

SMCI Award Lecture Series
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The Stanford Geriatric Trauma Care Pathway

A multi-disciplinary innovative pathway for
improving clinical outcomes in hospitalized
older adults

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Research

JAMA Surgery | **Original Investigation**

Association Between Implementation of a Geriatric Trauma Clinical Pathway and Changes in Rates of Delirium in Older Adults With Traumatic Injury

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Introducing the Author Team



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The Burden of Geriatric Trauma - Nationally

Geriatric Trauma care: need for improvement in clinical outcomes

- US population rapidly aging, projected to be 95 million by 2060 (23% of total population) (National Center for Health Statistics (NCHS) (2019) [National Vital Statistic System](#))
- Trauma patients over age 65 years estimated to reach over 40% by 2050 (MacKenzei *et al.* (1990) [J Trauma](#), Rzepka *et al.* (2001) [J Clin Epidemiol](#))
- Traumatic injury in age ≥ 65 yrs associated with worse outcomes compared to younger populations (Tillou *et al.* (2014) [JAMA Surg](#), Gerrish *et al.* (2018) [Am Surg](#), Dreinhofer *et al.* (2018) [Injury](#))
- Prior work has shown that a multidisciplinary pathway for in frail older adults ≥ 65 yrs with trauma resulted in reduced delirium and 30d readmission rates (Bryant *et al.* (2019) [J Am Coll Surg.](#))

The Burden of Geriatric Trauma – at Stanford Health Care

- Increase in Trauma Admissions - 24% increase in admissions 65 and older from FY17 to FY18.
 - Approximately 45% of trauma admissions: in patients 65 or older
 - Time-consuming, but nonoperative, problems
 - Usually under-triaged
 - Ground Level Falls - most common mechanism of injury
 - High rates of ICU “bounce back”, complications (mortality, morbidity, complications, delirium, and worse functional status)
 - High direct cost of care
 - Margins on the geriatric population is narrow
 - Gains/loss for the older vs. the younger population:
 - \$800,000 for those 65 and older
 - \$35M for those younger than 65
- Have to get it right

Objective

Develop a multi-disciplinary trauma care pathway for older adults incorporating the Age-Friendly Health Systems Initiative

Goals: Value Improvement, Culture Change, Advance Equity

SHC-Stanford Senior Care was Nationally Recognized by the IHI for Geriatric Trauma Work (Institute for Healthcare Improvement (2019))

- **Highest level of recognition** by the Age-Friendly Health System initiative
- Demonstrates our delivery age-friendly 4M care consistently and reliably (for a minimum of 6 months)
- Impressed by our process/ outcome measurement dashboard, they have **selected Stanford as one of 18 institutions amongst 200+ participants**, to be followed for an extended 18-month period to help us evaluate the ROI for our Geri-Trauma cohort



Age-Friendly Health Systems is an initiative of The John A. Hartford Foundation and the Institute for Healthcare Improvement (IHI) in partnership with the American Hospital Association (AHA) and the Catholic Health Association of the United States (CHA)

Ankur Barija
Stanford Senior Care
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Dear Ankur,

We are excited to recognize and celebrate **Stanford Health Care – Stanford Senior Care** as Age-Friendly. You are recognized by IHI and a leader in this rapidly growing movement committed to care of older adults that is:

- Guided by an essential set of age-friendly, evidence-based practices across the 4Ms (What Matters, Medication, Mentation, and Mobility);
- Causes no harms; and
- Is consistent with What Matters to the older adult and their family.

Our founding partners, The John A. Hartford Foundation, Institute for Healthcare Improvement, American Hospital Association, and Catholic Health Association of the United States, applaud your commitment. This is an exciting movement and there is much to be proud of as, together, we improve the health and health care of older adults.

We encourage you to celebrate Stanford Senior Care's accomplishment by displaying this badge and spreading the word about your involvement in the Age-Friendly Health Systems initiative.



In the attached Media Kit, there are several resources to support you doing so, including a sample press release, social media posts, and newsletter template. Please share with afhs@ihi.org the ways that you celebrate being a part of the movement.

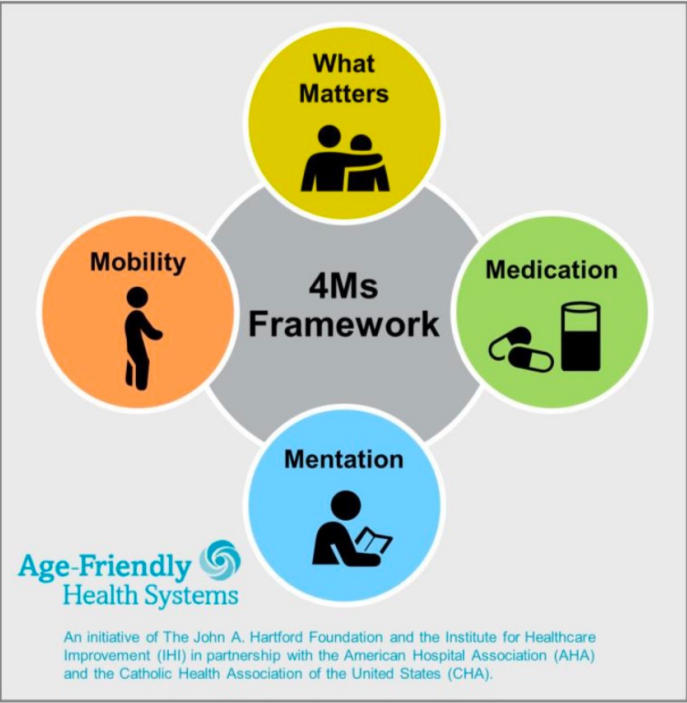
You will also receive resources and updates monthly about local and national progress to support Stanford Senior Care and other participants in this national movement.

Thank you for your commitment to older adults in your community and for being an Age-Friendly Health System and joining us in this movement. Please keep in touch with us at afhs@ihi.org.

Sincerely,

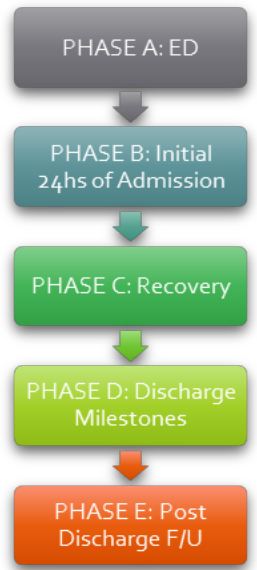
Kedar Mate, MD, Chief Innovation and Education Officer
Institute for Healthcare Improvement

Integrating Age-Friendly Care (4Ms) in Geriatric-Trauma Care



For related work, this graphic may be used in its entirety without requesting permission. Graphic files and guidance at ihi.org/AgeFriendly

- What Matters**
Know and align care with each older adult specific health outcome goals and care preferences including, but not limited to, end-of-life care, and across settings of care.
- Medication**
If medication is necessary, use Age-Friendly medication that does not interfere with What Matters to the older adult, Mobility, or Mentation across settings of care.
- Mentation**
Prevent, identify, treat, and manage dementia, depression, and delirium across settings of care.
- Mobility**
Ensure that older adults move safely every day in order to maintain function and do What Matters.



Recovery Milestones

AFHS 4M Care Definition – SHC Geriatric Trauma

4Ms	Definition	Role	Frequency	Measure
What Matters	<ol style="list-style-type: none"> 1. “What’s most important to you during this hospital stay?” 2. HC proxy/ Surrogate 3. Previous Advance Directive 	Geriatrics team	Once per stay for all and recurrent if needed	% receiving GOC note Time to complete first GOC note (Goal – 48 hrs)
Medications	Screen home and current medication list for potentially inappropriate medications	Geriatrics team	Daily	Admission med rec within 48 hrs.
Mentation	Screen for Delirium by CAM	Nursing	Every shift	% of positive CAM and/or Delirium DRG code during admission.
Mobility	Screen for mobility and proactive ambulation	Rehab and Nursing	Admission and Daily	# of hours (Time) to first mobility from admission.

Geriatric SPICES

<p>Sleep Issues</p>	<p>Initial: Do you have trouble falling asleep (longer than 30-45 minutes)? Do you sleep for <4 hours at a time? Do you take a sleep aid regularly at home?</p> <p>Hospital: How many hours did the patient sleep? Did they receive a sleep aid or antipsychotic over night?</p>
<p>Pain/Polypharmacy</p>	<p>Initial: Did you have pain before this hospitalization? What were you taking? What <u>dose</u>? How often?</p> <p>Hospital: What was the last pain score? Is the patient on a scheduled pain medication regimen?</p>
<p>Immobility</p>	<p>Initial: Did you come here because of a fall? Were you able to bathe, groom, toilet, walk and eat independently at home?</p> <p>Hospital: Has the patient been out of bed in the last 12 hours? Do they have a mobility order? Can they go outside their room with assistance (would need order okay to go off monitor, for example)</p>
<p>Confusion/Constipation</p>	<p>Initial: Does patient have trouble remembering appointments or family gatherings? Writing checks or paying bills? Shopping independently? Is there a diagnosis of dementia or cognitive impairment in the outpatient chart?</p> <p>Do you struggle with constipation at home? Do you take something to help you have regular bowel movements?</p> <p>Hospital: Is CAM positive? What is SIS score? Remember to complete the "Six Item Screen" only when/if CAM negative, complete "Six Item Screen" only once per hospitalization</p> <p>When was the last bowel movement? Was it large or small? Is the patient having urinary retention?</p>
<p>Enteral Nutrition</p>	<p>Initial: Have you lost weight recently, such that your clothes fit differently? Any trouble chewing or swallowing?</p> <p>Hospital: What type of diet is ordered? What percentage of meals has patient eaten? Do they need supplements?</p>
<p>Social Support/ Sensory (caregiver issues, <u>dispo</u> plan, goals)</p>	<p>Initial: Does someone help you regularly at home? Who? (for caregiver) Has the patient been needing more daily help in the past 3-6 months?</p> <p>Hospital: Has there been a family member of caregiver at bedside? Will they be taking care of the patient after discharge? What are your concerns (RN)?</p>

Milestones to developing SHC Geriatric Trauma Care Pathway

- First initiatives:
 - Targeted Geriatric Trauma Consults (2016)
 - Geriatric Trauma order sets (2017)
 - Pilot ACE unit 300P on C2 (2017)
- ***Was not sufficient-->Created the Geriatric Trauma Care Pathway (2018)***
- Geriatric Emergency Department (2019)
- Age-Friendly Health Systems IHI Collaborative (2019)*
- ACE unit 500P (January 2021)

Stanford Geriatric Trauma Initiatives

Pilot Data: Started with Targeted Geriatrics Consultations

October 2016

GT65 Screen - High-risk screening tool done by Trauma service at 24 hours during the Tertiary survey.

1. Geriatrics to consult on those who screen positive.
2. Process compliance ~ 50-60%
3. Observations:
 - Geriatrics team consulted in 90% plus cases.
 - 23% had delirium
 - 50% had cognitive impairment (nursing engagement)
 - 70% had medication change recs (order set opportunities)

Stanford Geriatric Trauma Screen (.GT65)

Screening Question	Suggested Action
1. In general, do you have problems with your memory? {Yes/No}	OT consult for cognitive evaluation
2. Before this injury, did you need someone to help you with daily activities (such as bathing or dressing) on a regular basis? {Yes/No}	PT consult for functional assessment
3. Do you live alone and not have someone you can count on to help you when you need help? {Yes/No}	Discuss discharge plans with Social Work
4. Have you been in the hospital twice or more in the last year? {Yes/No}	Discuss discharge plans with Case Manager
5. Have you recently lost weight such that your clothing has become looser? {Yes/No}	Nutrition consult & alert PCP for possible further w/u
6. Do you take 5 or more prescription medications on a regular basis? {Yes/No}	Transition of care pharmacist at discharge
7. Do you often feel sad or depressed? {Yes/No}	Consider social work consult and/or screen with PHQ-9. Alert PCP.
8. Do have more than 2 drinks containing alcohol per day? (1 drink/day for women) {Yes/No}	CIWA order set, social work consult
9. Have you had a fall with injury in the last 3 months (including current reason for admission)? {Yes/No}	Discuss Farewell to Falls referral with case manager
10. CAM positive on nursing flowsheet? {Yes/No}	Delirium order set (IP GenDelirium)

Continuous Process Improvement

Targeted Geriatrics Consultation

October 2016

Frailty screening led by Trauma service during Tertiary survey – GT65 Screen

1. Geriatrics to consult those who screen positive.

2. Observations:

- 23% had delirium
- 50% had cog impairment
- 70% had Med changes recommended

Geriatric Specific Order sets

May 2017

1. Admission order sets:

Trauma admission order sets reviewed and updated for senior-friendly pharma and non-pharma interventions

2. Elderly Rib Fracture pain Mx protocol

- Standardized pain evaluation and management protocols created by Pain service, Geriatrics and Trauma.

Acute Care for Elders Unit (Trauma)



Teamwork

Est 2017/2018

Multi-disciplinary steering committee formed representing:

- Trauma, Geriatric medicine
- Emergency Department (ED)
- Critical Care
- Nursing
- Physical and occupational therapy
- Speech and language pathology
- Case management and social work
- Pharmacy
- Nutrition
- Transitional care
- High Value Quality and Analytics teams
- Members of the patient family advisory council

Establishing the Geriatric Trauma Pathway Guidelines

- Used Design Process: Current state process mapping was done that included the patient continuum from the ED through discharge, and barriers to consistency in care were identified.
- From this, opportunities to employ evidence-based geriatric principles and processes were identified. An Age-Friendly Health System 4M care framework was used to prioritize interventions. A care pathway was designed incorporating all of these features.

Establishing the Geriatric Trauma Pathway Guidelines

Necessary electronic health record (EHR) and workflow needs were identified to support the pathway:

- Order sets
- Automatic multi-disciplinary consults (including geriatric medicine, physical and occupational therapy, case management, nutrition services, case management, and rehabilitation (OT/PT) services)
- Documentation requirements
- Escalation algorithms (how to manage expected and common symptoms like pain management, bowel and sleep regulation)

The Geriatric Medicine services were similarly standardized. A baseline frailty screen was to be performed on admission and includes cognition, function, social and polypharmacy assessments.

Establishing the Geriatric Trauma Pathway Guidelines

- A multi-disciplinary team meeting is done daily during the week on the non-ICU trauma unit with the geriatric clinician
- Prior to discharge, a transitional care team is consulted if deemed appropriate for post discharge follow-up or home visit.
- Those presenting with a ground level fall as the cause for injury, are provided with a fall prevention program 'Farewell To Falls' post-discharge for secondary fall prevention (described elsewhere). [needs reference]

Geriatric Trauma Non-Surgical Outcomes

Geriatric Trauma Care Pathway Dashboard (updated monthly)

Volume and Average LOS



Note: Average # days patient spent in hospital (Length of stay is discharge - admit).

Average # of Hours to First Mobility



Note: Averages are computed for all patients WITH a recorded first mobility time.

Average # of Hours to First Goals of Care Note



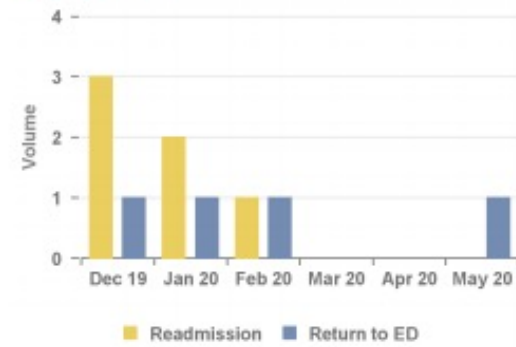
Note: Averages are computed for all patients WITH a recorded goals of care note.

Average Pain Score, Last 24 Hours



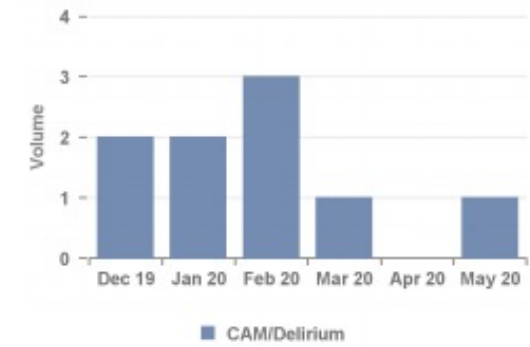
Note: Average pain score 24 hours prior to discharge is determined per patient first and then averaged per month.

Unplanned Care



Note: Readmission and ED are returns within a 30 day period.

CAM/Delirium



Number of patients with positive CAM and/or delirium diagnosis during the encounter (Delirium ICD-10 codes 'R41.0', 'R41.82', 'F05', 'F10.231', 'F11.221', 'F13.231', or 'F13.921')

GERIATRIC TRAUMA (NON-SURGICAL) CARE PATH

FREQUENTLY ASKED QUESTIONS

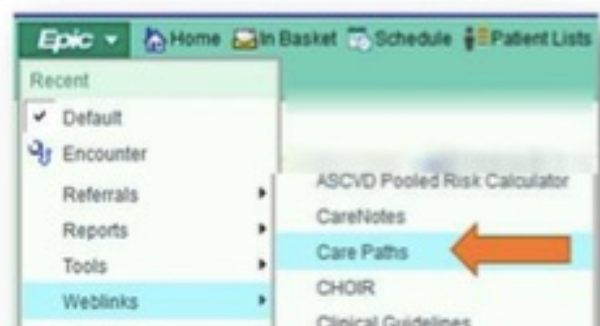
DOES THE PATHWAY APPLY TO ALL PATIENTS?

- ✓ The following cases will be excluded from the care path: All major surgical procedures
- ✓ Following cases will be flagged as "Off the target LOS": Insertion of pacemaker & defibrillator, Cardiac assist device- IABP, ECMO, VAD, patients on hemodialysis or CRRT, prolonged vent > 24 hrs

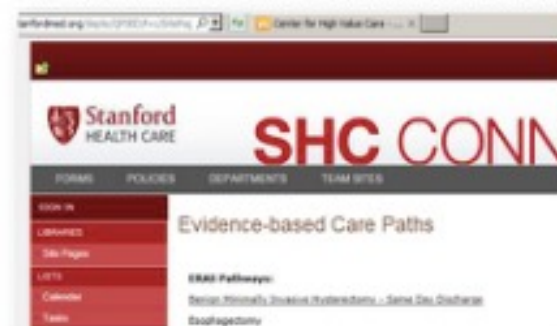
WHERE TO FIND THE GERIATRIC TRAUMA NON-SURGICAL CARE PATHWAY?

- ✓ The Care Path link is available here:
[Geriatric Trauma Non-Surgical Pathway](#)
- ✓ The link is also available for reference in Epic (see screenshots below) and in order sets.

Reference Link is located in "WebLinks"



Selection launches the SHC Care Path repository web site



WHICH ORDER SET TO USE?

- ✓ The following order sets are updated and are available to use in Epic:
 - IP SUR General Admit
 - IP GEN/ICU Rib Fracture

Standardized EPIC Documentation

Pain Assessment	
Pain Scale Type	
Pain Scale Instruction	
Pain Level - 1st Site	
Pain Goal	
Anxiety Level	
Does Patient have Chronic Pain	

Pulmonary	
Pulmonary (WDL)	
Incentive Spirometer (ml)	
Deep Breathing	
Flutter Valve	←

Mobility/Activity	
Mobility/Activity	
Bed Position	
Patient Position	
# of Siderails Up	
Therapy Bed Surface	
Pressure Redistribution/Off-loading Devices	
Bedside Mobility Level (BMAT)	
Activity	
Activity Assistance	
Activity Aid/Device	
ADL Assistance	
Safety Precautions	

Sleep Pattern	
Sleep Pattern	
Hours of Sleep	

Clinical Question

Is the establishment of a geriatric-centered clinical pathway associated with improved outcomes for injured older adults?

Study Design

Retrospective Case-control (2018-2020)

Setting: Stanford University Hospital

Population:

- Injured Older adults Age 65 and above
- Admitted to Trauma service but received non-operative treatment

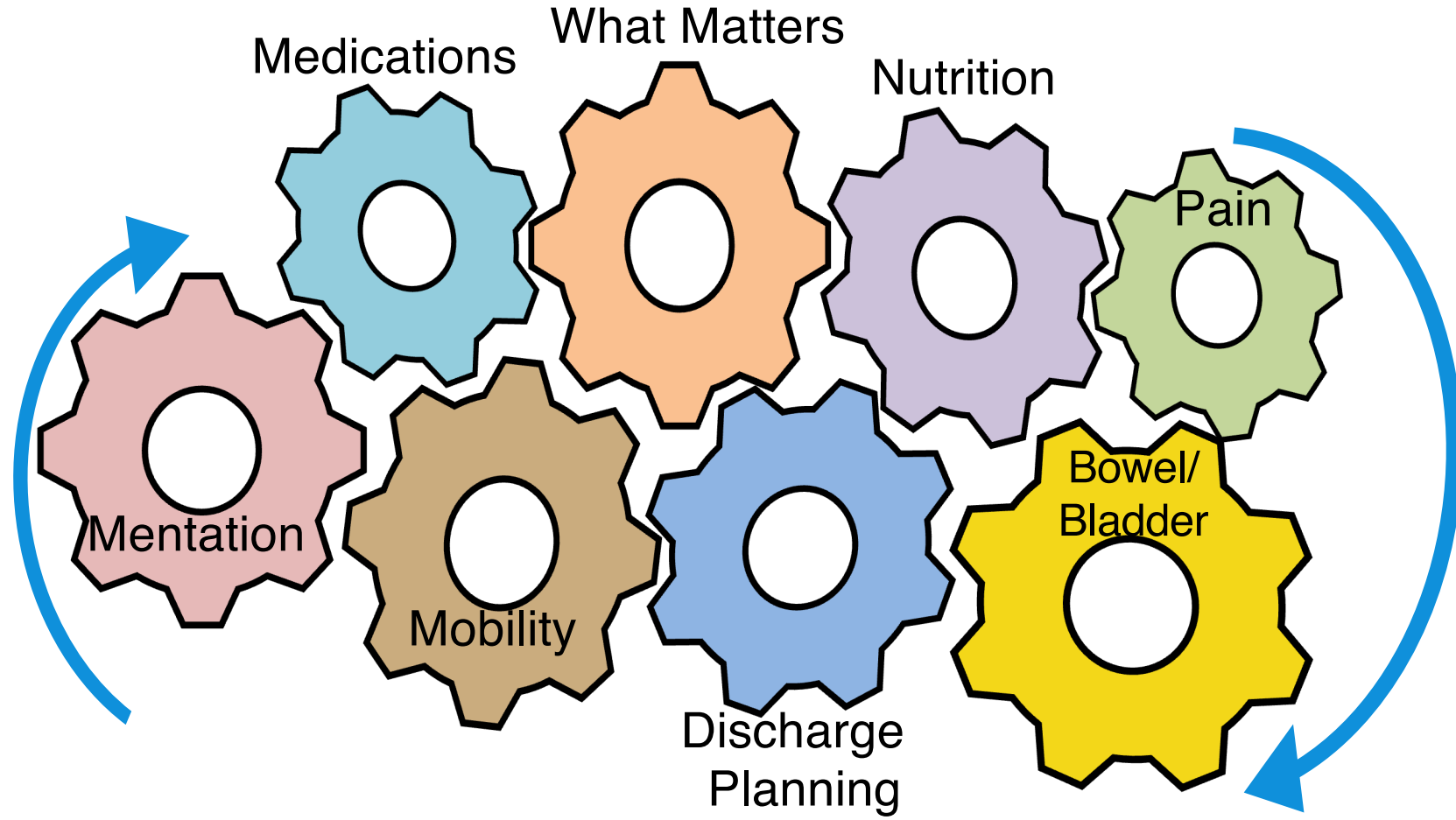
Intervention:

- Implementation of a geriatric medicine-based multi-disciplinary clinical pathway

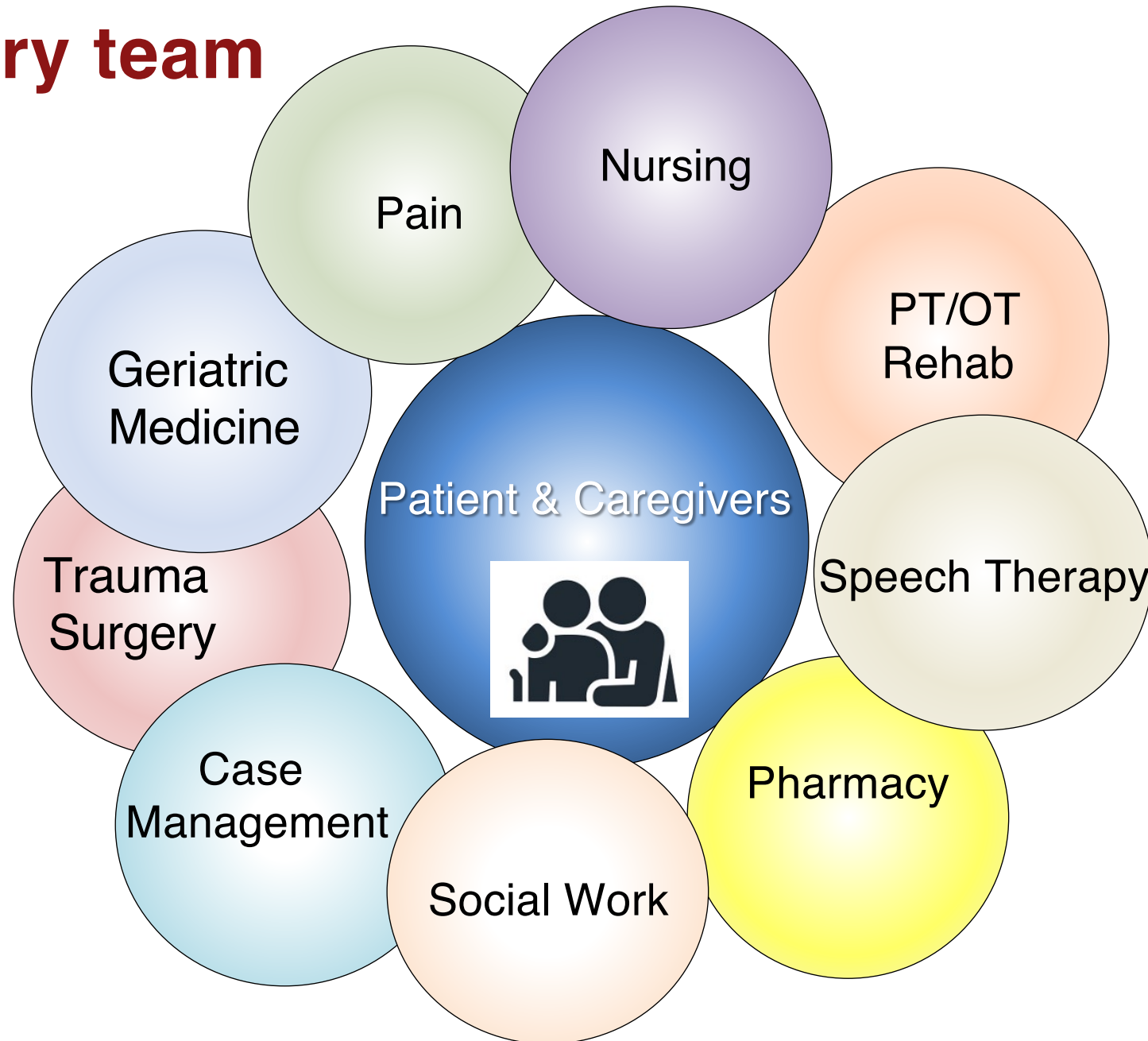
Outcomes:

- Primary: Delirium
- Secondary: hospital length of stay (LOS), process measures

Geriatric Trauma Pathway: key elements



Multi-disciplinary team



Analysis



- September 2015-April 2018

- May 2018-December 2018

- January 2019-January 2020

Excluded patients who had surgical operations as other pathways might interfere with results

Table 1

Baseline characteristics

Table 1. Characteristics of the Baseline and Postimplementation Cohorts

Characteristic	No. (%)		P value for difference
	Baseline	Postimplementation	
No. (%)	442 (62.1)	270 (37.9)	NA
Demographic			
Sex			
Female	247 (55.9)	147 (54.4)	.68
Male	194 (43.9)	123 (45.6)	
Age, mean (SD), y	81.8 (9.3)	81.6 (8.8)	.91
Age categories, y			
65-70	60 (13.6)	31 (11.5)	.88
71-80	132 (29.9)	82 (30.4)	
81-90	158 (35.7)	100 (37.0)	
>90	92 (20.8)	57 (21.1)	

Table 1. Characteristics of the Baseline and Postimplementation Cohorts

Characteristic	No. (%)		P value for difference
	Baseline	Postimplementation	
Race and ethnicity			
Asian	86 (19.5)	44 (16.3)	.03
White	269 (60.9)	182 (67.4)	
Other ^a	87 (19.7)	44 (16.3)	
Language			
Non-English speaking	75 (17.0)	40 (14.8)	.45
English speaking	367 (83.0)	230 (85.2)	
Injury			
Mechanism			
Fall	247 (55.9)	162 (60.0)	.43
MVC	34 (7.7)	18 (6.7)	
Bicycle	21 (4.8)	6 (2.2)	
Other or missing	140 (31.7)	84 (31.1)	
ISS ^b			
<9	78 (17.6)	50 (18.5)	.87
9-15	183 (41.4)	118 (43.7)	
>15	58 (13.1)	33 (12.2)	

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Table 2

Unadjusted Clinical Outcomes

Table 2. Unadjusted Clinical Outcomes

Clinical outcome	No. (%)		P value for difference
	Baseline	Postimplementation	
No. (%)	442 (62.1)	270 (37.9)	NA
Delirium			
All patients	125 (28.3)	50 (18.5)	.002
By ISS			
ISS <15	69 (15.6)	23 (8.5)	.001
ISS >15	56 (12.7)	27 (10.0)	.26
LOS, mean (SD), d			
All patients	4.3 (3.8)	4.3 (2.9)	.20
By ISS ^a			
ISS <15	3.9 (2.9)	3.9 (2.3)	.95
ISS >15	5.0 (4.8)	4.9 (3.7)	.28

What about mortality?

Abbreviations: ISS, Injury Severity Score; LOS, length of stay; NA, not applicable.

^a For statistical analysis, injury severity was dichotomized into minor or moderate (ISS <15) and severe injury (ISS >15) (ISS range, 0-75; ≥16 indicates serious overall injury).

Unadjusted Outcomes: Mortality data (not reported in published study for cell sizes <10)

Table 2: Unadjusted Clinical Outcomes

		Baseline		Post-Implementation		Difference
		<u>Number or</u>		<u>Number or</u>		
		<u>Mean</u>	<u>% or SD</u>	<u>Mean</u>	<u>% or SD</u>	<u>p value</u>
		442	62.1%	270	37.9%	
Clinical Outcomes						
Death	All patients	22	5%	6	2%	0.05
	By ISS					
	ISS < 15	7	1.6%	0	0.0%	0.03
	ISS > 15	15	3.4%	6	2.2%	0.31
Delirium	All patients	125	28.3%	50	18.5%	0.002
	By ISS					
	ISS < 15	69	15.6%	23	8.5%	0.001
	ISS > 15	56	12.7%	27	10.0%	0.26
LOS (days)	All patients	4.3	3.8	4.3	2.9	0.20
	By ISS					
	ISS < 15	3.9	2.9	3.9	2.3	0.95
	ISS > 15	5.0	4.8	4.9	3.7	0.28

SD Standard Deviation; ISS Injury Severity Score; LOS length of stay

Adjusted Outcomes

(Mortality data not reported in published manuscript)

Table 3: Summary of Regression Results, Post-Implementation vs. Baseline

<u>Outcome</u>	<u>Odds Ratio or Coefficient</u>	<u>P Value</u>	<u>95% Confidence Interval</u>	
			<u>Low</u>	<u>High</u>
Delirium	0.53	<0.001	0.11	2.65
Mortality	0.27	0.02	0.09	0.81
LOS (days)	-0.55	0.44	-1.96	0.85

Variables included in models include age, race, sex, injury severity, mechanism of injury, and process measures (pain, mobility, goals of care). English language included as variable for delirium regression.

Effect by Cohort

Figure. Percent Reduction in Delirium for Postimplementation and Baseline Cohorts

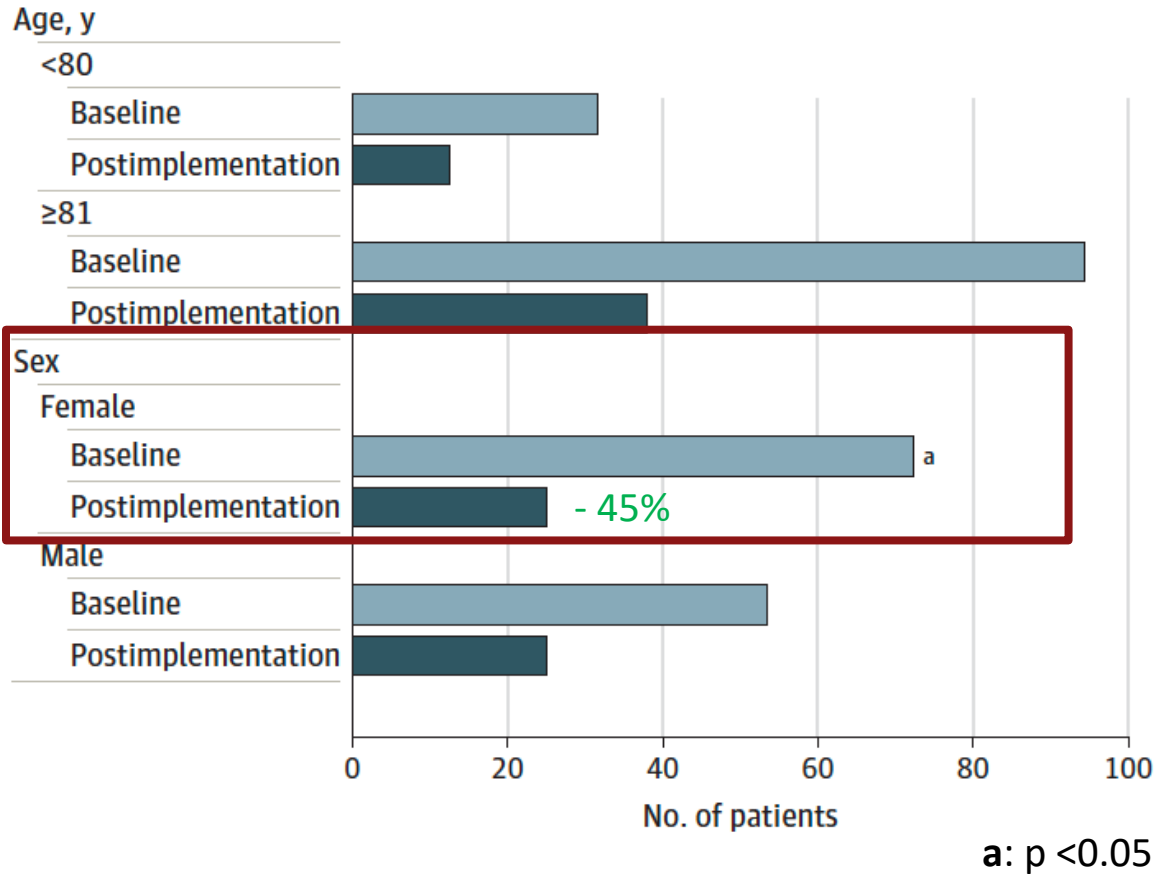
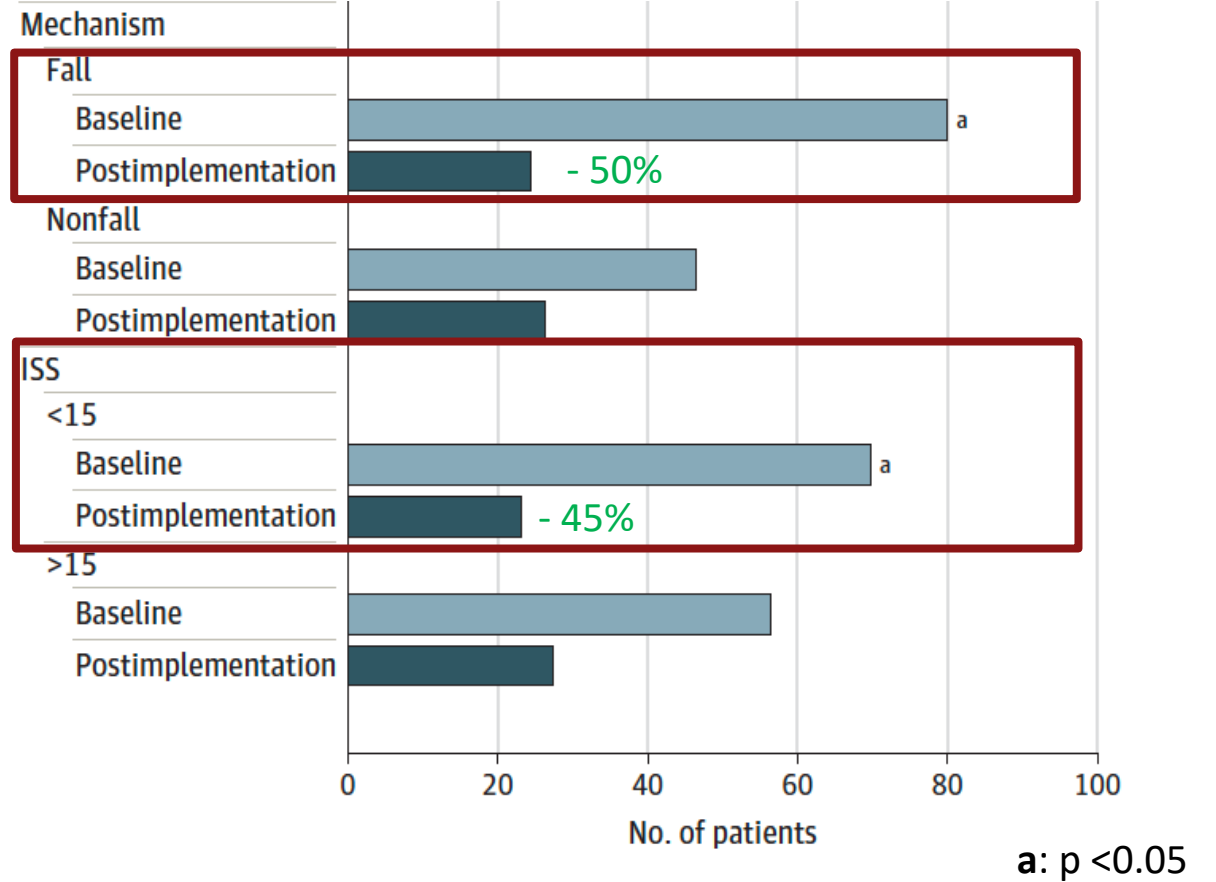
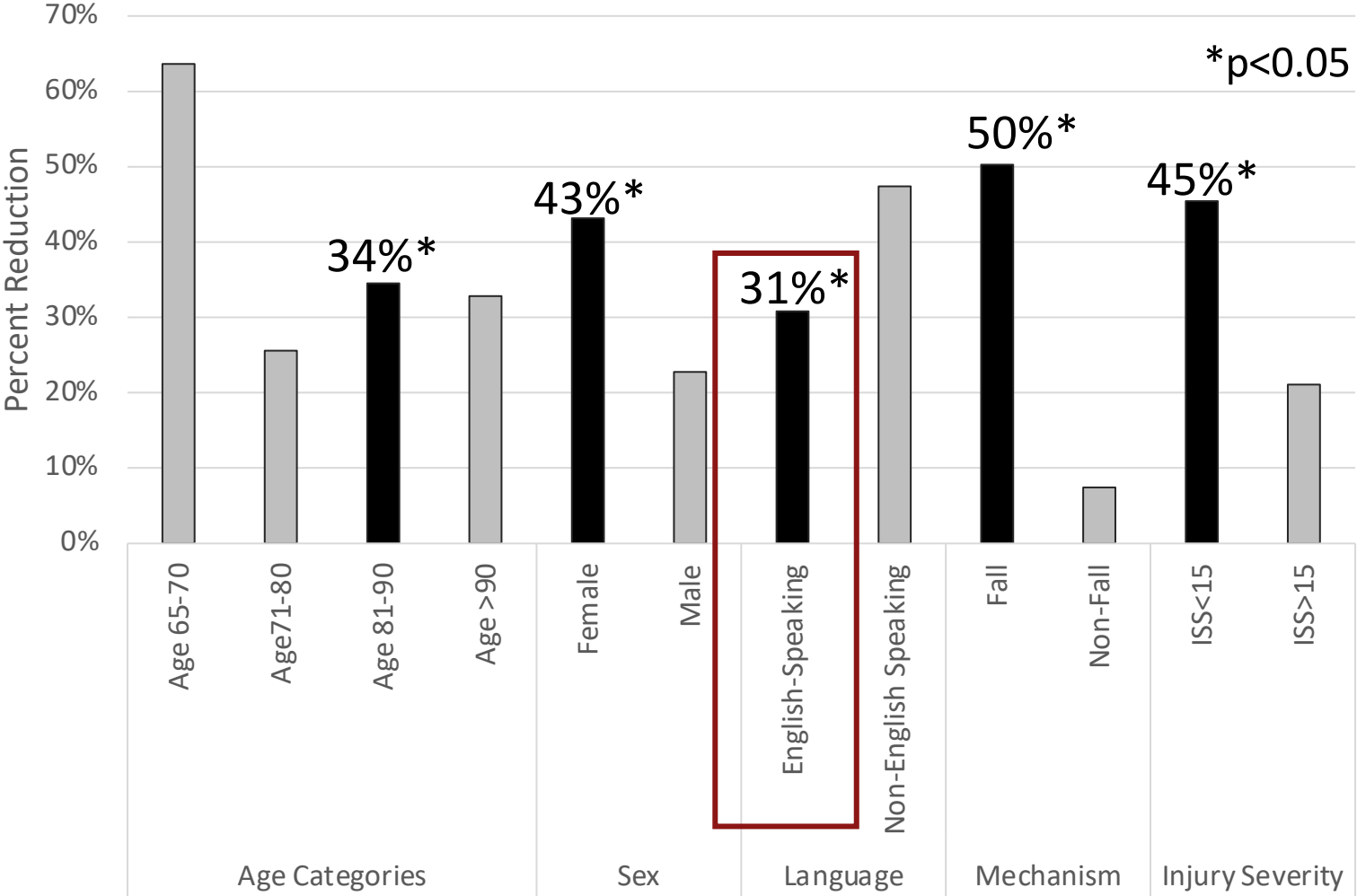


Figure. Percent Reduction in Delirium for Postimplementation and Baseline Cohorts



Significant Reduction in Delirium also observed in English-speaking subgroup (not reported in published manuscript)



Process Metric Outcomes

Table 4. Process Metric Outcomes

Process metric outcome	Mean (SD)		P value for difference
	Baseline	Postimplementation	
No. (%)	442 (62.1)	270 (37.9)	NA
Pain control (first 24 h)			
Pain score ^a	1.5 (1.7)	2.2 (1.9)	<.001
Pain score of 4 or higher	50 (11.3)	54 (20.0)	.001
Timing of first mobilization (if LOS >2 d)			
Hours to first ambulation	32.4 (24.2)	27.6 (20.8)	.11
Goals of care (if LOS >2 d)			
Had a goals of care discussion	74 (16.7)	145 (53.7)	<.001
Hours to first goals of care discussion	49.6 (105.5)	35.7 (25.3)	.03

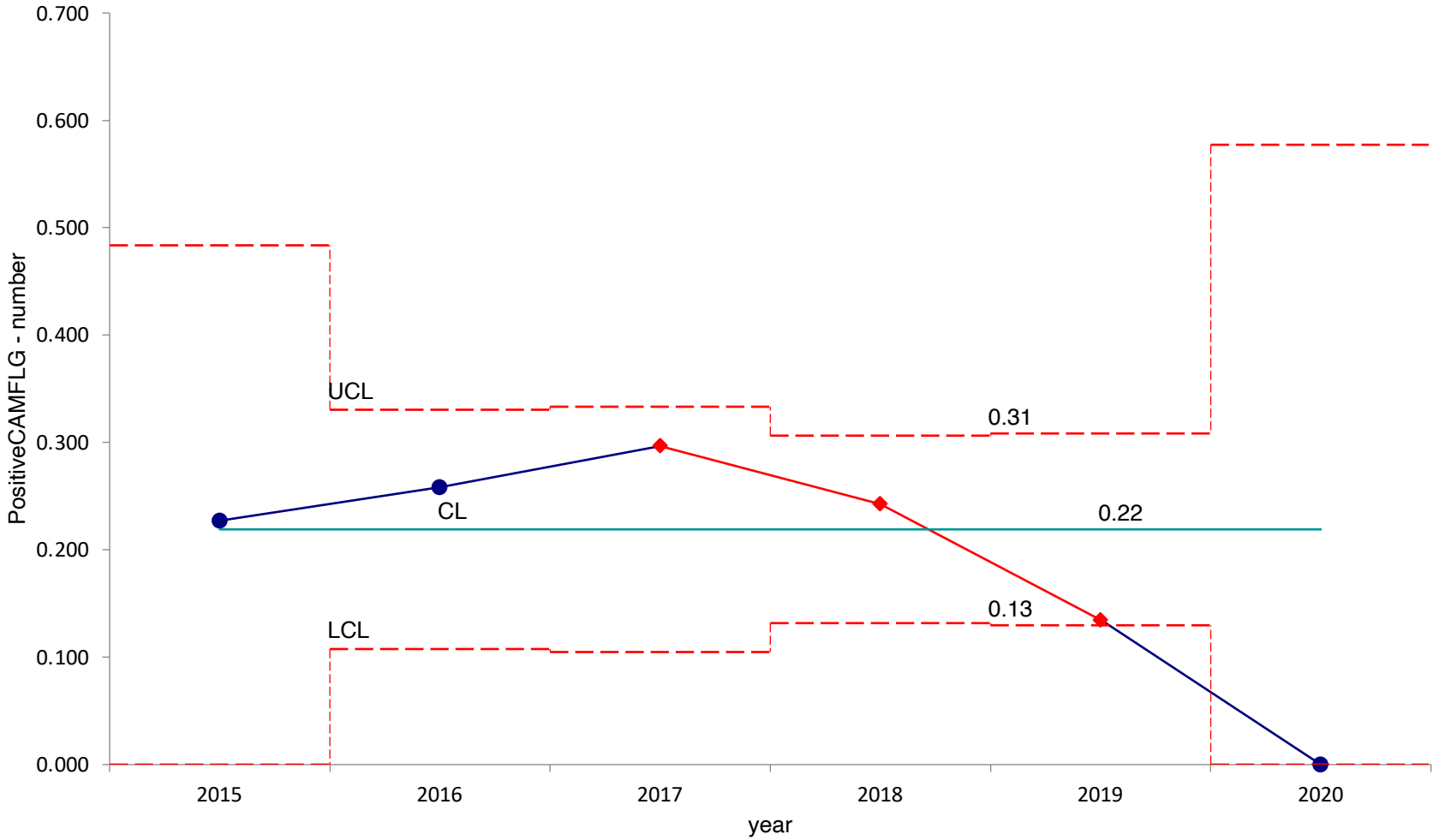
Trauma Quality Improvement Program Hospital Event Data

Fall 2022 Report

Table 4a: Risk-Adjusted Major Hospital Events Including Death by Reporting Period and Cohort

Cohort	Odds Ratio									
	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022
All Patients	0.79	0.81	0.80	0.86	1.00	NA	0.81	0.79	0.71	0.75
Blunt Multisystem	0.87	1.06	0.88	1.02	1.25	NA	0.80	0.76	0.70	0.74
Penetrating	0.98	0.92	0.85	0.93	0.97	NA	1.41	1.36	1.07	1.10
Shock	1.12	0.96	0.92	0.98	1.09	NA	1.00	0.93	0.90	1.03
Severe TBI	0.92	0.82	0.78	1.17	1.03	NA	0.99	0.85	0.74	0.78
Elderly	0.86	0.99	1.00	0.99	0.96	NA	0.76	0.68	0.66	0.76
Elderly Blunt Multisystem	1.02	1.15	1.05	1.13	1.23	NA	0.88	0.81	0.75	0.89
Isolated Hip Fracture	1.09	0.90	0.91	0.93	1.01	NA	0.92	0.96	1.09	1.05

Run Chart Delirium



Summary & Conclusions

- The Stanford Geriatric-Trauma Care Pathway reduced delirium and mortality in injured older adults
- Mortality and delirium benefits were accrued most to those with ISS<15
- Reductions in rates of delirium more common based on demographics, specifically sex and primary language—pointing to areas that require closer attention
- Pain scores were higher in the post-implementation period (may reflect change in how pain was assessed)

Summary of outcomes

- Single-center, Streamlined, Multi-disciplinary clinical care pathway improves outcomes in injured older adults
- Significant reductions observed in multiple outcomes:
 - Delirium
 - Length of stay
 - Time to discussion and documentation of Goals of care (GOC) conversation
- Significant Reduction in delirium especially in
 - Female, English-speaking
 - Admitted with Fall, ISS <15

Conclusions

- First study to implement of Geriatrics-centered care of older adults with trauma incorporating Age-friendly 4M healthcare system
- Novelty lies in the wide breadth of elements included
- Inclusive population of older adults above age 65 instead of pre-selecting those at high-risk
- Findings consistent with previous reports showing improved outcomes of geriatric-focused interdisciplinary trauma care pathways
- Mortality and delirium benefits were accrued most to those with ISS<15
- ***Limitation***: population mainly Caucasian, English-speaking

Future Directions

- Reductions in rates of delirium more common based on demographics, specifically sex and primary language—pointing to areas that require closer attention
- Pain scores were higher in the post-implementation period (may reflect change in how pain was assessed)
- Streamlined geriatric-centered trauma care of older adults → expand this model pathway in other trauma centers across the nation

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