

The Michigan Trauma Quality Improvement Program

**Traverse City, MI
May 18, 2021**



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
 - National Institutes of Health - NIGMS

No Photos Please



Evaluations

- ◆ Link will be emailed to you following meeting
- ◆ Please answer the evaluation questions
- ◆ No CME for this meeting

Data Submission

- ◆ Data submitted April 1, 2022
 - This report
 - 5-week turnaround
- ◆ Next data submission
 - June 3, 2022

Future Meetings

◆ Fall

- Tuesday October 11, 2022
- Ypsilanti, EMU Marriott

◆ Winter

- Tuesday February 7, 2023
- Ypsilanti, EMU Marriott
- Virtual ?

Agenda

- ◆ COVID-19 Impact on Trauma Patients
- ◆ Geriatric Hip Fracture Protocol
- ◆ MTQIP Data
- ◆ MTQIP CQI Hospital Scoring Index
- ◆ Break

Agenda

- ◆ Whole Blood
- ◆ Mark - Projects
 - UM Opioid Data
 - PROMS
- ◆ Jill - Program Manger Update
 - Length of Stay
- ◆ Orthopedic Update
- ◆ Wrap Up

Welcome - New People



COVID-19 Impact on Trauma and Socioeconomic Status in MI

Laura Krech, MPH

Spectrum Health & St. Mary Mercy Livonia



Impact of COVID-19 on Trauma Patients and their Socioeconomic Status in Michigan



Trauma Research Institute



Ms. Laura Krech, MPH
May 18, 2022

MTQID, Troy, Mich.



Study Personnel

Spectrum Health Trauma Research Institute

Ms. Laura Krech

Dr. Alistair Chapman

Ms. Jessi Parker

Mr. Steffen Pounders

Ms. Kelly Burns

Dr. Charles Gibson

University of Michigan School of Medicine

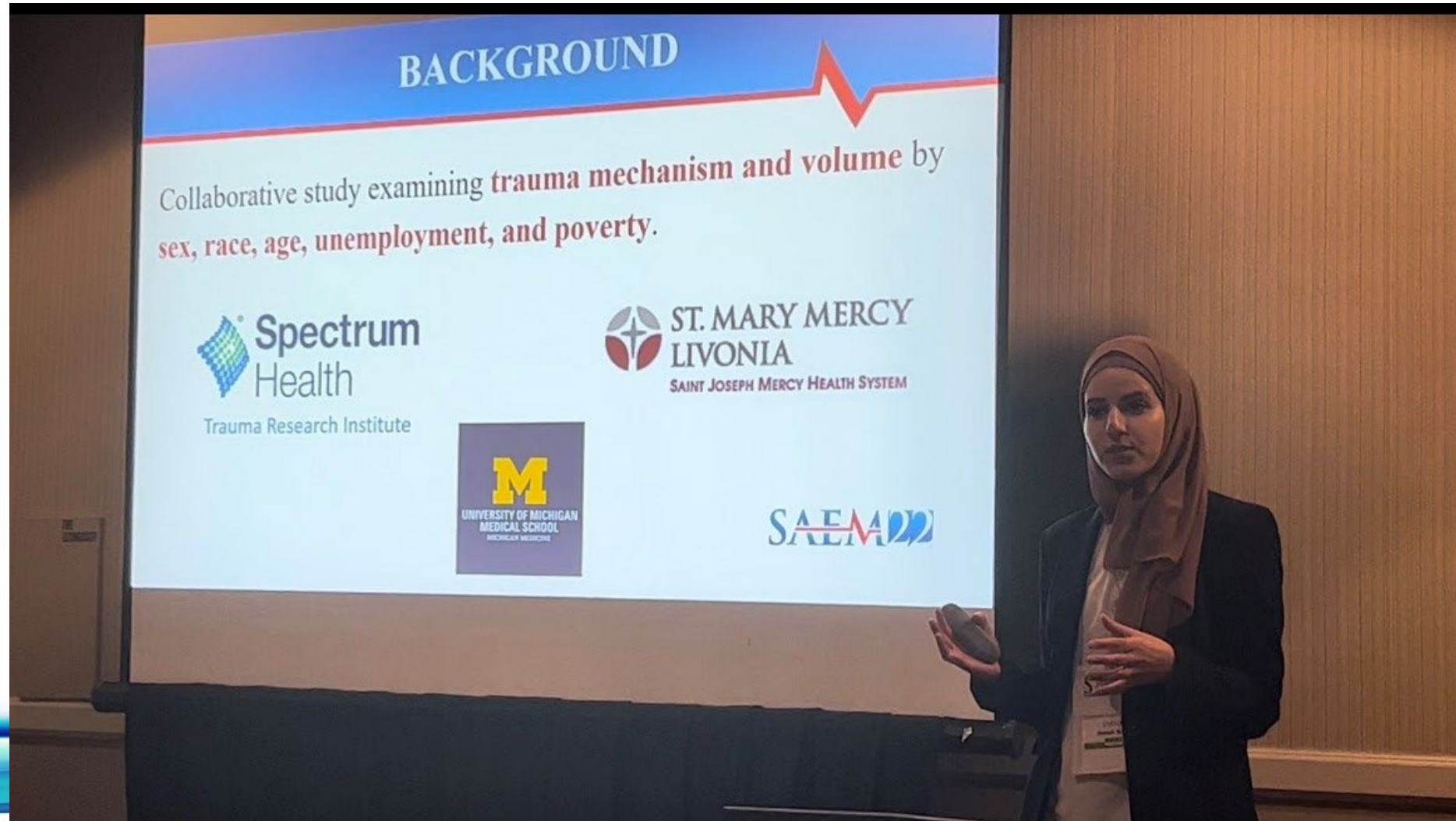
Ms. Hebah Reda

St. Mary Mercy Livonia Emergency Medicine Research Unit

Dr. Daniel Keys

Mr. Blake Hardin

Podium Presentation at the Society for Academic and Emergency Medicine (SAEM)
May 13th in New Orleans
Ms. Hebah Reda, first year UofM medical student



No Disclosures

All authors have nothing to disclose

BACKGROUND

Collaborative study examining **trauma mechanism and volume by sex, race, age, unemployment, and poverty**



Trauma Research
Institute



METHODS

MTQIP Database Query

Pre-pandemic

March 1, 2018 – June 30, 2019

During Pandemic

March 1, 2020-June 30, 2021

Merged with other databases:

***American Community Survey and
MI Unemployment database***



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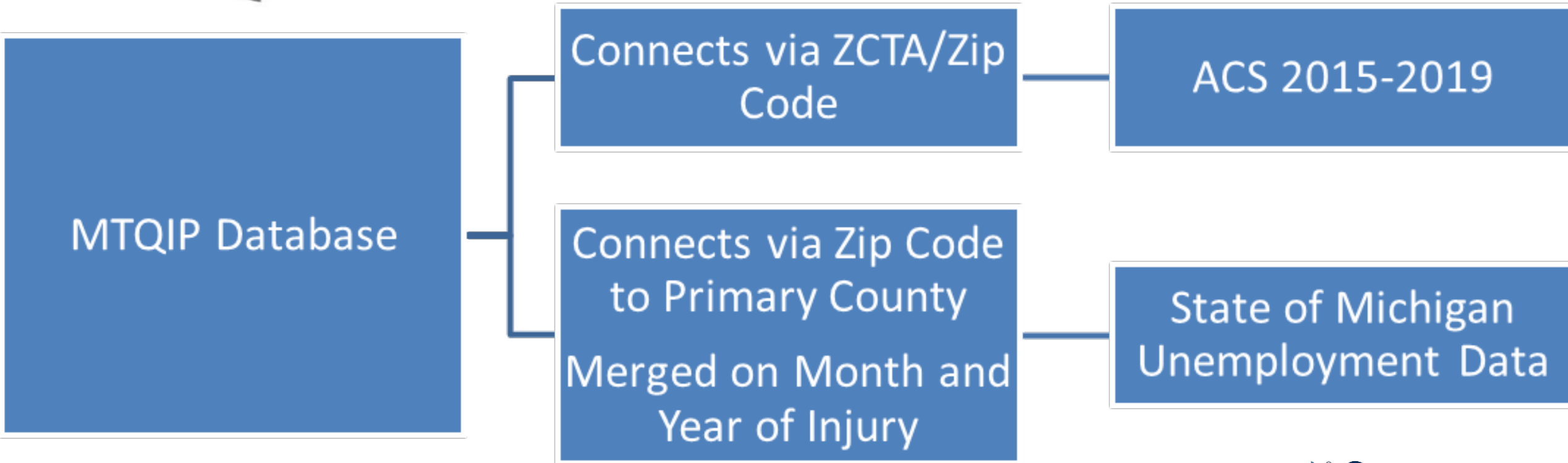
M·TQIP

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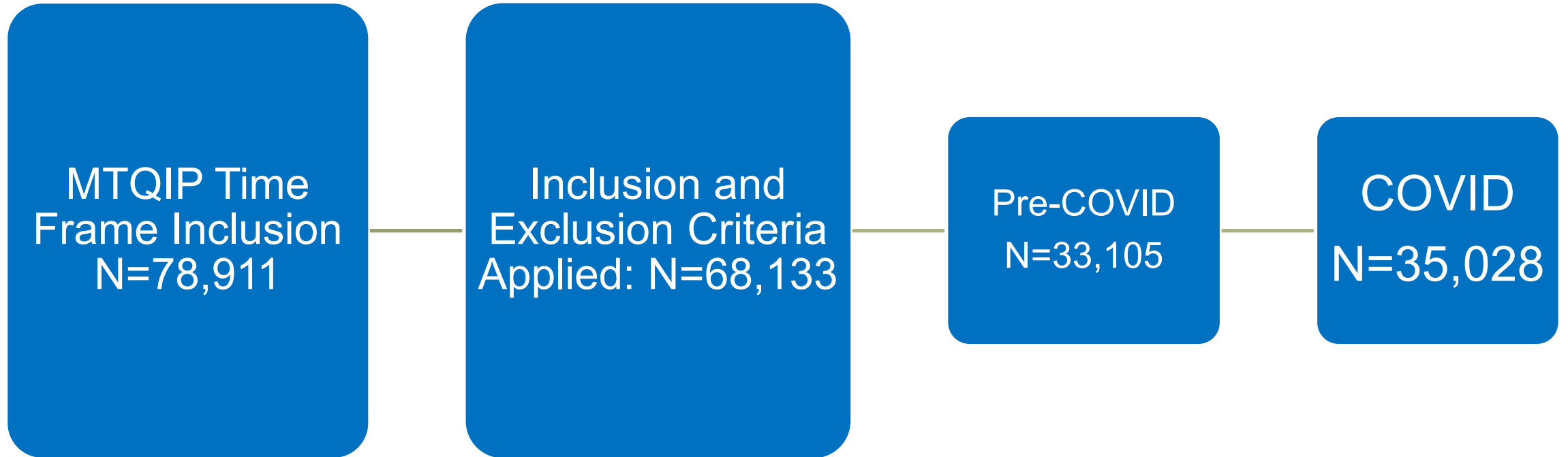


METHODS

M·TQIP



METHODS



- Normally distributed numeric data: two sample independent T test
- Non-normally distributed data: Wilcoxon Rank Sum
- Categorical data: count (percent) Chi-Square or Fisher's Exact

Demographic Results

Variable	Pre COVID (N=33,105)	COVID (N=35,027)	p-value
Age	64.9 ± 22.4	62.8 ± 23.1	<0.0001
Gender (Male)	16,684 (50.4)	18,316 (52.3)	<0.0001
Race			
Black/African Amr	4,330 (13.1)	3,626 (10.3)	<0.0001
Other Race	1,305 (3.9)	1,436 (4.1)	
White	27,470 (83.0)	29,965 (85.6)	
Ethnicity			
Hispanic or Latino	602 (1.8)	784 (2.2)	0.0001
ISS	9 [6, 11]	9 [8, 13]	<0.0001

Socioeconomic Status Indicators

Variable	Pre COVID N=33,062	COVID N=34,997	p-value
Median Household Income	59,500 ± 22,217	58,403 ± 22,126	<0.0001
Unemployment Rate	4.3 ± 1.2	9.2 ± 6.0	<0.0001
Poverty Proportion	N=33,078 0.11 ± 0.09	N=35,008 0.12 ± 0.10	<0.0001
Insurance Group	N=32,207	N=33,566	<0.0001
Private	4,961 (15.4)	5,593 (16.7)	
Medicaid	3,542 (11.0)	4,483 (13.4)	
Medicare	18,550 (57.6)	18,378 (54.8)	
No Fault Auto	3,892 (12.1)	3,984 (11.9)	
Self Pay	1,262 (3.9)	1,128 (3.4)	

Injury Characteristics and GCS

Variable	Pre COVID-19 (N=33,105)	COVID-19 (N=35,027)	p-value
Blunt Penetrating	31,598 (95.4) 1,507 (4.6)	32,809 (93.7) 2,218 (6.3)	<0.0001
Mechanism of Injury Assault GSW Fall MVC OVT + Ped/Cycle Other	2,222 (6.7) 143 (0.4) 21,376 (64.6) 5,878 (17.8) 2,363 (7.1) 1,123 (3.4)	2,791 (8.0) 183 (0.5) 21,170 (60.4) 7,091 (20.2) 2,702 (7.7) 1,090 (3.1)	<0.0001
GCS in ED 13-15 9-12 3-8	N=30,030 27,923 (93.0) 654 (2.2) 1,453 (4.8)	N=32,557 30,003 (92.2) 825 (2.5) 1,729 (5.3)	0.0003

Selected Comorbidities

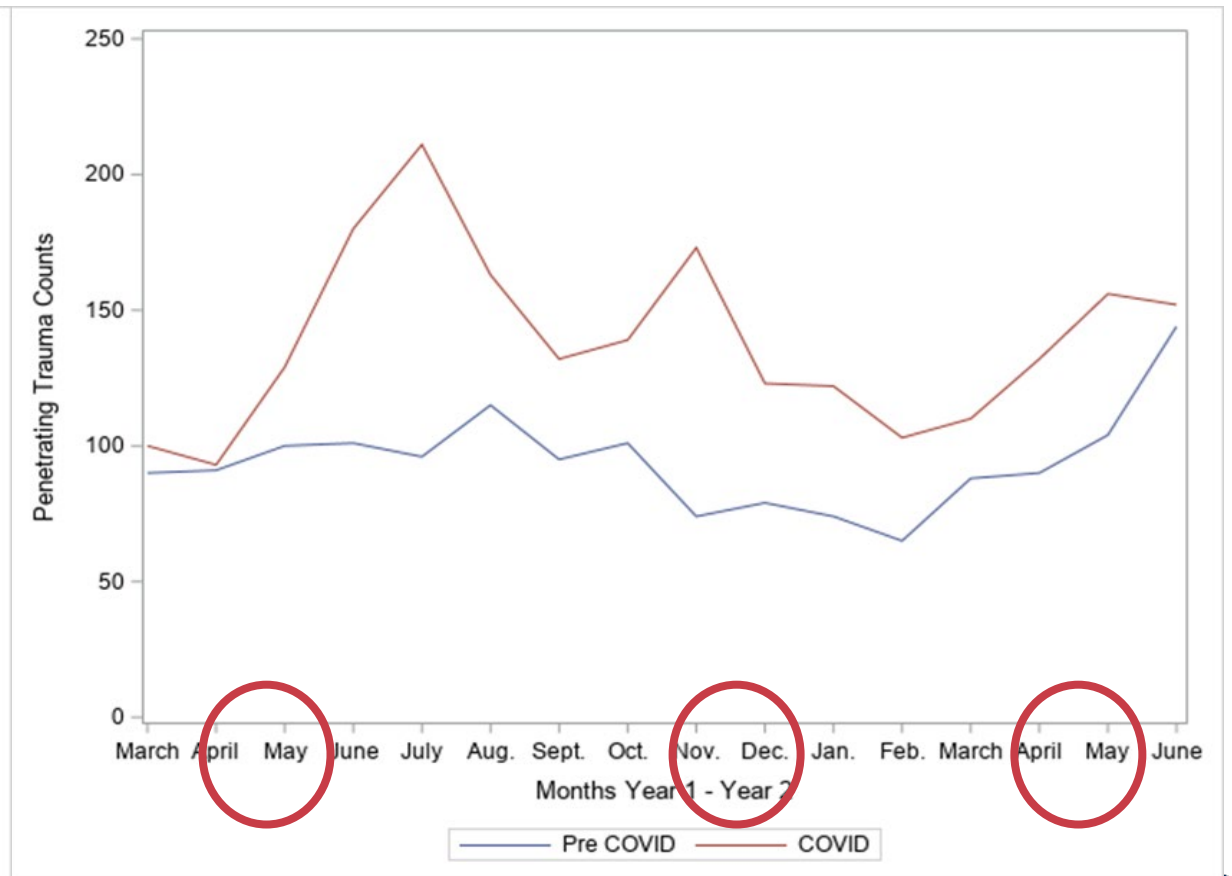
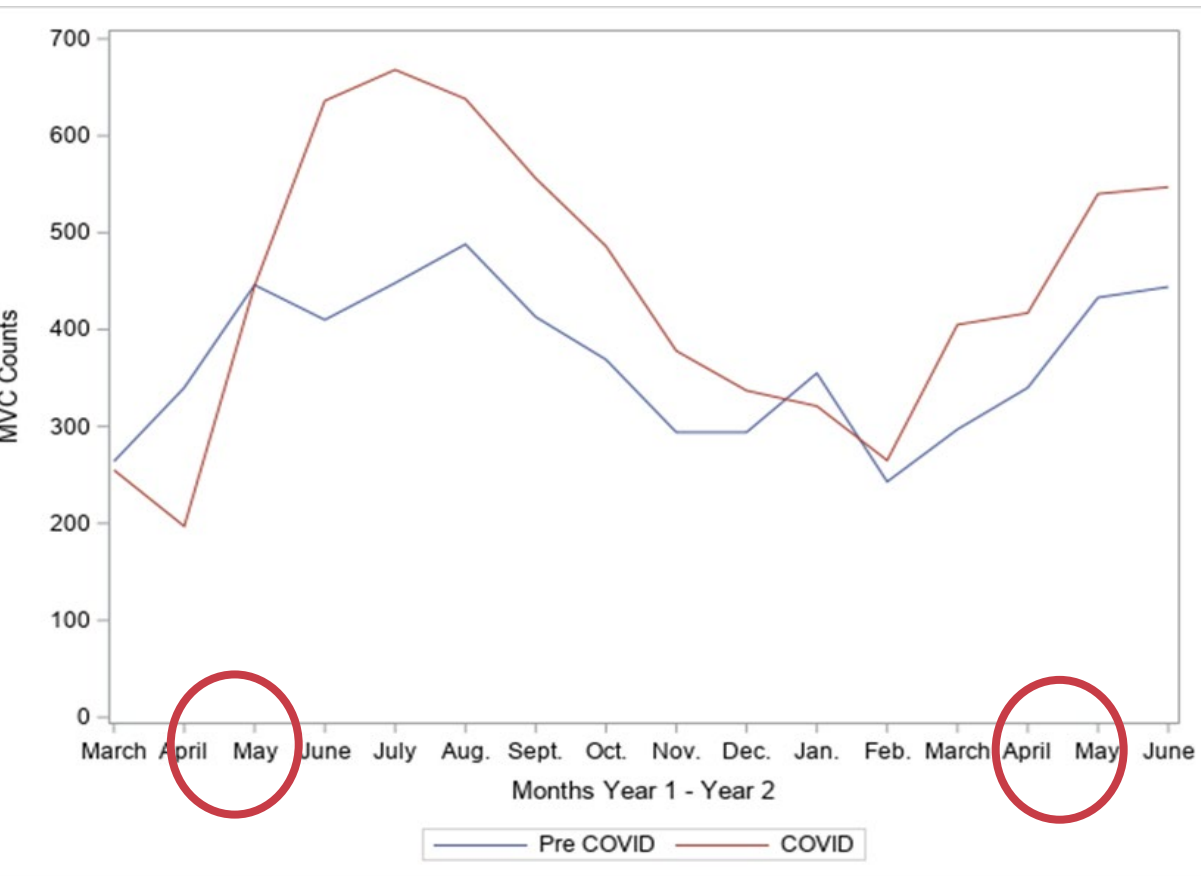
Variable	Pre COVID (N=33,105)	COVID (N=35,027)	p-value
Hypertension	16,382 (49.5)	16,475 (47.0)	<0.0001
COPD	3,347 (10.1)	3,421 (9.8)	0.1341
CHF	2,719 (8.2)	3,347 (9.6)	<0.0001
Mental/Personality Disorder	7,643 (23.1)	9,529 (27.2)	<0.0001
Substance Use Disorder	6,471 (19.6)	9,413 (26.9)	<0.0001
Diabetes Mellitus	5,574 (16.8)	5,452 (15.6)	<0.0001

Results: **Red Line During COVID-19 (Top)**

Blue Line Pre-Pandemic (Bottom)

Motor Vehicle Collision

Penetrating Trauma



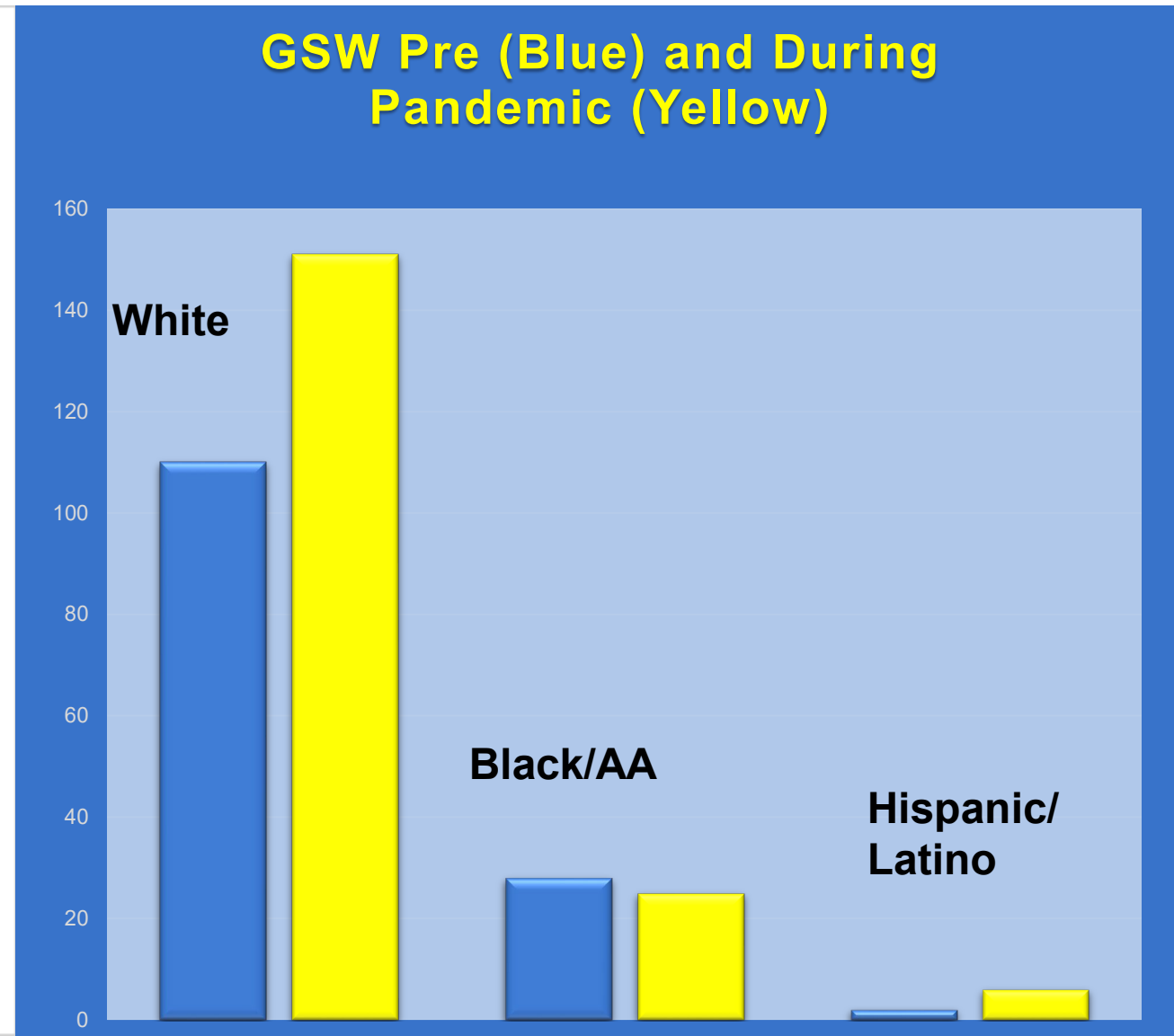
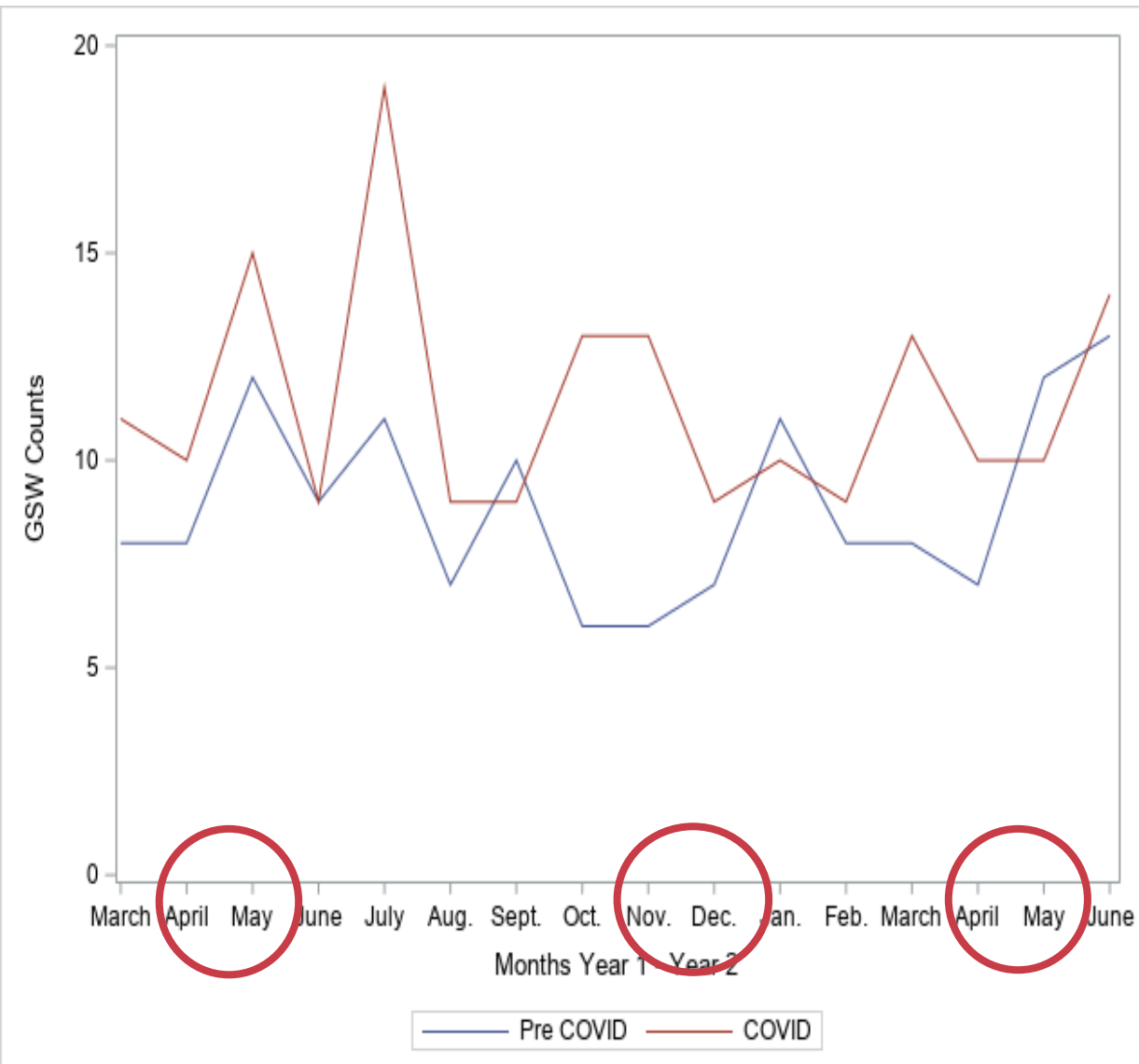
Penetrating Trauma: Intentional Assault and GSW

Variable	Pre COVID-19 (N=1,217)	COVID-19 (N=1,878)	p-value
Age	33.1 ± 13.6	33.1 ± 13.0	0.9399
Race			
Black	734 (60.3)	770 (41.0)	<0.0001
Other Race	51 (4.2)	86 (4.6)	
White	432 (35.5)	1,022 (54.4)	
Median Income	N=1,215 42,635 ± 18,515	N=1,877 40,404 ± 15,581	0.0005
Unemployment Rate	4.6 ± 0.9	10.6 ± 6.5	<0.0001
Poverty Proportion	N=1,216 0.21 ± 0.11	N=1,877 0.23 ± 0.11	0.0095

Gun Shot Wounds Increased and Followed Peaks

Red Line During COVID-19 (Top)

Blue Line Pre-Pandemic (Bottom)



Intentional Assault by Race: Blunt and Penetrating

Decrease -9.1% Assaults

Increase 68.4% Assaults

Black Trauma Patients

Patient Descriptors	Pre COVID-19 (N=1178)	COVID-19 (N=1067)
Age	35.4 ± 13.5	34.9 ± 13.8
Sex (male)	980 (83.2)	892 (83.6)
Medicaid	424 (38.2)	433 (41.5)
Substance Use Disorder	668 (56.7)	653 (61.2)
Mental Health Disorder	149 (12.7)	136 (12.8)

White Trauma Patients

Patient Descriptors	Pre COVID-19 (N=937)	COVID-19 (N=1578)
Age	40.0 ± 15.4	37.2 ± 14.3
Sex (male)	753 (80.4)	1253 (79.4)
Medicaid	391 (46.0)	636 (43.6)
Substance Use Disorder	516 (55.1)	982 (62.2)
Mental Health Disorder	238 (25.4)	364 (23.1)

MVC by Race

16% Increase MVC

Black Trauma Patients

22.4% increase MVC

White Trauma Patients

Patient Descriptors	Pre COVID-19 (N=1021)	COVID-19 (N=1190)
Age	38.1 ± 16.6	35.9 ± 15.1
Sex (male)	625 (61.2)	758 (63.7)
Substance Use Disorder	478 (46.8)	586 (49.2)
Mental Health Disorder	98 (9.6)	138 (11.6)
Medicaid	168 (17.2)	275 (23.5)

Patient Descriptors	Pre COVID-19 (N=4514)	COVID-19 (N=5524)
Age	48.6 ± 21.0	45.5 ± 20.0
Sex (male)	2608 (57.8)	3484 (63.1)
Substance Use Disorder	1174 (26.0)	2307 (41.8)
Mental Health Disorder	875 (19.4)	1295 (23.4)
Medicaid	308 (7.0)	605 (11.6)

Surging Traffic Deaths After Decades of Safety Gains Due to Pandemic

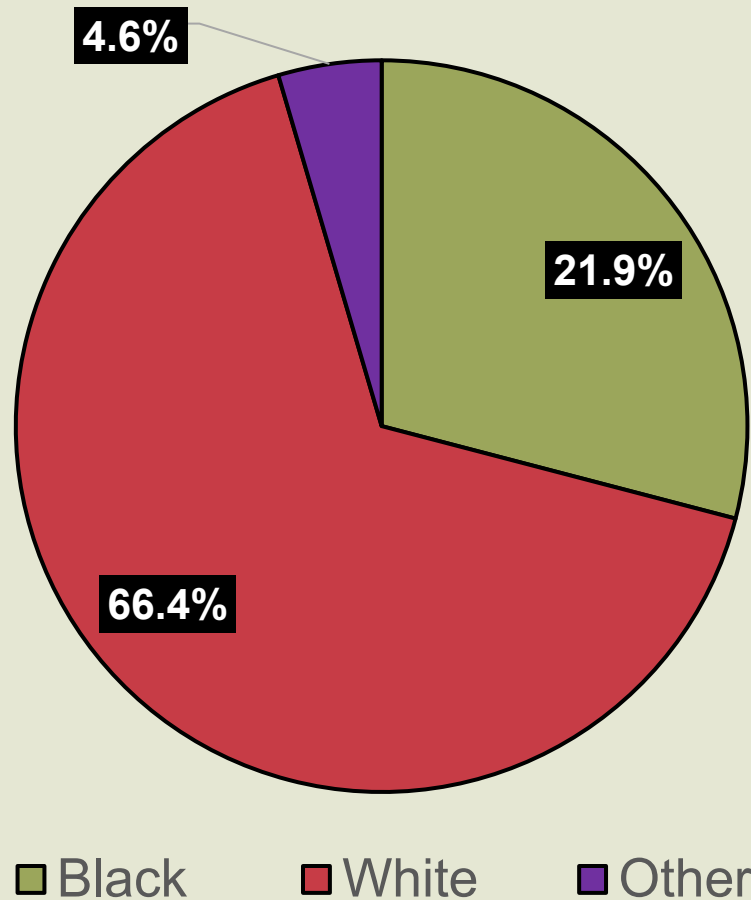
“This grim trend is another way that two years of isolation and disruption have damaged life....” Vehicle Crashes, Surging - The New York Times (nytimes.com) February 2022 [National Highway Traffic Safety Association, NHTSA]

“The pandemic has made US drivers more reckless-more likely to speed, drink or use drugs and leave their seatbelts unbuckled”. Why car crash deaths have surged during COVID-19 pandemic - Los Angeles Times (latimes.com) December 2021 [National Safety Council, Johns Hopkins SPH, Governors Highway Safety Association]

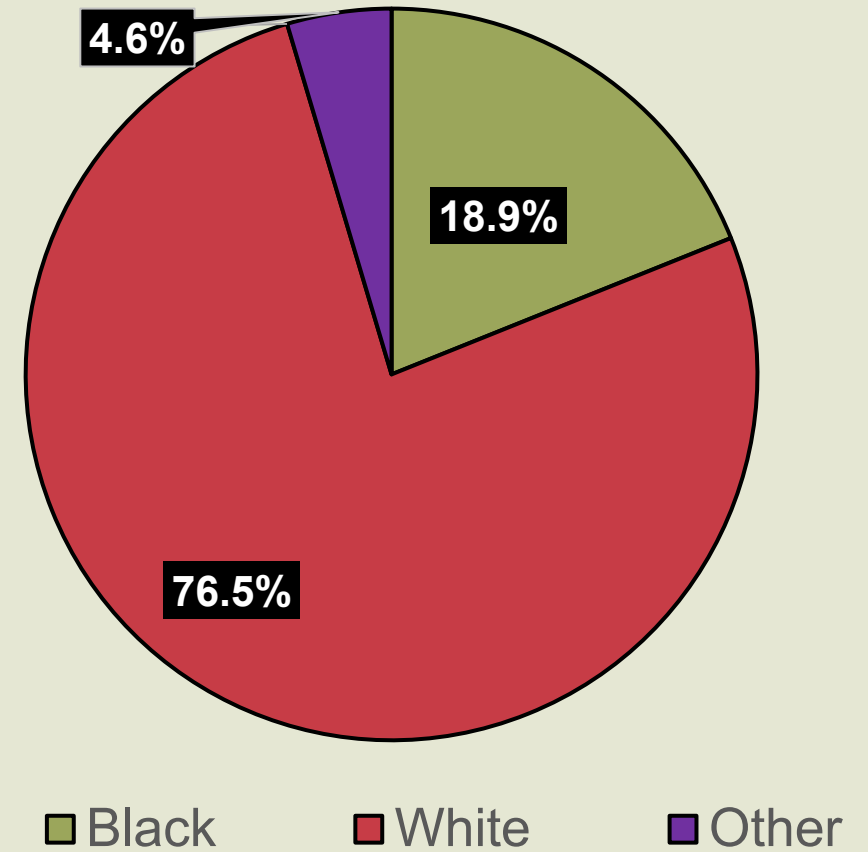
Substance Use Disorder by Race Pre and During COVID-19

Overall: over 70% Male and median age 45

Pre-COVID N=6471



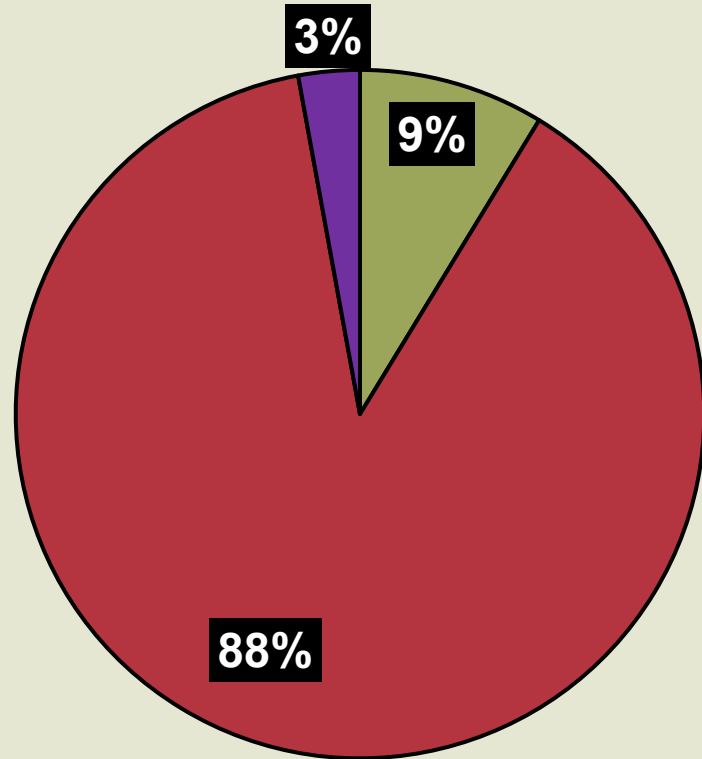
During Pandemic N=9413



Mental Health Disorder by Race Pre and During COVID-19

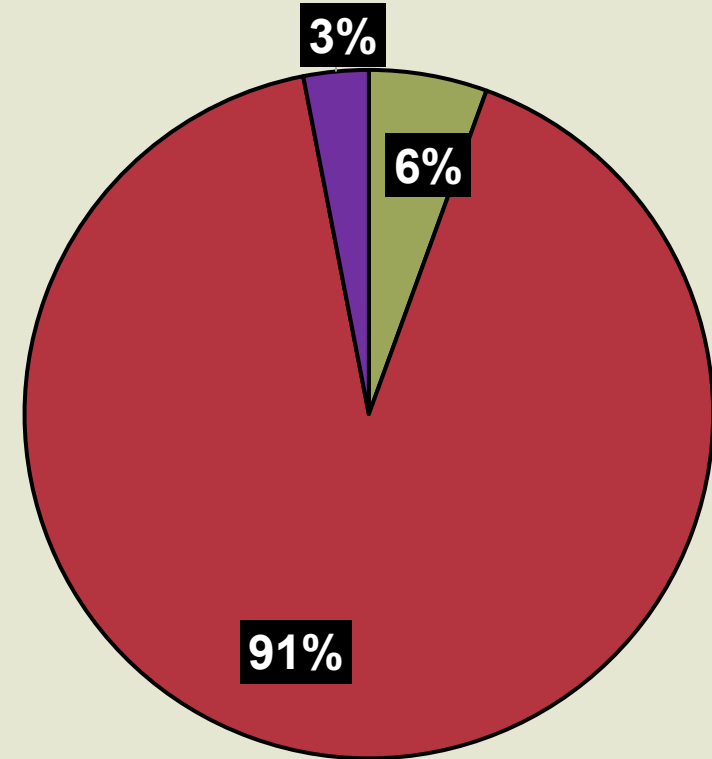
Overall: 40% Male and median age 65

Pre-COVID N=7643



Black White Other

During Pandemic N=9529



Black White Other

Summary: Comparing Pre COVID-19 and During Pandemic for all Trauma Patients

*Younger

*male %

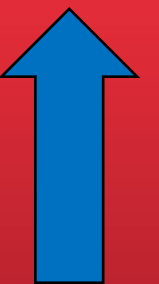
*Medicaid recipients



Black patients



White patients



*Household income

*Poverty



Unemployment rate



*MVCs

*Penetrating
trauma

*Intentional assaults



Summary: Comparing Pre COVID-19 and During Pandemic for all Trauma Patients

Increased MVCs: 22.4% increase white trauma patients and 16.6% increase in Black trauma patients

Literature and News: aggressive driving, social isolation, increased alcohol, substance use, and mental health disorders

White trauma cohort: increase in assaults, penetrating trauma, GSW, substance abuse, and mental health disorders

Black trauma cohort: decrease in assaults, penetrating trauma GSW, substance use, and mental health disorders

Black Trauma Cohort: Role of Social Engagement and Emotional Support

People of Color have a “Strong resilience and protective factors likely play a role in safeguarding the mental health of communities of color despite the numerous barriers they face.” CHI Resilience and Protective Factors Online Final 1.pdf (coloradohealthinstitute.org) (2021)

“Black participants showed significantly greater posttraumatic growth (during COVID-19) compared to white participants. Additionally, the coping strategies of religion and positive reframing were found to be significantly associated with posttraumatic growth.” *EClinicalMedicine* 45 (2022): 101343.

Limitations

- ❑ Need trauma studies for Latinos, Asian, and other races/ethnicities
- ❑ Intentional Assault includes Self-Harm
- ❑ American Community Survey and MI Unemployment databases Zip Code level, not individual level for SES data
- ❑ Did not compare urban versus rural trauma volume and mechanism

Questions?

Please contact me for any further information:

Ms. Laura Krech

Laura.Krech@spectrumhealth.org

Thank you MTQIP Leadership for allowing me to present our collaborative study to the group!

Geriatric Hip Fracture Protocol

Thomas Oweis, MD

Rick Ricardi, RN

Jeff Mendoza, RN

St. Mary Mercy Livonia





St. Mary Mercy Livonia: Evolution of Hip Fractures

Presented By:

Thomas Oweis MD, FACS

- SMML *Trauma Medical Director*

Rick Ricardi BSN, RN

- SMML *Director of Trauma Services*

Jeff Mendoza BSN, RN

- *MTQIP Coordinator*



Hospital Demographics



Registry Volume-1500 per year / 240 Hip Fractures per year



Hospital beds: 304



OR Suites: 8



Initial Orthopedic Call panel >20



Currently we have 15

2 Ortho Traumatologists

Our Team

9 Trauma Surgeons

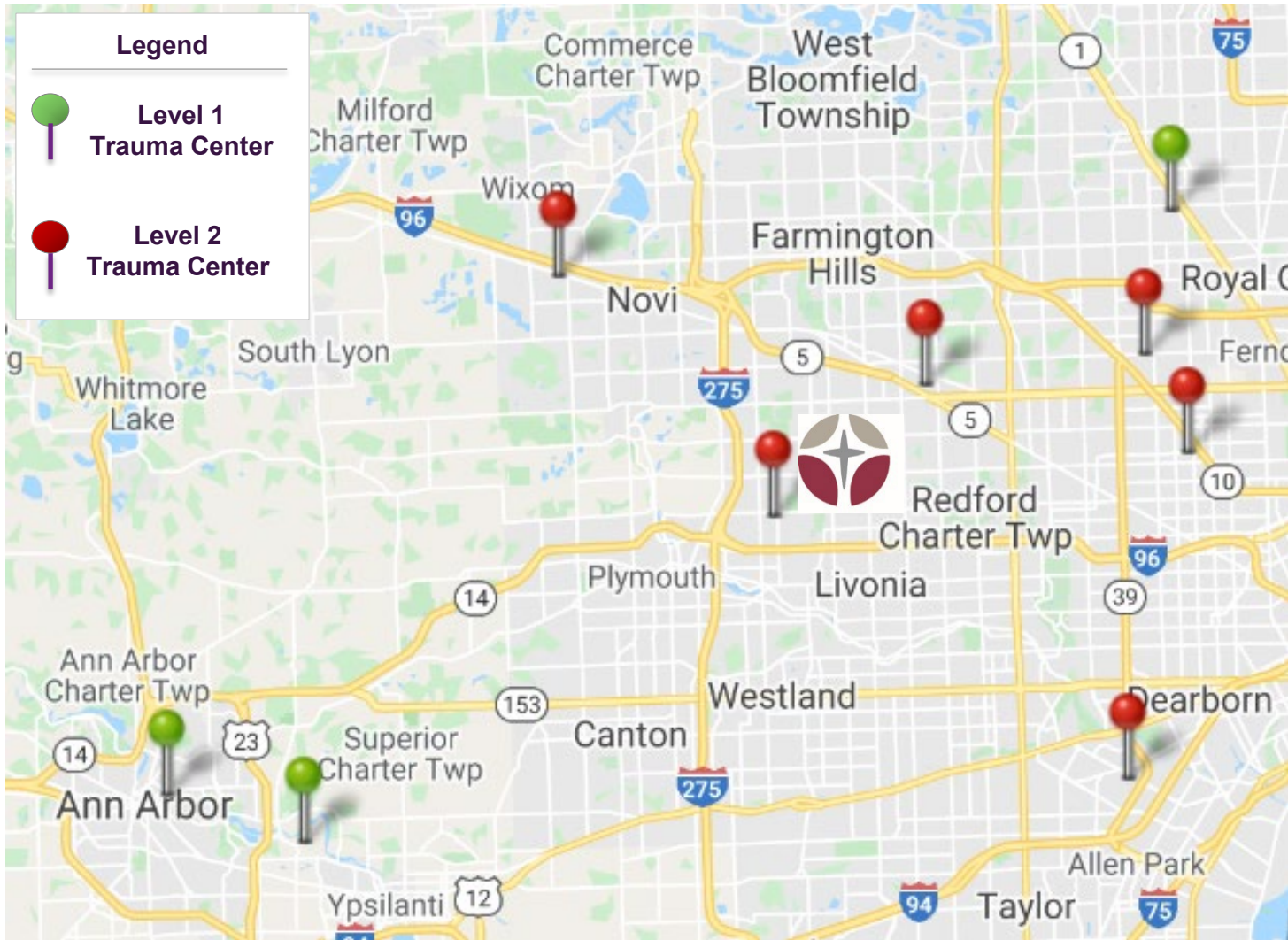
2 Trauma Registrars

1 Quality MTQIP Reviewer-BCBS

1 Injury Prevention Specialist

8.5 FT Advanced Practitioners- 2 Day/1Night

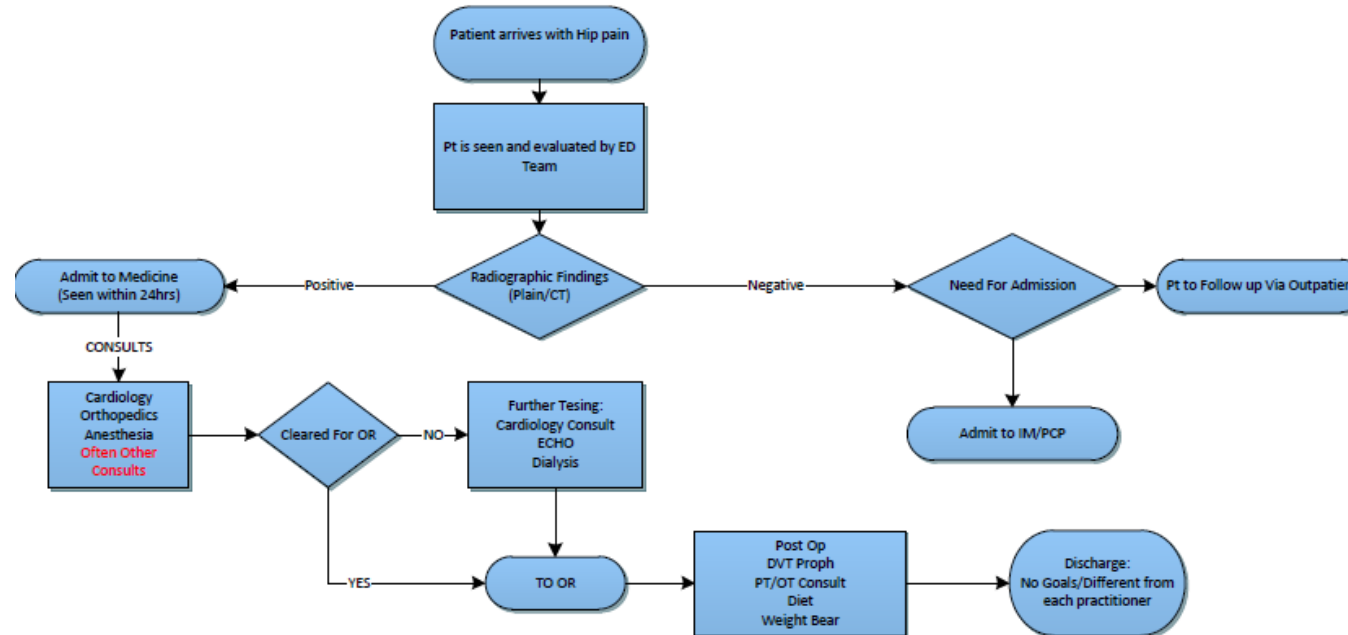
The Community We Serve



- **Across the trauma centers in Michigan, St Mary's treats some of the oldest patient population**
- **Situated at the intersection of 3 major freeways, St Mary's is the nearest trauma center**

“Old” Medicine Admit Algorithm

Medicine Admitting Hip Fx Patients



No Formal Review:

Hip Fx Deaths
Hip Fx Readmissions

Average LOS-7 days
Average Door-OR Time: >48hrs

The goal of the Hip Fracture Guideline is to:

Decrease the overall length of stay

Decrease the door to OR time

Decrease Morbidity/Mortality

Create Interdisciplinary Team Management

Goal: Hip fracture patients are best optimized with surgical fixation within 24 hours of admission and discharged to structured rehabilitation on POD#2-3

Collaborative Meeting:

Multidisciplinary Team Established

Physician Liaisons: Anesthesia, Cardiology,
Medicine, Trauma Orthopedics and Emergency
Medicine, Pharmacy Identified

Protocol Created / Revised

Hip Fracture Guideline Created

Hip Fracture Guideline**Trauma**

Effective Date: 6/2018

Revised Date: 2/2018

Reviewed Date: 5/2018, 01/2019, 12/20

Submitted by: Rick Ricardi, Director, Trauma

Approved by: Dr. Tom Oweis, Trauma Medical Director

Dr. Matt Steffes, Orthopedic Trauma Liaison

Dr. Roy Misirliyan, Cardiology

Dr. Katherine Vitale, Anesthesia

Cheryl Malloch-Clifton-PharmD

Teresa Guastella, PA-C, Lead APP Trauma Services

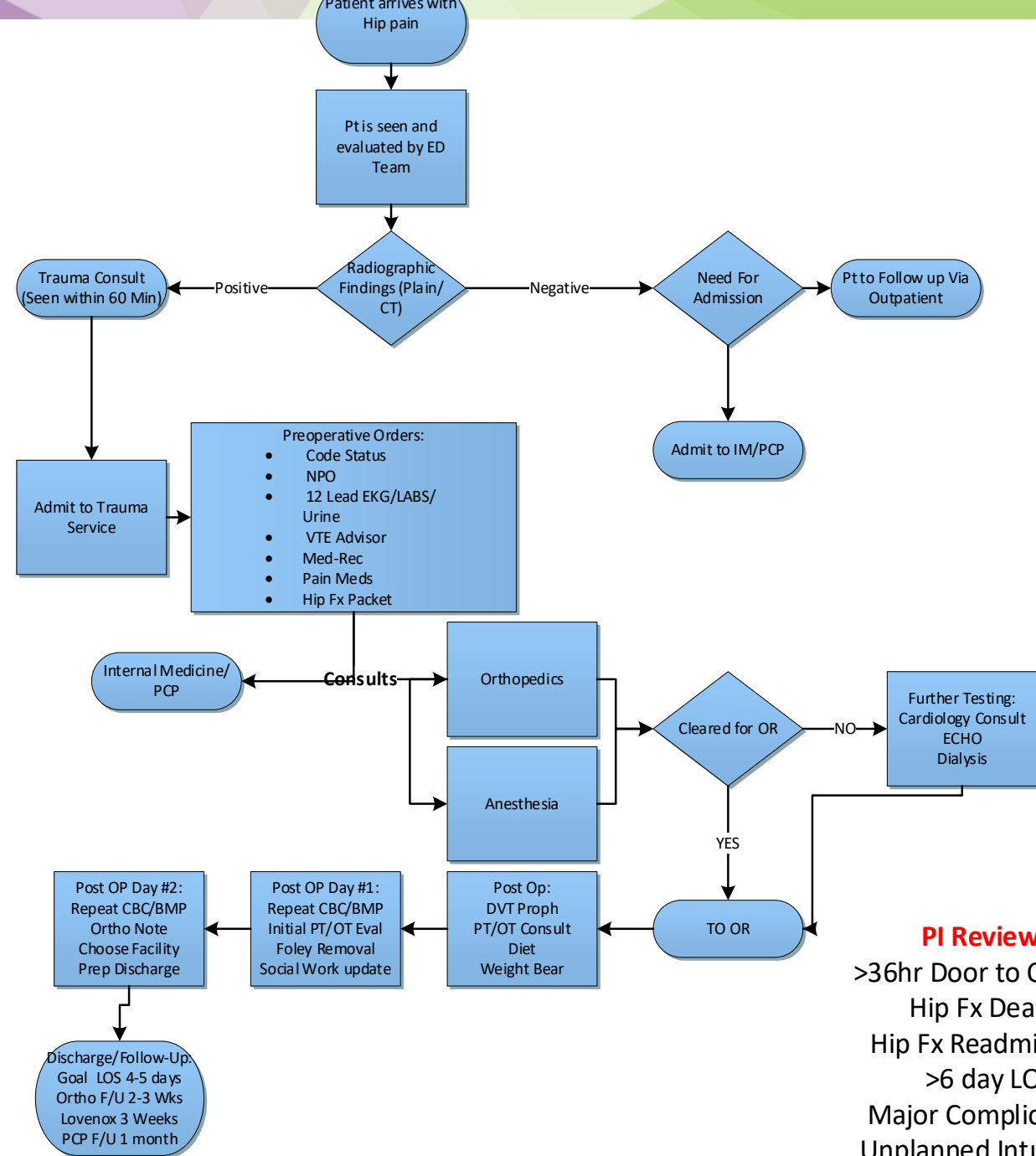
Rick Ricardi, Director of Trauma Services

1. Purpose: To provide treatment guidelines for adults with hip fractures. The use of standard protocols is aimed at reducing mortality, hospital length of stay, and complications
2. Goal: Hip fracture patients are best optimized with surgical fixation within 24 hours of admission and discharged to structured rehabilitation on POD#2-3

Preoperative

1. The trauma service will be notified by level 1, 2 or 3 activation based on the patient's mechanism of injury and overall hemodynamic stability. Ground-level mechanical falls resulting in isolated hip fractures will generally be activated by the ED as level 3 consults
2. All operative hip fractures are admitted to the trauma service. Admission orders should include:
 - a. Inpatient admission
 - b. Code status with supporting documentation
 - c. NPO status, depending on timing of surgery
 - d. 12 Lead EKG (if not already performed in ED)
 - e. DVT Prophylaxis: If surgery will not be completed until the next day, it is "OK" to order daily dose of lovenox 30-40 mg to be given on admission. Hold DVT prophylaxis day of surgery.
 - f. Foley Catheter (condom catheter/urinal may be appropriate in some males)
 - g. IV fluids
 - h. Laboratory work-up ordered in ED
 - i. CBC, BMP, PTT, PT/INR, Type and Screen
 - ii. Vitamin D 25 Hydroxy Level (add-on lab)
 1. If abnormal, have the patient follow-up with PCP for management and note in DEPART
 - i. Neurovascular checks q shift
 - j. Reconciliation of home medications, holding previous anticoagulants/antiplatelet agents
 - k. Pain medication regimen considering age/weight/mental status (see appendix)
 - l. Scheduled bowel regimen
 - m. Orthopedic consult, utilizing on-call schedule
 - n. Consult to patient's PCP or covering service if there are acute medical issues requiring consult.
 - o. Social work consult – selecting "placement" as reason
 - i. Patient/family will receive a "hip fracture information packet" from the social worker in the ED. During off hours, packet should be given the next morning prior to surgery

Trauma Admitting Hip Fracture Patients



PI Reviews:
 >36hr Door to OR Time
 Hip Fx Deaths
 Hip Fx Readmissions
 >6 day LOS
 Major Complications
 Unplanned Intubation
 Unplanned ICU Admission

Cardiology Clearance if:

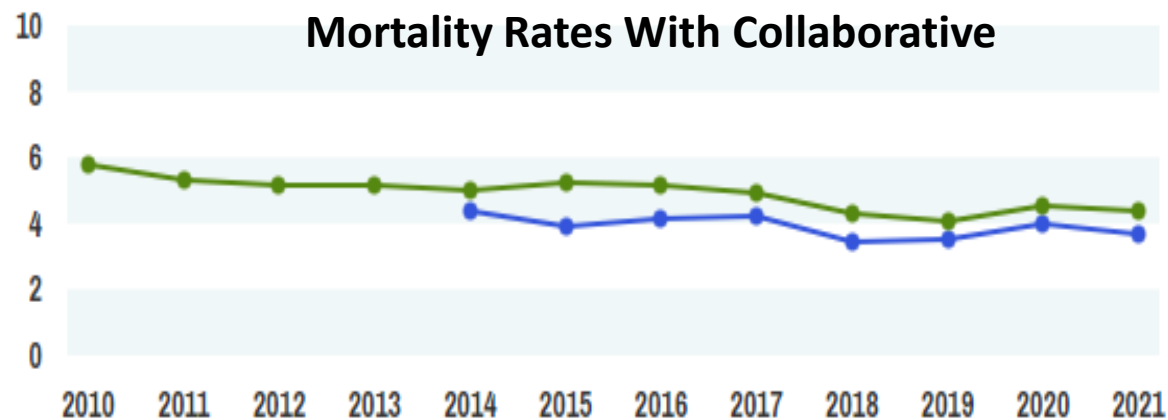
Active Chest Pain

New Arrhythmia/Tachycardia

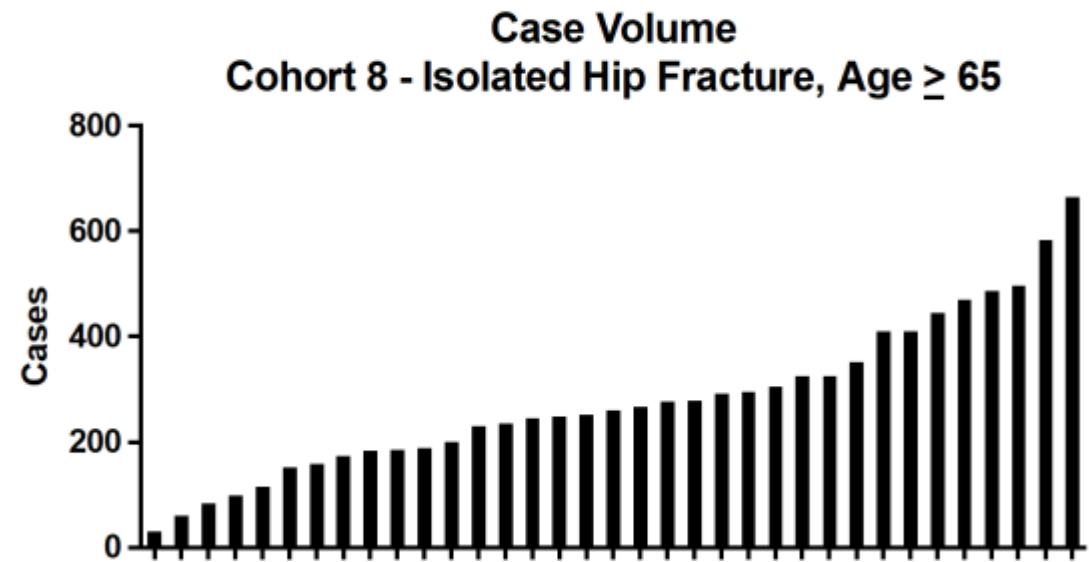
Overt Failure

New Documented Murmur

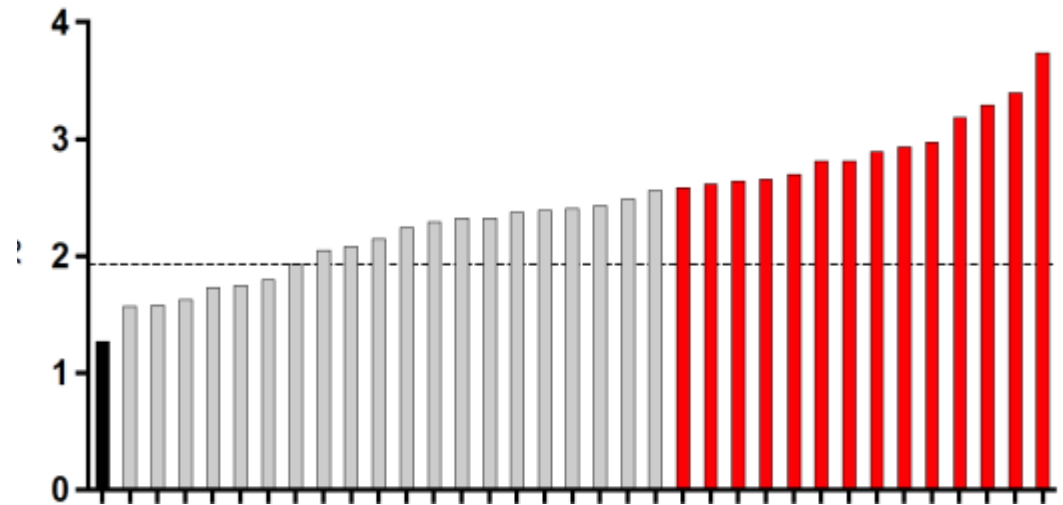
MTQIP: Quality Improvement and Focus



Isolated Hip Fracture



Mortality w/o DOA, Age ≥ 65
Cohort 8 - Isolated Hip Fracture



Process Monitoring and Control

- The care process is reviewed daily to keep track of our performance.
- Implementation of a monthly dashboard that is shared at both Trauma Peer Review and Trauma Committee Multidisciplinary Team
- In an effort to maintain the 24 hour door to OR guideline, any patient that becomes an outlier greater than 36 hours is reviewed by the Trauma Medical Director and Program Administrator. If the delay is deemed to be appropriate the case is closed; if opportunity for improvement is identified, the case is then escalated to our Orthopedic Trauma Liaison for review
- If further discussion is needed the case is abstracted and then reviewed at our Trauma Peer Review meeting for further discussion

Conclusion

- Hip fractures are a major cause of morbidity and mortality in the older population. The increase of falls and longer life span represent a significant strain on our health care organizations in the future. We were able to show that having a hip fracture guideline had a positive impact on our overall length of stay, door to OR time, morbidity/mortality and interdisciplinary communication.
- In conclusion, this guideline has truly benefited the patients and community in which we serve. It has brought multiple disciplines to the table to collaborate on best practice.
- Injury Prevention! https://youtu.be/Q_Eb9t6VKf4

A group of healthcare workers, including nurses and doctors, are walking away from the camera down a brightly lit hospital hallway. They are wearing blue scrubs and blue surgical caps. The hallway has white walls and a light-colored floor with a dark blue line marking. The image is semi-transparent, allowing the text to be overlaid.

Questions?

Annals of Surgery - March 2022

ORIGINAL ARTICLE

Learning From England's Best Practice Tariff

Process Measure Pay-for-Performance Can Improve Hip Fracture Outcomes

Cheryl K. Zogg, PhD, MSPH, MHS,†‡§✉ David Metcalfe, PhD, MRCP, MRCS, MRCEM,†
Andrew Judge, PhD,¶ Daniel C. Perry, PhD, FRCS (Orth),† Matthew L. Costa, PhD, FRCS (Orth),†
Belinda J. Gabbe, PhD,|| Andrew J. Schoenfeld, MD, MSc,‡** Kimberly A. Davis, MD, MBA, FACS,*
Zara Cooper, MD, MSc, FACS,‡ and Judith H. Lichtman, PhD§*

The BPT for fragility hip fractures, was developed to encourage two key clinical characteristics of best practice: prompt surgery and appropriate involvement of geriatric medicine. The benefits of this approach can lead to:

- improved patient outcomes;
- increased number of independent individuals and reduced mortality;
- shorter length of stay; and
- more cost-effective care.

Overall, it is known that providing best practice is less costly than not.

The key clinical characteristics of best practice were chosen by a group of clinicians and service managers chaired by the National Clinical Director for trauma care. The characteristics are applied to patients aged 60 years of age and over are defined as:

1. Time to surgery within 36 hours from arrival in an emergency department, or time of diagnosis if an inpatient, to the start of anaesthesia
2. Admitted under the joint care of a consultant geriatrician and a consultant orthopaedic surgeon
3. Admitted using an assessment protocol agreed by geriatric medicine, orthopaedic surgery and anaesthesia
4. Assessed by a geriatrician in the preoperative period: within 72 hours of admission.
5. Postoperative geriatrician-directed multi-professional rehabilitation team
6. Fracture prevention assessments (falls and bone health).

The time to surgery was set at 36 hours rather than the 48 hours outlined in the BOA/BGS Blue Book, as this is considered a more appropriate level for best practice, while 48 hours was a minimum standard.

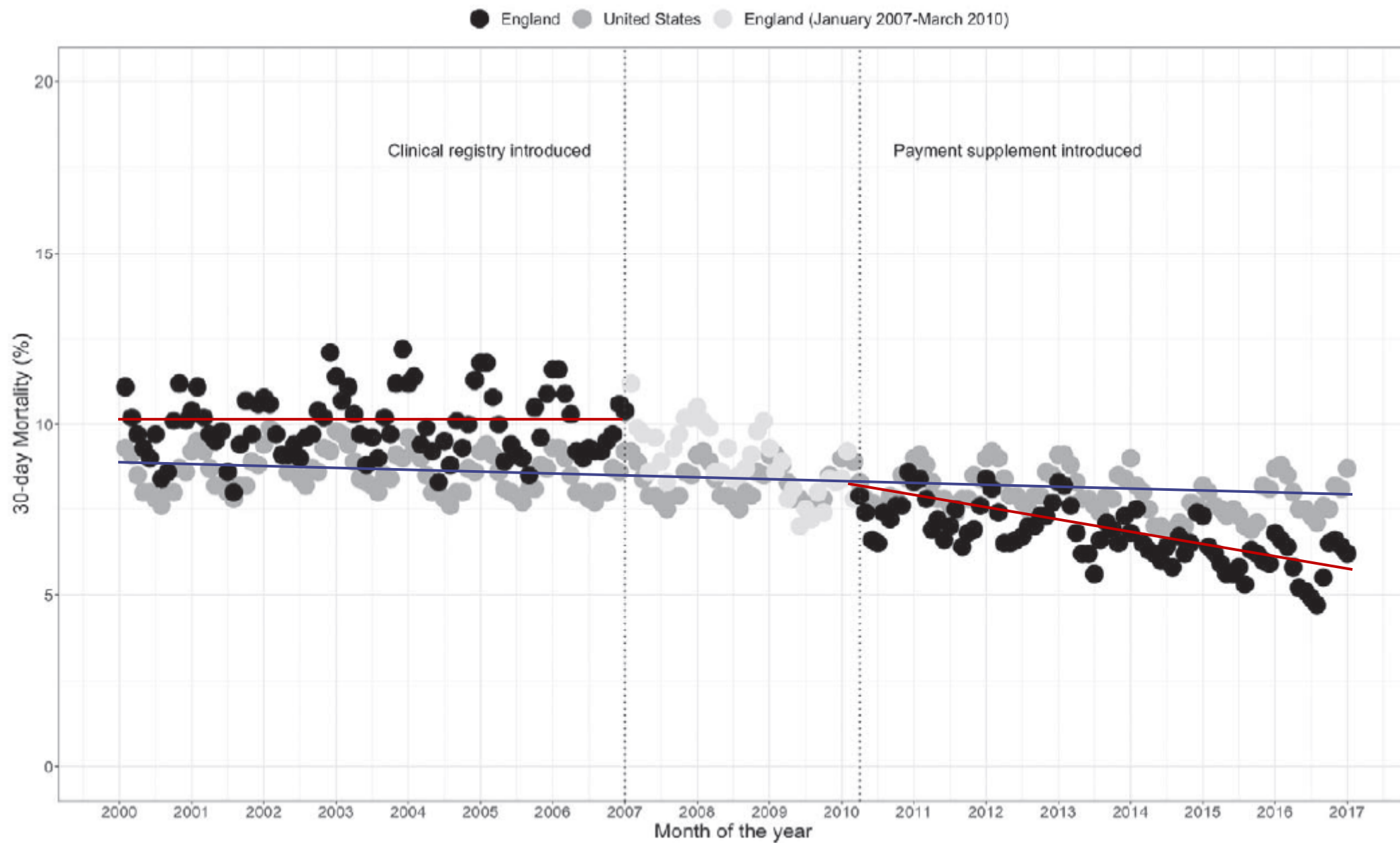
Eligibility for payment of the English Best Practice Tariff (BPT)

- Aged ≥ 60 y at time of admission
- Valid National Health Service number
- Receive a timely operation (time to surgery < 36 hours after arrival in the ED)
- All of the following:

Hip fractures after 2010	Hip fractures after 2012	Hip fractures after 2017
Admitted under named orthopaedic surgeon Admitted under named geriatrician Admitted using a joint assessment protocol Timely geriatrician assessment (< 72 hours) Rehabilitation assessment Specialist falls assessment Bone therapy assessment	Admitted under named orthopaedic surgeon Admitted under named geriatrician Admitted using a joint assessment protocol Timely geriatrician assessment (< 72 hours) Rehabilitation assessment Specialist falls assessment Bone therapy assessment Documentation of pre-op AMTS Documentation of post-op AMTS	Timely geriatrician assessment (< 72 hours) Specialist falls assessment Bone therapy assessment Documentation of pre-op AMTS* Delirium assessment Physiotherapist assessment Nutrition assessment

*AMTS = Abbreviated Mental Test Score

FIGURE 1. Monthly 30-day hip fracture mortality among adults aged ≥ 65 years in England (black/white) and the United States (grey), 2000 to 2016. *AMTS indicates Abbreviated Mental Test Score.



II. Counterfactual Model: Hypothetical Implementation in the United States

Outcome	England			O/E Ratio 2010–2016	Annual Deaths Averted 2010–2016
	O: 2000–2006	O: 2010–2016	E: 2010–2016		
Mortality, %					
30-d	9.9%	7.2%	9.9%	0.73	4881
90-d	19.8%	15.3%	21.2%	0.72	10,373
365-d	32.5%	28.6%	34.6%	0.83	19,390
Outcome	United States			O/T Ratio 2010–2016	Annual Deaths Averted 2010–2016
	O: 2000–2006	O: 2010–2016	T: 2010–2016		
Mortality, %					
30-d	8.4%	7.9%	5.7%	0.73	11,848
90-d	20.8%	19.3%	13.9%	0.72	28,724
365-d	24.5%	22.5%	18.6%	0.83	38,354

Grey shading denotes statistical significance (2-sided P -value < 0.05).

Models were risk-adjusted for: patient age on index admission, sex, and individual Elixhauser comorbidities.

Expected deaths obtained from models that accounted for differences in patient age on index admission, sex, and individual Elixhauser comorbidities.

E indicates expected; DID, difference-in-difference. O, observed; T, theoretical.

MTQIP Data & Hospital Scoring Index Results

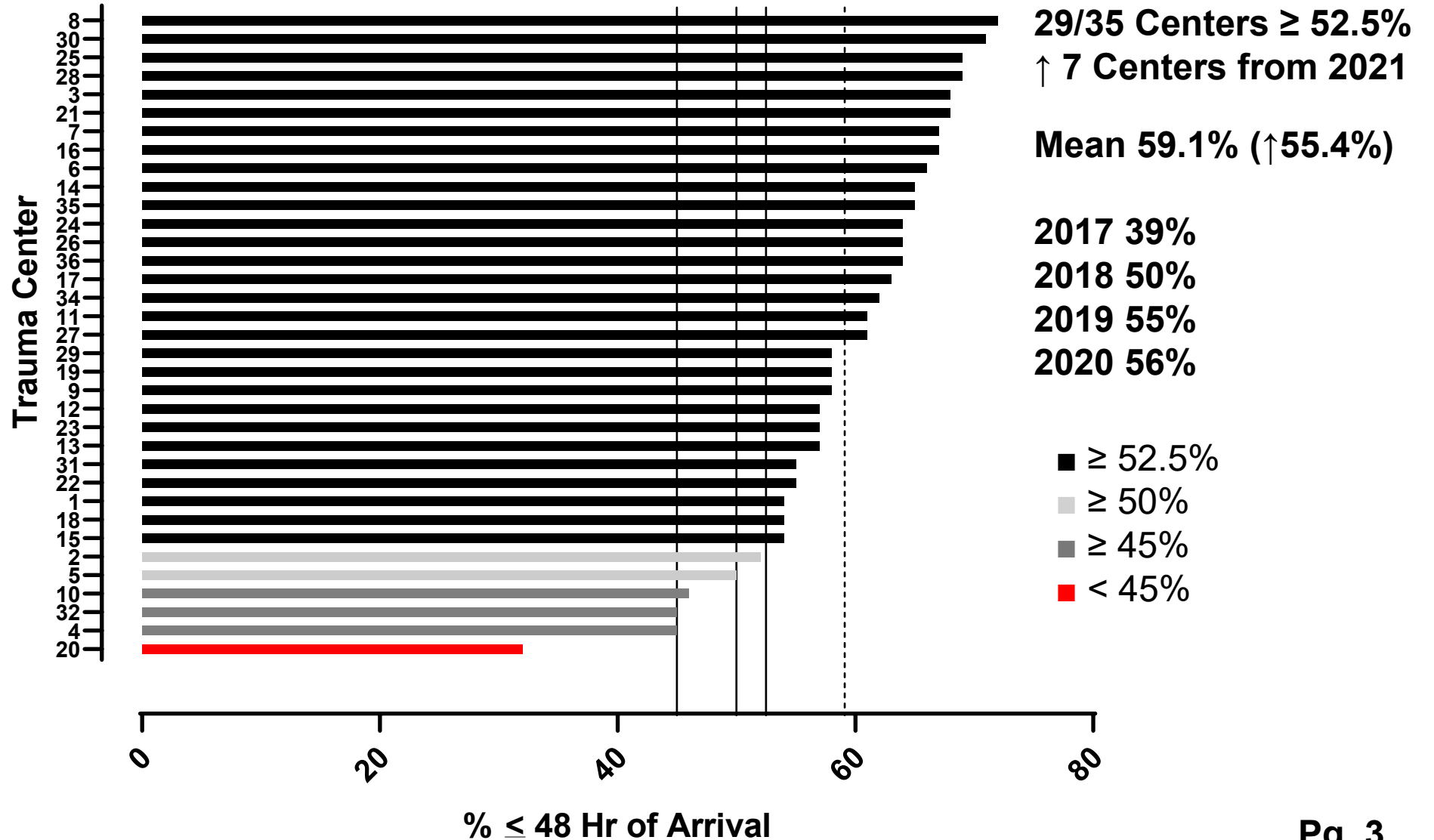
Mark Hemmila, MD



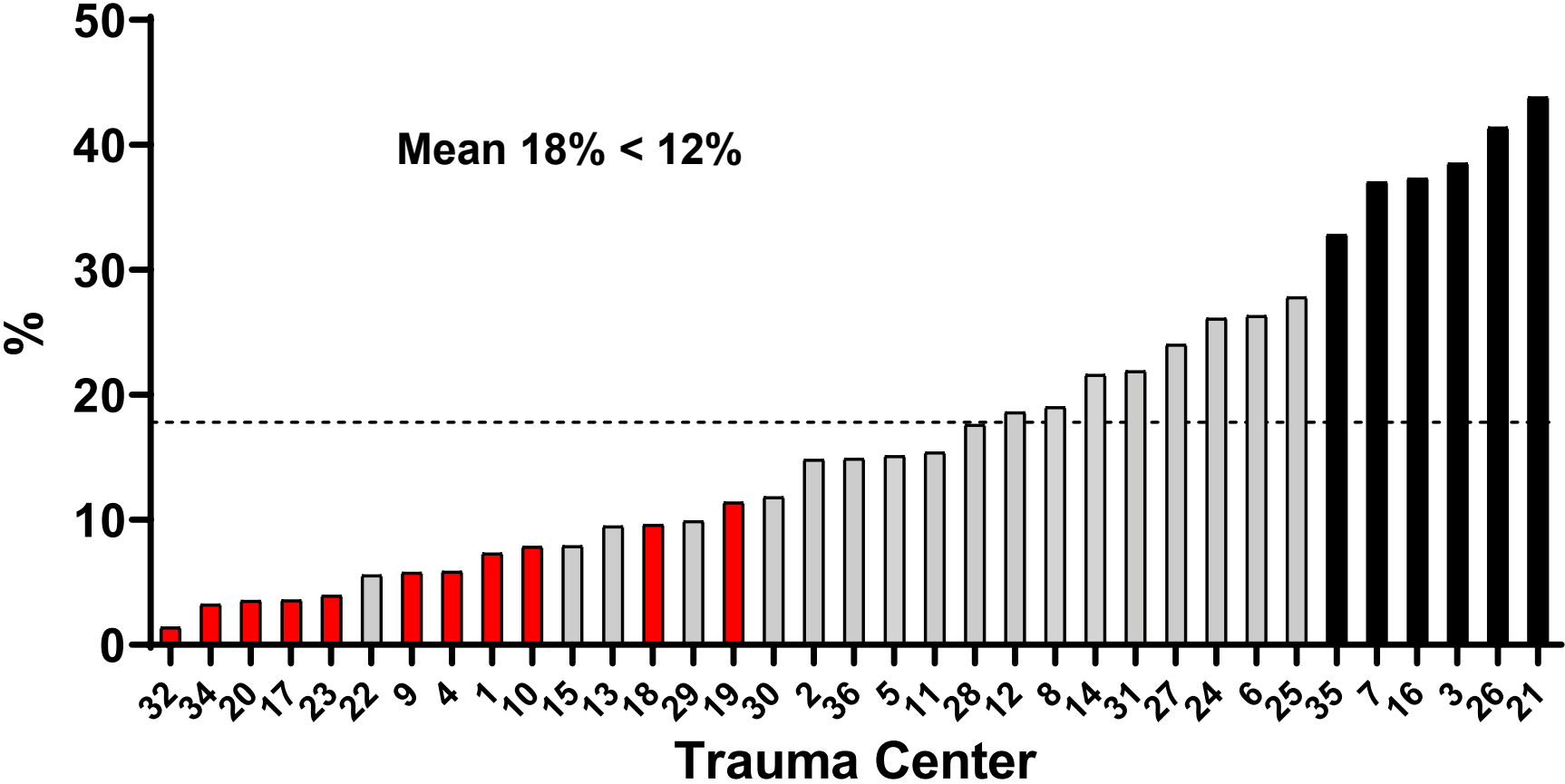
#4 Timely LMWH VTE Prophylaxis in Trauma Service Admits

- ◆ Venous Thromboembolism (VTE) Prophylaxis with LMWH Initiated Within 48 Hours of Arrival in Trauma Service Admits with > 2 Day Length of Stay (18 mo: 1/1/21-6/30/22)
 - $\geq 52.5\%$ 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** **1/1/21 - 1/31/22**

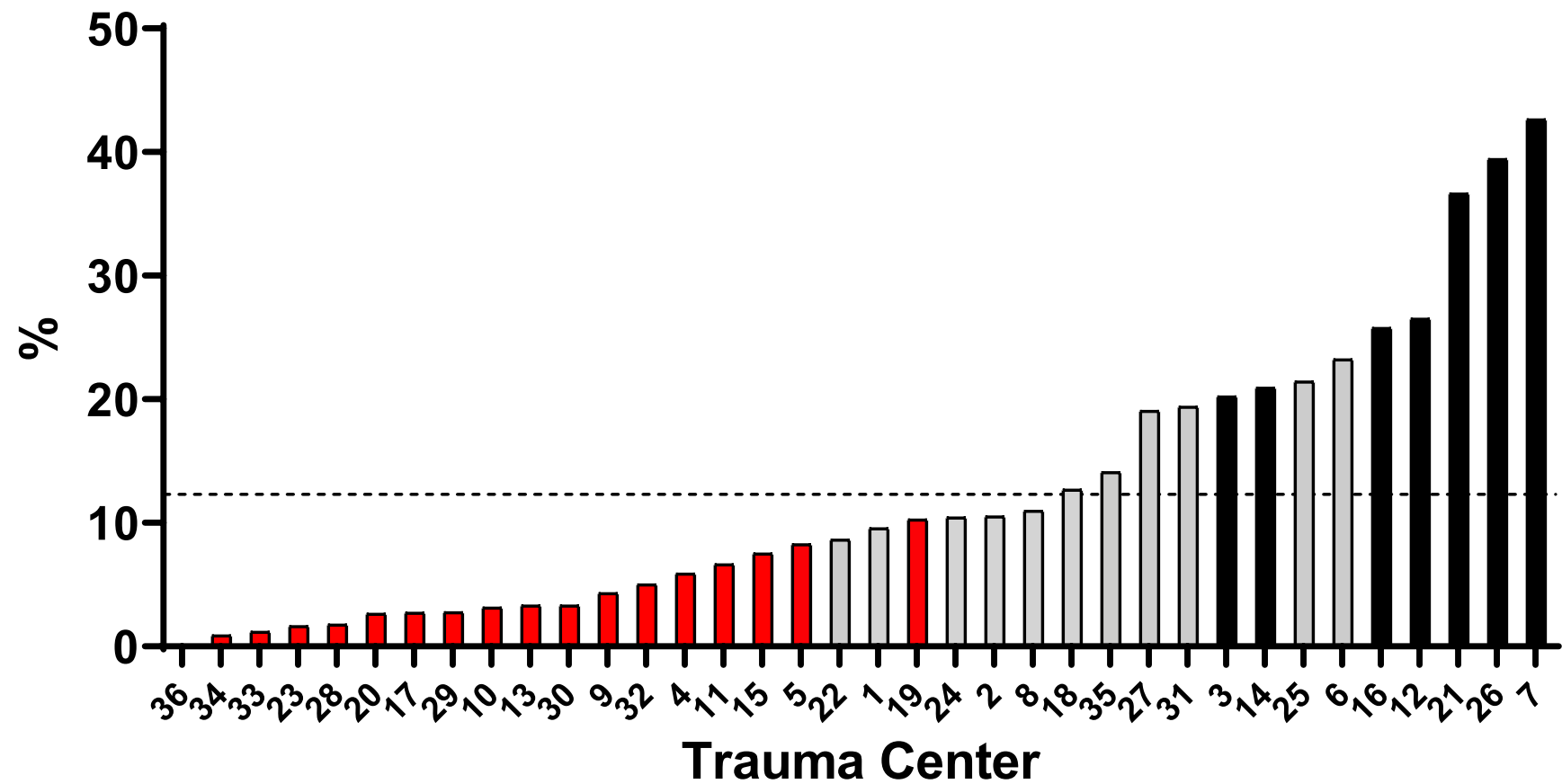


VTE LMWH \leq 48 hours
Cohort 9 - TBI



Last Year

VTE LMWH \leq 48 hours
Cohort - TBI





2022 CONSENSUS CONFERENCE

**TO IMPLEMENT OPTIMAL
VTE PROPHYLAXIS IN TRAUMA**

CNTR – William Geerts

Risk Factors for VTE in Trauma

- **Age**
- **Pelvic / lower extremity fracture**
- **Spinal cord injury**
- **Delay in thromboprophylaxis**
- **Major head injury**
- **Major venous injury**
- **Femoral venous line**
- **ISS**
- **Surgery**
- **Reduced mobility**

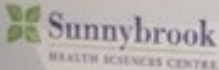
CNTR – William Geerts

Sunnybrook Trauma Prophylaxis

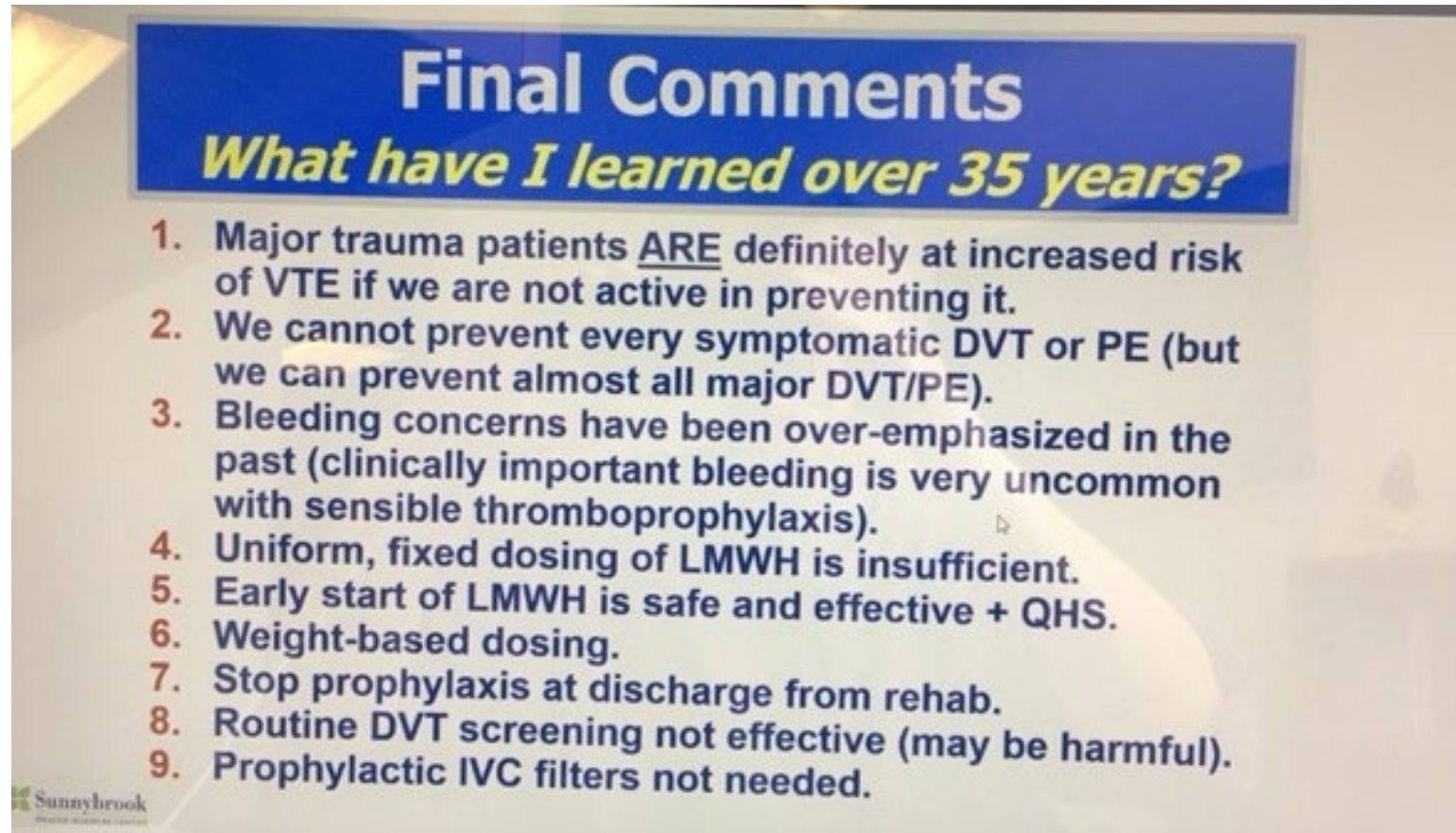
Patient	Enoxaparin dose
Wt <40 kg or CrCl <30 mL/mL	30 mg QHS
Usual risk – wt 40-100 kg	40 mg QHS
Usual risk – wt 100-125 kg	40 mg BID
Usual risk – wt >125 kg	0.5 mg/kg BID
High risk (SCI, major LEF) – wt 40-100 kg	40 mg QHS → 40 mg BID
High risk (SCI, major LEF) – wt 100-125 kg	40 mg BID → 60 mg BID

CNTR – William Geerts

Sunnybrook Trauma Prophylaxis	
SC heparin	Formal "avoid heparin policy"
AXa monitoring	Never
Duration of prophylaxis	Discharge from rehab (never after discharge)
Rivaroxaban 15 mg PO daily	High risk + LOS >1 week
Doppler U/S screening	Never
Prophylactic IVC filter	Never

 Sunnybrook
HEALTH SCIENCES CENTRE

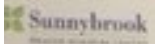
CNTR – William Geerts



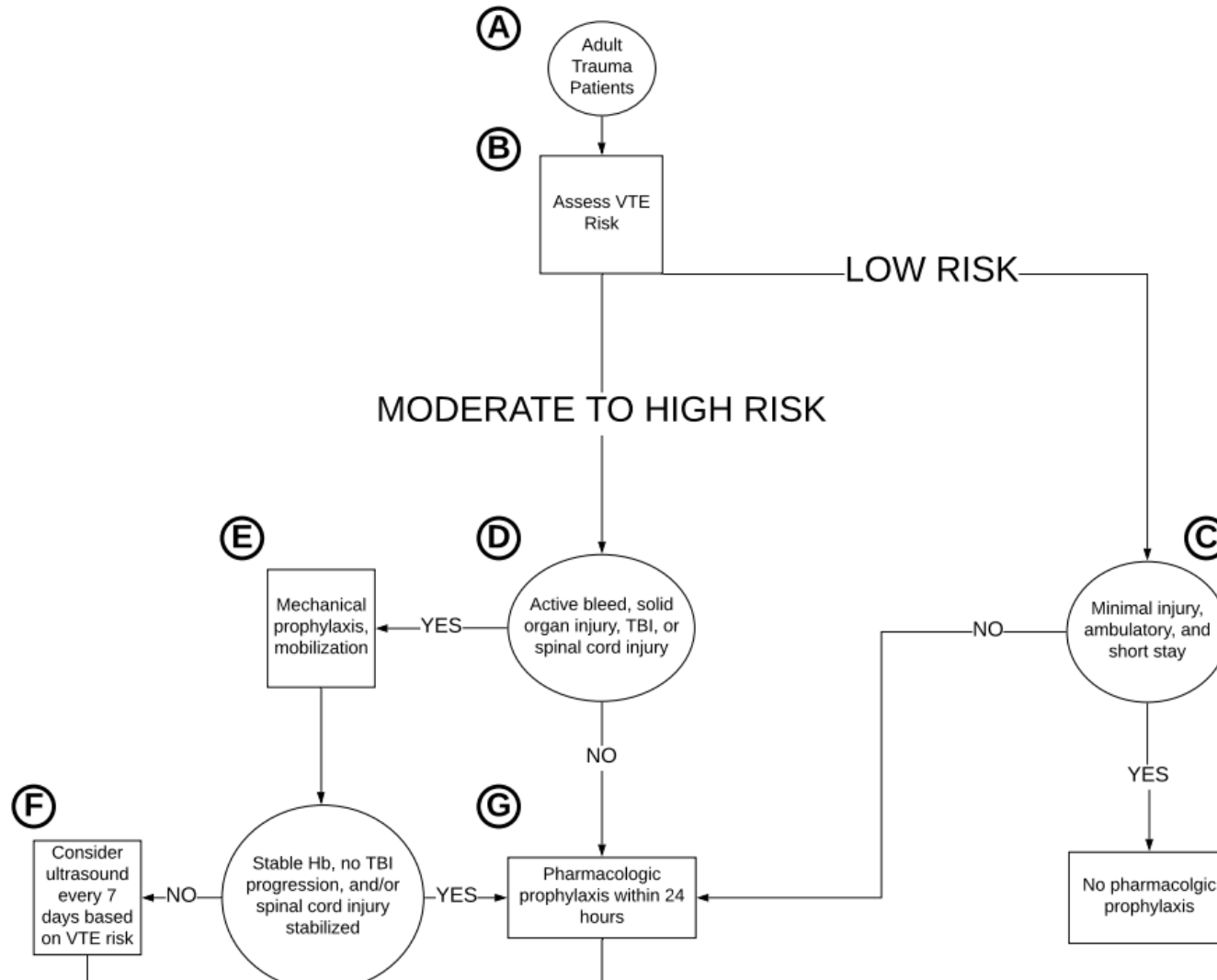
Final Comments

What have I learned over 35 years?

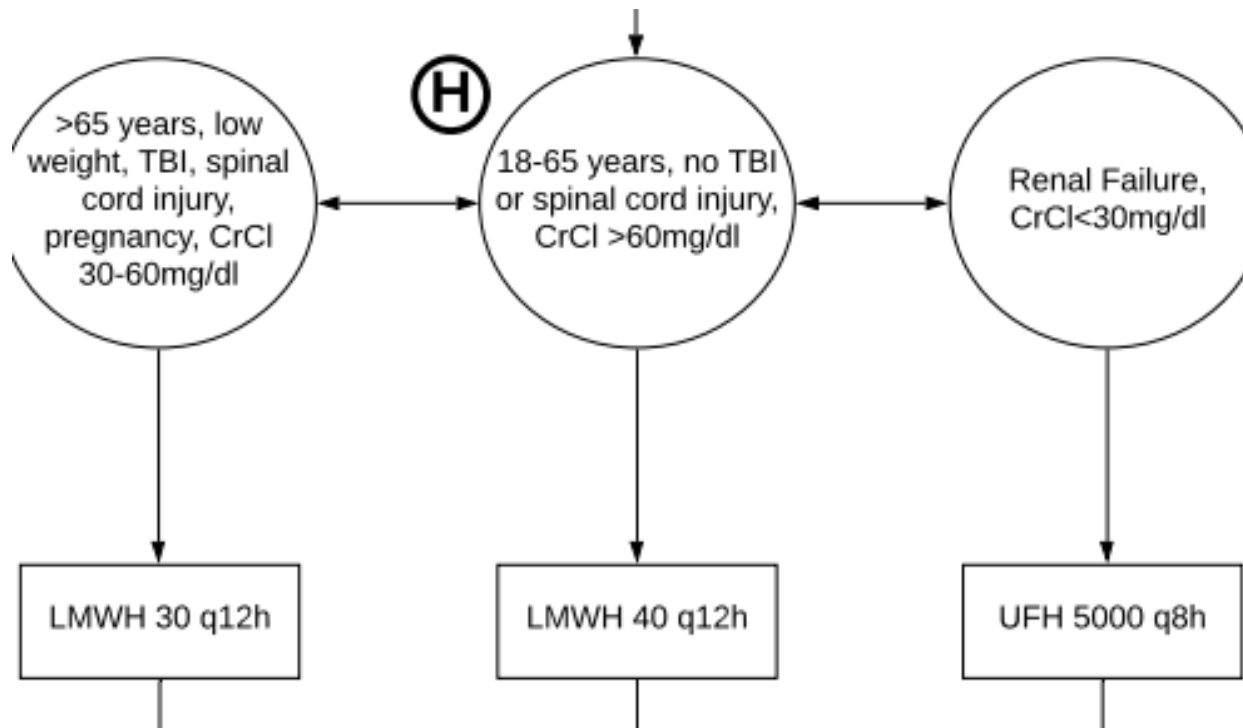
1. Major trauma patients ARE definitely at increased risk of VTE if we are not active in preventing it.
2. We cannot prevent every symptomatic DVT or PE (but we can prevent almost all major DVT/PE).
3. Bleeding concerns have been over-emphasized in the past (clinically important bleeding is very uncommon with sensible thromboprophylaxis).
4. Uniform, fixed dosing of LMWH is insufficient.
5. Early start of LMWH is safe and effective + QHS.
6. Weight-based dosing.
7. Stop prophylaxis at discharge from rehab.
8. Routine DVT screening not effective (may be harmful).
9. Prophylactic IVC filters not needed.

 Sunnybrook
Health Sciences Centre


CNTR – Eric Ley



CNTR – Eric Ley



Which patients should be started on Enoxaparin 30 q12?



```
graph TD; A(">65 years, low weight, TBI, spinal cord injury, pregnancy, CrCl 30-60mg/dl") --> B["LMWH 30 q12h"]; C{"Age > 65 years OR CrCl < 30 mL/min OR weight < 50kg OR pregnant?"}; C --> D("Enoxaparin 30mg BID"); C --> E("Enoxaparin 40mg BID");
```

- Low normal creatinine clearance
- Age >65y
- TBI, SCI
- Pregnancy

Zoom Meeting Participant ID: 50598
You are viewing screen sharing
More Options

A COMPARISON OF LOW-DOSE HEPARIN WITH LOW-MOLECULAR-WEIGHT
HEPARIN AS PROPHYLAXIS AGAINST VENOUS THROMBOEMBOLISM
AFTER MAJOR TRAUMA

WILLIAM H. GEERTS, M.D., RICHARD M. JAY, M.D., KAREN I. CODE, R.N., ERLUO CHEN, M.B., M.P.H.,
JOHN PAUL SZALAI, PH.D., ERIC A. SAIBIL, M.D., AND PAUL A. HAMILTON, M.D.

lowed. The study drug was generally not withheld in the event of a surgical procedure, although in exceptional circumstances such as spinal fixation, a single preoperative dose was permitted to be withheld. Treatment with the study medication was then resumed at the first dosing time after the operation.

Sigh..

- A drifting hemoglobin in a hemodynamically stable patient is not a reason to hold VTE prophylaxis
- Continue VTE prophylaxis through most surgeries

Unmute
Start Video

Participants

Chat

Share Screen

Record

Reactions

Apps

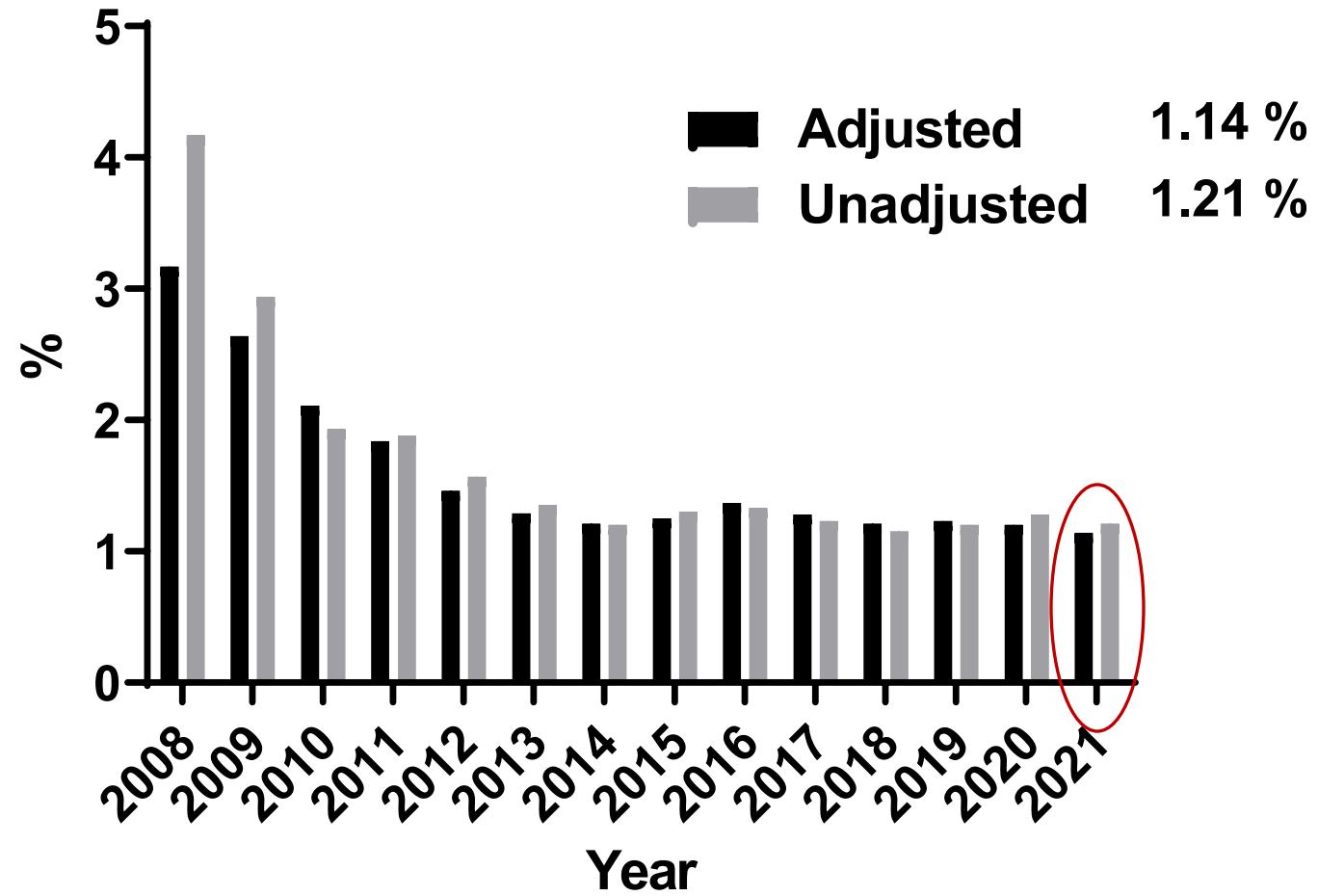
Windows taskbar showing icons for File Explorer, Microsoft Edge, and Zoom Meeting Participant ID: 50598.

DELL

Bottom Line

- ◆ Get rid of Heparin > Get rid of HIT
- ◆ Can be more aggressive
 - Experts
 - Guidelines
- ◆ Future goals
 - Do more
 - Prevent backsliding

VTE Event

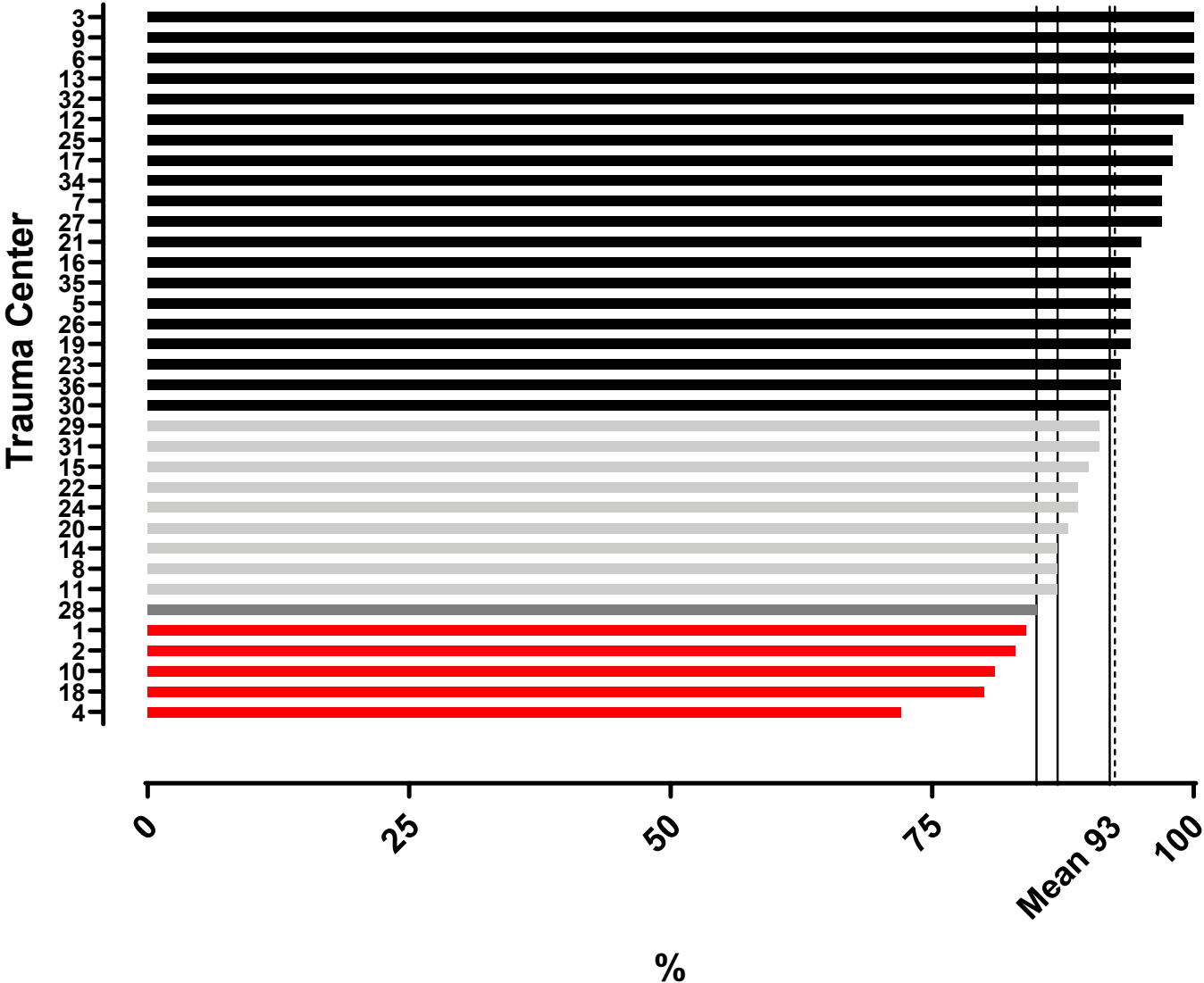


#5 Timely Surgical Repair in Geriatric (Age \geq 65) Isolated Hip Fracture

- ◆ Time to surgical repair of isolated hip fracture in patients age 65 or older (12 mo: 7/1/21-6/30/22)
 - \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)

Today

Metric 5 - Timely Surgical Hip Repair ≥ 65 years
Cohort 8 - Isolated Hip Fracture
7/1/21 - 1/31/22

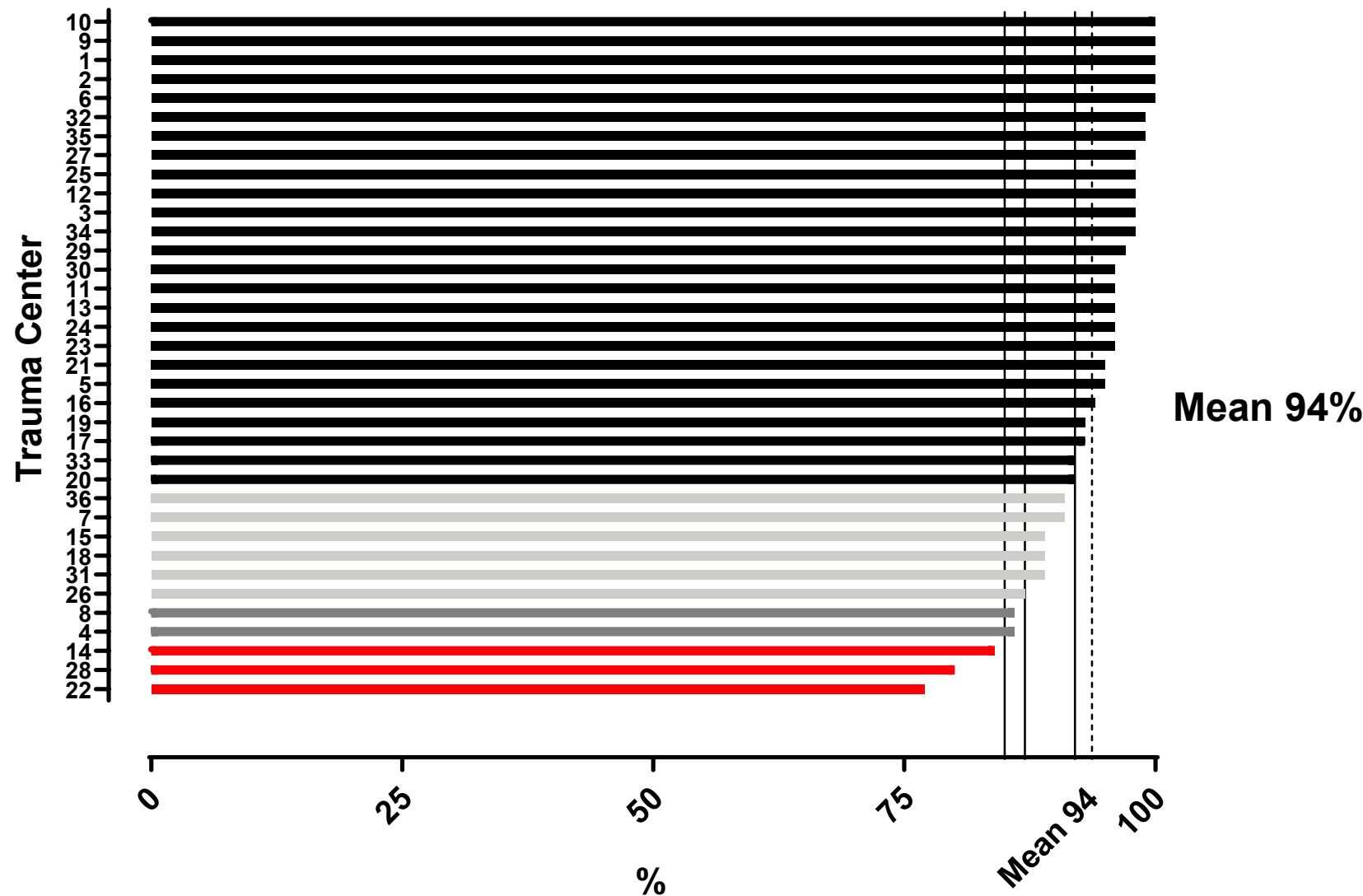


Mean 93%

Non-op excluded

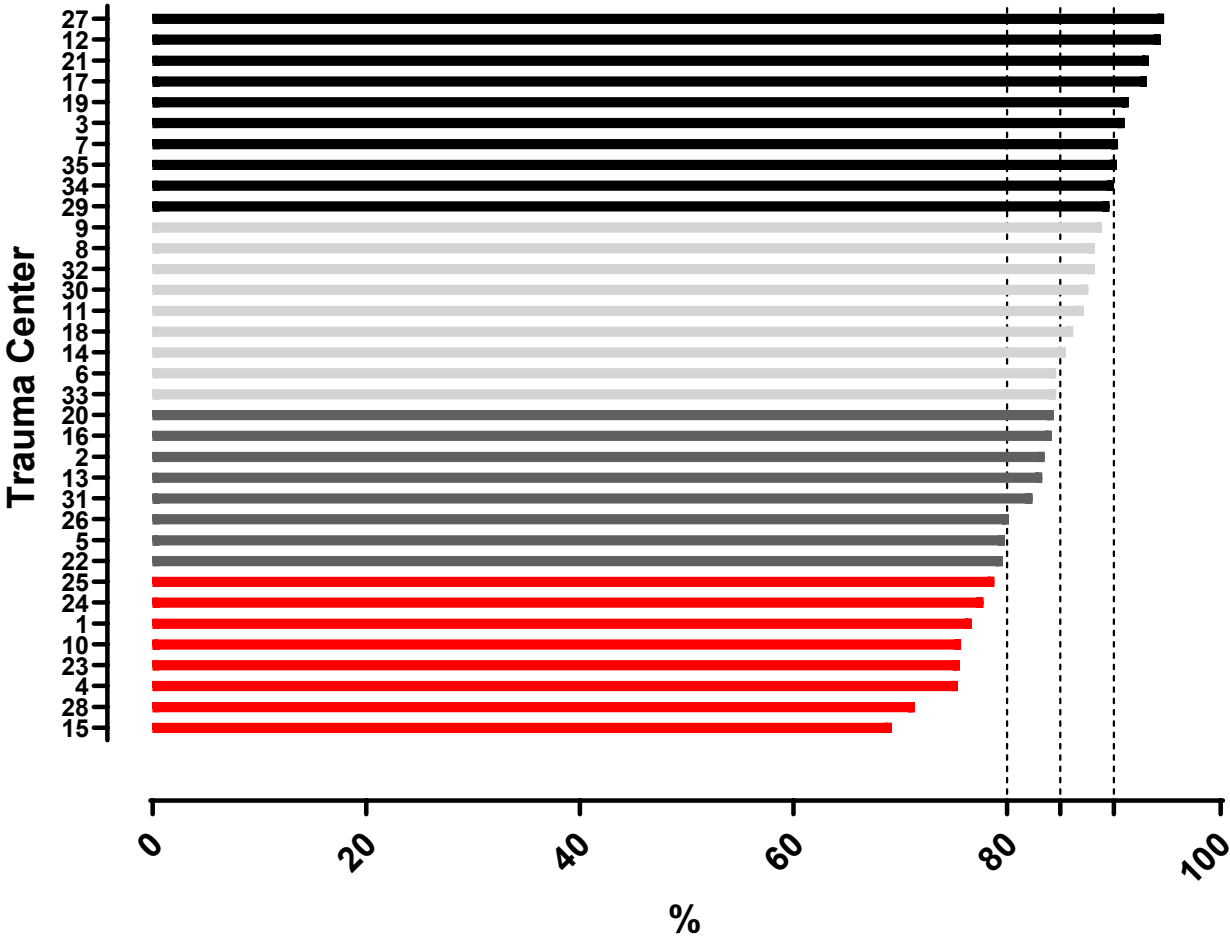
Last Year

Metric #5 - Timely Surgical Hip Repair \geq 65 years
Cohort 8 - Isolated Hip Fracture
7/1/20 - 1/31/21



2 Years Ago

Metric #5 - Timely Surgical Hip Repair \geq 65 years
Cohort 8 - Isolated Hip Fracture
7/1/19 - 1/31/20



Mean 85.3%

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

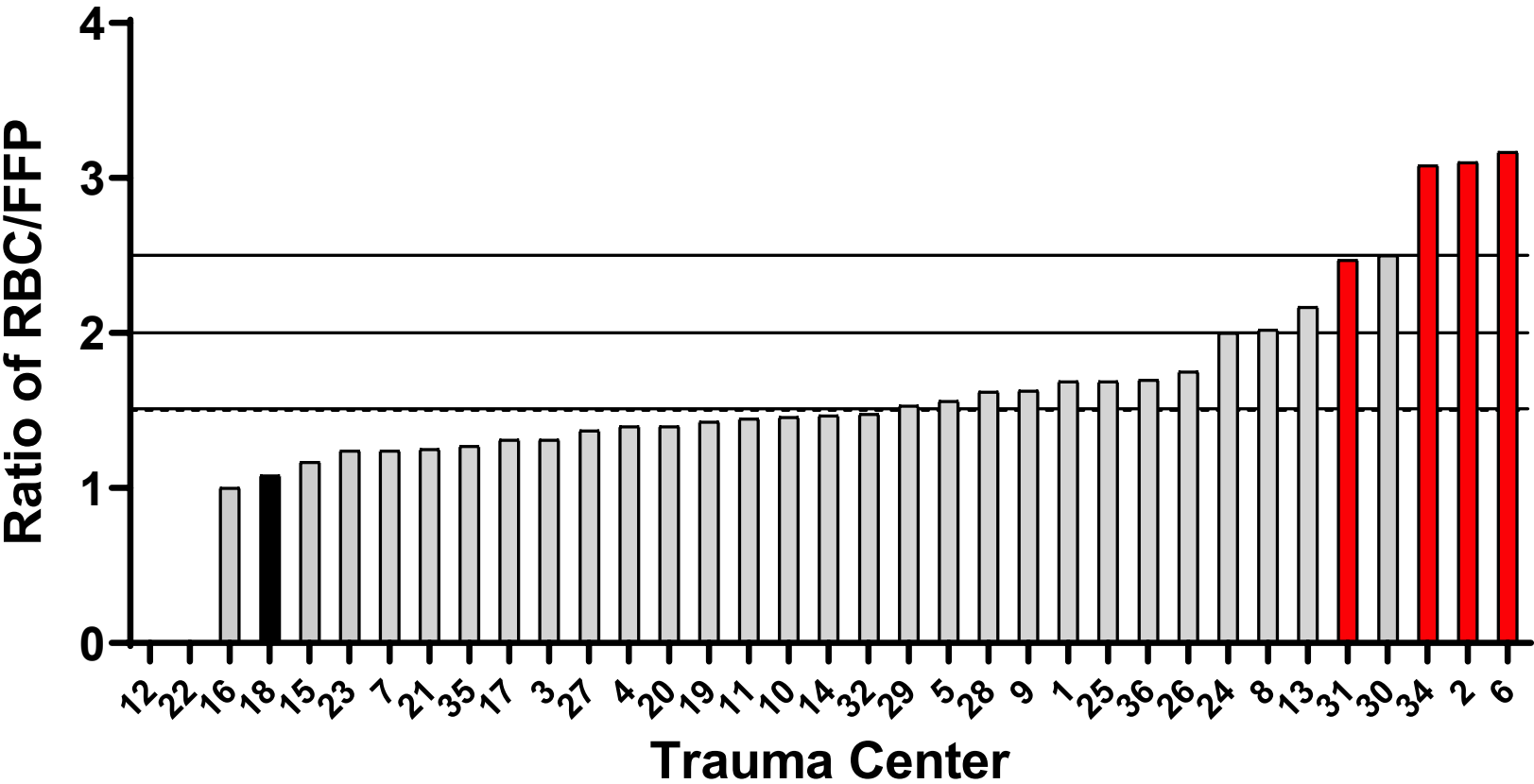
- ◆ Time to surgical repair of isolated hip fracture in patients age 65 or older (12 mo: 7/1/22-6/30/22)
 - $\geq 92\%$ of patients (≤ 48 hr)
 - $\geq 87\%$ of patients (≤ 48 hr)
 - $\geq 85\%$ of patients (≤ 48 hr)
 - $< 85\%$ of patients (≤ 48 hr)

? < 36 hours

#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: 1/1/21-6/30/22)

Metric 6 - RBC to FFP Ratio - Mean
Cohort 1 - MTQIP All
1/1/21 - 1/31/22



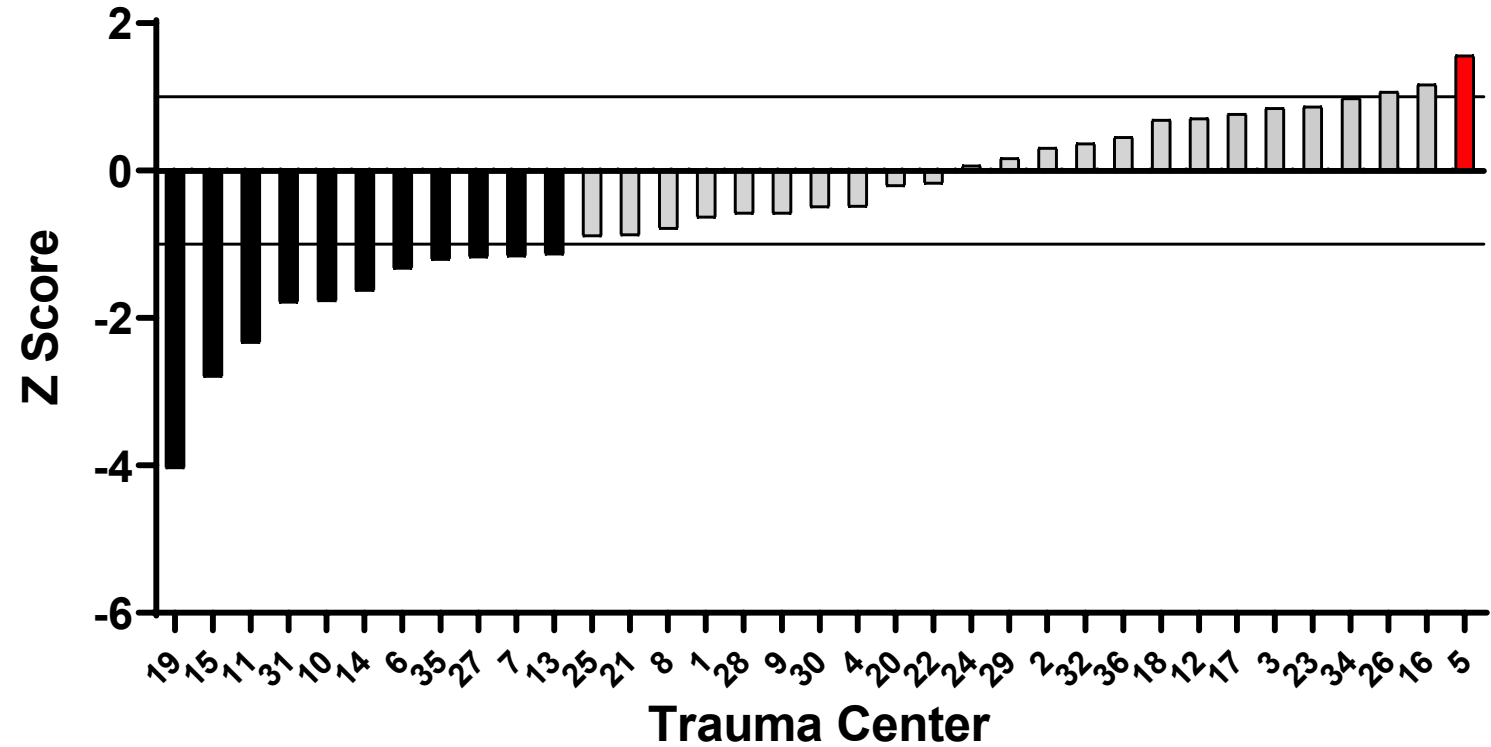
Mean 1.51

Z-score

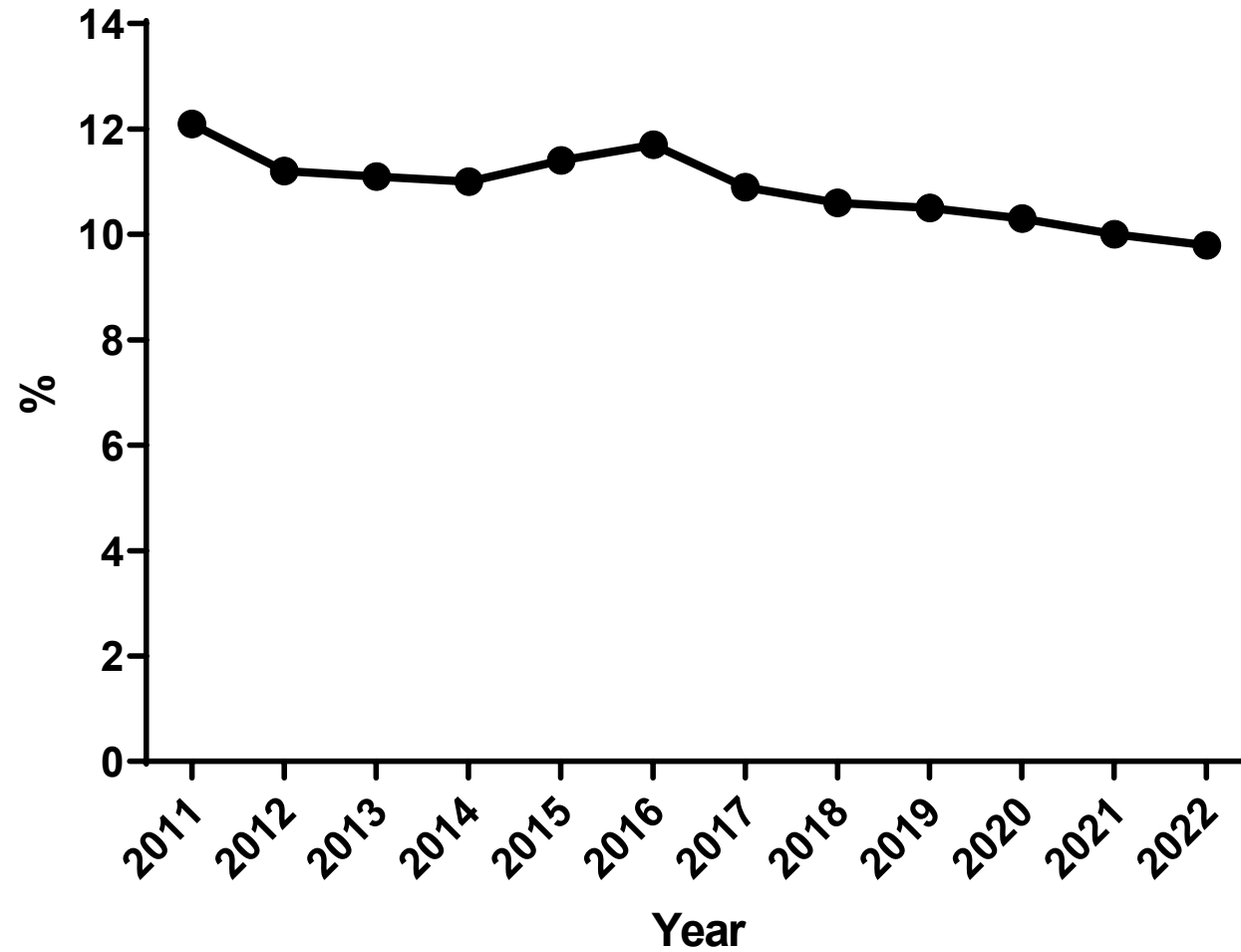
- ◆ Measure of trend in outcome over time
- ◆ Hospital specific
 - Compared to yourself
- ◆ Standard deviation
- ◆ > 1 getting worse
- ◆ 1 to -1 flat
- ◆ < -1 getting better

#7 Serious Complication Rate (Z-score)

Metric 7 - Z Score - Serious Complication Rate
Cohort 2 - Admit to Trauma
7/1/19 - 1/31/22

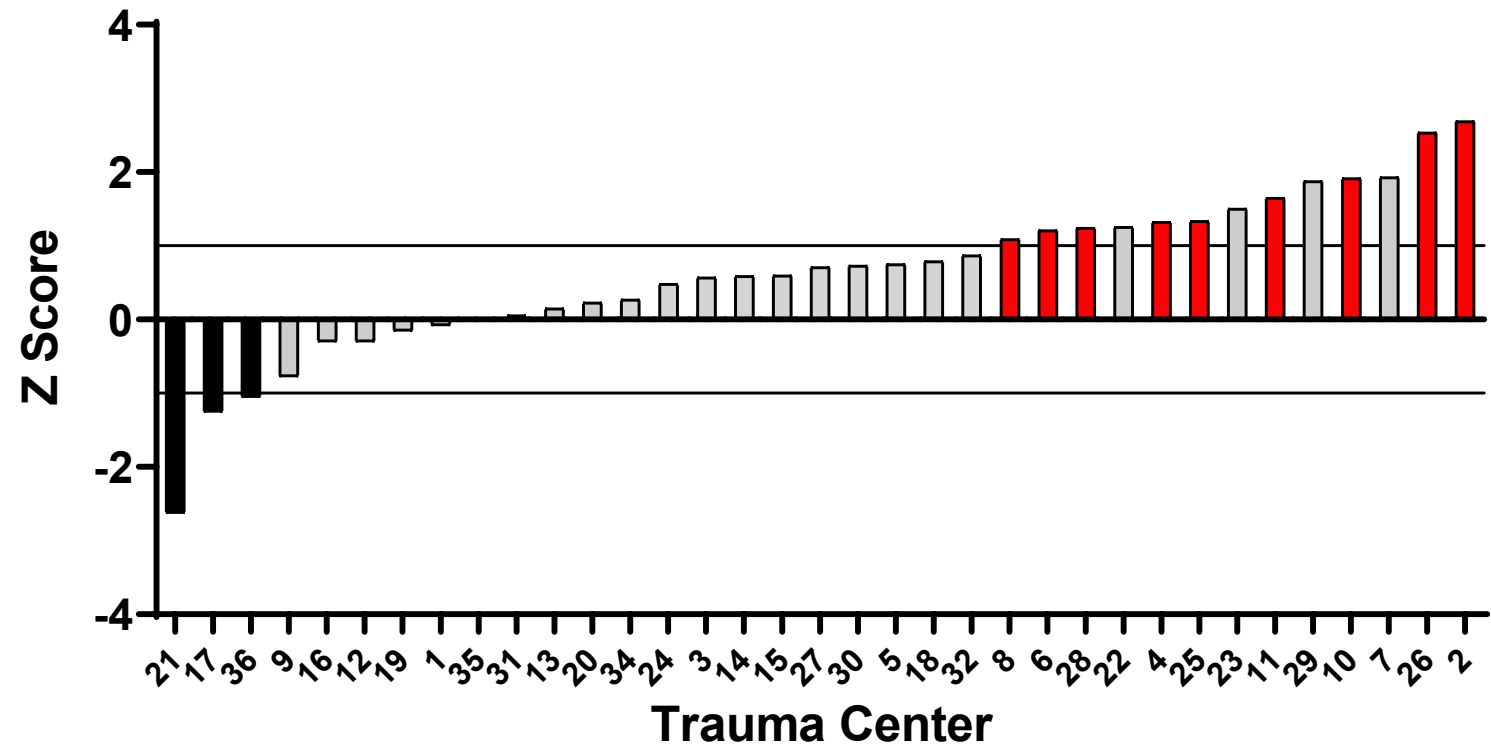


Collaborative Outcome Overview - Serious Cx Cohort 2 - Admit to Trauma

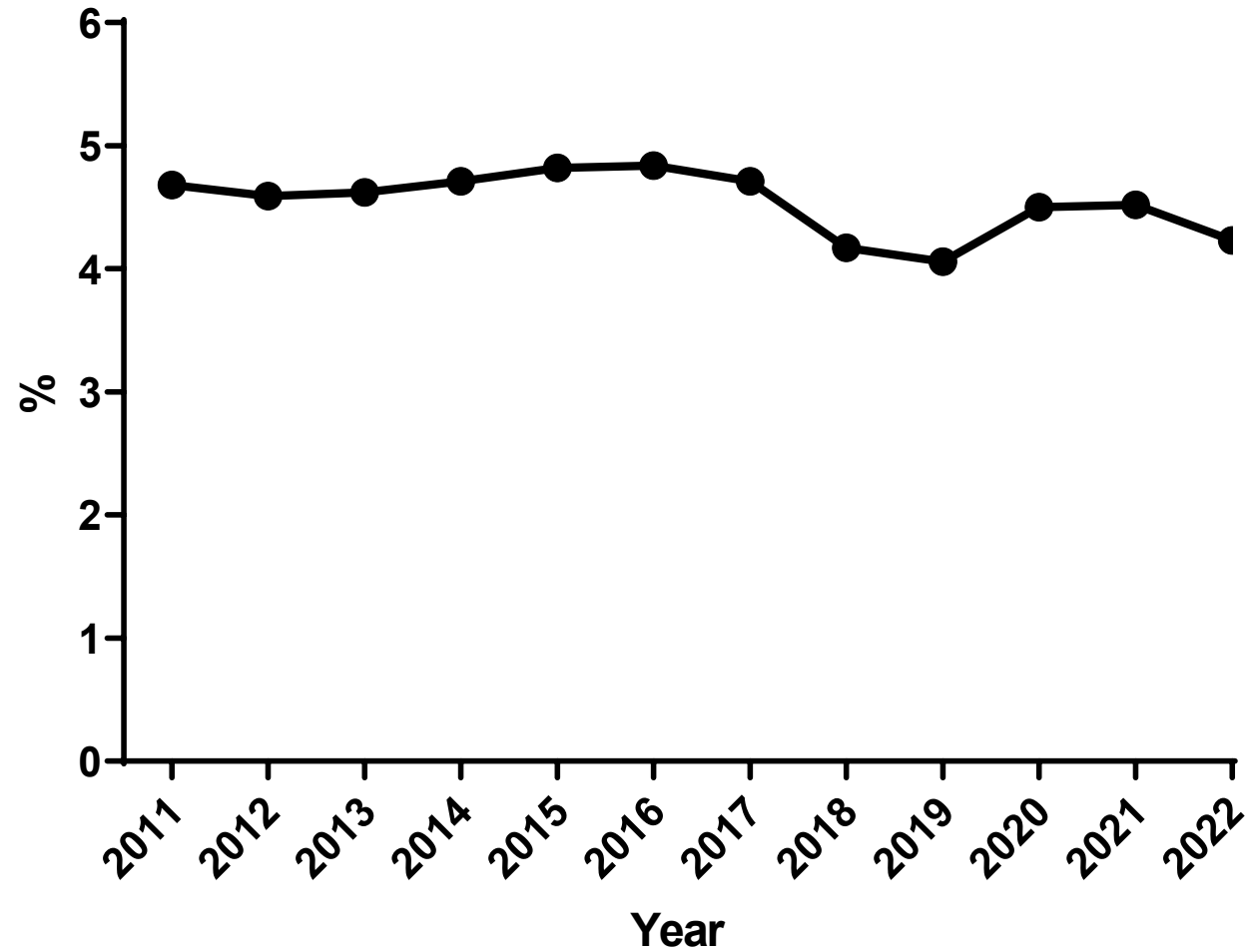


#8 Mortality Rate (Z-score)

Metric 8 - Z Score - Mortality Rate
Cohort 2 - Admit to Trauma
7/1/19 - 1/31/22



Collaborative Outcome Overview - Mortality Cohort 2 - Admit to Trauma



Mortality and Complications

Mark Hemmila, MD





FAILURE TO RESCUE IN TRAUMA: EARLY AND LATE MORTALITY IN LOW AND HIGH PERFORMING TRAUMA CENTERS

Naveen Sangji, MD, MPH, Laura Gerhardinger, Bryant W. Oliphant, MD, MBA, MSc,
Anne Cain-Nielsen, MS, John W Scott, MD, MPH*, Mark R. Hemmila, MD*
University of Michigan

Presenter: Naveen Sangji, MD, MPH

Discussant: Brittany K. Bankhead, MD, MS, Texas Tech University Health Sciences Ctr

Objectives: Failure to Rescue (FTR) is defined as mortality following a complication. FTR has had mixed results in the literature and has come under scrutiny as a quality metric to compare trauma centers. In contrast to elective surgery, trauma has an early period of high expected mortality due to injury sequelae rather than a complication. Here, we report FTR in early and late mortality using an externally validated trauma patient database.

Methods: The study included 114,220 patients at 34 Level I and II trauma centers in a statewide quality collaborative (2016-2020) with ISS ≥ 5 . Emergency room deaths were excluded. Multivariate regression models were used to produce center-level adjusted rates for mortality and major complications. Centers were ranked on adjusted mortality rate and divided into quintiles. Early deaths (within 48 hours of presentation) and late deaths (after 48 hours) were analyzed.

Results: Overall, 7.8% of patients had a major complication and 3.1% died. There was no difference in the mean risk-adjusted complication rate amongst the centers (Figures 1 and 2). FTR was significantly different across quintiles. For early deaths the FTR rate was 7.3% in the highest vs. 2.4% in the lowest mortality quintiles, $p < 0.001$ (ANOVA). For late deaths, the overall FTR rate was 14.0% vs. 4.7% for early deaths, and there was a twofold increase in the FTR rate between the lowest and highest performing centers, $p < 0.001$.

Conclusions: Similar to elective surgery, low-performing trauma centers have higher mortality rates due to lower rates of rescue following complications. Expected deaths may contribute more to early mortality than late mortality at low and high performing centers. A better understanding of the complications and their role in mortality after 48 hours is an area of interest for quality improvement efforts.

Failure to Rescue in Trauma: Early and Late Mortality in Low and High Performing Trauma Centers

34 Level I and II Trauma Centers

114,220 Patients

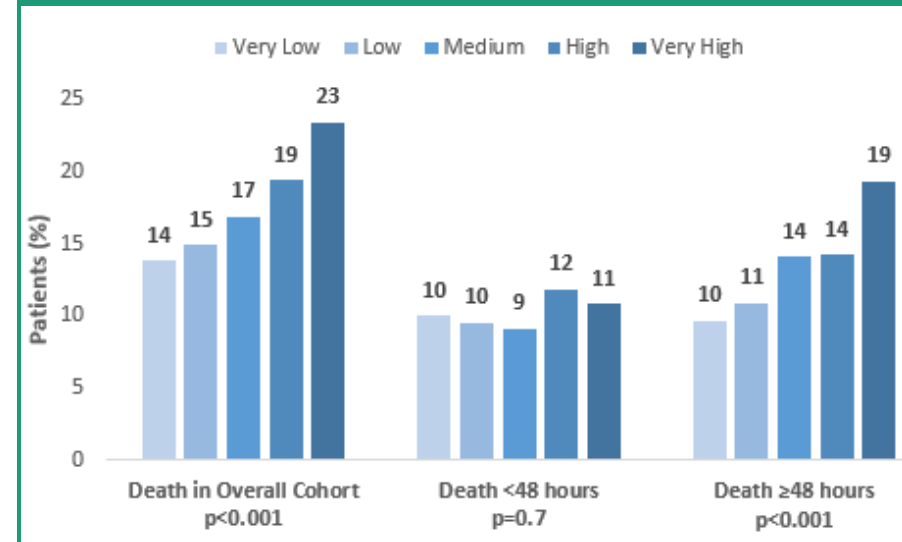
7,700 Complications

3,570 Deaths

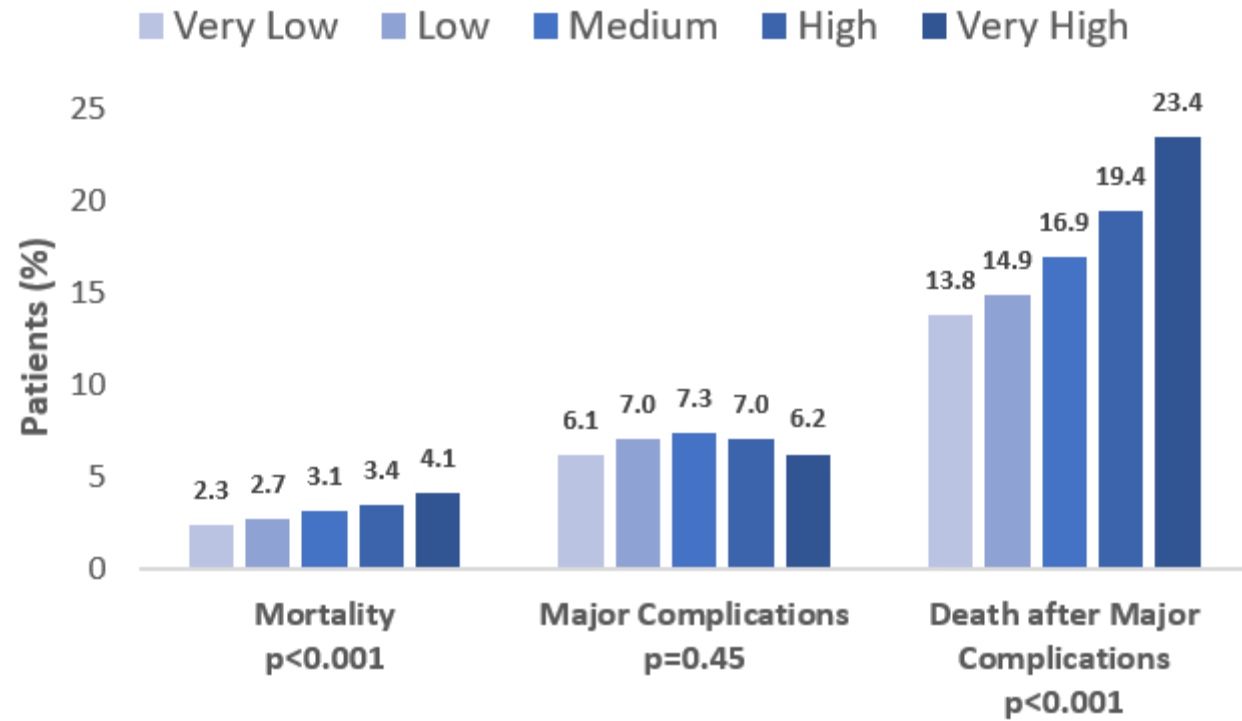
Failure to Rescue = Death after Complication

- ≥ 1 Major Complication
- Risk-adjusted Quintiles of Overall % Mortality
 - Early deaths < 48 hrs
 - Late deaths ≥ 48 hrs

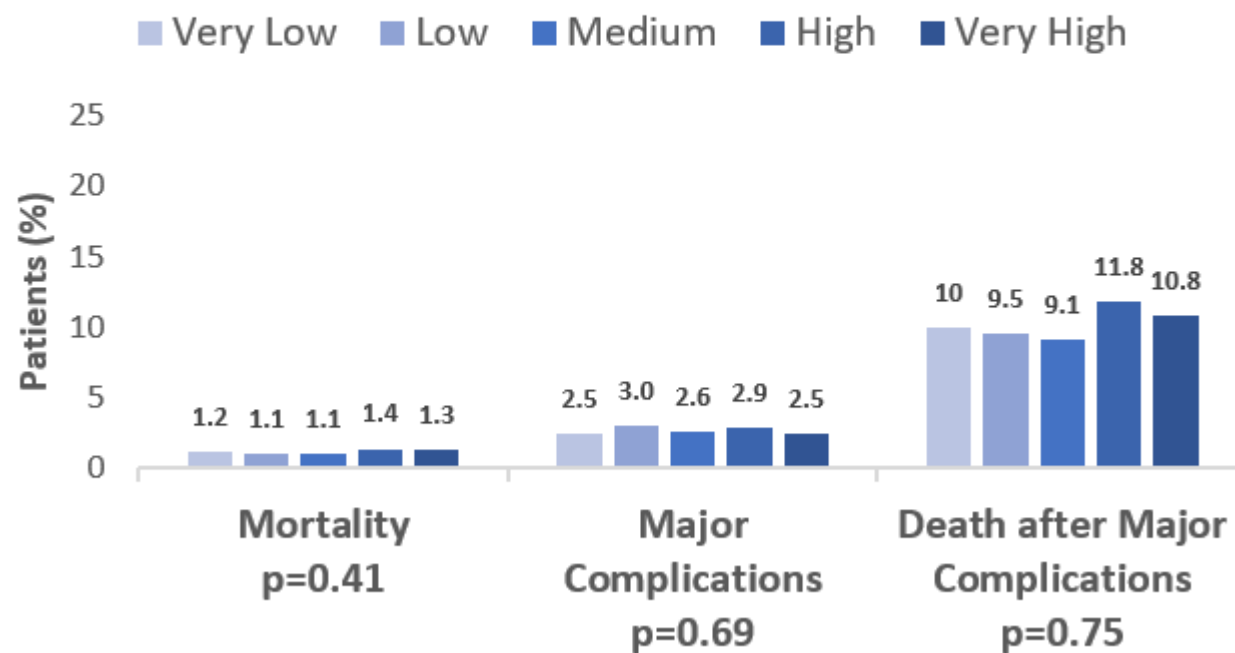
Failure to Rescue by Quintile of Mortality



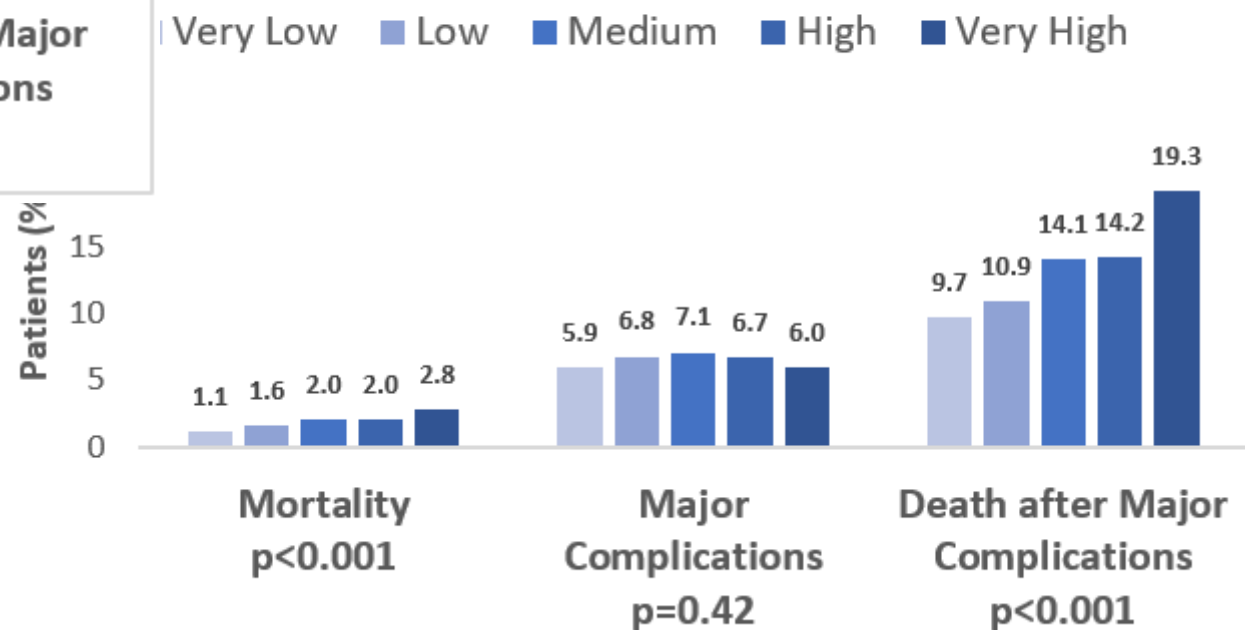
Hospital Mortality (quintiles)



Hospital Mortality (quintiles) for Early (<48 hours) Deaths



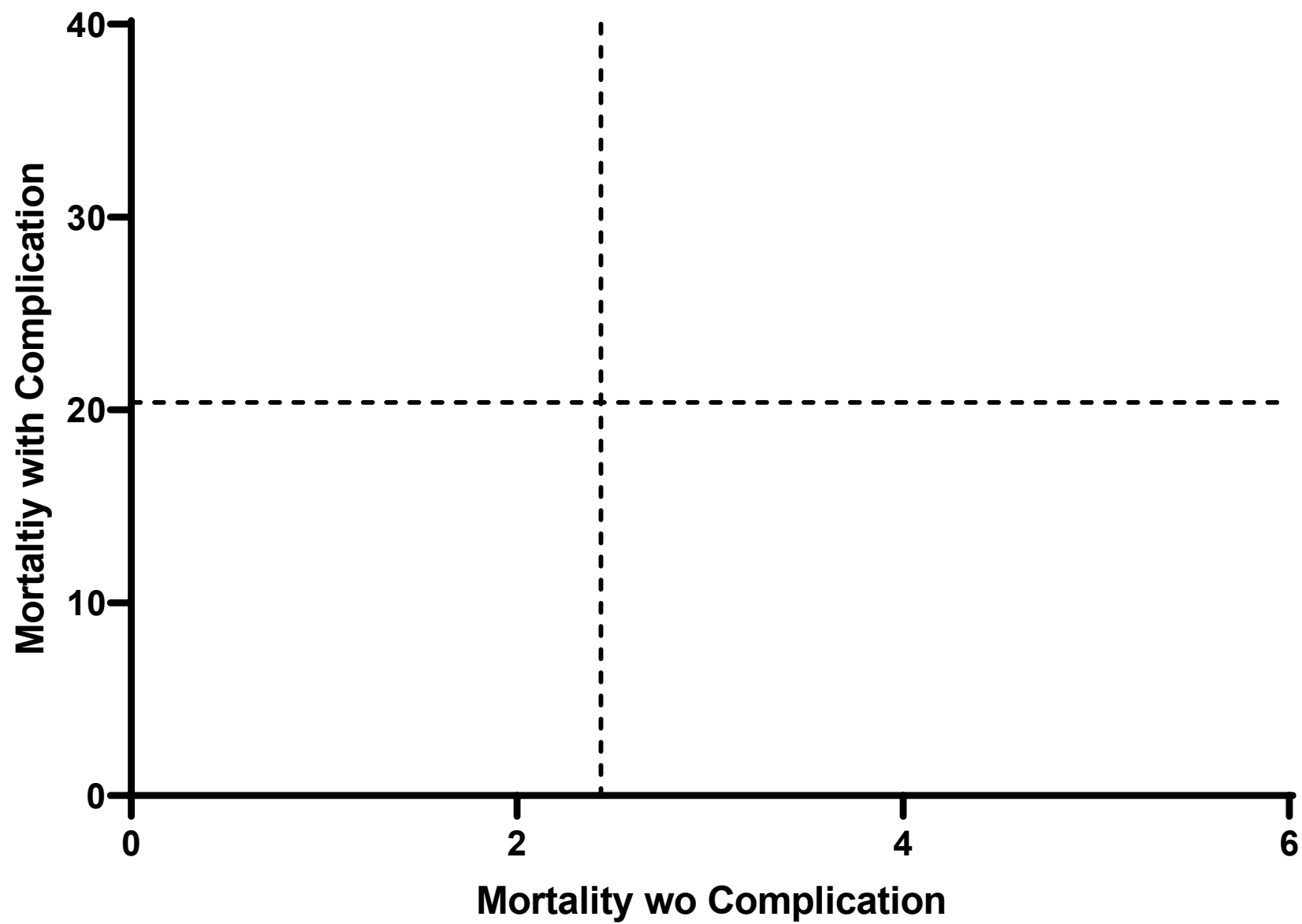
Hospital Mortality (quintiles) for Late (>48 hours) Deaths

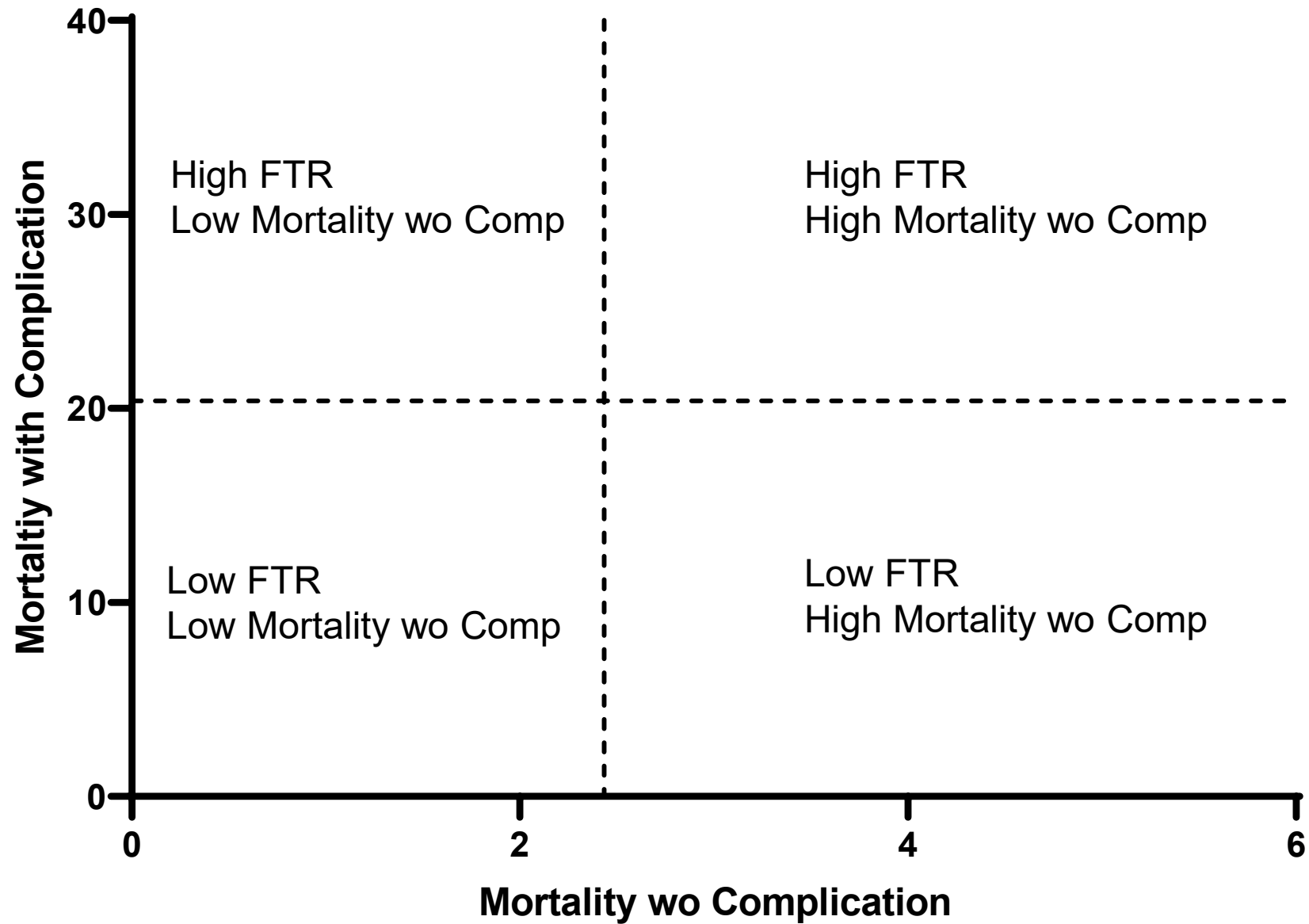


Peer Review

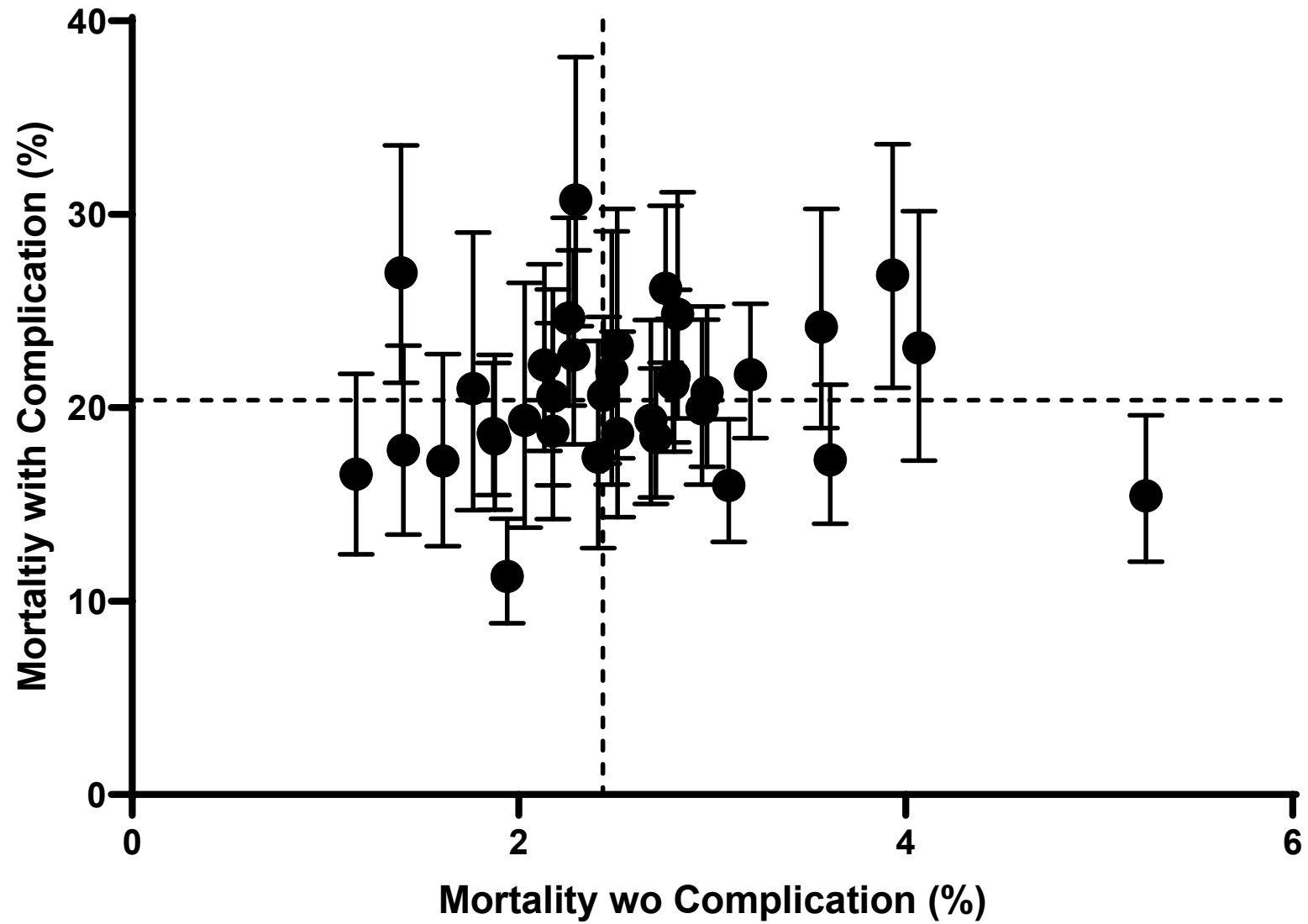
- ◆ What about early deaths in ED?
- ◆ Circular definition of major complications
 - Those with a high rate of mortality
- ◆ Can there be a more complete picture?

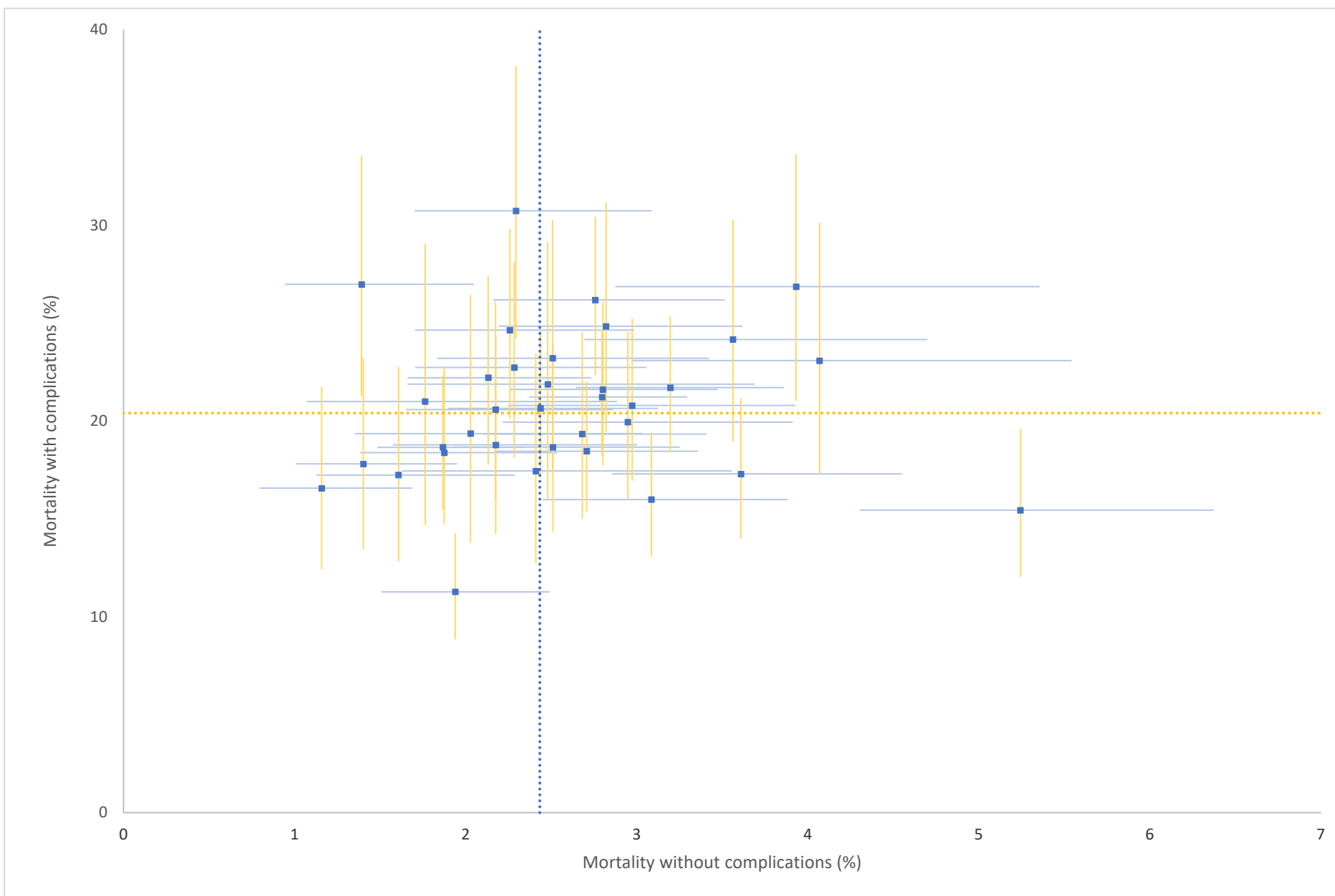
Mortality Rate	Alive	Complication		Complication Rate
	Dead	Complication	FTR	
	Dead	None		
	Alive	None		



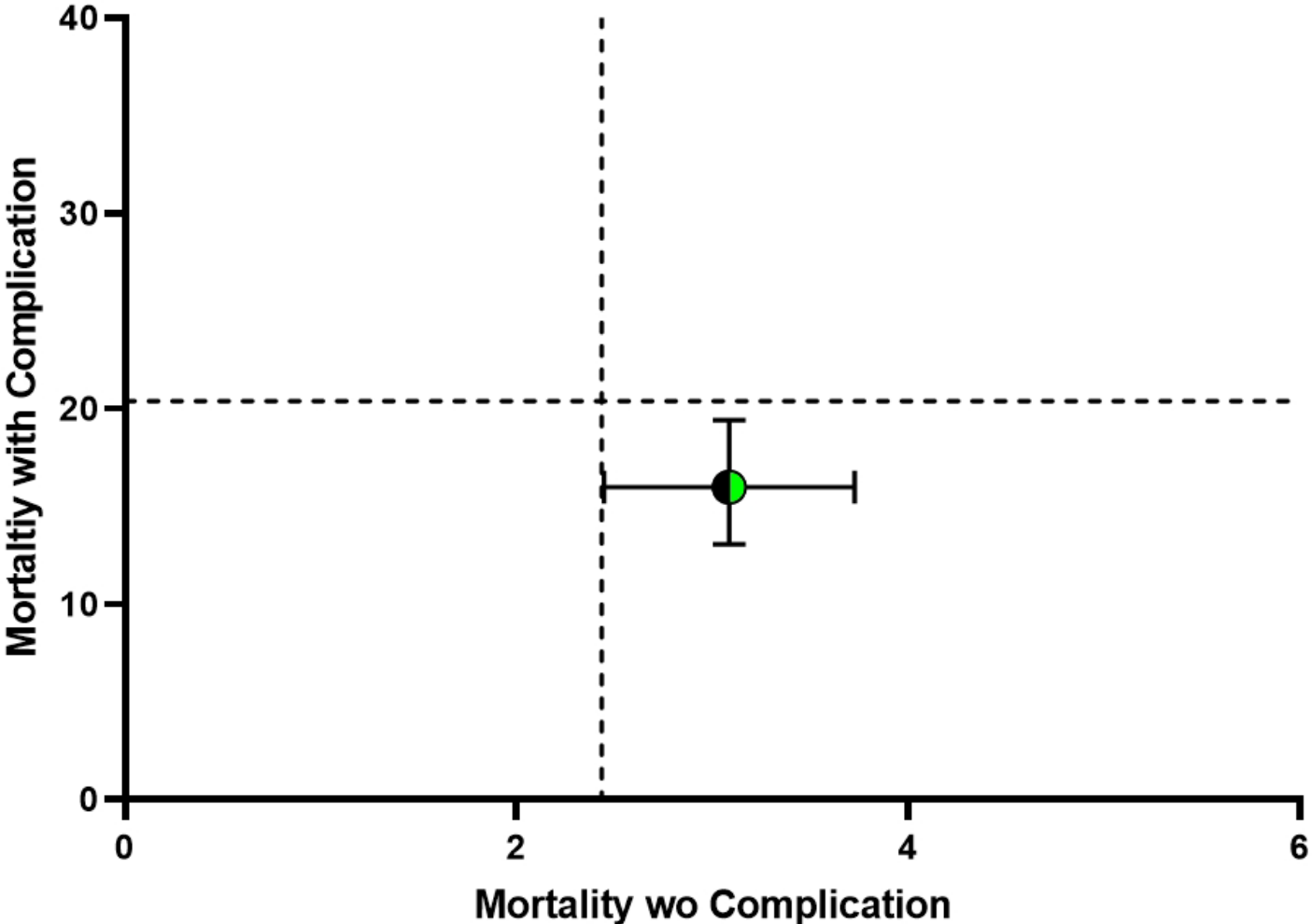


MTQIP (1/2019 - 12/2021)

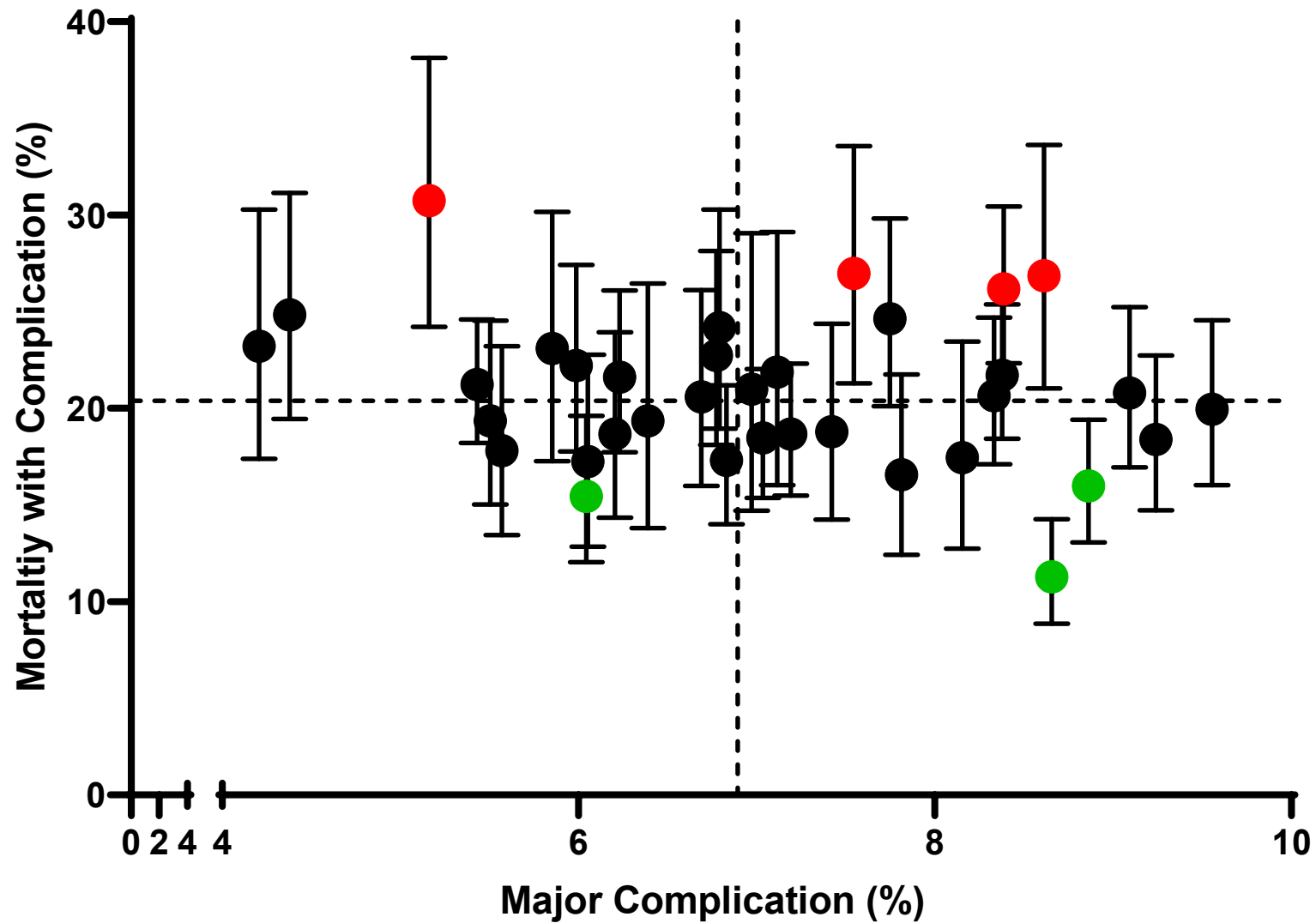




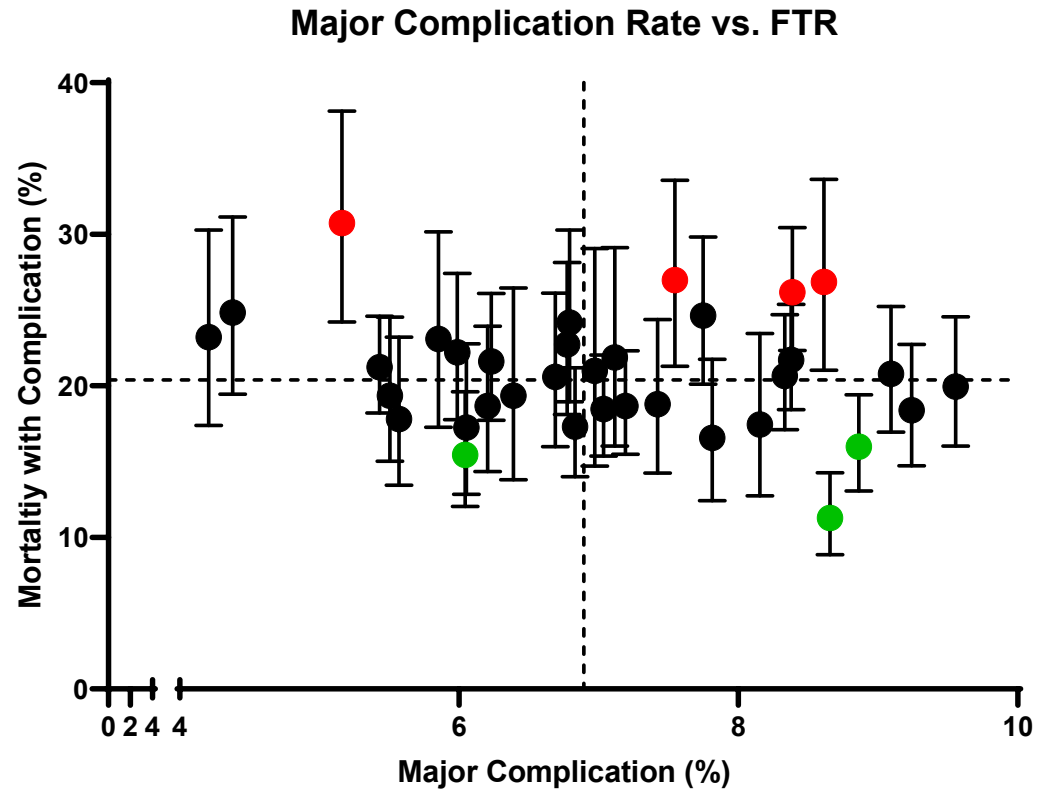
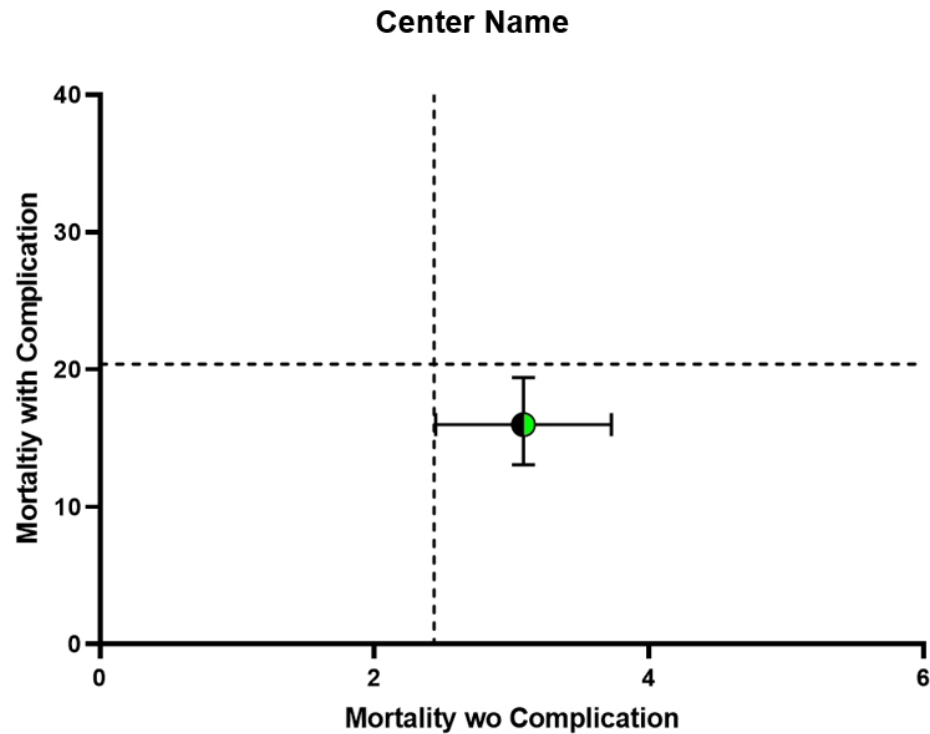
Center Name



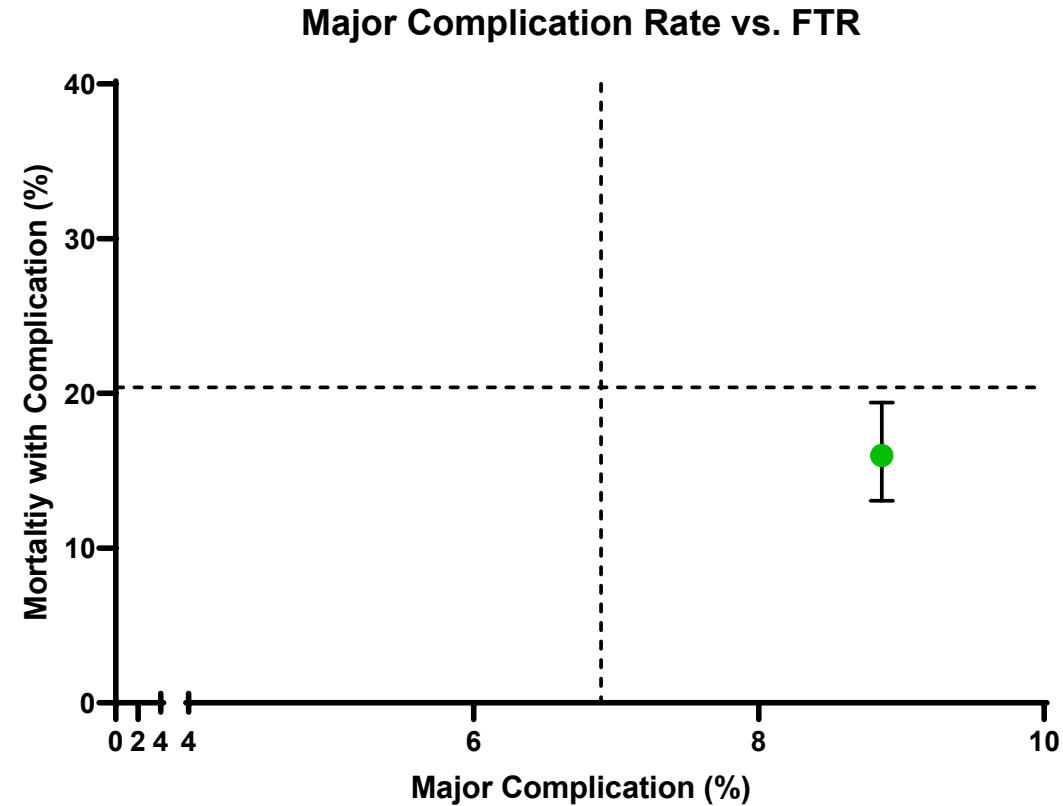
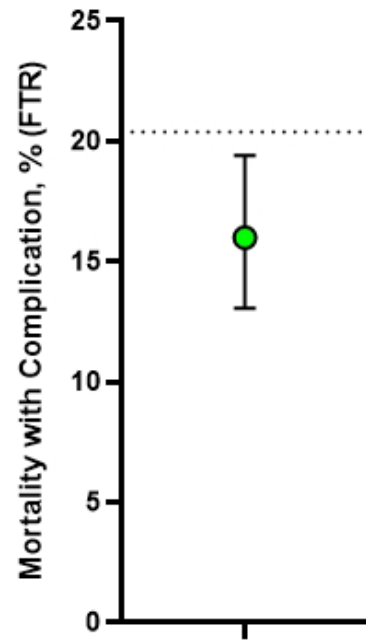
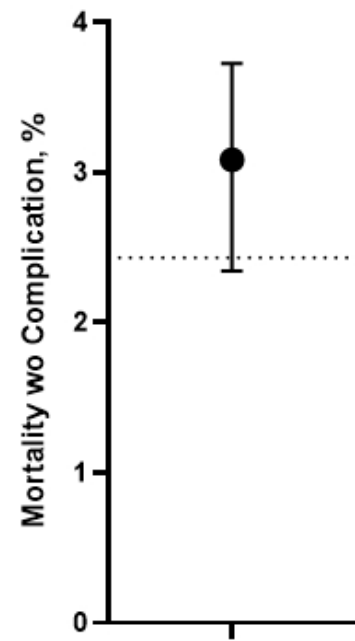
Major Complication Rate vs. FTR



Helpful or Mark you are making my head hurt?



Helpful or Mark you are making my head hurt?



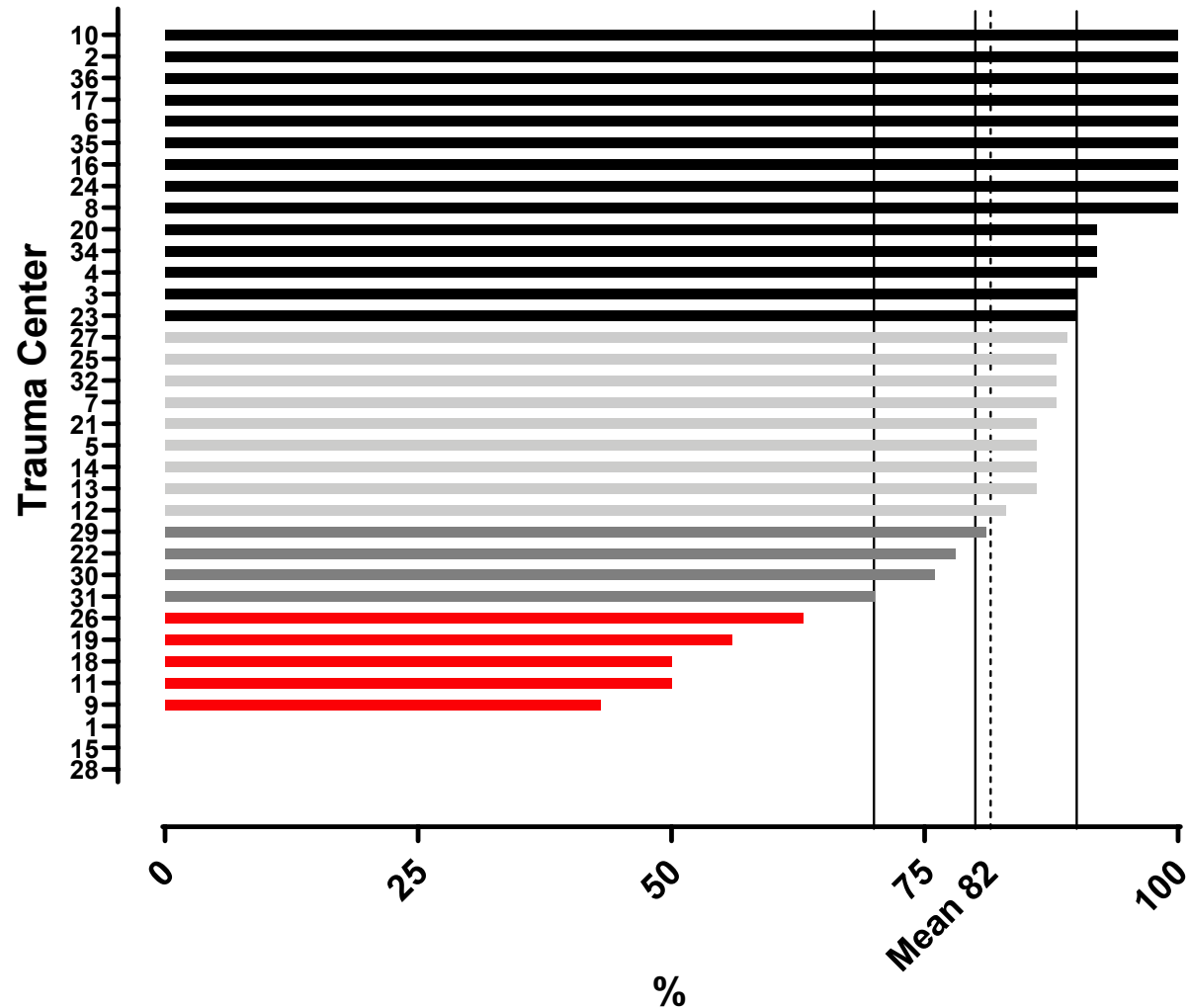
#9 Timely Head CT in TBI Patients on Anticoagulation Pre-Injury

- ◆ 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 = 7/1/19 to 6/30/20

#9 Head CT in Anticoagulated Patient with TBI

- ◆ 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)
7/1/21 - 1/31/22



Mean 81.5% ↓ 85.2%

14/35 Centers \geq 90% (-2)

#9 Head CT in Anticoagulated Patient with TBI

- ◆ Trend
 - 2017 = 80.7
 - 2018 = 85.4
 - 2019 = 88.6
 - 2020 = 86.3
 - 2021 = 83.4
- ◆ Can you impact this?
- ◆ Does it still matter to you?
- ◆ Small Numerators and Denominators effect

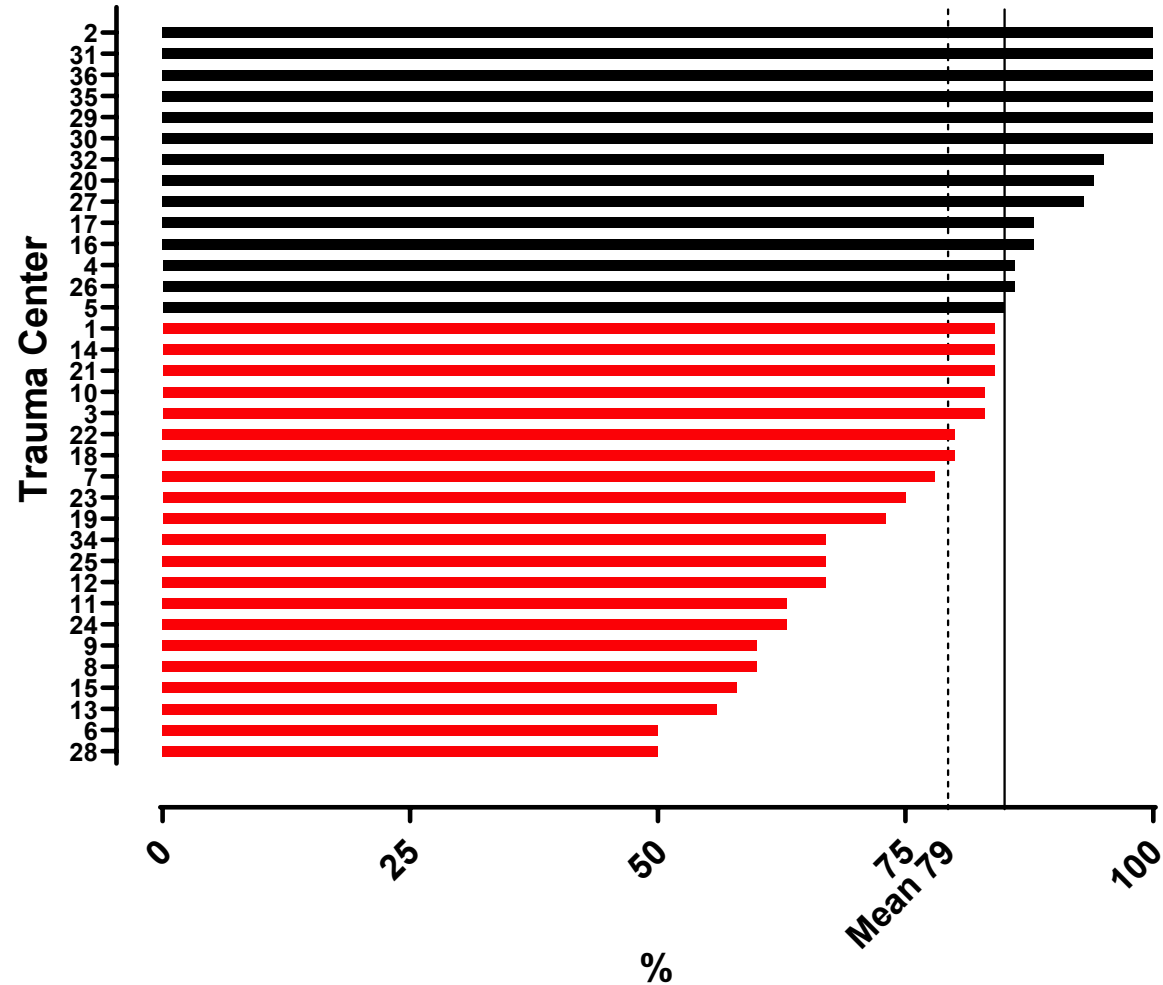
#10 Timely Antibiotic in Femur/Tibia Open Fractures - Collaborative Wide Measure

- ◆ 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 = 7/1/19 to 6/30/20

#10 Open Fracture Antibiotic Usage

- ◆ Measure = % of patients with antibiotic type, date, time recorded ≤ 90 minutes
 - $\geq 85\%$ patients (≤ 90 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

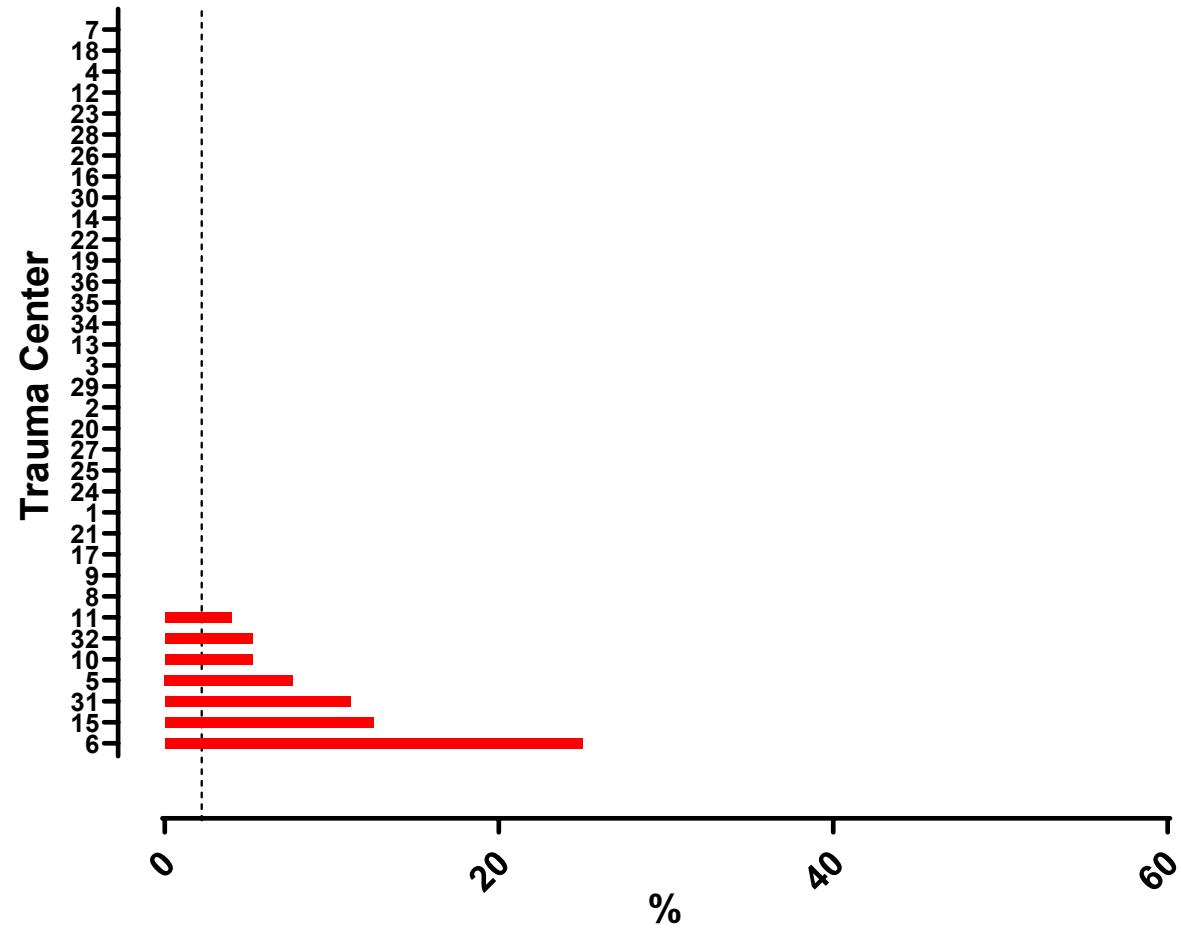
Metric 10 - Open Fracture - Time to Abx \leq 90 min
Cohort 1 - MTQIP All
7/1/21 - 1/31/22



14/35 Centers \geq 85%

**Collaborative Mean
= 79.3%**

Open Fracture - Missing Type, Date or Time
Cohort 1 - MTQIP All
7/1/21 - 1/31/22



	year	all	abx_data_ok	time_less_90	time_less_~k	per_ok	per_less_90	per_less_9~k
1	2016	545	29	26	25	5.3	4.8	4.6
2	2017	591	549	422	419	92.9	71.4	70.9
3	2018	612	596	478	477	97.4	78.1	77.9
4	2019	704	693	586	586	98.4	83.2	83.2
5	2020	793	786	688	687	99.1	86.8	86.6
6	2021	837	824	695	692	98.4	83.0	82.7
7	2022	25	25	15	15	100.0	60.0	60.0

	all	abx_data_ok	time_less_90	time_less_~k	per_ok	per_less_90	per_less_9~k
1	456	447	362	359	98.0	79.4	78.7

Delta of -30 patients out of 456

Annual volume is around 800 patients

#10 Open Fracture Antibiotic Usage 2022

- ◆ Check your list of patients
 - June Submission
 - Jill will send out separately in June/July
- ◆ Every patient counts

MTQIP Hospital Scoring Index Future

Mark Hemmila, MD



Potential Changes

- ◆ Mortality Classification
 - Cohort 2
- ◆ #4 Timely LMWH
 - Weight based dosing protocol
 - TBI and/or Spine rates
- ◆ #5 Timely IHF repair
 - 36 hrs
 - Geriatric involvement
- ◆ #6 Timely Head CT in anticoagulated
 - Collaborative wide?

Potential Changes

- ◆ Mortality Classification
 - Cohort 2
 - Total # of deaths missing a PI classification ?
 - Percent of deaths missing a classification ?
 - 5 points ?

Potential Changes

- ◆ #4 Timely LMWH
 - Weight based dosing protocol
 - ◆ % + weight-based protocol (10,8,5,0 points)
 - ◆ % (8,6,3,0 points)
 - TBI and/or Spine rates

Potential Changes

- ◆ #5 Timely IHF repair
 - 36 hrs – Show data
 - Geriatric involvement

Potential Changes

- ◆ #6 Timely Head CT in anticoagulated
 - Collaborative wide?
 - 5 points
 - Drop ?

Break

Back at 3:20 p



Whole Blood

Oreste Romeo, MD
Cheryl Stevenson, MSN, RN

Bronson Methodist Hospital



WHOLE BLOOD

May 18, 2022

Dr. Oreste Romeo, MD, FACS
Cheryl Stevenson, MSN, RN, SANE-A, SANE-P, TCRN



Disclosure

- No disclosures



Historical to Current

- Iraq/ Afghanistan conflicts swung pendulum back - Reconstituted 1:1:2/ 1:1:1 And FWB
- Before 2005 mostly reignited by poor supply of PLT availability/ease of storage in deconstructed ratios, shift of WB use from “rescue” therapy to early strategy for mitigation and resuscitation of life-threatening hemorrhagic shock.
- 2004- 2006 “Damage Control Resuscitation” solidifying into bundles of care with Hemostatic Resuscitation as centerpiece



Misconceptions

- WB must be ABO specific/high inventory +\$\$\$ / high waste
- No leukoreduction is possible-if so loose PLT in the process making it a no PLT tx
- At 4° C PLT becomes spherical with loss of function and agreeability or non-viable
- Cost of upfront purchase vs benefit



Facts

- At 4° C PLT function improved-stronger aggregability and stability of the clot
- Leukoreduction is possible-FDA approved filter WB specific (BMH:leuko-reduce prior to releasing)
- Risk for administration low titer WB=0-RBC
- Risk of ABO incompatibility & associated hemolytic reaction 1:120,000
- Costs of MTP higher (fractionation, PLT less functional and cost of bacterial testing if stored at 22° C, packaging issues/waste for plasma upon thawing) may argue in favor of WB



Inferred Benefits

- Less dilute vs component tx
- Dual effect-targets shock along with coagulopathy with less volume
- At 4° C storage, PLT activity is increased vs pheresis with 22° C storage
- Storage up to 21 Days in CPD (Citrate Phosphate Dextrose), 35 Days in CPDA1 (Citrate Phosphate Dextrose Adenine)
- Faster correction of physiologic (TEG/PLT mapping) coagulative endpoints



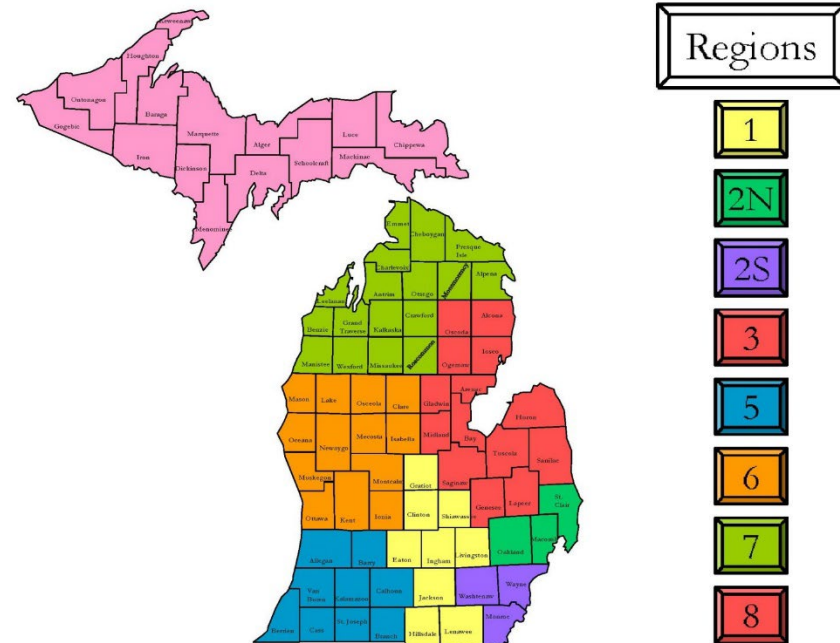
Logistical Benefits: Pre-Hospital

- Prehospital logistics/portability and packaging of multiple products in single release-exported use in prehospital setting for Region 5 to Air Medical Transport (WMAC) only. Unit ~500g vs plasma only ~400g with weight benefit ratio



Bronson Methodist Hospital

- Level I ACS Verified Trauma Center located in Southwest Michigan
- Region 5
- 52 bed ED with ~ 90,000 visits a year
- 350 inpatient beds





Why Whole Blood

- Timeliness of release of blood products for MTP
- Early pro-coagulable effect compared to component therapy
- Literature review pointing to benefits of whole blood therapy
- New logistics of lab/blood bank move



Steps to Success

Involved and
determined blood
bank manager
and supervisor

Supportive
hematology
medical director

Multiple
meetings to
develop a plan

Changes to MTP
policy



Planning

- In July 2018 corporate decision due to increase in needs to move lab and blood bank off site to their own individual facility.
- Literature review in 2019
- Met monthly to develop a plan
- Find a distributor for Whole Blood
- Blood & Blood Transfusion Policies updated
- SW for ED refrigerator updated
- Mass Transfusion Policy updated



Whole Blood Supplier

- Versiti Blood Center does not carry WB
- Bloodbuy out of South Texas Blood & Tissue Center
- Started with 4 units total at BMH
- 2 units WB in ED refrigerator
- 2 units in blood bank
- Standing order 2 units delivered every Thursday
- Request additional supplies if ran out



Cost

- **Whole Blood-\$500**
- **Packed Red Blood Cells-\$203**
- **Fresh Frozen Plasma-\$48**
- **Liquid Plasma-\$93**
- **Platelets-\$695**
- **Cryoprecipitate-\$278**



Blood & Blood Product Transfusion

- Added a section to include Whole Blood
 - Low titer type O-positive whole blood may be stocked in the ED Trauma Refrigerator based upon availability
 1. Indications
 - a. Used in cases of severe life-threatening hemorrhagic shock as a bridge to massive transfusion
 - b. Available for males \geq 15 years old and females $>$ 50 years old
 - c. Risks: Hemolysis from anti-A and/or anti-B in a patient with the A or B red blood cell type



ED Standard of Work


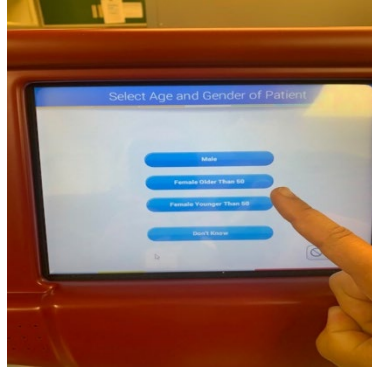

- Update the Priority Blood Standard of Work for the ED
- Educate Red Team nurses
- Check off for nurses on removing WB






Frontline Standard Work

Removing Priority Blood from Fridge

Area: BMH T&ED
Date & Version: March 2021
Who worked on it:

#	Major Step	Key Point (Why?)	🕒	Diagrams etc.
6	Select "Taking Out" on the touch screen			<div>7</div>  <div>9</div>  <div>10</div> 
7	Select "Red Cells", "Plasma", or "Whole Blood"	<ul style="list-style-type: none"> ▪ Criteria for Whole Blood: Only Traumas; Males 15 yrs and older; Women 50 years and older (non childbearing age) ; or per Trauma physician's discretion • Get clear orders from Trauma physician of what blood products he or she wants 		
8	Scan the barcoded patient label sticker on the Emergency Release flowsheet	<ul style="list-style-type: none"> • Obtain CSN from Registration if barcoded patient sticker not available during EPIC downtime. Will need to manually type in CSN during downtime. • Verify correct patient with Last Name, First Name, Birthdate, and Gender. The Medical Record Number will display the patient's CSN. • MRN=CSN. 		
9	If RBCs are requested, the screen will prompt you to answer the age/sex of the patient.	<ul style="list-style-type: none"> • Rh Positive units will be selected for Males and Women 50 and older (non childbearing age). Rh Negative units will be selected for women under 50 and when sex is unknown. 		
10	If selecting to remove "Whole Blood" or "Plasma" then select that option	<ul style="list-style-type: none"> ▪ Whole blood will have more volume in the bag compared to PRBCs ▪ It will not ask you the age or gender of patient for whole blood or plasma ▪ Whole Blood=1 PRBCs and 1 Plasma 		

Frontline Standard Work				
	Removing Priority Blood from Fridge			Area: BMH T&ED Date & Version: March 2021 Who worked on it:
#	Major Step	Key Point (Why?)		Diagrams etc.
20	If whole blood is not available in the fridge a sign will be placed on the kiosk	<ul style="list-style-type: none"> Blood bank will call charge nurse to notify him or her to place the sign on the kiosk Communicate with trauma physician that it's not available, but can pull PRBCs and plasma if not available 		20 
21	When Blood Bank is able to refill the fridge with whole blood they will remove the sign and place it back in the folder hanging			21 
22	In Epic, document how many units given of each product	<ul style="list-style-type: none"> This includes whole blood as well 		22



Initial ED Blood Refrigerator

- 2 units of whole blood-low titer type O+
- 6 units of RBC type O+
- 6 units of RBC type O-
- 6 units of liquid plasma or FFP
- Sign to indicate when whole blood is out
- Sign removed when restocked



Mass Transfusion Policy

- System Wide Policy
- Needed to include Whole Blood Definition
- Whole Blood use for trauma's only
- Whole Blood stocked in ED refrigerator



Communication & Education

- Discussed for 6 months at Trauma PI
- Final Go-Live date March 26, 2021
- **Whole blood would be given to...**
 - Male Patients ≥ 15
 - Female patients >50 or non-childbearing
 - Trauma attendings discretion

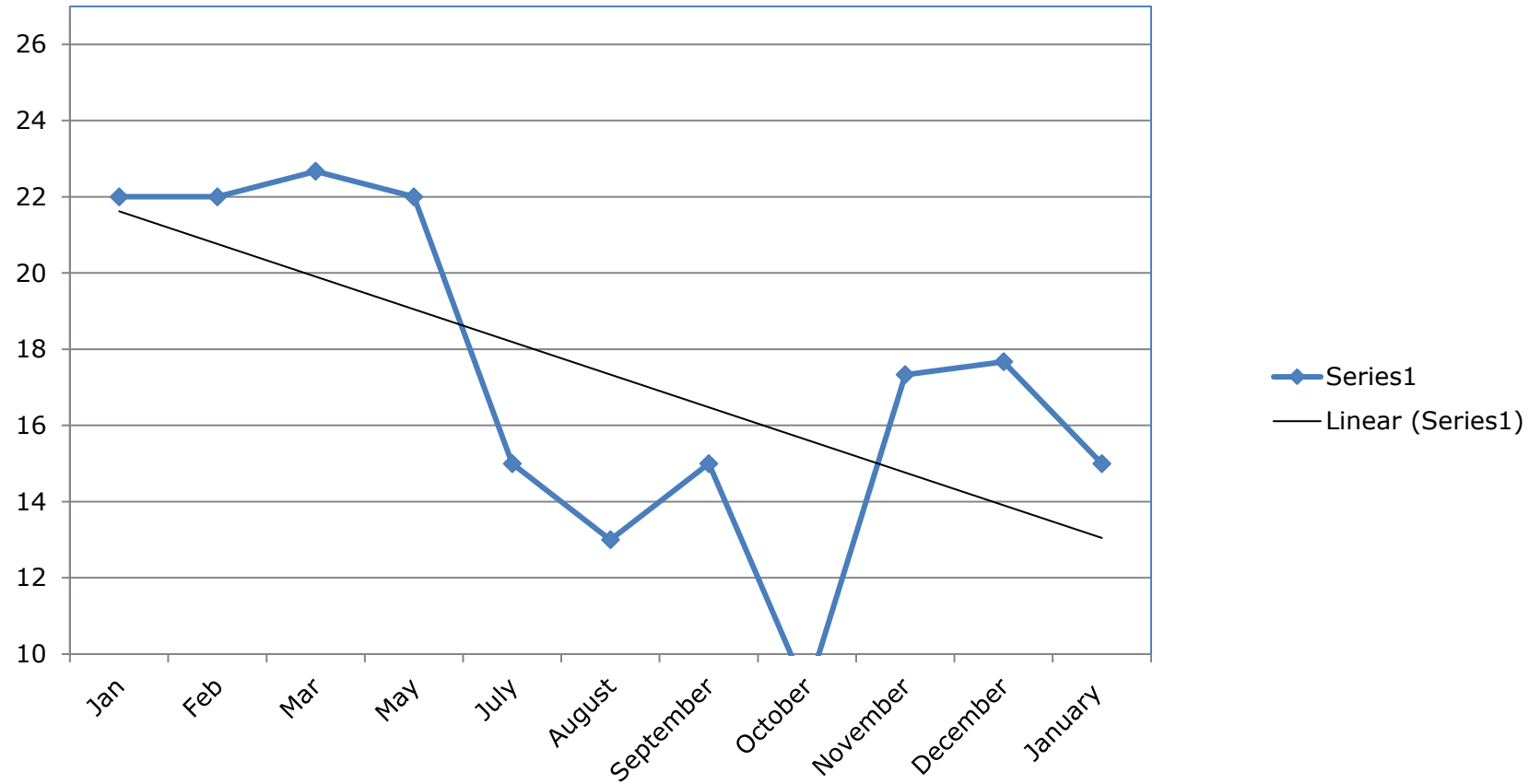


Go-Live

- Live 3/26/2021 at 00:01
- First whole blood use XX/XX/2021 @ XX:XX from ED fridge
- ED fridge restocked XX/XX/2021 at XX:XX



MTP PI Graph





Example of BB Feedback

- Patient Arrived
 - Units were transfused from the ED fridge (2 WB, 3 RBC and 1 plasma)
 - MTP Initiated
 - Cooler #1 left BB
 - Cooler #2 left BB
 - MTP Discontinued
-
- Cooler 2 was returned with unused products, **NO PRODUCTS WASTED**
Great job with communication and documentation



2020

2035 patients

- 8.2% Penetrating
- 86.2% Blunt
- 4.4% Burn
- 1.1% Other

51 MTP's Initiated

- 40 with at least 1 unit from first cooler



2021

2352 patients

- 11.5% Penetrating
- 84.4 % Blunt
- 3.3% Burn
- .9% Other

27-MTP's
Initiated

- All 27 had at least one unit given from 1st cooler

57 patients
received whole
blood



First Quarter 2022

499 patients

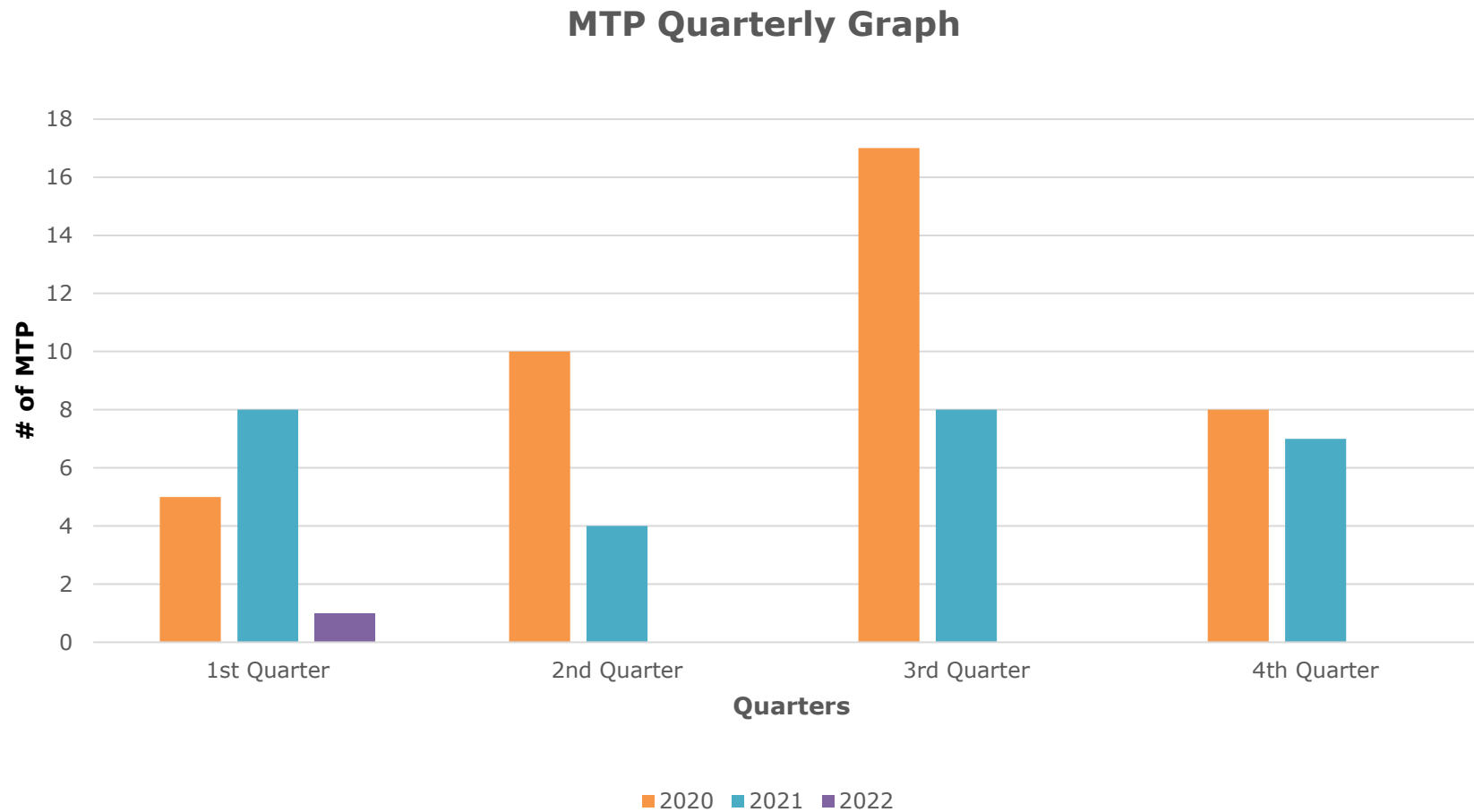
- 12.2% Penetrating
- 83.4 % Blunt
- 1.8% Burn
- 2.6% Other

1-MTP

12 patients
received whole
blood



MTP Quarterly Graph





AirCare

- Implemented December 1, 2021
- Protocol specific to AirCare
- Given to four patients
- No additional products required for the two patients transported to Bronson
- Currently only program giving whole blood pre-hospital in Michigan



Updated Inventory

- 4 units of whole blood-low titer type O+
- 6 units of RBC type O+
- 6 units of RBC type O-
- 6 units of liquid plasma or FFP
- Sign to indicate when whole blood is out
- Sign removed when restocked



Challenges

- COVID-19
- Blood bank moved 2 blocks from main campus July 2020
- Availability of whole blood from supplier
 - National Shortage
 - Hurricane in Texas



What Helped

- 18 months pre-planning
- Collaboration/Communication
- Timed trials in obtaining blood products from blood bank using ED refrigerator blood as a bridge for MTP
- Feedback from blood bank directly to trauma surgeons for all MTP
- Ongoing PI Process-monthly report out from blood bank at Trauma PI



Conclusion

- Collaborative Team Approach
- Lower amount of products expenditure in MTP
- During the first year 69 patients have received WB at BMH
- Strong PI monthly & quarterly reviews



Thank you!
bronsonhealth.com

UM Opioid Prescribing Data

Mark Hemmila, MD

Julia Kelm

Anne Cain-Nielsen



Introduction

- Excessive opioid prescribing > misuse and diversion
- Public Act 246
 - Prescribing policy law
 - June 1, 2018
- To determine the relationship between prescribing policy and opioid use in trauma patients, we compared opioid prescribing by oral morphine equivalents (OME) before and after implementation of Public Act 246.

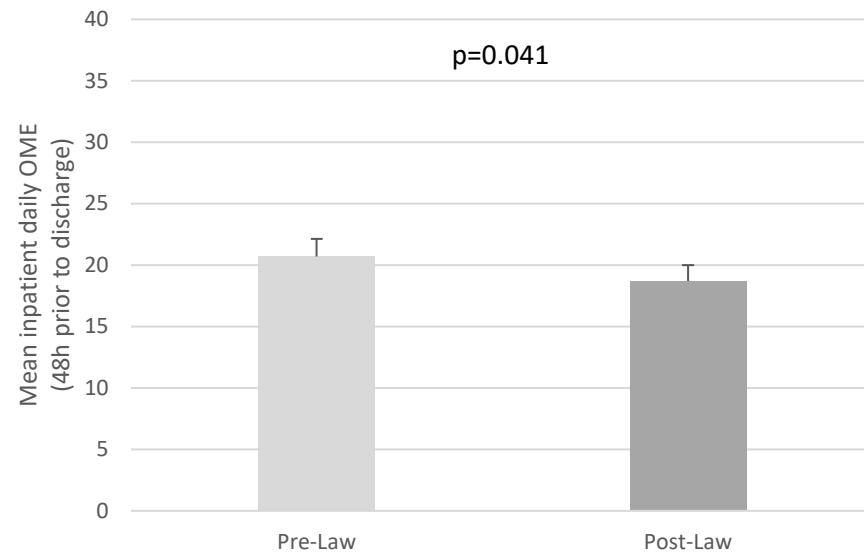
Methods

- UM Trauma Patients 1/1/2016 to 6/30/2021
- In MTQIP data (death or > 24 hrs, ISS >=5)
- Data direct
- Match for 4675 patients out of 4825 submitted
- Opioid medications on MAR (Medication administration record)
 - Oral, sublingual
 - ~~IV~~
 - ~~Transdermal~~
- Discharge prescription
- Exclude inpatient deaths

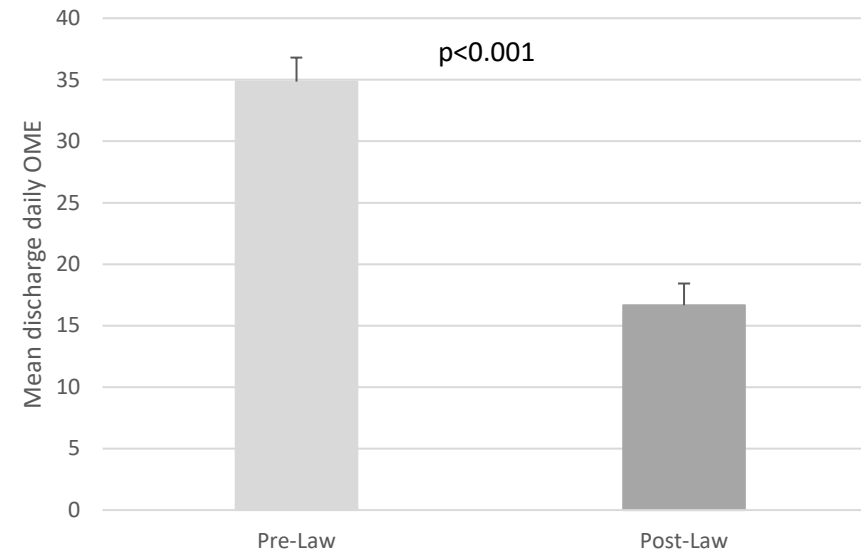
Analytics (3748 patients)

- Any oral opioid in-hospital or at discharge
- Look at 48 hrs prior to discharge
- Look at discharge prescription
- Oral morphine equivalents (OME)
- Place into quintiles based on inpatient daily average (OME/24 hrs)
 - 48 hrs
 - Mean discharge OME/24hrs
 - Pre and post State of Michigan law change (6/1/2018)

48 hrs prior to discharge, all patients

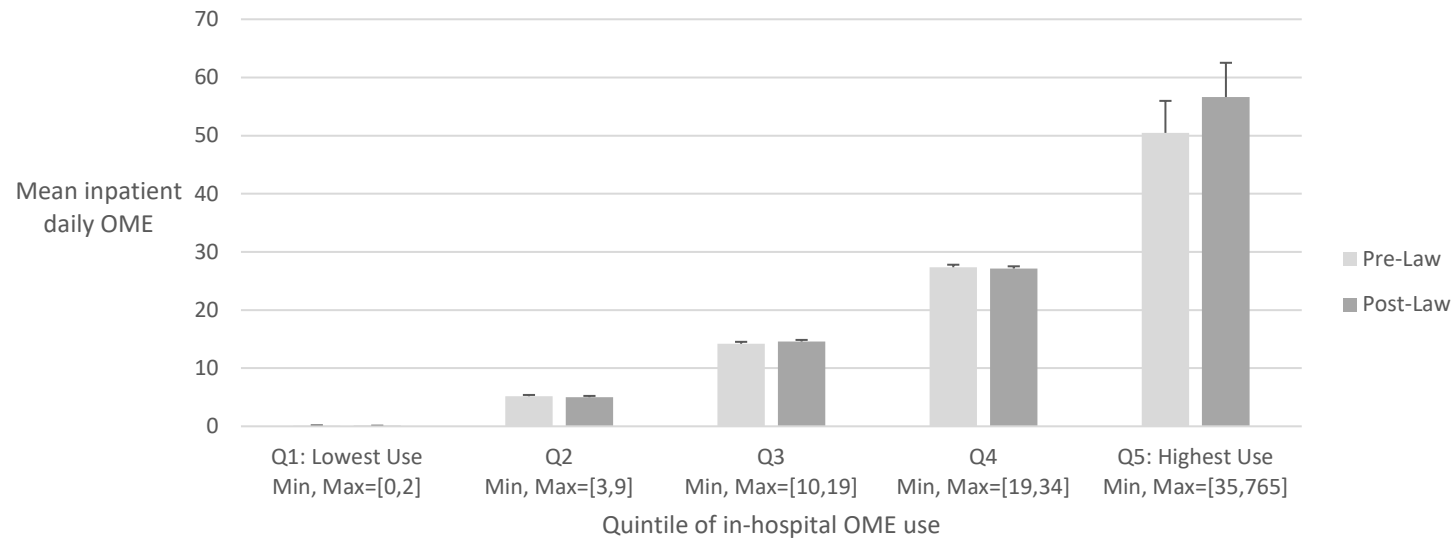


Inpatient



Discharge

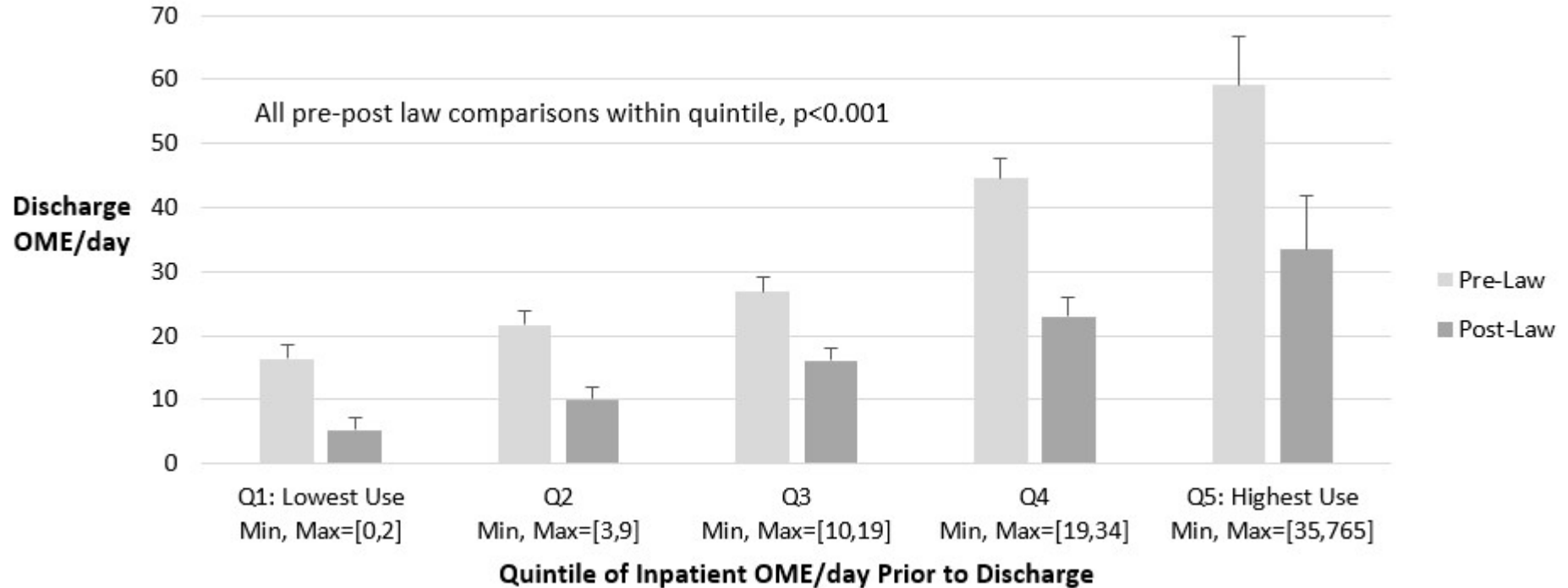
48 hrs of dc, all patients, inpatient



Error bars represent 95% CI

All pre-post law comparisons within quintile, $p > 0.05$ (Q1: $p = 0.14$, Q2: $p = 0.29$, Q3: $p = 0.12$, Q4: $p = 0.40$, Q5: $p = 0.13$)

48 hrs of dc, all patients, discharge



Error bars represent 95% CI

All pre-post law comparisons within quintile, $p < 0.001$

Risk Adjustment

- Without risk adjustment
 - Implementation of an opioid prescribing policy was associated with a significant decrease in mean discharge OME/day
 - 35 ± 49 vs. 17 ± 32 , $p < 0.001$
- With risk adjustment
 - Patient factors
 - Injury type/burden
 - Inpatient OME
 - -19.2 OME/day (95% CI -21.7 to -16.8, $p < 0.001$) difference in discharge prescriptions was present post-law implementation.

Additional Work

- 30-day outpatient data
- Refills
- ED visits

Patient Reported Outcomes Measures

Mark Hemmila, MD





Long-term outcomes after injury: from surviving to thriving

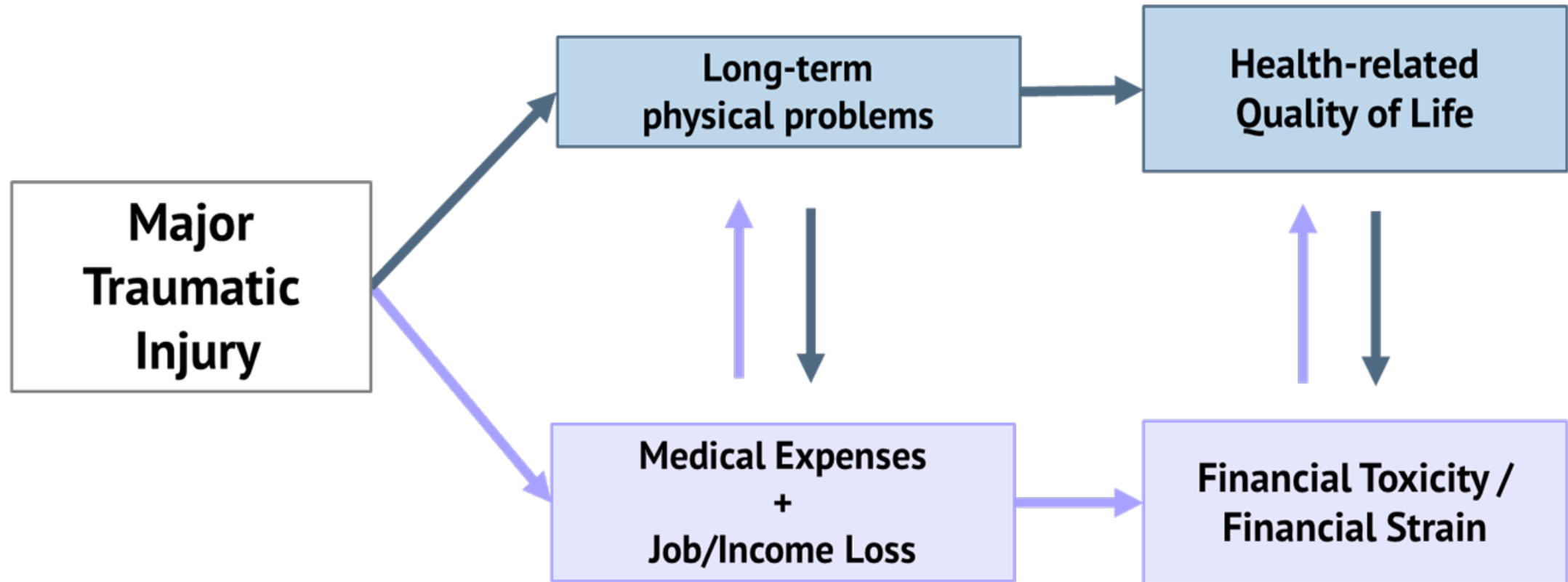
Mark Hemmila, MD

John Scott, MD, MPH

Janessa Monahan, MSW; Iman Mekled, BS; Julia Kelm, BS

Introduction

Long-term clinical and economic consequences of injury



Aim: Understand the clinical and economic burden of recovery after major injury

Methods

Single Trauma Center Registry

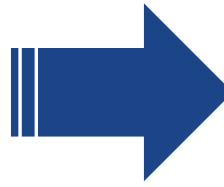
February 2021 - July 2021

1 center

Distribution:
Email/Phone

Timeline:

1 month post discharge



Six Participating Hospitals

September 2021 - May 2022

6 centers

Distribution:
Email/SMS/Postcard/Phone

Timeline:

1, 3, 6, 12 months post discharge

Inclusion Criteria

- Age ≥ 18
- ISS ≥ 15
- Fracture
 - Long bone, pelvis, 2+ ribs
- Operation
- Mechanical ventilation

Clinical Outcomes

- 5 measures of health related quality of life
- Opioid use
- Caregiver burden

Economic Outcomes

- Income loss
- Return to work
- Out-of-pocket spending
- New medical debt
- Financial toxicity

Pilot Cohort

2022 Early Expansion

52 Responses

1 Center Only
Distribution:

- Phone n=35
- Email n=17

Surveyed at ≤ 10 weeks
post discharge

6 Centers

41 Responses

6 Centers
Distribution:

- Email n=29
- SMS n=10
- Postcard n=2

Surveyed at > 10 weeks
post discharge

Pilot Cohort

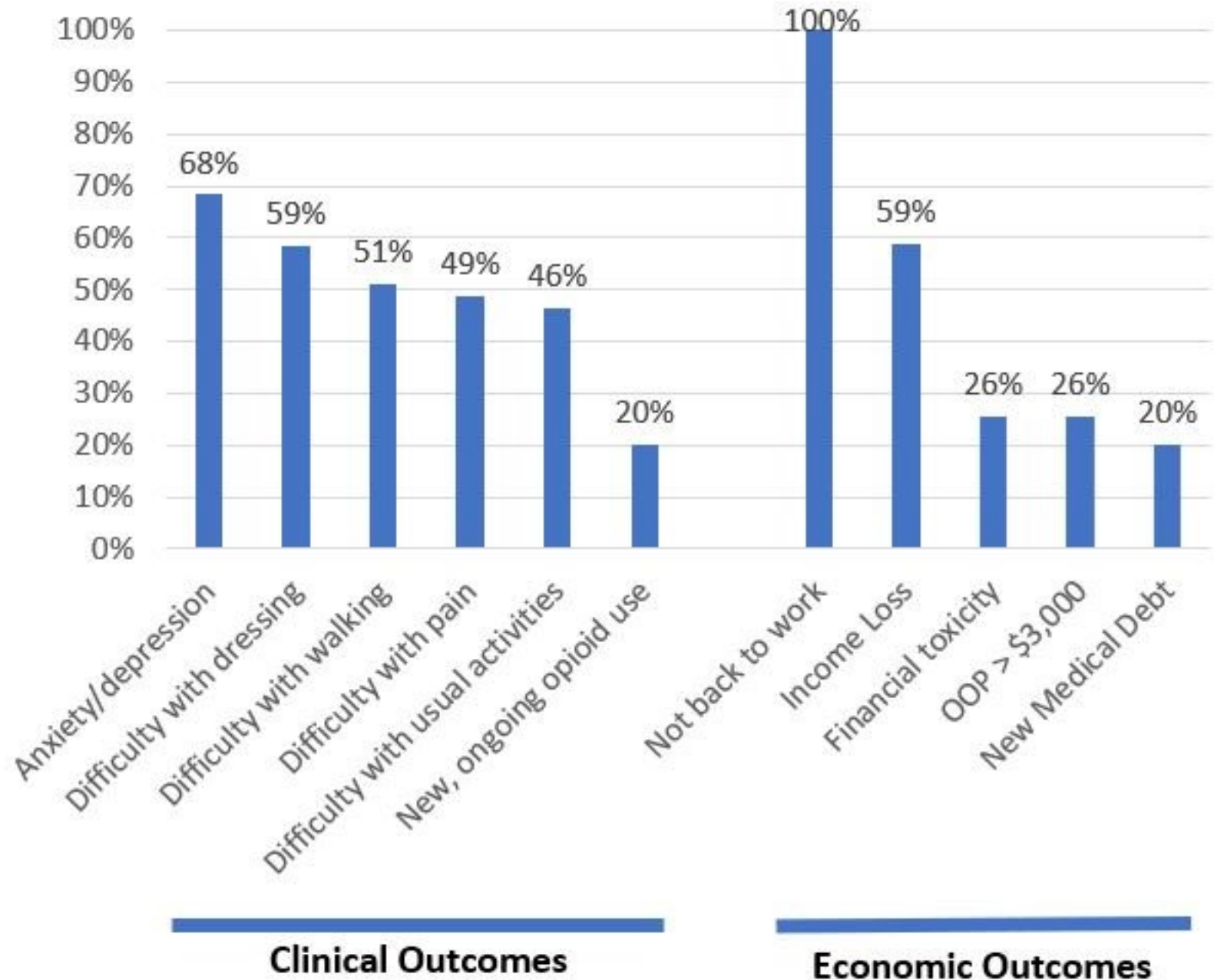
52 Responses

1 Center

Distribution:

- Phone n=35
- Email n=17

Surveyed at 1 month
post discharge



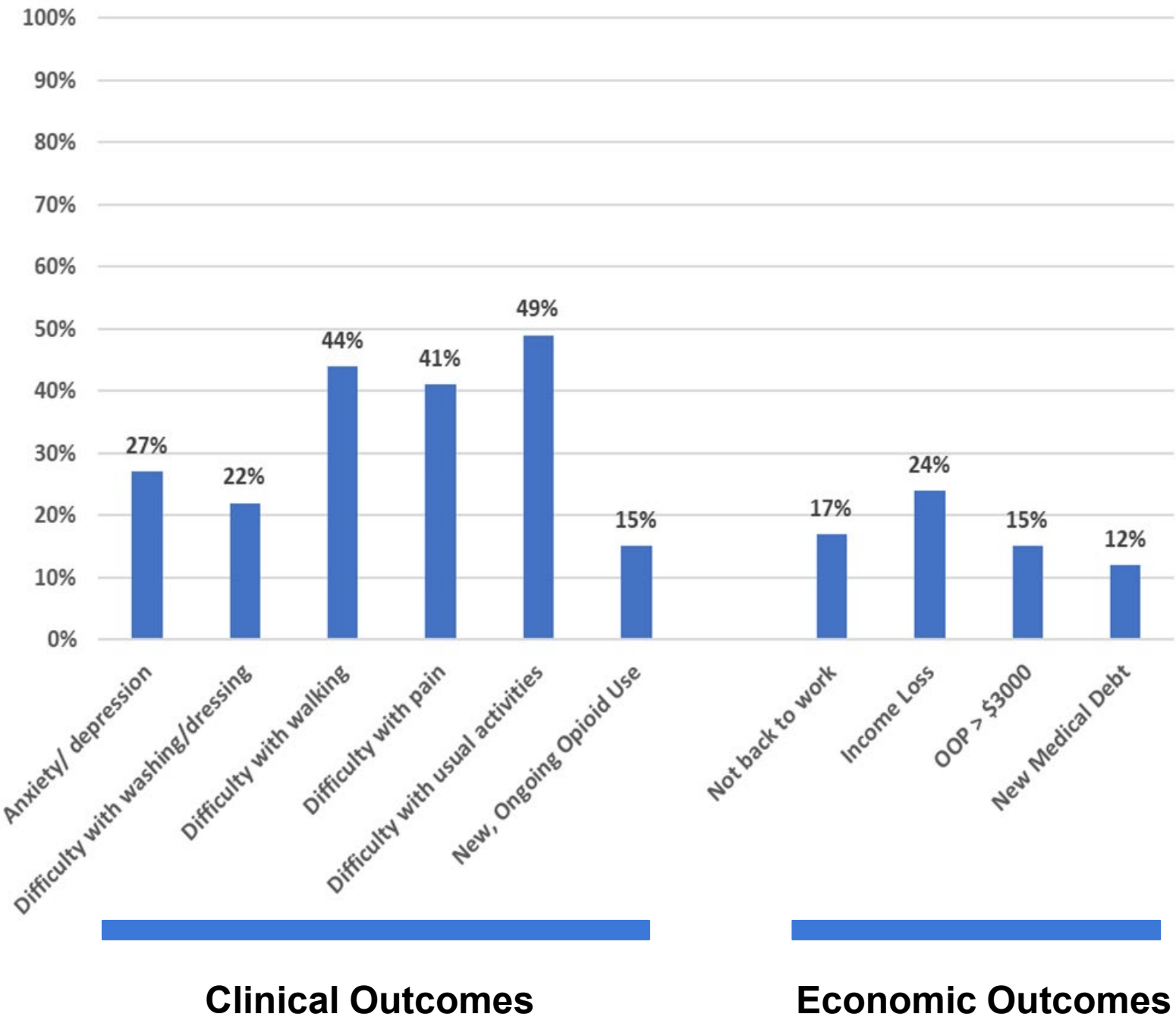
2022 Response Data

41 Responses

6 Centers

Distribution:

- Email n=29
- SMS n=10
- Postcard n=2



Current Findings

50%

struggle with
**health-related
quality of life**



1 in 4

reported **poor
economic
outcomes**



**Dynamic
Responses**

**evolving
challenges** over
the **course of
recovery**



Next Phase of Project Expansion

- ***Increasing Representation across MTQIP***
 - Inviting other MTQIP members to take part and have our team contact their patients for PROMs
- ***Fine-tuning Data Collection System***
 - PRO team is continuing to develop an efficient and effective system to consistently capture 1, 3, 6, (9), and 12 month outcomes
 - Expanding the PRO team
- ***Keeping Patients at the Center***
 - We're committed to using this data to improve the recovery of all trauma survivors across the state of Michigan

Thank you to the hospitals who are currently participating and we hope to have more of you involved!

MACS

- ◆ 10 Hospitals
- ◆ Risk Adjusted Reports
 - Acute Appendicitis
 - Acute Gallbladder Disease
 - Small Bowel Obstruction
 - Emergent Exploratory Laparotomy
 - Summary
- ◆ Recruitment

M·ACS

Michigan Acute Care Surgery Report
Exploratory Laparotomy

<u>Index Admission</u>		<u>Your Center</u>		<u>Aggregate</u>	
		<u>N =</u>		<u>N =</u>	
<u>Variable</u>		<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
Total patients		132	30.5	433	100.0
Point of Entry	ED	78	59.1	265	61.2
	Transfer from Outside Hospital ED	31	23.5	91	21.0
	Transfer from Outside Hospital	16	12.1	27	6.2
	ED Only/Not Admitted	5	3.8	44	10.2
	Home/Direct Admit	2	1.5	6	1.4
	Other		0.0		0.0
Diagnosis (ICD10-based*)	Perforation	34	25.8	117	27.0
	Colon	27	20.5	80	18.5
	Small bowel	1	0.8	2	0.5
	Stomach/Duodenum	6	4.5	35	8.1
	Obstruction	50	37.9	184	42.5
	Hernia	22	16.7	57	13.2
	Malignancy	5	3.8	17	3.9
	Other (Volvulus, Intussusception)	23	17.4	110	25.4
	Ischemia	17	12.9	34	7.9
	Other	17	12.9	53	12.2
Studies	Abdominal x-ray	63	47.7	164	37.9
	CT scan performed	122	92.4	405	93.5
	CT scan findings: free air	28	23.0	111	27.4
	CT scan findings: free fluid	37	30.3	166	41.0
	CT scan findings: fecalization	1	0.8	12	3.0
	CT scan findings: pneumatosis	9	7.4	31	7.7
	CT scan findings: swirl sign	6	4.9	20	4.9
	CT scan findings: ischemic/dead bowel	29	23.8	47	11.6
	CT scan findings: obstruction	51	41.8	171	42.2
	CT scan findings: other	113	92.6	230	56.8
NEWS 2 Score Interpretation	High risk (7-20)	31	23.5	94	21.7
	Moderate risk (5-6)	84	63.6	292	67.4
	Low risk (≤4)	17	12.9	47	10.9
SIRS Criteria positive	WBC > 12,000, 10% bands	45	34.1	156	36.0
Goal directed therapy	Esophageal doppler		0.0		0.0
	Flo-Trac	0	0.0	3	0.7
	Serial ABG/Lactate, Goal Fluid Rx	65	49.2	126	29.1

*Diagnoses (ICD10-based):

Perforation - colon: K57.20, K63.1, K91.71, K91.72

Perforation - small bowel: S36.438A

Perforation - stomach/duodenum: K25.1, K25.2, K25.5, K26.5, K27.9, K28.5, K94.29

Obstruction - hernia: K40.30, K41.30, K42.0, K42.1, K43.0, K43.1, K43.3, K43.6, K44.0, K45.0, K45.8

Obstruction - malignancy: C18.2, C18.9, C20, C23, C49.A3, C77.2, C78.4, C78.6

Obstruction - other (volvulus, intussusception): K56.0, K56.1, K56.2, K56.50, K56.690, K56.699, K91.30

Ischemia: K55.019, K55.029, K55.049, K55.059, K55.1, K55.8, K55.9

Other: A04.72, A41.9, J95.812, K35.21, K35.33, K35.5, K57.11, K63.89, K65.1, K65.9, Q43.0, R10.9, T81.32XA, T81.42XA, Z43.3

MACS

- ◆ Rolling enrollment every 6 mo
- ◆ Contact Kim Kramer or Mark Hemmila
 - kikramer@med.umich.edu
 - mhemmila@umich.edu
- ◆ Meeting
 - Great discussion
 - Thursday September 15th, 2022

Updates LOS Calculation

Jill Jakubus, PA-C, MHSA



Updates

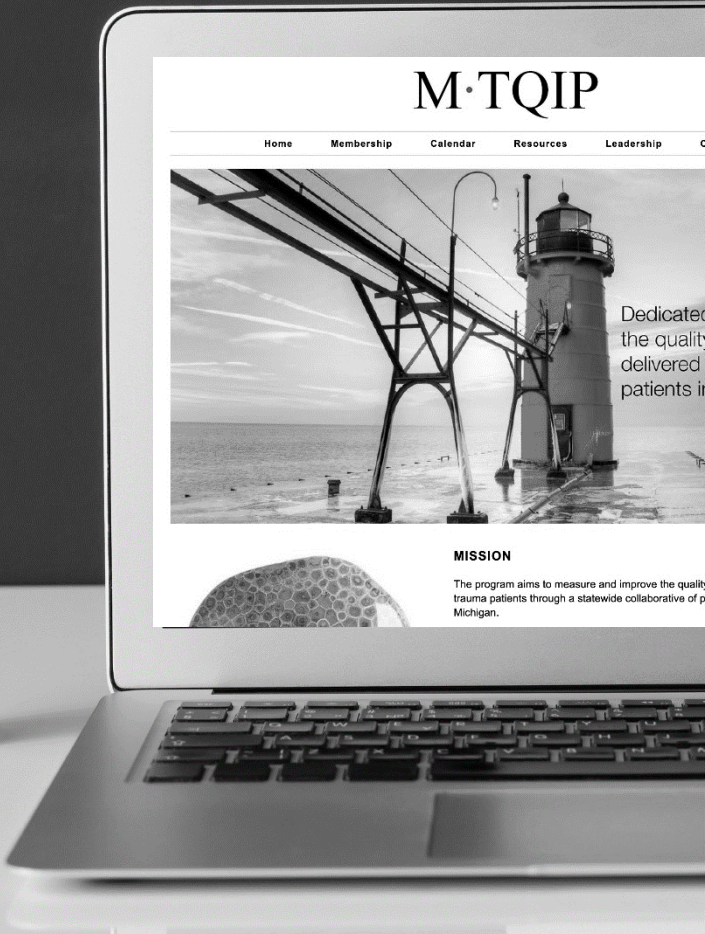
Research in Progress

- Highlights work members
- MTQIP collaborative dataset
- Improve care



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	
Michigan Medicine	Chung	Hand trauma: A geospatial analysis	New
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	Rerunning analysis
Spectrum Health	Miller	Outcomes in IMN of long bone fractures	Preparing manuscript
St Joseph Mercy	Curtiss	Infection rates in operative trauma patients	
St Joseph Mercy	Hecht	Early chemoprophylaxis in severe TBI patients reduces risk of VTE	Submitted for publication
St Joseph Mercy	Hecht	Effect of antiplatelet and anticoagulant agents on outcomes following emergent surgery for trauma	Finished analysis Preparing manuscript
St. Joseph Mercy	Hoesel	Rib fractures in the elderly	Preparing manuscript
St. Joseph Mercy	Sadek	Reversal of anticoagulants and antiplatelets following TBI	Finished analysis Preparing manuscript
St. Mary Mercy Livonia & Spectrum Health	Keyes	COVID-19's impact on trauma and socioeconomic status in Michigan	Presented 5/13 SAEM Presented 5/18 MTQIP
U of M Health - West	Mitchell	Blunt cerebral vascular injury	

Updates



MACS PUF

- **New participant use file**
- **MACS collaborative dataset**
- **Available to MACS Members**
- **Data request packet**

Data Request Packet



Data Request Information

Requirements

- An IRB approval letter is required for both research and quality improvement work.
- All listed researchers must be members of a participating MTQIP trauma center.

Instructions

- Provide the below-requested information
- Email the completed form to Judy Mikhail for review at jmikhail@med.umich.edu

Notifications

- Conference Presentations: Email MTQIP the conference name, date, and presentation title
- Conference Posters: Email MTQIP the conference name, date, and presentation title
- Publications: Email MTQIP a copy of the publication

Acknowledgments

- All publications require the inclusion of the MTQIP acknowledgment statement below.
- "The authors acknowledge the contribution of the collaborative efforts of the Michigan Trauma Quality Improvement Program (MTQIP) participating Level I and II Trauma Centers, Trauma Surgeon Champions, Trauma Program Managers, MTQIP Clinical Reviewers, and Trauma Registrars."

Data Request Form

Study Team

Role	Name	Institutional Email
Principal Investigator		

Institutional Review Board Application Information

Institution Name	
ID Number	
Study Title	
Status	<input type="radio"/> Approved <input type="radio"/> Not Approved
Study Type	<input type="radio"/> Research <input type="radio"/> Quality Improvement
Hypothesis	

Updates

Muti-Factor Authentication

- **ArborMetrix access**
- **Improved data security**
- **Target release 5/19**
- **Help guide resource email**



Questions ?

LOS Calculation

Logic

- Problem review
- Data issues
- Solution
- Cohort consistency
- Data accuracy



Problem review

LOS = Hospital Discharge Date/Time – ED/Hospital Arrival Date/Time

Rounding

1.5 days
=
1 or 2

Precision

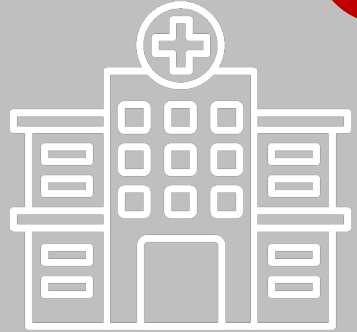
2 min
=
1 day

Admitted ED

2 days
=
. or 0 day

Data Issues

16



**Negative Hospital
LOS**

27



**Negative
ED LOS**

64



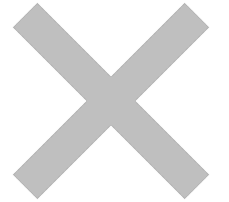
**Registry Under
Capture
Delta < -2 Days**

21



**Registry Over
Capture
Delta < 2 Days**

3K



**Missing
Dates/Times**

Solution

- **Calculate hospital LOS (0.00 days)**
- **Calculate ED LOS (0.00 days)**
- **New hospital days = calculated hospital LOS**

Use vendor value if . . .

- **New hospital days negative**
- **New hospital days has missing data**

Use ED LOS value if . . .

- **Missing vendor value**

Additionally . . .

- **Added inclusion for admitted patients**



NATIONAL TRAUMA DATA STANDARD (NTDS) PATIENT INCLUSION CRITERIA

DESCRIPTION: To ensure consistent data collection across States into the National Trauma Data Standard, a trauma patient is defined as a patient sustaining a traumatic injury within 14 days of initial hospital encounter and meeting the following criteria*:

At least ONE of the following injury diagnostic codes defined as follows:

International Classification of Diseases, Tenth Revision (ICD-10-CM):

- S00-S99 with 7th character modifiers of A, B, or C ONLY. (Injuries to specific body parts—initial encounter)
- T07 (unspecified multiple injuries)
- T14 (injury of unspecified body region)
- T79.A1-T79.A9 with 7th character modifier of A ONLY (Traumatic Compartment Syndrome—initial encounter)

**EXCLUDING the
ICD-10-CM:**

- S00 (Su
- S10 (Su
- S20 (Su
- S30 (Su

**AND MUST INCLUDE ONE OF THE FOLLOWING IN ADDITION TO
(ICD-10-CM S00-S99, T07, T14, and T79.A1-T79.A9):**

- Death resulting from the traumatic injury (independent of hospital admission or hospital transfer status);
OR
- Patient transfer from one acute care hospital** to another acute care hospital;
OR
- Patients directly admitted to your hospital (exclude patients with isolated injuries admitted for elective and/or planned surgical intervention);
OR
- Patients who were an in-patient admission and/or observed.

Cohort Consistency

- Blunt or penetrating mechanism of injury
- Age ≥ 16 years old
- ISS ≥ 5
- All deaths
- Length of stay ≥ 1 day who are discharged alive

Cohort Consistency

- Blunt or penetrating mechanism of injury
- Age ≥ 16 years old
- ISS ≥ 5
- Transfer to another acute care hospital or in-patient observation/admission or death

Data Accuracy

calculated		vendor	
hosp_los	ed_los	hospdays	new_hospdays
.0090278	.0090278	1	.0090278
.0090278	.0090278	1	.0090278
.0090278	.0090278	1	.0090278
.0090278	.0090278	1	.0090278
.0076389	.0076389	1	.0076389
.0076389	.0076389	1	.0076389
.0076389	.0076389	1	.0076389
.0076389	.0076389	1	.0076389
.0076389	.0076389	1	.0076389
.0076389	.0076389	1	.0076389
.0076389	.0076389	1	.0076389

Questions ?



Thank You

MTQIP Orthopaedics Update

Bryant Oliphant, MD



MTQIP Ortho Working Group

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



Update

- Formalizing List of Service Chief + Surgeons
- Creating Ortho Advisory Working Group
- Engaging & Informing Ortho Surgeons about MTQIP
- Want to hear from TMDs: ortho wants/issues

Ortho MTQIP Meeting – Potential Topics

- Hip Fractures
 - Timing/Delays to OR (?36 hours?)
 - D/C Destination
 - Clinical Pathways
- Open Fractures
 - Plastics-Flap Coverage
 - Barriers & Facilitators
 - Transfers
 - Time to ABX Admin

Working Group Items

- Consensus VTE Prophylaxis

TQIP/MTQIP Orthopaedic Process Measures

Time to operative fixation in patients with mid-shaft femur fracture *
Time to operative fixation in patients with open tibia shaft fracture *
Time to irrigation and debridement in patients with open tibia shaft fracture *
Time to flap coverage in patients with open tibia shaft fracture *
Number of fasciotomies performed in patients with tibia shaft fractures *
Time to operative fixation in elderly patients with hip fractures ¥
Time to antibiotics in open femur or tibia fractures ‡
* Only in TQIP ¥ Both TQIP & MTQIP ‡ Only in MTQIP

Other Potential Metrics

- Time to pelvis/acetabular fixation
- Time to complete MSK fixation

Questions

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

 @BonezNQuality



Questions

Wrap Up

Jill Jakubus, PA-C, MHSA



Conclusion

- ◆ Thank you for attending
- ◆ We will correspond about Hospital CQI Index
- ◆ Evaluations
 - Judy will send out email
- ◆ Questions?
- ◆ See you in October