The Michigan Trauma Quality Improvement Program

Boyne Mountain, MI
May 17, 2023

Disclosures

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

Disclosures

- Mark Hemmila Grants
  - Blue Cross Blue Shield of Michigan
  - Michigan Department of Health and Human Services

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 7, 2023
  - This report
- Next data submission
  - June 2, 2023

Future Meetings

- Registrars
  - Tuesday June 6, 2023
  - Ypsilanti, EMU Marriott
- Fall
  - Tuesday October 10, 2023
  - Ypsilanti, EMU Marriott
- Winter
  - Tuesday February 6, 2024
  - Virtual

Agenda

- MTQIP Data
- PI Death Determination
- PROM
- ASPIRE
- Orthopedic Updates
- Break

Agenda

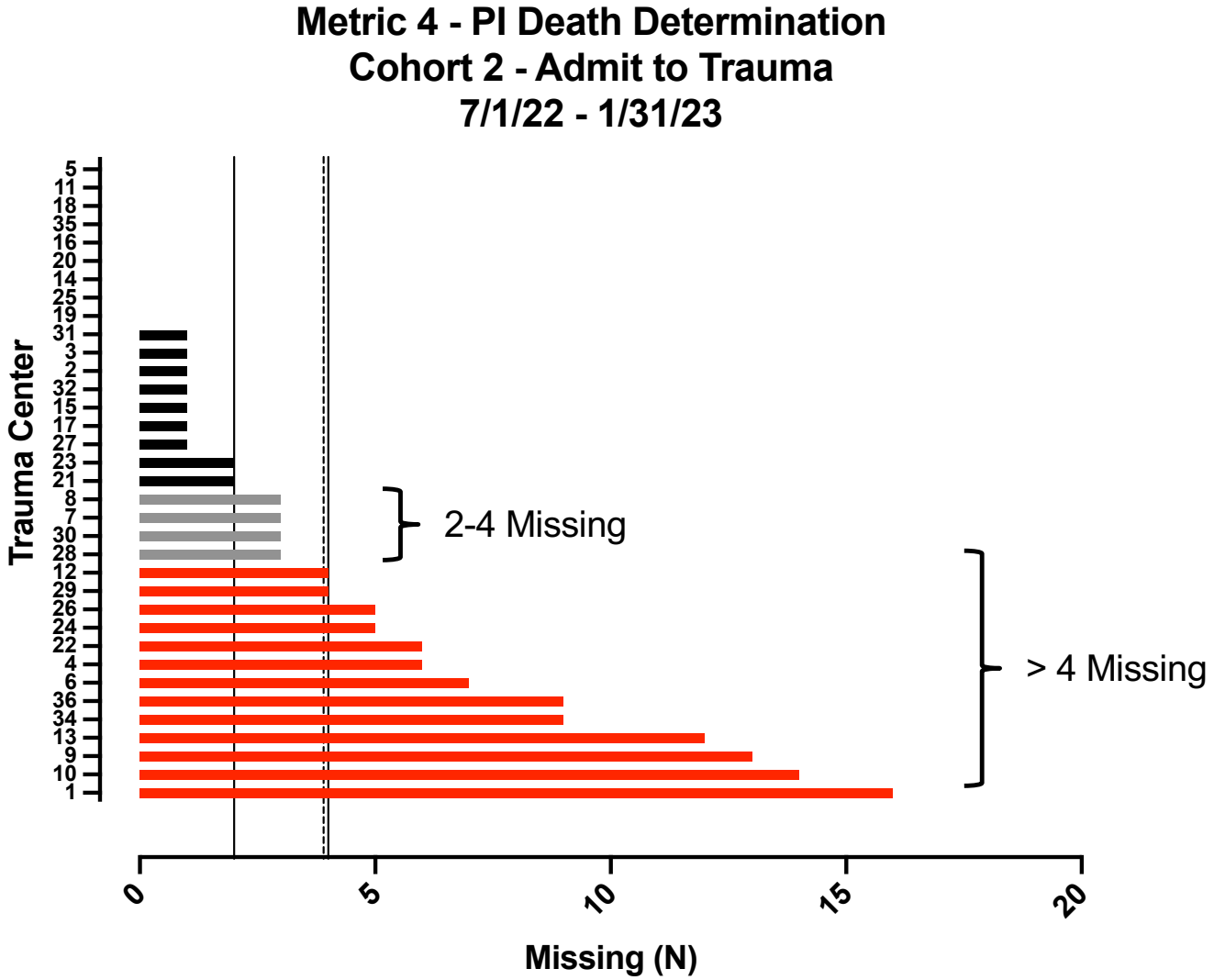
- Jill - Program Manager Updates
  - Updates
  - ASA and VTE
- Judy - Program Manager Updates
  - Future Metrics Planning
  - ACS Optimal Book
  - Tackling Delirium
- Wrap Up

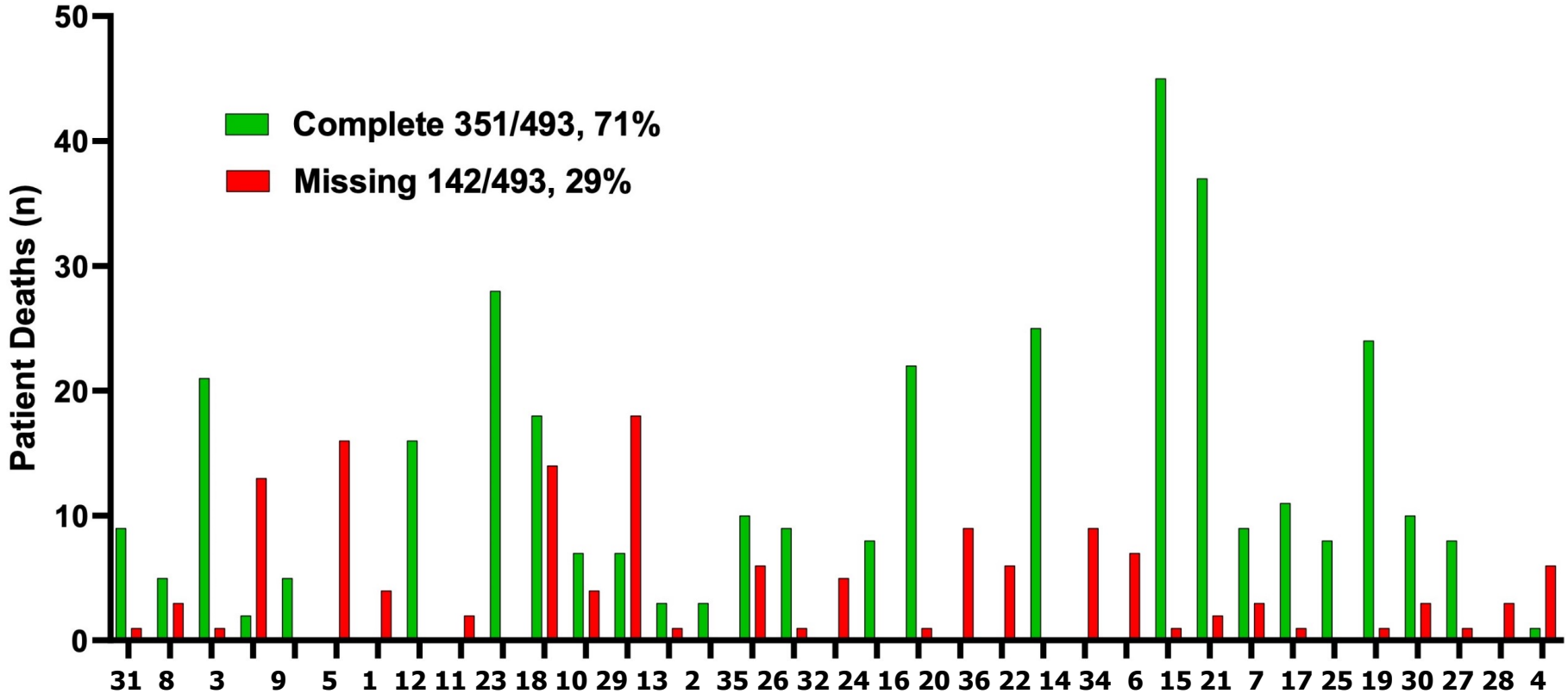
MTQIP Data &
Hospital Scoring Index Results

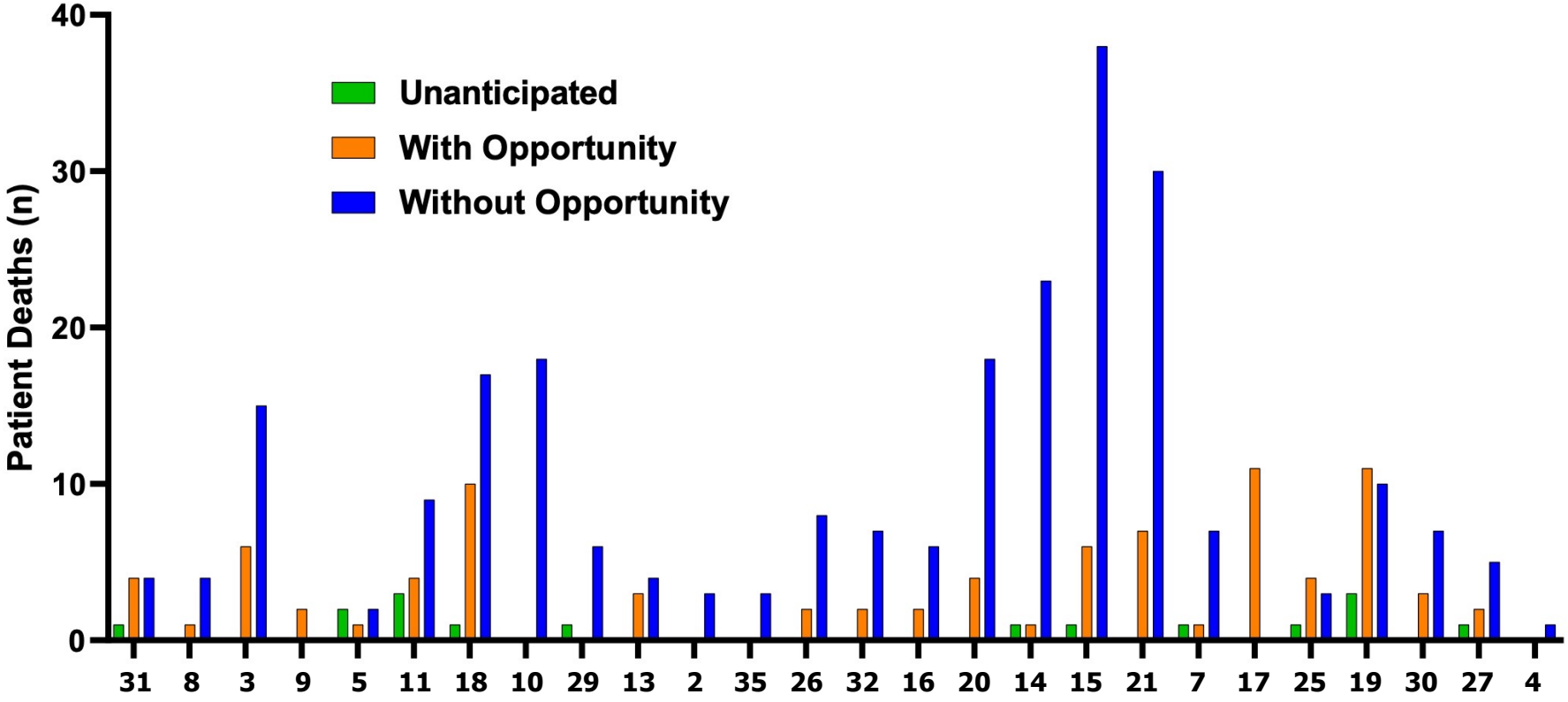
Mark Hemmila, MD

#4 PI Death Determination Documentation

- Completed PI death determination (12 mo: 7/1/22-6/30/23)
- Cohort 2 (Admit trauma)
- Exclude no signs of life
  - 0-2 patients missing = 5 points
  - 3-4 patients missing = 3 points
  - > 4 patients missing = 0 points


Metric 4 - PI Death Determination
Cohort 2 - Admit to Trauma
7/1/22 - 1/31/23
Trauma Center
5
11
18
35
16
20
14
25
19
31
3
2
32
15
17
27
23
21
8
7
30
28
12
29
26
24
22
4
6
36
34
13
9
10
1
2-4 Missing
> 4 Missing
0
5
10
15
20
Missing (N)


Complete 351/493, 71%
Missing 142/493, 29%
Patient Deaths (n)
50
40
30
20
10
0
31 8 3 9 5 1 12 11 23 18 10 29 13 2 35 26 32 24 16 20 36 22 14 34 6 15 21 7 17 25 19 30 27 28 4


Patient Deaths (n)
40
30
20
10
0
Unanticipated
With Opportunity
Without Opportunity
31
8
3
9
5
11
18
10
29
13
2
35
26
32
16
20
14
15
21
7
17
25
19
30
27
4

	Age	ISS
Unanticipated mortality	65.4 ± 6.2	18.6 ± 2.5
Anticipated, with opportunity	58.1 ± 2.5	28.6 ± 1.7
Anticipated, without opportunity	57.8 ± 1.5	28.5 ± 1.1

preventable	race B	O	W	Total
Unanticipated mortali	5	0	11	16
	31.25	0.00	68.75	100.00
Mortality with opport	19	3	65	87
	21.84	3.45	74.71	100.00
Mortality without opp	73	8	167	248
	29.44	3.23	67.34	100.00
Total	97	11	243	351
	27.64	3.13	69.23	100.00

Pearson chi2(4) = 2.4661 Pr = 0.651

preventable	blunt Blunt	Penetra..	Total
Unanticipated mortali	14	2	16
	87.50	12.50	100.00
Mortality with opport	72	15	87
	82.76	17.24	100.00
Mortality without opp	184	64	248
	74.19	25.81	100.00
Total	270	81	351
	76.92	23.08	100.00

Pearson chi2(2) = 3.7182 Pr = 0.156

	Operate	Emergent Operate
Unanticipated mortality	62.5%	50%
Anticipated, with opportunity	51.7%	36.8%
Anticipated, without opportunity	25.8%	17.3%
p-value (Chi2)	<0.001	<0.001

Are these patients having complications before they die, and does it matter?

preventable	(max) return_or 0	1	Total
Unanticipated mortali	12 75.00	4 25.00	16 100.00
Mortality with opport	82 94.25	5 5.75	87 100.00
Mortality without opp	242 97.58	6 2.42	248 100.00
Total	336 95.73	15 4.27	351 100.00

Pearson chi2(2) = 19.3477 Pr = 0.000

preventable	(max) acute_renal_failure 0	1	Total
Unanticipated mortali	14 87.50	2 12.50	16 100.00
Mortality with opport	80 91.95	7 8.05	87 100.00
Mortality without opp	244 98.39	4 1.61	248 100.00
Total	338 96.30	13 3.70	351 100.00

Pearson chi2(2) = 11.1103 Pr = 0.004

preventable	(max) pulmonary_embolism 0	1	Total
Unanticipated mortali	15 93.75	1 6.25	16 100.00
Mortality with opport	87 100.00	0 0.00	87 100.00
Mortality without opp	246 99.19	2 0.81	248 100.00
Total	348 99.15	3 0.85	351 100.00

Pearson chi2(2) = 6.2530 Pr = 0.044

preventable	(max) dvt_le 0	1	Total
Unanticipated mortali	15	1	16
	93.75	6.25	100.00
Mortality with opport	84	3	87
	96.55	3.45	100.00
Mortality without opp	246	2	248
	99.19	0.81	100.00
Total	345	6	351
	98.29	1.71	100.00

Pearson chi2(2) = 4.7324 Pr = 0.094

preventable	(max) vap 0	1	Total
Unanticipated mortali	13	3	16
	81.25	18.75	100.00
Mortality with opport	83	4	87
	95.40	4.60	100.00
Mortality without opp	234	14	248
	94.35	5.65	100.00
Total	330	21	351
	94.02	5.98	100.00

Pearson chi2(2) = 4.9835 Pr = 0.083

preventable	(max) stroke_cva 0	1	Total
Unanticipated mortali	16	0	16
	100.00	0.00	100.00
Mortality with opport	84	3	87
	96.55	3.45	100.00
Mortality without opp	247	1	248
	99.60	0.40	100.00
Total	347	4	351
	98.86	1.14	100.00

Pearson chi2(2) = 5.4940 Pr = 0.064

preventable	unpintubat 0	1	Total
Unanticipated mortali	12	4	16
	75.00	25.00	100.00
Mortality with opport	77	10	87
	88.51	11.49	100.00
Mortality without opp	228	20	248
	91.94	8.06	100.00
Total	317	34	351
	90.31	9.69	100.00

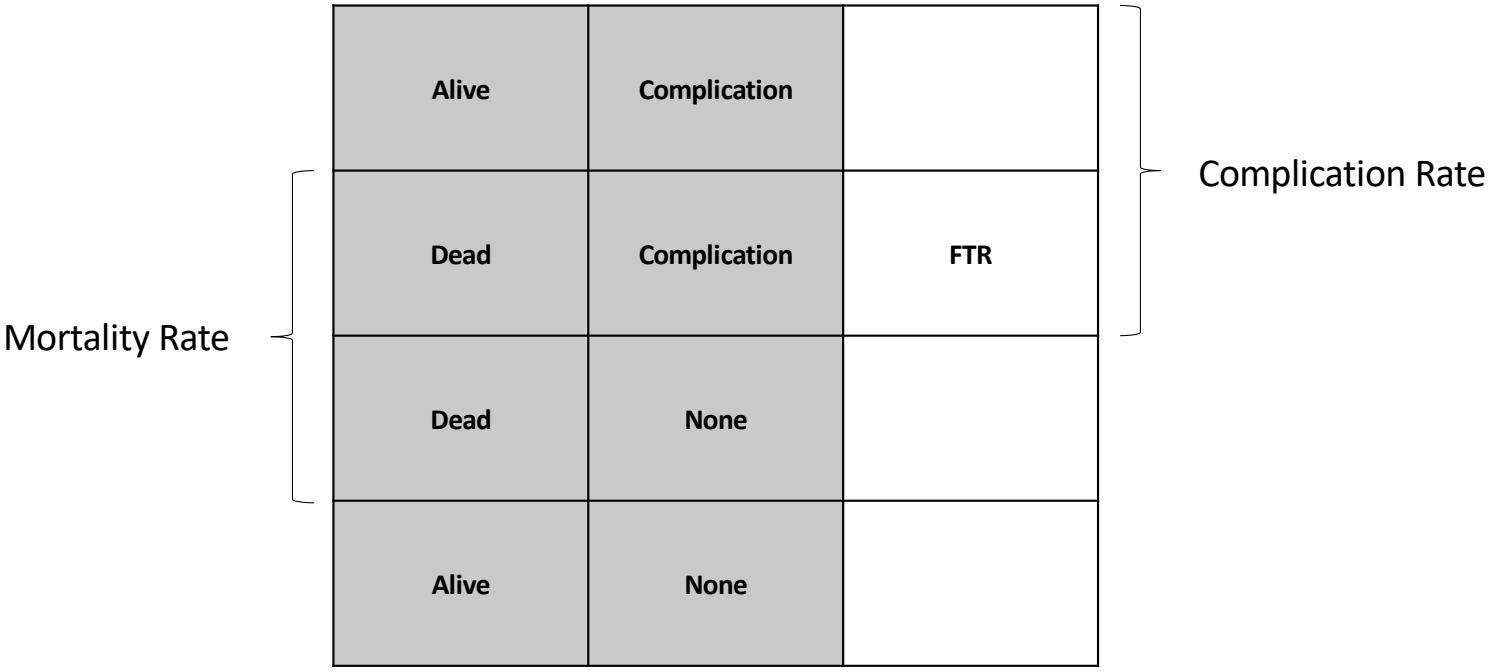
Pearson chi2(2) = 5.3597 Pr = 0.069

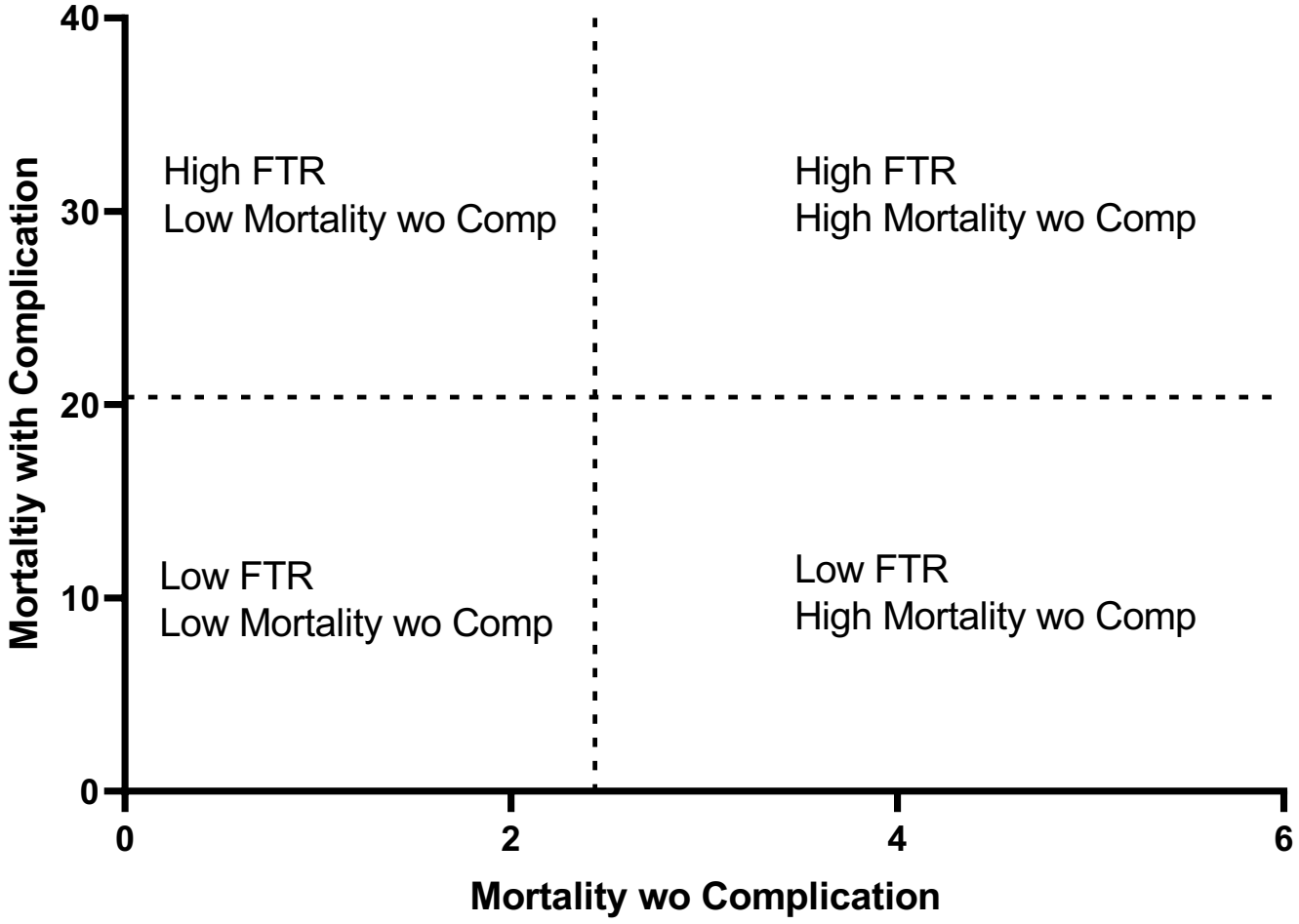
preventable	serious 0	1	Total
Unanticipated mortali	2	14	16
	12.50	87.50	100.00
Mortality with opport	48	39	87
	55.17	44.83	100.00
Mortality without opp	159	89	248
	64.11	35.89	100.00
Total	209	142	351
	59.54	40.46	100.00

Pearson chi2(2) = 17.5390 Pr = 0.000

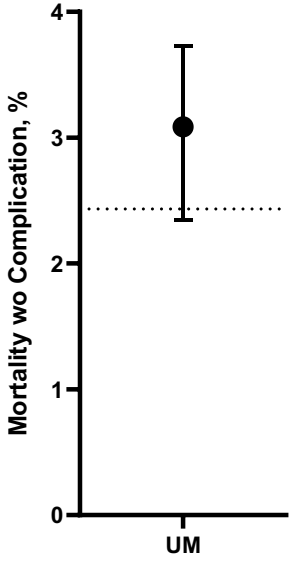
preventable	(max) myocardial_infarction_comp 0	1	Total
Unanticipated mortali	14	2	16
	87.50	12.50	100.00
Mortality with opport	84	3	87
	96.55	3.45	100.00
Mortality without opp	246	2	248
	99.19	0.81	100.00
Total	344	7	351
	98.01	1.99	100.00

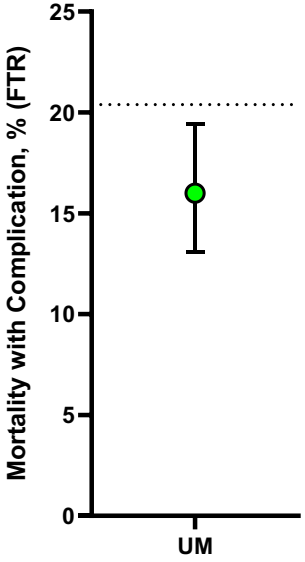
Pearson chi2(2) = 11.7663 Pr = 0.003

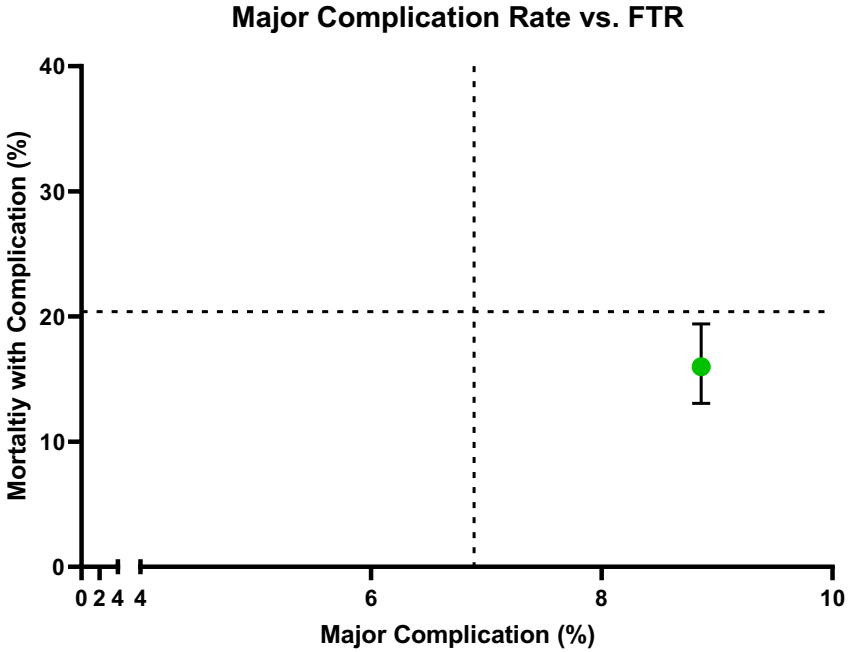

Alive
Complication
Dead
Complication
FTR
Dead
None
Alive
None
Mortality Rate
Complication Rate


40
30
20
10
0
Mortaltiy with Complication
High FTR
Low Mortality wo Comp
High FTR
High Mortality wo Comp
Low FTR
Low Mortality wo Comp
Low FTR
High Mortality wo Comp
0
2
4
6
Mortality wo Complication

Reporting


Mortality wo Complication, %
4
3
2
1
0
UM


Mortality with Complication, % (FTR)
25
20
15
10
5
0
UM


Major Complication Rate vs. FTR
Mortaltiy with Complication (%)
40
30
20
10
0
0 2 4 4
6
8
10
Major Complication (%)

Error reduction in trauma care: Lessons from an anonymized, national, multicenter mortality reporting system

Doulia M. Hamad, MD, Samuel P. Mandell, MD, MPH, FACS, Ronald M. Stewart, MD, FACS, Bhavin Patel, MPH, Matthew P. Guttman, MD, Phillip Williams, MD, Arielle Thomas, MD, MPH, Angela Jerath, MD, MSc FRCPC, FANZCA, MD, Eileen M. Bulger, MD, FACS, *and* **Avery B. Nathens, MD, MPH, PhD, FRCSC, FACS**, *Toronto, Canada*

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. Nevertheless, rates of preventable deaths, particularly in trauma care, have not materially changed. The American College of Surgeons Trauma Quality Improvement Program developed a voluntary Mortality Reporting System 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 factors contributing to potentially preventable deaths after injury and to evaluate the effectiveness of strategies identified by trauma centers to mitigate future harm, as reported in the Mortality Reporting System.

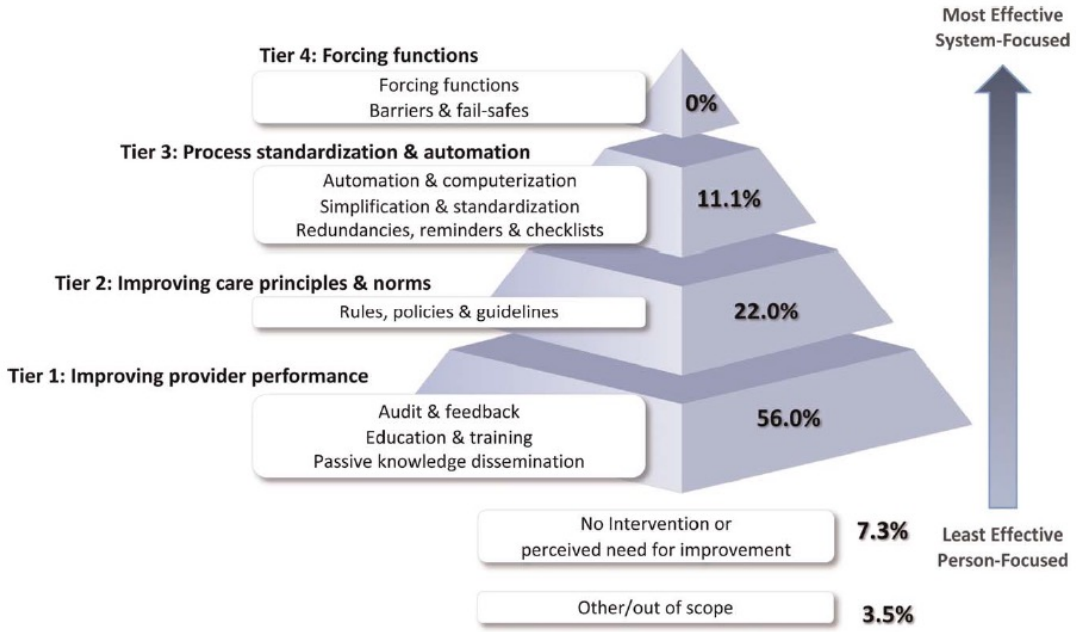
METHODS: An anonymous structured web-based reporting template based on the Joint Commission on Accreditation of Healthcare Organizations taxonomy was made available to trauma centers participating in the Trauma Quality Improvement Program to allow for reporting of deaths that were potentially preventable. Contributing factors leading to death were evaluated. The effectiveness of mitigating strategies was assessed using a validated framework and mapped to tiers of effectiveness ranging from person-focused to system-oriented interventions.

RESULTS: Over a 2-year period, 395 deaths were reviewed. Of the mortalities, 33.7% were unanticipated. Errors pertained to management (50.9%), clinical performance (54.7%), and communication (56.2%). Human failures were cited in 61% of cases. Person-focused strategies like education were common (56.0%), while more effective system-based strategies were seldom used. In 7.3% of cases, centers could not identify a specific strategy to prevent future harm.

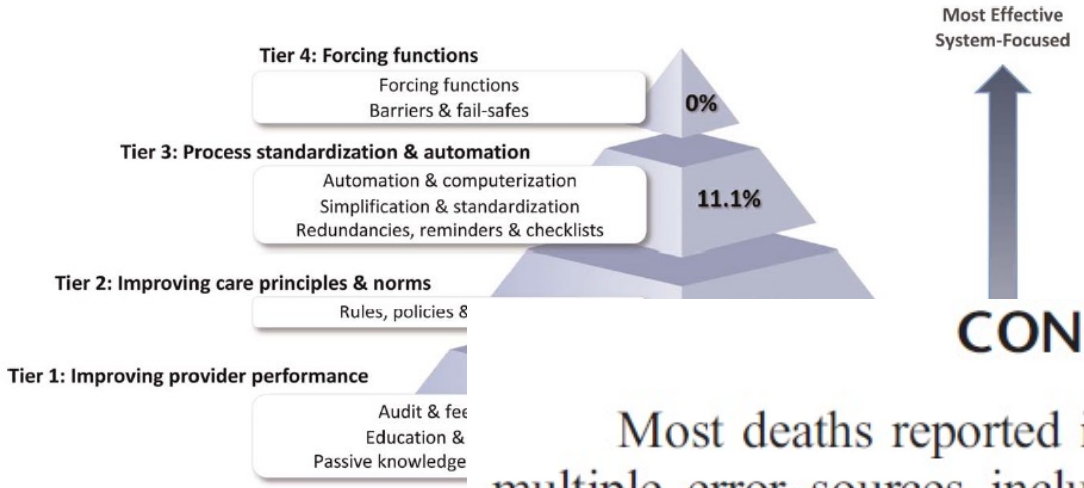
CONCLUSION: Most strategies to reduce errors in trauma centers focus on changing the performance of providers rather than system-level interventions such as automation, standardization, and fail-safe approaches. Centers require additional support to develop more effective mitigations that will prevent recurrent errors and patient harm. (*J Trauma Acute Care Surg.* 2022;92: 473–480.

LEVEL OF EVIDENCE: Therapeutic/Care Management, level V.

KEY WORDS: Trauma centers; patient harm; patient safety; quality improvement; medical errors.



Mitigation Strategies



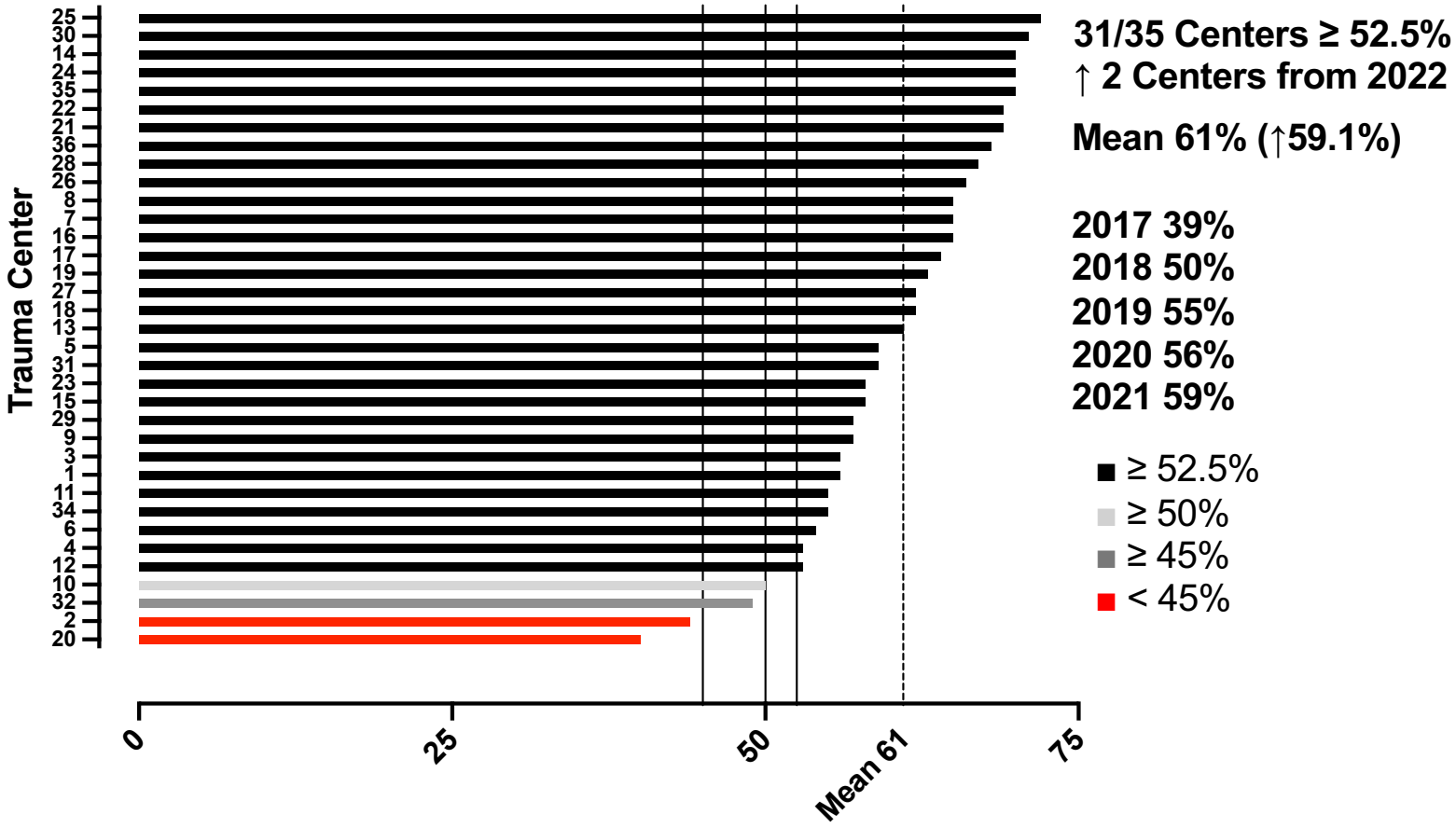
CONCLUSION

Most deaths reported in the ACS TQIP MRS identified multiple error sources including individual and system-level causes. Trauma centers frequently adopt mitigation plans that focus on person-level interventions such as education and training, with little attention to system-level interventions, such as automation, standardization, and forcing functions. Trauma centers would benefit from a greater exploration of system-level interventions, in line with known principles of high reliability, to reduce error-related deaths.

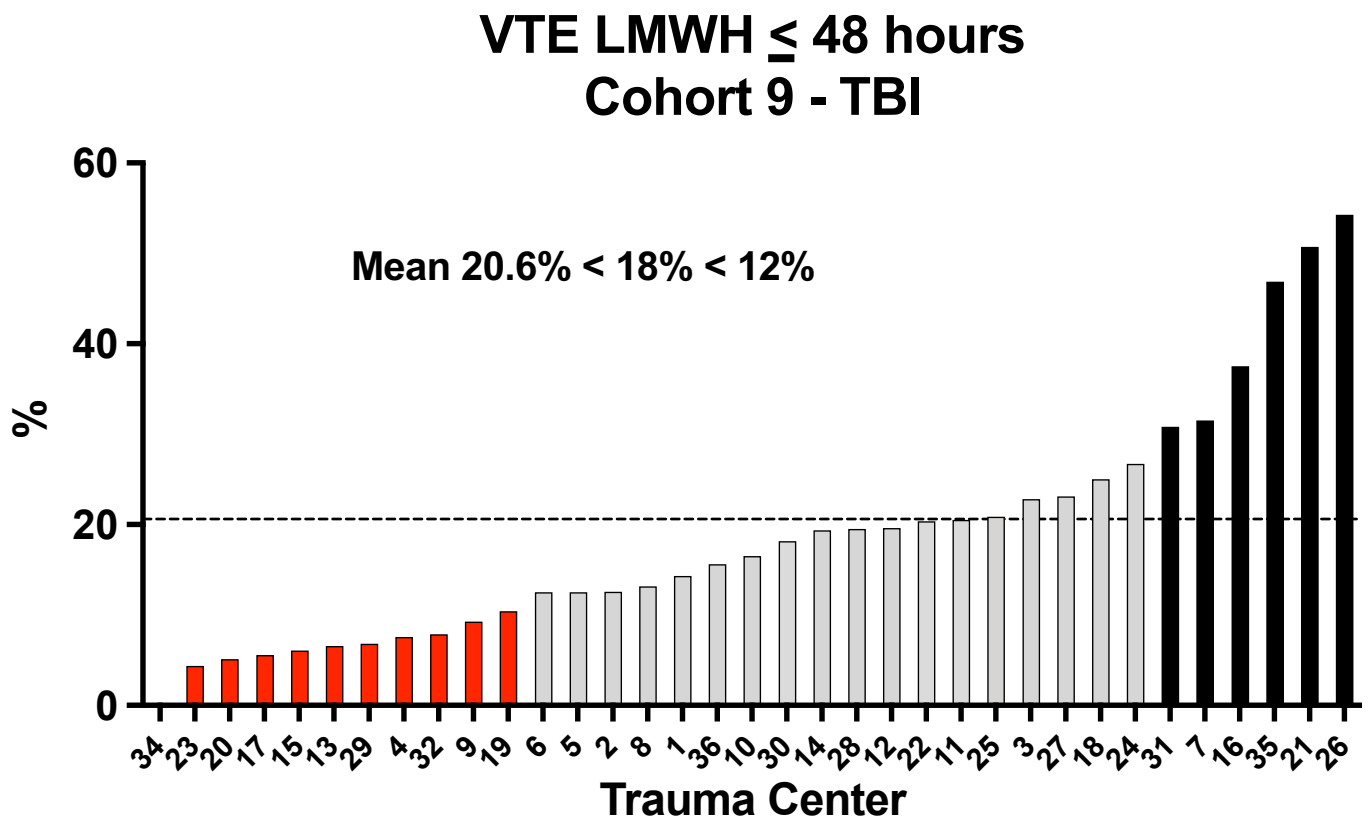
#5 Timely LMWH VTE Prophylaxis in Trauma Service Admits

- Venous Thromboembolism (VTE) Prophylaxis with LMWH Initiated Within 48 Hours of Arrival in Trauma Service Admits with > 2 Day Length of Stay (18 mo: 1/1/22-6/30/23)
  - ≥ 52.5% of patients (≤ 48 hr)
  - ≥ 50% of patients (≤ 48 hr)
  - ≥ 45% of patients (≤ 48 hr)
  - < 45% of patients (≤ 48 hr)

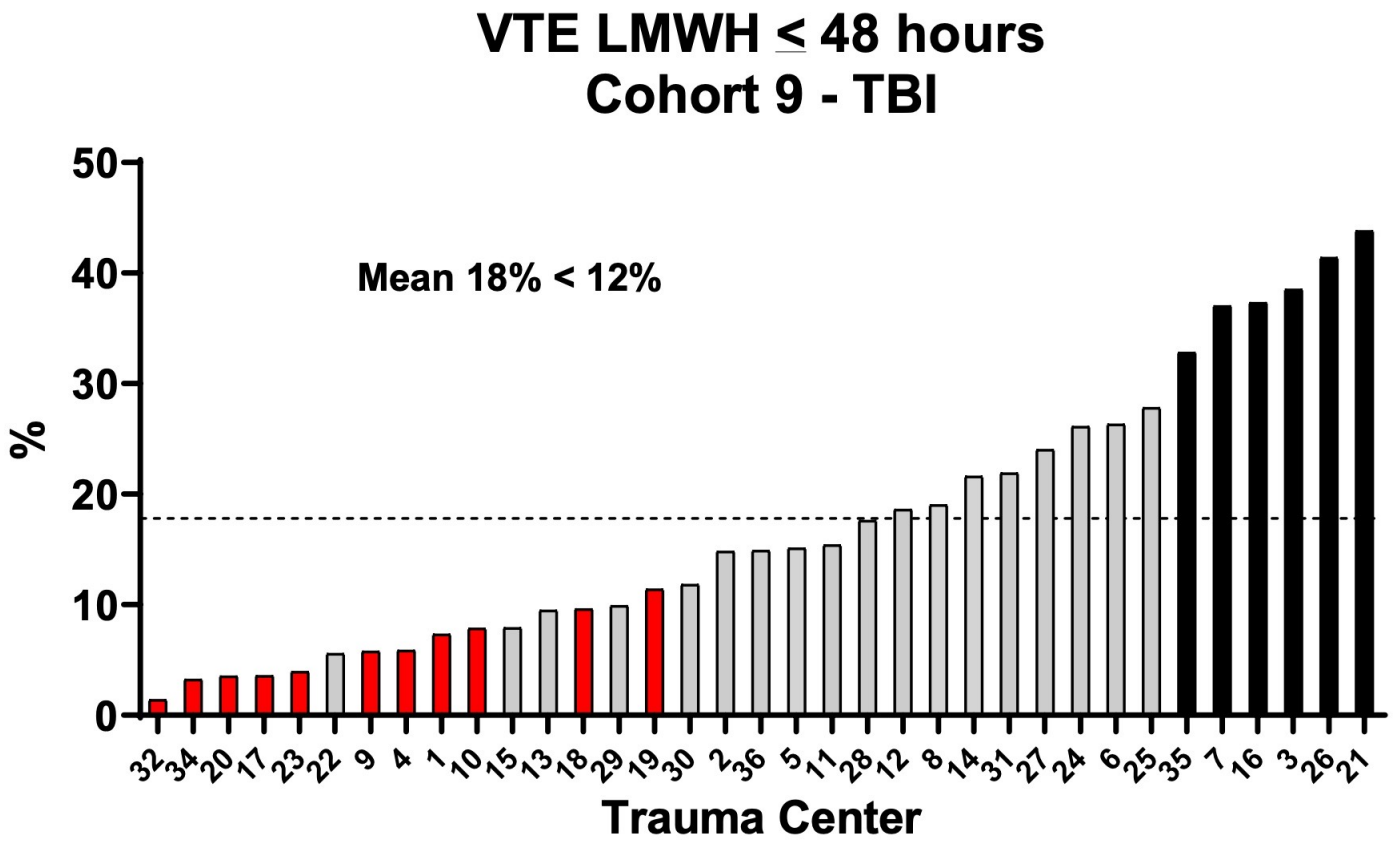
Metric 5 - VTE Prophylaxis LMWH Timeliness
Cohort 2 - Admit to Trauma
1/1/22 - 1/31/23



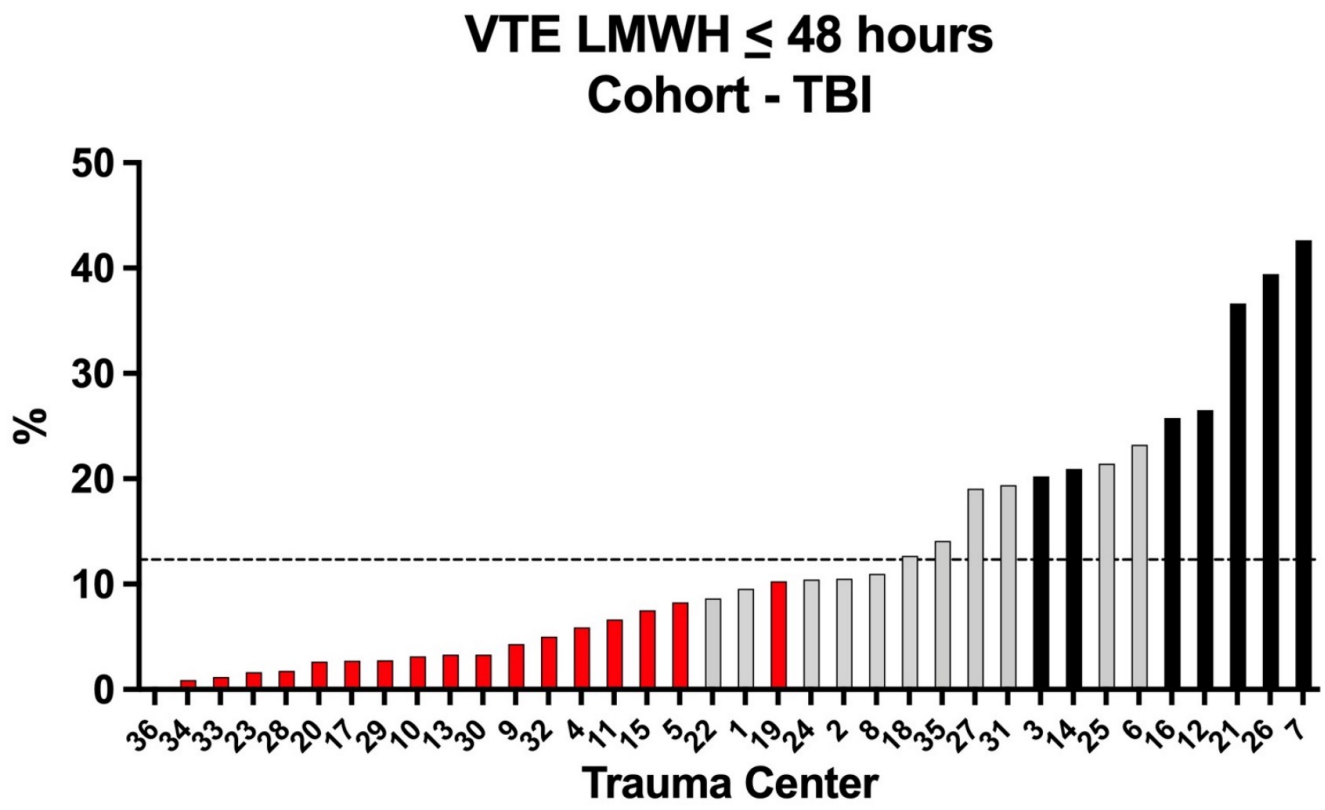
Today


VTE LMWH ≤ 48 hours
Cohort 9 - TBI
Mean 20.6% < 18% < 12%
%
60
40
20
0
34 23 20 17 15 13 29 4 32 9 19 6 5 2 8 1 36 10 30 14 28 12 22 11 25 3 27 18 24 31 7 16 35 21 26
Trauma Center

Last Year


VTE LMWH ≤ 48 hours
Cohort 9 - TBI
Mean 18% < 12%
%
50
40
30
20
10
0
32 34 20 17 23 22 9 4 1 10 15 13 18 29 19 30 2 36 5 11 28 12 8 14 31 27 24 6 25 35 7 16 3 26 21
Trauma Center

2021


VTE LMWH ≤ 48 hours
Cohort - TBI
%
50
40
30
20
10
0
36 34 33 23 28 20 17 29 10 13 30 9 32 4 11 15 5 22 1 19 24 2 8 18 35 27 31 3 14 25 6 16 12 21 26 7
Trauma Center

EARLY VTE PROPHYLAXIS IN SEVERE TRAUMATIC BRAIN INJURY: A PROPENSITY SCORE WEIGHTED EAST MULTICENTER TRIAL

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Crozer Chester Medical Center

Presenter: Daniel Kim, MD

Discussant: Christina Colosimo, DO, MS - University of Arizona, Tucson

Objectives: Patients with TBI are at high risk of venous thromboembolism events (VTE). We hypothesized that early chemical VTE prophylaxis initiation (≤24 hours of a stable head CT) in severe TBI would reduce VTE without increasing risk of intracranial hemorrhage expansion (ICHE).

Methods: A retrospective review of patients ≥18 years of age with isolated severe TBI (AIS≥3) who were admitted to 24 level 1 and level 2 trauma centers from January 1st 2014 to December 31st 2020 was conducted. Patients were divided into those who did not receive any VTE prophylaxis (NO VTEP), who received VTE prophylaxis ≤24 hours after stable head CT (VTEP ≤24) and who received VTE prophylaxis > 24 hours after stable head CT (VTEP>24). Primary outcomes were VTE and ICHE. Covariate balancing propensity score weighting was utilized to balance demographic & clinical characteristics across three groups. Weighted univariate logistic regression models were estimated for VTE & ICHE with patient group as predictor of interest.

Results: Of 3,936 patients, 2,659 met inclusion criteria. VTEP≤24 had a significantly lower incidence of VTE (p<0.001) compared to VTEP>24 and NO VTEP, with no difference in ICHE after VTE prophylaxis initiation (p=0.590) [Table 1]. After propensity score weighting, logistic regression modeling demonstrated VTEP>24 had more than two-fold odds of VTE compared to VTEP≤24 (Table 2; p=0.059). NO VTEP had 31% decreased odds of VTE compared to VTEP≤24 group (p=0.389). In comparison to VTEP≤24, NO VTEP had 36% decreased odds of ICHE (p=0.001) & VTEP>24 had 4% decreased odds of ICHE (p=0.757).

Conclusions: In this large multi-center analysis, there were no significant differences in VTE based on timing of initiation of VTE prophylaxis. Patients who never received VTE prophylaxis had decreased odds of ICHE. Further evaluation of VTE prophylaxis in larger randomized studies will be necessary for definitive conclusions.

Table 1. Demographics and Characteristics of Patients with Severe TBI

		No VTEP (N=1477)	VTEP≤24 (N=395)	VTEP >24 (N=787)
Age, Median (Q1, Q3)		66 (50, 81)	64 (45.9, 82)	62 (45, 75)
Sex, n(%)	Female	588 (39.8%)	154 (39.0%)	294 (37.4%)
Race, n(%)	African American	303 (20.5%)	69 (17.5%)	184 (23.4%)
	White	1060 (67.7%)	283 (71.6%)	510 (64.8%)
	Hispanic	88 (6.0%)	14 (3.5%)	36 (4.6%)
	Asian	43 (2.9%)	9 (2.3%)	18 (2.3%)
	Other	43 (2.9%)	20 (5.1%)	39 (4.9%)
AIS Head, n(%)	3	723 (49.0%)	201 (50.9%)	352 (44.7%)
	4	455 (30.8%)	124 (31.4%)	220 (28.0%)
	5	299 (20.2%)	70 (17.7%)	215 (27.3%)
Mechanism of Injury, n(%)	Blunt	1435 (97.1%)	384 (97.2%)	752 (95.5%)
	Penetrating	32 (2.2%)	8 (2.0%)	32 (4.1%)
Mechanism of Blunt Injury, n(%)	Fall	1095 (76.4%)	284 (74.3%)	534 (71.0%)

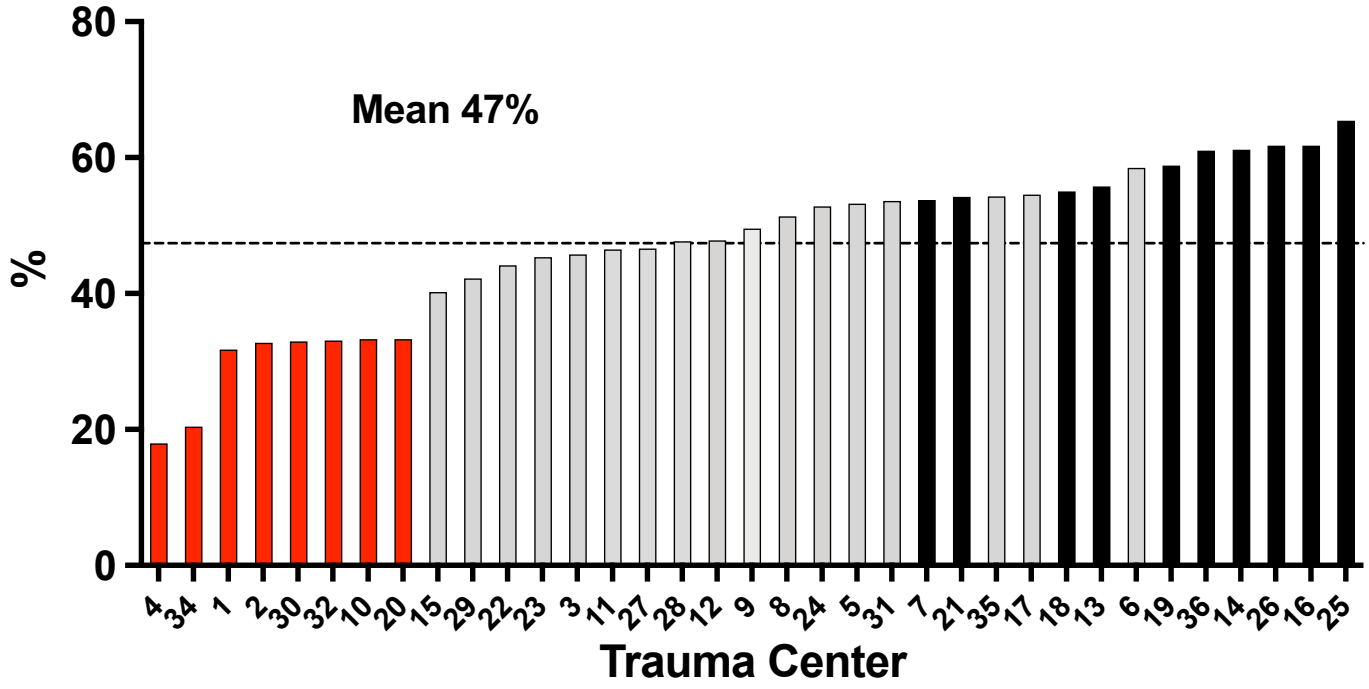
Table 2: Summary of Weighted* Univariate Logistic Regression Model Results for VTE and ICHE in Severe TBI Patients (N=2,659)

Model	*Outcome**	*Predictor*	*Odds Ratio (95% CI)*	*p-value*
1	VTE	Patient Group		
		No VTEP	0.69 (0.30, 1.59)	0.389
		VTEP >24	2.14 (0.97, 4.72)	0.059
		VTEP ≤24	-Reference-	
2	ICHE	Patient Group		
		No VTEP	0.64 (0.49, 0.83)	0.001
		VTEP >24	0.96 (0.73, 1.26)	0.757
		VTEP ≤24	-Reference-	

CI: Confidence Interval; *Variables included in CBPS weighting were: patient age, admission HR, admission SBP, admission GCS, initial platelet count, hemoglobin, international normalized ratio, PRBC given at admission, FFP given at admission, platelets given at admission, cryo given at admission, TXA given at admission, PCC given at admission, gender, race, AIS, HTN, CAD, DM-1 or DM-2, COPD, CKD, coagulopathy, liver disease, cancer, mechanism of blunt injury, MTP at admission, multiple contusions per lobe, subarachnoid hemorrhage, SAH with abnormal CTA, subdural hematoma > 8mm and presence of intraventricular hemorrhage.

Today

VTE LMWH ≤ 48 hours
Cohort - Spine Injury



CNTR

COALITION FOR NATIONAL TRAUMA RESEARCH

2022 CONSENSUS CONFERENCE

TO IMPLEMENT OPTIMAL VTE PROPHYLAXIS IN TRAUMA

CNTR and Trauma Societies > Weight Based LMWH

International Consensus Meeting VTE-Trauma

Orthopaedics representation

LMWH

Recommendations from the ICM-VTE: Trauma

The ICM-VTE Trauma Delegates*

1 - What is the most optimal VTE prophylaxis in patients with multiple orthopaedic injuries?

Response/Recommendation: Although multiple forms of prophylaxis against venous thromboembolism (VTE) with variable effectiveness are available for patients with multiple orthopedic injuries, low-molecular-weight heparin (LMWH) is considered the most optimal choice based on available literature.

Strength of Recommendation: Acceptable.

Delegates vote: Agree 86.36% Disagree 9.09% Abstain 4.55% (Strong Consensus).

and safe method in preventing DVT in high-risk trauma patients[15]. Geerts et al., also concluded in a randomized double blinded study that LMWH was more effective than LDH in preventing VTE after major trauma[16]. Aggarwal et al., concluded in their guidelines for prevention of VTE in hospitalized patients with pelvis and acetabular fractures that LMWH is the preferred agent of choice[8].

In the updated Western Trauma Association (WTA) guidelines to reduce VTE in trauma patients[1], LMWH was the recommended agent of choice for most trauma patients with a standard dose of 40 mg subcutaneously twice daily. However, in some cases

“Not so fast, my friend”

The NEW ENGLAND JOURNAL of MEDICINE

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Aspirin or Low-Molecular-Weight Heparin for Thromboprophylaxis after a Fracture

Major Extremity Trauma Research Consortium (METRC)*

ABSTRACT

BACKGROUND

Clinical guidelines recommend low-molecular-weight heparin for thromboprophylaxis in patients with fractures, but trials of its effectiveness as compared with aspirin are lacking.

METHODS

In this pragmatic, multicenter, randomized, noninferiority trial, we enrolled patients 18 years of age or older who had a fracture of an extremity (anywhere from hip to midfoot or shoulder to wrist) that had been treated operatively or who had any pelvic or acetabular fracture. Patients were randomly assigned to receive low-molecular-weight heparin (enoxaparin) at a dose of 30 mg twice daily or aspirin at a dose of 81 mg twice daily while they were in the hospital. After hospital discharge, the patients continued to receive thromboprophylaxis according to the clinical protocols of each hospital. The primary outcome was death from any cause at 90 days. Secondary outcomes were nonfatal pulmonary embolism, deep-vein thrombosis, and bleeding complications.

RESULTS

A total of 12,211 patients were randomly assigned to receive aspirin (6101 patients) or low-molecular-weight heparin (6110 patients). Patients had a mean (±SD) age of 44.6±17.8 years, 0.7% had a history of venous thromboembolism, and 2.5% had a history of cancer. Patients received a mean of 8.8±10.6 in-hospital thromboprophylaxis doses and were prescribed a median 21-day supply of thromboprophylaxis at discharge. Death occurred in 47 patients (0.78%) in the aspirin group and in 45 patients (0.73%) in the low-molecular-weight–heparin group (difference, 0.05 percentage points; 96.2% confidence interval, −0.27 to 0.38; P<0.001 for a noninferiority margin of 0.75 percentage points). Deep-vein thrombosis occurred in 2.51% of patients in the aspirin group and 1.71% in the low-molecular-weight–heparin group (difference, 0.80 percentage points; 95% CI, 0.28 to 1.31). The incidence of pulmonary embolism (1.49% in each group), bleeding complications, and other serious adverse events were similar in the two groups.

CONCLUSIONS

In patients with extremity fractures that had been treated operatively or with any pelvic or acetabular fracture, thromboprophylaxis with aspirin was noninferior to low-molecular-weight heparin in preventing death and was associated with low incidences of deep-vein thrombosis and pulmonary embolism and low 90-day mortality. (Funded by the Patient-Centered Outcomes Research Institute; PREVENT CLOT ClinicalTrials.gov number, NCT02984384.)

The members of the writing committee (Robert V. O'Toole, M.D., Deborah M. Stein, M.D., M.P.H., Nathan N. O'Hara, Ph.D., Katherine P. Frey, Ph.D., R.N., Tara J. Taylor, M.P.H., Daniel O. Scharfstein, Sc.D., Anthony R. Carlini, M.S., Kuladeep Sudini, Ph.D., Yasmin Degani, M.P.H., Gerard P. Slobogean, M.D., M.P.H., Elliott R. Haut, M.D., Ph.D., William Obremskey, M.D., M.P.H., Reza Firoozabadi, M.D., Michael J. Bosse, M.D., Samuel Z. Goldhaber, M.D., Debra Marvel, M.A., and Renan C. Castillo, Ph.D.) assume responsibility for the overall content and integrity of this article.

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*A complete list of the METRC trial investigators is provided in the Supplementary Appendix, available at NEJM.org.

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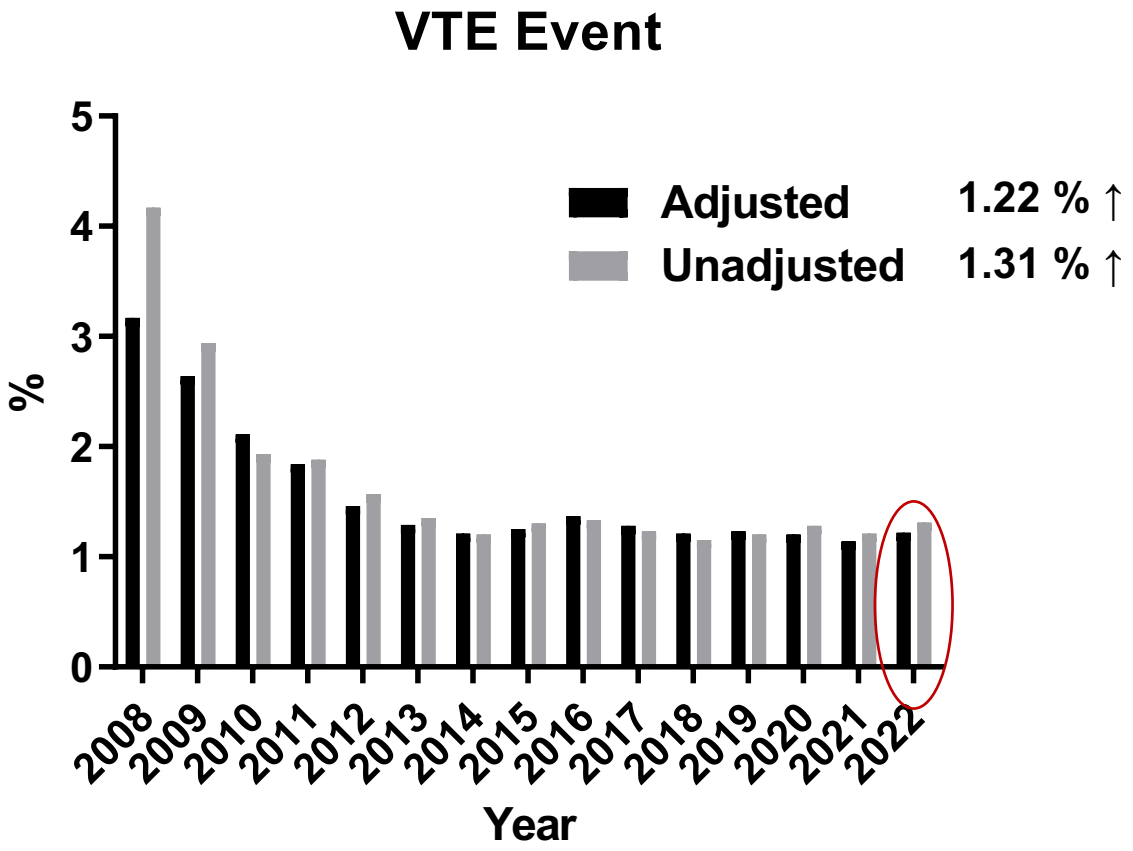
CME at NEJM.org

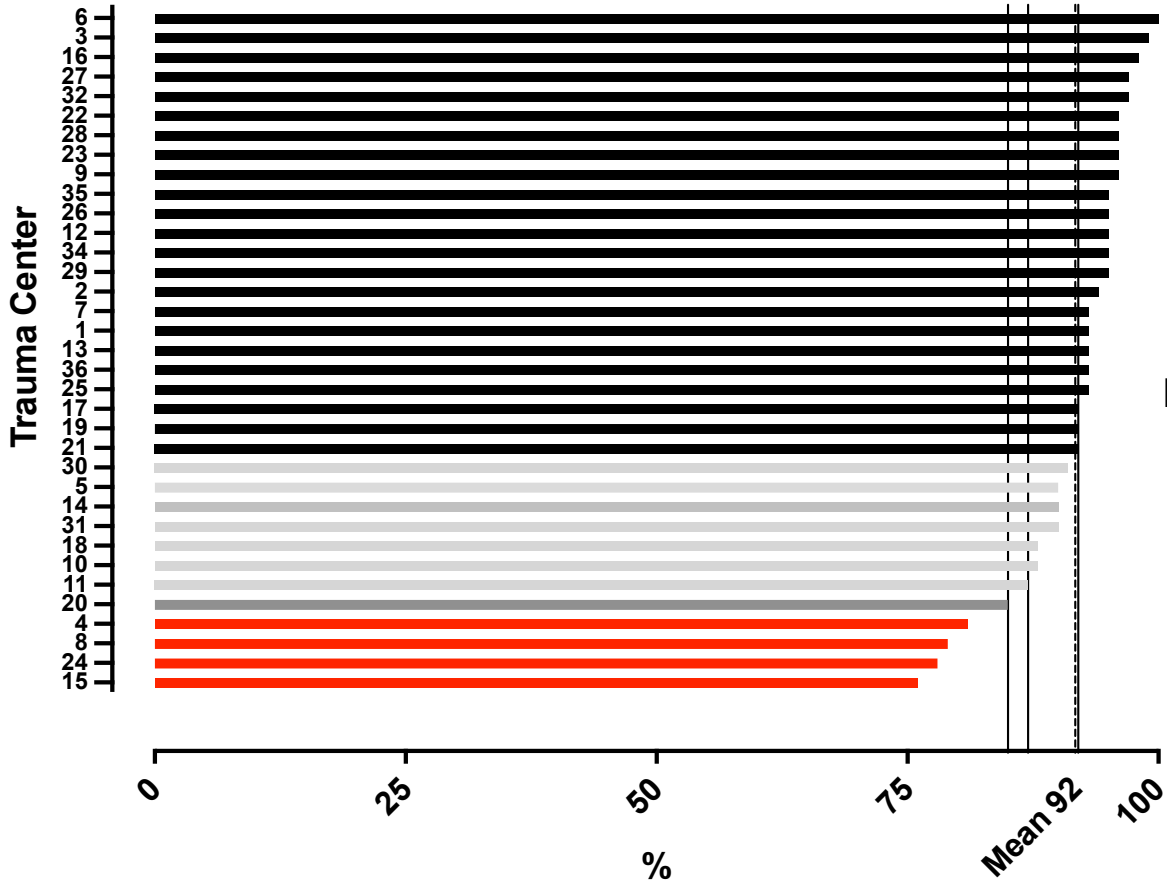

VTE Event
5
4
3
2
1
0
%
Adjusted
1.22 % ↑
Unadjusted
1.31 % ↑
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

#6 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: 7/1/21-6/30/22)
  - ≥ 92% of patients (≤ 48 hr)
  - ≥ 87% of patients (≤ 48 hr)
  - ≥ 85% of patients (≤ 48 hr)
  - < 85% of patients (≤ 48 hr)

Today

Metric 6 - Timely Surgical Hip Repair ≥ 65 years
Cohort 8 - Isolated Hip Fracture
7/1/22 - 1/31/23

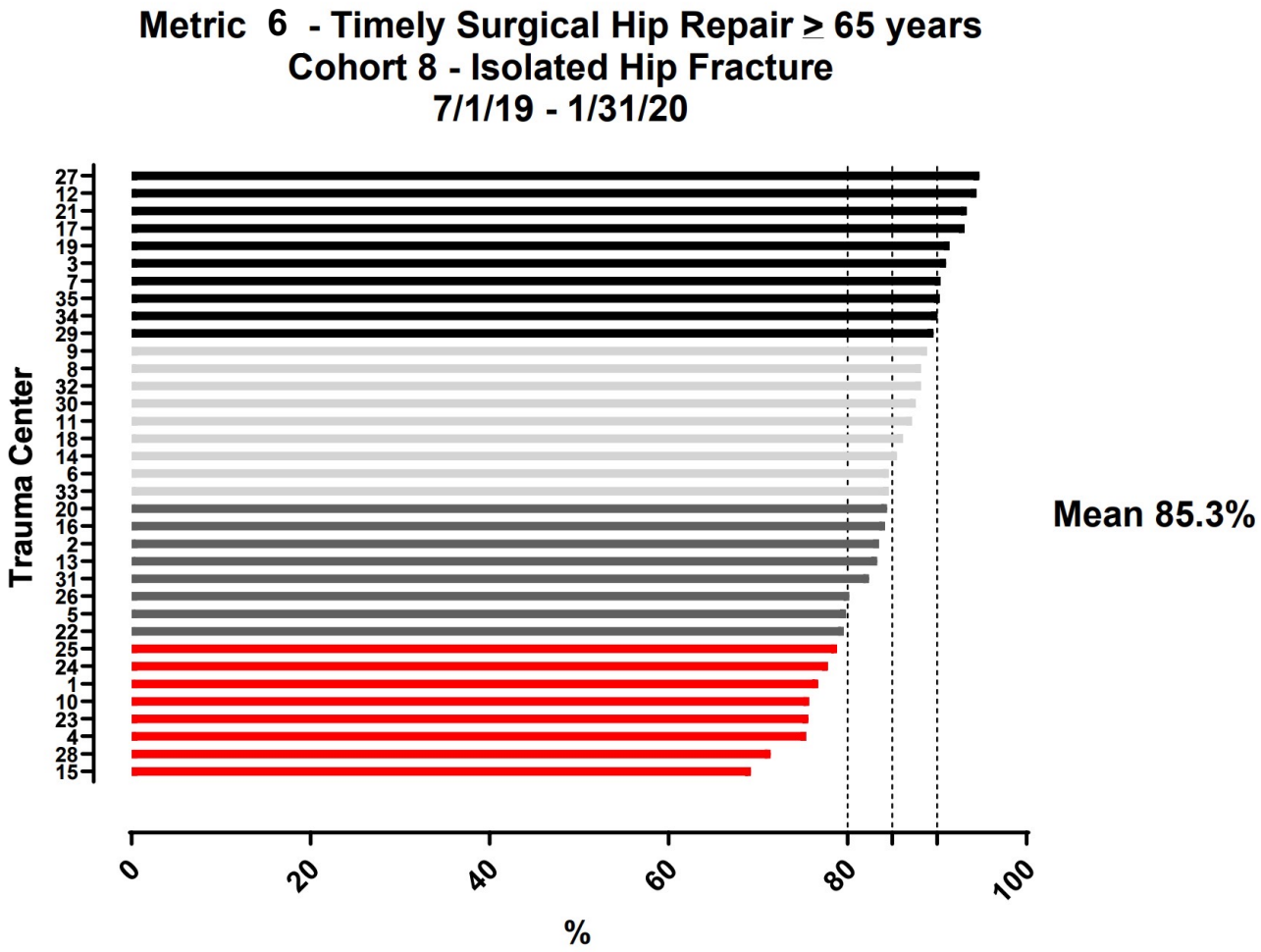


Mean 93% > 92%

Non-op excluded

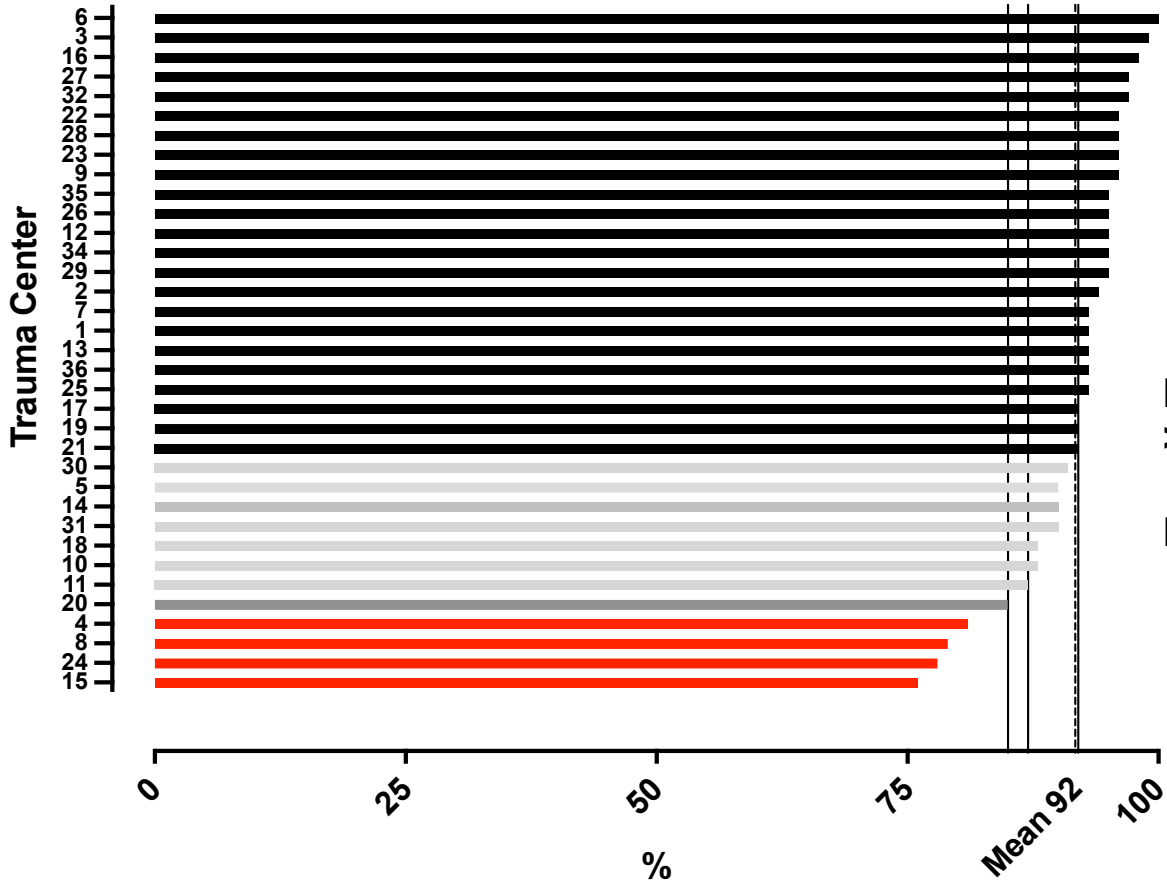
Pg. 6

3 Years Ago


Metric 6 - Timely Surgical Hip Repair ≥ 65 years
Cohort 8 - Isolated Hip Fracture
7/1/19 - 1/31/20
Trauma Center
27
12
21
17
19
3
7
35
34
29
9
8
32
30
11
18
14
6
33
20
16
2
13
31
26
5
22
25
24
1
10
23
4
28
15
0
20
40
60
80
100
%
Mean 85.3%

Today

Metric 6 - Timely Surgical Hip Repair ≥ 65 years
Cohort 8 - Isolated Hip Fracture
7/1/22 - 1/31/23



Mean 94% > 93%
> 92%

Backsliding

Non-op excluded

Pg. 6

ASPIRE

time_to_room_cat_enc	dead_or_hospice 0	1	Total
1. <=24h	1,508 96.79	50 3.21	1,558 100.00
2. 24h to 48h	811 95.19	41 4.81	852 100.00
3. >48h	186 94.42	11 5.58	197 100.00
Total	2,505 96.09	102 3.91	2,607 100.00

Pearson chi2(2) = 5.3477 Pr = 0.069

time_to_room_cat_enc	serious 0	1	Total
1. <=24h	1,494 95.89	64 4.11	1,558 100.00
2. 24h to 48h	795 93.31	57 6.69	852 100.00
3. >48h	180 91.37	17 8.63	197 100.00
Total	2,469 94.71	138 5.29	2,607 100.00

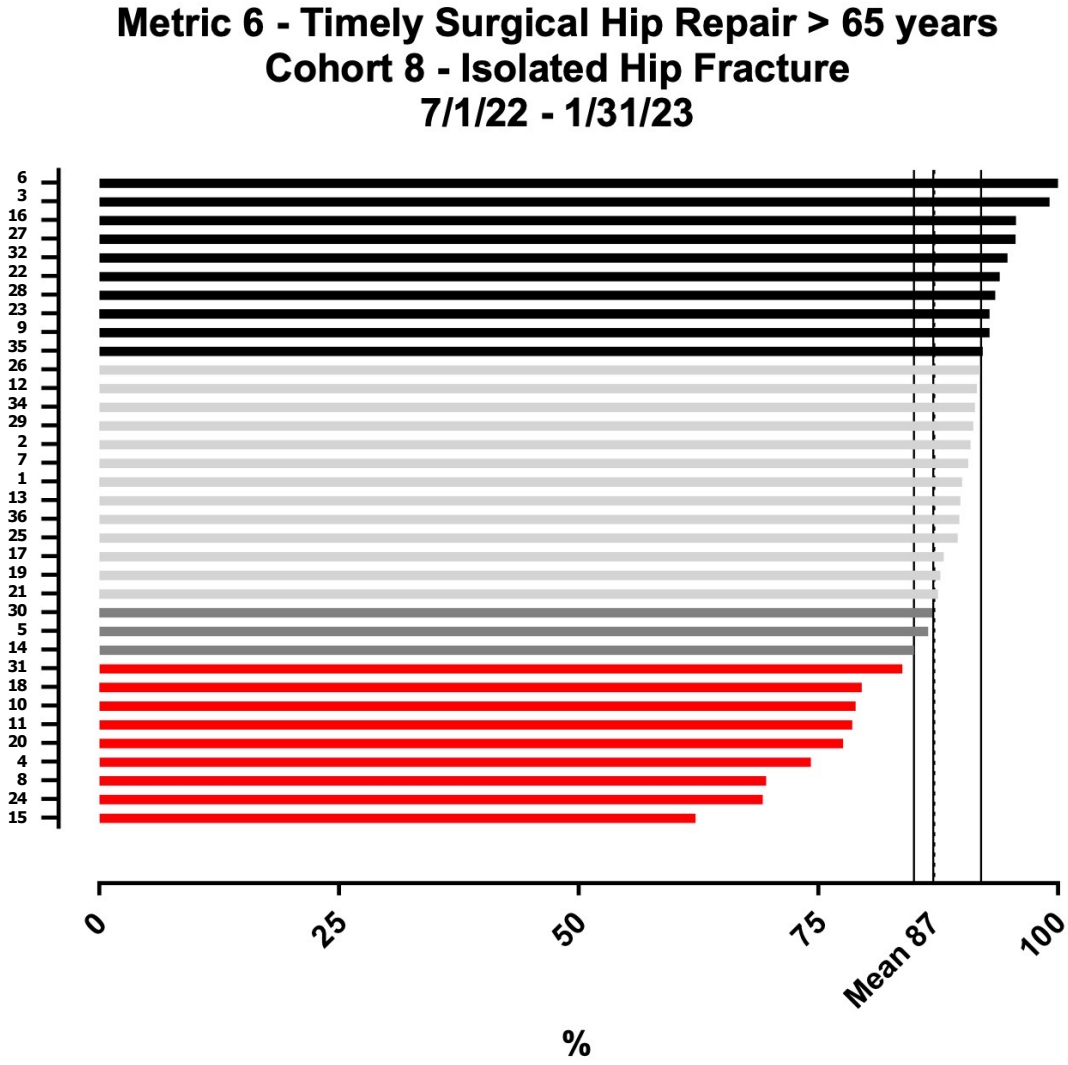
Pearson chi2(2) = 12.0571 Pr = 0.002

#6 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: 7/1/23-6/30/24)
  - ≥ 92% of patients (≤ 42 hr)
  - ≥ 87% of patients (≤ 42 hr)
  - ≥ 85% of patients (≤ 42 hr)
  - < 85% of patients (≤ 42 hr)

< 42 hours

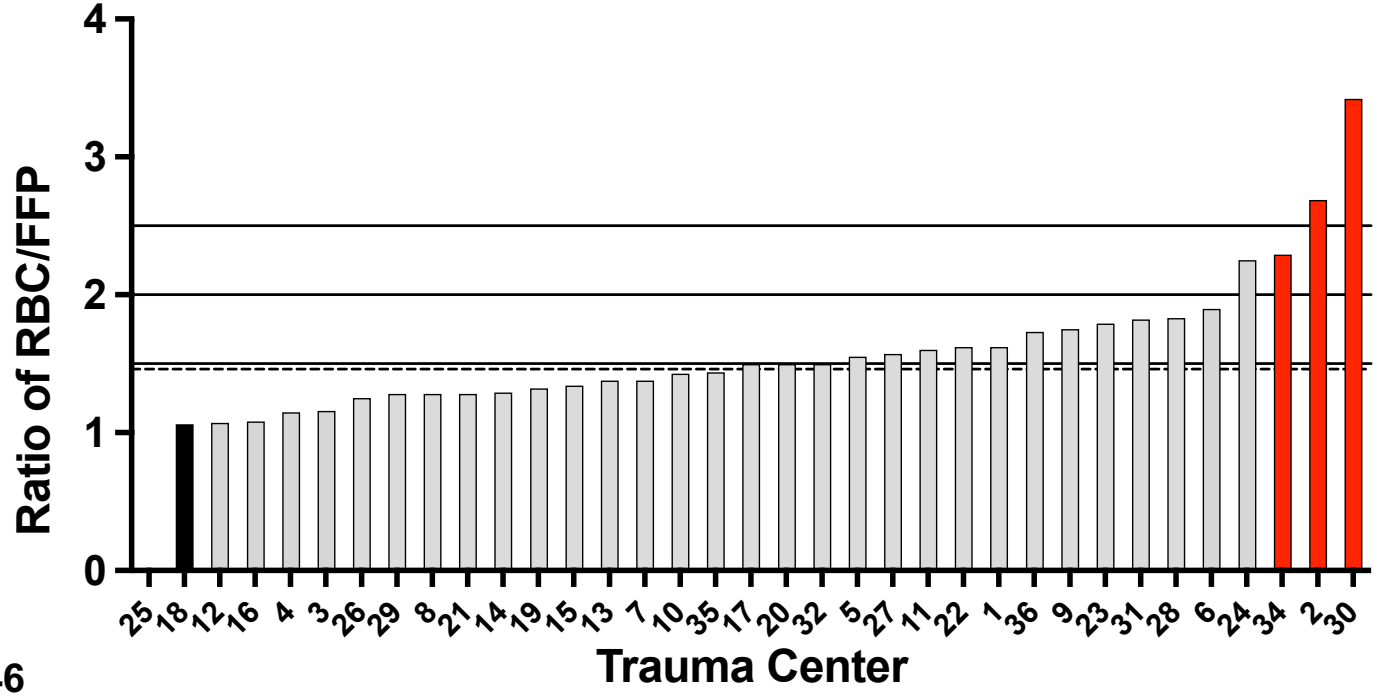
42 hours


Metric 6 - Timely Surgical Hip Repair > 65 years
Cohort 8 - Isolated Hip Fracture
7/1/22 - 1/31/23
6
3
16
27
32
22
28
23
9
35
26
12
34
29
2
7
1
13
36
25
17
19
21
30
5
14
31
18
10
11
20
4
8
24
15
0
25
50
75
Mean 87
100
%

#7 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: 1/1/22-6/30/23)

Metric 7 - RBC to FFP Ratio - Mean
Cohort 1 - MTQIP All
1/1/22 - 1/31/23



Mean 1.46

JAMA Surgery | Original Investigation

Association of Whole Blood With Survival Among Patients Presenting With Severe Hemorrhage in US and Canadian Adult Civilian Trauma Centers

Crisanto M. Torres, MD, MPH; Alistair Kent, MD, MPH; Dane Scantling, DO, MPH; Bellal Joseph, MD; Elliott R. Haut, MD, PhD; Joseph V. Sakran, MD, MPH, MPA

Invited Commentary
page 540

Multimedia

Supplemental content

IMPORTANCE Whole-blood (WB) resuscitation has gained renewed interest among civilian trauma centers. However, there remains insufficient evidence that WB as an adjunct to component therapy–based massive transfusion protocol (WB-MTP) is associated with a survival advantage over MTP alone in adult civilian trauma patients presenting with severe hemorrhage.

OBJECTIVE To assess whether WB-MTP compared with MTP alone is associated with improved survival at 24 hours and 30 days among adult trauma patients presenting with severe hemorrhage.

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study using the American College of Surgeons Trauma Quality Improvement Program databank from January 1, 2017, and December 31, 2018, included adult trauma patients with a systolic blood pressure less than 90 mm Hg and a shock index greater than 1 who received at least 4 units of red blood cells within the first hour of emergency department (ED) arrival at level I and level II US and Canadian adult civilian trauma centers. Patients with burns, death within 1 hour of ED arrival, and interfacility transfers were excluded. Data were analyzed from February 2022 to September 2022.

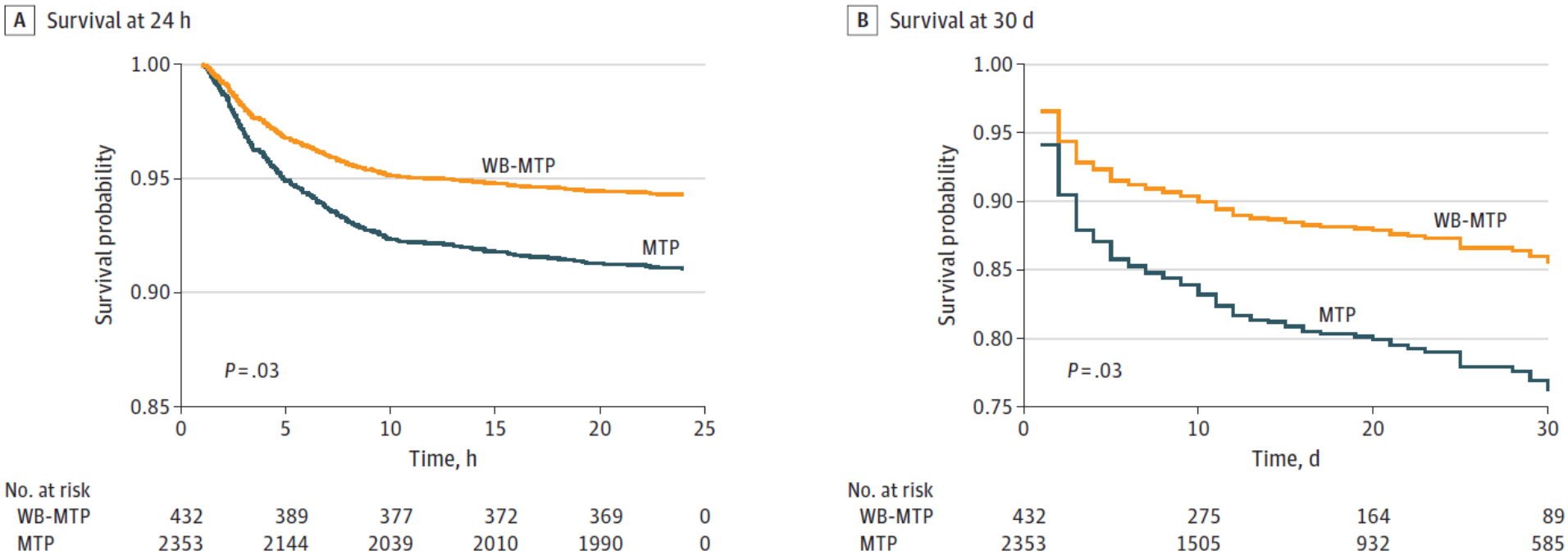
EXPOSURES Resuscitation with WB-MTP compared with MTP alone within 24 hours of ED presentation.

MAIN OUTCOMES AND MEASURES Primary outcomes were survival at 24 hours and 30 days. Secondary outcomes selected a priori included major complications, hospital length of stay, and intensive care unit length of stay.

RESULTS A total of 2785 patients met inclusion criteria: 432 (15.5%) in the WB-MTP group (335 male [78%]; median age, 38 years [IQR, 27-57 years]) and 2353 (84.5%) in the MTP-only group (1822 male [77%]; median age, 38 years [IQR, 27-56 years]). Both groups included severely injured patients (median injury severity score, 28 [IQR, 17-34]; median difference, 1.29 [95% CI, −0.05 to 2.64]). A survival curve demonstrated separation within 5 hours of ED presentation. WB-MTP was associated with improved survival at 24 hours, demonstrating a 37% lower risk of mortality (hazard ratio, 0.63; 95% CI, 0.41-0.96; $P = .03$). Similarly, the survival benefit associated with WB-MTP remained consistent at 30 days (HR, 0.53; 95% CI, 0.31-0.93; $P = .02$).

CONCLUSIONS AND RELEVANCE In this cohort study, receipt of WB-MTP was associated with improved survival in trauma patients presenting with severe hemorrhage, with a survival benefit found early after transfusion. The findings from this study are clinically important as this is an essential first step in prioritizing the selection of WB-MTP for trauma patients presenting with severe hemorrhage.

Figure 2. Adjusted Kaplan-Meier Survival Estimates by Transfusion Group



MTP indicates massive transfusion protocol and WB-MTP, whole blood as an adjunct to component therapy–based MTP.

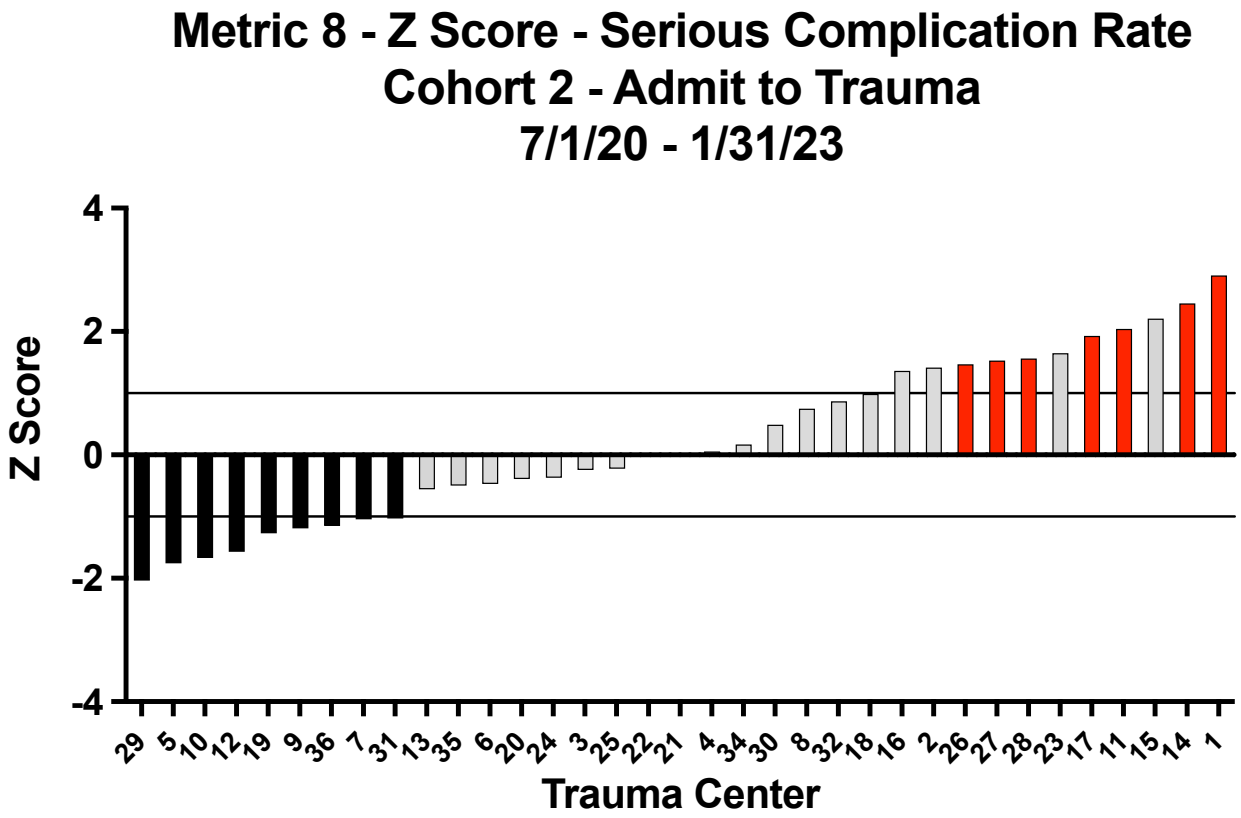
Whole Blood

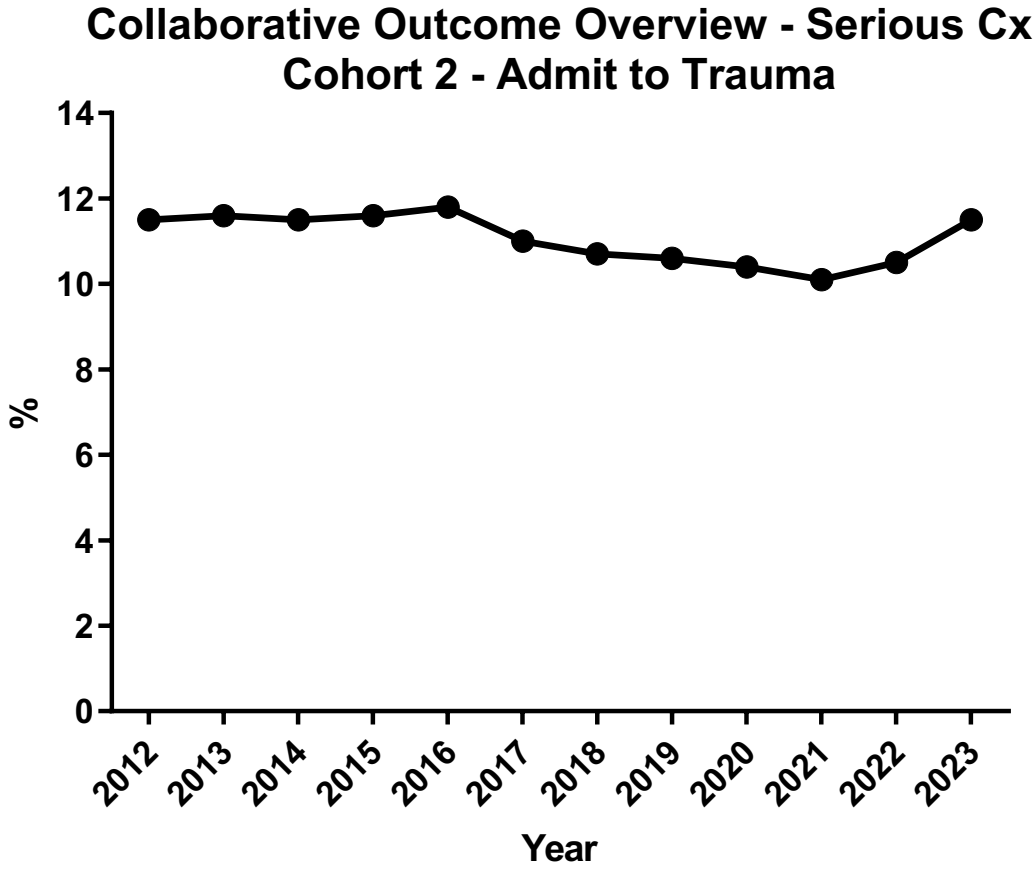
- Presentation by Bronson last year
- Who is using?
  - Bronson
  - Sparrow
  - Mid Michigan, Corewell Royal Oak (William Beaumont) ?
  - University of Michigan > Since May 1
- Plans ? Barriers ?

Z-score

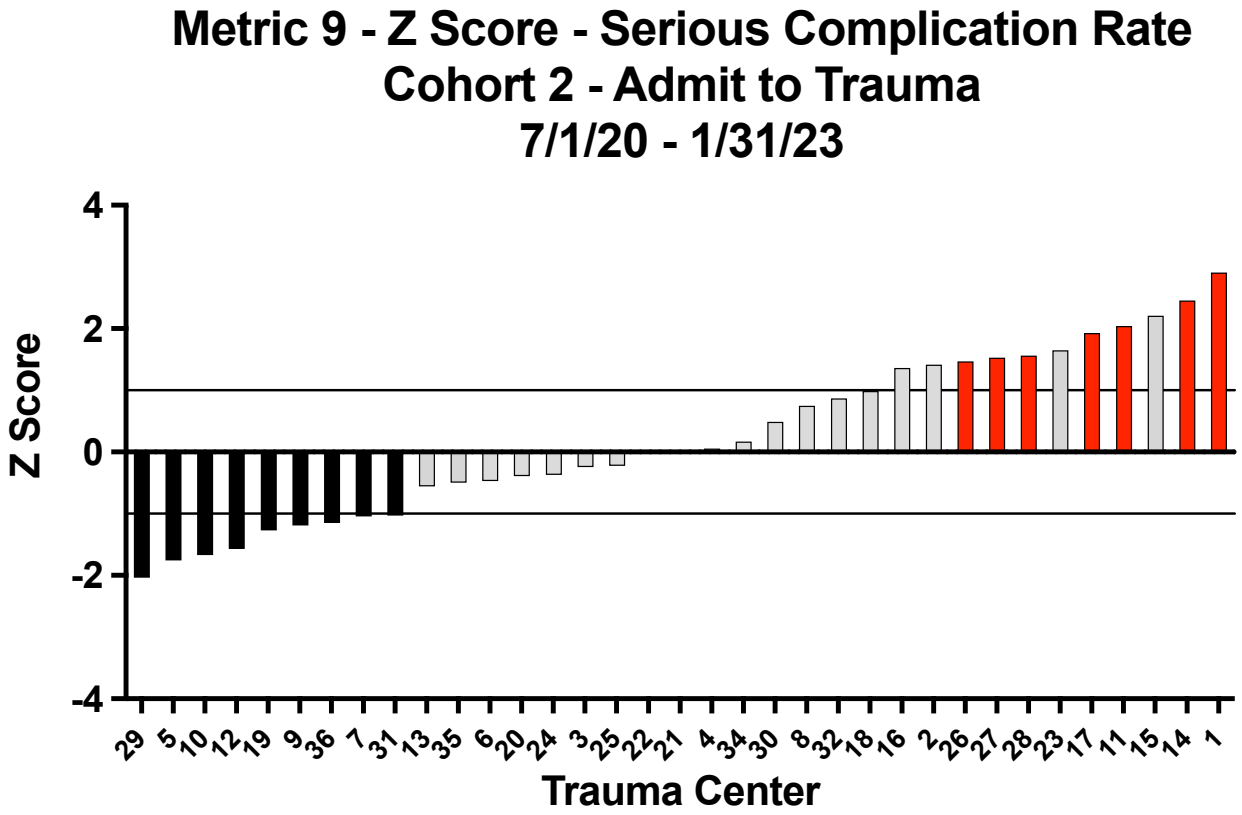
- Measure of trend in outcome over time
- Hospital specific
  - Compared to yourself
- Standard deviation
- > 1 getting worse
- 1 to -1 flat
- < -1 getting better

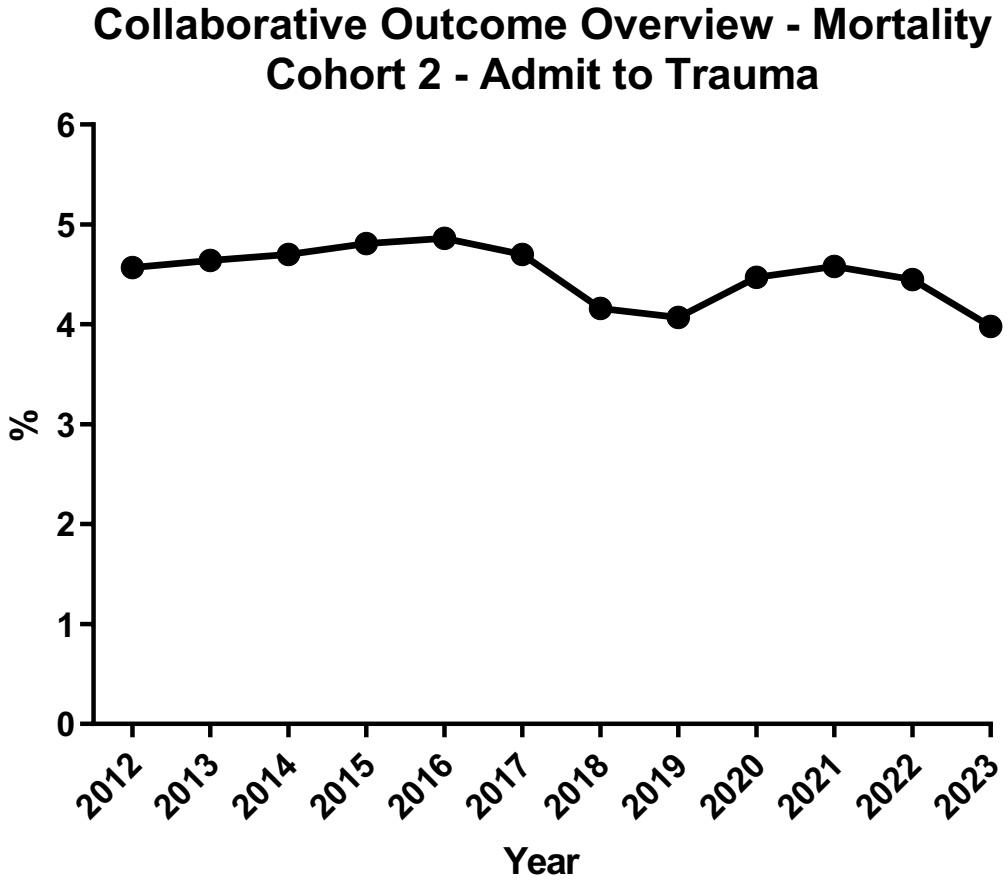
#8 Serious Complication Rate (Z-score)




Collaborative Outcome Overview - Serious Cx
Cohort 2 - Admit to Trauma
14
12
10
8
6
4
2
0
%
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year

#9 Mortality Rate (Z-score)




Collaborative Outcome Overview - Mortality
Cohort 2 - Admit to Trauma
6
5
4
3
2
1
0
%
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year

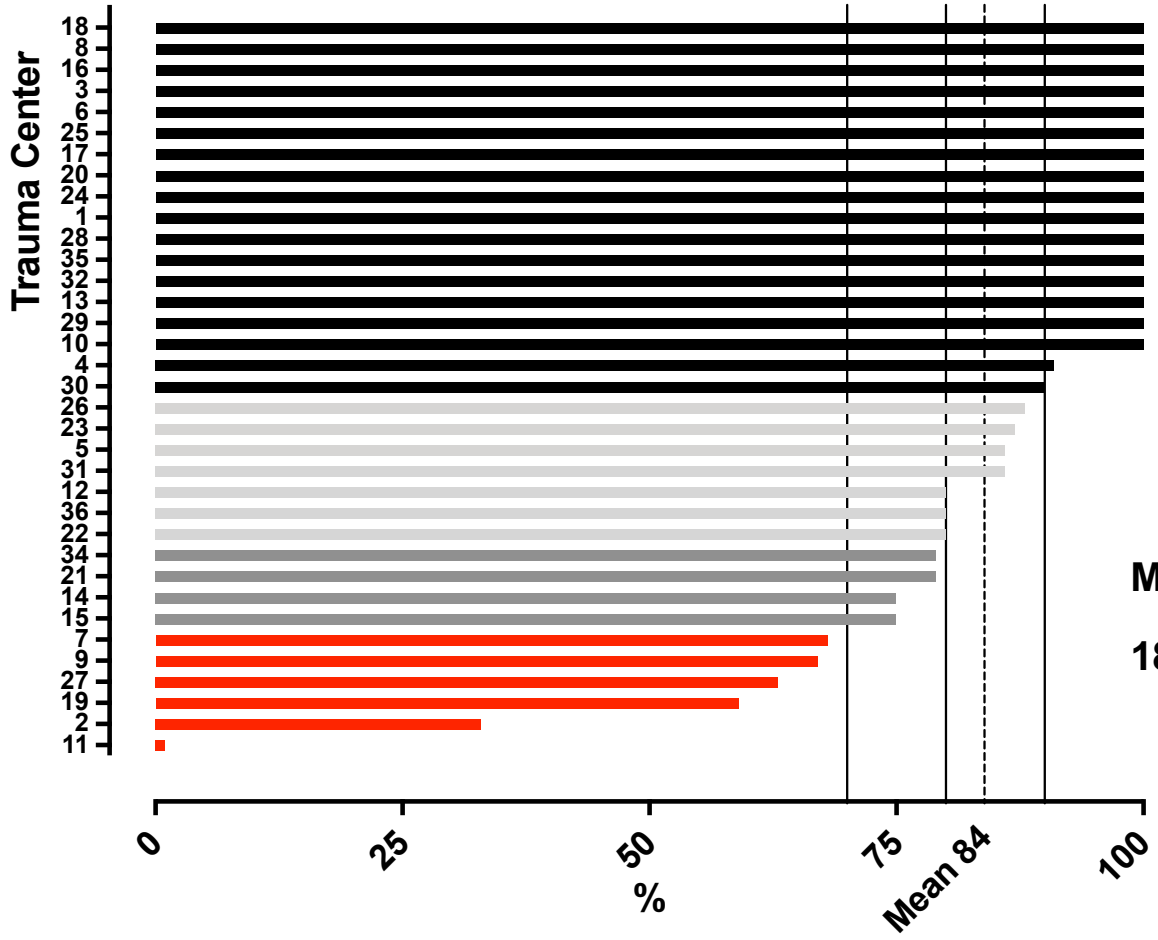
#10 Timely Head CT in TBI Patients on Anticoagulation Pre-Injury

- 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

#10 Head CT in Anticoagulated Patient with TBI

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

Metric 10 - ED Head CT ≤ 120 min
Cohort 1 - MTQIP All on Anticoagulant (Excluding ASA)
7/1/22 - 1/31/23



Mean 84% ↑ 81.5%

18/35 Centers ≥ 90% (+4)

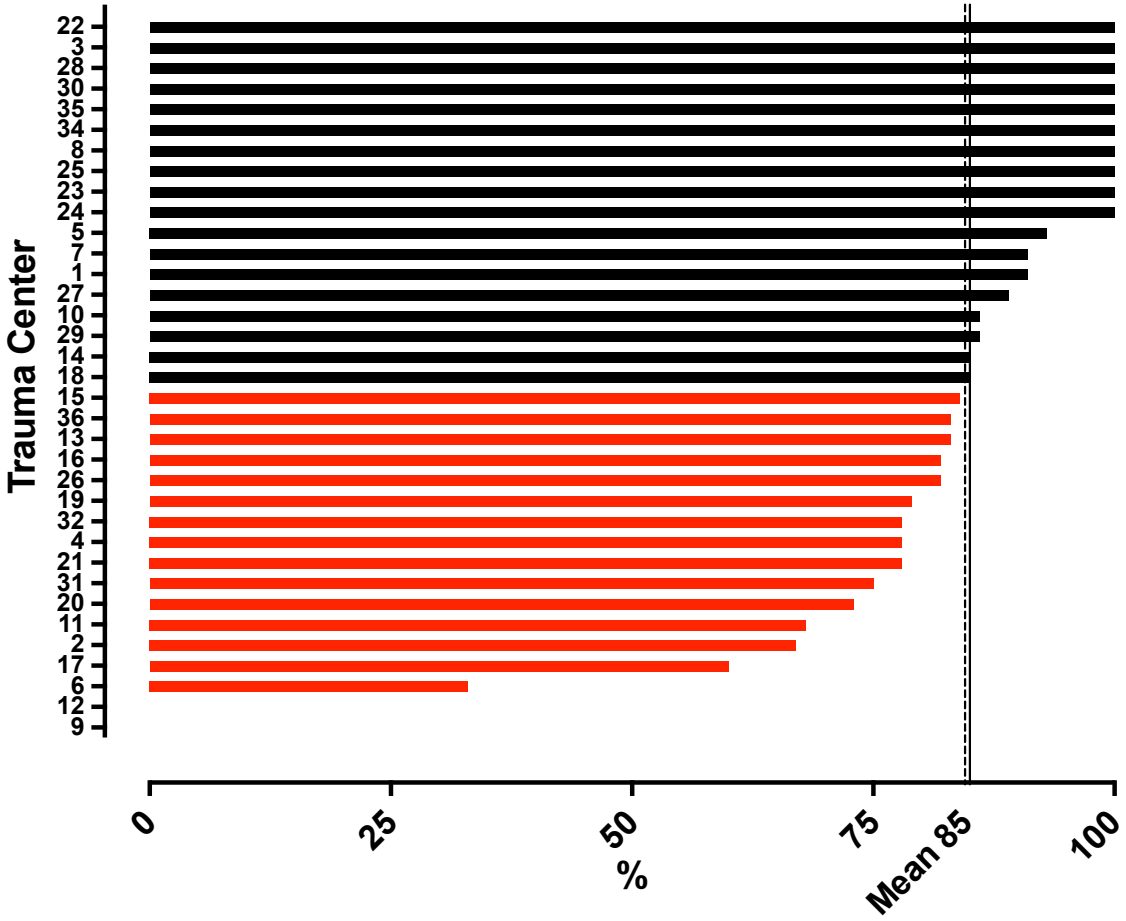
#11 Timely Antibiotic in Femur/Tibia Open Fractures - Collaborative Wide Measure

- 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 = 7/1/22 to 6/30/23

#11 Open Fracture Antibiotic Usage

- Measure = % of patients with antibiotic type, date, time recorded ≤ 90 minutes
  - ≥ 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

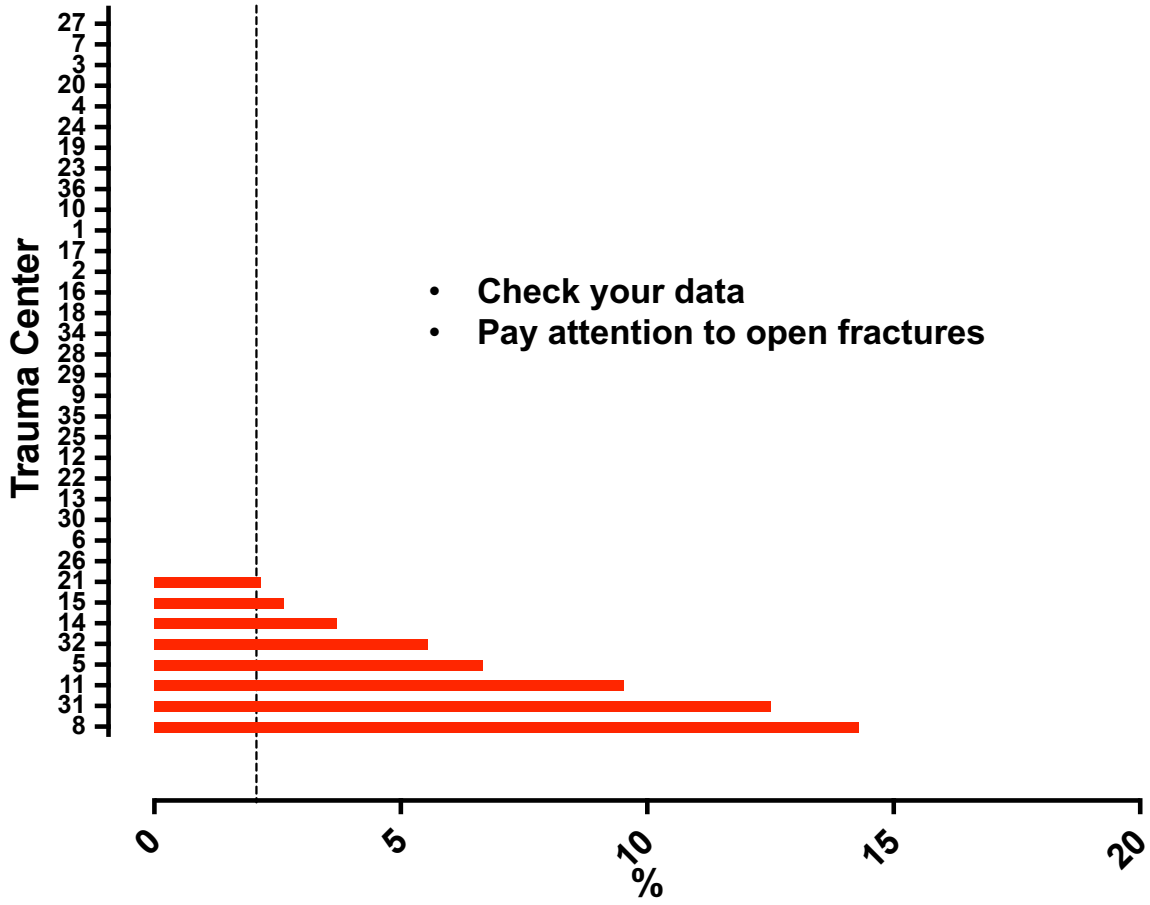
Metric 11 - Open Fracture - Time to Abx ≤ 90 min
Cohort 1 - MTQIP All
7/1/22 - 1/31/23



18/35 Centers ≥ 85%

Collaborative Mean = 84.5%

Open Fracture - Missing Type, Date or Time
Cohort 1 - MTQIP All
7/1/22 - 1/31/23



Antibiotic administration within 1 hour for open lower extremity fractures is not associated with decreased risk of infection

Areg Grigorian, MD, Morgan Schellenberg, MD, Kenji Inaba, MD, Matthew Martin, MD, Kazuhide Matsushima, MD, Michael Lekawa, MD, *and* **Jeffry Nahmias, MD, MHPE**, *Orange, California*

BACKGROUND: Open fractures have a high risk of infection with limited data correlating timing of prophylactic antibiotic administration and rate of subsequent infection. The Trauma Quality Improvement Program has established a standard of antibiotic administration within 1 hour of arrival, but there is a lack of adequately powered studies validating this quality metric. We hypothesize that open femur and/or tibia fracture patients undergoing orthopedic surgery have a decreased risk of infectious complications (osteomyelitis, deep and superficial surgical site infection) if antibiotics are administered within 1 hour of presentation compared with administration after 1 hour.

METHODS: The 2019 Trauma Quality Improvement Program was queried for adults with isolated (Abbreviated Injury Scale <1 for the head/face/spine/chest/abdomen/upper extremity) open femur and/or tibia fractures undergoing orthopedic surgery. Transfer patients were excluded. Patients receiving early antibiotics (EA) within 1 hour were compared with patients receiving delayed antibiotics (DA) greater than 1 hour from arrival.

RESULTS: Of 3,367 patients identified, 2,400 (70.4%) received EA. Patients receiving EA had a higher rate of infections compared with DA (1.1% vs. 0.2%, $p = 0.011$). After adjusting for age, comorbidities, injury severity, nerve/vascular trauma to the lower extremity, washout of the femur/tibia performed in <6 hours, blood transfusion, and admission vitals, patients in the EA group had a similar associated risk of surgical site infection/osteomyelitis compared with the DA cohort ($p = 0.087$). These results remained in subset analyses of patients with only femur, only tibia, and combined femur/tibia open fractures (all $p > 0.05$).

CONCLUSION: In this large national analysis, approximately 70% of isolated open femur or tibia fracture patients undergoing surgery received antibiotics within 1 hour. After adjusting for known risk factors of infection, there was no association between timing of antibiotic administration and infection. Reconsideration of the quality metric of antibiotic administration within 1 hour for open fractures appears warranted. (*J Trauma Acute Care Surg.* 2023;94: 226–231.

LEVEL OF EVIDENCE: Therapeutic/Care Management; Level IV.

KEY WORDS: Open fractures; surgical site infection; osteomyelitis; surgical dogma; antibiotic prophylaxis.

B. Oliphant and COT Orthopedics Chairs Letter to the Editor

#11 Open Fracture Antibiotic Usage 2022

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

MTQIP Patient Recorded Outcome Measures

Mark Hemmila, MD

Summary

- Participant Trauma Centers
  - 11 Total
  - 9 with patient responses
- Surveys
  - 462 Total
  - 368 Unique patients
- Contact
  - Text, E-mail > Phone
  - Patient preference after first contact

EuroQol

- EQ-5D-5L
  - EQ-5D is a standardized measure of health status developed by the EuroQol Group to provide a simple, generic measure of health for clinical and economic appraisal.
- Descriptive system questionnaire
  - 5 Dimensions
  - 5 Response Levels
- Visual Analogue Scale
  - EQ-VAS 0-100

Trauma Center	Patients
Center 5	8
Center 29	25
Center 35	14
Center 32	28
Center 16	15
Center 7	53
Center 25	27
Center 19	15
Center 27	183
Total	368

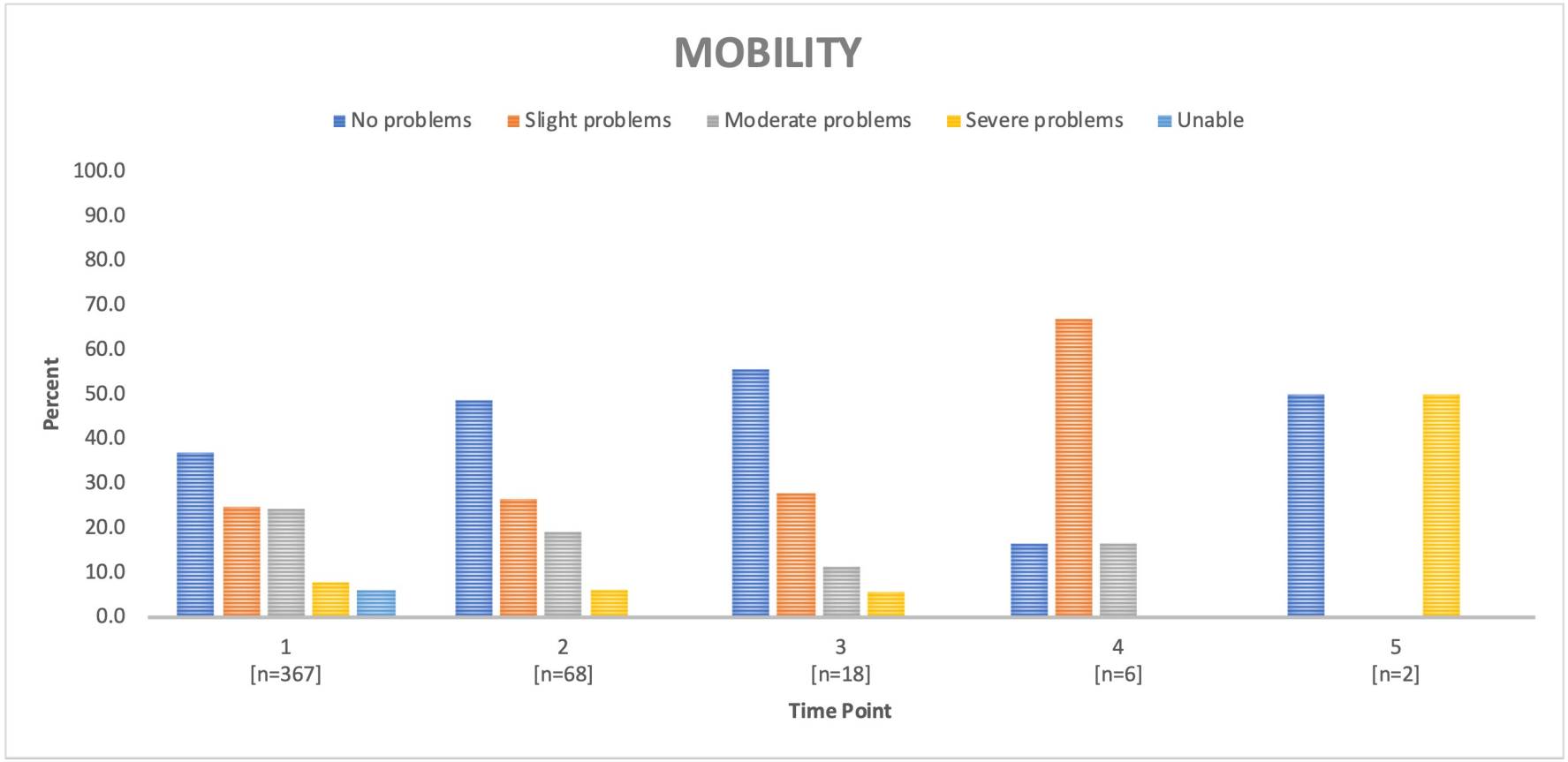
Characteristic	Value
Age	60.8 ± 19.3
Female	51.6%
Race White	92.1%
Race Black	4.1%
Race Other	3.8%
ISS	11.8 ± 6.8
Hospital LOS	5.5 ± 5.2
Operation	56%
Discharge Home (Self-care)	40%
Discharge Rehab	22.3%
Discharge SNF	18.2%
Discharge Home (Home health)	17.1%

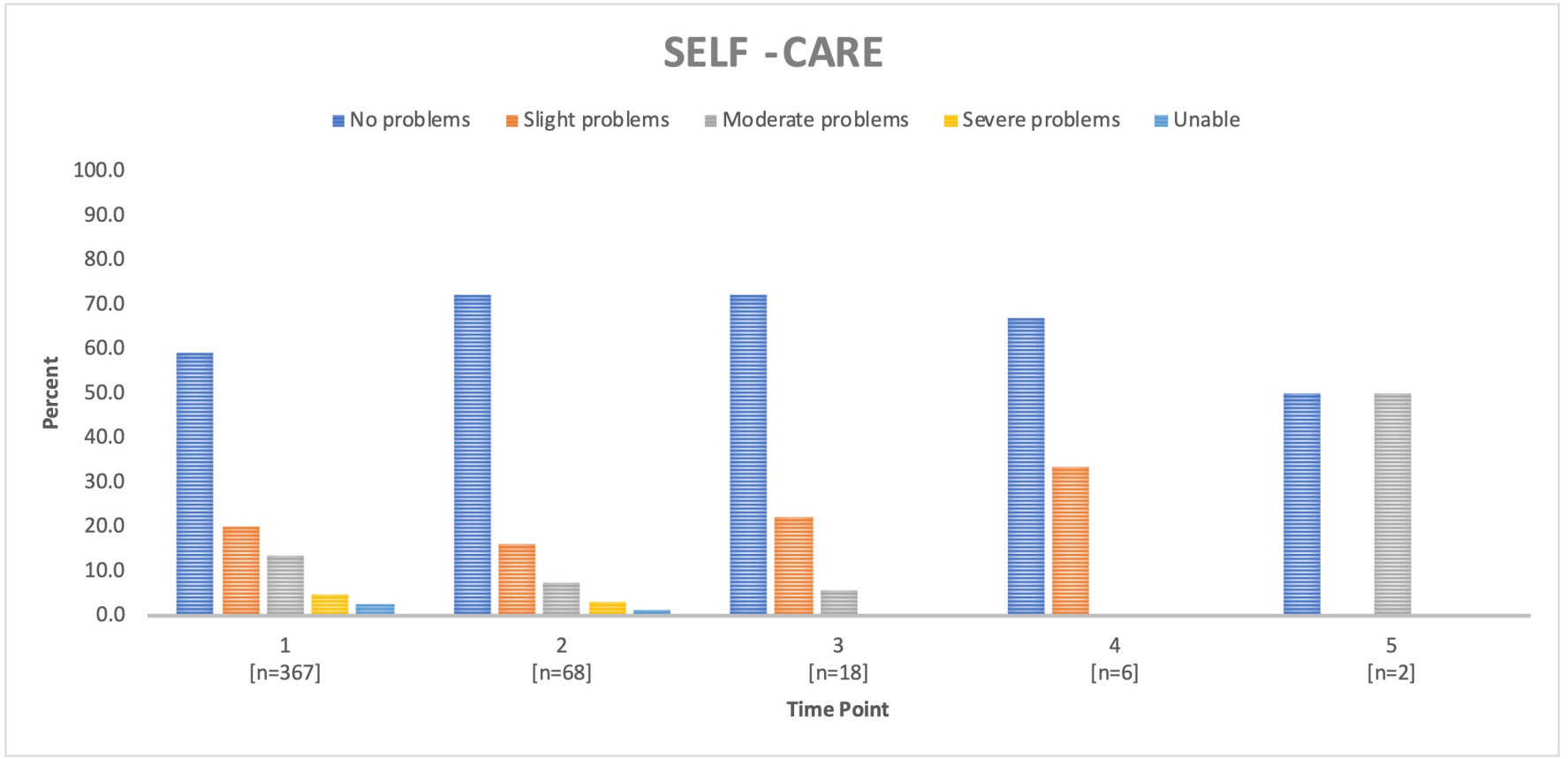
First Survey (Mean 6.0 mo, 37% 2-4 mo, 42% 5-7 mo

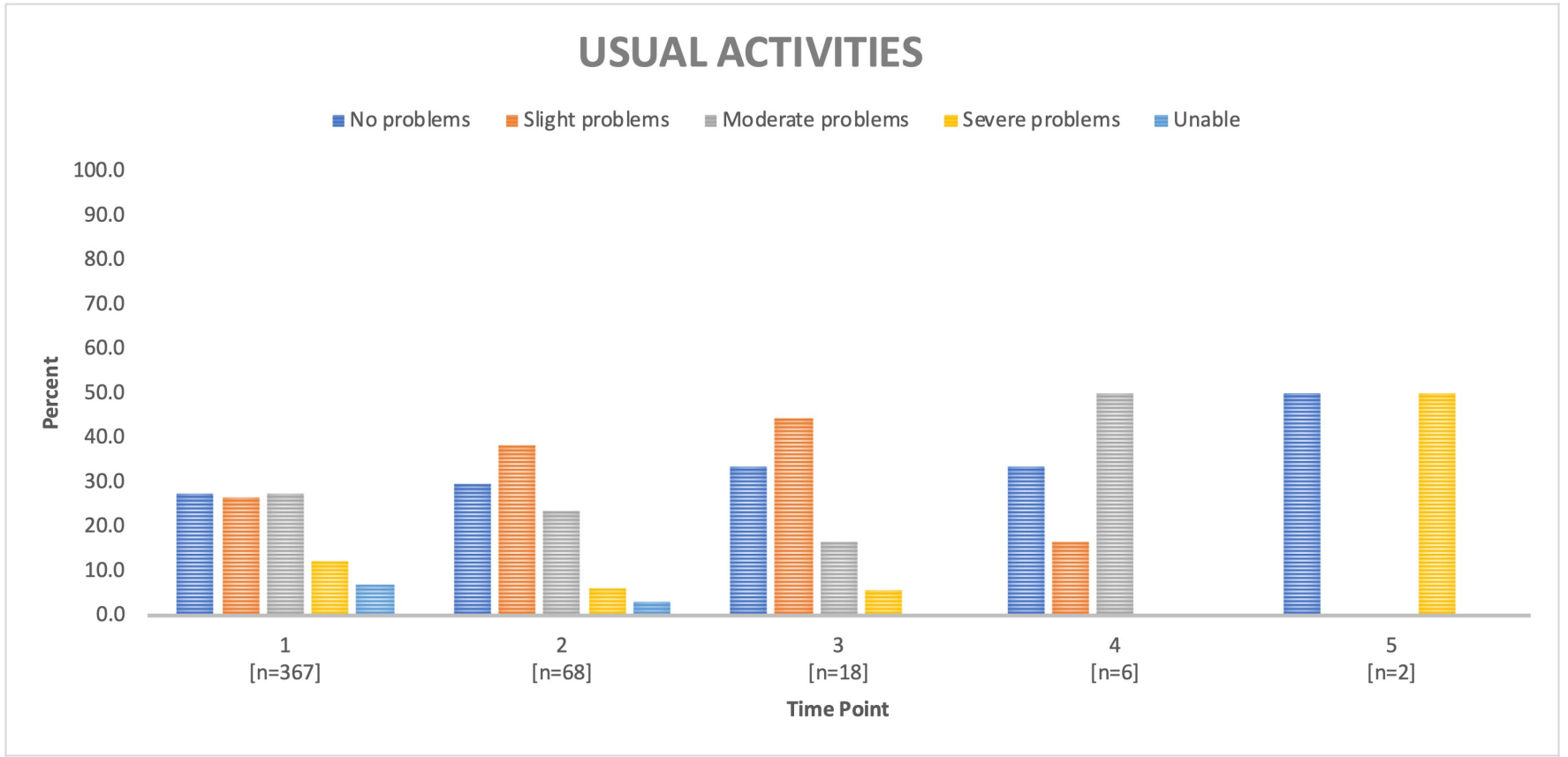
	Mobility N (%)	Self-Care N (%)	Usual Activities N (%)	Pain/ Discomfort N (%)	Anxiety/ Depression N (%)
Level 1 No problems	136 (37.1)	217 (59.1)	100 (27.3)	89 (24.3)	208 (56.7)
Level 2 Slight problems	91 (24.8)	73 (19.9)	97 (26.4)	136 (37.1)	80 (21.8)
Level 3 Moderate problems	89 (24.3)	50 (13.6)	100 (27.3)	118 (32.2)	51 (13.9)
Level 4 Severe problems	29 (7.9)	17 (4.6)	44 (12.0)	17 (4.6)	15 (4.1)
Level 5 Extreme problems/ unable to do	22 (6.0)	10 (2.7)	26 (7.1)	7 (1.9)	13 (3.5)

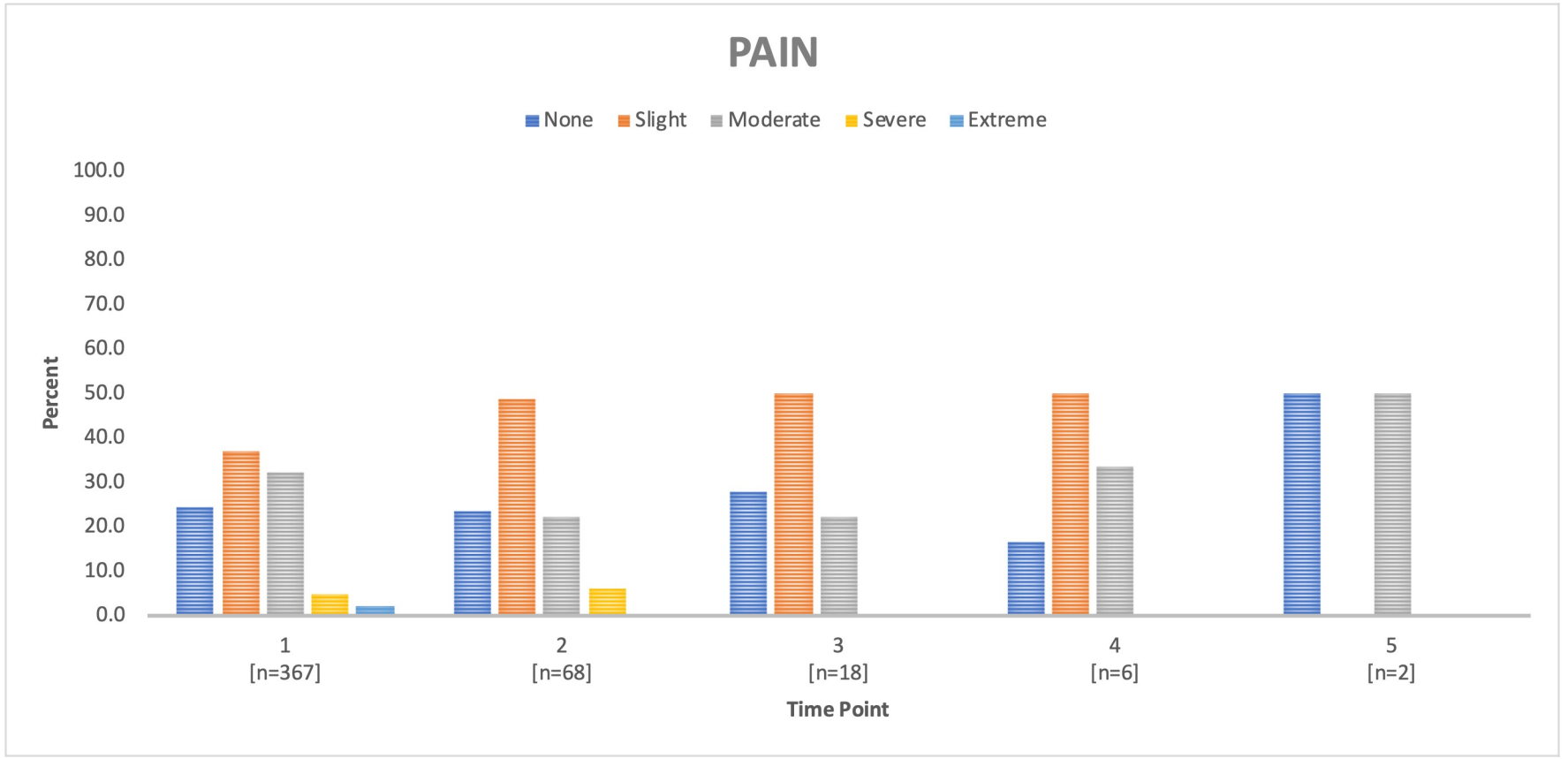
2nd Survey (Mean 10.0 mo, 31% 13-24 mo, 25% 8-12 mo

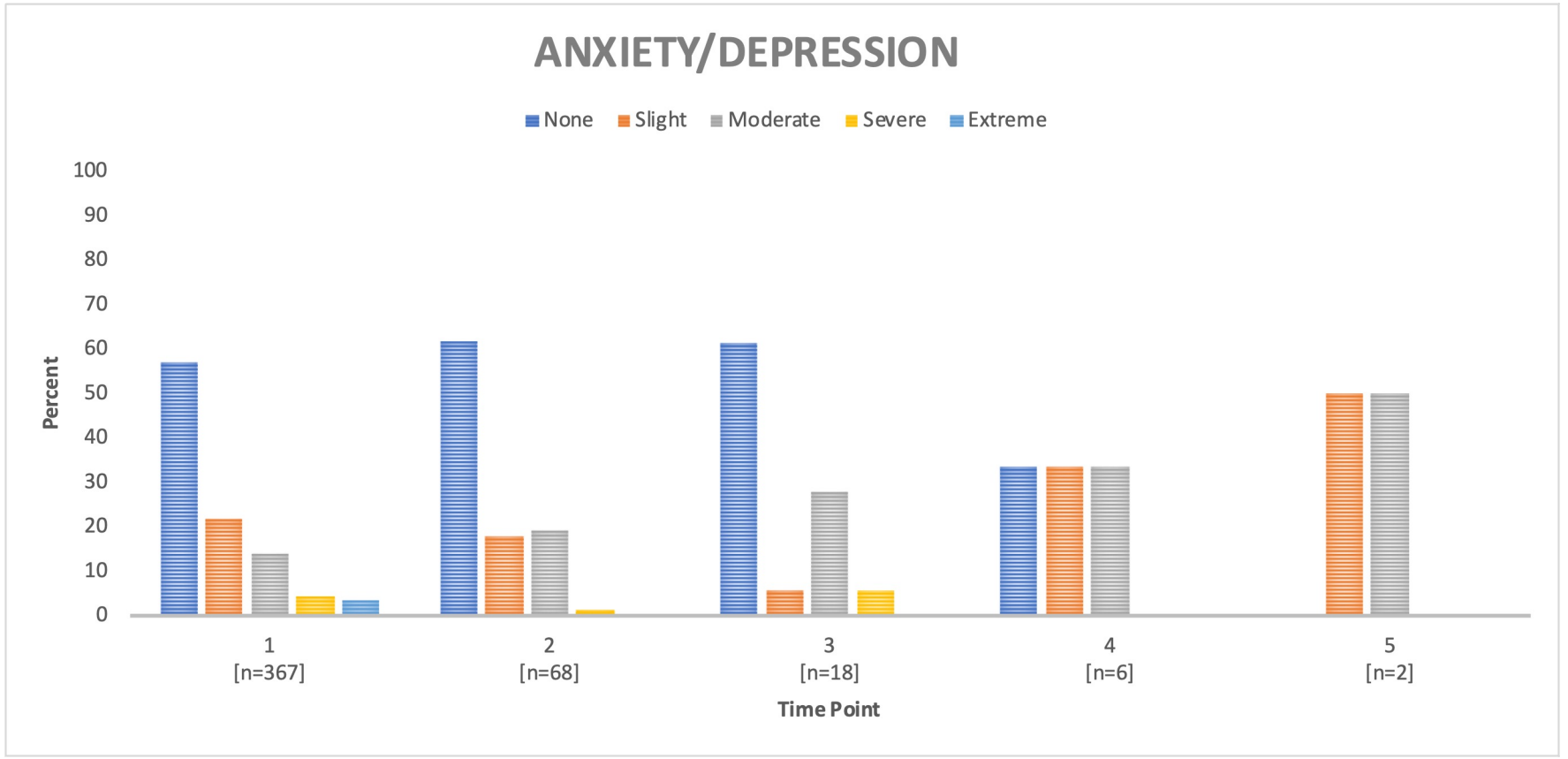
	Mobility N (%)	Self-Care N (%)	Usual Activities N (%)	Pain/ Discomfort N (%)	Anxiety/ Depression N (%)
Level 1 No problems	33 (48.5)	49 (72.1)	20 (29.4)	16 (23.5)	42 (61.8)
Level 2 Slight problems	18 (26.5)	11 (16.2)	26 (38.2)	33 (48.5)	12 (17.7)
Level 3 Moderate problems	13 (19.1)	5 (7.4)	16 (23.5)	15 (22.1)	13 (19.1)
Level 4 Severe problems	29 (7.9)	2 (2.9)	4 (5.9)	4 (5.9)	1 (1.5)
Level 5 Extreme problems/ unable to do	4 (5.9)	1 (1.5)	2 (2.9)	0 (0)	0 (0)


MOBILITY
No problems
Slight problems
Moderate problems
Severe problems
Unable
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
1
[n=367]
2
[n=68]
3
[n=18]
4
[n=6]
5
[n=2]
Time Point


SELF -CARE
No problems
Slight problems
Moderate problems
Severe problems
Unable
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
1
[n=367]
2
[n=68]
3
[n=18]
4
[n=6]
5
[n=2]
Time Point

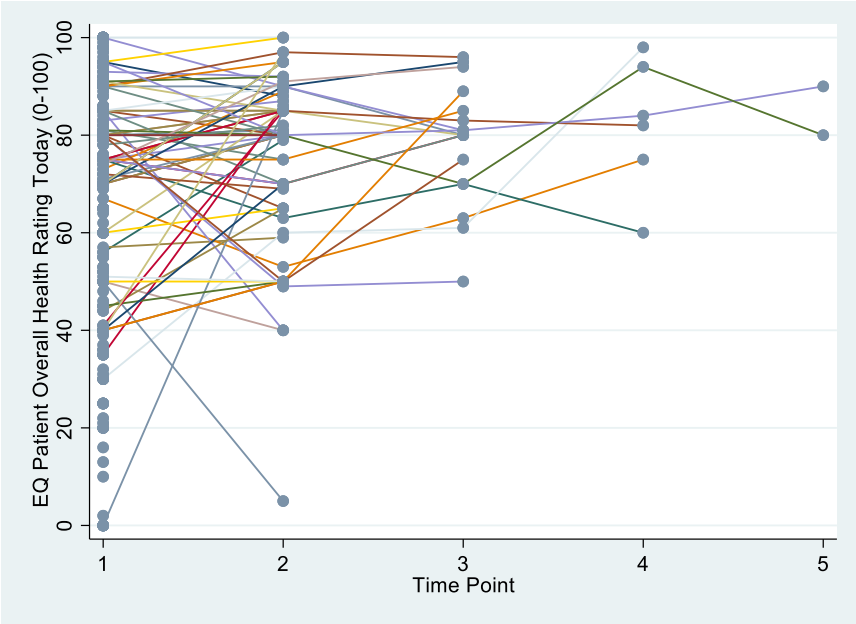

USUAL ACTIVITIES
No problems
Slight problems
Moderate problems
Severe problems
Unable
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
1
[n=367]
2
[n=68]
3
[n=18]
4
[n=6]
5
[n=2]
Time Point


PAIN
None
Slight
Moderate
Severe
Extreme
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent
1
[n=367]
2
[n=68]
3
[n=18]
4
[n=6]
5
[n=2]
Time Point


ANXIETY/DEPRESSION
None
Slight
Moderate
Severe
Extreme
100
90
80
70
60
50
40
30
20
10
0
Percent
1
[n=367]
2
[n=68]
3
[n=18]
4
[n=6]
5
[n=2]
Time Point

Overall Health – EQ Visual Analogue Scale

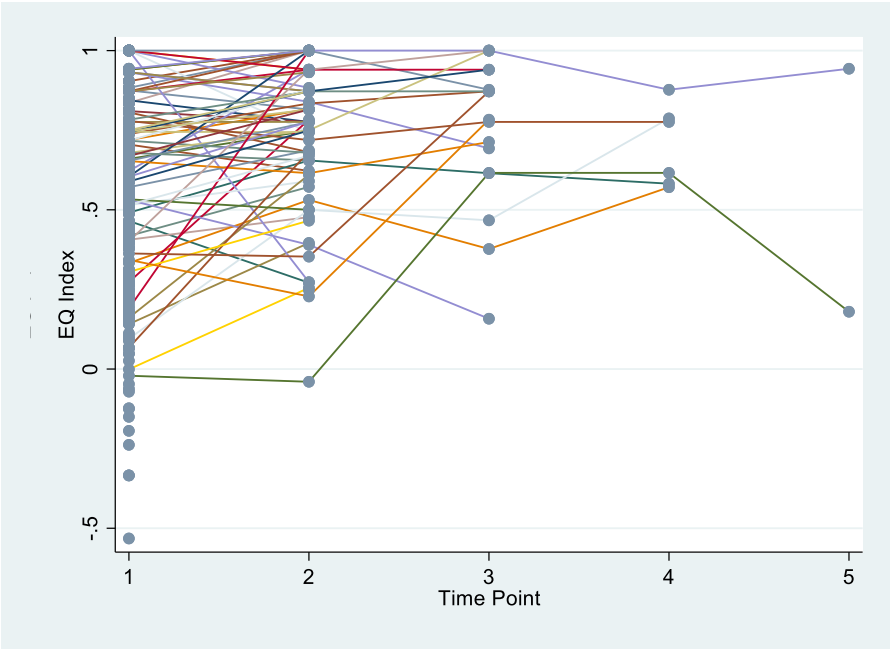
Survey	Mean EQ VAS
1st	69.4
2nd	75.6
3rd	78.5
4th	82.2
5th	85



EQ-5D Index (Weighting of descriptive survey answers)

Survey	Mean EQ-5D Index
1st	0.635
2nd	0.725
3rd	0.753
4th	0.702
5th	0.562

Population Norm = 0.897



MTQIP and ASPIRE Data

Mark Hemmila, MD

ASPIRE

- Multicenter Perioperative Outcomes Group
  - Parent
  - 60 Hospitals
- ASPIRE
  - In Michigan
  - BCBSM CQI

Hospitals in ASPIRE and MTQIP

Center 31	Center 29
Center 11	Center 29
Center 23	Center 32
Center 3	Center 16
Center 8	Center 7
Center 22	Center 25
Center 14	Center 26
Center 30	Center 19
Center 4	Center 27

Data Cohorts

- MTQIP uses ICD10 procedure codes
- ASPIRE uses CPT procedure codes
- Date range from 1/2021 to 12/2021
- Cohorts
  - Isolated Hip Fracture (91% match rate, 2609/2856)
  - Femur Fracture (87% match rate, 2652/3044)
  - Hemorrhage control (69% match rate, 71/103)
  - Spleen (76% match rate, 25/33)

Isolated Hip Fractures

- Time to OR
  - *ED arrival to OR
  - <=24hrs
  - >24 to <=48 hrs
  - >48 hrs
- Surgery duration
- Anesthesia duration
- Anesthesia technique
  - General (ETT or LMA)
  - Epidural or Block

Isolated Hip Fractures

- Outcomes
  - Dead or Hospice = 3.9% (102 pts)
  - Serious complication = 5.3% (138 pts)

4 quantiles of anesthesia _duration	serious 0	1	Total
1	634 96.79	21 3.21	655 100.00
2	624 94.69	35 5.31	659 100.00
3	612 94.88	33 5.12	645 100.00
4	601 92.46	49 7.54	650 100.00
Total	2,471 94.71	138 5.29	2,609 100.00

Pearson chi2(3) = 12.2770 Pr = 0.006

4 quantiles of n_surgery_ duration	serious 0	1	Total
1	639 95.95	27 4.05	666 100.00
2	613 95.04	32 4.96	645 100.00
3	603 94.37	36 5.63	639 100.00
4	583 93.43	41 6.57	624 100.00
Total	2,438 94.72	136 5.28	2,574 100.00

Pearson chi2(3) = 4.3675 Pr = 0.224

time_to_room_cat_enc	dead_or_hospice 0	1	Total
1. <=24h	1,508 96.79	50 3.21	1,558 100.00
2. 24h to 48h	811 95.19	41 4.81	852 100.00
3. >48h	186 94.42	11 5.58	197 100.00
Total	2,505 96.09	102 3.91	2,607 100.00

Pearson chi2(2) = 5.3477 Pr = 0.069

time_to_room_cat_enc	serious 0	1	Total
1. <=24h	1,494 95.89	64 4.11	1,558 100.00
2. 24h to 48h	795 93.31	57 6.69	852 100.00
3. >48h	180 91.37	17 8.63	197 100.00
Total	2,469 94.71	138 5.29	2,607 100.00

Pearson chi2(2) = 12.0571 Pr = 0.002

Risk-Adjusted

Factor	Outcome	Odds Ratio	95% CI	p-value
Non-General Anesthesia	Dead or Hospice	1.3	0.55-3.0	0.5
Non-General Anesthesia	Serious Comp.	2.3	1.3-4.2	0.005
Anesthesia Duration High	Dead or Hospice	1.6	0.96-2.7	0.07
Anesthesia Duration High	Serious Comp.	1.7	1.0-2.8	0.048
Surgery Duration High	Dead or Hospice	0.98	0.6-1.6	0.9
Surgery Duration High	Serious Comp.	1.4	0.8-2.3	0.3
Time to OR 24-48	Dead or Hospice	1.3	0.8-2.1	0.3
Time to OR >48	Dead or Hospice	1.6	0.8-3.2	0.2
Time to OR 24-48	Serious Comp.	1.5	1.1-1.9	0.009
Time to OR >48	Serious Comp.	1.7	1.2-2.5	0.004

Orthopaedics Update

Bryant Oliphant MD

MTQIP Ortho Group - Update

May 17, 2023

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

TPM Responses

- Thank you!
- Updated OTL/Orthopaedic Surgeon List
- Let me know if ortho have questions/involvement

Combined Fall Ortho Meeting

- MTIQP Fall Meeting – October 10, 2023
- OTA - October 18 – 21, 2023
- Very positive response from last meeting
- Potential Topics:
  - Hip Fxs
  - DVT Prophylaxis – Lovenox vs. ASA
  - Other Ideas?

Ortho Working Group Initial Meeting

- May 3rd 2023
- 5 Orthopaedic Surgeons Across State
- Great Initial Discussion
- Definite Interest
- Breaking Down Silos

Antibiotic administration within 1 hour for open lower extremity fractures is not associated with decreased risk of infection

Areg Grigorian, MD, Morgan Schellenberg, MD, Kenji Inaba, MD, Matthew Martin, MD, Kazuhide Matsushima, MD, Michael Lekawa, MD, *and* **Jeffry Nahmias, MD, MHPE**, *Orange, California*

- Only Inpatient Admissions – No Post D/C data
- Difficult to risk adjust orthopaedic injuries
  - Gustilo Anderson Type
  - Fx severity
- Rebuttal Letter Submitted to JTACS

Questions

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

Break

Back at 3:20 p

M·TQIP

Analytic Updates

Jill Jakubus, PA-C, MHSA, MS

Topics

- AIS 2015 Transition
- Weight-Based LMWH Use Submission
- Research in Progress
- Collaborative Aspirin Data

AIS 2015 Transition

Announce

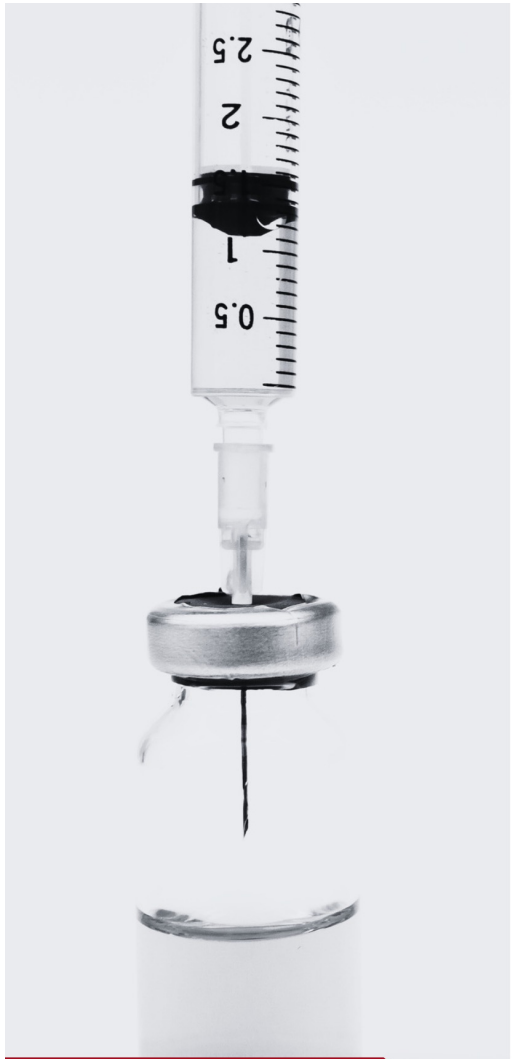
ACS TQIP April email. MTQIP May and June meetings.

Implement

Work with your registry vendor. Staff training. Code/model updates.

Go Live

All MTQIP centers transition to AIS 2015 together with Jan 1, 2025 admissions.



Due 12/6/24

2024 Performance Index

Weight-based LMWH Protocol and Case Submission

Points can be earned for weight-based LMWH protocol and use

Screenshot your weight-based LMWH protocol and cases

Submission portal available now on mtqip.org

Video demo available now on MTQIP YouTube Channel

Points earned populated on scorecard

Research in Progress

- **Highlights work members**
- **MTQIP collaborative dataset**
- **Improve care**

Major article

Reusing personal protective equipment (PPE) did not increase surgical site infection in trauma surgical patients during the COVID-19 pandemic: A retrospective cohort study in Michigan Trauma Centers

Evan Gorgas MD [*], Heather Klepacz MD [#], Shawn Dowling DO, Roger Ramcharan MD, PhD, Laszlo Hoesel MD, Jeffrey Walker MD, William J. Curtiss MD

Department of Trauma, Acute, and Critical Care Surgery, Trinity Health, Ann Arbor, MI

Key words:
Surgical mask
SSI
Injury
Michigan Trauma Quality Improvement Program
Operative trauma

A B S T R A C T

Background: Reuse of personal protective equipment (PPE), masks more specifically, during the COVID-19 pandemic was common. The primary objective of this study was to compare pre-pandemic surgical site infection (SSI) rates prior to reuse of PPE, to pandemic SSI rates after reuse of PPE in trauma surgical patients.
Methods: A retrospective cohort analysis collected from the Michigan Trauma Quality Improvement Program database was performed. The pre-COVID cohort was from March 1, 2019 to December 31, 2019 and post-COVID cohort was March 1, 2020 to December 31,2020. Descriptive statistics were used to assess differences between variables in each cohort.
Results: Nearly half (49.8%) of our cohort (n = 48,987) was in the post-COVID group. There was no significant difference in frequency of operative intervention between groups ($p > .05$). There was no significant increase ($p > .05$) between pre- and post-COVID cohorts for superficial, deep, or organ space SSI when reuse of masks was common.
Conclusion: Reuse of PPE did not lead to an increase in SSI in surgical patients. These findings are consistent with previous studies, but the first to be described in the trauma surgical patient population. Studies such as this may help inform further discussion regarding PPE usage as we continue to emerge from the current pandemic with the continuous threat of future pandemics.

Center	Author(s)	Topic	Status
Corewell Butterworth	Chapman/Eickholtz	Cracked Ribs and COVID: The effect of COVID-19 on rib fracture patients in Michigan	Accepted 69th Annual MCOT & MCACS
	Miller	Outcomes of simultaneous versus staged IMN nailing fixation of multiple long bone lower extremity fractures	Manuscript accepted to Injury
	Chapman	Trauma Volume, Mechanism, Race and Socioeconomic Status Pre and Post COVID	Manuscript update
	Chapman	Mental Health and Substance Use of Trauma Patients Pre and Post COVID	Manuscript update
Covenant Health Care	Sharpe	Incidence of pulmonary embolism in liver trauma	New
DMC Detroit Receiving	Lee	Impacts of COVID-19 on spinal cord injuries	New
Hurley Medical Center	Daswani	Resuscitation efficiency by dedicated trauma nurses in the ED	Data analysis
Michigan Medicine	Chung	Hand trauma: A geospatial analysis	Revising submission
Trinity Health Ann Arbor	Hecht	The Clinical Effects Of Chronic Antiplatelet And Anticoagulant Use On Thoracoabdominal Trauma	Accepted 18th Annual Academic Surgical Congress Manscript to follow
	Hecht/Westfall	A Multicenter Study of DDAVP versus Platelet Transfusions for Antiplatelet Agent Reversal in Patients with Traumatic Brain Injury	Accepted 69th Annual MCOT & MCACS Manuscript to follow
	Hecht	Effect of antiplatelet and anticoagulant agents on outcomes following emergent orthopedic surgery for trauma	Manuscript preparation
	Hoesel	Rib fractures in the elderly	Manuscript preparation
	Hecht	Need for 4-Factor prothrombin complex concentrate vs. Andexanet Alfa for the reversal of traumatic brain injuries	Manuscript under review
	Curtiss/Hecht	Is Reversal of Anticoagulants Necessary in Neurologically Intact Traumatic Intracranial Hemorrhage?	Submitted AAST

Center	Author(s)	Topic	Status
Henry Ford	Johnson	EMS vs. private car effect on outcomes	
	Kabbani	Impact of COVID-19 on outcomes in trauma patients	
Michigan Medicine	Oliphant	Infection and long-term outcomes in trauma patients	Analysis
	Scott	Long-term outcomes and trauma policy	
U of M Health - West	Mitchell	Blunt cerebral vascular injury	

M·TQIP

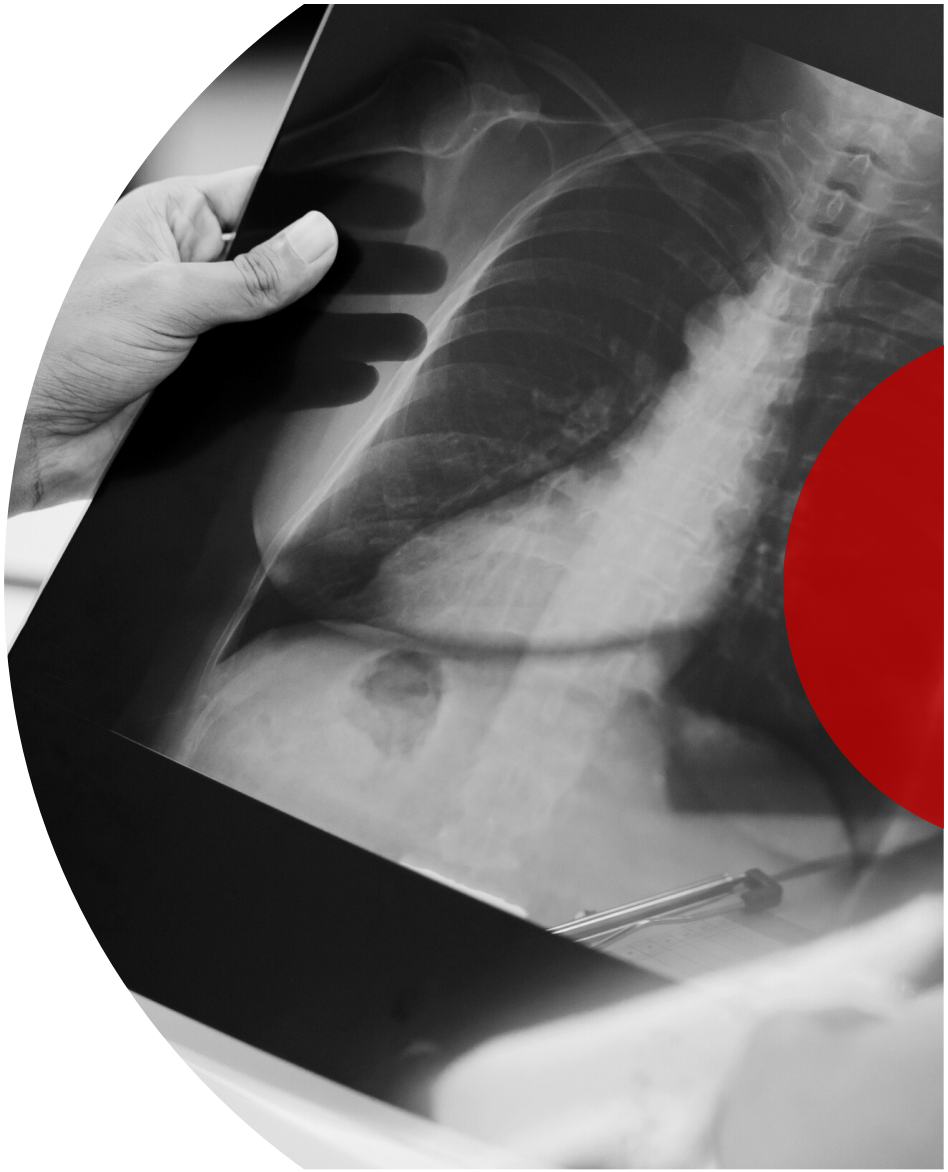
ASPIRIN

IN MICHIGAN

Exploring aspirin use as the first DVT prophylaxis type across all Level I and II trauma centers in Michigan.

Approach

- Definition
- Literature Reference
- Data



13.1 VENOUS THROMBOEMBOLISM PROPHYLAXIS TYPE

Jan 2022

Reporting Criterion

Report on all patients.

Description

Type of first dose of venous thromboembolism prophylaxis or treatment administered to patient at your hospital.

EXCLUDE:

- Sequential compression devices

Element Values

5. None
6. LMWH (Dalteparin, Enoxaparin, etc.)
7. Direct Thrombin Inhibitor (Dabigatran, etc.)
8. Xa Inhibitor (Rivaroxaban, etc.)
9. Coumadin
10. Other
11. Unfractionated Heparin (UH)
50. Aspirin

Jan 2022

Additional Information

- Must be administered, not just ordered.
- Element Value "5. None" is reported if the patient refuses venous thromboembolism prophylaxis.
- Report heparin, LMWH, direct thrombin inhibitor and Xa inhibitor class agents regardless of the indication when it is administered first.
- Report aspirin and Coumadin and 'other' agents when the indication of VTE prevention is identified in the medical record documentation.
- Exclude non-prophylactic dosing of agents, such as heparin administered for line clearance purposes.
- Use drug search for agents and dosing outside these parameters to determine class and/or indicated use.
- Venous Thromboembolism Prophylaxis Types which were retired greater than 2 years before the current NTDS version are no longer listed under Element Values above, which is why there are numbering gaps. Refer to the NTDS Change Log for a full list of retired Venous Thromboembolism Prophylaxis Types.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 19, 2023 VOL. 388 NO. 3

Aspirin or Low-Molecular-Weight Heparin for Thromboprophylaxis after a Fracture

Major Extremity Trauma Research Consortium (METRC)*

ABSTRACT

BACKGROUND

Clinical guidelines recommend low-molecular-weight heparin for thromboprophylaxis in patients with fractures, but trials of its effectiveness as compared with aspirin are lacking.

METHODS

In this pragmatic, multicenter, randomized, noninferiority trial, we enrolled patients 18 years of age or older who had a fracture of an extremity (anywhere from hip to midfoot or shoulder to wrist) that had been treated operatively or who had

The members of the writing committee (Robert V. O'Toole, M.D., Deborah M. Stein, M.D., M.P.H., Nathan N. O'Hara, Ph.D., Katherine P. Frey, Ph.D., R.N., Tara J. Taylor, M.P.H., Daniel O. Scharfstein, Sc.D., Anthony R. Carlini, M.S., Kuladeep Sudini, Ph.D., Yasmin Degani, M.P.H., Gerard P. Slobogean, M.D., M.P.H., Elliott R. Haut, M.D., Ph.D., William Obremskey, M.D., M.P.H., Reza

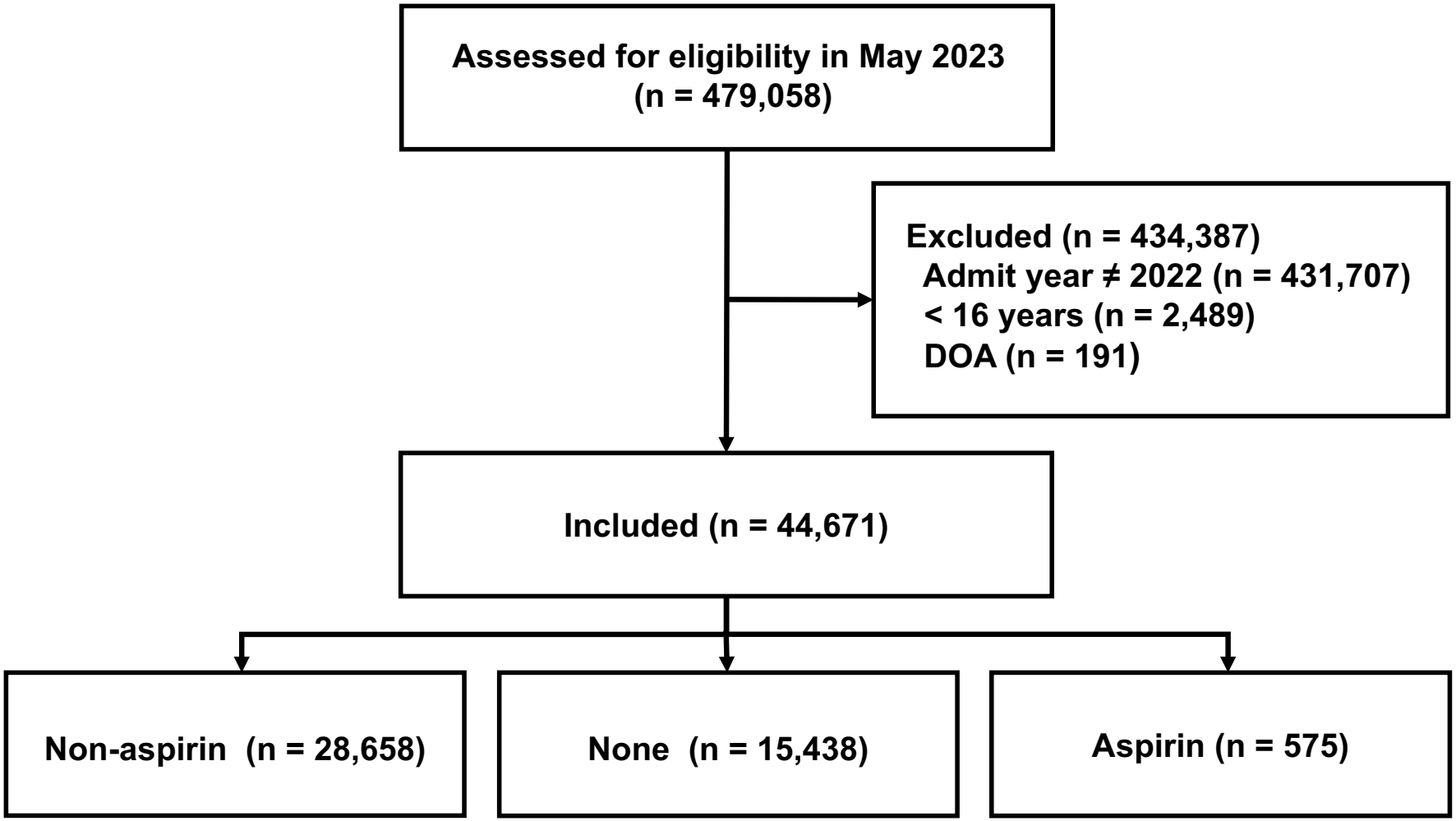
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 19, 2023 VOL. 388 NO. 3

Aspirin or Low-Molecular-Weight Heparin for Thromboprophylaxis after a Fracture

CONCLUSIONS

In patients with extremity fractures that had been treated operatively or with any pelvic or acetabular fracture, thromboprophylaxis with aspirin was noninferior to low-molecular-weight heparin in preventing death and was associated with low incidences of deep-vein thrombosis and pulmonary embolism and low 90-day mortality. (Funded by the Patient-Centered Outcomes Research Institute; PREVENT CLOT ClinicalTrials.gov number, NCT02984384.)



Patients' selection criteria flow diagram outlining the selection of adult trauma cases reported to MTQIP.

Patient demographics and characteristics.

	Total N=29,233	Non-aspirin N=28,658	Aspirin N=575	p-value
Age, mean (SD)	66 (21)	65 (21)	69 (20)	<0.001
Male sex	49%	49%	40%	<0.001
Mechanism				0.002
Blunt	95%	95%	98%	
Penetrating	5%	5%	2%	
Other	1%	1%	0%	
Payor				<0.001
Medicaid	10%	10%	8%	
Self-Pay	2%	2%	1%	
Private	20%	20%	18%	
Automobile	8%	8%	4%	
Medicare	53%	53%	65%	
Other	7%	7%	5%	

The cohort who received aspirin DVT prophylaxis is different in a statistically significant way that cannot be explained by chance.

Patient demographics and characteristics.

	Total N=29,233	Non-aspirin N=28,658	Aspirin N=575	p-value
Age, mean (SD)	66 (21)	65 (21)	69 (20)	<0.001
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Medicare	53%	53%	65%	
Other	7%	7%	5%	

Patients who received aspirin DVT prophylaxis are older and female.

Patient demographics and characteristics.

	Total N=29,233	Non-aspirin N=28,658	Aspirin N=575	p-value
Body Mass Index, median (IQR)	26 (23-31)	26 (23-31)	26 (22-30)	0.018
Anticoagulant therapy	20%	20%	16%	0.011
Current smoker	20%	20%	16%	0.009
Diabetes	19%	19%	20%	0.32
Disseminated cancer	1%	1%	1%	0.4
Home aspirin	26%	26%	43%	<0.001

Patients who received aspirin DVT prophylaxis have higher rates of home aspirin use.

Patient demographics and characteristics.

	Total N=29,233	Non-aspirin N=28,658	Aspirin N=575	p-value
Body Mass Index, median (IQR)	26 (23-31)	26 (23-31)	26 (22-30)	0.018
Anticoagulant therapy	20%	20%	16%	0.011
Current smoker	20%	20%	16%	0.009
Diabetes	19%	19%	20%	0.32
Disseminated cancer	1%	1%	1%	0.4
Home aspirin	26%	26%	43%	<0.001

Patients who received aspirin DVT prophylaxis have lower rates of smoking and anticoagulant therapy use.

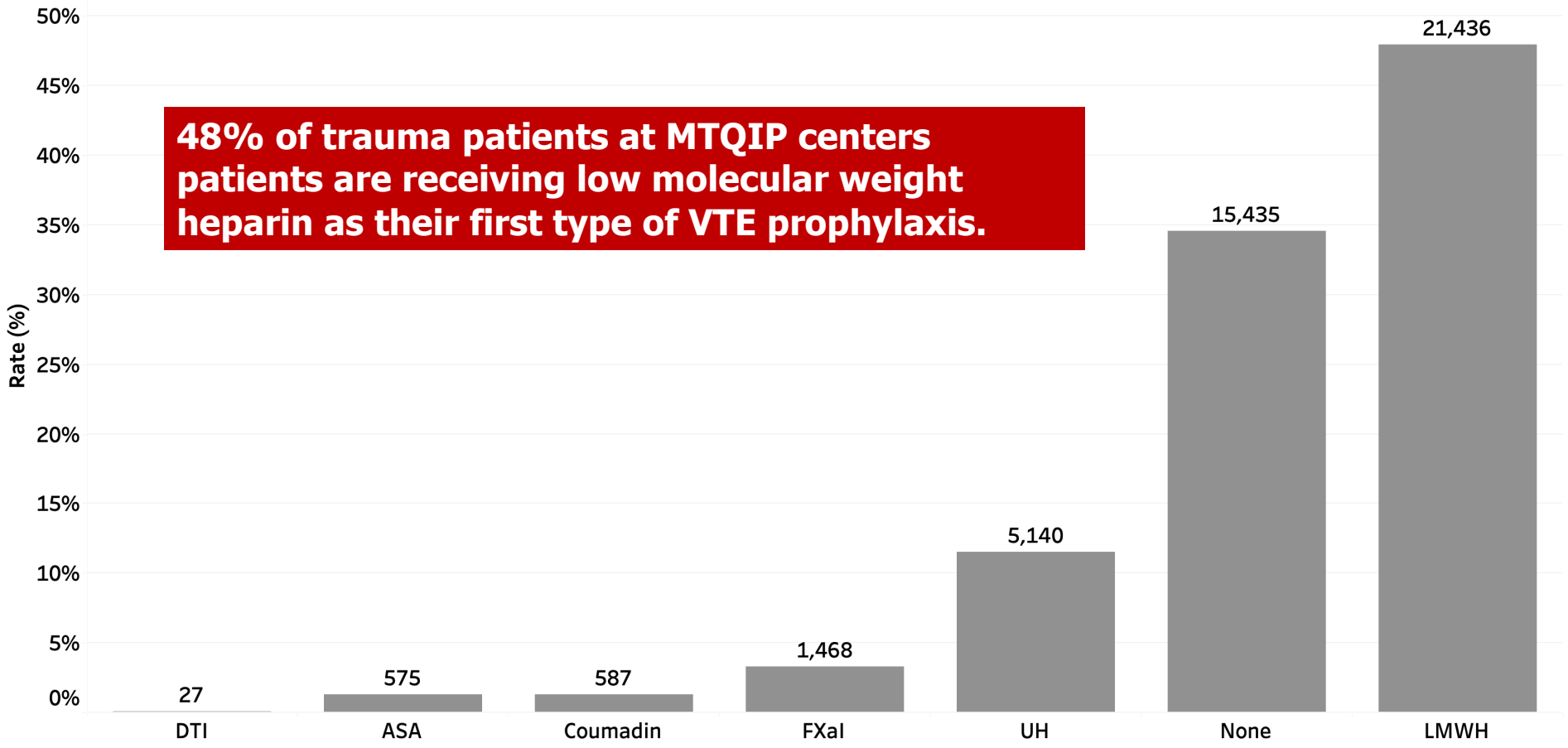
Patient demographics and characteristics.

	Total N=29,233	Non-aspirin N=28,658	Aspirin N=575	p-value
ISS, median (IQR)	9 (5-10)	9 (5-10)	9 (5-9)	<0.001
ISS distribution				<0.001
ISS < 9	37%	37%	34%	
ISS 9-15	50%	49%	63%	
ISS > 15	13%	14%	3%	
Head neck	23%	24%	7%	<0.001
Face	8%	8%	3%	<0.001
Chest	26%	27%	8%	<0.001
Abdomen	12%	12%	3%	<0.001
Extremity	62%	62%	87%	<0.001
External	55%	55%	33%	<0.001
Length of stay, median (IQR)	5 (3-8)	5 (3-8)	4 (2-6)	<0.001
Ventilator days				<0.001
None	93%	93%	97%	
1 day	1%	1%	0%	
2-4 days	3%	3%	1%	
>= 5 days	3%	3%	1%	
Deep vein thrombosis	1%	1%	1%	0.28
Pulmonary embolism	0%	0%	0%	0.68
Death	2%	2%	1%	0.11

Patients who received aspirin DVT prophylaxis have injuries primarily in the 9-15 ISS range involving extremity region.

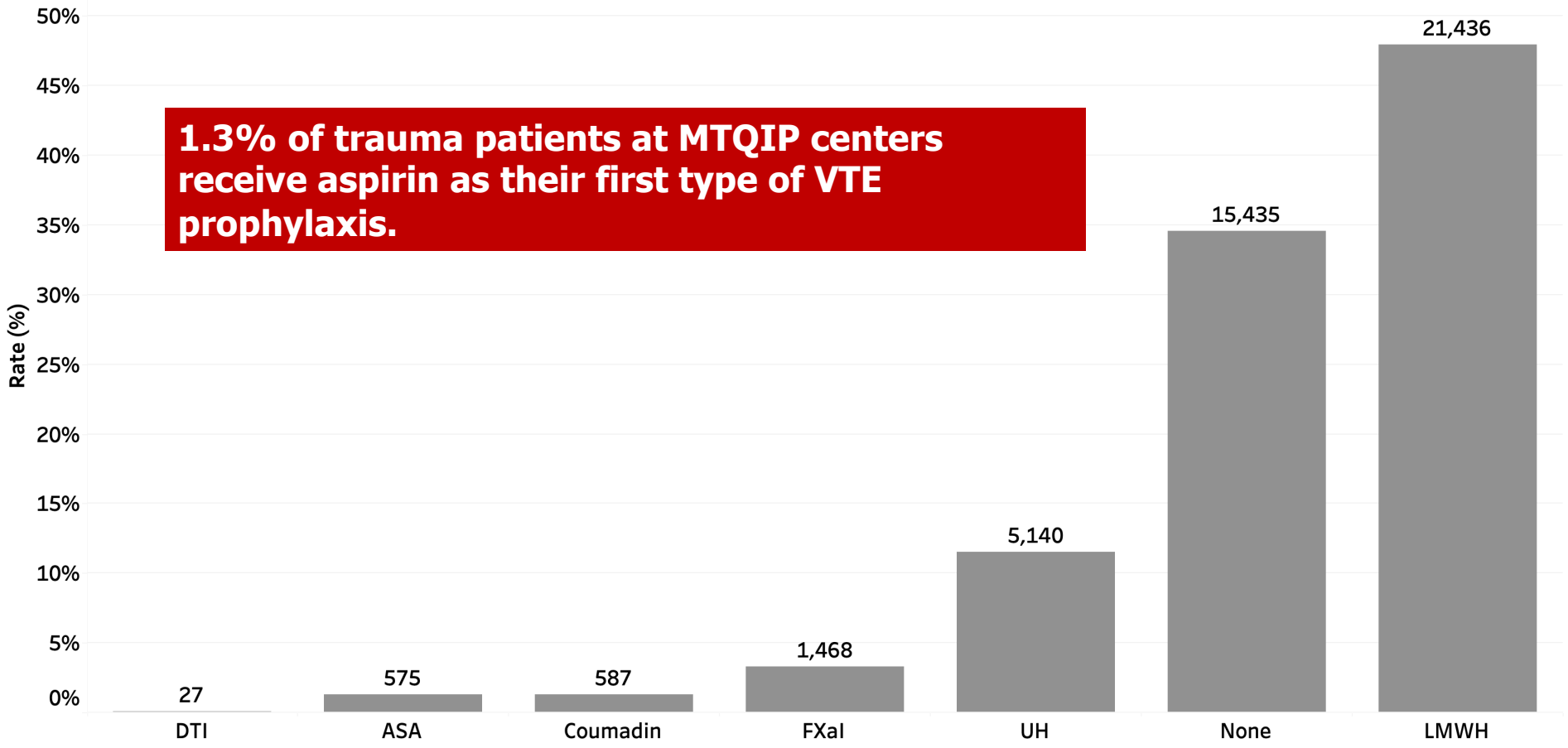
Collaborative Distribution of First VTE Prophylaxis by Drug Type

Cohort: All | Excluding: Age < 16, DOA
Year: 2022



Collaborative Distribution of First VTE Prophylaxis by Drug Type

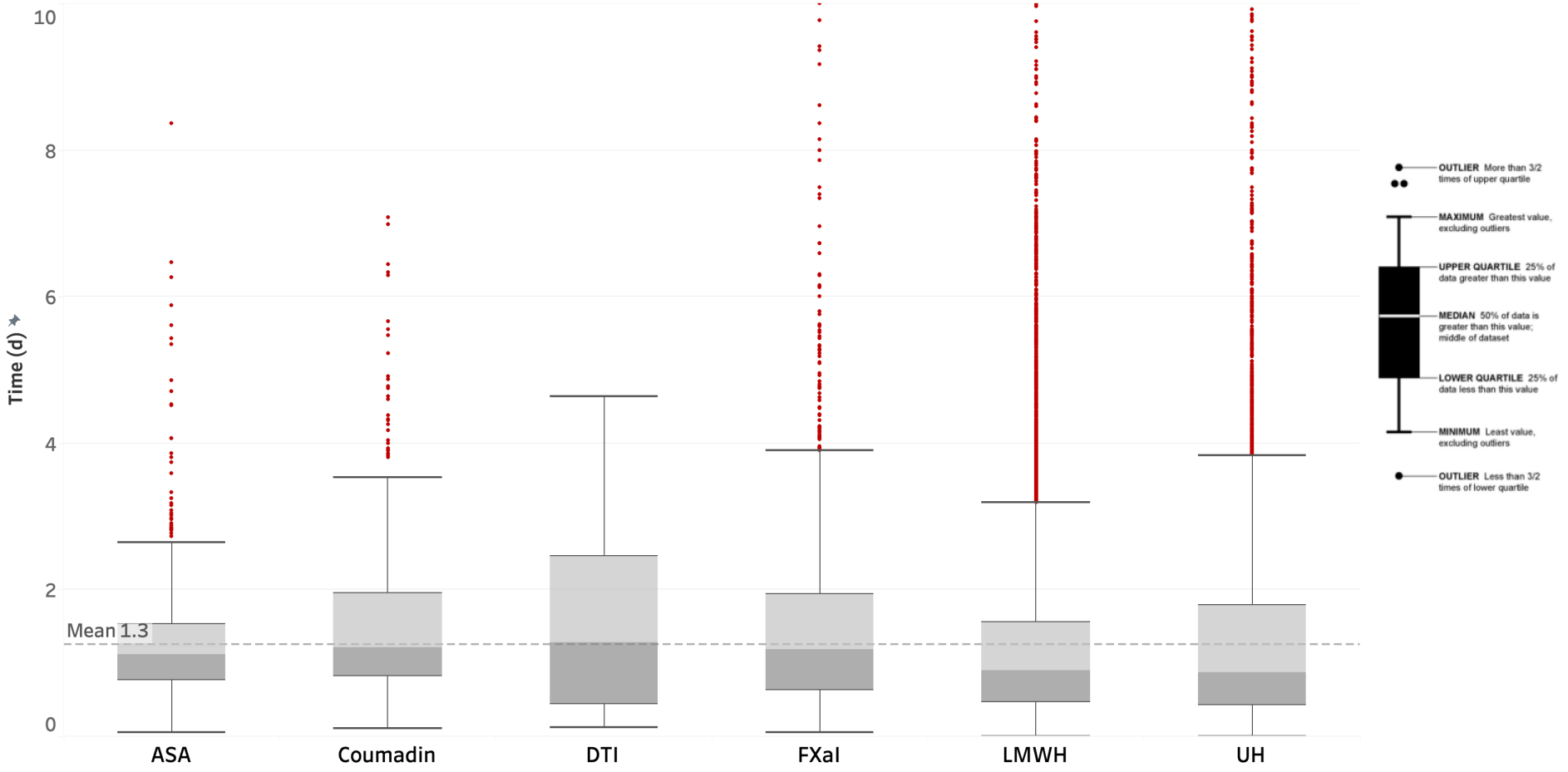
Cohort: All | Excluding: Age < 16, DOA
Year: 2022



Time to First VTE Prophylaxis by Drug Type

Cohort: All | Excluding: Age < 16, DOA
Year: 2022

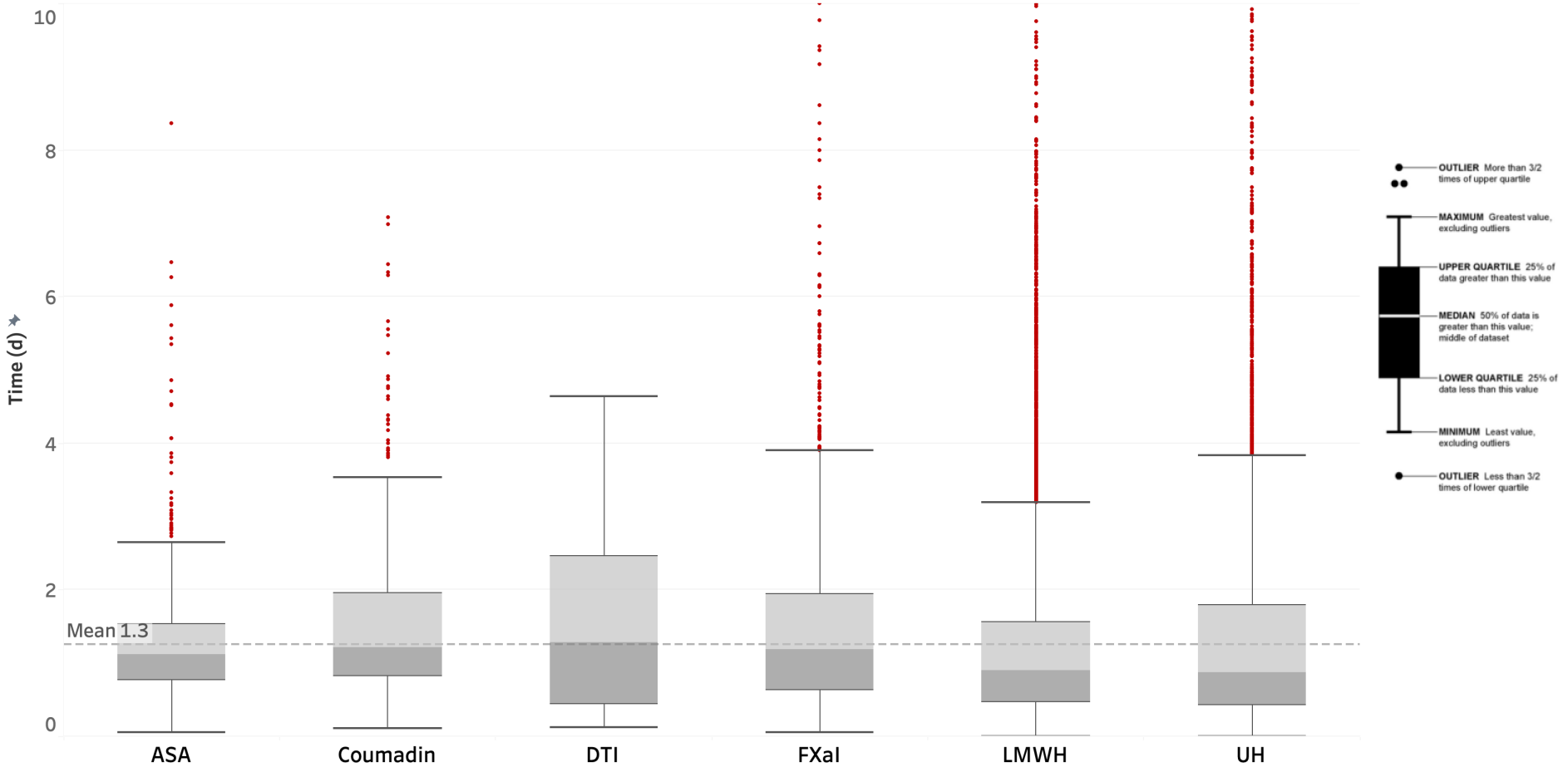
Trauma patients at MTQIP centers have a 0.9-day median time to first VTE drug with LMWH.



Time to First VTE Prophylaxis by Drug Type

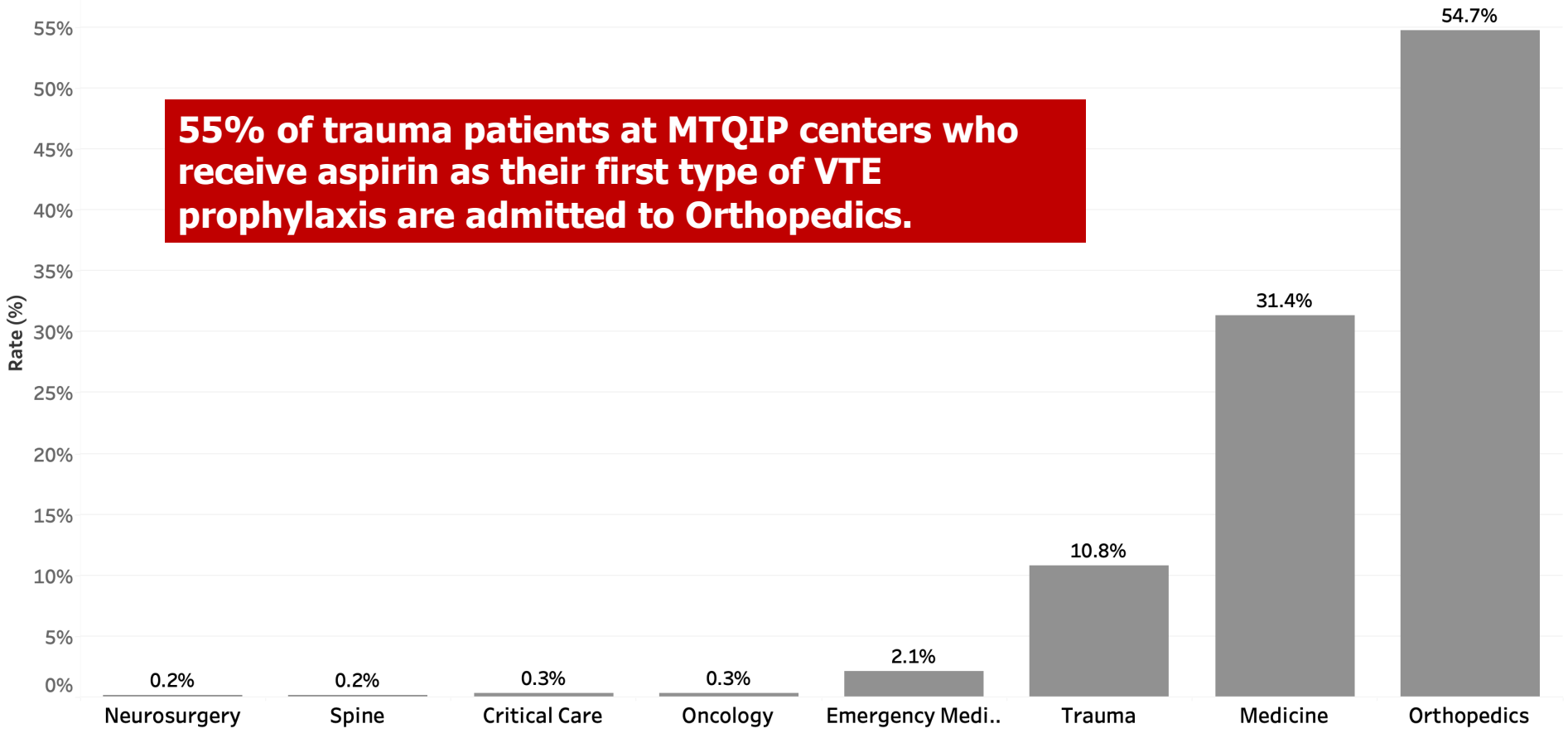
Cohort: All | Excluding: Age < 16, DOA
Year: 2022

Trauma patients at MTQIP centers have a 1.1-day median time to first VTE drug with aspirin.



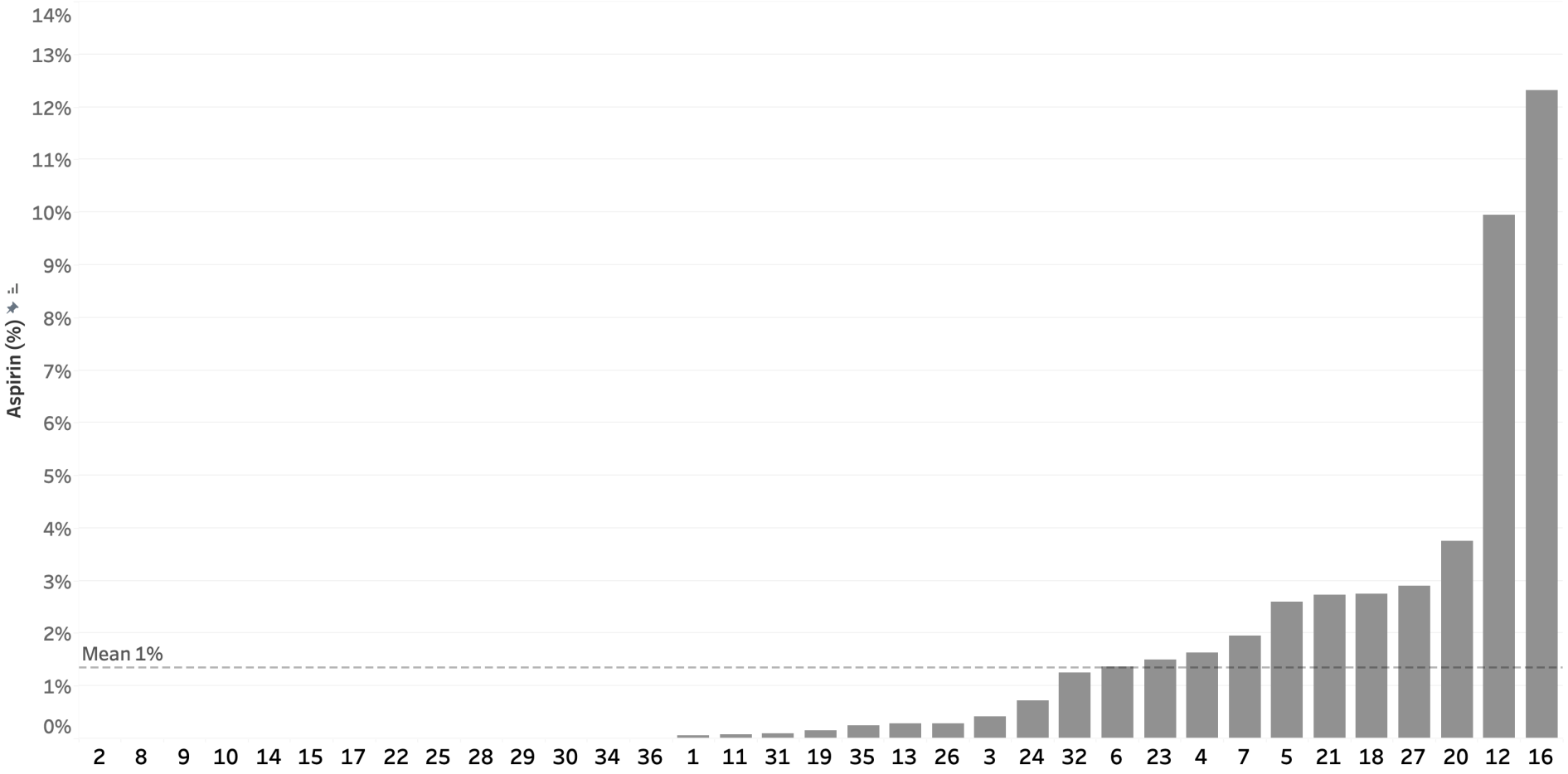
Collaborative Distribution of Aspirin DVT Prophylaxis Drug Type by Admit Service

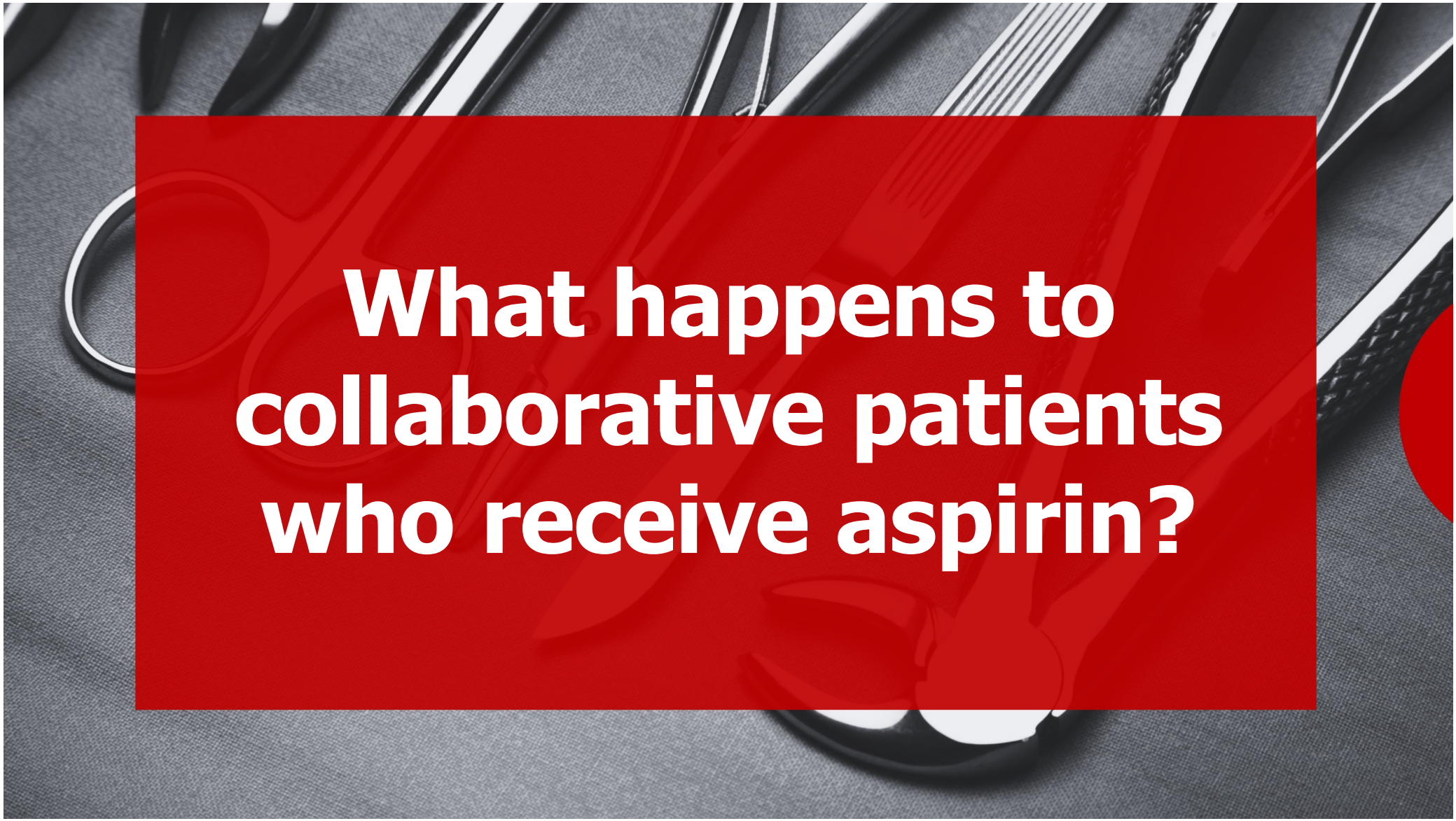
Cohort: All | Excluding: Age < 16, DOA
Year: 2022



Rate of Aspirin DVT Prophylaxis Use by Center

Cohort: All | Excluding: Age < 16, DOA
Year: 2022




What happens to collaborative patients who receive aspirin?

Unadjusted Collaborative Outcomes by First VTE Prophylaxis Drug Type

Cohort: All | Excluding: Age < 16, DOA
Year: 2022

	No DVT	DVT	Total	%
None	15,426	12	15,438	0.1%
Coumadin	585	2	587	0.3%
Aspirin	572	3	575	0.5%
FXaI	1,459	9	1,468	0.6%
LMWH	21,288	148	21,436	0.7%
UH	5,023	117	5,140	2.3%
DTI	26	1	27	3.7%
Total	44,379	292	44,671	0.7%

	No PE	PE	Total	%
DTI	27	0	27	0.0%
None	15,429	9	15,438	0.1%
ASA	573	2	575	0.3%
LMWH	21,355	81	21,436	0.4%
FXaI	1,462	6	1,468	0.4%
Coumadin	584	3	587	0.5%
UH	5,097	43	5,140	0.8%
Total	44,527	144	44,671	0.3%

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Advanced Age

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

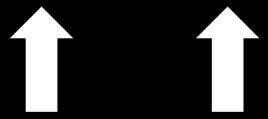
Fall

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo



Moderate Extremity Injury

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Non-trauma service admit

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Receive TXA

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

OR

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

ASA (mean 2.5)

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Events

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Rehab

0 cases received any blood products 0-24

Drill Down First VTE Prophylaxis Type Aspirin and VTE

Cohort: All | Excluding: Age < 16, DOA

Year: 2022

age	sex	bmi	ecode	iss	ais h/n	ais ext	service	time to txa (d)	operation	time to asa prophy (d)	pe	dvt	ventilator (d)	icu (d)	los (d)	dispo

Evidence-based indications for TXA use in trauma patients:

Traumatic hemorrhage: **The CRASH-2 trial showed a reduction in mortality in trauma patients with significant hemorrhage or risk of significant hemorrhage. As a result, it is recommended for use in these patients if administered within 3 hours of injury.**

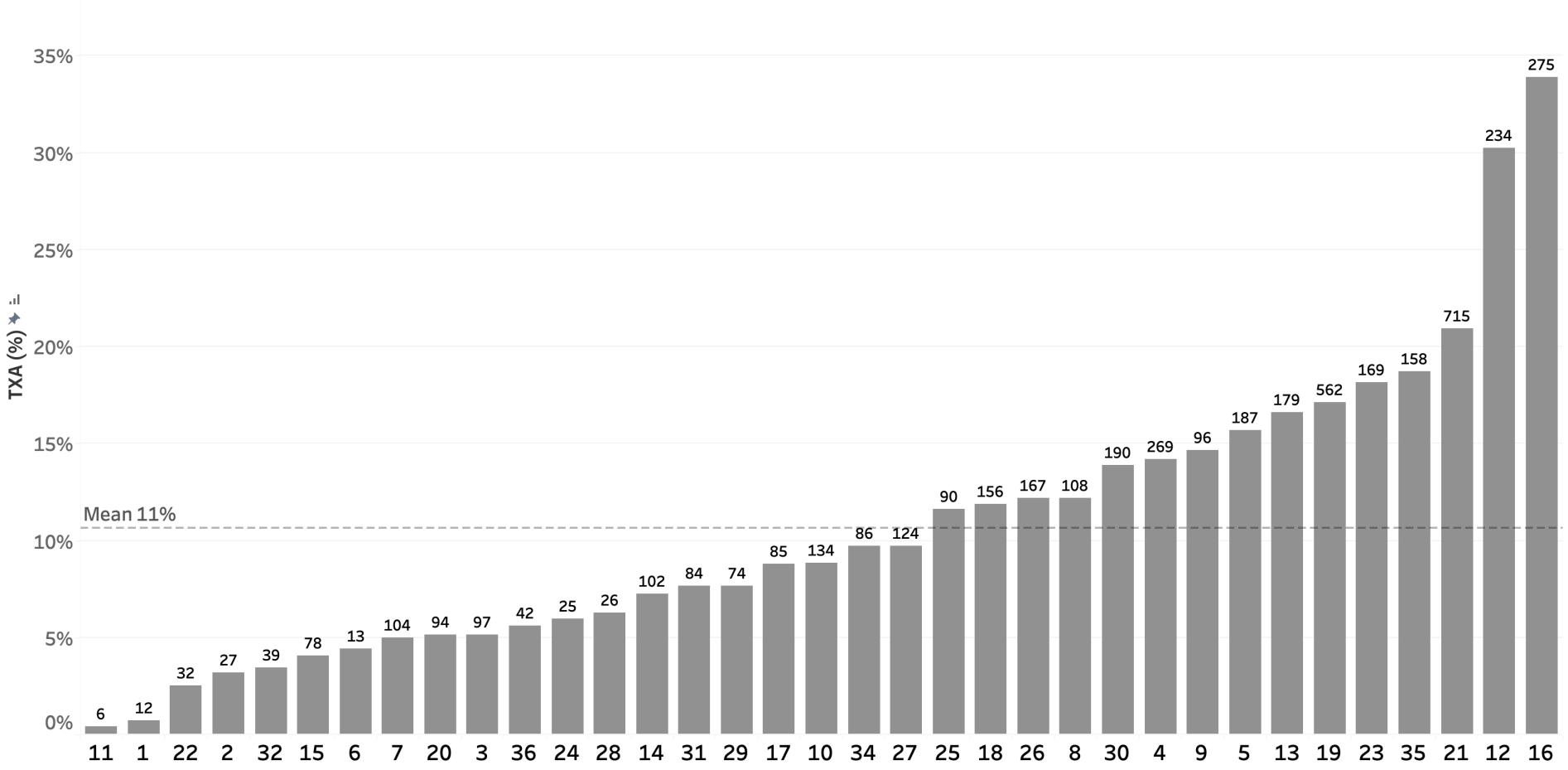
Traumatic brain injury (TBI): **The CRASH-3 trial studied the use of TXA specifically in TBI and found a reduction in head injury-related death in patients with mild to moderate head injury who received TXA within 3 hours of injury. However, there was no significant reduction in patients with severe head injury.**

Massive transfusion: **TXA is used as part of a massive transfusion protocol in patients with severe trauma. This is typically defined as the replacement of a patient's total blood volume in less than 24 hours, or more than half the total blood volume per hour.**

	No Indication	Indication	Total	
No TXA	28,118	11,714	39,832	
TXA	3,574	1,265	4,839	74%
Total	31,692	12,979	44,671	

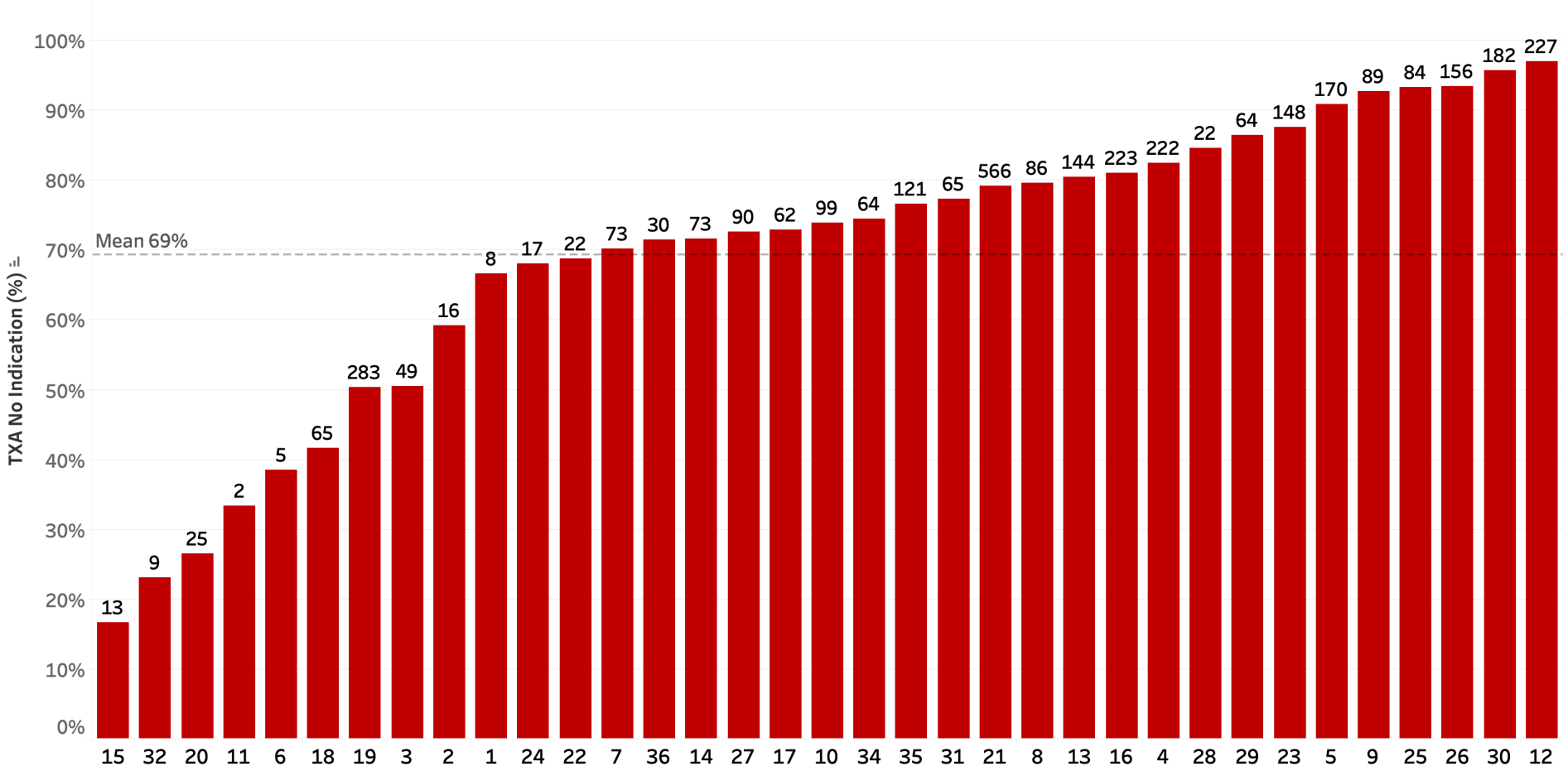
TXA Use by Center

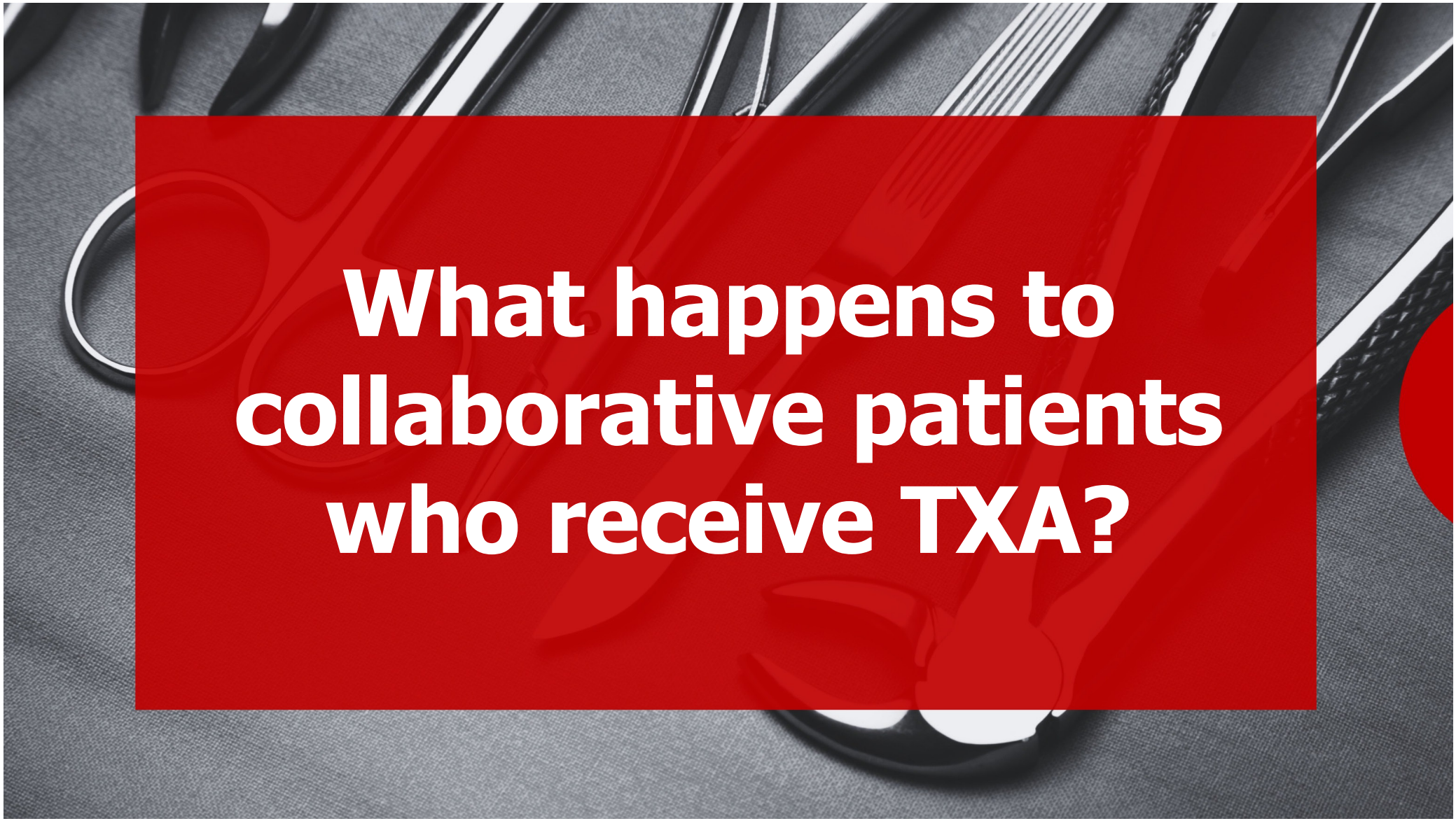
Cohort: All | Excluding: Age < 16, DOA
Year: 2022



TXA Use w/o AIS Head/Neck, PRBC4, or FFP4 by Center

Cohort: All | Excluding: Age < 16, DOA
Year: 2022




What happens to collaborative patients who receive TXA?

Unadjusted Collaborative Outcomes by TXA Administration

Cohort: All | Excluding: Age < 16, DOA
Year: 2022

No TXA

	No PE	PE	Total	%
ISS < 9	20,887	18	20,905	0.09%
ISS 9-15	14,216	53	14,269	0.37%
ISS > 15	4,624	34	4,658	0.73%
Total	39,727	105	39,832	0.26%

	No DVT	DVT	Total	
ISS < 9	20,866	39	20,905	0.19%
ISS 9-15	14,197	72	14,269	0.50%
ISS > 15	4,547	111	4,658	2.38%
Total	39,610	222	39,832	0.56%

TXA

	No PE	PE	Total	%
ISS < 9	520	1	521	0.19%
ISS 9-15	3,311	18	3,329	0.54%
ISS > 15	969	20	989	2.02%
Total	4,800	39	4,839	0.81%

	No DVT	DVT	Total	
ISS < 9	519	2	521	0.38%
ISS 9-15	3,308	21	3,329	0.63%
ISS > 15	942	47	989	4.75%
Total	4,769	70	4,839	1.45%

Unadjusted Collaborative Outcomes by TXA Administration

Cohort: All | Excluding: Age < 16, DOA
Year: 2022

No TXA

	No PE	PE	Total	%
ISS < 9	20,887	18	20,905	0.09%
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Total	4,769	70	4,839	1.45%

› Bone Joint J. 2015 Apr;97-B(4):458-62. doi: 10.1302/0301-620X.97B4.34656.

Does tranexamic acid alter the risk of thromboembolism after total hip arthroplasty in the absence of routine chemical thromboprophylaxis?

S Nishihara [1], M Hamada [1]

Affiliations + expand

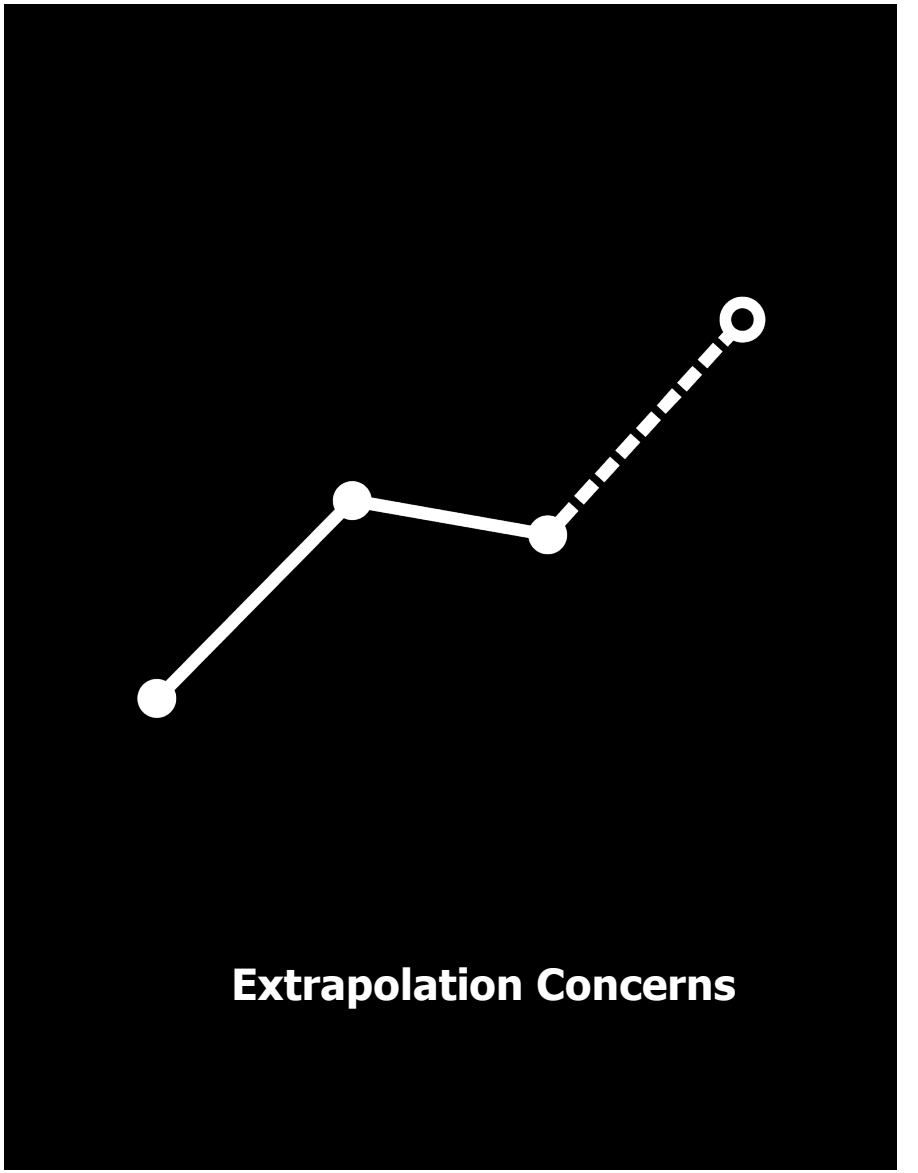
PMID: 25820882 DOI: 10.1302/0301-620X.97B4.34656

Free article

Abstract

Tranexamic acid (TXA) has been used to reduce blood loss during total hip arthroplasty (THA), but its use could increase the risk of venous thromboembolic disease (VTE). Several studies have reported that TXA does not increase the prevalence of deep vein thrombosis (DVT), but most of those used routine chemical thromboprophylaxis, thereby masking the potential increased risk of TXA on VTE. We wished to ascertain whether TXA increases the prevalence of VTE in patients undergoing THA without routine chemical thromboprophylaxis. We carried out a retrospective case-control study in 254 patients who underwent a primary THA, 127 of whom received TXA (1 g given pre-operatively) and a control group of 127 who did not. All patients had mechanical but no chemical thomboprophylaxis. Each patient was examined for DVT by bilateral ultrasonography pre-operatively and on post-operative days 1 and 7. TXA was found to statistically significantly increase the incidence of total DVT on post-operative day 7 compared with the control group (24 (18.9%) and 12 (9.4%), respectively; $p < 0.05$) but most cases of DVT were isolated distal DVT, with the exception of one patient with proximal DVT in each group. One patient in the control group developed a non-fatal symptomatic pulmonary embolism (PE). The use of TXA did not appear to affect the prevalence of either proximal DVT or PE.

Keywords: deep venous thrombosis; total hip arthroplasty; tranexamic acid.



Tranexamic acid administration and pulmonary embolism in combat casualties with orthopaedic injuries

Benjamin W. Hoyt, MD[a,b], Michael D. Baird, MD[a,b], Seth Schobel, PhD[a,b,c], Henry Robertson, PhD[a,b,c], Ravi Sanka, MS[a,b,c], Benjamin K. Potter, MD[a,b], Matthew Bradley, MD[a,b,d], John Oh, MD[a,b,d], Eric A. Elster, MD[a,b]

Objectives: In combat casualty care, tranexamic acid (TXA) is administered as part of initial resuscitation effort; however, conflicting data exist as to whether TXA contributes to increased risk of venous thromboembolism (VTE). The purpose of this study is to determine what factors increase risk of pulmonary embolism after combat-related orthopaedic trauma and whether administration of TXA is an independent risk factor for major thromboembolic events.

Setting: United States Military Trauma Centers.

Patients: Combat casualties with orthopaedic injuries treated at any US military trauma center for traumatic injuries sustained from January 2011 through December 2015. In total, 493 patients were identified.

Intervention: None.

Main Outcome Measures: Occurrence of major thromboembolic events, defined as segmental or greater pulmonary embolism or thromboembolism-associated pulseless electrical activity.

Results: Regression analysis revealed TXA administration, traumatic amputation, acute kidney failure, and hypertension to be associated with the development of a major thromboembolic event for all models. Injury characteristics independently associated with risk of major VTE were Injury Severity Score 23 or greater, traumatic amputation, and vertebral fracture. The best performing model utilized had an area under curve =0.84, a sensitivity=0.72, and a specificity=0.84.

Conclusions: TXA is an independent risk factor for major VTE after combat-related orthopaedic injury. Injury factors including severe trauma, major extremity amputation, and vertebral fracture should prompt suspicion for increased risk of major thromboembolic events and increased threshold for TXA use if no major hemorrhage is present.

Level of evidence: III, Prognostic Study

Keywords: amputation, combat-related trauma, pulmonary embolism, tranexamic acid, venous thromboembolism

OTA Int. 2021 Dec; 4(4): e143.
Published online 2021 Oct 19. doi: 10.1097/OI9.0000000000000143

Summary

- **Aspirin is being used in the collaborative as the first type of VTE prophylaxis primarily in admissions to non-trauma services.**
- **TXA is being used across the collaborative in a significant volume of cases without hemorrhage or TBI indications.**
- **The impact of TXA use on non-hemorrhage or non-TBI indications on VTE outcomes in trauma patients is unclear.**

M·TQIP

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Program Manager Updates
5-17-23
Judy Mikhail

1. Future Metrics
2. Grey Bk/MTQIP Clarifications
3. Dissecting Delirium

Topic 1

Metrics Planning

Continuously plan for new metrics

Timeline:
May: Propose new metrics
June: Submit metrics to BCBSM for approval
July: Data collection begins

Performance Index Changes

2023	2024	2025
NEW Death Determination Documentation		

Performance Index Changes

2023	Proposed 2024	2025
Death Determination Documentation	NEW Wt Based VTE Protocol Use	

Weight-Based VTE Prophylaxis
3 Guideline Options

(emailed 1/6/23)

- Western Trauma Association
- AAST/COT Guideline
- Geert's Sunnybrook Guideline

Options:

- Use your existing wt-based LMWH protocol
- Develop your own wt-based LMWH protocol
- Use a suggested wt-based LMWH protocol

MTQIP
Adult Trauma Weight-Based VTE Prophylaxis
Three Guideline Options

Western Trauma Association (WTA) Guideline

Ley et al., 2020 J Trauma Acute Care Surgery 89(5):971-981 find the abstract here

Renal Failure	Special Cases	Most Trauma	Obese
CrCl < 30 mL/min ↓	Age > 65 yr or CrCl ≥ 30-60 mL/min or Low wt < 60 kg or TBI or SCI or Pregnant ↓	Age 18-65 yr, CrCl > 60 mL/min Wt ≥ 60 kg No TBI, SCI ↓	Obese Wt > 100 kg ↓
Heparin 5000 u q8 hr	Enoxaparin 30 mg BID	Enoxaparin 40 mg BID	Enoxaparin 50 mg BID
	Consider adjusting by Anti-Xa Levels Consider the addition of aspirin		

AAST/COT Guideline

Yorkgitis et al., 2022 J Trauma Acute Care Surgery 92(3):597-604 find the abstract here

Renal Failure		Special Cases	Most Trauma	Obese
CrCl < 30 mL/min ↓		Age > 65 yr or CrCl < 60 mL/min or Low Wt < 50 kg or TBI or SCI or Solid Organ Injury or Pregnant ↓	Age 18-65 yr, CrCl ≥ 60 mg/dL Wt ≥ 50 kg; BMI < 30 No TBI, SCI ↓	BMI > 30 ↓
BMI ≤ 30 ↓	BMI > 30 ↓			
Heparin 5000 u q8 hr	Heparin 7500 u q8 hr	Enoxaparin 30 mg BID	Enoxaparin 40 mg BID	Enoxaparin 0.5 mg/kg BID
		Consider adjusting by Anti-Xa Levels		

Geert's Sunnybrook Guideline 2022

ACS VTE 2022 Consensus Conference, find Geert's slides here

Renal Failure or Low Wt	Special Cases	Most Trauma
CrCl < 30mL/min or Wt < 40 kg ↓	**High Risk Trauma:** SCI or Major lower extremity fractures ↓	**Usual Risk Trauma** ↓
Enoxaparin 30 mg daily	Wt 40-100 kg ↓ Enoxaparin 40 mg daily → 40 mg BID	Wt 40-100 kg ↓ Enoxaparin 40 mg daily
	Wt 101-125 kg ↓ Enoxaparin 40 mg BID → 60 mg BID	Wt 101-125 kg ↓ Enoxaparin 40mg BID
		Wt >125 kg ↓ Enoxaparin 0.5 mg/kg BID

Wt-Based LMWH Protocol Use

#5A	8	**Timely LMWH VTE Prophylaxis in Trauma Admits** (18 mo: 1/1/23-6/30/24) ≥ 52.5 % of patients (≤ 48 hr) ≥ 50.0 % of patients (≤ 48 hr) ≥ 45.0 % of patients (≤ 48 hr) < 45.0 % of patients (≤ 48 hr)	 8 6 3 0
#5B	2	**Weight Based LMWH Protocol in Use** (12mo: 7/1/23-6/30/24) Yes No	 2 0

Reduce by 2 points

Add 2 points

Criteria

#5b: Weight Based LWMH Protocol in Use

Credit given:

- Protocol and 5 cases submitted via weight-based LMWH submission portal on mtqip.org by 12/6/24.
- Video demonstration on using the submission portal.

Performance Index Changes

2023	Proposed 2024	2025
Death Determination Documentation	NEW Wt Based VTE Protocol Use	
	NEW Geri Hip Fx Repair Lower from 48 to 42 hrs	

Performance Index Changes

2023	Proposed 2024	2025
NEW Death Determination Documentation	NEW Wt Based VTE Protocol Use	
	NEW Geri Hip Fx Repair Lower to 42 hrs	
	NEW Delete Head CT Add PROs Participation	

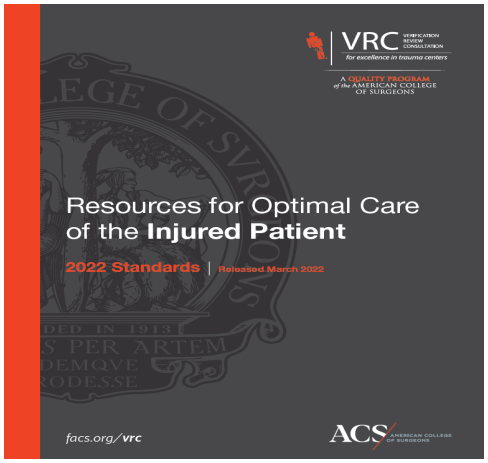
Potential 2025 Metric

Patient-reported outcome measures (PROMs) data collection

5.28 Discharge Planning
NEW Level I & II Centers

Should use patient-centered strategies:

Peer-to-peer mentoring
Trauma survivor program
ATS Trauma Survivors Network
Continuous Case Management
- Wrap-around services
- Navigator positions
- Trauma center community linkages



Patient Reported Outcomes

- ✓Aligns with ACS Verification
- ✓Aligns with Research
- ✓Aligns with BCBSM

Thinking ahead to 2025

Performance Index Changes

2023	Proposed 2024	2025
Death Determination Documentation	NEW Wt Based VTE Protocol Use	Consider Bad Case-Good PI?
	NEW Geri Hip Fx Repair Lower to 42 hrs	
	NEW Delete Head CT Add PROs Participation	

Bad Case – Good PI

The Journal of Trauma and Acute Care Surgery

Journal of Trauma & Acute Care Surgery

Just announced…

EDITORIAL

Educational cases from the TQIP mortality reporting system: A new publication initiative of The Journal of Trauma and Acute Care Surgery

Coimbra, Raul MD, PhD, FACS

Author Information

Journal of Trauma and Acute Care Surgery 94(5):p 635-636, May 2023. | **DOI:** 10.1097/TA.0000000000003936

Potential 2025 Metric

Bad Case-Good PI

- PI skills likely vary across centers
- Most PI goes in a drawer = lost learning
- Shared PI “lifts all boats”
- Aligns with ACS-TQIP mortality reporting system
- Aligns with MTQIP PI Death Determination
- Identify patterns
- You already do the work

How to operationalize?

- Develop criteria for case selection
- Each center submits X? cases a year (from the previous years PI)
- Cases selected and presented at MTQIP mtg
- Structured PI format –JCAHO taxonomy
- De-identified vs Identified?

Performance Index Changes

2023	Proposed 2024	2025
NEW Death Determination Documentation	NEW Wt Based VTE Protocol Use	CONSIDER Bad Case-Good PI?
	NEW Geri Hip Fx Repair Lower to 42 hrs	CONSIDER IR within 60 min tbd % of patients (Hem Control) **COLLABORATIVE WIDE MEASURE**
	NEW Delete Head CT Add PROs Participation	

LI, LII, PTCI, PTCII

ACS Optimal Resources Book

4.15 Interventional Radiology Response for Hemorrhage-Type II

Necessary human and physical resources continuously available for an endovascular or interventional radiology procedure for hemorrhage control can begin within 60 minutes

Continuously available 24/7/365

The response time is tracked from request to arterial puncture

Response times tracked through the PIPS Plan

Performance Index Changes

2023	Proposed 2024	2025 *Planning Ahead….*
NEW Death Determination Documentation	NEW Wt Based VTE Protocol Use	CONSIDER Bad Case-Good PI?
	NEW Geri Hip Fx Repair Lower to 42 hrs	CONSIDER IR within 60 min tbd % of patients (Hem Control) **COLLABORATIVE WIDE MEASURE**
	NEW Delete Head CT Add PROs Participation	

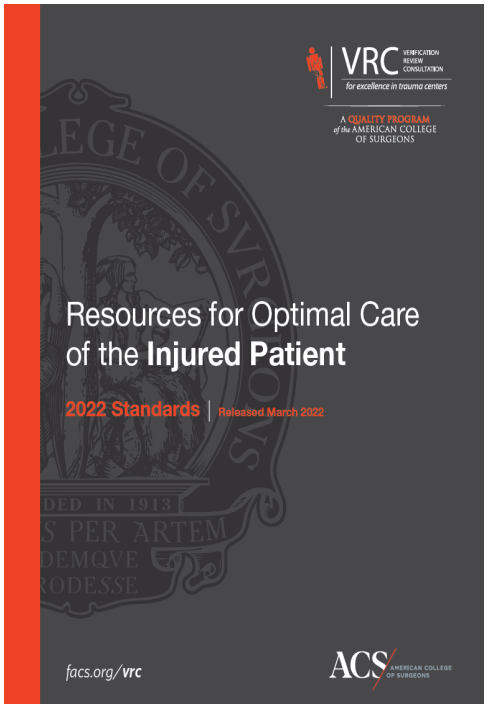
Topic 2

ACS Optimal Resources Book and MTQIP Clarifications

4.35 PI Staffing Requirements

- 0.5 FTE Vol > 500pts
- 1.0 FTE Vol > 1000pts

MCR can be used toward PI staffing



ACS Optimal Resources Book and MTQIP Clarifications

2.8 TMD Requirements (Type II)

Level I	**Level II or III**
TMD must hold active membership in at least one national trauma organization	TMD must hold active membership in at least one regional, state, or national trauma organization.
Have attended at least one meeting during the verification cycle	Have attended at least one meeting during the verification cycle

TQIP & MTQIP Do Not Count

Topic 3

Dissecting Delirium

Delirium

- MTQIP only recently started to collect (2020)
- Aligns with growing geriatric trauma population
- Tx: Heavily (bundle, guideline, pathway) oriented
- ACS is looking for ↑ guideline use

PRQ

5.1 - Clinical Practice Guidelines (Type II)

Applicable Levels

LI, LII, LIII, PTCI, PTCII

PRQ Question Text *[Field Type]*

*1. Upload a list of clinical practice guidelines, protocols, or algorithms with date of last revision. *[Attachment]*

*2. Confirm that the relevant clinical practice guidelines are also included in the medical records available for review. *[Radio button]*

LI, LII

5.6 Injured Older Adult Protocol – Type II

- **Level I and II Trauma Centers Must Have The Following Protocols for Geriatric Trauma:**
- • Identify vulnerable geriatric patients
- • Identify those needing geriatric provider expertise
- • Prevent, identify, and manage dementia, depression, delirium
- • Process to capture and document patient preferences:
- [care goals, code status, advanced directives, proxy decision maker]
- • Medication reconciliation and avoidance inappropriate meds
- • Screening for mobility: assure early, frequent, and safe mobility
- • Implement safe transitions to home or other facility

M·TQIP Began Collecting 2020

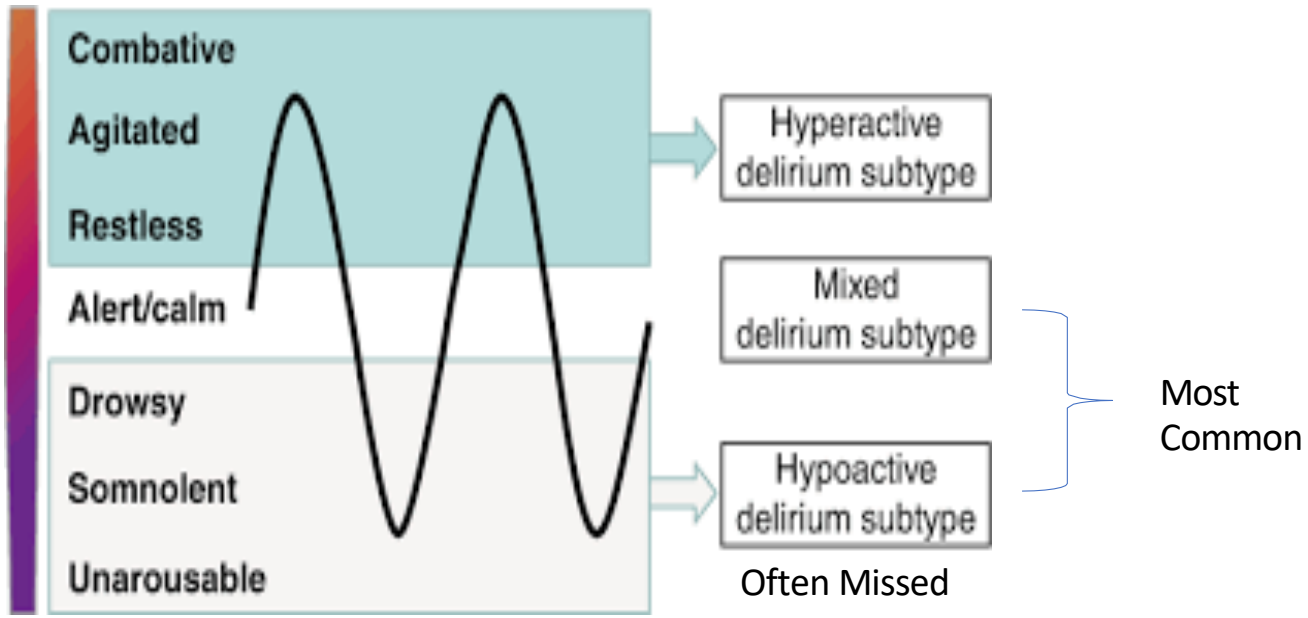
Analytics Dictionary

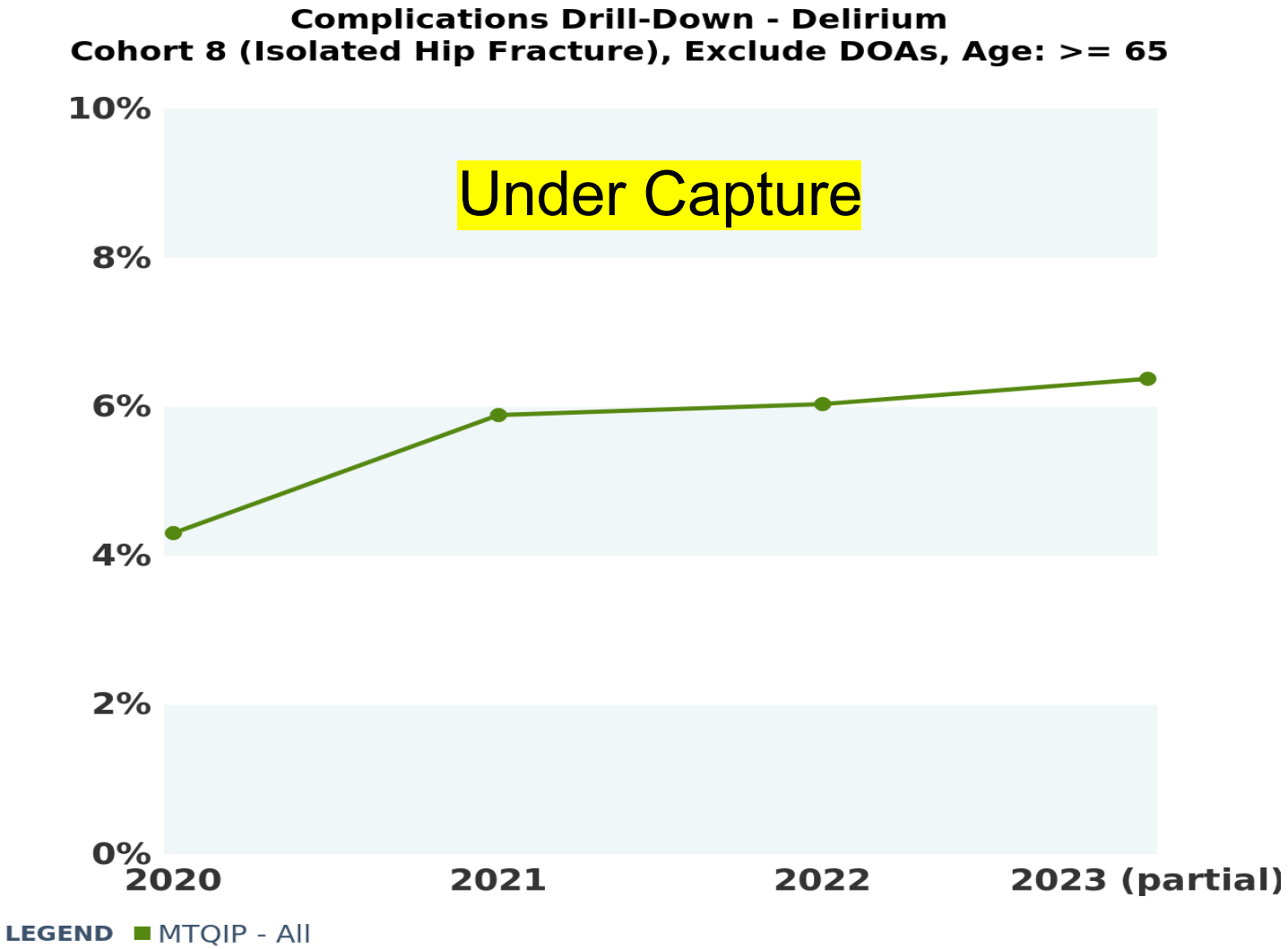
Delirium	Denominator: All cases meeting the MTQIP analytic inclusion criteria.
	Numerator: Defined as Acute onset of behaviors characterized by restlessness, delusions, and incoherence of thought and speech. Delirium can often be traced to one or more contributing factors, such as a severe or chronic medical illness, changes in your metabolic balance (e.g., low sodium), medication, infection, surgery, or drug withdrawal. OR Patient tests positive after using an objective screening tool like the Confusion Assessment Method (CAM) or the Intensive Care Delirium Screening Checklist (ICDSC). OR A diagnosis of delirium documented in the patient's medical record. • Must have occurred during the patient's initial stay at your hospital. • EXCLUDE patients whose delirium is due to alcohol withdrawal.

Delirium Definition Key Features

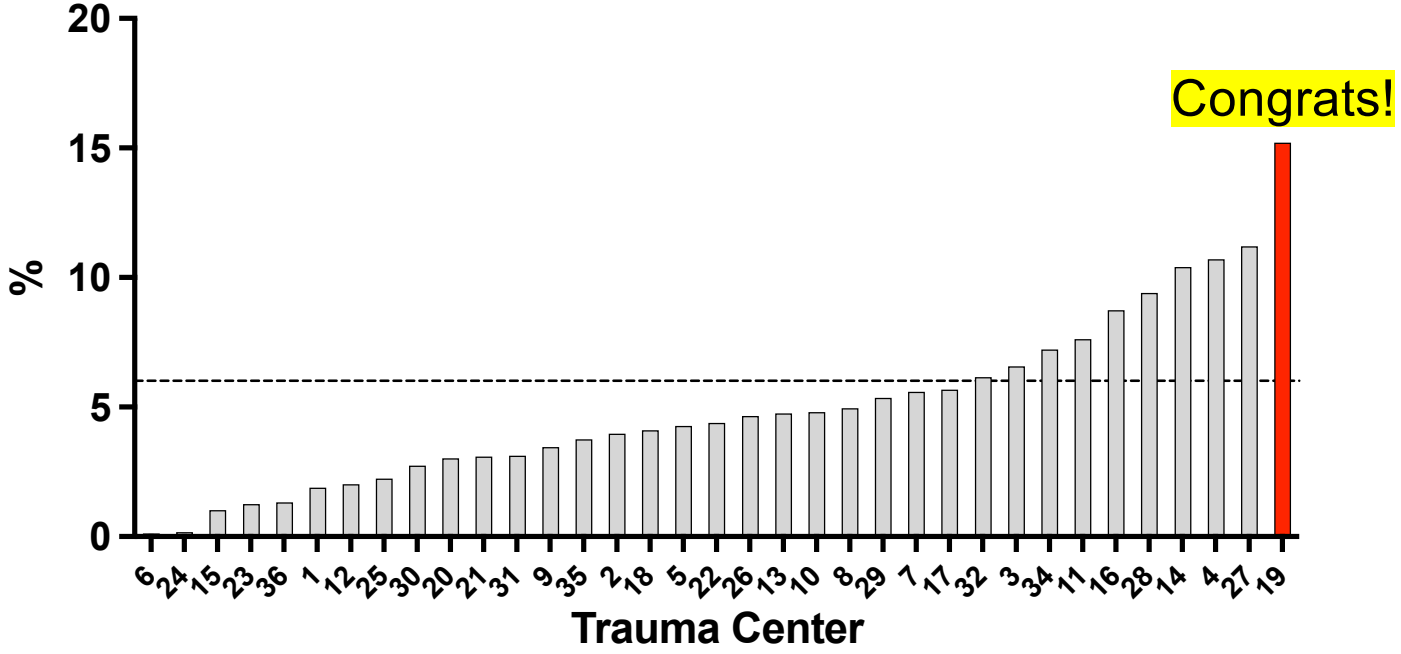
1. Disturbance of consciousness with reduced ability to focus, sustain or shift attention
2. A change in cognition or the development of a perceptual disturbance - not accounted for by pre-existing, established, or evolving dementia
3. Develops over a short period of time, and fluctuates over the course of a day
4. There is evidence (H&P/Labs) that the disturbance is caused by a medical condition, substance intoxication, or med side effect

Delirium: Three Prototypes




Complications Drill-Down - Delirium
Cohort 8 (Isolated Hip Fracture), Exclude DOAs, Age: >= 65
10%
8%
6%
4%
2%
0%
Under Capture
2020
2021
2022
2023 (partial)
LEGEND
MTQIP - All

Delirium
Cohort 8 - Isolated Hip Fracture, Age ≥ 65



Epidemiology

Non Modifiable Risk Factors

- Underlying Dementia
- HTN
- ETOH
- High acuity

Modifiable Risk Factors

- Pain
- Sedation
- Benzos
- Coma
- MV
- Sleep Deprivation
- Immobility
- Restraints
- Social Isolation

Outcomes of ICU Delirium

- Up to 60-80% of mechanically ventilated patients will develop (highly variable)
  - Dependent on underlying patient risk
- Increased vent days
- Increased ICU LOS
- Increased ICU Mortality
- **Duration of delirium** is associated with increased long-term mortality (6-12 mo) (*predictor*)
- Huge healthcare/societal costs

Long Term Impact

- ICU delirium is an independent risk factor for long term cognitive impairment
- Cognitive impairment is substantial and often persists 1 year after discharge
  - 34% cognitive function similar to TBI survivor
  - 24% cognitive function similar to Alzheimer's patient
  - This cognitive decline is not limited to older adults

Pandharipande et al NEJM 2013

Key Point: Work aggressively to prevent/stop/shorten Delirium

Delirium Screening Tools

- Confusion Assessment Method for ICU (CAM-ICU)
- Intensive Care Delirium Screening Checklist (ICDSC)

Clinician Delirium Screening Challenges

Barriers

- Time consuming
- Complex
- Difficult in vent pts
- Not confident
- Results not used

Tips

-Education/Training

-Multidisciplinary buy in

-Case based scenarios best

-Clinical champion q shift

-Embed nursing orientation

-Embed EMR

-Adherence/accountability

Delirium Assessment Timing?

Optimally when patient has been off sedation

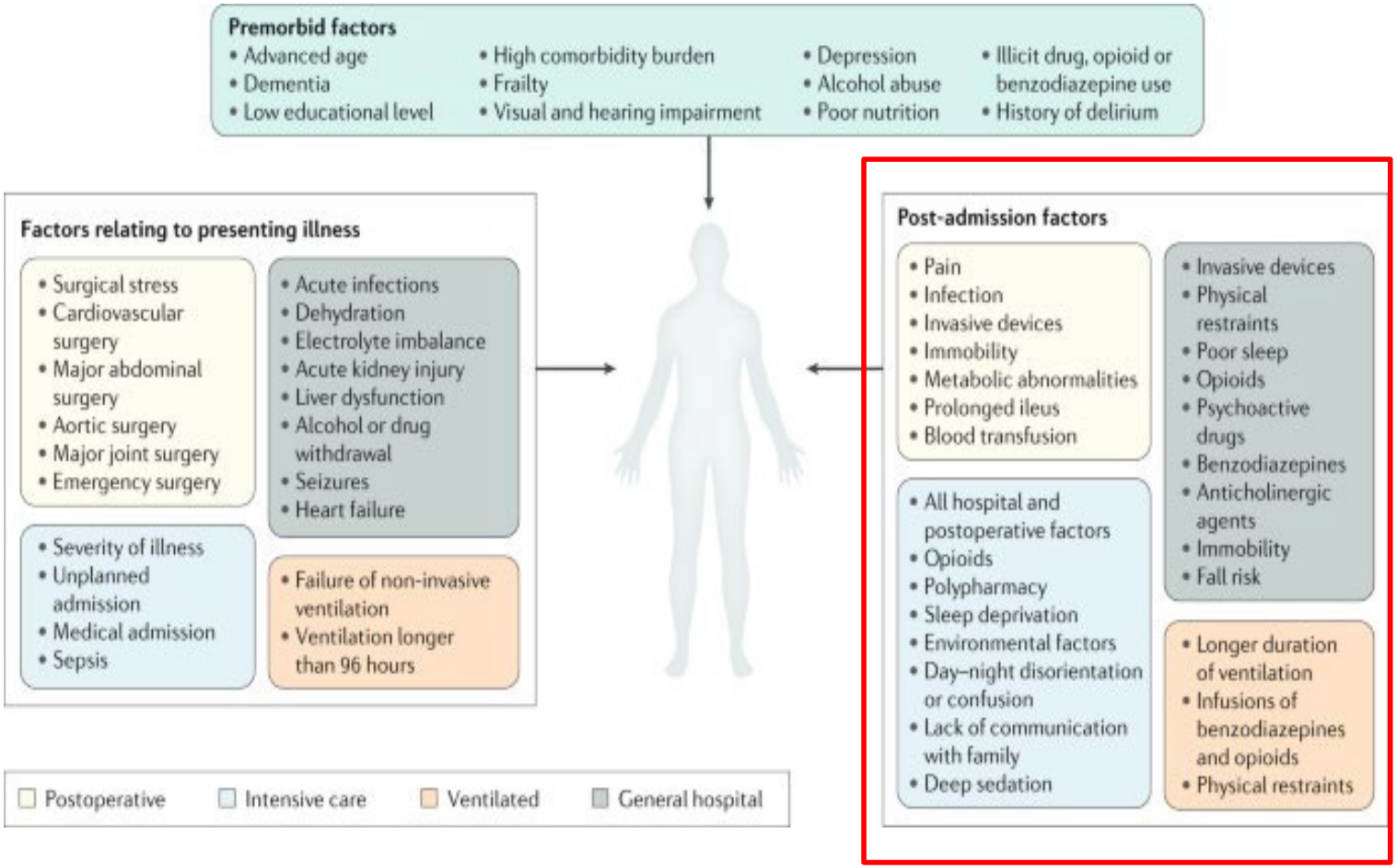
- Patients were 10.5 times more likely to have delirium (CAM-ICU +) when evaluated **before** sedation interruption than after sedation interruption

Patel et al. AJRCCM 2014

Modifiable

- **Benzodiazepine Use**
  - Substantial research shows that benzos transition patients to delirium (highly consistent & dose-related)
  - Awake and without delirium on Monday
  - Given a benzo
  - Substantial risk that on Tuesday will + delirium

Zaal et al Inten Care Med 2015



Nurse Sensitive Factors

Early Mobility
↓ Delirium

Frequent Reorientation
↓ Delirium

Reorienting Patients (min of once a shift)	
Who?	Who are you? Who is the nurse/physician?
What?	What happened?
When?	When did it happen and what is the date?
Where?	Where are you/we?
Why?	Why did it happen?
How?	How did it happen? What is the illness progression?

Sleep Hygiene = ↓ Delirium

- Nighttime
  - TV off
  - Dim lights
  - Decrease overhead pages, noise
- Daytime
  - Raise blinds
  - Mobilize
  - Reduce napping
  - Optimize family interaction
- Avoid Benzos, Opioids
- Adjuncts
  - Earplugs
  - Eye masks
  - Music

Goal: Prevent Prolonged Ventilation

- Appropriate use and titration of sedation
- Use assessment tools like RASS/SAS/CPOT
- Sedation vacations
- Breathing trials
- RT and Nursing coordination
- Prevent oversedation
- Ensure successful extubation
- Prevent reintubation
- Prevent prolonged ventilation

Table. The ABCDEF Bundle[a]

Assess, prevent and manage pain
Both spontaneous awakening trials and spontaneous breathing trials
Choice of analgesia and sedation
Delirium: assess, prevent and manage
Early mobility and exercise
Family engagement and empowerment

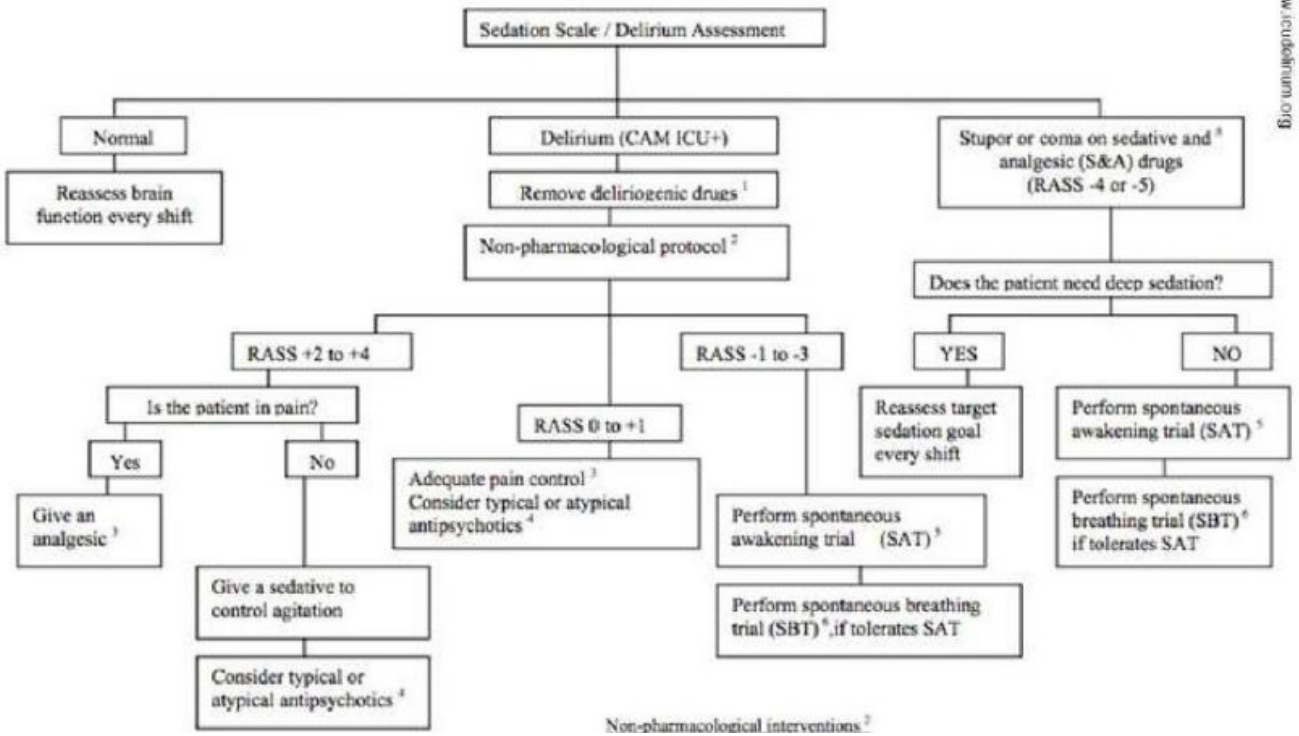
[a] These items individually and collectively can reduce delirium and long-term consequences for adult ICU patients, and improve pain management.

A2F Bundle

ICU Liberation Bundle

↓ Delirium	↓ Mort	↓ Intub	↓ Pain	↓ Restraint	↓ LOS	↑ DC Home	↑ Independence

DELIRIUM PROTOCOL



Non-pharmacological interventions [7]

Resources

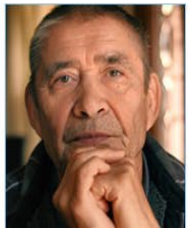
American Delirium Society

AMERICAN DELIRIUM SOCIETY

MEMBER PORTAL JOIN

HEALTHCARE PROFESSIONALS EVENTS PATIENTS & FAMILIES MEMBERSHIP ABOUT ADS

Healthcare Professionals



ADS provides a wide range of delirium educational information for medical professionals, family, and

ADS 2023 Annual Conference

June 11 – 13, 2023

Providence, RI

Clinical Application

Videos

- Delirium presentation issues & management in palliative care: https://www.youtube.com/watch?v=pkVia_NIc-k
- Article & Video: Delirium: the under-recognized medical emergency "How to Try this" (51 min): http://journals.lww.com/
- Managing Delirium Out of Hours: https://www.youtube.com/watch?v=1iKe-6Ic5b0
- ABCDE and F Bundle: The Science Behind Liberating ICU Patients and Families: https://www.youtube.com/watch?time_continue=4&v=g0Bo3LtzLYU

PDFs

- Delirium Education Cards: View PDF
- Delirium and Acute Encephalopathy Care Pathway: View PDF
- Post Acute Delirium and Acute Encephalopathy: View PDF
- Manual for Delirium Assessment and Intervention: View PDF

HEALTHCARE PROFESSIONALS

CLINICAL APPLICATION →

IDELIRIUM →

ESSENTIAL READINGS →

ADDITIONAL RESOURCES →

AGS COCARE®: CAM AND HELP TOOLS →

SPECIAL INTEREST GROUPS (SIGS) →

EDUCATION →

AGS COCARE®: HELP →

DELIRIUM JOURNALS →

Society of Critical Care Medicine
The Intensive Care Professionals

Membership Education Critical Care Congress Research Clinical Resources

SCCM > Clinical Resources > ICU Liberation

Society of Critical Care Medicine
www.sccm.org

ICU Liberation

The ICU Liberation campaign aims to liberate patients from the harmful effects of an intensive care unit stay.

The Society of Critical Care Medicine's (SCCM) ICU Liberation Campaign aims to liberate patients from the harmful effects of pain, agitation/sedation, delirium, immobility, and sleep disruption (PADIS) in the intensive care unit (ICU).

ICU Liberation provides evidence-based strategies for the entire multiprofessional critical care team that have been shown to improve outcomes for patients and reduce costs for hospitals, while transforming ICU culture.

Among the harmful effects possible is post-intensive care syndrome (PICS), defined as new or increased physical, cognitive, or mental health impairment in a patient after hospitalization in an intensive care unit.

Through the **2018 Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU**, known as the PADIS Guidelines, and the ICU Liberation Bundle (A-F), the ICU Liberation campaign seeks to empower the multiprofessional team to provide care that can improve outcomes for patients after they leave the ICU.

Studies have shown that implementing ventilator weaning protocols, maintaining light levels of sedation, and preventing and managing delirium can improve patient outcomes. Early mobilization and family engagement also play a key role in reducing long- and short-term consequences of an ICU stay. The greatest benefit occurs when these interventions are combined.

ICU Liberation: ABCDEF Bundle

Symptoms Pain, Agitation, Delirium Guidelines	Monitoring Tools	Care ABCDEF Bundle	Done
Pain	Critical-Care Pain Observation Tool (CPOT) NRS Numeric Rating Scale BPS Behavioral Pain Scale	A: Assess, Prevent and Manage Pain	☐
Agitation	Richmond Agitation-Sedation Scale (RASS) Sedation-Agitation Scale (SAS)	B: Both Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT) C: Choice of Analgesia and Sedation	☐ ☐
Delirium	Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) Intensive Care Delirium Screening Checklist (ICDSC)	D: Delirium: Assess, Prevent and Manage E: Early Mobility and Exercise F: Family Engagement and Empowerment	☐ ☐ ☐

ICU Liberation Schematic Depicting Symptoms, Monitoring Tools, and ABCDEF Rounding Checklist

ICU Liberation:
Evidence in the Numbers

Society of Critical Care Medicine

Implementation of the ICU Liberation Bundle is associated with:

- **72%** decrease in next day mechanical ventilation
- **68%** reduction in hospital death within 7 days
- **65%** decrease in next day comas
- **63%** reduction in next day use of physical restraints
- **46%** decrease in ICU readmissions
- **40%** decrease in next day delirium
- **36%** decrease in likelihood of being discharged to nursing home and rehab facilities

Learn more about the ICU Liberation Initiative at iculiberation.org.

ICU LIBERATION

Source: Caring for Critically Ill Patients with the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults. Pun, Crit Care Med, 2019;47:3-14.

ICU Liberation Products

ICU Liberation offers educational materials to help clinicians improve care and quality of life for ICU patients. Various online learning options as well as the latest *ICU Liberation* book are available.

Learn More →

Electronic Health Record Integration

Epic and Cerner are the first to include the ICU Liberation Bundle (A-F) in their electronic health record (EHR) software, incorporating the interventions into clinicians' workflows.

Learn More →

ICU Liberation Implementation Toolkit

The ICU Liberation Implementation Toolkit provides adult and pediatric critical care teams with a variety of resources to champion and sustain bundle implementation. The toolkit contains:

- An ICU Liberation Implementation Framework Booklet, with individual guidance for each bundle element
- Data metrics and compliance definitions
- A spreadsheet for data collection
- Dashboard compliance and performance reports

Get the Toolkit

Host an ICU Liberation Course at Your Institution

The SCCM Licensing Team can provide details about bringing training to your institution.

Contact Us

Hosting an SCCM licensed course offers a unique opportunity to train your staff. Hosted courses combine expert-developed lectures with hands-on skill stations and are available in both in-person and online formats. Choose to hold one course or explore package pricing.

Learn More About Hosting a Course →

ACS TQIP GERIATRIC TRAUMA MANAGEMENT GUIDELINES

ACS tqip TRAUMA QUALITY IMPROVEMENT PROGRAM

ACS Geriatric Guideline

- Geriatric Triage Criteria
- Dev criteria for geri consult
- Geri Screening -ISAR
- Establish med history
- Follow Beers Criteria
- Pt family priorities
- Surrogate decision maker
- Hold family meeting within 72 hours

Identification of Seniors At Risk

ISAR	Yes	No
1) Before the illness or injury that brought you to the Emergency, did you need someone to help you on a regular basis?	1	0
2) Since the illness or injury that brought you to the Emergency, have you needed more help than usual to take care of yourself?	1	0
3) Have you been hospitalized for one or more nights during the past six months (excluding a stay in the Emergency Department)?	1	0
4) In general, is your sight good?	0	1
5) In general, do you have serious problems with your memory?	1	0
6) Do you take more than three different medications every day?	1	0

Score >=2 higher expected decline

ACS Geriatric Guidelines Delirium in Trauma

Monitor Reversible Causes

- ✓Wake-sleep disturbances
- ✓Immobilization
- ✓Hypoxia
- ✓Infection
- ✓Uncontrolled pain
- ✓Electrolytes/dehydration
- ✓Urinary retention or Foley
- ✓Use or restraints

ACS Geriatric Guideline

- ✓ Monitor fluid intake
- ✓ Early mobilization within 48 hrs
- ✓ Assess/prevent fall risk
- ✓ Aspiration precautions
  - HOB up
  - Sit upright-eating and up to 2 hrs after
  - Evaluate for swallowing deficits
- ✓ Incentive spirometry
- ✓ Deep breathing
- ✓ Bowel regimen/opiates
- ✓ Screen: pressure ulcers with Braden or Norton scale within 24 hrs
- ✓ Doc skin integrity

2019

Frailty Identification and Care Pathway: An Interdisciplinary Approach to Care for Older Trauma Patients

Elizabeth A Bryant, MPH, Samir Tulebaev, MD, Manuel Castillo-Angeles, MD, MPH, Esther Moberg, MPH, Steven S Senglaub, MS, Lynne O'Mara, PAC, Meghan McDonald, RN, MSN, Ali Salim, MD, FACS, Zara Cooper, MD, MSc, FACS

BACKGROUND: Frailty is a well-established marker of poor outcomes in geriatric trauma patients. There are few interventions to improve outcomes in this growing population. Our goal was to determine if an interdisciplinary care pathway for frail trauma patients improved in-hospital mortality, complications, and 30-day readmissions.

: This was a retrospective cohort study of frail patients ≥65 years old, admitted to the trauma service at an academic, urban level I trauma center between 2015 and 2017. Patients transferred to other services and those who died within the first 24 hours were excluded. An interdisciplinary protocol for frail trauma patients, including early ambulation, bowel/pain regimens, nonpharmacologic delirium prevention, nutrition/physical therapy consults, and geriatrics assessments, was implemented in 2016. Our main outcomes were delirium, complications, in-hospital mortality, and 30-day readm
treated the year before the patl
to determine the association o
There were 125 and 144 frail
There were no significant demo
mean age was 83.51 years (SD 7
was 10 (interquartile range 9 to 14). In univariate analysis, there were no significant differences in complications (28.0% vs 28.5%, respectively, p = 0.93); however, there was a significant decrease in delirium (21.6% to 12.5%, respectively, p = 0.04) and 30-day readmission (9.6% to 2.7%, respectively, p = 0.01). After adjusting for patient characteristics, patients on the pathway had lower delirium (odds ratio [OR] 0.44, 95% CI 0.22 to 0.88, p = 0.02) and 30-day readmission rates (OR 0.25, 95% CI 0.07 to 0.84, p = 0.02), than pre-pathway patients.

CONCLUSIONS: An interdisciplinary care protocol for frail geriatric trauma patients significantly decreases their delirium and 30-day readmission risk. Implementing pathways standardizing care for these vulnerable patients could improve their outcomes after trauma. (J Am Coll Surg 2019;228:852–860.

Level I Center

Frailty Bundle

- Early mobility
- Bowel regimen
- Pain regimen
- Nutrition
- Physical Therapy
- Geri Assessment

After Implementation:
56% decrease in delirium

Questions?

Wrap Up

Jill Jakubus, PA-C, MHSA

OPEN

MAPS-CQI Data Matching

Opt-out email

Conclusion

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