M·TQIP

Ann Arbor, MI
June 6, 2017

Welcome and Introductions
Announcements
Survey Feedback
Opening

Jill Jakubus
10:00

Disclosures

Salary support for MTQIP from BCBSM/BCN

- Mark Hemmila
- Judy Mikhail
- Jill Jakubus

New Member Introductions

- Name
- Center
- Title
- Previous experience

Announcements – Optional Data Submission

- DI – 15 centers
- CDM – 10 centers
- Lancet – 1 center

Announcements – ACS-TQIP High Outlier

- 5 points
- Submit by July 7
- Patient list
- Benchmark report

Announcements – State of Michigan

- MTQIP approached
- Proposal submitted
- Verbally accepted

Announcements – State of Michigan

- Level I and II
  - Streamlined data submission
  - Online reporting: center, state, region
  - Education
- Level III
  - Data submission
  - Report development
  - Education
- EMS Data

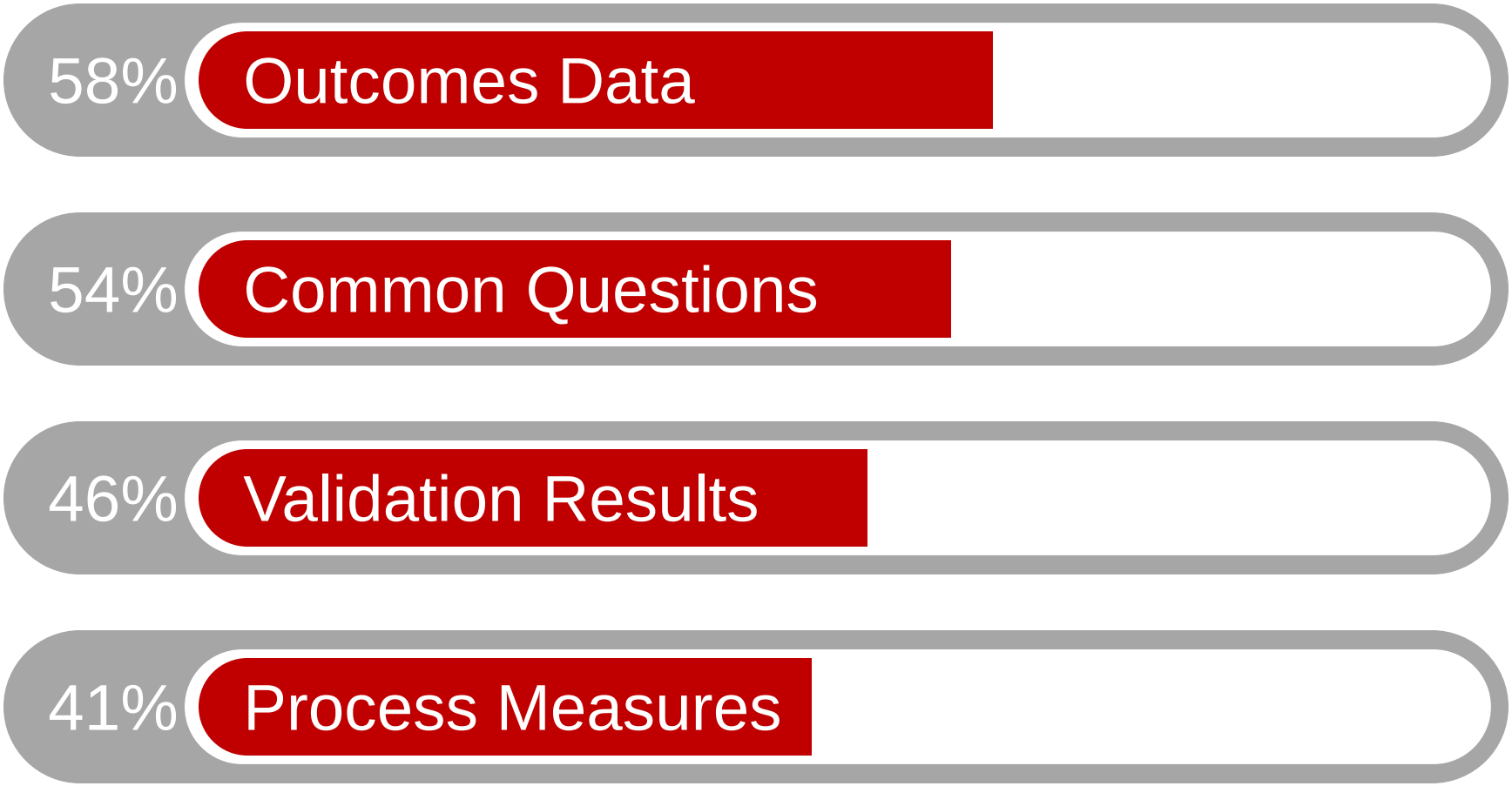
Announcements – Steering Committee

- Open to all members
- Sounding board
- Email communication
- Duty

Announcements – Steering Committee

Donna Deanne Shauna Cece Sara Michelle

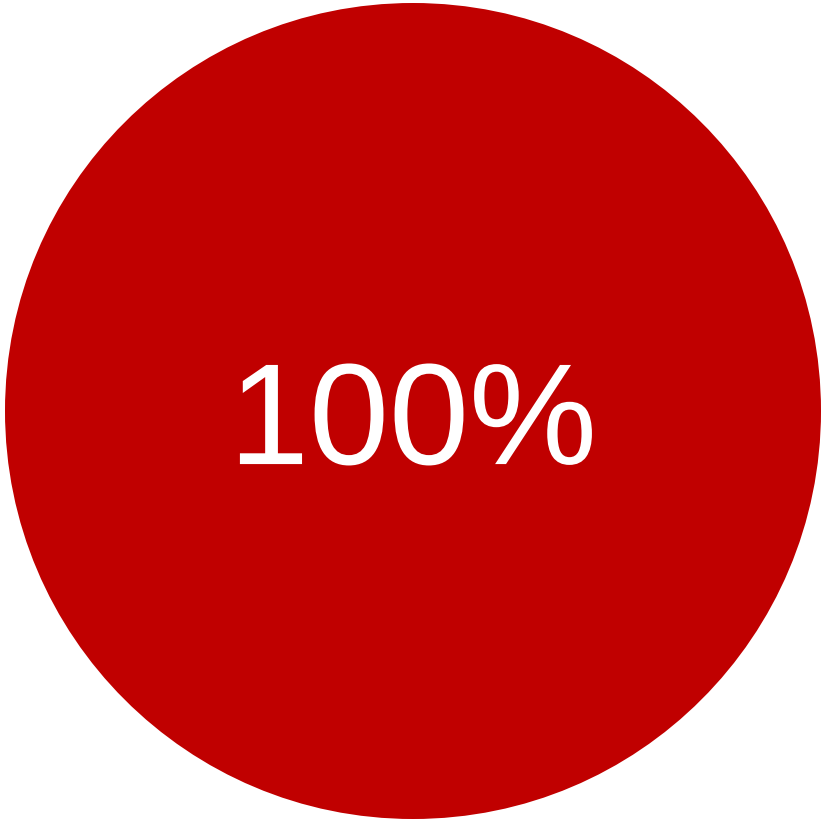
Survey Feedback



Survey Feedback

Would you like to present at the June meeting?

24 responses



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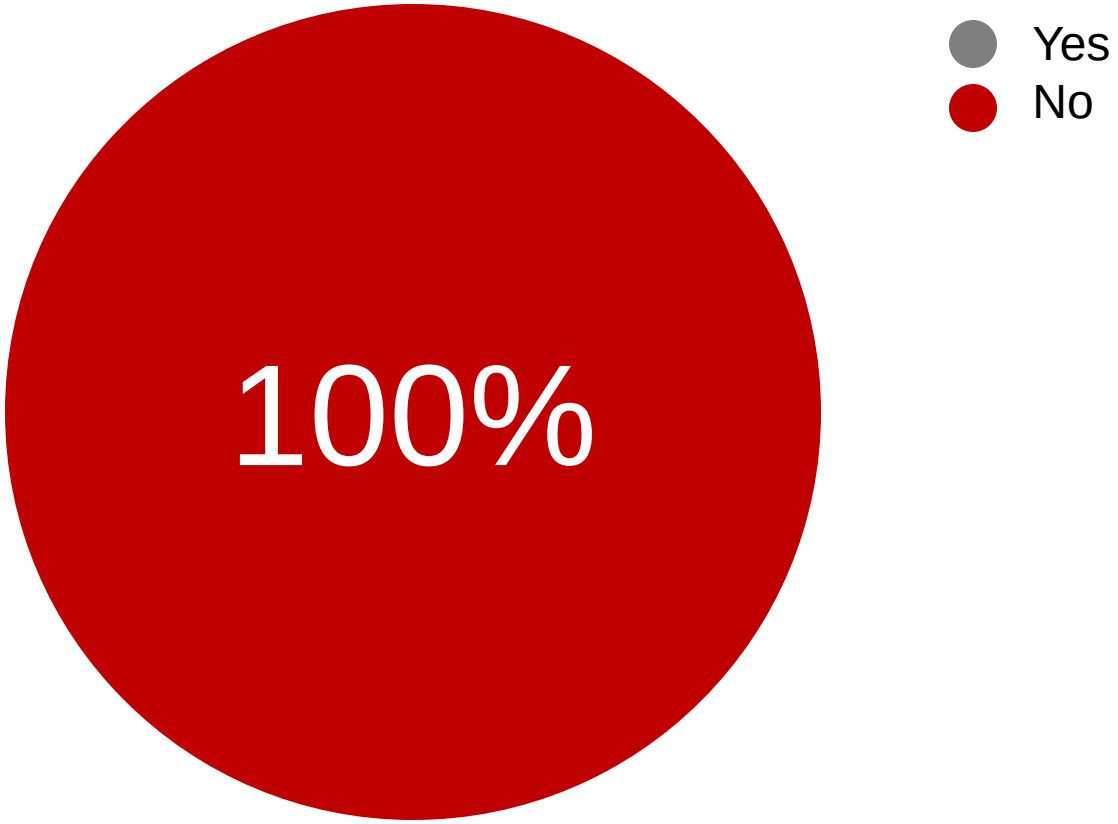


We are the varsity team

Are we watching the ball or the field?


What does it mean to be on the varsity team?

Efficiency

JV Team

Event
Peripheral Short Catheter [redacted] Unplanned by patient Placed
Other Flowsheet Documentation
Trauma Classification/Activation
ED Triage Note Addendum
Trauma wound/injury 05/21/17 Laceration Scalp Right;Posterior Placed
Trauma Start
Patient arrived in ED
Staff Arrived
ED Triage Checklist
Prehospital Care
Mechanism of Injury
Triage Start
Triage Plan
Abuse Screening
Travel and Exposure Screening
Triage Sepsis Screen

Efficiency

Varsity Team

--	--	97	18	117/56
--	--	114	17	113/53
--	--	100	16	--
--	--	97	15	136/60
--	--	90	16	129/58
--	--	98	18	150/64
--	--	90	18	133/60
--	--	95	18	146/61
36.6 (97.9)	Oral	102	18	114/58
--	--	96	18	115/66
--	--	96	18	117/54
--	--	96	18	96/54
36.4 (97.5)	Oral	102	18	104/73
--	--	102	16	126/60
--	--	105	16	146/62
--	--	102	16	102/47
--	--	103	16	! 116/36
--	--	105	18	139/58
--	--	101	18	139/62
--	--	101	18	160/69
--	--	104	--	--
--	--	--	18	104/53
--	--	--	18	96/61
--	--	81	18	102/52
--	--	81	18	--
--	--	82	18	126/61
--	--	79	18	148/74
37 (98.6)	--	79	18	154/77
--	--	77	20	176/69
--	--	93	! 23	! 193/94
--	--	96	20	169/79
36.8 (98.3)	Oral	89	16	! 199/98
--	--	95	15	! 219/101
--	--	86	20	! 209/95

Make it easy to do the right thing

Make it hard to do the wrong thing

Visualization

JV Team

Visualization

Varsity Team

We are only as strong as we are united

If you
SEE something
SAY something

Engagement

- Enhance retention
- Add interest
- It’s okay if you don’t know an answer
- Remember . . .

Engagement

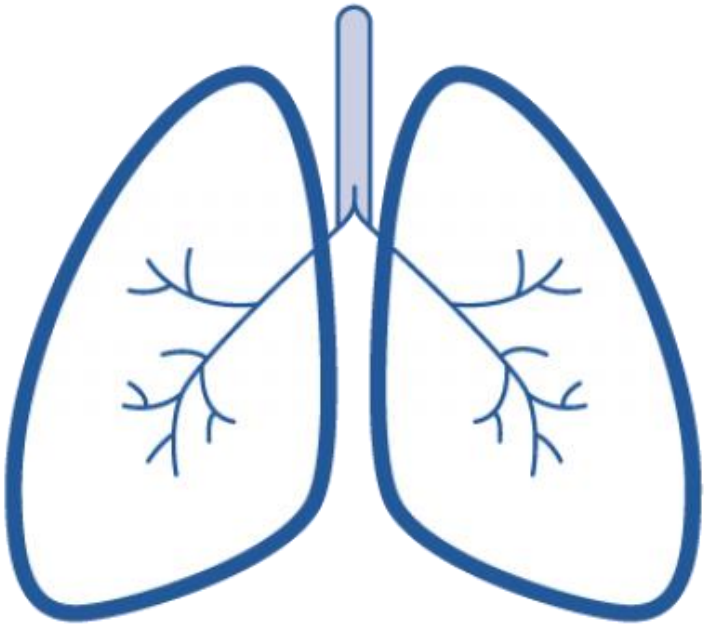
Everyone makes a mistake sometimes

a.k.a. “coverage”

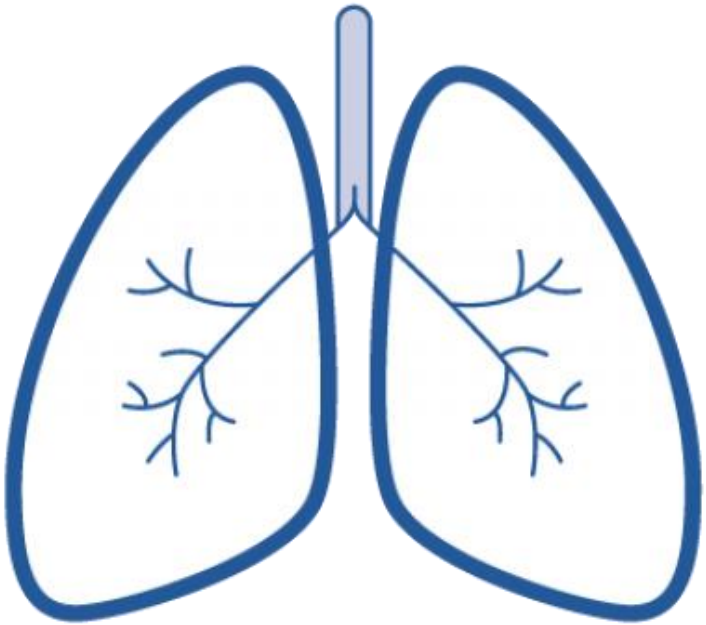
Understanding ARDS

Jill Jakubus
10:20

What is ARDS?



What is does ARDS stand for?



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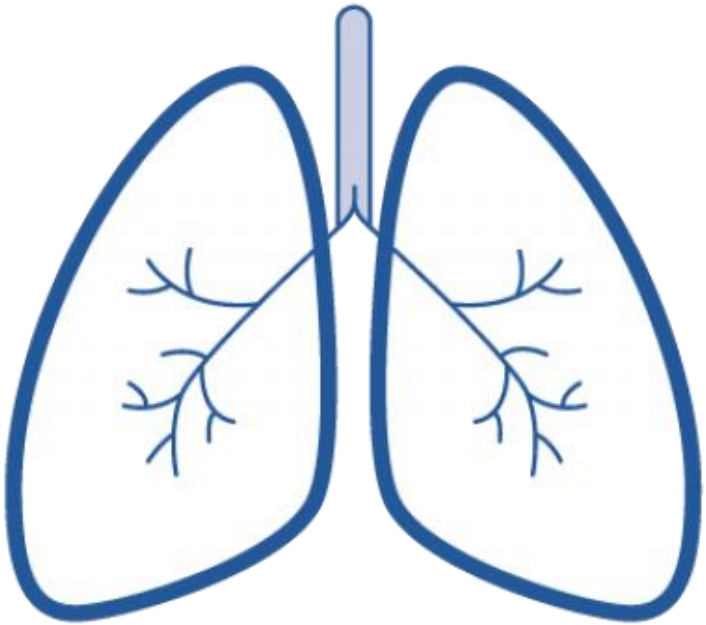
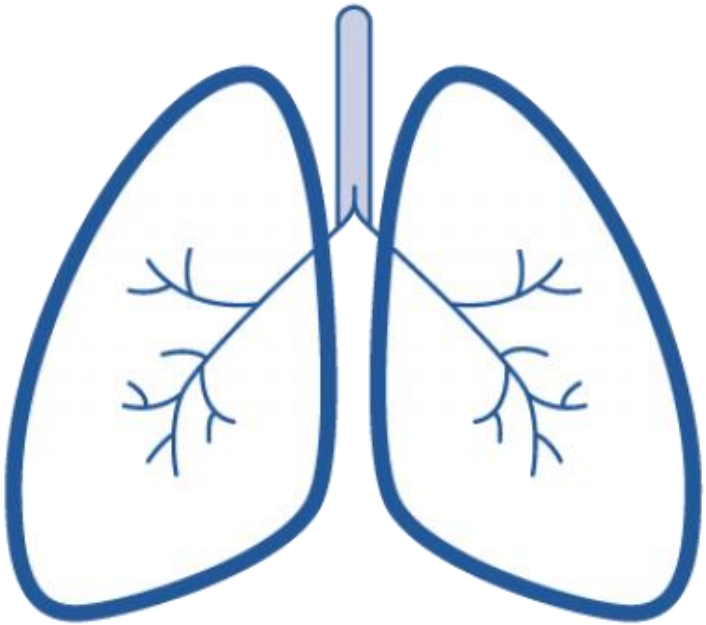
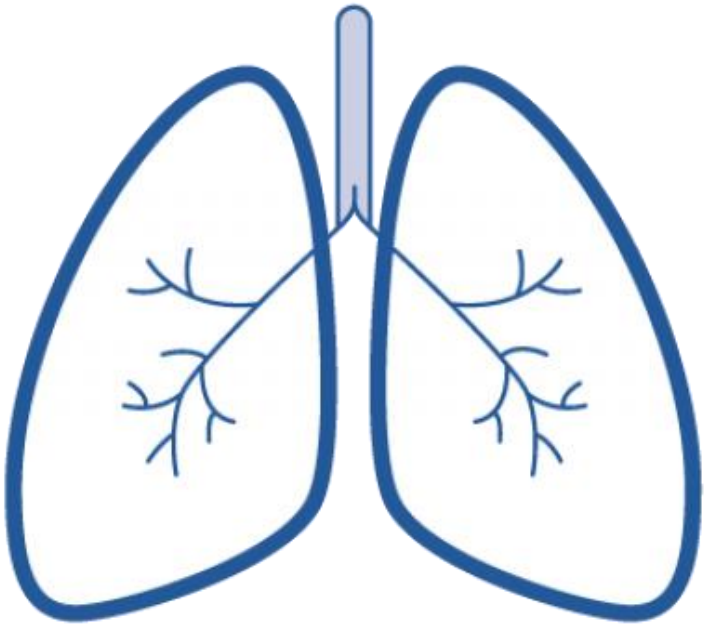


Acute Respiratory Distress Syndrome

What causes ARDS?



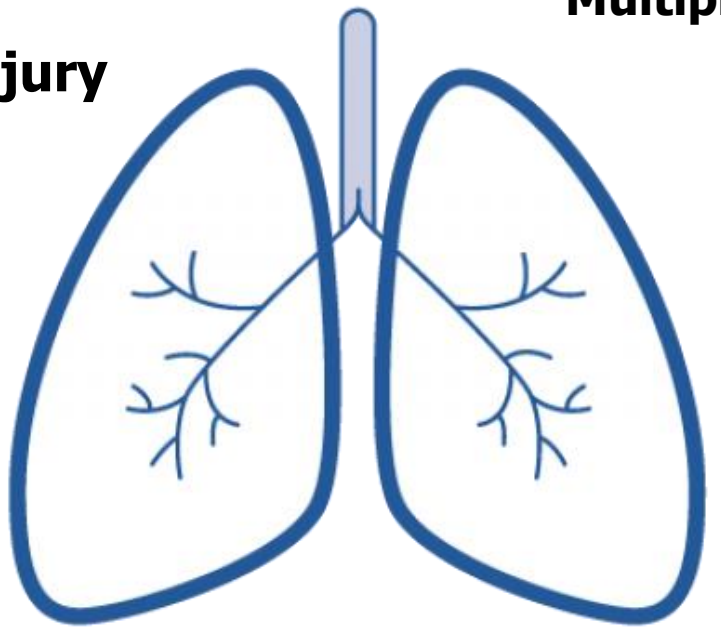
What causes ARDS?



Insult

What are the two most common risks?

Pneumonia
Aspiration
Inhalation injury
Pulmonary contusion
Pulmonary vasculitis
Drowning



Sepsis
Multiple transfusions
Major trauma
Pancreatitis
Severe burns
Shock
Drug overdose

Insult

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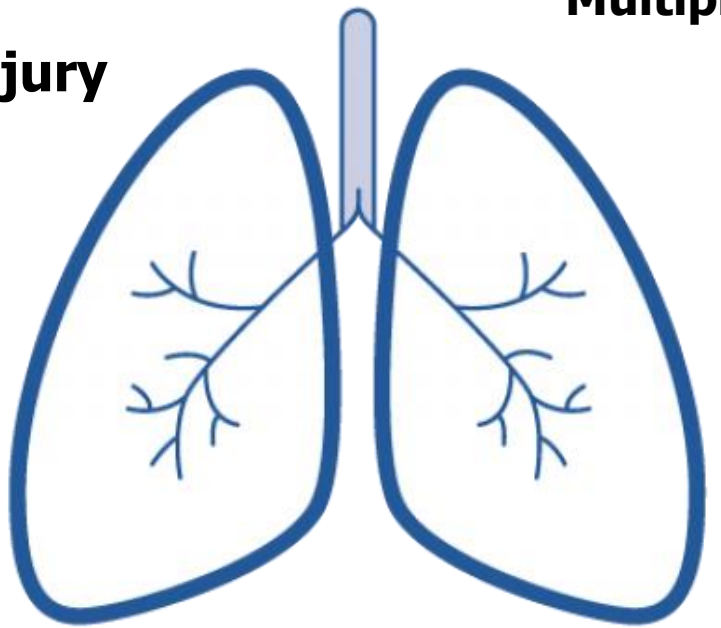
Inhalation injury
Pulmonary contusion
Pulmonary vasculitis
Drowning



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Severe burns
Shock
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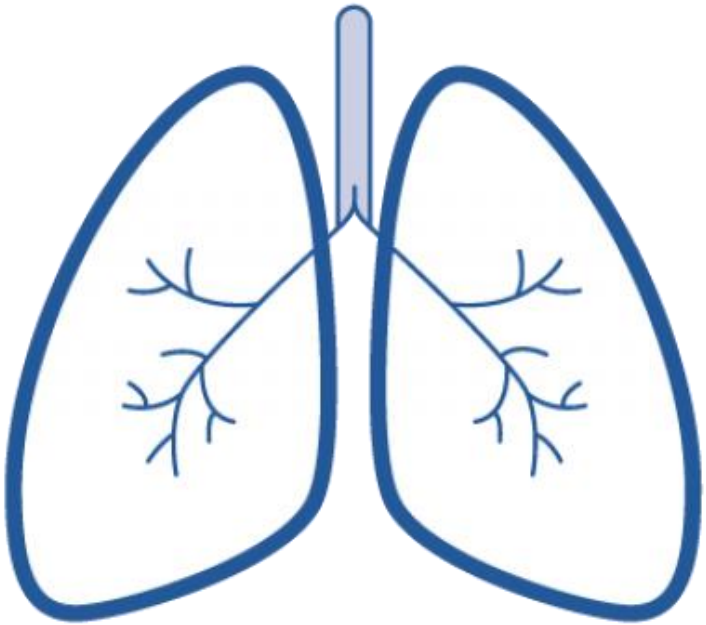
Insult

After the insult then what happens?



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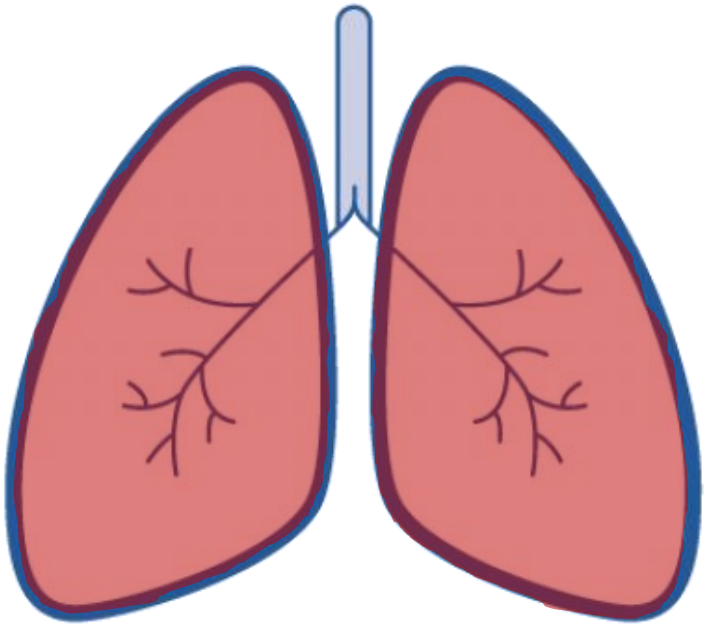
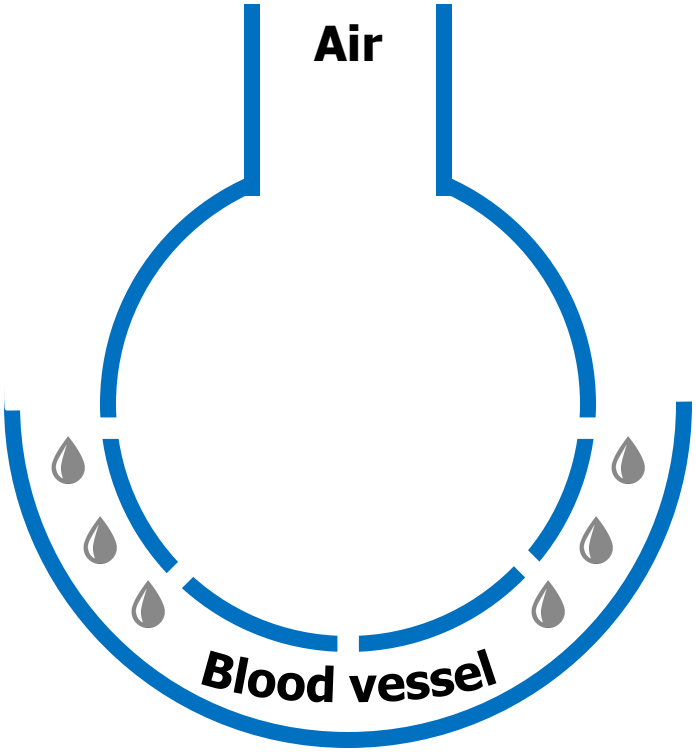
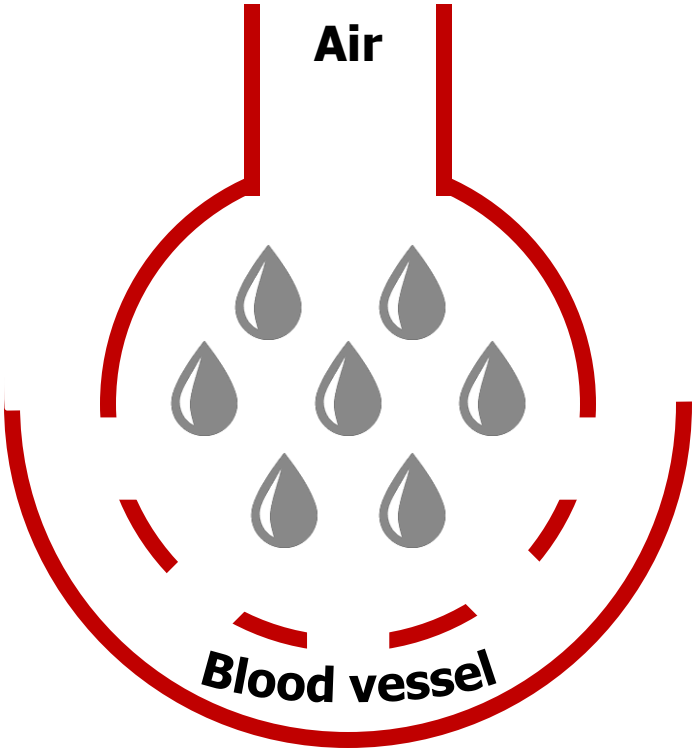


Inflammation

What else happens?



What else happens?



Leaking

What do we know?

What do we know?

ARDS = inflamed leaky lung

What do we know?

ARDS = inflamed leaky lung

Applying ARDS

Jill Jakubus
10:40

What are the ARDS capture criteria?

What are the ARDS capture criteria?

MTQIP 2017

ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

Timing	Within 1 week of known clinical insult or new or worsening respiratory symptoms.
Chest imaging	Bilateral opacities – not fully explained by effusions, lobar/lung collage, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure of fluid overload. Need objective assessment (e.g., echocardiography) to exclude hydrostatic edema if no risk factor present.
Oxygenation (at a minimum)	200<Pa02/Fi02 ≤ 300 With PEEP or CPAP ≥ 5 cmH20c

Def. Source: NTDS, New Berlin

Acute Respiratory Distress Syndrome (NTDS 5)

What is a risk factor?

MTQIP 2017

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Acute Respiratory Distress Syndrome (NTDS 5)

What does the oxygenation criteria mean?

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Acute Respiratory Distress Syndrome (NTDS 5)

What does the minimum mean?

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Acute Respiratory Distress Syndrome (NTDS 5)

Where can you find reference material?

MTQIP 2017

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Acute Respiratory Distress Syndrome (NTDS 5)

Don’t you think we could make this easier?

MTQIP 2017

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Acute Respiratory Distress Syndrome (NTDS 5)

New Berlin

SPECIAL COMMUNICATION

ONLINE FIRST

Acute Respiratory Distress Syndrome
The Berlin Definition

The ARDS Definition Task Force*

The acute respiratory distress syndrome (ARDS) was defined in 1994 by the American-European Consensus Conference (AECC); since then, issues regarding the reliability and validity of this definition have emerged. Using a consensus process, a panel of experts convened in 2011 (an initiative of the European Society of Intensive Care Medicine endorsed by the American Thoracic Society and the Society of Critical Care Medicine) developed the Berlin Definition, focusing on feasibility, reliability, validity, and objective evaluation of its performance. A draft definition proposed 3 mutually exclusive categories of ARDS based on degree of hypoxemia: mild (200 mm Hg < Pao_2/Fio_2 ≤ 300 mm Hg), moderate (100 mm Hg < Pao_2/Fio_2 ≤ 200 mm Hg), and severe (Pao_2/Fio_2 ≤ 100 mm Hg) and 4 ancillary variables for severe ARDS: radiographic severity, respiratory system compliance (≤40 mL/cm H_2O), positive end-expiratory pressure (≥10 cm H_2O), and corrected expired volume per minute (≥10 L/min). The draft Berlin Definition was empirically evaluated using patient-level meta-analysis of 4188 patients with ARDS from 4 multicenter clinical data sets and 269 patients with ARDS from 3 single-center data sets containing physiologic information. The 4 ancillary variables did not contribute to the predictive validity of severe ARDS for mortality and were removed from the definition. Using the Berlin Definition, stages of mild, moderate, and severe ARDS

VALID AND RELIABLE DEFINITIONS are essential to conduct epidemiological studies successfully and to facilitate enrollment of a consistent patient phenotype into clinical trials.[1] Clinicians also need such definitions to implement the results of clinical trials, discuss prognosis with families, and plan resource allocation.

Following the initial description of acute respiratory distress syndrome (ARDS) by Ashbaugh et al[2] in 1967, multiple definitions were proposed and used until the 1994 publication of the American-European Consensus Conference (AECC) definition.[3] The AECC defined ARDS as the acute onset of hypoxemia (arterial partial pressure of oxygen to fraction of inspired oxygen [Pao_2/Fio_2] ≤ 200 mm Hg) with bilat

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Acute Respiratory Distress Syndrome (NTDS 5)

Oxygenation (at a minimum)

Table 3. The Berlin Definition of Acute Respiratory Distress Syndrome

	Acute Respiratory Distress Syndrome
Timing	Within 1 week of a known clinical insult or new or worsening respiratory symptoms
Chest imaging[a]	Bilateral opacities—not fully explained by effusions, lobar/lung collapse, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure or fluid overload Need objective assessment (eg, echocardiography) to exclude hydrostatic edema if no risk factor present
Oxygenation[b]	
Mild	200 mm Hg < PaO_2/FIO_2 ≤ 300 mm Hg with PEEP or CPAP ≥5 cm H_2O[c]
Moderate	100 mm Hg < PaO_2/FIO_2 ≤ 200 mm Hg with PEEP ≥5 cm H_2O
Severe	PaO_2/FIO_2 ≤ 100 mm Hg with PEEP ≥5 cm H_2O

Abbreviations: CPAP, continuous positive airway pressure; FIO_2, fraction of inspired oxygen; PaO_2, partial pressure of arterial oxygen; PEEP, positive end-expiratory pressure.

[a] Chest radiograph or computed tomography scan.

[b] If altitude is higher than 1000 m, the correction factor should be calculated as follows: [PaO_2/FIO_2 × (barometric pressure/760)].

[c] This may be delivered noninvasively in the mild acute respiratory distress syndrome group.

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Acute Respiratory Distress Syndrome (NTDS 5)

Risk Factors

eTable 1. Common Risk Factors for ARDS

Direct	Indirect
Pneumonia	Non-pulmonary sepsis
Aspiration of gastric contents	Major trauma
Inhalational injury	Pancreatitis
Pulmonary contusion	Severe burns
Pulmonary vasculitis	Non-cardiogenic shock
Drowning	Drug overdose
	Multiple transfusions or transfusion-associated acute lung injury (TRALI)

Risk Factors – What is "major trauma"?

eTable 1. Common Risk Factors for ARDS

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HUDSON PAPER

1. Sepsis Syndrome, defined as a clinical picture of serious infection or inflammation with a concurrent, deleterious systemic response. Patients had to display two findings suggesting infection or inflammation (Table 1, Column A) and at least one finding demonstrating evidence of a deleterious systemic response (Table 1, Column B), with no alternative explanation for these findings.
2. Aspiration, defined as the inhalation of gastric contents, was documented by direct observation by medical personnel or by suctioning gastric contents from the trachea. Aspiration of blood or other material was excluded.
3. Drug overdose was defined as the ingestion or parenteral injection of narcotic drugs, aspirin, tricyclic antidepressants, or sedative–hypnotic agents that resulted in a depressed level of consciousness and need for ICU monitoring.

4. Near-drowning was defined as a serious immersion accident resulting in loss of consciousness and either acidosis with pH < 7.25 or hypothermia with core temperature < 32° C.
5. Pulmonary contusion was defined as the development of a localized infiltrate on a chest roentgenogram within 6 h of blunt trauma and which corresponded to clinical evidence of overlying chest wall trauma, such as ecchymosis or rib fractures.
6. Multiple transfusions, defined as the infusion of at least 15 units of blood within 24 h for the purpose of emergency resuscitation.
7. Multiple fractures, defined as the fracture of two or more major long bones; an unstable pelvic fracture; or one major long bone and a major pelvic fracture.
8. Head trauma was defined as a traumatic head injury that resulted in a loss of consciousness for more than 2 h; intracranial hemorrhage; depressed skull fracture; lateralizing signs on neurologic examination; or evidence of elevated intracranial pressure by computed tomographic (CT) scan.

Don’t you think we could make this easier?

PROPOSED MTQIP 2018

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	Common risk factors: major trauma (ISS ≥ 20), pneumonia, pulmonary contusion, aspiration of gastric contents, non-cardiogenic shock, drug overdose, multiple transfusions, transfusion-associated acute lung injury (TRALI) pancreatitis, inhalation injury, pulmonary vasculitis, drowning, severe burns,
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Def. Source: NTDS New Berlin

Acute Respiratory Distress Syndrome (NTDS 5)

Feedback?

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Acute Respiratory Distress Syndrome (NTDS 5)

Scenarios

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Acute Respiratory Distress Syndrome (NTDS 5)

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/6/17, patient has findings concerning for ARDS.

Does this patient meet the timing criteria for ARDS?

YES

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/6/17, patient has findings concerning for ARDS.

Does this patient meet the timing criteria for ARDS?

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/16/17, patient has findings concerning for ARDS with no other clinical changes.

Does this patient meet the timing criteria for ARDS?

NO

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/16/17, patient has findings concerning for ARDS with no other clinical changes.

Does this patient meet the timing criteria for ARDS?

Scenarios

PROPOSED MTQIP 2018

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Def. Source: NTDS, New Berlin

Acute Respiratory Distress Syndrome (NTDS 5)

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/5/17, patient has findings concerning for ARDS with right pulmonary opacity.

Does this patient meet the timing and chest imaging criteria for ARDS?

NO

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/5/17, patient has findings concerning for ARDS with right pulmonary opacity.

Does this patient meet the timing and chest imaging criteria for ARDS?

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/5/17, patient has findings concerning for ARDS with bilateral pulmonary opacities.

Does this patient meet the timing and chest imaging criteria for ARDS?

YES

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/5/17, patient has findings concerning for ARDS with bilateral pulmonary opacities.

Does this patient meet the timing and chest imaging criteria for ARDS?

Scenarios

PROPOSED MTQIP 2018

ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

Timing	Within 1 week of known clinical insult or new or worsening respiratory symptoms.
Chest imaging	Bilateral opacities – not fully explained by effusions, lobar/lung collage, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure of fluid overload. Need objective assessment (e.g., echocardiography) to exclude hydrostatic edema if no risk factor present. Common risk factors: major trauma (ISS ≥ 20), pneumonia, pulmonary contusion, aspiration of gastric contents, non-cardiogenic shock, drug overdose, multiple transfusions, transfusion-associated acute lung injury (TRALI) pancreatitis, inhalation injury, pulmonary vasculitis, drowning, severe burns,
Oxygenation	Pa02/Fi02 ≤ 300 With PEEP or CPAP ≥ 5 cmH20c

Def. Source: NTDS, New Berlin

Acute Respiratory Distress Syndrome (NTDS 5)

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/5/17, patient has findings concerning for ARDS with bilateral pulmonary opacities.

Does this patient need an echo for assessing origin of edema for ARDS?

NO

Scenarios

18 year-old man involved in MVC on 1/1/17. Patient sustained a grade III splenic laceration, right pulmonary contusion and right femur fracture. On 1/5/17, patient has findings concerning for ARDS with bilateral pulmonary opacities.

Does this patient need an echo for assessing origin of edema for ARDS?

Scenarios

PROPOSED MTQIP 2018

ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

Timing	Within 1 week of known clinical insult or new or worsening respiratory symptoms.
Chest imaging	Bilateral opacities – not fully explained by effusions, lobar/lung collage, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure of fluid overload. Need objective assessment (e.g., echocardiography) to exclude hydrostatic edema if no risk factor present. Common risk factors: major trauma (ISS ≥ 20), pneumonia, pulmonary contusion, aspiration of gastric contents, non-cardiogenic shock, drug overdose, multiple transfusions, transfusion-associated acute lung injury (TRALI) pancreatitis, inhalation injury, pulmonary vasculitis, drowning, severe burns,
Oxygenation	Pa02/Fi02 ≤ 300 With PEEP or CPAP ≥ 5 cmH20c

Def. Source: NTDS, New Berlin

Acute Respiratory Distress Syndrome (NTDS 5)

What does PaO2 stand for?

What does PaO2 stand for?

Arterial partial pressure of oxygen

What does PaO2 mean?

What does PaO2 mean?

Arterial oxygen concentration

What does FiO2 stand for?

What does FiO2 stand for?

Fraction of inspired oxygen

What does FiO2 mean?

What does FiO2 mean?

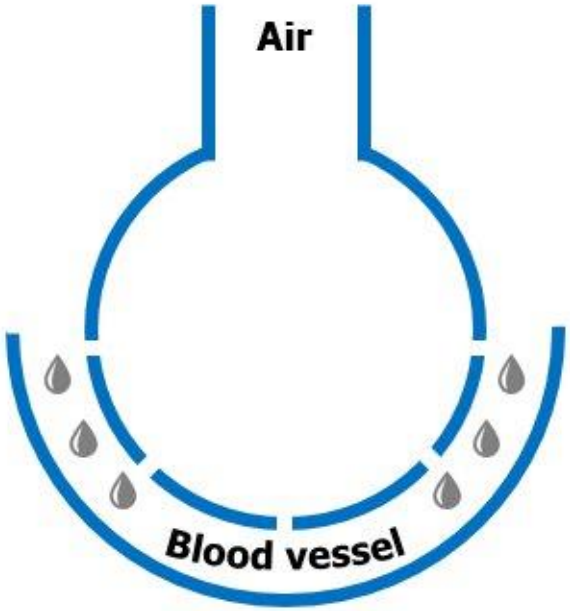
Amount of oxygen-enriched air being given

Let's put it together

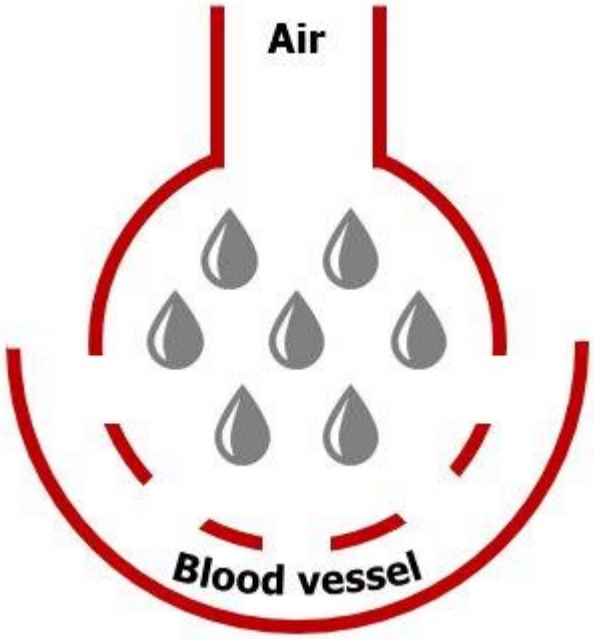
PaO2 = oxygen in blood
FiO2 = oxygen given

Let's put it together

PaO2 = oxygen in blood
FiO2 = oxygen given



> 300



≤ 300

What are your calculation results?

	1	2	3	4	5	6
PaO2	78	85	75	77	64	247
FiO2		0.3		0.3		0.4
Calculation	NA	283	NA	257	NA	618
Assessment		ARDS		ARDS		No ARDS

Rapid Review

What is ARDS?

What is ARDS?

ARDS = inflamed leaky lung

What is the timing interval?

What is the timing interval?

1 week

What do you need to see on imaging?

What do you need to see on imaging?

Bilateral opacities

How do you calculate oxygenation?

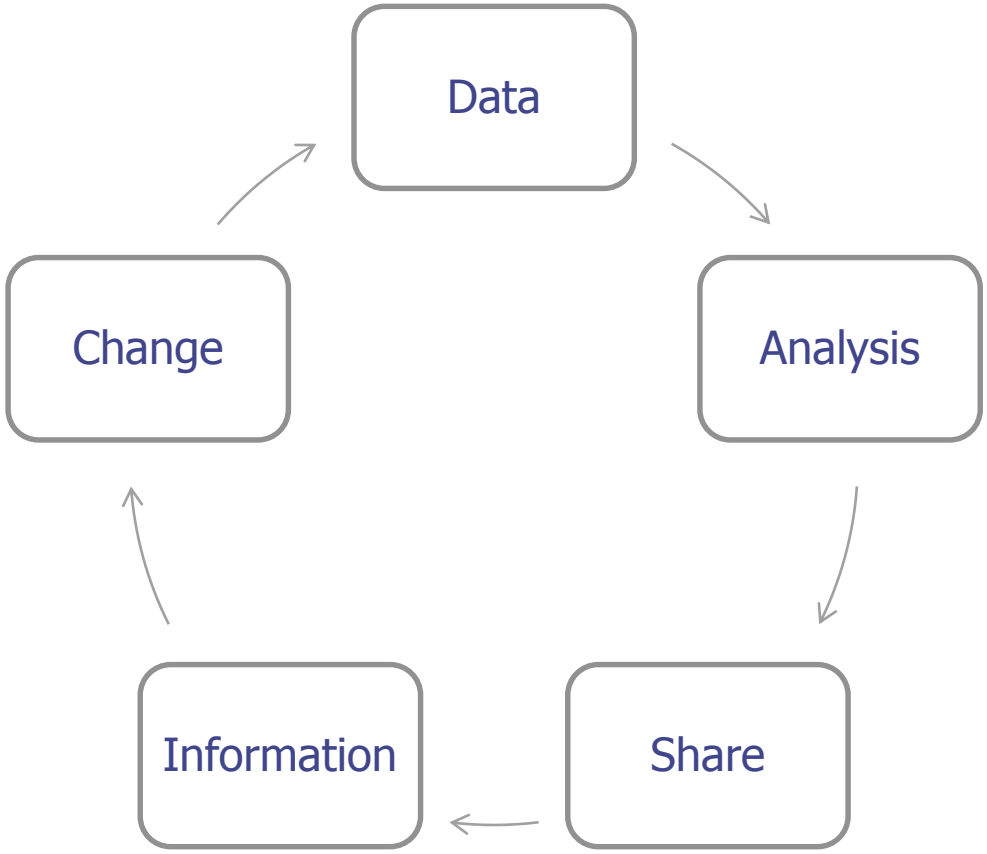
How do you calculate oxygenation?

PaO2/FiO2

Data Impact on Care Delivery

Mark Hemmila
11:00

Collaborative

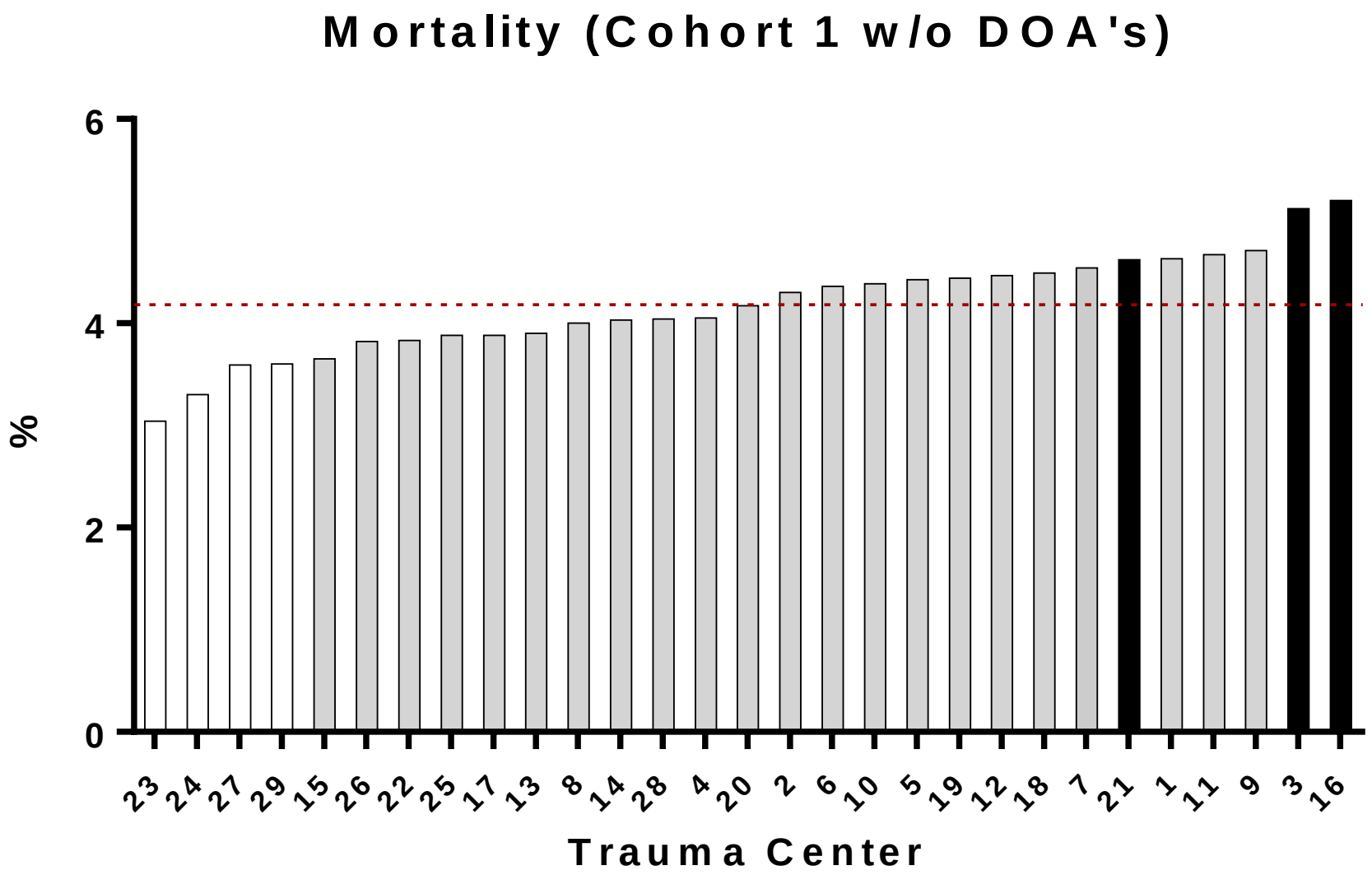


Reports

- ICD9/ICD10
  - Trauma diagnosis
- Age
- ED and/or Hospital Disposition
- Length of stay
- E-code
  - Mechanism

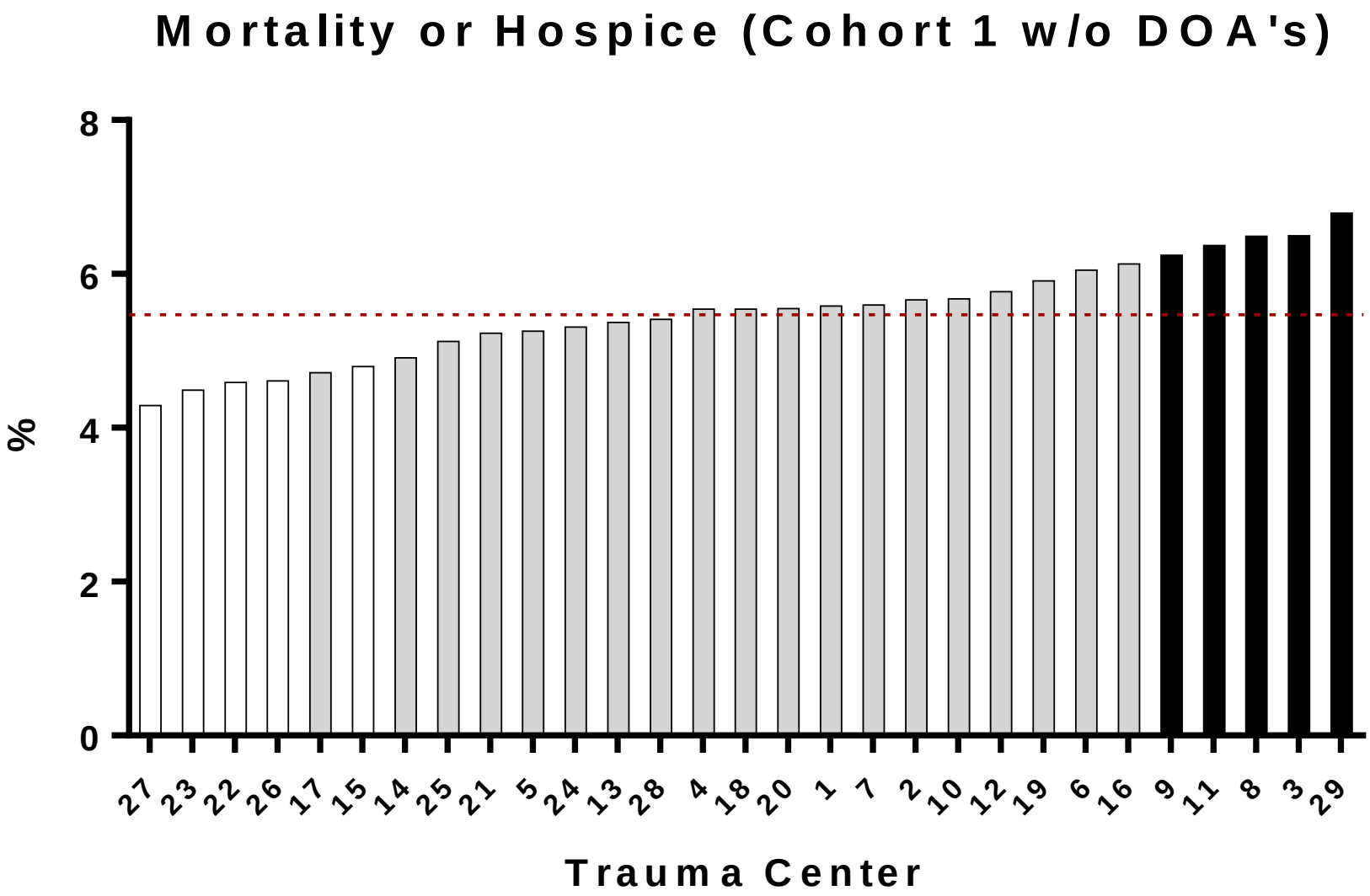
Reports

- Groups
  - Admit service
  - AIS 2005/08 codes
  - Mechanism
  - PRBC
  - ICD9/10 procedure code
    - IVC filter
    - Brain operation or monitor
    - Angiography
  - ED SBP


Mortality (Cohort 1 w/o DOA's)
6
4
2
0
%
23 24 27 29 15 26 22 25 17 13 8 14 28 4 20 2 6 10 5 19 12 18 7 21 1 11 9 3 16
Trauma Center

Report Logic

- Group
- Filters
- Risk Adjust
- Outcome


Mortality or Hospice (Cohort 1 w/o DOA's)
%
8
6
4
2
0
27 23 22 26 17 15 14 25 21 5 24 13 28 4 18 20 1 7 2 10 12 19 6 16 9 11 8 3 29
Trauma Center

IVC Filter

ASA PAPER

Prophylactic Inferior Vena Cava Filter Placement Does Not Result in a Survival Benefit for Trauma Patients

Mark R. Hemmila, MD, Nicholas H. Osborne, MD,* Peter K. Henke, MD,* John P. Kepros, MD,† Sujal G. Patel, MD,‡ Anne H. Cain-Nielsen, MS,* and Nancy J. Birkmeyer, PhD**

IVC Filter

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

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

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

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

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

VTE Outcomes and Prophylaxis

ORIGINAL ARTICLE

Unfractionated heparin versus low-molecular-weight heparin for venous thromboembolism prophylaxis in trauma

Benjamin N. Jacobs, MD, Anne H. Cain-Nielsen, MS, Jill L. Jakubus, MHSA, MS, PA-C, Judy N. Mikhail, PhD, RN, John J. Fath, MD, Scott E. Regenbogen, MD, *and* **Mark R. Hemmila, MD**, *Ann Arbor, Michigan*

VTE Outcomes and Prophylaxis

BACKGROUND: Venous thromboembolism (VTE) is a common complication in trauma patients. Pharmacologic prophylaxis is utilized in trauma patients to reduce their risk of a VTE event. The Eastern Association for the Surgery of Trauma guidelines recommend use of low-molecular-weight heparin (LMWH) as the preferred agent in these patients. However, there is literature suggesting that unfractionated heparin (UFH) is an acceptable, and less costly, alternative VTE prophylaxis agent with equivalent efficacy in trauma patients. We examined data from the Michigan Trauma Quality Improvement Program to perform a comparative effectiveness study of UFH versus LMWH on outcomes for trauma patients.

METHODS: We conducted an analysis of the Michigan Trauma Quality Improvement Program data from January 2012 to December 2014. The data set contains information on date, time, and drug type of the first dose of VTE prophylaxis. Thirty-seven thousand eight hundred sixty-eight patients from 23 hospitals were present with an Injury Severity Score of 5 or greater and hospitalization for more than 24 hours. Patients were excluded if they died within 24 hours or received no pharmacologic VTE prophylaxis or agents other than UFH or LMWH while admitted to the hospital. We compared patients receiving LMWH to those receiving UFH. Outcomes assessed were VTE event, pulmonary embolism, deep vein thrombosis, and mortality during hospitalization. We used a generalized estimating equation approach to fit population-averaged logistic regression models with the type of first dose of VTE prophylaxis as the independent variable. Unfractionated heparin was considered the reference value. Timing of the first dose of VTE prophylaxis was entered into the model in addition to standard covariates. Odds ratios were generated for each of the dependent variables of interest.

RESULTS: The analysis cohort consisted of 18,010 patients. Patients administered LMWH had a decreased risk of mortality (odds ratio, 0.64; confidence interval, 0.49–0.83), VTE (odds ratio, 0.67; confidence interval, 0.53–0.84), pulmonary embolism (odds ratio, 0.53; confidence interval, 0.35–0.79), and deep vein thrombosis (odds ratio, 0.73; confidence interval, 0.57–0.95) when compared with UFH following risk adjustment and accounting for hospital effect. The reduced risk of a VTE event for patients receiving LMWH was most pronounced for patients in the lower injury-severity categories.

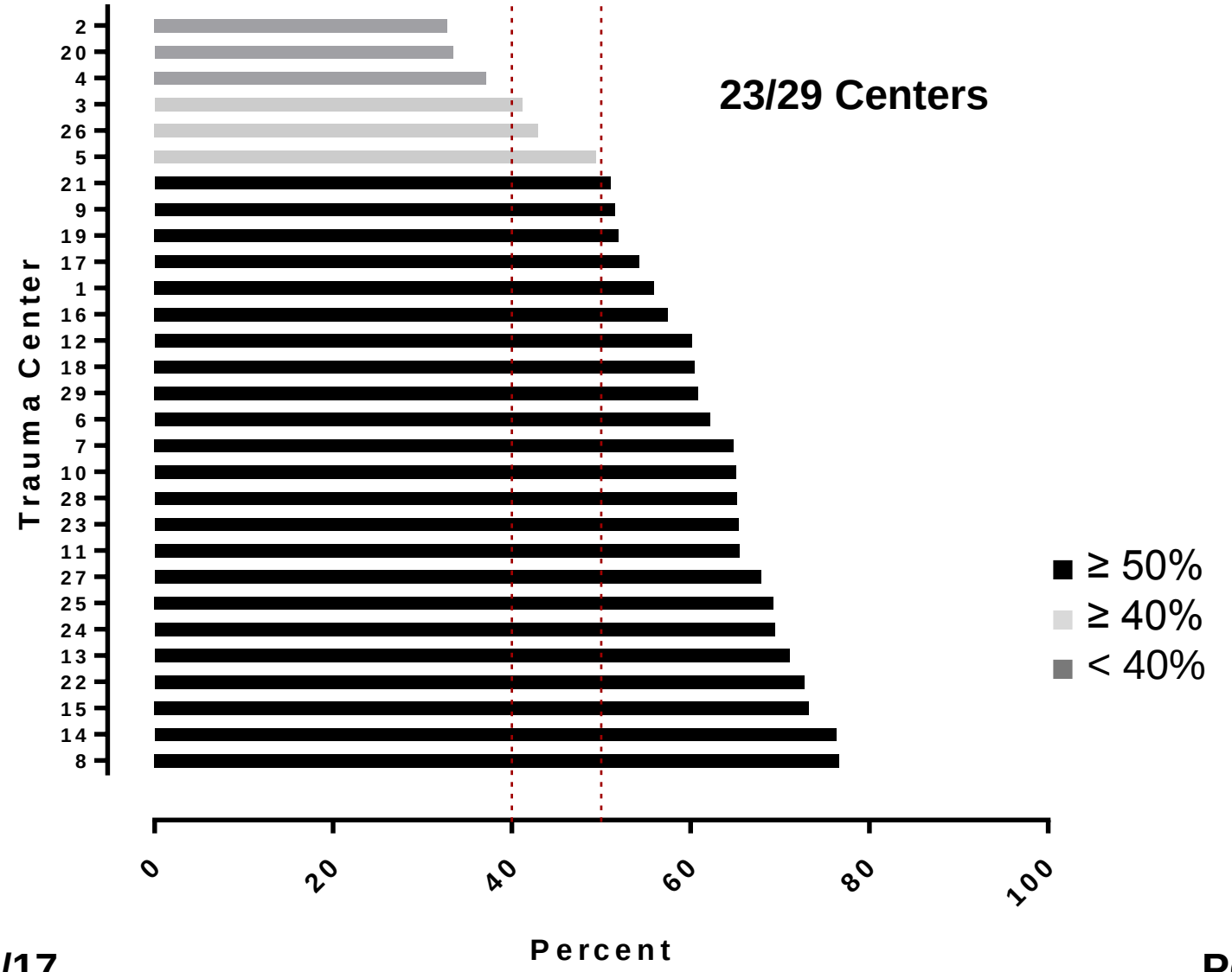
CONCLUSIONS: In our examination of VTE prophylaxis drug effectiveness, LMWH was found to be superior to UFH in reducing the incidence of mortality and VTE events among trauma patients. Therefore, LMWH should be the preferred VTE prophylaxis agent for use in hospitalized trauma patients. (*J Trauma Acute Care Surg.* 2017;00: 00–00.

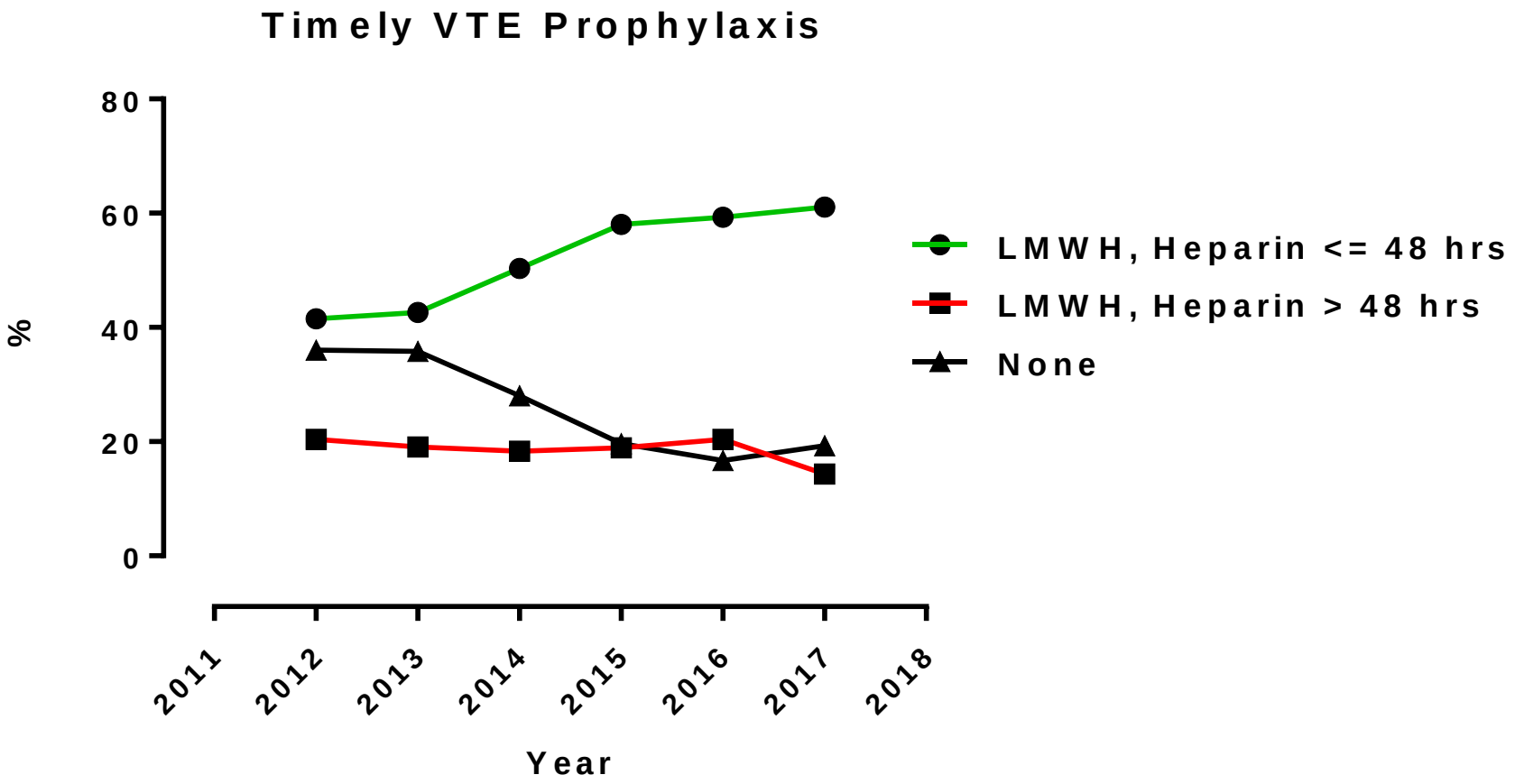
Michigan Trauma Quality Improvement Program (MTQIP)
2017 Performance Index January 1, 2017 to December 31, 2017

Measure	Weight	Measure Description			Points	
#1	10	**Data Submission (Partial/Incomplete Submissions No Points)**				PARTICIPATION (30%)
		On time and complete 3 of 3 times			10	
		On time and complete 2 of 3 times			5	
		On time and complete 1 of 3 times			0	
#2	10	**Meeting Participation All Disciplines *Surgeon represents 1 hospital only**				
		Surgeon, and (TPM or MCR) Participate in 3 of 3 Collaborative meetings (9 pts)			0-10	
		Surgeon, and (TPM or MCR) Participate in 2 of 3 Collaborative meetings (6 pts)				
		Surgeon, and (TPM or MCR) Participate in 1 of 3 Collaborative meetings (3 pts)				
		Surgeon, and (TPM or MCR) Participate in 0 of 3 Collaborative meetings (0 pts)				
		Registrar, and/or MCR Participate in the Data Abstractor Meeting (1 pt)				
#3	10	**Data Accuracy**	**1st Validation Visit-Error Rate**	**≥2 Validation Visits-Error Rate**		
		5 Star Validation	0-4.5%	0-4.0%	10	
		4 Star Validation	4.6-5.5%	4.1-5.0%	8	
		3 Star Validation	5.6-8.0%	5.1-6.0%	5	
		2 Star Validation	8.1-9.0%	6.1-7.0%	3	
		1 Star Validation	>9.0%	>7.0%	0	
#4	10	**Venous Thromboembolism (VTE) Prophylaxis Initiated Within 48 Hours of Arrival in Trauma Service Admits with ≥ 2 Day Length of Stay (18 Mo's: 1/1/16-6/30/17)**				PERFORMANCE (70%)
		≥ 50%			10	
		≥ 40%			5	
		< 40%			0	
#5	10	**Low Molecular Weight Heparin (LMWH) Venous Thromboembolism (VTE) Prophylaxis Use in Trauma Service Admits (18 Mo's: 1/1/16-6/30/17)**				
		≥ 50%			10	
		21-49%			7	
		5-20%			5	
		< 5%			0	
#6	10	**Red Blood Cell to Plasma Ratio (Weighted Mean Points) of Patients Transfused ≥5 Units in 1st 4 Hours (18 Mo's: 1/1/16-6/30/17)**				
		10 pts: Tier 1: ≤ 1.5			0-10	
		10 pts: Tier 2: 1.6-2.0				
		5 pts: Tier 3: 2.1-2.5				
		0 pts: Tier 4: >2.5				
#7	10	**Serious Complication Rate-Trauma Service Admits (3 years: 7/1/14-6/30/17)**				
		Z-score: < -1 (major improvement)			10	
		Z-score: -1 to 1 or serious complications low-outlier (average or better rate)			7	
		Z-score: > 1 (rates of serious complications increased)			5	
#8	10	**Mortality Rate-Trauma Service Admits (3 years: 7/1/14-6/30/17)**				
		Z-score: < -1 (major improvement)			10	
		Z-score: -1 to 1 or mortality low-outlier (average or better rate)			7	
		Z-score: > 1 (rates of mortality increased)			5	
#9	10	**Inferior Vena Cava Filter Use (All Admits) (Collaborative Wide) (7/1/16-6/30/17)**				
		≤ 1.2			10	
		> 1.2			0	
#10	10	**Site Specific Quality Improvement Project (July 2016-December 2017)**				
		Implemented, and met or exceeded target			10	
		Implemented, showed improvement, but did not meet target			7	
		Implemented, but showed no improvement			0	
				Total (Max Points) =	100	

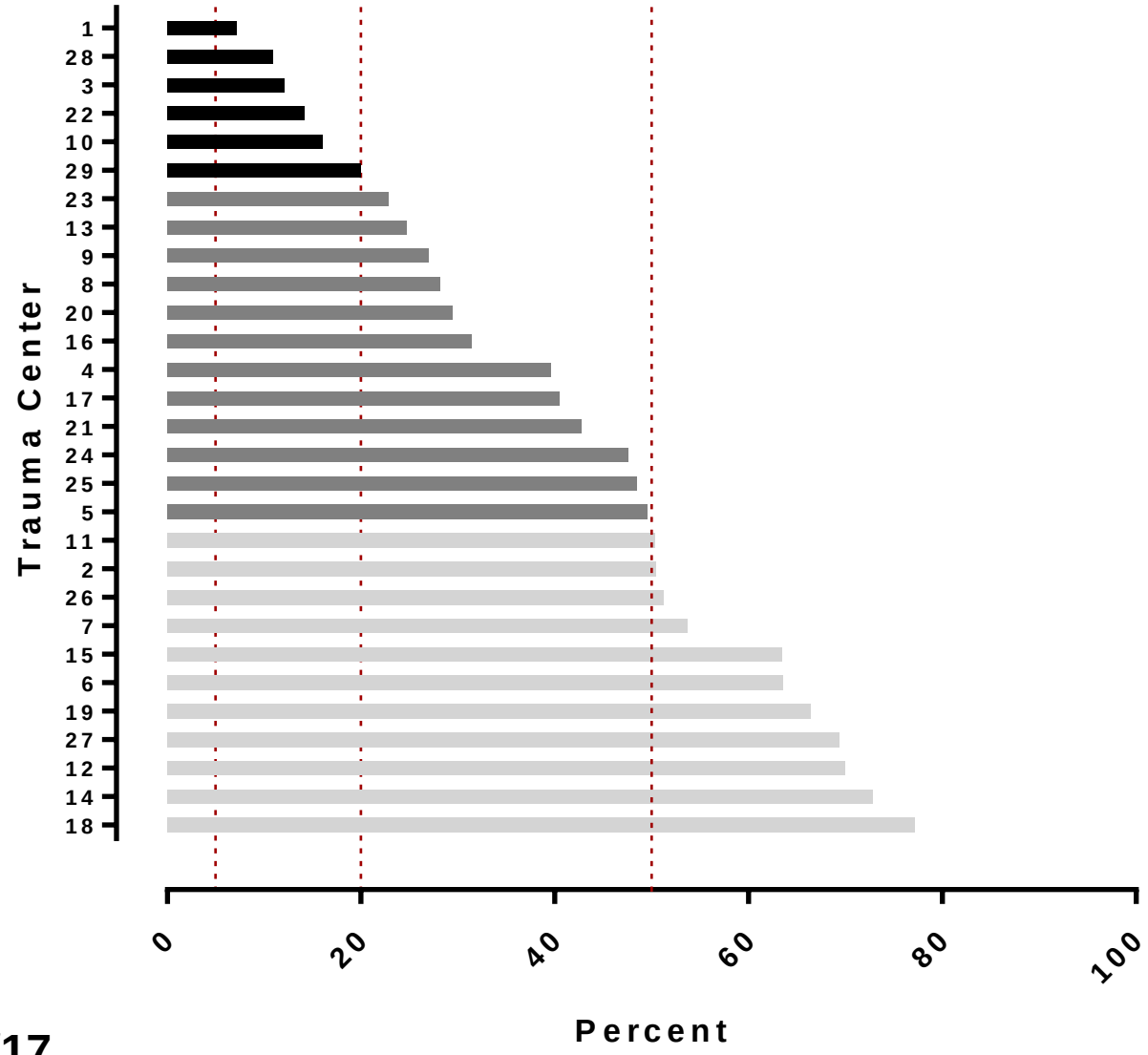
VTE Prophylaxis Timing ≤ 48 hrs

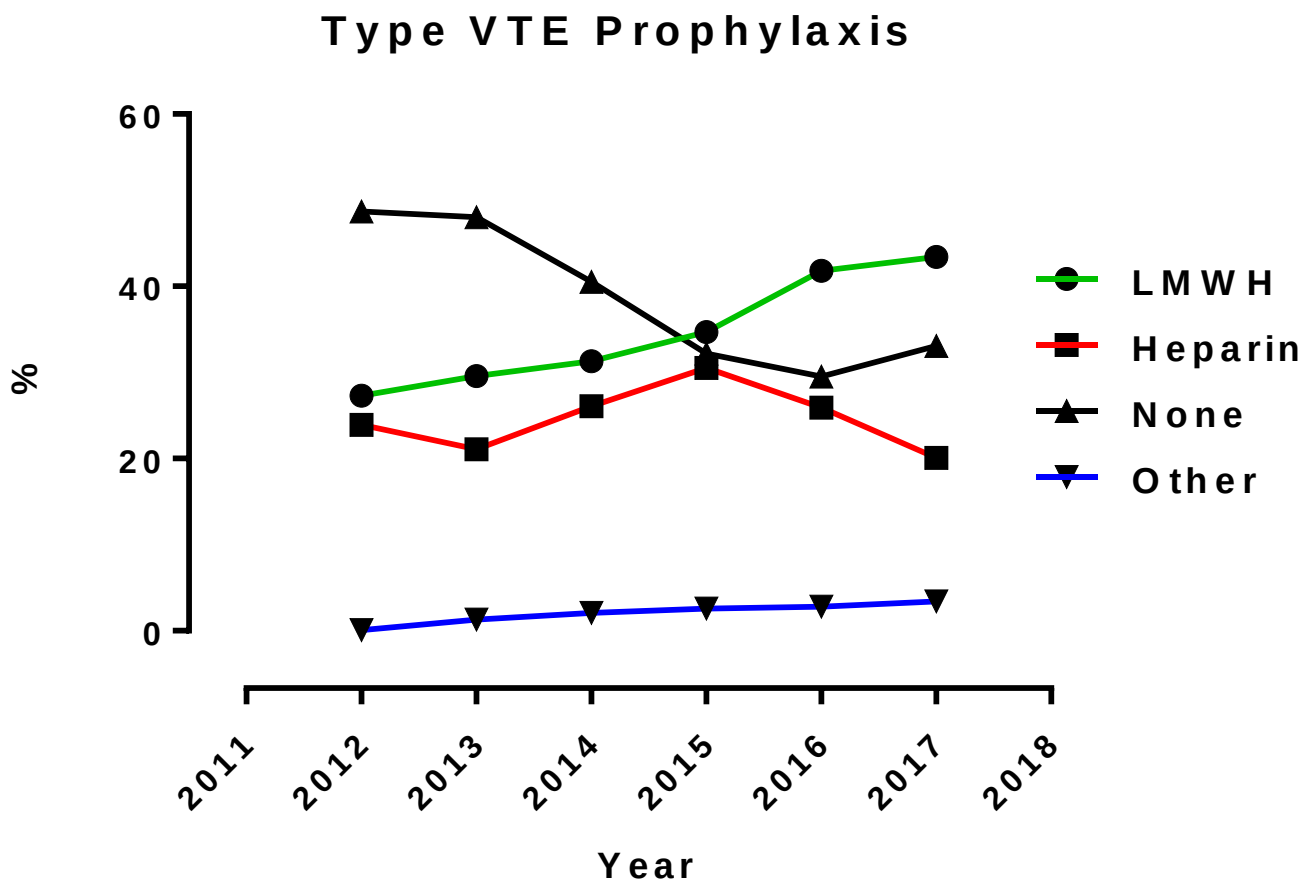
1/1/16 - 1/31/17




Timely VTE Prophylaxis
80
60
40
20
0
%
2011
2012
2013
2014
2015
2016
2017
2018
Year
LMWH, Heparin <= 48 hrs
LMWH, Heparin > 48 hrs
None

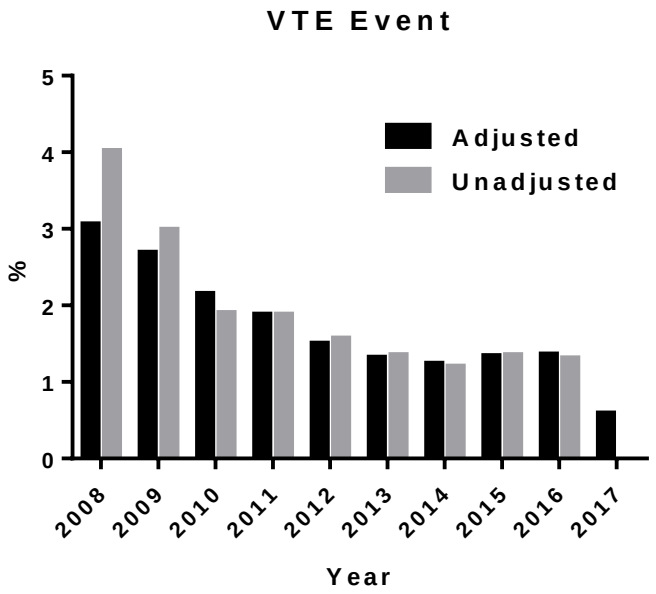
VTE Prophylaxis Type - LMWH
1/1/16 - 1/31/17




Type VTE Prophylaxis
60
40
20
0
%
2011
2012
2013
2014
2015
2016
2017
2018
Year
LMWH
Heparin
None
Other

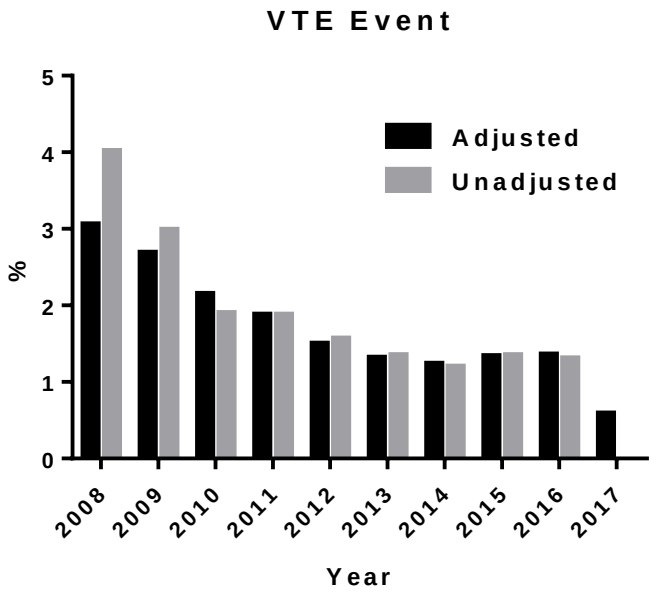
MTQIP VTE Prophylaxis

- VTE
  - VTE Rate
    - Begin = 2.5 %
    - Previous = 1.3 %
    - Current = **1.3 %**
    - Target = 1.5 %
  - 48 hr VTE Prophylaxis Rate
    - Begin = 38 %
    - Previous = 59 %
    - Current = **61 %**
    - Target = 50 %



MTQIP VTE Prophylaxis

- VTE
  - VTE Rate
    - Begin = 2.5 %
    - Previous = 1.3 %
    - Current = **1.3 %**
    - Target = 1.5 %
  - VTE Prophylaxis with LMWH
    - Begin = 27 %
    - Previous = 41 %
    - Current = **43 %**
    - Target = 50 %



#6 PRBC to Plasma ratio in Resuscitation

- Website
  - Practices > Hemorrhage
  - Cohort = Cohort 1
  - No Signs of Life = Include DOAs
  - Transfers Out = Include Transfers Out
  - Default Period = Set for CQI Index time period
- N, Eligible patients
  - List
  - PRBC/FFP Ratio

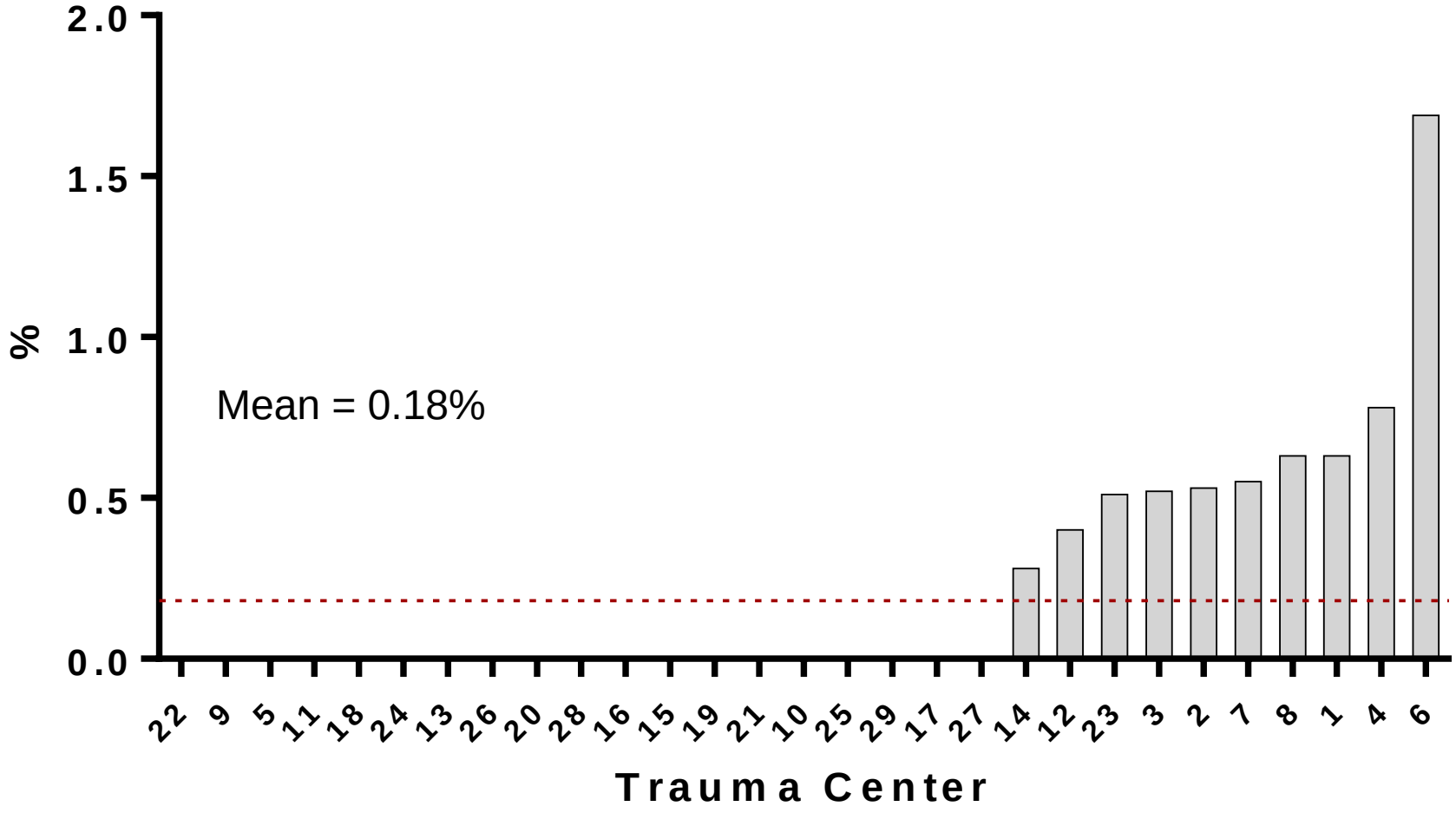
MTQIP 2016 Collaborative-Wide PI Projects

- Hemorrhage (≥ 5 u PRBC's first 4 hrs)
  - 1/1/2016 to 1/31/2017
  - % of patients with 4hr PRBC/FFP ratio ≤ 2.5
    - 2013 = 65 %
    - Current = **85 %** (190/223)
  - % of patients with 4hr PRBC/FFP ratio ≤ 2.0
    - 2013 = 55 %
    - Current = **79 %** (177/223)
    - Target = 80 %

#9 IVC Filter Use

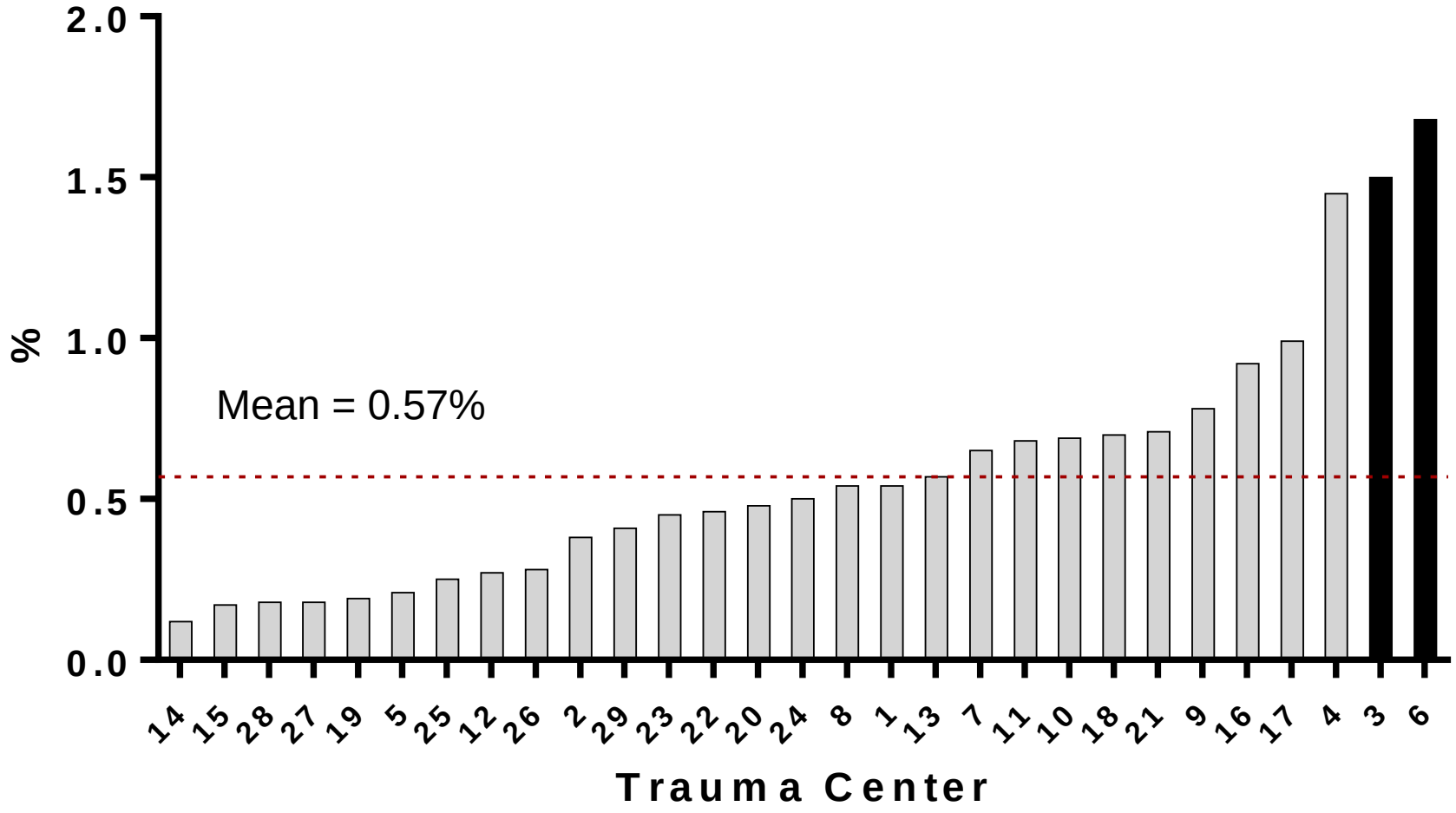
- Website
  - Practices > IVC Summary
  - Cohort = Cohort 1
  - No Signs of Life = Exclude DOAs
  - Transfers Out = Exclude Transfers Out
  - Default Period = Set for CQI Index time period
- IVC Filter Use
  - Group - Unadj %

Unadjusted IVC Filter Use
7/1/16 - 1/31/17

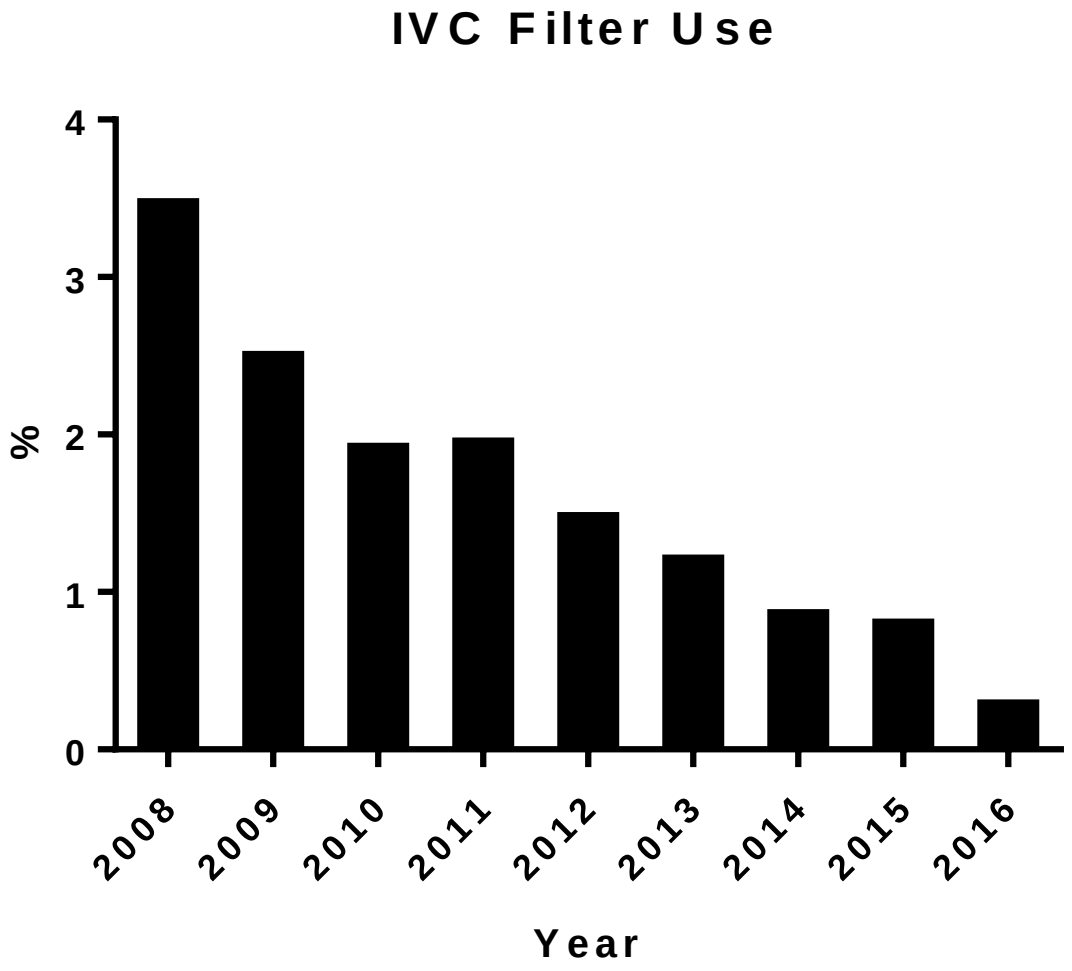


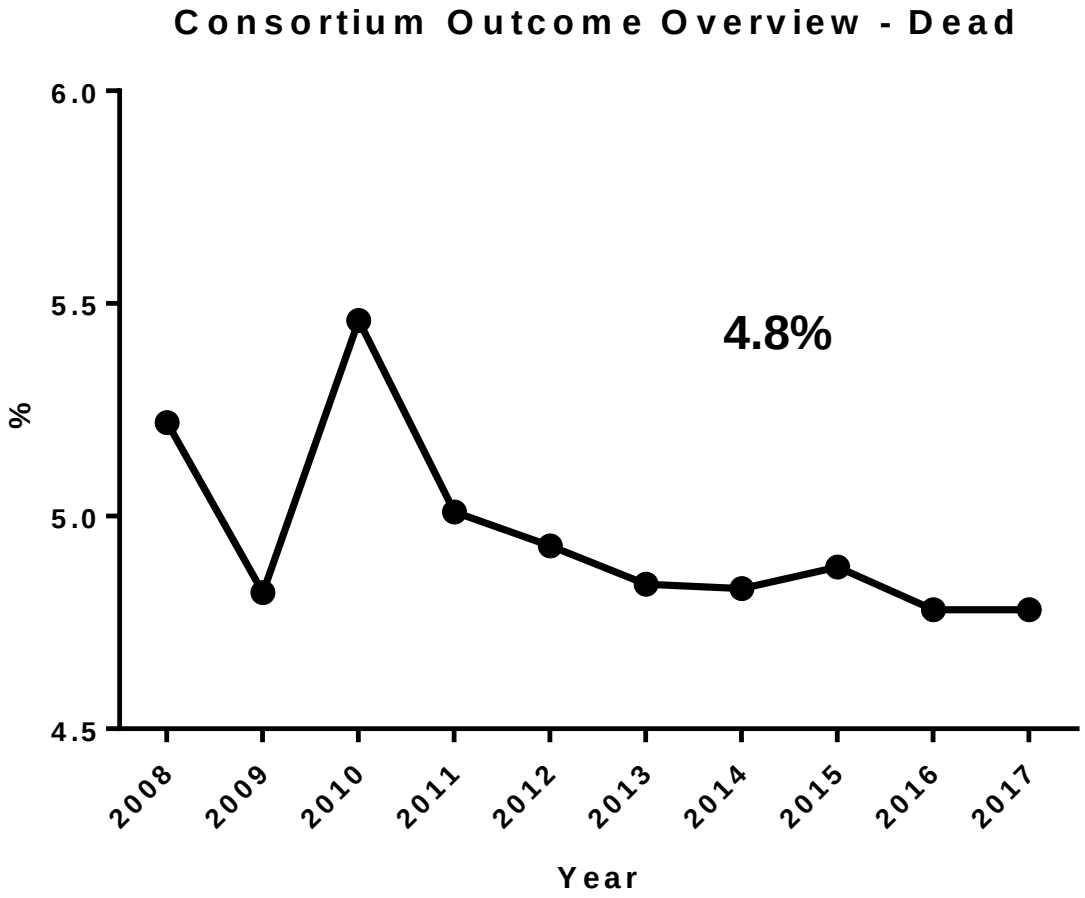
7/1/16 – 1/31/17

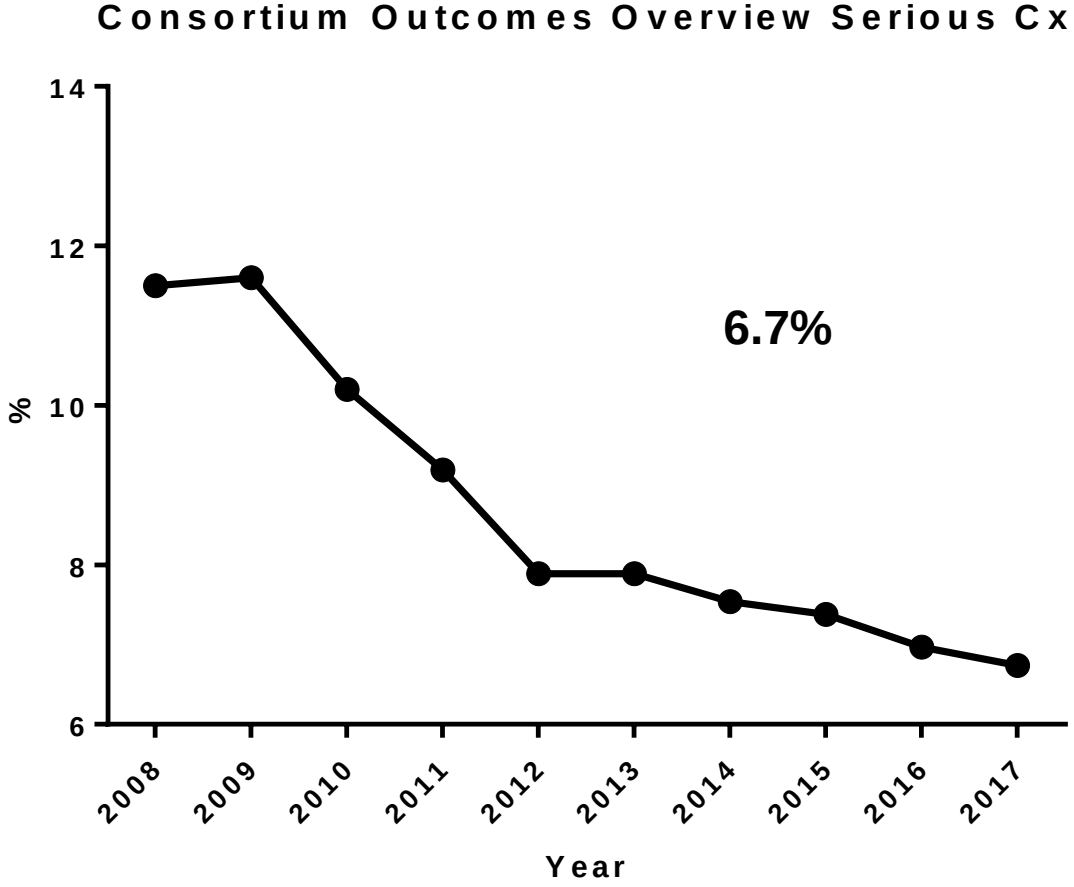
Unadjusted IVC Filter Use
11/1/14 - 1/31/17



1/1/14 – 1/31/17


IVC Filter Use
4
3
2
1
0
%
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year


Consortium Outcome Overview - Dead
6.0
5.5
5.0
4.5
%
4.8%
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year


Consortium Outcomes Overview Serious Cx
14
12
10
8
6
%
6.7%
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year

A National Trauma Care System: Zero Preventable Deaths

Judy Mikhail
11:20

A NATIONAL TRAUMA CARE SYSTEM

Integrating Military and Civilian Trauma Care Systems to Achieve Zero Preventable Deaths After Injury

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

1966

ACCIDENTAL DEATH AND DISABILITY: THE NEGLECTED DISEASE OF MODERN SOCIETY

Prepared by the
COMMITTEE ON TRAUMA AND COMMITTEE ON SHOCK
DIVISION OF MEDICAL SCIENCES
NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL

NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL
Washington, D. C., September, 1966

1985

Injury In America

A Continuing Public Health Problem

Committee on Trauma Research
Commission on Life Sciences
National Research Council and the
Institute of Medicine

National Academy Press
Washington, D.C. 1985

1999

Reducing the Burden of Injury

ADVANCING PREVENTION AND TREATMENT

INSTITUTE OF MEDICINE

2016

A NATIONAL TRAUMA CARE SYSTEM

Integrating Military and Civilian Trauma Systems to Achieve ZERO Preventable DEATHS After Injury

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

Definition of Preventable Death

- Those casualties whose lives could have been saved by appropriate and timely medical care, irrespective of tactical, logistical, or environmental issues.

Study Sponsors

- American College of Emergency Physicians
- American College of Surgeons
- National Association of Emergency Medical Technicians
- National Association of EMS Physicians
- Trauma Center Association of America
- U.S. Depart of Defense's U.S. Army Medical Research and Material Command
- U.S. Department of Homeland Security's Office of Health Affairs
- U.S. Department of Transportation's National Highway Traffic Safety Administration

Charge to the Committee

1. Identify and describe the **key components of a learning health system** necessary **to optimize care** of individuals who have sustained traumatic injuries **in military and civilian settings**.
2. Characterize the military's Joint Trauma System (JTS) and Defense Health Program research investment and their integrated **role as a continuous learning and evidence-based process improvement model**.
3. Examine opportunities to **ensure that advances in trauma care are sustained and built on** for future combat operations.
4. Consider **strategies necessary to more effectively translate**, sustain, and build upon elements of knowledge and practice from the military's learning health system into the civilian health sector and **lessons learned** from the civilian sector into the military sector.

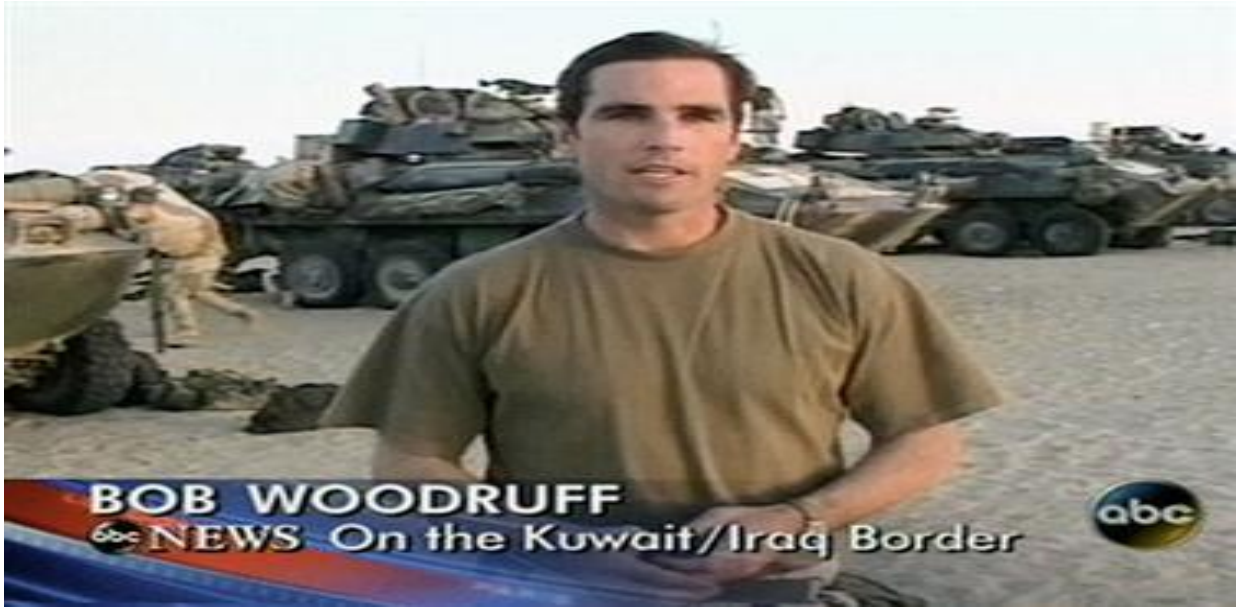
Timeline

- **May 2015** — **1st committee meeting**
- **July 2015** — **2nd committee meeting and public workshop**
- **Sept 2015** — **3rd committee meeting and public workshop**
- **Nov 2015** — **4th committee meeting**
- **Jan 2016** — **5th committee meeting**
- **Jun 2016** — **Report release**
- **Nov 2016** — **Critique of report**
- **Jan 2017** — **Report dissemination**


ADVANCING
A NATIONAL TRAUMA
CARE SYSTEM
November 1-2, 2016
Dissemination Meeting
Don Berwick, Committee Chair
The National Academies of
Windows is not genuine
Click this message to learn how to get genuine
EXIT
Jorie Klein
John Holcomb
C. William Schwab
Don Berwick


ADVANCING
A NATIONAL TRAUMA
CARE SYSTEM
November 1-2, 2016
Dissemination Meeting
Jon Krohmer
David Hoyt


EXIT
EXIT
AASTH/AAAM Joint Meeting
September 24 – 27, 2008
Maui, Hawaii



- 1-29-06 Embedded with infantry in Iraq
- IED explosion while traveling in convoy
- Blast to left side of head and neck
- Shattered skull left temporal region
- Gaping neck wound
- Unconscious and hemorrhaging

Sequential Evacuations

- Evacuated -Army helicopter from scene under fire
- To military hospital in Baghdad- stabilized-24 hrs
- Flown to field hospital in Balad, Iraq-24 hrs
  - Neurosurgery while hospital being shelled
  - Large bone flap removed
- Flown to Landstuhl-24 hrs
  - More neurosurgery to remove debris
- Flown to Bethesda Naval Hospital
- Unconscious for 36 days
- Prolonged rehabilitation
- 9 months later returned to work

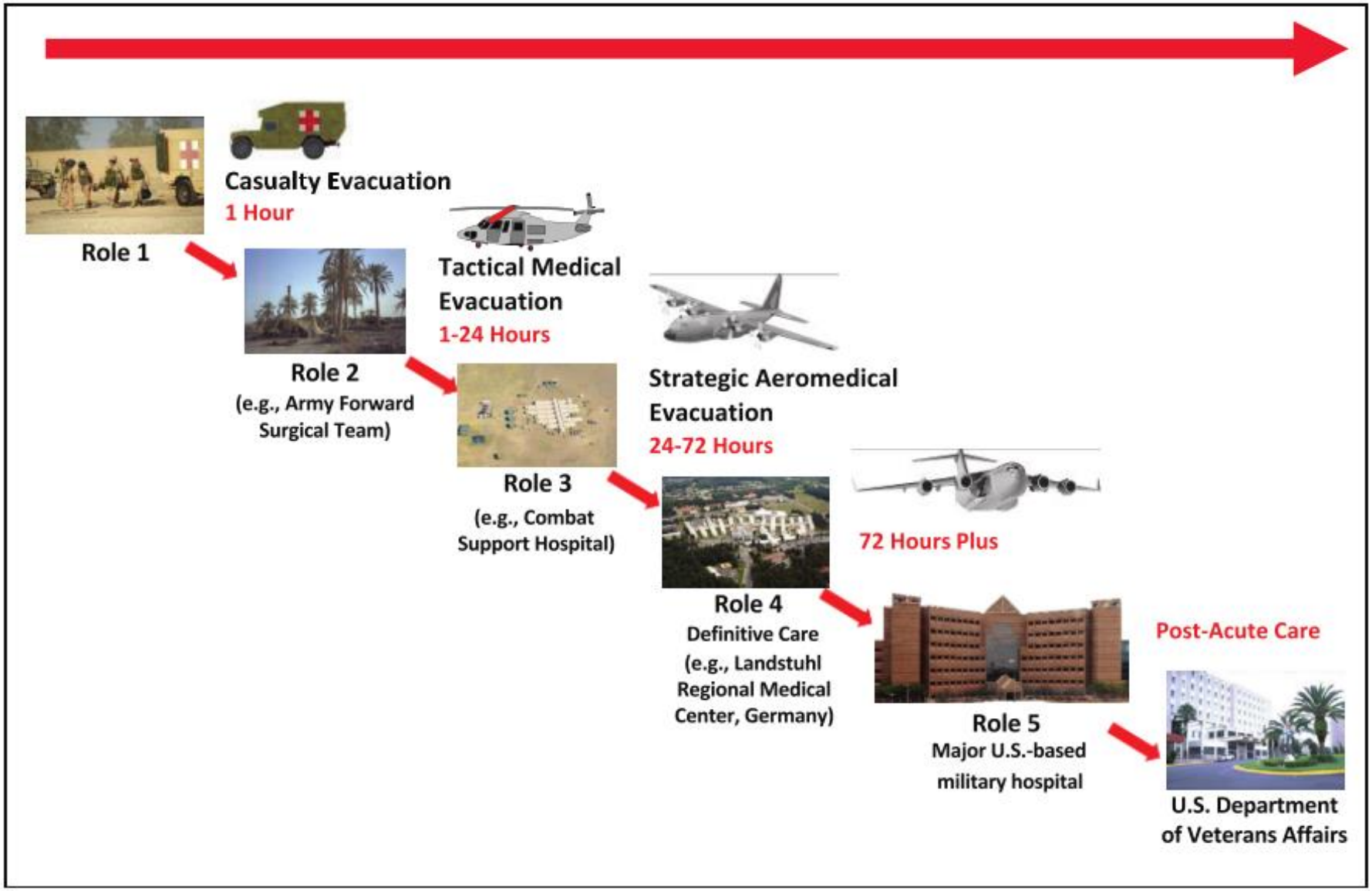
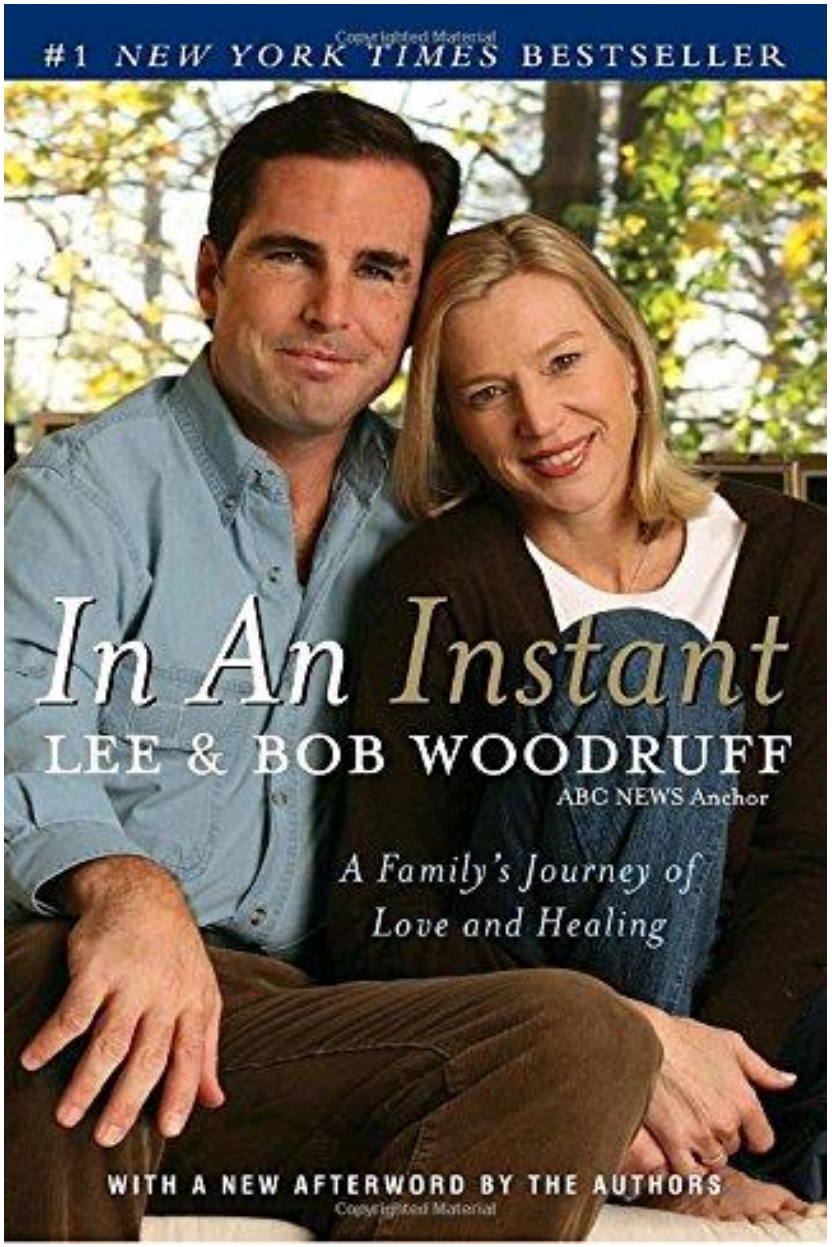


FIGURE 2-6 Military trauma care continuum.

SOURCE: Adapted from Bailey et al., 2012a.

Doctors would later confide to his wife Lee:

"…had this kind of traumatic brain injury occurred in the United States instead of the Iraqi desert, Bob likely would not have survived."



2011

Isolated Severe Traumatic Brain Injuries Sustained During Combat Operations: Demographics, Mortality Outcomes, and Lessons to be Learned From Contrasts to Civilian Counterparts

Joseph J. DuBose, MD, Gallinos Barmparas, MD, Kenji Inaba, MD, Deborah M. Stein, MD, MPH, Tom Scalea, MD, Leopoldo C. Cancio, MD, John Cole, MD, Brian Eastridge, MD, and Lorne Blackbourne, MD

Comparison of Isolated TBI (AIS>3)
Military Registry vs NTDB
ICP 13.8% vs 1.7%
OR 21.5% vs 7.2%
Mortality All 7.7% vs 21%
Pen Mort 5.6% vs 47.9%

Background: Sever
modern military con
reviewed the epiden
Registry (JTTR), co
National Trauma Da
Methods: Isolated s
scale [AIS] ≥3 and
JTTR over a period
these injuries were r
of similar patients, a
NTDB using proper
blood pressure, Glas
Results: JTTR revie
mean age of 25.7 ye
were men. Hypotens
gunshot wound (19.
injuries. Intracrania
underwent some fo
debridement. When
JTTR patients were
monitoring (13.8%
intervention (21.5%
better among milita
ratio, 0.32 [0.16–0.

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From the University o
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Surgery and Surg
Center—University of Southern California, Los Angeles, California; and United State Army Institute of Surgical Research (L.C.C., J.C., B.E., L.B.), Fort Sam Houston, Texas.

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equiring
that are
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severe
Surgeon
Theater
care and
. Subse-
(CPGs)
continue to provide all in-theater care providers with best-evidence approaches designed to optimize casualty outcomes

Context

The Problem

The Imperative

- **All Americans (military & civilian) should have the best possible chance for survival and functional recovery after injury.**

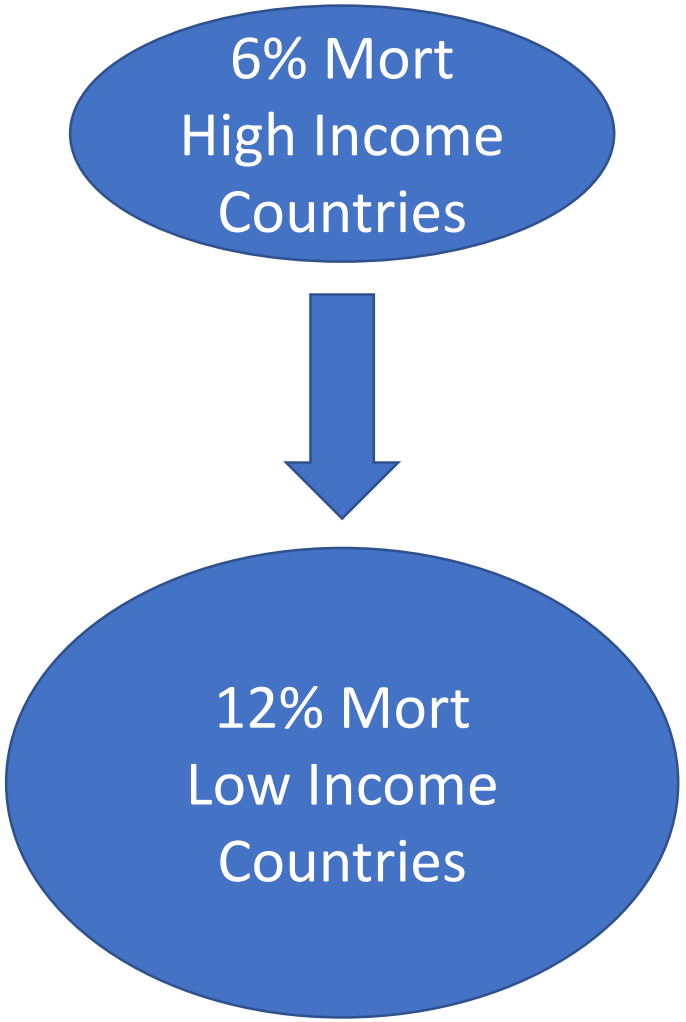
The Urgency

- **Military burden**: ~6,850 service member deaths in Iraq and Afghanistan. Nearly 1,000 from potentially survivable injuries.
- **Civilian burden**: 147,790 U.S. trauma deaths in 2014 - as many as 30,000 may have been preventable with optimal trauma care.
- ↑ Threats from active shooter and other mass casualty incidents.
- As wars end and service members leave the military, the knowledge, experience and advances in trauma care gained over past decade are being lost:
  - System degradation
  - Institutional memory loss with retirements

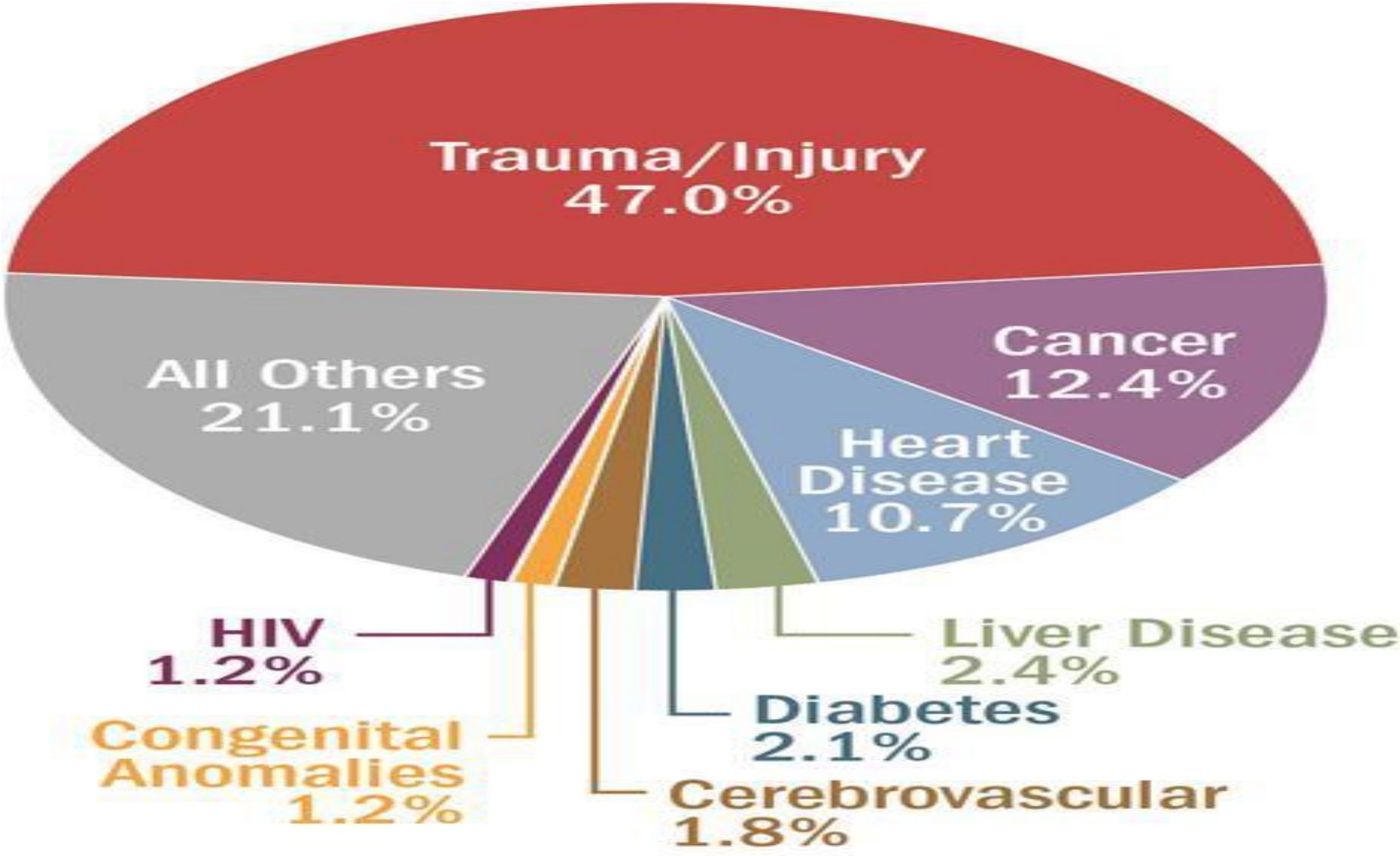
Global Burden of Trauma

- ≈1 in 10 deaths worldwide are trauma related

- Expect dramatic rise globally in coming decades
  1. MVC
  2. Homicide
  3. Suicide



Traumatic injury accounts for nearly half of all deaths for Americans under 46 years of age and cost the nation $670B in 2013.



J Trauma 2012

Death on the battlefield (2001–2011): Implications for the future of combat casualty care

Brian J. Eastridge, MD, Robert L. Mabry, MD, Peter Seguin, MD, Joyce Cantrell, MD, Terrill Tops, MD, Paul Uribe, MD, Olga Mallett, Tamara Zubko, Lynne Oetjen-Gerdes, Todd E. Rasmussen, MD, Frank K. Butler, MD, Russell S. Kotwal, MD, John B. Holcomb, MD, Charles Wade, PhD, Howard Champion, MD, Mimi Lawnick, Leon Moores, MD, *and* Lorne H. Blackbourne, MD

Military Preventable Death Rate = 25%

91% Hemorrhage Related:

- 67.3% Truncal
- 19.2% Junctional
- 13.5% Extremity

BACKG

METHO

RESUL

CONCL

KEY W

The vis
marin
theater of
maximal
vision is the mission to improve trauma care delivery and patient outcomes across the entire continuum from point of injury through rehabilitation using techniques for continuous

dicine
luated
war.[1]
ce has
been amassed validating improvements in combat casualty care once a casualty has reached a military medical treatment facility (MTF). However, no studies have comprehensively evaluated the outcomes of wounded warriors who died of their injuries before reaching an MTF. This relative blind spot

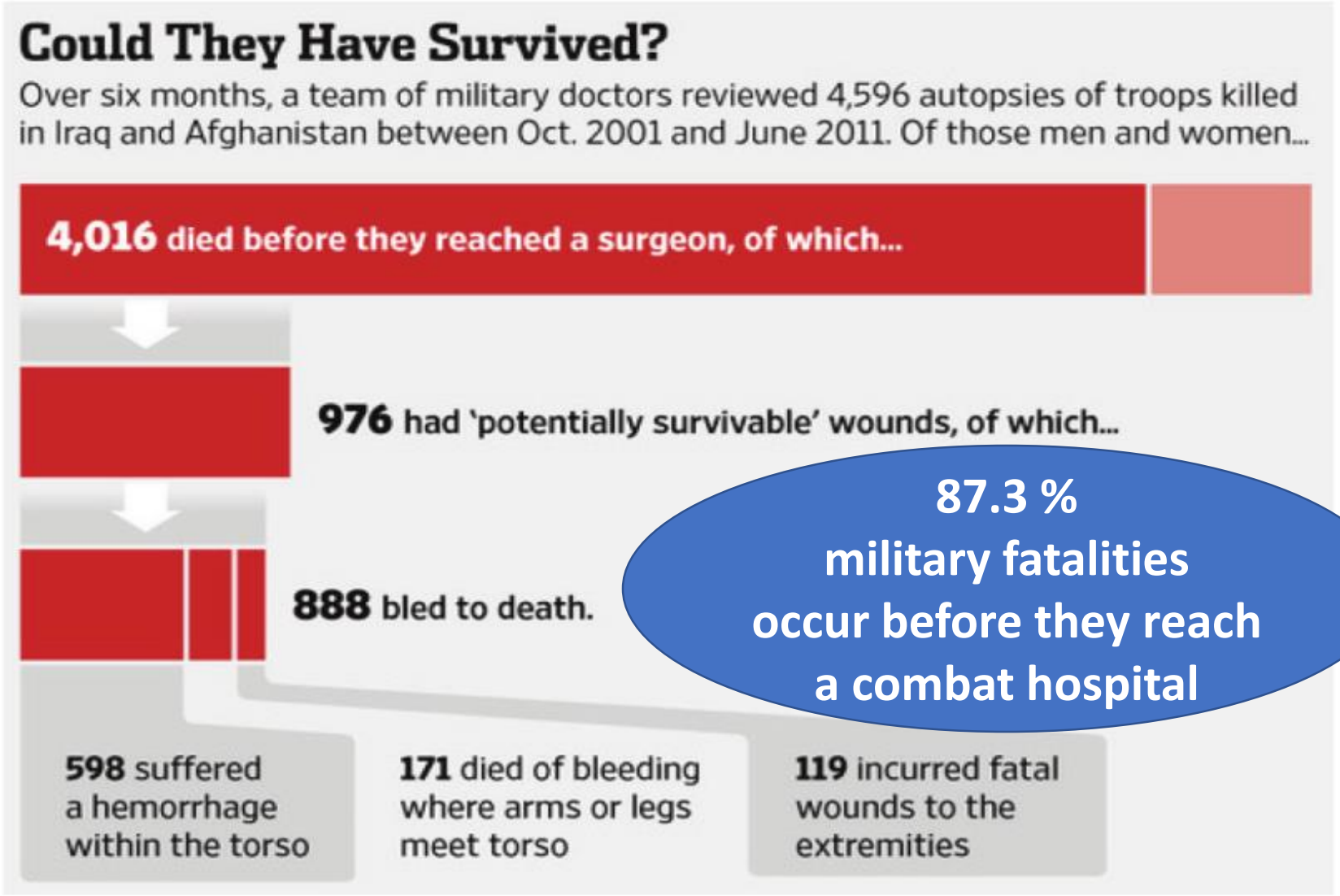


FIGURE 1-4 Military preventable deaths in the prehospital setting.

SOURCE: Reprinted with permission of Dow Jones Company, from Are U.S. soldiers dying from survivable wounds? Phillips, M. M., *Wall Street Journal*, 2014; permission conveyed through Copyright Clearance Center, Inc.

Military Burden of Injury Over 15 years of War

- Increased survivors = Increased disability
- Increased needs for acute, chronic, & rehabilitative
- Musculoskeletal injuries 69%
  - Single amputee (remained constant)
  - Multiple amputees (much higher than previous conflicts)
- Large increase in TBI
  - PTSD strongly associated even with mild TBI
- Genitourinary trauma 12%

Eur J Trauma Emerg Surg (2014) 40:279–285
DOI 10.1007/s00068-013-0364-5

REVIEW ARTICLE

Pooled preventable death rates in trauma patients

Meta analysis and systematic review since 1990

A. M. Kwon · N. C. Garbett · G. H. Kloecker

Civilian Preventable Death Rate = 20%

n=27 articles

- preventable trauma death studies
- From 1990-2013 (23 years)

➢ Consistent over time

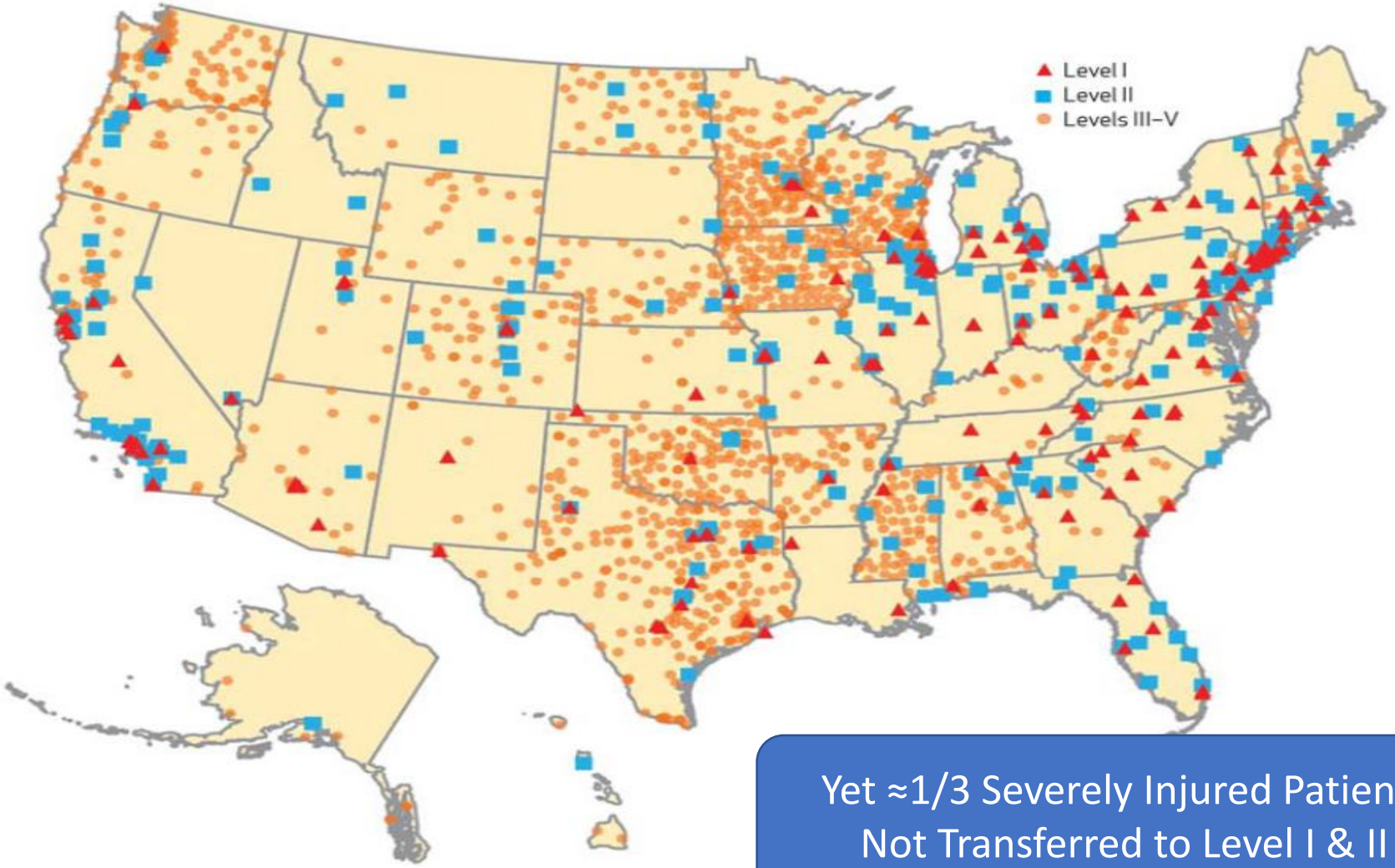
A. M. K
Biomed
Hospita
Jongro-gu, Seoul, Korea
e-mail: amykwon@snu.ac.kr

[23]. As a result, many physicians are aware of the

Civilian Burden of Injury

- Similar to Military heaviest long term burden:
  - Extremity trauma
  - TBI
- PTSD ≈ 20%
- Depression ≈ 7%
- Estimated ≈ 60% return to work w/i 1 year

Expanding Trauma Center Coverage



Yet ≈1/3 Severely Injured Patients Not Transferred to Level I & II

FIGURE 2-2 Trauma centers in the United States, 2012.

NOTE: Because of limited resolution when trauma centers are depicted on a national scale, the presence of multiple trauma centers within a single city may not be apparent in this figure.

Trauma Center Access & Mortality

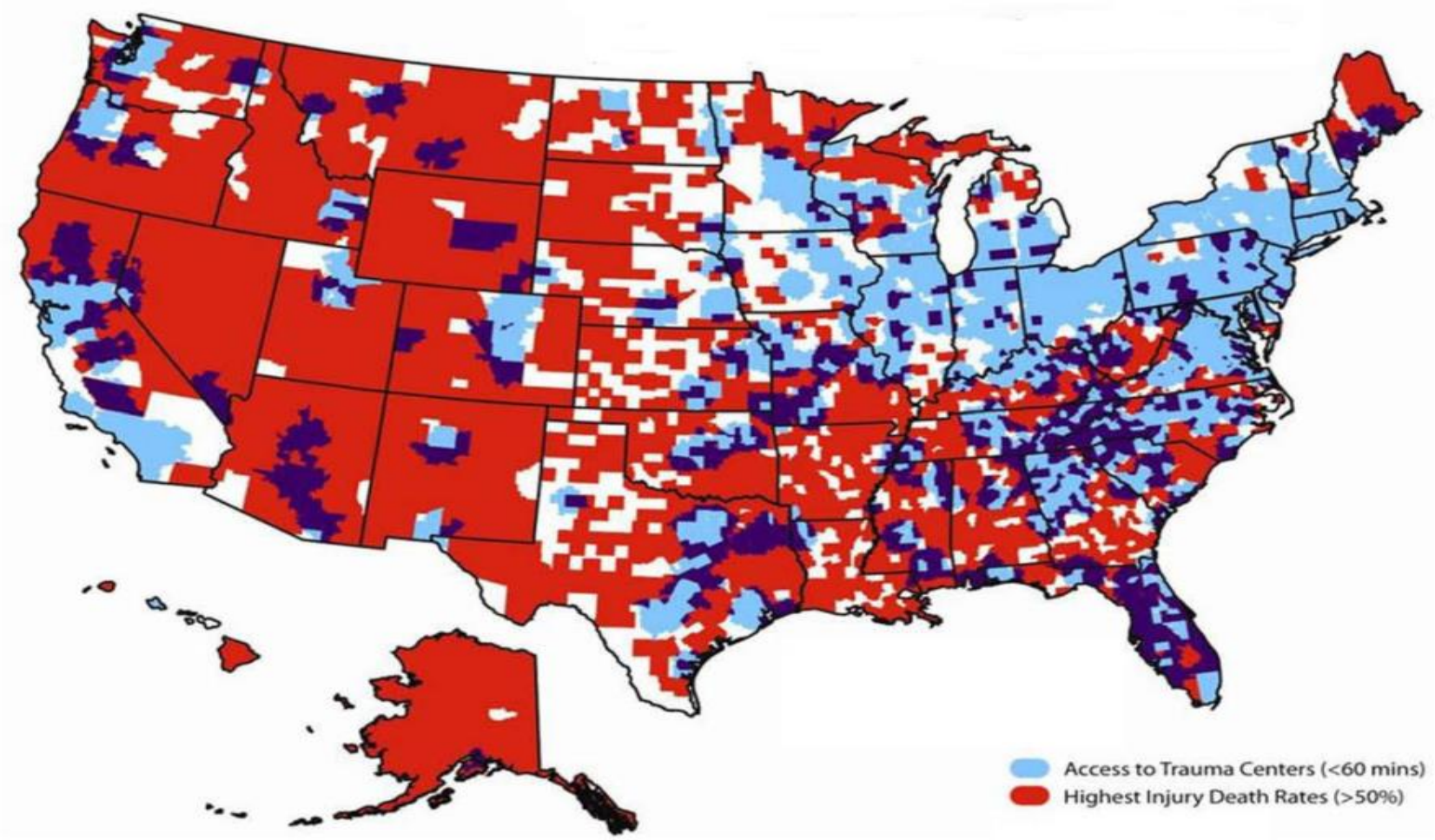
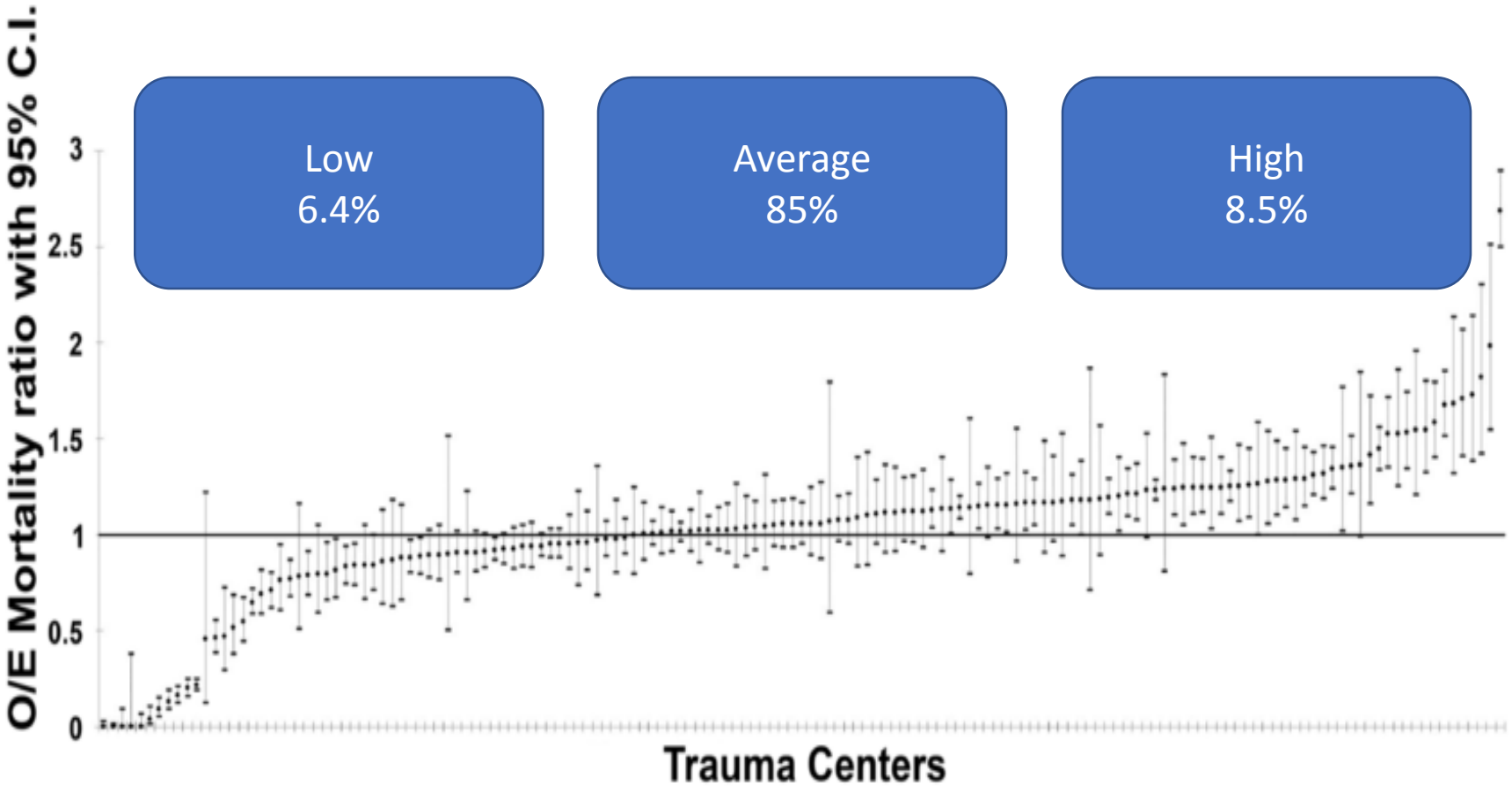


FIGURE 2-3 Lack of access to an appropriate level of trauma care is associated with higher trauma patient mortality.

SOURCE: Map provided by Charles Branas, Ph.D., Professor of Epidemiology, University of Pennsylvania, 2016.

Hashmi, et al 2016

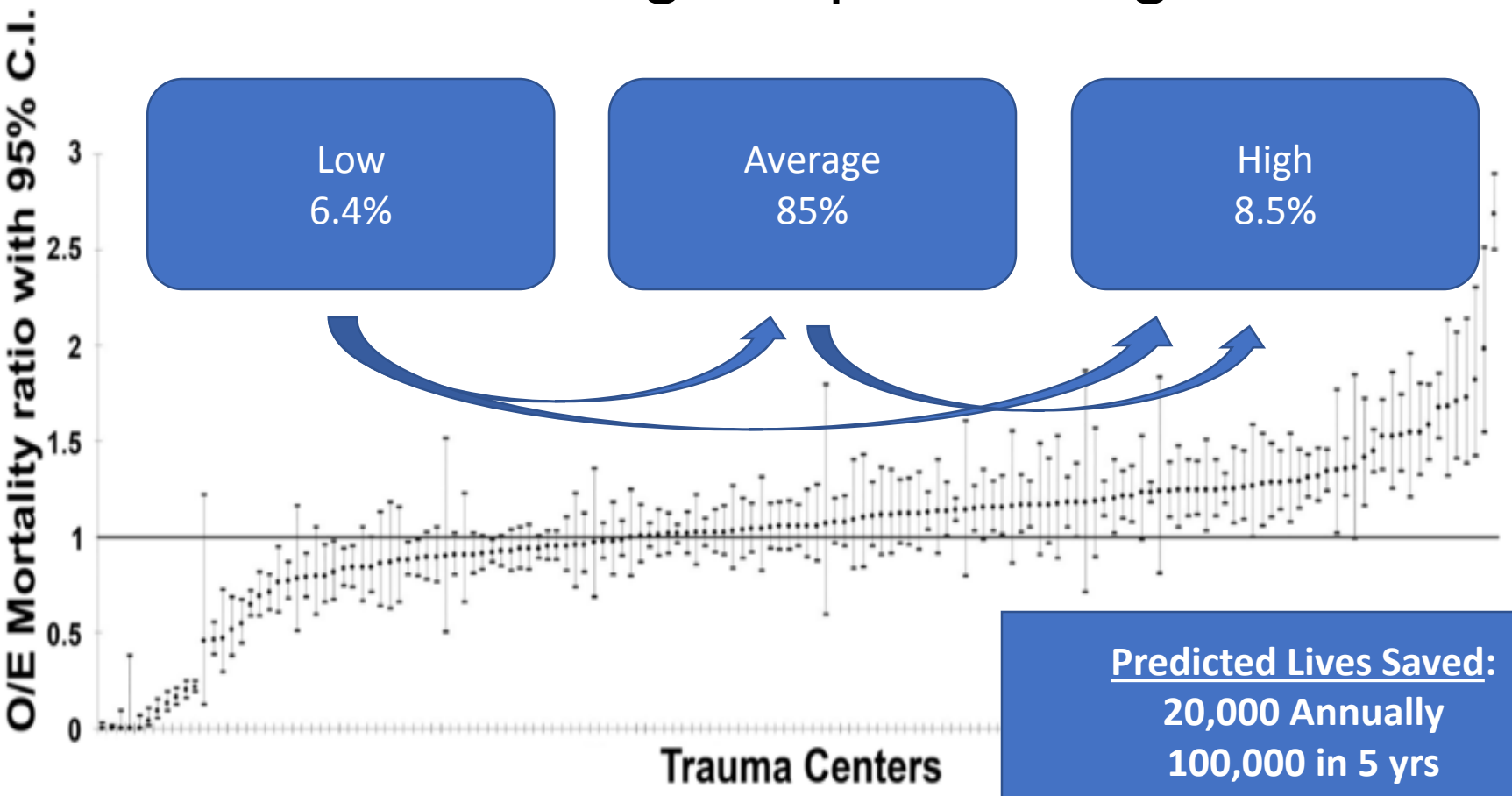
- 10 million pts, 1777 hospitals, 2006-2010
- TQIP Methodology



Hashmi, et al 2016

Predictive Modeling

- If all trauma centers achieved outcomes similar to those at the highest performing centers



Predicted Lives Saved:
20,000 Annually
100,000 in 5 yrs

The Opportunity = Synergy

- Existence of a military trauma system built on a learning system framework that has achieved unprecedented survival rates for casualties.

- Organized civilian trauma system that is well positioned to assimilate recent wartime trauma lessons learned and serve as a repository and incubator for innovation during the interwar period.

Problem

How to sustain war learned improvements?

"*We are going to repeat the same mistakes we have made before. You have just got to pray your son or daughter is not the first casualty of the next war. Pray they come in at about the year five mark.*" (Chiarelli, 2015)

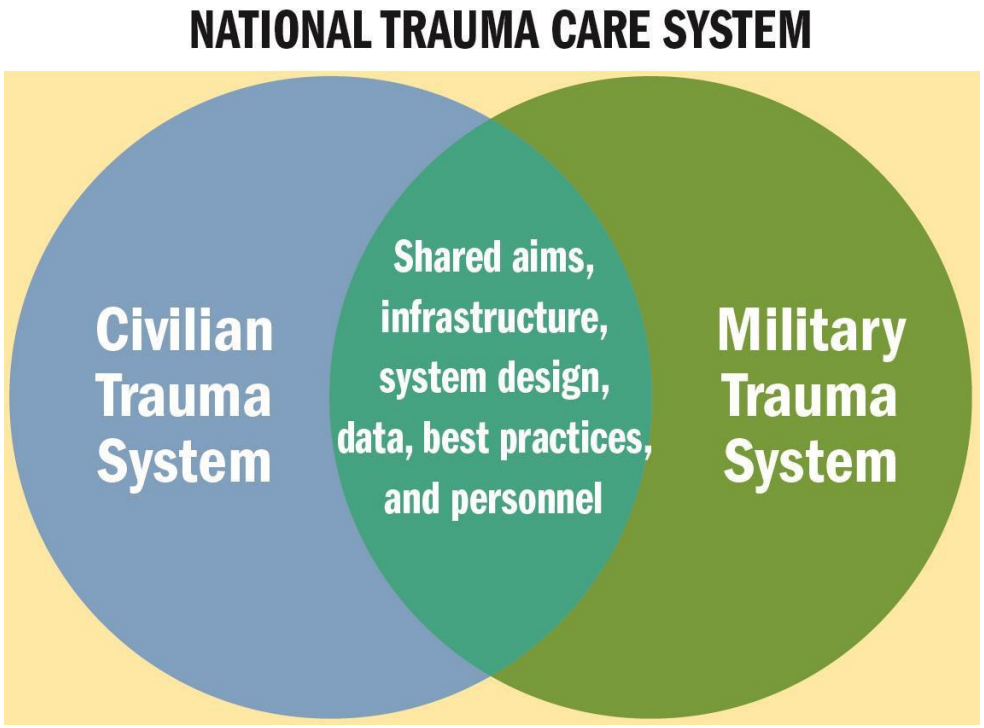
Why Integrate?

- End of Iraq and Afghan wars
- Keep military prepared
- ↓ Preventable deaths
- ↑ civilian terrorism threats

The Vision: A National Trauma Care System

A national strategy and joint military–civilian approach for improving trauma care is lacking. **A unified effort is needed** to ensure the delivery of optimal trauma care **to save the lives of Americans** injured within the United States and on the battlefield.

A national learning trauma care system would **ensure continuous improvement of trauma care best practices** in military and civilian sectors.



"Military and civilian trauma care will be optimized together, or not at all."

Military's Focused Empiricism Approach to PI used when:

(1) high-quality data are not available to inform clinical practice changes

(2) there is extreme urgency to improve outcomes because of high morbidity and mortality rates

(3) data collection is possible

- A key principle of focused empiricism is using the best data available in combination with experience to develop clinical practice guidelines that, through an iterative process, continue to be refined until high-quality data can be generated to further inform clinical practice and standards of care.

Military to Civilian Translation

The vital civilian-military link in combat casualty care research: Impact of attendance at scientific conferences

Leopoldo C. Cancio, MD, Todd E. Rasmussen, MD, Jeremy W. Cannon, MD, *and* Michael A. Dubick, PhD, *San Antonio, Texas*

2015

BACKGROUND: Attendan
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METHODS: (1) We i
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CONCLUSION: Recent c
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KEY WORDS: Military personnel; wounds and injuries; Afghanistan; Iraq war, 2003–2011; societies, medical.

Military-to-civilian translation of battlefield innovations in operative trauma care

2015

Adil H. Haider, MD, MPH, FACS,[a] Lydia C. Piper, BA,[b] Cheryl K. Zogg, MSPH, MHS,[a] Eric B. Schneider, PhD,[b] Jean A. Orman, ScD,[c] Frank K. Butler, MD,[d] Robert T. Gerhardt, MD, MPH, FACEP,[e] Elliott R. Haut, MD, PhD, FACS,[b] Jacques P. Mather, MD, MPH, FACS,[f] Ellen J. MacKenzie, PhD,[g] Diane A. Schwartz, MD, FACS,[b] David W. Geyer, MD,[h] Joseph J. DuBose, MD, FACS,[i] Todd E. Rasmussen, MD, FACS,[i] *and* Lorne H. Blackbourne, MD, FACS,[j] *Boston, MA, Baltimore and Bethesda, MD, Washington, DC, Houston, TX, Miami, FL, and West Reading, PA*

Background. *Historic improvements in operative trauma care have been driven by war. It is unknown whether recent battlefield innovations stemming from conflicts in Iraq/Afghanistan will follow a similar trend. The objective of this study was to survey trauma medical directors (TMDs) at level 1–3 trauma*

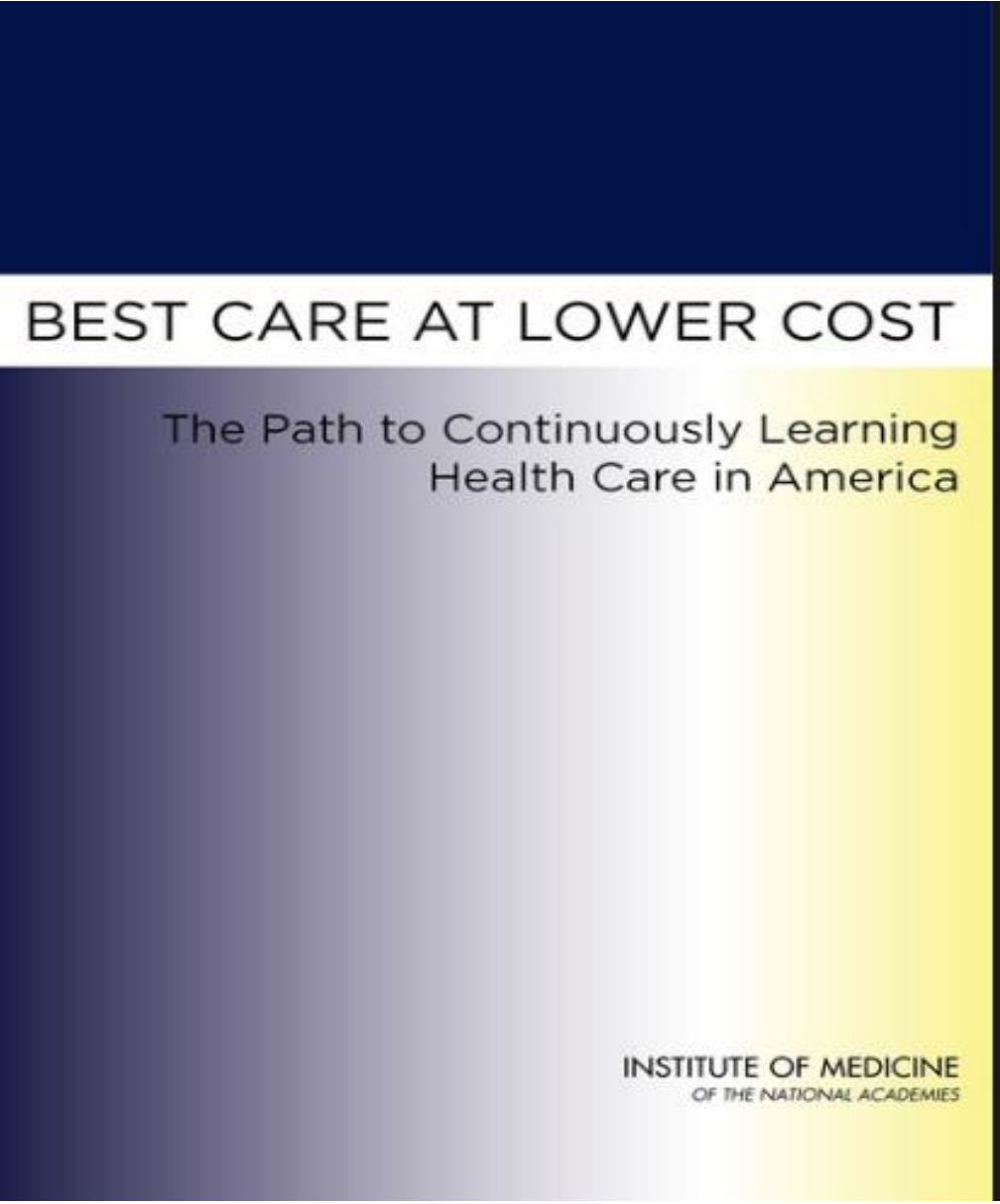
Damage Control Resuscitation
Permissive Hypotension
Massive Transfusion Protocol
1:1:1 Blood Ratios
Tourniquets
Hemostatic Agents
Intraosseous Access

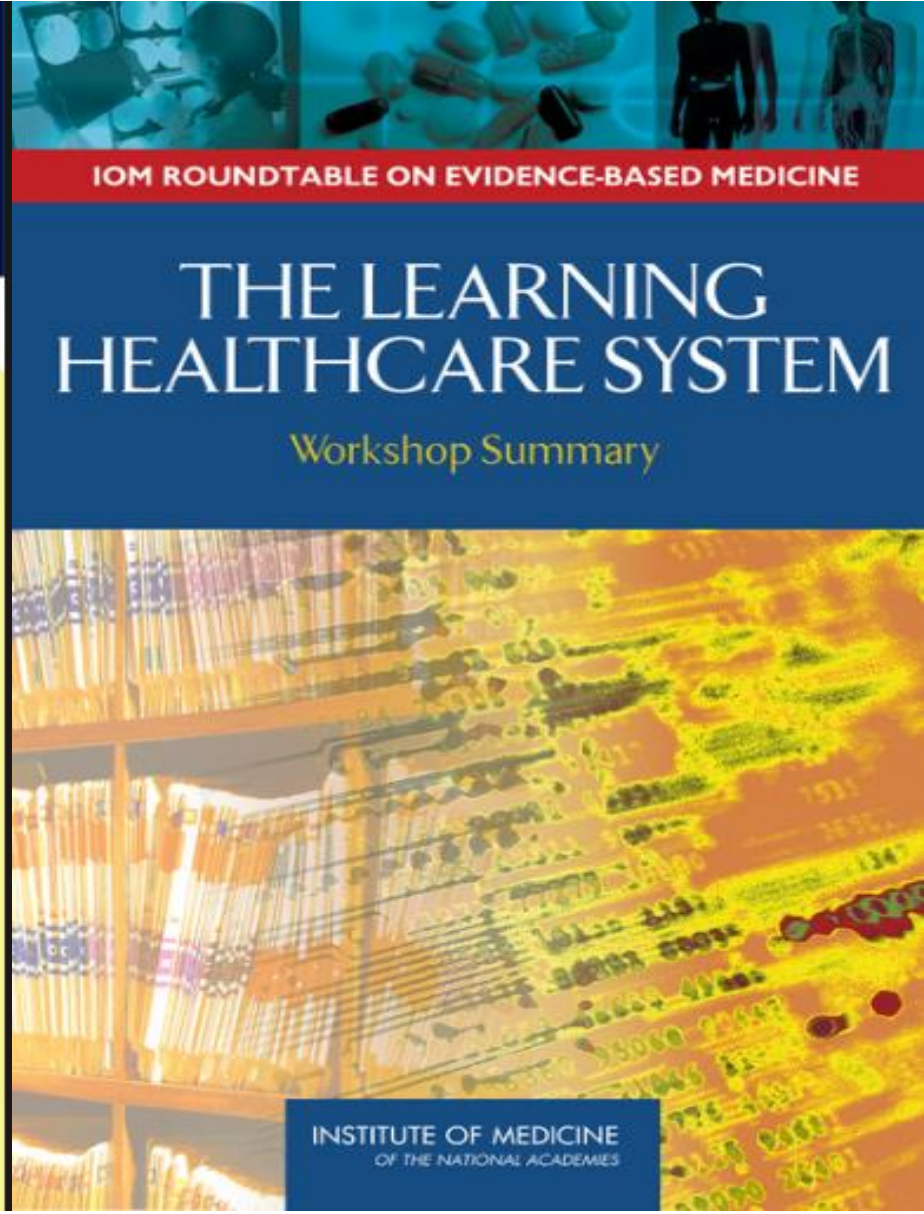
CPR
Stop Drop & Roll

STOP THE BLEED℠

HARTFORD CONSENSUS™
SAVE A LIFE
STOP THE BLEEDING

SAVE A LIFE


BEST CARE AT LOWER COST
The Path to Continuously Learning Health Care in America
INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES


IOM ROUNDTABLE ON EVIDENCE-BASED MEDICINE
THE LEARNING HEALTHCARE SYSTEM
Workshop Summary
INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

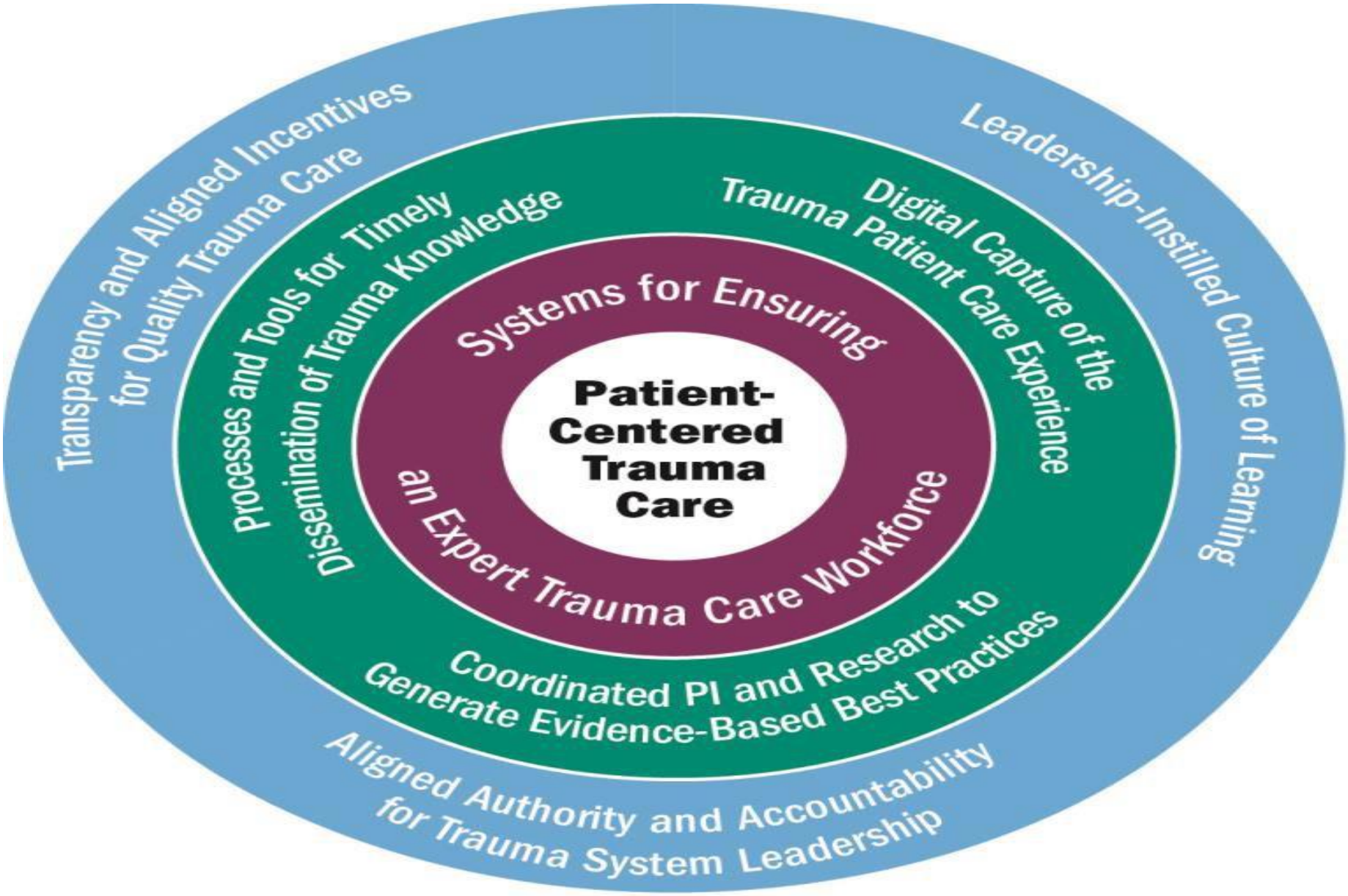
2013

Learning Healthcare System Definition

"System in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience"

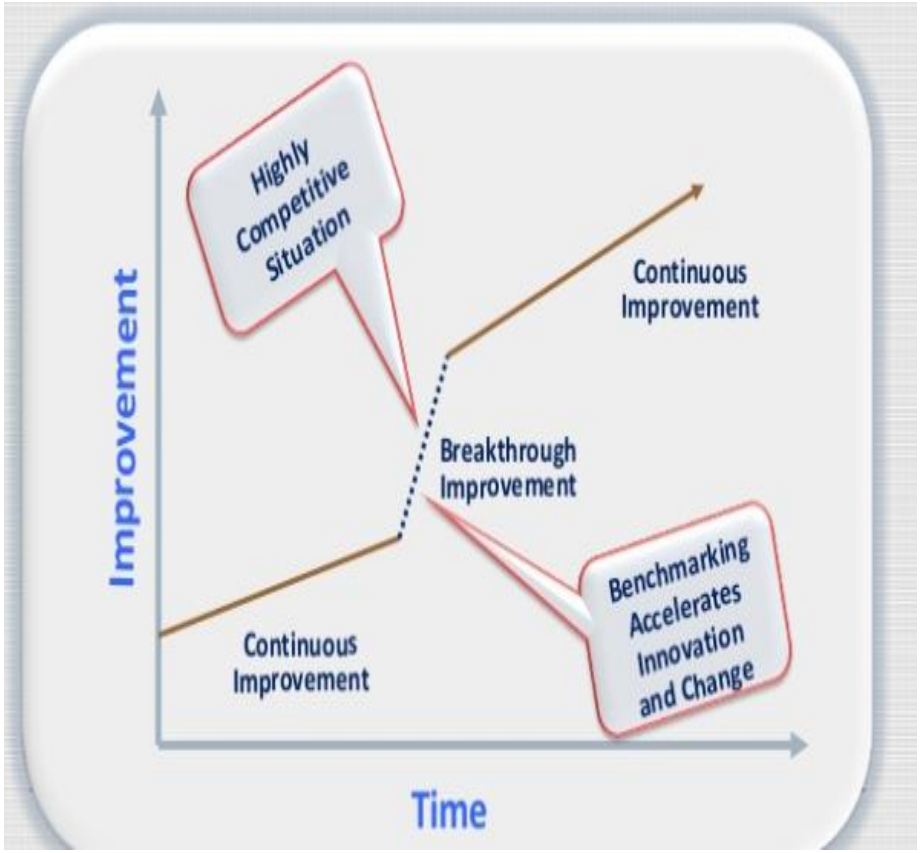
(IOM, 2013)

Framework for a Learning Trauma Care System



Continuous Vs Breakthrough Improvement

Rapid Improvement



Barriers

- Inertia
- Conflicting values
- Oversaturation of ideas
- Fear

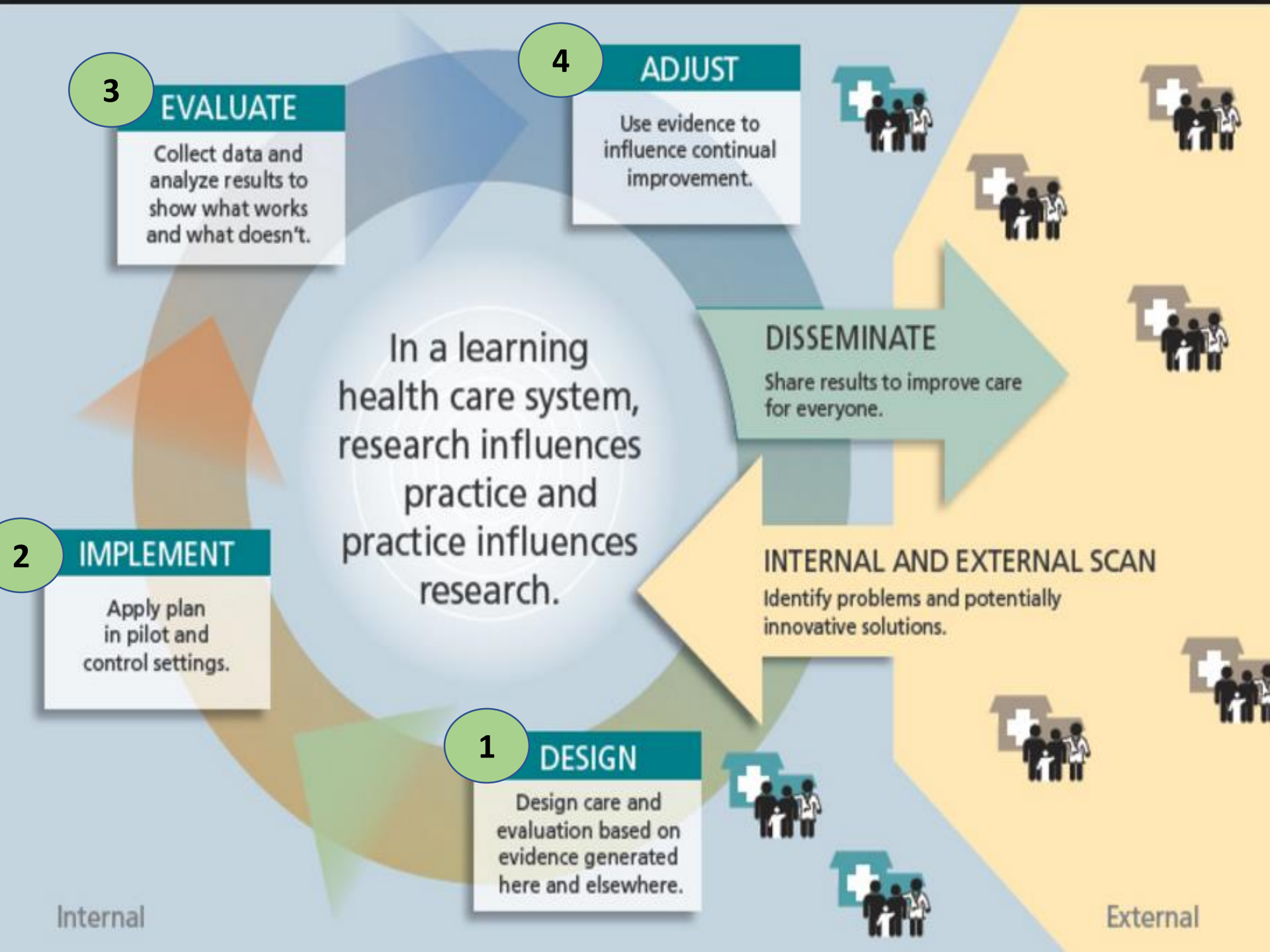

3
EVALUATE
Collect data and analyze results to show what works and what doesn't.
4
ADJUST
Use evidence to influence continual improvement.
In a learning health care system, research influences practice and practice influences research.
DISSEMINATE
Share results to improve care for everyone.
INTERNAL AND EXTERNAL SCAN
Identify problems and potentially innovative solutions.
2
IMPLEMENT
Apply plan in pilot and control settings.
1
DESIGN
Design care and evaluation based on evidence generated here and elsewhere.
Internal
External

TABLE 3-1 Components of a Continuously Learning Health System

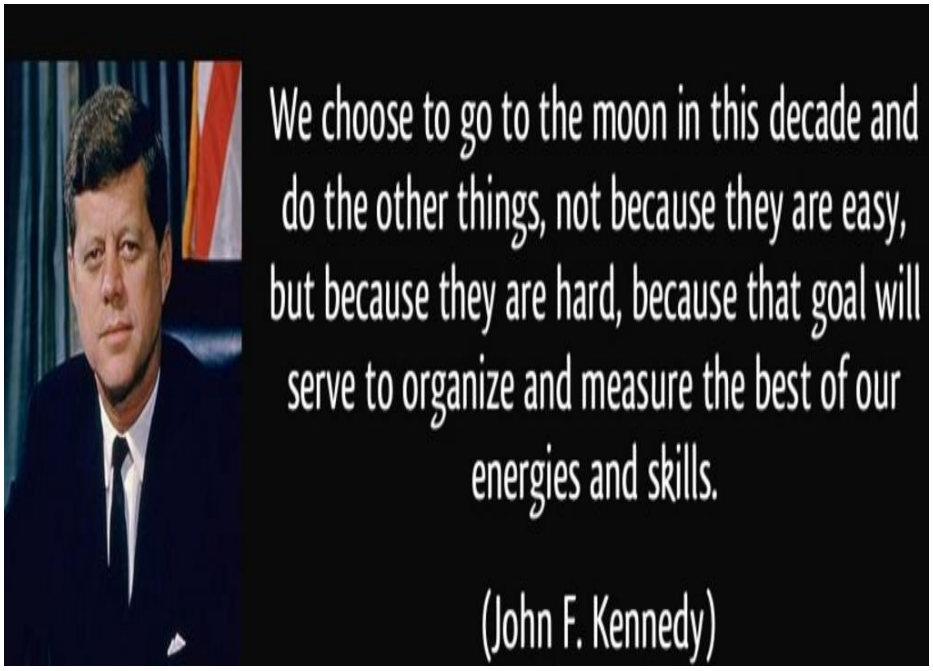
Science and Informatics	
Real-time access to knowledge	A learning health system continuously and reliably captures, curates, and delivers the best available evidence to guide, support, tailor, and improve clinical decision making and care safety and quality.
Digital capture of the care experience	A learning health system captures the care experience on digital platforms for real-time generation and application of knowledge for care improvement.
Patient–Clinician Partnerships	
Engaged, empowered patients	A learning health system is anchored on patient needs and perspectives and promotes the inclusion of patients, families, and other caregivers as vital members of the continuously learning care team.
Incentives	
Incentives aligned for value	A learning health system has incentives actively aligned to encourage continuous improvement, identify and reduce waste, and reward high-value care.
Full transparency	A learning health system systematically monitors the safety, quality, processes, prices, costs, and outcomes of care, and makes information available for care improvement and informed choices and decision making by clinicians, patients, and their families.
Continuous Learning Culture	
Leadership-instilled culture of learning	A learning health system is stewarded by leadership committed to a culture of teamwork, collaboration, and adaptability in support of continuous learning as a core aim.
Supportive system competencies	A learning health system constantly refines complex care operations and processes through ongoing team training and skill building, systems analysis and information development, and creation of the feedback loops for continuous learning and system improvement.

Learning Healthcare System Characteristics

1. Explicit AIMs

Learning Healthcare Systems Set Crisp, Quantifiable, Aims

- Sense of urgency
- Mobilize people to action



MTQIP AIMs

RIGHT PERSON. RIGHT PLACE.

RIGHT CARE MANAGEMENT

RIGHT TIME

DOING THE RIGHT THING.

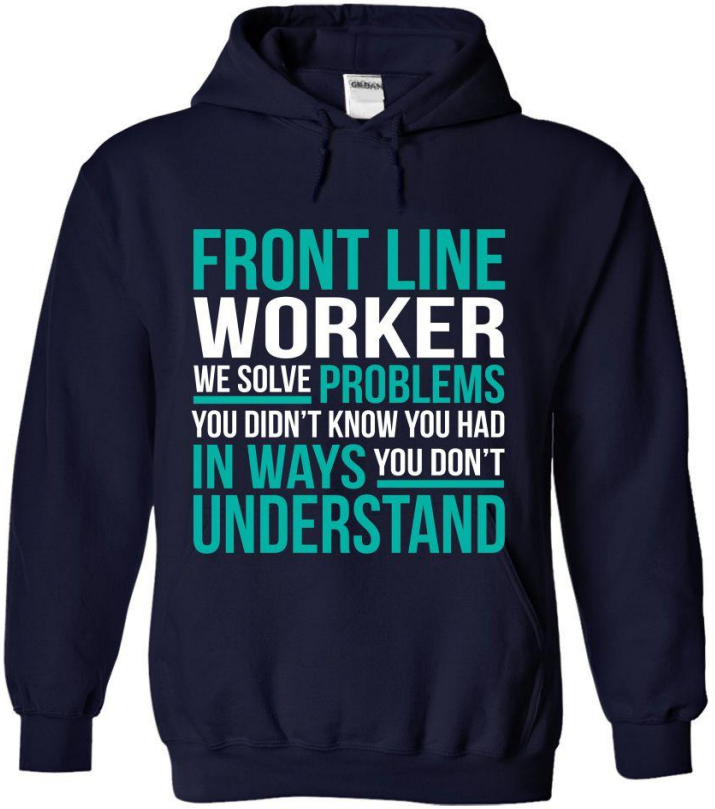
Learning Healthcare System Characteristics

1. Explicit AIMs
2. Focus on the customer (front line worker)

Focus on Frontline Workers

- Supportive of front-line providers of care
- Strives to remove workers barriers

➢Versus a system focused on administration [hierarchical] using data & reports to placate leadership.

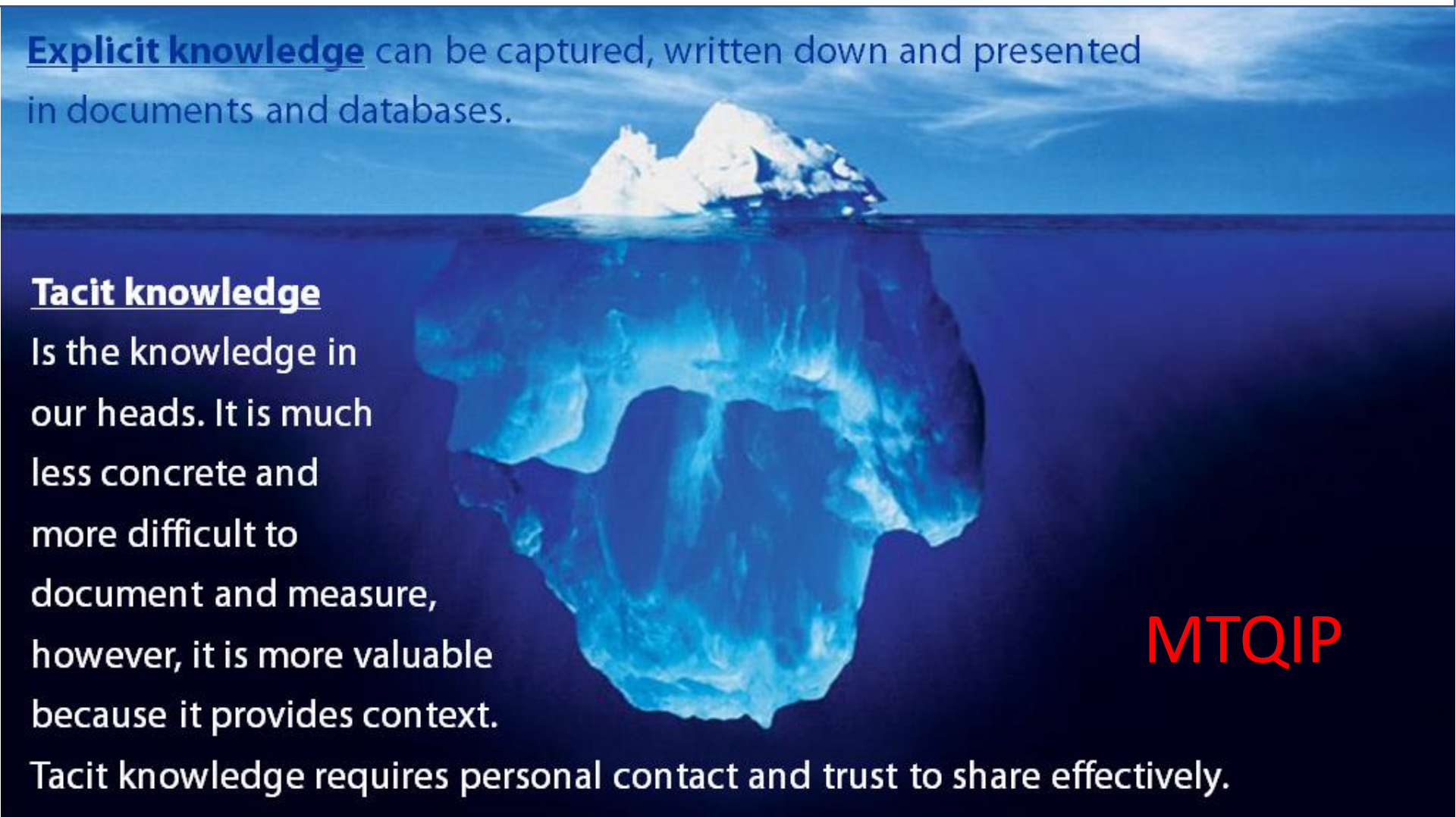


MTQIP

Learning Healthcare System Characteristics

1. Explicit AIM's
2. Focus on the front line worker
3. Facilitate exchange of tacit knowledge

Learning Health Systems
Facilitate Exchange of Tacit Knowledge



Learning Healthcare System Characteristics

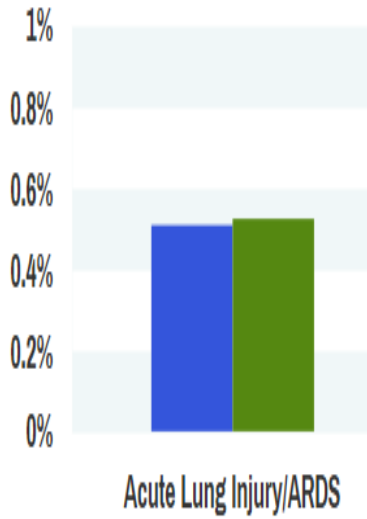
1. Explicit AIM's
2. Focus on the front line worker
3. Facilitate exchange of tacit knowledge
4. Measuring performance (team, provider level)

- Acute Lung Injury/Adult Respiratory Distress Syndrome

Drill Down

Click on Num Cases

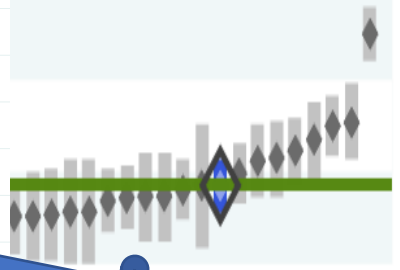
Adjusted	Unadjusted	O/E Ratio	Confidence Intervals	Detail
0.51	0.77	0.82	HIGH 0.69	NUM 65
			LOW 0.33	DEN 8397



Outcomes // Complications Drill-Down // Patient List

Spectrum Health's Patients with Acute Lung Injury/ARDS

Record #	Age	ISS	Injury Date	Admit Date	Date Discharge	Expected Mortality	Death
47053	31	43	01/11/2011	01/11/2011	01/16/2011	0.89	Yes
47074	37	38	01/15/2011	01/15/2011	02/04/2011	0.55	Yes
47134	71	27	01/27/2011	01/27/2011	01/28/2011	0.93	Yes
47165	80	13	02/03/2011	02/03/2011	02/09/2011	0.06	Yes
	50	14	02/10/2011	02/10/2011	02/17/2011	0.00	No
			03/19/2011	03/19/2011	03/31/2011	0.07	No
					04/12/2011	0.55	No
						0.03	No
47411							
47448	30	5					
47459	78	21	04/09/2011	04/09/2011			
47577	45	41	04/29/2011	04/29/2011	05/27/2011	0.10	



Motivation

MTQIP Blood Drill Down

3/1/14 - 9/30/15

M·TQIP

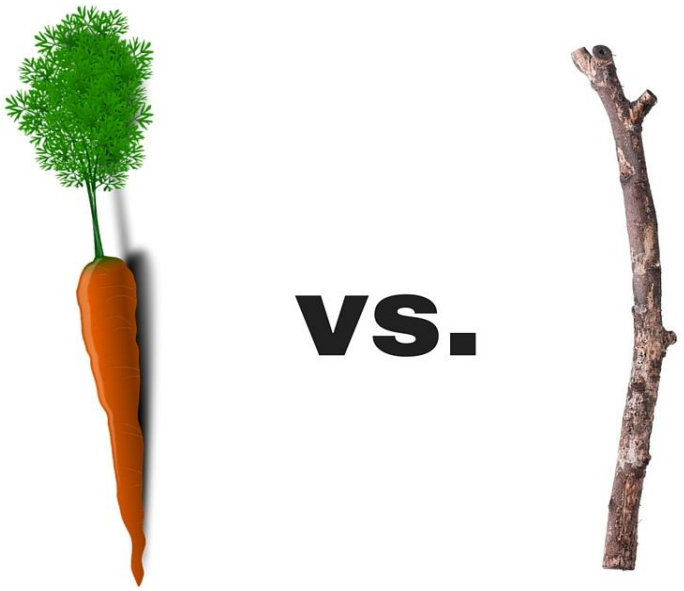
Trauma #	Age	ISS	PRBC 4hr	FFP 4 hr	PLT 4 hr	Cryo 4 hr	IVF 4 hr	4 hr PRBC/FFP Ratio	24 hr PRBC/FFP Ratio	Points	TXA	Mortality	Surgeon
337217	55	41	18	19	20	1	0	0.9	0.9	10	0	1	Machado-Aranda, David
337056	40	8	7	7	10	0	2	1.0	1.0	10	0	0	Cherry-Bukowiec, Jill
337066	18	41	14	14	4	0	3	1.0	1.0	10	0	0	To, Kathleen
337053	36	34	46	44	45	5	2	1.0	1.0	10	0	1	Cherry-Bukowiec, Jill
336658	26	48	7	6	0	0	0	1.2	1.2	10	0	0	Hemmila, Mark
337006	30	54	7	6	0	0	0	1.2	1.2	10	0	1	Hemmila, Mark
336731	63		15	12	0	0	0	1.3	1.3	10	0	1	Park, Pauline
337153	54				0	0	4	1.3	1.3	10	0	0	To, Kathleen
336568	50					1	0	1.5	1.5	10	0	1	Alam
336723	50							1.5	1.5	10	0	0	Hemmila, Mark
337072	35									10	0	1	Cherry-Bukowiec, Jill
337130	61											0	Machado-Aranda, David
337184	53	9										0	Cherry-Bukowiec, Jill
338100	19	66	37	21								1	Delano, Matthew
336614	63	30	43	24	15	0						1	Hemmila, Mark
336461	23	27	14	7	15	0	0					1	Raghavendran,
337885	28	5	9	4	0	0	2	2.3	2.3		0	1	Machado-Aranda, David
336991	24	34	5	2	5	0	0	2.5	2.5	5	0	1	To, Kathleen
337680	65	48	5	2	5	0	1	2.5	2.5	5	0	0	Wang, Stewart
338051	61	45	5	2	0	0	5	2.5	3.0	5	0	1	Napolitano, Lena
337483	72	16	8	3	0	0	6	2.7	3.0	0	0	0	Park, Pauline
336643	26	41	6	2	0	3	0	3.0	3.0	0	0	0	Raghavendran,
336736	66	36	9	3	1	0	0	3.0	3.0	0	0	1	Cherry-Bukowi
337624	50	20	7	2	0	0	1	3.5	3.5	0	0	1	Alam, Hasan
337790	51	29	8	2	5	0	6	4.0	2.5	0	0	0	Cherry-Bukowiec, Jill
336403	23	22	5	0	0	0	0			0	0	1	Alam

Learning Healthcare System Characteristics

1. Explicit AIM's
2. Focus on the front line worker
3. Facilitate exchange of tacit knowledge
4. Measuring performance (team, provider level)
5. Applying multiple stimulants to effect change

Multiple Improvement Levers

- Payment alone insufficient for systematic change
- Superior results when multiple levers employed
- Examples:
  - Recognition
  - Collaboration
  - Transparency
  - Engagement
  - Learning
  - Integrity
  - Competition
  - Money
  - Fear



Learning Healthcare System Characteristics

1. Explicit AIM's
2. Focus on the front line worker
3. Facilitate exchange of tacit knowledge
4. Measuring performance (team, provider level)
5. Applying multiple stimulants to effect change
6. Encouraging experimentation & improvisation

Ability to Improvise

Empowering trauma teams to find different approaches which works best in their environment

Context Sensitive

Learning Healthcare System Features

1. Explicit AIM's
2. Focus on the front line worker
3. Facilitate exchange of tacit knowledge
4. Measuring performance (team, provider level)
5. Applying multiple stimulants to effect change
6. Encouraging experimentation & improvisation
7. Regards agility as a value

Agility and Speed Valued

Improving the Collection and Use of Data

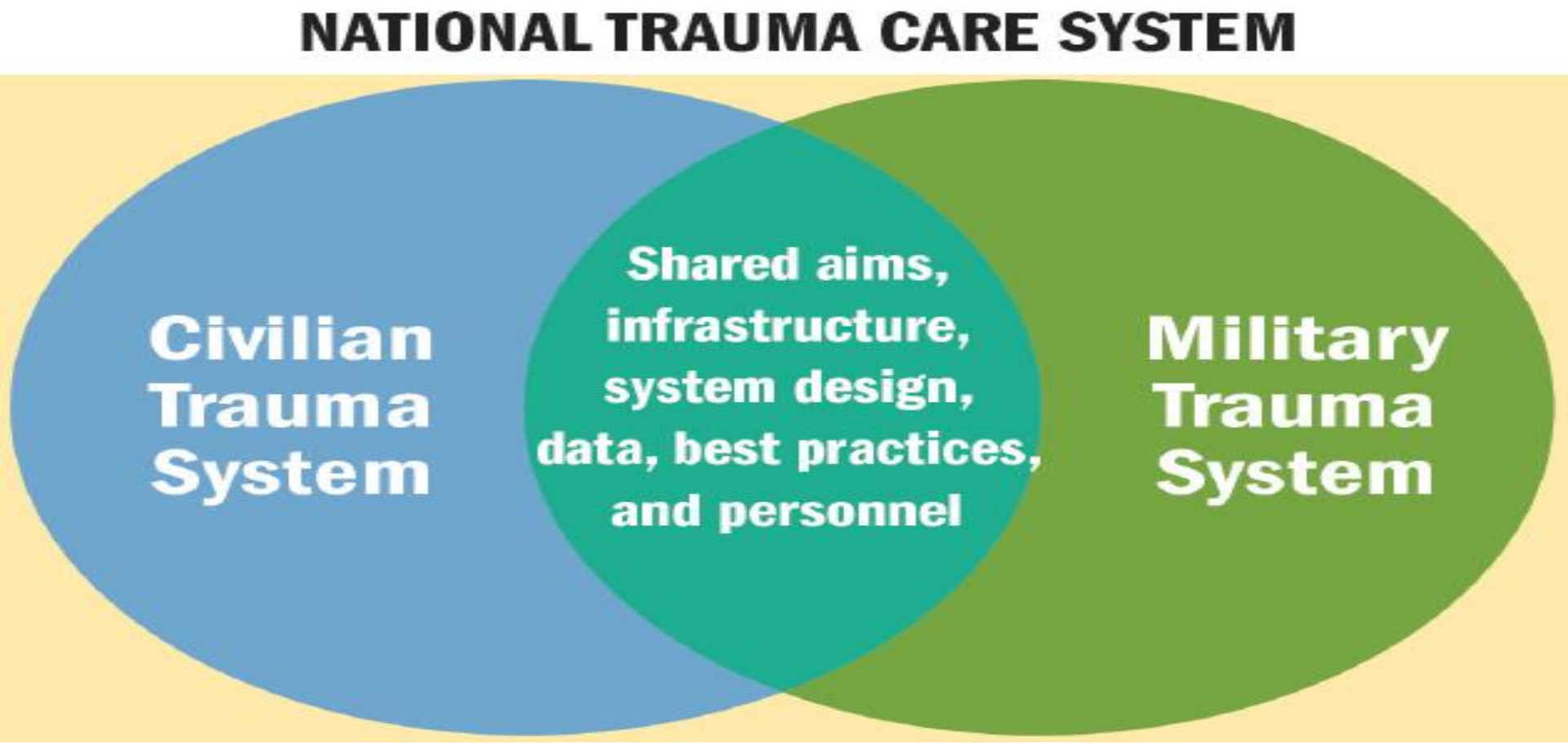
Findings:

- The **collection and integration of trauma data** across the care **continuum is incomplete** in both the military and civilian sectors.
- Military and civilian trauma management information systems rely on **inefficient and error-prone manual data abstraction to populate registries**.
- **Data are fragmented** across existing trauma registries and other data systems, and **data sharing** within and across the military and civilian sectors **is impeded** by political, operational, technical, regulatory, and security- related barriers.
- In both the military and civilian sectors, **performance transparency** at the provider and system levels **is lacking**.
- Providers **lack real-time access** to their performance data.
- **Lack of benchmarking** trauma system performance across the entire continuum of care within and between the military and civilian sectors.
- **Military participation** in national trauma quality improvement collaboratives **is minimal**; only a single military hospital participates in an ACS TQIP.

Final 11 Recommendations

1. White House set National AIM of Zero Prev Deaths
2. White House lead integration Civilian & Military Systems
3. Military Sec of Defense to hold military accountable
4. HHS to Coordinate Civilian (Fed-State-Local) Efforts
5. Collect & connect data across the continuum
6. Disseminate best practices
7. White House set National Trauma Research Action Plan
8. Revise Research Regulatory Environment
9. Military & Civilian Systems Participate in Structured QI
10. Integrate EMS into system as a provider vs transport
11. Workforce: Integrated civilian military training

Questions?


NATIONAL TRAUMA CARE SYSTEM
Civilian Trauma System
Shared aims, infrastructure, system design, data, best practices, and personnel
Military Trauma System

REBOA in Action

Jill Jakubus
12:00

What does REBOA mean?

What does REBOA mean?

Resuscitative Endovascular Balloon Occlusion of the Aorta

What does REBOA do?

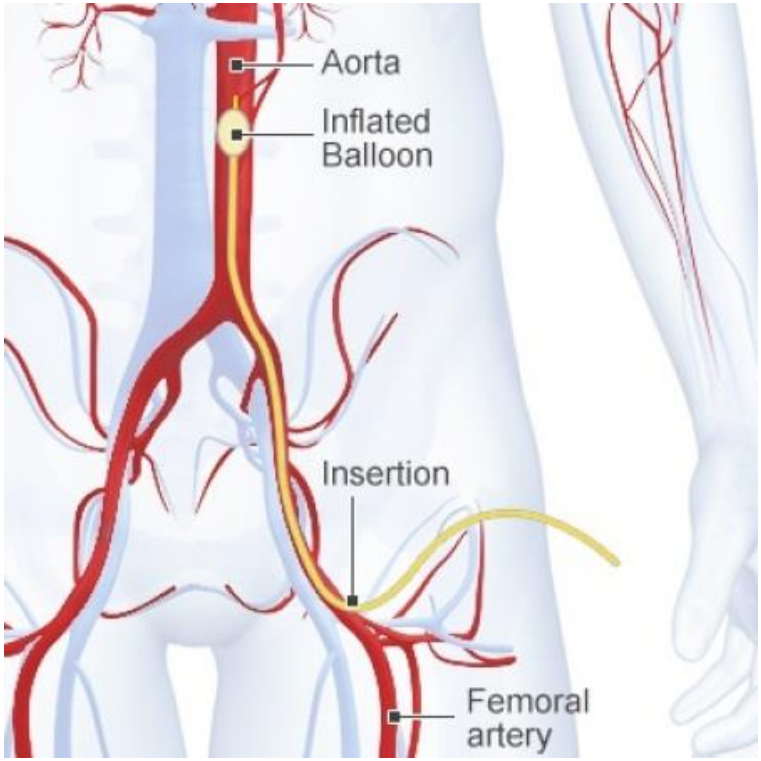
What does REBOA do?

Stops bleeding

What does REBOA work?

Is REBOA captured in procedures?

Is REBOA captured in procedures?



Yes

ICD-10: 04L03DZ

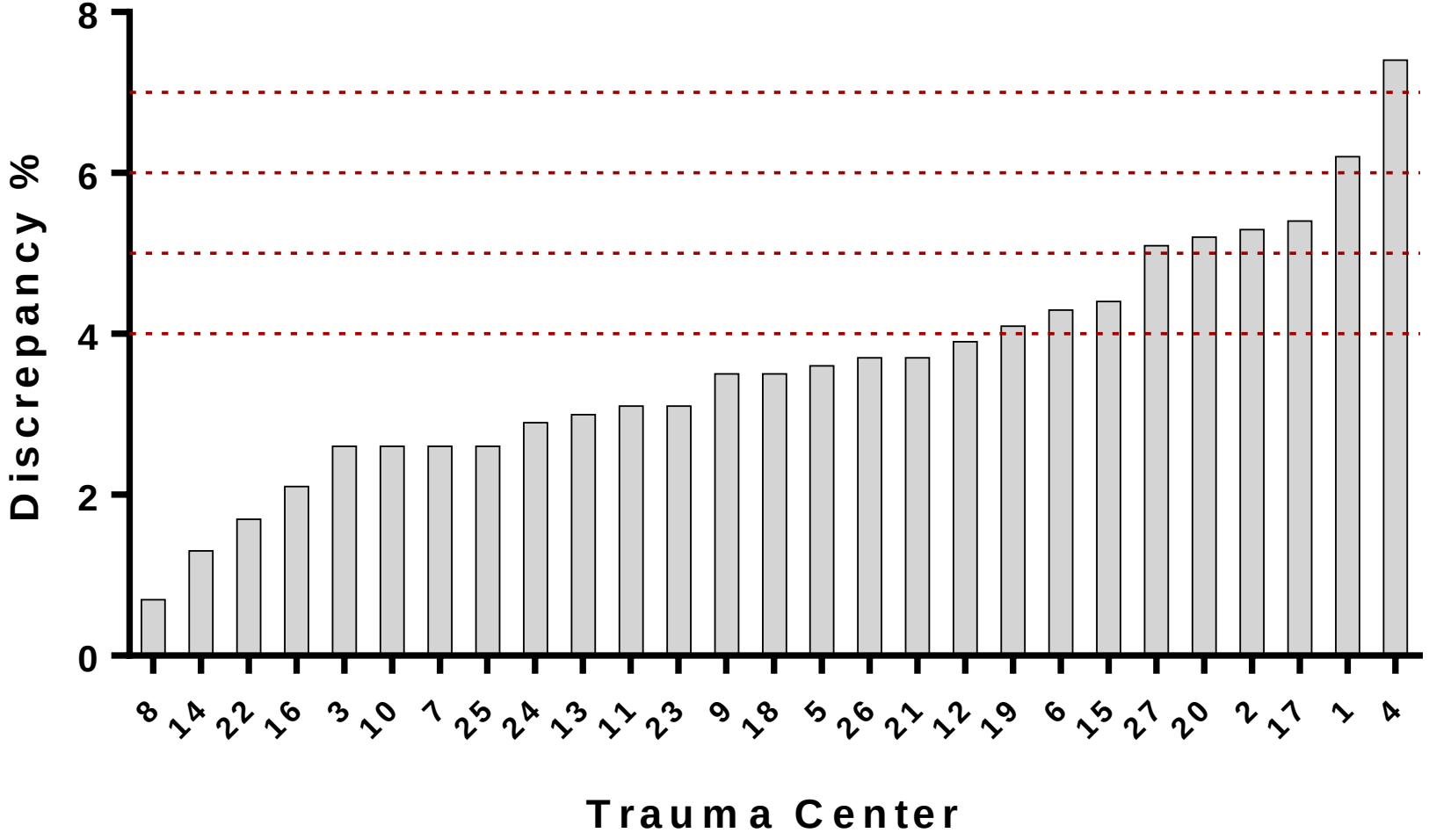
Lunch

Jennifer O'Gorman
12:15

Validation Results

Jill Jakubus
1:00

Validation
(Last Processed Report)



2017 Meeting

How can we help?

Common Questions

Jill Jakubus
1:20

Year: 2017
Variable: Sepsis complication
Staff: Levinson

Question: Is a patient required to have bacteremia for capture of sepsis?

SEPSIS

Sepsis is life-threatening organ dysfunction due to a dysregulated host response to infection. Septic shock is defined as a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities substantially increase mortality. The baseline SOFA score should be assumed to be zero unless the patient is known to have preexisting (acute or chronic) organ dysfunction before the onset of infection.

Presence of infection

1. Documented infection (i.e., bacteremia)

AND

Sepsis Quick Sequential Organ Failure Criteria (qSOFA) – 2 or more of the following are required:

1. Altered mentation (GCS $\leq$ 13)
2. Systolic blood pressure $\leq$ 100 mmHg
3. Respiratory rate $\geq$ 22 breaths/min

OR

Septic Shock - all required

1. Persistent hypotension requiring vasopressors to maintain MAP ≥65 mmHg
2. Serum lactate level >2 mmol/L (18 mg/dL) despite adequate volume resuscitation

Def. Source: SCCM 2016

Year: 2017
Variable: Sepsis complication
Staff: Levinson

Question: Is a patient required to have bacteremia for capture of sepsis?

Answer: No

Year: 2017
Variable: Emergency operation
Staff: Haverkamp

Question: Can we capture a case as emergent if the anesthesiologist does not capture ASA as "E", but the surgeon lists as emergent?

EMERGENCY OPERATION

An emergency case is commonly performed as soon as possible after the patient sustained an injury. This is identified as emergent by the American Society of Anesthesiologists (ASA) Class. The presence of an "E" after ASA Class indicates an emergent operation. Answer "YES" if the surgeon and/or anesthesiologist report the case as emergent

(1) Yes
(2) No

Def. Source: MTQIP

Year: 2017
Variable: Emergency operation
Staff: Haverkamp

Question: Can we capture a case as emergent if the anesthesiologist does not capture ASA as "E", but the surgeon lists as emergent?

Answer: Yes, definition capture allows for surgeon documentation. Pls feedback to your anesthesia clinical staff.

Year: 2017
Variable: Midline shift
Staff: Krajkowski

Question: CT documents 6 mm midline shift. Neurosurgeon documents 4 mm midline shift. Should we capture as Y or N?

MIDLINE SHIFT

Collection Criterion: Collect on patients with at least one injury in AIS head region, excluding patients with isolated scalp abrasion(s), scalp contusion(s), scalp laceration(s) and/or scalp avulsion(s).

Definition

> 5mm shift of the brain past its center line within 24 hours after time of injury

Field Values

1. Yes
2. No
3. Not Imaged (e.g. CT Scan, MRI)

Additional Information

- If there is documentation of "massive" midline shift in lieu of >5mm shift measurement, submit field value 1. Yes.
- Radiological and surgical documentation from transferring facilities should be considered for this data field.
- The null value "Not Applicable" is used for patients that do not meet the collection criterion.
- The null value "Not Known/Not Recorded" is used if both the injury date and injury time are unknown.
- If the injury time is unknown, but there is supporting documentation that the injury occurred within 24-hours of any CT measuring a >5mm shift, report the field value "1. Yes" if there is no other contradicting documentation.
- If the patient was not imaged within 24 hours from the time of injury, report the field value "3. Not Imaged (e.g. CT Scan, MRI)".

Data Source Hierarchy Guide

1. Radiology Report
2. OP Report
3. Physician's Progress Notes
4. Nurse's Notes
5. Hospital Discharge Summary

Year: 2017
Variable: Midline shift
Staff: Krajkowski

Question: CT documents 6 mm midline shift. Neurosurgeon documents 4 mm midline shift. Should we capture as Y or N?

Answer: Hierarchy indicates radiology as #1 for contradicting documentation. Please capture as Y.

Year: 2017
Variable: Antibiotic class
Staff: Vandenberg

Question: What class do I capture the combination antibiotics in such as Zosyn which is piperacillin/tazobactam?

ANTIBIOTIC 1 TYPE

- Enter the first antibiotic class administered to patient at your hospital.
- Must be given, not just ordered.
- Antibiotic reference available at www.mtqip.org > Resources > Education > Antibiotic Reference

0. None
1. Penicillin
2. Monobactam
3. Carbapenem
4. Macrolide
5. Lincosamide
6. Aminoglycoside
7. Quinolone
8. Sulfonamide
9. Tetracycline
10. Cephalosporin
11. Other

Collection Criterion: Collect on all patients with open fractures.

Year: 2017
Variable: Antibiotic class
Staff: Vandenberg

Question: What class do I capture the combination antibiotics in such as Zosyn which is piperacillin/tazobactam?

Answer: Penicillin

Year: 2017
Analytic: Z-score
Staff: Meredith

Question: Where do I find my center's z-score?

Year: 2017
Analytic: Z-score
Staff: Meredith

Question: Where do I find my center's z-score?

Answer: CQI Scorecard

2017 Performance Index Scorecard
5/17/17
XX

M·TQIP

PARTICIPATION POINTS 3

Data Validation 2017 **0 / 10 points**

%

Data Submission **0 / 10 points**

Feb submission	complete
June submission	pending
Oct submission	pending

Meeting Attendance **3 / 10 points**

Feb meeting	present
May meeting	pending
June meeting	pending
Oct meeting	pending

PERFORMANCE POINTS 48.3

VTE Prophy Timing ≤ 48 hrs **10 / 10 points**

Admit to trauma - cohort 2
1/1/16 - 1/31/17

VTE Prophy Type - LMWH **7 / 10 points**

Admit to trauma - cohort 2
1/1/16 - 1/31/17

RBC/FFP Ratio **7.3 / 10 points**

All - cohort 1
1/1/16 - 1/31/17

Serious Complications Z-score **7 / 10 points**

Admit to trauma - cohort 2
7/1/14 - 1/31/17

Mortality Z-score **7 / 10 points**

Admit to trauma - cohort 2
7/1/14 - 1/31/17

IVC Filter Placement **10 / 10 points**

All - cohort 1
7/1/16 - 1/31/17
Collaborative total

PI Project **0 / 10 points**

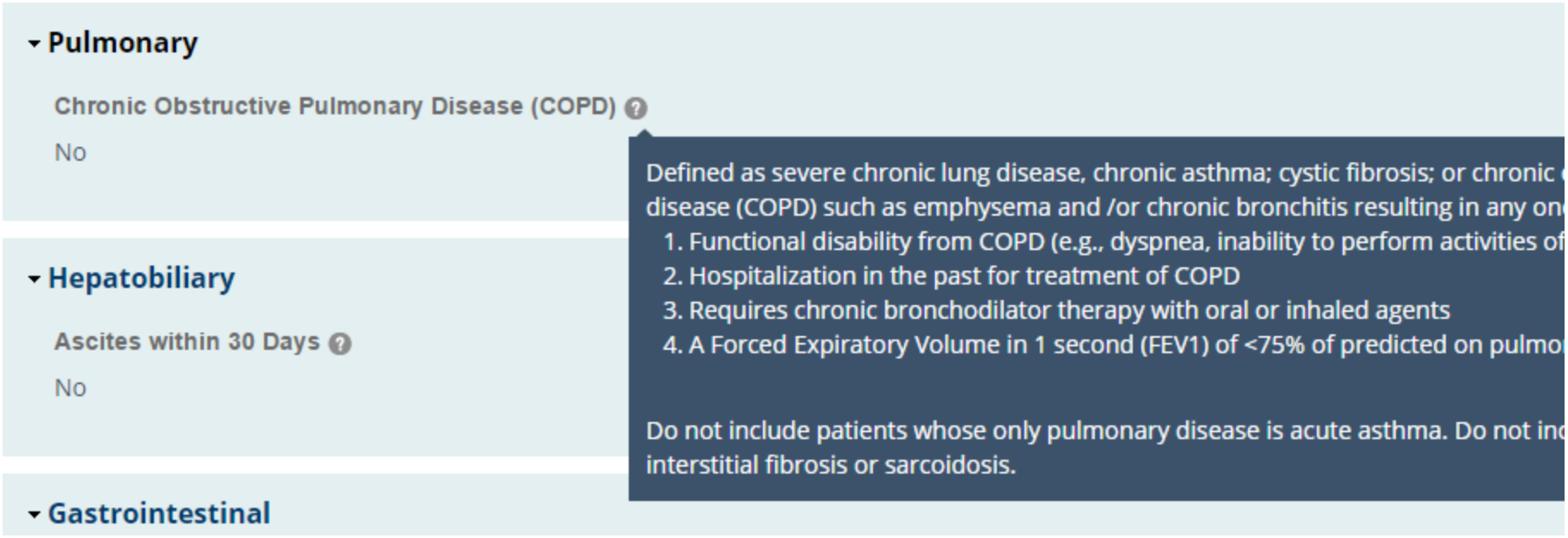
Met or exceeded target (10 pts)
Improved, but did not meet target (7 pts)
No improvement (0 pts)

TOTAL POINTS 51.3

Collaborative Query

Jill Jakubus
1:40

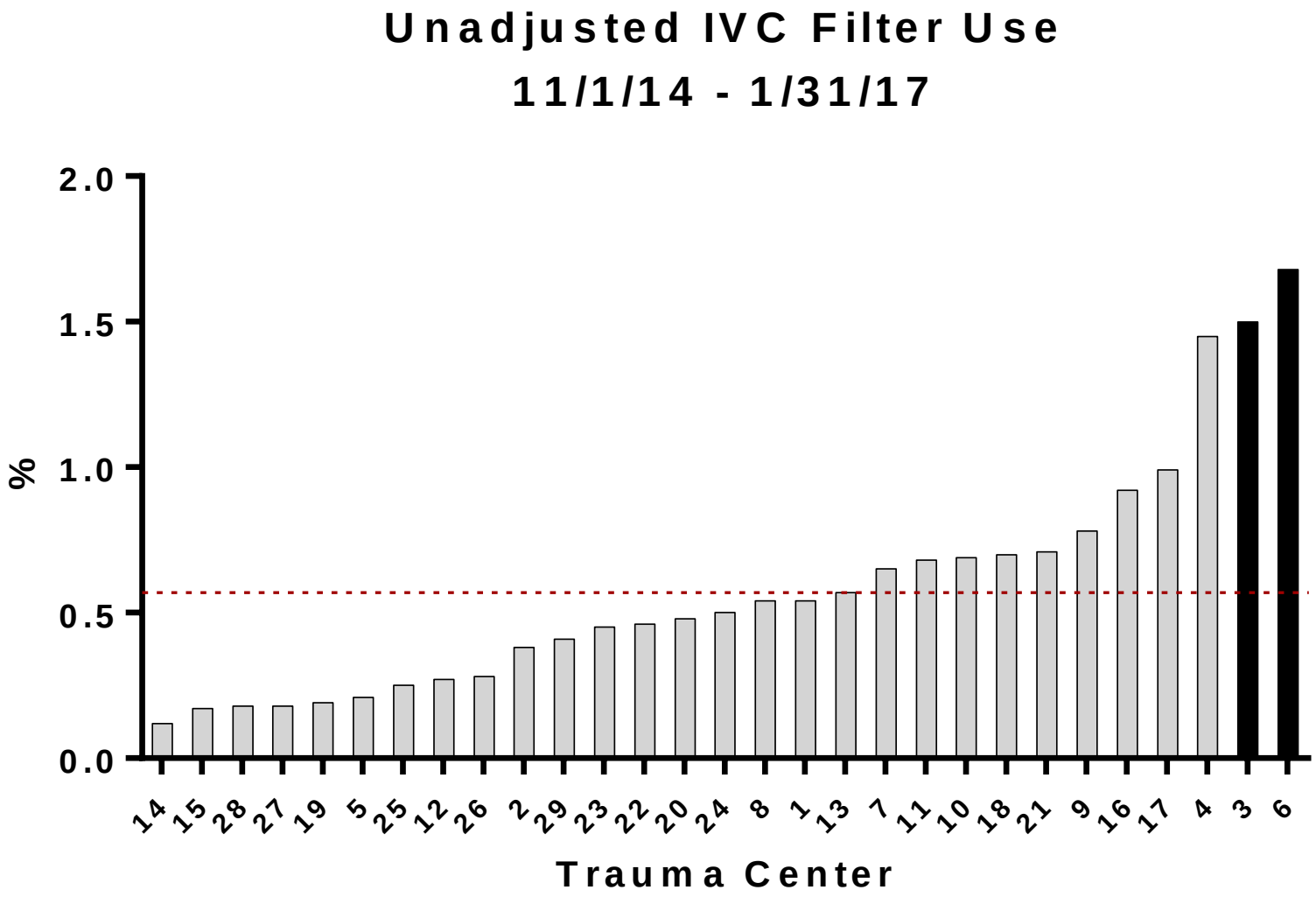
Do you use the online help text?



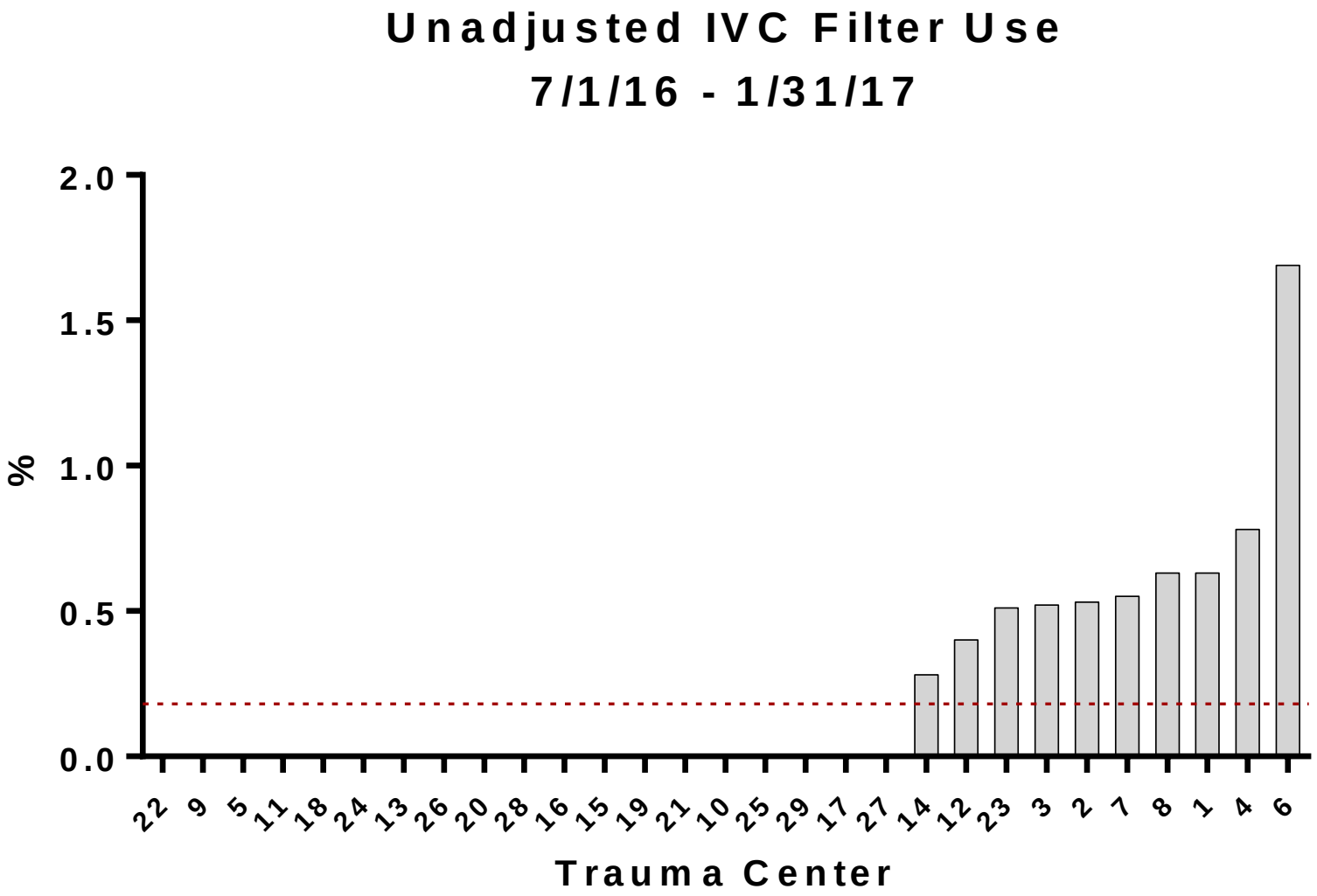
Response: Okay to remove

Are we potentially missing IVC filter codes?

ICD-9


Unadjusted IVC Filter Use
11/1/14 - 1/31/17
2.0
1.5
1.0
0.5
0.0
%
14 15 28 27 19 5 25 12 26 2 29 23 22 20 24 8 1 13 7 11 10 18 21 9 16 17 4 3 6
Trauma Center

ICD-10


Unadjusted IVC Filter Use
7/1/16 - 1/31/17
2.0
1.5
1.0
0.5
0.0
%
22 9 5 11 18 24 13 26 20 28 16 15 19 21 10 25 29 17 27 14 12 23 3 2 7 8 1 4 6
Trauma Center

Are we potentially missing IVC filter codes?

ICD-9
38.7

ICD-10
06H00DZ - Lower vein-insertion-inferior vena cava-open-intraluminal device-no qualifier
06H03DZ - Lower vein-insertion-inferior vena cava-perc-intraluminal device-no qualifier
06V03DZ - Lower vein-restriction-inferior vena cava-perc-intraluminal device-no qualifier
06V03ZZ - Lower vein-restriction-inferior vena cava-perc-no device-no qualifier

Response: Seeing a decrease in placement across centers. Second code most common.

What about consistency for codes for . . . .

Tracheostomy
Brain operation
Hip fracture

Response: Okay to email survey to assess

CQI index changes

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

Measure	Weight	Measure Description	Points	
#1	10	**Data Submission (Partial/Incomplete Submissions No Points)** On time and complete 3 of 3 times On time and complete 2 of 3 times On time and complete 1 of 3 times	 10 5 0	PARTICIPATION (30%)
#2	10	**Meeting Participation All Disciplines *Surgeon represents 1 hospital only** Surgeon, and (TPM or MCR) Participate in 3 of 3 Collaborative meetings (9 pts) Surgeon, and (TPM or MCR) Participate in 2 of 3 Collaborative meetings (6 pts) Surgeon, and (TPM or MCR) Participate in 1 of 3 Collaborative meetings (3 pts) Surgeon, and (TPM or MCR) Participate in 0 of 3 Collaborative meetings (0 pts) Registrar, and/or MCR Participate in the Data Abstractor Meeting (1 pt)	0-10	
#3	10	**Data Accuracy** / **1st Validation Visit-Error Rate** / **≥2 Validation Visits-Error Rate** 5 Star Validation: 0-4.5% / 0-4.0% — 10 4 Star Validation: 4.6-5.5% / 4.1-5.0% — 8 3 Star Validation: 5.6-8.0% / 5.1-6.0% — 5 2 Star Validation: 8.1-9.0% / 6.1-7.0% — 3 1 Star Validation: >9.0% / >7.0% — 0		
#4	10	**Venous Thromboembolism (VTE) Prophylaxis Initiated Within 48 Hours of Arrival in Trauma Service Admits with ≥ 2 Day Length of Stay (18 Mo's: 1/1/16-6/30/17)** ≥ 50% ≥ 40% < 40%	 10 5 0	PERFORMANCE (70%)
#5	10	**Low Molecular Weight Heparin (LMWH) Venous Thromboembolism (VTE) Prophylaxis Use in Trauma Service Admits (18 Mo's: 1/1/16-6/30/17)** ≥ 50% 21-49% 5-20% < 5%	 10 7 5 0	
#6	10	**Red Blood Cell to Plasma Ratio (Weighted Mean Points) of Patients Transfused ≥5 Units in 1st 4 Hours (18 Mo's: 1/1/16-6/30/17)** 10 pts: Tier 1: ≤ 1.5 10 pts: Tier 2: 1.6-2.0 5 pts: Tier 3: 2.1-2.5 0 pts: Tier 4: >2.5	0-10	
#7	10	**Serious Complication Rate-Trauma Service Admits (3 years: 7/1/14-6/30/17)** Z-score: < -1 (major improvement) Z-score: -1 to 1 or serious complications low-outlier (average or better rate) Z-score: > 1 (rates of serious complications increased)	 10 7 5	
#8	10	**Mortality Rate-Trauma Service Admits (3 years: 7/1/14-6/30/17)** Z-score: < -1 (major improvement) Z-score: -1 to 1 or mortality low-outlier (average or better rate) Z-score: > 1 (rates of mortality increased)	 10 7 5	
#9	10	**Inferior Vena Cava Filter Use (All Admits) (Collaborative Wide) (7/1/16-6/30/17)** ≤ 1.2 > 1.2	 10 0	
#10	10	**Site Specific Quality Improvement Project (July 2016-December 2017)** Implemented, and met or exceeded target Implemented, showed improvement, but did not meet target Implemented, but showed no improvement	 10 7 0	
		Total (Max Points) =	100	

Maintenance

Drop

≥ 55% 10
≥ 50% 8
≥ 40% 5
< 40% 0

≥ 50% 10
37-49% 7
25-36% 5
20-24% 3
<20% 0

Summary

- 3 with Changes
- 2 Drop
- Need 2 New

Open Fracture

- Define group of AIS codes
  - Femur, Tibia
  - Record date, time, antibiotic given
  - Scoring, need all 3 of above
    - ≥ 90 % patients = 10 points
    - ≥ 80 % patients = 7 points
    - ≥ 70 % patients = 5 points
    - < 70 % patients = 0 points
  - Allow for determination of baseline % given within 60 minutes
  - New targets based on collected data

Open fracture logic feedback. . .

1. **Arrive from scene**
   Record type, date, time abx given in ED.
2. **Arrive from referring ED**
   Record type, date, time abx given in ED. If antibiotic given in referring ED and documented enter type and make date and time antibiotic given = to date and time of arrival at your ED.
3. **Arrive as a direct admit.**
   Exclude

Response: Request exclusion of transfers in

Head Injury on Anticoagulation

- Head CT date, time in anticoagulated patient
  - Anticoagulated patient, Head AIS≥1
  - Record date, time, Head CT starting 7/1/17
  - Scoring, need all 3 of above
    - ≥ 90 % patients = 10 points
    - ≥ 80 % patients = 7 points
    - ≥ 70 % patients = 5 points
    - < 70 % patients = 0 points
  - Allow for determination of baseline time to CT scan
  - New targets based on collected data

Head Injury on Anticoagulation

- Add data elements for 2018
- Collect on head injury patient with
  - Coumadin
  - NOAC
  - Plavix
  - Aspirin (Antiplatelet)
- Excel pilot
- Grow project iteratively

Response: MTQIP to investigate inclusion of negative head CT head injuries and will reflect this in the inclusion criteria. Majority are already including.

Head injury on anticoag pilot feedback. . .

1. **Timing of implementation**
2. **Method of implementation**
3. **Duration of pilot**
4. **Pilot definition formulation**

Response: Agree with 1 month interval, around Aug 2017, on Excel sheet, reviewed by steering committee

Weird But Helpful Trauma Information I Wish I Had Learned But Missed Along the Way

Judy Mikhail
2:00

M·TQIP

Weird But Helpful Trauma Information I Wish I Had Learned--- But Missed Along The Way

Judy N. Mikhail

Program Manager, MTQIP


Weekend
Just Ahead

In Trauma Centers is there a weekend effect in trauma?

Do patients who are admitted on the weekend have worse outcomes than those admitted on a week day?

A. Yes
B. No

What is Already Known On The Topic

Previous Research→ Poor Outcomes:

- Acute stroke
- Myocardial infarction
- Pulmonary embolism
- Lower Extremity Ischemia
- Emergency General Surgery
- Elective Joint Replacement

Potential Reasons

- Inadequate risk adjustment due to systematic miscoding found in administrative datasets

or

- Weekend care (suboptimal)

ORIGINAL ARTICLE

2010

Does the Trauma System Protect Against the Weekend Effect?

Brendan G. Carr, MD, MA, MS, Peter Jenkins, MD, Charles C. Branas, PhD, Douglas J. Wiebe, PhD, Patrick Kim, MD, Charles W. Schwab, MD, and Patrick M. Reilly, MD

Background: Occu
poor outcomes for t
dial infarction, strol
the "weekend effec
Methods: We perf
center (2006–2008)
or night arrival wer
Results: Four thou
One-third of patien
arrived at night (12
(44.2 weekdays vs
nights, $p < 0.001$),
p = not significant
overall Injury Sev
ends, p = NS an
Glasgow Coma Sc
p = NS and 13.7 d
no survival differe
(5.2% vs. 5.3%; od
0.75–1.28) or at nig
In adjusted analys
Glasgow Coma Sc
ence was detected
night (OR, 0.79 an
Conclusion: Differ
trauma center. Out
week may be beca
be fully staffed an
staffing and systen
ST elevation myoc
tions may include
emergency care c
ments, and requiri
program.
Key Words: Traun

(*J Trauma.* 2010;69

Retrospective Cohort Study
Single Level I Pennsylvania 2006-2008
N=4,382
Weekend or Night (12M-6AM)
Risk Adjustment: Age, Sex, ISS, GCS, SBP<90
NO DIFFERENCE FOUND

The "weekend effect" refers to the inferior outcomes that
s medical and sur-
ess hours.[1–4] There
toward conditions
optimal outcomes.
ved for ST segment
ac arrest, and isch-
en associated with
lures,[5] less subspe-
more medical er-

ons Committee on
ines for trauma care
plicitly describe the
initive trauma care
fully resourced and
y of week and have
icine as a model of

o be transparent and
care for injured pa-
ospital system that
ate facilities, may be
Thus, we sought to
y risks existed for
nters on nights and

f Pennsylvania is a
phia, PA, serving a
nter at Pennsylvania
ource center located
oth the local urban
by a combination of
ground emergency medical service programs and a hospital-based aeromedical program with advanced airway manage-

ORIGINAL ARTICLE

ONLINE FIRST

Weekend and Night Outcomes in a Statewide Trauma System

Brendan G. Carr, MD, MS; Patrick M. Reilly, MD; C. William Schwab, MD; Charles C. Branas, PhD; Juliet Geiger, RN, MSN; Douglas J. Wiebe, PhD

2011

Retrospective Cohort Study
Pennsylvania State Registry
Level I, II, III
Weekend Or Nights (12M-6AM)
n=90,461 Collected over 5 years
Risk Adjusted
NO DIFFERENCE FOUND

Original article

Is there a 'weekend effect' in major trauma?

2016

David Metcalfe,[1] Daniel C Perry,[2] Omar Bouamra,[3] Ali Salim,[4] Fiona E Lecky,[3,5] Maralyn Woodford,[3] Antoinette Edwards,[3] Matthew L Costa[1]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/emermed-2016-206049).

[1]Nuffield Department of Orthopaedics, Rheumatology and Musculoskele University of Oxfo UK
[2]Institute of Trans Medicine, Univers Liverpool, Liverpo
[3]Trauma Audit an Network, Universi Manchester, Salfo Manchester, UK
[4]Center for Surge Health, Harvard M School, Boston, M USA
[5]School of Health Research, Universi Sheffield, Sheffiel

Correspondenc
Dr David Metcalfe Centre for Critical Research, John Ra Hospital, Headley OX3 9DU, UK; da metcalfe@ndorms

Received 11 May
Revised 30 June 2
Accepted 4 July 2
Published Online
28 October 2016

ABSTRACT

Background Many previous studies have shown that patients admitted to hospital at weekends have worse outcomes than those on other days. It has been proposed that parity of clinical services throughout the week could mitigate the 'weekend effect'. This study

Observational Cohort Study
22 Trauma Centers in England
n=49,070 patients
Risk adjusted methodology
Weekend vs Weekday Admission
NO DIFFERENCE in LOS, GOS, Mortality

Key messages

What is already known on this subject?
Increased mortality for patients admitted at weekends has been demonstrated across many

INTRODUCTION

Increased mortality for patients admitted at the weekend was first shown in Canadian hospitals in 2001.[1] The 'weekend effect' has since been

administrative datasets. For example, it has been proposed that the weekend effect can be eliminated by studies that only analyse high-quality data, for example, from clinical registries.[16 17] Finally, an alternative explanation is that the delivery of healthcare services varies at the weekend to the detriment of patients. This has prompted a vigorous

JOURNAL OF SURGICAL RESEARCH 177 (2012) 295–300

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

ELSEVIER

JSR Surgical Research

Association for Academic Surgery

2012

Beating the weekend trend: Increased mortality in older adult traumatic brain injury (TBI) patients admitted on weekends

Eric B. Schn
Elliott R. Ha
and Adil H.

[a] *Department of Su*
[b] *Department of Ep*
[c] *Department of He*

ARTICLE IN

Article history:
Received 7 January
Received in revise
4 June 2012
Accepted 14 June
Available online 7

Keywords:
Weekend admissi
Weekday admissi
Head trauma
Traumatic brain i
Older adults
Nationwide Inpati

National Inpatient Sample
2006-2008
Restricted to: Elderly TBI (AIS >3) & Age 65-89
Elderly Weekend TBI: less severe ISS, less comorbidity
BUT 14% greater odds of mortality
Suspected reason: NonTC, staffing differences?

$27,703, respectively, $P = 0.667$). Proportional mortality was higher among weekend patients (9.3% *versus* 8.4%, $P = 0.008$). After adjustment, weekend patients demonstrated

ANSWER
In Trauma Centers is there a weekend effect in trauma?

Do patients who are admitted on the weekend have worse outcomes than those admitted on a week day?

A. Yes

B. No

Is there a nighttime effect in trauma?

Articles shown so far, have found no difference

What is already known on the topic

- In a verified trauma center there should be no difference
- Staffed 24 hours a day
- On call roster and backup schedule
  - Surgeons
  - OR Team
- “Fire house staffing” → $

What about TBI?

When do most TBI's arrive?

A. Day
B. Night

Is there a nighttime TBI effect in trauma?

For TBI admissions requiring acute neurosurgery, does time of admission effect time to surgery?

A. Yes
B. No

JCN Journal of Clinical Nursing

2010 Journal of Clinical Nursing

CLINICAL ISSUES

Night admission to the emergency department: a factor delaying time to surgery in patients with head injury

Young-Ju Kim

Aim. To investigate fa th head injury.
Background. A better artment to surgery for patients
Design. A cross-sectio
Methods. The sample centres. Data were extracted fr yse data at the patient level wh ncluded patient characteristics
Results. Patients with ed with those with a Glasgow ring the nighttime (6pm–8am) n–6pm) (β = −0·15, 95% CI =
Conclusions. The mor rived to the emergency departm ergency department at night h ly head injured than those wh
Relevance to clinical e night shift, time from patient's arrival at emergency department to surgery should be consistently assessed to identify opportunities for improvement in the structure and process of trauma care.

NTDB Study

TBI Requiring Acute Neurosurgery Op

N=493

Results:

Night admissions (6P-8A)

despite having more severe TBI (↓GCS)

Had longer time to OR

Table 4 Distribution of four time categories by patient characteristics

Patient characteristics	Valid (*n*)	Time to surgery (%) Less than two hours	Two to four hours	Four to six hours	Greater than six hours
Gender					
Male	323	40·9	25·1	7·1	26·9
Female	114	36·0	31·6	7·0	25·4
Age					
< 18 year	45	33·3	22·2	8·9	35·6
18–64 year	256	43·0	25·8	5·5	25·8
≥65 year	52	25·0	34·6	11·5	28·8
Diagnosis					
Skull fracture	183	45·4	23·0	7·7	24·0
Multiple IH	62	38·7	22·6	3·2	35·5
SDH	101	33·7	31·7	7·9	26·7
Other single IH	77	36·4	32·5	6·5	24·7
Race or ethnic group					
White, non-hispanic origin	268	42·5	26·1	5·6	25·7
Black, non-hispanic origin	31	22·6	45·2	3·2	29·0
Hispanic	32	43·8	18·8	6·3	31·3
Other	16	25·0	25·0	6·3	43·8
Injury type					
Blunt injury	404	38·6	27·2	6·9	27·2
Penetrating injury	31	51·6	19·4	9·7	19·4
First GCS score in ED					
Severe (3–8)	194	57·2	18·6	5·2	19·1**
Moderate (9–12)	40	30·0	37·5	12·5	20·0
Mild (13–15)	156	22·4	34·0	8·3	35·3
Injury severity score					
< 16	24	12·5	29·2	4·2	54·2**
16–24	130	30·0	30·0	10·0	30·0
25–34	221	45·2	25·8	6·3	22·6
> 34	60	51·7	20·0	5·0	23·3
ED arrival time					
Daytime (8am–6pm)	203	36·5	32·0	8·9	8·4*
Nighttime (6pm–8am)	234	42·3	22·2	5·6	9·8

*$p < 0.05$; **$p < 0.01$.

IH, intracranial haemorrhage; SDH, subdural haemorrhage; GCS, glasgow coma scale; ED, emergency department.

ACS Audit Filter ≤4hr to NS

≈76% Severe <4 hrs

ANSWER

2. When do most TBI's arrive?

A. Day
B. Almost Evenly Split?
C. Night?

ANSWER

For TBI admissions requiring acute neurosurgery, does time of admission effect time to surgery?

A. Yes
B. No


Neurosurgeon Availability

Adv Surg. 2006;40:213-21. 2006

Do we need neurosurgical coverage in the trauma center?

Esposito TJ[1], Luchette FA, Gamelli RL.

Author information

1 Loyola University Medical Center, Department of Surgery, 2160 South First Avenue, Building 110, Maywood, IL 60153, USA. tesposi@lumc.edu

Abstract

The undersupply and maldistribution of neurosurgeons coupled with the apparent abandonment of trauma care by a significant number of rank and file neurosurgeons, and perhaps an over demand for their services, has created a crisis in access to neurotrauma care across the country. There is evidence to support that the immediate availability of a neurosurgeon to participate in the care of all trauma patients, including those who have documented head injury, may not be essential to providing optimal care, calling the American College of Surgeons' mandated criterion for trauma center verification into question. Given the volume, nature, and timeliness of head injury and its care, it seems this crisis can be resolved to a great extent by having trauma surgeons or other properly trained, credentialed, and monitored providers assume nonoperative, in-patient neurotrauma care when hospital admission is actually indicated. Although part of the solution lies in increased supply of neurotrauma services regardless of provider type, a second component rests in decreasing demand for these services in cases of mild and extremely severe head injury. Such a solution seems feasible and advantageous in several respects and should be seriously considered by healthcare policy makers, trauma system planners, and the leaders of the neurosurgical and trauma surgery disciplines. What is truly needed in hospitals treating trauma patients (ie, trauma centers) is a philosophy centered on patient services rather than the specific provider. What is needed is a provider who is committed, capable, and competent, who recognizes and meets the patients' needs and provides the appropriate services. These providers, regardless of pedigree, must be supported and valued by the healthcare system and society. In the future this may require regionalization of services. In some hospitals and systems the primary person responsible for providing these services will be a neurosurgeon. In others, it may not and perhaps need not be.

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

Availability of Trauma Specialists in Level I and II Trauma Centers: A National Survey

2007

Young-Ju Kim, RN, ACNP, PhD, Yan Xiao, PhD, Colin F. Mackenzie, MB, ChB, FRCA, FCCM, and Sharyn D. Gardner, PhD

Background: **Despite American College of Surgeons Committee on Trauma's criteria, little data exists about the variability of practices in both the composition of trauma teams and timing of s availability across trauma cent purpose of the study was to deter availability of trauma team pers Level I and II trauma centers a United States.**

Methods: **Two surveys we oped and mailed to trauma direc coordinators in 450 centers. R were received from 254 directo and 218 coordinators (48%). The survey was designed to collect trauma team composition and t in response to a hypothetical scenario. The coordinator survey was designed to collect data on trauma center character-**

Surgeons were significantly associated with higher likelihood of trauma surgeons physically present at the bedside

There was a large vari- bility of expertise at or uma admission. For cen- patient volume, early triage, ation systems based on ad- ommunication technology, ation for IH call may be a tter use the trauma surgical

rds: **Call system, Coordina- system, Trauma surgeon, alist.**

J Trauma. 2007;63:676–683.

Marked Variability of
On Call Trauma Specialists

The American College of Su (ACSCOT) established c availability 24 hours a da centers.[1] The specialties includ pedic surgery, emergency medi value of these clinical speci has been well established volvement has not been s variability of specialty availability and time of availability across trauma centers because of organizational characteristics such as designation, center level, admission volume, geographic location, residency program, or financial resources. Studies have compared trauma systems with in-house (IH) and on-call (OC) trauma attending surgeons in terms of time to operating room entry or mortality.[3,4] However, the time of

rly documented. For exam- s were required to be avail- spital.[2] In other studies, 20 usually designated times of

rent practices of specialist were all limited to a small SCOT's criteria, little data exist about the variability of practices in both the composition of trauma teams and timing of specialist availability across trauma centers. In this study, we surveyed Level I and II trauma centers across the United States to determine the availability of their trauma team personnel.

MATERIALS AND METHODS

Identification of Trauma Centers

A list of all US Level I and II trauma centers was

Submitted for publication January 11, 2006

sponding editorial in this issue, pp 597–598.

2012

J Neurosurg 117:599–603, 2012

Increased population density of neurosurgeons associated with decreased risk of death from motor vehicle accidents in the United States

Clinical article

Atman Desai, M.D.,[1] Kimon Bekelis, M.D.,[1] Wenyan Zhao, Ph.D.,[2] and Perry A. Ball, M.D.[1]

[1]Section of Neurosurgery, and [2]Department of Orthopaedics, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire

Object. Motor vehi… Given that a major cause of death … this area relative to other membe… would be related to reduced morta…

Methods. The Area… retrospectively analyzed. The pri… lion population for each county. T… pulation in the year 2006. Multiple … actitioners, urbanicity of the county…

Results. The media… lyzed, was 226 (interquartile range… as 0 (IQR 0–0), while the median … Using an unadjusted analysis, ea… ewer MVA deaths per million popu… rgeon per million population was … respective decrease in MVA death… 07). Rural location, persistent pov… the rate of MVA deaths.

Conclusions. A hig… in deaths from MVAs, a major ca… an important factor in the overal… promoting neurosurgical education and practice throughout the country.

(*http://thejns.org/doi/abs/10.3171/2012.6.JNS111281*)

Key Words • **motor vehicle crash** • **area resource file** • **trauma** • **neurosurgeon population density**

The more NS's you have
The lower the MVC mortality

Decreasing Regional Neurosurgical Workforce—A Blueprint for Disaster

2010

Brian G. Harbrecht, MD, Jason W. Smith, MD, Glen A. Franklin, MD, Frank B. Miller, MD, and J. David Richardson, MD

Background: Traumati
substantial source of mo
in the management of
injuries to minimize n
injuries. However, NS
increasingly scarce. A
affected by shortages
regional changes in NS
Methods: We queried a
hemorrhages (ICH) and
Classification of Diseas
tions were categorized
year. The state medical
state per year.
Results: The total numb
over the study period.
period. A greater propo
>30 ICH per year, and
decreased.
Conclusion: In this stat
concentrated in a small
to care for them has d
patients with traumatic
on a regional basis if
created.

Key Words: Head injury, Workforce, Trauma systems, Traumatic brain injury.

(*J Trauma.* 2010;68: 1367–1374)

Kentucky State Database
2004-2007
↑ Severe TBI Over Study Period
↓ Practicing NS
TBI ↑ concentrated at fewer centers
NS Manpower Crisis

levelop-
g with a
one re-
d emer-

d can be
d long-
ntly in-
perative,
fficulties
nts have
ems can
several
or NS in
rend on
en more
npatient
n neuro-
ral state

MATERIALS AND METHODS

Data were abstracted from the Kentucky Hospital Association database, which includes data collected from all healthcare facilities in the state and represents all inpatient discharges. The database records the primary admitting diag-

Will growth of MI Trauma Centers be curtailed by lack of surgical subspecialists (NS, Ortho)?

A. Yes, it has already started to cause problems in MI
B. Not yet, but may in the future
C. No


49% 11:15 AM
The Weather Channel
Vinings, GA
RADAR
NOW
VIDEOS
FORECAST
NEWS
80°
Sunny
88°/67°

Do trauma admissions increase when there is a full moon?

A. Yes
B. No

Do trauma admissions increase with warmer weather?

A. Yes
B. No

Injury, Int. J. Care Injured (2005) 36, 40—46

ELSEVIER

INJURY

www.elsevier.com/locate/injury

2005

A year's trauma admissions and the effect of the weather

Level I Trauma Center

England

One year Trauma Admissions

Matched to Weather

Results:

No association of weather to adult trauma admissions

However Day of Week Was Sig (↑ Mon/Tue)

Peds Trauma ↑ Good Weather

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

Correlating Weather and Trauma Admissions at a Level I Trauma Center

2006

William R. Rising, PhD, Joseph A. O'Daniel, BS, and Craig S. Roberts, MD

Background: Popular emergency room wisdom touts higher temperatures, snowfall, weekends, and evenings as variables that increase trauma admissions. This study analyzed the possible correlation between trauma admissions and specific weather variables, and between trauma admissions and time of day or season.

Methods: Trauma admission data from a Level I trauma center database from July 1, 1996 to January 31, 2002 was downloaded and linked with local weather data from the Archives of the National Oceanic and Atmospheric Administration website, and then analyzed.

Results: There were 8,269 trauma admissions over a total of 48,984 hours for an average of one admission every 6 hours. Daily high temperature and precipitation were valid predictors of trauma admission volume, with a 5.25% increase in hourly incidents for each 10-degree difference in temperature, and a 60% to 78% increase in the incident rate for each inch of precipitation in the previous 3 hours.

Conclusions: Weather and seasonal variations affect admissions at a Level I trauma center. Data from this study could be useful for determining staffing requirements and resource allocation.

Key Words: Weather, Trauma, Admission, Seasons.

J Trauma. 2006;60:1096–1100.

Popular emergency room wisdom touts higher tempera-

volume, explaining 84% of daily variance and 44% of week-

variables (high temperature and snow fall) forecasted clinic

the university hospital. When one person sustained multiple

Level I Trauma Center Registry Louisville, Kentucky

Trauma Admissions Matched to Weather

7 Years (1996 to 2002)

n=48,984

Results: ↑ Temperature & ↑ Precipitation = ↑ Trauma

ORIGINAL ARTICLE

2009

Relation of the Weather and the Lunar Cycle With the Incidence of Trauma in the Groningen Region Over a 36-Year Period

Wouter Stomp, MD, Vaclav Fidler, PhD, Henk-Jan ten Duis, MD, PhD, and Maarten W. N. Nijsten, MD, PhD

Single Level I Trauma Center
Netherlands
1970-2005 (36 years)
Tracked Against Weather & Moon
Results:
Better Weather (10%) ↑ Injury Incidence
Full Moon (2.1%) ↓ Injury Incidence

Age and Ageing 2015; **44:** 403–408
doi: 10.1093/ageing/afu199
Published electronically 19 December 2014

Weather warnings predict fall-related injuries among older adults

2015

LUKE MONDOR, KATIA CHARLAND, AMAN VERMA, DAVID L. BUCKERIDGE

Department of

Address corres
Tel: (+1) 5149

Montreal Trauma Center
Age >65 and Fall Related to Weather
1998 to 2006
Freezing Rain ↑ Falls

Abstract

Background: for non-injury health o assessed previously.
Objective: to r weather warnings.
Methods: usi we iden-tified all fall-re ompared rates of injuri . We also compared the atified by age and sex.
Results: freez 1.20, 95% confidence interval [CI]: 1.08–1.32), particularly among males (IRR = 1.31, 95% CI: 1.10–1.56), and lower rates of injuries

2015

World J Surg (2015) 39:934–939
DOI 10.1007/s00268-014-2881-8

World Journal of Surgery

ORIGINAL SCIENTIFIC REPORT

How's the Weather? Relationship Between Weather and Trauma Admissions at a Level I Trauma Center

Vanessa P. Ho · Christopher W. Towe · Jeffrey Chan · Philip S. Barie

Published

Level I Trauma Center
Queens, New York
2000-2009, n=9,490

Results: ↑ Temp strongly associated with Pen Trauma
Precipitation, Overcast Sky, Snow = ↓ Trauma

Open Access Research

BMJ Open

Impact of high ambient temperature on unintentional injuries in high-income countries: a narrative systematic literature review

2016

Evelina Otto im Kampe, Sari Kovats, Shakoor Hajat

To cite: Ott
Kovats S, H
high ambie
unintention
income cou
systematic
BMJ Open
doi:10.113
010399

► Prepubli
this paper
To view the
visit the jou
(http://dx.d
bmjopen-2

Received 2
Revised 24
Accepted 5

Systematic Review

Articles on Unintentional Injury and Temp

13 Studies

11/13 Showed ↑ Injury Incidence ↑ Temp

Mod Temp: Injuries ↑ (0.4-5.3%)

for each 1 degree C rise

Extreme Temp Days: Injuries ↓

CrossMark

than has previously been reported. Our review confirms that hot weather can increase the risk of known occupational health risk.[6] Human

ANSWER

Do trauma admissions increase with full moon?

A. Yes

B. No

Do trauma admission increase with warmer weather?

A. Yes

B. No


0
20
40
60
80
100
120
140
160
180

Is there an obesity effect in trauma?

Do obese trauma patients have worse outcomes?

A. Yes
B. No

What is known

- Obesity is increasing
- Obesity strongly linked to multiple chronic diseases
- Obesity leads to metabolic and immune dysfunction
- Critical Care: no increase in mortality
- Non cardiac surgery: increased complications but not mortality
- Cardiac surgery: increased complications and mortality
- What about injury?

J Trauma. 2005 Nov;59(5):1048-51; discussion 1051.

The impact of obesity on the outcomes of 1,153 critically injured blunt trauma patients.

Brown CV[1], Neville AL, Rhee P, Salim A, Velmahos GC, Demetriades D.

Author information

2005

Abstract

BACKGROUND: Several small series have had mixed conclusions regarding the impact of obesity on outcomes of trauma patients. The purpose of the present study was to evaluate a large cohort of critically injured patients to better understand the influence of obesity on the outcomes of

METHODS: ...itted to the ICU at our u... were compared w...

RESULTS: T... BMI = 35 +/- 6 kg/m) a... e, sex, Injury Sever... versus 38%; p = 0.0... cotomy, or craniotomy. ...r mortality in obese pat... y (odds ratio, 1.6; 95... 21 versus 19 +/- 17 da... versus 6 +/- 9 days; p...

CONCLUSIO... ing fewer head injuries... nd obesity is independently associated with mortality.

Single Level I Trauma Center
5 year period
Admit to ICU Blunt Trauma
n=1,153
25% Obese (BMI>30)
Results: Higher complications
Longer Vent Days & LOS
Higher Mortality

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

Obesity and Outcomes After Blunt Trauma

2006

Therèse M. Duane, MD, Tracey Dechert, MD, Michel B. Aboutanos, MD, MPH, Ajai K. Malhotra, MD, and Rao R. Ivatury, MD

Background: Obesity has proven to be an independent risk factor of mortality in the intensive care unit (ICU) in both nontrauma and trau… patients. The pur… pose of this study… whether the detrim… extend to morbidity… the intensive and no… trauma patients.

Methods: A r… son of obese (body m… kg/m^2) to nonobese (… trauma patients wa… January 2004 and D… demographics, morb… ventilator, ICU, and …

were analyzed. Continuous variables were evaluated using the Wilcoxon Rank test and the nominal variables were evaluated using the Fisher's exact test.

with a p value of 0.055. Overall the mortality rates were not different between the groups (3.5% obese versus 7.1% nonobese, p = 0.26).

Single Level I Trauma Center

2004-2005

n=542

BMI > 30

Results: ↑ ICU LOS

No increase in mortality

Obesity is a na… heath care. Th… index (BMI)… continues to rise. … Disease Control an… prevalence rates of … to 24%, and four states with rates of more than 25%. This increase is a sharp rise from 1991 when four states had obesity prevalence rates of 15% to 19% and none had rates at

… this to … trauma … et al.[4] … in mor… …y, however, evaluated only patients directly admitted to the ICU. The purpose of this study was to determine whether the detrimental effect of obesity extend to morbidity as well as

Body Mass Index and Outcomes in Critically Injured Blunt Trauma Patients: Weighing the Impact

2006

Mark A Newell, MD, FACS, Michael R Bard, MD, FACS, Claudia E Goettler, MD, FACS, Eric A Toschlog, MD, FACS, Paul J Schenarts, MD, FACS, Scott G Sagraves, MD, FACS, Don Holbert, PhD, Walter J Pories, MD, FACS, Michael F Rotondo, MD, FACS

BACKGROUND: The influence of increased body mass index (BMI) on morbidity and mortality in critically

Level I Trauma Center

5 year registry review (2001-2005)

ISS>16 & Blunt Injury

n=1,543

Risk Adjustment (ISS & RTS)

Results: ↑ LOS

↑ Complications

No increase in mortality

Impact of Obesity in the Critically Ill Trauma Patient: A Prospective Study

2006

Grant V Bochicchio, MD, FACS, MPH, Manjari Joshi, MD, Kelly Bochicchio, RN, BSN, Shelly Nehman, MS, RD, CNSD, J Kathleen Tracy, PhD, Thomas M Scalea, MD, FACS

BACKGROUND: Obesity has risen at an epidemic rate over the past 20 years in the US. To our knowledge, there is an absence of data evaluating the impact of obesity in the critically ill trauma patient.

METHODS: Prospective data were collected on 1,167 patients admitted to the ICU over a 2-year period. Obesity was defined as a body mass index (calculated as weight [kg]/height [m^2]) of 30 or

Single Level I Trauma Center

Prospective Study

n=1,167 Admitted to ICU-2 year period

BMI >30 = 5.3%

Risk Adjusted (Age & ISS)

Twofold ↑ risk for complications & ICU Admit

Seven times more likely to die

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

Morbid Obesity is Not a Risk Factor for Mortality in Critically Ill Trauma Patients

Jose J. Diaz, Jr., MD, Patrick R. Norris, PhD, Bryan R. Collier, DO, Marschall B. Berkes, BS, Asli Ozdas, PhD, Addison K. May, MD, Richard S. Miller, MD, and John A. Morris, Jr., MD

2009

Background: **Age, Injury severity score (ISS), hyperglycemia (HGL) at admission, and morbid obesity are known risk factors of poor outcome in trauma**

mortality. Differences in mortality and demographic variables between groups were compared using Fisher's exact and Wilcox-

nonobese, but not significantly (7.8 vs. 4.6%; not significant [NS] $p = 0.222$). Univariate logistic regression relationships of

Single Level I Trauma Center

Registry Review 2000-2004

n=1,334

Results: Morb Obese (BMI>40) Vs Non-Obese

No Increase in Mortality Found

way control. The obese patient tends to be older, suffer chest trauma, pelvic injuries, and extremity injuries.[4] Morbid obesity and the accompanying metabolic syndrome are considered to be an immune compromised state.[5]

Trauma patient with HGL greater than 150 mg/dL at admission are known to have a higher morbidity and mortality rate.[13,14] The data on obese trauma patients are not clear. We chose to study the MO trauma patient after the introduction of the era of intense glucose (GLU) control. We hypothesize

2012

Injury, Int. J. Care Injured 43 (2012) 184–188

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

The impact of BMI on polytrauma outcome

Michael Hoffmann [a,*], Rolf Lefering [b], Michaela Gruber-Rathmann [a], Johannes Maria Rueger [a], Wolfgang Lehmann [a]

German Trauma Registry

45 Trauma Centers

Recording Ht & Wt since 2005 (BMI)

n=5,766

Results: ↑ Mech Vent & LOS

↑ MOF & Sepsis

↑Mortality

square of the height in metres (kg/m^2). Despite some contradictory results,[3] population studies have demonstrated U-shaped curves

concerning the outcome of underweight polytraumatized patients is limited. Studies focusing on the relationship between body-

ORIGINAL ARTICLE

Impact of Obesity on Mortality and Complications in Trauma Patients

2014

Laurent G. Glance, MD,¶ Yue Li, PhD,† Turner M. Osler, MD,‡ Dana B. Mukamel, PhD,§ and Andrew W. Dick, PhD¶*

Pennsylvania Trauma Registry

28 Level I & II Centers

2000-2009 Retrospective Registry Study

n=147,680

Ht not collected, unable to use BMI

Pts classified using predefined weight categories

Sophisticated Risk Adjustment Modeling

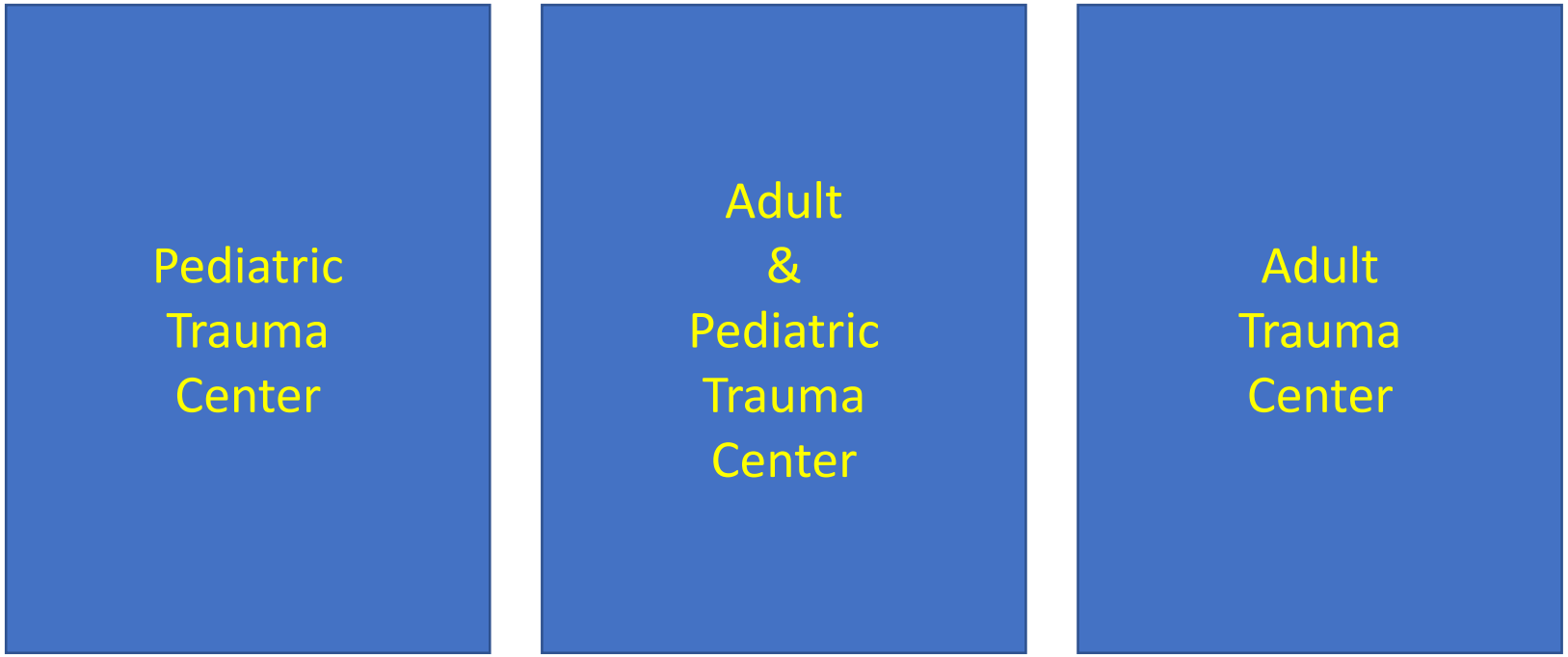
Higher grade obesity:

30% more likely to die

Twice as likely to have major complication

Limitations

- Across studies
- 15% to 80% of patient height and weight data missing


Pediatric
Trauma
Center
Adult
&
Pediatric
Trauma
Center
Adult
Trauma
Center

Is there a difference in adolescent [age 15-19] trauma outcomes among different types of centers: [Pediatric, Adult with Peds, Adult]?

A. Yes
B. No

2016

Research

JAMA Pediatrics | Original Investigation

Association Between Trauma Center Type and Mortality Among Injured Adolescent Patients

Rachel B. Webman, MD; Elizabeth A. Carter, PhD, MPH; Sushil Mittal, PhD; Jichaun Wang, PhD; Chethan Sathya, MD; Avery B. Nathens, MD, PhD; Michael L. Nance, MD; David Madigan, PhD; Randall S. Burd, MD, PhD

IMPORTANCE Although data obtained from regional trauma systems demonstrate improved outcomes for children treated at pediatric trauma centers (PTCs) compared with those treated at adult trauma centers (ATCs), differences in mortality have not been consistently observed for adolescents. Because trauma is the leading cause of death and acquired disability among adolescents, it is important to better define differences in outcomes among injured adolescents by using national data.

OBJECTIVES To use a national data set to compare mortality of injured adolescents treated at ATCs, PTCs, or mixed trauma centers (MTCs) that treat both pediatric and adult trauma patients and to determine the final discharge disposition of survivors at different center types.

DESIGN, SETTING, AND PARTICIPANTS Data from level I and II trauma centers participating in the 2010 National Trauma Data Bank (January 1 to December 31, 2010) were used to create multilevel models accounting for center-specific effects to evaluate the association of center characteristics (PTC, ATC, or MTC) on mortality among patients aged 15 to 19 years who were treated for a blunt or penetrating injury. The models controlled for sex; mechanism of injury (blunt vs penetrating); injuries sustained, based on the Abbreviated Injury Scale scores (post-dot values <3 or ≥3 by body region); initial systolic blood pressure; and Glasgow Coma Scale scores. Missing data were managed using multiple imputation, accounting for multilevel data structure. Data analysis was conducted from January 15, 2013, to March 15, 2016.

EXPOSURES Type of trauma center.

MAIN OUTCOMES AND MEASURES Mortality at each center type.

RESULTS Among 29 613 injured adolescents (mean [SD] age, 17.3 [1.4] years; 72.7% male), most were treated at ATCs (20 402 [68.9%]), with the remainder at MTCs (7572 [25.6%]) or PTCs (1639 [5.5%]). Adolescents treated at PTCs were more likely to be injured by a blunt than penetrating injury mechanism (91.4%) compared with those treated at ATCs (80.4%) or MTCs (84.6%). Mortality was higher among adolescents treated at ATCs and MTCs than those treated at PTCs (3.2% and 3.5% vs 0.4%; $P < .001$). The adjusted odds of mortality were higher at ATCs (odds ratio, 4.19; 95% CI, 1.30-13.51) and MTCs (odds ratio, 6.68; 95% CI, 2.03-21.99) compared with PTCs but was not different between level I and II centers (odds ratio, 0.76; 95% CI, 0.59-0.99).

CONCLUSION AND RELEVANCE Mortality among injured adolescents was lower among those treated at PTCs, compared with those treated at ATCs and MTCs. Defining resource and patient features that account for these observed differences is needed to optimize adolescent outcomes after injury.

JAMA Pediatr. 2016;170(8):780-786. doi:10.1001/jamapediatrics.2016.0805
Published online June 27, 2016.

NTDB
1 year (2010)
N=29,613

Mortality lowest among Pediatric trauma centers Compared to Adult or Mixed Centers

Original Investigation

Mortality Among Injured Children Treated at Different Trauma Center Types

Chethan Sathya, MD; Aziz S. Alali, MD, PhD; Paul W. Wales, MD; Damon C. Scales, MD, PhD; Paul J. Karanicolas, MD, PhD; Randall S. Burd, MD, PhD; Michael L. Nance, MD; Wei Xiong, MSc; Avery B. Nathens, MD, PhD, MPH

2017

IMPORTANCE Trauma is the leading cause of death among US children. Whether pediatric trauma centers (PTCs), mixed trauma centers (MTCs), or adult trauma centers (ATCs) offer a survival benefit compared with one another when treating injured children is controversial. Ascertaining the optimal care environment will better inform quality improvement initiatives and accreditation standards.

OBJECTIVE To evaluate the association between type of trauma center (PTC, MTC, or ATC) and in-hospital mortality among young children (5 years and younger), older children (aged 6-11 years), and adolescents (aged 12-18 years).

DESIGN, SETTING, AND PARTICIPANTS In this retrospective cohort study, injured children aged 18 years or younger who were hospitalized in the United States from January 1, 2010, to December 31, 2013, were observed for the duration of their admission until discharge or death. We included patients with an Abbreviated Injury Score of 2 or greater in at least 1 body region. Random-intercept multilevel regression was used to evaluate the association between center type and in-hospital mortality after adjusting for confounders. Stratified analyses in young children, older children, and adolescents were performed. We conducted secondary analyses limited to patients with severe injuries (Injury Severity Score ≥25). Both analyses were performed between January 1 and August 31, 2014. Data were derived from 252 US level I and II trauma centers voluntarily participating in the American College of Surgeons adult or pediatric Trauma Quality Improvement Program.

MAIN OUTCOME AND MEASURE In-hospital mortality.

RESULTS We identified 175 585 injured children. Crude mortality rates were 2.3% for children treated at ATCs, 1.8% for children treated at MTCs, and 0.6% for children treated at PTCs. After adjustment, children had higher odds of dying when treated at ATCs (odds ratio [OR], 1.57; 95% CI, 1.15-2.14) and MTCs (OR, 1.45; 95% CI, 1.05-2.01) compared with those treated at PTCs. In stratified analyses, young children had higher odds of death when treated at ATCs vs PTCs (OR, 1.78; 95% CI, 1.05-3.40), but there was no association between center type and mortality among older children (OR, 1.17; 95% CI, 0.65-2.11) and adolescents (OR, 1.23; 95% CI, 0.82-1.85). Results were similar in analyses of severely injured children: those treated at ATCs (OR, 1.75; 95% CI, 1.25-2.44) and MTCs (OR, 1.62; 95% CI, 1.15-2.29) had higher odds of death when compared with those treated at PTCs.

CONCLUSIONS AND RELEVANCE Injured children treated at ATCs and MTCs had higher in-hospital mortality compared with those treated at PTCs. This association was most evident in younger children and remained significant in severely injured children. Quality improvement initiatives geared toward ATCs and MTCs are required to provide optimal care to injured children.

TQIP
3 years
2010-2012

Higher mortality seen at Adult and Mixed Centers compared to Ped Centers

ANSWER

Is there a difference in adolescent [age 15-19] trauma outcomes among different types of centers: [Pediatric, Adult with Peds, Adult]?

A. Yes
B. No


z z z z

Adjourn

3:00

Thank you