

A Comprehensive Multidisciplinary Rib Fracture Algorithm Associated with Improved In-hospital Outcomes

Stephen Thorp MD, Jessica L Thompson MD, Kathy Crystal MSN RN, Amanda Y Yang MD, Charles J Gibson MD,
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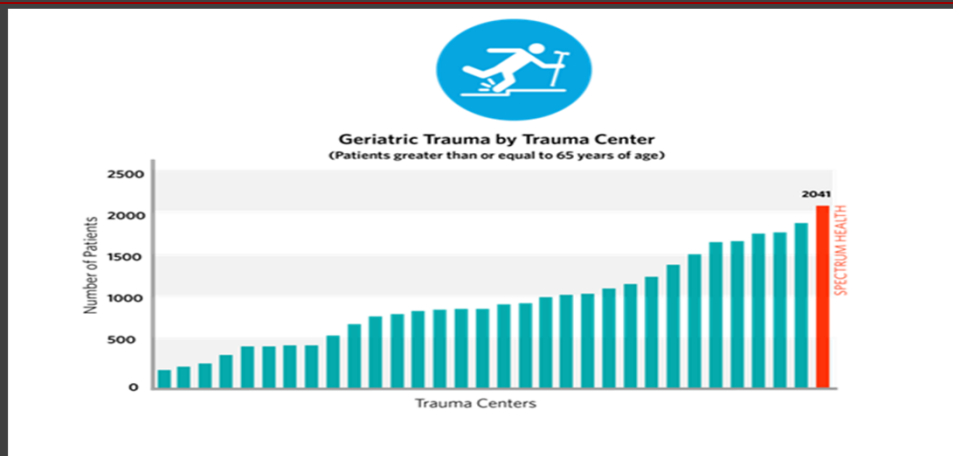
Benjamin Johnson MD | Spectrum Health
Las Vegas, Nevada | May 1, 2019

Project Purpose

Spectrum Health Butterworth Hospital is a Level I Trauma
Center in West Michigan

- Highest geriatric volume in Michigan
- Large number of elderly rib fracture patients
- Identified gap in triage and care

Project Purpose



Data Utilized to Drive Change

MTQIP data = high number unplanned ICU admissions

- Outlier for mortality
- Identified gap in triage
- Need for protocol

Process: Background

Prior to 2018

- Care based on surgeon preference
- No standardized care plan

Process: Background

Multidisciplinary and comprehensive rib fracture algorithm

- Single Institution
- Two cohorts of trauma patients
 - Pre-implementation: ICU admission May – September 2017
 - Post-implementation: ICU admission May – September 2018

Screening Tool

Patients stratified into High, Moderate, and Low Risk

- High Risk → ICU Admission
- Moderate Risk → Admission to Trauma Floor
- Low Risk → Patient observed overnight or discharged

Screening Tool

Patients stratified into High, Moderate, and Low Risk

- High Risk
 - Forced Vital Capacity <55%
 - Incentive Spirometry <1000mL or 15mL/kg
 - ≥65 years with ≥3 rib fractures
 - Positive FRAIL Screen
 - FLAIL Segment
 - Oxygen requirement ≥4 liters nasal cannula
 - Lung Parenchyma injury or O2 Dependent Chronic Lung Disease

Screening Tool

Patients stratified into High, Moderate, and Low Risk

■ Moderate Risk

- Forced Vital Capacity >55%
- Incentive Spirometry 1000-1500 mL or >15mL/kg
- <65 years of age with ≥ 3 rib fractures
- Injuries preventing mobility

Screening Tool

Patients stratified into High, Moderate, and Low Risk

■ Low Risk

- Incentive Spirometry >1500mL
- ≤ 2 rib fractures
- No New O2 requirements

Screening Tool

- **FRAIL Screen**
 - Fatigue – Are you fatigued?
 - Resistance – Cannot walk up one flight of stairs
 - Aerobic – Cannot walk one block
 - Illnesses - >5 Illnesses
 - Loss of Weight - >5% weight loss last six months
- **Scoring: 3 or more = Frail**

Process: Subjects

	Pre-Protocol	Post-Protocol	p-value
Total Patients	242	271	
≥3 Rib Fractures	169	201	
ICU Admission	58 (34.3%)	119 (59.2%)	
Average Age	60.7	67.1	0.050
Mean ISS	27.5	21.9	0.002

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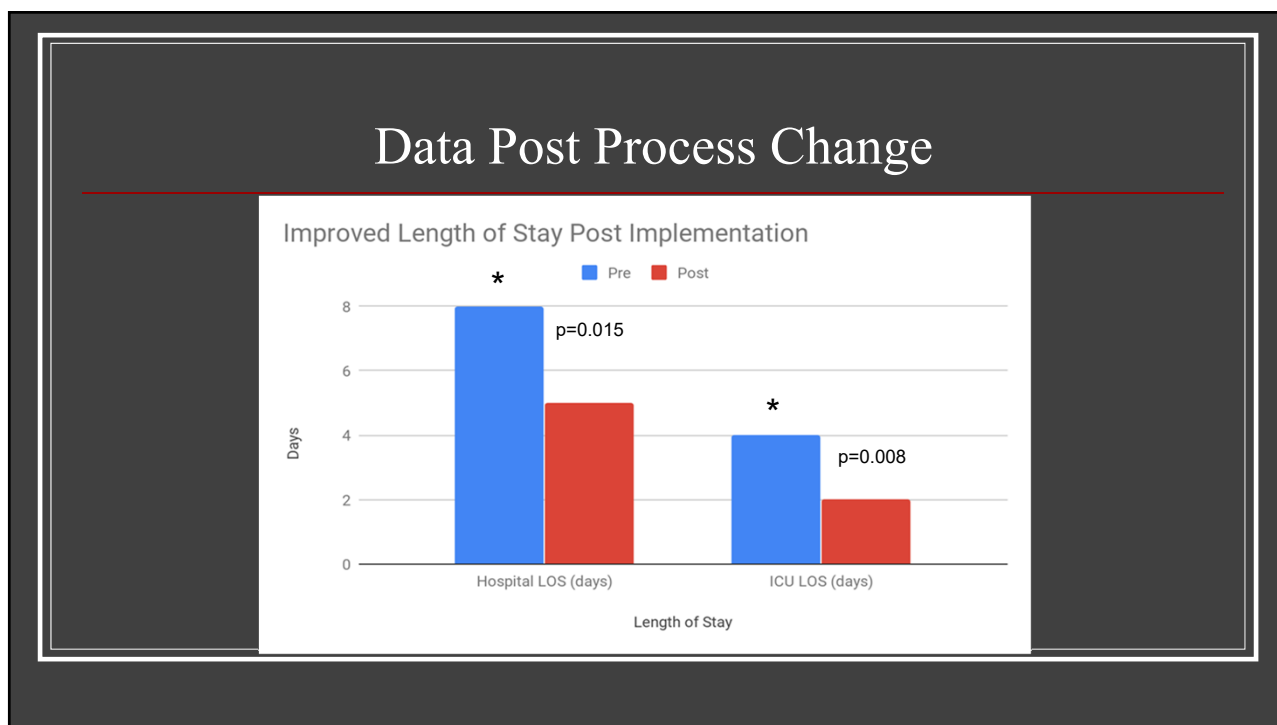
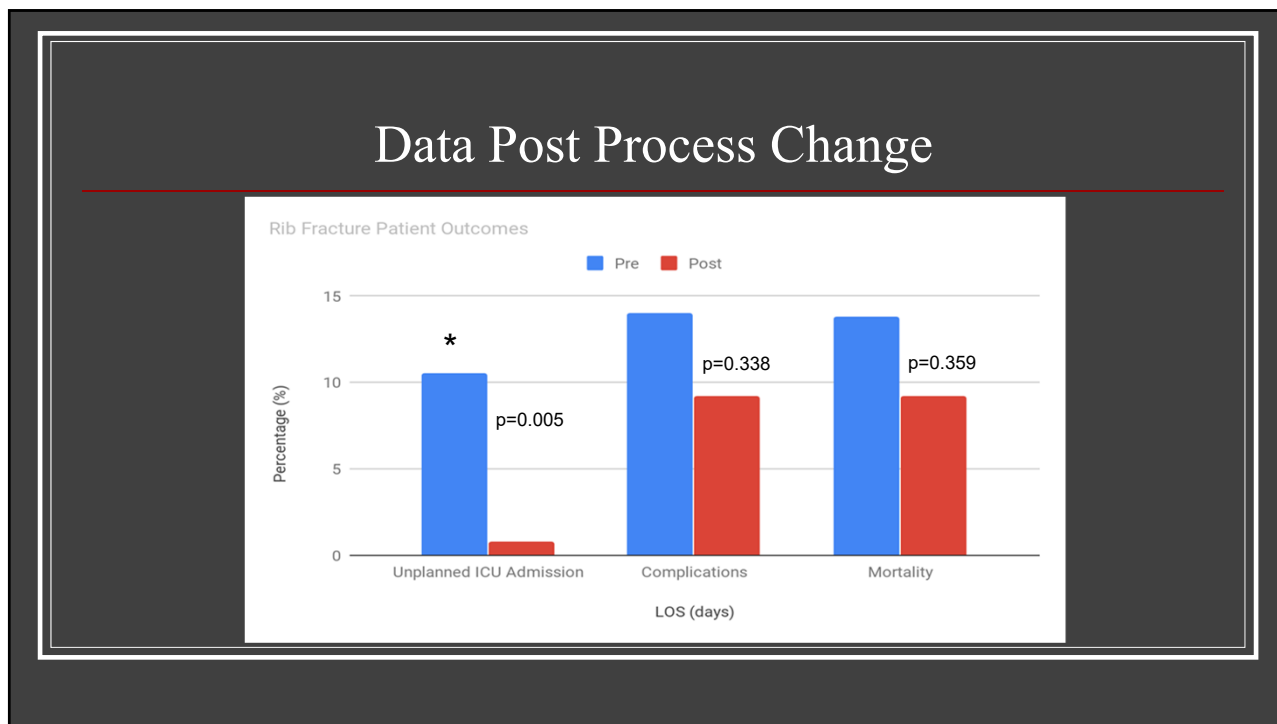
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Project Resolution or Next Steps

- Increased data collection
- Analysis for validation of screening and management protocol
- Improved screening
- Improved tailoring of care

Lessons Learned

- Early patient screening, stratification, and directed care for rib fracture patients admitted to the ICU was associated with shortened ICU and hospital length of stay
 - ICU Length of Stay - 4 days to 2 days
 - Shortened Hospital Length of Stay - 8 days to 5 days
 - Decreased Unplanned ICU readmission -10% to 0.8%
- Appropriate screening allowed for proactive care

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