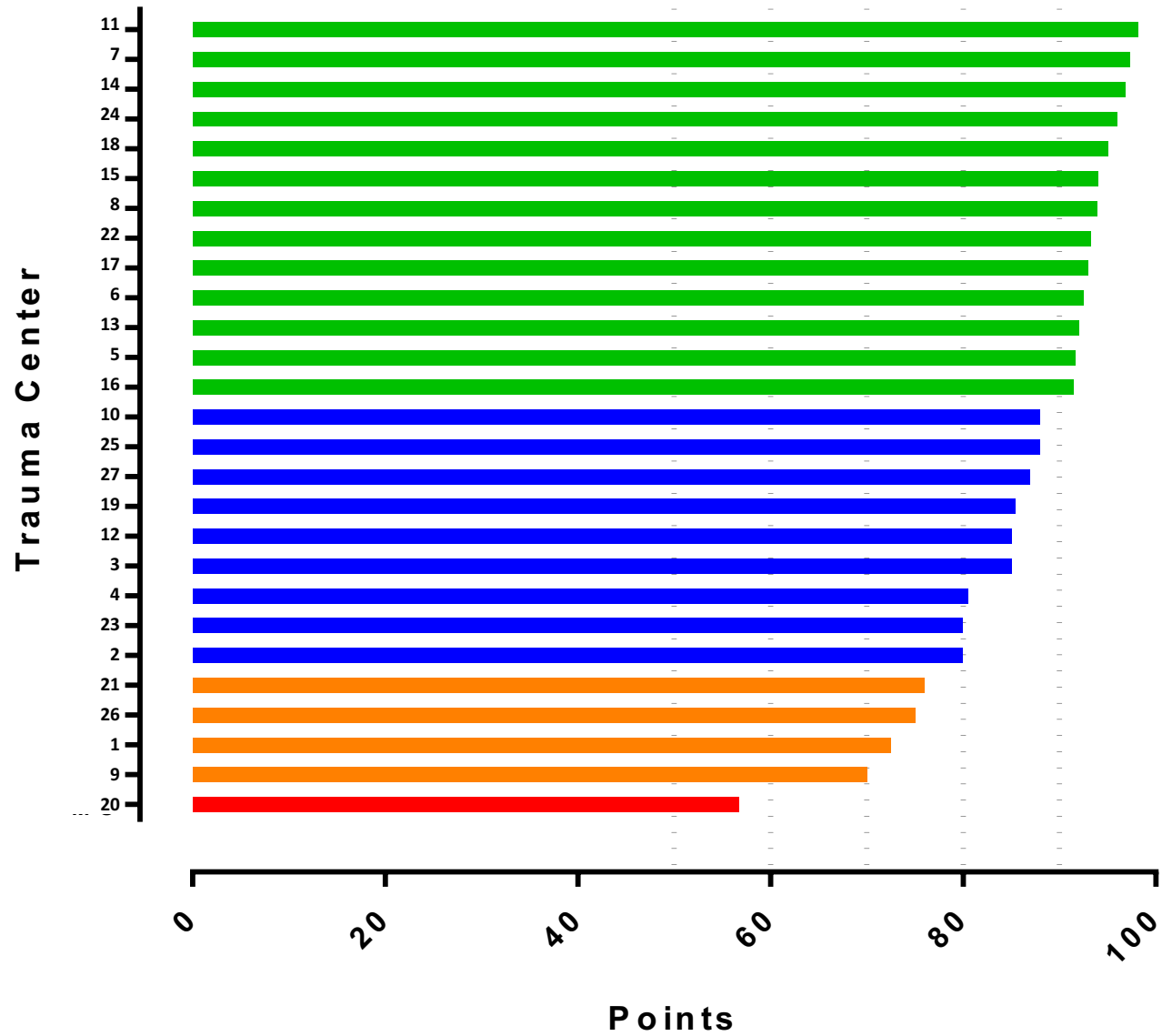
Advisory Ideas

- Adjust
  - Validation
  - VTE Prophylaxis Timing
- VTE Type LMWH
- Complication Z-score
- Repeat Head CT
- Time to reversal anticoagulated TBI
- Type reversal anticoagulated TBI

QI Topics

Judy Mikhail, PhD, MBA, RN

Unplanned Intubation

Henry Ford Macomb Hospital

TMD: Scott Barnes, D.O.

TPM: Christine McEachin, R.N.

MCR: Michelle Schwarb, R.N.

The Problem/The Barriers

- Consistently high-outlier
- Initial adjusted baseline: X.X% when 2015 site-specific project began
- Understanding of definition & appropriate use
- Physician buy-in
- Where were we failing the patient?
  - ED, ICU, PACU?

Actions Taken

- Utilized ArborMetrix to review 14 cases
  - 24-month time period, cohort: all, ISS: all
- Initial review: 2 cases did not meet definition
- Several pts with multiple comorbid factors
  - (oldest pt population, per TQIP reports)
  - Most unplanned intubation (UI) were elderly hip fx cases
- Identified opportunities for improvement in 4 of these 14 cases

Case reviews

- One case reviewed internally; three taken to Trauma M&M:

Outcomes (Results)

- X.XX% as of January 2016 results
- Improvement likely multi-factorial:
  - Education of Trauma residents & attendings
  - Discussion at PIPS for multidisciplinary review
  - Potential age-related changes

Sustaining The Change

- Continue "UI" as our site-specific project for 2016
- Already noticing an up-tick
  - X.XX% with 1st quarter 2016 data

- TPM distributed Q2 2016 internal CME
  - Post-op UI article

Future Directions

- Goal for 2016 project: X.X%
- TPM & MCR to review cases
- Develop abstraction tool
- Identify opportunities for improvement & commonalities
  - Age/comorbid factors
  - Pt location
  - Fluid management
  - Narcotic use

The Problem

Alarms

Actions

Immediate Action

- Unplanned Intubation Task Force
  - Anesthesia
  - Critical Care Intensivist
  - Nurse Educator
  - Respiratory Services

- Case Review
  - Patterns
  - Co-Morbidities

- Relentless discussion
  - Trauma Meetings
  - Department Specific Meetings
  - Identification of high risk patients

McLaren

Barriers

Lack of Brutal Honesty

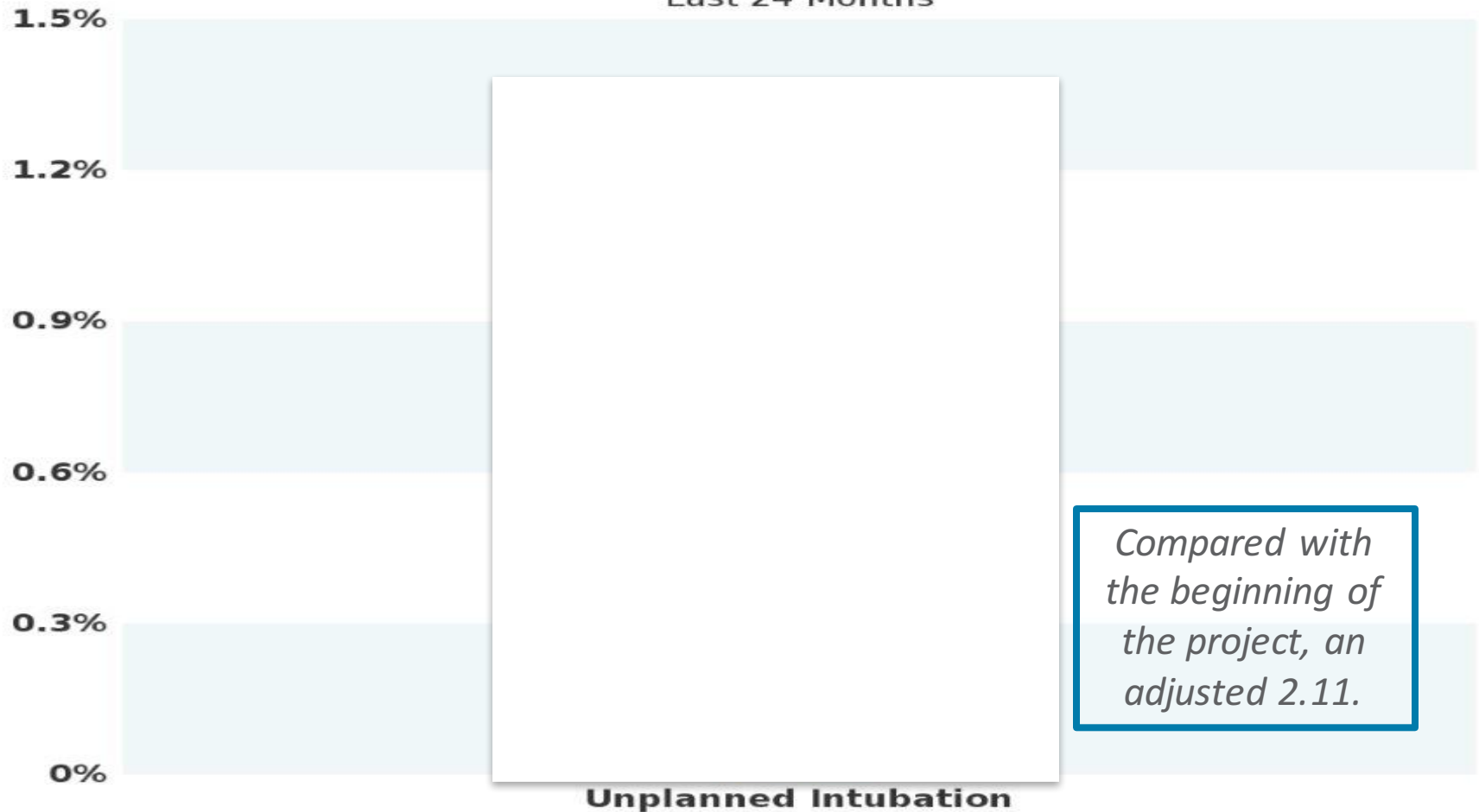- Hard to admit we had a problem,

- We had excuses

- Not agreeing with the definition

McLaren

Advantages

Failure is not an option

- Small institution

- Highly engaged Administration

- Employed physicians

McLaren

The Outcome

Complications Drill-Down - Unplanned Intubation
Last 24 Months

1.5%

1.2%

0.9%

0.6%

0.3%

0%

Unplanned Intubation

Compared with the beginning of the project, an adjusted 2.11.

McLaren

The Outcome

Complications Drill-Down - Unplanned Intubation
Last 24 Months

4%

3.2%

2.4%

1.6%

0.8%

0%

LEGEND　McLaren Lapeer Regional Medical Center　MTQIP - All　Other Hospitals　— MTQIP - All　95% Confidence Interval

McLaren

Results that Last

Hardwiring these behaviors

- Open door policy with all staff.
  - Encourage them to share observations about what they are seeing in real-time on the front lines.

- Keep discussing it.
  - Don't let it become another flavor of the month.

- Continue to report progress.
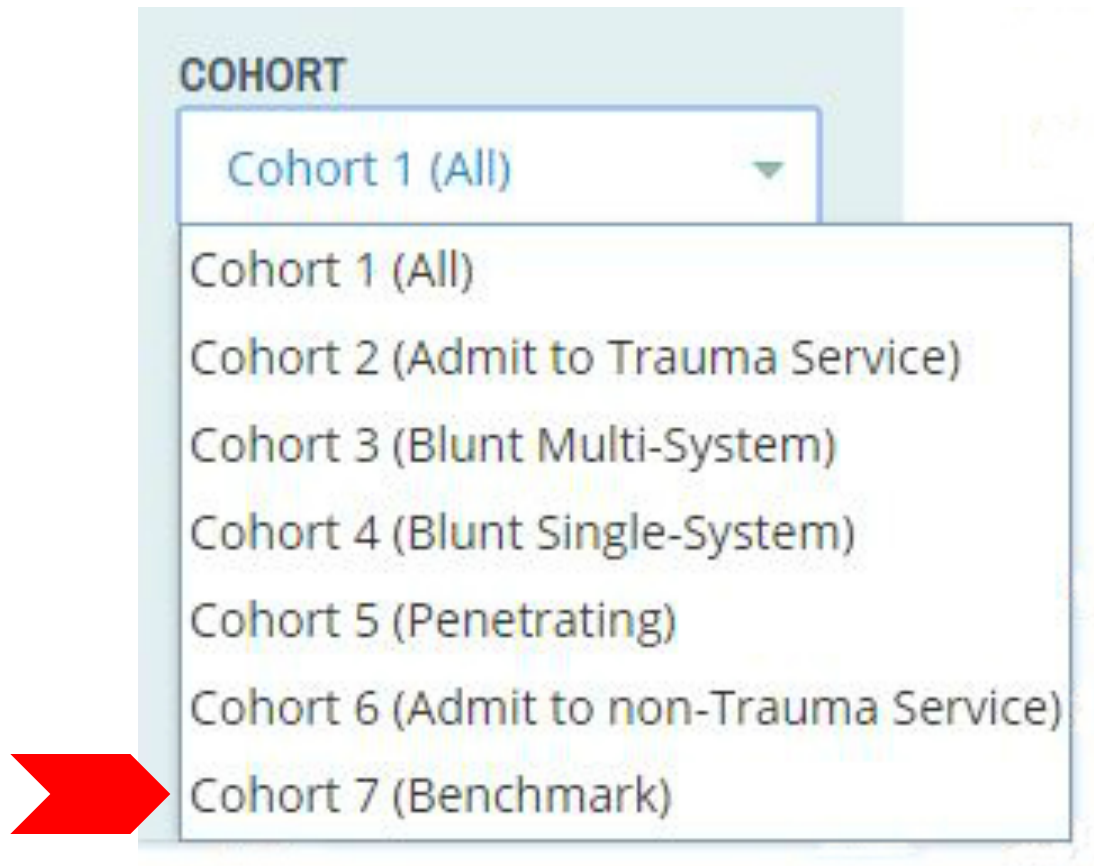
McLaren

Lessons Learned

Define

Discuss

Don't be Discouraged

McLaren

Analytics
Resources
Validation Modeling
Centralized Data Submission
Mortality Log

Jill Jakubus, PA-C

# Analytics – Cohort 7 (Benchmark Filter)

Available Now

Analytics – Cohort 7 (Benchmark Filter)

- Age $\geq$ 16
- ISS $\geq$ 9
- Exclude if DOA
- Exclude if transferred out
- Exclude if discharged directly from ED alive
- Exclude if has advanced directive limiting care
- Exclude if hip fx and fall and age $\geq$ 65

- Will not match ACS-TQIP exactly
  - MTQIP AIS 2005
  - ACS-TQIP ICD9 → AIS 1998

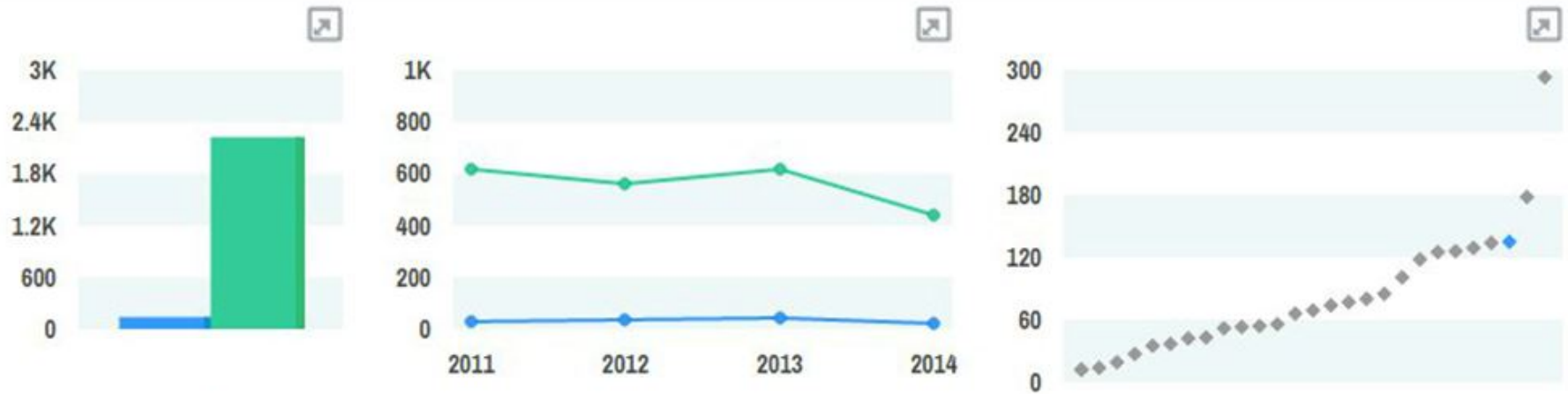*Available Now*

Analytics – VTE Performance Metric

Kaplan Meier
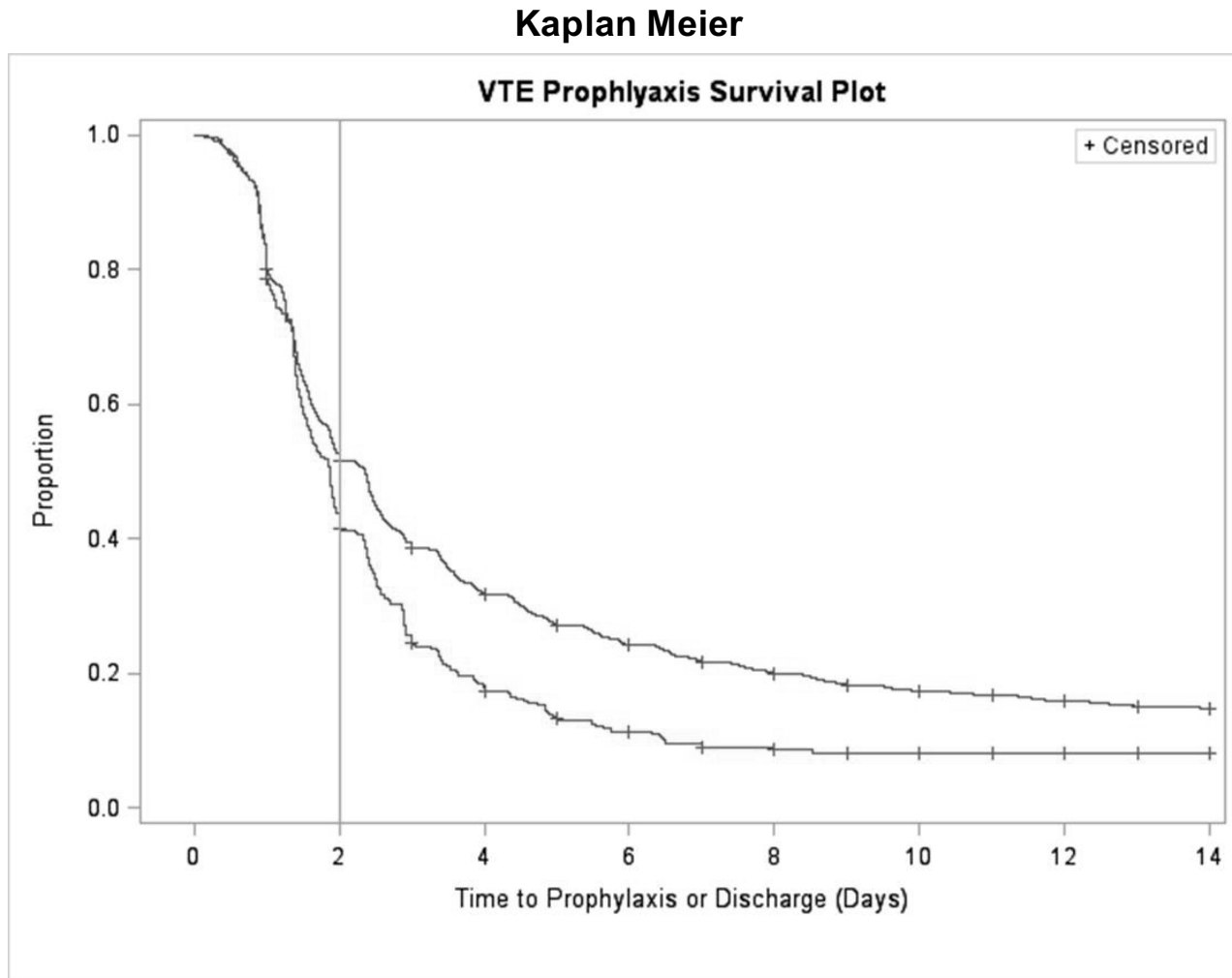
Retired

Analytics – VTE Metric

VTE Prophylaxis at 48 Hours	Cases Numerator	Cases Demoninator	X Hospital - Unadj	MTQIP All - Unadj	P Value - Unadj
Heparin, LMWH ≤ 48 Hours	N	N	%	%	
Heparin, LMWH > 48 Hours	N	N	%	%	
Coumadin, Xa, DTI, Other ≤ 48 Hours	N	N	%	%	
Coumadin, Xa, DTI, Other > 48 Hours	N	N	%	%	
No VTE Prophylaxis	N	N	%	%	
Missing Time	N	N	%	%	

Coming Soon

Analytics – VTE Metric

VTE Prophylaxis at 48 Hours
Heparin, LMWH $\leq$ 48 Hours
Heparin, LMWH > 48 Hours
Coumadin, Xa, DTI, Other $\leq$ 48 Hours
Coumadin, Xa, DTI, Other > 48 Hours
No VTE Prophylaxis
Missing Time

Coming Soon

Analytics – VTE Metric

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No VTE Prophylaxis
Missing Time

Coming Soon

Analytics – VTE Metric

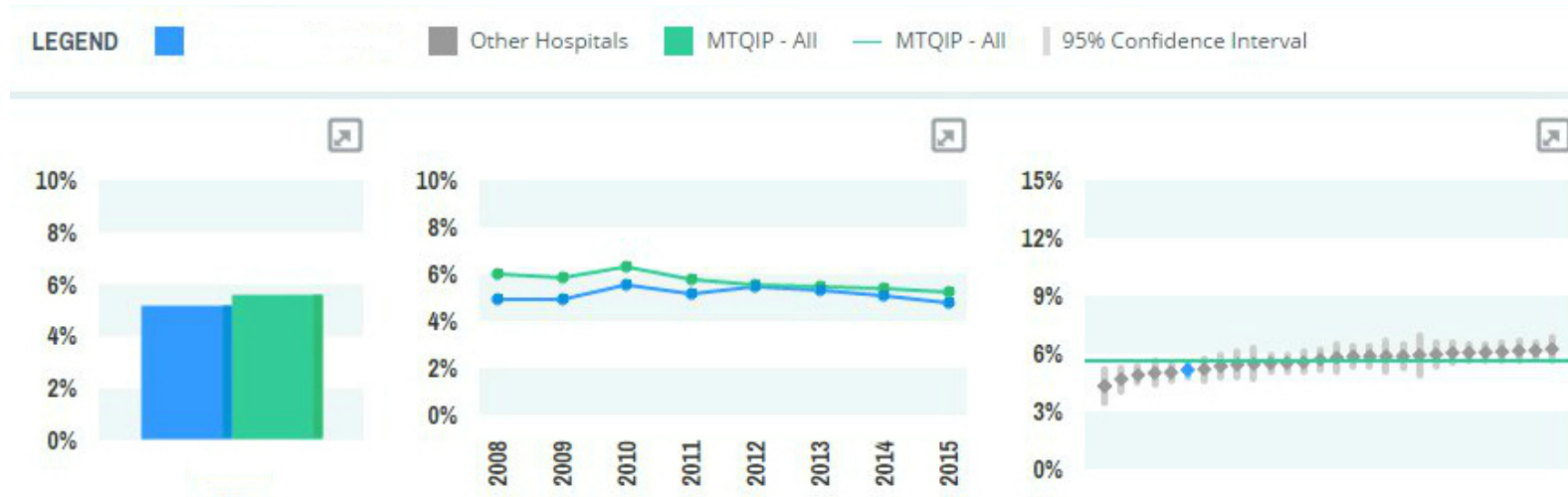| VTE Prophylaxis at 48 Hours |
| --- |
| Heparin, LMWH $\leq$ 48 Hours |
| Heparin, LMWH > 48 Hours |
| Coumadin, Xa, DTI, Other $\leq$ 48 Hours |
| Coumadin, Xa, DTI, Other > 48 Hours |
| No VTE Prophylaxis |
| Missing Time |

Coming Soon

Analytics – VTE Metric

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Heparin, LMWH > 48 Hours
Coumadin, Xa, DTI, Other $\leq$ 48 Hours
Coumadin, Xa, DTI, Other > 48 Hours
No VTE Prophylaxis
Missing Time

Coming Soon

Analytics – Performance Index

Performance Index	Result	Center Points	Max Points	MTQIP Ave Points
Total	-	100	100	100
Data Submission (n)	3	10	10	10
Meeting Participation - Surgeon (n)	3	20	20	20

Coming Soon

Analytics – Performance Index

Performance Index	Result	Center Points	Max Points	MTQIP Ave Points
Total	-	100	100	100
Data Submission (n)	3	10	10	10
Meeting Participation - Surgeon (n)	3	20	20	20
Meeting Participation - MCR or PM (n)	3	15	15	15
Meeting Participation - Registrar (n)	1	5	5	5
Data Validation (%)	1.3	10	10	10
Site Specific Quality Initiative	-	10	10	10
Ratio PRBC:FFP	-	10	10	10
VTE Prophylaxis <= 48 hrs (%)	75	10	10	10
IVC Filter Use (%)	1.2	10	10	10

Coming Soon

Resources – Filter Index

Resources > Data Resources > Cohort Formation ◀

Filter Index

ID	Graph	Menu	Sub-Menu	Cohort	Dead
1	Mortality (Cohort 1 - all)	Mortality Drill-Down	Dead	1	No Filter
2	Mortality (Cohort 1 - all w/o DOA)	Mortality Drill-Down	Dead	1	No Filter
3	Mortality (Cohort 2 - admit trauma)	Mortality Drill-Down	Dead	2	No Filter
4	Mortality (Cohort 2 - admit trauma w/o DOA)	Mortality Drill-Down	Dead	2	No Filter
5	Mortality (Cohort 3 - blunt multi w/o DOA)	Mortality Drill-Down	Dead	3	No Filter
6	Mortality (Cohort 4 - blunt single w/o DOA)	Mortality Drill-Down	Dead	4	No Filter
8	Mortality or hospice (Cohort 1 w/o DOA)	Mortality Drill-Down	Dead or Hospice	1	No Filter
9	Mortality (Cohort 5 - penetrating)	Mortality Drill-Down	Dead	5	No Filter
10	Mortality (Cohort 5 - penetrating w/o DOA)	Mortality Drill-Down	Dead	5	No Filter

Available Now

Resources – Filter Index

Resources > Data Resources > Cohort Formation

Filter Index

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3	Mortality (Cohort 2 - admit trauma)	Mortality Drill-Down	Dead	2	No Filter
4	Mortality (Cohort 2 - admit trauma w/o DOA)	Mortality Drill-Down	Dead	2	No Filter
5	Mortality (Cohort 3 - blunt multi w/o DOA)	Mortality Drill-Down	Dead	3	No Filter
6	Mortality (Cohort 4 - blunt single w/o DOA)	Mortality Drill-Down	Dead	4	No Filter
8	Mortality or hospice (Cohort 1 w/o DOA)	Mortality Drill-Down	Dead or Hospice	1	No Filter
9	Mortality (Cohort 5 - penetrating)	Mortality Drill-Down	Dead	5	No Filter
10	Mortality (Cohort 5 - penetrating w/o DOA)	Mortality Drill-Down	Dead	5	No Filter

Available Now

Resources - PI Library

Resources > Slides > Modules ◀

Media	Type	Search		
PDF ▾	QI/PI ▾		Apply	Reset

Date ▾	Topic	Presenter	Type	Media
10/13/15	ED Resuscitation	Maxson	QI/PI	📁
02/10/15	Triage	Janczyk	QI/PI	📁
02/10/15	Triage Ground Level Falls	Rohs	QI/PI	📁
02/10/15	Triage	Davidson	QI/PI	📁
02/11/14	LOS	Wagner	QI/PI	📁

Available Now

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02/10/15	Triage	Davidson	QI/PI	🗁
02/11/14	LOS	Wagner	QI/PI	🗁

Available Now

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02/10/15	Triage	Davidson	QI/PI	📁
02/11/14	LOS	Wagner	QI/PI	📁

Available Now

Validation Modeling

Validation Modeling

M•TQIP

Mean case error rate by visit and year
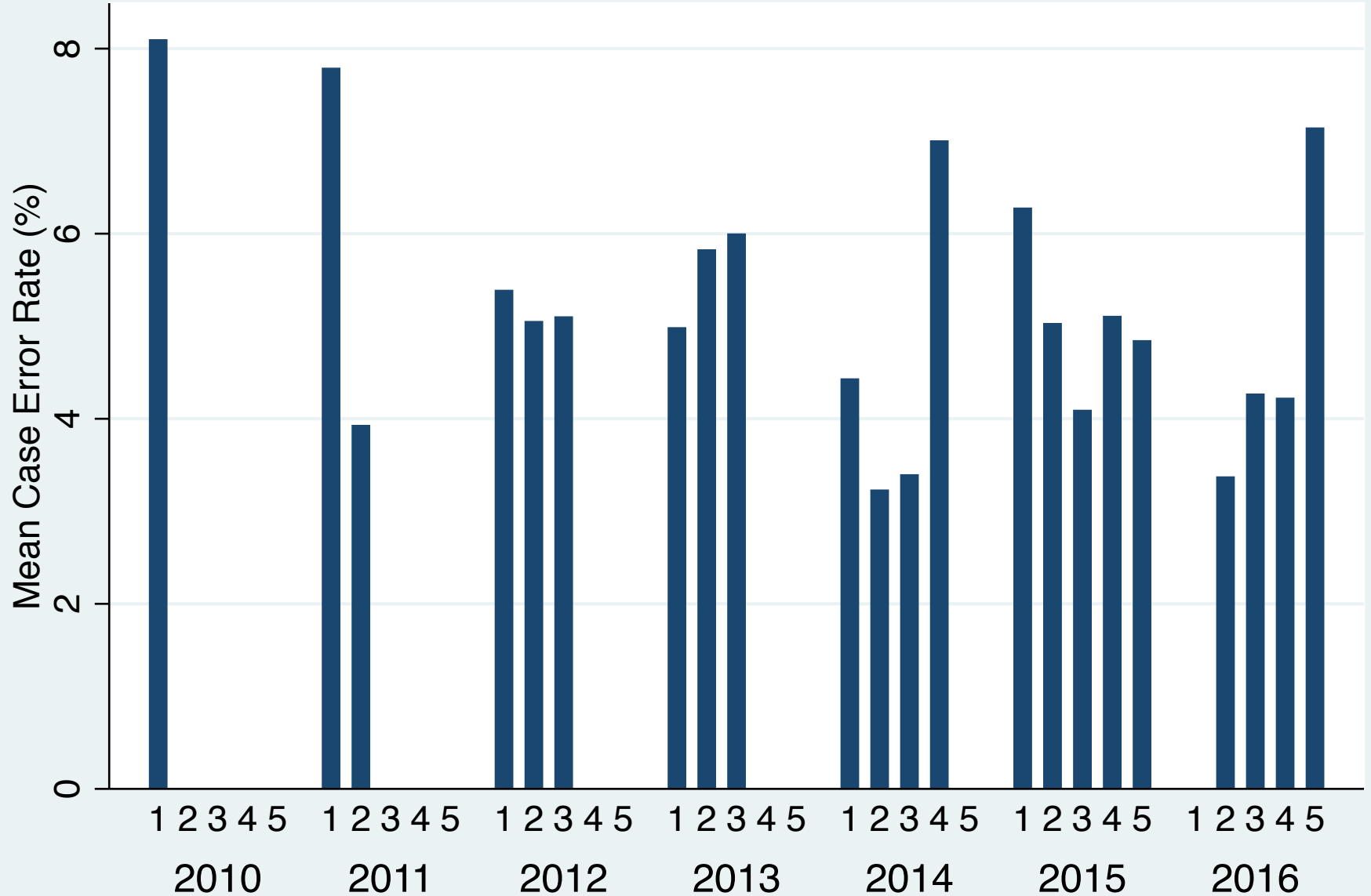
Box Plot of Validation Error Type by Center Numeric ID
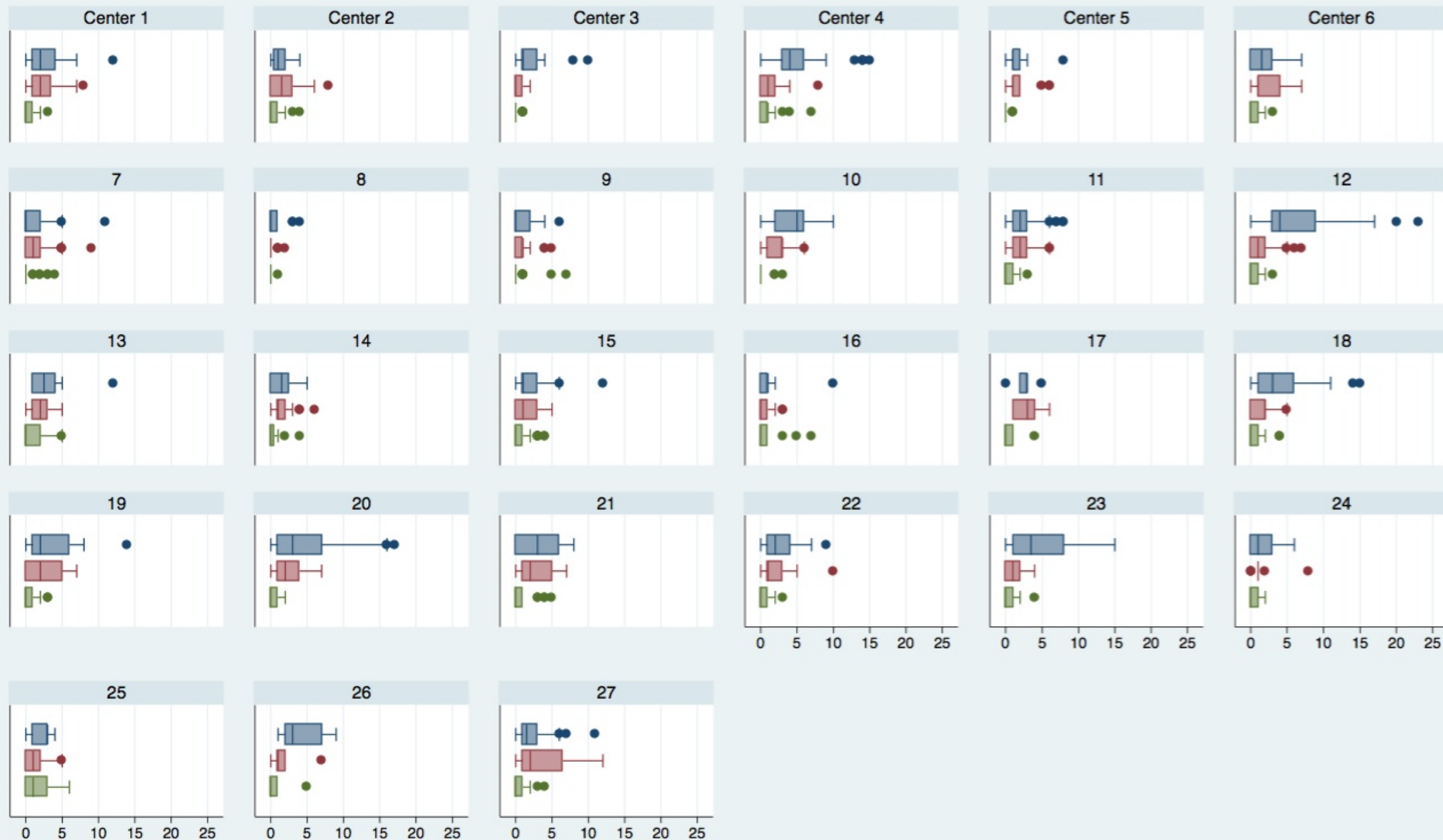
Type 1 Error - Under Capture
Type 2 Error - Inconsistent Capture
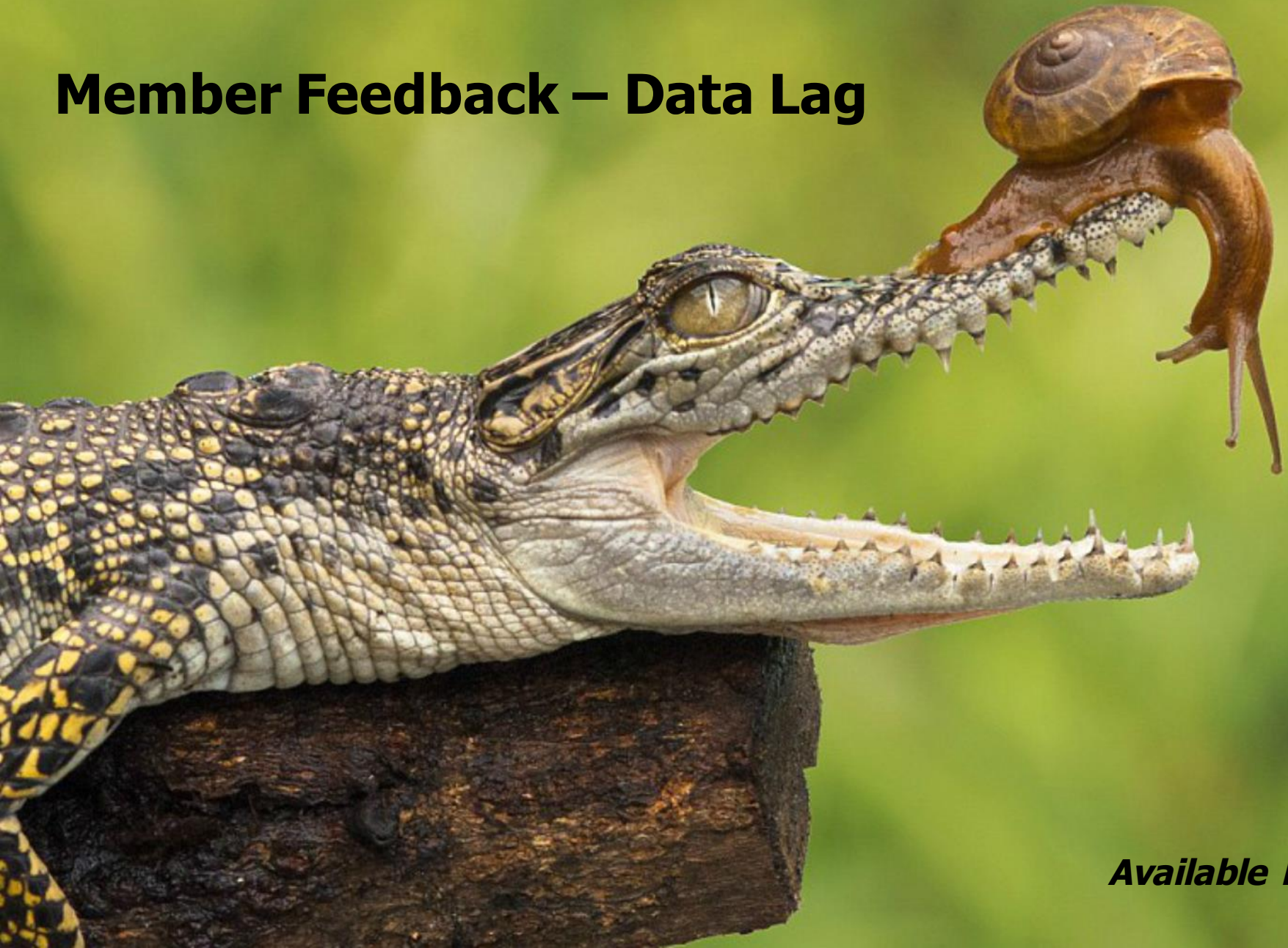Type 3 Error - Over Capture

Centralized Data Submission
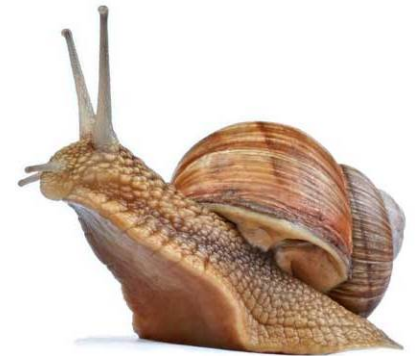
Member Feedback – Data Lag

Available Now

Centralized Data Submission

Member Feedback – Data Lag
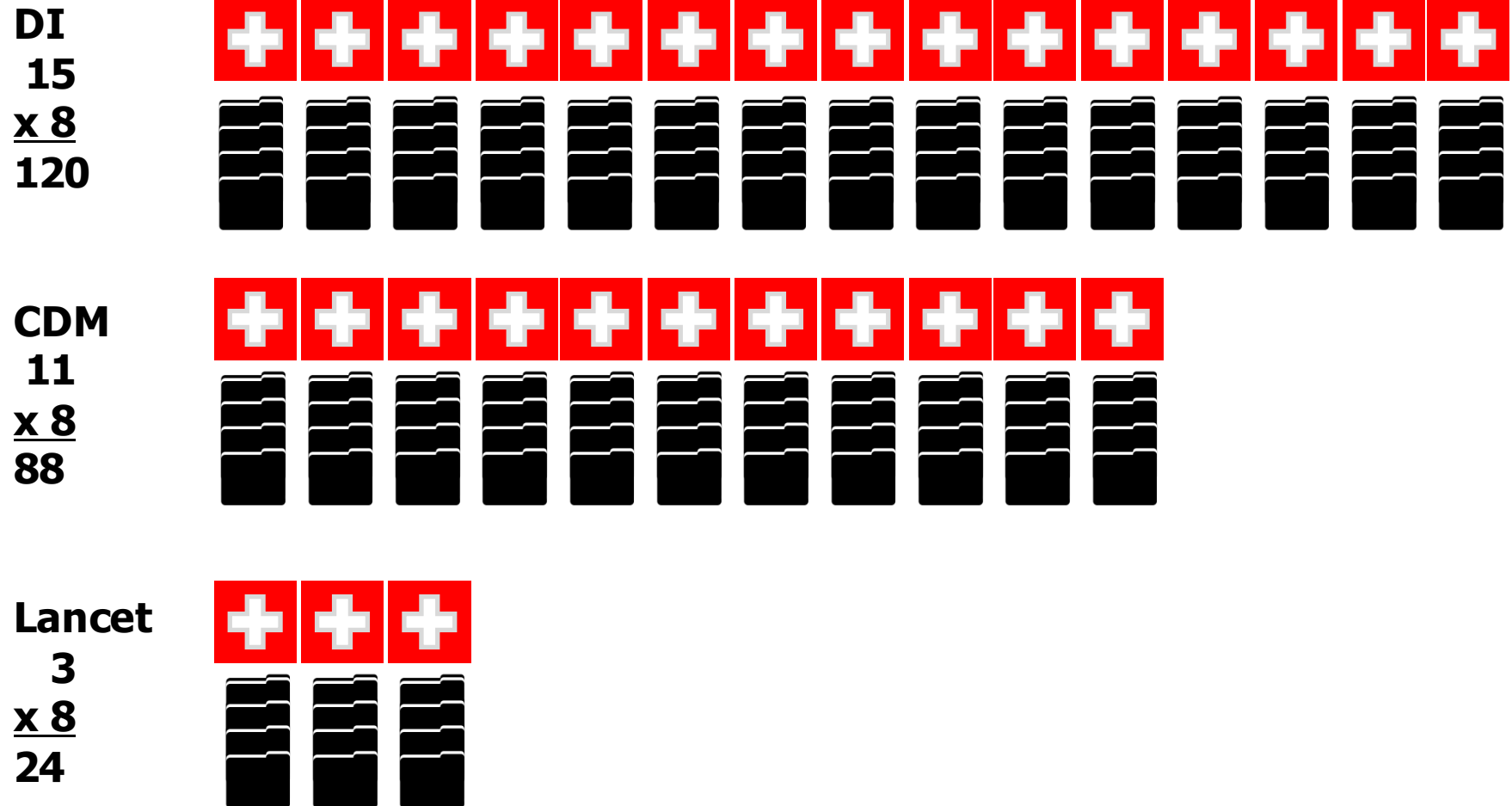
Available Now

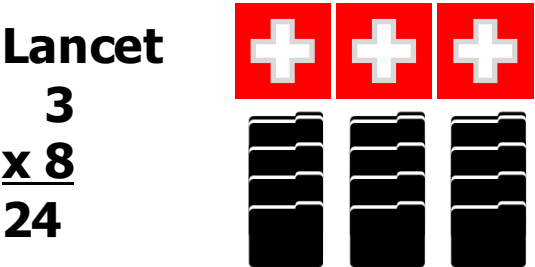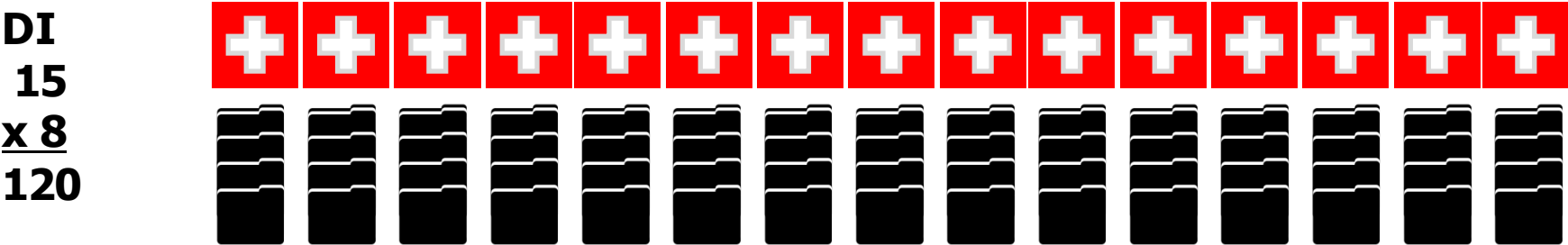# Centralized Data Submission

DI 15

CDM 11

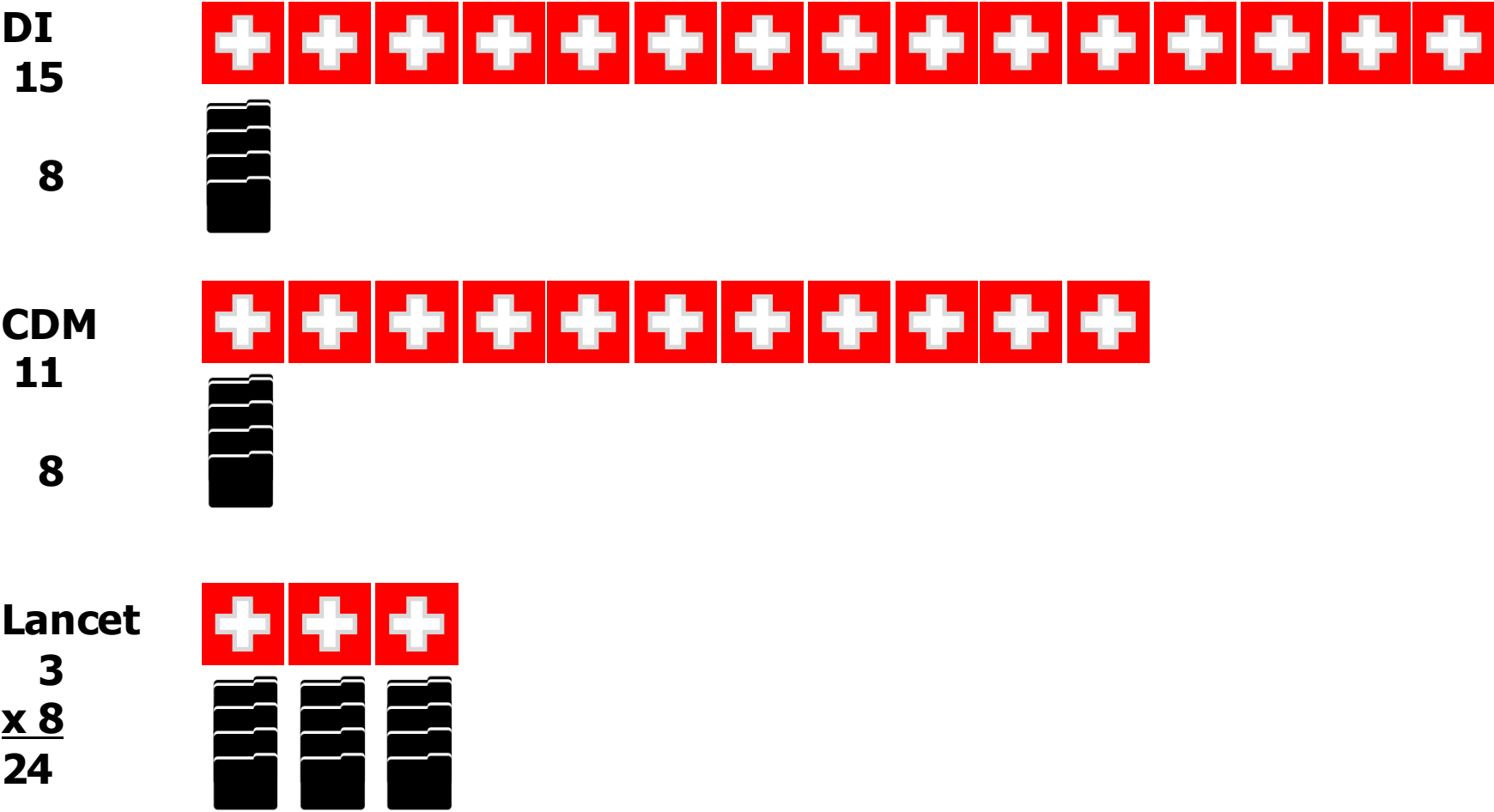**Lancet 3**

Available Now

Centralized Data Submission

DI
15
x 8
120

CDM
11
x 8
88

Lancet
3
x 8
24

Available Now

Centralized Data Submission

**DI
15
x 8
120**

**CDM
11
x 8
88**

**Lancet
3
x 8
24**

**Total
232 Files**

Available Now

Centralized Data Submission

DI 15

8

CDM 11

8

Lancet 3

x 8

24

Total 40 Files

Available Now

Centralized Data Submission - CDM

Training

Vendor Contact

Video

Online User Guide

Implementation

BAA

Online Download

Process

Run Export

CDM Aggregates

Box Download

Available Now

Centralized Data Submission - DI

Training

Webinar

User Guide

Implementation

Download Patch

Link to Server

Process

Run iSend

Data Set to MTQIP Server

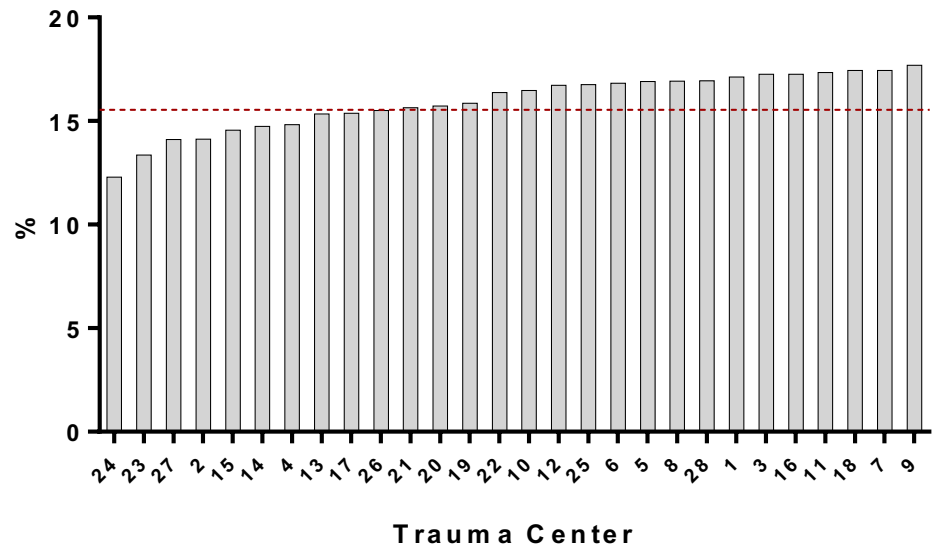***Available Now***

Mortality Log Submission

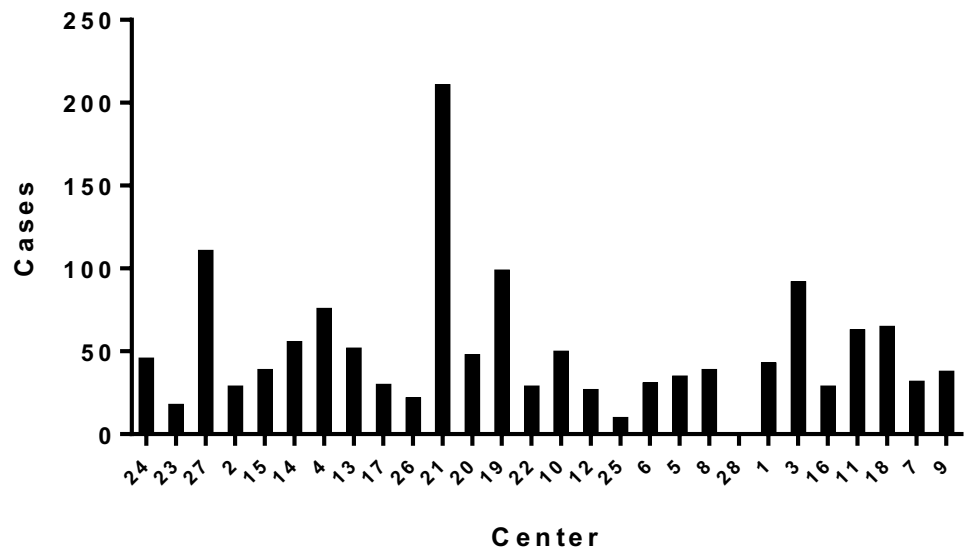# Power and Reliability
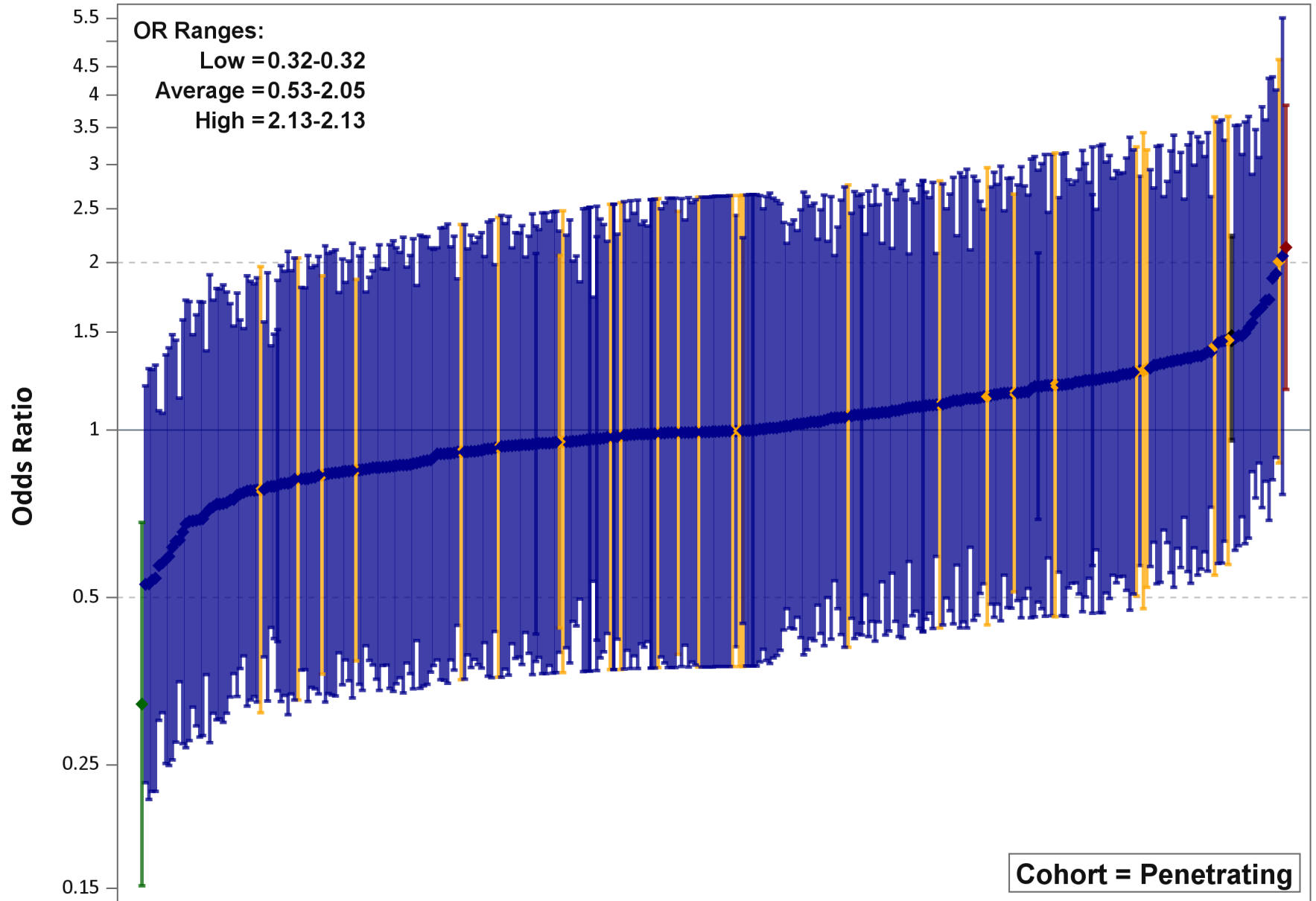
Mark Hemmila, MD
Anne Cain-Nielsen, MS
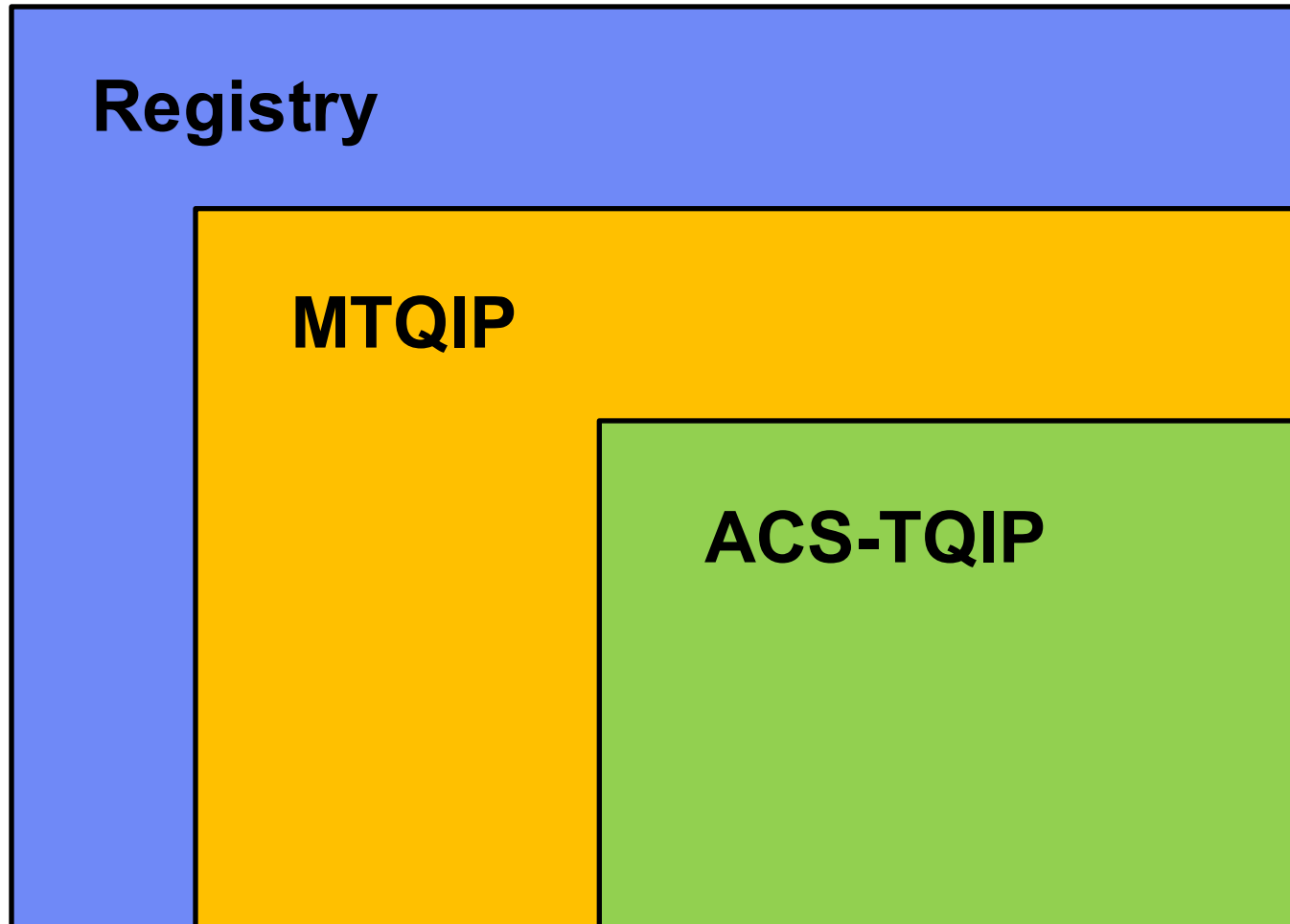
Mortality (Cohort 3 - Blunt Multi w/o DOA's)

Case Volume Mortality (Cohort 3)

Odds Ratios (95% Confidence Intervals) by TQIP Hospital; Mortality

OR Ranges:
Low = 0.32-0.32
Average = 0.53-2.05
High = 2.13-2.13

Odds Ratio

Cohort = Penetrating

Statistical Power

The power of any test of statistical significance is defined as the probability that it will reject a false null hypothesis. **Statistical power** is inversely related to beta or the probability of making a Type II error. In short, power = $1 - \beta$.

Statistical Power

Or

The **power** or sensitivity of a binary hypothesis test is the probability that the test correctly rejects the null hypothesis (H_0) when the alternative hypothesis (H_1) is true. It can be equivalently thought of as the probability of accepting the alternative hypothesis (H_1) when it is true—that is, the ability of a test to detect an effect, if the effect actually exists.

Statistical Power
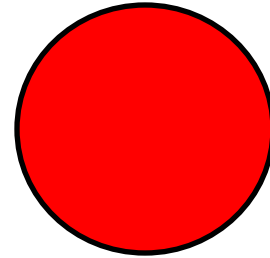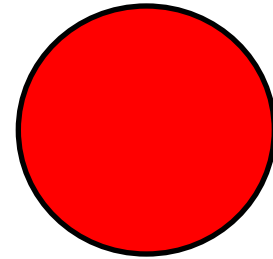
In plain English, statistical power is the likelihood that a study will detect an effect when there is an effect there to be detected.

If statistical power is high, the probability of making a Type II error, or concluding there is no effect when, in fact, there is one, goes down
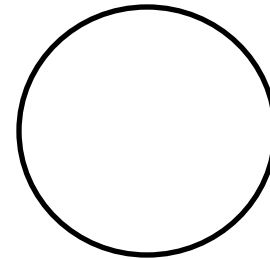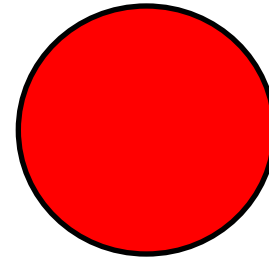
Statistical Power
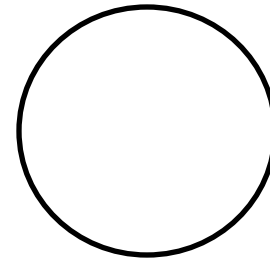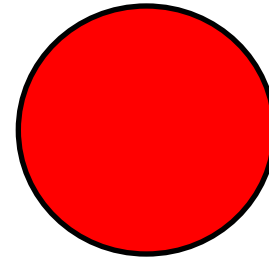
Statistical Power

Statistical Power

Design your study or test to detect a difference.

Statistical Power

Power Outage—Inadequate Surgeon Performance Measures Leave Patients in the Dark

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ProPublica created their Surgeon Scorecard, released in July, in an attempt to shed light on surgeons' outcomes and help patients choose high-quality surgeons for 8 common, elective procedures.[1] Whether the Scorecard has achieved these goals has become the subject of controversy. Its release has served as a lightning-rod for criticism, with many questioning the validity and reliability of its results. Supporters of the Scorecard argue that the ratings are an imperfect but valuable first step toward devising a transparent, accurate surgeon performance measure. Critics have questioned the use of a data set that lacks key performance indicators and potentially flawed statistical analysis, ultimately claiming that the Scorecard's imperfections render it useless.[2]

Low case volumes make the likelihood of type II errors (ie, incorrectly assuming surgeons are no different from the average) on the Scorecard a near certainty, and the implications are troubling. Although the Scorecard is able to correctly identify some of the most-concerning surgeons with particularly poor performance (ie, complication rates more than twice the national average), many others might be wrongfully reassured their performance is up-to-par, and patients may be falsely comforted they have chosen a safe surgeon. Ultimately, both surgeons and patients remain in the dark.

The problem of small samples is not unique to the Scorecard. Studies have found most commonly reported

Simple Test to Measure Power

- 1-sample: Is a hospital different than the population benchmark?
- 1-sided: Is the hospital higher (worse) than the benchmark?
- Stata <u>sampsi</u> command
- Alpha = 0.05, significance
- Power = 80%
- Collaborative Mean
- 1.5x or 2.0x higher than Mean

ACS-TQIP

Table: Mortality				<25%		<50%				Report Status
Report	Mean Rate (%)	Difference	n Patients	n Centers Under	% Okay	Difference	n Patients	n Centers Under	% Okay	Report Status
Mortality-All	6.2	2.0x	115	0	100	1.5x	428	17	37	(green)
Mortality-Blunt Multi	13.3	2.0x	49	16	41	1.5x	179	26	4	(red)
Penetrating	10.3	2.0x	67	25	7	1.5x	249	27	0	(red)
Shock	23.4	2.0x	21	21	22	1.5x	87	27	0	(red)
TBI	12.1	2.0x	50	8	70	1.5x	206	25	7	(yellow)
Intubated TBI	37.6	2.0x	10	3	89	1.5x	42	25	7	(yellow)
Severe TBI	49.8	1.75x	9	10	63	1.5x	23	25	7	(yellow)
Elderly	8.1	2.0x	88	5	81	1.5x	313	24	11	(yellow)
Elderly Blunt Multi	18.3	2.0x	33	26	4	1.5x	121	27	0	(red)
IHF	3.3	2.0x	233	27	0	1.5x	789	27	0	(red)

Report Status Key

(white)	(white)	=	(green)
(white)	(yellow)	=	(green)
(white)	(red)	=	(yellow)
(yellow)	(yellow)	=	(yellow)
(yellow)	(red)	=	(red)
(red)	(red)	=	(red)

ACS-TQIP

Table: Complications

Report	Mean Rate (%)	Difference	n Patients	n Centers Under	% Okay	Difference	n Patients	n Centers Under	% Okay		
Comp-All	7.3	2.0x	99	0	100	1.5x	350	11	56		🟩
Comp-Blunt Multi	16.0	2.0x	39	12	52	1.5x	142	23	8		🟨
Penetrating	14.2	2.0x	45	20	17	1.5x	168	24	0		🟥
Shock	22.5	2.0x	25	23	8	1.5x	94	25	0		🟥
TBI	7.9	2.0x	89	19	24	1.5x	321	25	0		🟥
Intubated TBI	26.2	2.0x	19	20	20	1.5x	74	25	0		🟥
Severe TBI	26.7	2.0x	19	22	8	1.5x	73	24	0		🟥
Elderly	6.9	2.0x	108	8	68	1.5x	392	25	0		🟨
Elderly Blunt Multi	16.8	2.0x	36	24	4	1.5x	137	25	0		🟥
IHF	4.2	2.0x	180	24	4	1.5x	648	25	0		🟥

ACS-TQIP

Table: Mort or Comp

Report	Mean Rate (%)	Difference	n Patients	n Centers Under	% Okay	Difference	n Patients	n Centers Under	% Okay	
Mort/Comp-All	11.9	2.0x	56	0	100	1.5x	204	0	100	
Mort/Comp-Blunt Multi	27.6	2.0x	18	2	92	1.5x	71	21	16	
Penetrating	22.4	2.0x	25	18	28	1.5x	96	24	4	
Shock	38.1	2.0x	10	9	64	1.5x	41	25	0	
TBI	17.5	2.0x	35	1	96	1.5x	131	21	16	
Intubated TBI	52.6	1.75x	8	0	100	1.5x	20	17	32	
Severe TBI	62.5	1.5x	11	13	48	1.25x	54	25	0	
Elderly	12.7	2.0x	53	0	100	1.5x	195	19	24	
Elderly Blunt Multi	29.4	2.0x	16	18	28	1.5x	63	25	0	
IHF	6.6	2.0x	111	17	32	1.5x	400	25	0	

Table: Specific Comp

Report	Mean Rate (%)	Difference	n Patients	n Centers Under	% Okay	Difference	n Patients	n Centers Under	% Okay	
AKI in Shock	1.7	2.0x	515	25	0	1.5x	1850	25	0	
Pneumonia in TBI	4.0	2.0x	182	23	8	1.5x	623	25	0	
Pneumonia in sTBI	13.9	2.0x	46	24	0	1.5x	170	24	0	

ACS-TQIP Power

- 33 reports
- 4 (12%) Green
- 10 (30%) Yellow
- 19 (58%) Red

MTQIP Power

- 28 reports
- Same analysis
- Pre
- Post

MTQIP Report	Time	Mean Rate (%)	Difference	n Patients	n Centers Under	% Okay	Difference	n Patients	n Centers Under	% Okay
Mortality, Cohort 1	1.5 yr	4.05	2x	187	0	100%	1.5x	673	8	70%
Mortality, Cohort 2	1.5 yr	4.87	2x	154	0	100%	1.5x	555	10	63%
Mortality, Cohort 3	1.5 yr	15.54	2x	41	14	48%	1.5x	151	26	4%
Mortality, Cohort 4	1.5 yr	3.70	2x	206	1	96%	1.5x	740	23	15%
Mortality, Cohort 5	1.5 yr	11.26	2x	60	19	30%	1.5x	221	26	4%
Mortality, Cohort 6	1.5 yr	2.49	2x	312	16	41%	1.5x	1117	27	0%
Mortality, Age < 65	1.5 yr	3.61	2x	211	1	96%	1.5x	759	22	19%
Mortality, Age ≥ 65	1.5 yr	4.70	2x	160	1	96%	1.5x	576	22	19%
Mortality, ISS > 35	1.5 yr	41.74	2x	8	12	56%	1.5x	35	26	4%
Mortality, Cohort 1, GCS 3-8, Age ≥ 65	1.5 yr	55.65	1.5x	17	22	19%	1.25x	75	27	0%
TBI Mortality	1.5 yr	43.73	2x	7	1	96%	1.5x	31	20	26%
Complications, Any, Cohort 2	1.5 yr	9.84	2x	71	0	100%	1.5x	257	2	93%
Complications, Serious, Cohort 2	1.5 yr	10.51	2x	66	0	100%	1.5x	239	2	93%
Failure to Rescue, Cohort 2	1.5 yr	19.55	2x	30	8	70%	1.5x	113	26	4%
Cardiac/Stroke	1.5 yr	1.71	2x	459	8	70%	1.5x	1640	27	0%
VTE	1.5 yr	1.25	2x	633	15	44%	1.5x	2261	27	0%
Pneumonia	1.5 yr	3.16	2x	244	2	93%	1.5x	873	20	26%
Renal Failure	1.5 yr	0.49	2x	1624	27	0%	1.5x	5790	27	0%
Sepsis	1.5 yr	0.46	2x	1733	27	0%	1.5x	6180	27	0%
UTI	1.5 yr	1.66	2x	473	9	67%	1.5x	1692	27	0%
C. Diff Colitis	1.5 yr	0.41	2x	1947	27	0%	1.5x	6942	27	0%
Unplanned Intubation	1.5 yr	1.18	2x	672	16	41%	1.5x	2399	27	0%
Unplanned Return to OR	1.5 yr	0.59	2x	1362	26	4%	1.5x	4858	27	0%
Unplanned Return to ICU	1.5 yr	0.97	2x	821	20	26%	1.5x	2931	27	0%
Patients Admitted to ICU	1.5 yr	27.93	2x	18	0	100%	1.5x	69	0	100%
Patients on Ventilator	1.5 yr	11.71	2x	58	0	100%	1.5x	211	0	100%
Extended LOS	1.5 yr	6.46	2x	114	0	100%	1.5x	410	7	74%
Prophylactic IVC Filter Use	1.5 yr	1.40	2x	561	19	30%	1.5x	2006	27	0%
% Reports poorly powered		<25%				18%				68%
% Reports marginally powered		<50%				43%				75%

MTQIP Report	Time	Mean Rate (%)	Difference	n Patients	n Centers Under	% Okay	Difference	n Patients	n Centers Under	% Okay
Mortality, Cohort 1	2 yr	5.29	2x	141	0	100%	1.5x	508	0	100%
Mortality, Cohort 2	2 yr	6.56	2x	112	0	100%	1.5x	403	2	93%
Mortality, Cohort 3	5 yr	21.05	2x	27	0	100%	1.5x	102	6	78%
Mortality, Cohort 4	2 yr	4.04	2x	188	0	100%	1.5x	676	10	63%
Mortality, Cohort 5	5 yr	19.49	2x	30	4	85%	1.5x	113	11	59%
Mortality, Cohort 6	5 yr	2.78	2x	278	1	96%	1.5x	996	12	56%
Mortality, Age < 65	2 yr	5.56	2x	133	0	100%	1.5x	480	9	67%
Mortality, Age ≥ 65	2 yr	5.00	2x	150	0	100%	1.5x	539	11	59%
Mortality, ISS > 25	5 yr	37.25	2x	10	0	100%	1.5x	43	0	100%
Mortality, Cohort 1, GCS 3-8, Age ≥ 65	5 yr	60.95	1.5x	-	-	-	1.25x	12	2	93%
TBI Mortality	5 yr	44.82	2x	6	0	100%	1.5x	30	3	89%
Complications, Any, Cohort 2	2 yr	9.77	2x	71	0	100%	1.5x	259	0	100%
Complications, Serious, Cohort 2	2 yr	12.10	2x	55	0	100%	1.5x	203	0	100%
Failure to Rescue, Cohort 2	3 yr	20.49	2x	28	2	93%	1.5x	104	17	37%
Cardiac/Stroke	2 yr	1.79	2x	439	2	93%	1.5x	1568	26	4%
VTE	2 yr	1.23	2x	642	8	70%	1.5x	2294	27	0%
Pneumonia	2 yr	3.18	2x	314	1	96%	1.5x	1123	19	30%
Renal Failure	3 yr	0.49	2x	1646	18	33%	1.5x	5870	27	0%
Sepsis	3 yr	0.56	2x	1437	14	48%	1.5x	5123	27	0%
UTI	2 yr	1.58	2x	499	3	89%	1.5x	1783	26	4%
C. Diff Colitis	3 yr	0.45	2x	1794	20	26%	1.5x	6396	27	0%
Unplanned Intubation	2 yr	1.16	2x	680	9	67%	1.5x	2428	27	0%
Unplanned Return to OR	3 yr	0.55	2x	1446	14	48%	1.5x	5157	27	0%
Unplanned Return to ICU	2 yr	1.07	2x	743	10	63%	1.5x	2653	27	0%
Patients Admitted to ICU	2 yr	37.34	2x	10	0	100%	1.5x	43	0	100%
Patients on Ventilator	2 yr	14.95	2x	43	0	100%	1.5x	158	0	100%
Extended LOS	2 yr	6.44	2x	114	0	100%	1.5x	411	2	93%
Prophylactic IVC Filter Use	2 yr	1.11	2x	715	9	67%	1.5x	2552	27	0%
% Reports poorly powered		<25%				0%				36%
% Reports marginally powered		<50%				15%				43%

MTQIP Power

- 28 reports
- Pre
  - 9 (32%) Green
  - 7 (25%) Yellow
  - 12 (43%) Red
- Post
  - 18 (64%) Green
  - 6 (21%) Yellow
  - 4 (14%) Red

More Science

Reliability of Risk-Adjusted Outcomes for Profiling Hospital Surgical Quality

Robert W. Krell, MD; Ahmed Hozain, BS; Lillian S. Kao, MD, MS; Justin B. Dimick, MD, MPH

Reliability of Superficial Surgical Site Infections as a Hospital Quality Measure

Lillian S Kao, MD, MS, FACS, Amir A Ghaferi, MD, MS, Clifford Y Ko, MD, MS, MSHS, FACS, Justin B Dimick, MD, MPH, FACS

Reliability

- ◆ Like Power
- ◆ Function of
  - ▪ Signal to Noise
  - ▪ Size of cohort
  - ▪ Prevalence of outcome
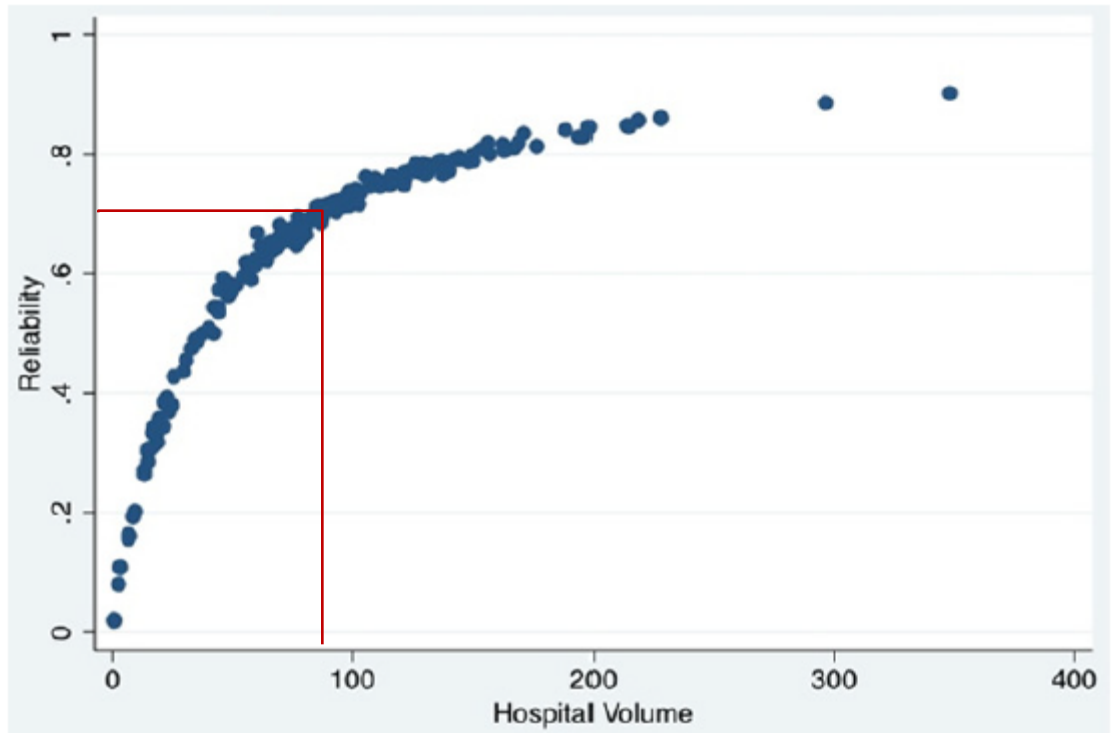
Figure 2. Relationship between reliability and hospital caseload of colon resections based on the American College of Surgeons National Surgical Quality Improvement Program 2007 database.

Reliability

Two kinds of variability determine the "statistical reliability" of a profiling model - the variability of the outcome between hospitals (ie, "signal") and the variability or error of measuring the outcome within the hospital (ie, "noise"). *Statistical reliability* is defined as the proportion of total variability in a hospital performance metric due to between-hospital variability (ie, the ratio of "signal" to "signal plus noise"). Statistical reliability quantifies the degree to which a calculated performance metric is based on true differences in hospital performance. Statistical reliability is measured on a scale of 0 to 1, where "0" implies a hospital's performance assessment is attributable only to measurement error, and "1" implies a hospital's performance assessment is attributable entirely to true differences in hospital performance.

Reliability

$$Reliablity = \frac{Signal}{Signal + Noise}$$

Reliability

- Scale 0 to 1
- "0" hospital's performance assessment is attributable only to measurement error
- "1" implies a hospital's performance assessment is attributable entirely to true differences in hospital performance
- Moderate 0.5 or 50%
- Good 0.7 or 70%

MTQIP Report	Time	Mean Rate (%)	Mean Reliability (%)	n Centers Over 0.5	n Centers over 0.7	% Fair (reliability > 0.5)	% Good (reliability > 0.7)
Mortality, Cohort 1 Include DOA	1.5 yr	4.9%	75.3%	27	18	100.0%	66.7%
Mortality, Cohort 1	1.5 yr	4.0%	70.5%	27	16	100.0%	59.3%
Mortality, Cohort 2 Include DOA	1.5 yr	6.0%	70.4%	25	16	92.6%	59.3%
Mortality, Cohort 2	1.5 yr	4.7%	61.6%	22	6	81.5%	22.2%
Mortality, Cohort 3	1.5 yr	16.6%	12.0%	0	0	0.0%	0.0%
Mortality, Cohort 4	1.5 yr	3.9%	36.9%	3	0	11.1%	0.0%
Mortality, Cohort 5, Include DOA	1.5 yr	17.9%	44.5%	10	5	37.0%	18.5%
Mortality, Cohort 5	1.5 yr	11.3%	58.0%	16	9	59.3%	33.3%
Mortality, Cohort 6	1.5 yr	2.6%	33.6%	3	0	11.1%	0.0%
Mortality, Age < 65	1.5 yr	3.5%	67.1%	24	11	88.9%	40.7%
Mortality, Age ≥ 65	1.5 yr	4.6%	67.8%	24	12	88.9%	44.4%
Mortality, ISS > 35	1.5 yr	43.8%	3.2%	0	0	0.0%	0.0%
Mortality, Cohort 1, GCS 3-8, Age ≥	1.5 yr	54.0%	37.9%	4	1	14.8%	3.7%
Complications, Any, Cohort 2	1.5 yr	10.0%	89.7%	27	27	100.0%	100.0%
Complications, Serious, Cohort 2	1.5 yr	7.2%	83.0%	27	25	100.0%	92.6%
Failure to Rescue, Cohort 2	1.5 yr	19.8%	47.0%	11	1	40.7%	3.7%
Cardiac/Stroke	1.5 yr	1.7%	64.1%	23	10	85.2%	37.0%
VTE	1.5 yr	1.2%	64.0%	24	9	88.9%	33.3%
Pneumonia	1.5 yr	3.3%	82.6%	27	25	100.0%	92.6%
Renal Failure	1.5 yr	0.5%	45.5%	9	0	33.3%	0.0%
Sepsis	1.5 yr	0.5%	45.0%	10	0	37.0%	0.0%
UTI	1.5 yr	1.6%	79.8%	27	24	100.0%	88.9%
C. Diff Colitis	1.5 yr	0.4%	39.5%	6	0	22.2%	0.0%
Unplanned Intubation	1.5 yr	1.4%	68.7%	26	15	96.3%	55.6%
Unplanned Return to OR	1.5 yr	0.6%	72.0%	25	16	92.6%	59.3%
Unplanned Return to ICU	1.5 yr	1.2%	86.6%	27	27	100.0%	100.0%
Patients Admitted to ICU	1.5 yr	29.5%	98.7%	27	27	100.0%	100.0%
Patients on Ventilator	1.5 yr	10.7%	86.1%	27	27	100.0%	100.0%
Prophylactic IVC Filter Use	1.5 yr	0.8%	73.1%	27	17	100.0%	63.0%
			>=50			>=50	>=50
			>=70			>=67	>=67

MTQIP Report	Time	Mean Rate (%)	Mean Reliability (%)	n Centers Over 0.5	n Centers over 0.7	% Fair (reliability > 0.5)	% Good (reliability > 0.7)
Mortality, Cohort 1 Include DOA	2 yr	5.0%	78.5%	27	23	100.0%	85.2%
Mortality, Cohort 1	2 yr	4.1%	76.3%	27	21	100.0%	77.8%
Mortality, Cohort 2 Include DOA	2 yr	6.1%	76.2%	27	19	100.0%	70.4%
Mortality, Cohort 2	2 yr	4.8%	68.3%	25	13	92.6%	48.1%
Mortality, Cohort 3	5 yr	17.0%	59.6%	15	3	83.3%	16.7%
Mortality, Cohort 4	2 yr	3.9%	59.9%	23	4	85.2%	14.8%
Mortality, Cohort 5, Include DOA	2 yr	19.5%	75.5%	16	12	88.9%	66.7%
Mortality, Cohort 5	2 yr	10.7%	70.6%	16	10	88.9%	55.6%
Mortality, Cohort 6	2 yr	2.9%	74.6%	15	14	83.3%	77.8%
Mortality, Age < 65	2 yr	3.5%	60.7%	19	9	70.4%	33.3%
Mortality, Age ≥ 65	2 yr	4.8%	72.9%	26	17	96.3%	63.0%
Mortality, ISS > 25	5 yr	30.5%	60.4%	15	5	83.3%	27.8%
Mortality, Cohort 1, GCS 3-8, Age ≥	5 yr	59.1%	37.5%	3	0	16.7%	0.0%
Complications, Any, Cohort 2	2 yr	9.9%	90.4%	27	27	100.0%	100.0%
Complications, Serious, Cohort 2	2 yr	7.1%	84.9%	27	26	100.0%	96.3%
Failure to Rescue, Cohort 2	3 yr	19.8%	66.1%	20	10	87.0%	43.5%
Cardiac/Stroke	2 yr	1.7%	71.3%	26	16	96.3%	59.3%
VTE	2 yr	1.3%	64.1%	24	10	88.9%	37.0%
Pneumonia	2 yr	3.4%	84.0%	27	25	100.0%	92.6%
Renal Failure	3 yr	0.5%	55.7%	15	6	55.6%	22.2%
Sepsis	3 yr	0.6%	59.6%	18	5	78.3%	21.7%
UTI	2 yr	1.7%	80.5%	27	24	100.0%	88.9%
C. Diff Colitis	3 yr	0.5%	69.2%	22	11	95.7%	47.8%
Unplanned Intubation	2 yr	1.4%	78.7%	27	22	100.0%	81.5%
Unplanned Return to OR	2 yr	0.6%	84.1%	23	21	100.0%	91.3%
Unplanned Return to ICU	2 yr	1.1%	88.7%	27	27	100.0%	100.0%
Patients Admitted to ICU	2 yr	29.3%	99.1%	27	27	100.0%	100.0%
Patients on Ventilator	2 yr	10.7%	95.0%	27	27	100.0%	100.0%
Prophylactic IVC Filter Use	2 yr	0.9%	81.2%	27	26	100.0%	96.3%
			>=50			>=50	>=50
			>=70			>=67	>=67

MTQIP Reliability

- 29 reports
- Pre
  - 13 (45%) Green
  - 5 (17%) Yellow
  - 11 (38%) Red
- Post
  - 18 (62%) Green
  - 9 (31%) Yellow
  - 2 (7%) Red

What I now know

- ◆ Reports should have meaning to you
- ◆ State Values
  - ■ Probably real
  - ■ Individual centers move to mean with small n's
  - ■ Michigan as a large group does not
- ◆ Data Validation
  - ■ MTQIP Data Validation Program
  - ■ ACS-TQIP ?
  - ■ Complications ↑
  - ■ BMC2 has similar problem

Feedback

- Reports handed out at meeting
- Yours
- Advisory Committee
- Length of time
    - Standard, 1.5-2 years
    - Long, some reports 3-5 years

Break

Back at 3:15 pm

MTQIP Data/Reports

Mark Hemmila, MD

Collaborative-Wide Metric
IVC Filter Placement

2016 Group Project

- Target is 1.5% for 2016 reporting
- If collaborative mean is ≤ 1.5% every center gets 10 points.
- If collaborative mean is > 1.5% every center gets 0 points.
- At or near target – maintain performance
- Above target
  - Educate providers
  - Assistance from collaborative members

IVC Filter Reporting Criteria

- Cohort = Cohort 2
- No Signs of Life = Exclude DOA
- ISS > 8
- 18 months data
- Date Range
  - 5/1/2014 to 10/31/15
- IVC Filter Usage = 1.27%

Unadjusted IVC Filter Use
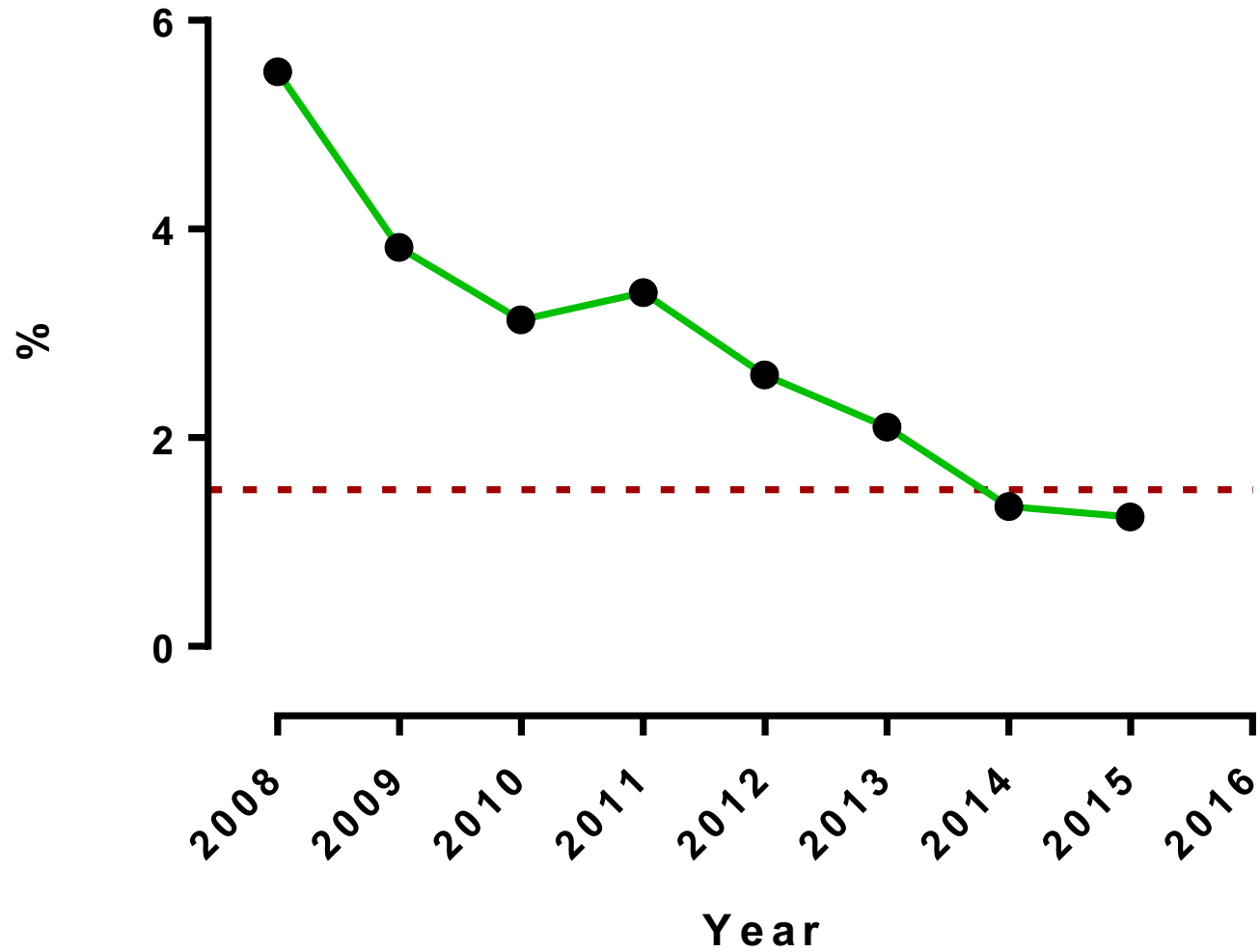
Risk and Reliability Adjusted IVC Filter Use
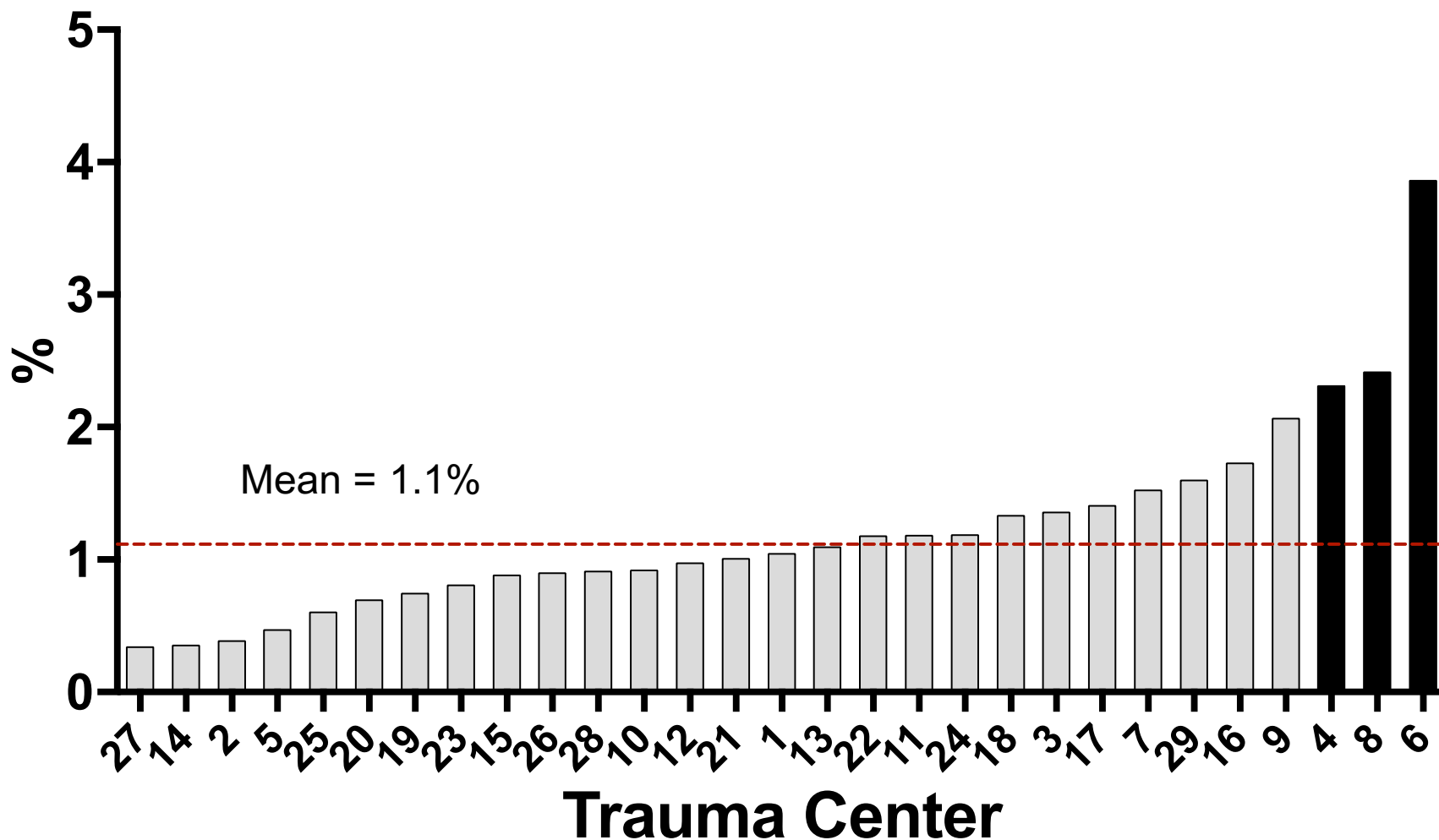
Mean = 1.1%

% (y-axis, 0 to 5)

Trauma Center (x-axis): 27, 14, 2, 5, 25, 20, 19, 23, 15, 26, 28, 10, 12, 21, 1, 13, 22, 11, 24, 18, 3, 17, 7, 29, 16, 9, 4, 8, 6

Risk and Reliability Adjusted IVC Filter Use

Trauma Center

DVT/Pulmonary Embolus

Trauma Center

VTE Prophylaxis by 48 hrs

Trauma Center (y-axis)

Percent (x-axis)

Legend:
- ≥ 50%
- ≥ 40%
- < 40%

5/1/14-1/31/16

Pg. 34
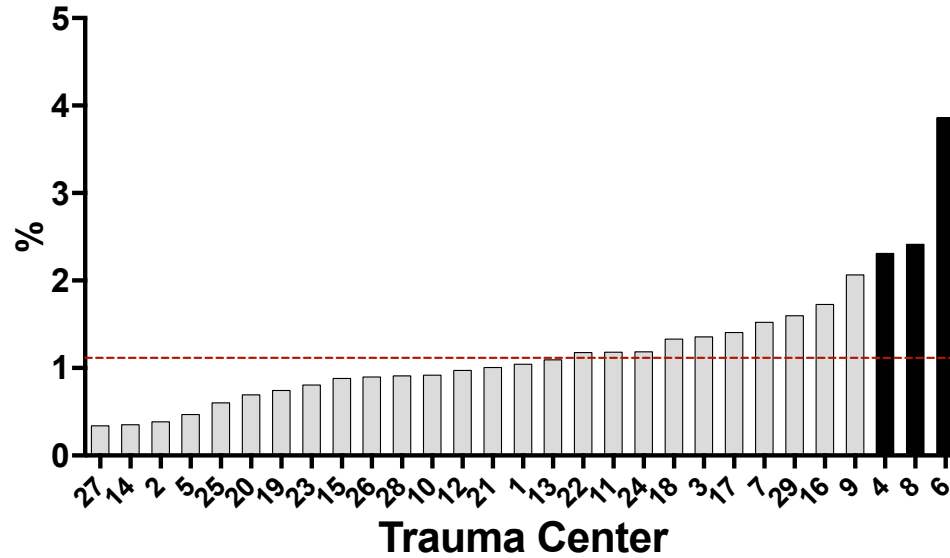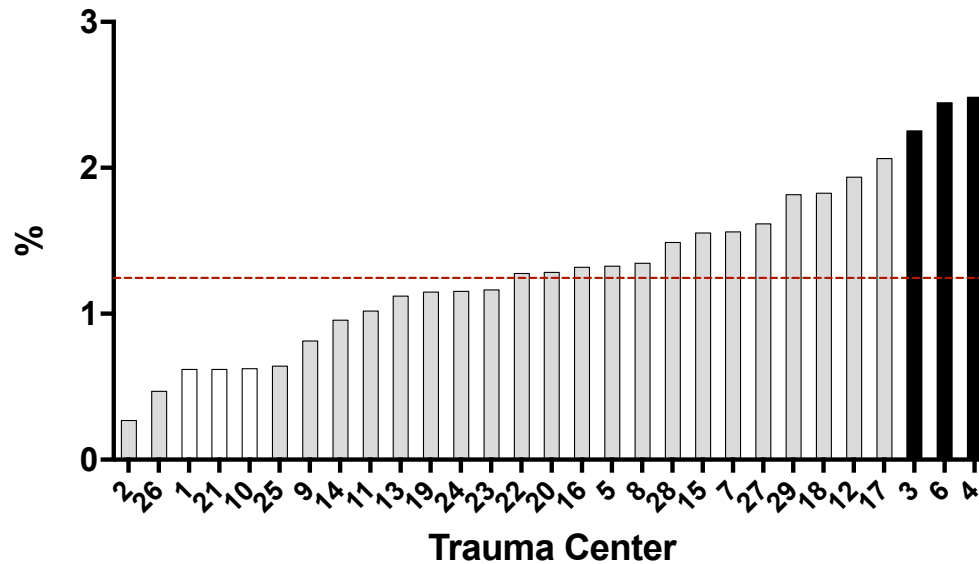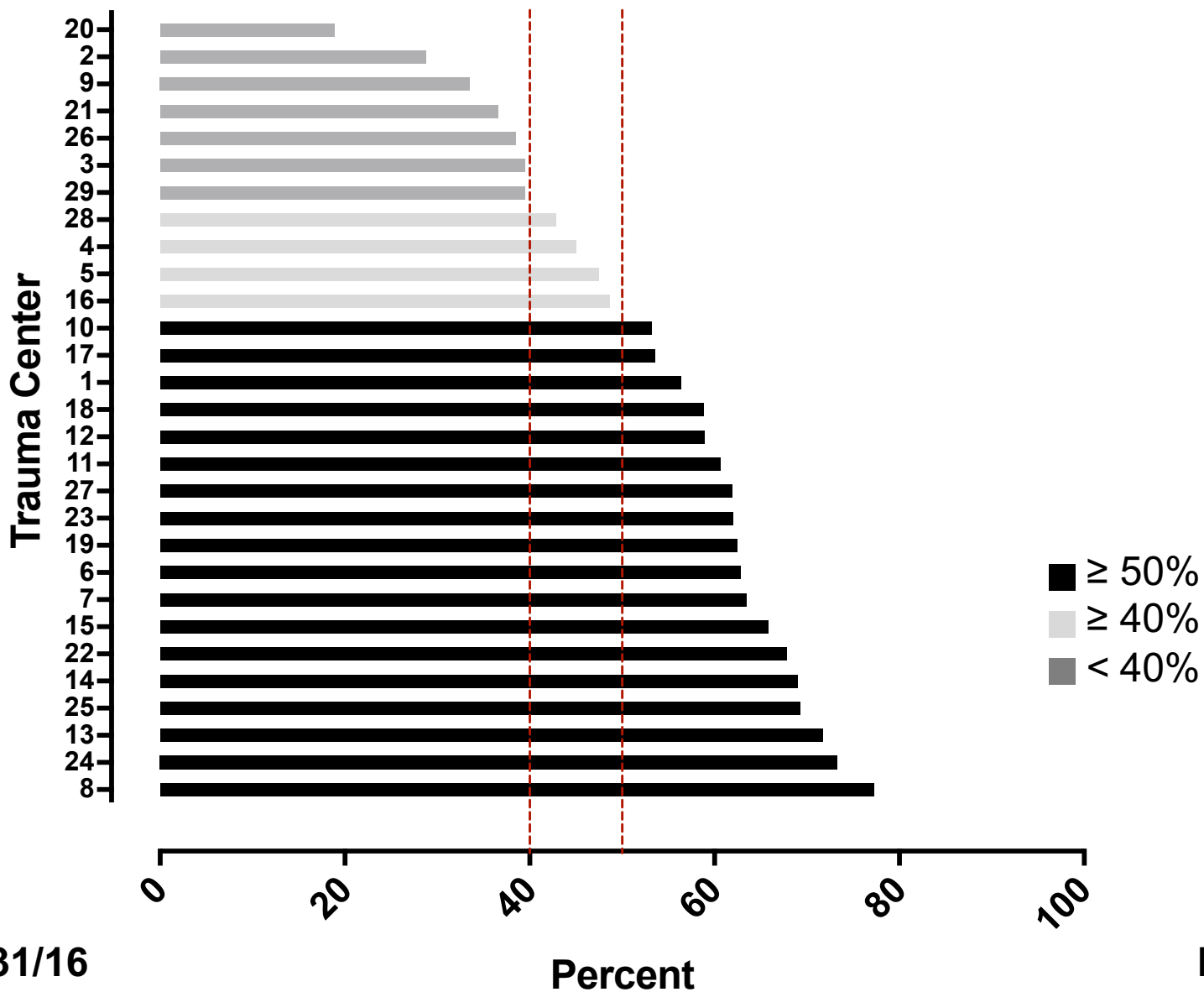
Walk-Through

Hospital Metrics

MTQIP 2016 Hospital Metrics

- Participation 50%
    - Data Submission
    - Surgeon Lead
    - Trauma Program Manager/MCR
    - Registrar
- Performance 50%
    - Data Validation
    - Site-specific QI project
    - Massive Transfusion Protocol
    - VTE Prophylaxis
    - IVC Filter Usage

Massive Transfusion Ratio

- ◆ Massive Transfusion
  - ■ ≥ 5 units PRBC's in first 4 hrs
  - ■ Average of tier points score for each patient
  - ■ 0 units FFP places patient in tier 4
  - ■ 5/1/14 – 1/31/16

Ratio PRBC/FFP	Tier	Points
< 1.5	1	10
1.6 – 2.0	2	10
2.1 – 2.5	3	5
> 2.5	4	0

Massive Transfusion Metric Calculation Example

Patient	PRBC	FFP	PRBC/FFP	Tier	Points
1	10	10	1.0	1	10
2	5	4	1.3	1	10
3	7	4	1.8	2	10
4	8	5	1.6	2	10
5	5	2	2.5	3	5
6	7	3	2.3	3	5
7	9	2	4.5	4	0
8	5	1	5.0	4	0
9	11	0		4	0
10	6	0		4	0
					50

$$\frac{\text{Total Points}}{\text{Total Patients}} = \text{Metric Points}$$

$$\frac{50}{10} = 5$$

Blood Product Ratio Points
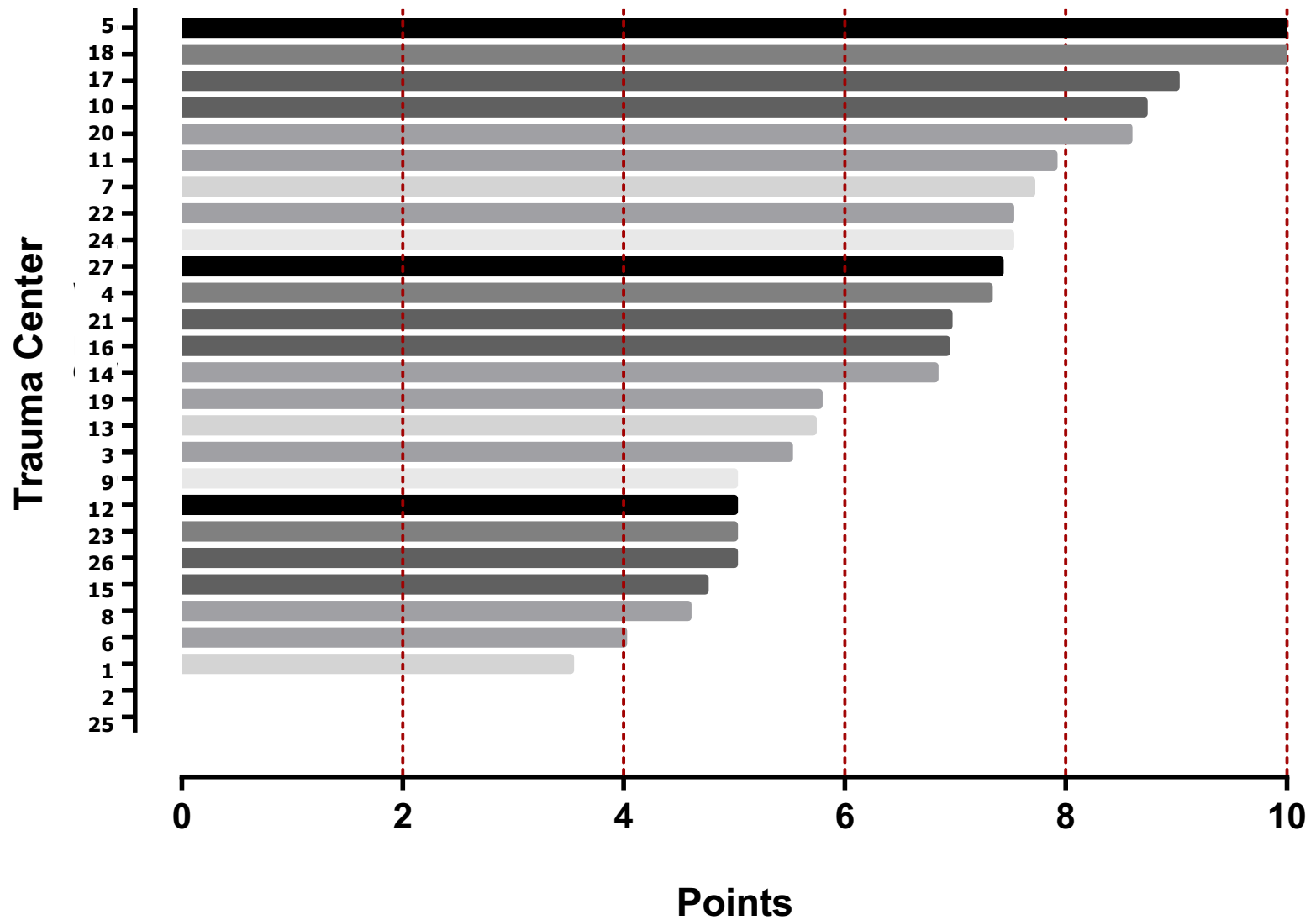
5/1/14 – 1/31/16

VTE Prophylaxis

- Admit Trauma Service (Cohort 2)
  - Discharge Home in 48 hrs = Drop
  - Dead day 0,1,2 = Drop
  - In hospital with no VTE pro = None
  - VTE Prophylaxis ≤ 48 hrs = Count
  - VTE Prophylaxis > 48 hrs = Count
  - 5/1/14 – 1/31/16
- Rate
  - ≥ 50% (10 points)
  - ≥ 40% (5 points)
  - 0 – 39% (0 points)

VTE Prophylaxis Kaplan-Meier

VTE Prophylaxis by 48 hrs

Percent
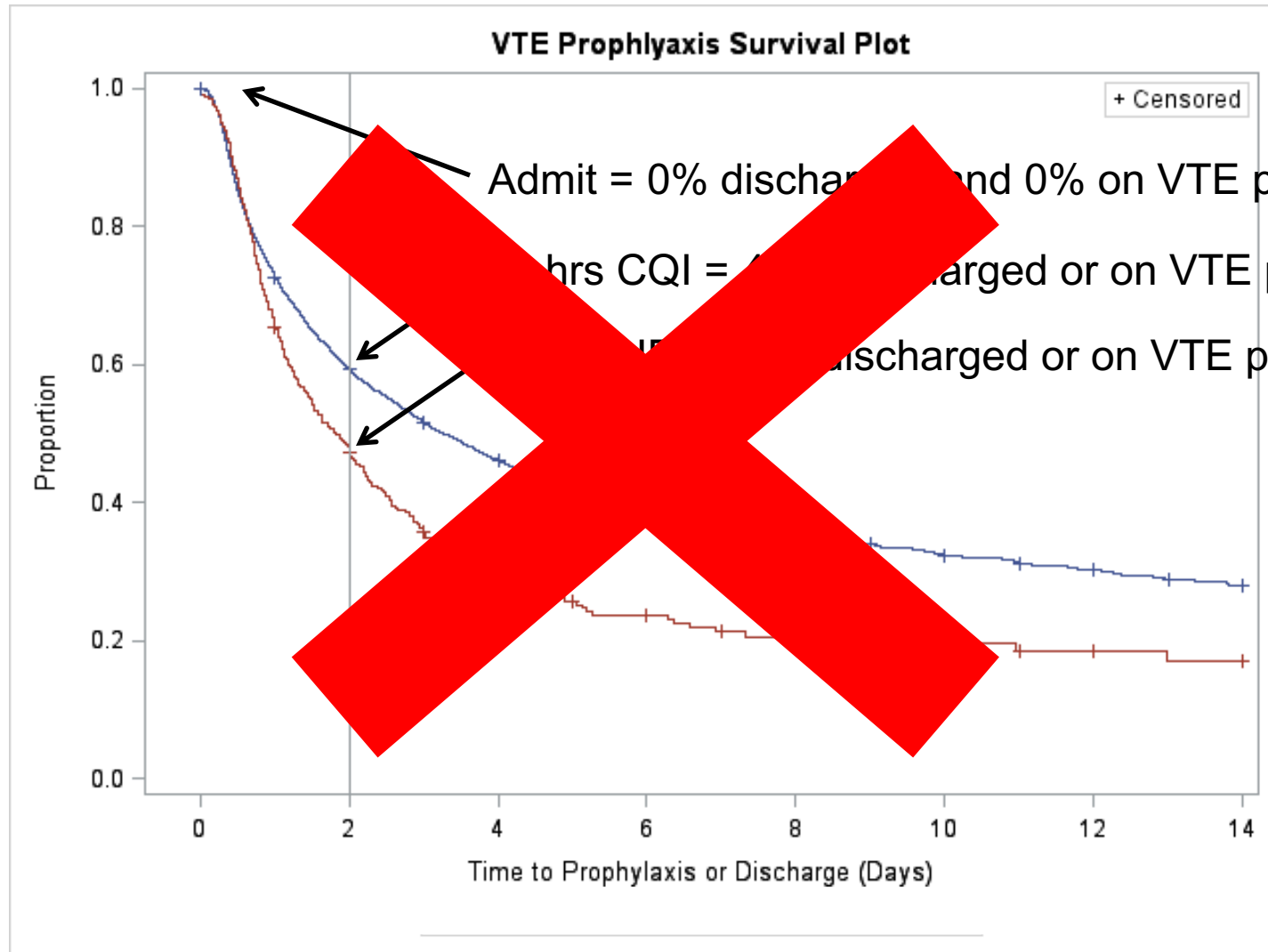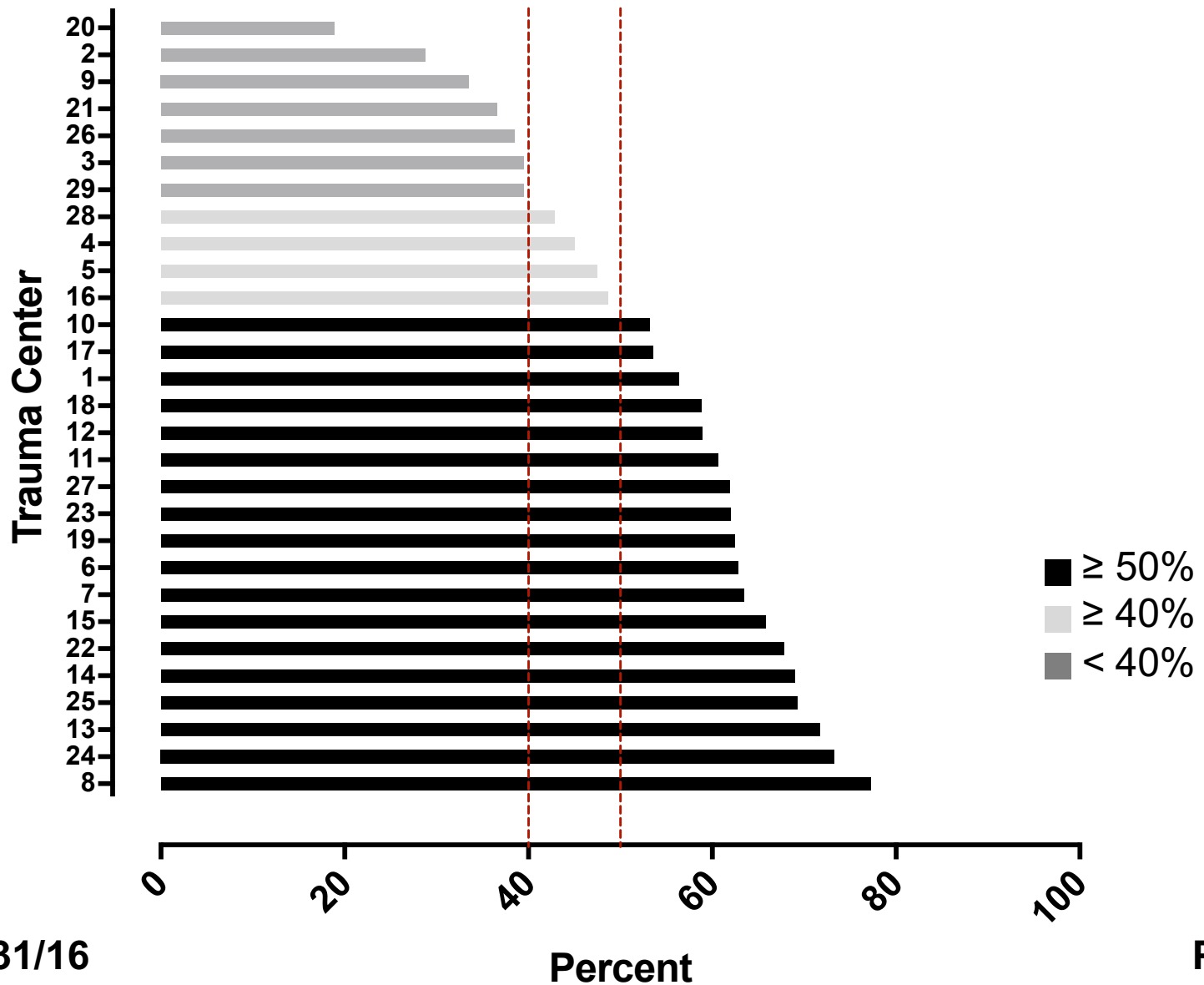
MTQIP Outcomes

- ArborMetrix Report
  - 11/1/2013 to 1/31/2016 (Standard)
- Rates
  - Risk and Reliability-adjusted
  - Red dash line is collaborative mean
- Legend
  - ☐ Low-outlier status (better performance)
  - ▨ Non-outlier status (average performance)
  - ▮ High-outlier status (worse performance)

Mortality (Cohort 1 w/o DOA's)

Y-axis: %
X-axis: Trauma Center
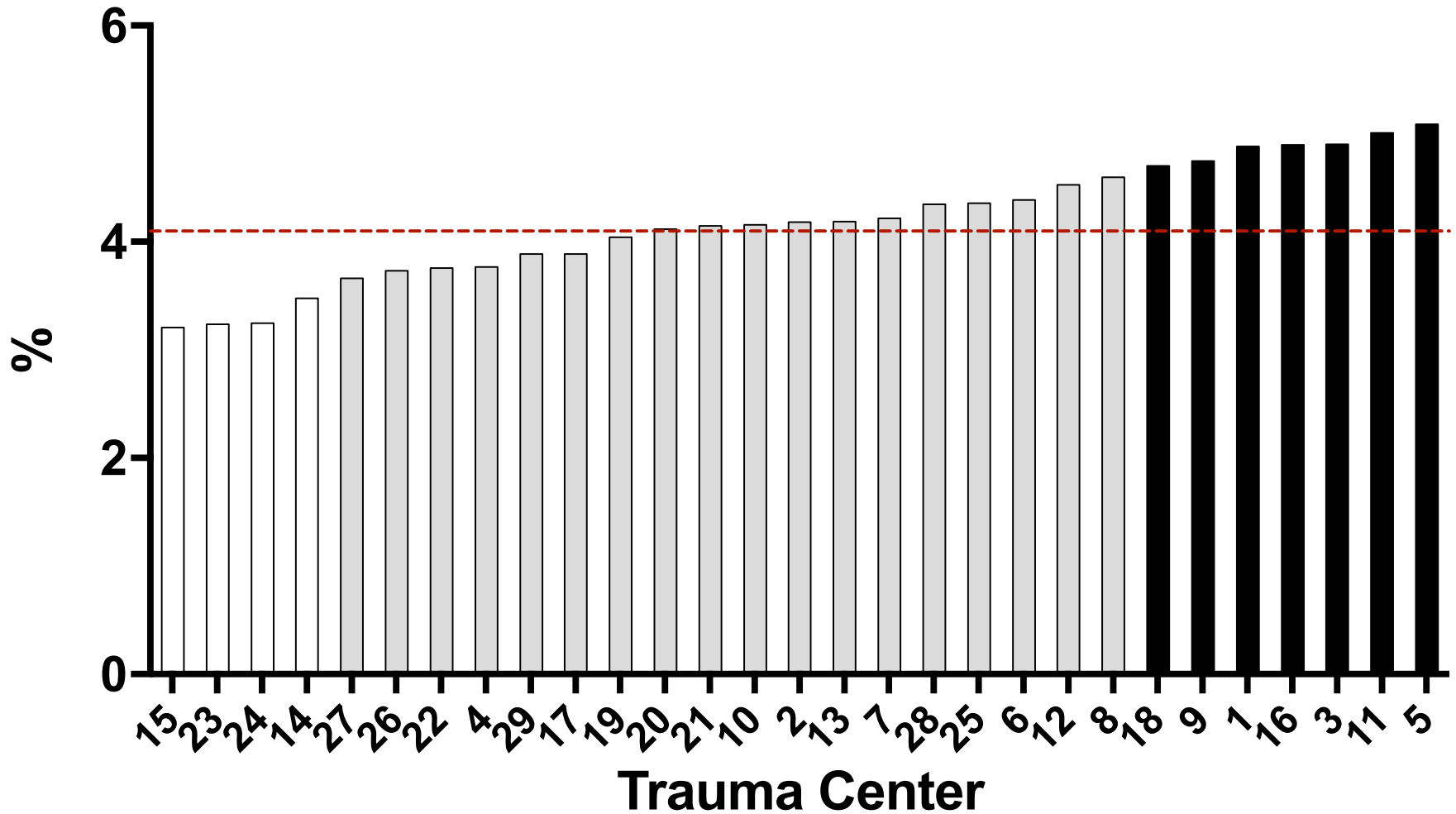
Mortality (Cohort 2 w/o DOA's)

Bar chart with y-axis labeled "%" ranging from 0 to 8, and x-axis labeled "Trauma Center". Trauma centers along the x-axis from left to right: 24, 15, 23, 14, 27, 26, 2, 22, 17, 29, 13, 19, 28, 4, 20, 21, 25, 10, 6, 8, 12, 7, 18, 16, 9, 1, 11, 3, 5. A red dashed horizontal line is at approximately 4.9%.

Mortality or Hospice (Cohort 1 w/o DOA's)

%

Trauma Center
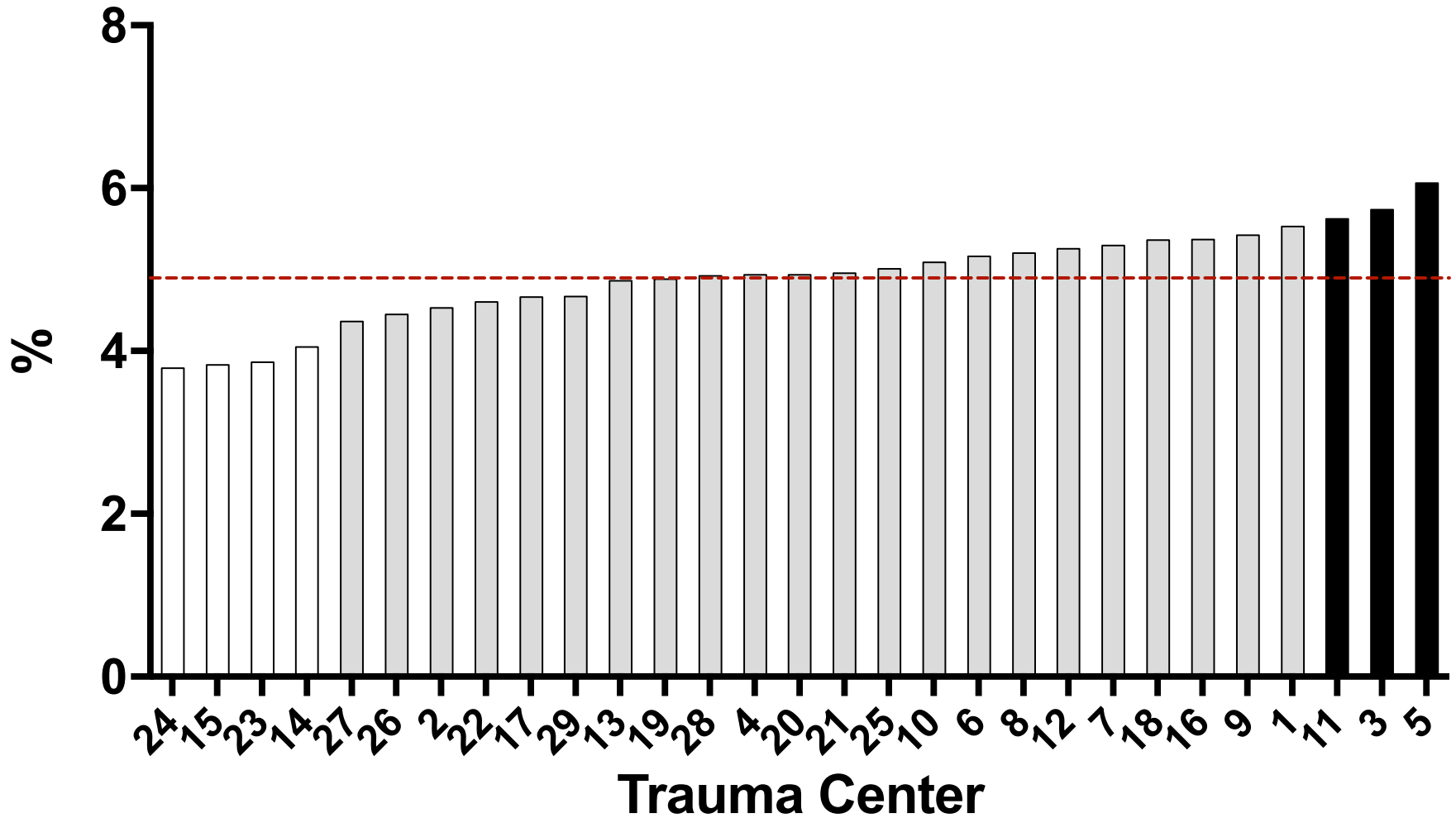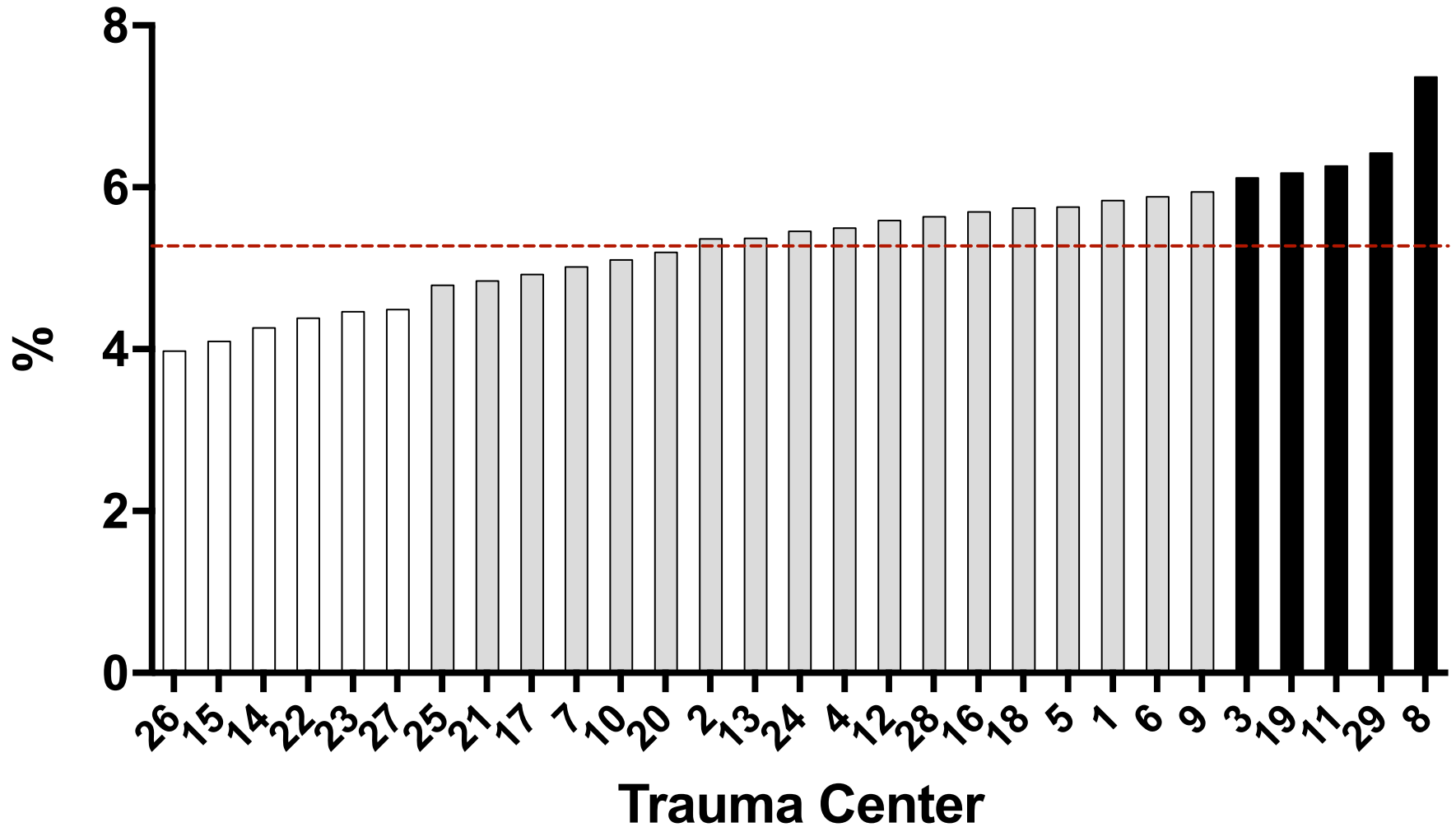
Mortality (Cohort 6)

Admit to Non-Trauma Service
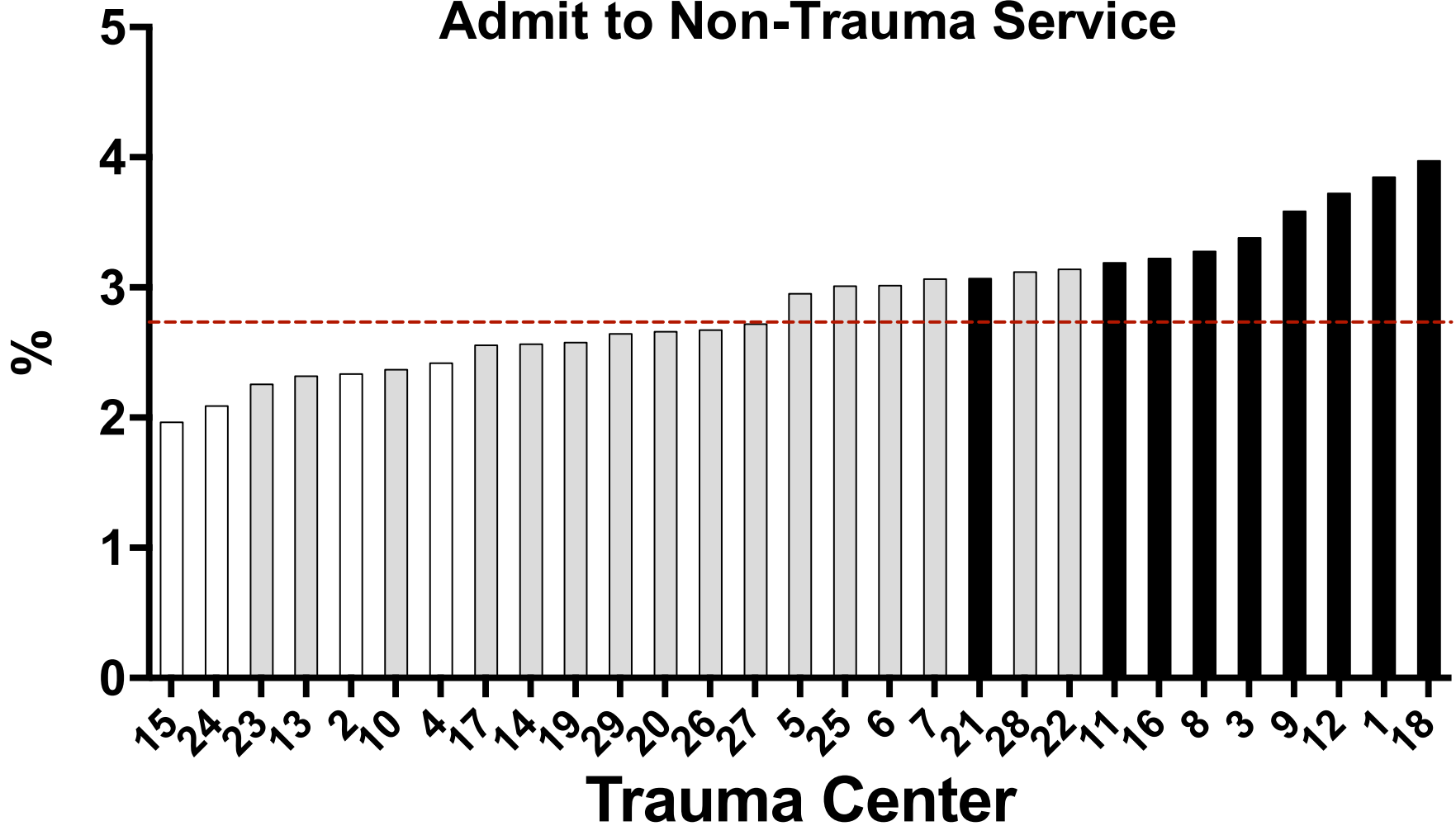
Antibiotic Days

- ## Two-part model
  - Accounts for patients who get no antibiotics
- ## Analysis
  - First part is a logistic regression that predicts the probability of a patient getting any antibiotic day.
  - Second part is a negative binomial model that predicts the expected number of antibiotic days.
  - These two estimates get multiplied together to get a predicted # of antibiotic days for each patient.

Adjusted Antibiotic Days

Days

Trauma Center
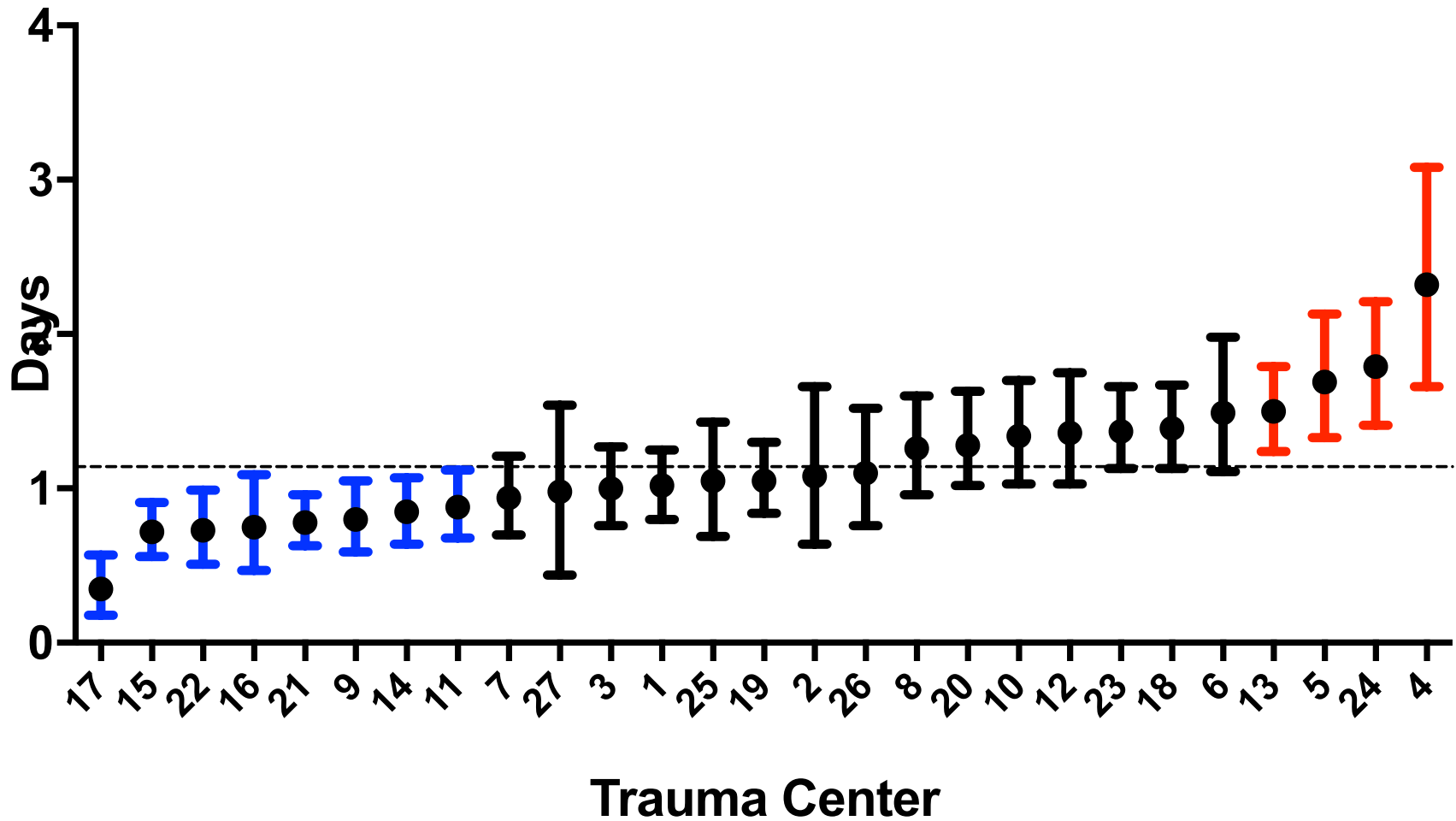
Feedback

- Now

- Later
  - Look at report and compare to infection data
  - Does it make sense?

ACS-TQIP State Report

Mark Hemmila, MD
University of Michigan

Risk-Adjusted Mortality by Cohort
TQIP Report ID: Michigan
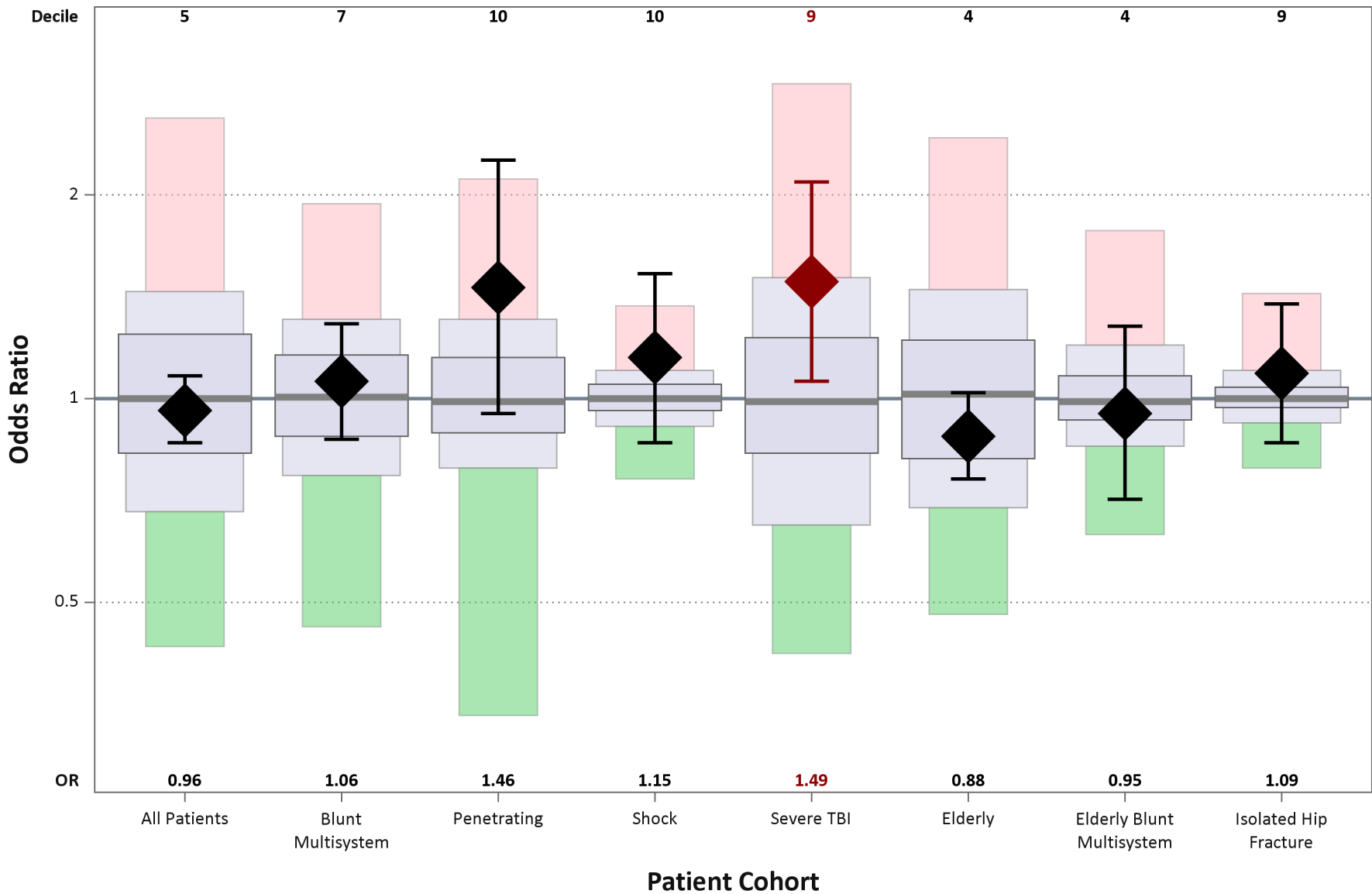
Decile	5	7	10	10	9	4	4	9
OR	0.96	1.06	1.46	1.15	1.49	0.88	0.95	1.09

Patient Cohort: All Patients, Blunt Multisystem, Penetrating, Shock, Severe TBI, Elderly, Elderly Blunt Multisystem, Isolated Hip Fracture

Odds Ratio

Risk-Adjusted Mortality by Cohort
TQIP Report ID: Michigan

Risk-Adjusted Major Complications by Cohort
TQIP Report ID: Michigan

	All Patients	Blunt Multisystem	Penetrating	Shock	Severe TBI	Elderly	Elderly Blunt Multisystem	Isolated Hip Fracture
Decile	6	6	6	6	9	6	4	6
OR	1.16	1.05	1	1.01	1.63	1.11	0.92	0.99

Odds Ratio (y-axis)

Patient Cohort (x-axis)

Risk-Adjusted Major Complications by Cohort
TQIP Report ID: Michigan

Risk-Adjusted Major Complications Including Death by Cohort
TQIP Report ID: Michigan

Risk-Adjusted Major Complications Including Death by Cohort
TQIP Report ID: Michigan

Risk-Adjusted Major Complications Including Death by Cohort
TQIP Report ID: Michigan

Decile	4	1	7	9	7	8	7	6

Odds Ratio

OR	0.81	0.79	1.41	1.77	1.13	1.49	1.43	1.1

Patient Cohort: Acute Kidney Injury in All Patients | Acute Kidney Injury in Shock | Pneumonia in All Patients | Pneumonia in Severe TBI | Pulmonary Embolism in All Patients | SSI in All Patients | Unplanned Return to OR in All Patients | UTI in All Patients
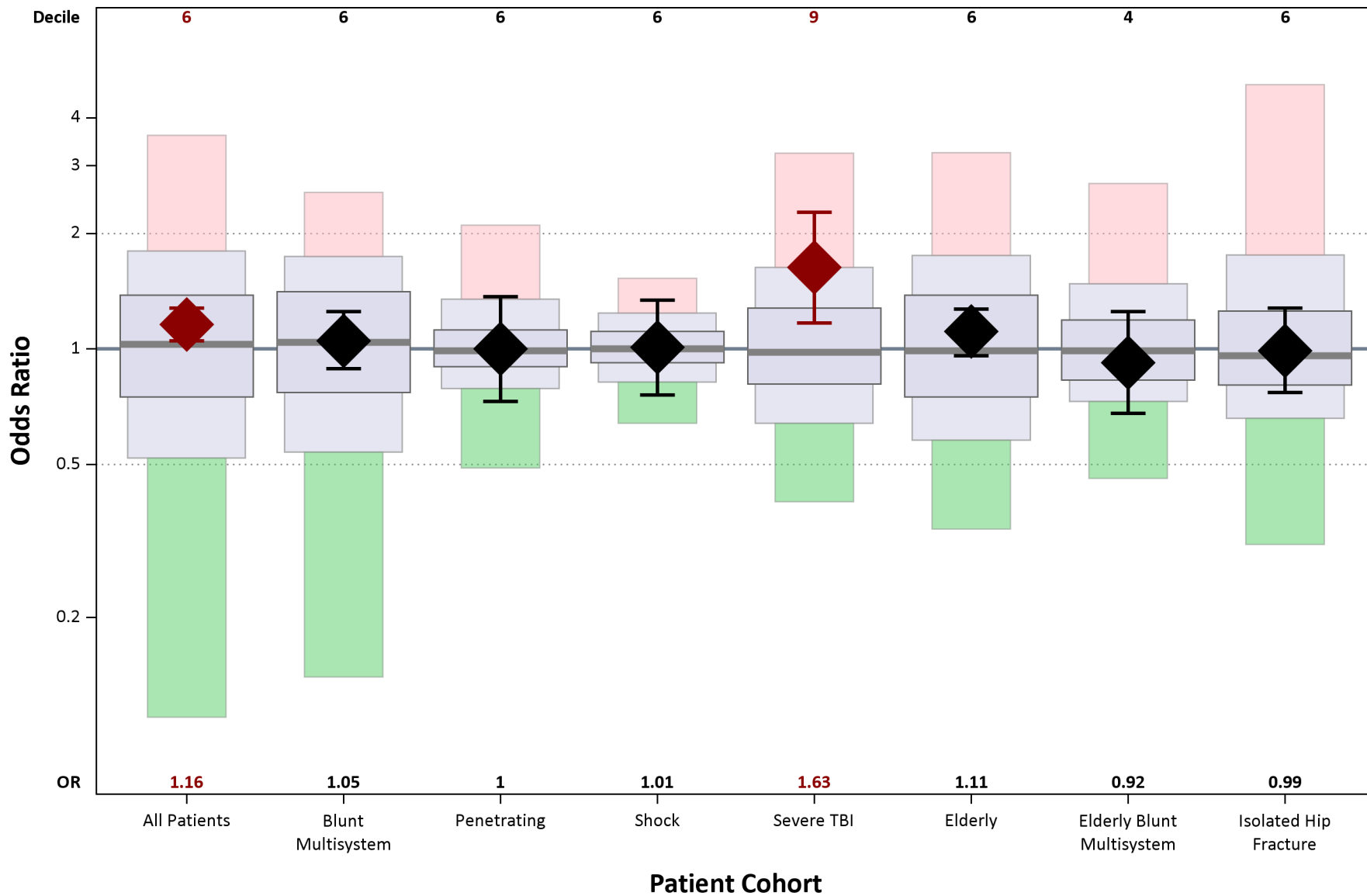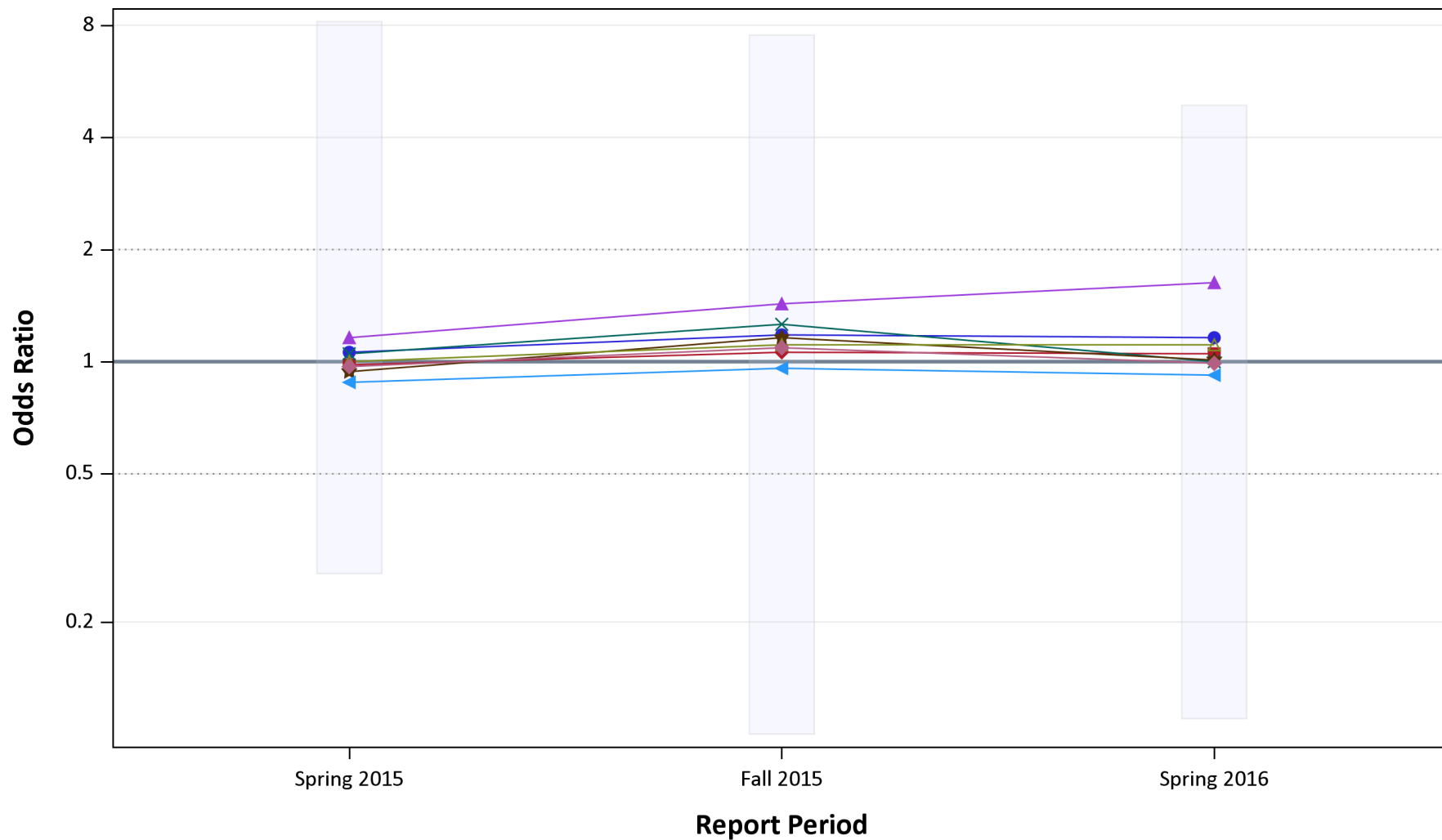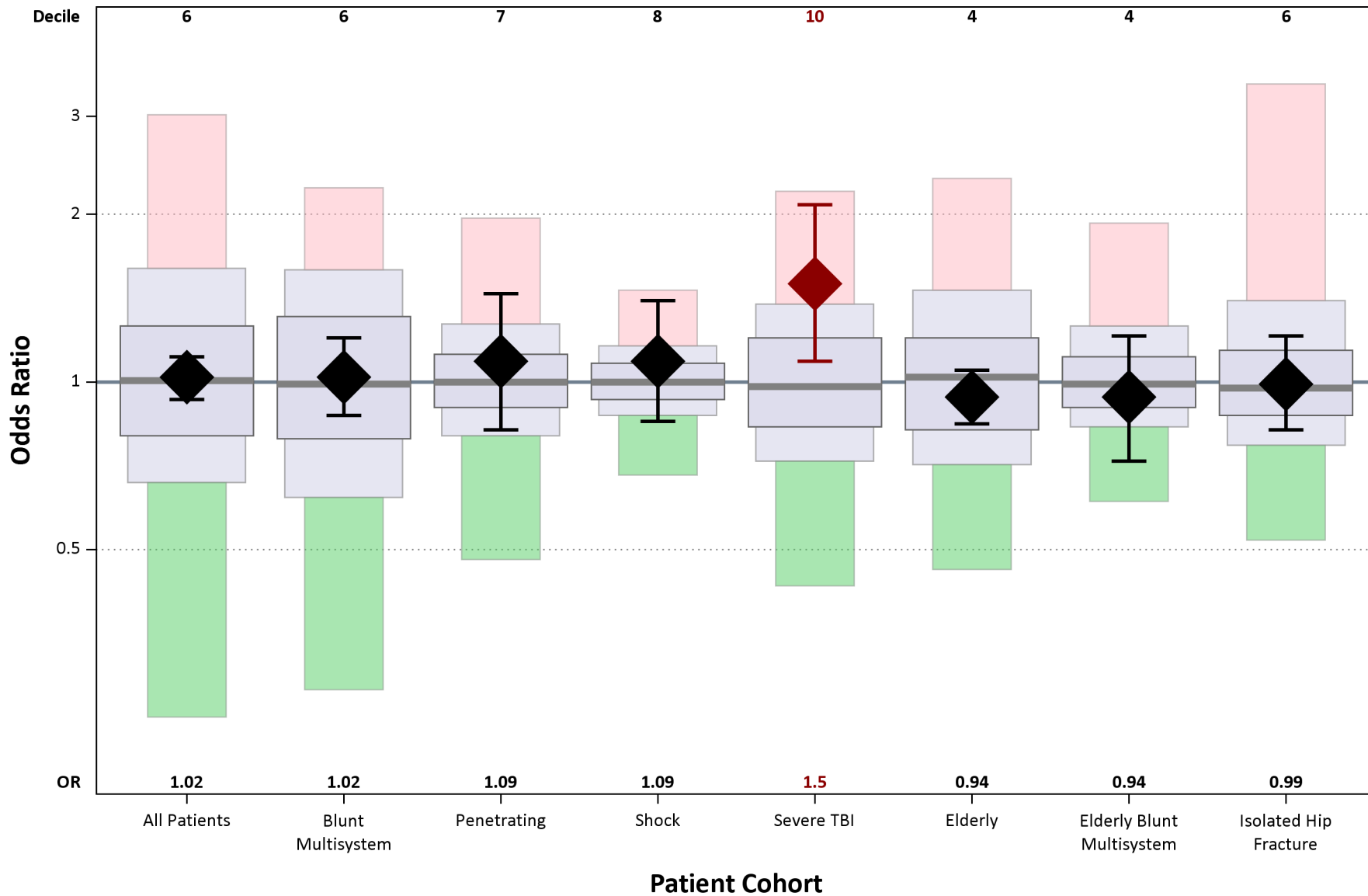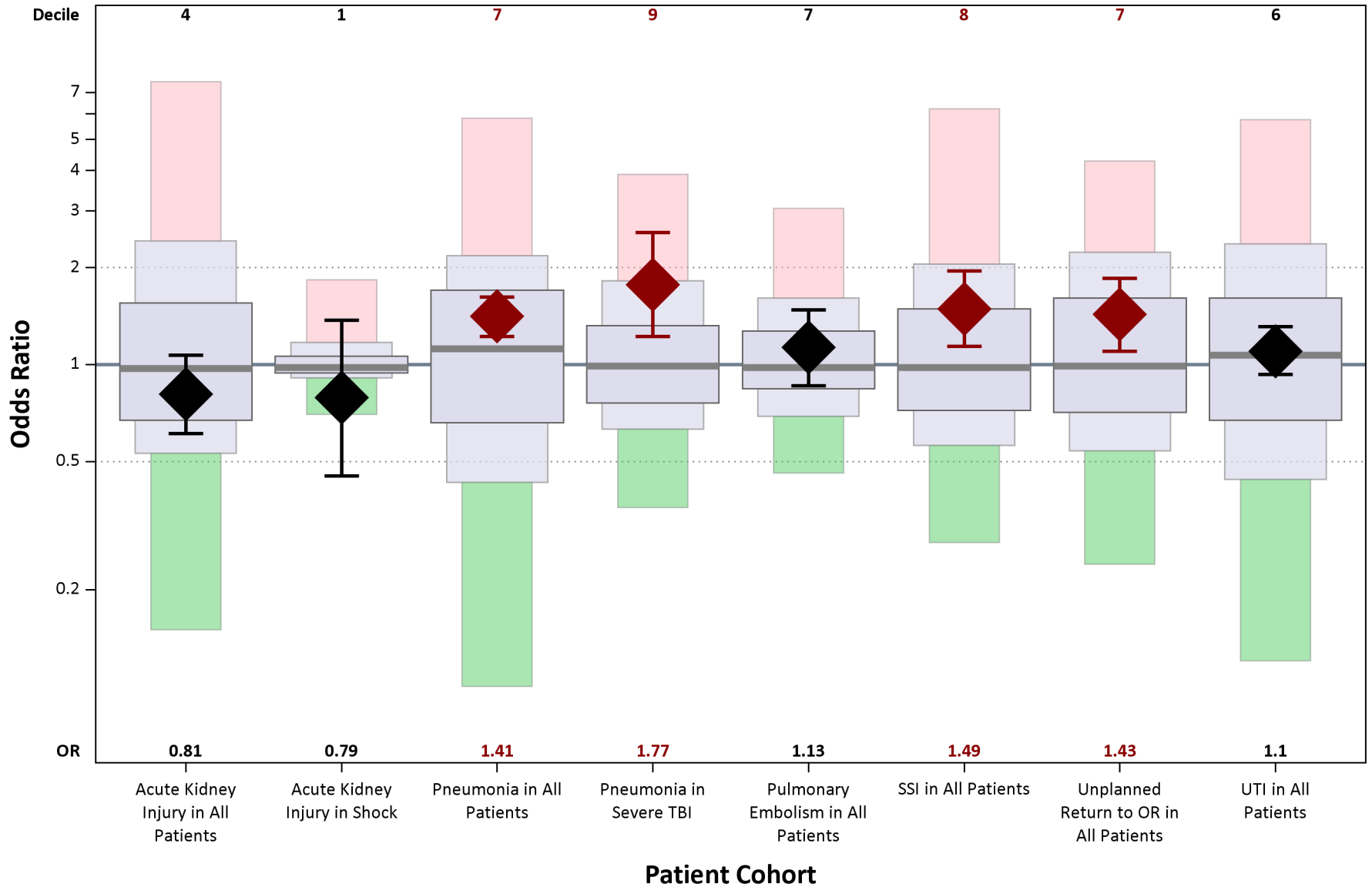
ACS-TQIP

- DVT
  - All Others 1.5%, Collaborative 1.1%
- VTE Prophylaxis
  - None: All Others 40%, Collaborative 33%
  - Heparin: All Others 23%, Collaborative 40%
  - LMWH: All Others 74%, Collaborative 55%
- Blunt Splenic Injury
  - Time to Operative Manage: Median 1.8 vs. 2.5 hrs
  - Splenic Preservation: 79% vs. 84%

ACS-TQIP

- Severe TBI
  - ICP Monitor: All Others 18%, Collaborative 24%
  - Time to ICP Monitor: Median 3.3 vs. 3.0 hrs
  - Drill into STBI more?
- Hemorrhagic Shock
  - Surgery: All Others 48%, Collaborative 51%
  - Angiography: All Others 17%, Collaborative 20%

ACS-TQIP

- Change to payment structure
  - Combined with trauma verification
  - What does this mean for contract?
- Options
  - Revert back to trauma center
  - Some other arrangement (keep state report)

MTQIP Services

- Voluntary
  - Reach out, accept or decline
- Facilitate
  - Pairing of centers to share data and experience
  - Reach out, accept or decline
- ACS-TQIP Report
  - Review
  - Dive into data with MTQIP tools

Conclusion

- Evaluations
    - Fill out and turn in
- Feedback
    - CQI Scoring
    - ACS-TQIP funding
- Questions?
- See you in Petoskey on Friday

Michigan Association of Neurological Surgeons

M·TQIP

Petoskey, Michigan

May 20, 2016

Disclosures

- Salary Support from BCBSM/BCN for MTQIP
  - Mark Hemmila
  - Judy Mikhail
  - Jill Jakubus

M·TQIP

Welcome

- Share
- Learn
- Understand

Planning

- Neurosurgeons
  - Robert Johnson, MD
  - Rick Olsen, MD
  - Jason Heth, MD
  - Sanjay Patra, MD
- MTQIP Advisory Committee
- CME – 4.25 hrs

Questions

- Mark Hemmila
  - mhemmila@umich.edu
  - (734) 763-2854
- Web-site
  - www.mtqip.org

Objective

- Explain MTQIP
- Cases
- Survey results
- Access and disseminate data
- Promote collaboration
- Gain Perspective
- Advice

Discussion

Dialogue

Acknowledgement

Why?

- Why build a collaborative quality initiative?

Systems Based Care

RESOURCES FOR OPTIMAL CARE OF THE INJURED PATIENT 2014

COMMITTEE ON TRAUMA
AMERICAN COLLEGE OF SURGEONS

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality:
Highest Standards, Better Outcomes

100+years
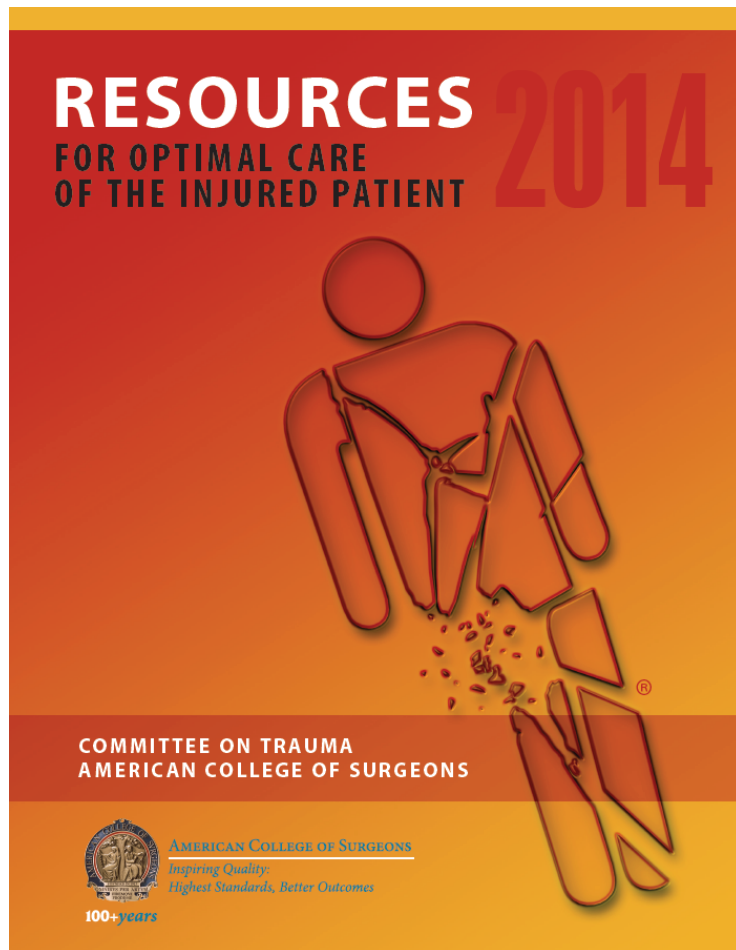
Guidelines for the Management
of Severe Traumatic Brain Injury
3rd Edition

A Joint Project of the

Brain Trauma Foundation
Improving the Outcome of Brain Trauma Patients Worldwide

and

American Association of Neurological Surgeons (AANS)
Congress of Neurological Surgeons (CNS)
AANS/CNS Joint Section on Neurotrauma and Critical Care

Michigan Trauma Quality Improvement Program

- 29 Level 1 and 2 Trauma Centers in Michigan
- Voluntary Participation
- Funded by BCBS of Michigan
- Coordinating Center
  - University of Michigan
  - Program Director, Manager, Analyst, Support Staff
- Participating Centers
  - Trauma Registry
  - ACS-TQIP

Michigan Trauma Quality Improvement Program

- Meetings
  - Unblinded data
- Feedback Reports
- Quality Improvement Projects
  - Global
  - Center specific
- Trauma Registry
  - Data submission and collation
  - Data definitions
  - Validation visits
  - Process measures module

M·TQIP

Individual Site Summary Report

July 1, 2013 through December 31, 2014

Issued May 13, 2015
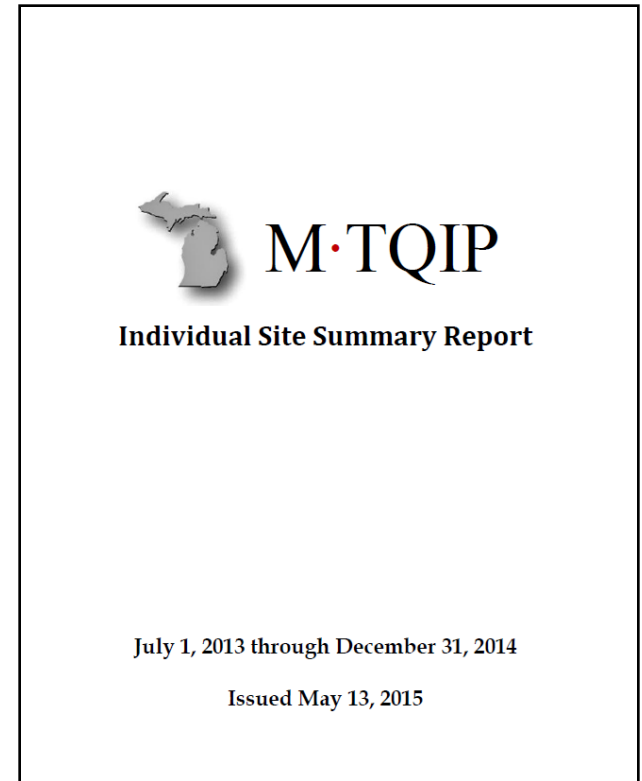
Data Driven Care

- Registry
- Outcomes
- Reports
- Literature Review
- Peer Review
- Peers
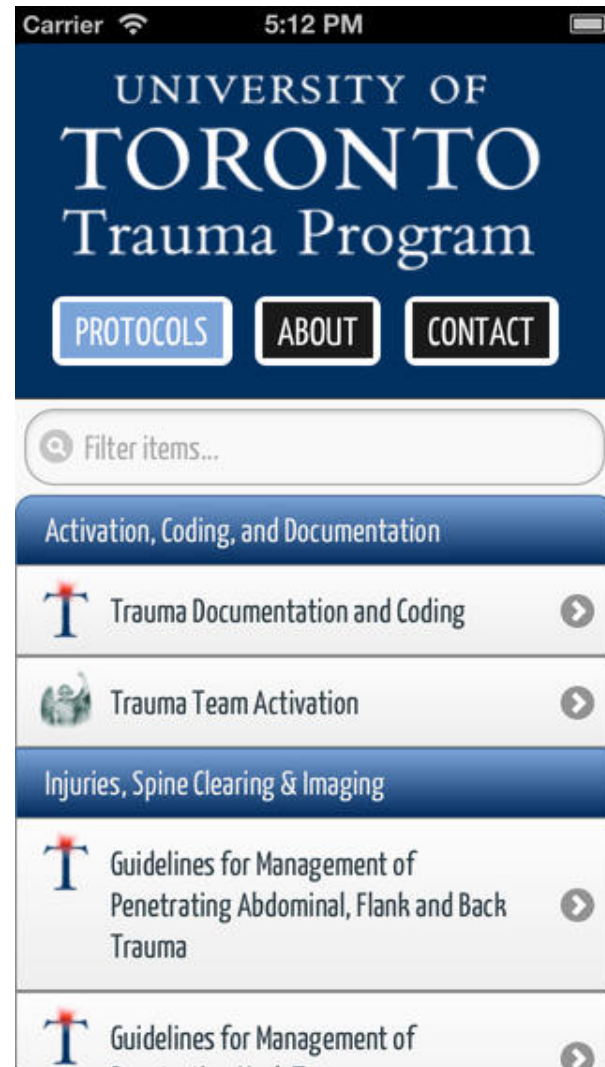
Data Driven Care

- Registry
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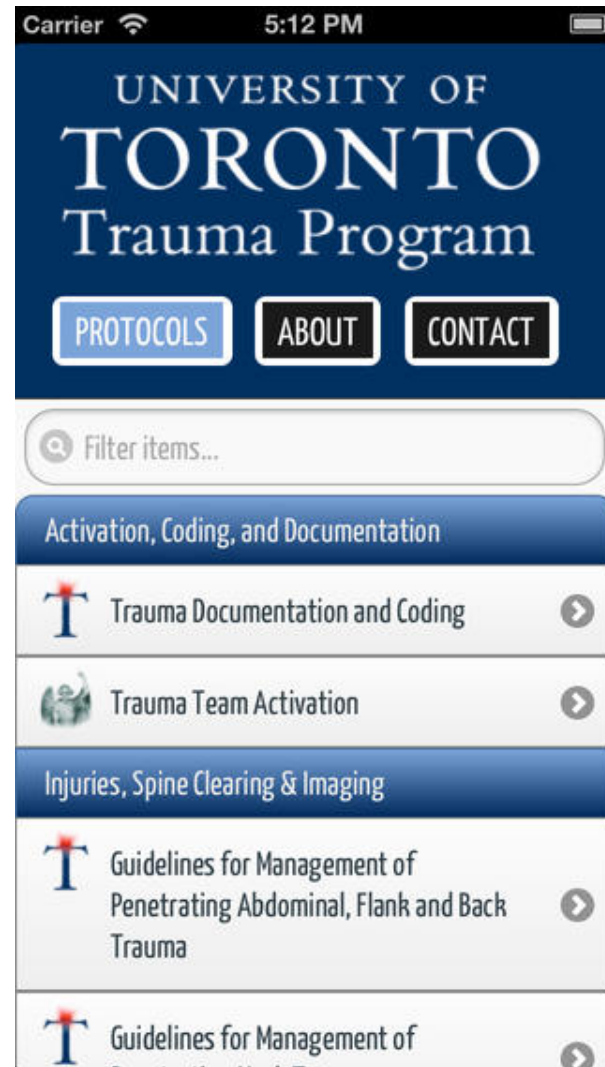
Reports

Individual Site Summary Report

July 1, 2013 through December 31, 2014

Issued May 13, 2015

ACS TQIP BENCHMARK REPORT:

Spring 2016

Michigan Trauma Quality Improvement Program (MTQIP)
2016 Performance Index
January 1, 2016 to December 31, 2016

Measure	Weight	Measure Description			Points Earned	
#1	10	**Data Submission (No Points For Partial/Incomplete Submissions)**				PARTICIPATION (50%)
		On time and complete 3 of 3 times			10	
		On time and complete 2 of 3 times			5	
		On time and complete 1 of 3 times			0	
#2	20	**Meeting Participation-Surgeon**				
		Participated in 3 of 3 meetings			20	
		Participated in 2 of 3 meetings			10	
		Participated in 1 of 3 meetings			5	
		Participated in 0 of 3 meetings			0	
#3	10	**Meeting Participation-Clinical Reviewer or Trauma Program Manager**				
		Participated in 3 of 3 meetings			15	
		Participated in 2 of 3 meetings			10	
		Participated in 1 of 3 meetings			5	
		Participated in 0 of 3 meetings			0	
#4	10	**Meeting Participation-Trauma Registrars (All Registrars Attend-Preferred)**				
		At least one Registrar per program participated in the June Registrar meeting			5	
		Did not participate			0	
#5	10	**Data Accuracy**	**First Validation Visit Error Rate**	**Two or > Validation Visits Error Rate**		PERFORMANCE (50%)
		5 Star Validation	0-4.5%	0-4.5%	10	
		4 Star Validation	4.6-5.5%	4.6-5.5%	8	
		3 Star Validation	5.6-8.0%	5.6-7.0%	5	
		2 Star Validation	8.1-9.0%	7.1-8.0%	3	
		1 Star Validation	>9.0%	>8.0%	0	
#6	10	**Site Specific Quality Initiative Using MTQIP Data (Feb 2016-Feb 2017)**				
		Developed and implemented with evidence of improvement			10	
		Developed and implemented with no evidence of improvement			5	
		Not developed or implemented			0	
#7	10	**Mean Ratio of Packed Red Blood Cells (PRBC) to Fresh Frozen Plasma (FFP) in Patients Transfused >5 Units RBC In First 4 Hrs (18 Months Data)**				
		Tier 1: < 1.5			10	
		Tier 2: 1.6-2.0			10	
		Tier 3: 2.1-2.5			5	
		Tier 4: >2.5			0	
#8	10	**Admitted Patients (Trauma Service-Cohort 2) With Initiation of Venous Thromboembolism (VTE) Prophylaxis <48 Hours After Arrival (18 Months Data)**				
		>50%			10	
		>40%			5	
		<40%			0	
#9	10	**COLLABORATIVE WIDE INITIATIVE: Inferior Vena Cava Filter Use**				
		<1.5			10	
		>1.5			0	
				Total (Max Points) =	100	

MTQIP Outcomes

- Web-based platform - ArborMetrix
- Time period
- Rates
  - Risk and Reliability adjusted
  - Red line is mean   ------------
- Legend
  - ☐ Low-outlier status (better performance)
  - ▨ Non-outlier status (average performance)
  - ■ High-outlier status (worse performance)

MTQIP Data

HOSPITALS

APPLY

COHORT

Cohort 1 (All)

DEAD

No Filter

NO SIGNS OF LIFE

Include DOAs

ISS

ALL

AGE

ALL

TRANSFERS OUT

Include Transfers Out

PERIOD GROUP

Default Periods

DEFAULT PERIODS

Program To Date

TRENDING INTERVAL

Annual

PEER GROUPS

MTQIP - All

LEGEND   ▮   ▮ MTQIP - All   ▮ Other Hospitals   — MTQIP - All   ▮ 95% Confidence Interval

Ventriculostomy (Manage)

2011   2012   2013   2014   2015

TBI Management	Cases Numerator	Cases Denominator
TBI Patients		
Dead (with TBI)		
Alive w/o Intervention		
Alive with Intervention		
Dead w/o Intervention		
Dead with Intervention		
Dead and Intervention Withheld		
Any Intervention (Manage)		
Brain Operation (Manage)		
Any Monitor (Manage)		
Ventriculostomy (Manage)		
IPPM (Manage)		

MTQIP - All - Unadj	MTQIP - All - Adj	P Value (unadj)	P Value

Login

USER NAME

PASSWORD

Forgot Password ?   **LOGIN**

Request Access

Don't have a username and password? Please click the link below to request an account.

REQUEST ACCESS

Hospital must be an MTQIP participant.

To request an account :

Go to home screen and click on "Request Access"

Fill out all of the fields and submit

Problems? 734 763-2854

Mortality (Cohort 1 w/o DOA's)

% (y-axis)

Trauma Center (x-axis)
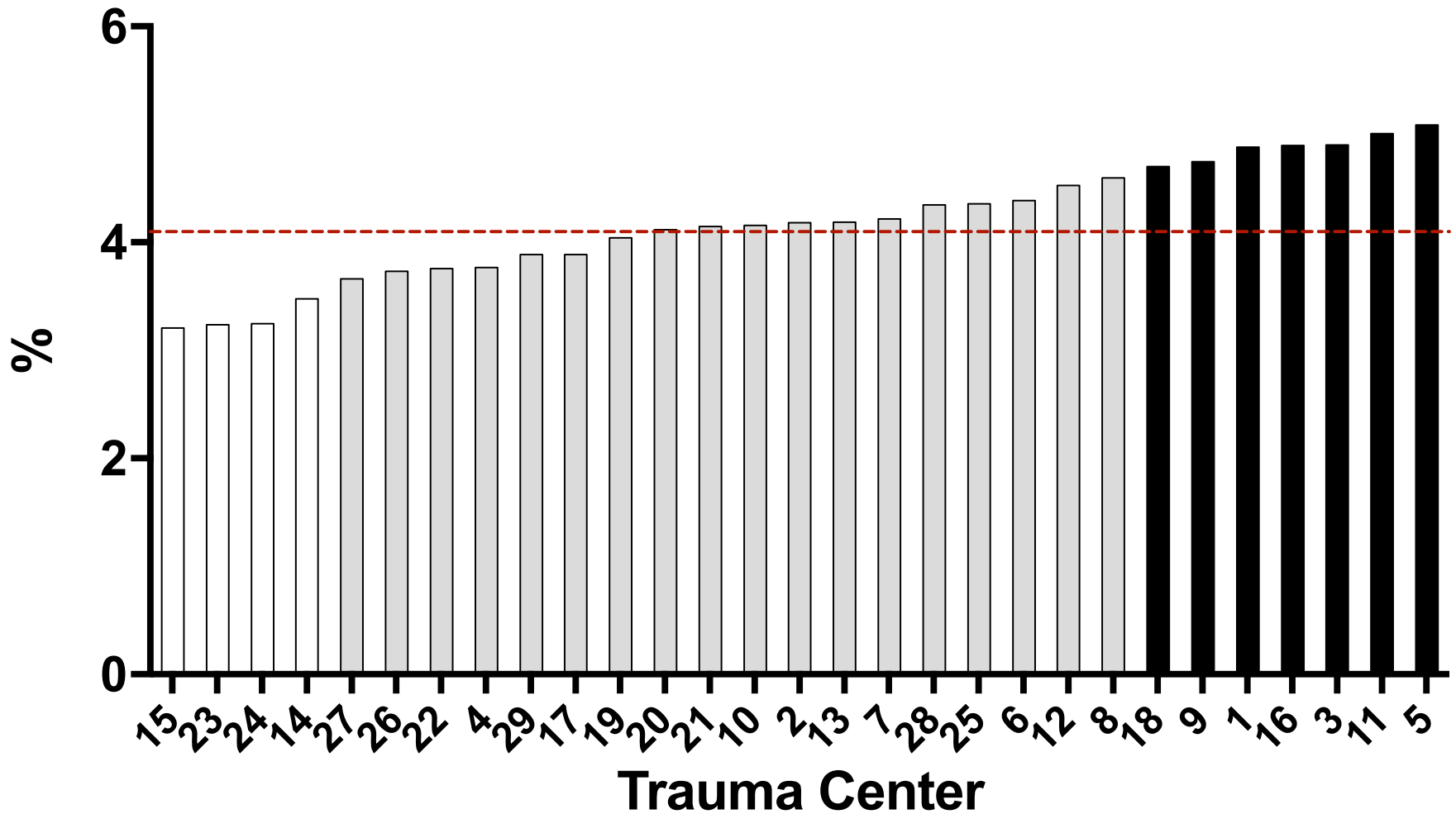
Mortality or Hospice (Cohort 1 w/o DOA's)

Complications (Serious)

%

Trauma Center
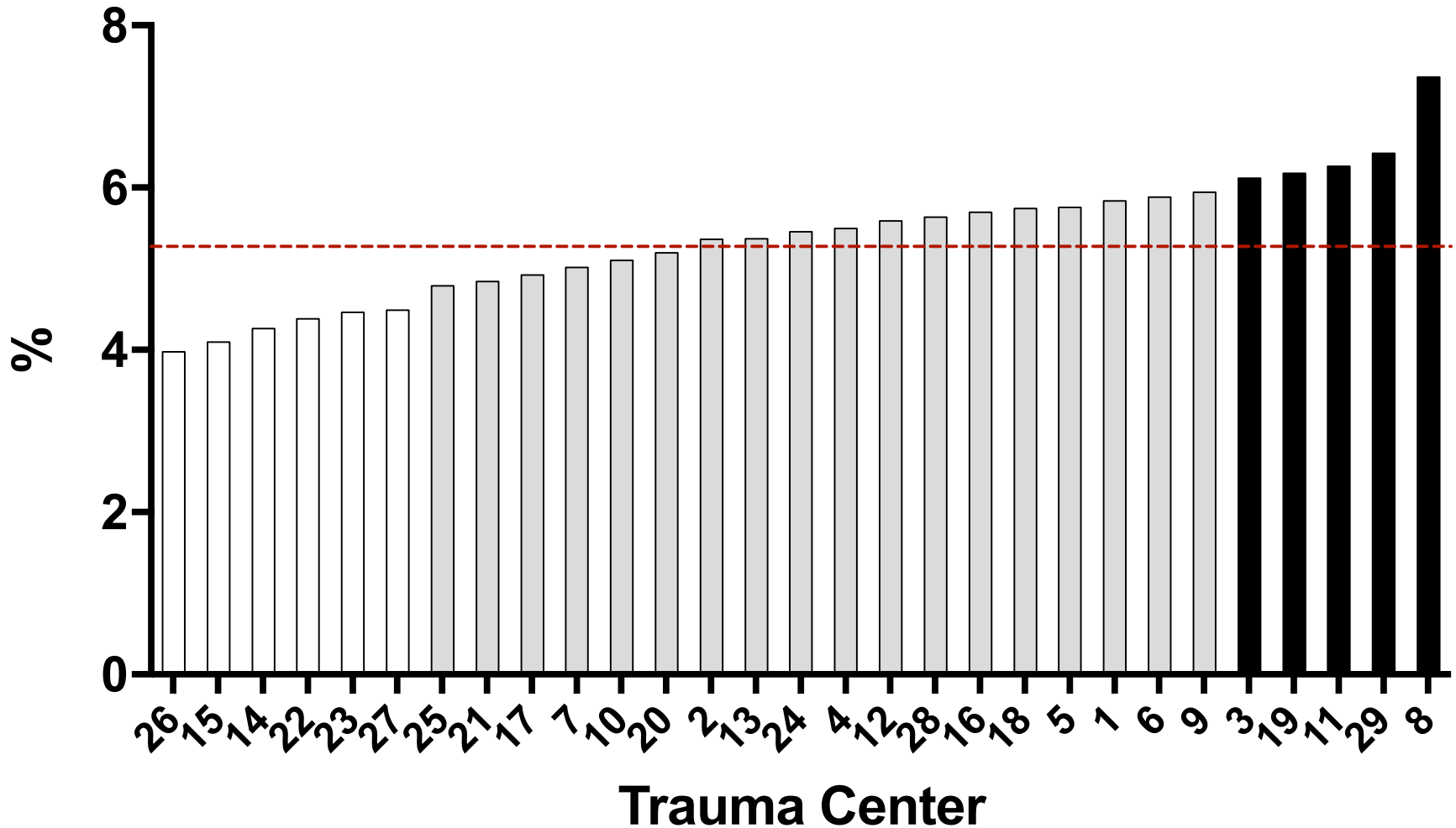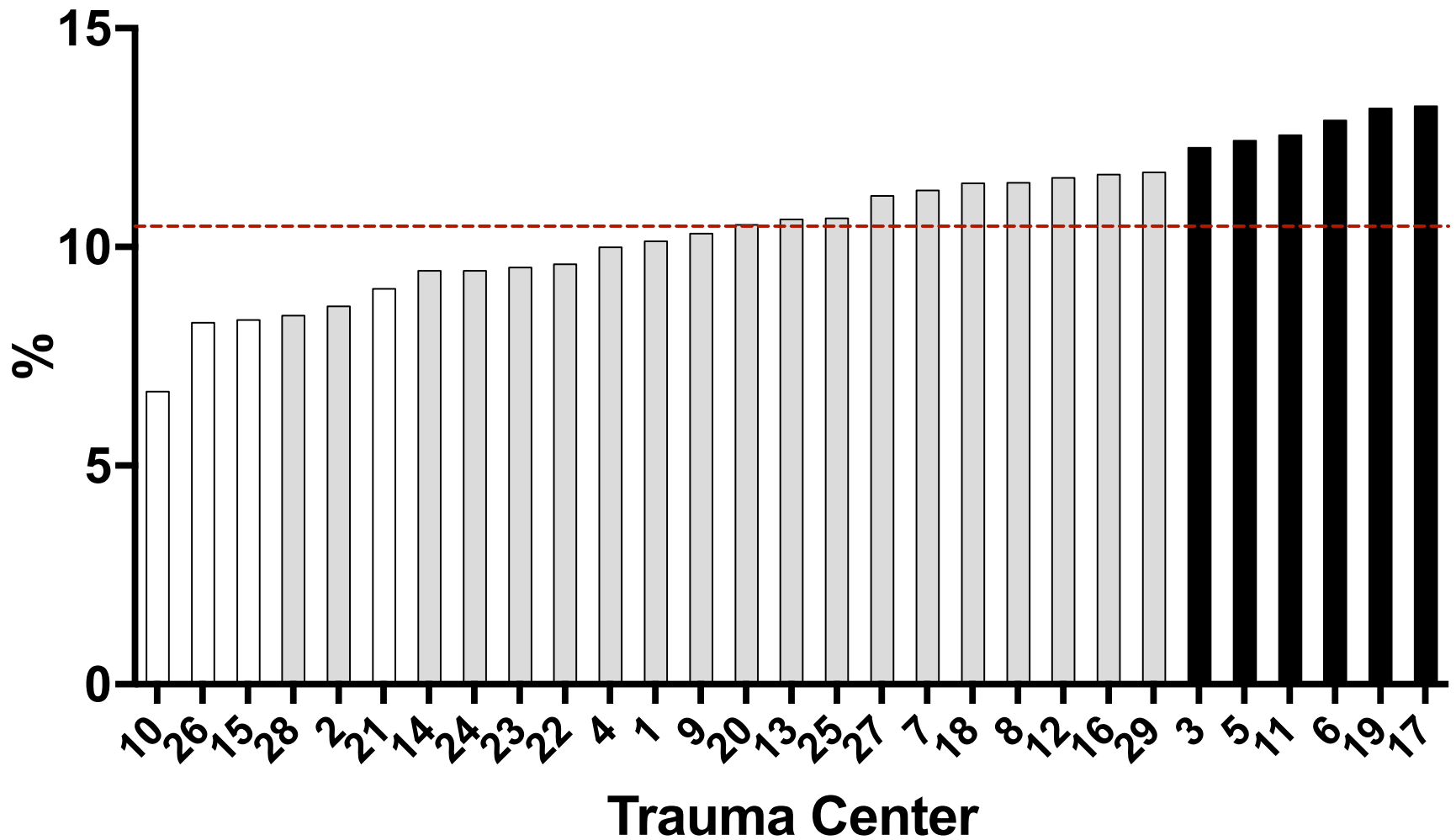
Consortium Outcomes Overview Serious Cx
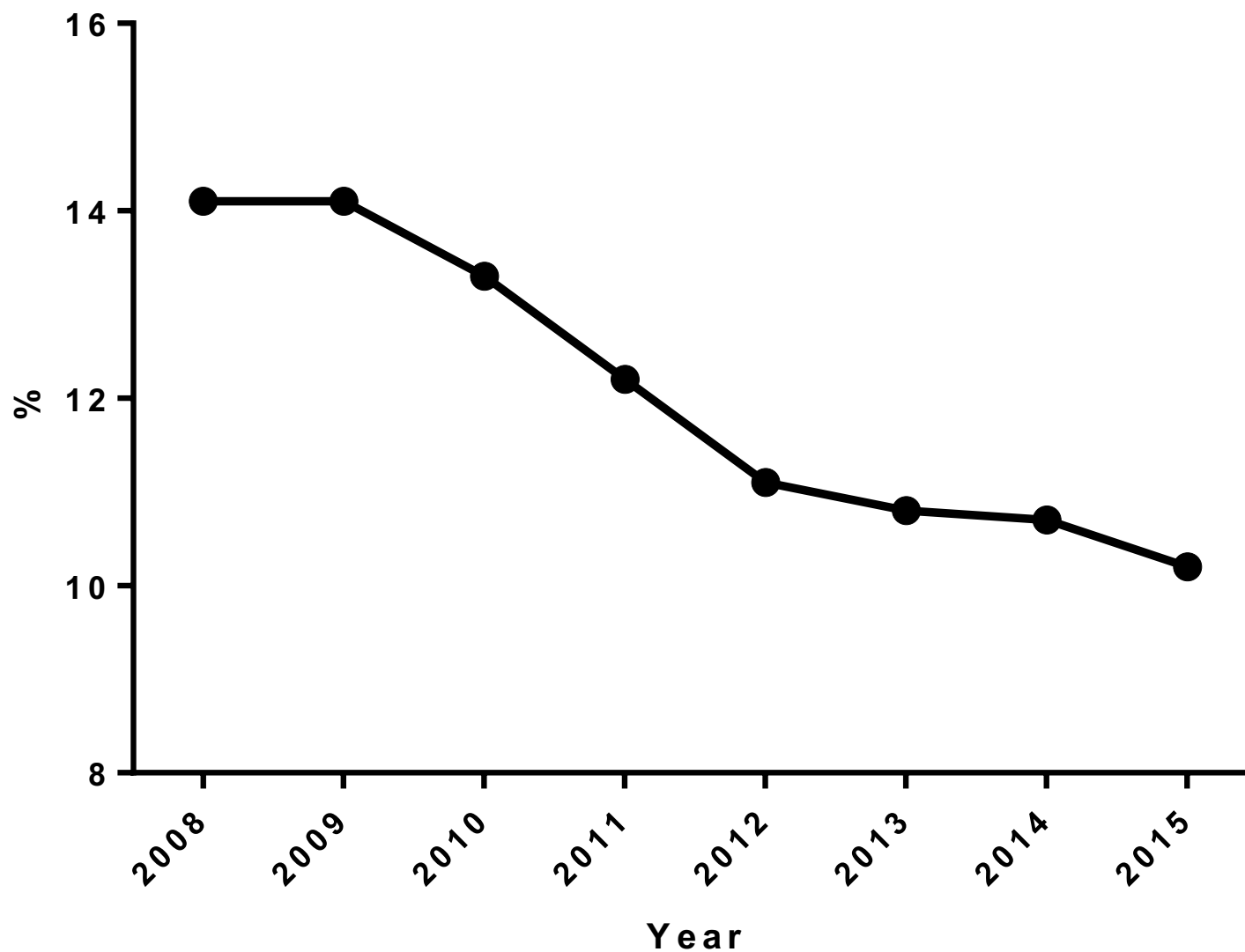
Case #1

Case #1

- Question 1
  - What course of action would you choose?
    - A) Medical therapy with hypertonic saline
    - B) Intraparenchymal pressure monitor
    - C) Ventriculostomy
    - D) ICP Monitor and hypertonic saline

Case #1

- Question 2
  - What course of action would you choose?
    - A) Medical therapy with hypertonic saline
    - B) Medical therapy with hypertonic saline and pentobarbital coma
    - C) Craniectomy

Case #2

Case #2

- Question 3
  - What course of action would you choose?
    - A) Medical therapy with hypertonic saline
    - B) Intraparenchymal pressure monitor
    - C) Ventriculostomy
    - D) ICP Monitor and hypertonic saline
    - E) Operative evacuation

Traumatic Brain Injury

- TBI Mortality
  - Crude
  - Risk adjusted
- % of eligible patients with a TBI intervention
  - Operation
  - Monitor
- % of TBI intervention patients with timely intervention ($\leq$ 8 hrs after arrival)
- Reason for withholding intervention

Brain Injury

- Selection Criteria
  - Abbreviated Injury Scale (AIS) Head > 0, excluding vascular, scalp, and bony injuries
  - Exclude if penetrating mechanism
  - Exclude if no signs of life
  - Exclude if direct admission transfer
  - Exclude if maximum GCS>8 and lowest GCS>8
    - First 24 hrs

TBI Mortality (Raw)
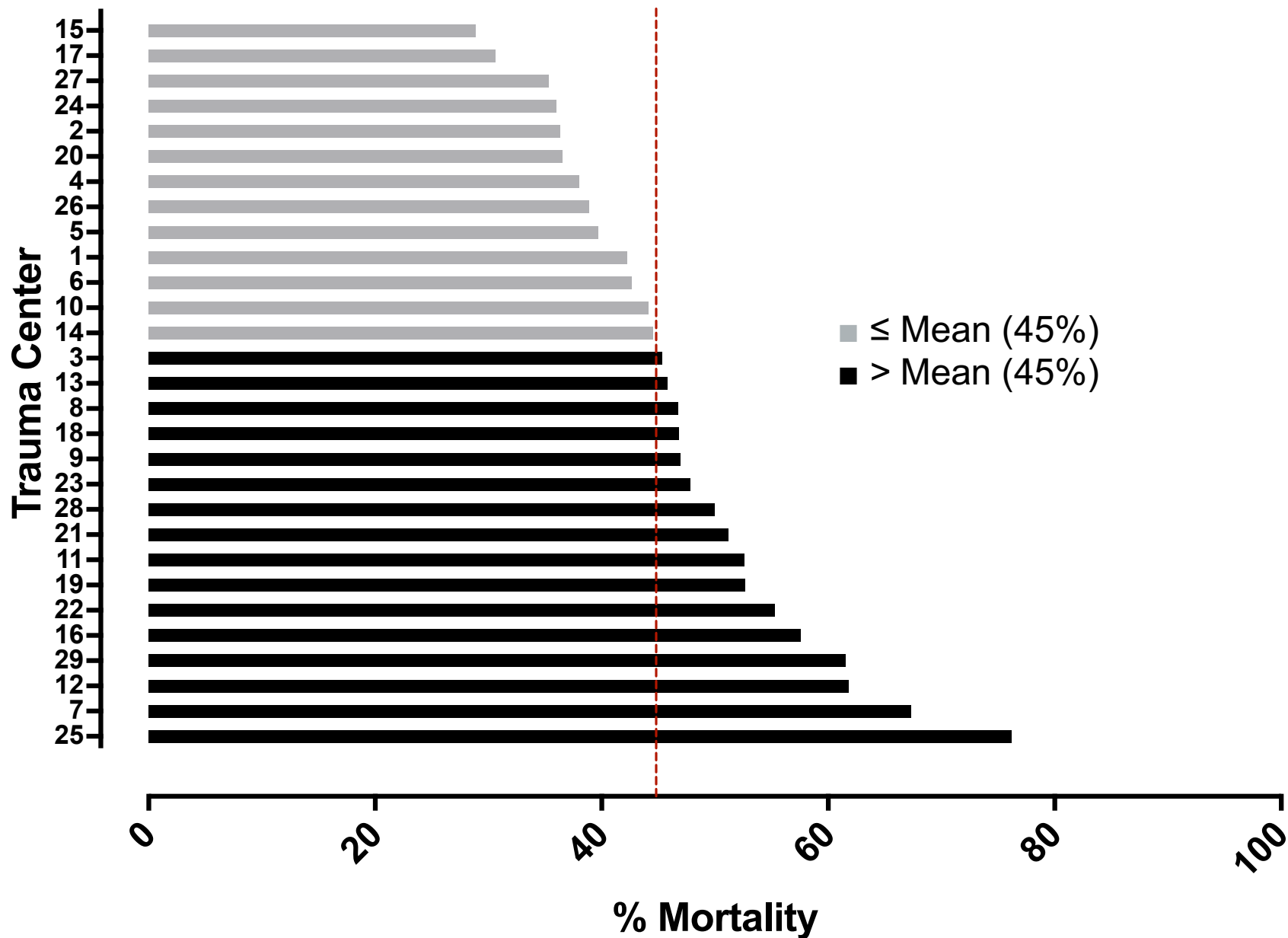
Mortality GCS 3-8
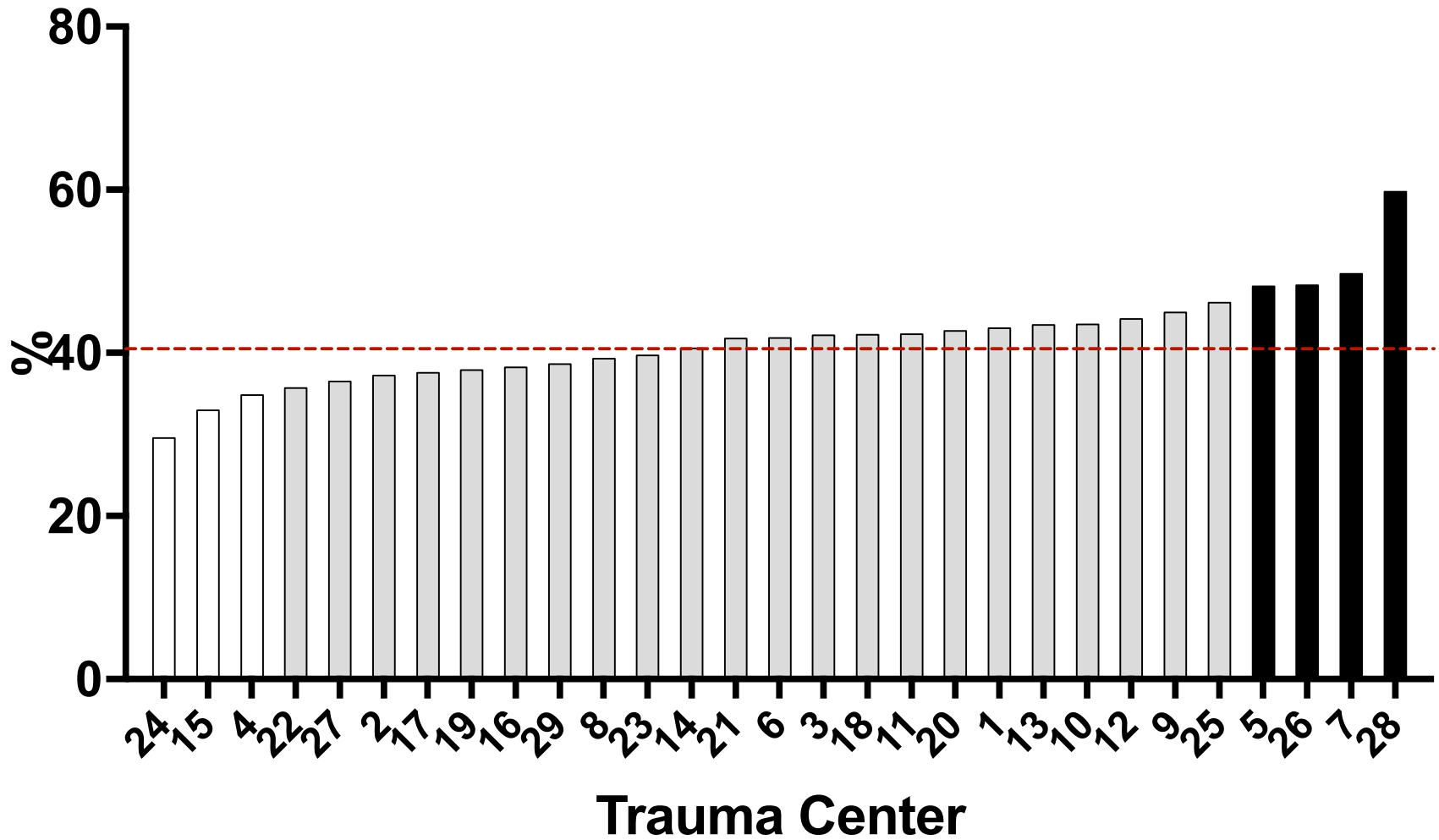
Adjusted TBI Mortality
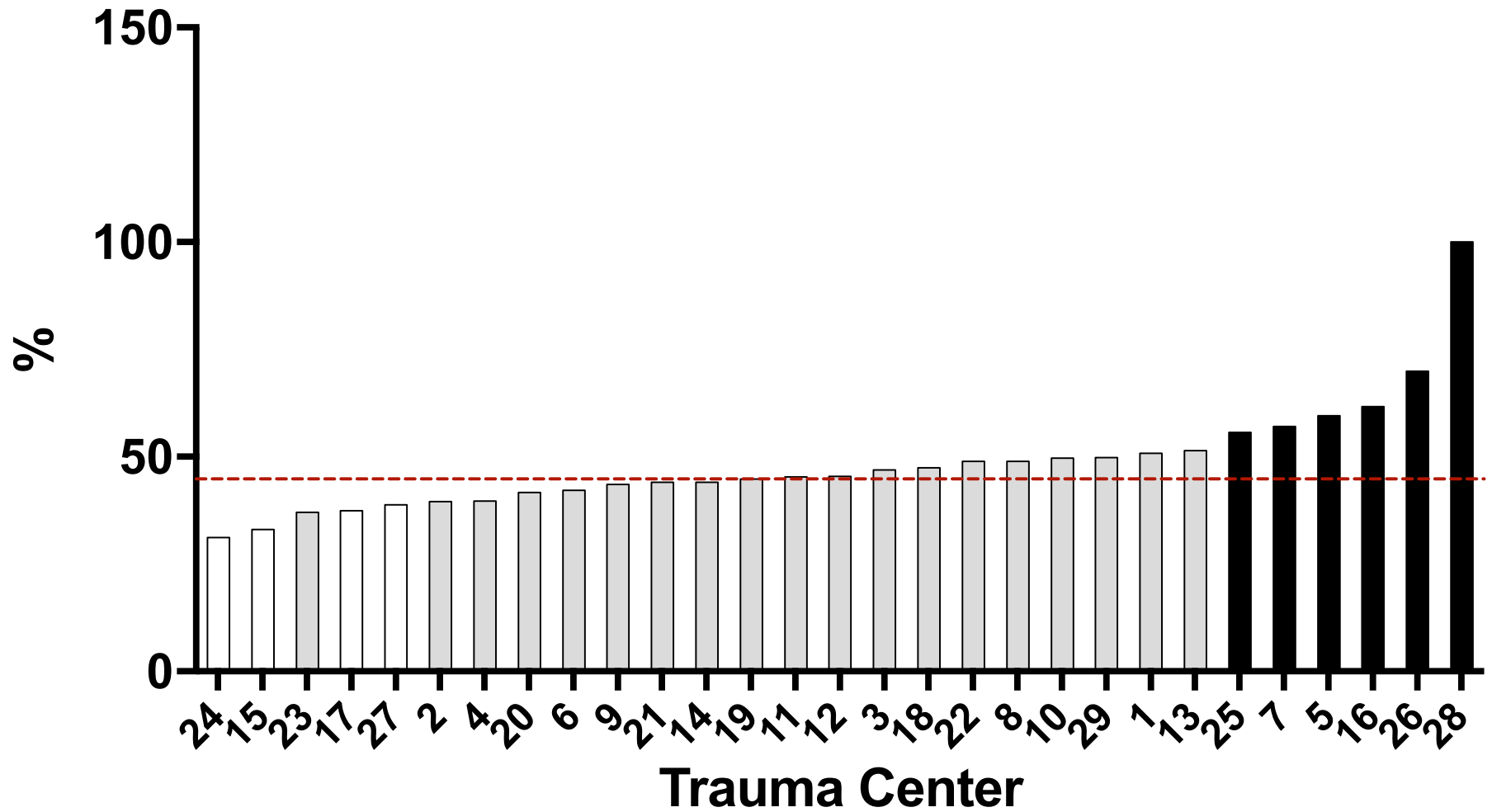
TBI Intervention

Eligible = N - Alive w/o intervention - Dead and monitor withheld for reason

■ ≤ Mean Mortality (45%)
■ > Mean Mortality (45%) and High % Eligible without ICP Monitor or Brain Operation

% Eligible without ICP Monitor or Brain Operation
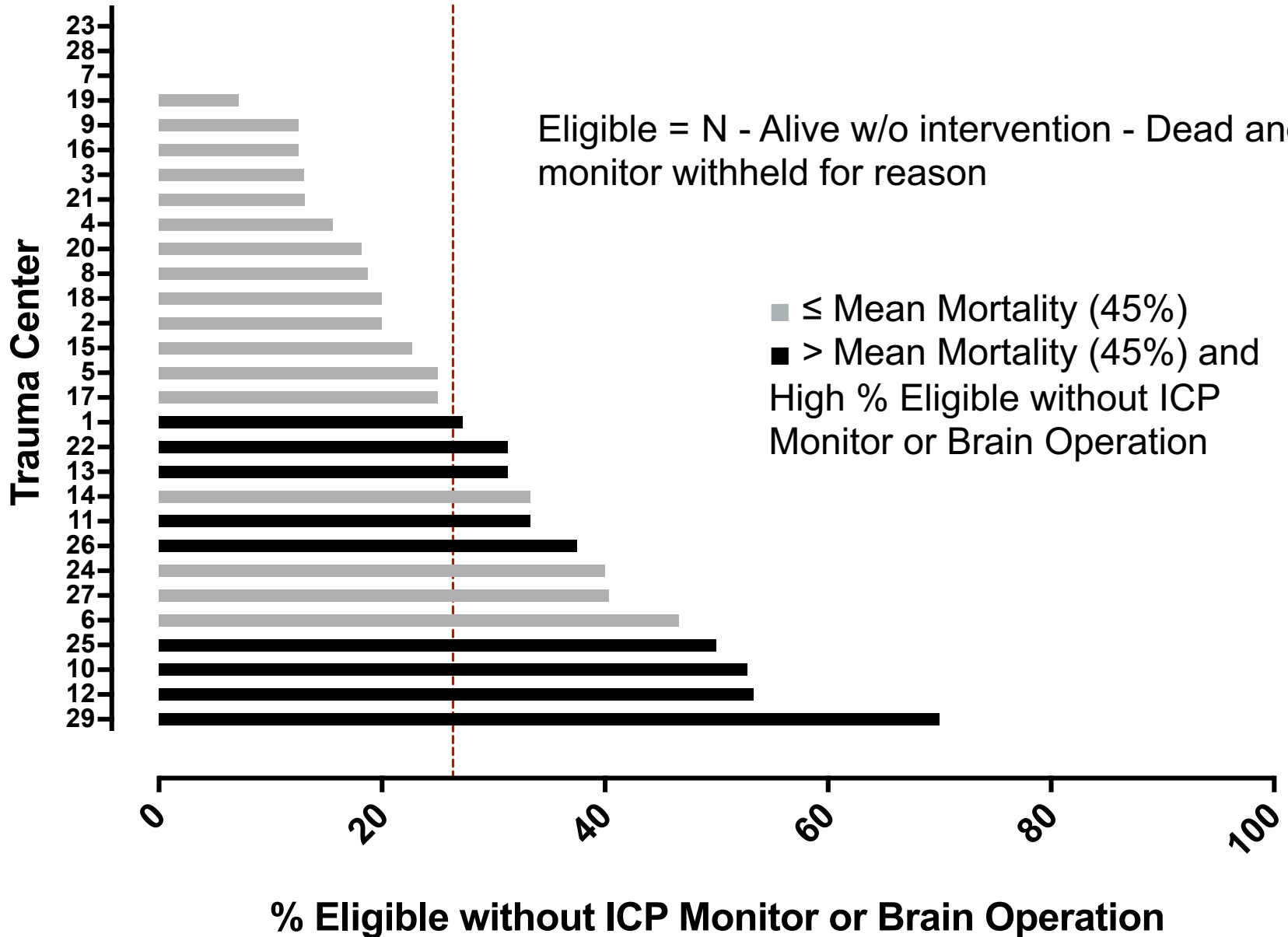
Monitor Withheld for Reason

- Not Known/Not Recorded
- Decision to withhold life sustaining measures
- Death prior to correction of coagulopathy
- Expected to improve within 8 hours due to effects of alcohol and/or drugs
- Operative evacuation with improvement post-op
- No ICP because of coagulopathy
- Attempt made, but unsuccessful due to technical issues
- Neurosurgical discretion

TBI Intervention Timing
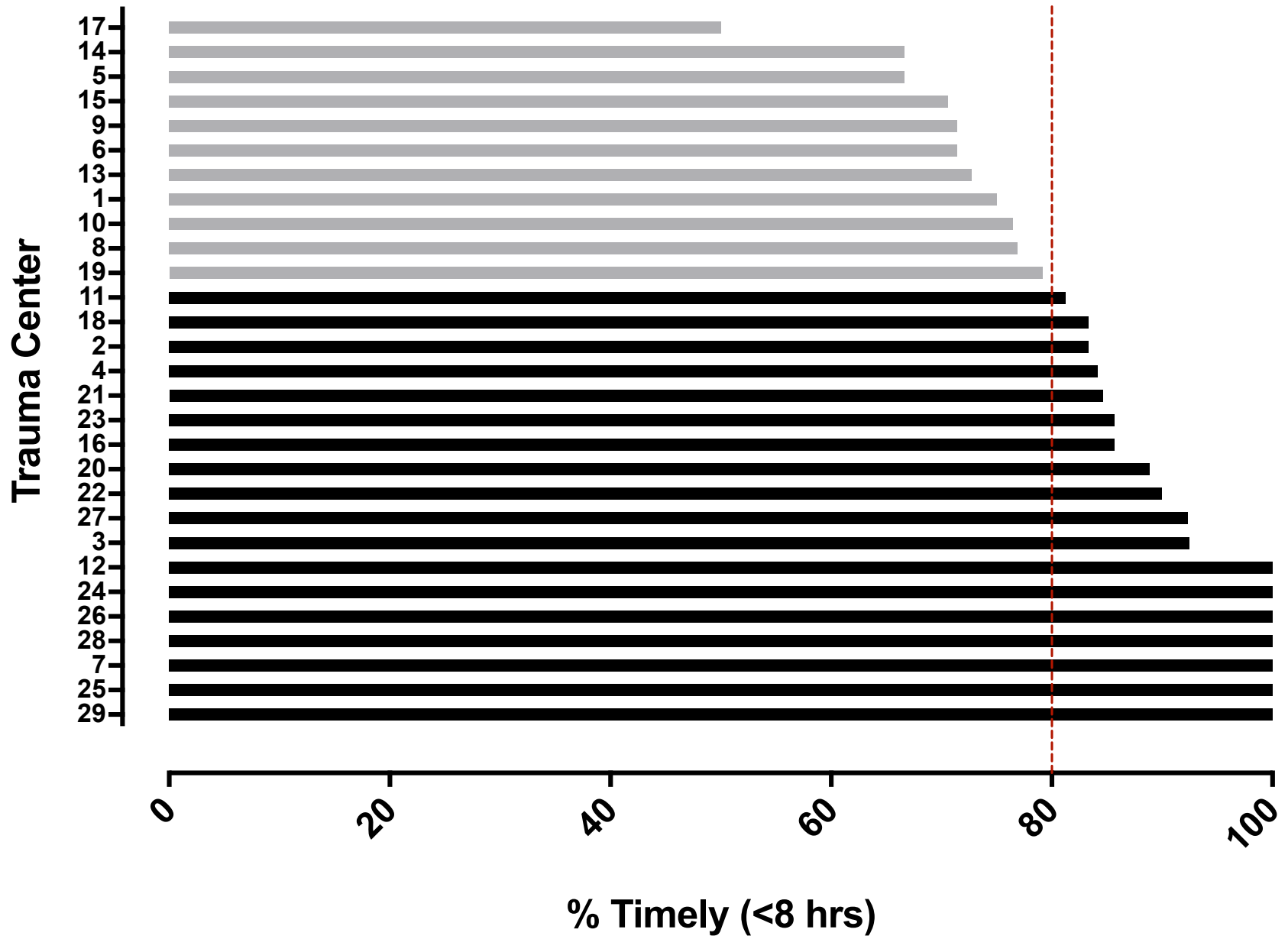
Why do I have these results?

- Feedback does not always correlate with performance.
  - Warning light
  - Delve into data

Why do I have these results?

- Data
  - Capture
    - Available in Medical Record
    - Source
  - Definition
    - MTQIP Data Dictionary
    - Validation
- Real "It must be me"
  - Review Patients
  - Explanation? Yes or No
  - What do you do – process of care

Novel Neuroprotective Strategies

Hasan B. Alam, MD
University of Michigan

M·TQIP

Lunch

Return at 1:15 pm

Risk-Adjusted Mortality by Cohort
TQIP Report ID: Michigan

| Decile | 5 | 7 | 10 | 10 | 9 | 4 | 4 | 9 |

Odds Ratio

| OR | 0.96 | 1.06 | 1.46 | 1.15 | 1.49 | 0.88 | 0.95 | 1.09 |

All Patients | Blunt Multisystem | Penetrating | Shock | Severe TBI | Elderly | Elderly Blunt Multisystem | Isolated Hip Fracture

Patient Cohort
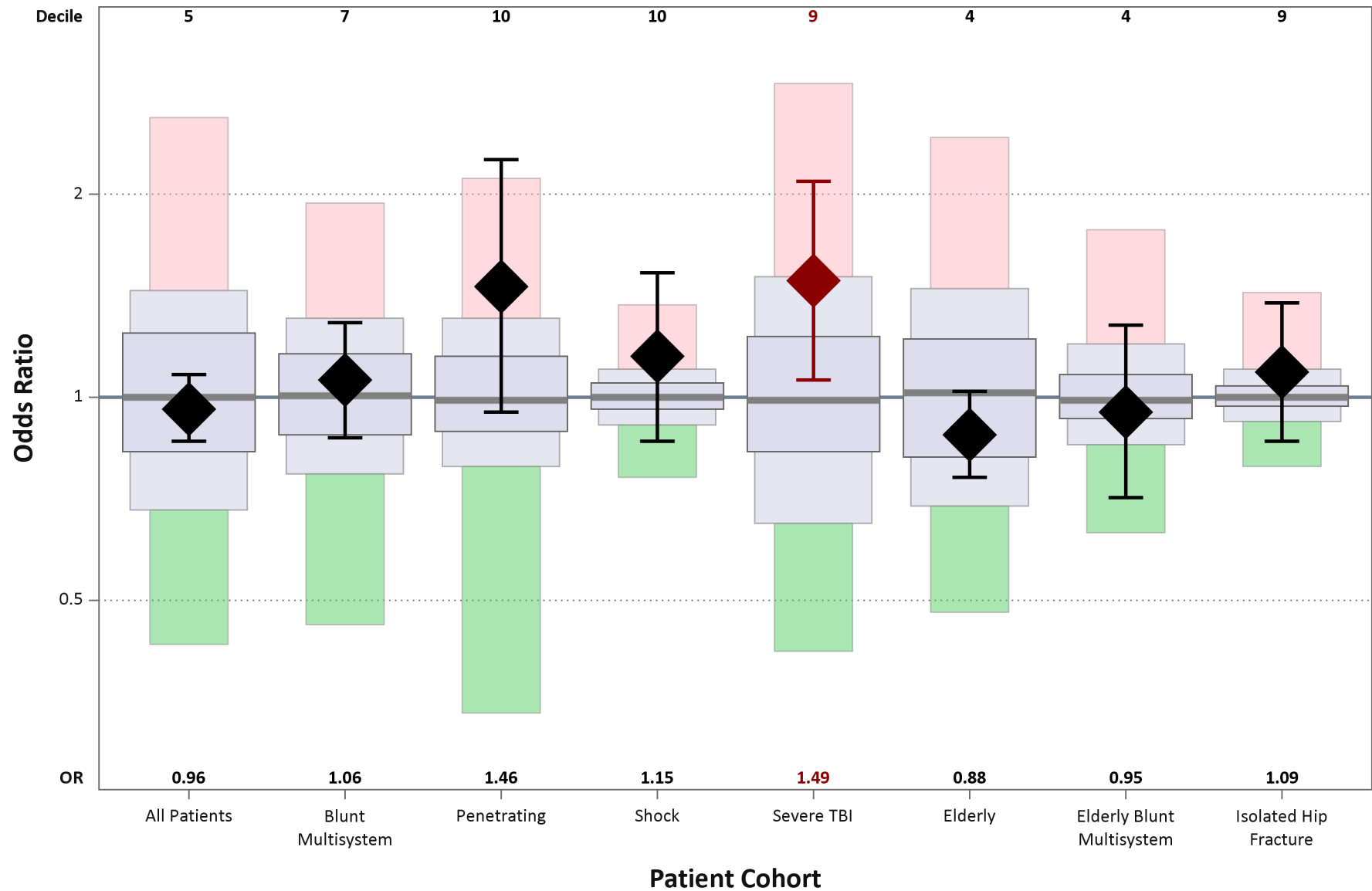
Severe Traumatic Brain Injury

- AIS Severity 3 or greater in head body region
- Initial ED/Hospital GCS Total 8 or less
- No other severe (AIS>2) injuries in non-head region
- Exclude select injuries
  - Scalp laceration
  - Internal carotid artery
  - Vertebral artery
  - Skull fracture
- Includes penetrating

Odds Ratios (95% Confidence Intervals) by TQIP Hospital; Mortality

OR Ranges:
Low = 0.42-0.48
Average = 0.45-1.97
High = 1.49-2.87

Odds Ratio
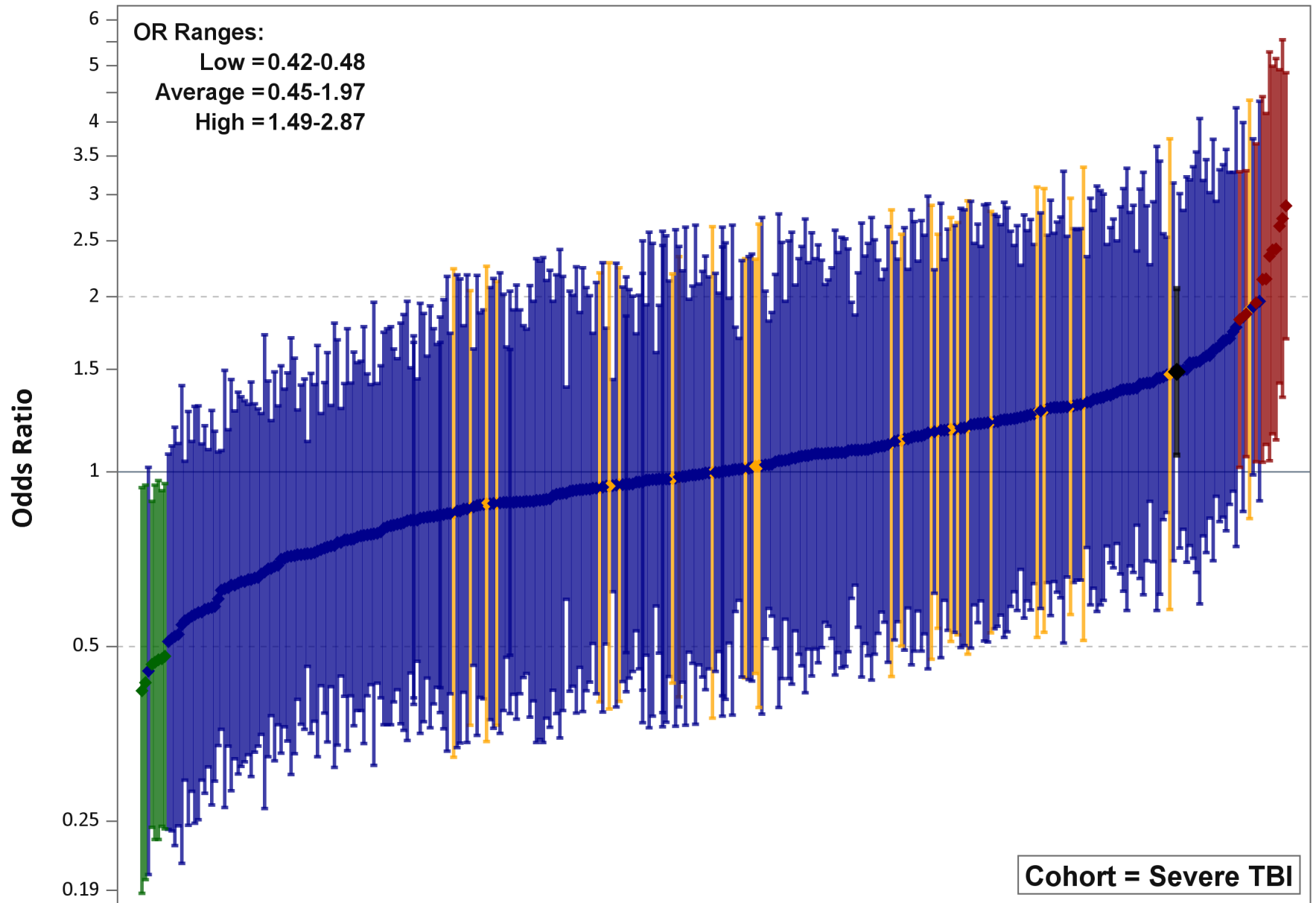
Cohort = Severe TBI

Risk-Adjusted Mortality by Cohort
TQIP Report ID: Michigan
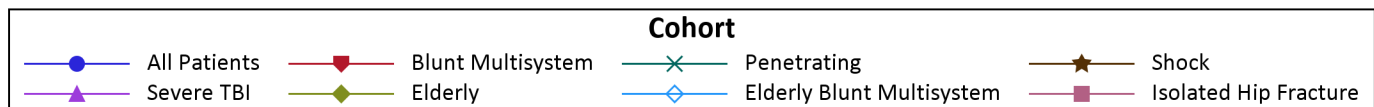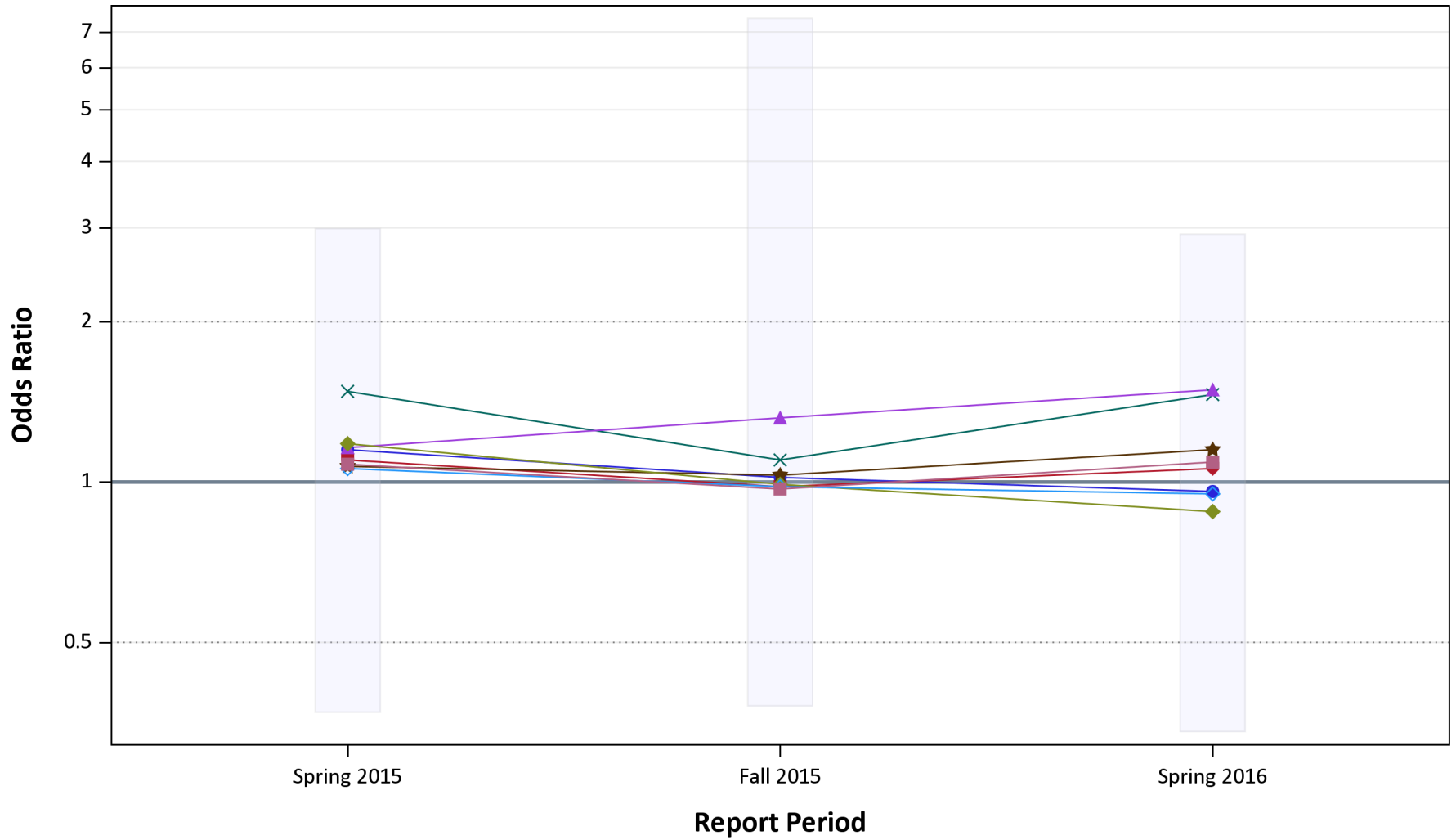
ACS-TQIP

- **Severe TBI**
  - **ICP Monitor**
    - All Others 18%
    - Collaborative 24%
  - **Time to ICP Monitor**
    - All Others Median 3.3 hrs
    - Collaborative 3.0 hrs

Back to MTQIP Data

TBI Intervention > excluding DOA, program to date

LEGEND ■ Alive w/o Intervention ■ Alive with Intervention

100%

80%

60%

40%

20%

0%

MTQIP - All

TBI – excluding DOA, program to date

TBI – excluding DOA, program to date

TBI – excluding DOA, program to date, age $\geq$ 65

LEGEND
- Alive w/o Intervention
- Alive with Intervention
- Dead w/o Intervention
- Dead with Intervention

Demo

Case #3

Case #3

- Question 4
  - What course of action would you choose?
    - A) No pharmacologic VTE prophylaxis
    - B) VTE prophylaxis with Heparin 5000 u SQ TID
    - C) VTE prophylaxis with LMWH 30 mg SQ BID

Case #3

- Question 5
  - What course of action would you choose?
    - A) Goals of care conversation
    - B) Discontinue VTE prophylaxis, no OR, continued medical management
    - C) Operation

Case #4

Case #4

- Question 6
  - What course of action would you choose?
    - A) Goals of care conversation
    - B) Medical therapy with hypertonic saline
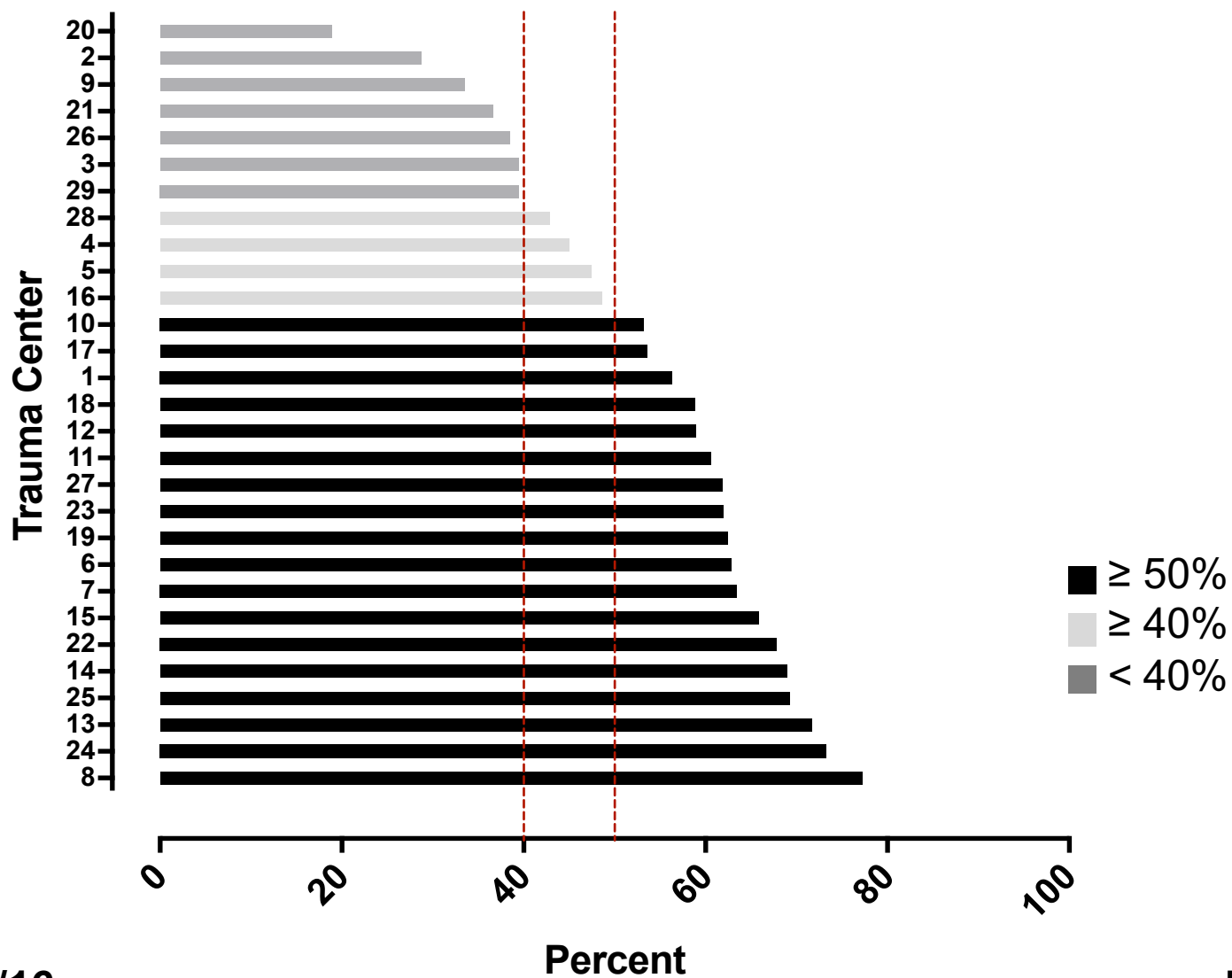   - B) ICP Monitor and hypertonic saline
    - C) Craniectomy

Case #4

- Question 7
  - What course of action would you choose?
    - A) No pharmacologic VTE prophylaxis
    - B) VTE prophylaxis with Heparin 5000 u SQ TID
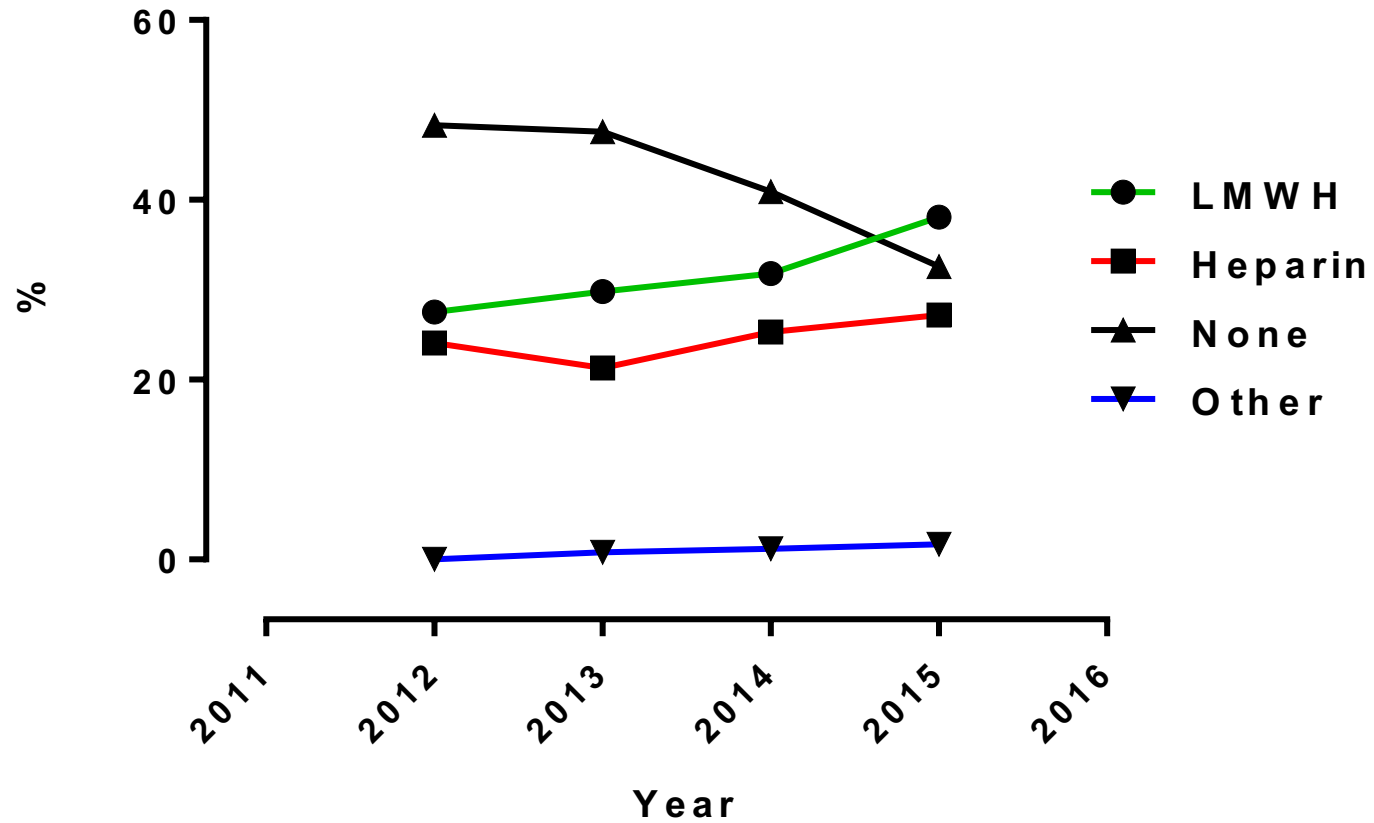   - C) VTE prophylaxis with LMWH 30 mg SQ BID

VTE Prophylaxis

- Admit Trauma Service (Cohort 2)
  - Discharge Home in 48 hrs = Drop
  - Dead day 0,1,2 = Drop
  - In hospital with no VTE pro = None
  - VTE Prophylaxis ≤ 48 hrs = Count
  - VTE Prophylaxis > 48 hrs = Count
  - 5/1/14 – 1/31/16
- Rate
  - ≥ 50% (10 points)
  - ≥ 40% (5 points)
  - 0 – 39% (0 points)

VTE Prophylaxis by 48 hrs

Legend:
- ≥ 50% (black)
- ≥ 40% (light gray)
- < 40% (dark gray)

X-axis: Percent

Y-axis: Trauma Center

Type VTE Prophylaxis

VTE Prophylaxis Results
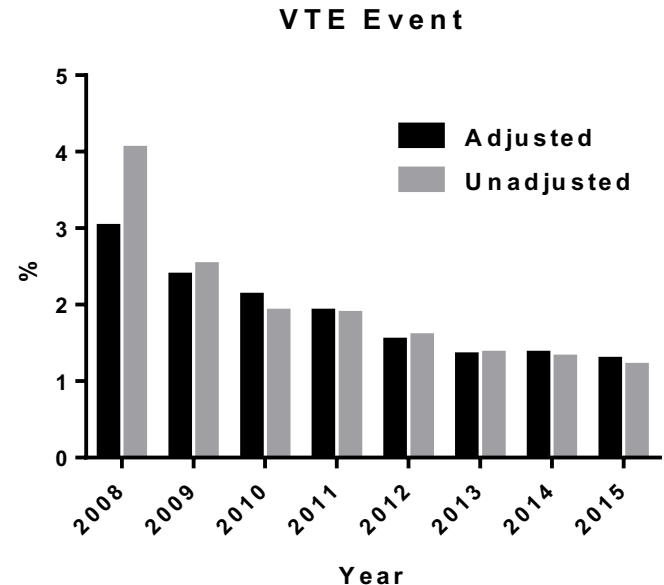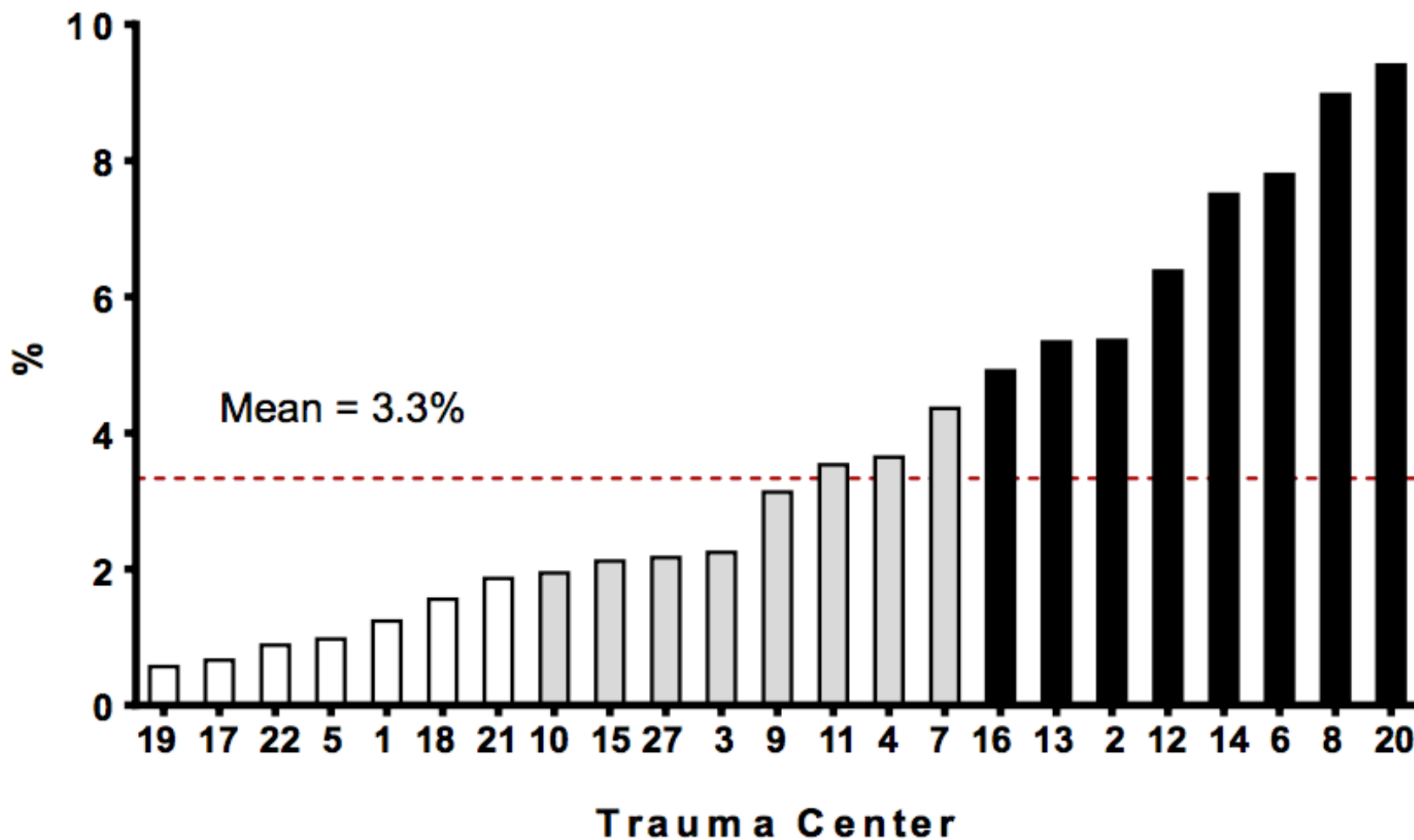
◆ VTE

  ■ VTE Rate

   • Begin = 2.5 %

   • Previous = 1.4 %

   • Current = **1.3 %**

   • Target = 1.5 %

  ■ 48 hr VTE Prophylaxis Rate

   • Begin = 38 %

   • Previous = 44 %

   • Current = **53 %**

   • Target = 50 %

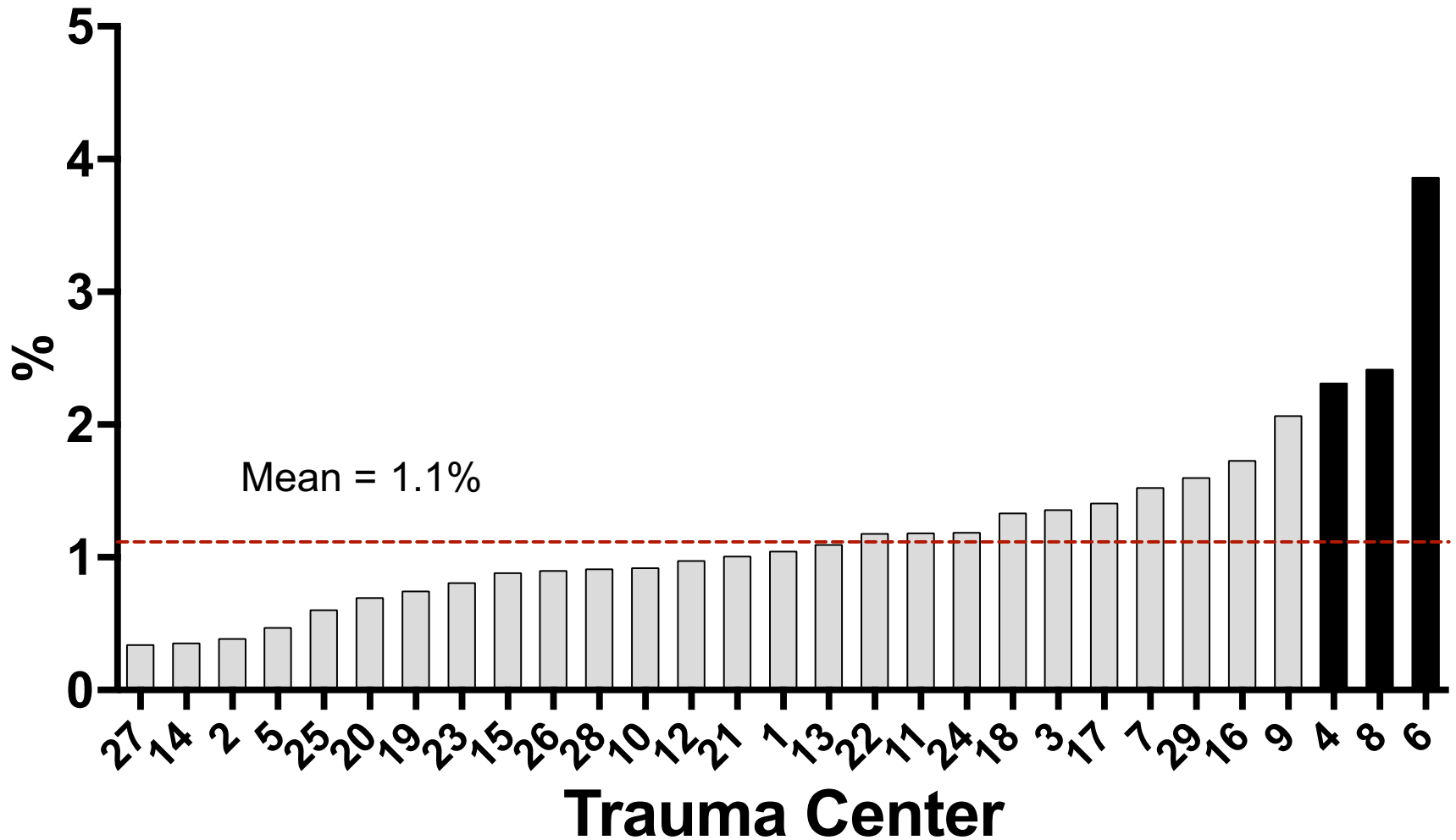**VTE Event**

- Adjusted
- Unadjusted

Year

Risk and Reliability Adjusted IVC Filter Use

1/1/10 to 12/31/11

Risk and Reliability Adjusted IVC Filter Use

Mean = 1.1%

% (y-axis)

Trauma Center (x-axis)

Risk and Reliability Adjusted IVC Filter Use
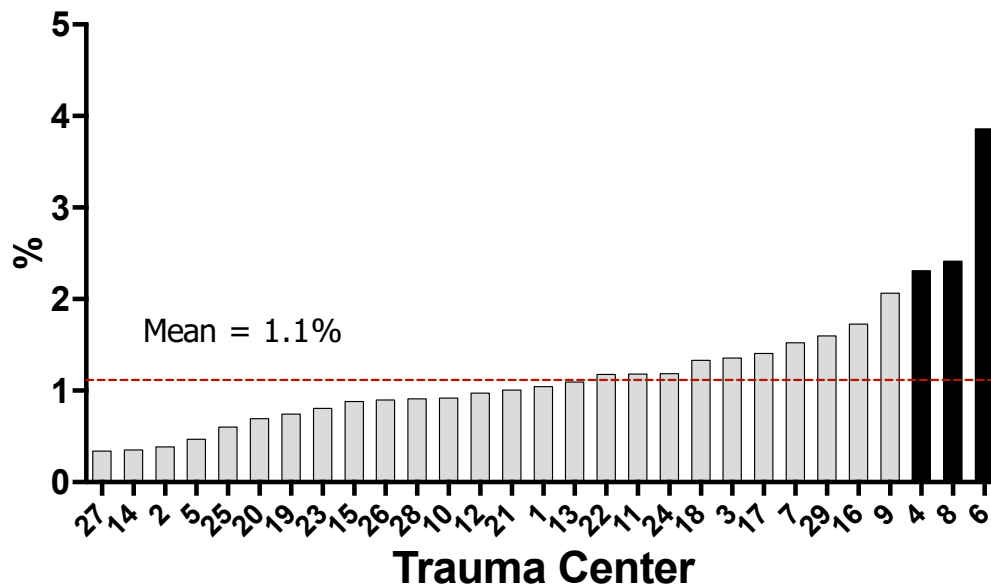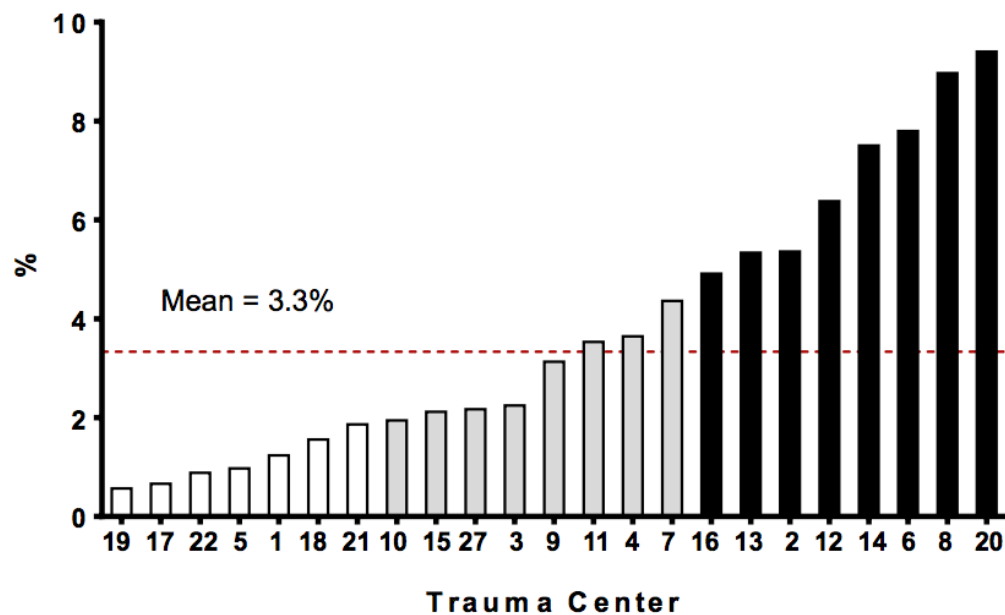
IVC Filter Use
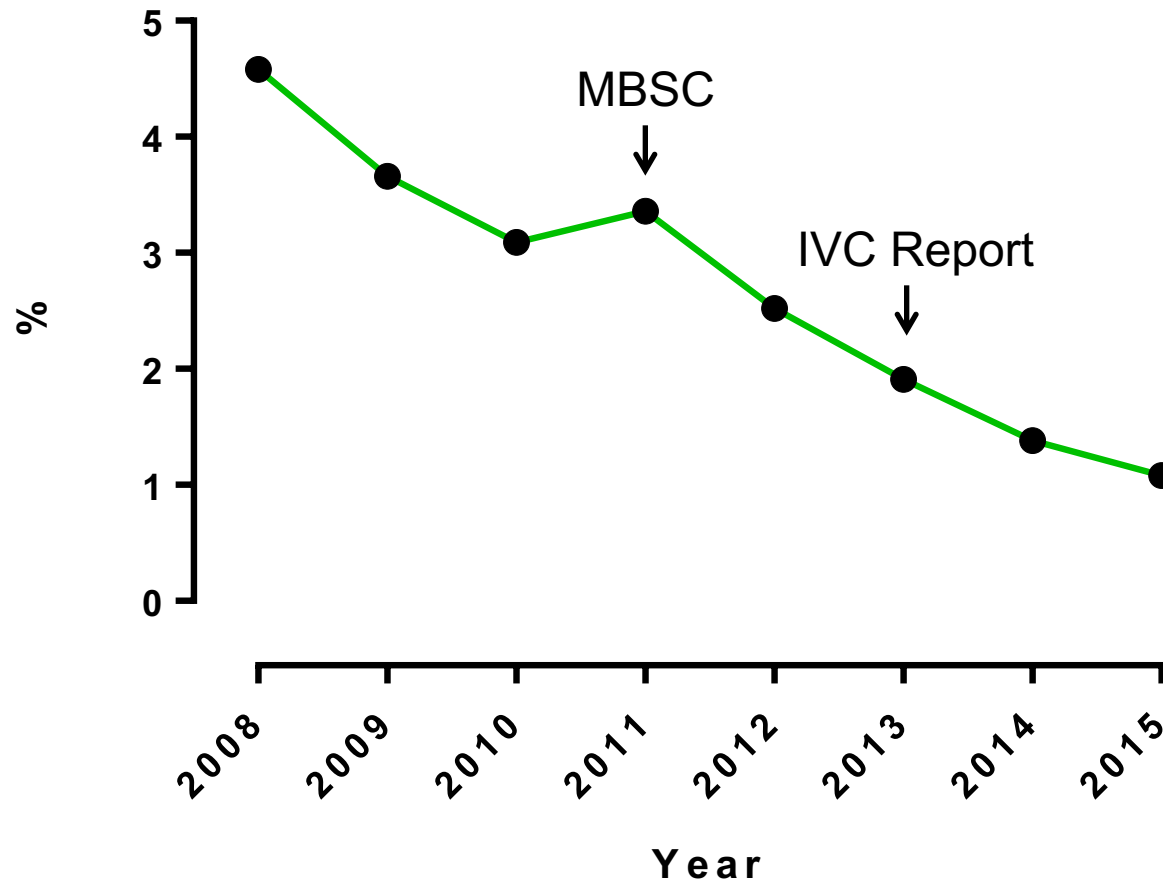
Prophylactic Inferior Vena Cava Filter Placement Does Not Result in a Survival Benefit for Trauma Patients

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Sujal G. Patel, MD,‡ Anne H. Cain-Nielsen, MS,* and Nancy J. Birkmeyer, PhD*

Objective: Trauma patients are at high risk for life-threatening venous thromboembolic (VTE) events. We examined the relationship between prophylactic inferior vena cava (IVC) filter use, mortality, and VTE.

Summary Background Data: The prevalence of prophylactic placement of IVC filters has increased among trauma patients. However, there exists little data on the overall efficacy of prophylactic IVC filters with regard to outcomes.

Methods: Trauma quality collaborative data from 2010 to 2014 were analyzed. Patients were excluded with no signs of life, Injury Severity Score <9, hospitalization <3 days, or who received IVC filter after occurrence of VTE event. Risk-adjusted rates of IVC filter placement were calculated and hospitals placed into quartiles of IVC filter use. Mortality rates by quartile were compared. We also determined the association of deep venous thrombosis (DVT) with the presence of an IVC filter, accounting for type and timing of initiation of pharmacological VTE prophylaxis.

Results: A prophylactic IVC filter was placed in 803 (2%) of 39,456 patients. Hospitals exhibited significant variability (0.6% to 9.6%) in adjusted rates of IVC filter utilization. Rates of IVC placement within quartiles were 0.7%, 1.3%, 2.1%, and 4.6%, respectively. IVC filter use quartiles showed no variation in mortality. Adjusting for pharmacological VTE prophylaxis and patient factors, prophylactic IVC filter placement was associated with an increased incidence of DVT (OR = 1.83; 95% CI, 1.15–2.93, P-value = 0.01).

Conclusions: High rates of prophylactic IVC filter placement have no effect on reducing trauma patient mortality and are associated with an increase in DVT events.

Keywords: inferior vena cava filter, quality improvement, trauma outcomes, venous thromboembolism

BACKGROUND

The first inferior vena cava (IVC) filter was developed by a surgeon: Lazar J. Greenfield, MD, and a petroleum engineer: Garman O. Kimmel. The device was originally conceived as a secondary component of a catheter-based approach to the management of acute massive pulmonary embolism (PE).[1] Hence, the initial purpose for placement of an IVC filter was to decrease the incidence of recurrent PE and reduce associated mortality. Accepted indications for IVC filter placement are characteristically therapeutic, including proximal deep vein thrombosis (DVT) or PE and contraindication to anticoagulation, failure of anticoagulation, massive PE, or severe cardiopulmonary disease with DVT.[2]

Indications for prophylactic placement of an IVC filter are controversial. Also, the definition of what constitutes a "contraindication" to anticoagulation or pharmacological prophylaxis to prevent venous thromboembolism (VTE) is variable in the medical literature and among clinicians. Examples of suspected high-risk patients in whom IVC filters have been placed prophylactically in the absence of a VTE event include: bariatric surgery patients, spine surgery patients, and head injured patients.[3–5] Utilizing the Nationwide Inpatient Sample, the incidence of prophylactic IVC filter placement is increasing at a significantly higher rate than placement after a VTE event (157% versus 42%, adjusted rate increase from 1998 to 2005).[6]

Despite development of temporary retrievable IVC filters, these devices often become permanent in trauma patients and are not removed once the VTE risk has subsided.[7] IVC filters are not without complications, including device migration, filter penetration, filter fracture, IVC perforation, IVC thrombosis, and PE even with presence of the device.[2,8] The incidence of PE has increased more than 2-fold from 1994–2001 to 2007–2009 for trauma patients based

Target-Specific Oral Anticoagulant Reversal Guideline

	Drug Profile			Laboratory Assessment Options					
	Half-life (hours)	5 Half-Lives (days)	Renal Excretion (%)	PT	APTT	TT	Anti-factor Xa Activity	Clearance Capacity	Adjunct Testing
Dabigatran (Pradaxa)	12-17 14-17** 15-18† 28‡	2.5-3.5	80	↑ or ↔	↑* (qualitative)	↑* nl = no drug (qualitative)	N/A	CrCl	Hct (anemia) Plt (thrombocytopenia) Electrolytes
Apixaban (Eliquis)	12	1 – 2	27	↑ or ↔	↑ or ↔	N/A	↑* enoxaparin calibrated (quantitative)	CrCl LFT's	
Rivaroxaban (Xarelto)	5-9	1.5 – 3.5	33	↑ or ↔* (qualitative)	↑ or ↔	N/A	↑* rivaroxaban calibrated (quantitative)	CrCl LFT's	

**Elderly, †Mild to moderate renal impairment, ‡Severe renal impairment   *Preferred, ↑ Simple increase, ↔ No change

	Assessment		Interventions		
	History	Exam	General	Major Blood Loss	Critical Blood Loss (Life-threatening)
Dabigatran (Pradaxa)	• Last dose • Potential for unintentional overdose • Renal or hepatic disease • Concomitant agents associated with bleeding (e.g. clopidogrel)	• Hemodynamic assessment • Active blood loss • Blood loss severity • Blood loss location	Stop anticoagulant IV access – large bore Hemodynamic optimization	1. Antifibrinolytic 2. Oral activated charcoal (if last dose within 2 hrs) 3. Hemodialysis	1. Major blood loss interventions 2. Idarucizumab (Praxbind)
Apixaban (Eliquis)				1. Antifibrinolytic 2. Oral activated charcoal (if last dose within 6 hrs)	1. Major blood loss interventions 2. Unactivated or activated 4-factor PCC*
Rivaroxaban (Xarelto)				1. Antifibrinolytic 2. Oral activated charcoal (if last dose within 8 hrs)	

* Pro-hemostatic products (e.g. PCC) carry substantial risk of thrombosis.

	Prothrombin Complex Concentrates					
	Factors	Parameter	Dosing	Max Dosage	Infusion Time	Duration of Effect
Unactivated 4 Factor *Kcentra*	II, VII, IX, X	Not defined	25-50 units/kg IV	5000 units	20 min	~12-24 hours
Unactivated 3 Factor *Bebulin VH*	II, IX, X	Moderate bleeding Major bleeding	50-65 units/kg IV 75-90 units/kg IV	5000 units	15 min	
Activated 4 Factor *FEIBA NF*	II, IX, X VII (activated)	Mucous membrane Soft tissue Severe hemorrhage	50-100 units/kg IV Q 6 hrs 100 units/kg IV Q 12 hrs 100 units/kg IV Q 6-12 hrs	200 units/kg	15 min	

No current approved antidote is available for TSOAC-induced anticoagulation. While reversal is felt to be prudent in the setting of critical blood loss, evidence from randomized control trials is not available to confirm the efficacy of this practice. Some experts report need to redoes PCC regardless of coagulation testing results.

"It is not the strongest of the species that survives, nor the most intelligent, but rather the one most responsive to change."
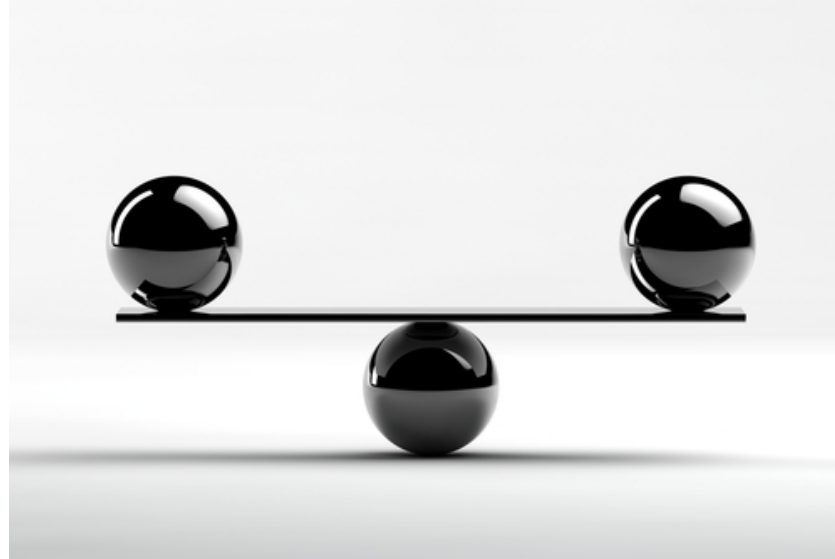
Charles Darwin

Quality Dilemmas

Standardization   **Innovation**

Wrap-Up

- Feedback
  - Data
  - QI Initiatives
  - Reporting
- Evaluation Forms
  - Turn in for CME

Questions

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