

Identifying Patient Characteristics Associated with Delays in Orthopaedic Process Measures

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OUTCOMES & POLICY**



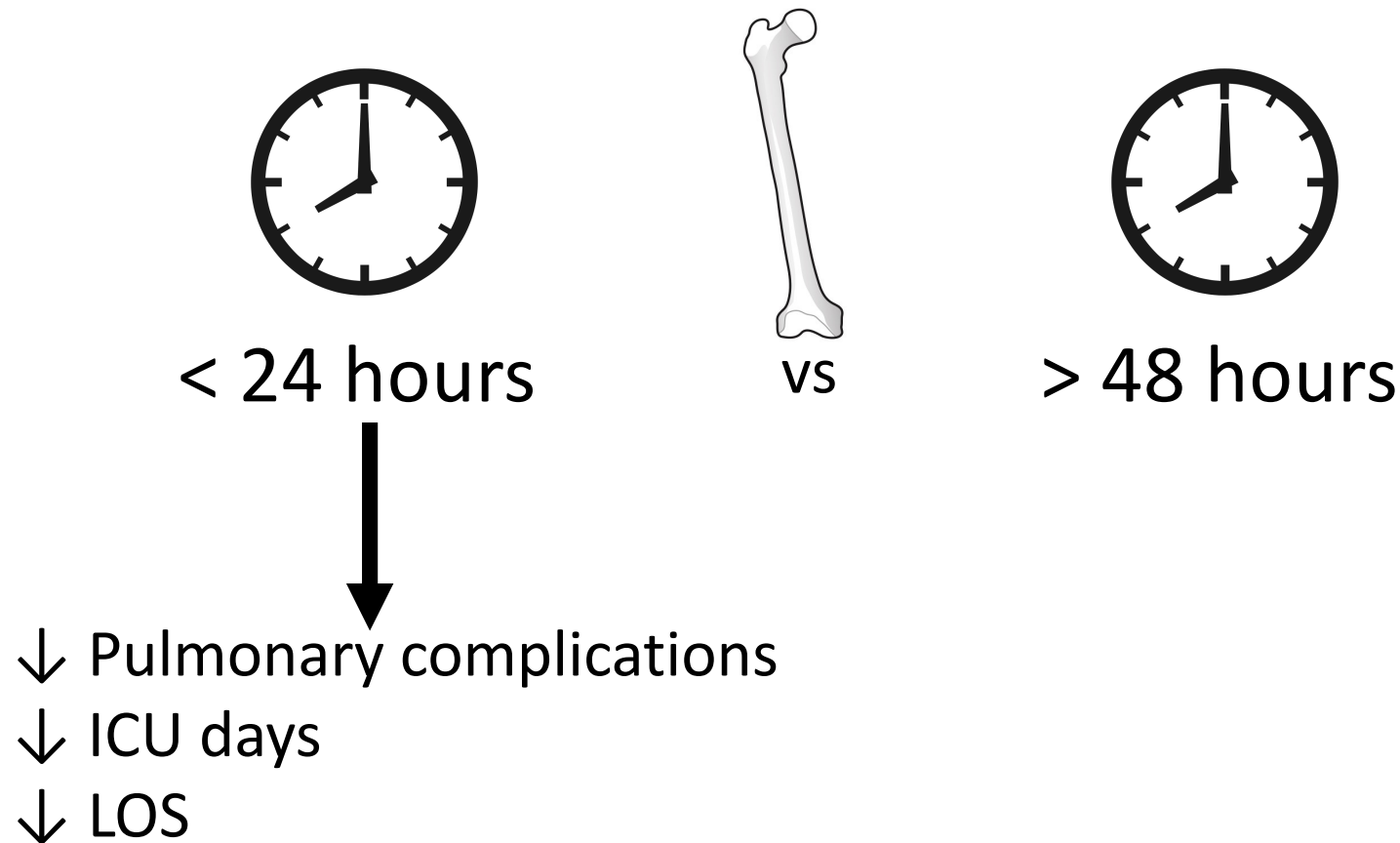
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Disclosures

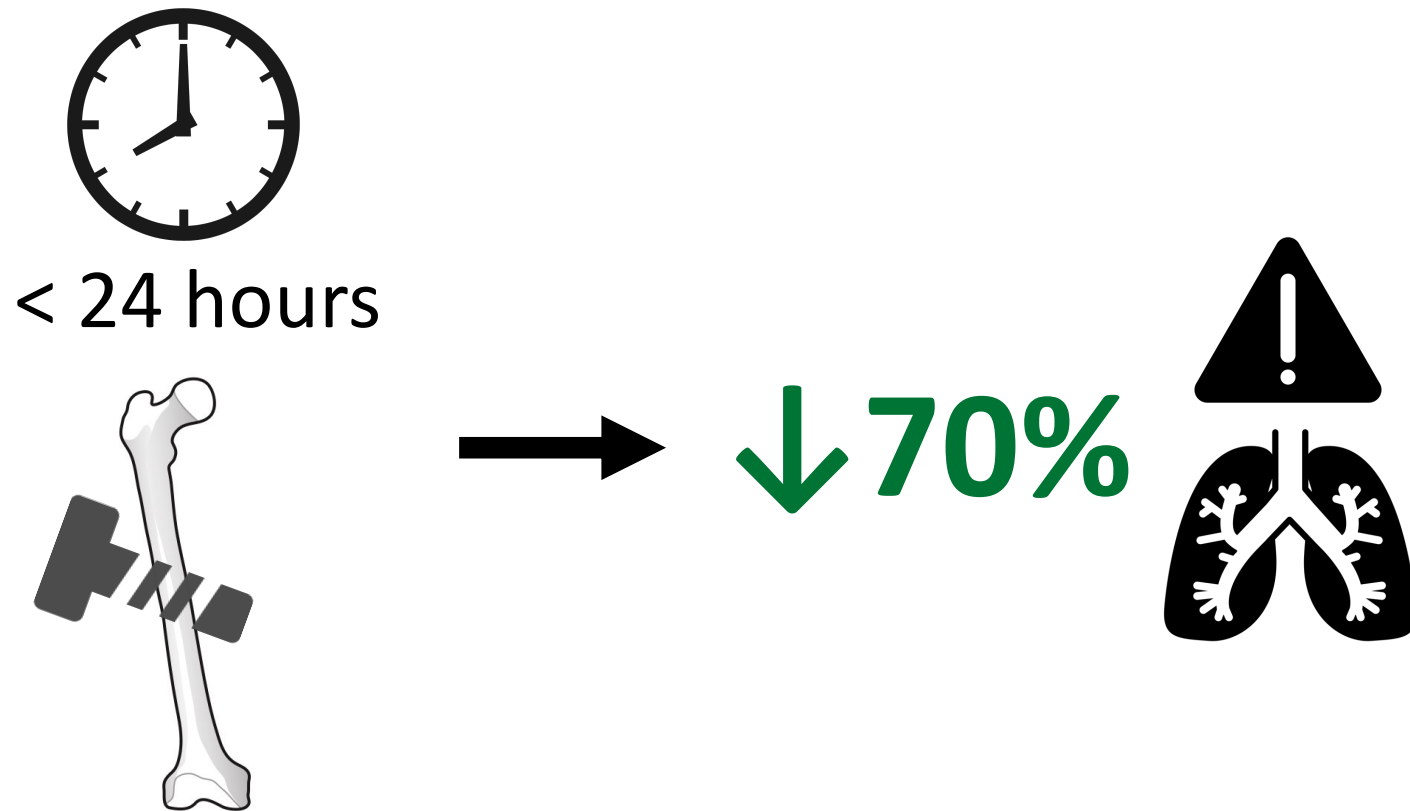
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Timely Fixation of Ortho Injuries is Good!



Bone et al 1989

Timely Fixation of Ortho Injuries is Good!



C.M. Robinson 2001

Timely Fixation of Ortho Injuries is Good!



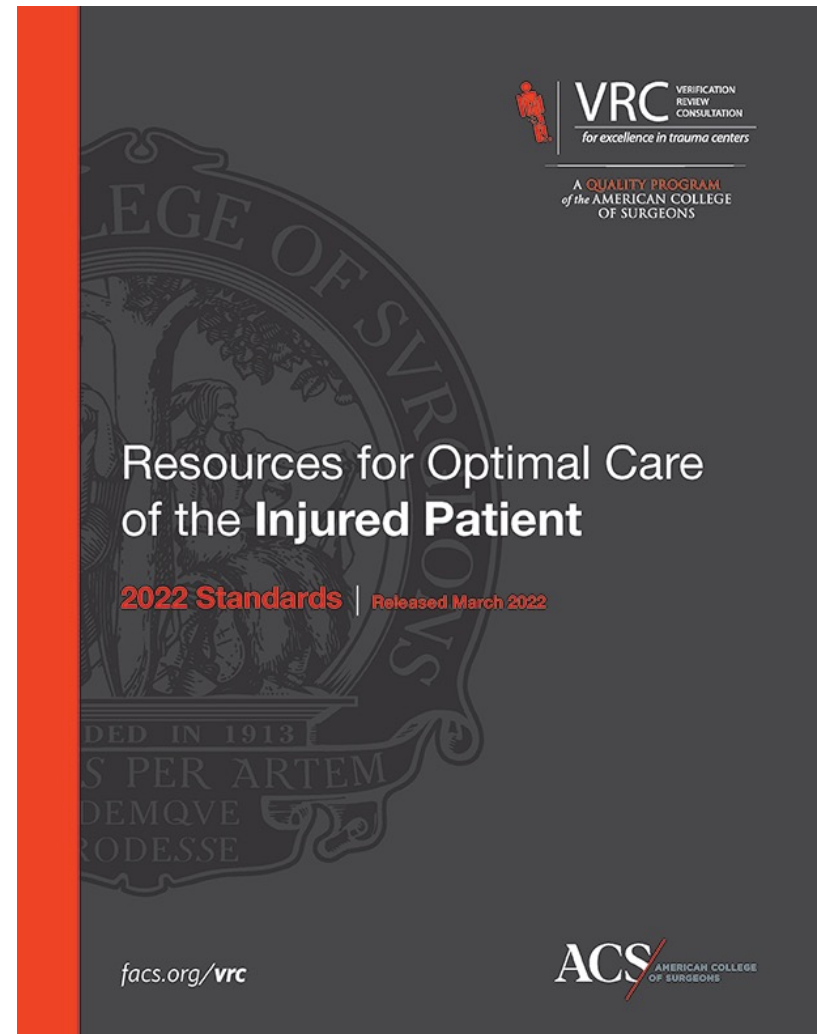
Orthopaedic Process Measures

1. Fixation of mid-shaft femur fracture < 24 hours
2. Fixation of open tibia shaft fracture < 24 hours
3. I & D of open tibia shaft fracture < 24 hours
4. Flap coverage of open tibia shaft fracture within 7 days
5. Number of fasciotomies performed in tibia shaft fractures
6. Operative fixation in elderly hip fractures < 48 hours
7. Antibiotics administered in open femur or tibia fractures < 60 minutes



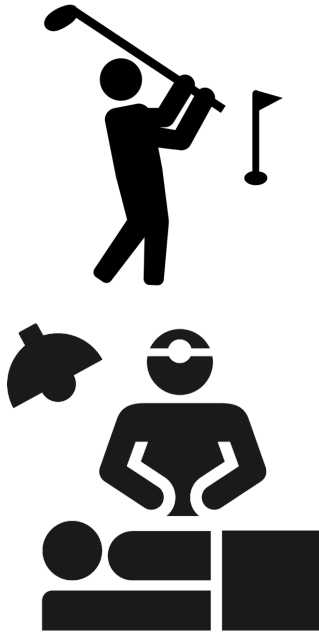
“Less than 80% of femurs were fixed within 24 hours. Recommend examining barriers to timely surgery.”

Reviewers rarely comment on patient factors as a reason for delay...



Reasons for Delay

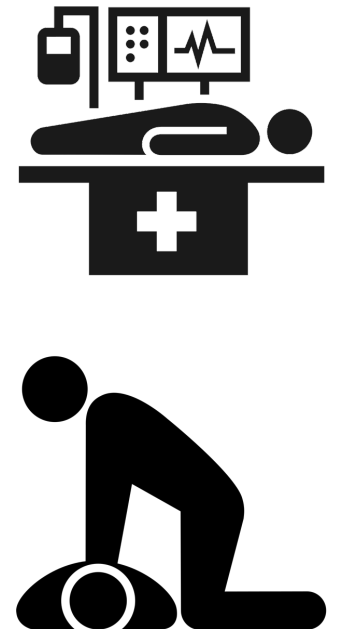
Surgeon Factors



Hospital Factors



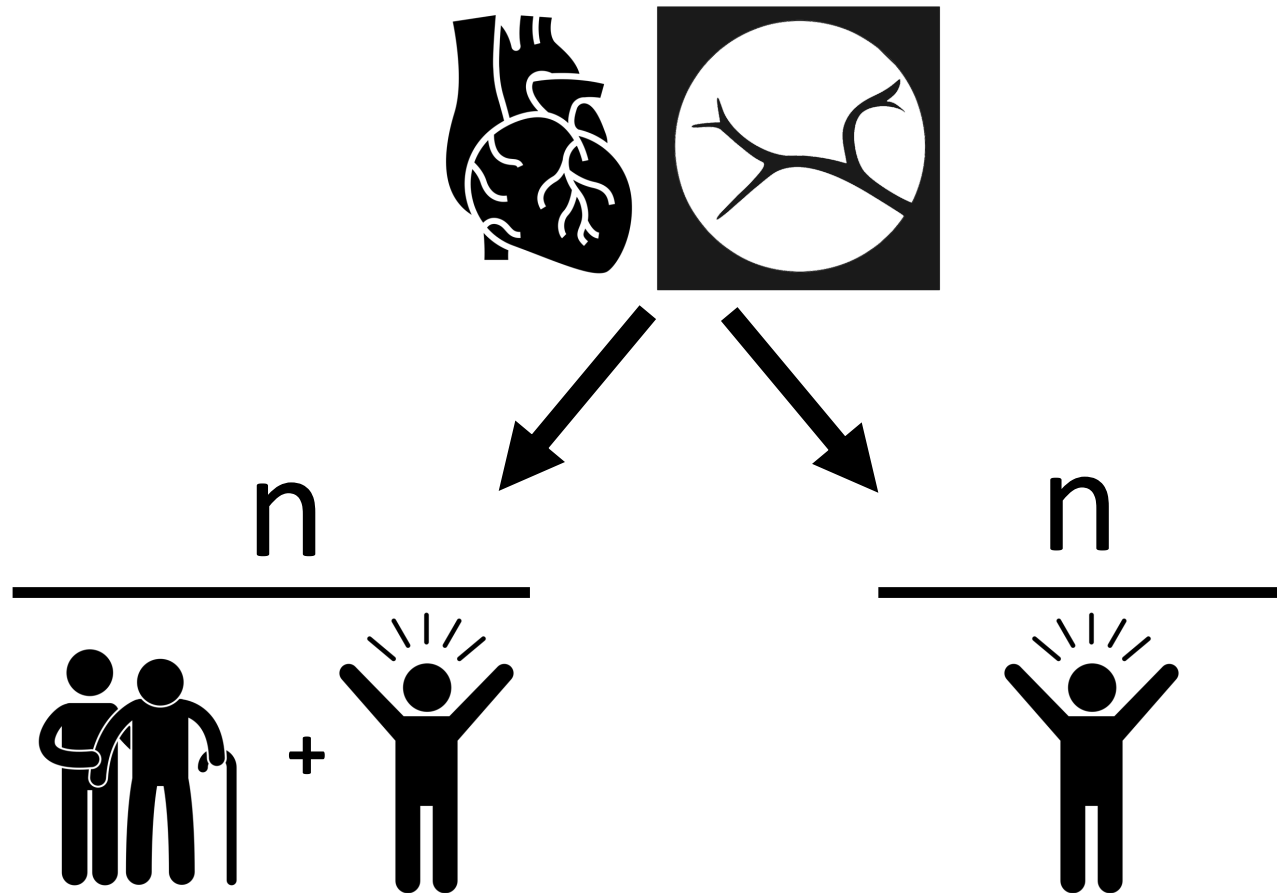
Patient Factors



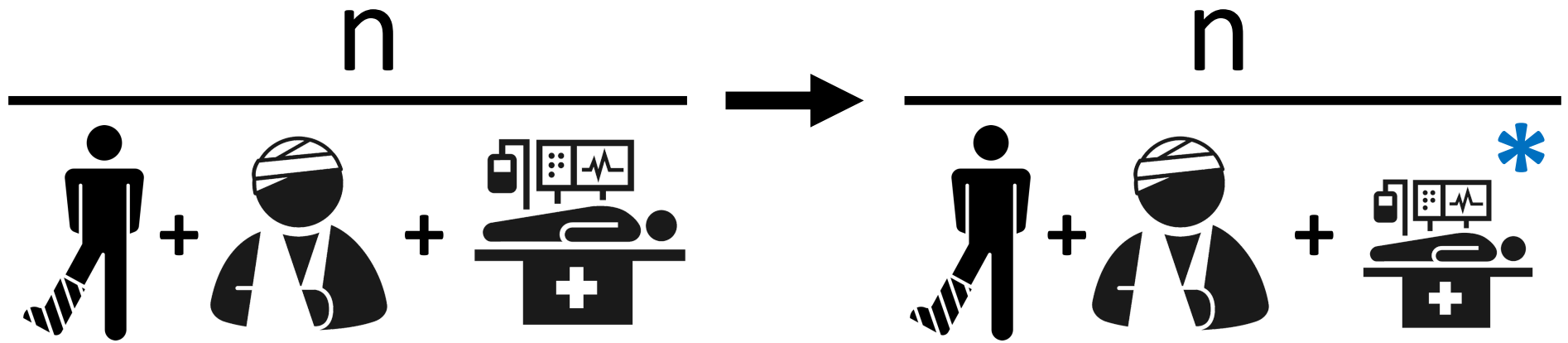
Standing in the corner...



What is the Real Denominator?



Can We Risk Adjust Process Measures?



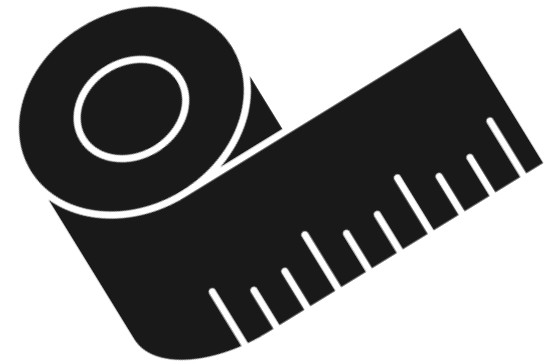
Are there certain factors that predict a delay?

3 Orthopaedic Injuries + Associated Surgery

1. Closed Femoral Shaft Fracture → Fixation within 24 hours
2. Open Tibia Shaft Fracture → Fixation within 24 hours
3. Open Tibia Shaft Fracture → I & D within 24 hours

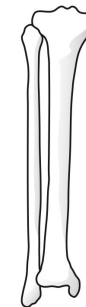
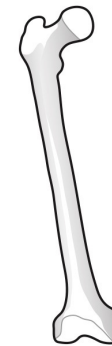
Methods – Measures

- Delay = time to associated procedure > 24 hours from ED arrival
 - e.g. Femur Fixation of Femoral Shaft Fracture
- Delay in “Healthy Patients” – proxy for structural issue
- Outcomes
 - Complications
 - Length of stay
- Univariate analysis to describe groups
- Multivariable logistic regression to evaluate factors associated with a delay



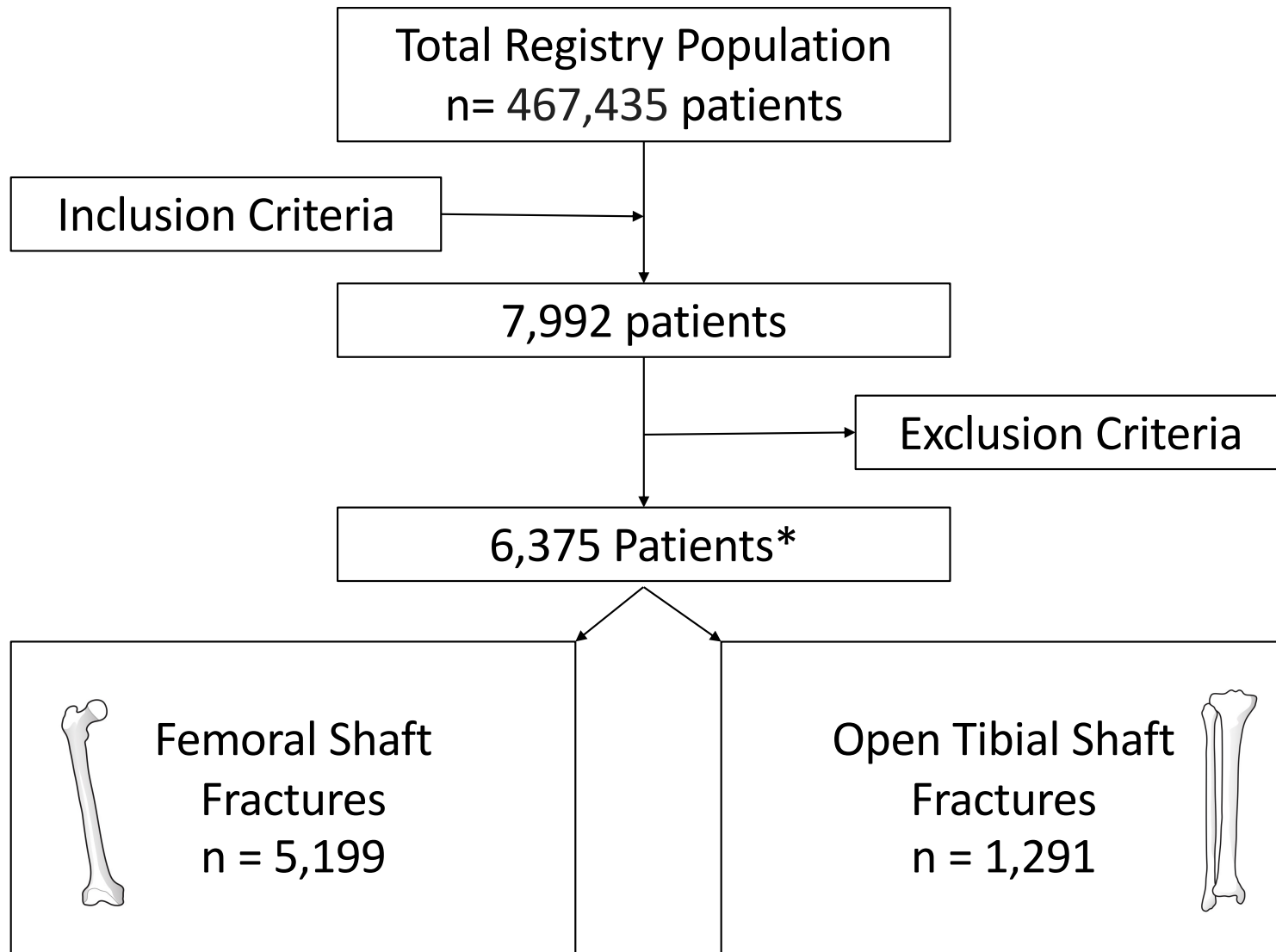
Methods – Inclusion Criteria

- Used Fall 2022 ACS TQIP Reporting Code Set
- Injuries defined using AIS05
 - Femoral Shaft Fracture
 - Open Tibial Shaft Fracture
- Procedures defined using ICD-10-PCS
- Age ≥ 18 years
- January 1, 2017 through October 30, 2022
- Injury Severity Score ≥ 5
- Blunt or penetrating mechanism
- Level 1 or Level 2 Trauma Center



Methods – Exclusion Criteria

- Transfers in
- Hospital length of stay < 12 hours
- Missing procedure date/time
- Dead on arrival
- Death in Emergency Department
- Death during admission



Results



n = 5,199



87.5%
(n=4,550)



31.8%



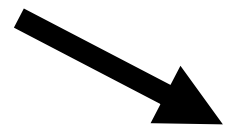
n = 1,291



92.2%
(n=1,190)



11.2%



50.5%
(n=652)

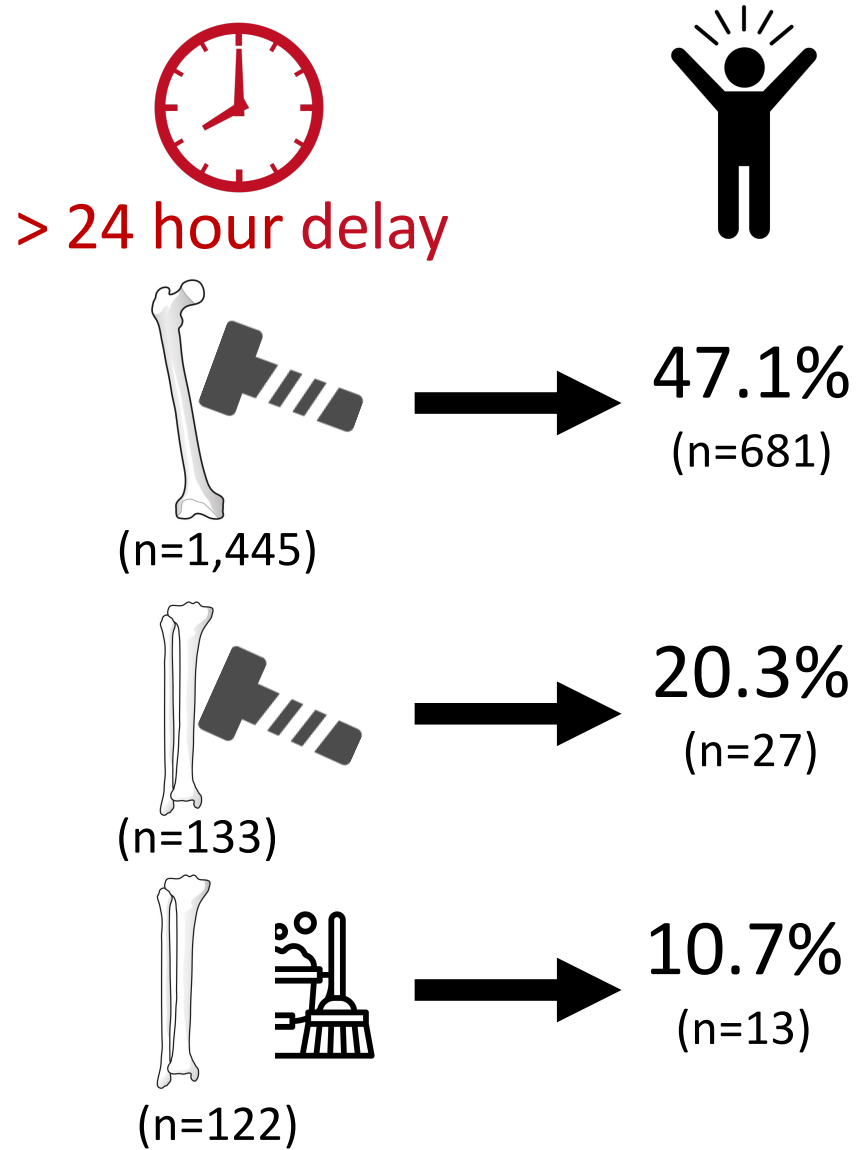


18.7%



> 24 hour delay

Results



Femur Group



> 24 hour delay



No Delay



Age

66.9 (22.4)

51.4 (24.7)

p<0.001



Female

58.5%

46.5%

p<0.001



Insured

96.8%

93.6%

p<0.001

Tibia Fix Group



> 24 hour delay



No Delay



AIS Head & Neck

16.5%

7.0%

$p < 0.001$

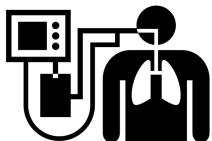


AIS Face

1.5%

0.2%

$p = 0.014$



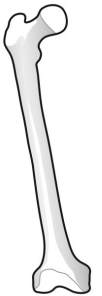
Intubated

15.8%

7.8%

$p = 0.002$

Factors Associated with Femur Fixation Delay



46-65y OR 2.32

65-75y OR 3.14

>75y OR 3.37

*p<0.001

ISS > 35

OR 2.64

*p=0.012

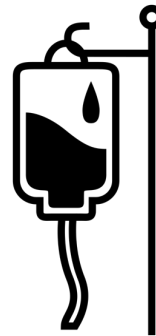
Intubated	OR 2.59	p=0.000
Hypertension requiring medication	OR 1.32	p=0.003
Anti-coagulant Use	OR 1.70	p<0.001
Functionally dependent health status	OR 1.59	p<0.001
Disseminated cancer	OR 2.13	p=0.011
Blood transfusion	OR 0.54	p<0.001
Chronic renal failure	OR 2.43	p=0.029

Factors Associated with Tibia Fixation Delay



65-75 yo OR 2.62

*p=0.031



OR 1.59

*p=0.012

Other Race	OR 2.04	p=0.016
Uninsured	OR 0.65	p=0.025

Complications



> 24 hour delay



No Delay

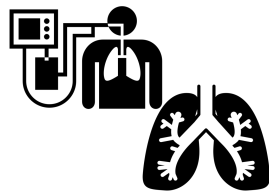


Pneumonia

3.5%

1.5%

$p < 0.001$



VAP

2.1%

0.9%

$p < 0.001$



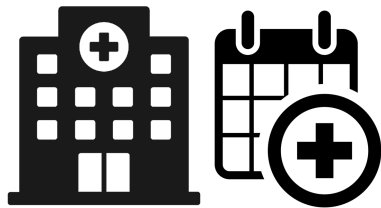
ICU Return

4.2%

2.1%

$p < 0.001$

LOS (days)



> 24 hour delay

8.4 (7.5)



No Delay

6.7 (6.7)



$p < 0.001$

Limitations

- Retrospective study – limited to registry data
- Some patients did not have an associated surgery
- Excluded those who died
- Antibiotics is likely more important than I&D in open fractures

Conclusions

- There are some patient characteristics associated with a delay to femur fixation
- A substantial amount of “healthy” patients had a surgical delay
- Can we consider “risk adjusting” process measures through better understanding the denominator

Thank you



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