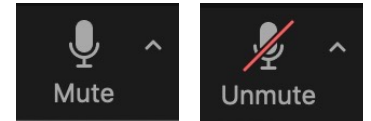


The Michigan Trauma Quality Improvement Program

**Virtual, MI
February 8, 2022**





Meeting Logistics

- **Join via computer and enter full name**
- **Mute all microphones**
- **Discussion opportunities at section ends**
- **Use chat to signal contribution**
- **You'll unmute your own microphone**

Disclosures

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

Disclosures

- ◆ Mark Hemmila Grants
 - Blue Cross Blue Shield of Michigan
 - Michigan Department of Health and Human Services
 - Department of Defense
 - National Institutes of Health - NIGMS

No Photos Please



Evaluations

- ◆ Link will be emailed to you following meeting
- ◆ You have up to 7 days to submit
- ◆ Please answer the evaluation questions
- ◆ Physicians/Nurses/Advanced Practitioners:
 - E-mail certificate for 3.25 Category 1 CME

New People

- ◆ Janessa Monahan, MSW
 - PROM's



Data Submission

- ◆ Data submitted December 3, 2021
 - This report
 - Long turnaround
 - Submitted to ArborMetrix on December 18, 2021
- ◆ Data submitted February 2, 2022
 - Pending
- ◆ Next data submission
 - April 1, 2022

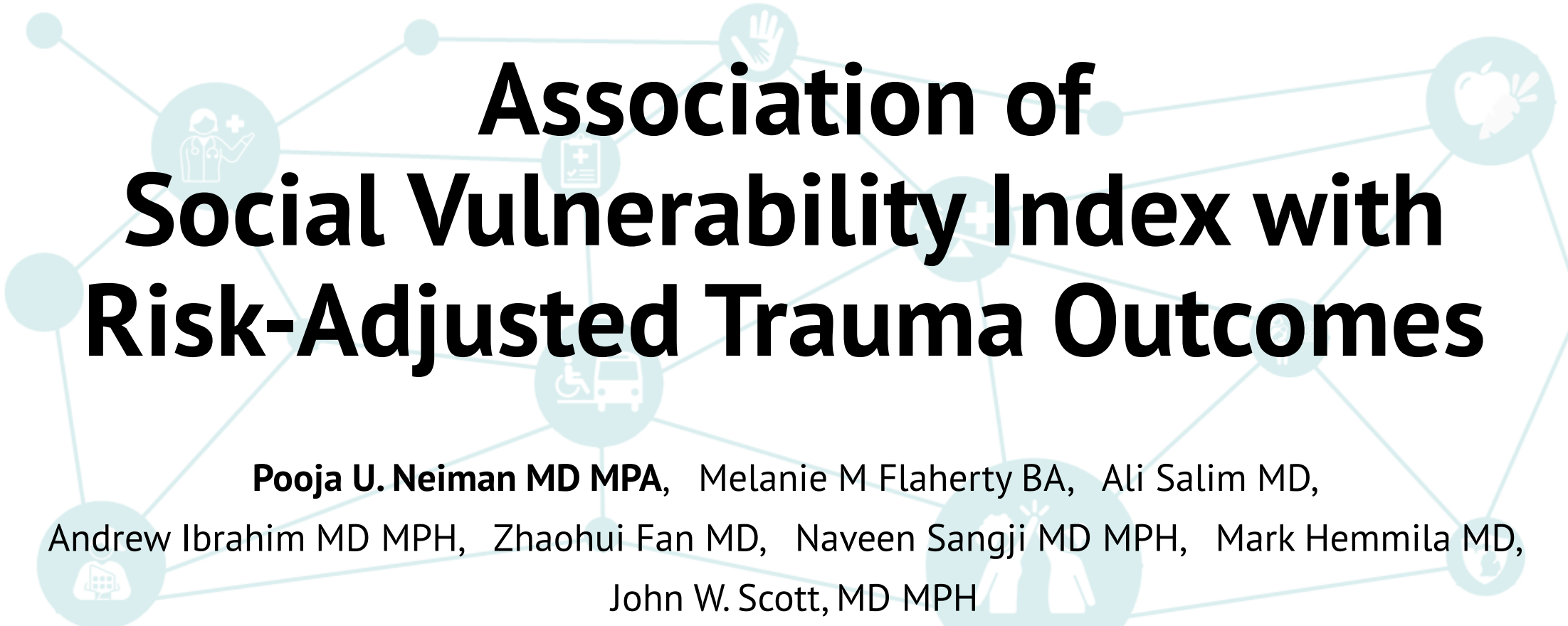
Future Meetings

- ◆ Spring (MCOT)
 - Wednesday May 18, 2022
 - Grand Traverse Resort, Traverse City
 - We are motivated
- ◆ Spring (Registrars and MCR's)
 - Tuesday June 7, 2022
 - Ypsilanti, EMU Marriott ?
 - Level 3's

Association of Social Vulnerability Index with Risk-Adjusted Trauma Outcomes

Pooja Neiman, MD
Jonathan Scott, MD





Association of Social Vulnerability Index with Risk-Adjusted Trauma Outcomes

Pooja U. Neiman MD MPA, Melanie M Flaherty BA, Ali Salim MD,
Andrew Ibrahim MD MPH, Zhaohui Fan MD, Naveen Sangji MD MPH, Mark Hemmila MD,
John W. Scott, MD MPH

February 8, 2022

@PoojaNeiman
@DrJohnScott



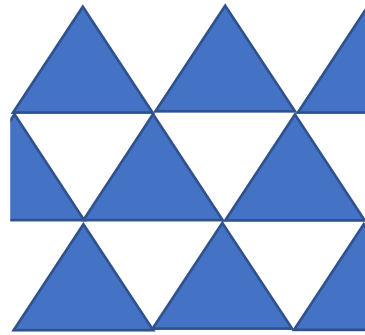
CENTER FOR HEALTHCARE OUTCOMES & POLICY

Disclosures

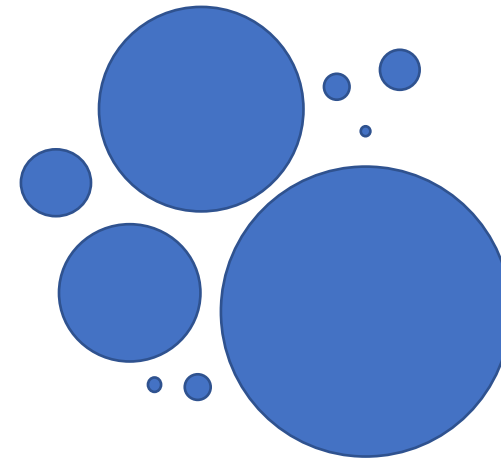
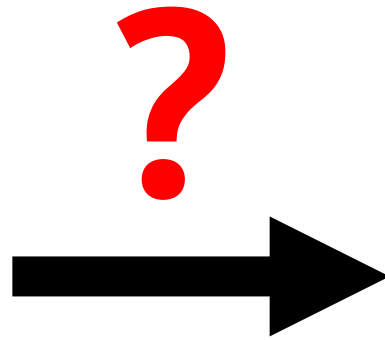
- This work was accepted for publication in the Journal of Trauma and Acute Care Surgery on December 13th, 2021
- A version of this talk was given at AAST (American Association for the Surgery of Trauma) on September 7th, 2021

Little is known regarding the mechanisms that drive disparities in trauma outcomes

- ✓ Insurance status
- ✓ Race
- ✓ Ethnicity
- ✓ Income
- ✓ State/Region
- ✓ Hospital system



**Social &
Economic Traits**



**Inequitable
Outcomes**

- ✓ Inpatient mortality
- ✓ Inpatient morbidity
- ✓ End of life care
- ✓ Access to rehab
- ✓ Return to work

See Haider et al. Arch Surg 2008, Haider et al. J Trauma 2013, Haider et al. JAMA Surg 2015, Haider et al. Ann Surg 2018

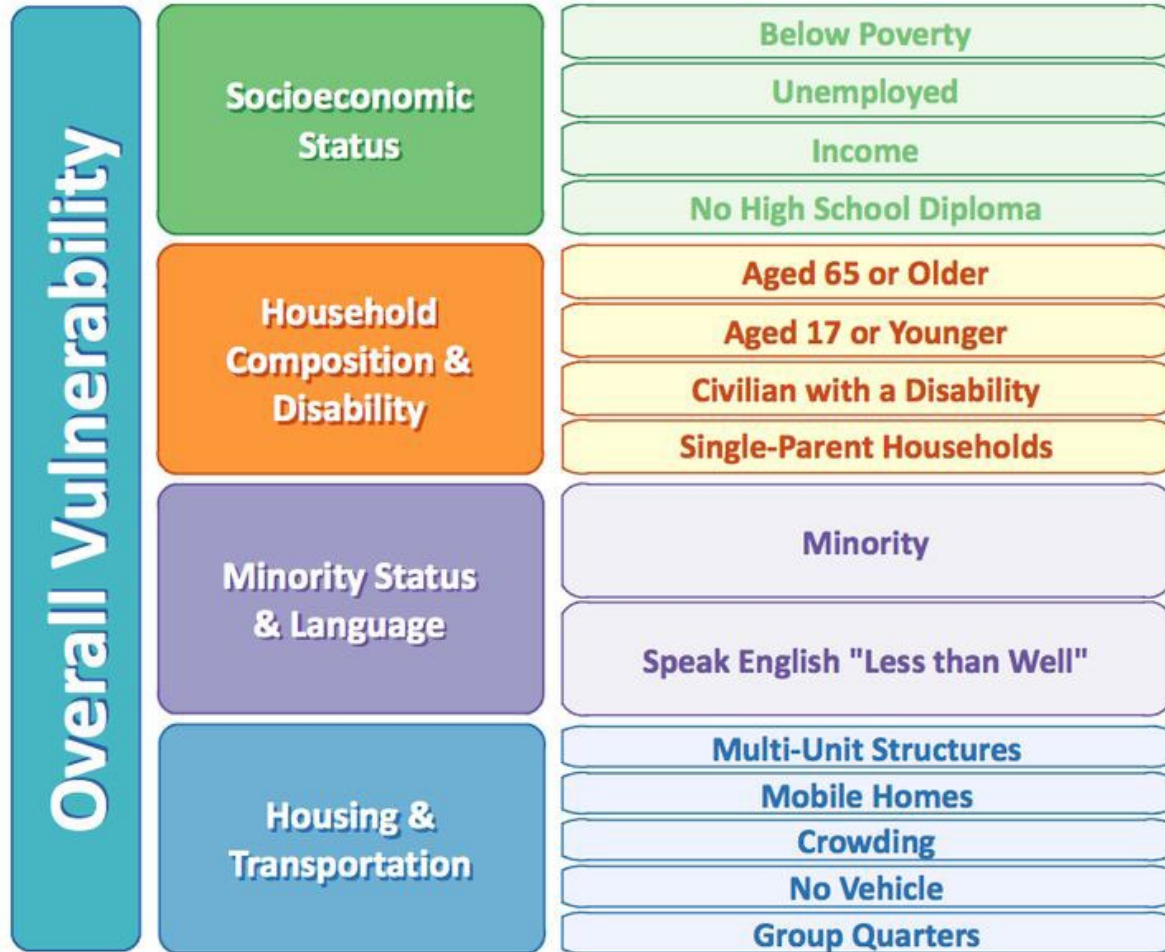
@PoojaNeiman
@DrJohnScott

Social Determinants of Health as a potential driver of disparities in outcomes

- Social determinants of Health (SDOH) are the **conditions in the places where people live, learn, work, and play**
- **Difficult to measure** and thus little understanding of their impact on Trauma Outcomes



The Social Vulnerability Index provides a lens into community resilience and SDOH



- Developed and validated by the **CDC** to guide disaster response
- Census tract level → ZIP codes
- Indexed between 0 and 100
 - **0-20 = least vulnerable**
 - 20-40
 - 40-60
 - 60-80
 - **80-100 = most vulnerable**

Novel application of SVI to Michigan's state-wide trauma collaborative (MTQIP)



NATIONAL
TRAUMA DATA
STANDARD

M·TQIP

CHALLENGE

- Census tract or ZIP code data not available in national trauma registries
- Commercial/federal claims databases may have them, but lack clinical detail

SOLUTION

- The Michigan Trauma Quality Improvement Program's (MTQIP) statewide trauma registry has geographic identifiers, claims-level data, and NTDS clinical detail

@PoojaNeiman
@DrJohnScott

Retrospective, observational study to evaluate association between SVI and inpatient outcomes



STUDY COHORT

- Ages 18+
- Admitted 2017-20
- Level 1 or 2 center

PRIMARY PREDICTOR

- **SVI Quintile**
 - 0-20 = least vulnerable
 - 80-100 = most vulnerable

PRIMARY OUTCOME

- **Inpatient mortality**
 - Death or hospice

Three levels of “risk adjustment”

UNADJ. MODEL

CLAIMS MODEL

ROBUST CLINICAL MODEL



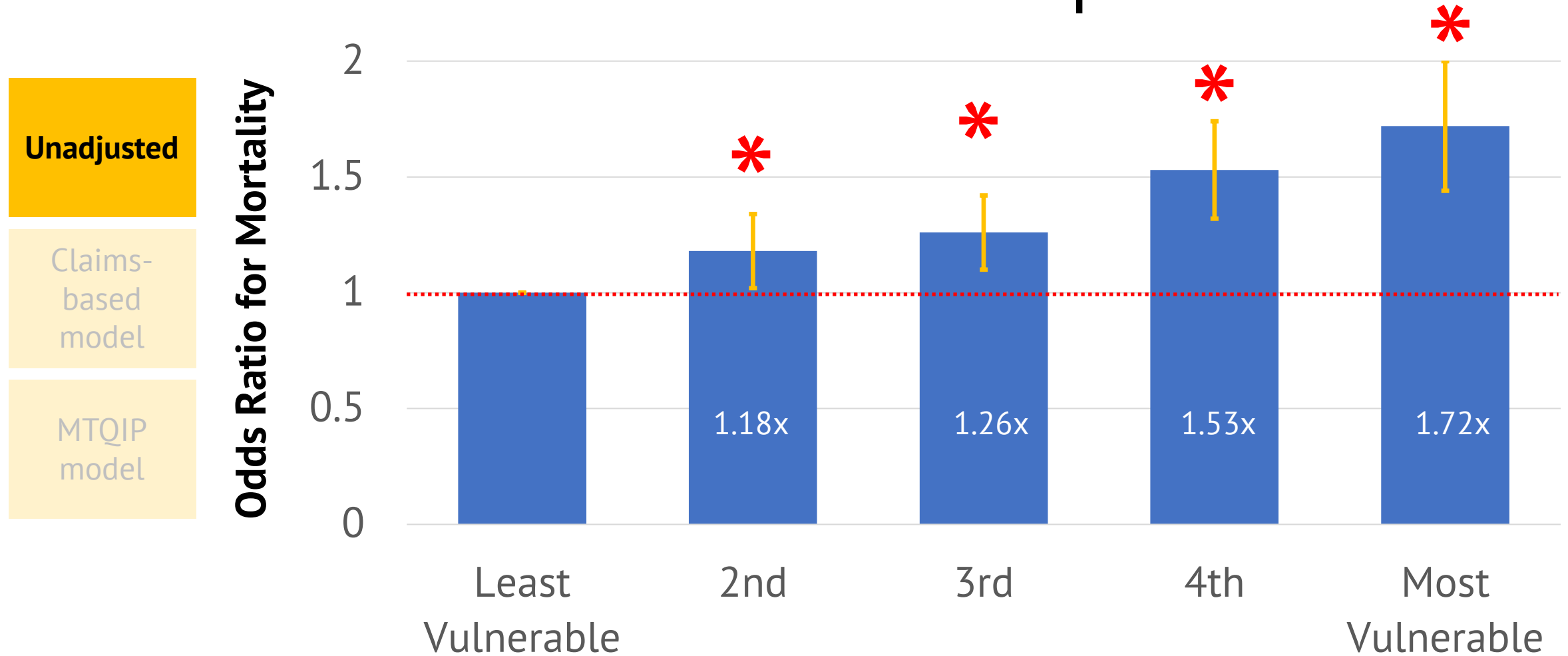
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@DrJohnScott

Demographics of study population

	Entire Study	Extremes of SVI Quintiles	
	Cohort	Lowest	Highest
Sample (n)	83,607	10,379	6,874
Age (mean, sd)	63 (± 21)	70 (± 20)	51 (± 22)
Male (%)	53	45	66
Race/Ethnicity			
Non-Hispanic White (%)	83	94	34
Non-Hispanic Black (%)	13	2	59
Hispanic (%)	2	1	5
Non-Hispanic, Other (%)	3	3	3
Insurance Type			
Private (%)	22	21	29
Medicare (%)	50	60	26
Medicaid (%)	10	4	20
Uninsured (%)	4	2	9
Other (%)	15	13	15

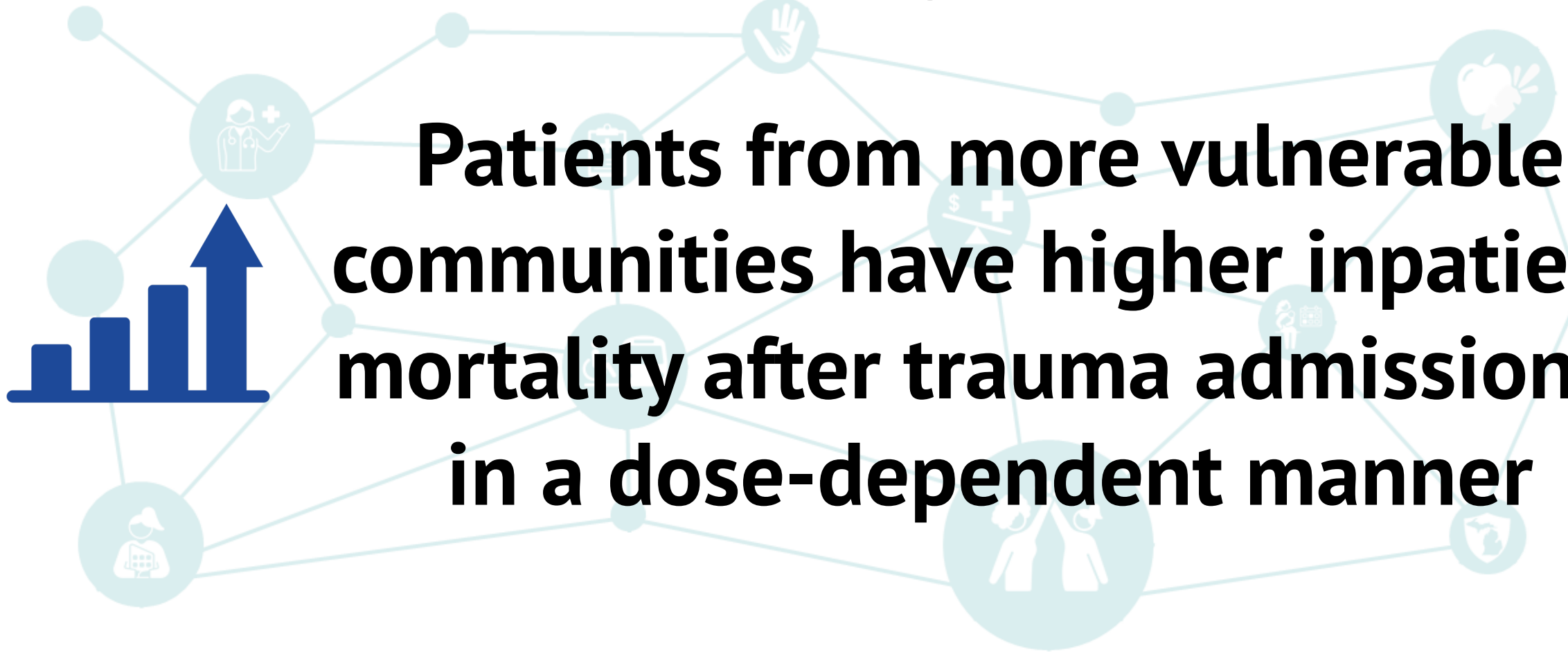
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@DrJohnScott

Unadjusted outcomes show “dose-dependent” association between SVI and inpatient mortality

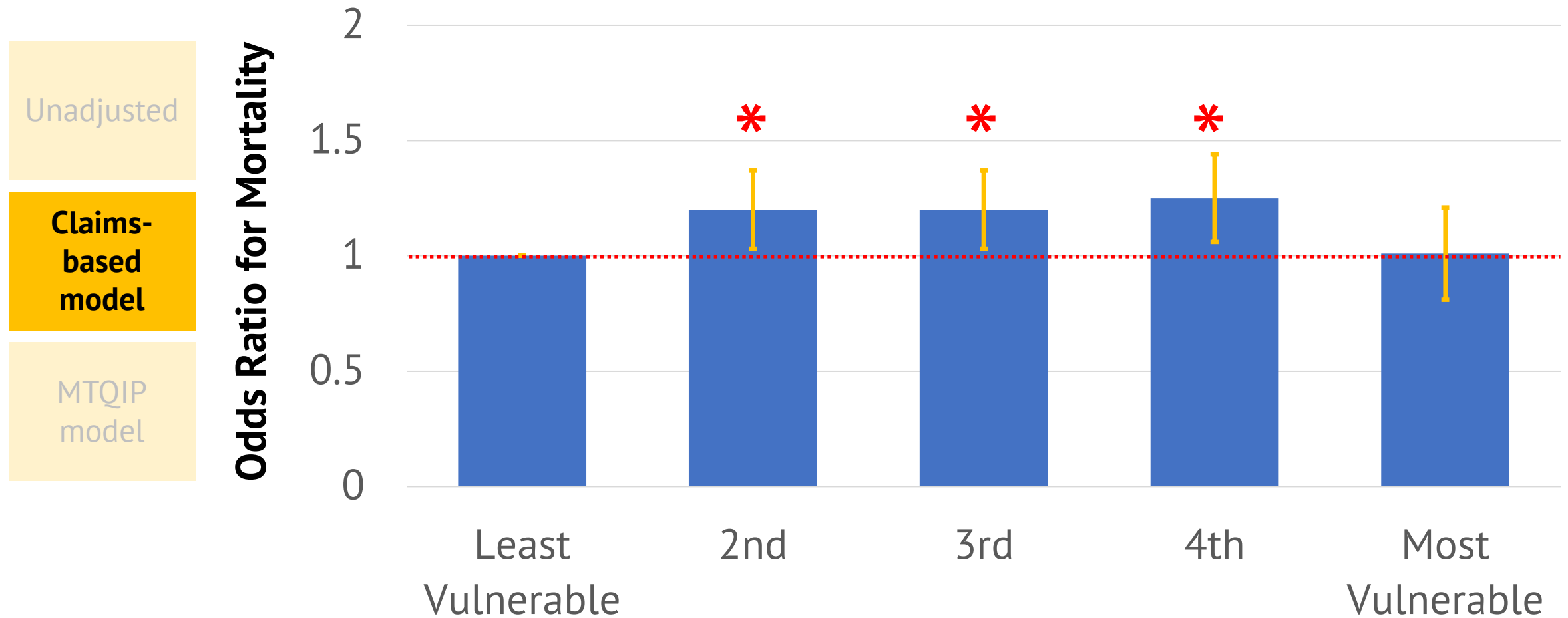


Key Finding #1

Patients from more vulnerable communities have higher inpatient mortality after trauma admission... in a dose-dependent manner

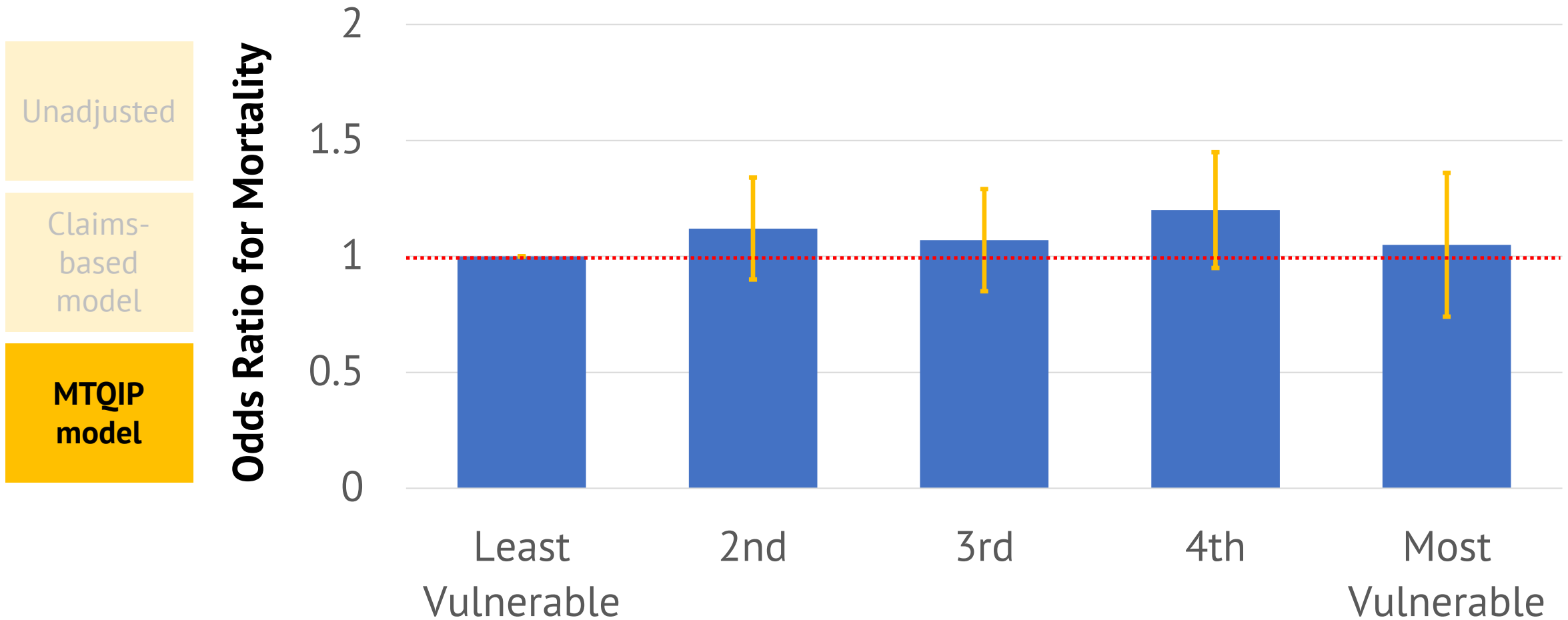


Dampened association between SVI and mortality after “Claims-based” risk adjustment




@PoojaNeiman
@DrJohnScott

No risk-adjusted difference in mortality using the robust clinical model

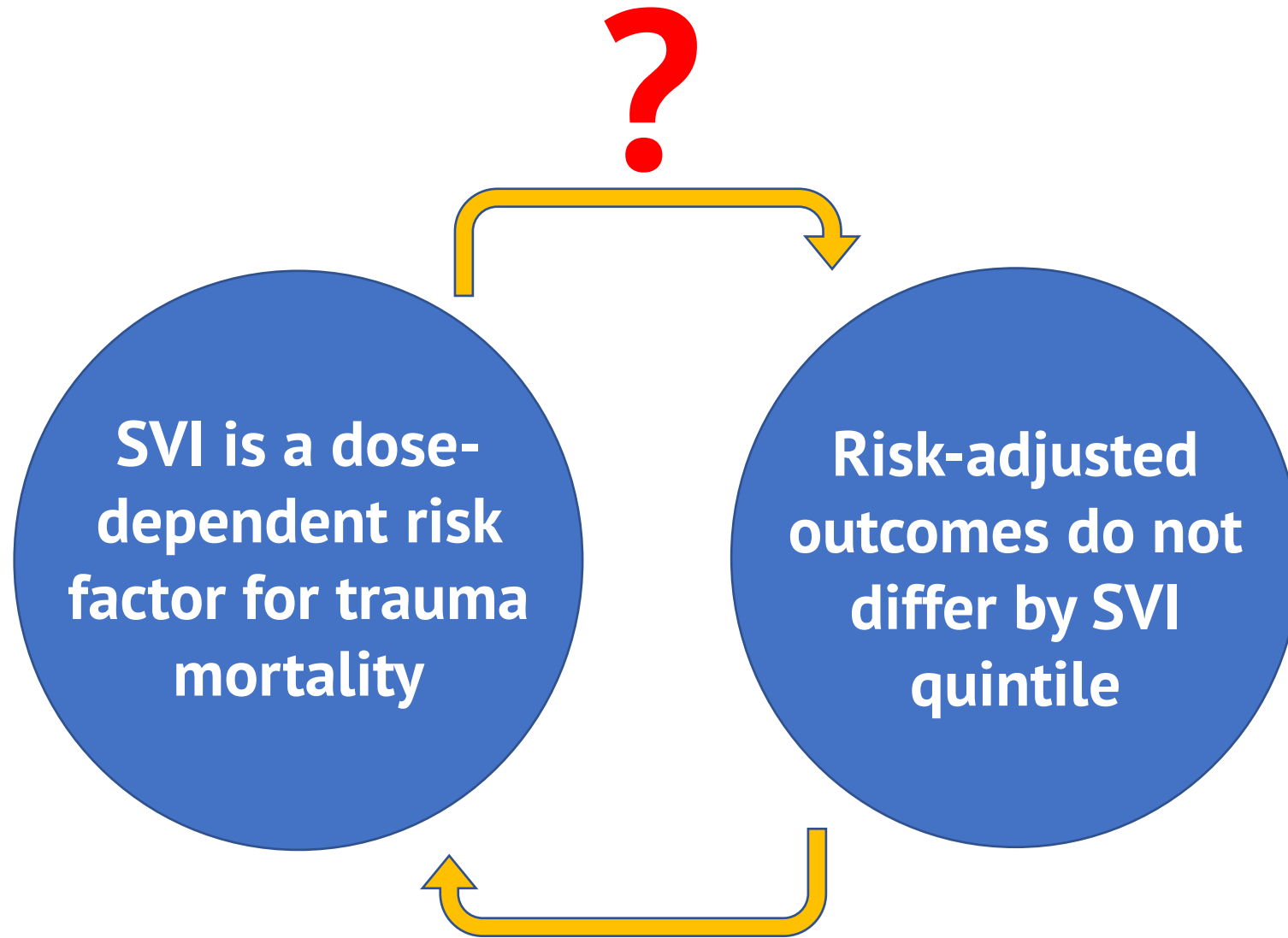


@PoojaNeiman
@DrJohnScott

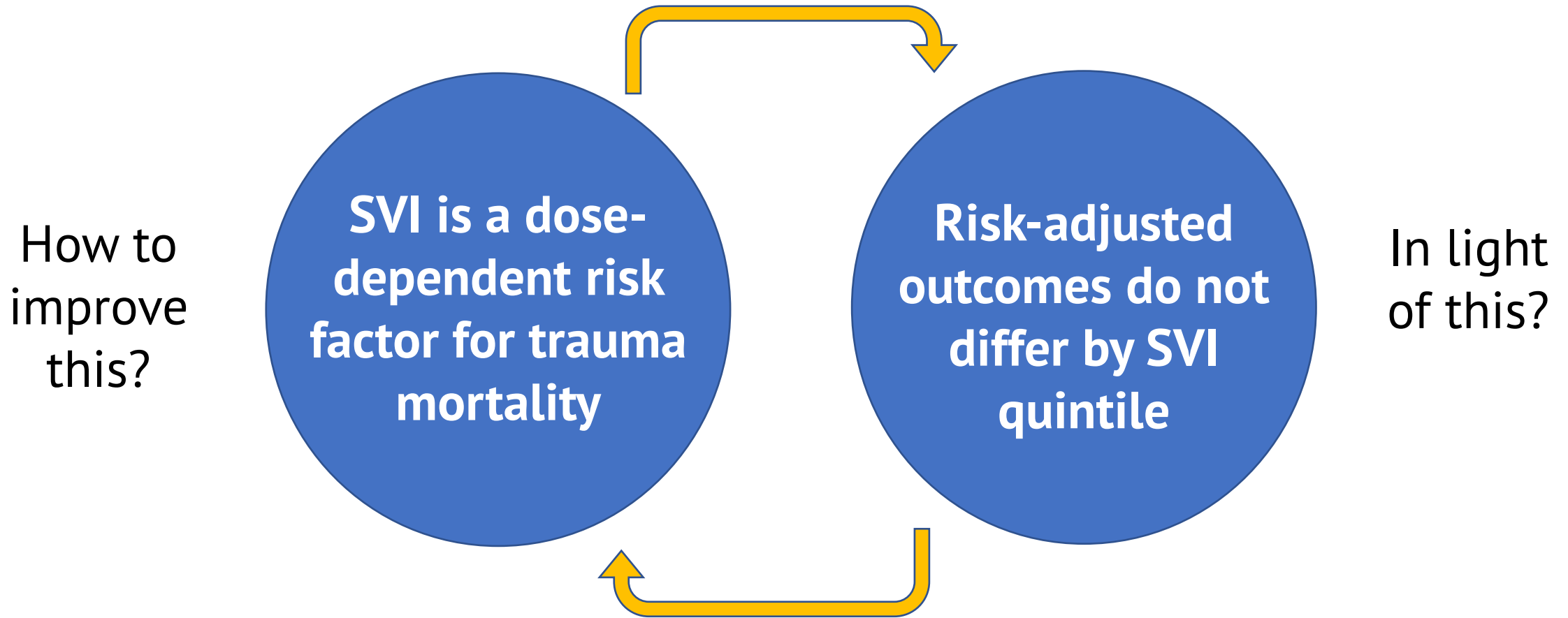
Key Finding #2



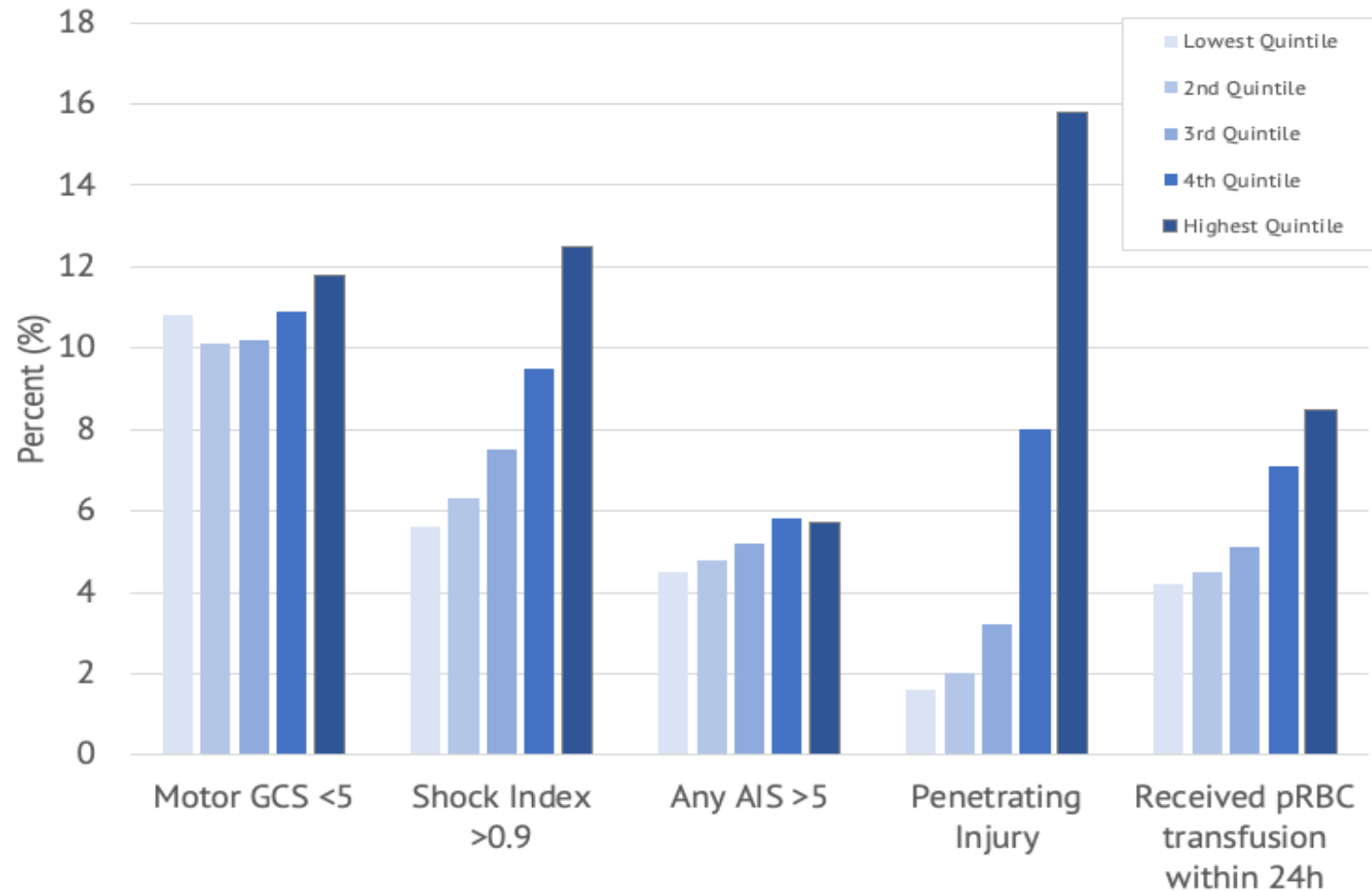
**Compared to lower SVI,
patients from more vulnerable
communities have similar
risk-adjusted inpatient mortality**



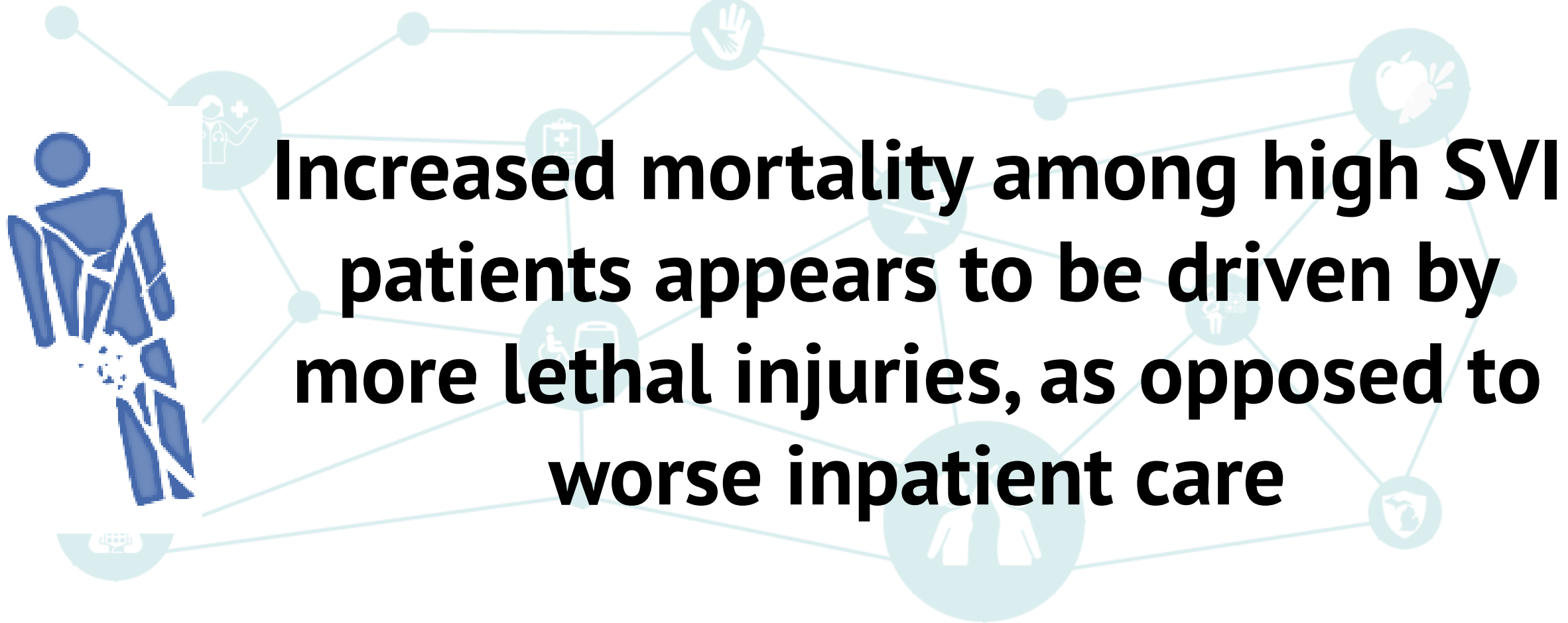
How do we improve outcomes for high SVI patients when risk-adjusted outcomes are the same?



Injury severity and lethality has a similar dose-dependent association with SVI



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@DrJohnScott

[illegible]

Increased mortality among high SVI patients appears to be driven by more lethal injuries, as opposed to worse inpatient care

Improving disparities in outcomes will require investment in communities and injury prevention

ISAVE: Improving Social Determinants to Attenuate Violence



UNITE: Understanding the links between social determinants and firearm violence in California communiTiEs



MSHIELD
MICHIGAN SOCIAL HEALTH INTERVENTIONS
to ELIMINATE DISPARITIES

@PoojaNeiman
@DrJohnScott



CENTER FOR HEALTHCARE OUTCOMES & POLICY

Eliminating SDOH-linked disparities requires both excellent inpatient care **AND** investing in communities



SVI associated with
“dose-dependent”
risk of inpatient
mortality



Equivalent “risk-
adjusted” outcomes
suggests high-quality
inpatient care



Must invest
“upstream” to reduce
community risk of
lethal injuries

MTQIP Hospital Scoring Index Results

Mark Hemmila, MD



Metrics for MTQIP

- ◆ Hospital = CQI Scoring Index
 - 10 Measures
 - End result: Hospital P4P
- ◆ Surgeon = VBR
 - 3 Measures (VTE LMWH Timing (G), IHF OR in <48hrs (G), Open femur/tibia fracture abx in 120 minutes (C))
 - Scoring as a group practice
 - End result: Surgeon VBR in 2022 (March)
 - BCBSM will notify

- Hospital Result
- Points
- Possible Points
 - New Center
 - No patients in metric
- Score =
Points/Possible Points x 100

Michigan Trauma Quality Improvement Program (MTQIP)					
2021 Performance Index					
January 1, 2021 to December 31, 2021					
Measure	Weight	Measure Description	Result	Points	Possible
#1	10	Data Submission			
		On time and complete 3 of 3 times	3	10	10
		On time and complete 2 of 3 times			5
		On time and complete 1 of 3 times			0
#2	10	Meeting Participation			
		Surgeon and (TPM or MCR) participate in 3 of 3 collaborative meetings (9 pts)	3	10	9
		Surgeon and (TPM or MCR) participate in 2 of 3 collaborative meetings (6 pts)			6
		Surgeon and (TPM or MCR) participate in 1 of 3 collaborative meetings (0 pts)			0
		Surgeon and (TPM or MCR) participate in 0 of 3 collaborative meetings (0 pts)			0
#3	10	Registrar or MCR participate in the annual June data abstractor meeting (1 pt)	1		1
		Data Validation Error Rate			
		0.0-3.0%	1.6	10	10
		3.1-4.0%			8
		4.1-5.0%			5
#4	10	> 5.0%			0
		Timely LMWH VTE Prophylaxis in Trauma Admits (18 mo: 1/1/20-6/30/21)			
		≥ 52.5% of patients (≤ 48 hr)	63.0	10	10
		≥ 50.0% of patients (≤ 48 hr)			8
		≥ 45.0% of patients (≤ 48 hr)			5
#5	10	< 45% of patients (≤ 48 hr)			0
		Timely Surgical Repair in Geriatric (Age ≥ 65) Isolated Hip Fxs (12 mo: 7/1/20-6/30/21)			
		≥ 92.0% of patients (≤ 48 hr)	91.0	8	10
		≥ 87.0% of patients (≤ 48 hr)			8
		≥ 85.0% of patients (≤ 48 hr)			5
#6	10	< 85.0% of patients (≤ 48 hr)			0
		RBC to Plasma Ratio in Massive Transfusion (18 mo: 1/1/20-6/30/21)			
		Weighted mean points in patients transfused with > 5 units 1st 4 hr	1.7	8.0	0-10
		Serious Complication Z-Score Trend in Trauma Service Admits (3 years: 7/1/18-6/30/21)			
		< -1 (major improvement)	-0.72	7	10
#7	10	-1 to 1 or serious complications low-outlier (average or better rate)			7
		> 1 (rates of serious complications increased)			5
		Mortality Z-Score Trend in Trauma Service Admits (3 years: 7/1/18-6/30/21)			
		< -1 (major improvement)	0.40	7	10
		-1 to 1 or mortality low-outlier (average or better rate)			7
#8	10	> 1 (rates of mortality increased)			5
		Timely Head CT in TBI Patients on Anticoagulation Pre-injury (12 mo: 7/1/20-6/30/21)			
		≥ 90% patients (≤ 120 min)	83	7	10
		≥ 80% patients (< 120 min)			7
		≥ 70% patients (< 120 min)			5
#9	10	< 70% patients (< 120 min)			0
		Timely Antibiotic in Femur/Tibia Open Fractures - Collaborative Wide Measure (12 mo: 7/1/20-6/30/21)			
		Center	78		
		MTQIP	89	10	10
		≥ 85% patients (< 120 min)			0
#10	10	< 85% patients (< 120 min)			0
		MACS Enrollment Bonus	No	0	5
		Total Points		87.0	100
		BCBSM Reported Score		87.0	

CQI Index Changes for 2021

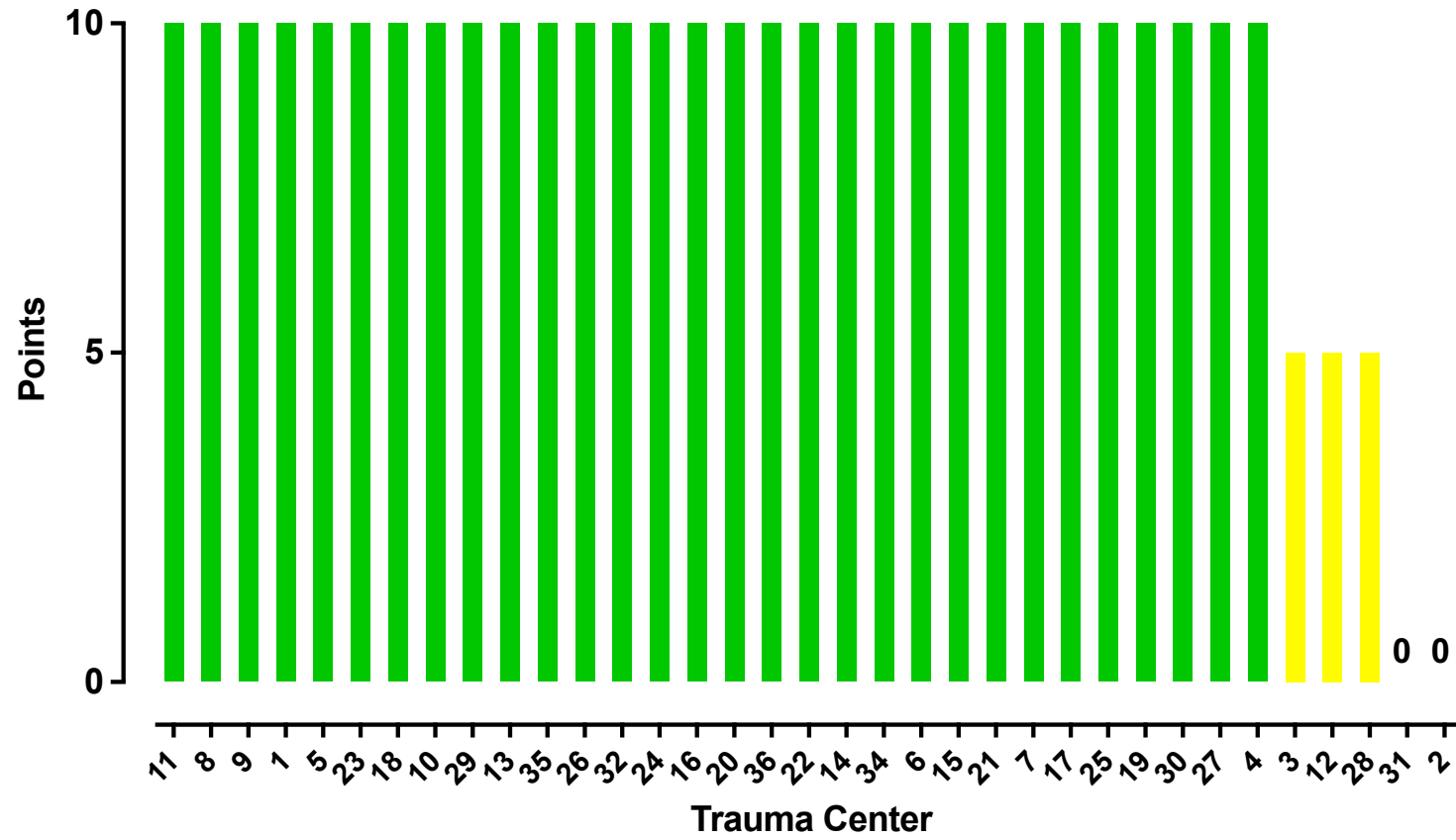
#3	10	Data Validation Error Rate 0.0-3.0% 3.1-4.0% 4.1-5.0% > 5.0%	10 8 5 0
#4	10	Timely LMWH VTE Prophylaxis in Trauma Admits (18 mo: 1/1/20-6/30/21) ≥ 52.5 % of patients (≤ 48 hr) ≥ 50.0 % of patients (≤ 48 hr) ≥ 45.0 % of patients (≤ 48 hr) < 45.0 % of patients (≤ 48 hr)	10 8 5 0
#5	10	Timely Surgical Repair in Geriatric (Age ≥ 65) Isolated Hip Fxs (12 mo: 7/1/20-6/30/21) ≥ 92.0 % of patients (≤ 48 hr) ≥ 87.0 % of patients (≤ 48 hr) ≥ 85.0 % of patients (≤ 48 hr) < 85.0 % of patients (≤ 48 hr)	10 8 5 0

Data Validation Error Rate
 0-4.0%
 4.1-5.0%
 5.1-6.0%
 6.1-7.0%
 > 7.0%

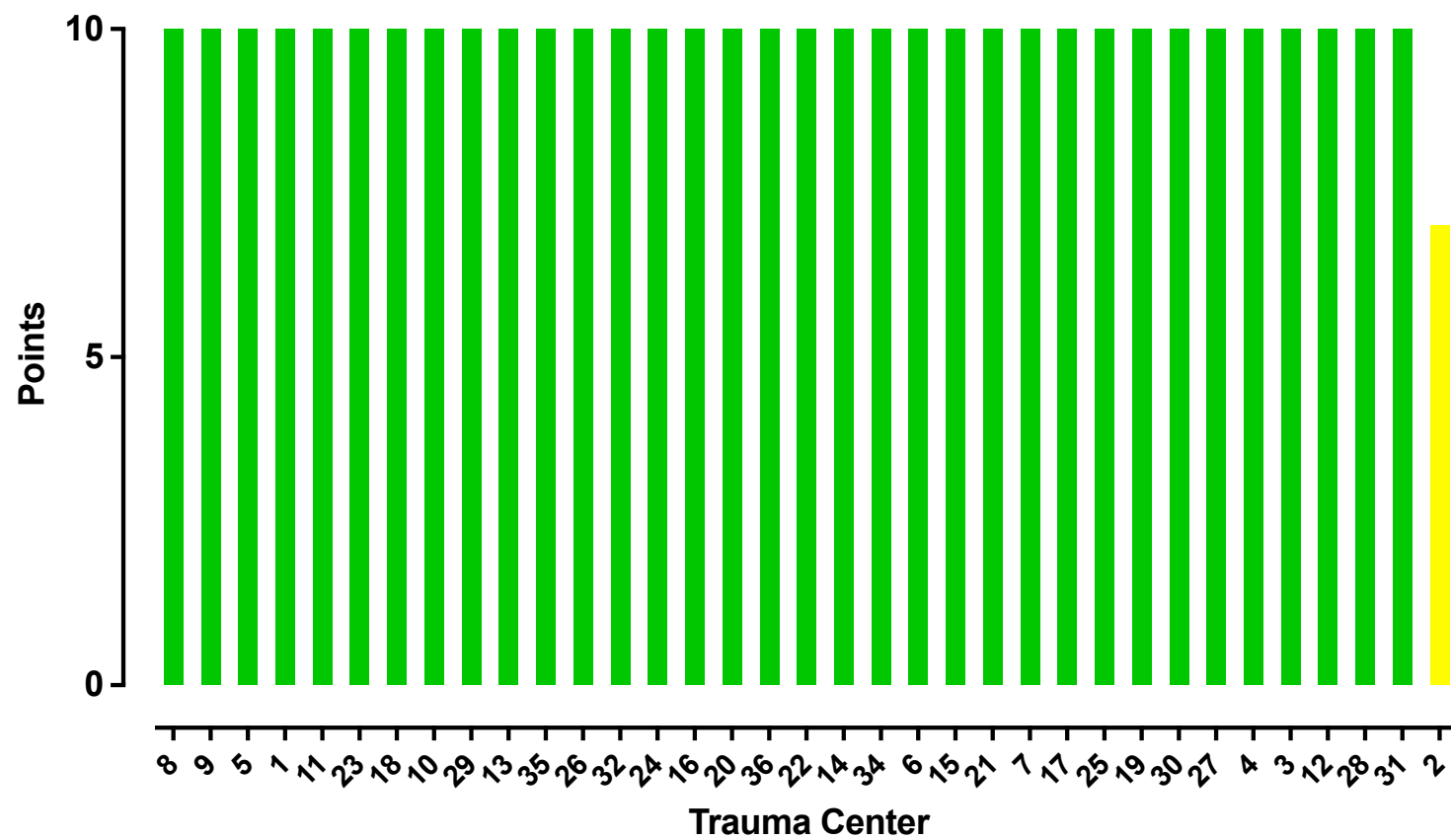
Timely LMWH VTE Prophylaxis
 ≥ 50% of patients (≤ 48 hr)
 ≥ 45% of patients (≤ 48 hr)
 ≥ 40% of patients (≤ 48 hr)
 < 40% of patients (≤ 48 hr)

Timely Surgical Repair in Geriatric
 ≥ 90% of patients (≤ 48 hr)
 ≥ 85% of patients (≤ 48 hr)
 ≥ 80% of patients (≤ 48 hr)
 < 80% of patients (≤ 48 hr)

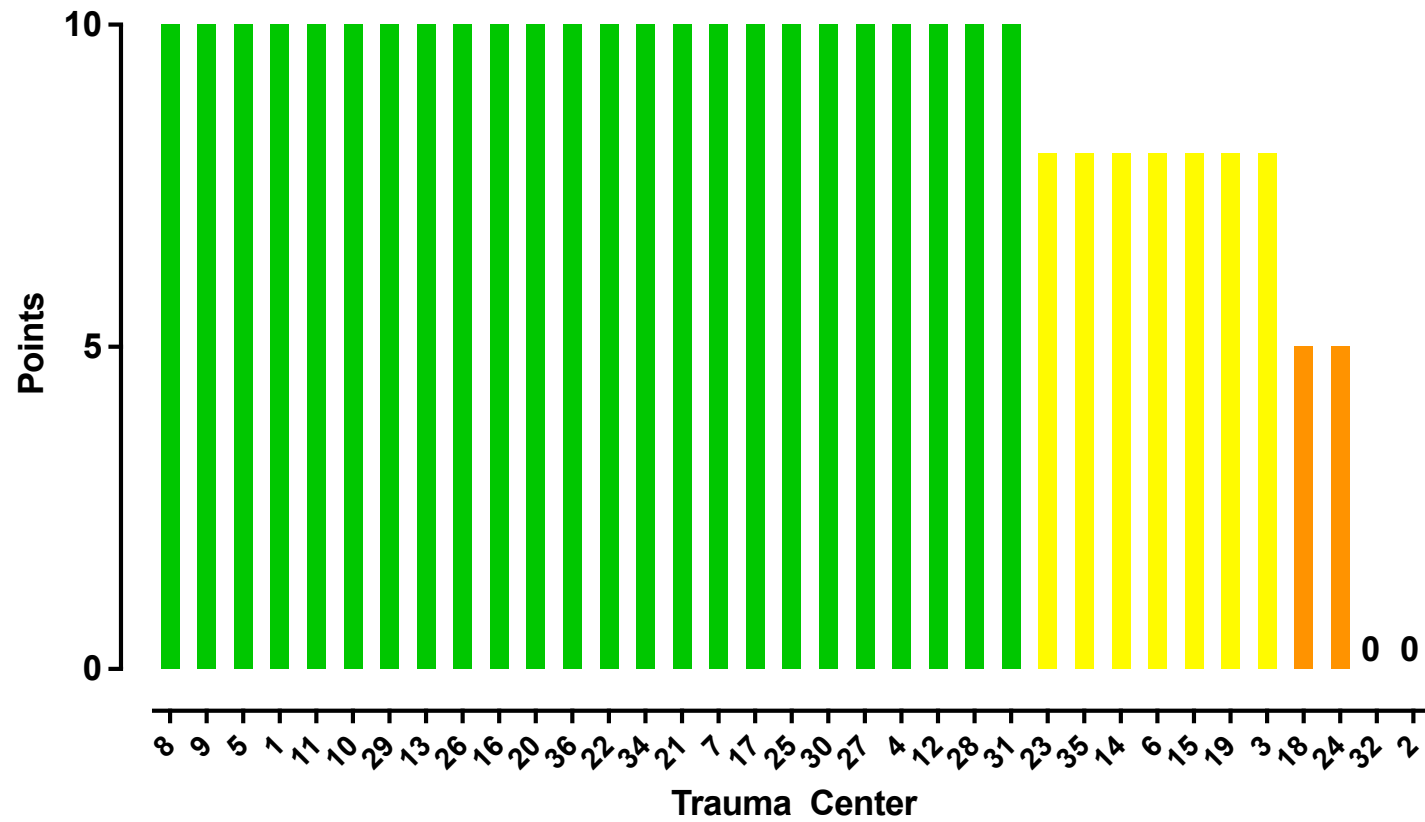
Data Submission



Meeting Participation



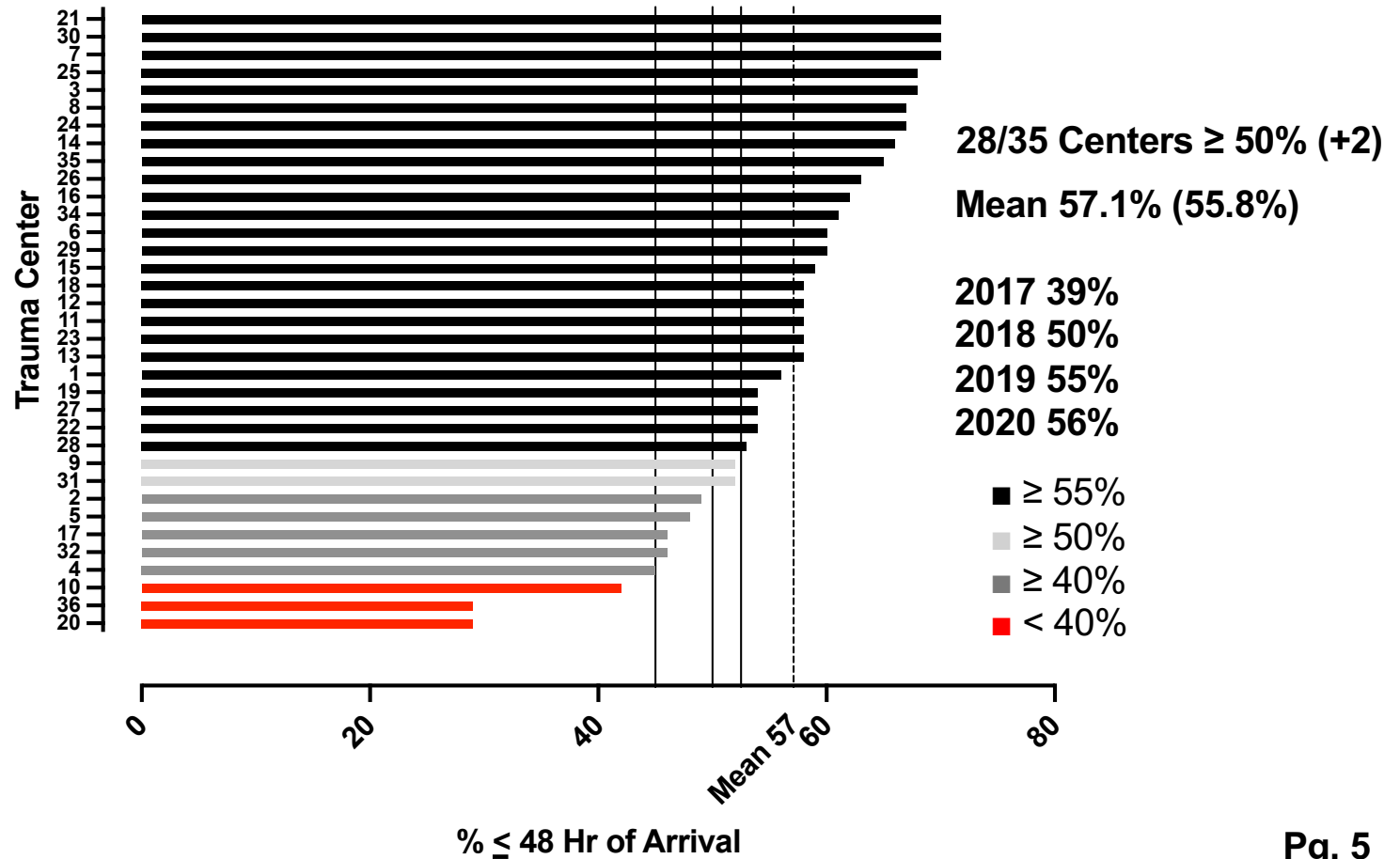
Accuracy of Data



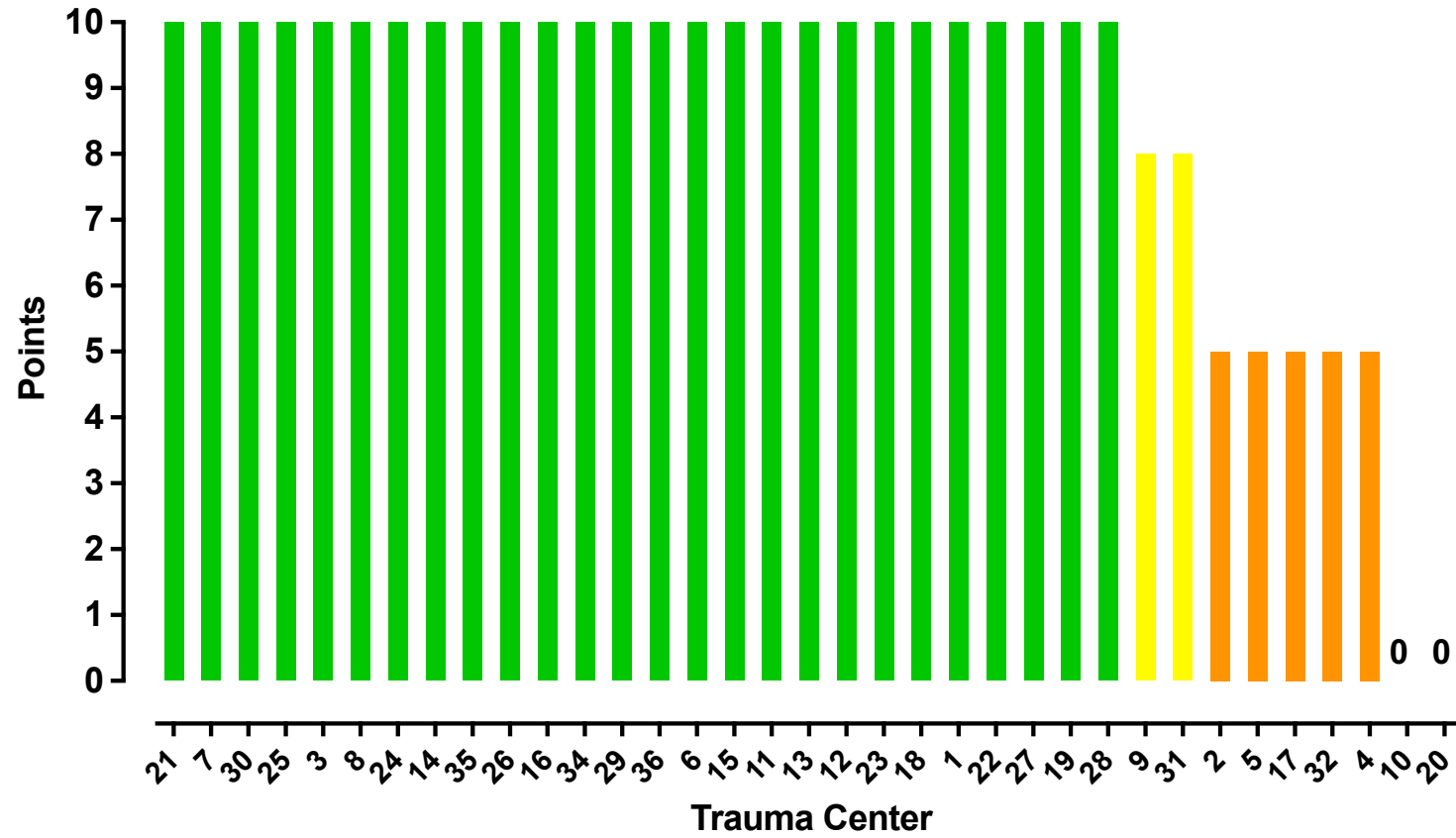
#4 Timely LMWH VTE Prophylaxis in Trauma Service Admits

- ◆ Venous Thromboembolism (VTE) Prophylaxis with LMWH Initiated Within 48 Hours of Arrival in Trauma Service Admits with > 2 Day Length of Stay (18 mo: 1/1/20-6/30/21)
 - $\geq 52.5\%$ of patients (≤ 48 hr)
 - $\geq 50\%$ of patients (≤ 48 hr)
 - $\geq 45\%$ of patients (≤ 48 hr)
 - $< 45\%$ of patients (≤ 48 hr)

Metric #4 - VTE Prophylaxis LMWH Timeliness
Cohort 2 - Admit to Trauma
1/1/20 - 6/30/21



Timely VTE Prophylaxis



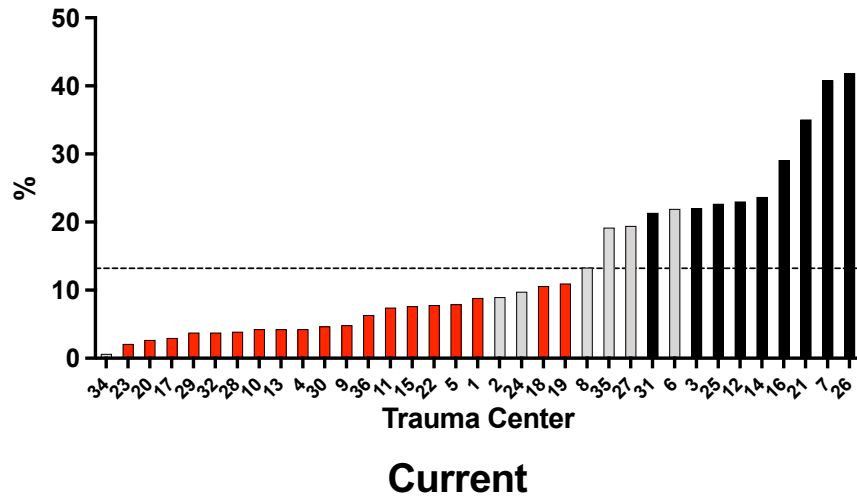
Coalition for National Trauma Research (CNTR)



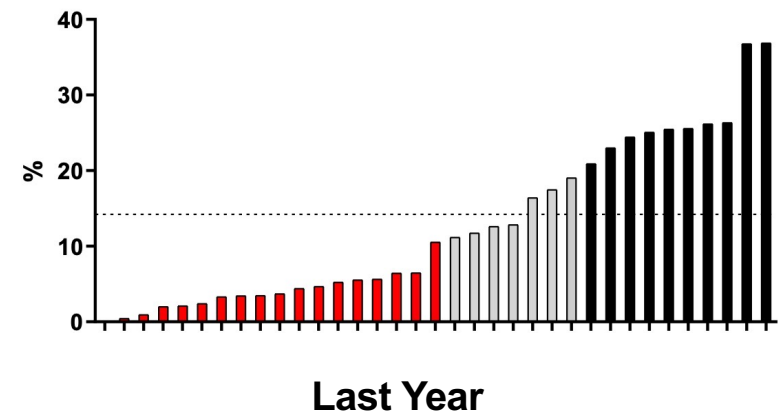
2022 CONSENSUS CONFERENCE

**TO IMPLEMENT OPTIMAL
VTE PROPHYLAXIS IN TRAUMA**

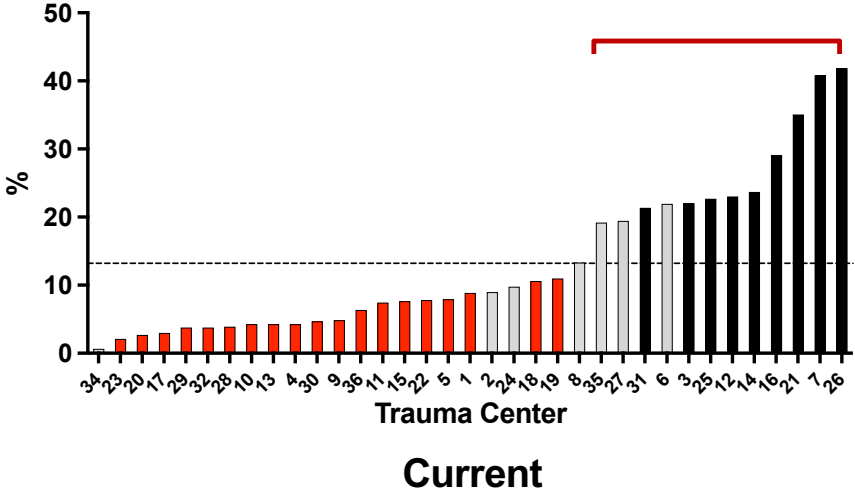
VTE LMWH \leq 48 hours
Cohort - TBI



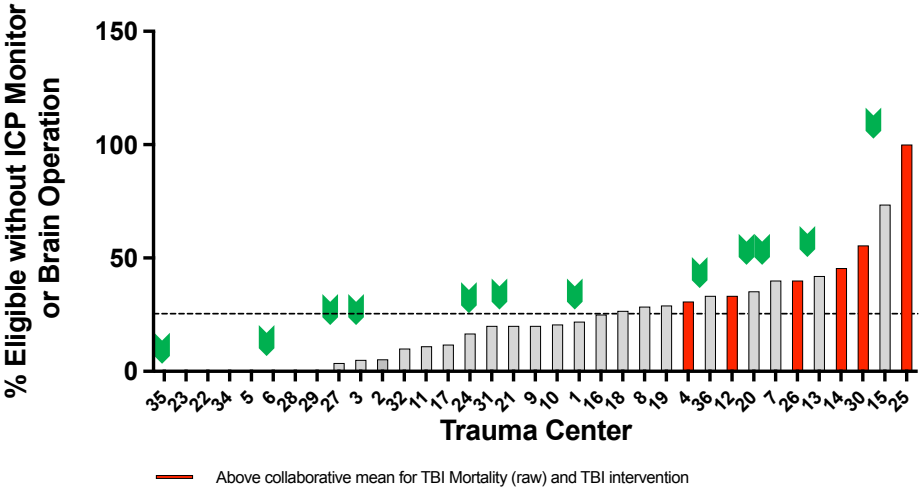
VTE LMWH \leq 48 hours
Cohort - TBI



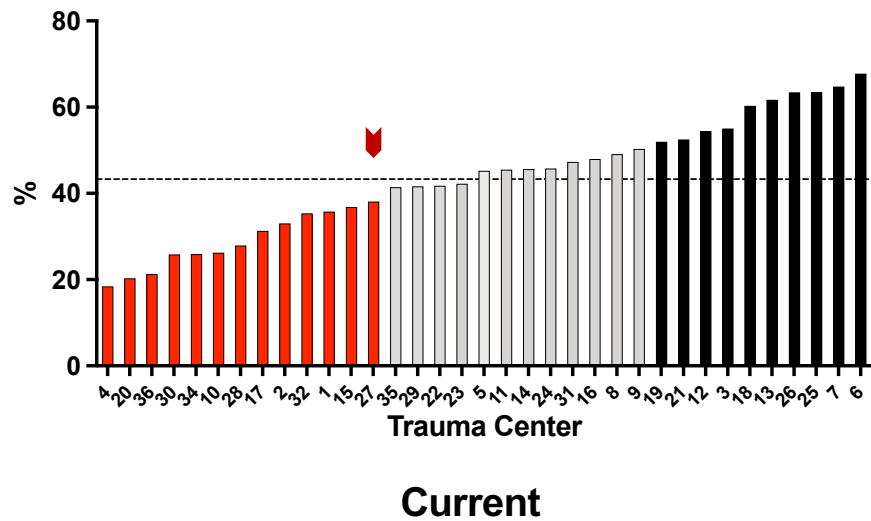
**VTE LMWH \leq 48 hours
Cohort - TBI**



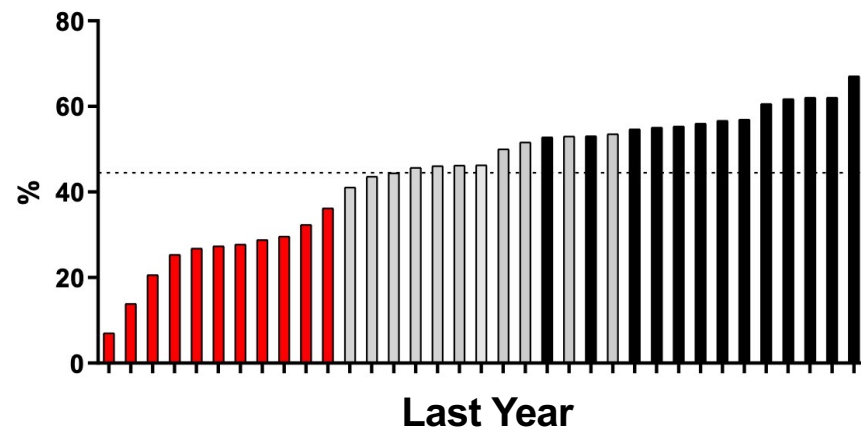
**TBI Intervention
Cohort 1 - MTQIP All**



VTE LMWH \leq 48 hours
Cohort - Spine Injury

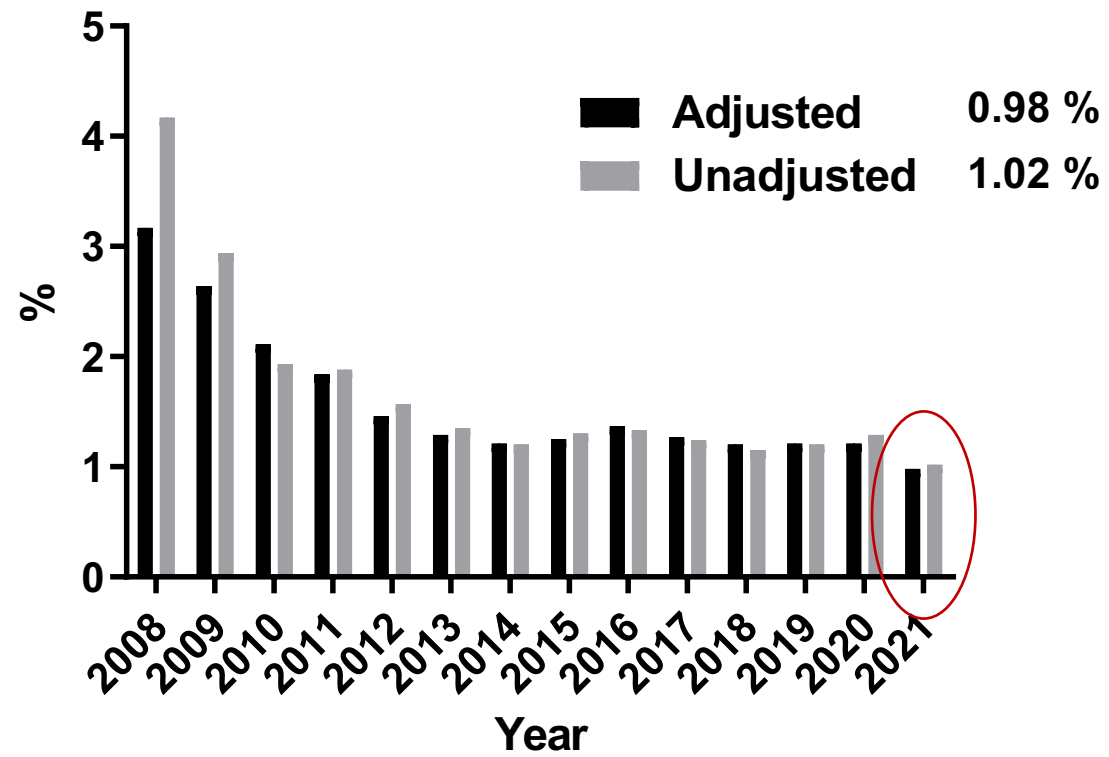


VTE LMWH $<$ 48 hours
Cohort - Spine Injury

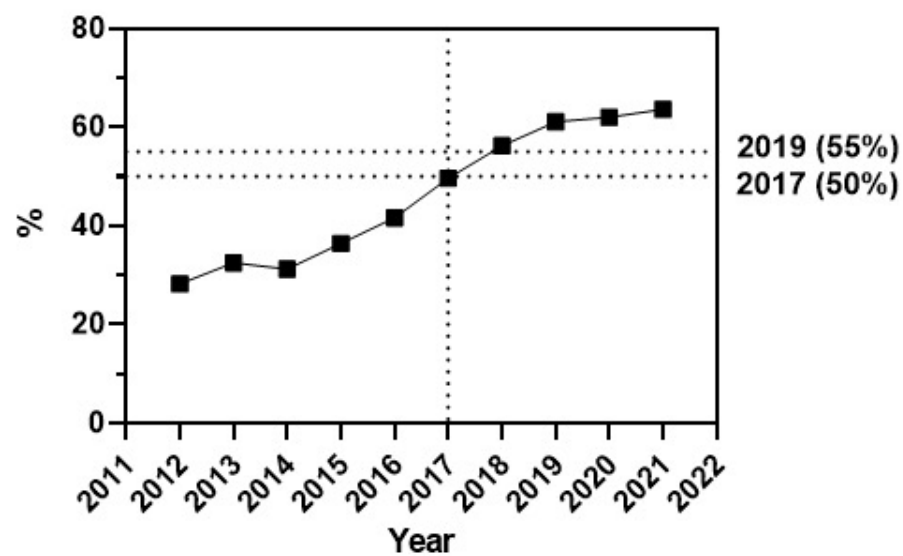


What drives this large spread in practice?

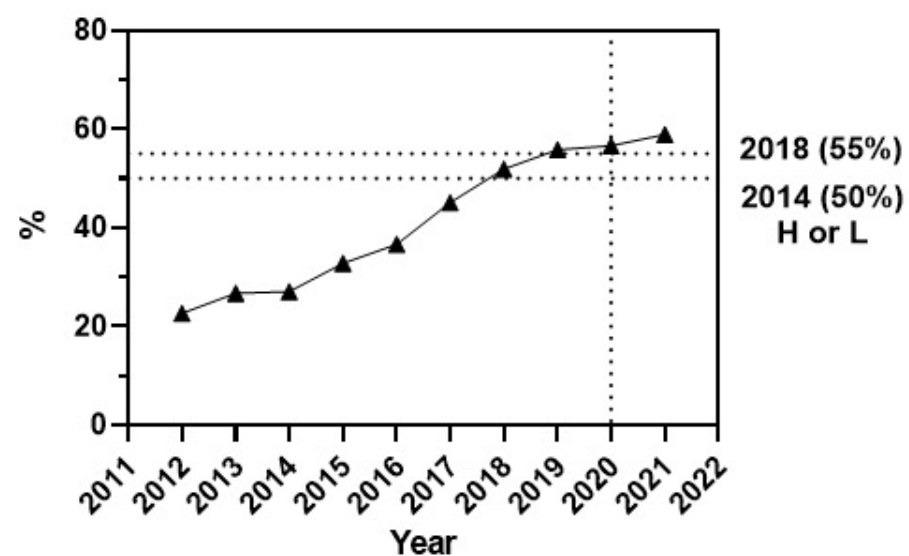
VTE Event



LMWH Type VTE Prophylaxis



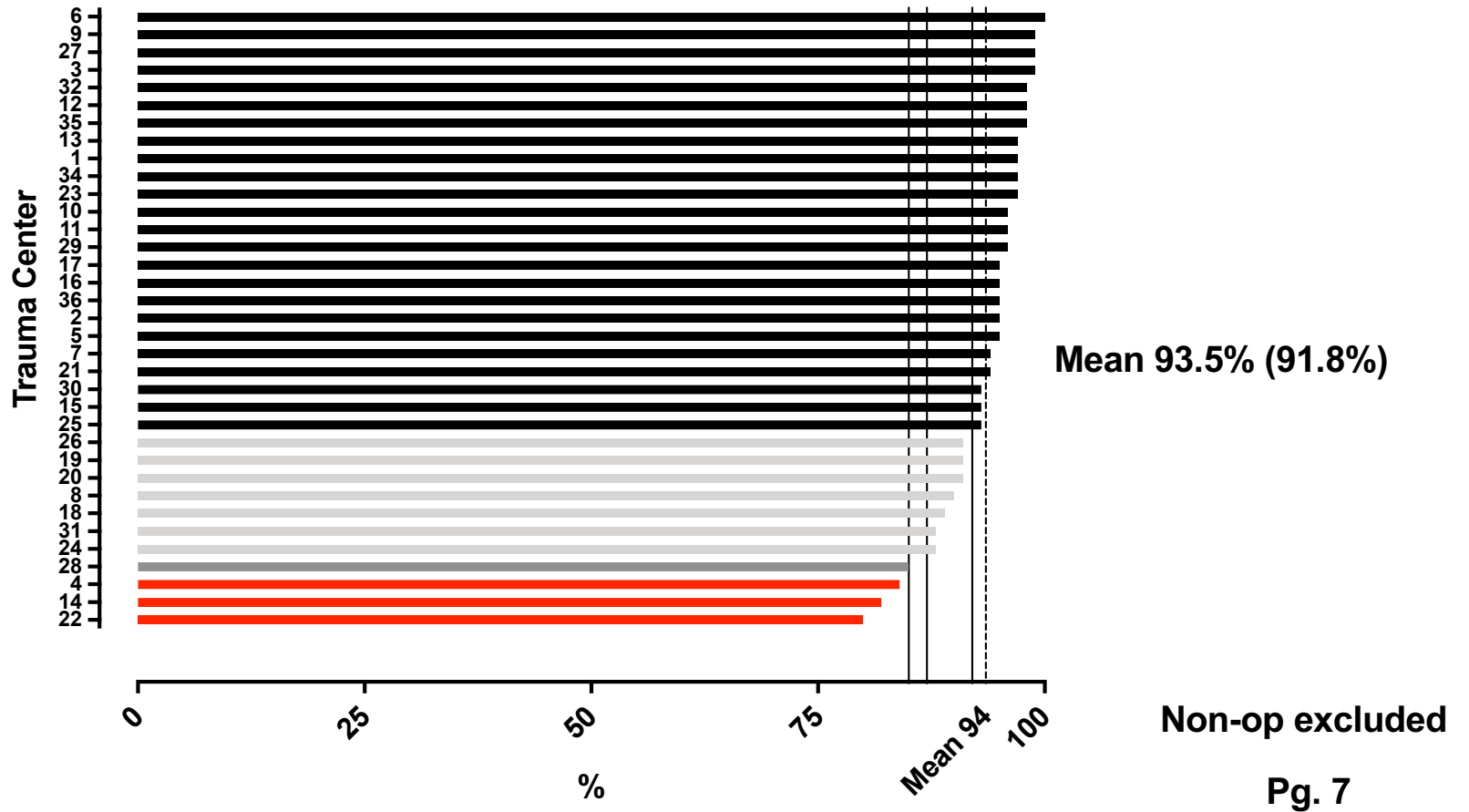
VTE Prophylaxis (LMWH, ≤ 48 hrs)



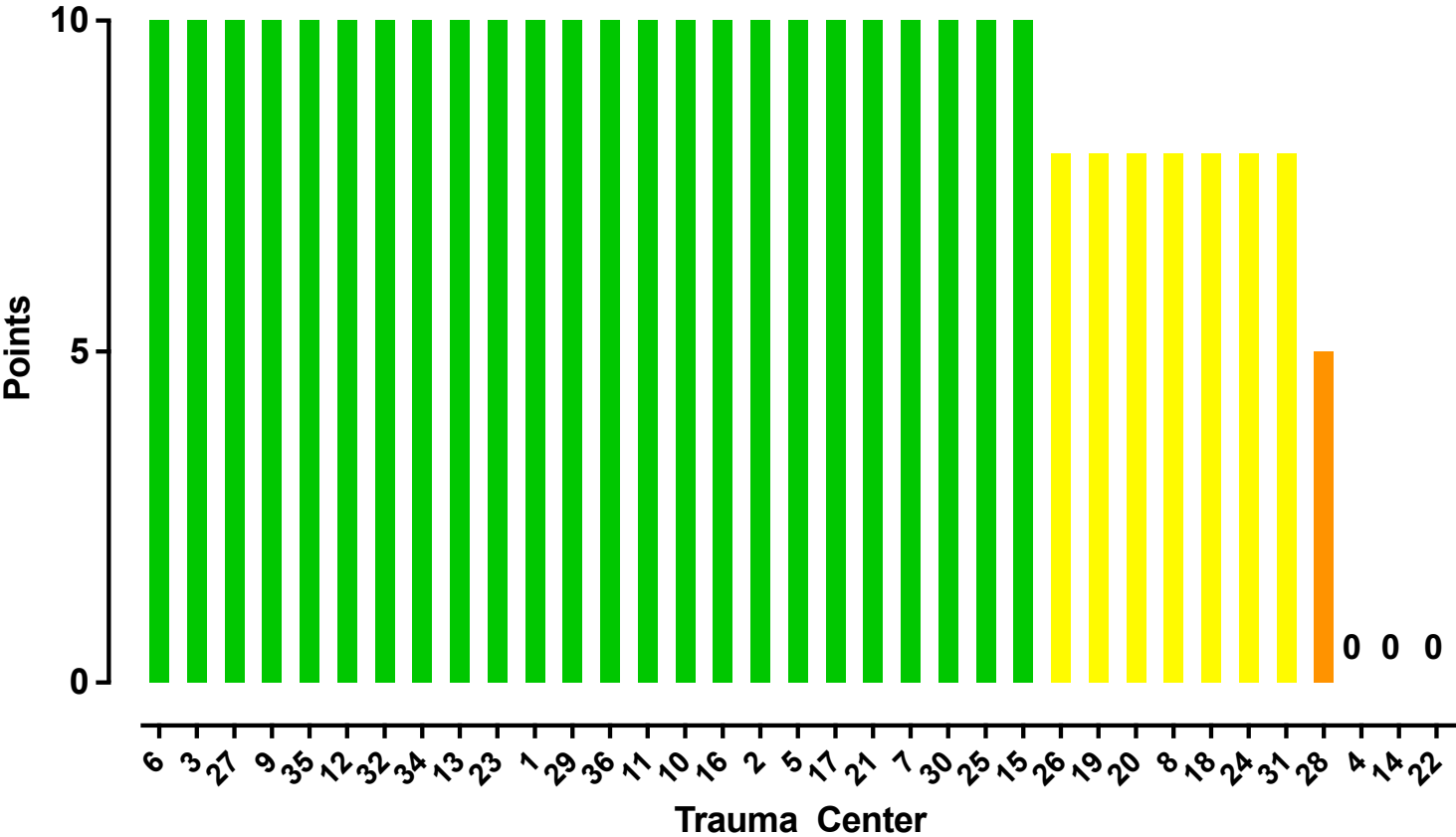
#5 Timely Surgical Repair in Geriatric (Age \geq 65) Isolated Hip Fracture

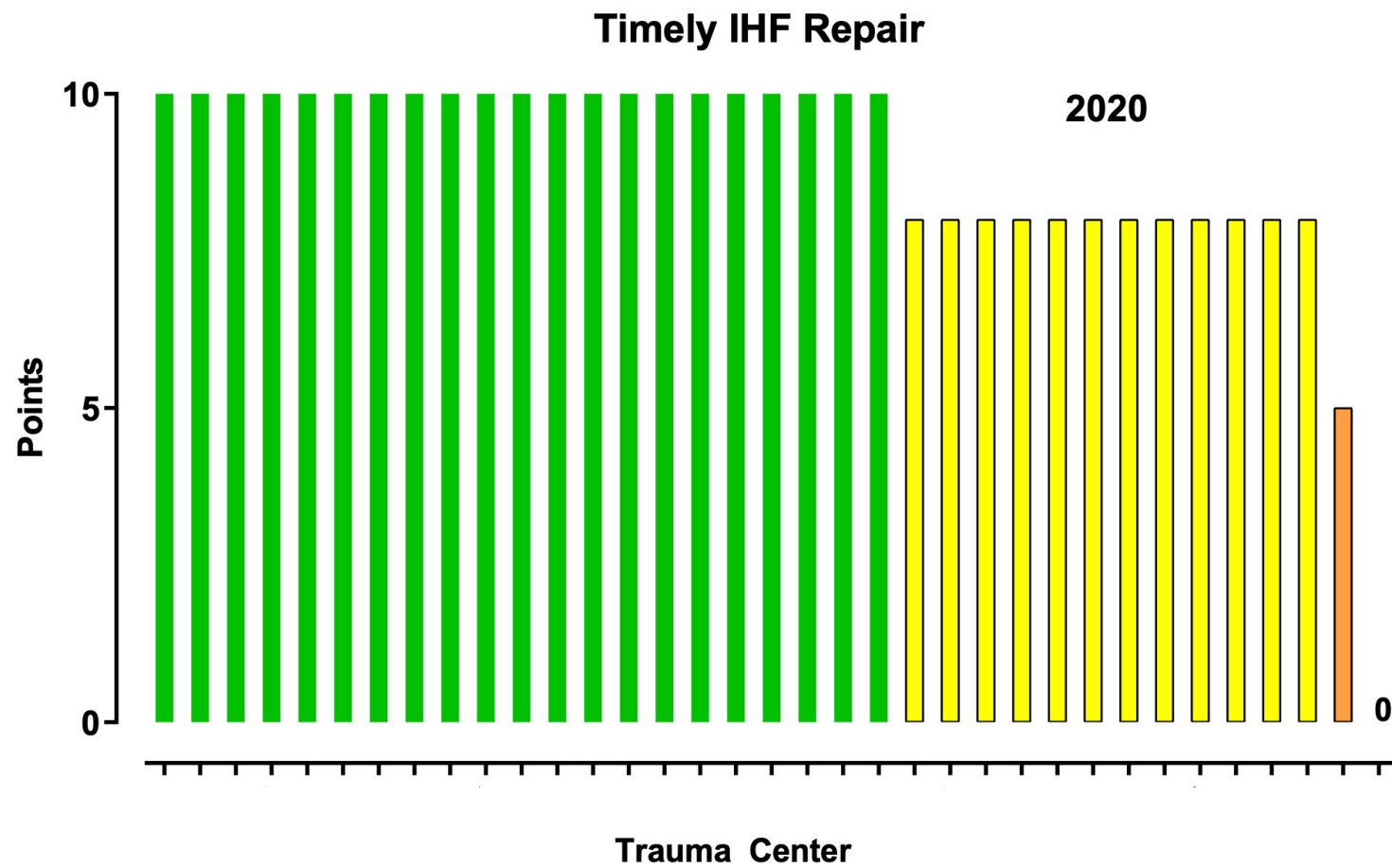
- ◆ Time to surgical repair of isolated hip fracture in patients age 65 or older (12 mo: 7/1/20-6/30/21)
 - \geq 92% of patients (\leq 48 hr)
 - \geq 87% of patients (\leq 48 hr)
 - \geq 85% of patients (\leq 48 hr)
 - $<$ 85% of patients (\leq 48 hr)

Metric #5 - Timely Surgical Hip Repair \geq 65 years
Cohort 8 - Isolated Hip Fracture
7/1/20 - 6/30/21



Timely IHF Repair





What is your experience?

Barriers to OR access

- Block Time
- Inpatient Time Sensitive

System

- Clearance
- Anesthesia
- Orthopedics

Does this data help?

- Patient is already admitted
- Bed shortages

How can we push this forward (+5,000 pts /yr)?

CQI's Address 17 of the Top 20 Surgical Procedures Identified by AHRQ

Rank	Procedure	Number of OR Procedures	Percent of OR Procedures	CQI
1	Cesarean section	1,242,800	8.8	OBI
2	Circumcision	1,075,100	7.6	N/A
3	Arthroplasty of knee	752,900	5.3	MARCQI
4	Hip replacement, total and partial	522,800	3.7	MARCQI
5	Percutaneous coronary angioplasty (PTCA)	465,400	3.3	PCI
6	Spinal fusion	463,200	3.3	MSSIC
7	Laminectomy, excision of intervertebral disc	438,200	3.1	MSSIC
8	Cholecystectomy and common duct exploration	372,600	2.6	MSQC
9	Colorectal resection	302,400	2.5	MSQC
10	Treatment, fracture or dislocation of hip and femur	289,800	2.0	MTQIP
11	Ligation of fallopian tubes	254,500	1.8	N/A



https://www.hcup-us.ahrq.gov/reports/statbriefs/sb233-Operating-Room-Procedures-United-States-2014.jsp?utm_source=ahrq&utm_medium=en-1&utm_term=&utm_content=1&utm_campaign=ahrq_en4_24_2018

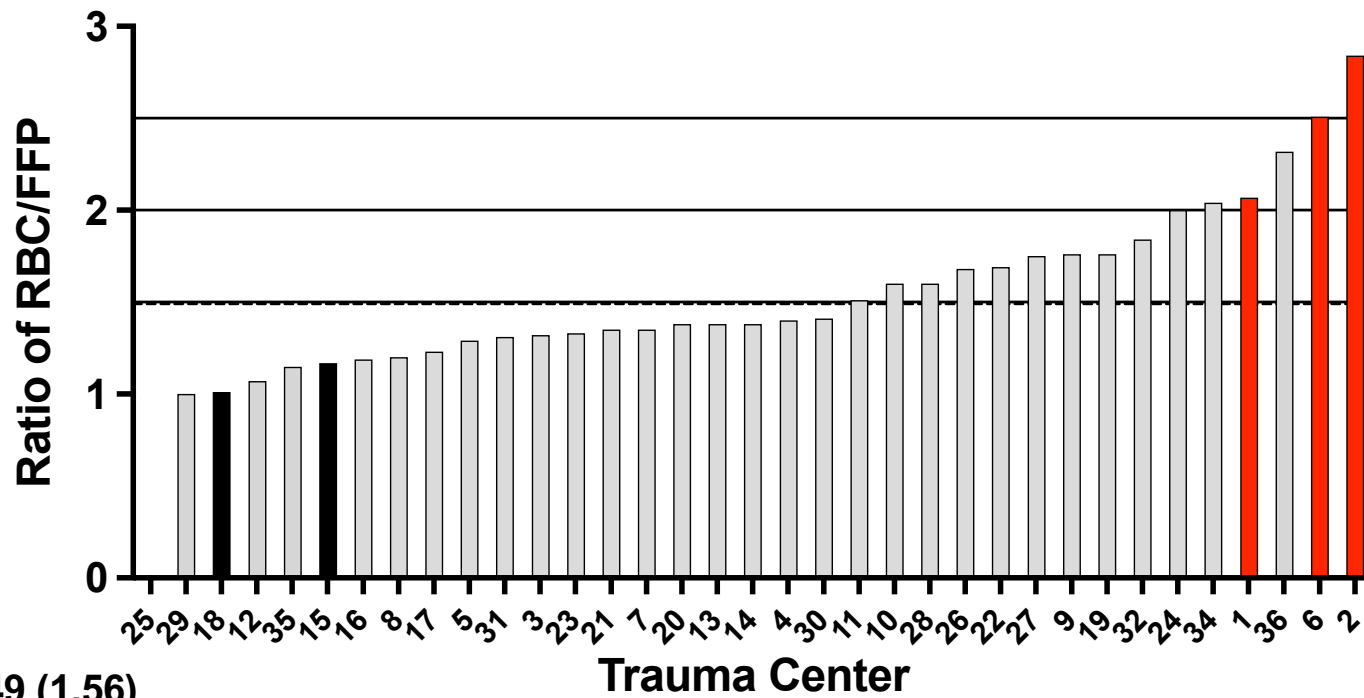


Blue Cross Blue Shield of Michigan and Blue Care Network are nonprofit corporations and independent licensees of the Blue Cross and Blue Shield Association.

#6 Red Blood Cell to Plasma Ratio

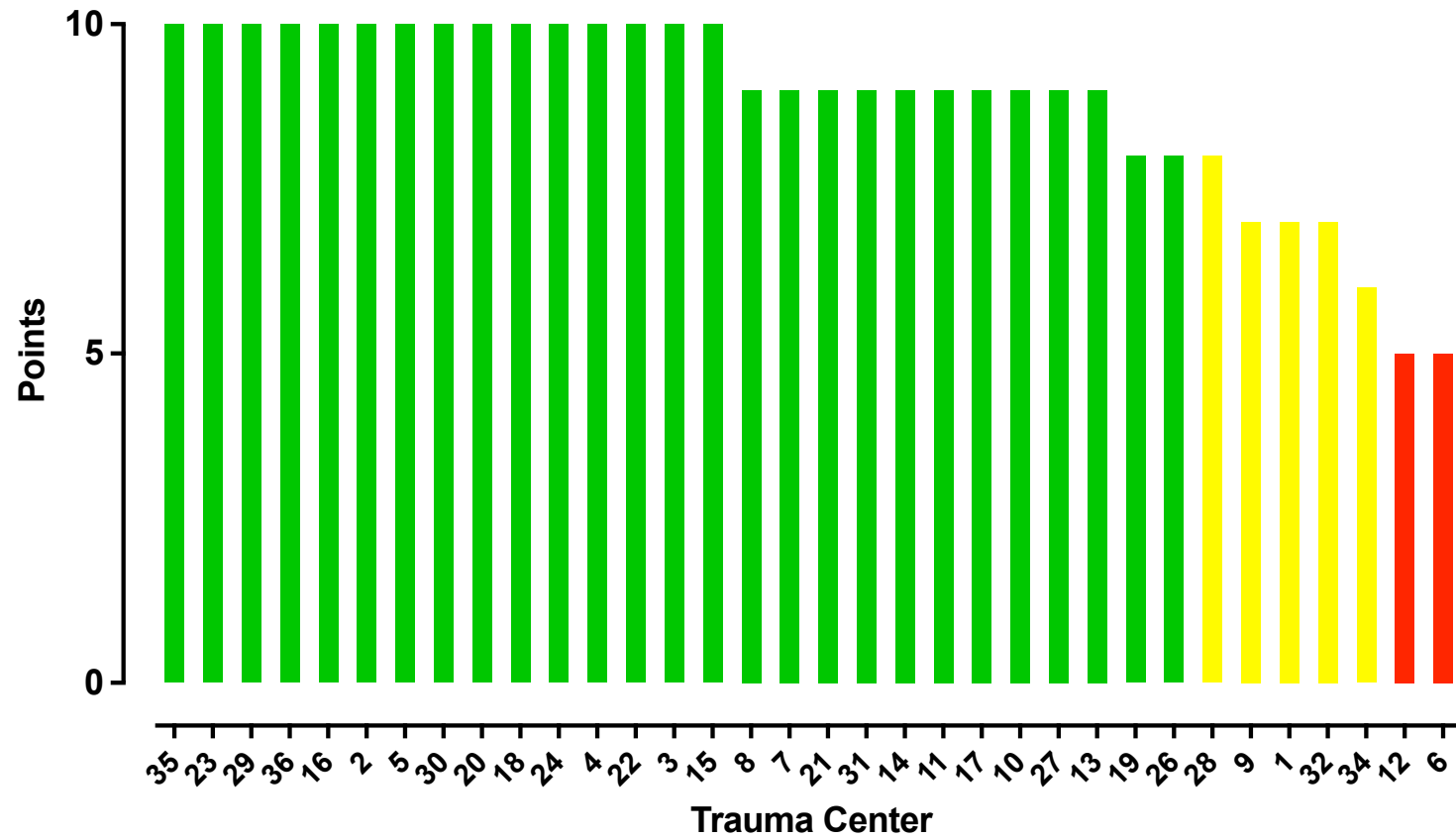
- ♦ Red blood cell to plasma ratio (weighted mean points) of patients transfused ≥ 5 units in first 4 hours (18 Mo's: 1/1/20-6/30/21)

Metric #6 - RBC to FFP Ratio - Mean
Cohort 1 - MTQIP All
1/1/20 - 6/30/21

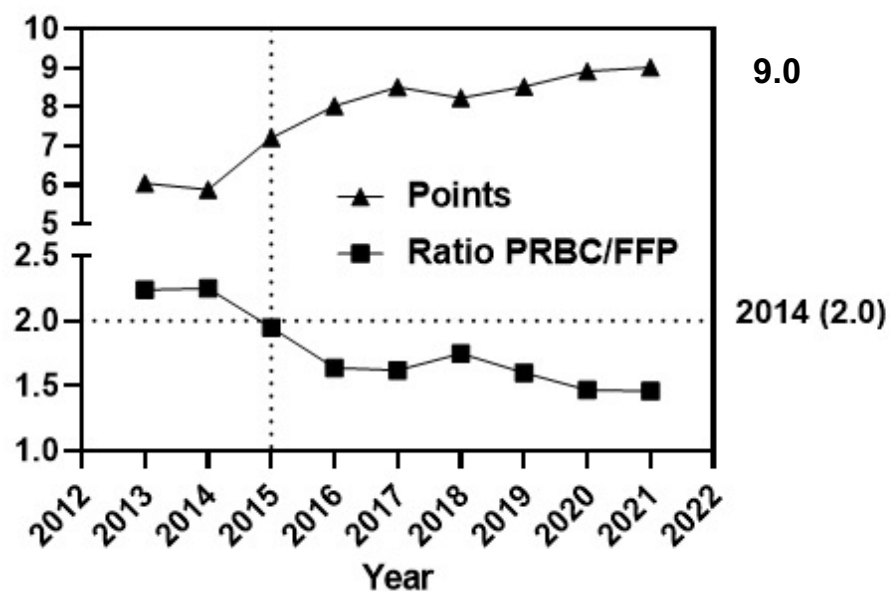


Mean 1.49 (1.56)

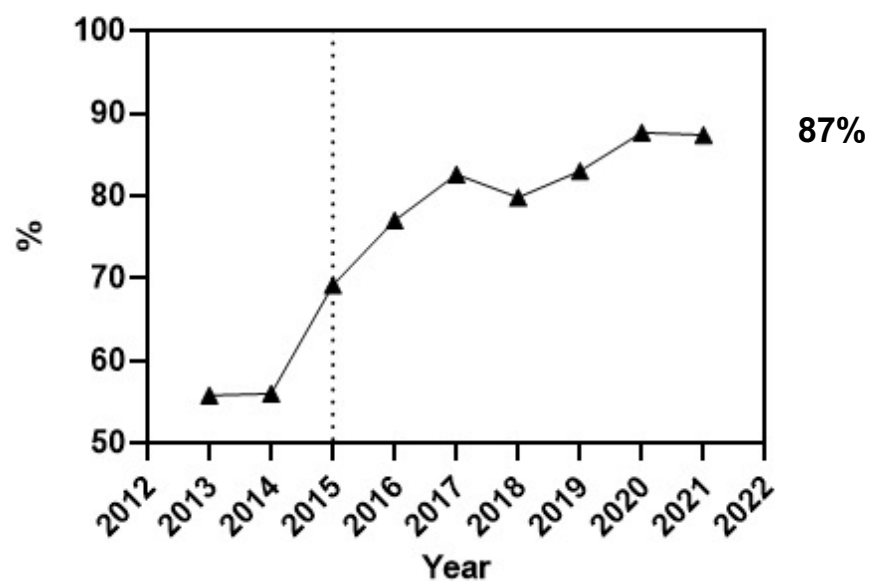
PRBC to Plasma Ratio



Blood Product Ratio in first 4 hrs



% Patients with Blood Product Ratio ≤ 2.0 in first 4 hrs



#7 Serious Complications

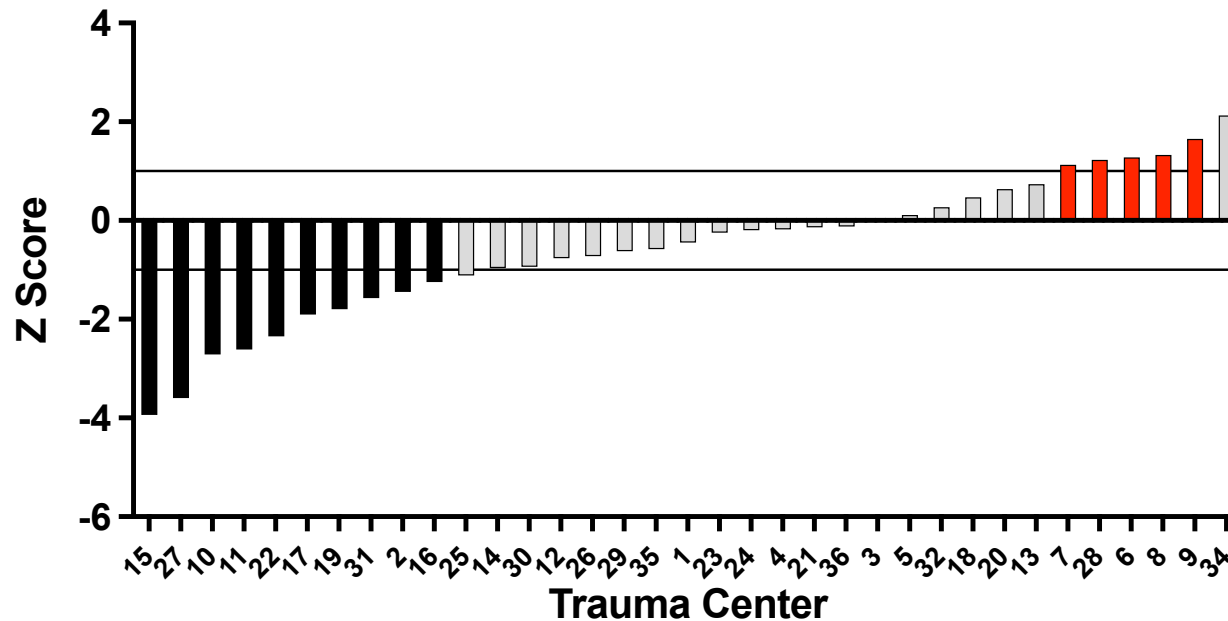
- ◆ Serious Complication Rate-Trauma Service Admits (3 years: 7/1/18-6/30/21)

Z-score

- ◆ Measure of trend in outcome over time
- ◆ Hospital specific
 - Compared to yourself
- ◆ Standard deviation
- ◆ > 1 getting worse
- ◆ 1 to -1 flat
- ◆ < -1 getting better

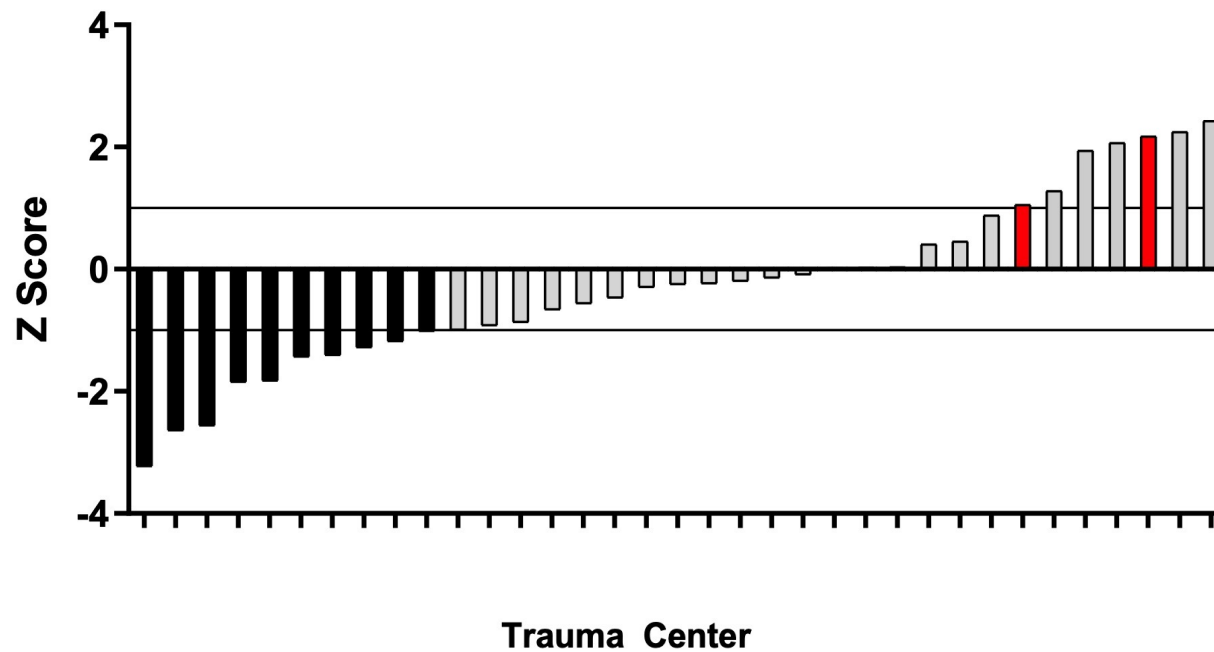
#7 Serious Complication Rate (Z-score)

Metric #7 - Z Score - Serious Complication Rate
Cohort 2 - Admit to Trauma
7/1/18 - 6/30/21

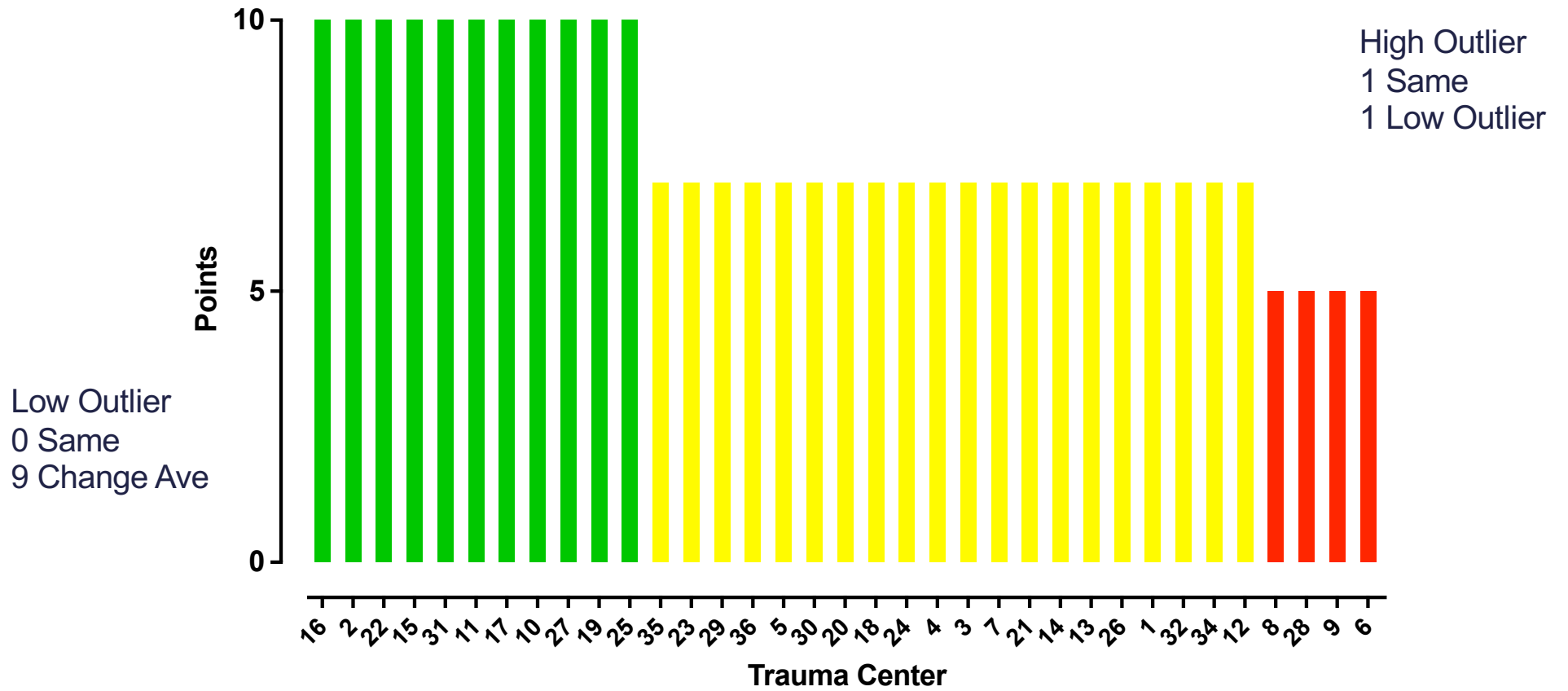


Last Year

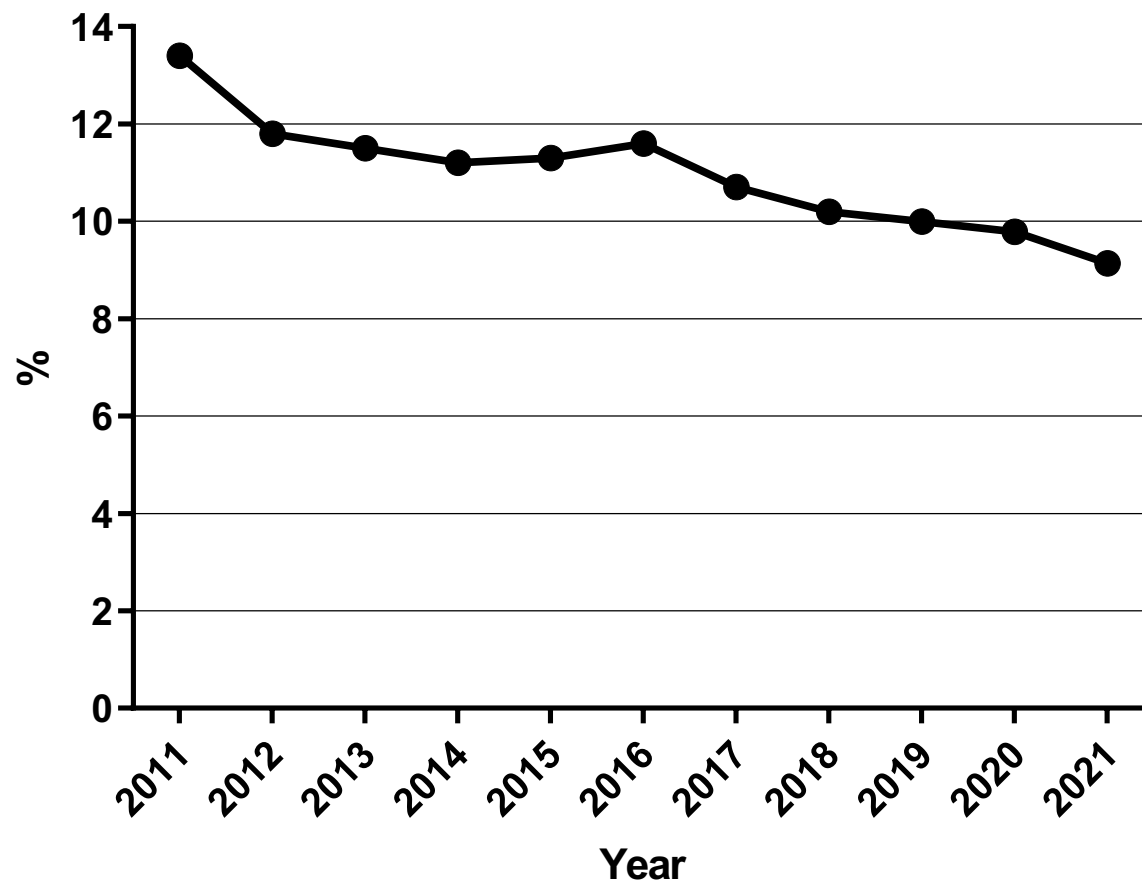
Metric #7 - Z Score - Serious Complication Rate
Cohort 2 - Admit to Trauma
7/1/17 - 6/30/20



Complication Rate: Z-score



Collaborative Outcome Overview - Serious Cx Cohort 2 - Admit to Trauma

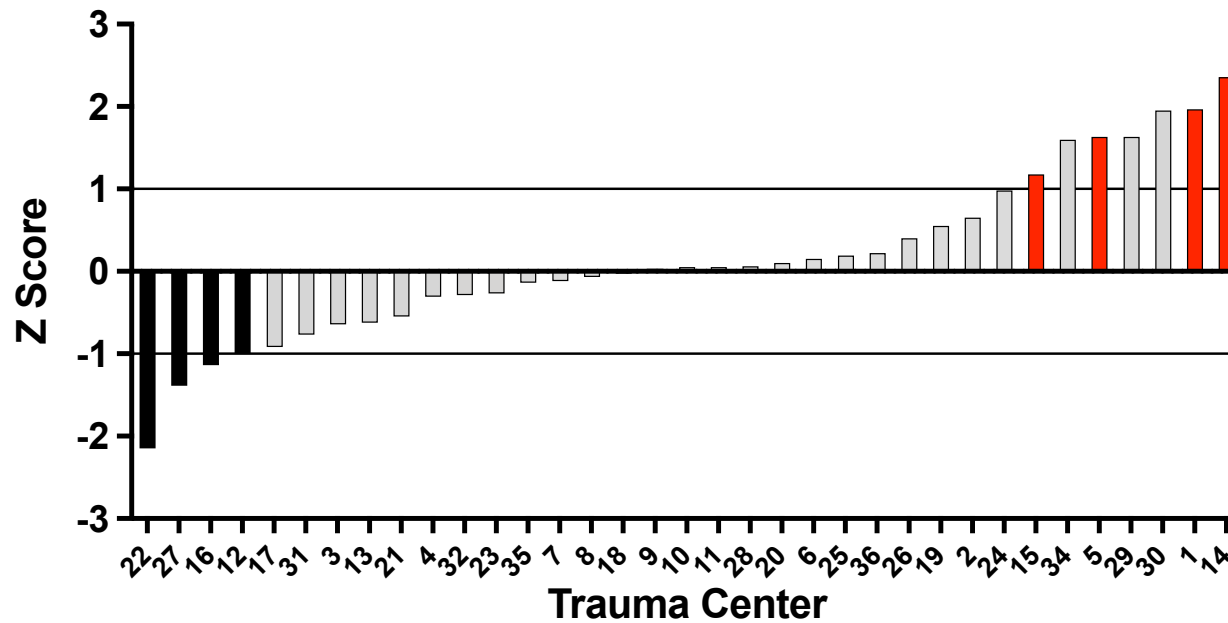


#8 Mortality

- ◆ Mortality Rate-Trauma Service Admits (3 years: 7/1/18-6/30/21)

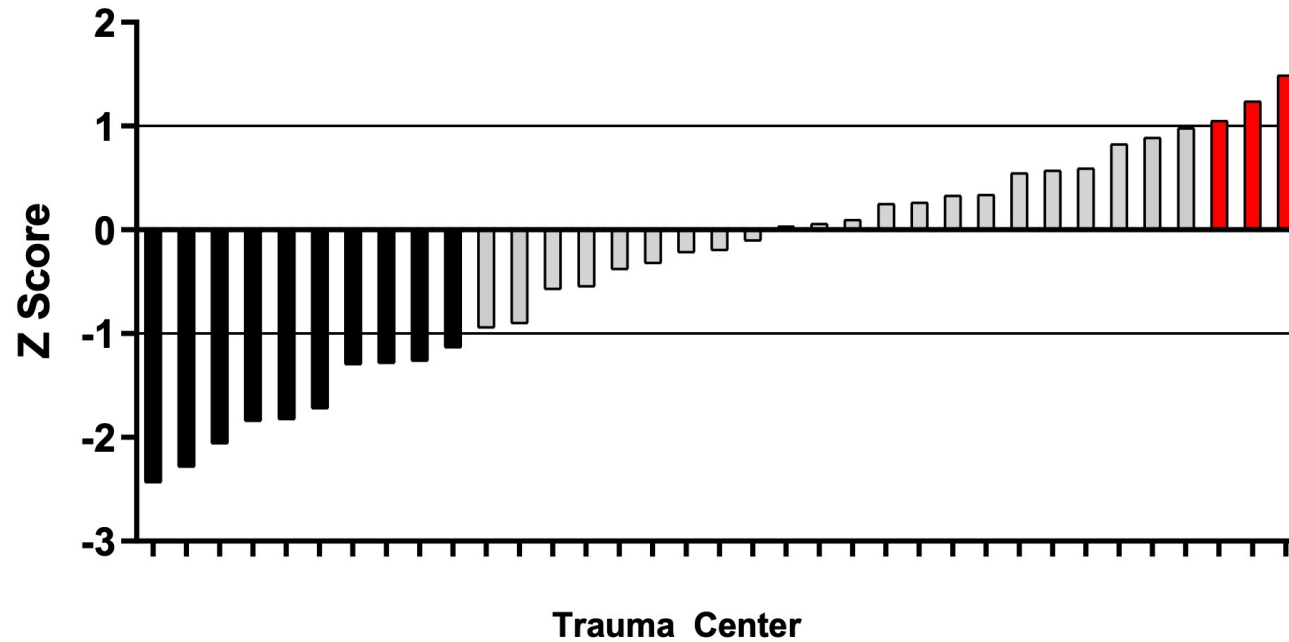
#8 Mortality Rate (Z-score)

Metric #8 - Z Score - Mortality Rate
Cohort 2 - Admit to Trauma
7/1/18 - 6/30/21

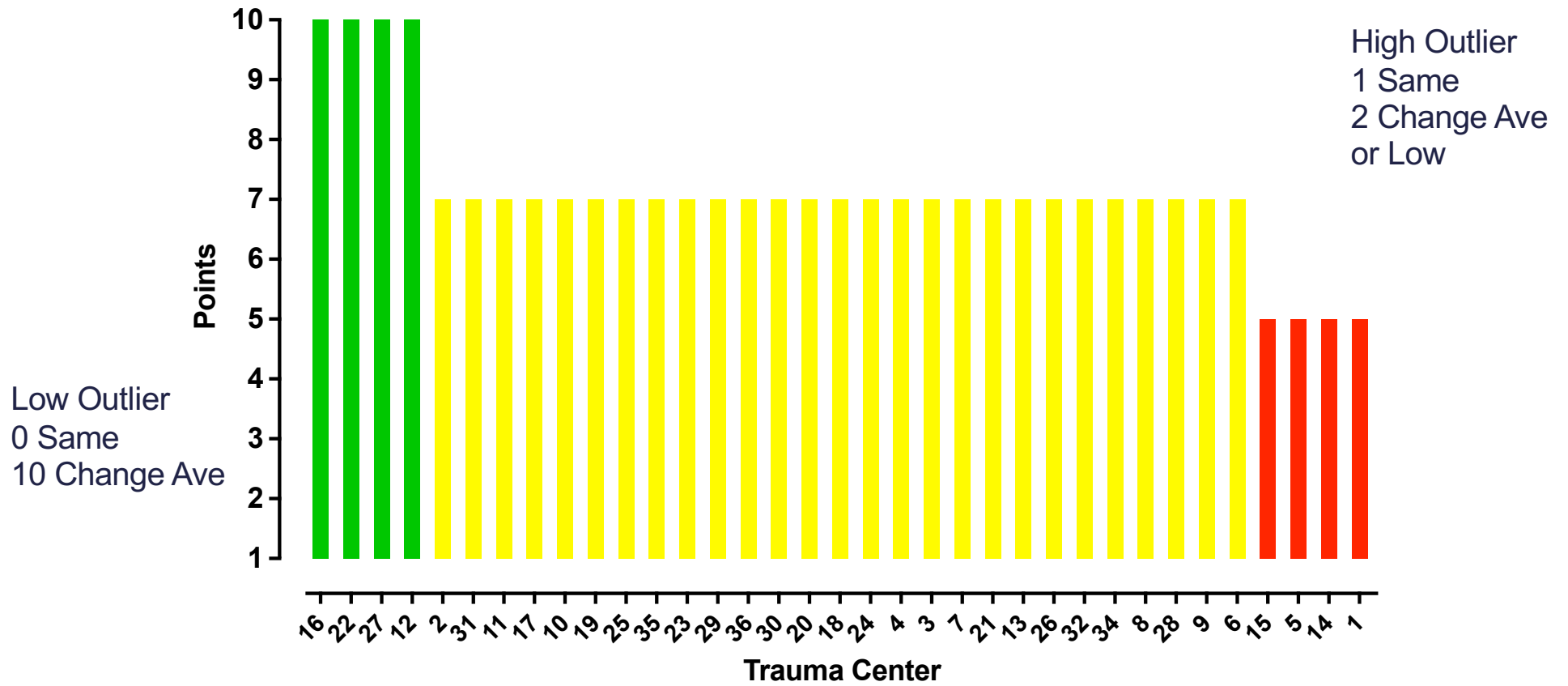


Last Year

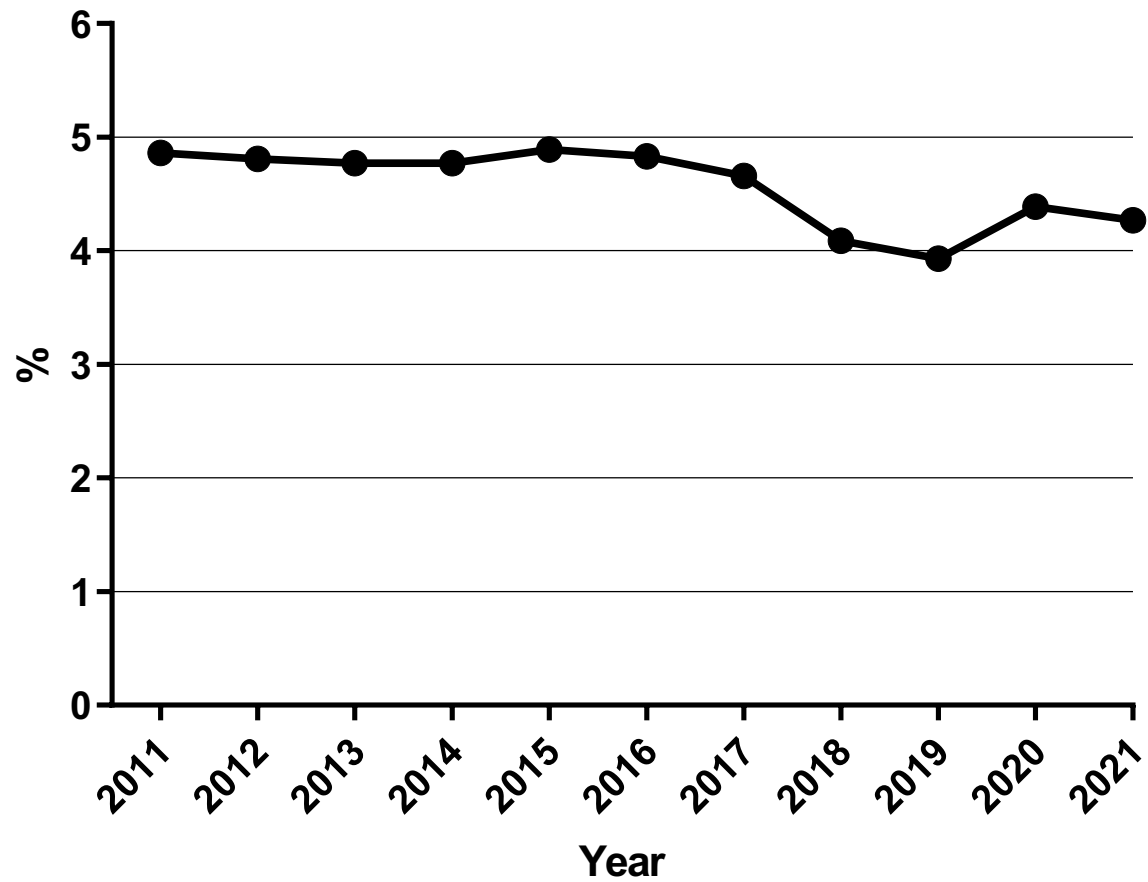
Metric #8 - Z Score - Mortality Rate Cohort 2 - Admit to Trauma 7/1/17 - 6/30/20



Mortality Rate: Z-Score



Collaborative Outcome Overview - Mortality Cohort 2 - Admit to Trauma



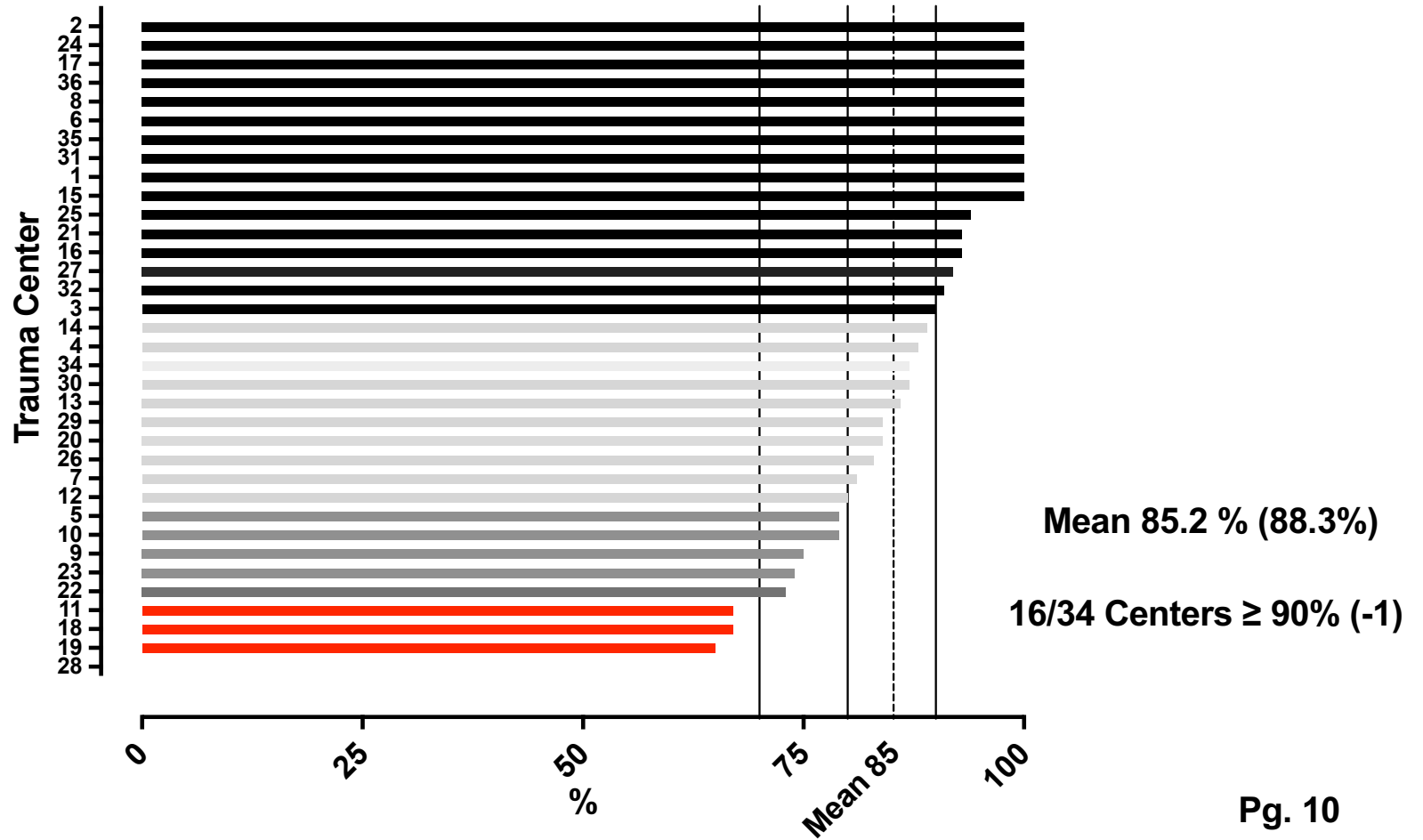
#9 Timely Head CT in TBI Patients on Anticoagulation Pre-Injury

- ◆ Head CT date and time from procedures
- ◆ Presence of prehospital anticoagulation
- ◆ TBI (AIS Head, excluding NFS, scalp, neck, hypoxia)
- ◆ Cohort1, Blunt mechanism
- ◆ Exclude direct admissions and transfer in
- ◆ No Signs of Life = Exclude DOAs
- ◆ Transfers Out = Include Transfers Out
- ◆ Time Period = 7/1/20 to 6/30/21

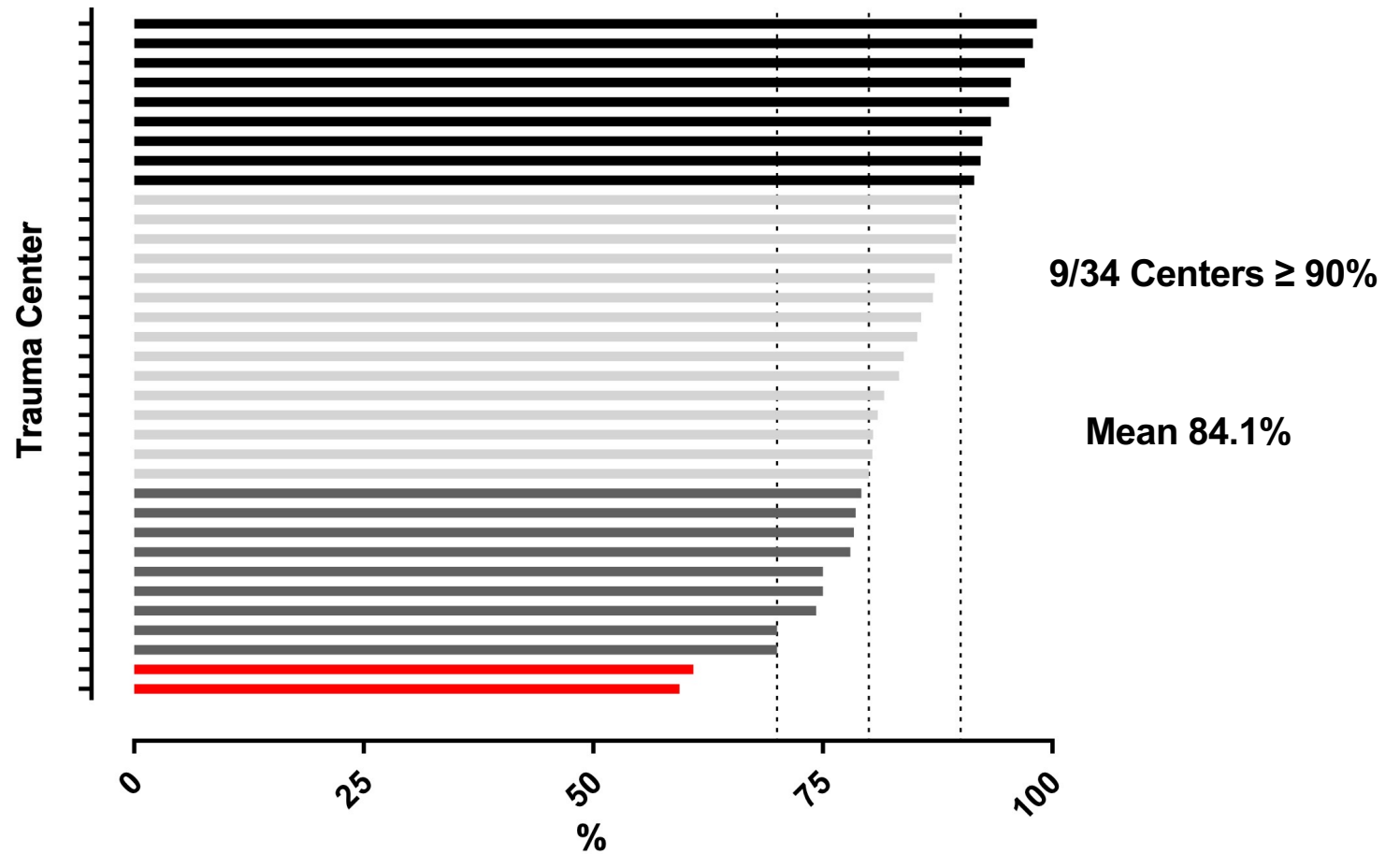
#9 Head CT

- ◆ Measure = % of patients with Head CT, date, and time
- ◆ Timing
 - $\geq 90\%$ patients (≤ 120 min)
 - $\geq 80\%$ patients (≤ 120 min)
 - $\geq 70\%$ patients (≤ 120 min)
 - $< 70\%$ patients (≤ 120 min)

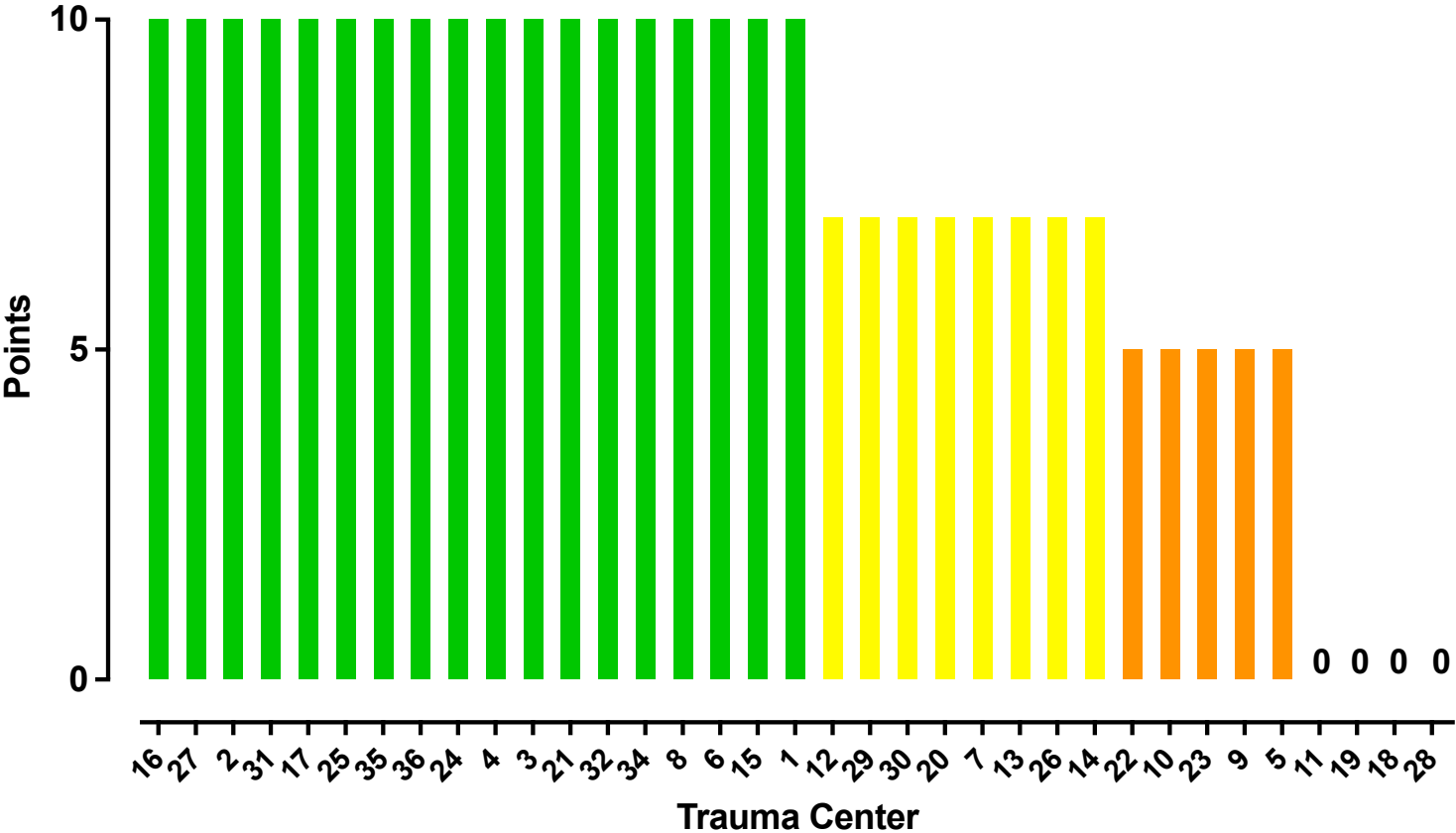
Metric #9 - ED Head CT \leq 120 min
Cohort 1 - MTQIP All on Anticoagulant (Excluding ASA)
7/1/20 - 6/30/21



2020 Metric #9 - ED Head CT \leq 120 min
Cohort 1 - MTQIP All, TBI on Anticoagulant (Excluding ASA)
7/1/18 - 6/30/19



Head CT Time with Anticoagulant



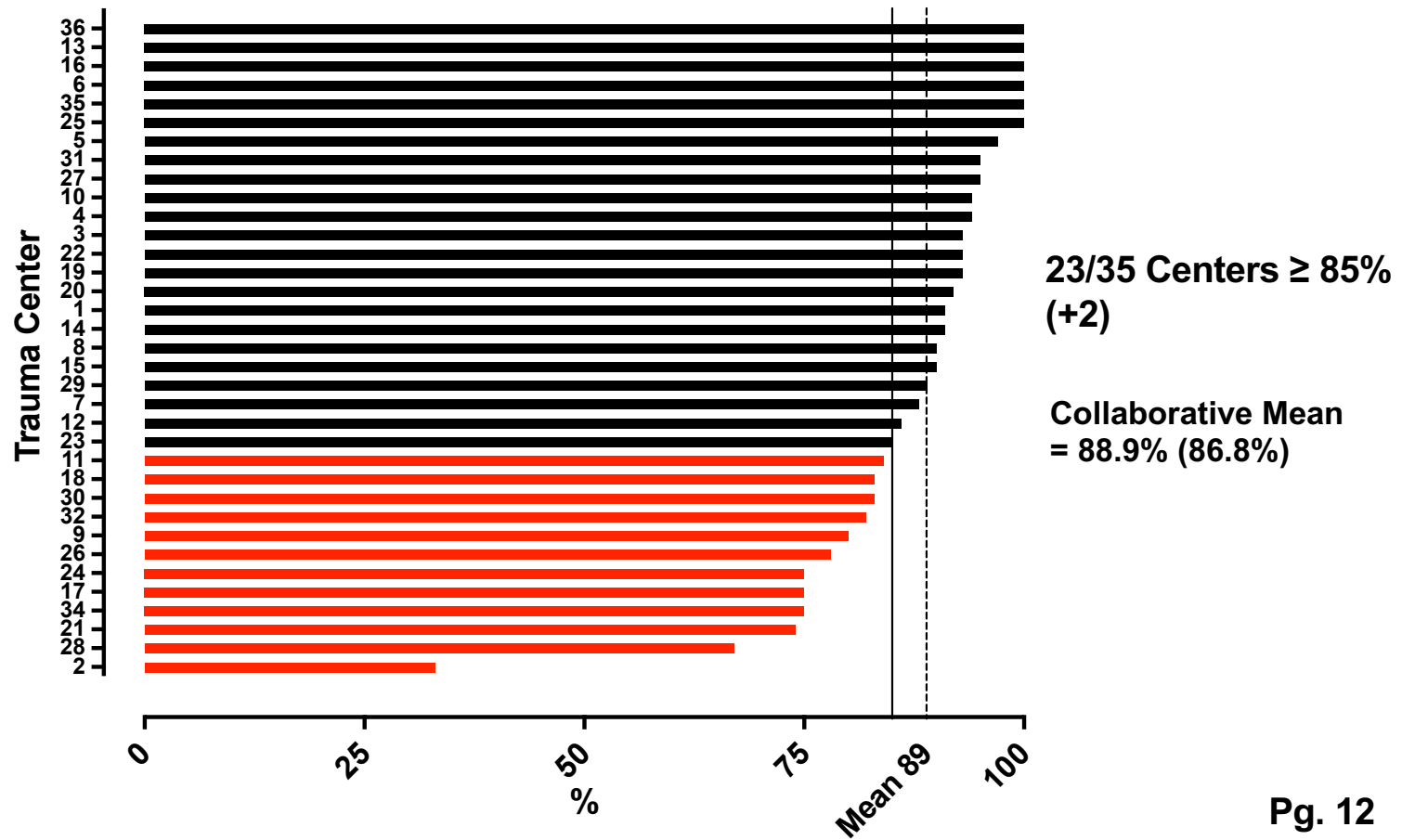
#10 Timely Antibiotic in Femur/Tibia Open Fractures - Collaborative Wide Measure

- ◆ Type of antibiotic administered along with date and time for open fracture of femur or tibia
- ◆ Presence of acute open femur or tibia fracture based on AIS or ICD10 codes (See list)
- ◆ Cohort = Cohort 1 (All)
- ◆ Exclude direct admissions and transfer in
- ◆ No Signs of Life = Exclude DOAs
- ◆ Transfers Out = Include Transfers Out
- ◆ Time Period = 7/1/20 to 6/30/21

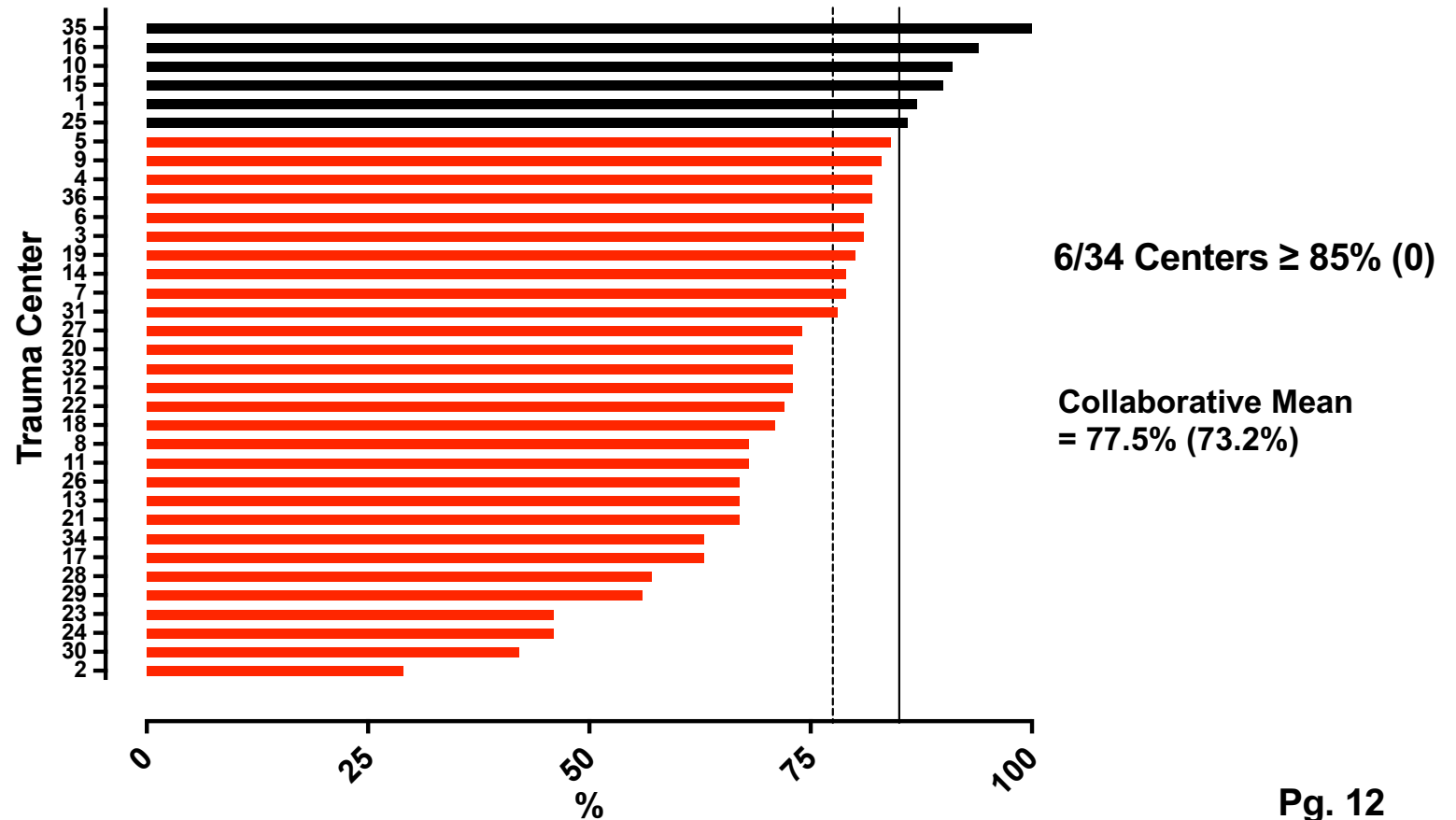
#10 Open Fracture Antibiotic Usage

- ◆ Measure = % of patients with antibiotic type, date, time recorded ≤ 120 minutes
 - $\geq 85\%$ patients (≤ 120 min) > 10 points
 - All or nothing
- ◆ ACS-COT Orange Book – VRC resources
 - Administration within 60 minutes
 - ◆ ACS OTA Ortho Update
 - ◆ ACS TQIP Best Practices Orthopedics

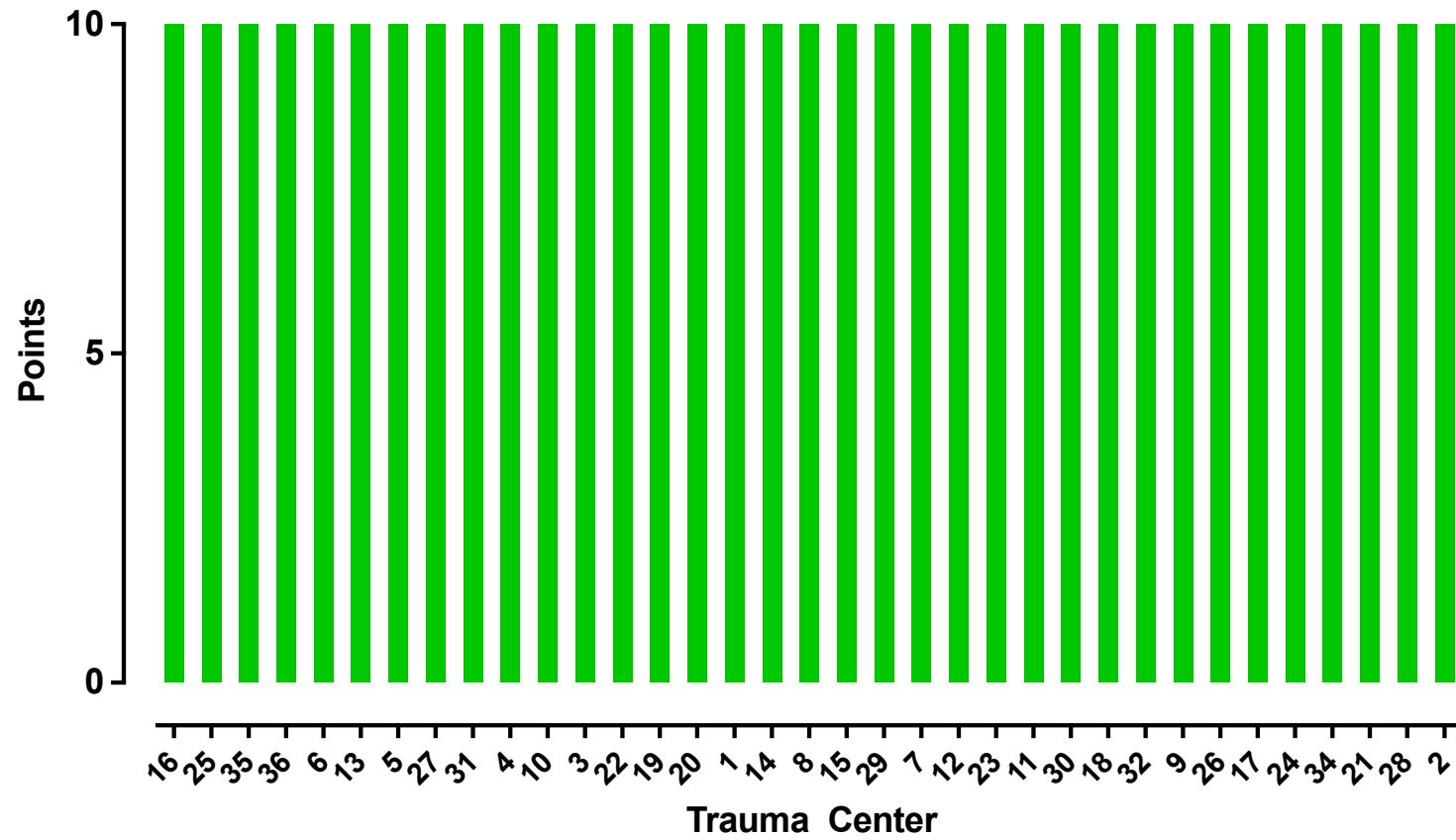
Metric #10 - Open Fracture - Time to Abx \leq 120 min
Cohort 1 - MTQIP All
7/1/20 - 6/30/21



Open Fracture - Time to Abx \leq 60 min
Cohort 1 - MTQIP All
7/1/20 - 6/30/21



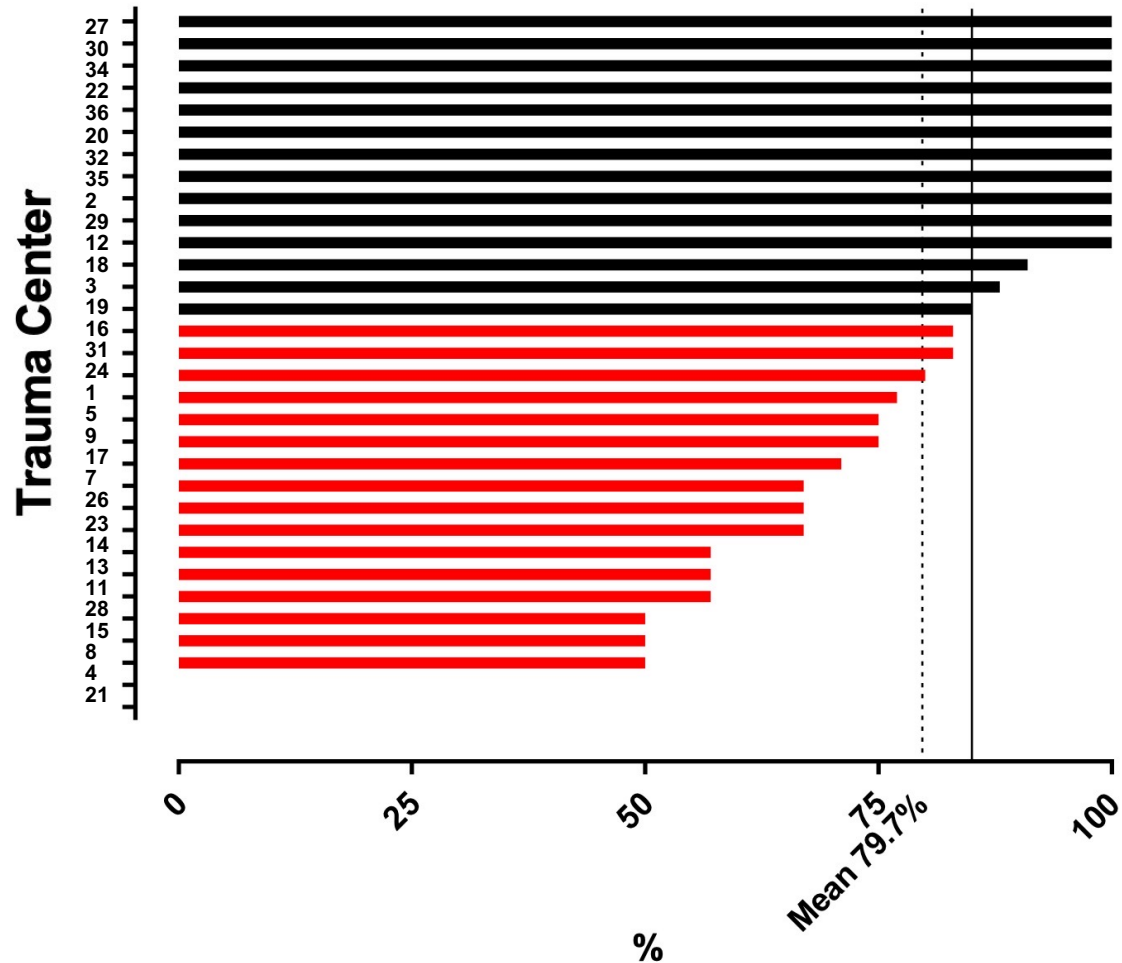
Open Fracture Antibiotic



#10 Open Fracture Antibiotic Usage 2022

- ◆ Measure = % of patients with antibiotic type, date, time recorded \leq **90** minutes
 - $\geq 85\%$ patients (\leq **90** min) > 10 points
 - All or nothing

Open Fracture - Time to Abx \leq 90 min
Cohort 1 - MTQIP All
7/1/21 - 12/31/21



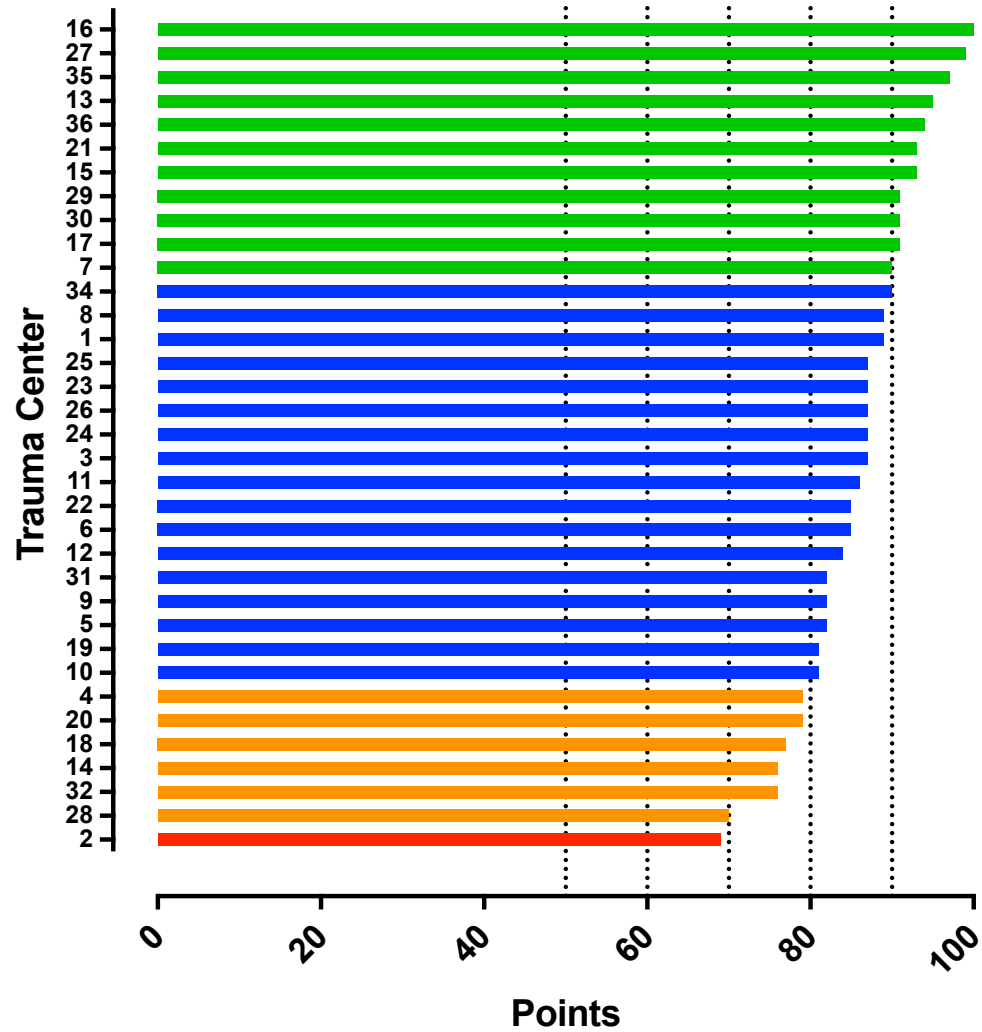
Current 79.7%

Collaborative Mean
7/1/2020 – 6/30/2021
= 86.3%

#10 Open Fracture Antibiotic Usage 2022

- ◆ Check your list of patients
 - February Submission
 - Jill will send out separately
- ◆ Every patient counts

2021 CQI Total Score



2021

86.0%

100 – 69%

2020

87.7%

97 – 74%

2014	86%
2015	86%
2016	92%
2017	85%
2018	86%
2019	89%
2020	88%
2021	86%

MTQIP Hospital CQI Index Changes for 2022

#10	10	Timely Antibiotic in Femur/Tibia Open Fractures - COLLABORATIVE WIDE MEASURE (12 mo: 7/1/21-6/30/22) ≥ 85% patients (≤ 90 min) < 85% patients (≤ 90 min)	10 0
-----	----	--	---------

Questions



VBR (2021 scoring for 2022 payout)

- ◆ Timely LMWH VTE Prophylaxis ($\geq 50\%$ of patients within 48 hours)
- ◆ Timely operative repair in geriatric hip fractures ($\geq 90\%$ of patients within 48 hours)
- ◆ Timely antibiotic in femur/tibia open fractures ($\geq 85\%$ of patients within 120 min)
 - Collaborative
- ◆ Scoring
 - 2 of 3 Measures = 103%
 - 3 of 3 Measures = 105%

VBR 105% (All 3)

Center ID

- **8**
- **3**
- **1**
- **12**
- **29**
- **13**
- **35**
- **16**
- **6**
- **15**
- **7**
- **25**
- **19**
- **27**

VBR 103% (2 of 3)

Center ID

- **31**
- **9**
- **5**
- **11**
- **23**
- **10**
- **26**
- **20**
- **36**
- **22**
- **14**
- **34**
- **21**
- **30**

VBR (2022 scoring for 2023 payout)

- ◆ Timely LMWH VTE Prophylaxis ($\geq 50\%$ of patients within 48 hours)
- ◆ Timely operative repair in geriatric hip fractures ($\geq 90\%$ of patients within 48 hours)
- ◆ Timely antibiotic in femur/tibia open fractures ($\geq 85\%$ of patients within 90 min)
 - Collaborative
- ◆ Scoring
 - 2 of 3 Measures = 103%
 - 3 of 3 Measures = 105%

Questions



Engaging Orthopaedic Surgery

Bryant Oliphant, MD MBA
Judy Mikhail, PhD MBA RN



MTQIP Ortho Working Group - Update -

Bryant W. Oliphant, MD, MBA, MSc

Staff Physician Detroit Receiving Hospital

Assistant Professor – Wayne State University, Department of Orthopaedic Surgery

Research Investigator – University of Michigan, Department of Orthopaedic Surgery

 @BonezNQuality



Initial Meeting – December 8th, 2021

- 11 Institutions
- 30 Orthopaedic Surgeons Invited
- Overwhelming positive responses and interest
- How to engage locally?
- Can we have access to data?




Next Steps

- Create list of ortho trauma providers at each center
 - Chief (Primary Contact)
 - Call pool
- Expand to all 35 (+level III) centers
- Query for future initiatives
- Continue breaking down silos → current initiatives



Questions

- Contact info:
- Bryant W. Oliphant, MD, MBA, MSc
- bryantol@med.umich.edu
- Cell: XXX-XXX-XXXX
-  @BonezNQuality



Break

Back at 12:00 noon



Analytic Updates
LOS Calculation
Mortality Classification Data

Jill Jakubus, PA-C, MHSA



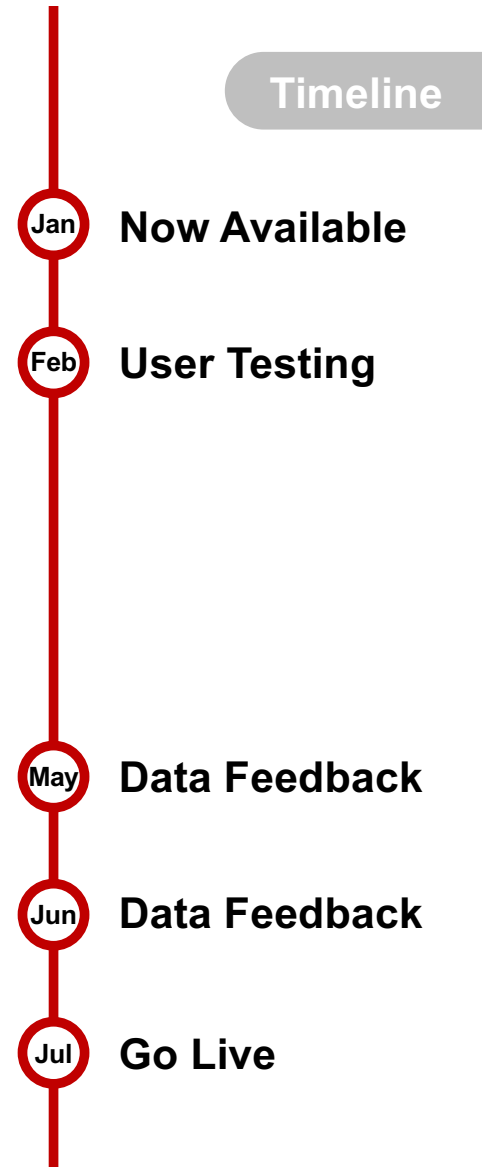
Objectives



Analytic Updates

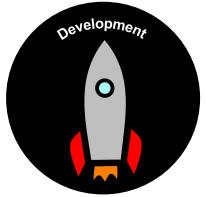
- Opioid process measures
- Research in progress
- Cohort 9 (TBI)
- Data validation progress

Opioid Process Measures



Research in Progress

Center	PI	Topic	Phase
Detroit Receiving	Oliphant	The accuracy of orthopedic data in a trauma registry	
Henry Ford	Johnson	EMS vs. private car effect on outcomes	
● Henry Ford	Kabbani	Impact of COVID-19 on outcomes in trauma patients	New
● Michigan Medicine	Oliphant	Decreasing time to antibiotic administration in open fractures of the femur and tibia through PI in a statewide CQI	Published 12/21 <i>Surgery</i>
Michigan Medicine	Oliphant	Trauma center characteristics that drive quality, cost and efficiency in lower extremity injuries	
Spectrum Health	Chapman	Outcomes in operative fixation of rib fractures	Analysis update in progress
Spectrum Health	Miller	Outcomes in IMN of long bone fractures	Manuscript drafting
St Joseph Mercy Ann Arbor	Curtiss	Infection rates in operative trauma patients	
● St Joseph Mercy Ann Arbor	Hecht	Time to anticoagulant reversal in all trauma patients	Manuscript submitted
St Joseph Mercy Ann Arbor	Hecht	Time to anticoagulant reversal emergent trauma surgery	Analysis Target 2/28/22
St. Joseph Mercy Ann Arbor	Hoesel	Rib fractures in the elderly	
● St. Mary Mercy Livonia & Spectrum Health	Keyes	Impact of COVID-19 on trauma in the ED	Abstract submitted
U of M Health - West	Mitchell	Blunt cerebral vascular injury	Analysis

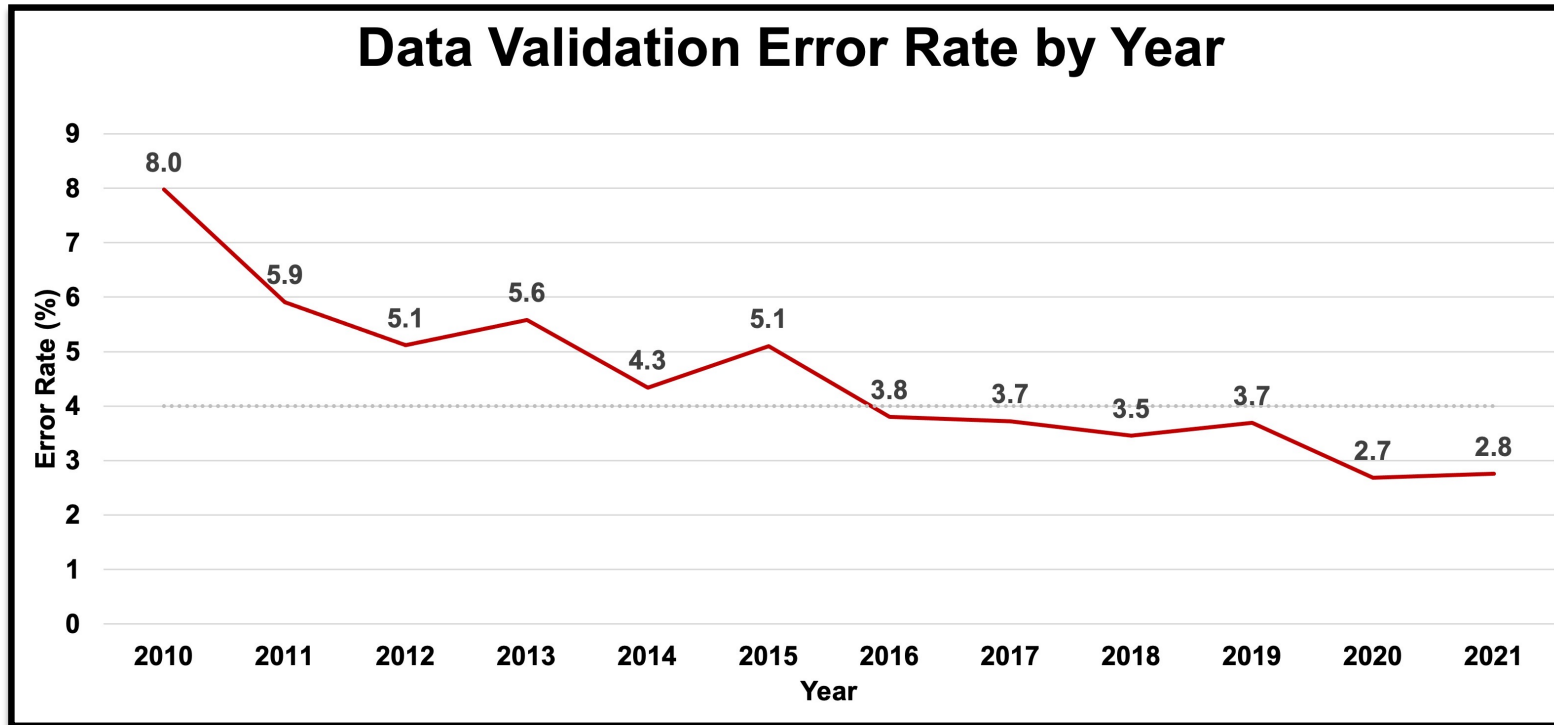


Cohort 9 (TBI)

COHORT 0%

Cohort 1 (All) ▼

- Cohort 1 (All)
- Cohort 2 (Admit to Trauma Service)
- Cohort 3 (Blunt Multi-System)
- Cohort 4 (Blunt Single-System)
- Cohort 5 (Penetrating)
- Cohort 6 (Admit to non-Trauma Service)
- Cohort 7 (Benchmark)
- Cohort 8 (Isolated Hip Fracture)
- Cohort 9 (TBI)



237
total # visits

6
mean # visits



THANK YOU
DATA ABSTRACTION STAFF

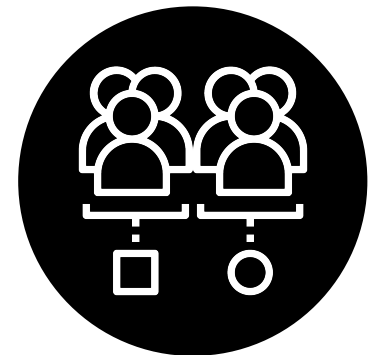
LOS Calculation

- Cohort formation
- Use case poll
- Clinical considerations
- Issue & Impact
- Analytic considerations
- Next steps




MTQIP Cohort Formation

- Blunt or penetrating mechanism
- Age ≥ 16
- ISS ≥ 5
- All deaths or LOS ≥ 1 day if discharged alive



Which patient meets cohort inclusion?

- Blunt or penetrating mechanism
- Age ≥ 16
- ISS ≥ 5
- All deaths or LOS ≥ 1 day if discharged alive

**Adult 1
MVC**


Level I/II ED

Pelvic Fx, Abrasion

Trauma Admit

Transfer Floor

Discharge HD 3

**Adult 2
MVC**

Level I/II ED

Pelvic Fx, Abrasion

Trauma Admit

No Beds

Discharge HD 3

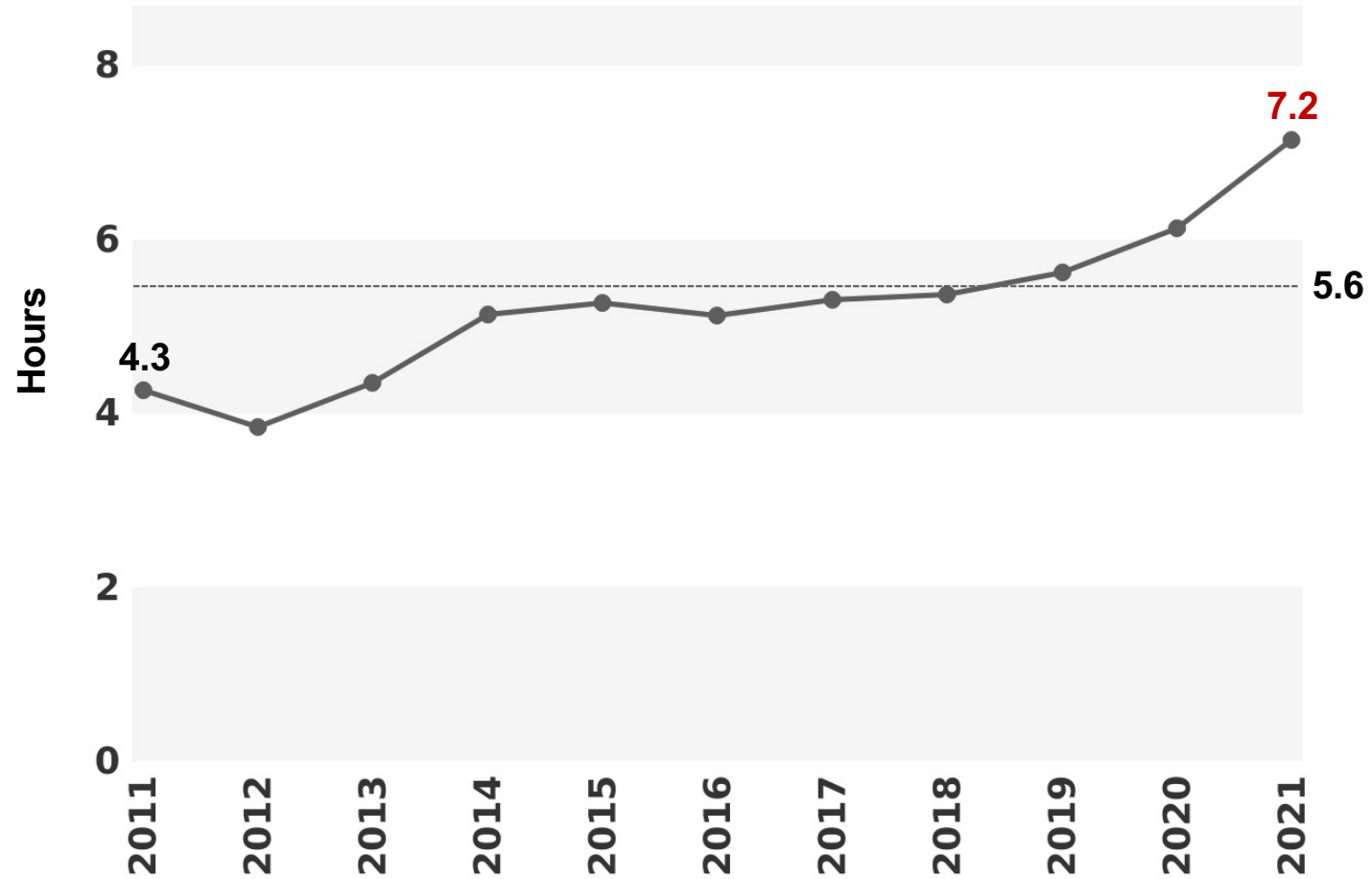
Answer



Current State

- Hospital Discharge – ED Arrival

Mean ED LOS – Cohort 1, Exclude DOA
MTQIP Collaborative



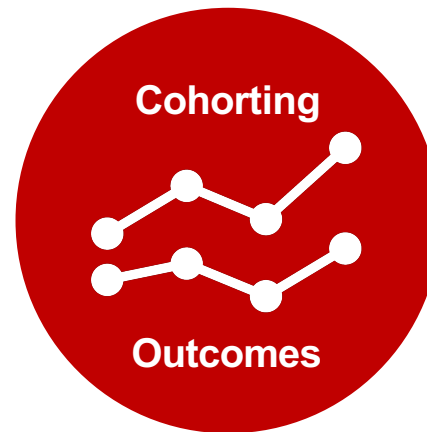
Issue & Impact



Providers



Email



Precision



Care

LOS Logic



Current State

- Hospital Discharge – ED Arrival



Future State Consideration

- Hospital Discharge – ED Arrival
- ED Discharge – ED Arrival

- Blunt or penetrating mechanism
- Age ≥ 16
- ISS ≥ 5
- All deaths or LOS ≥ 1 day if discharged alive

Analytic Considerations

	ED/Hospital Arrival	Hospital Discharge	Actual	Vendor	MTQIP
2020	Jan 1, 20XX 00:00	Jan 2, 20XX 15:00	1.63 days	1 or 2 days	2.00 days
2022	Jan 1, 20XX 00:00	Jan 1, 20XX 15:00	0.63 day 15.00 hours	1.00 day 24.00 hours	1.00 day 15.00 hours
	Jan 1, 20XX 00:00	Jan 1, 20XX 00:40	0.03 day 0.67 hours	1 day (usually) 24 hours	0.00 day 0.67 hours

Guiding Principles



Next Steps

Collaborative Notification

Sensitivity Analysis

Collaborative Update

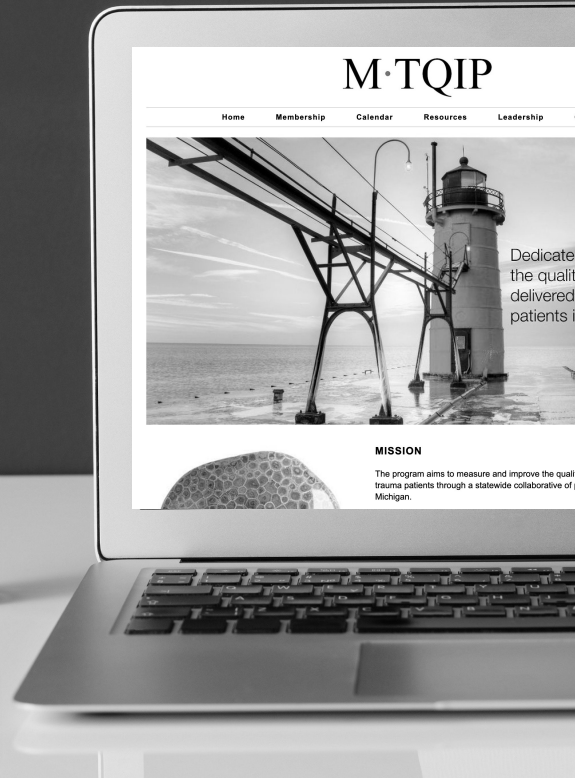
Implement

Feedback

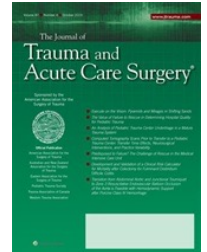
Objectives

Mortality Classification Data

- Literature
- Definition
- Data feedback
- Questions
- Next steps



Literature



ERROR REDUCTION IN TRAUMA CARE: LESSONS FROM AN ANONYMIZED, NATIONAL, MULTICENTER MORTALITY REPORTING SYSTEM

Doulia M Hamad ¹, Samuel P Mandell, Ronald M Stewart, Bhavin Patel, Matthew P Guttman, Phillip Williams, Arielle Thomas, Angela Jerath, Eileen M Bulger, Avery B Nathens

Affiliations + expand

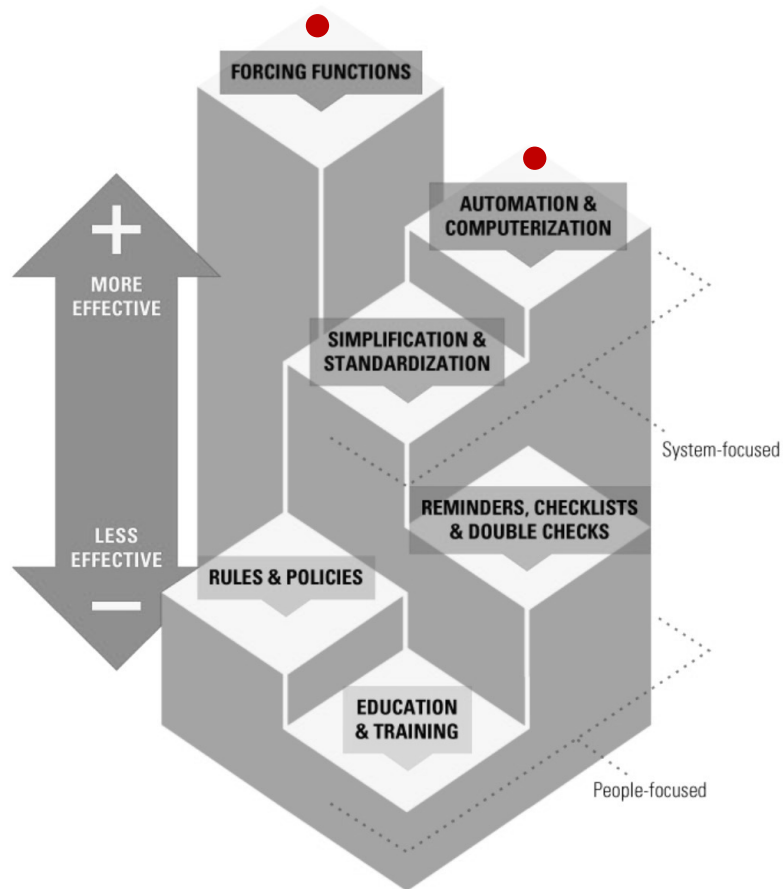
PMID: 34840270 DOI: [10.1097/TA.0000000000003485](https://doi.org/10.1097/TA.0000000000003485)

Abstract

Background: Twenty years ago, the landmark report To Err is Human, illustrated the importance of system-level solutions, in contrast to person-level interventions, to assure patient safety. Yet rates of preventable deaths, particularly in trauma care, have not materially changed. The American College of Surgeons Trauma Quality Improvement Program (ACS TQIP) developed a voluntary Mortality Reporting System (MRS) to better understand the underlying causes of preventable trauma deaths and the strategies used by centers to prevent future deaths. The objective of this work is to describe the MRS and to evaluate the effectiveness of the strategies reported in the MRS.

Methods: An analysis of the MRS was made available to all participating centers. The data were potentially

Conclusions: Most strategies to reduce errors in trauma centers focus on changing the performance of providers rather than system-level interventions such as automation, standardization, and fail-safe approaches. Centers require additional support to develop more effective mitigations that will prevent recurrent errors and patient harm.



Hierarchy of Intervention Effectiveness

Patient safe implementing effective safety solutions. The hierarchy of intervention effectiveness, 2015.

Questions

- Can mortality classification be standard reporting?
- How can we use mortality classification to help you?
- What analytics do you find most meaningful?
- Future direction?



12.5.7 MORTALITY CLASSIFICATION

Reporting Criterion

Optional reporting. If participating, report on all deaths.

Definition

The mortality classification is determined for all trauma deaths as part of the PIPS process at each trauma center.

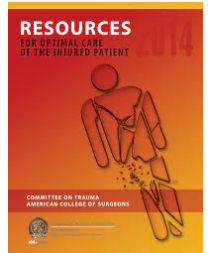
Element Values

- Unanticipated mortality with opportunity for improvement (UNANTIC.QI.OPP)
- Mortality with opportunity for improvement (OPPORTUNITY)
- Mortality without opportunity for improvement (NO.OPPORTUNITY)
- Not done (NOT)

Additional Information

- Report the final mortality classification as determined by PIPS committee/attending review.
- An unanticipated mortality with opportunity for improvement is defined as patients whose death is unexpected in relation to their injuries and comorbid conditions. These deaths are considered to be potentially preventable and should have opportunities for improvement.
- A mortality with opportunity for improvement is defined as patients in whom death is anticipated, but where potential system or provider improvements/gaps in care could be identified.
- A mortality without opportunity is defined as patients in whom death is anticipated and no system provider improvements/gaps in care could be identified.

Resources



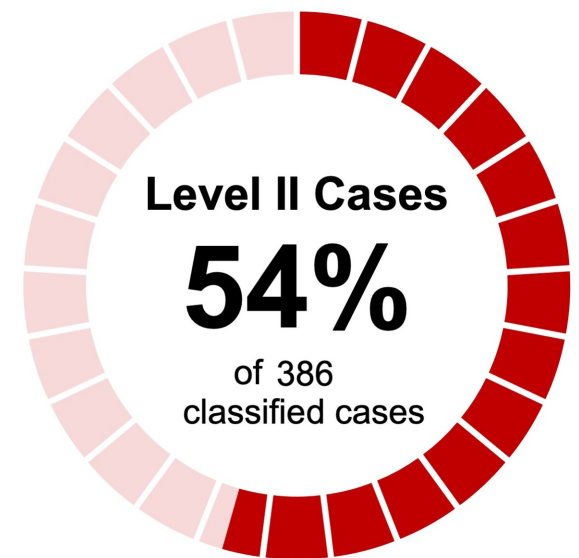
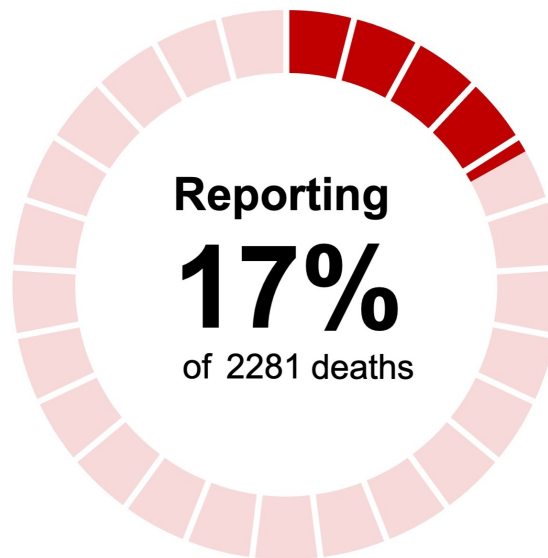
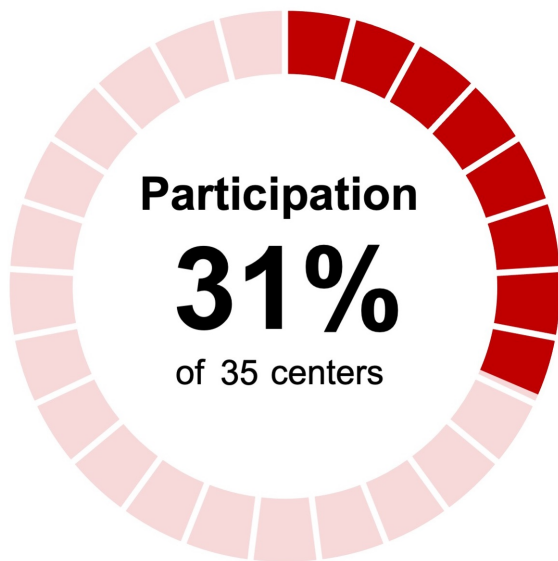
16	I, II, III	The multidisciplinary trauma peer review committee must systematically review mortalities, significant complications, and process variances associated with unanticipated outcomes and determine opportunities for improvement (CD 16–17).	TYPE II
16	I, II, III	When an opportunity for improvement is identified, appropriate corrective actions to mitigate or prevent similar future adverse events must be developed, implemented, and clearly documented by the trauma PIPS program (CD 16–18).	TYPE II

Mortality without Opportunity for Improvement:

Mortality with Opportunity for Improvement:

Unanticipated mortality with opportunity for improvement:

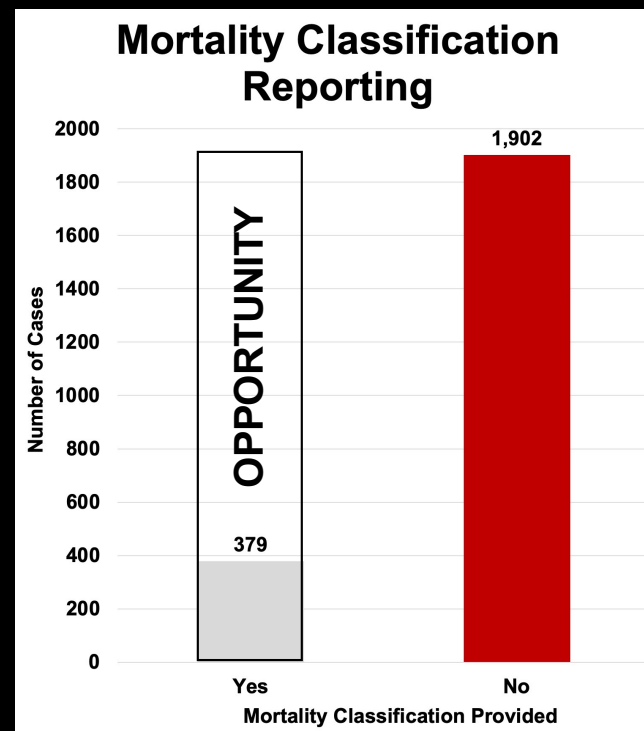
Metadata



Interval: 1/1/20 – 8/31/21 (minimum)

Limitations

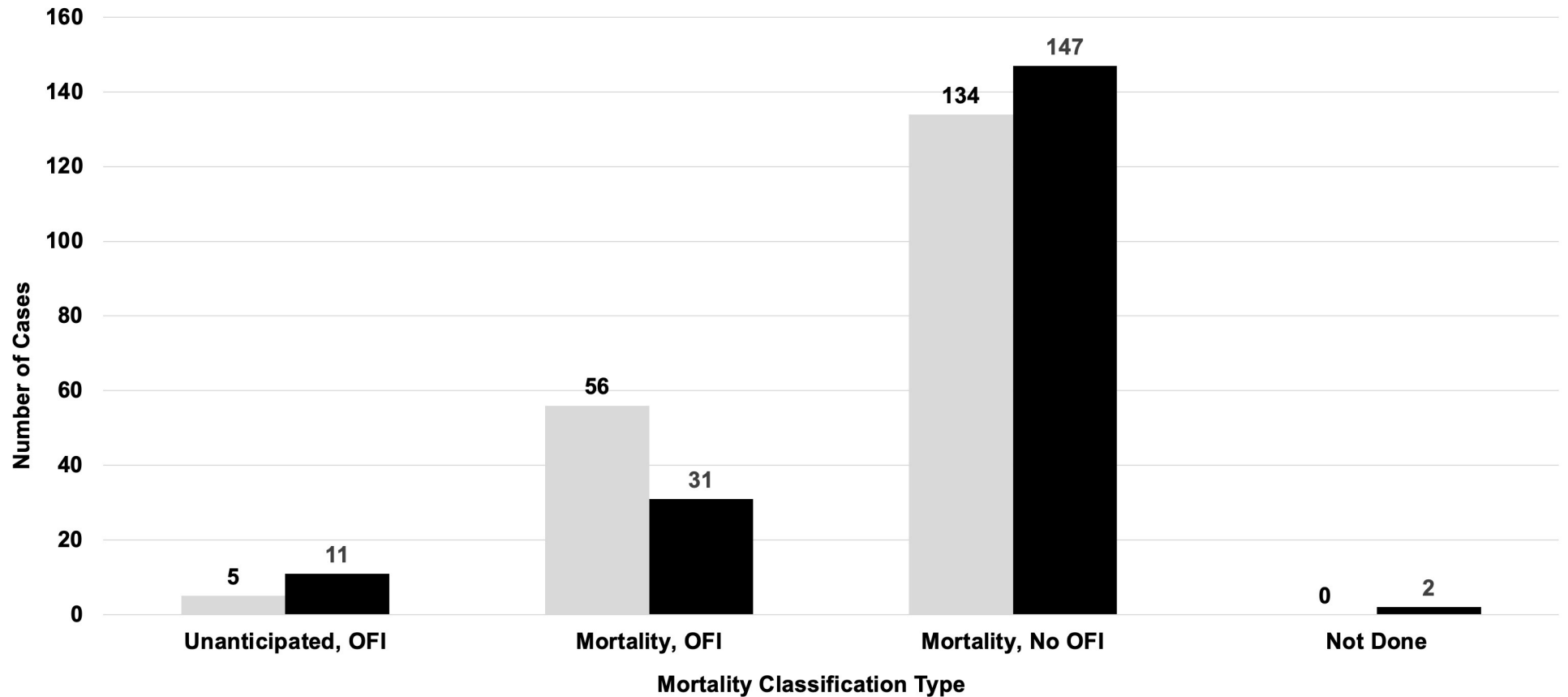
- Non-response bias
- Power



7 reported cases d/c to hospice

Mortality Classification Type Over Time

■ 2020 ■ 2021

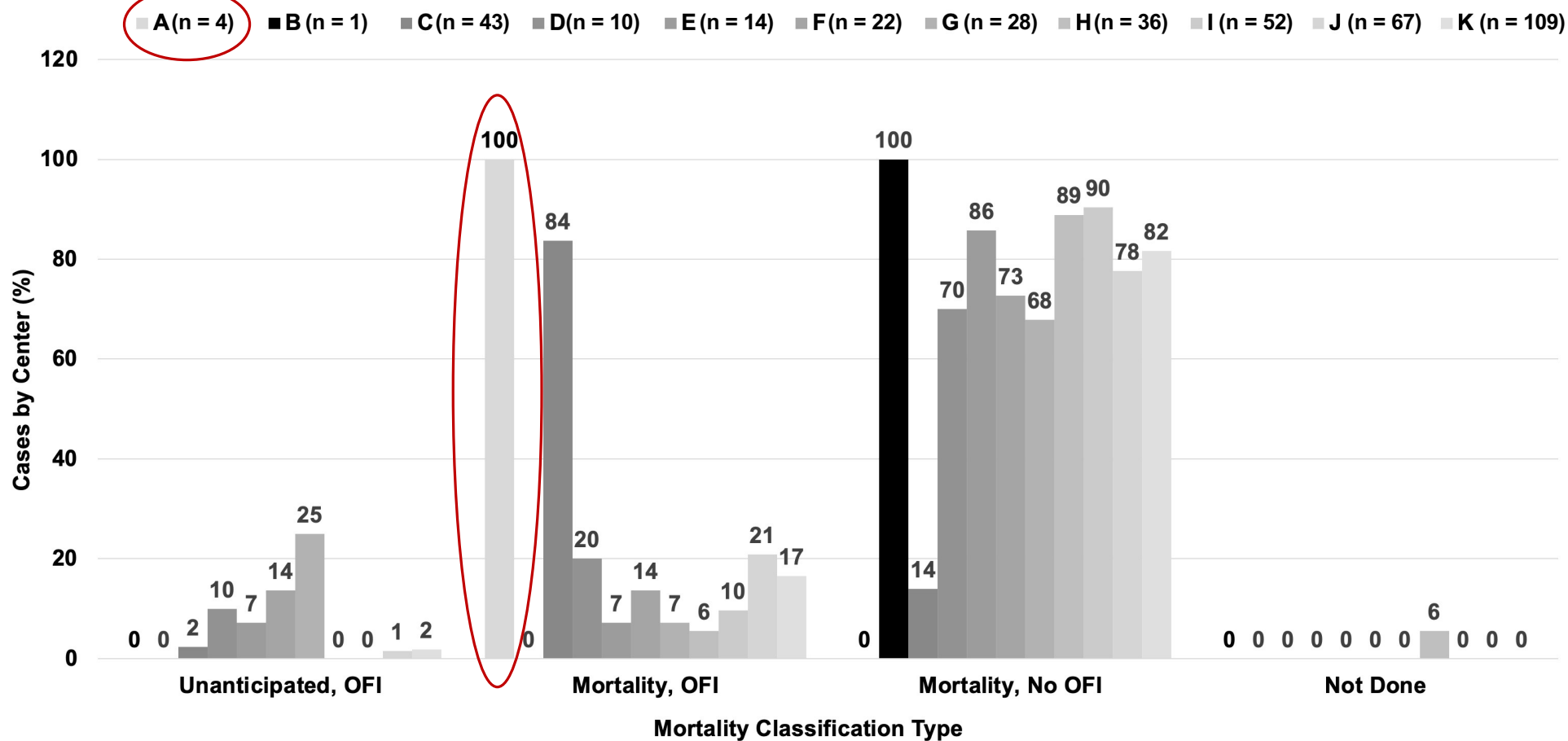


Interval: 1/1/20 – 8/31/21 (minimum)

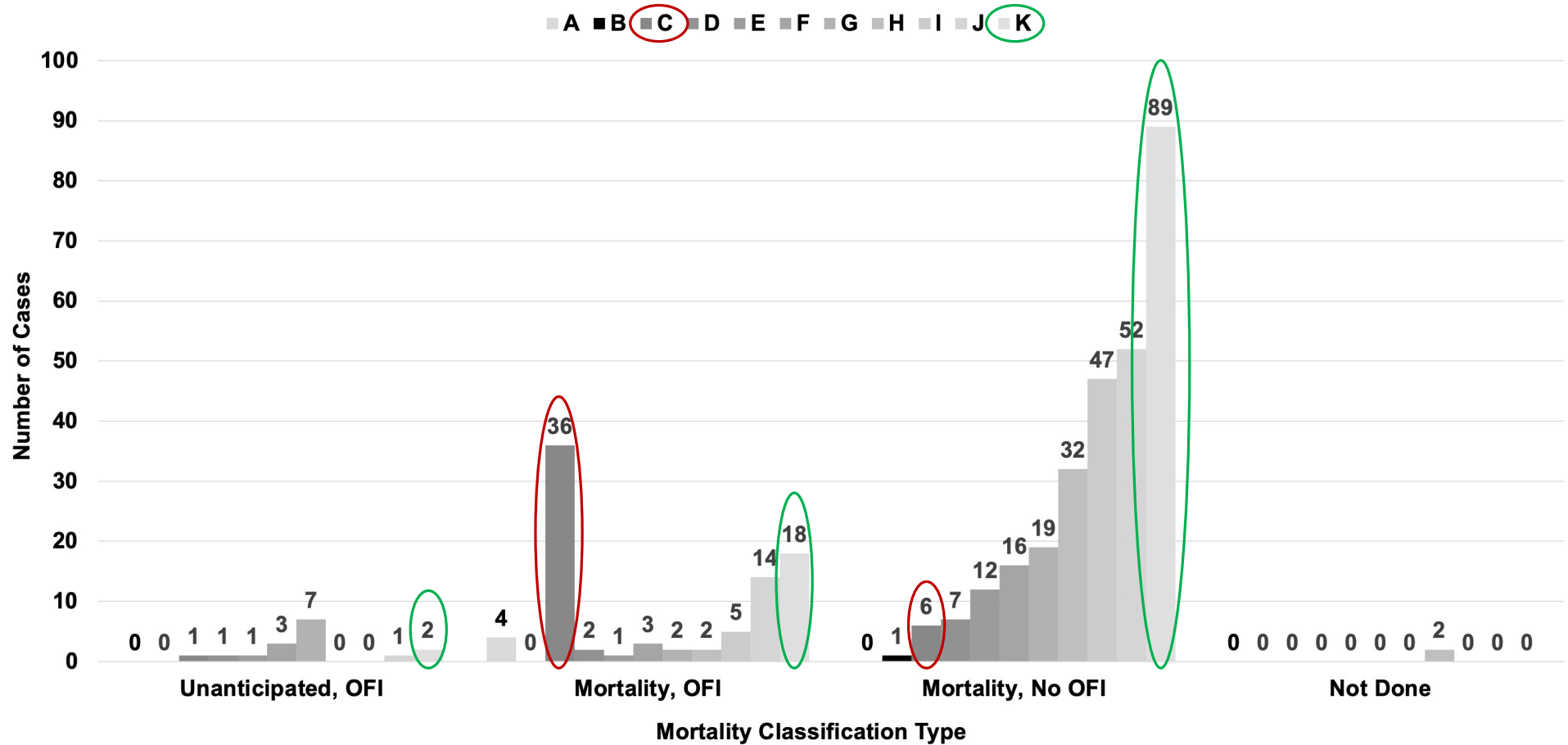
Patient Characteristics	No. (%) of patients				
	Overall Dead (N = 2281)	Unanticipated, OFI (n = 16)	Mortality, OFI (n = 85)	Mortality, No OFI (n = 276)	Not Done (n = 2)
Demographic data					
Age, median (IQR), y	63 (36-80)	75 (54-86)	71 (51-82)	66 (42-83)	63 (52-73)
Male sex	1605 (70)	10 (63)	62 (73)	179 (65)	1 (50)
Medicare	938 (41)	11 (69)	37 (44)	136 (49)	2 (100)
Mechanism of injury					
Blunt	1772 (78)	15 (94)	73 (86)	223 (81)	2 (100)
Penetrating	509 (22)	1 (6)	12 (14)	53 (19)	0 (0)
ISS, median (IQR)	25 (10-30)	21 (9-31)	24 (10-30)	25 (14-30)	26 (14-38)
Initial vital parameters					
GCS score, median (IQR)	3 (3-15)	14 (8-15)	8 (3-15)	3 (3-14)	9 (3-15)
Systolic blood pressure, mean, mm Hg	114	145	122	121	115
Heart rate, mean, min	77	84	83	75	58
In-hospital data					
Hospital LOS, median (IQR)	2 (1-6)	9 (5-17)	3 (1-5)	1 (1-5)	1 (1-1)
ICU days, median (IQR)	3 (2-7)	9 (2-14)	3 (2-6)	3 (2-6)	1 (1-1)
Ventilator days, median (IQR)	2 (1-5)	9 (2-12)	2 (1-5)	2 (1-3)	1 (1-1)

Interval: 1/1/20 – 8/31/21 (minimum)

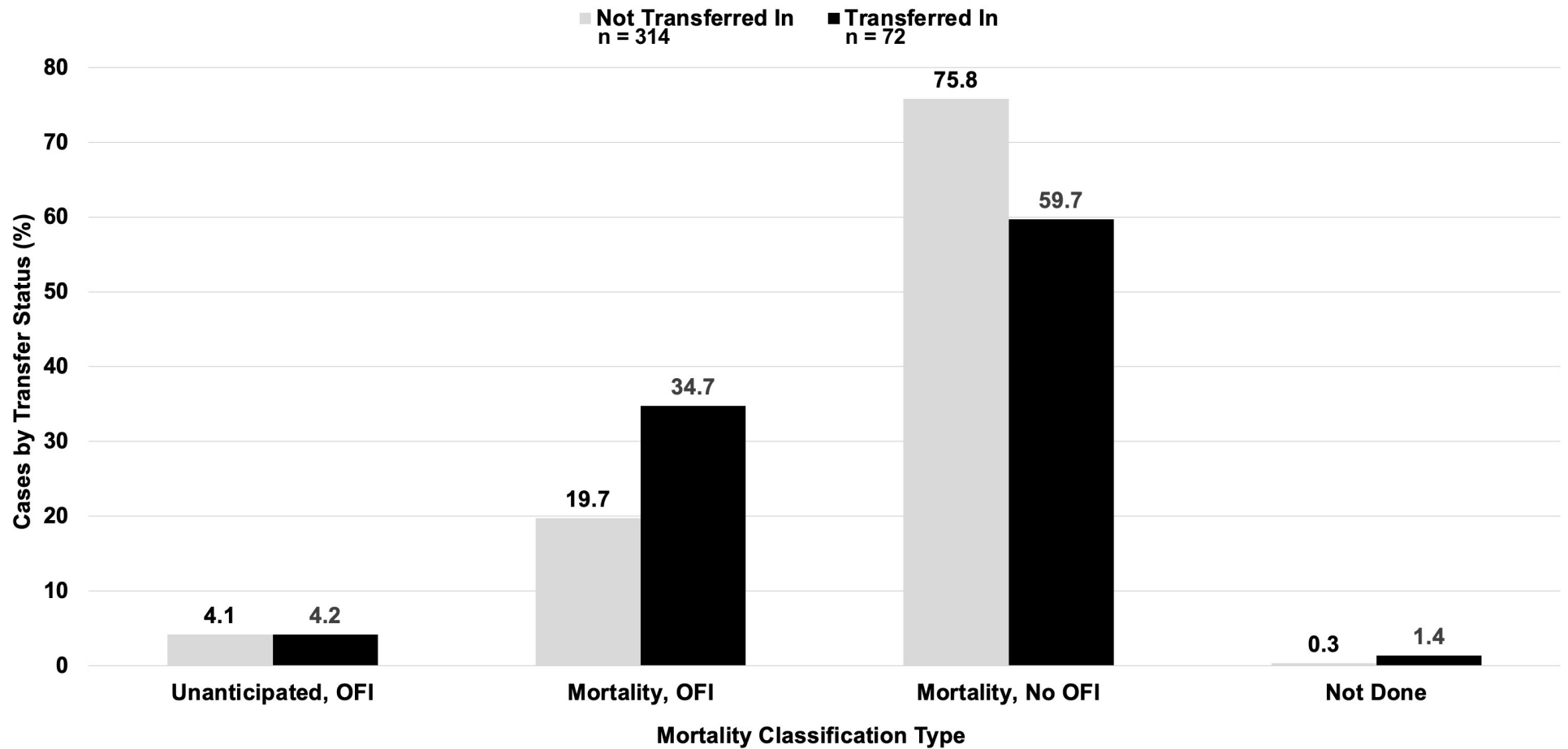
■ **A(n = 4)**



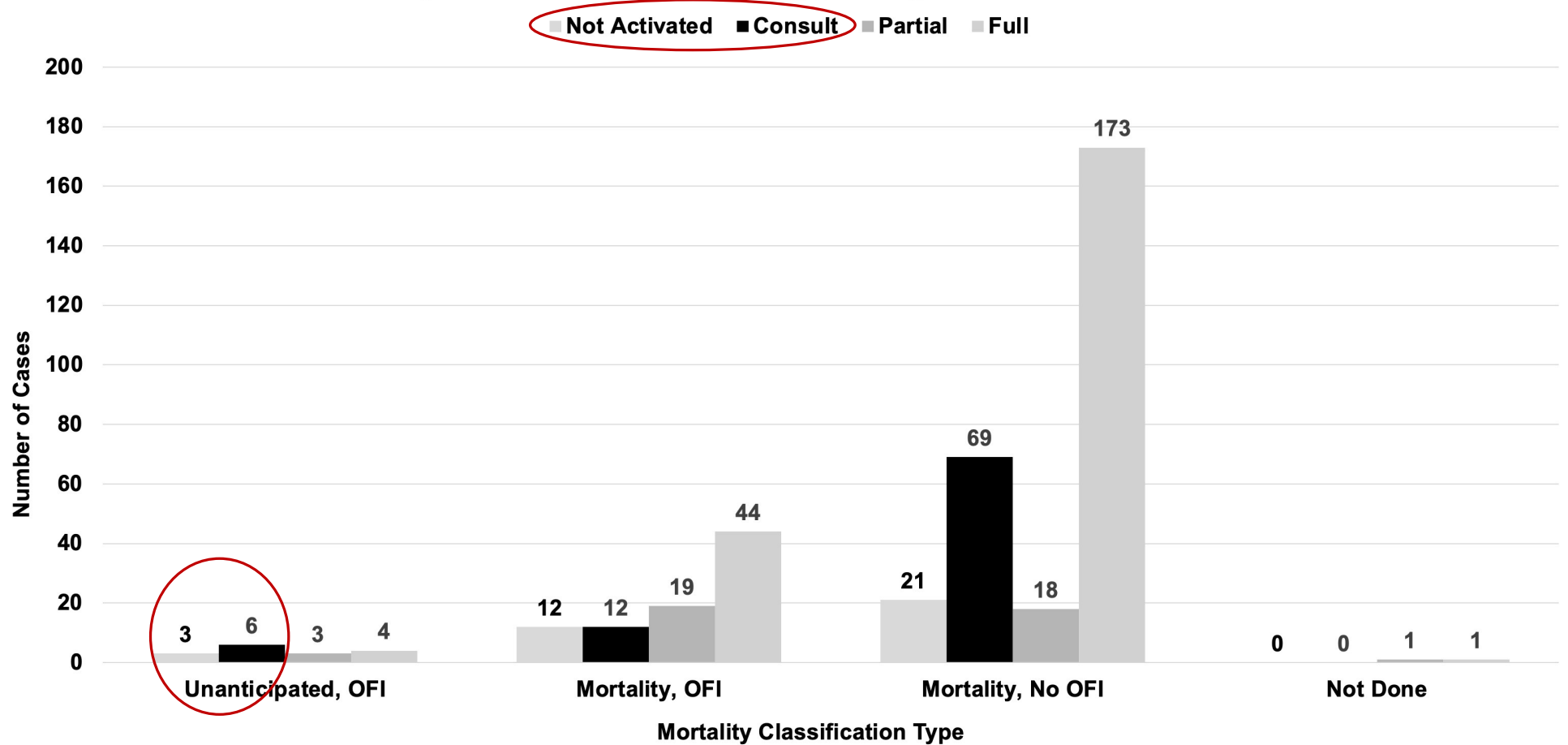
Mortality Classification Type by De-Identified Center



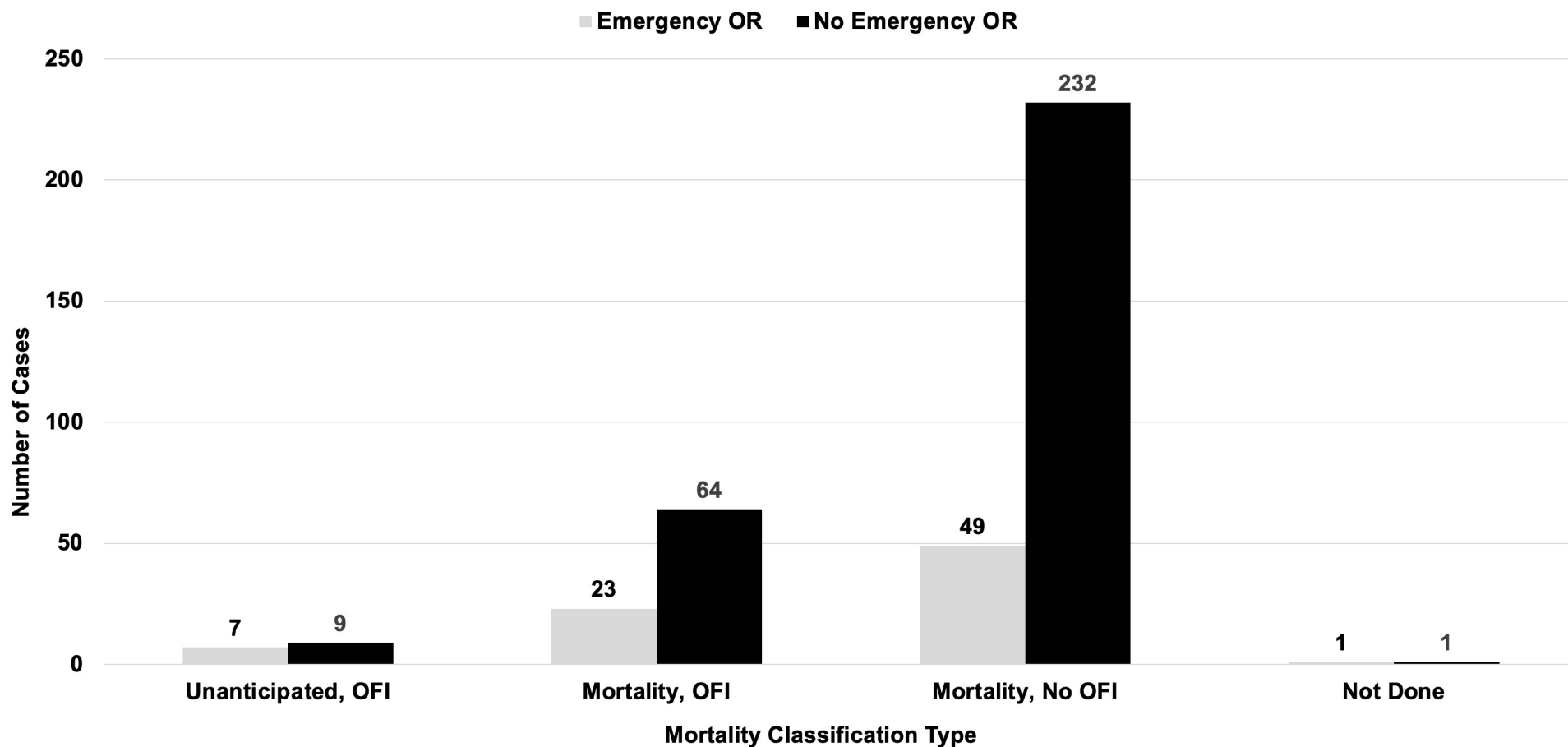
Mortality Classification Type by Transfer Status



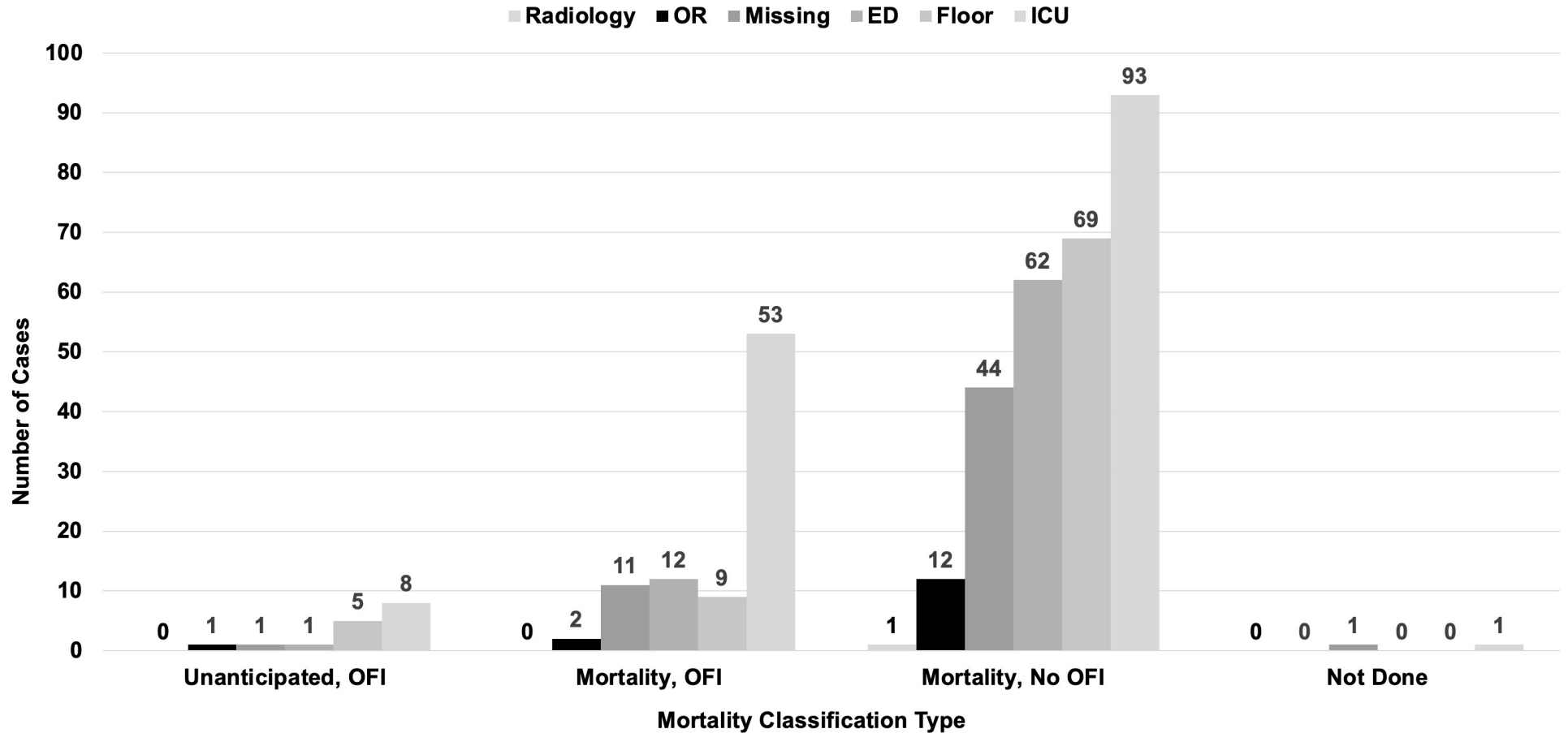
Mortality Classification Type by Activation Status



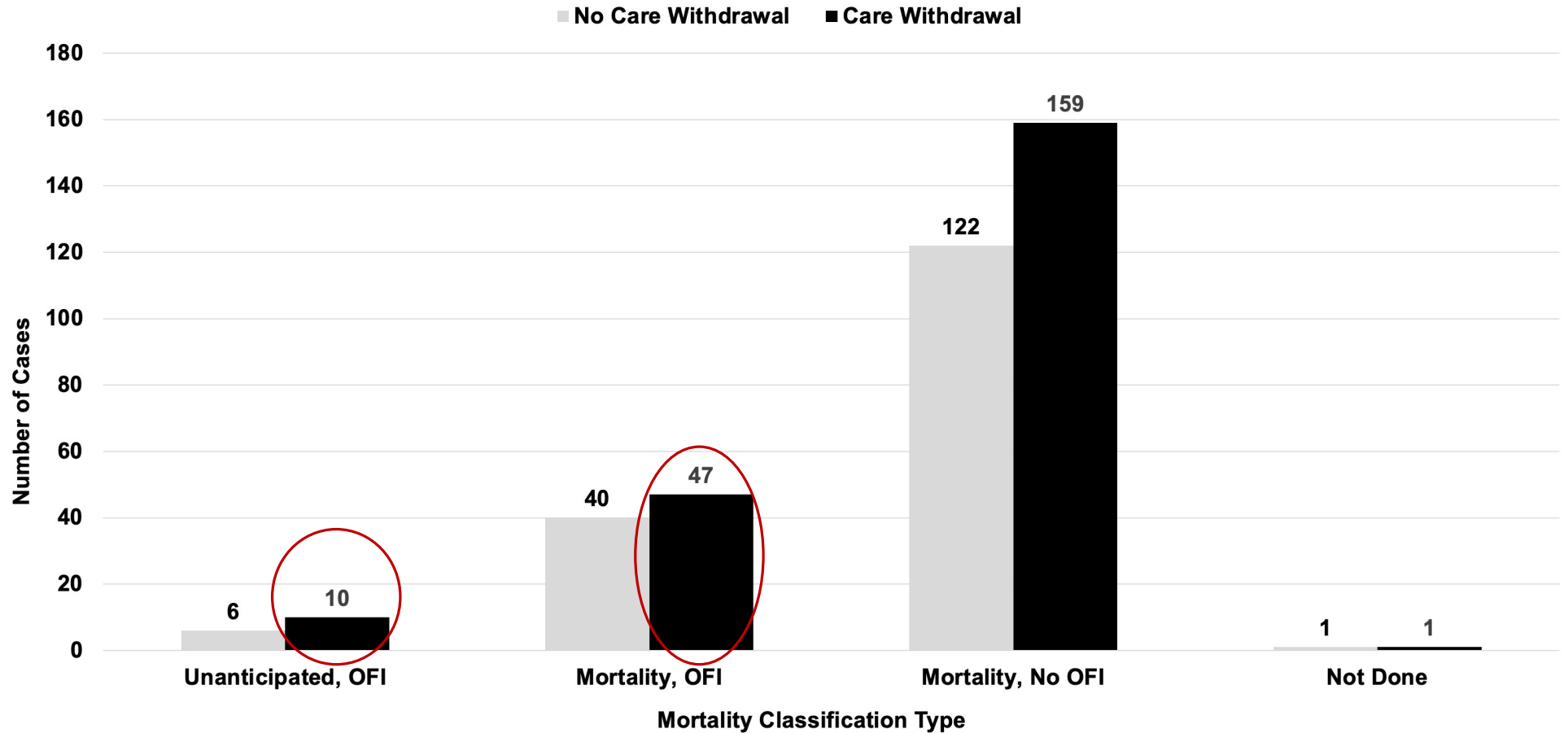
Mortality Classification Type by Emergency Operation



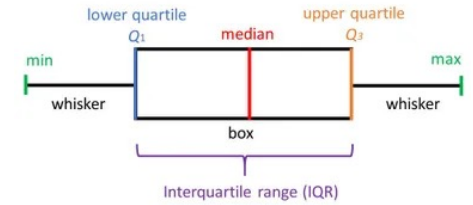
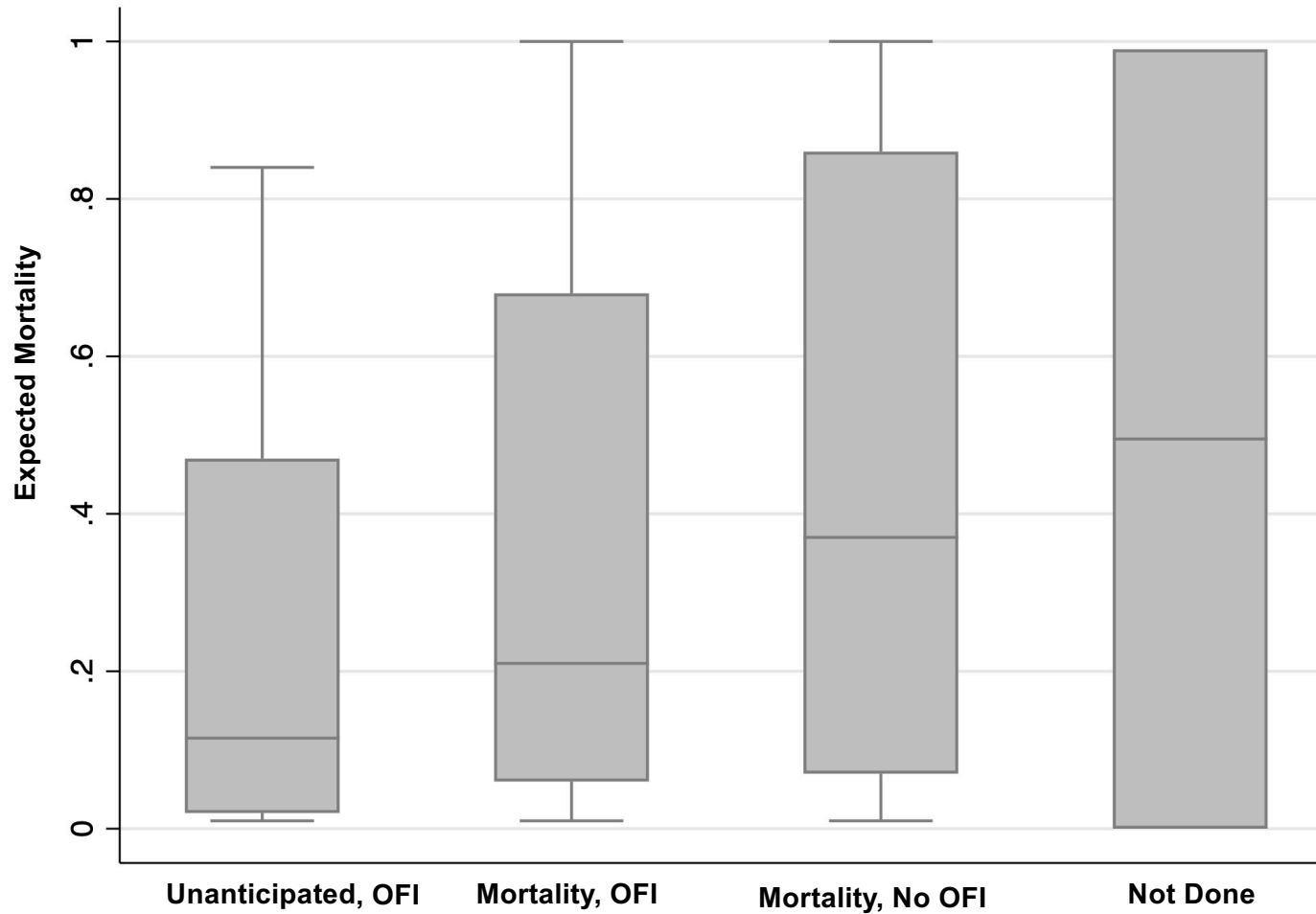
Mortality Classification Type by Death Location



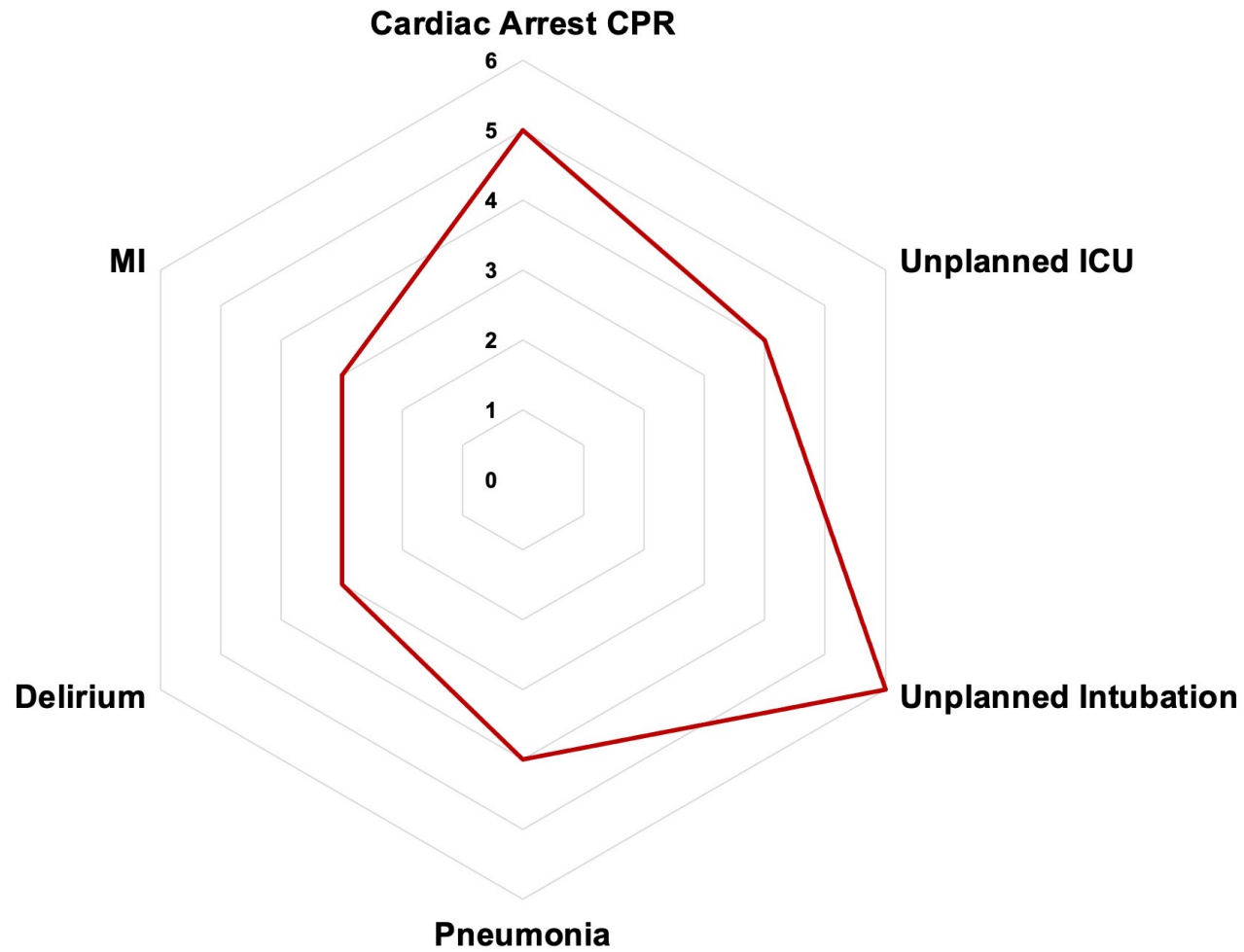
Mortality Classification Type by Care Withdrawal



Mortality Classification by Expected Mortality

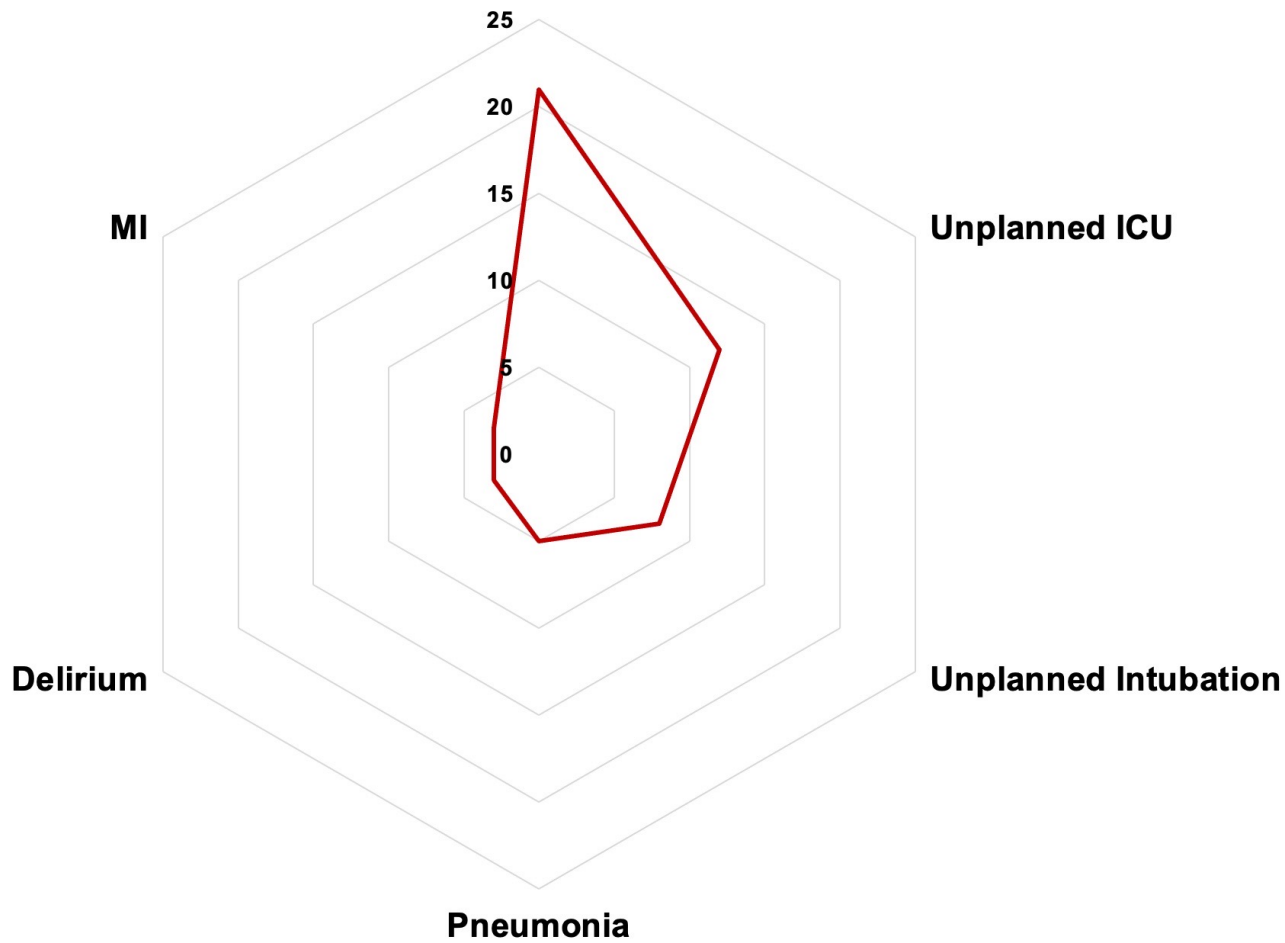


Unanticipated, OFI



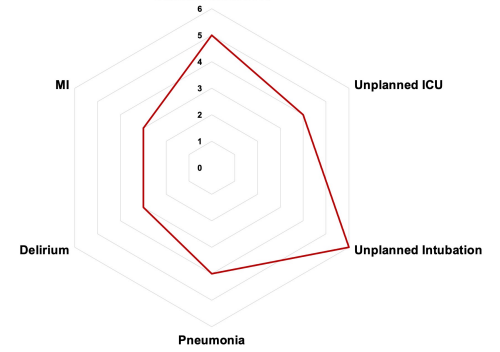
Mortality, OFI

Cardiac Arrest CPR



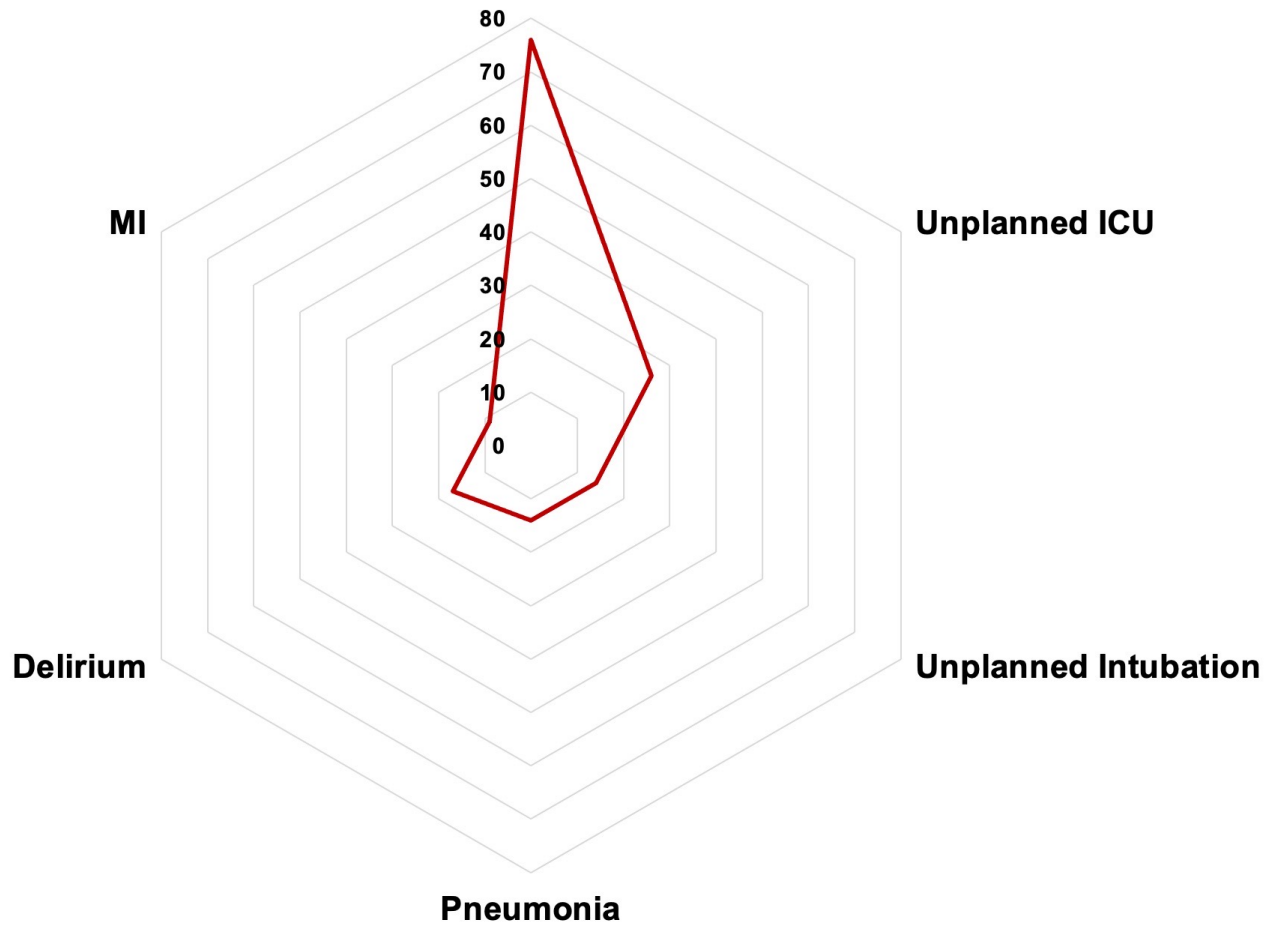
Unanticipated, OFI

Cardiac Arrest CPR



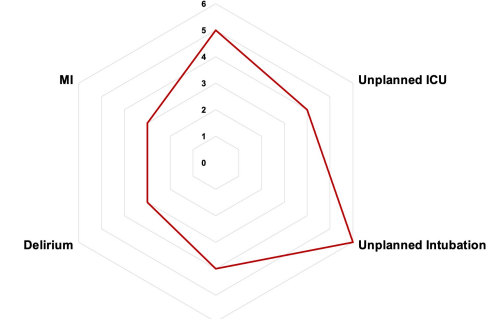
Mortality, No OFI

Cardiac Arrest CPR



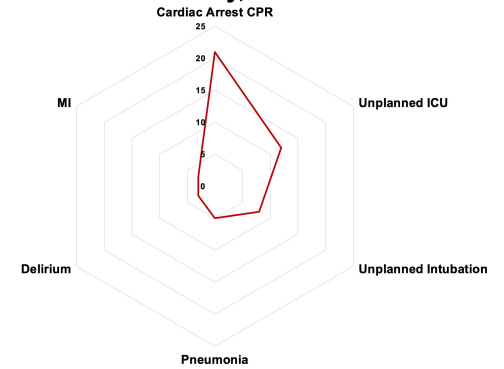
Unanticipated, OFI

Cardiac Arrest CPR



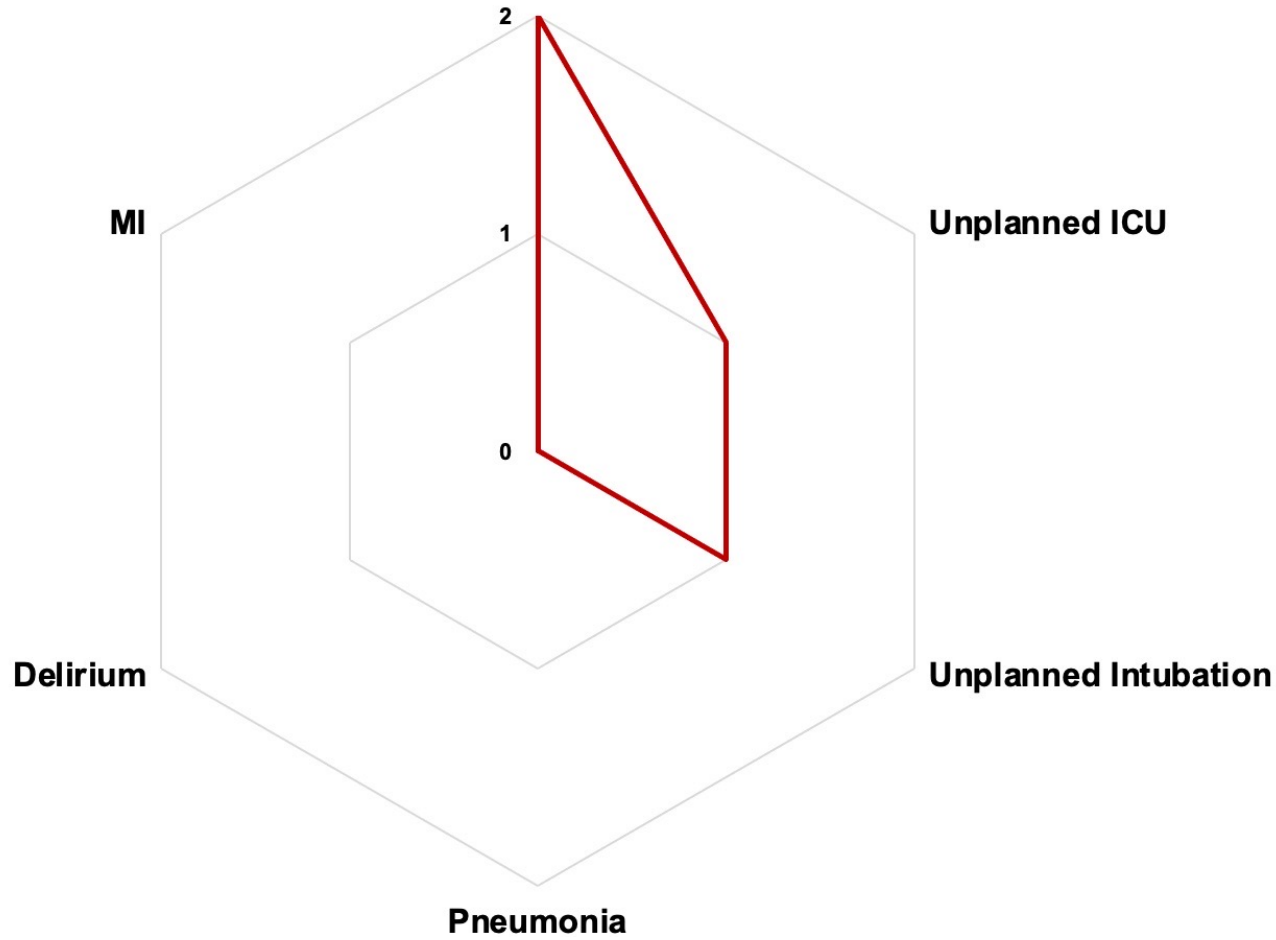
Mortality, OFI

Cardiac Arrest CPR

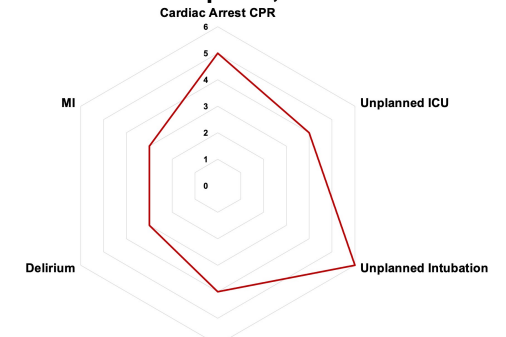


Not Done

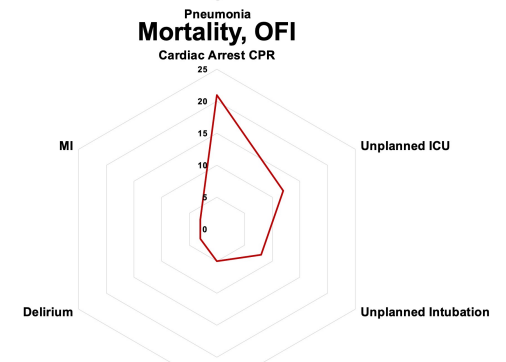
Cardiac Arrest CPR



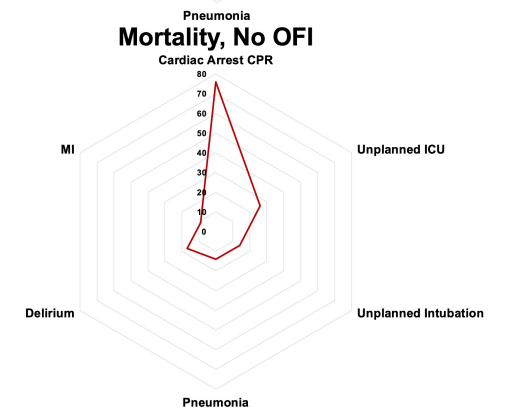
Unanticipated, OFI



Mortality, OFI



Mortality, No OFI



Questions

- Can mortality classification be standard reporting?
- How can we use mortality classification to help you?
- What analytics do you find most meaningful?
- Future direction?





Next Steps

Thank You



ACS VRC Review of ACS TQIP/MTQIP Data Example - VAP

**Meaghan Crawley, RN
Gaby Iskander, MD**



SPECTRUM HEALTH



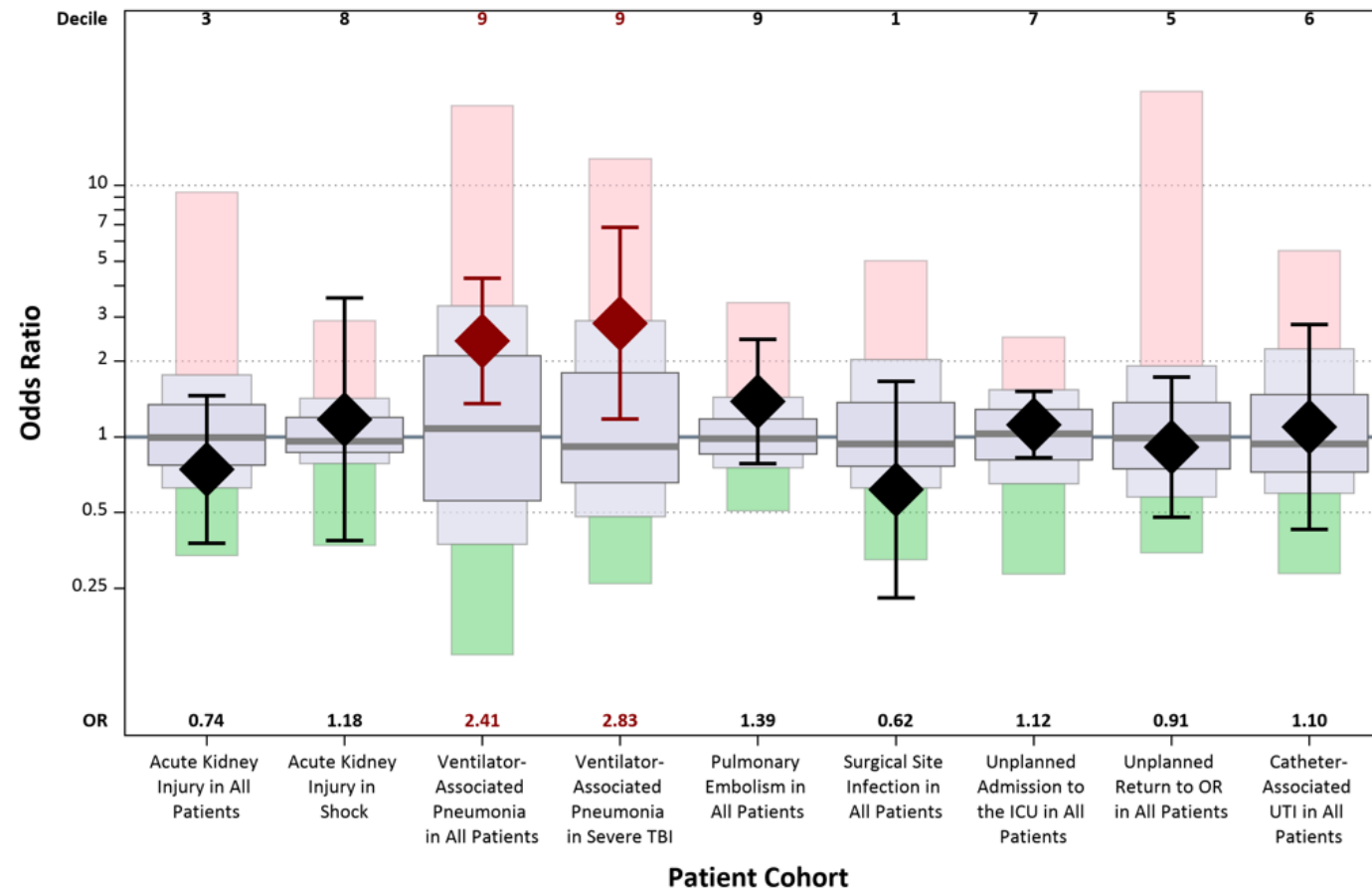
TQIP VAP & TBI VAP Data

Disclosure

We have no disclosures

Fall 2020 TQIP Report

Risk-Adjusted Specific Hospital Events by Cohort - Fall 2020
TQIP Report ID: 87



TQIP Report: 4/1/19 – 3/31/20

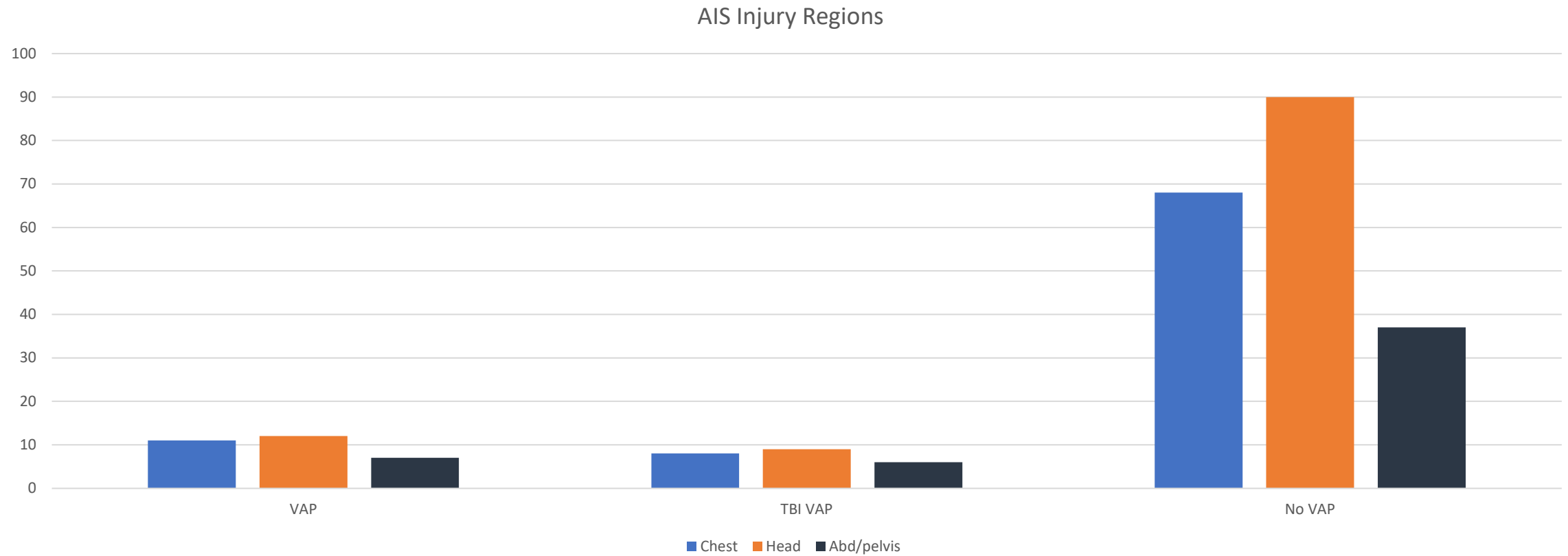
Table 5: Risk-Adjusted Specific Hospital Events by Hospital Event/Cohort

			Specific Hospital Event				Odds Ratio and 95% Confidence Interval				
Hospital Event	Cohort	N	Observed Events	Observed (%)	Expected (%)	TQIP Average (%)	Odds Ratio	Lower	Upper	Outlier	Decile
Acute Kidney Injury	All Patients	1,273	5	0.4	0.6	0.8	0.74	0.38	1.46	Average	3
Acute Kidney Injury	Shock	31	1	3.2	1.6	3.7	1.18	0.39	3.57	Average	8
Ventilator-Associated Pneumonia	All Patients	1,273	13	1.0	0.4	0.8	2.41	1.36	4.28	High	9
Ventilator-Associated Pneumonia	Severe TBI	41	6	14.6	4.8	6.2	2.83	1.18	6.82	High	9
Pulmonary Embolism	All Patients	1,273	9	0.7	0.4	0.6	1.39	0.79	2.44	Average	9
Surgical Site Infection	All Patients	1,273	1	0.1	0.2	0.5	0.62	0.23	1.67	Average	1
Unplanned Admission to the ICU	All Patients	1,273	39	3.1	2.7	2.7	1.12	0.83	1.52	Average	7
Unplanned Return to OR	All Patients	1,273	7	0.5	0.6	1.0	0.91	0.48	1.73	Average	5
Catheter-Associated UTI	All Patients	1,273	3	0.2	0.2	0.3	1.10	0.43	2.80	Average	6

BW Data Drill Down – Registry Query

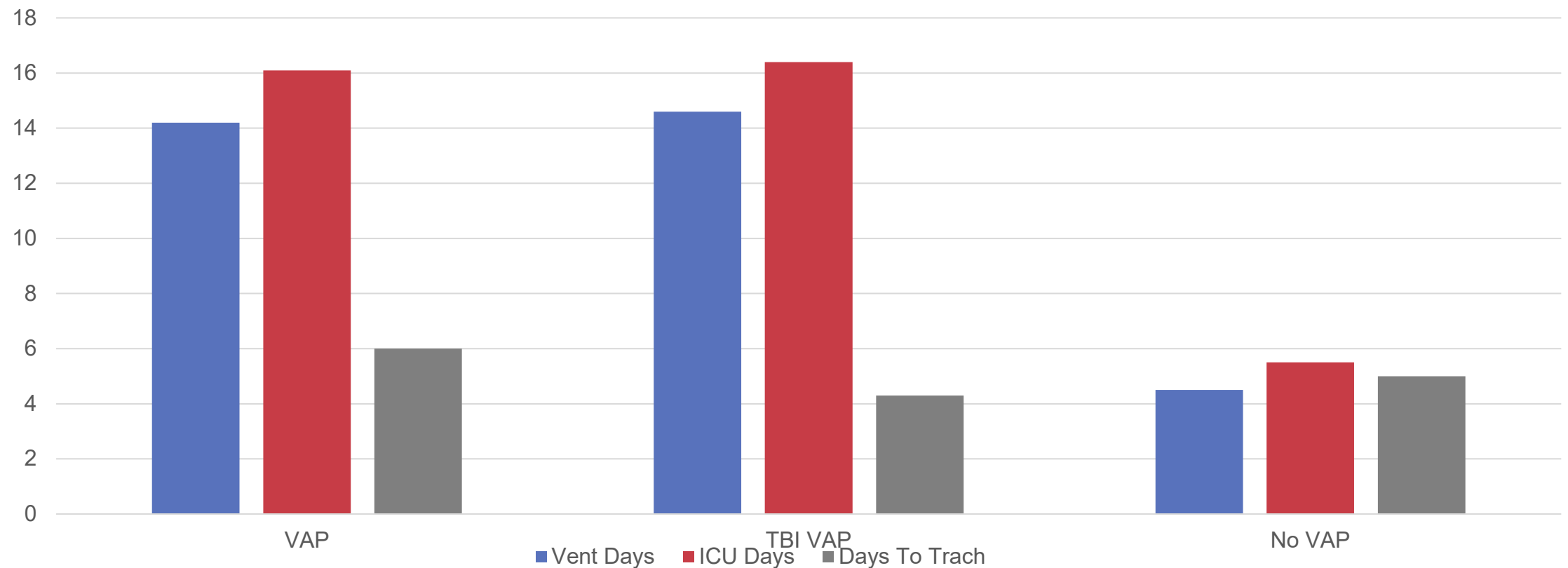
	Total VAP Patients	Severe TBI VAP	Intubated w/o VAP Dx
Total Number Identified	15	11	141
Average ISS	28.2	28.2	22.1
Average ICU Days	16.1	16.4	5.5
Average Vent Days	14.2	14.6	4.5
Average Days to Trach	6	4.3	5 (n = 21)
Average Days to Dx	5.2	5.3	NA

BW Data Drill Down – Registry Query



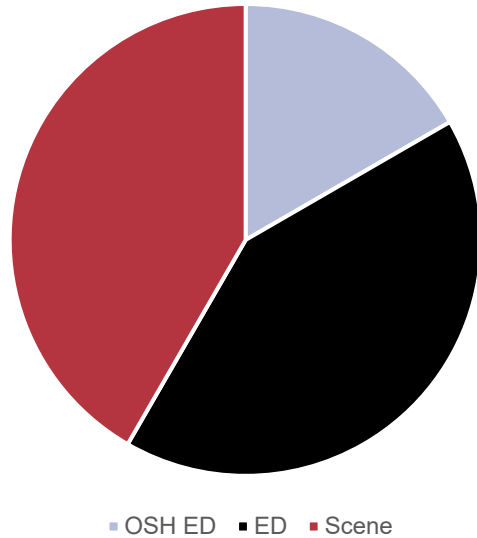
VAP Data Drill Down – Registry Query

Vent Days, ICU Days, Days to Trach

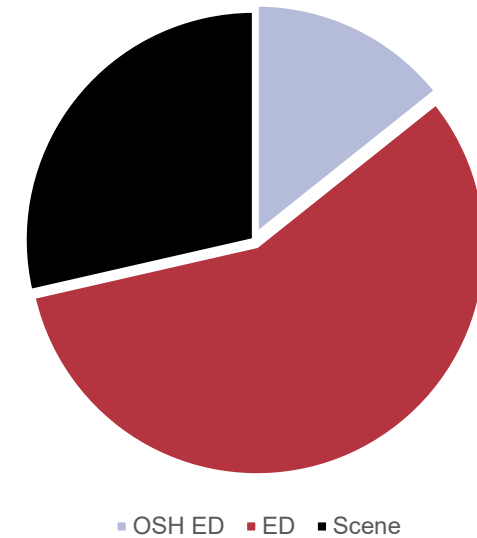


BW Data Drill Down – Registry Query

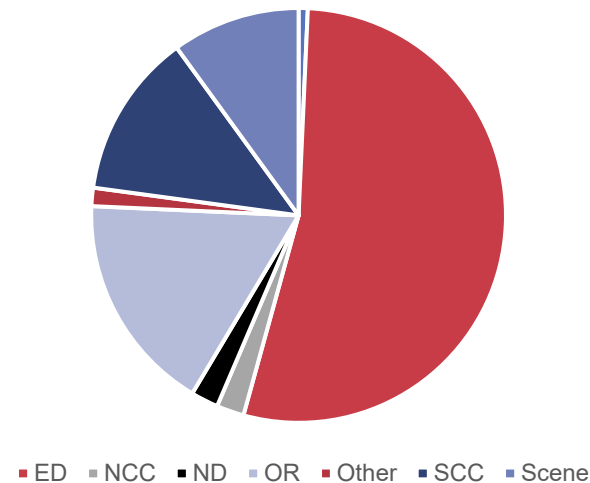
Intubation Location - Total VAP Population



Intubation Location - Severe TBI



Intubation Location – Non VAP



Current VAP Prevention

Mechanical Ventilation – Adult (Invasive) – Mechanical Ventilator Management ...

- Addresses the following components of VAP Prevention
 - HOB Elevation (30 degrees)
 - Vent circuit changes (daily, or when grossly contaminated)
 - In-line suction catheter changes (q week, or when grossly contaminated)
 - Required RN/RT documentation

Current VAP Prevention

▼ Nursing

▼ Respiratory Interventions

- ☒ Oral Care and Suctioning
Routine, Now then every 4 hours and PRN, Starting today at 0958, Until Specified
- ☒ Suction Airway
Routine, PRN, Starting today at 0958, Until Specified
Type: Artificial Airway
- ☒ Orogastic Tube
Until discontinued, Starting today at 0959, Until Specified
Reason: Decompression
Status: Low Intermittent Suction
- ☐ Nasogastric (NG) Tube
Until discontinued
- ☐ Adult Mechanical Vent
- ☐ Monitor Exhaled CO2
- ☐ Initial Alveolar Recruitment Maneuver
40 PEEP for 40 seconds, every 20 minutes for 3 times
- ☐ Subsequent Alveolar Recruitment Maneuvers
Every 4 hours, 40 PEEP for 40 seconds every 4 hours for 24 hours
- ☐ Esophageal Pressure Monitoring
Monitor with each vent check and PEEP change.

Adherence to Current VAP Prevention

Identified Opportunities by ICU nursing leadership

- RASS goals
- SBT
- Oral Care

Identified Opportunities by physician Leadership

- Pneumonia present on admission not identified
- Early Extubation

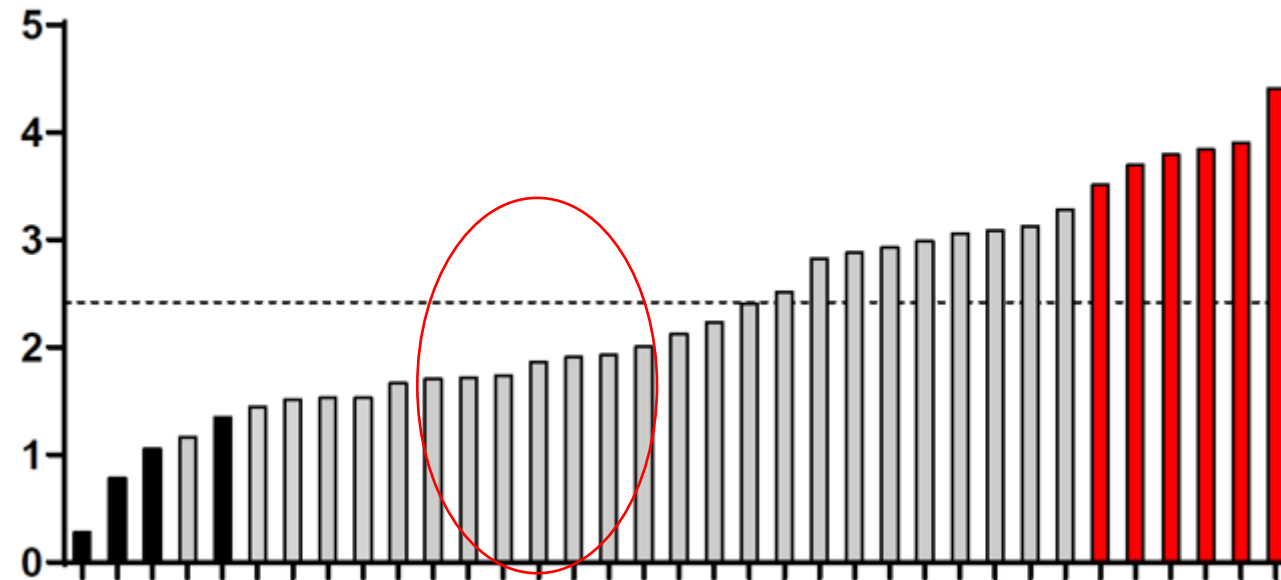
But...

How do we look in our MTQIP Data?

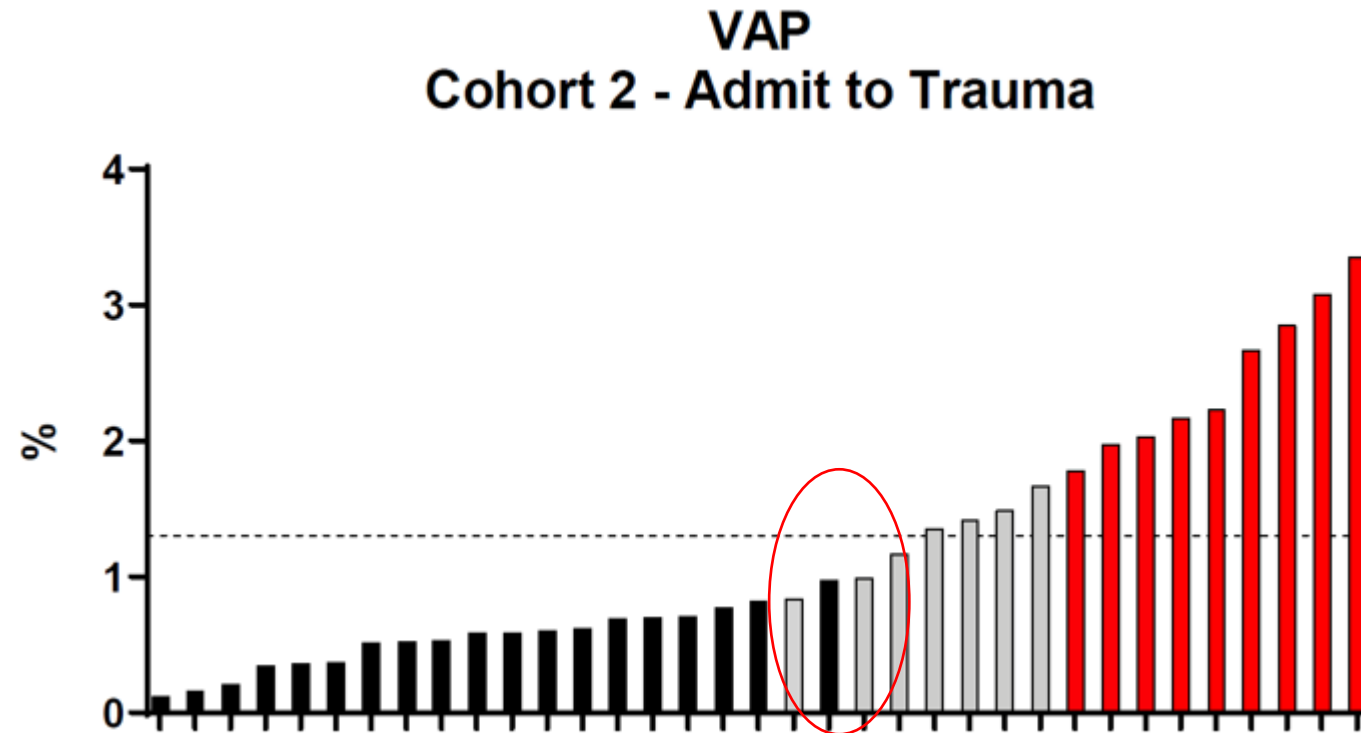
Where does MTQIP sit in the TQIP Data?

Cohort #2 Pneumonia

**Pneumonia
Cohort 2 - Admit to Trauma**

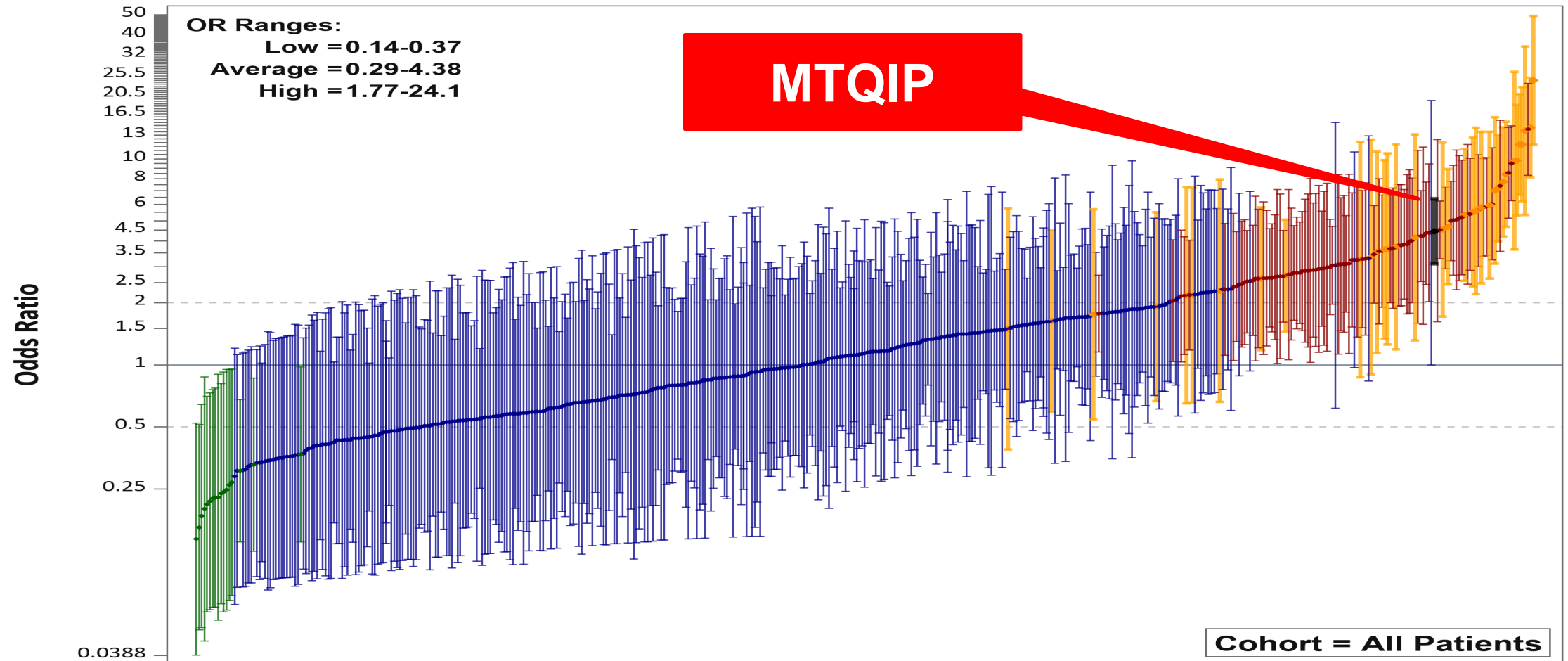


Cohort #2 - VAP



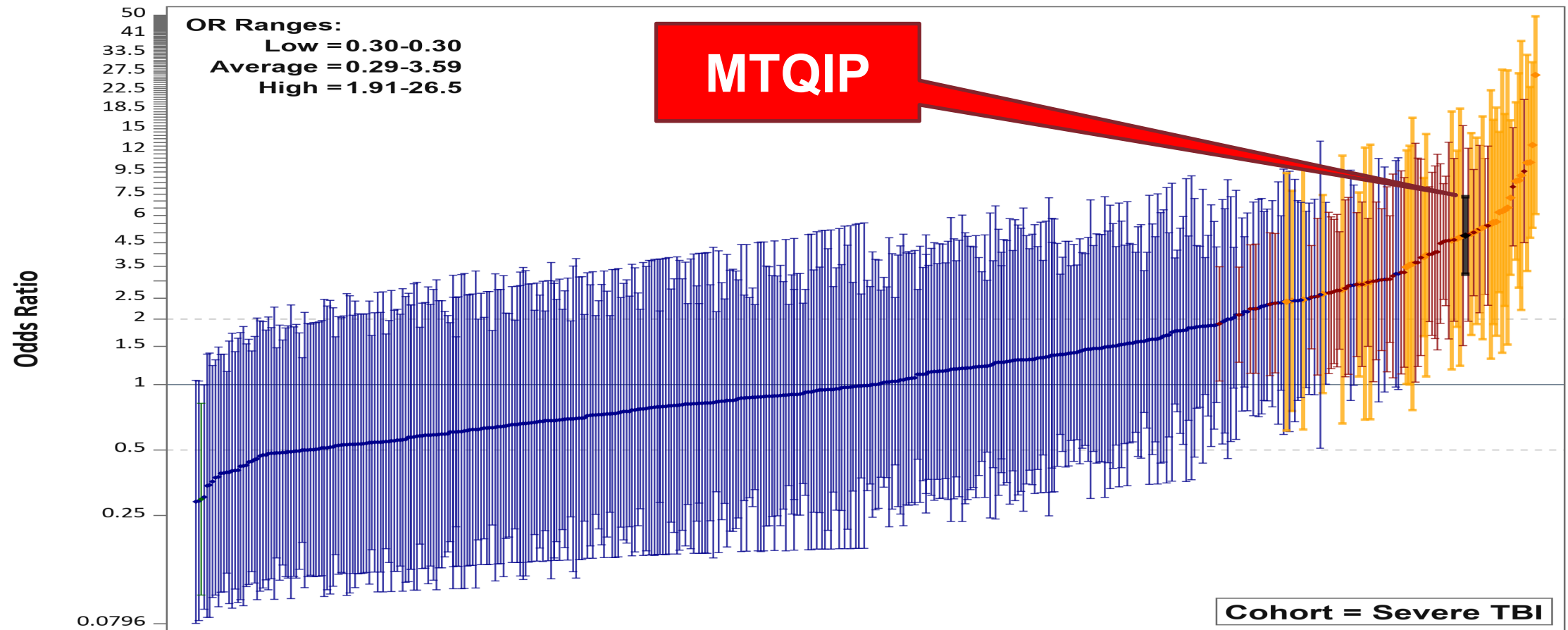
TQIP MTQIP State Report – VAP AI

Odds Ratios by TQIP Hospital; Ventilator-Associated Pneumonia



TQIP MTQIP State Report - VAP TBI

Odds Ratios by TQIP Hospital; Ventilator-Associated Pneumonia



TQIP MTQIP State Report

Table 5: Risk-Adjusted Specific Hospital Events by Hospital Event/Cohort

			Specific Hospital Event				Odds Ratio and 95% Confidence Interval				
Hospital Event	Cohort	N	Observed Events	Observed (%)	Expected (%)	TQIP Average (%)	Odds Ratio	Lower	Upper	Outlier	Decile
Acute Kidney Injury	All Patients	13,082	55	0.4	0.6	0.8	0.60	0.43	0.84	Low	2
Acute Kidney Injury	Shock	358	8	2.2	3.0	3.7	0.68	0.32	1.45	Average	2
Ventilator-Associated Pneumonia	All Patients	13,082	260	2.0	0.4	0.8	4.45	3.05	6.49	High	10
Ventilator-Associated Pneumonia	Severe TBI	521	98	18.8	4.3	6.2	4.85	3.17	7.42	High	10
Pulmonary Embolism	All Patients	13,082	80	0.6	0.4	0.6	1.37	1.04	1.80	High	9
Surgical Site Infection	All Patients	13,082	89	0.7	0.3	0.5	2.05	1.46	2.86	High	9
Unplanned Admission to the ICU	All Patients	13,082	384	2.9	2.7	2.7	1.02	0.85	1.21	Average	5
Unplanned Return to OR	All Patients	13,083	113	0.9	0.6	1.0	1.13	0.84	1.54	Average	7
Catheter-Associated UTI	All Patients	13,082	40	0.3	0.2	0.3	1.36	0.89	2.07	Average	7

Next Steps

Early Extubation

Identifying pneumonia on admission

Early Trach

Nursing/RT education

**VAP PREVENTION
STANDARD WORK**

Next Steps



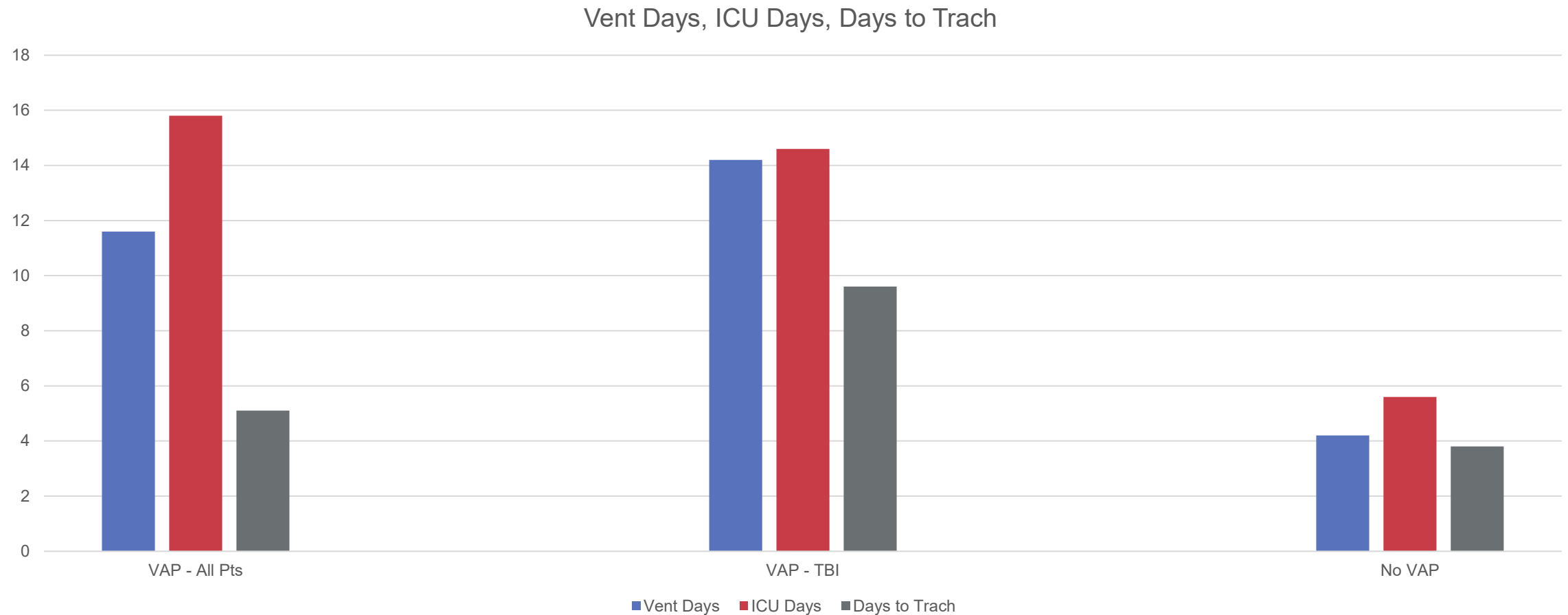
Data Drill Down – November 2021

	Total VAP Patients	Severe TBI VAP	Intubated w/o VAP
Total Number Identified	21*	13**	147
Average ISS	28.4	30.8	22.5
Average ICU Days	15.8	14.6	5.6
Average Vent Days	11.6	14.2	4.2
Average Days to Trach	5.1 (5 pts w/o trach)	9.6 (3 pts w/o trach)	3.8 (126 pts w/o trach)
Average Days to Dx	6.2	5.2	NA

* 26 patients were identified on the Fall 2021 TQIP report. On data drill down, 5 cases did not meet VAP/PNEU definition for all patients, therefore were excluded from this table

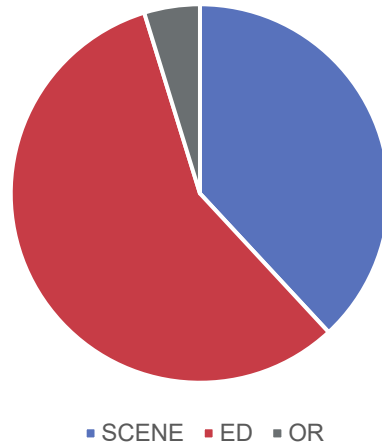
** 16 patients were identified on the Fall 2021 TQIP report. On data drill down, 3 cases did not meet VAP/PNEU definition for the Severe TBI population, therefore were excluded from this table

Data Drill Down – November 2021

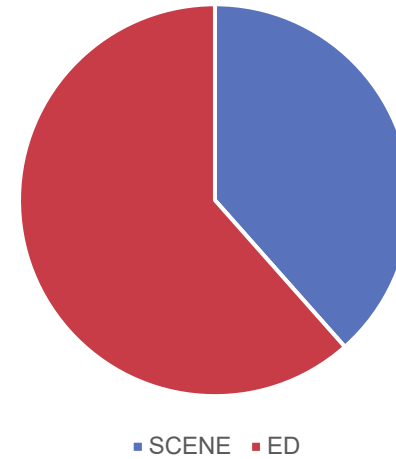


Data Drill Down – November 2021

Intubation Location - All Patients



Intubation Location - Severe TBI



Data August 2021 – December 2021

VAP Cases – 15

Intubated Patients – 44

- * 14 cases identified as CAP v VAP by BAL on admission

Opportunities for Improvement

- * consistent Bronch/BAL on admission
- * RASS Goal compliance

Standard Work Compliance

Bronch/BAL on admission:

- * 42% of VAP cases did not have Bronch/BAL on admission
- * RASS @ Goal – 30%

Standard Work Compliance

Reviewed with Trauma/SICU Providers at December TPC

Reviewed with ICU Nursing Leadership

- Reported at Trauma System's meeting in January 2021 that ICU leadership is meeting to address RASS goal compliance across all ICU's. Meeting to be held beginning of February 2022.

Oxford Shooting - Trauma Center Debrief

McLaren Oakland
St. Joseph Mercy Oakland





Oxford School Shooting Trauma Center Debriefing

- McLaren Oakland: Jason Pasley, Courtney Berry
- St. Joseph Mercy Oakland: Alicia Kieninger, Chris Lopez



Polling Questions





Multi Casualty Response-11/30/21

Jason Pasley, DO, FACS, TMD

Courtney Berry, MBA-HA, BSN, TPM

Initial Response

- Call came to ED alerting of potential for multiple casualties
- Dr. Pasley was about to start elective operation.
- Notified of multiple casualties – stopped his case, received more information
- Called Head of Anesthesia to assess OR capability and to hold rooms when available
 - 3 rooms available within 15 min
- Second trauma surgeon happened to be on site
- Back up trauma surgeon available (10 min away)
- ED was cleared to have both trauma bays and space in between open for additional casualty


Analysis of Core Capabilities

- **Perform Emergency Procedures to Save Incident Victims**
 - Strengths:
 - Prompt appropriate triage
 - Highly skilled, experienced staff in-house
 - OFI:
 - Update MCI plan to include additional areas such as PACU as Delayed Treatment area
 - Station staff at elevators to alleviate congestion and decrease delay
 - Assign Command Post runners to deliver equipment/supplies to the ED



Analysis of Core Capabilities

Security Lock Down

- 
- Strengths:
 - Procedure was prompt to ensure safety of incident, victims, existing patients, hospital staff, and visitors
 - Mass notification was sent out timely and received
 - Security and Buildings & Grounds guarded critical access points.
 - OFI:
 - MRI entrance was not manned; key card entrance. Review for gap.

Analysis of Core Capabilities

- **Patient Management Tracking**

- Strengths:

- Patient locations were tracked in Cerner

- OFI:

- EMR data entry may lag when patients transferred from one area to another. Implementing a real time patient tracking system would be ideal.
 - Overflow areas of hospital set-up for COVID relief are not currently built into the system.
 - Consideration for paper easel to write where patients are/going for real time knowledge of directing physician

**“If everyone is moving forward together,
then success takes care of itself.”**

Henry Ford





SJMO MCI Response

Experience and Lessons Learned

- [MTQIP Meeting](#)
- [February 8, 2022](#)

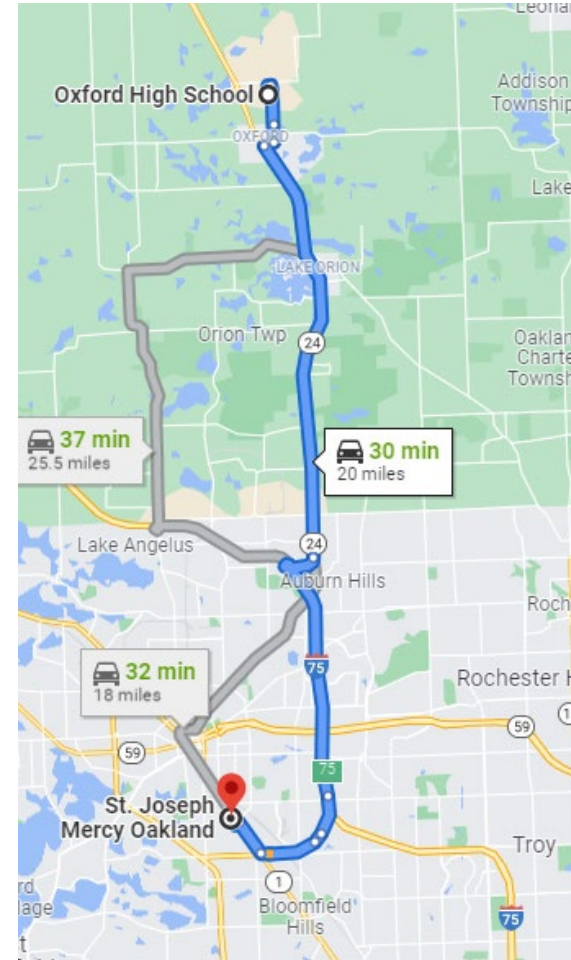


BeRemarkable.



St. Joseph Mercy Oakland

- ACS Verified Level 2 Trauma Center
- 497 licensed beds
- 11 operating rooms
- 38 critical care beds
- 61 patient ED capacity
- 2 trauma bays



Status morning November 30, 2021

- ED Census 45 patients
 - 7 inpatient holds
- 31 critical care patients
- 81% capacity

What worked?

- Rapid mobilization of resources
- IC command established quickly
- Roles defined
- Mobilization of ancillary services
 - OR
 - Blood Bank
 - Anesthesia
 - Radiology
- Security response
- Media Response
- Family/Reunification support

What could be improved?

- Trauma/MCI notification
 - Lack of utilization of traditional trauma activation pathways
- Communication
 - Both external and internal
 - Radios
- Staging
- Labor pool
 - Physician
 - Nursing
 - Ancillary

Questions & Discussion

BCBSM Evaluation of MTQIP



Watch for Email



Today's Meeting Evaluation and CME

Meeting Attendance Points
&
CME

**Confidentiality
Agreement**



Wrap Up

Judy Mikhail, PhD MBA

