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# The Role of Frailty in Trauma & Surgery

Bellal Joseph MD, FACS  
*Professor and Chief of Surgery  
Division of Trauma and Acute Care Surgery*



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Nothing to Disclose

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125 years

109 all the time



# Twenty Years Ago in the Journal of Trauma

## Differences in Mortality between Elderly and Younger Adult Trauma Patients: Geriatric Status Increases Risk of Delayed Death

Perdue, Philip W. MD, MPH; Watts, Dorraine D. RN, PhD; Kaufmann, Christoph R. MD, MPH; Trask, Arthur L. MD

The Journal of Trauma: Injury, Infection, and Critical Care: October 1998 - Volume 45 - Issue 4 - p 805-810  
Article

**Background** Elderly patients suffer higher mortality rates after trauma than younger patients. This increased mortality is attributable to age, preexisting disease, and complications as well as injury severity.


**Methods** Records from 5,139 adult patients from a Level I trauma center were retrospectively reviewed. Injury Severity Score (ISS), Revised Trauma Score (RTS), early mortality (<24 hours), and late mortality (>24 hours) were determined for elderly ( $\geq 65$  years) and younger (16-64 years) patients. Preexisting diseases and complications were identified by International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis coding.

**Results** Mortality in elderly patients was twice that in younger patients despite equivalent injury severity ( $p < 0.001$ ), and elderly patients were more likely to suffer later death than younger patients ( $p < 0.005$ ). The prevalence of preexisting disease was greater in the elderly, as was the incidence of complications. Using logistic regression, ISS, RTS, preexisting cardiovascular or liver disease, the development of cardiac, renal, or infectious complications, and geriatric status were all independently predictive of late mortality ( $p < 0.05$ ).

**Conclusion** Elderly trauma patients more frequently suffer late mortality than younger patients because of the combination of injury and increased preexisting disease and complications after injury. Aggressive treatment of the elderly trauma patient is warranted; however, in the face of significant preexisting disease or complications, survival is less likely. Predictive models of survival can be developed, taking into account preexisting disease and complications as well as admission parameters such as age, ISS, and RTS, and specific risk of mortality quantitated.

How Have we  
Changed in 2018?



Elderly patients suffer  Mortality after trauma compared to younger patients.

In 1998 this was found to be Attributable to:

- Preexisting disease
- Higher incidence of complications
- Increased Age

What variables are we using now?

February 1, 2007

## Surgery in the Geriatric Patient

### Aging, the Heart, Emergencies, and Us

Michael E. Zenilman, MD

» [Author Affiliations](#) | [Article Information](#)

*Arch Surg.* 2007;142(2):109-110. doi:10.1001/archsurg.142.2.109



Yes, things are looking good for our elderly patients and us aging surgeons. As we understand the aging process and create safer environments, we can get our patients through complex surgery with acceptable morbidity and mortality. Now we need to start to recognize other curve balls our elderly patients throw us, which when controlled can improve survival even more—issues like dementia, delirium, polypharmacy, unrecognized alcoholism or abuse, and the need for dedicated geriatric services. The American College of Surgeons and the American Geriatrics Society have teamed up to increase research and awareness in these areas. There is a lot we do not know, that we weren't taught, and that we need to study. Maybe next time I'll go to the next level and talk about nursing homes.

# TRANSFORMATION

- Marked change in form, nature, appearance  
process by which one figure or function is converted into  
another one of **SIMILAR VALUE**

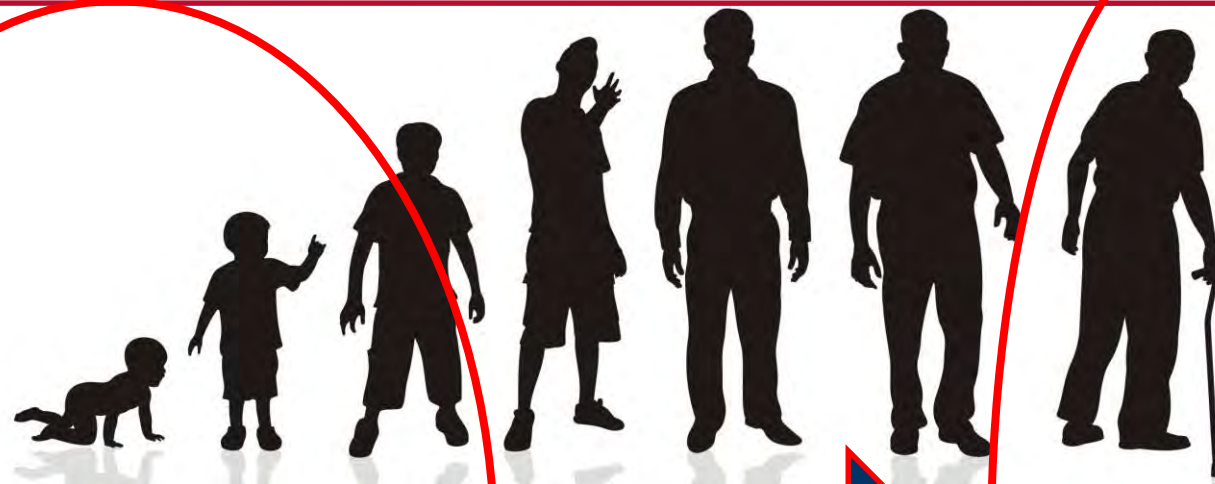






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# AGING



**Focus is Shifting**



# INTRODUCTION

## Expectations





# INTRODUCTION

Reality



# SILVER SERVICE



**GERIATRIC**

**How Do you Decide ICU, Geriatric, Rehab**

**Family Discussions – Objective Data**

**Quality Hospital/Surgeon Data**

# **Why Should We Distinguish Geriatric Patients?**



# Trauma

Extrication

**Traumatic brain  
injury**

Transfusion vasopressors

FAST

GCS

Protocol

Burns

Injury severity score

Intubation

**Falls**

Cardiac  
Arrest



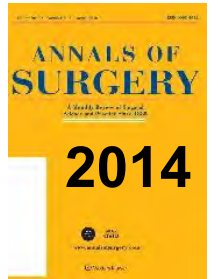
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# Geriatric Trauma

Dementia      Extrication      hypertension      anxiety  
depression      **Traumatic brain**  
Transfusion      vasopressors      osteoarthritis      **injury**  
Incontinence      cirrhosis      FAST      GCS  
Protocol      Burns      Parkinson's  
Functional      Injury severity score  
decline      Intubation      Malignancy  
**Falls**      **Delirium**      presbycusis      Cardiac  
**Morbidity**      Chronic kidney disease      Arrest

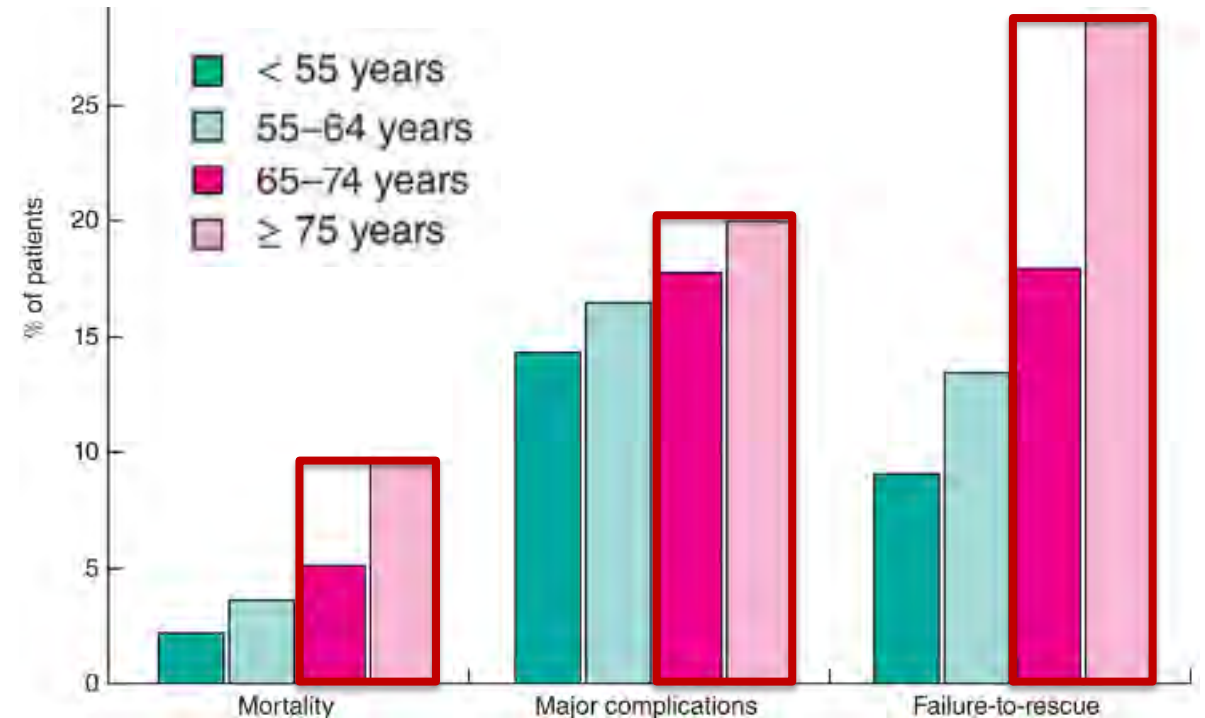
# Improving Mortality Following Emergency Surgery in Older Patients Requires Focus on Complication Rescue

*Kyle H. Sheetz, Seth A. Waits, Robert W. Krell, Darrell A. Campbell, Jr., Michael J. Englesbe, and Amir A. Ghaferi*

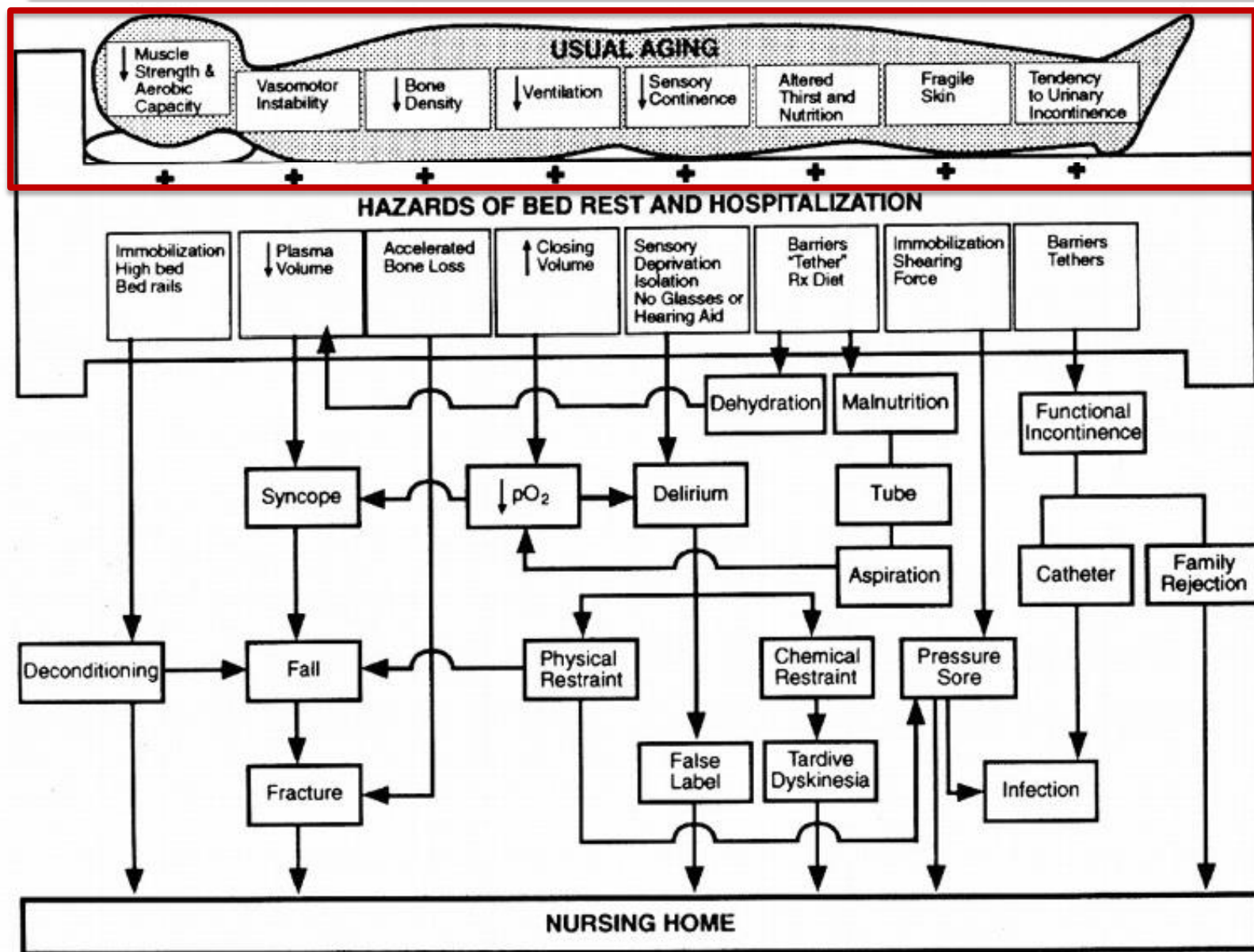


## In Elderly:

- ↑ Major Complications
- ↑ Mortality
- ↑ Failure to Rescue





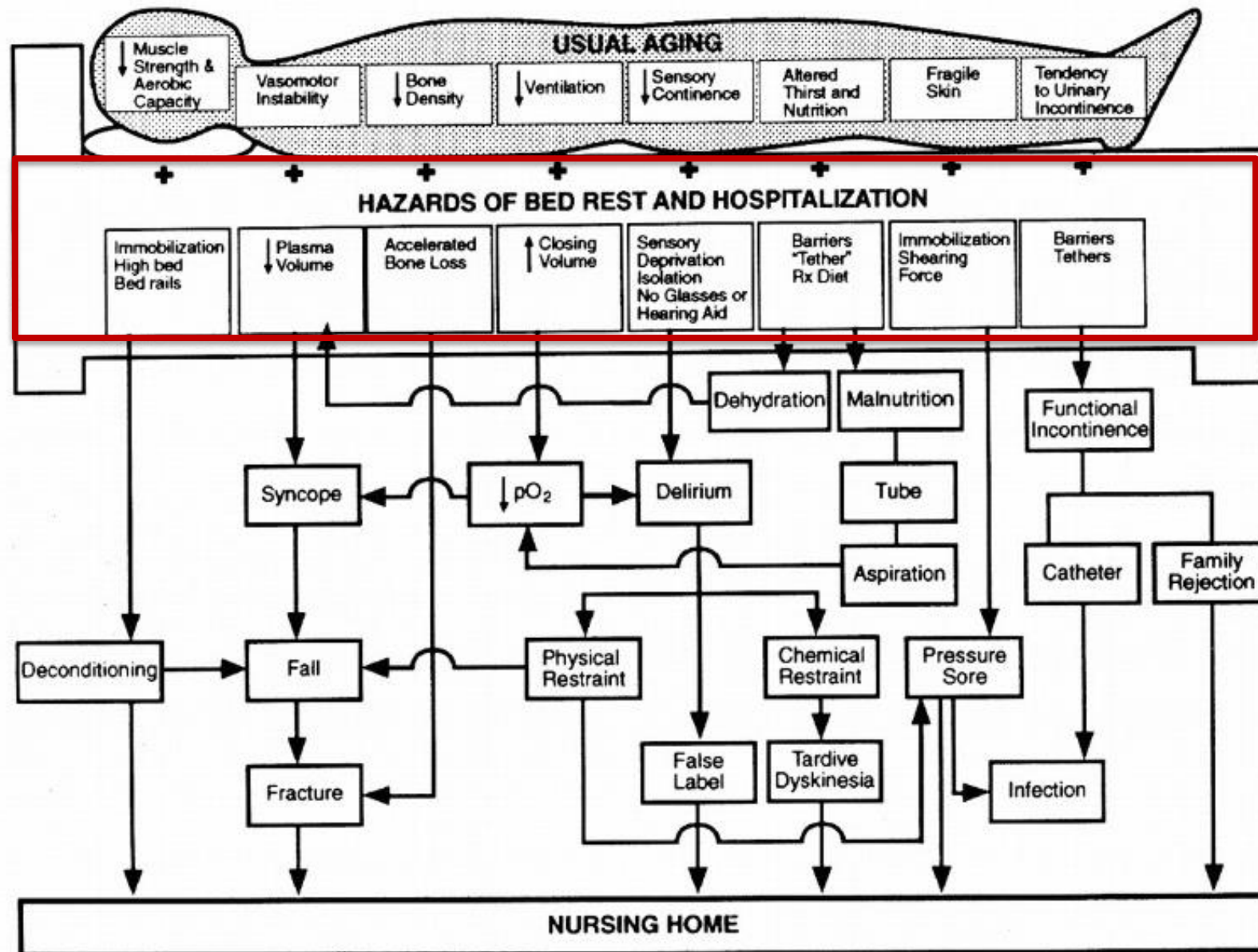


## Normal Aging

↓ Muscle strength

↓ Respiratory Function

↓ Nutrition



# Hospitalization

↓ Mobilization

↓ Plasma Volume

↑ Bone Loss



 Dehydration

 Delirium

↑ Fall

↓ Function status



# AGING

# *Frailty*

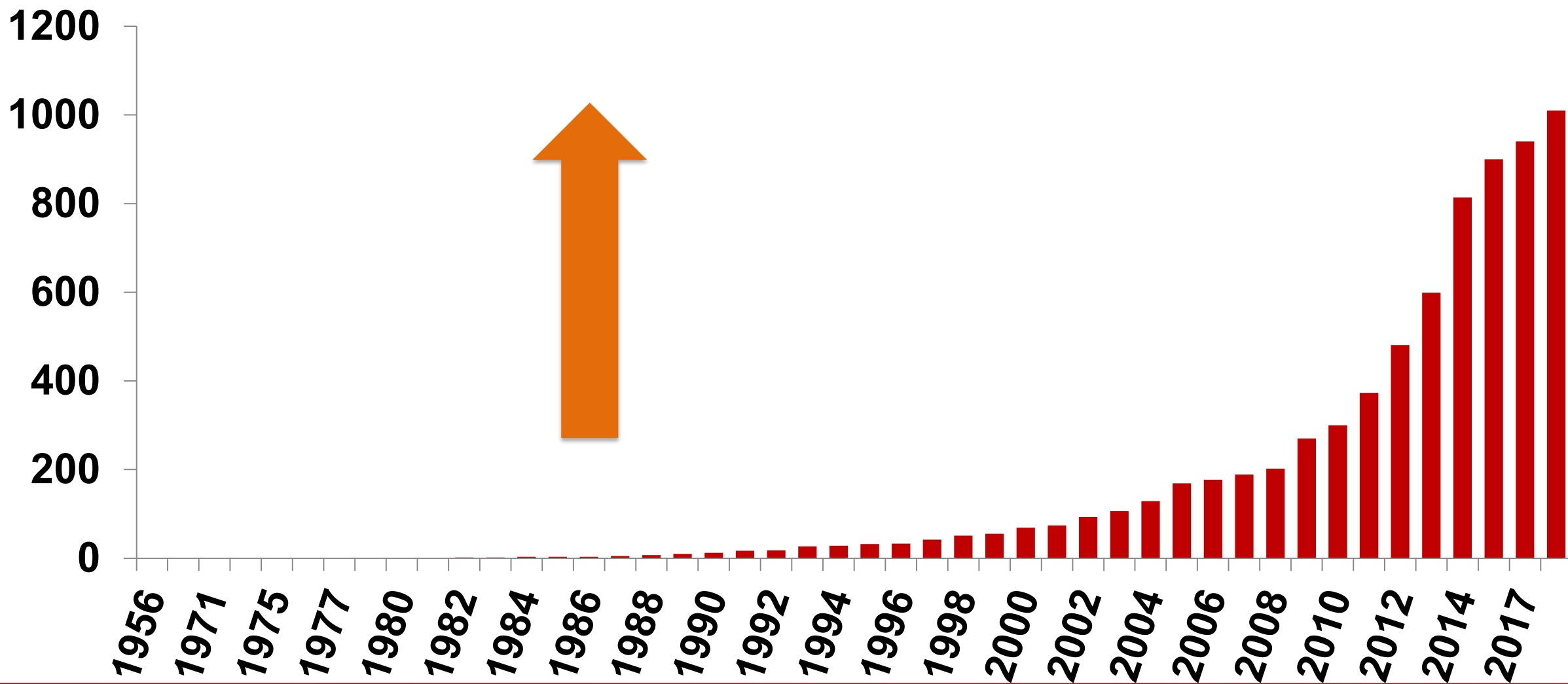


Which life are you designing?



## Frailty:

- Osteoporosis
- Weight loss
- Adverse drug reactions
- Cognitive impairment and dementia
- Disability





**F**IXING

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**R**EASONS

**A**GING

**I**NDIVIDUALS

**L**IVE

**T**IMELY CONSUMING

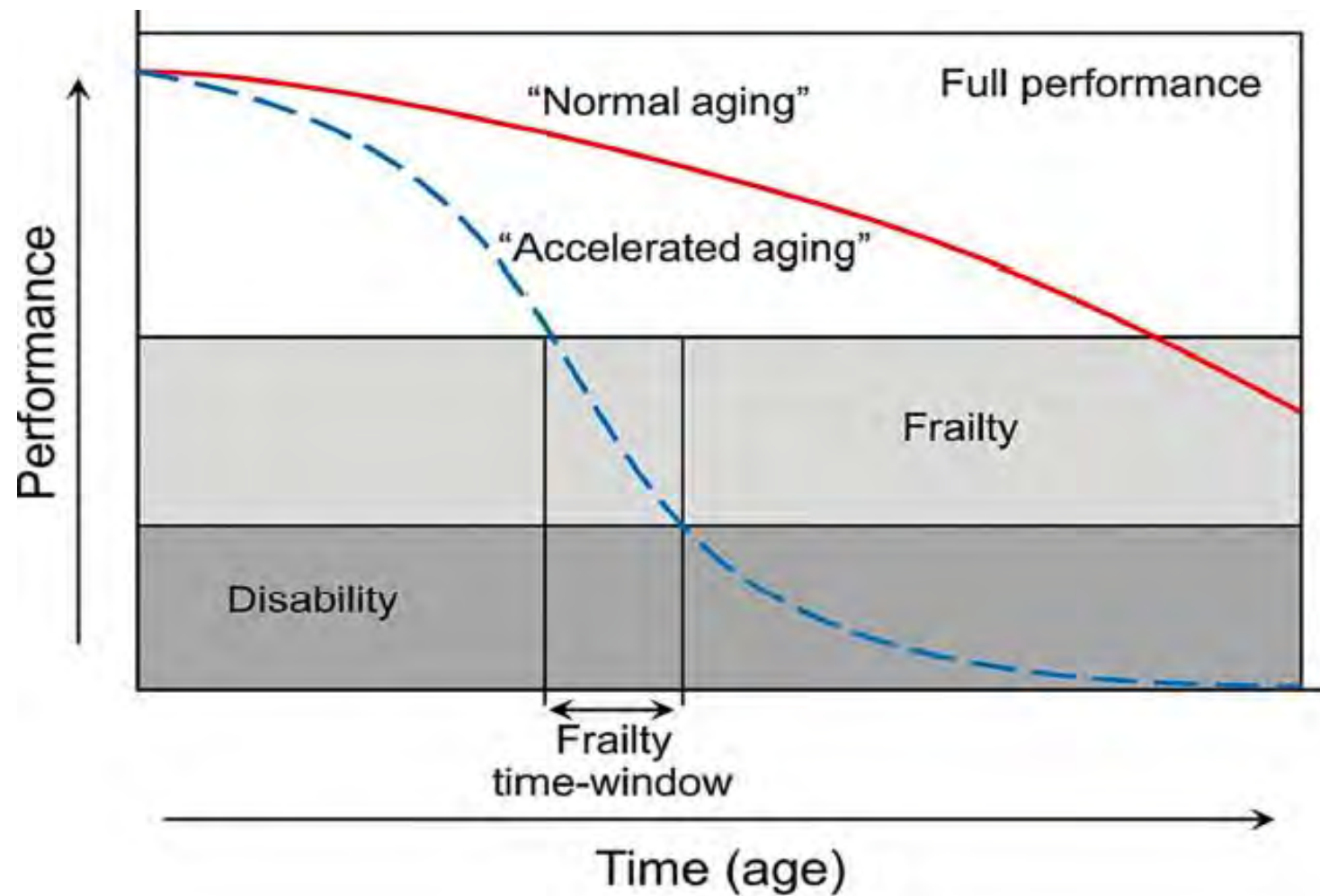
**Y**EARS

# FRAILITY

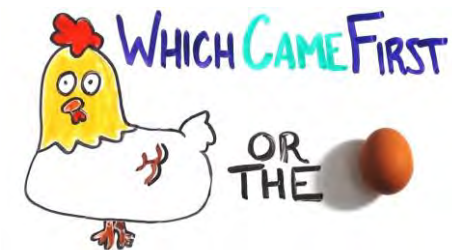
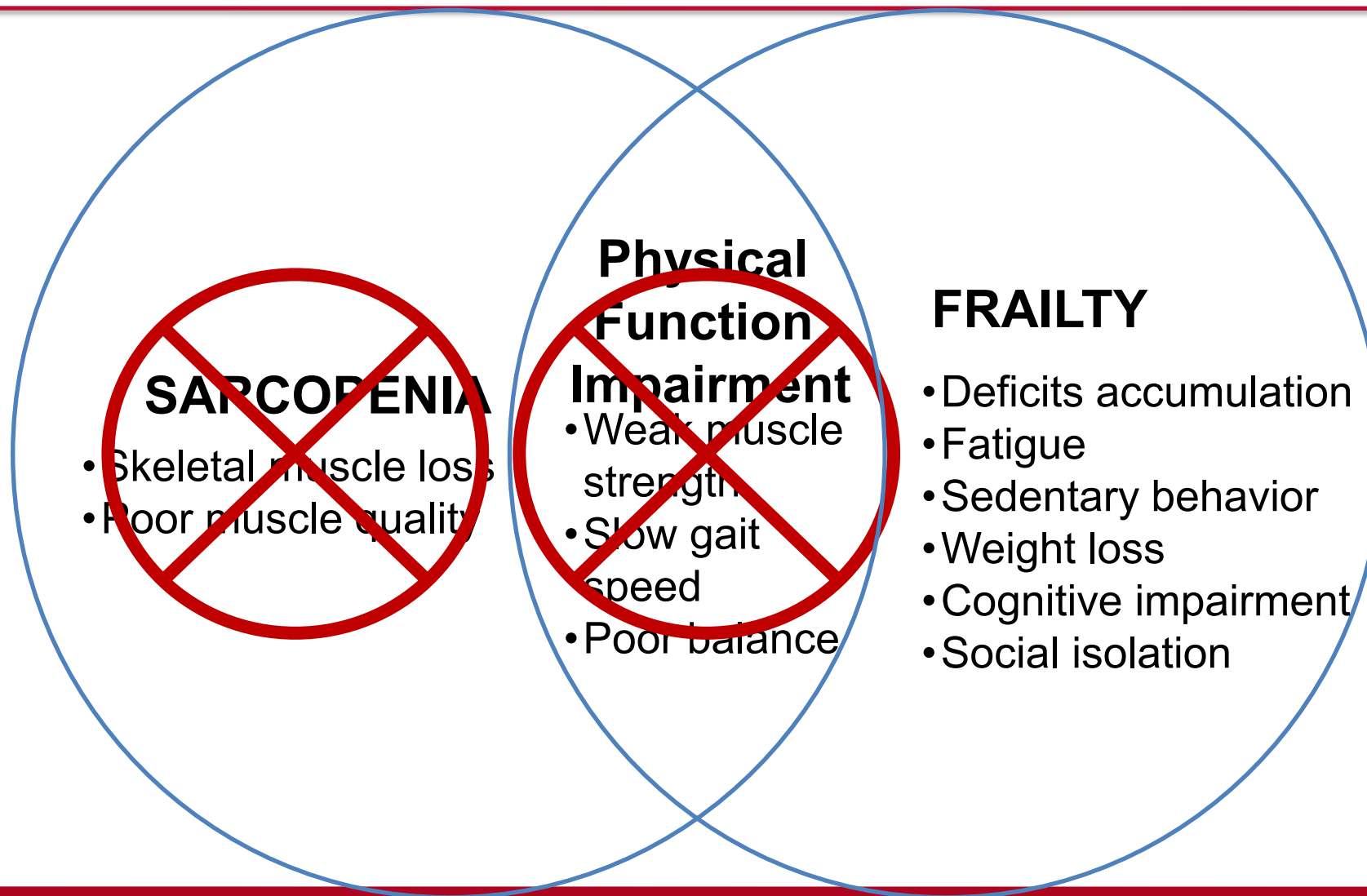
A syndrome of **Physiological Decline** that affects **all** organ systems.

- Clinically recognizable state with Increased Vulnerability
- Age-associated declines in physiologic reserve and function across multiple organ systems.
- **Independent** of
  - Age
  - Functional disability



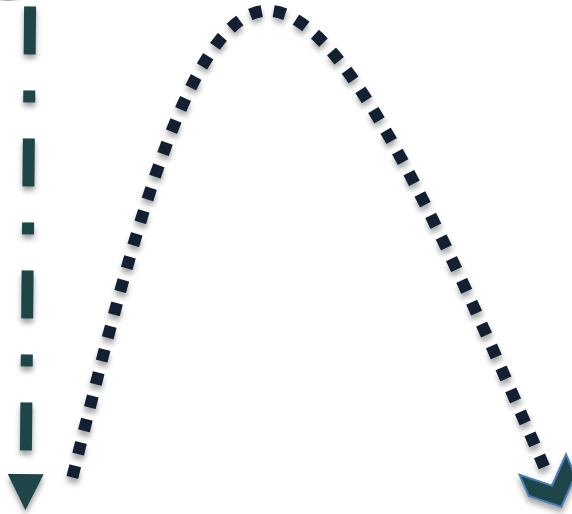




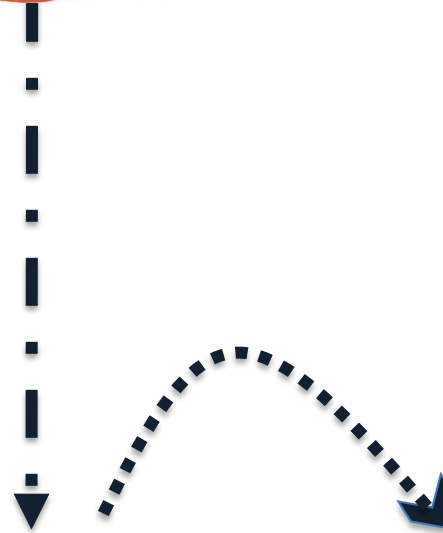


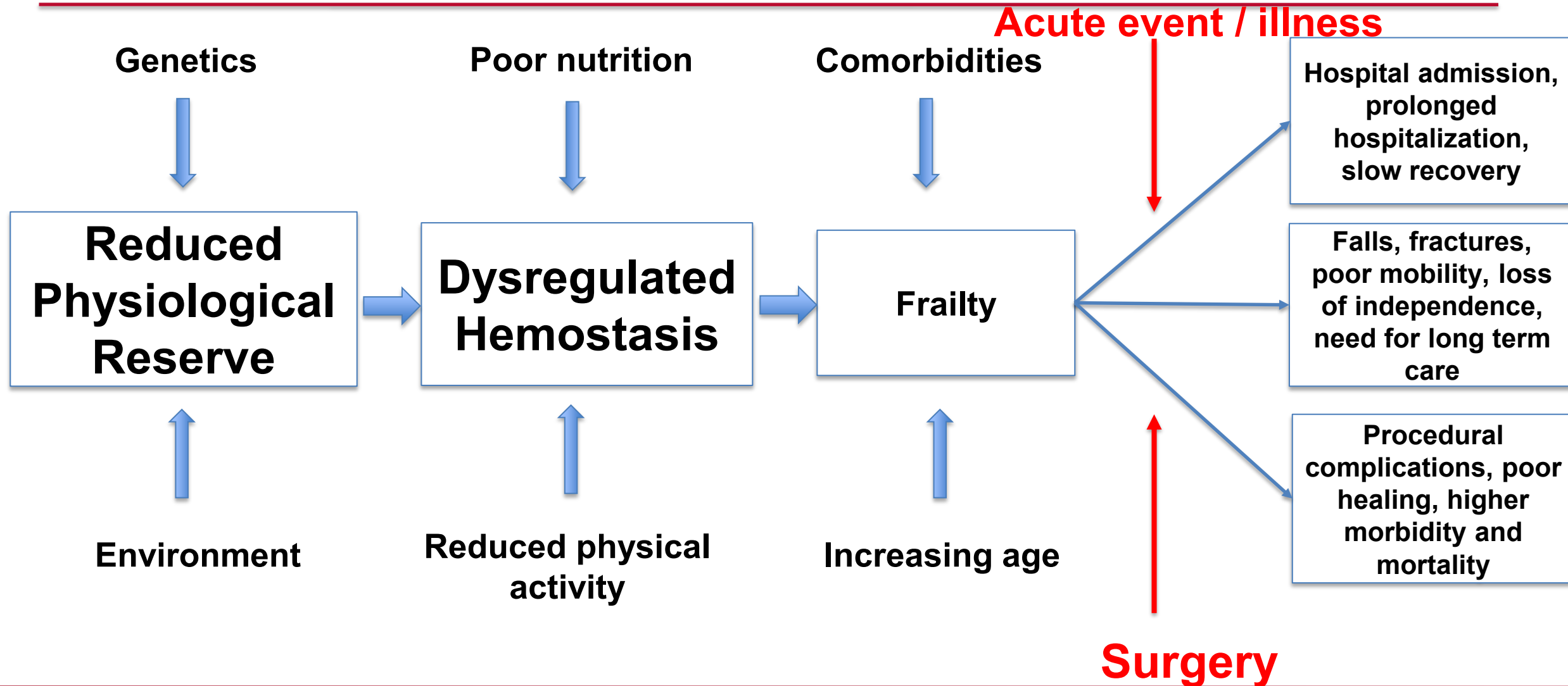


**Non-Frail**



**Frail**









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## FRIED'S Index

## ROCKWOOD'S

## ACS Frailty Score

### Frailty criteria

Weight loss

Exhaustion

Weakness

Slowness

Low physical activity level

Frailty

### Frailty Domains

Changes in everyday activity

Head and neck problems

Poor muscle tone in neck

Bradykinesia, facial

Problems getting dressed

Problems with bathing

Problems with grooming

Urinary incontinence

Problems with toileting

Bulk difficulties

Rectal problem

Gastrointestinal problems

Problems cooking

Sucking problems

Problem going out alone

Impaired mobility

Musculoskeletal problems

Bradykinesia of the limbs

Poor tone in limbs

Poor trunk coordination trunk

Poor standing posture

Irregular gait pattern

Falls

### FRAILTY SCORE: OPERA

#### Criteria

#### Definition

Shrinkage

Unintentional weight loss

Weakness

Decreased grip strength

Exhaustion

Self-reported poor energy

Low physical activity

Low weekly energy expenditure

Slowness

Slow walking

#### Interpretation of the Frailty Score

The patient receives 1 point for each criterion

0-1 = Not Frail

2-3 = Intermediate Frail (Pre-frail)

4-5 = Frail

Frail patients are at much higher risk of

Intermediate frail patients are at elevated risk of becoming frail at more than double the risk of becoming

See Appendix III for a more detailed description

### FRAILTY SCORE<sup>89,92</sup>

PATIENT RECEIVES ONE POINT FOR EACH CRITERION (0-5)

#### Frailty Criteria

#### Definition

Weight loss

Unintentional weight loss  $\geq 10$  pounds in the past year.

Decreased grip strength (Weakness)

Grip strength in the lowest 20th percentile by gender and BMI. Three trials are performed with a hand-held dynamometer and the average value is used.

#### Men

BMI	Kg Force
$\leq 24$	$\leq 29$
24.1-26	$\leq 30$
26.1-28	$\leq 30$
$> 28$	$\leq 32$

#### Women

BMI	Kg Force
$\leq 23$	$\leq 17$
23.1-26	$\leq 17.3$
26.1-29	$\leq 18$
$> 29$	$\leq 21$

Exhaustion

For the following two statements:

- "I felt that everything I did was an effort."
- "I could not get going."

The patient is asked: "How often in the last week did you feel this way?"

0 = rarely or none of the time ( $< 1$  day)

1 = some or a little of the time (1-2 days)

2 = a moderate amount of the time (3-4 days)

3 = most of the time

The criterion is met if patient answers 2 or 3 to either statement.

Low physical activity

Weekly energy expenditure, determined with the short version of the Minnesota Leisure Time Activities Questionnaire (see Taylor et al.<sup>125</sup>) in the lowest 20th percentile by gender:

**Men:**  $< 383$  kcal/week. **Women:**  $< 270$  kcal/week.

Slowed walking speed

Walking speed in the lowest 20th percentile by gender and height. Time is measured for a distance of 15 feet at normal pace. The average of three trials is used.

#### Men

Height	Time
$\leq 173$ cm	$\geq 7$ sec
$> 173$ cm	$\geq 6$ sec

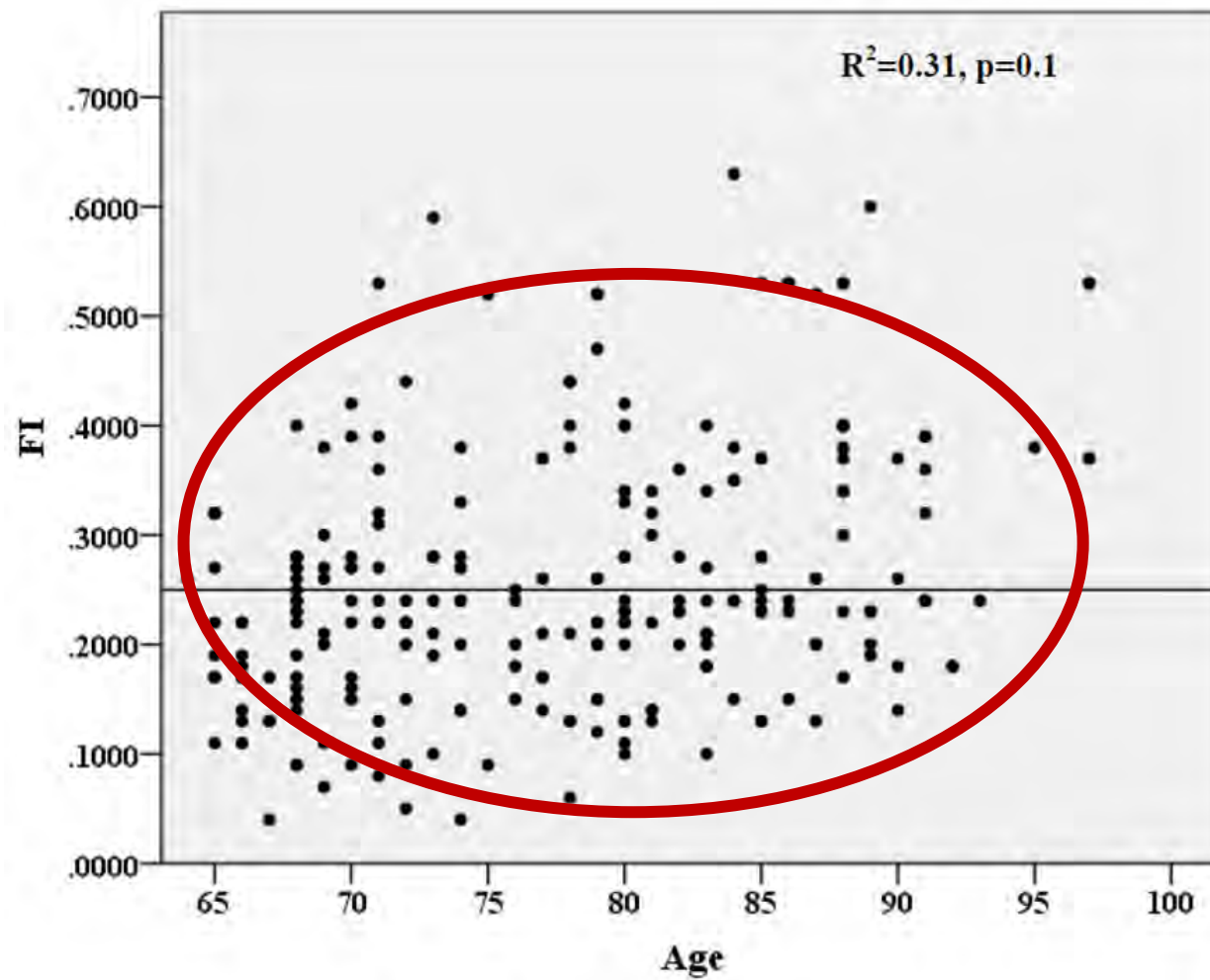
#### Women

Height	Time
$\leq 159$ cm	$\geq 7$ sec
$> 159$ cm	$\geq 6$ sec



Table 2. Trauma Specific Frailty Index (TSFI)	Table 2. EGS Specific Frailty Index (EGSFI)
Fifteen Variable Trauma Specific	Fifteen Variable EGS Specific Frailty Index
<b>Comorbidities</b> Cancer history YES (1) Coronary Heart Disease MI (1) Medication (0.25) Dementia Severe (1) No (0)	<b>Comorbidities</b> Cancer history YES (1) No (0) Hypertension YES (1) No (0) Coronary Heart Disease MI (1) CABG (0.75) PCI (0.5) Medication (0.25) None (0) Dementia Severe (1) Moderate (0.5) Mild (0.25) No (0)
<b>Daily Activities</b> Help with grooming Yes (1) Help managing money Yes (1) Help doing housework Yes (1) Help toileting Yes (1) Help walking Wheelchair (1) No (0)	<b>Daily Activities</b> Help with grooming Yes (1) No (0) Help managing money Yes (1) No (0) Help doing housework Yes (1) No (0) Help toileting Yes (1) No (0) Help walking Wheelchair (1) Walker (0.75) Cane (0.5) No (0)
<b>Health Attitude</b> Feel less useful Most time (1) Feel sad Most time (1) Feel effort to do everything Most time (1) Falls Within last month (1) Feel lonely Most time (1)	<b>Health Attitude</b> Feel less useful Most time (1) Sometimes (0.5) Never (0) Feel sad Most time (1) Sometimes (0.5) Never (0) Feel effort to do everything Most time (1) Sometimes (0.5) Never (0) Feel lonely Most time (1) Sometimes (0.5) Never (0)
<b>Function</b> Sexual active Yes (0)	<b>Function</b> Sexual active Yes (0) No (1)
<b>Nutrition</b> Albumin <3 (1)	<b>Nutrition</b> Albumin <3 (1) >3 (0)





# Novel Wearable Technology for Assessing Spontaneous Daily Physical Activity and Risk of Falling in Older Adults with Diabetes



## Frailty Meter™

### A SIMPLE ARM TEST TO ASSESS FRAILTY

Quantitative frailty assessment that does not require walking or self-rated health and activity measures



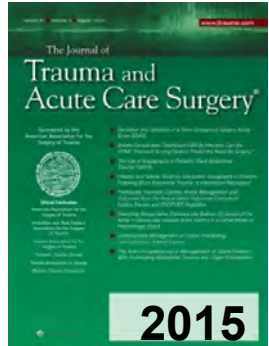
## FRAIL scale

- ☐ **F**atigue
- ☐ **R**esistance (ability to climb one flight of stairs)
- ☐ **A**mbulation (ability to walk one block)
- ☐ **I**llnesses (Greater than 5)
- ☐ **L**oss of Weight ( $>5\%$ )

0 = robuste / 1-2 = pre-frail /  $\geq 3$  = frail

# Injury In The Aged: Geriatric Trauma Care at the Crossroads

Rosemary A. Kozar, MD, PhD, Saman Arbabi, MD, MPH, Deborah M. Stein, MD, MPH, Steven R. Shackford, MD, Robert D. Barraco, MD, MPH, Walter L. Biffl, MD, Karen J. Brasel, MD, MPH, Zara Cooper, MD, MSc, Samir M. Fakhry et al/



- **No consensus** on which frailty score is best to use across all clinical settings
- **Scores lack feasibility** → require assessment of up to 30 to 70 variables
- Due to the limitations of current frailty measures → use functional status and sarcopenia as surrogate measures



# Prospective Evaluation And Comparison Of The Predictive Ability Of Different Frailty Scores To Predict Outcomes In Geriatric Trauma Patients

Mohammad Hamidi, MD, Muhammad Zeeshan, MD, Terence O'Keeffe, MD, Narong Kulvatunyou, MD, Andrew Tang, MD, Lynn Gries, MD, El-Rasheid Zakaria, MD, Bellal Joseph, MD



- 2-year Prospective
- 341 geriatric trauma patients
- TSFI, mFI, Rockwood FI, Frail Scale
- Outcomes
  - Predictive ability of each model

# Prospective Evaluation And Comparison Of The Predictive Ability Of Different Frailty Scores To Predict Outcomes In Geriatric Trauma Patients

Mohammad Hamidi, MD, Muhammad Zeeshan, MD, Terence O'Keeffe, MD, Narong Kulvatunyong, MD, Andrew Tang, MD, Lynn Gries, MD, El-Rasheid Zakaria, MD, Bellal Joseph, MD



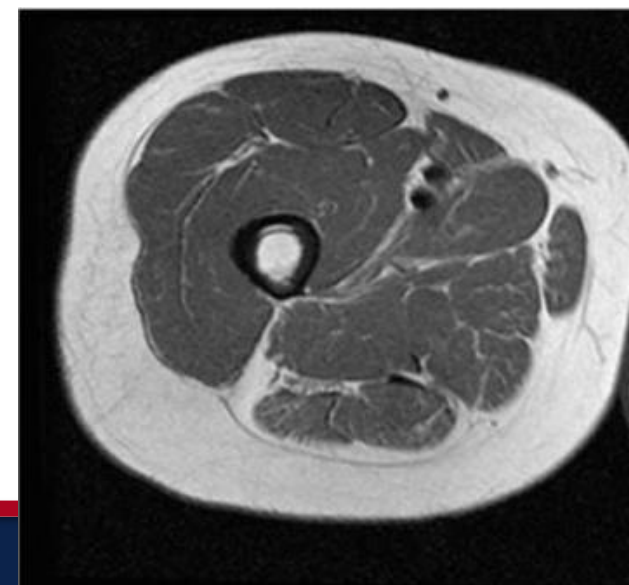
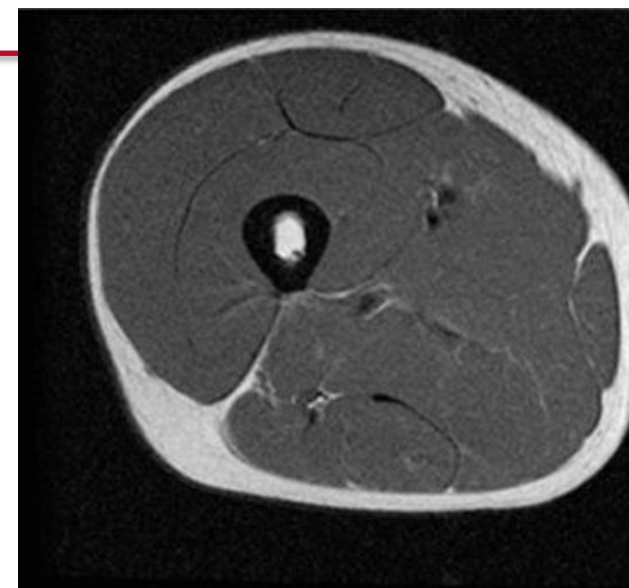
Outcomes	TSFI	RFS	mFI	FS
Complications	80%	81%	71%	70%
Mortality	84%	85%	74%	70%
Rehab/SNF Disposition	84%	82%	65%	61%
30-d Readmission	75%	76%	61%	60%

## THE IMPACT OF SARCOPENIA

NEARLY  
**25%** OF 65+ YEAR OLDS  
ARE AFFECTED BY  
SARCOPENIA<sup>6</sup>



**60%** OF 80+ YEAR OLDS  
ARE AFFECTED BY  
SARCOPENIA<sup>6</sup>





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# Can Sarcopenia Quantified by CT Scan Predict Adverse Outcomes in Emergency General Surgery?

Mohammad Hamidi, MD, Cathy Ho, MD, Muhammad Zeeshan, MD, Terence O'Keeffe, MD, Ali Hamza, MD, Narong Kulvatunyong, MD, Faisal Jehan, MD, and Bellal Joseph, MD



# Sarcopenia does not predict frailty

- 30d-outcomes





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**FRAILTY  
PUBLICATIONS  
5631**

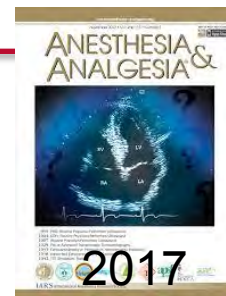
**FRAILTY &  
SURGERY  
595**



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# The Association of Frailty With Outcomes and Resource Use After EGS: A Population-Based Cohort Study

Mclsaac, Daniel I. MD, MPH, FRCPC; Moloo, Husein MD, FRCSC, MSc; Bryson, Gregory L. MD, MSc, FRCPC; van Walraven, Carl MD, FRCPC, MSc



## Frailty as a Risk Predictor of Morbidity and Mortality Following Liver Surgery

Faiz Gani, Marcelo Cerullo, Neda Amini, Stefan Buettner, Georgios A. Margonis, Kazunari Sasaki, Yuhree Kim,

## Frailty, Aging, and Cardiovascular Surgery

Graham, Antonio DO; Brown, Charles H. IV MD, MHS



## Comparison of Frailty Measures as Predictors of Outcomes After Orthopedic Surgery

## Superiority of Frailty Over Age in Predicting Outcomes Among Geriatric Trauma Patients: A Prospective Analysis

Bellal Joseph, MD, Viraj Pandit, MD, Bardiya Zangbar, MD, Narong Kulvatunyoo, MD, Ammar Hashmi, MD, Donald J. Green, MD, Terence O'Keeffe, MB, ChB1, Andrew Tang, MD, Gary Vercruysse, MD, Mindy J. Fain, MD, Randall S. Friesse, MD, and Peter Rhee, MD

JAMA Surgery

2014

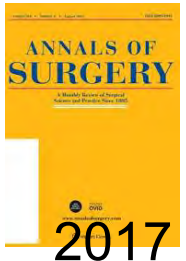


## Frailty Predicts Increased Hospital And 6-month Healthcare Cost Following Colorectal Surgery In Older Adults

Thomas N. Robinson, M.D., F.A.C.S, Daniel S. Wu, M.D, Gregory V. Stiegmann, M.D., F.A.C.S., and Marc Moss, M.D.cMD, MSc

## Frailty, Length of Stay, and Mortality in Kidney Transplant Recipients: A National Registry and Prospective Cohort Study

McAdams-DeMarco, Mara A. PhD; King, Elizabeth A. MD; Luo, Xun MD, MPH; Haugen, Christine et al



## Assessing Risk of Critical Care Complications and Mortality in the Elective Bariatric Surgery Population Using a Modified Frailty Index





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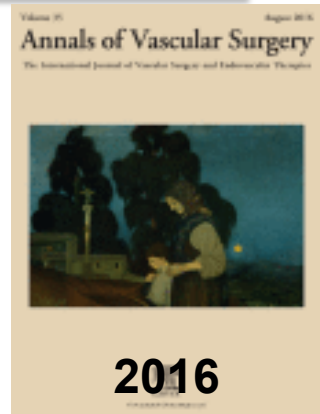
...and i should care,  
why?





# Simplified **Frailty** Index to Predict Adverse Outcomes and **Mortality** in Vascular Surgery Patients

Joseph Karam, Athanasios Tsiouris, Alexander Shepard, Vic Velanovich, and Ilan Rubinfeld



# Simple **Frailty** Score Predicts Postoperative **Complications** Across Surgical Specialties

Thomas N. Robinson, M.D., F.A.C.S., Daniel S. Wu, M.D., Lauren Pointer, M.S., Christina L. Dunn, B.A., Joseph C. Cleveland Jr., M.D., and Marc Moss

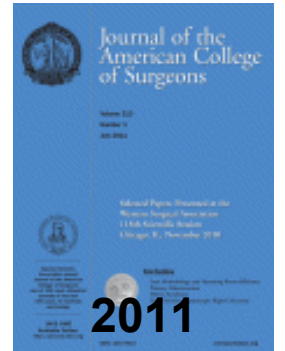


# The Impact Of **Frailty** On **Failure-to-rescue** In Geriatric EGS Patients: A Prospective Study



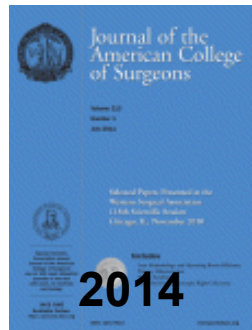
# Accumulated **Frailty** Characteristics Predict Postoperative **Discharge Institutionalization** in the Geriatric Patient

Thomas N. Robinson, MD, FACS, Jeffrey I. Wallace, MD, Daniel S. Wu, MD, Arek Wiktor, MD et al.



# The Association of **Frailty** With Outcomes and **Resource** Use After EGS: A Population-Based Cohort Study

Mclsaac, Daniel I. MD, MPH, FRCPC; Moloo, Husein MD, FRCSC, MSc; Bryson, Gregory L. Et al



# Prospective Evaluation of **Delirium** in Geriatric Patients Undergoing Emergency General Surgery

# Superiority of Frailty Over Age in Predicting Outcomes Among Geriatric Trauma Patients: A Prospective Analysis

Bellal Joseph, MD, Viraj Pandit, MD, Bardiya Zangbar, MD, Narong Kulvatunyou, MD, Ammar Hashmi, MD, Donald J. Green, MD, et al



# The Impact Of Frailty On Failure-to-rescue In Geriatric Trauma Patients: A Prospective Study

Joseph B, Phelan H, Hassan A, Orouji Jokar T, O'Keeffe T, Azim A, Gries L, Kulvatunyou N, Latifi R, Rhee P.

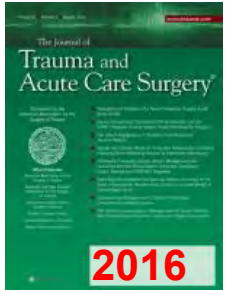


# Preinjury Physical Frailty And Cognitive Impairment Among Geriatric Trauma Patients Determine Post Injury Functional Recovery And Survival



# Predicting Hospital Discharge Disposition In Geriatric Trauma Patients: Is Frailty The Answer?

Joseph, Bellal MD; Pandit, Viraj MD; Rhee, Peter MD; Aziz, Hassan MD; Sadoun, Moutamn MD; Wynne, Julie MD et al



# Redefining The Association Between Old Age And Poor Outcomes After Trauma: The Impact Of Frailty Syndrome.

Joseph, Bellal MD; Orouji Jokar, Tahereh MD; Hassan, Ahmed MD; Azim, Asad MD; Mohler, Martha Jane PHD, MPH et al







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- Narong Kulavattanyou, MD, Usab Haider, MD, Rob A. Phelan, MD, Mindy Fain, MD,  
Martha Jane Mohler, PhD, MPH, and Bellal Joseph, MD Tucson, Arizona

- AAST Continuing Medical Education Article

- ## Pressure Information

- AMERICAN COLLEGE OF SURGEONS**  
*Inspiring Quality.  
Highest Standards. Better Outcomes.*

- ## Objectives

To claim credit, please visit the AAST website at [www.aast.org](http://www.aast.org) and click on the "e-Learning MOC" tab. You must read the article, successfully complete the post-test and evaluation. Your CME certificate will be available immediately upon receiving a passing score of 75% or higher on the post-test. Post-tests receiving a score of below 75% will require a retake of the test to receive credit.

## A Prospective Analysis

- Belal Joseph, MD; Aray Pandit, MD; Barbra Zangbar, MD; Narong Kulwattana, MD; Ammar Hashmi, MD; Donald J. Green, MD; Terence O'Keeffe, MB, ChB; Andrew Tang, MD; Gary Vercautse, MD; Mindy J. Fain, MD; Randall S. Fries, MD; Peter Rhee, MD

- IMPORTANCE** The Frailty Index (FI) is a known predictor of adverse outcomes in geriatric patients. The usefulness of the FI as an outcome measure in geriatric trauma patients is unknown.

- ## Trauma Specific Frailty

- ## Outcomes:

- ## In-hospital complications

- ## Adverse disposition

# FRAIL STATUS:

Emergency general surgery specific frailty index: A validation study

Tahereh Orouji Jokar, MD, Kareem Ibraheem, MD, Peter Rhee, MD, MPH, Narong Kulvatanyou, MD, Ansab Haider, MD, Herb A. Phelan, MD, Mindy Fain, MD, Martha Jane Mohler, PhD, MPH, and Belal Joseph, MD, Tucson, Arizona

- Higher rates of complications (x2)

- Prolonged hospital length of stay (x3)

- Higher odds of discharge to SNF/LTAC (x2)

- Higher mortality (22% vs 2%)

# Age was not a predictor of outcomes when controlled for frailty

## Superiority of Frailty Over Age in Predicting Outcomes Among Geriatric Trauma Patients A Prospective Analysis

Belal Joseph, MD, Viraj Pandit, MD, Bardiya Zangbar, MD, Narong Kulvatanyou, MD, Ammar Hashmi, MD, Donald J. Green, MD, Terence O'Keeffe, MB, ChB, Andrew Tang, MD, Gary Vercruysse, MD, Mindy J. Fain, MD, and Peter S. Rhee, MD

**IMPORTANCE** The Frailty Index (FI) is a known predictor of adverse outcomes in geriatric patients. The usefulness of the FI as an outcome measure in geriatric trauma patients is unknown.

**OBJECTIVE** To assess the utility of the FI as an effective assessment tool in predicting adverse outcomes in geriatric trauma patients.

**DESIGN, SETTING, AND PARTICIPANTS** A 2-year (June 2011 to February 2013) prospective cohort study at a level I trauma center at the University of Arizona. We prospectively enrolled 250 geriatric trauma patients. Geriatric patients were defined as those 65 years of age or older. Frailty was defined using the FI, a validated tool that uses 30 admission frailty variables. Frailty in patients was defined by an FI of 0.25 or higher.

**MAIN OUTCOMES AND MEASURES** The primary outcome measure was in-hospital complications. The secondary outcome measure was adverse discharge disposition. In-hospital complications were defined as cardiac, pulmonary, infectious, hematologic, renal, and reoperation. Adverse discharge disposition was defined as discharge to a skilled nursing facility or in-hospital mortality. Multivariate logistic regression was used to assess the relationship between the FI and outcomes.

**RESULTS** In total, 250 patients were enrolled, with a mean (SD) age of 77.9 (8.1) years, median Injury Severity Score of 15 (range, 9-18), median Glasgow Coma Scale score of 15 (range, 12-15), and mean (SD) FI of 0.21 (0.10). Forty-four percent (n = 110) of patients had frailty. Frailty was associated with in-hospital complications (OR = 2.0, 95% CI = 1.2-3.4, P = .001). The mortality rate was 2.0% (n = 5), and all patients who died had frailty.

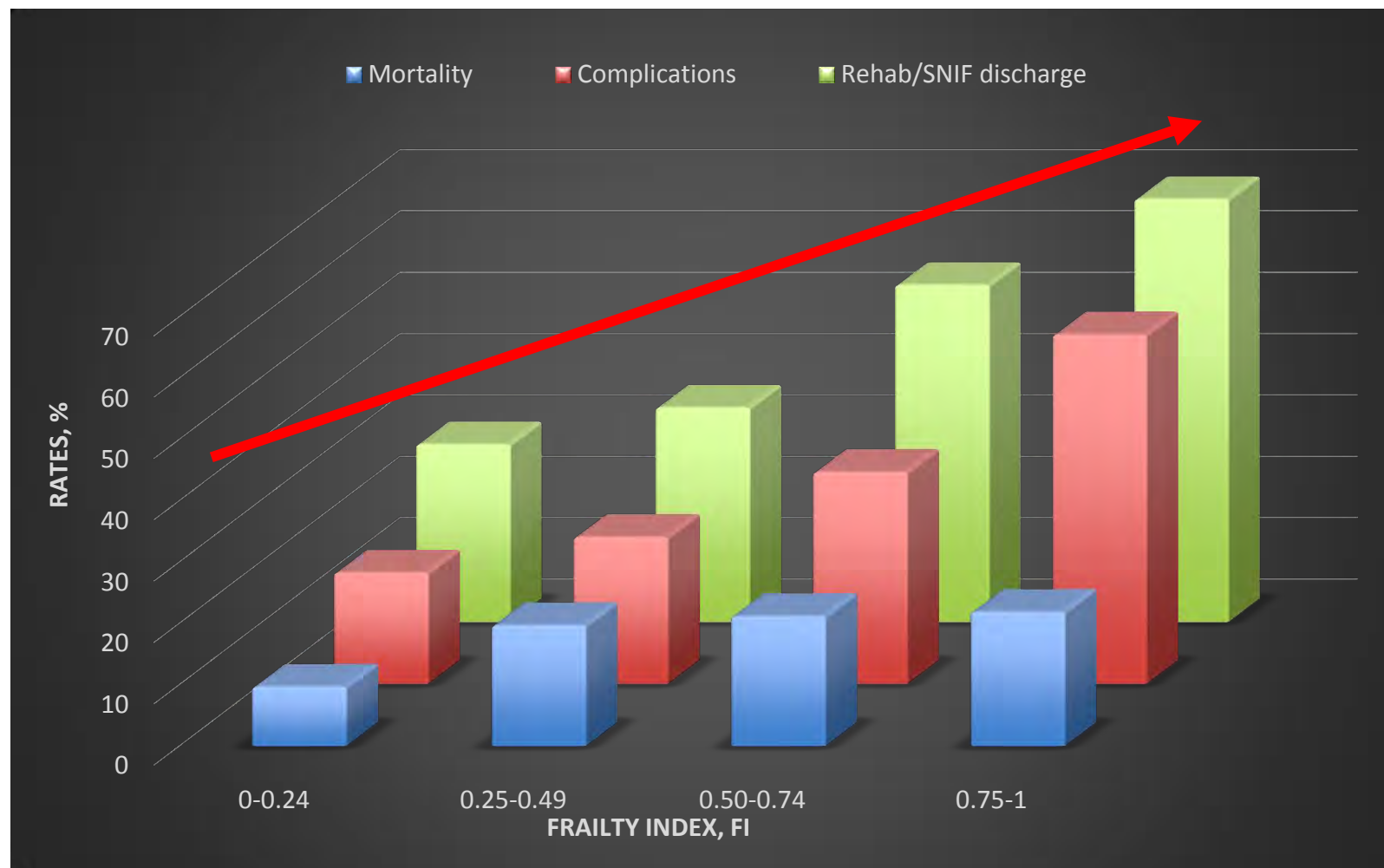
**CONCLUSIONS AND RELEVANCE** The FI is an independent predictor of in-hospital complications and adverse discharge disposition in geriatric trauma patients. This index should be used as a clinical tool for risk stratification in this patient group.

## The Impact of Frailty on Outcomes after Trauma in Critically Ill Geriatric Patients Admitted to Intensive Care Unit

Mohammad Hamidi, MD, Terence O'Keeffe, MD, Muhammad Zeeshan, MD, Narong Kulvatunyou, MD, Andrew Tang, MD, Gary Vercruysse, MD, Arpana Jain, MD, and Bellal Joseph, MD

- 5-year retrospective national database analysis
- 88629 geriatric trauma patients admitted to ICU (66% TBI patients).
- Frailty: CSHA-FI 11 variables
- **Outcomes:**
  - Complications
  - Mortality
  - Unfavorable discharge disposition (Rehab/SNF)









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# Measure Quality





Available online at [www.sciencedirect.com](http://www.sciencedirect.com)  
**ScienceDirect**  
 journal homepage: [www.JournalofSurgicalResearch.com](http://www.JournalofSurgicalResearch.com)



- Prospective, single center
- 326 EGS patients
- EGS Specific Frailty Index
- Outcomes:
  - Failure to rescue

## Failure to rescue after emergency general surgery in geriatric patients for trauma

Muhammad Khan, MD,<sup>a</sup> Faisal Jehan, MD,<sup>a</sup> Muhammad Zeeshan, MD,<sup>a</sup> Muhammad Zeeshan, MD,<sup>b</sup> Muhammad Zeeshan, MD,<sup>b</sup> Faisal Jehan, MD, FACS,<sup>a</sup> and Bellal Joseph, MD, FACS<sup>a,\*</sup>

<sup>a</sup> Division of Trauma, Critical Care, Emergency Surgery, and Burns, Department of Surgery, University of Arizona,

### ARTICLE INFO

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 Failure to rescue  
 FTR  
 Frailty  
 EGS

### ABSTRACT

**Background:** Failure to rescue (FTR) is considered as an index of quality of care provided by a hospital. However, the role of frailty in FTR remains unclear. We hypothesized that the FTR rate is higher for frail geriatric emergency general surgery (EGS) patients than nonfrail geriatric EGS patients.  
**Methods:** We performed a 3-y (2015-2017) prospective cohort study of all geriatric patients (age > 65 y) requiring EGS. Frailty was calculated by using the EGS-specific Frailty Index (FI). Patients were divided into two groups: frail (FI ≥ 0.325) and nonfrail (FI < 0.325). FTR was defined as death from a major complication. Regression analysis was performed to control for demographics, type of operative intervention, admission vitals, and admission laboratory values.  
**Results:** Three hundred twenty-six geriatric EGS patients were included, of which 38.9% were frail. Frail patients were more likely to be white ( $P < 0.01$ ) and, on admission, had a higher American Association of Anesthesiologist class ( $P = 0.03$ ) and lower serum albumin ( $P < 0.01$ ). However, there was no difference between the groups regarding age ( $P = 0.54$ ), gender ( $P = 0.56$ ), admission vitals, and WBC count ( $P = 0.35$ ). Overall, 36.7% ( $n = 85$ ) of patients developed in-hospital complications; and mortality occurred in 30% ( $n = 26$ ) of those patients (i.e., the FTR group). Frail patients had higher rates of FTR (34% vs. 4%,  $P < 0.001$ ) than nonfrail patients. On regression analysis, after controlling for confounders, frail status was an independent predictor of FTR (OR: 3.4 [2.3-4.6]) in geriatric EGS patients.  
**Conclusions:** Our study demonstrates that in geriatric EGS patients, a frail status independently contributes to FTR and increases the odds of FTR threefold compared with nonfrail status. Thus, it should be included in quality metrics for geriatric EGS patients.

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### WTA 2016 PLENARY PAPER

## The impact of frailty on failure-to-rescue in geriatric trauma patients: A prospective study

Bellal Joseph, MD, Herb Phelan, MD, MPH, Ahmed Hassan, MD, Tahereh Orouji Jokar, MD, Terence O'Keefe, MD, Assad Azimi, MD, Ron Grier, MD, Narang Kalyanaram, MD, Peter ...

AAST Continuing Medical Education Article

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After reading the featured article published in the *Journal of Trauma and Acute Care Surgery*, participants should be able to demonstrate increased understanding of the material specific to the article. Objectives for each article are featured at the beginning of each article and online. Test questions are at the end of the article, with a critique and specific location in the article referencing the question topic.

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 From the Department of Surgery (B.J., A.H., T.O., T.O.K., A.A., L.G., N.K., R.J., P.S.), Division of Trauma, Critical Care, Burns and

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JSR

2018

# FRAIL STATUS:

## Failure to rescue (FTR) in geriatric patients

Muhammad Khan, MD,<sup>a</sup> Faisal Jehan, MD,<sup>a</sup> Muhammad Zeeshan, MD,<sup>a</sup> Narong Kulvatunyou, MD, FACS,<sup>a</sup> Mindy J. Fain, MD,<sup>b</sup> Abdul Tawab Saljuqi, MD,<sup>a</sup> Terence O'Keeffe, MD,<sup>a</sup> and Bellal Joseph, MD, FACS<sup>a,\*</sup>

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Frailty  
EGS

### ABSTRACT

**Background:** Failure to rescue (FTR) is a leading cause of death in geriatric patients. However, the role of frailty in FTR is not well understood. We hypothesized that the FTR rate is higher for frail geriatric emergency general surgery (EGS) patients than nonfrail geriatric EGS patients.

**Methods:** We performed a 3-y (2015-2017) prospective cohort study of all geriatric patients (age > 65 y) requiring EGS. Frailty was calculated by using the Frailty-specific Frailty Index (FSFI) within 24 h of admission. Patients were divided into two groups: frail (FSFI > 0.325) and nonfrail (FSFI < 0.325). We defined FTR as death from a major complication. Regression analysis was performed to control for demographics, type of operative intervention, comorbidities, and laboratory values. Results: A total of 100 geriatric EGS patients were included. The frail group (n = 35) had higher American Association of Anesthesiologists class (P = 0.03) and lower albumin (P < 0.01). However, there was no difference between the groups regarding age (P = 0.54), gender (P = 0.56), admission vitals, and WBC count (P = 0.35). Overall, 36.7% (n = 35) of patients developed in-hospital complications; and mortality occurred in 30% (n = 26) of those patients (i.e., the FTR group). Frail patients had higher rates of FTR (34% vs. 4%, P < 0.001) than nonfrail patients. On regression analysis, after controlling for confounders, frail status was an independent predictor of FTR (OR: 3.4 [2.3-4.6]) in geriatric EGS patients. **Conclusions:** Our study demonstrates that in geriatric EGS patients, a frail status independently contributes to FTR and increases the odds of FTR threefold compared with nonfrail status. Thus, it should be included in quality metrics for geriatric EGS patients.

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• EGS: 19% vs 4%

• Trauma: 15% vs 5%

• Independent predictor of FTR [OR~3]

WTA 2016 PLENARY PAPER

## The impact of frailty on failure-to-rescue in geriatric trauma patients: A prospective study

Bellal Joseph, MD, Herb Phelan, MD, MPH, Ahmed Hassan, MD, Tahereh Orouji Jokar, MD, Terence O'Keeffe, MD, Asad Azim, MD, Lynn Gries, MD, Narong Kulvatunyou, MD, Rifat Latifi, MD, and Peter Rhee, MD, MPH, Tucson, Arizona

AAST Continuing Medical Education Article

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### Objectives

After reading the featured article published in the *Journal of Trauma and Acute Care Surgery*, the reader should be able to: understand the impact of frailty on failure-to-rescue in geriatric trauma patients; identify the factors that contribute to failure-to-rescue in geriatric trauma patients; and describe the role of frailty in failure-to-rescue in geriatric trauma patients.

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### Conflict of Interest

The authors have nothing to disclose.

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# Long term outcome



Eating



Bathing



Dressing



Transferring

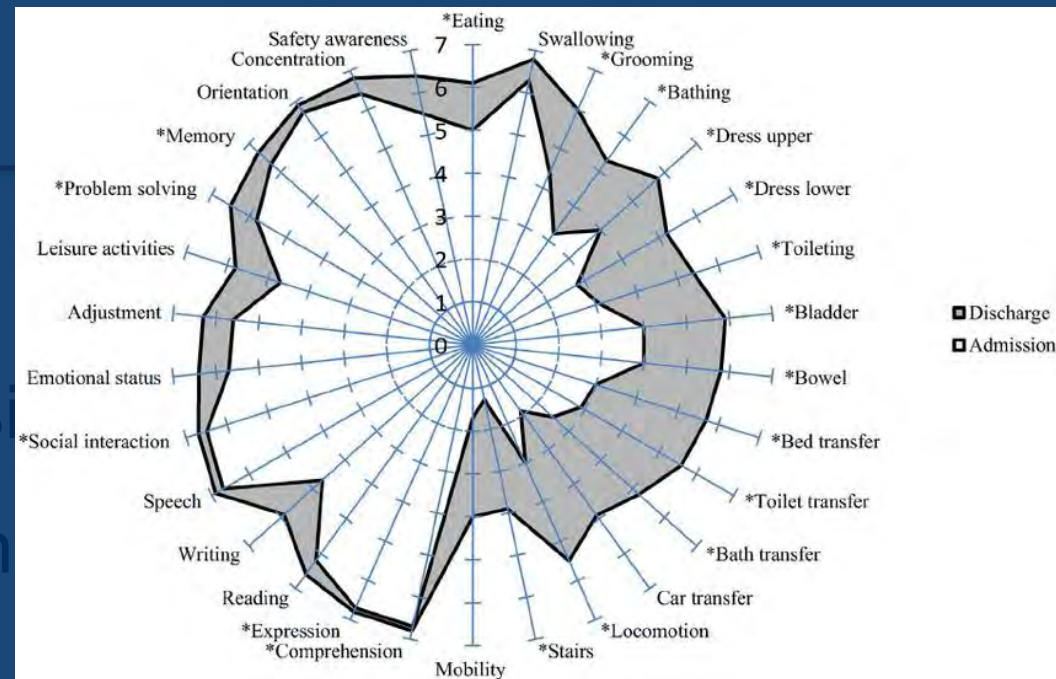


Toileting



Walking or  
moving around





of frailty and functional independence in older

Muhammad Zeeshan <sup>a</sup>, Terence O'Keeffe <sup>a</sup>, Bryn Nisbet <sup>b</sup>,  
Nikolich-Zugich <sup>c</sup>, Muhammad Khan <sup>a</sup>, Narong Kulvatanyou <sup>a</sup>,

<sup>a</sup> Surgery and Burns, Department of Surgery, College of Medicine, University of Arizona, Tucson, AZ, USA

<sup>b</sup> Tucson, USA

<sup>c</sup> Section of Geriatrics, General Internal Medicine and Palliative Medicine, University of Arizona, Tucson, AZ, USA

FIM	Non-Frail	Pre-Frail	Frail	<i>p</i>
Admission FIM	11.98 ± 0.14	11.96 ± 0.18	11.81 ± 0.52	0.004
Discharge FIM	11.20 ± 0.80	11.14 ± 1.51	10.32 ± 2.14	0.002
Delta FIM	-0.78 ± 0.81	0.82 ± 1.51	-1.48 ± 2.1	0.013

- Prospective, single center study

Variables	Non-Frail (n=99)	Pre-Frail (n=84)	Frail (n=97)	<i>p</i>
Trauma readmission	4%	14%	40%	0.01
Recurrent Falls	5%	13%	65%	0.03
No. of falls	0[0-1]	0[0-3]	2[0-4]	0.01
Mortality	1%	3.5%	8.2%	0.04

- Recurrent falls



# The Impact Of Frailty On Quality Of Life In The Geriatric Trauma Population: A Prospective Study

Chelsea Santino, MS, Muhammad Zeeshan, MD, Terence O’Keeffe, MD, Mohammad Hamidi, MD, Narong Kulvatunyou, MD, Andrew Tang, MD, Gary Vercruysse, MD, Arpana Jain, MD, and Bellal Joseph, MD



- 1 year prospective, single-center cohort study
- 296 trauma patients
- TSFI
- Short Form 36
- **Outcomes:** Quality of Life at discharge & Quality of Life at 30d after discharge

# The Impact Of Frailty On Quality Of Life In The Geriatric Trauma Population: A Prospective Study

Chelsea Santino, MS, Muhammad Zeeshan, MD, Terence O’Keeffe, MD, Mohammad Hamidi, MD,  
 Narong Kulvatunyou, MD, Andrew Tang, MD, Gary Vercruysse, MD, Arpana Jain, MD, and Bellal  
 Joseph, MD



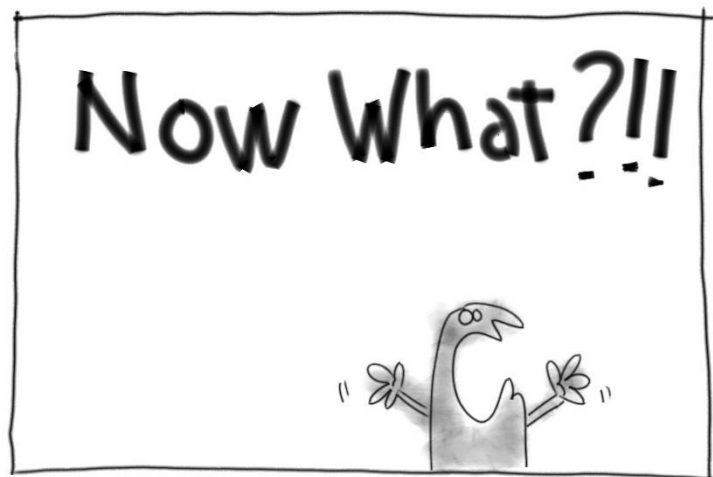
Variables	Frail (n=50)	Non-Frail (n=50)	P-Value
HRQoL at discharge, (mean $\pm$ SD)	366 $\pm$ 81	547 $\pm$ 54	<0.01
30-d Post Discharge HRQoL, (mean $\pm$ SD)	393 $\pm$ 74	743 $\pm$ 32	<0.01
Delta HRQoL (mean $\pm$ SD)	21 $\pm$ 16	196 $\pm$ 38	<0.01
P-value	0.11	<0.01	

# Geriatric Acute Care Surgery





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# MANAGE THE DAMAGE





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# GERIATRIC TRAUMA OPTIMIZATION



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# GERIATRIC SPECIFIC EDs

## Geriatric Emergency Department Accreditation Program

GEDA was developed by leaders in emergency medicine to ensure that our older patients receive well-coordinated, quality care at the appropriate level at every ED encounter.

### Level 3

**Level 3** accreditation signifies excellence in older adult care as represented by one or more geriatric-specific initiatives that are reasonably expected to elevate the level of elder care in one or more specific areas.

### Level 2

**Level 2** accreditation identifies sites that have integrated and sustained older adult care initiatives into daily operations.

### Level 1

**Level 1** accreditation defines an ED with policies, guidelines, procedures, and staff (both within the ED and throughout the institution) providing a coherent system of care targeting and measuring specific ED outcomes for older adults

# GERIATRIC SPECIFIC EDs

---

- Began appearing in the US in **2008** and have become increasingly common
- **Multi-disciplinary team** of care providers focused on the needs of the geriatric population
- **Staffing enhancements:** availability of
  - Specialized nurses
  - Specialized Pharmacists
  - Social workers
  - Geriatric consultation services in the ED



# GERIATRIC SPECIFIC EDs

- Main goals → ↓ **hospital admissions**
- **Discharge protocols:** facilitate communication with outpatient care providers
- Provides **appropriate outpatient follow up** (telephone/telemedicine)
- **Geriatric Program Quality Improvement Plan**
  - Geriatric volume
  - Admission and readmission rates





# MANAGEMENT PLAN



## PREVENTION

### Triage



### Assessment



### In-hospital management

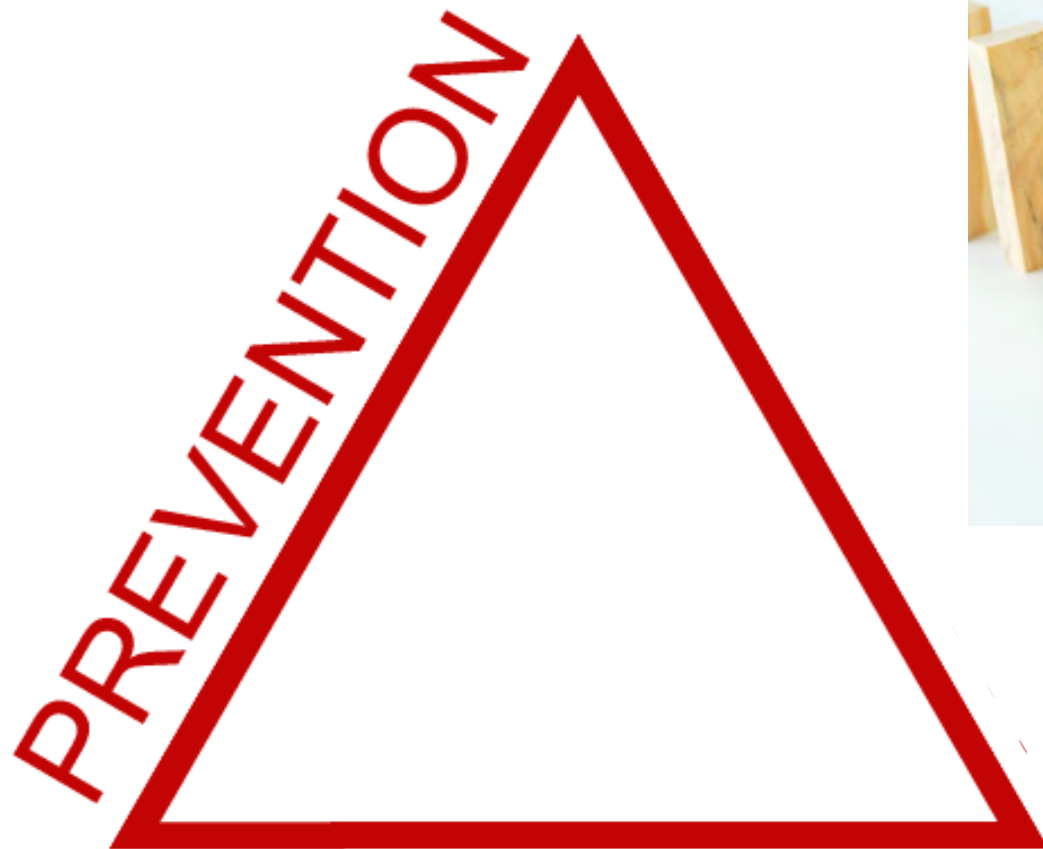




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# PREVENTION



# PREVENTION



## Fall Prevention

- Gait, and balance check
- Medication modification
- Exercise program
- Home modification
- Avoid polypharmacy

**60% ↓ in Falls**



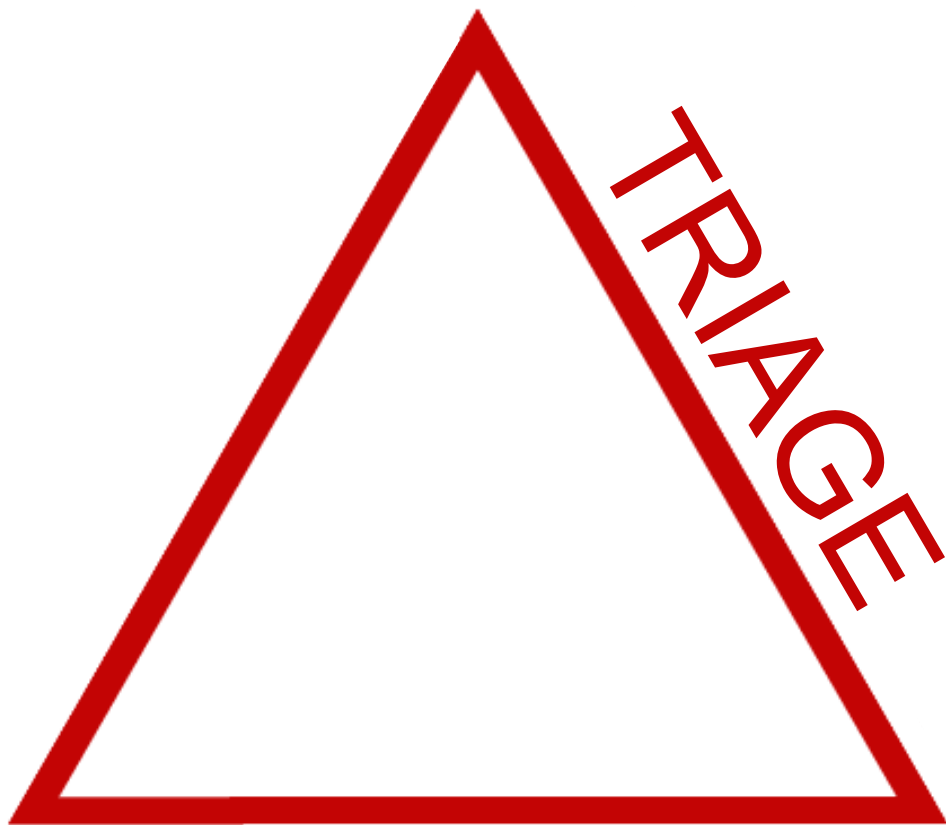
## MVC Prevention

- Graduated exercise programs
- Driving simulations
- Video based training



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# TRIAGE





# TRIAGE

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**Are Trauma Systems Designed for Geriatric Injuries ?**

## Unconscious Age Bias:

Older adults, especially women, are **less likely to receive care** at trauma centers



# TRIAGE

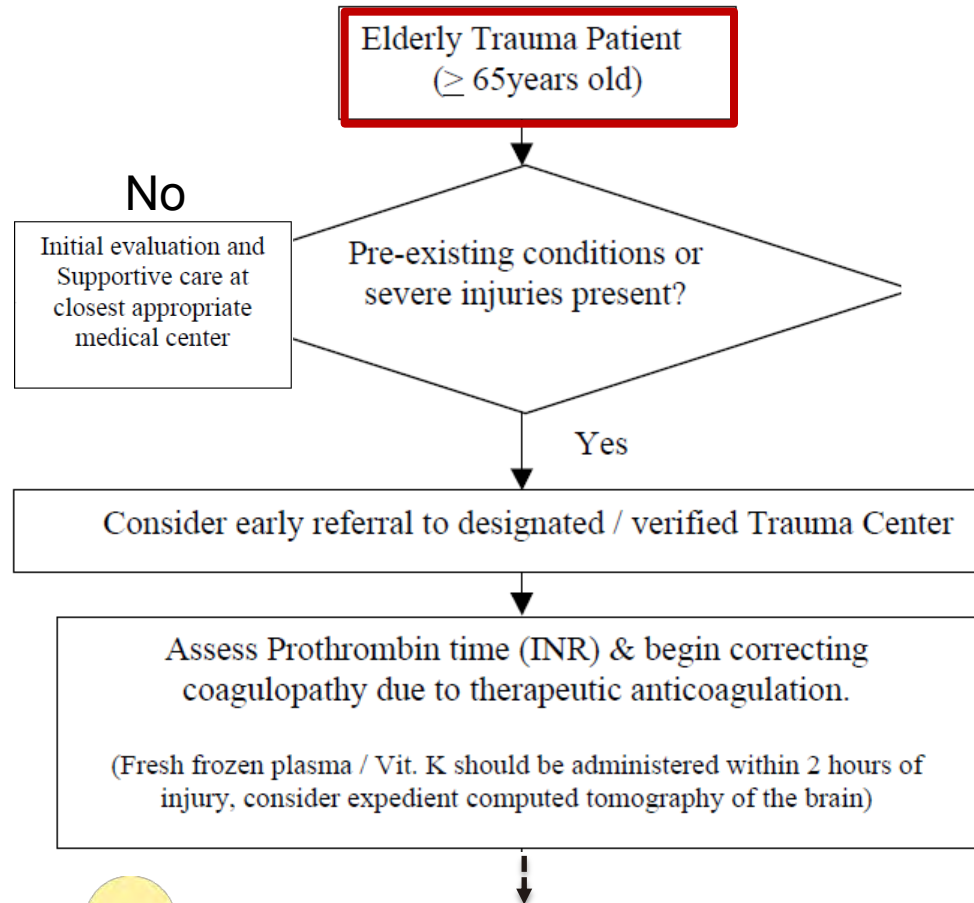
Older Adults are Under-Triaged

Lethal: **2-fold** ↑ mortality

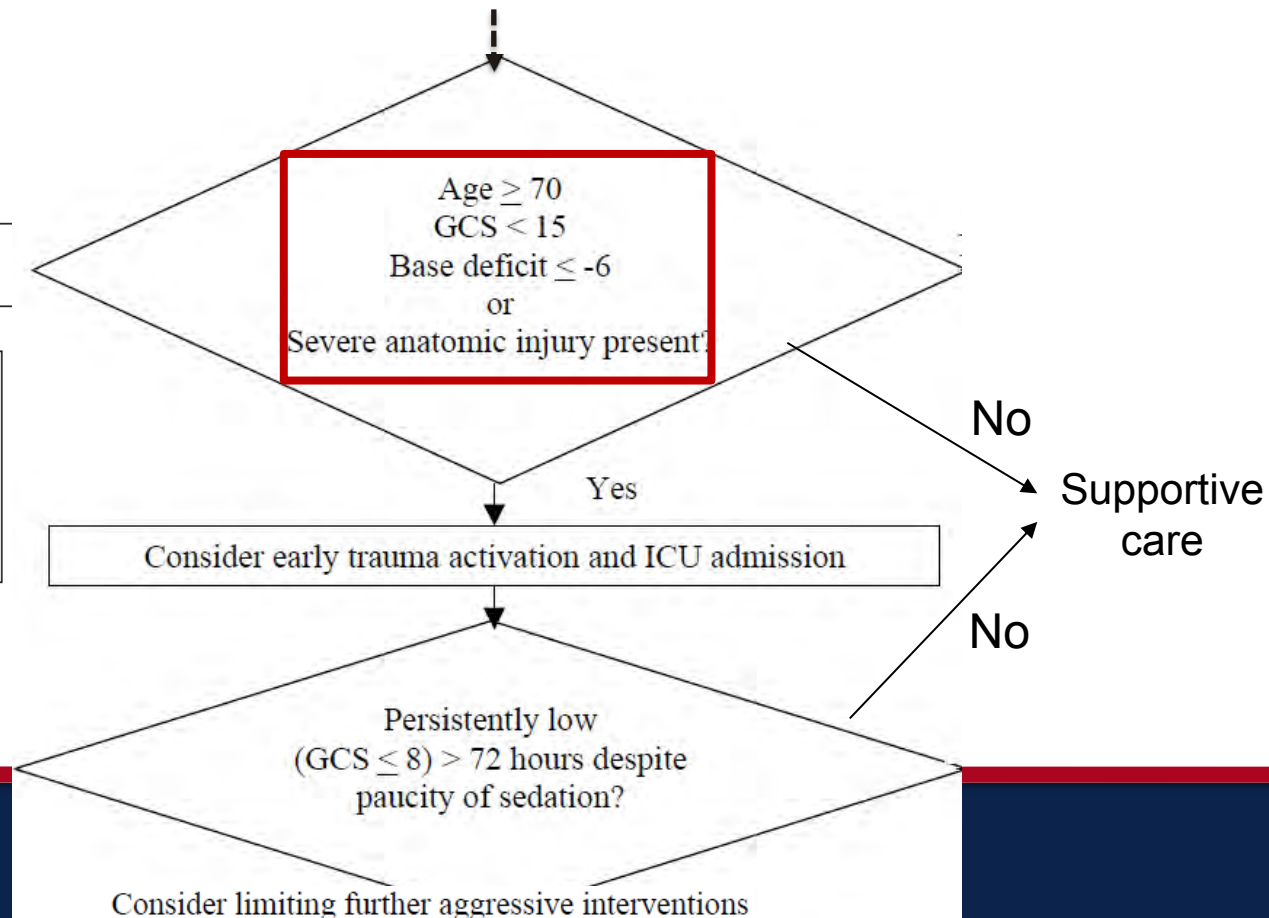




# TRIAGE



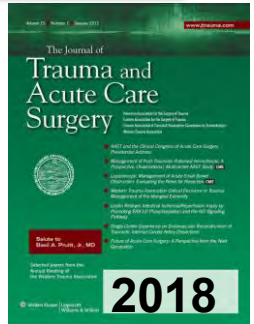
Practice Management Guideline





# Increased Trauma Activation Is Not Equally Beneficial For All Elderly Trauma Patients

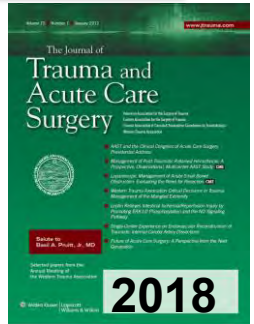
Carr, Bryan W., MD; Hammer, Peter M., MD; Timsina, Lava, PhD, MPH; Rozycki, Grace, MD, MBA; Feliciano, David V., MD; Coleman, Jamie J., MD



- ↑ Trauma activation was proposed to improve outcomes vs. increased cost and stress to the hospital system
- **What is the age at which an increase in activation status is beneficial?**
- Policy change ↑ the activation criteria to the highest level for patients >70y

# Increased Trauma Activation Is Not Equally Beneficial For All Elderly Trauma Patients

Carr, Bryan W., MD; Hammer, Peter M., MD; Timsina, Lava, PhD, MPH; Rozycki, Grace, MD, MBA; Feliciano, David V., MD; Coleman, Jamie J., MD



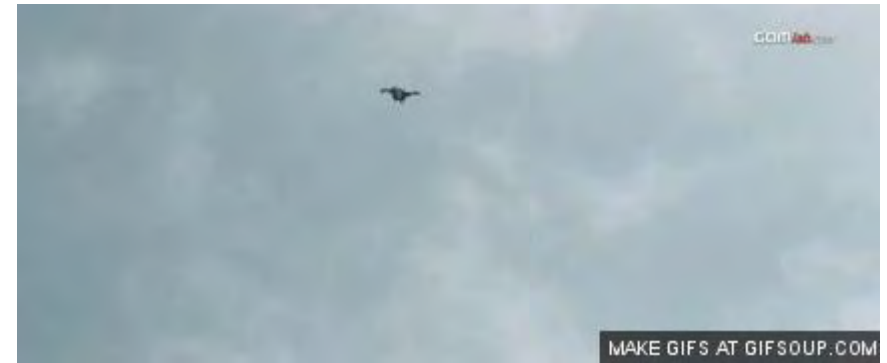
- Patients who presented prior to policy changes (PRE) were compared with those after the change (POST)
- Mortality and LOS were ↓ in patients in the POST group **who are >77y**
  - There is benefit with ↓ cost



## TRAUMA TEAM ACTIVATION

- **Lower Threshold for Trauma Team Activation in Elderly patients**
- **Own activation Team**
- Advanced AGE is not an absolute predictor of poor outcomes should not be used
- Aggressive Care
- Shock Index Will help in Triage Protocol

# INTERVENTION





# INTERVENTION



## Geriatric Trauma:

- Primary survey: **No difference**
- Secondary survey
  - Determine medications that affect initial evaluation
    - Anticoagulants
    - Antiplatelet
    - Beta blocker
    - ACE Inhibitors
  - Identify disease that complicate patient's presentation
    - MI
    - CVA
    - Pneumonia
    - Hypovolemia

# RESUSCITATION

- Adopt moderate resuscitation approaches
- High volume resuscitation ( $\geq 1.5$  L) → high risk for mortality
- When required consider
  - ICU admission
  - Operative intervention



# Massive Blood Transfusions Post Trauma In The Elderly Compared To Younger Patients

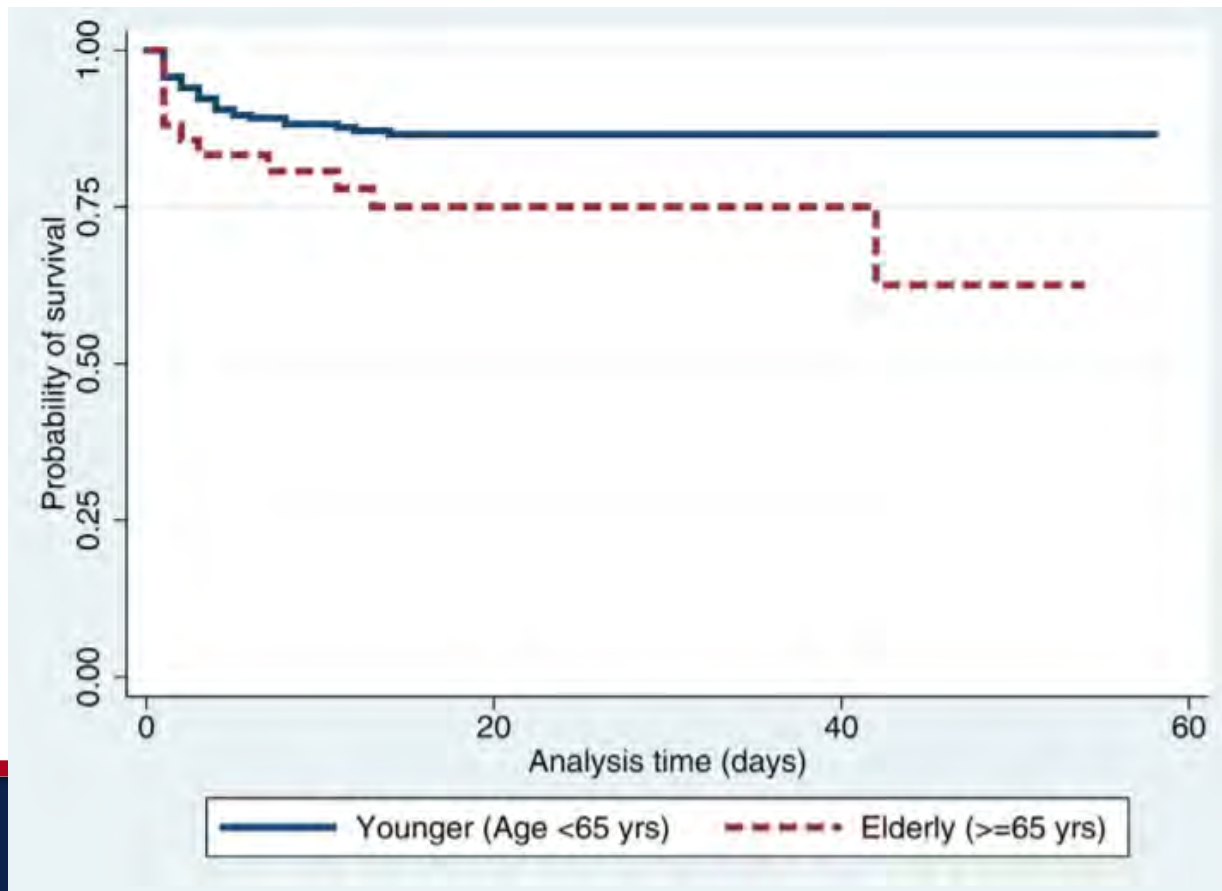
Biswadev Mitra , Alexander Olausson , Peter A.Cameron , Tom O'Donohoe , Mark Fitzgerald



- 311 patients receiving massive transfusion post trauma
- Aim: investigate mortality of elderly patients and explore variables associated with poor outcomes
- Stratification  $>65$  y and  $<65$  y

# Massive Blood Transfusions Post Trauma In The Elderly Compared To Younger Patients

Biswadev Mitra , Alexander Olausson , Peter A.Cameron , Tom O'Donohoe , Mark Fitzgerald

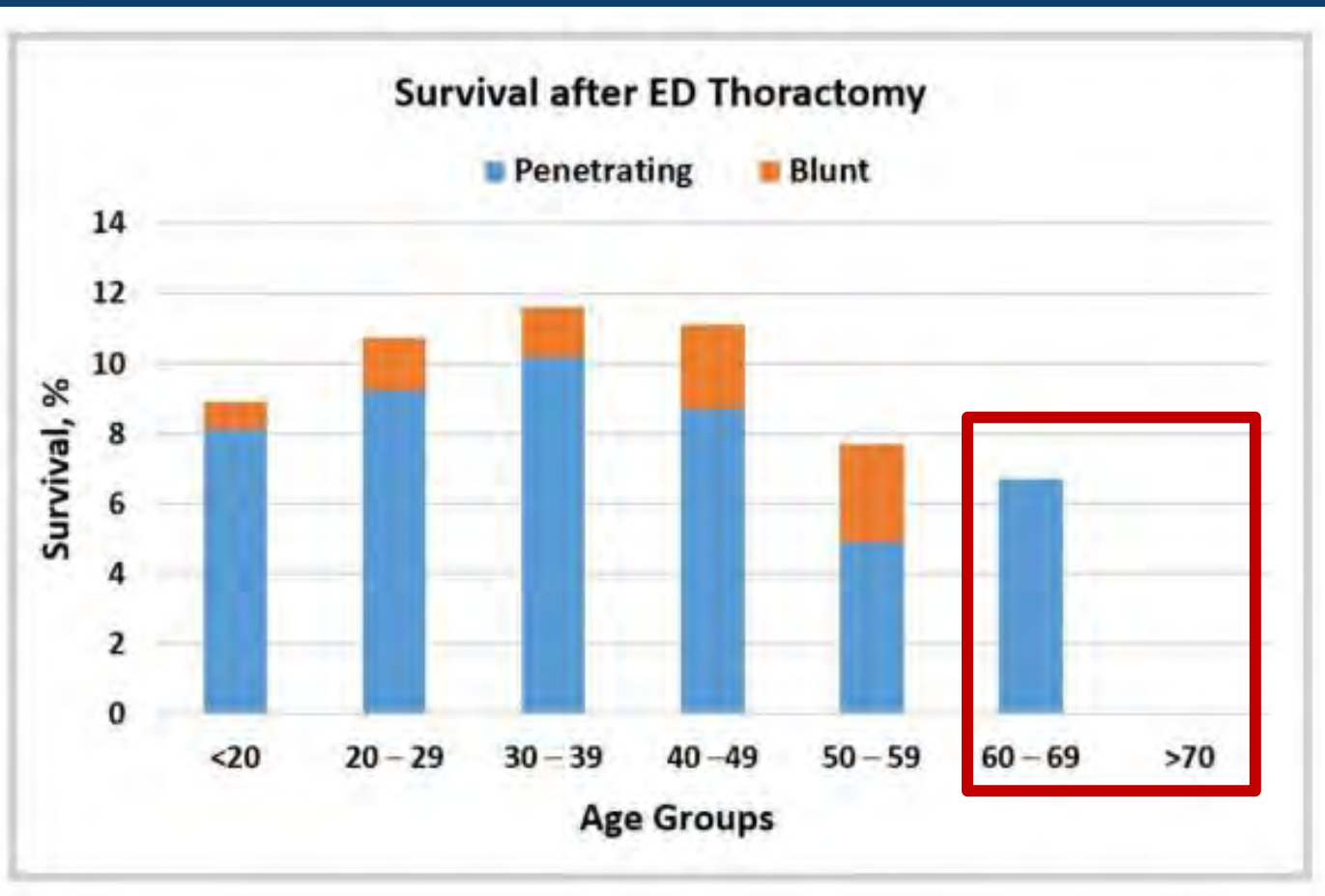


- Predictors of mortality
  - Acute traumatic coagulopathy (OR 11.75 p=0.02)
  - Age (OR 1.18 p=0.06)



## Improving Thoracotomy

Bellal J



**No patient  $\geq 60$  y with a blunt MOI survived**

**No patient  $\geq 70$  y regardless of MOI survived**

ative  
ality

TRAUMA  
SURGERY  
& ACUTE  
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2018

S-TQIP

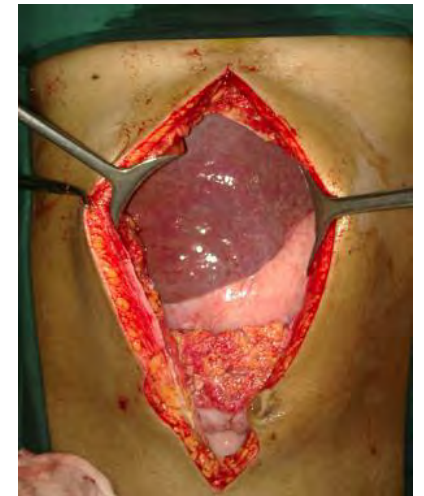
## Mortality After Trauma Laparotomy In Geriatric Patients

Bellal Joseph, Bardiya Zangbar, Viraj Pandit, Narong Kulvatunyong, Lynn Gries, Randall S. Friese, Peter Rhee



- 6-year retrospective analysis, all trauma patients undergoing a laparotomy
- Age  $\geq 55$  y who underwent a trauma laparotomy

**Outcomes:** Mortality & Predictors of mortality



# LAPAROTOMY IN ELDERLY

## Predictors of Mortality

- Age
- Admission lactate

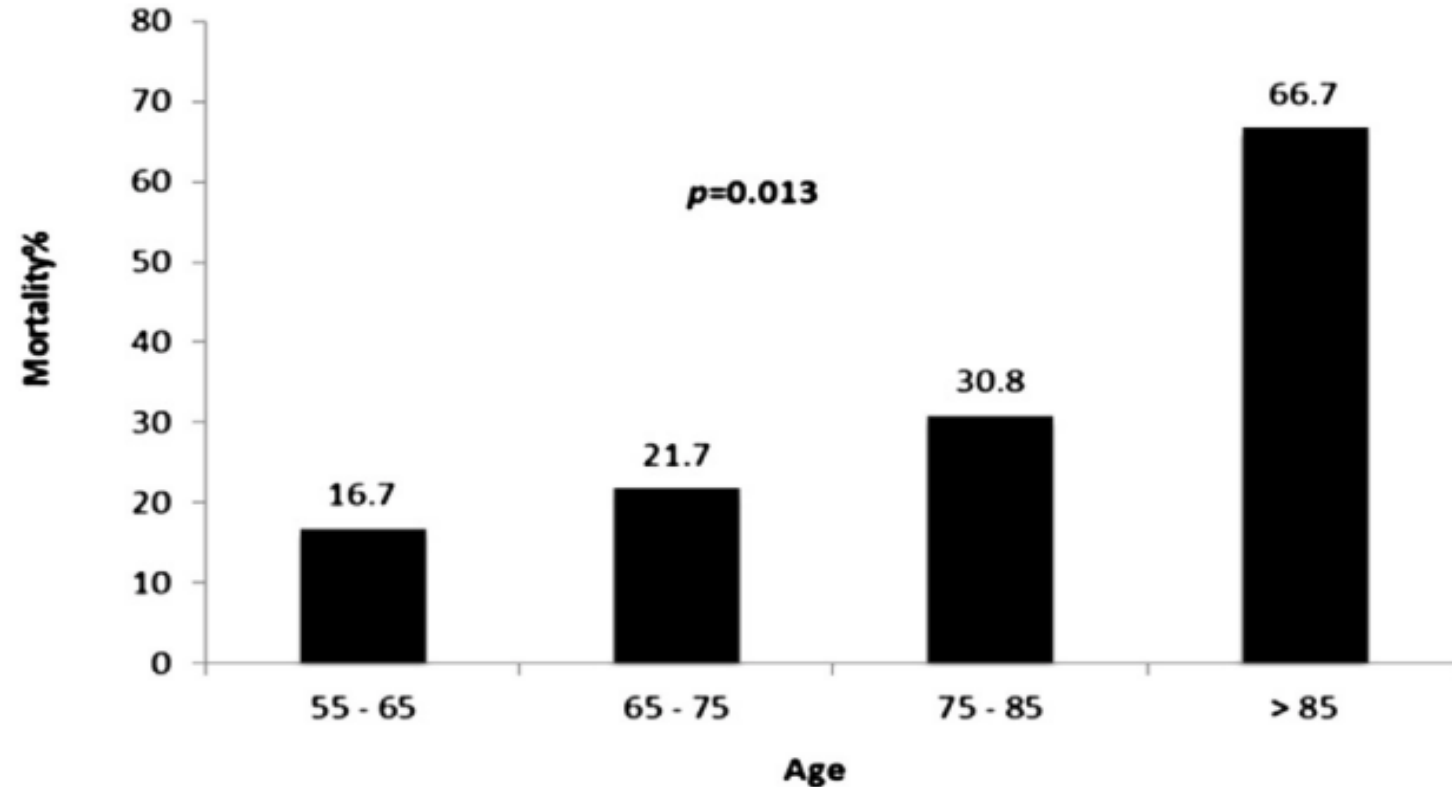


Fig — Mortality stratified by age.

# INPATIENT CARE

## Specialized Inpatient Care

- Pain management
- Consult geriatrician
- CGA
- Frailty





# PAIN MANAGEMENT

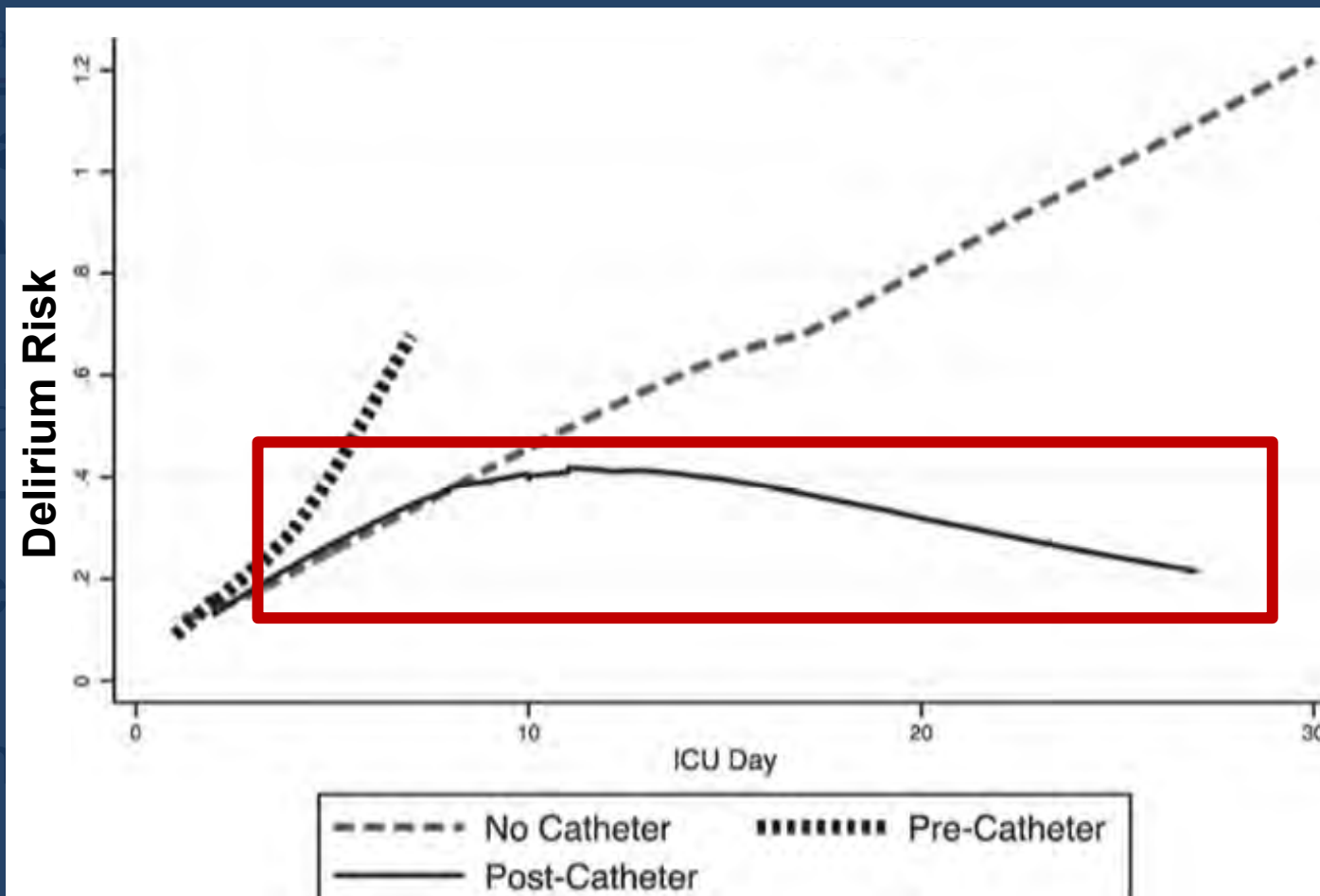
- Assessment of pain severity
- Multimodal approach to pain
  - Regional anesthesia
  - PCA
  - Nerve blocks
- Careful utilization of opioids
  - Bowel stimulating laxatives
- NSAIDs
  - PUD
  - Anticoagulation



## Decreased Analgesia

O'Connell, Kathleen  
Cuschieri, Joseph, MD

- Retrospective
- 144 patients
- ICU



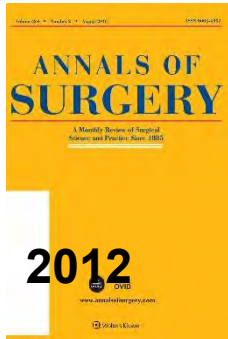
**Risk of delirium ↓ by 24% per day per patient after regional anesthesia**

**Individual opioid use ↓ after regional anesthesia**

## An Evaluation of a Proactive Geriatric Trauma Consultation Service

Lenartowicz, Magda MD\*; Parkovnick, Meredith MSc†; McFarlan, Amanda BA†; Haas, Barbara MD‡; Straus, Sharon E. MD, MSc§; Nathens, Avery B. MD, PhD, MPH||; Wong, Camilla L. MD

- 2 year prospective analysis
- 486 geriatric trauma patient
- **Intervention:** geriatric trauma consultation
- **Outcome measures** Complications & Mortality



# INPATIENT CARE

## Geriatric trauma consultation:

- Clinical nurse specialist
- Geriatrician
- Communication of recommendations
- Weekly interdisciplinary meetings with the trauma team
- Measurement of quality indicators.

↓ **10% delirium**

↓ **5% SNF discharge**

Issue addressed:

- Sensory impairment
- Pain



## Comprehensive Geriatric Assessment:

- 10% ↓ in delirium
- 36% ↓ in falls
- 4 days ↓ in hospital stay
- 13% ↑ in ADL





Fifteen Variable Trauma Specific Frailty Index			
<b>Comorbidities</b>			
Cancer history	YES (1)	No (0)	
Coronary Heart Disease	MI (1)	CABG (0.75)	PCI (0.5)
	Medication (0.25)	None (0)	
Dementia	Severe (1)	Moderate (0.5)	Mild (0.25)
	No (0)		
<b>Daily Activities</b>			
Help with grooming	Yes (1)	No (0)	
Help managing money	Yes (1)	No (0)	
Help doing housework	Yes (1)	No (0)	
Help toileting	Yes (1)	No (0)	
Help walking	Wheelchair (1)	Walker (0.75)	Cane (0.5)
	No (0)		
<b>Health Attitude</b>			
Feel less useful	Most time (1)	Sometimes (0.5)	Never (0)
Feel sad	Most time (1)	Sometimes (0.5)	Never (0)
Feel effort to do everything	Most time (1)	Sometimes (0.5)	Never (0)
Falls	Within last month (1)	Present not in last month (0.5)	None (0)
Feel lonely	Most time (1)	Sometimes (0.5)	Never (0)
<b>Function</b>			
Sexual active	Yes (0)	No (1)	
<b>Nutrition</b>			
Albumin	<3 (1)	>3 (0)	

## If limited resources

- Use: **Trauma Specific Frailty Index**

### ISAR screening questions

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

Score of 2 or more

**Obtain Geriatric Consultation**

# INPATIENT CARE

Establish

- 
- 
- 

Effective

Plan

Hallucination • Agitated • Distracted  
Disoriented • Rambling • Withdrawn  
Restless **Delirium** sense of place  
Bewildered • Confused • Incoherent  
Hallucination • Agitated • Distracted  
Disoriented • Rambling • Withdrawn  
Maintenance of Emergency

**AGS**  
**BEERS**  
CRITERIA 2015



## Delirium in the ICU: What About the Floor?

Cahill, Anthony MD; Percy, Christopher MD; Agrawal, Vaidehi PhD; Sladek, Phillip MD;  
Truitt, Michael S. MD



## Don't Call Me Crazy! Delirium Occurs Outside of the Intensive Care Unit

Cahill, Anthony MD; Percy, Christopher MD; Almahmoud, Khalid MD; Agrawal, Vaidehi PhD; Mani, Usha MD; Sladek, Phillip MD; Truitt, Michael S. MD





- 14-56 % of all hospitalized elderly patients
- 70-87% of all elderly in ICU
  - **Mortality: 22-76%**
- Increases cost by \$2,500/patient
- **Annual expenditures: \$7 billion.**

# INPATIENT CARE

Outcomes	Consultation (n=62)	Standard (n=65)	<i>P-value</i>
<b>Delirium</b>	32%	50%	0.04
<b>Severe delirium</b>	12%	29%	0.02
<b>Hospital stay,</b>	5 ± 2	5 ± 2	0.72
<b>Rehab/SNF Disposition</b>	92%	88%	0.41
<b>Delirium at discharge</b>	13%	19%	0.35



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# MANAGING EGGS



## Pre-operative care



## In-hospital management



## Discharge planning

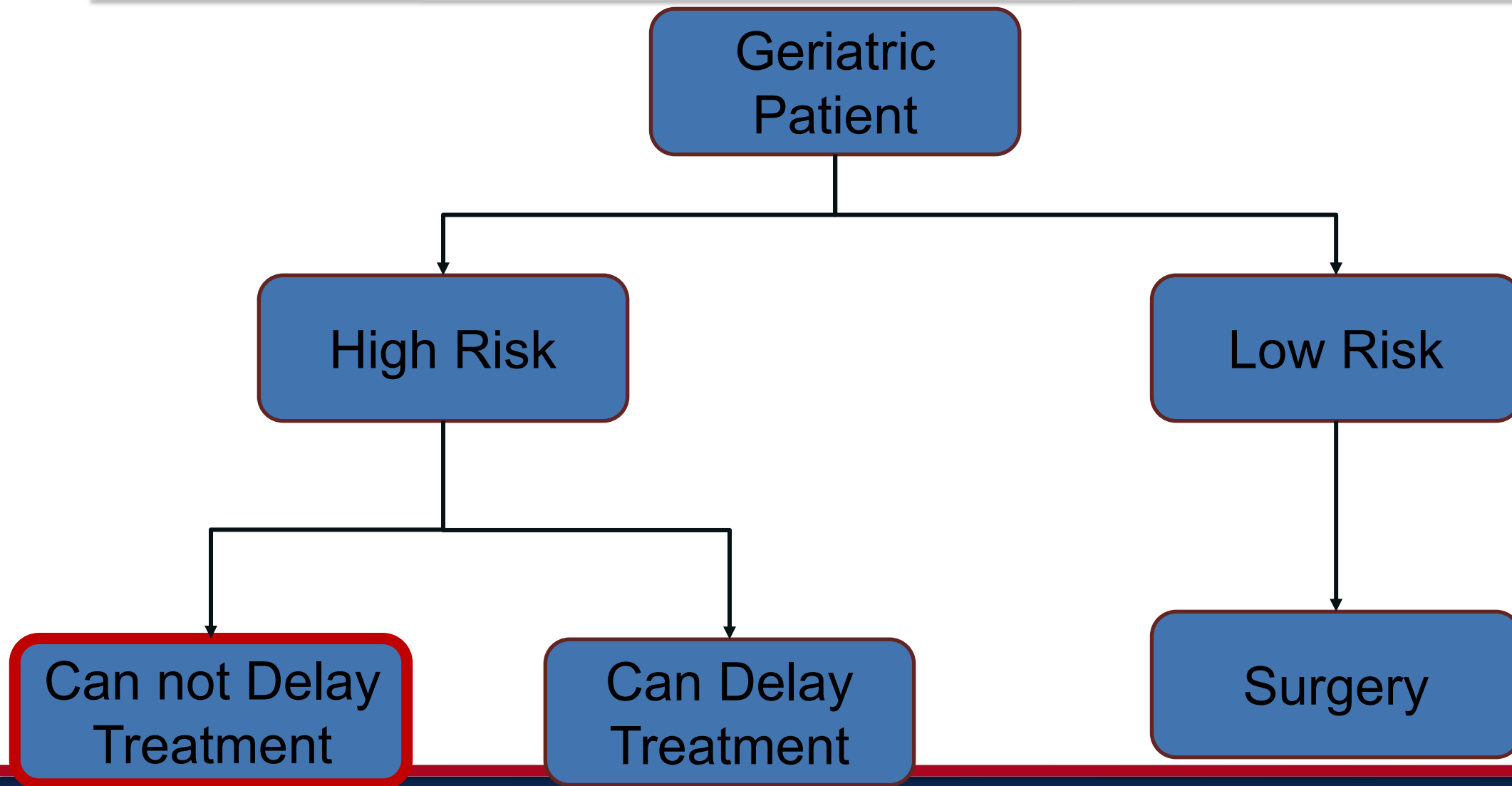




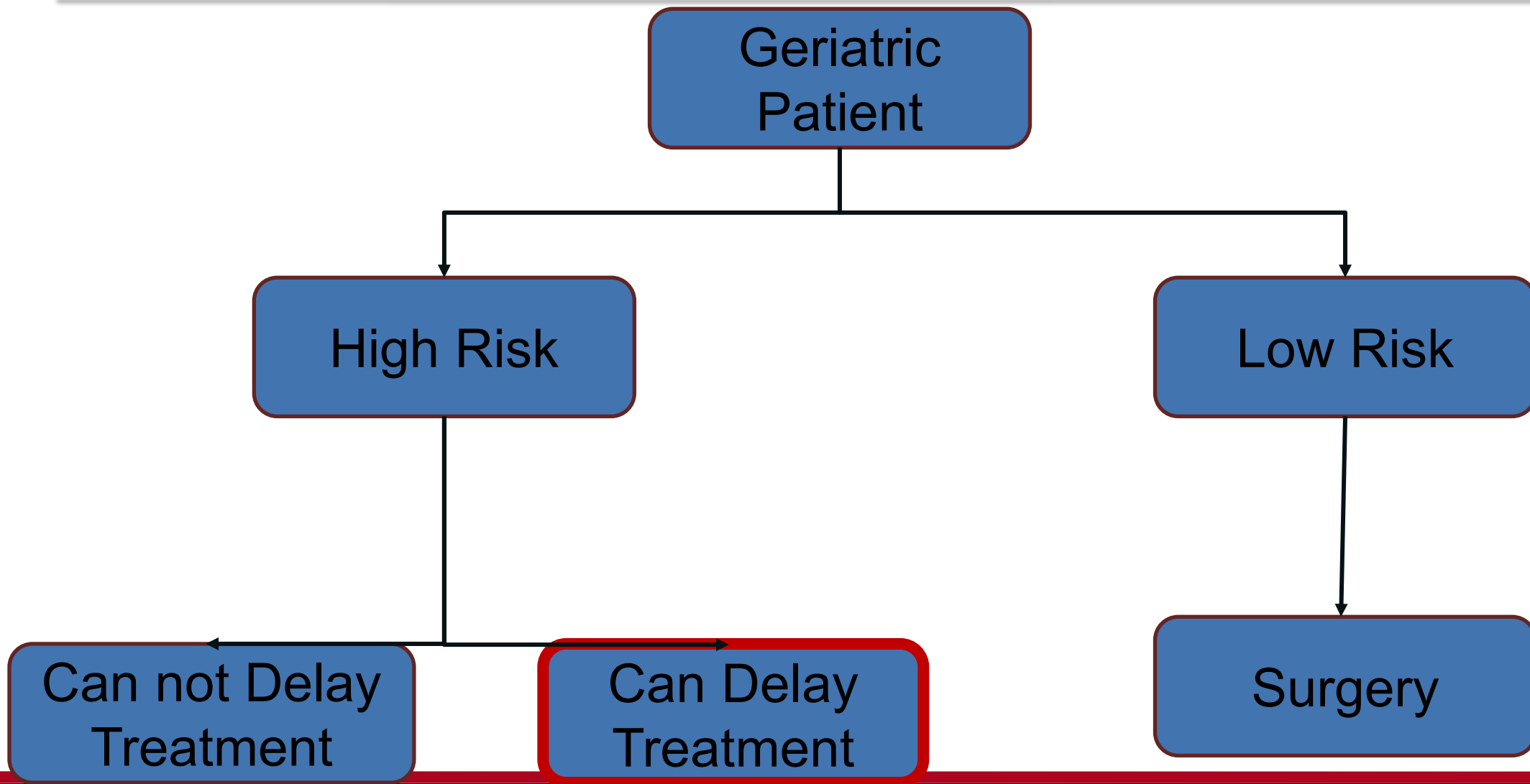
## RECOMMENDATIONS

- Use realistic risk prediction tools





Diagnosis	Non-surgical options
Diveritiular/appendix abcess	Radiological drainage
Nongangrenous mesenteric ischemia	Anticoagulation Interventional radiology
Severe cholecystitis	Radiological drainage, “cholecystostomy”
Bleeding duodenal ulcer	Endoscopic hemostasis Selective IR emolization
Obstructing colorectal cancer	Endoluminal stenting
Sigmoid volulus	Rigid or flexible endoscopic decompression



## Prehabilitation

- Enhancing functional capacity
- Withstand the stressor of surgery

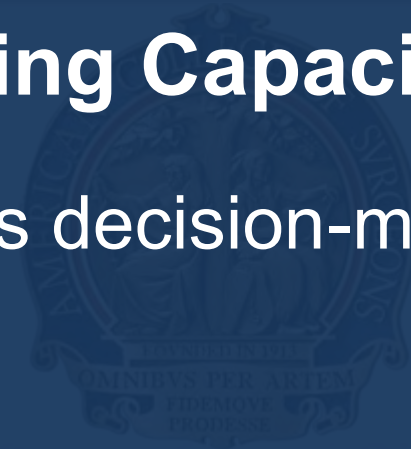


## Intention

The fitter they are, the quicker they will recover.

In addition to conducting a complete and thorough history and physical examination of the patient, the following assessments are strongly recommended:

- ☐ Determine whether or not the patient has decision-making capacity
  - Able to communicate a choice
  - Understand the relevant information
  - Appreciate the situation and its consequences
  - Reason about treatment options
- ☐ Screen the patient for depression (see Section I.C).
- ☐ Identify the patient's risk factors for postoperative pulmonary complications and implement appropriate strategies for prevention (see Section III).
- ☐ Document functional status and history of falls (see Section IV).
- ☐ Determine baseline frailty score (see Section V and Appendix III).
- ☐ Assess patient's nutritional status and consider preoperative interventions if the patient is at severe nutritional risk (see Section VI and Appendix IV).
- ☐ Take an accurate and detailed medication history and consider the patient's risk for polypharmacy (see Section VII, Appendix VI, Appendix V, and Appendix VII).
- ☐ Determine the patient's treatment goals and expectations in the context of the possible treatment outcomes (see Section VIII).
- ☐ Determine patient's family and social support system (see Section VIII).
- ☐ Order appropriate preoperative diagnostic tests focused on elderly patients (see Section IX).







# Patient Goals, Preferences, and Advance Directives

Personal goals and treatment preferences should be addressed prior to surgery

## Discuss:

- Postoperative functional decline
- Loss of independence
- Skilled care burden
- Advance directive and a designated health care proxy



## Preoperative Assessment

In addition to conducting a complete and thorough history and physical examination on the patient, the following assessments are strongly recommended:

- ☐ Assess the patient's cognitive ability and capacity to understand the risks and benefits of surgery (see Section I.B. and Appendix I.B.).
- ☐ Screen the patient for depression (see Section I.C.).
- ☐ Identify the patient's risk factors for developing postoperative delirium (see Section I.D.).
- ☐ Screen for alcohol and other substance abuse/dependence (see Section I.E.).
- ☐ Perform a preoperative cardiac evaluation according to the American College of Cardiology/American Heart Association (ACC/AHA) algorithm for patients undergoing noncardiac surgery (see Section II and Appendix II).
- ☐ Identify the patient's risk factors for postoperative pulmonary complications (see Section III).
- ☐ Document functional status and history of falls (see Section IV).
- ☐ Determine baseline frailty score (see Section V and Appendix III).
- ☐ Assess patient's nutritional status and consider preoperative interventions if the patient is at severe nutritional risk (see Section VI and Appendix IV).
- ☐ Take an accurate and detailed medication history and consider appropriate perioperative adjustments. Monitor for polypharmacy (see Section VII, Appendix V, Appendix VI, and Appendix VII).
- ☐ Determine the patient's treatment goals and expectations in the perioperative period (see Section VIII).
- ☐ Determine patient's family and social support system (see Section VIII).
- ☐ Order appropriate preoperative diagnostic tests focused on elderly patients (see Section IX).

# Medication Management

- **Review** all medications including OTC and herbal products
- **Discontinue** medications with risk of adverse reaction
- **Adequately control pain**
- **Appropriate reversal of anticoagulation**



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## Pre-operative care



## In-hospital management



## Discharge planning





## Anesthetic Approach

- Elderly Considerations
- Techniques



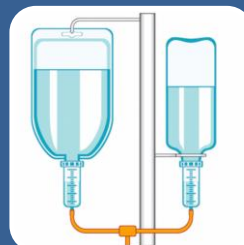
## Patient Safety

- Pressure Ulcers / Nerve Damage
- VTE Prophylaxis



## Perioperative Analgesic Plan

- Opioid-Sparing Techniques
- Regional Techniques



## Fluid management

- IV Fluids considerations



## Perioperative Nausea & Vomiting

- Risk stratification



## Hypothermia and Pulmonary Complications

- Prevention Strategies

- A **directed pain history** and physical examination
- **Multimodal approach**
  - Scheduled **acetaminophen** > **regional blocks** > **epidural**
  - Appropriately **titrate** to patient needs
  - Give **prophylactic** pharmacological **bowel regimen**
    - Stool softeners + Stimulant Laxatives
  - Follow **Beers Criteria** (Benzos, barbiturates, non-cox NSAIDs...)



# Multidisciplinary approach





## Postoperative Rounding Checklist

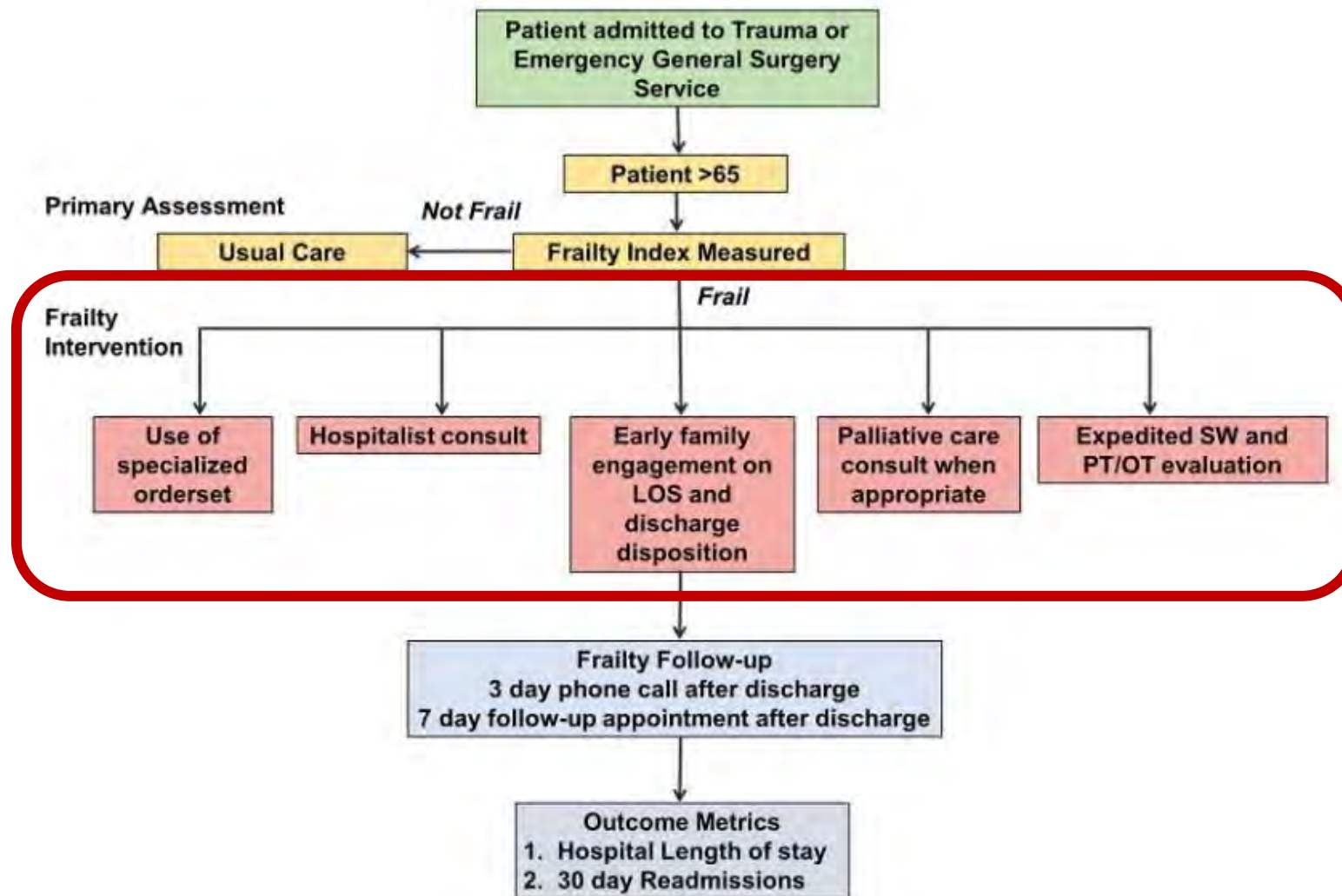
Daily Evaluation For	Prevention/Management Strategies								
<input type="checkbox"/> Delirium/cognitive impairment	<ul style="list-style-type: none"> <li>• Pain control</li> <li>• Optimize physical environment (for example, sleep hygiene, sleep protocol, minimize tethers, encourage family at bedside)</li> <li>• Vision and hearing aids accessible</li> </ul>								
<input type="checkbox"/> Perioperative acute pain*	<table border="1"> <tr> <td data-bbox="690 566 1429 739"> <input type="checkbox"/> Ability to maintain adequate nutrition           </td><td data-bbox="1437 566 2489 739"> <ul style="list-style-type: none"> <li>• Resume diet as early as feasible</li> <li>• Dentures made available</li> <li>• Supplementation if indicated</li> </ul> </td></tr> <tr> <td data-bbox="690 743 1429 848"> <input type="checkbox"/> UTI prevention           </td><td data-bbox="1437 743 2489 848"> <ul style="list-style-type: none"> <li>• Daily documentation of Foley catheter indication</li> <li>• Catheter care bundles, hand hygiene, barrier precautions</li> </ul> </td></tr> <tr> <td data-bbox="690 852 1429 1219"> <input type="checkbox"/> Functional decline           </td><td data-bbox="1437 852 2489 1219"> <ul style="list-style-type: none"> <li>• Care models and pathways</li> <li>• Structural: uncluttered hallways, large clocks and calendars</li> <li>• Multidisciplinary rounds</li> <li>• Early mobilization and/or PT/OT</li> <li>• Family participation</li> <li>• Nutritional support</li> <li>• Minimize patient tethers</li> </ul> </td></tr> <tr> <td data-bbox="690 1223 1429 1379"> <input type="checkbox"/> Pressure ulcers           </td><td data-bbox="1437 1223 2489 1379"> <ul style="list-style-type: none"> <li>• Reduce/minimize pressure, friction, humidity, shear force</li> <li>• Maintain adequate nutrition</li> <li>• Wound care</li> </ul> </td></tr> </table>	<input type="checkbox"/> Ability to maintain adequate nutrition	<ul style="list-style-type: none"> <li>• Resume diet as early as feasible</li> <li>• Dentures made available</li> <li>• Supplementation if indicated</li> </ul>	<input type="checkbox"/> UTI prevention	<ul style="list-style-type: none"> <li>• Daily documentation of Foley catheter indication</li> <li>• Catheter care bundles, hand hygiene, barrier precautions</li> </ul>	<input type="checkbox"/> Functional decline	<ul style="list-style-type: none"> <li>• Care models and pathways</li> <li>• Structural: uncluttered hallways, large clocks and calendars</li> <li>• Multidisciplinary rounds</li> <li>• Early mobilization and/or PT/OT</li> <li>• Family participation</li> <li>• Nutritional support</li> <li>• Minimize patient tethers</li> </ul>	<input type="checkbox"/> Pressure ulcers	<ul style="list-style-type: none"> <li>• Reduce/minimize pressure, friction, humidity, shear force</li> <li>• Maintain adequate nutrition</li> <li>• Wound care</li> </ul>
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<input type="checkbox"/> Pulmonary complications									

# Frailty screening and a Frailty Pathway Decrease Length of stay, Loss of Independence, and 30-day Readmission rates in Frail Geriatric Trauma and Emergency General Surgery Patients

Kathryn E. Engelhardt, MD, Quentin Reuter, MD, Jessica Liu, MD, Jonathan F. Bean, MD, Joliette Barnum, MD, Michael B. Shapiro, MD, Allison Ambre, DPT, Amanda Dunbar, Mara Markzon, Tara N. Reddy, MD, Christine Schilling, MFS, and Joseph A. Posluszny, Jr.



- Prospective (before-after) study
- 70 frail patients (11 before vs 59 after intervention)
- **Intervention:** novel frailty pathway
- **Outcomes:** LOS & 30-day readmission rate



Measure/Outcome	Before Intervention n = 11 (%)	After Intervention n = 59 (%)	P-value
Hospitalist consult	27%	98%	<0.001
Documented discussion of expectations	18%	96%	<0.001
Length of stay, median [IQR]	9 [3-14]	6 [3-12]	0.40
30-day readmission	4 (36.4)	6 (10.2)	0.04



# ERAS<sup>®</sup>



## Preop:



- Patient education (1C)
- Carb loading (2B) / Clear liquids until 2hrs prior (1A)



- Mechanical & oral bowel prep (2B)
- Optimize comorbidity (2B)

## Intraop:



- Preset orders (2C)
- SSI bundle: abx / prep (1B)
- Pre-emptive, multimodal pain control (1B)



- Restrictive / goal directed fluid use (1B)



- Laparoscopic approach (1A)

## Postop:

- Early feeding, heplock (1B)
- Multimodal pain regimen (1B)
- Early foley removal / ambulation (1B)
- No drains (1B)



# High Cor ≥65 Years As Oluwaf

TABLE 1. ERP in Perioperative Care

Perioperative Variables	Definition of Variables
<b>Preoperative</b>	
1. Preadmission counselling	Shared educational book and online EMMI module on enhanced recovery after gastrointestinal surgery
<b>Day of surgery</b>	
2. Prevention of Insulin Resistance	Clear liquid carbohydrate drink (Gatorade) consumption between midnight and 3 h prior to induction of anesthesia
3. Prevention of postoperative nausea/vomiting	Documented screening for risk factors for postoperative nausea or vomiting. Risk factors include: female, nonsmoking, history of motion sickness, history of postoperative nausea and vomiting, and preoperative, intraoperative opioid. Preoperative placement of a scopolamine patch + $\geq 1$ intraoperative IV antiemetic.
4. Use of regional anesthetic	The use of a thoracic epidural placed preoperatively of for all open cases with continuous epidural infusion of bupivacaine unless contraindicated. Alternatively, a TAP block can be performed preoperatively for laparoscopic cases unless contraindicated. If regional anesthetic is contraindicated, intraoperative intravenous lidocaine infusion may be used.
5. Intraoperative temperature control	Intraoperative temperature $\geq 36$ C/96.8 F and on admission to the PACU.
6. Intraoperative fluid management	Goal-directed fluid therapy monitored by Edwards ClearSight hemodynamic monitoring and/or case volume = 3 mL/kg per hour of intraoperative crystalloid and colloid fluid.
<b>Postoperative</b>	
7. Multimodal analgesia	Preoperative administration of Gabapentin, Acetaminophen and Celebrex. Use of Lidocaine dermal patches 24 h after TAP block in laparoscopic procedures. Use of intravenous and oral NSAIDS postoperatively. Use of intravenous Acetaminophen postoperatively. If epidural in place, continuous epidural infusion of Bupivacaine + low dose Fentanyl. Recording of POD pain controlled with oral pain medication: First date on which pain is adequately controlled with oral pain medications alone for 24 h. The patient should be able to ambulate (unless unable preoperatively) without significant pain (significant pain is a score $> 4$ on a scale from 0 to 10).
8. Mobilization POD #0	Ambulation occurred any length of time within the POD 0 given time
9. Mobilization POD #1	Ambulation occurred twice during this time period. Standing at bedside not included.
10. Mobilization POD #2	Ambulation occurred twice during this time period. Standing at bedside not included.
11. Diet started on POD #0	Clear liquid diet ordered POD #0. Return of bowel function recorded in EMR as date bowel movement or flatus passed.
12. Diet advanced POD #1	Solid diet was ordered POD #1. Date tolerating diet recorded as first date patient could tolerate 1 solid meal and drink 800 cc or more of a liquid diet without need for IV fluids and no signs of nausea/vomiting, or abdominal pain. Solid meal indicates not puree food.
13. Discontinuation of IVF	Maintenance IVF discontinued (anything $\geq 42$ cc or more) POD #0, fluid bolus allowed
14. Discontinuation of Foley Catheter	Foley catheter removed POD #1 unless indicated patient was high risk (history of BPH, prostate surgery, bladder injury, extensive pelvic surgery or history of postoperative urinary retention)

- 4 years
- intestin
- Analys
- Outco



major



## High Compliance to an Enhanced Recovery Pathway for Patients $\geq 65$ Years Undergoing Major Small and Large Intestinal Surgery Is Associated With Improved Postoperative Outcomes

Oluwafemi P. Owodunni, MD, MPH, Jessica Hampton, MS, y Dianne Bettick, MSN, CNS, RN, z  
Sara Sateri, MD, Thomas Magnuson, MD, Elizabeth



### ERP:

- Shorter **h-LOS** (OR:0.7[0.6-0.9])    **30% decrease**
- Lower **complications** (OR: 0.4[0.1-1.0])    **60% decrease**
- No effect on readmissions



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## Pre-operative care



## In-hospital management

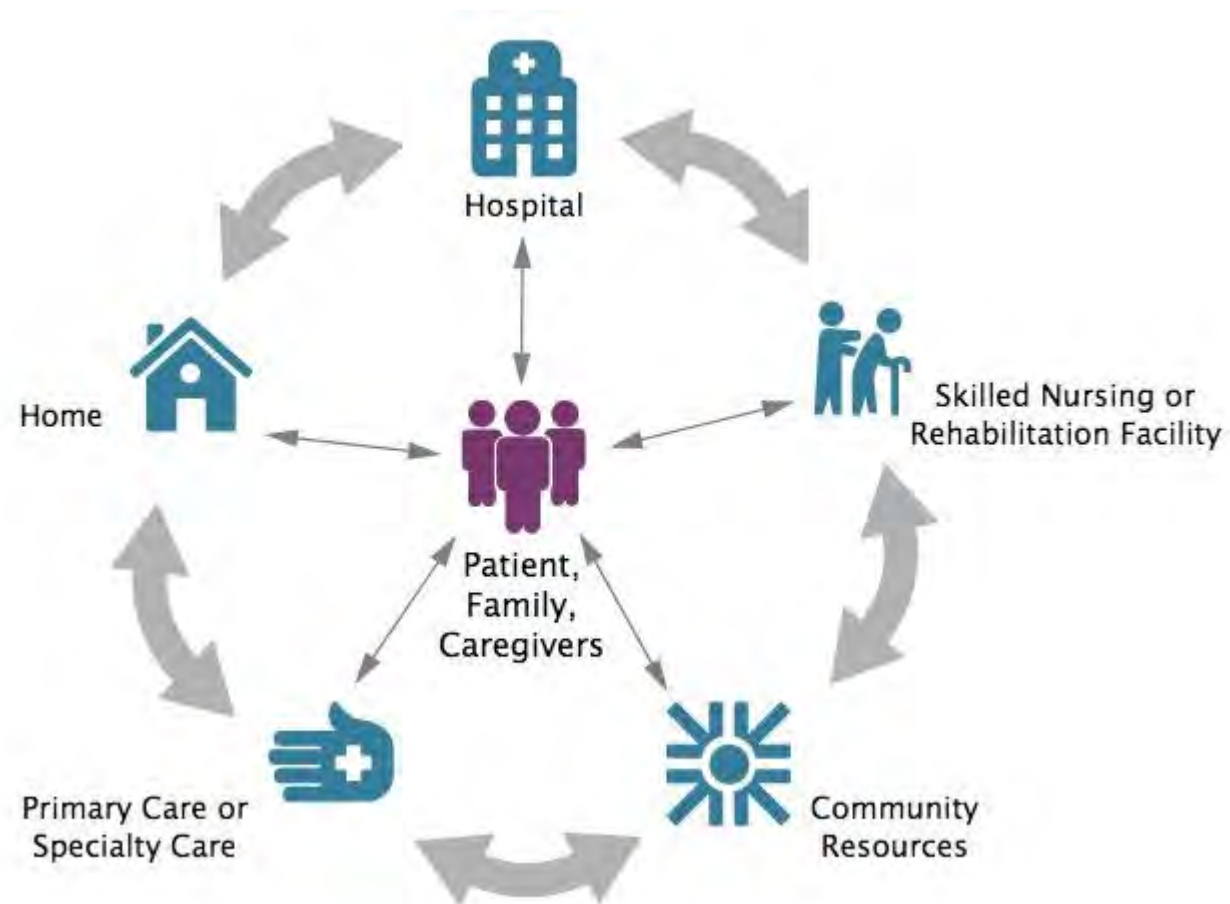


## Discharge planning

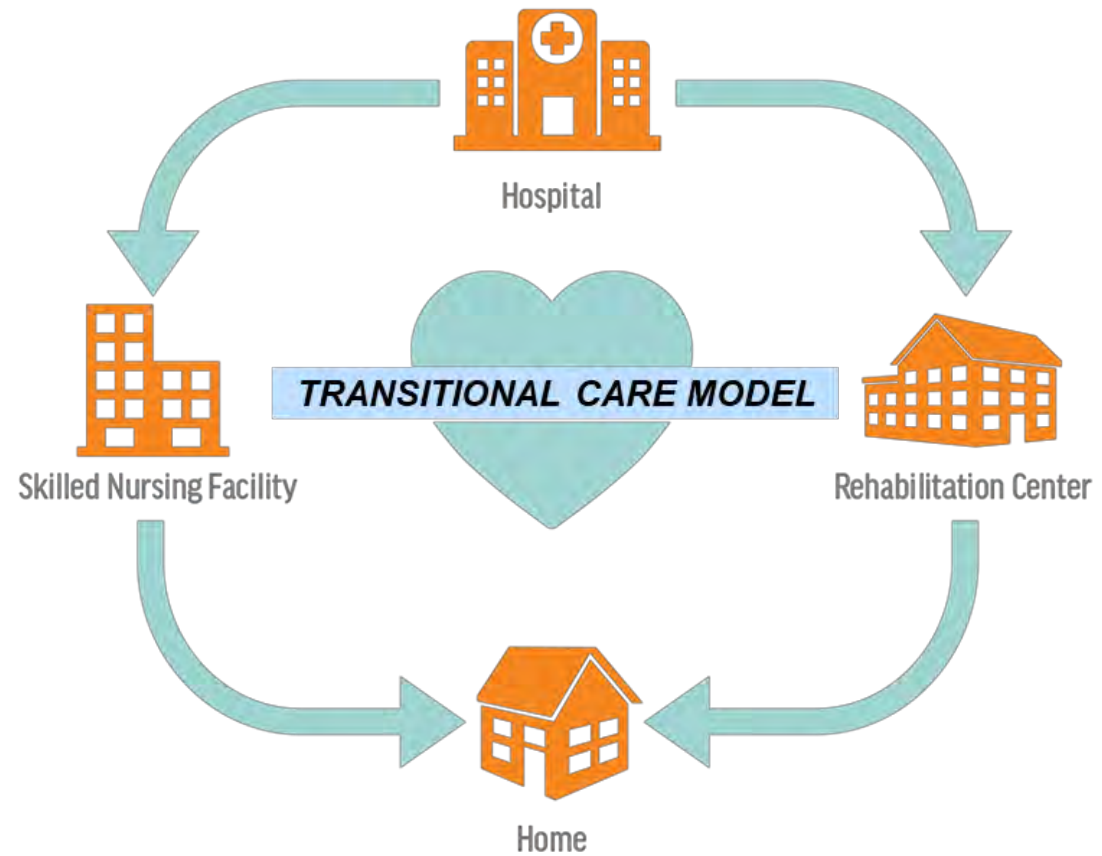




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## THE 5 C'S OF TRANSITION OF CARE

- Evaluate need for and obtain language assistance

- Make follow-up appointments

- Plan for follow-up of problems, pending test results

- Organize postdischarge outpatient services and medical equipment

- Identify the correct medicines and a plan for a patient to obtain them

- Engage the patient with questions about understanding

- Teach a written discharge plan the patient can understand

- Educate the patient about his or her diagnosis and medicines

- Develop a plan for what to do if a problem arises

- Assess the degree of the patient's understanding of the discharge plan

- Expedite the transmission of the discharge summary to clinicians accepting care of the patient

- Provide telephone reinforcement of the discharge plan

Coordinated care, particularly with primary care physician

Engagement of patient, family, and/or caregiver

Post-discharge follow up plan

Consistent communication



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# HOSPICE & PALLIATIVE CARE

## High Burden of Palliative Care Needs of Older Adults During Emergency Major Abdominal Surgery

Zara Cooper, MD, MSc, Elizabeth J. Lilley, MD, MPH, Evan Bollens-Lund, MA, Susan L. Mitchell, MD, Christine S. Ritchie, MD, MSPH, Stuart R. Lipstiz, ScD, Amy S. Kelley, MD,



- Retrospective study
- 411 elderly patients undergoing emergency major abdominal surgery
- **Aim:** Quantify preoperative illness burden, examine its association with outcomes, and describe end-of-life care



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## **High Burden of Palliative Care Needs of Older Adults During Emergency Major Abdominal Surgery**

Zara Cooper, MD, MSc, Elizabeth J. Lilley, MD, MPH, Evan Bollens-Lund, MA, Susan L. Mitchell, MD, Christine



**2/3<sup>rd</sup> of these individuals were  
potential candidates for palliative  
care**



## Validation of a P.A.

Calculator: A

**Primary Sample  
(n = 16,114)**

Allyson C. Cook, MD, Bellal Joseph, MD, M. Jane Mohler, MSN, MPH, PhD,c Kenji Inaba, MD,d Brandon R. Bruns, MD, Paul A. Nakonezny, PhD, Jeff D. Kerby, MD, PhD, Karen J. Grasel, MD, MPH, Steven E. Wolf, MD et al.

**Score Creation  
Sample  
(n = 8,057)**

**Score Validation  
Sample  
(n = 942)**

- Retrospective cohort study (2000-2015)
- **Aim:** Validate a prognosis calculator → geriatric trauma outcome score ii (GTOS II)
  - Estimate
- 16,114 trauma
- **Outcomes:** gastrostomy, tracheostomy placement, and enrollment in hospice

# Surgical Palliative Care Consultations Over Time in Relationship to Systemwide Frailty Screening

Katherine F. Ernst, BS; Daniel E. Hall, MD, MDiv, MHSc; Kendra K. Schmid, PhD; Georgia Seeever, RN; Pierre Lavedan, MD; Thomas G. Lynch, MD, MHA; Jason Michael Johanning, MD, MS



- 310 surgery patients who underwent palliative care consultations (160 before frailty screening, 150 after)
- **Intervention:** Surgical palliative care consultations, including frailty screening
- **Primary Outcomes:** 30-, 180-, and 360-day mortality

## Surgical Palliative Care Consultations Over Time in Relationship to Systemwide Frailty Screening

JAMA Surgery

### Take Home Message:

1. You Must Calculate Frailty
2. Use Objective Data for Conversations

- Increased rate of palliative care consultations (30%)

# Future

## Emergency General Surgery in Geriatric Patients: A Statewide Analysis Of Surgeon And Hospital Volume With Outcomes

Mehta, Ambar MPH; Dultz, Linda A. MD, MPH; Joseph, Bellal MD; Canner, Joseph K. MHS; Stevens, Kent MD, MPH; Jones, Christian MD, MS; Haut, Elliott R. MD, PhD; Efron, David T. MD; Sakran, Joseph V. MD, MPH, MPA



- Geriatric specific centers?
- Surgeon volume is predictor, NOT the hospital volume
- Surgeons performing  $\leq 8$  procedures annually:
  - 86% higher odds of death
  - 74% higher odds of FTK
- Dedicated geriatric surgical training?

# Thank You!



@TopKnife\_B



[bjoseph@surgery.arizona.edu](mailto:bjoseph@surgery.arizona.edu)