THE SURGICAL PAUSE:
Preoperative Frailty Screening and Prehabilitation
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Outline

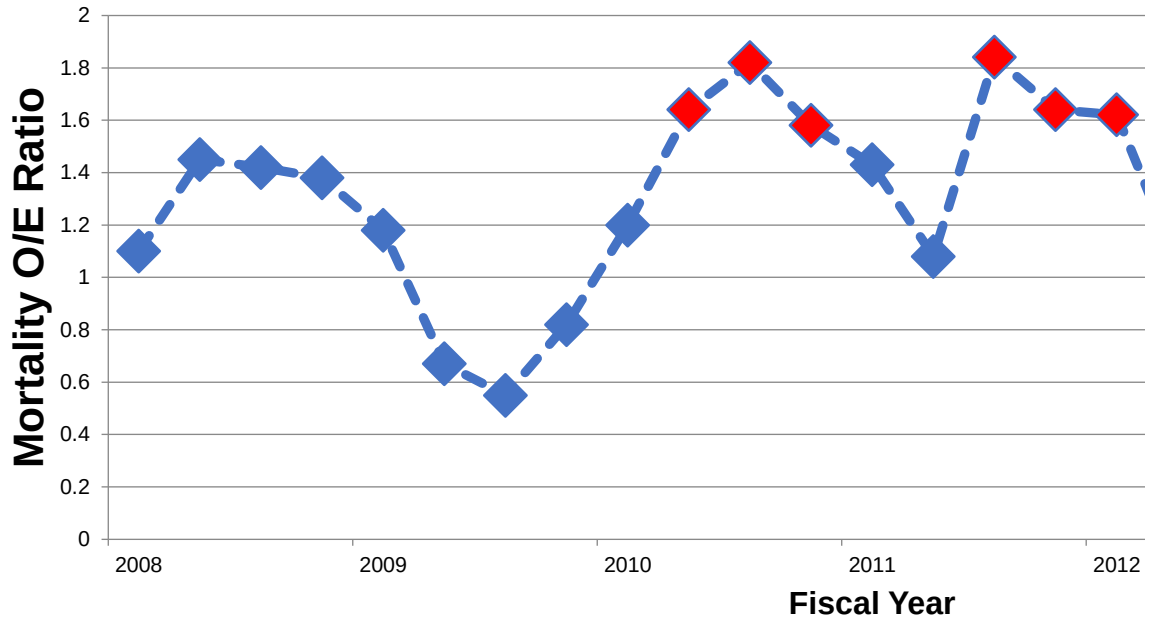
- The Risk Analysis Index & the Surgical Pause
  - Origin story
  - Conceptual framework
  - Data—It works
- Your Questions

- NOT going to tell you who should/should not have surgery

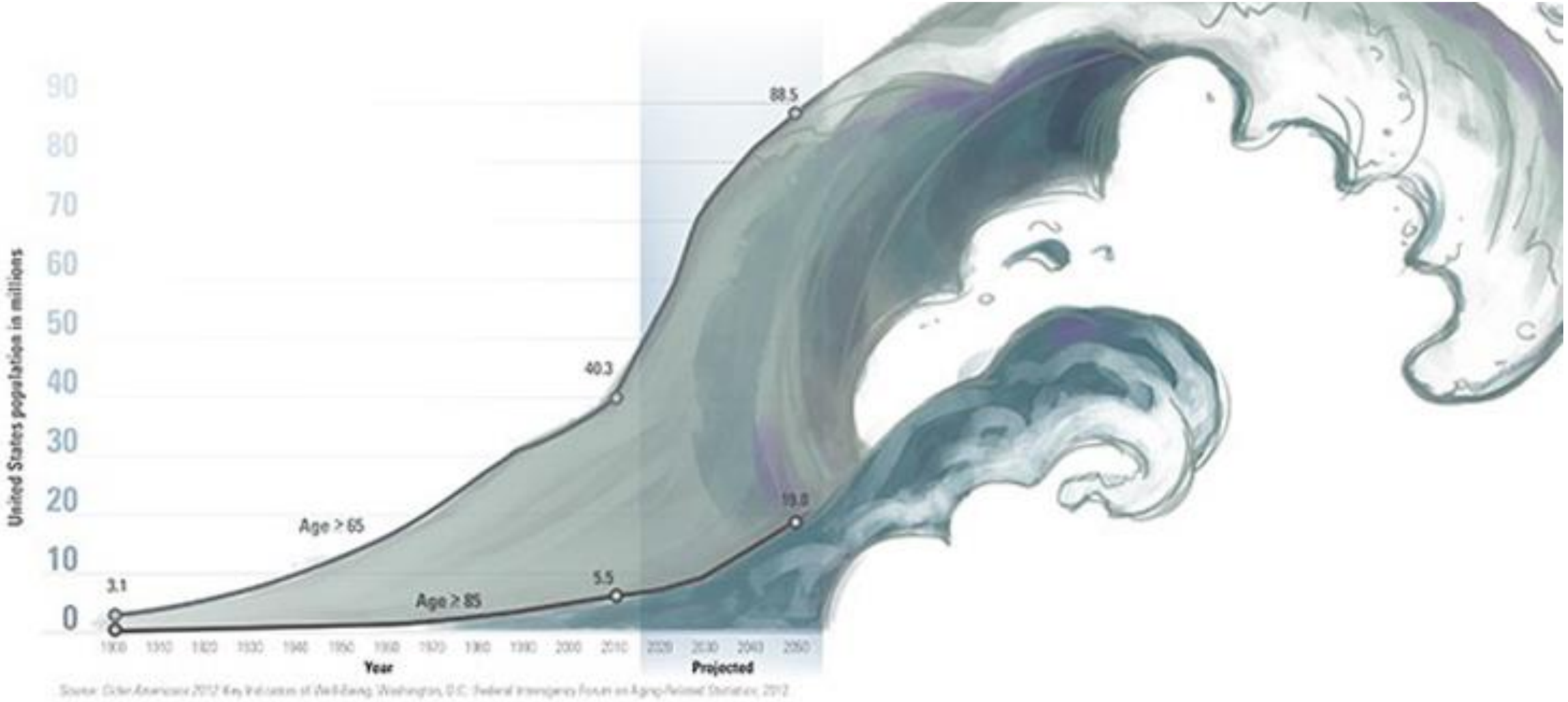
- May cause anxiety
  - New ways of thinking
  - Changing culture is hard

Origin Story & Conceptual Framework
Omaha: We've got a problem

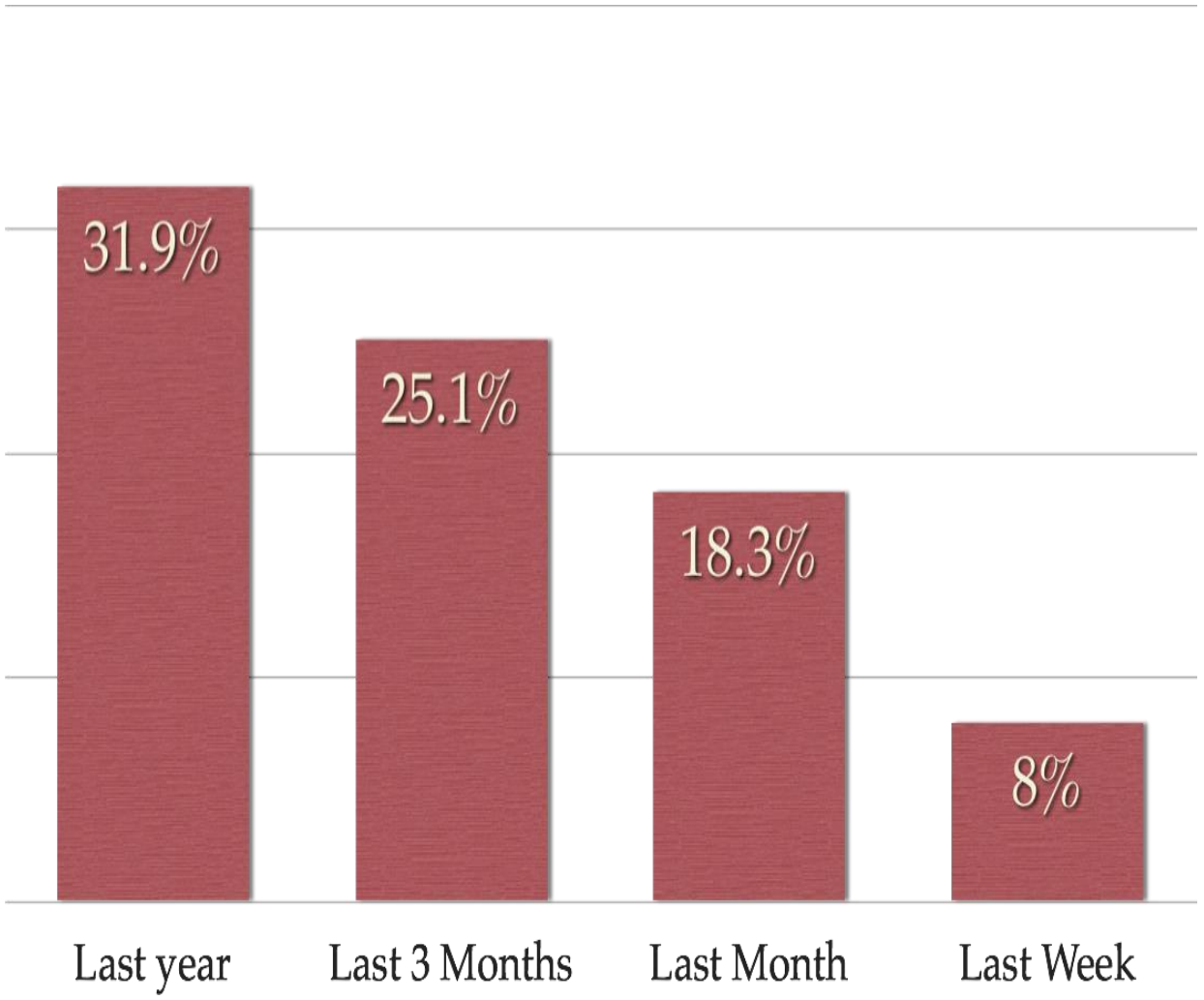
Observed/Expected Mortality at the Omaha VAMC (Red points are > 90% Confidence Interval)



Silver Tsunami



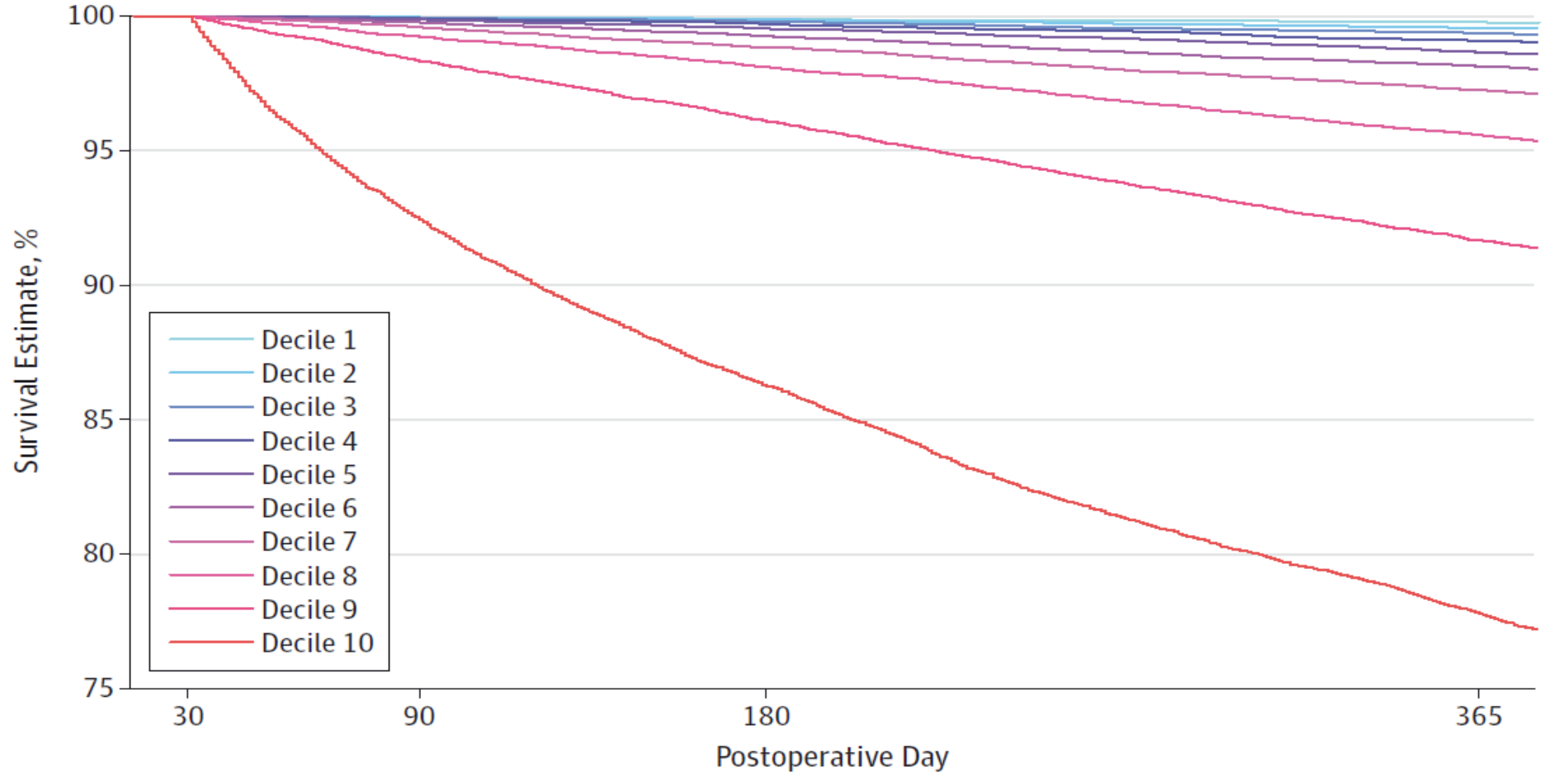
- 1/3 of patients had surgical interventions in last year of life
  - Majority occurred in month before death
- Surgery associated with
  - More admissions
  - Longer LOS
  - Greater ICU LOS



Kwok AC. *Lancet.* 2011;378(9800):1408-1413.

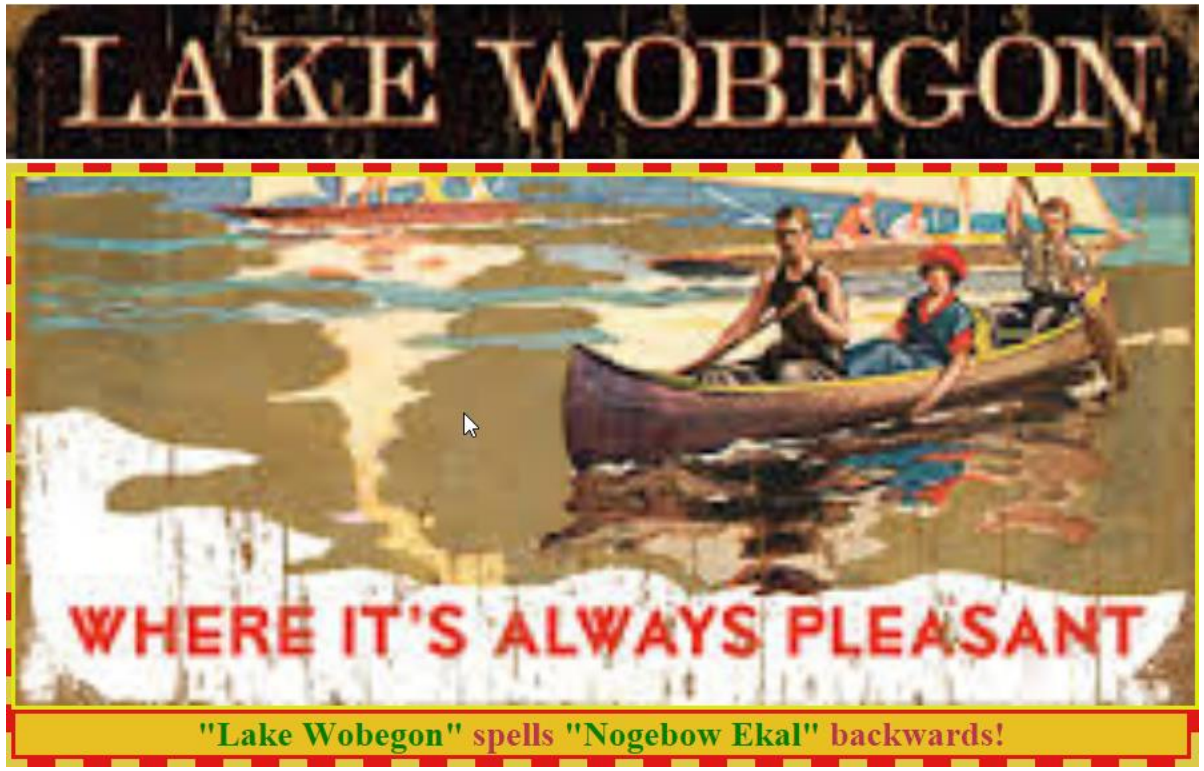
We know some patients don’t do well

Figure 2. Survival Curves for Risk Deciles, Excluding Patient Mortalities Prior to Postoperative Day 30



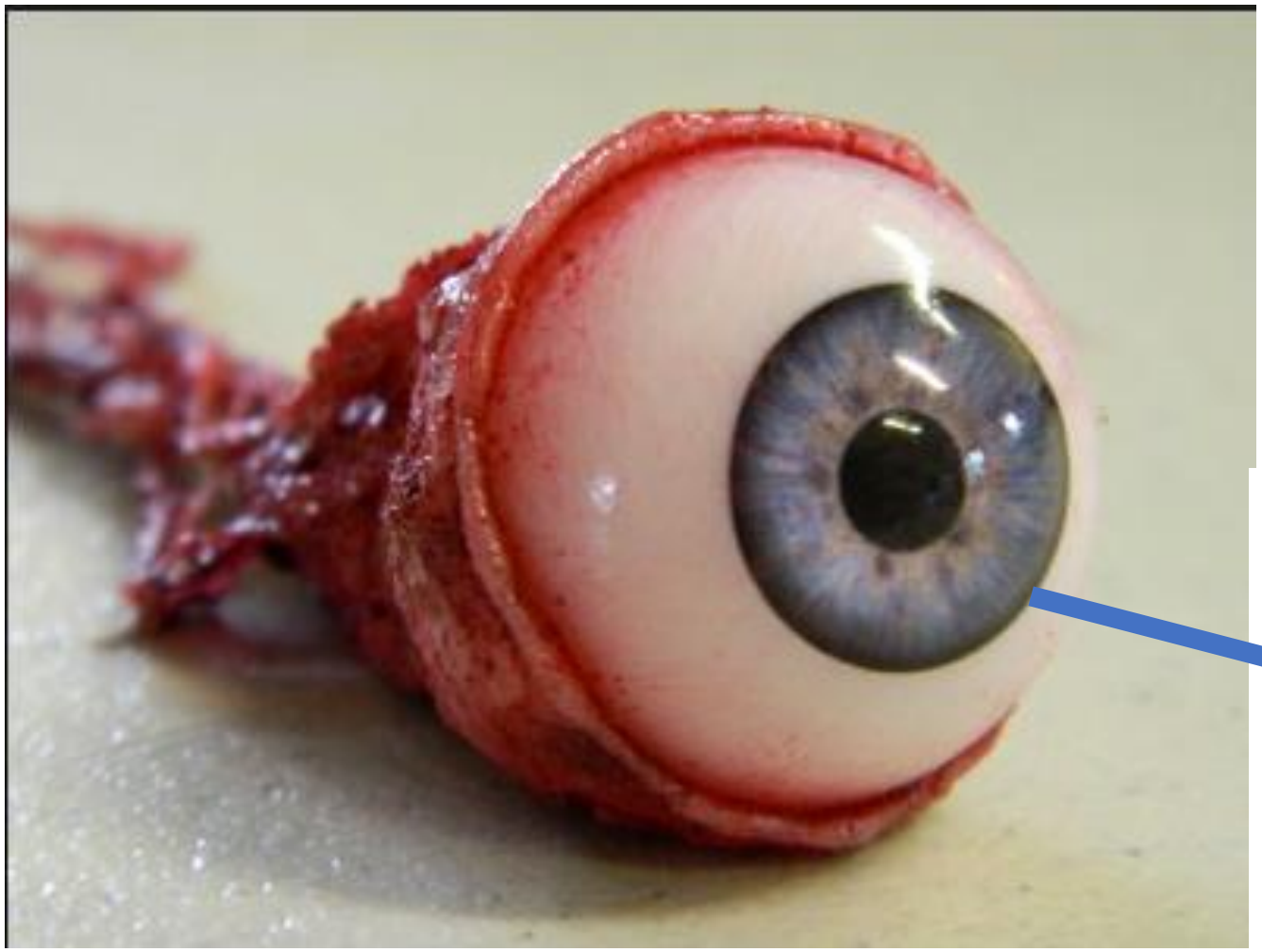
Smith T, et al., *JAMA Surg.* 2016;151(5):417-422.

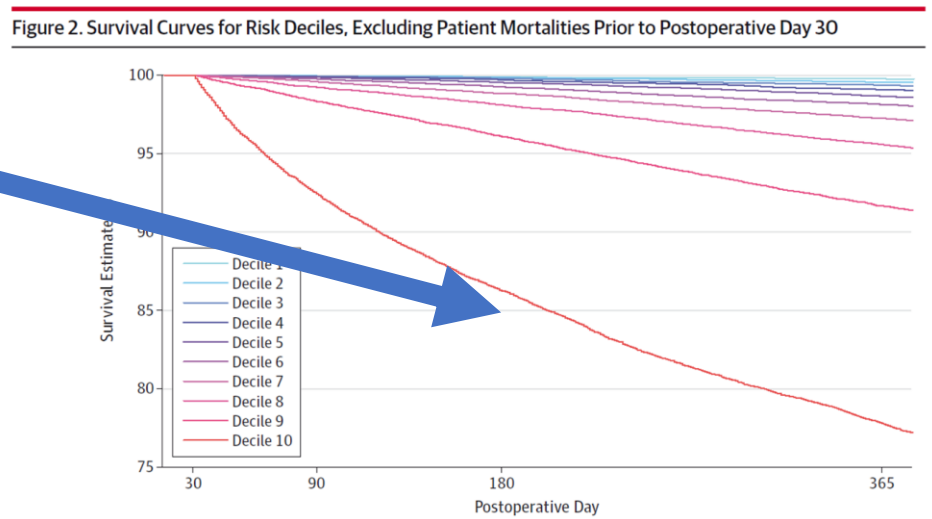
But surgeons are optimists!



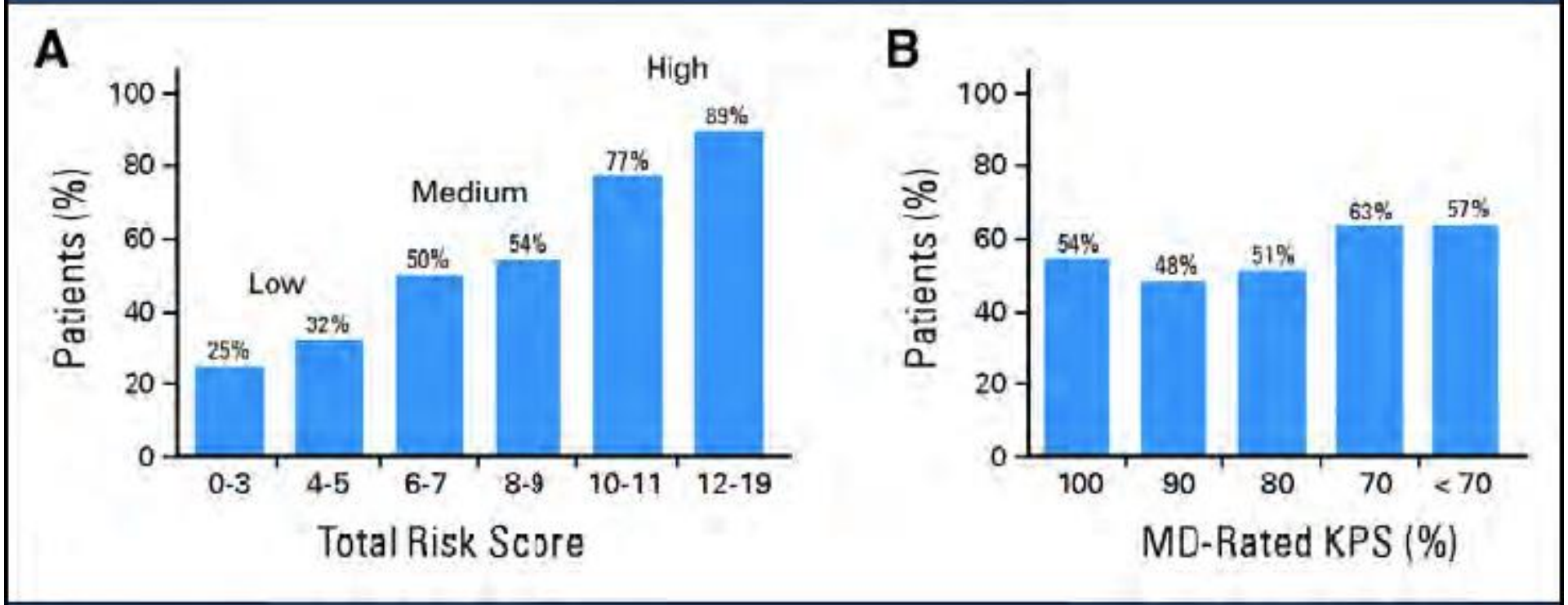
"Where all the surgeons are strong, all the anesthesiologists are good looking, and all the patients are above average."

Now how accurate is your eyeball?





Risk score versus physician-rated KPS to predict chemotherapy toxicity

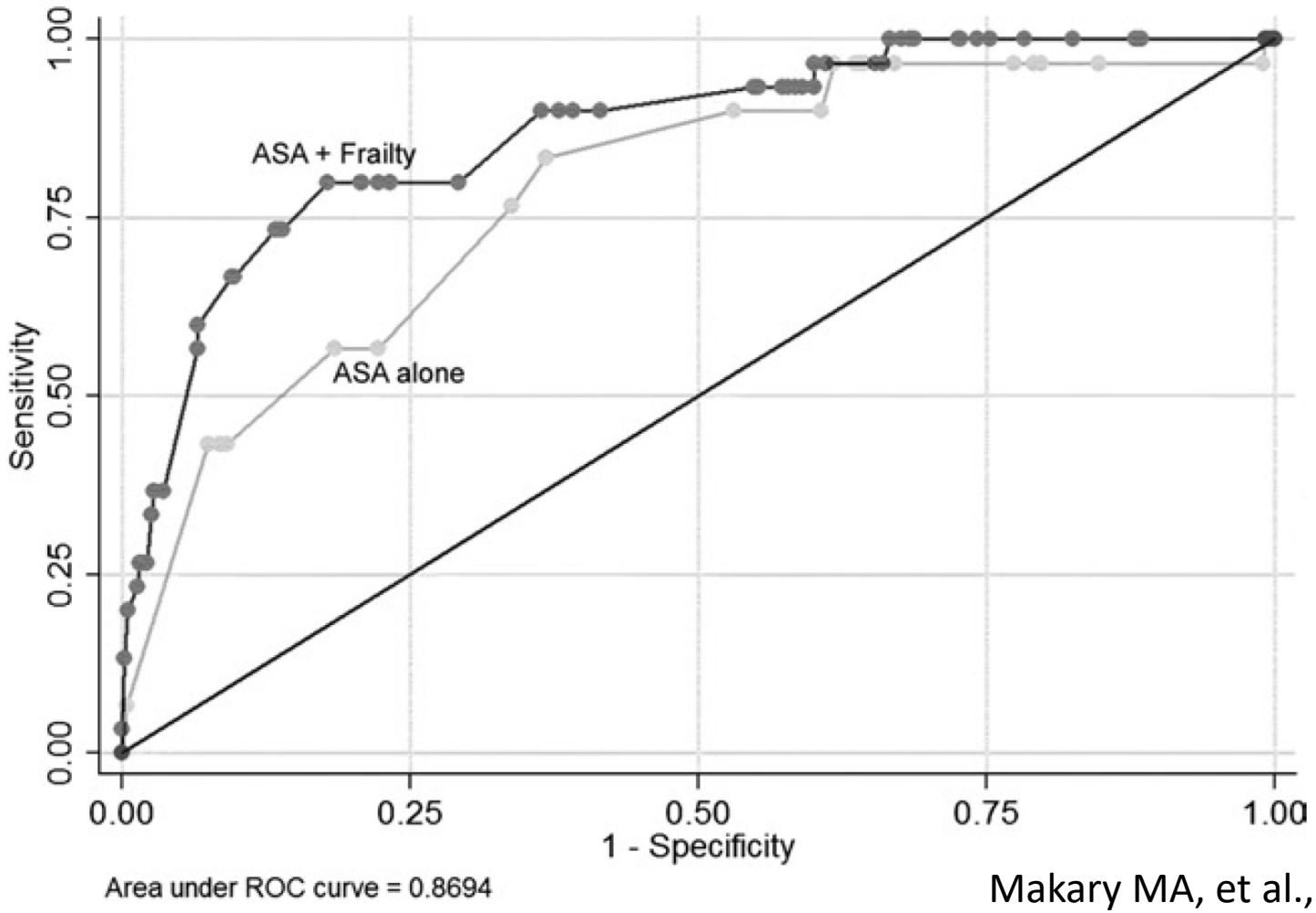


Hurria A, JCO 2011;29:3457-3465

Systematic, multifactorial, risk assessment

- “Foot of the bed” assessments of cardiac risk not reliable due to disagreement between clinicians.
  - Hii TB, et al. *Heart Lung Circ*. 2015;24(6):551-556.
- Multifactorial tools are superior to single-item assessments.
  - Afilalo J, et al. *Circulation*. 2017;135(21):2025-2027
  - Hurria A, et al. *J Clin Oncol*. 2011;29(25):3457-3465.
  - Fried L, et al. *The Journals of Gerontology: Series A*, 2004; 59(3):M255–M263
- Vascular Surgeons effectively estimate mortality, but underestimate complications and long-term disability compared to multifactorial tool.
  - George EL, et al. *J Surg Res*. 2020;248:38-44.
- Modified Geriatric Assessment (mGA) effectively identifies frailty among patients that oncologists considered non frail (e.g. ↑ sensitivity).
  - Kirkhus, et al. *Br J Cancer* 117, 470–477 (2017)

Frailty is the Best Predictor of Postoperative Outcomes….



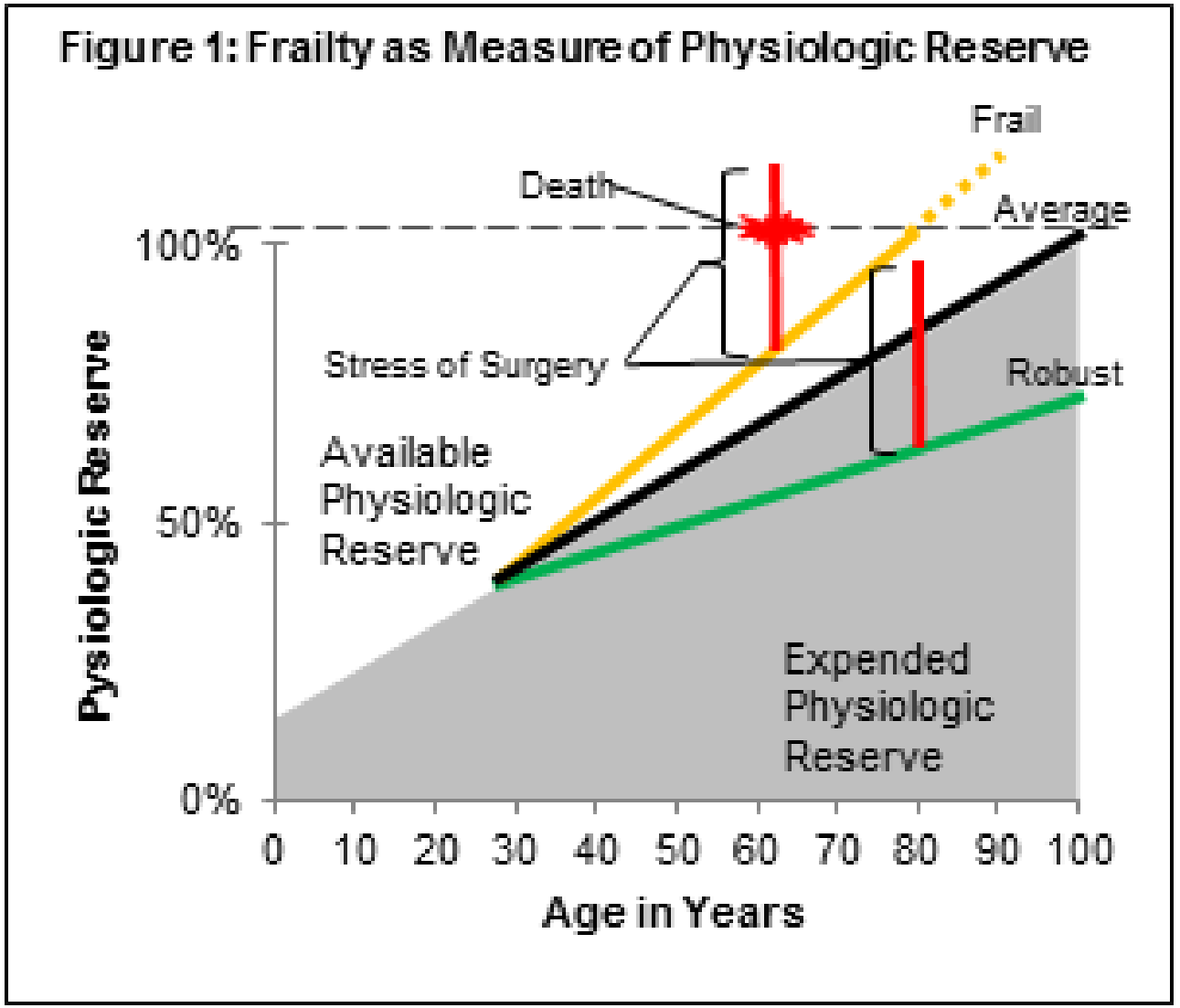
- Mortality
- Complications
- Failure to Rescue
- Length of Stay
- Readmission
- Loss of Independence

Makary MA, et al., *J Am Coll Surg.* 2010;210(6):901-908

Why Frailty?

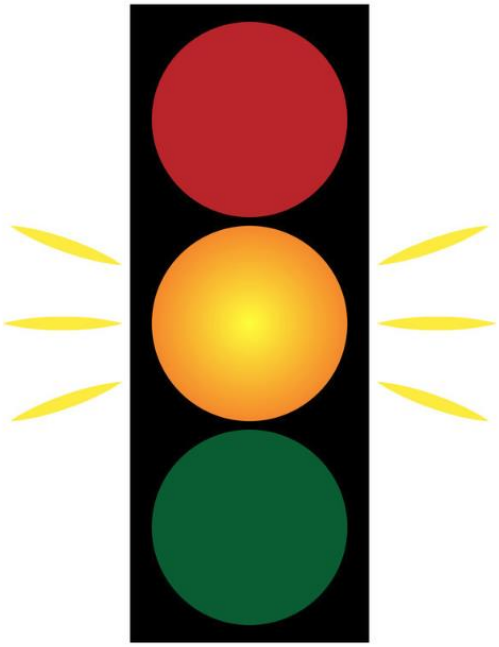
A clinical syndrome of decreased physiological reserve

- process whereby small deficits accumulate in multiple adaptive systems, any one of which might be clinically insignificant, but together they produce significant vulnerability to stress that can lead to catastrophic decompensation.
- multiple causes and contributors
- characterized by diminished strength, endurance, nutrition, and cognitive capacity
- More than just age or the sum of comorbidities (not captured by standard risk stratification tools like ASA or Eagle criteria).



Robert, C. M., & Sean, M. B. (2014). *Physiological Reserve and Frailty in Critical Illness*. Oxford, UK: Oxford University Press.

The Surgical Pause



Patient Presents to Outpatient Surgical Clinic

Risk Stratify by Assessing Frailty

Usual Care

SURGICAL PAUSE (*Make No Promises*)

- Further Risk Assessment & Mitigation
- Risk-informed Shared Decision Making Process

Prehabilitation

Surgery

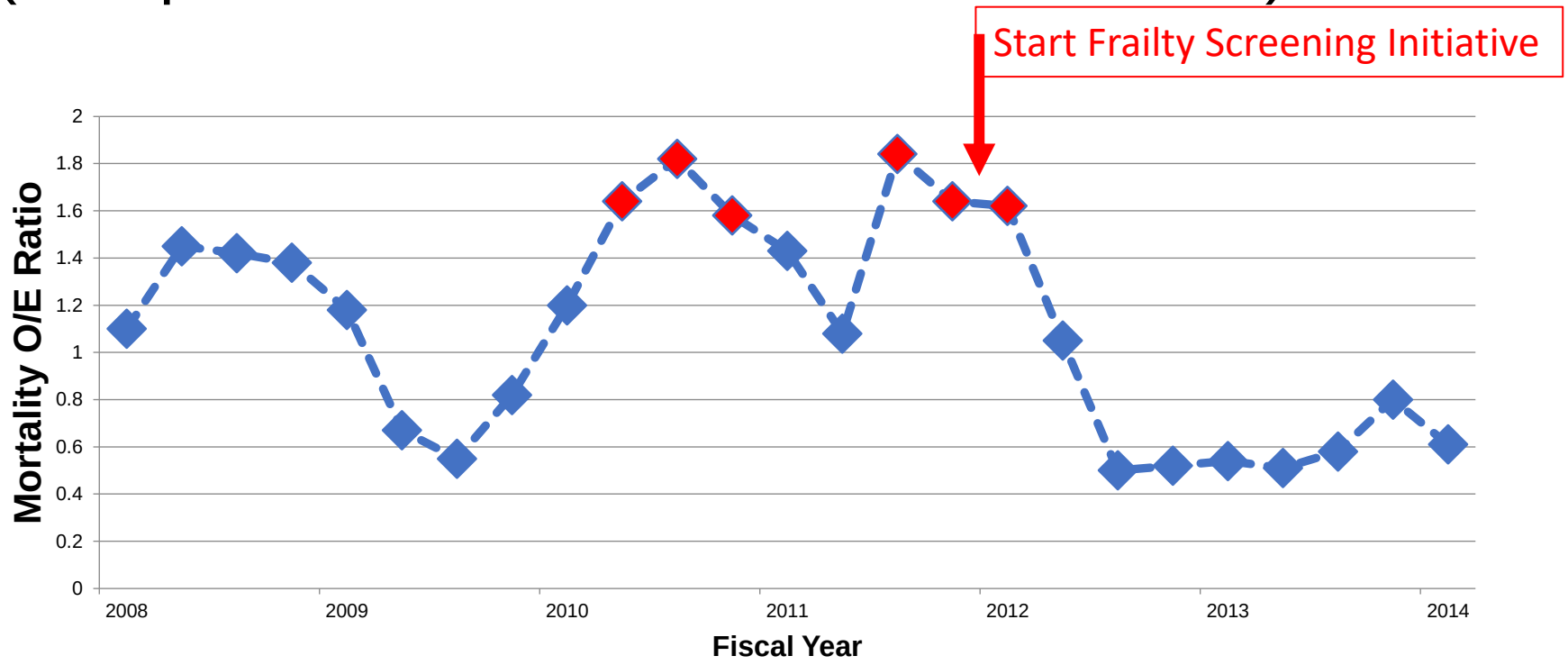
Non Operative Management

So what happened in Omaha?

- Modified an existing frailty measure (MMRI) for use in surgery
  - RISK ANALYSIS INDEX (RAI)
  - Made it mandatory to book OR time
- Conducted weekly review of all surgeries scheduled on frail patients.
  - Spoke with surgeon to review operative decision making.
  - Spoke with anesthesiologists to optimize anesthetic plan.
  - Spoke with intensivists to encourage post-operative rescue from near certain complications.
  - Aggressive referral for preoperative palliative care to clarify goals.

Outcomes: Decreased Mortality

Observed/Expected Mortality at the Omaha VAMC
(Red points are > 90% Confidence Interval)



Omaha Frailty Screening Initiative (FSI)

- 180-day mortality among frail fell from **23.9%** to **7.7%** ($p<0.001$)
- 3-fold survival advantage after FSI implementation (OR 2.87 [95%CI 1.98-4.16]), controlling for:
  - Age
  - Frailty
  - Predicted mortality based on VA risk-adjustment

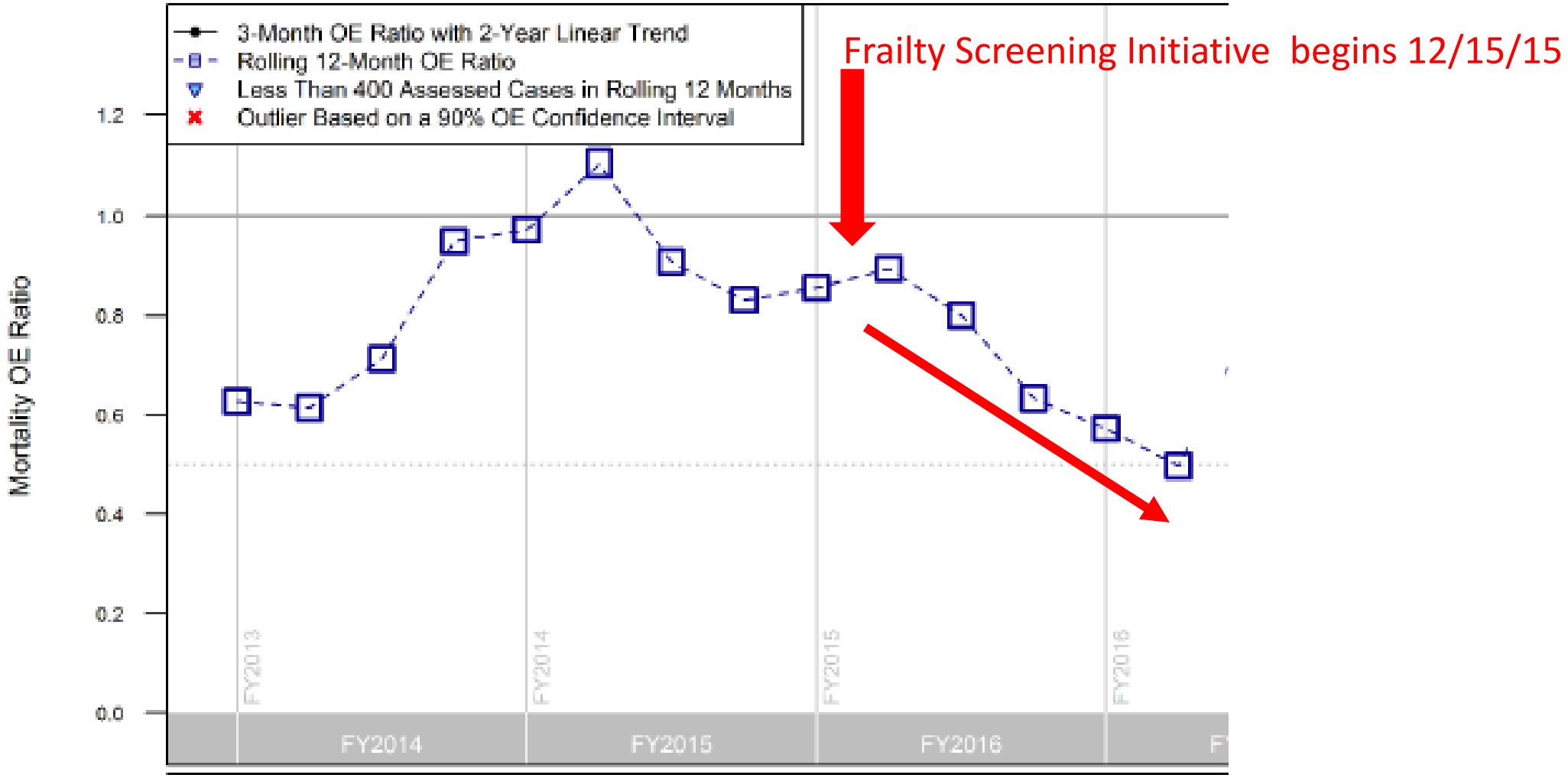
Hall, DE. et al. *JAMA Surgery* 152(3) doi:10.1001/jamasurg.2016.4202 (Nov 23).

FSI Changed Perioperative Palliative Care

- Changed Pattern of Perioperative Palliative Care Care Consult
  - *Rate increased* from 32 to 56 per year.
  - More often *ordered by a surgeon* (56.7% vs 24.4%; p< 0.05).
  - More often *ordered before surgery* (52.0% vs 26.3%; p< 0.05).
- Controlling for age, frailty and *whether the patient had surgery,* Preoperative Palliative Care Consult reduced risk of death when:
  - ordered by a surgeon (AOR 0.50[95% CI 0.30-0.83], p=0.007).
  - ordered before surgery (AOR 0.52[95% CI 0.30-0.90], p=0.02).
  - ordered by surgeon before surgery (AOR 0.27[95% CI 0.11-068], p=0.006)

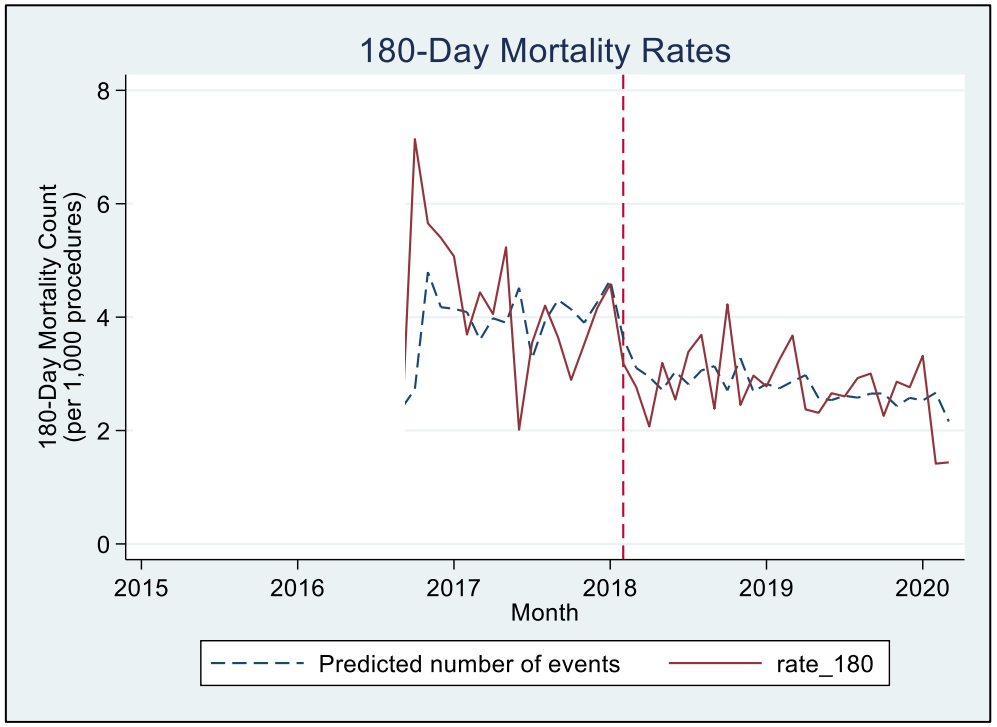
Ernst, K. F., et al(2014). *JAMA Surg, 149*(11), 1121-1126.

Decreased Mortality at VA Pittsburgh



Decreased Mortality at UPMC

- Interrupted Time Sequence Analysis with segmented Poisson regression.
- 51,385 patients July 2016-November 2020
  - 23,153 before BPA Implementation
  - 28,232 after BPA Implementation
- Overall 180-day mortality reduction
  - aOR 0.76 [95% CI 0.65-0.88]
- 2-fold survival advantage among frail.
  - aOR for survival 2.14 [95% CI 1.42-3.21]
  - Cut raw mortality among frail from 14% to 7%
- Lag-adjusted ITS model
  - 0.03 fewer 180-day mortalities/1,000 procedures/month



rate_180	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
death_time	.0206505	.0037606	5.49	0.000	.0132799	.0280211
intervention	-.2864171	.1280697	-2.24	0.025	-.5374291	-.0354051
interaction	-.0278729	.0082757	-3.37	0.001	-.0440931	-.0116528
lag_180	.1069392	.0404603	2.64	0.008	.0276385	.1862398
_cons	.3495465	.123177	2.84	0.005	.1081239	.590969

OK, but… I can get anyone through a minor procedure: RAI, Operative Stress and Mortality

- Delphi consensus methodology to rate operative physiological stress.
  - 566 surgical procedures that account for 90% all VA surgery
  - Ratings by panel of surgeons and anesthesiologists
  - Consensus reached after 3 rounds of rating.
- 5-point Operative Stress Score:

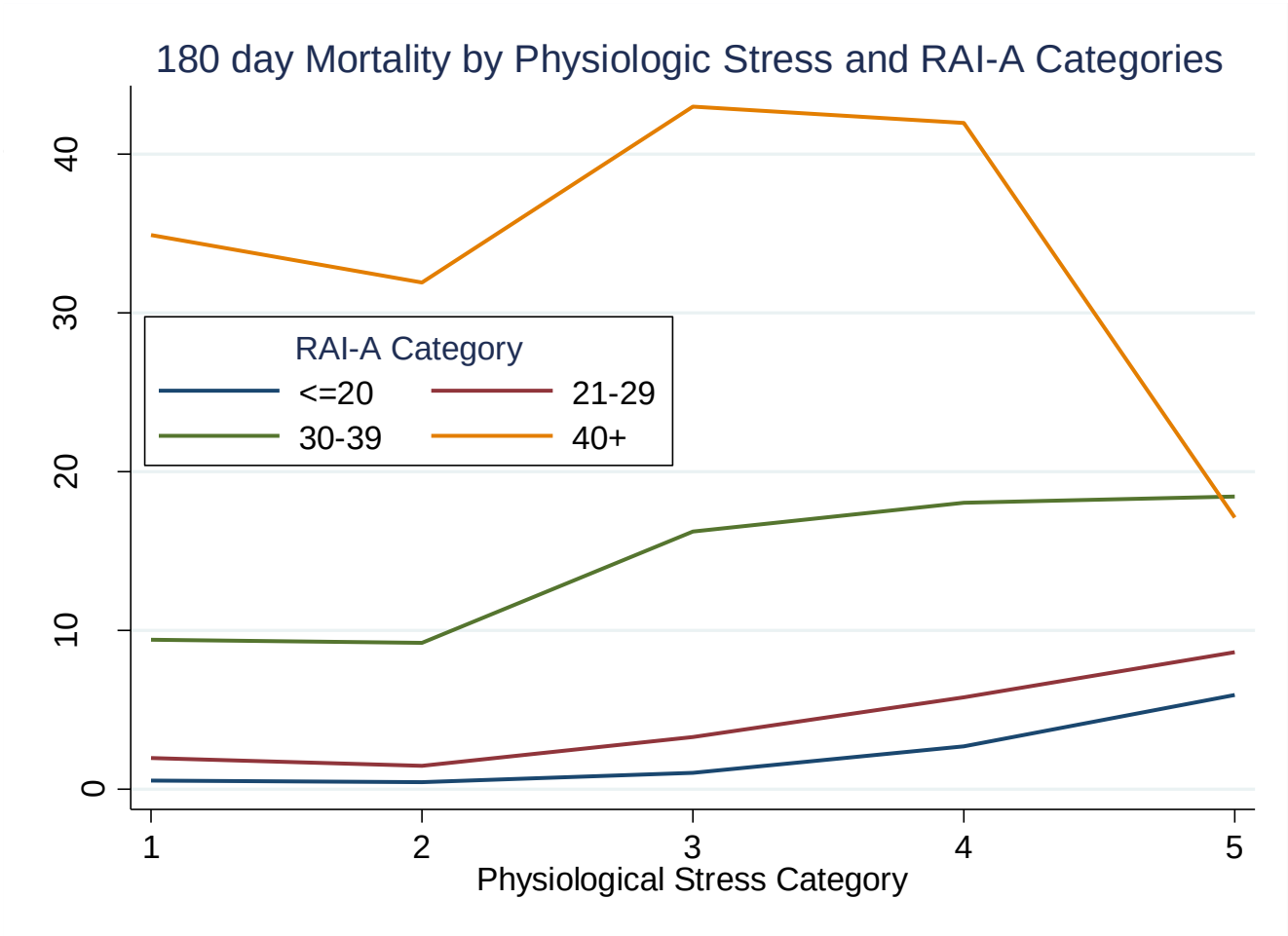
  1-cystoscopy, hydrocele, ganglion cyst

  2-inguinal or umbilical hernia, arthroscopy of kn or shoulder

  3-cholecystectomy, CEA, arthroplasty of knee, shoulder or hip

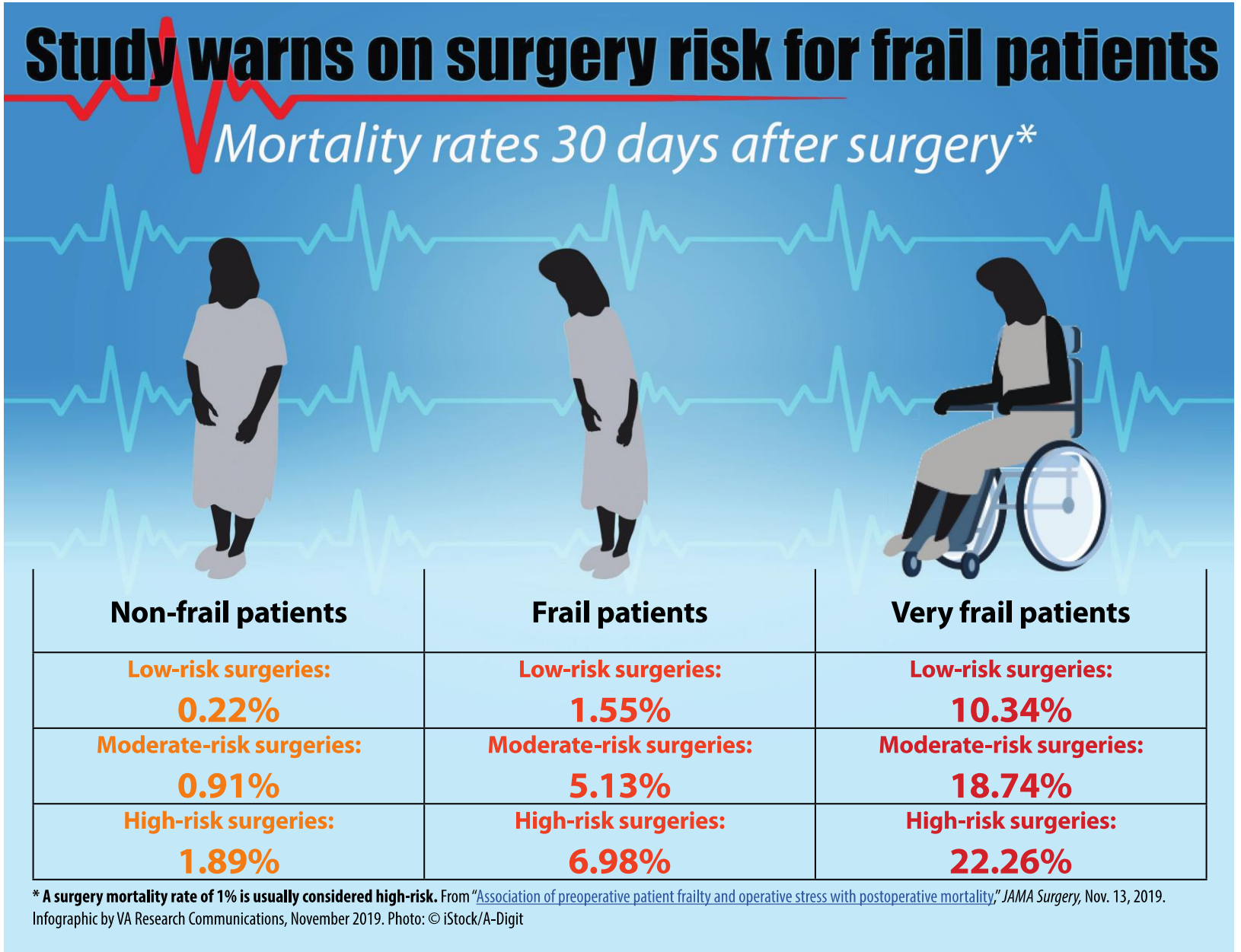
  4-open colectomy, prostatectomy, pulmonary lobectomy or segmentectomy

  5-abdominal aortic aneurysm, pancreaticoduodenectomy, esophagectomy



Shinall, Myrick C. et al. *JAMA Surgery* 10.1001/jamasurg.2019.4620 (Nov 13).

NO SUCH THING AS LOW-RISK SURGERY FOR THE FRAIL



Practical Implementation at UPMC

Frailty Screening

RAI Survey

Instructions: Please answer the following questions to the best of your ability. Your advocate or companion can help you complete this survey.

1. Do you live in place other than your own home? ☐ No ☐Yes
   If Yes, circle where: Nursing Home Skilled Nursing Facility Assisted Living Other_____
   When did you begin living in the place you are currently residing? Less than 3 months 3 months to 1 year Greater than one year ago

2. Any kidney failure, kidney not working well, or seeing a kidney doctor (nephrologist)? ☐ No ☐Yes
   If yes circle one: was your nephrologist visit for Kidney stones Other Both Kidney Stones and Other problem

3. Any history of chronic (long-term) congestive heart failure (CHF)? ☐ No ☐Yes

4. Any shortness of breath when resting? ☐ No ☐Yes
   Do you have trouble catching your breath when resting or doing minimal activities, like walking to the bathroom?

5. In the past five years, have you been diagnosed with or treated for cancer? ☐ No ☐Yes
   Prompt: Please answer "Yes" if the clinic visit today is to discuss the possibility of cancer surgery.

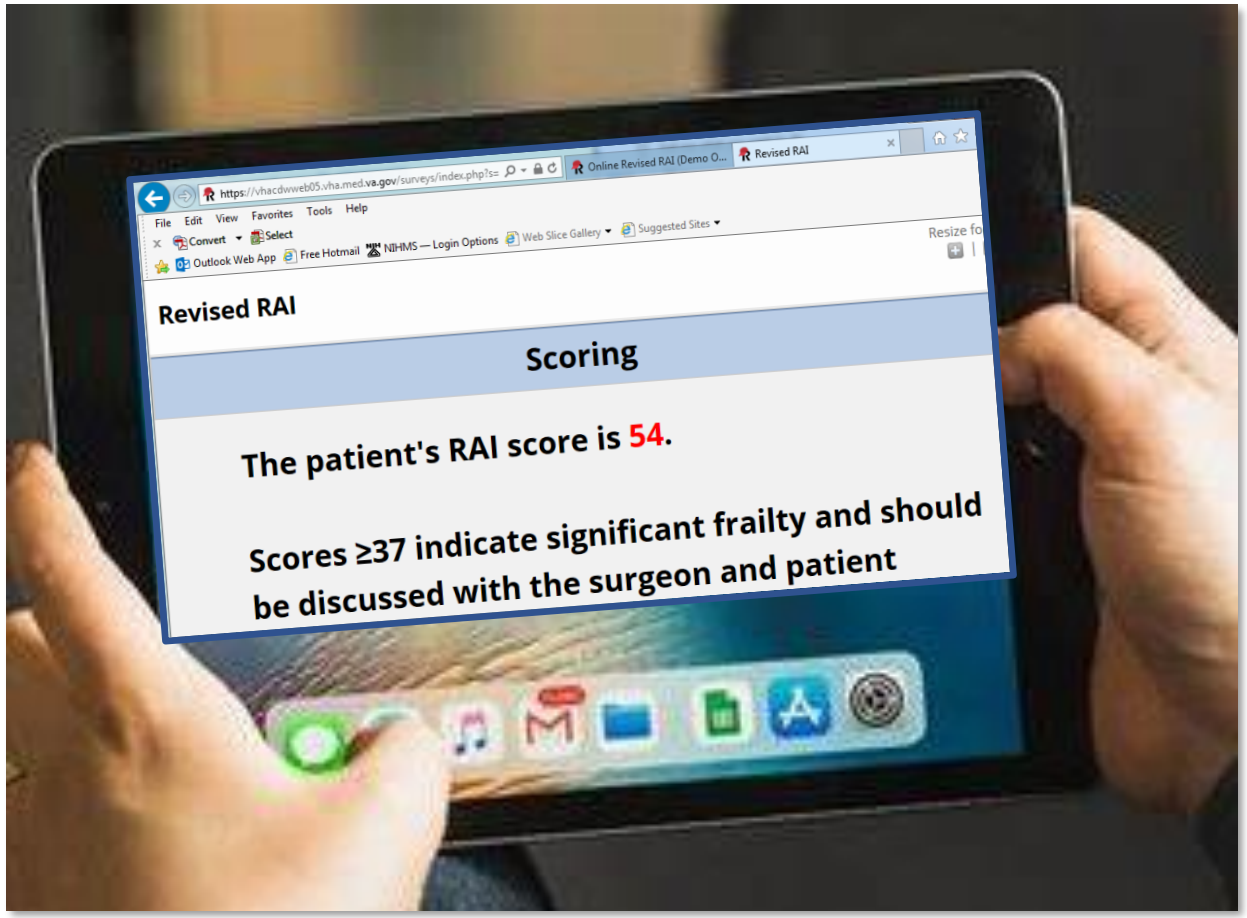
6. Have you lost weight of 10 pounds or more in the past 3 months without trying? ☐ No ☐Yes
   Prompt: Are your clothes feeling looser than in the past?

7. Do you have any loss of appetite?
   Prompt: Do you or your family notice that you are not eating as much? ☐ No ☐Yes

8. During the last 3 months has it become difficult for you to remember things or organize your thoughts? ☐ No ☐Yes

9. Getting around (mobility)	Can get around without any help	Needs help from a cane, walker or scooter	Needs Help from others to get around the house or neighborhood	Needs help getting in or out of a chair	Totally dependent on others to get around
10. Eating	Can plan and prepare own meals	Needs help planning meals	Needs help preparing meals	Needs help eating meals	Totally dependent on others to eat meals
11. Toileting	Can use toilet without help	Needs help getting to or from toilet	Needs help to use toilet paper	Cannot use a standard toilet, with help can use bedpan/urinal	Totally dependent on others for toileting
12. Personal hygiene (bathing, hand washing, changing clothes	Can shower or bathe without prompt or help	Can shower or bathe without help when prompted	Needs help preparing the tub or shower	Needs some help with some elements of washing	Totally dependent on others to shower or bathe

Online RAI



Risk Analysis Index (RAI)

- 14 Variables; weighted scale
- Grouped into 4 categories with increasing frailty severity

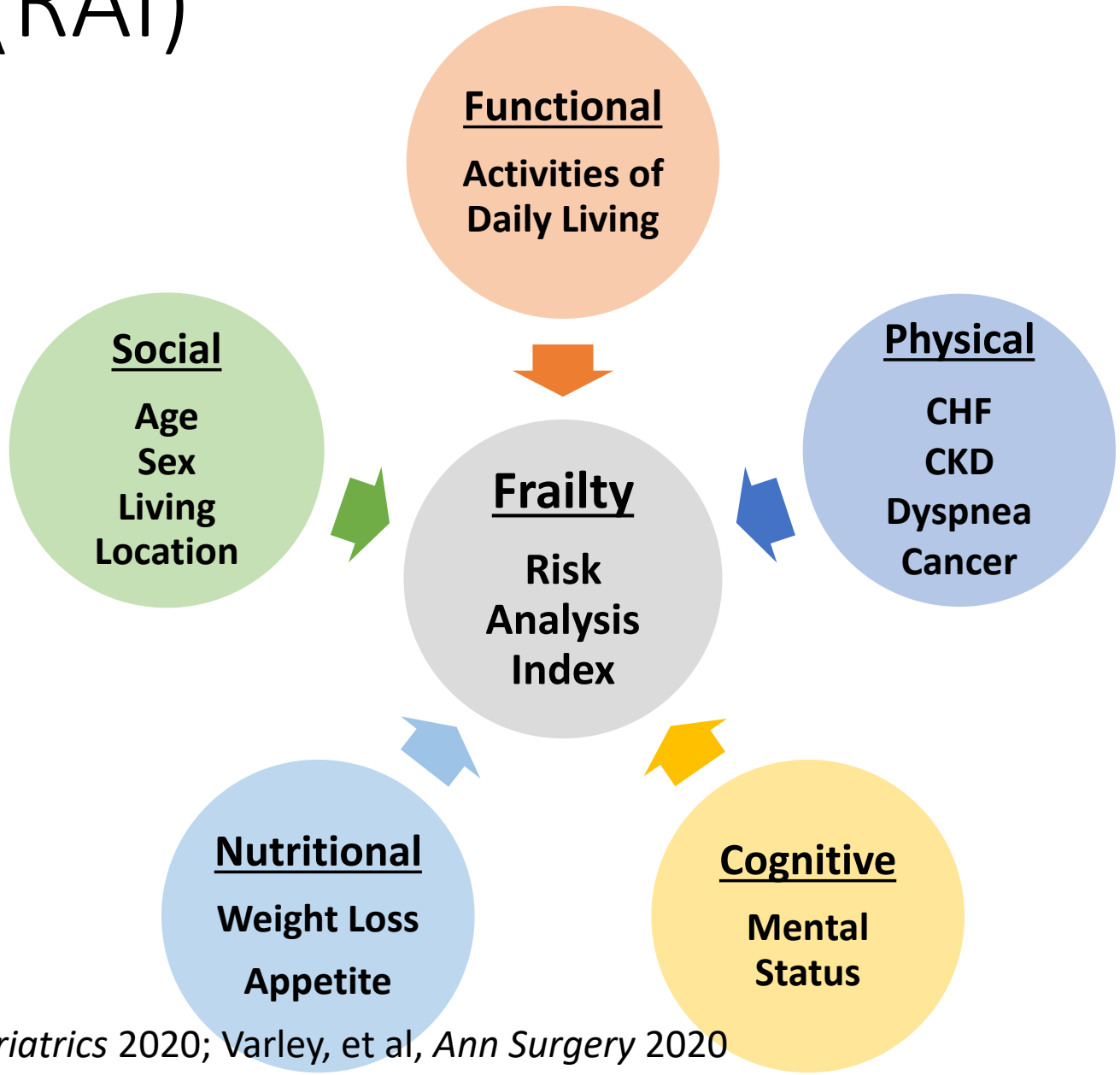
  Robust: 0-29

  Average: 30-36

  Frail: 37-44

  Very Frail: ≥ 45

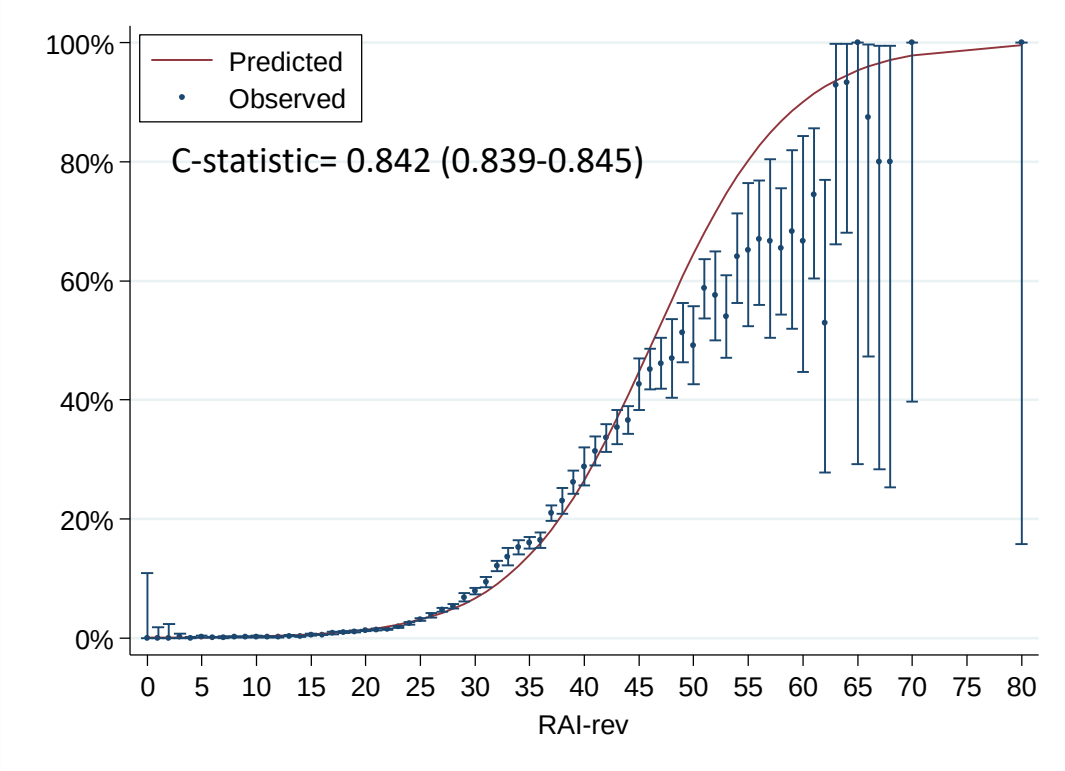
- Most thoroughly validated measure of *surgical* frailty, and only shown feasible for point-of-care testing[1]



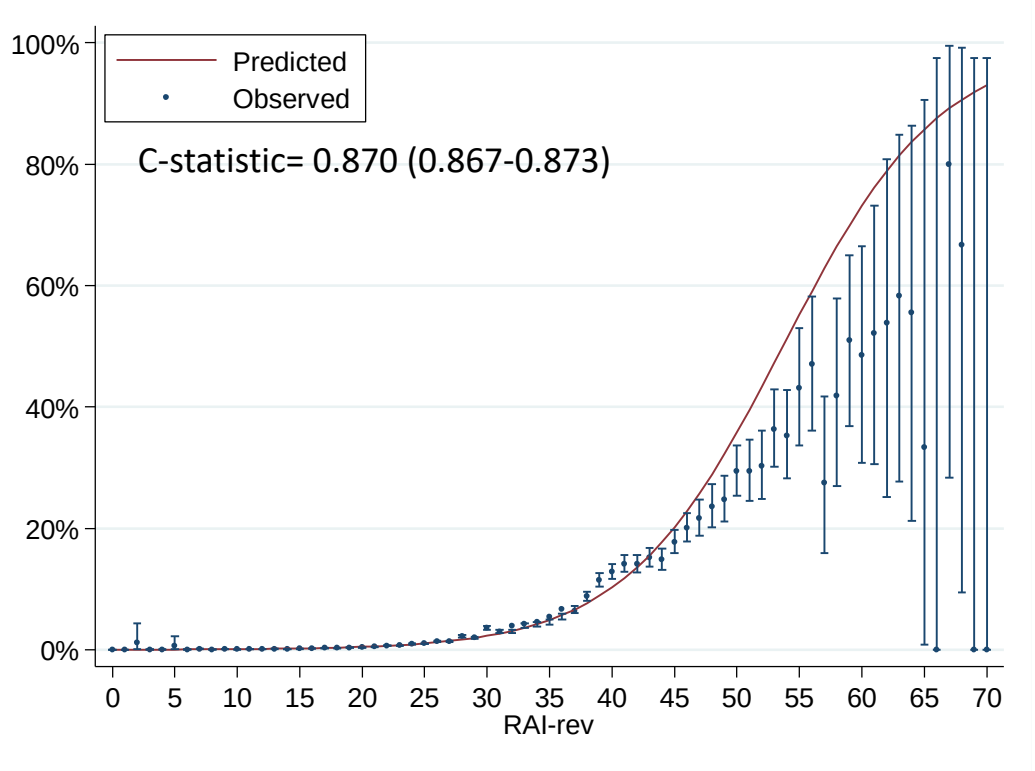
[1]Arya et al. *Ann Surgery* 2019; Shah, et al, *J Am Geriatrics* 2020; Varley, et al, *Ann Surgery* 2020

RAI Validation in Veterans and Private Sector VASQIP & ACS-NSQIP

VASQIP (c=0.842, n=480,731)

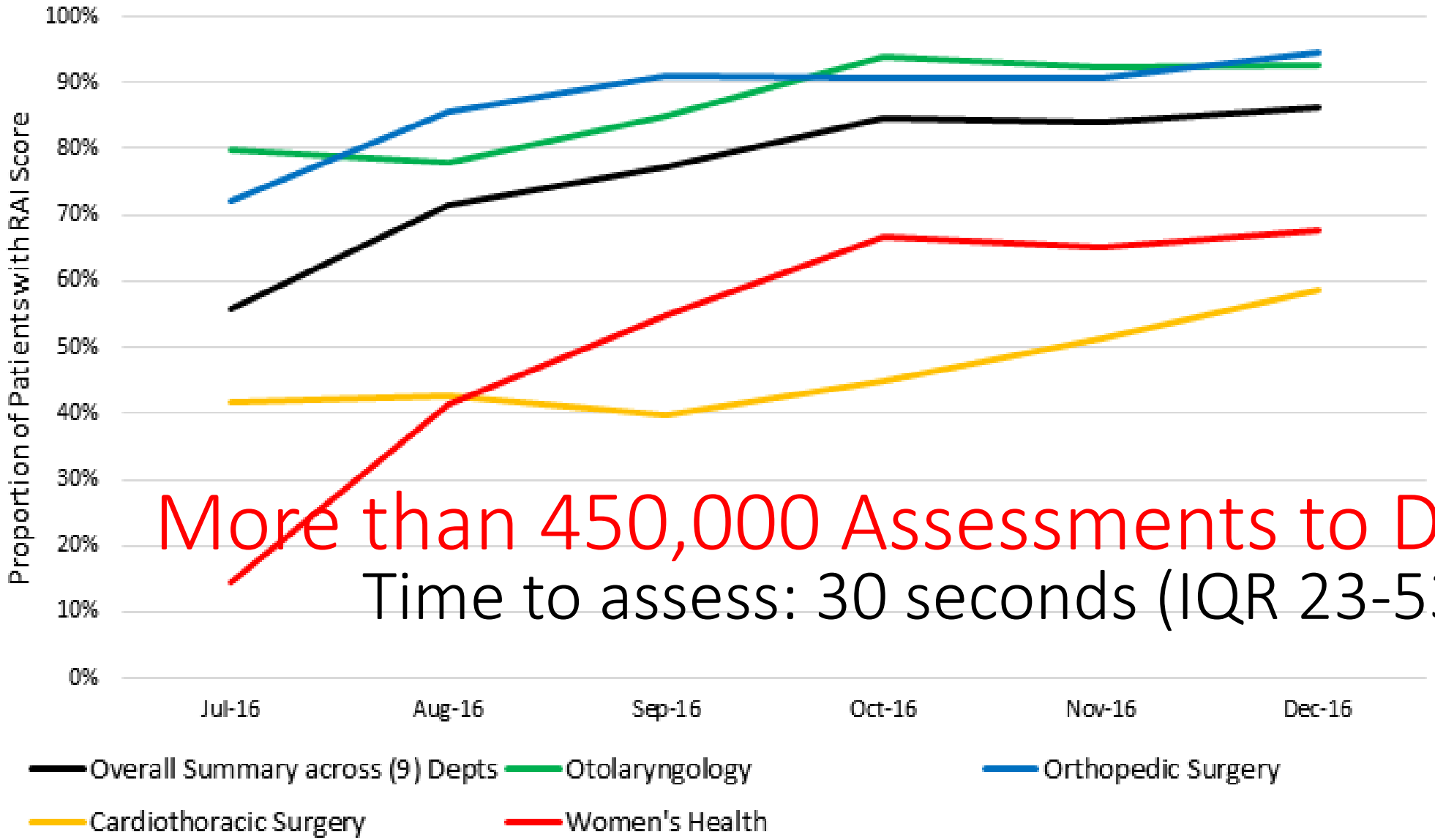


ACS-NSQIP (c=0.870, N=1,391,785)



Arya, S. et al. *Annals of Surgery* doi 10.1097/SLA.0000000000003276 (2019, March 23).

RAI Implementation at UPMC: Feasible



More than 450,000 Assessments to Date

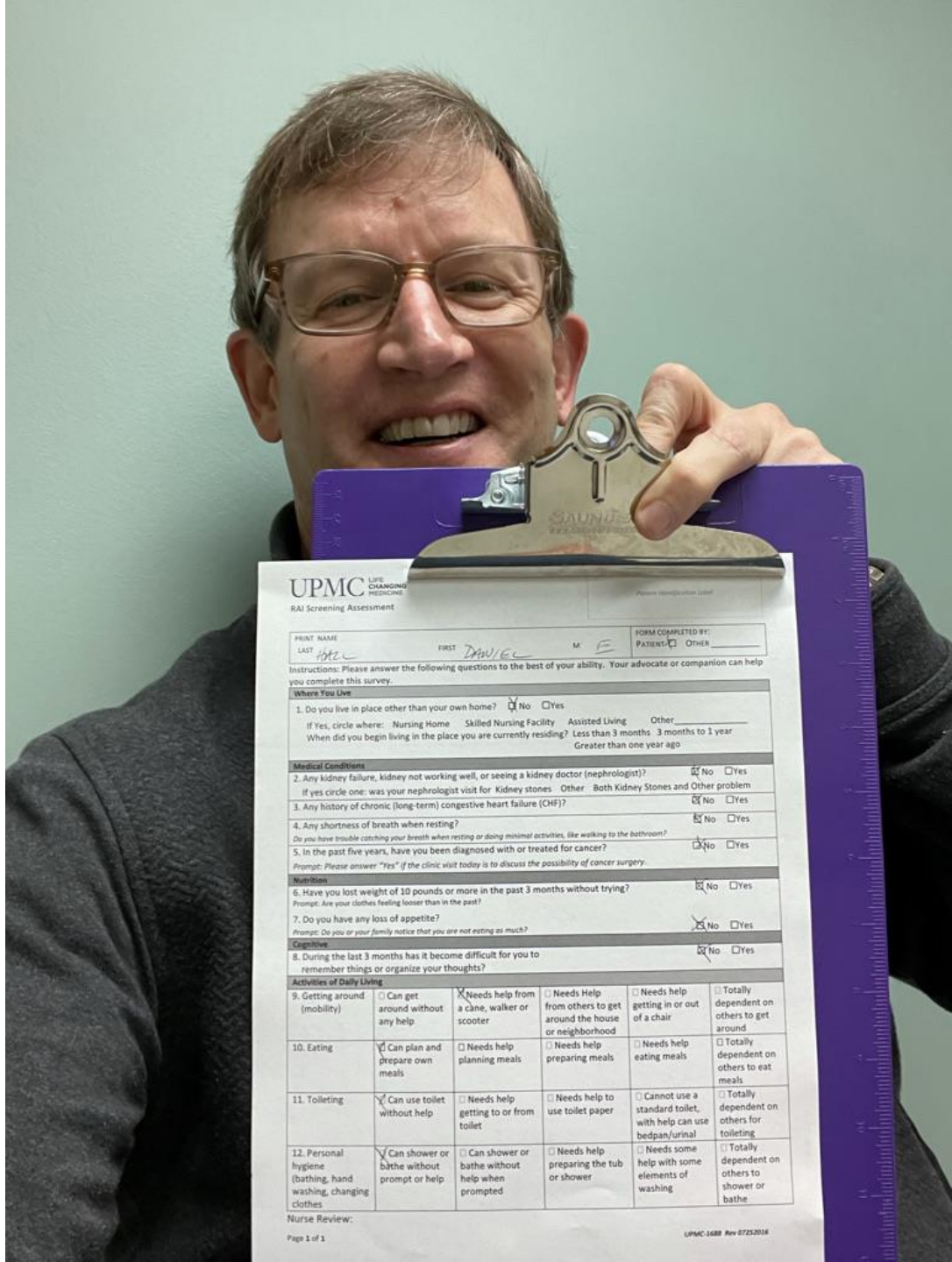
Time to assess: 30 seconds (IQR 23-53)

Varley PR, et al *Ann Surg.* 2020 10.1097/SLA.0000000000003808

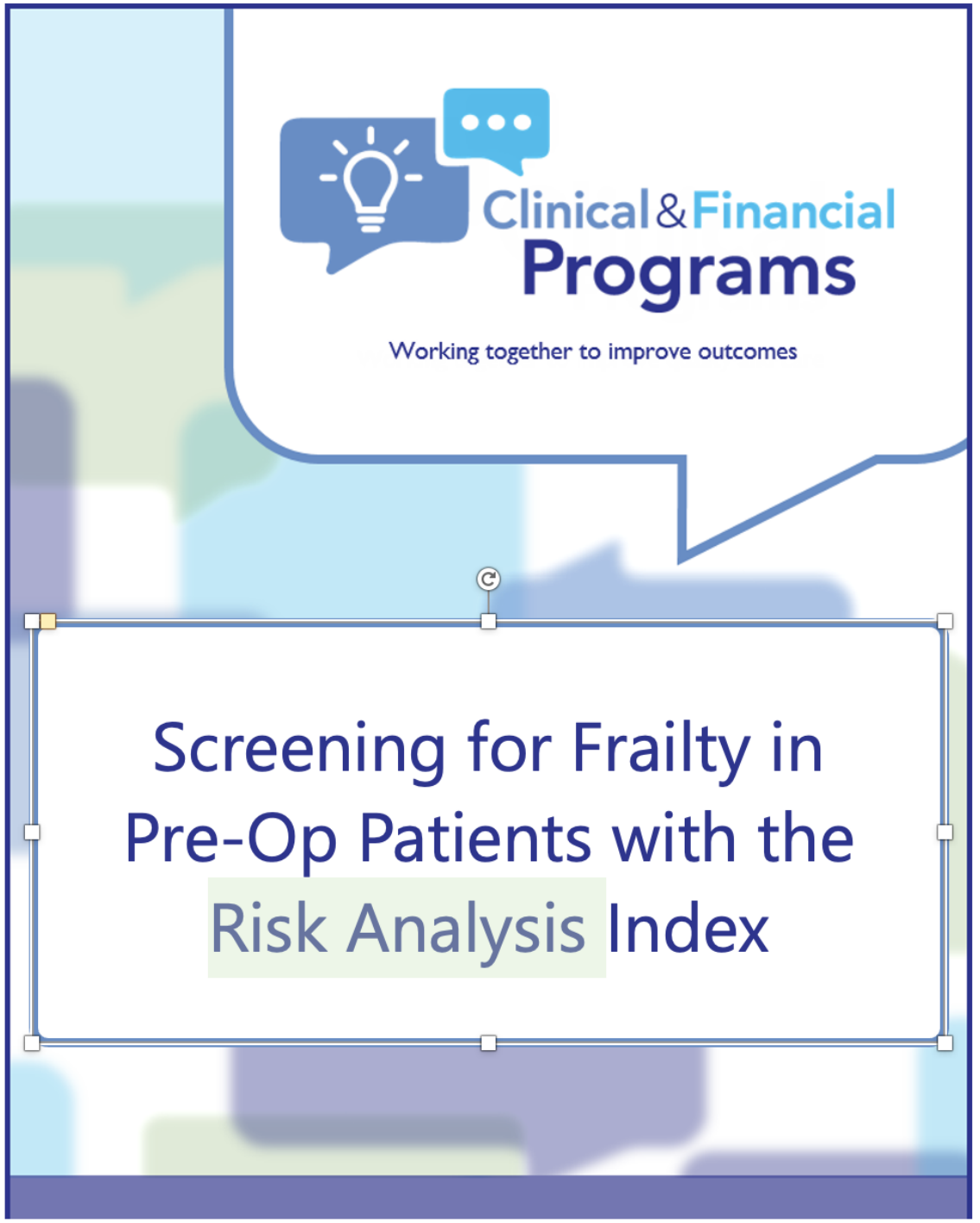
Including me!
5/20/2021

A torn achilles made me less mobile than the day before…

but not frail yet.



Now available in Epic as a Clinical Program



Implementation Map

- **Total of 50 engaged sites across ALL 18 VISNs**
  - 28 Sites are active
    - 16 sites are considered fully implemented
    - 12 sites are nearing full implementation within the next few months.
- **FY22 Goal:**
  - 35 fully implemented sites across 18 VISNs

Step 1:
Assess Frailty

Threshold for Action: Revised RAI ≥ 37

- Riskiest 10% of population;
- At least twice the average 6-month mortality
  - 12% vs 6%
- Twice the rate of 30- and 90-day readmission
  - 22% vs 12%
- Twice the rate of long term ICU stay ≥ 5 days
  - 6% vs. 3%
- Modest positive predictive value: 19%
- Strong negative predictive value: 96%
  - *<u>Safe to operate</u> on patients with Revised RAI<37 (e.g. most patients)*

Step 2:
Do *Something* About It

IF FRAIL

(a)

Interdisciplinary Review

↓Mortality

25% to 8% (6-month Mortality)

- 3-Fold Survival Advantage

(b)

Goal Clarification

Changes Care Plans

21% declined surgery

(c)

Exercise Training

3-6 Weeks Before Surgery

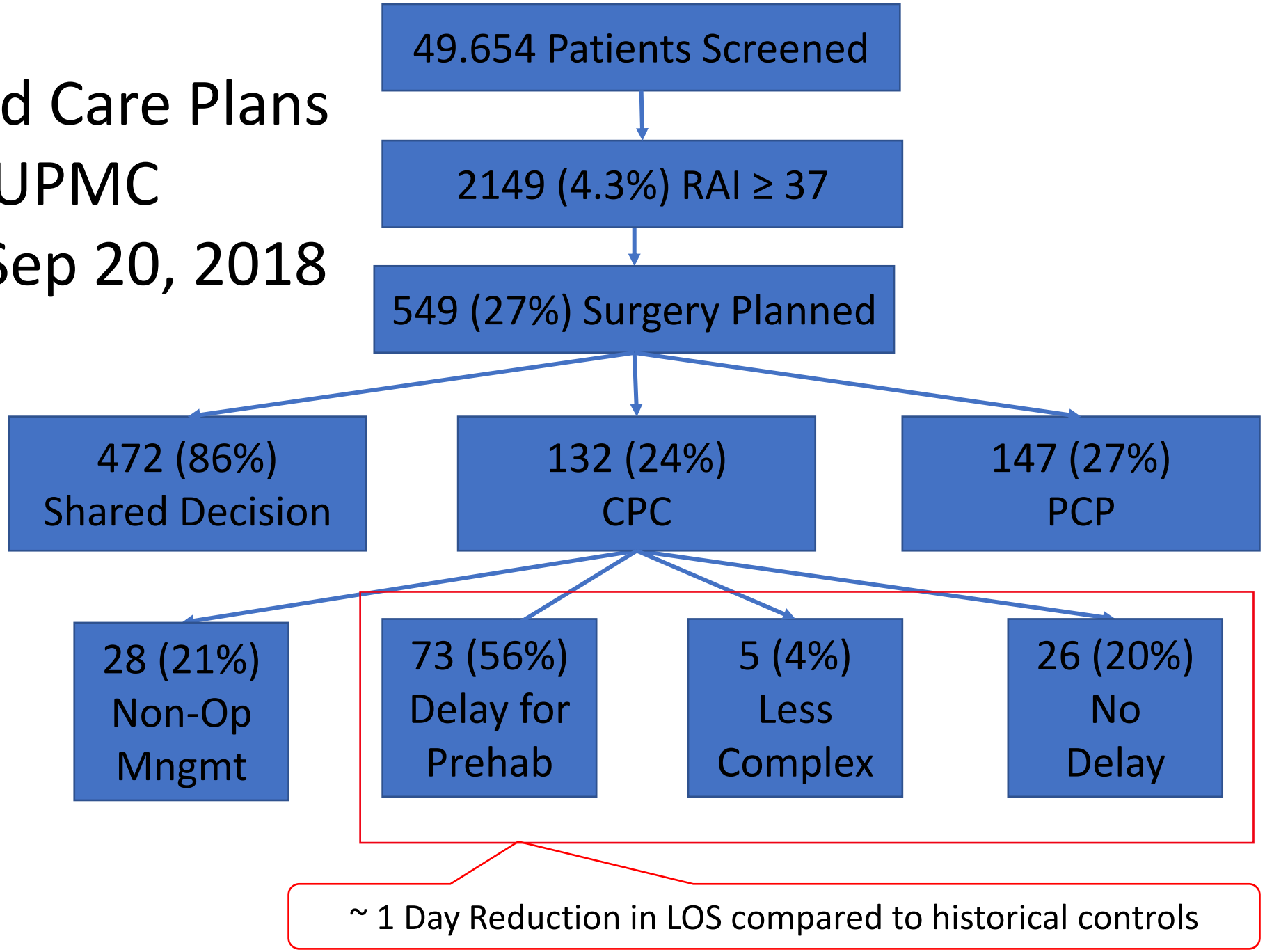
↑Functional Performance

↑Endurance

↑Gait Speed

↑Respiratory Pressures

Changed Care Plans
UPMC
Feb 1- Sep 20, 2018



Baseline to Day of Surgery

Significant Changes in Physical Performance

Measure	Baseline Mean (SD)	Day of Surgery Mean (SD)	Mean Difference (Standard Error)	P value	Minimum Clinically Important Difference
Extended TUG (seconds)	N=42 21.9 (12.5)	N=33 17.8 (4.6)	-2.3 (0.5)	<0.001	2.4s
Gait Speed (meters/second)	N=42 1.11 (0.32)	N=33 1.24 (0.30)	+0.1 (0.03)	0.002	0.1m/s
5 Chair Rise (seconds)	N=38 13.3 (5.7)	N=33 11.8 (4.6)	-1.6 (0.6)	0.007	2.3s
Six Minute Walk Test (meters)	N=40 348.6 (109.1)	N=30 380.6 (102.2)	+29.3 (15.6)	0.060	30m
SPPB Score	N=41 10.2 (1.9)	N=33 10.8 (1.1)	+0.6 (0.3)	0.068	1 unit

Implementation Nuts and Bolts

Two Step Process

- Step 1: Measure Frailty
  - Don ‘t Triage the Triage Tool (Measure on Everyone)
  - Must measure frailty before booking surgery date

Two Step Process

- Step 2: Do Something About It
  - Surgeon champion review
  - Interdisciplinary Review Panel
    - Surgery, Anesthesia, Palliative Care, Geriatrics, IMPACT Clinic
    - Real time or Time Asynchronous
  - Goal Clarification & Shared Decision Making
    - ”Not a candidate” is NOT shared decision making
    - Avoid mental model of “fixing it”
      - I’m worried that no matter what we do life will never be the same for you
    - Best, Worst, and Most Likely Scenarios of at least 2 options
    - Who has this conversation?
      - Palliative care has skill but not necessarily the knowledge
      - Surgeons have the knowledge, but not necessarily the skill
    - Training options available

Lessons Learned

- It's not a math problem
  - Maximizing c-statistics is a distraction
  - No algorithm can determine what we should/should not do
  - RAI signals need to shift from fast to slow thinking
- It's about insight not technique
  - Shared decision making is *really* challenging, but it is the next frontier
  - Focusing on all-cause mortality creates opportunity
- The RAI works because it is simple, fast, and guides intervention
  - Phenotypical frailty may be more "pure" but not feasible for wide screening
  - Don't try to triage the triage tool
- Light, flexible touch—not too much structure
  - With a gentle nudge, surgeons step up
  - So adapt to your site's requirements
  - 1-2 hours/week of surgical champion

Many thanks to growing Research network.

- Health Systems with RAI
  - Atlanta-Emory/VA
  - Nashville-Vanderbilt
  - Phoenix-VA
  - Pittsburgh-UPMC/VA
  - Palo Alto-Stanford/VA
  - Omaha-UNMC/VA
  - Richmond-VA
  - Houston-Baylor/VA
  - Salt Lake-Utah/VA
  - San Antonio-UTH/VA
  - Indiana-University
  - University of New Mexico
- RAI Workgroup
  - Jason, Dan, Shipra
  - Ricky Shinall
  - Nader Massarweh
  - Rupen Shah
- VQI workgroup
  - Philip Goodney
  - Matthew Mell
  - Benjamin Brooke
  - Larry Kraiss
- Team Hall/UPMC/VAPHS
  - Ada Youk
  - Andrew Bilderback
  - Jacob Hodges
  - Jeff Borrebach
  - Mary K Wisniewski
  - Tami Minnier
  - Steve Shapiro
  - Mark Wilson
  - Joel Nelson
  - Bob Arnold
  - Johanna Bellon
  - Dan Forman
  - Kelly Allsup
  - Jonas Johnson
  - Stephen Esper
  - Jenn Holder-Murray
- Team Arya/Stanford/ VA Palo Alto/ VA Atlanta/ Emory
  - Sebastian Perez
  - Amber Trickey
  - Rui Chen
  - Kelly Blum
  - Elizabeth George
  - Kara Rothenberg
  - Jordan Stern
  - Arden Morris
  - Mary Hawn
  - Ronald Dalman
  - Paula Tucker
  - Luke Brewster
  - Theodore Johnson
  - Jason Hockenberry
- Team Johanning/ UNMC/NWICHS/ VISN 23
  - Tom Lynch
  - Kendra Schmid
  - Kaeli Samson
  - Georgia Lyles
  - Krishna Chaitanya
  - Karen Taylor
  - Tom Edes
  - Richard Allman
  - Scott Shreve
  - Jahnigen Scholars
  - Health and Aging Policy Fellowship

Questions?

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….Including Cost (Reality Check)

Variable	Nonfrail (0 or 1 Trait) (n = 24)′	Prefrail (2 or 3 Traits) (n = 13)	Frail (≥4 Traits) (n = 23)	P
Hospital cost	$27,731 ± $15,693	$29,776 ± $12,782	$76,363 ± $48,595	<.001
Posthospital 6-mo cost	$6,472 ± $7,523	$21,874 ± $13,018	$34,339 ± $31,756	<.001
Total 6-mo postoperative cost	$33,453 ± $17,870	$51,650 ± $21,569	$110,702 ± $67,705	<.001
Medicare DRG payment	$23,142 ± $6,751	$25,425 ± $5,234	$27,399 ± $3,148	.028
Baseline health	802,872		2,530,000	
Age (y)	70 ± 5	75 ± 6	81 ± 6	<.001
Postdischarge variables				
Discharge institutionalization	0% (0)	15% (2)	59% (13)*	<.001
30-d readmission	4% (1)	15% (2)	32% (7)*	.044

Robinson TN, et al., *Am J Surg.* 2011;202(5):511-514.

RAI & Cost: Direct and Net Hospital Costs

Univariate Analysis:

↑length of stay (0.8 v. 2.1 days)

↑ total cost ($6,934 v. $13,319)

↓ net hospital income ($5,447 v. $3,129)

Multivariate analysis:

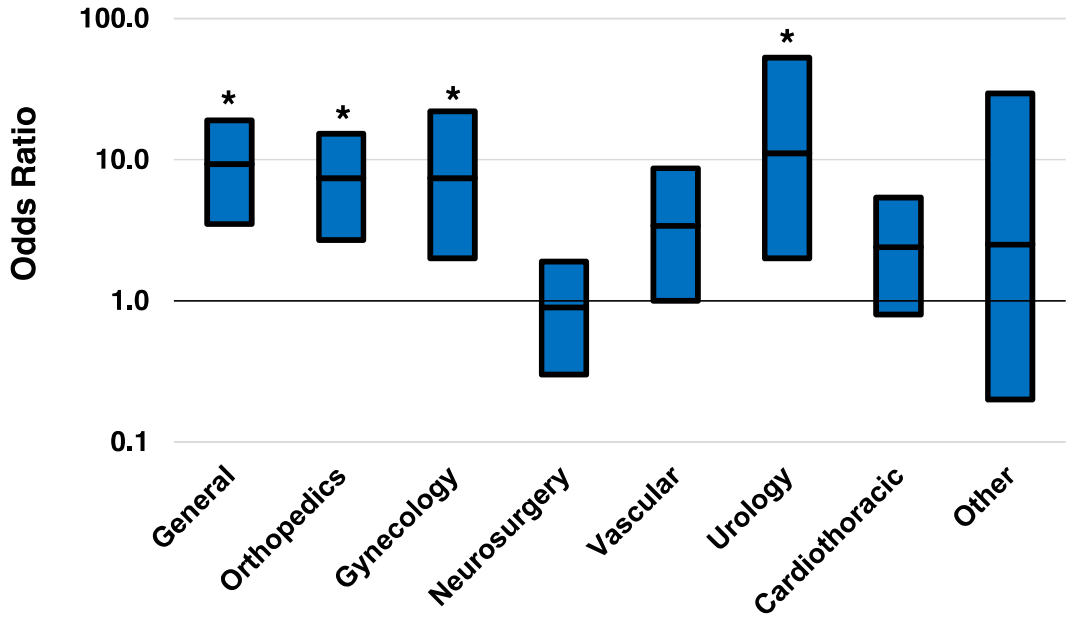
↑ direct cost (OR 2.2)

↑ indirect cost (OR 1.9)

↑ total cost (OR 2.2)

↓ net income (OR 0.8)

(all p<0.001)



Total cost odds ratio (with 95% CI, as demonstrated by box plot) on logarithmic scale. Calculated as odds of significantly frail patients costing greater than the median cost for inpatient elective operations stratified by service and Risk Analysis Index with unfrail patients (not depicted) as the reference value (*p < 0.05).

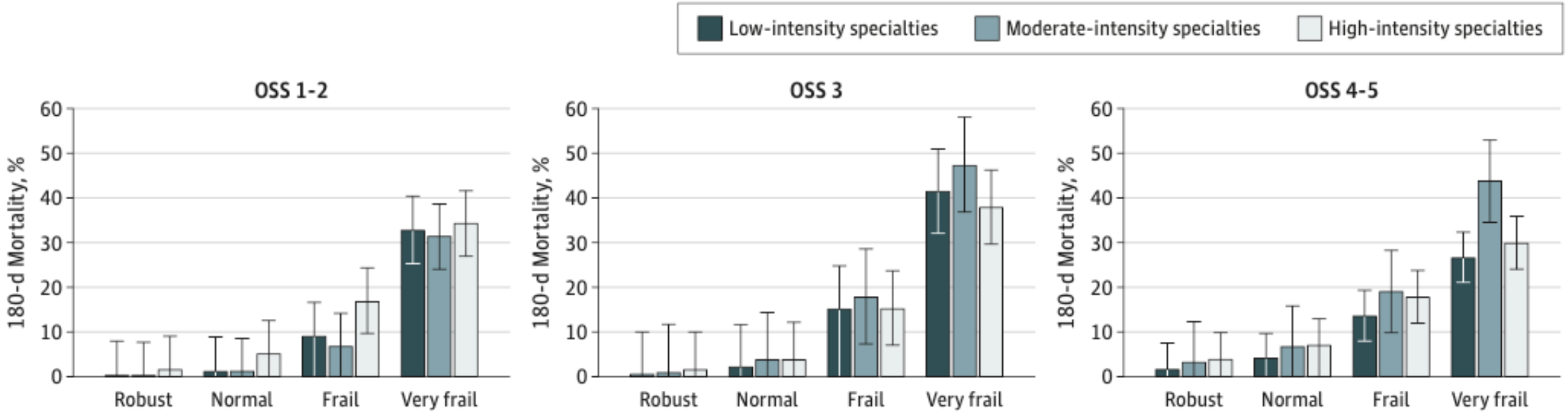
Wilkes JG, et al. *J Am Coll Surg.* 2019;228(6):861-870.

UPMC Charges normalized to 'Normal 30-36' total charges

	Category	Robust ≤29	Normal 30 to 36	Frail 37 to 44	Very frail ≥45
Inpatient	Inpatient Surgical DRG	0.34	0.34	0.35	0.34
	ER to Inpatient Surgical DRG	0.03	0.05	0.07	0.08
	Inpatient Medical DRG, General, Specialist and Observation	0.06	0.11	0.14	0.19
	Inpatient Rehabilitation	0.00	0.00	0.01	0.01
	Inpatient Behavioral Health	0.00	0.00	0.00	0.00
	Ambulance from Facility to Facility	0.00	0.00	0.00	0.00
	Subtotal Inpatient Charges	0.43	0.51	0.57	0.62
Outpatient	Outpatient Surgery	0.04	0.07	0.05	0.06
	Outpatient Hospital and Specialized Facility	0.09	0.28	0.21	0.24
	Outpatient Office, PCP and Other	0.01	0.02	0.02	0.03
	Therapy Service (Is this like Outpatient Rehab/PT?)	0.01	0.00	0.00	0.00
	Outpatient Behavioral Health	0.00	0.00	0.00	0.00
	ER Discharged to Home	0.01	0.01	0.01	0.01
	Observation, from ER or Office	0.01	0.01	0.01	0.01
	Subtotal Outpatient Charges	0.17	0.39	0.32	0.36
Post Acute	Nursing, Skilled and General	0.01	0.02	0.05	0.07
	Home Care	0.03	0.05	0.06	0.07
	Subtotal Post Acute Charges	0.04	0.08	0.11	0.14
Other	Other (e.g., Lab, OB/GYN, Maternity, Urgent Care)	0.00	0.01	0.01	0.00
	Shock Claims	0.04	0.01	0.05	0.04
	Subtotal Other Charges	0.04	0.02	0.05	0.04
	Total Charge	0.69	1.00	1.05	1.17

OK, but…it's only for those (other) surgeons: RAI, Operative Stress, Mortality and Specialty

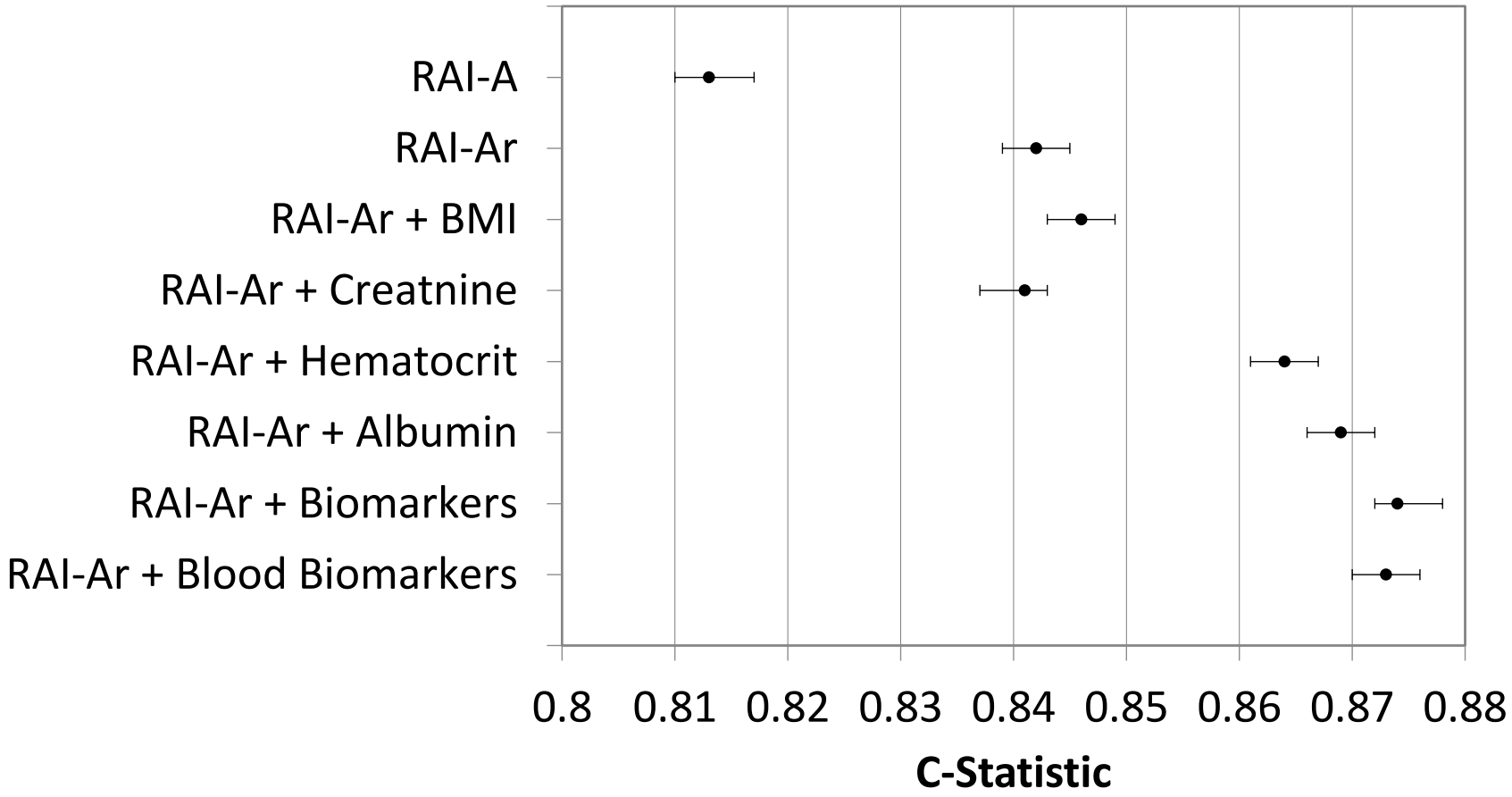
Figure 2. Veterans Affairs Surgical Quality Improvement Program (VASQIP) 180-Day Mortality Following Surgery in 9 Noncardiac Surgical Specialties Stratified by Frailty Status (Risk Analysis Index) and Operative Stress Score (OSS)



Specialties were categorized by the percentage of low-stress (OSS 1 and 2) procedures performed. Frail and very frail patients experienced high mortality rates following low- and moderate-stress procedures in all specialties. Error bars represent the SEs.

George EL, et al., *JAMA Surg.* 2020:e205152. 10.1001/jamasurg.2020.5152

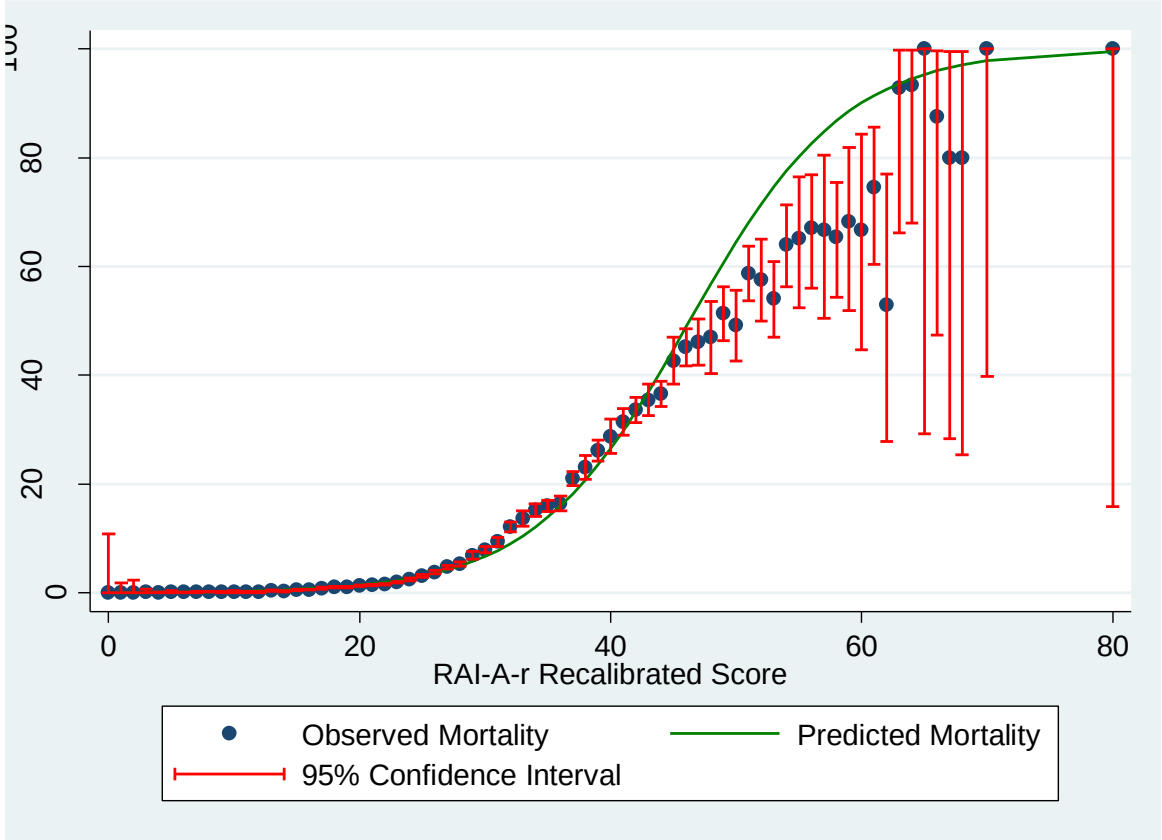
“But the RAI is too subjective….”
Do ”objective” biomarkers help?



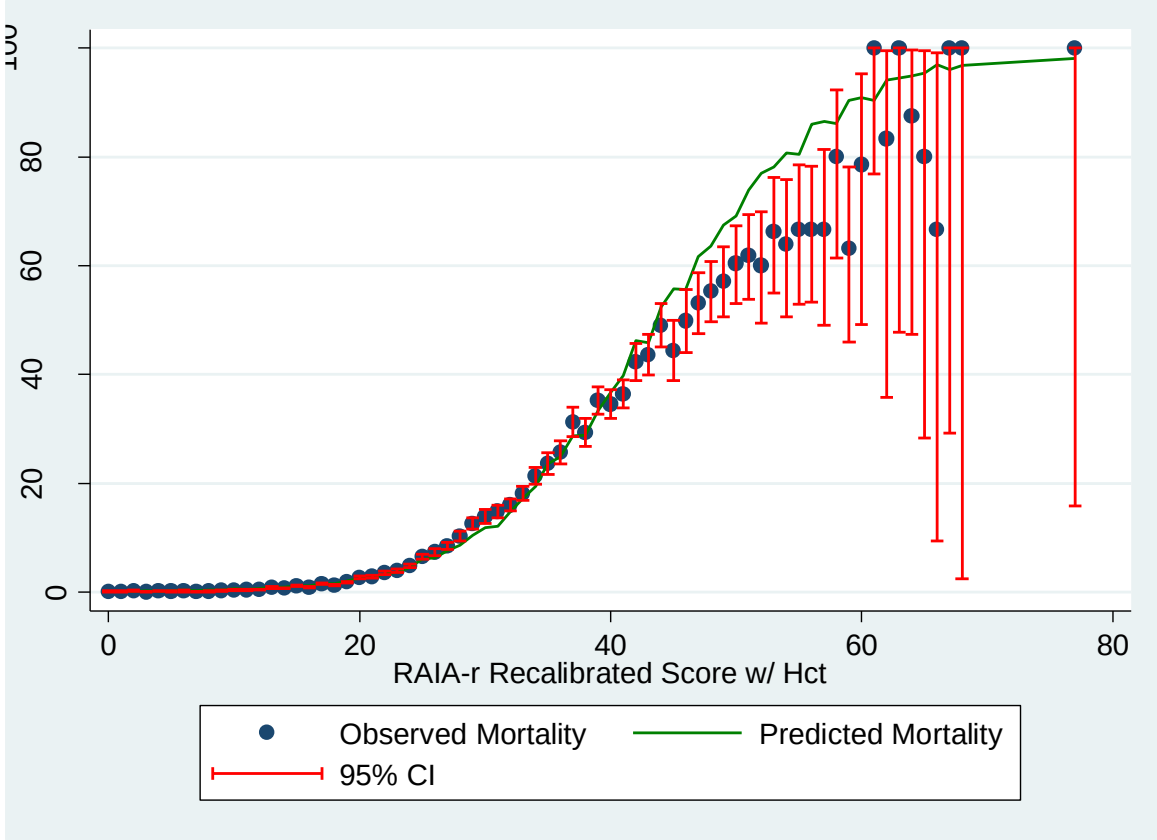
Pandalai, et al, ACS Clinical Congress, 2020

Maybe, but is the juice worth the squeeze?

RAI



RAI+Hematocrit

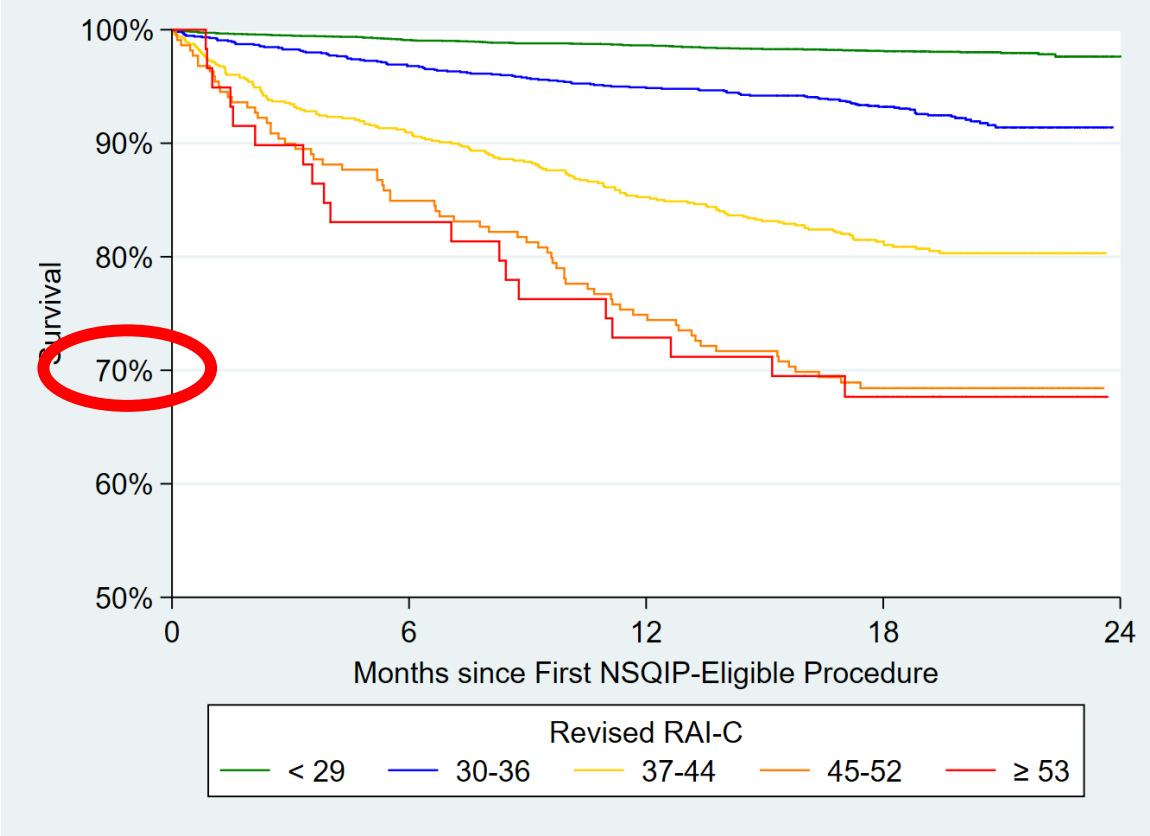


Pandalai, et al, ACS Clinical Congress, 2020

RAI Survey Implementation at UPMC

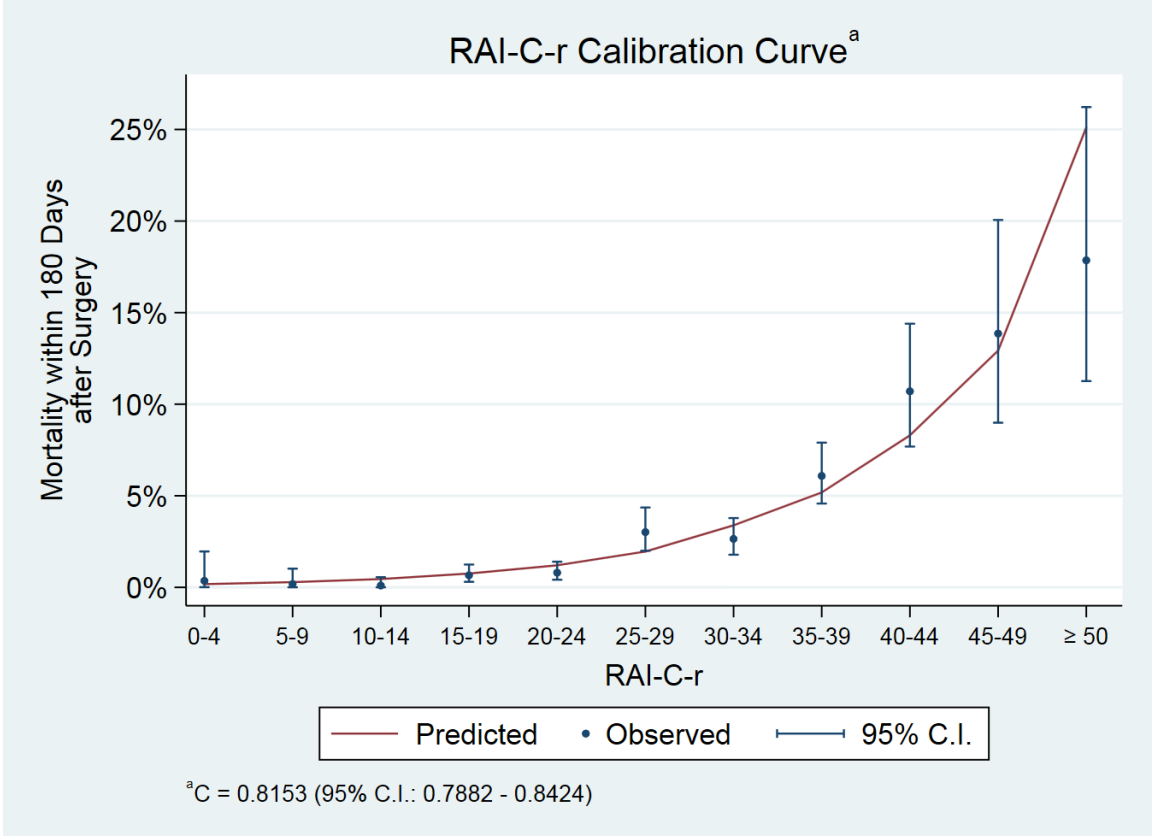
Discrimination

C= 0.815 (95% CI 0.788-0.842)



Calibration

95.6% of predicted deaths within 95% CI of observed deaths

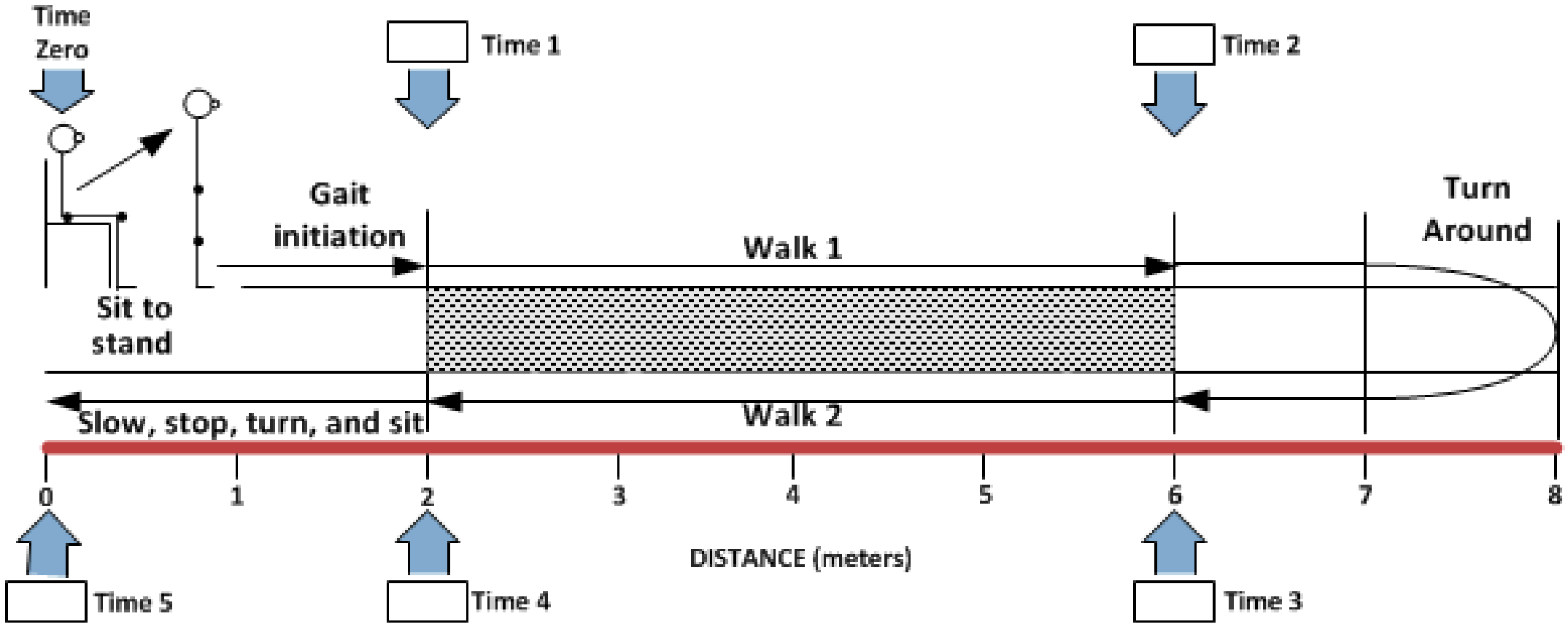


Varley PR, et al *Ann Surg.* 2020 10.1097/SLA.0000000000003808.

Multi-Mode Frailty Assessment

- 2-step process
  - Screen with RAI (30-seconds)
  - Physical function measures for the potentially frail (RAI≥37)
- Grip Strength
- Gait Speed
- TUG
- MiniCog
- Additional History (medication, admission, etc)

Clinic Runway



eTUG	50 s	Abnormal: > 30 s
Walking Speed	0.4 m/s	Abnormal: ≤ 0.65 m/s*
Average Grip Strength	24.5 kg	Abnormal: ≤ 32 kg**
RAI (without cancer)	60	0-15:Robust 16-25: Pre-frail 26-35:Frail 36+:Severly Frail
RAI (with cancer)	68	0-15:Robust 16-25: Pre-frail 26-35:Frail 36+:Severly Frail
Edmonton FRAIL	13	0-5: Not Frail 6-7: Vulnerable 8-9: Mild Frailty 10-11: Moderate Frailty 12+: Severe Frailty
Fried Frailty	5	0: Not Frail 1-2: Pre-frail 3+: Frail
Clinical Frail Scale	6-Moderately Frail	1: Very Fit 2: Well 3:Managing Well 4: Vulnerable 5: Mildly Frail 6: Moderately Frail 7: Severely Frail 8: Very Severely Frail 9: Terminally Ill
Mini-Cog	1	0: Negative for Cognitive Impairment 1: Positive for Cognitive Impairment

*Cutoff adjusted for sex and height

**Cutoff adjusted for sex and BMI

Goal Clarification
Best Case Worst Case Scenario Planning

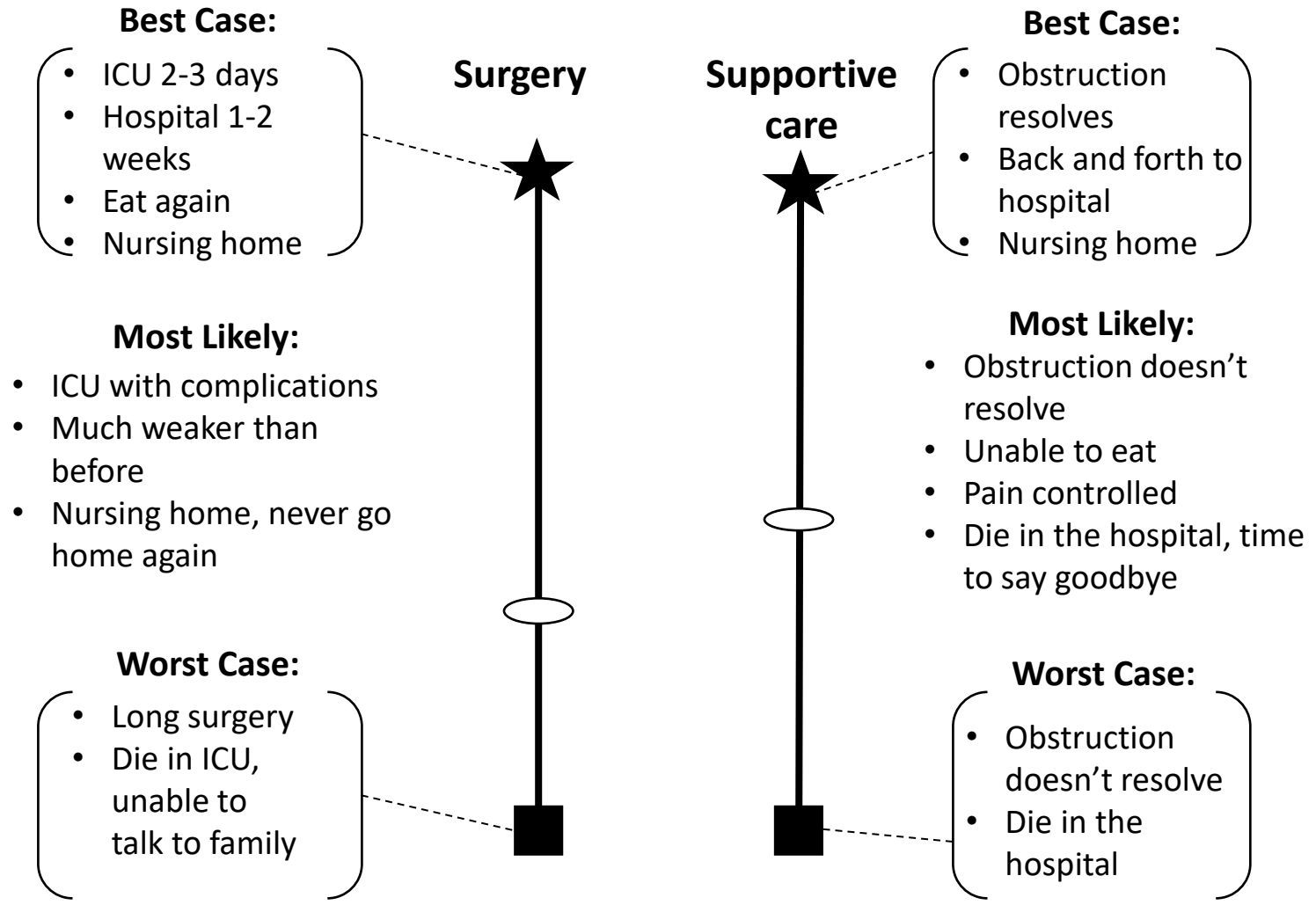
- Developed by and for surgeons for preoperative conversations
- Presents a choice between two options.
- Uses story telling to describe what is likely under the best, worst and most likely scenarios.
- Sparks a conversation about patient goals, values, fears and aspirations.
- Memorialized in a graphic aid. (Check out the white board video)
- Requires substantial communication skills.

6 Steps for BC/WC

- Recognize that bad/serious news needs to be broken
- Create a visual aid
  - Surgery vs. Non Op Management
  - Treatment A vs. Treatment B
    - Gets you clear in your own head
    - Simplifies language
    - Physical deposit for family
- Break bad news
- Tell stories about best, worst and most likely scenarios
  - Why stories: Scenario Planning
- Elicit preferences: What is important to you now?
- Make a recommendation

UPMC Adaptation

- Gathering information on operative and non-operative options and outcomes (e.g., “cat herding”
- Making a recommendation to the surgeon rather than the patient


Best Case:
ICU 2-3 days
Hospital 1-2 weeks
Eat again
Nursing home
Surgery
Most Likely:
ICU with complications
Much weaker than before
Nursing home, never go home again
Worst Case:
Long surgery
Die in ICU, unable to talk to family
Supportive care
Best Case:
Obstruction resolves
Back and forth to hospital
Nursing home
Most Likely:
Obstruction doesn't resolve
Unable to eat
Pain controlled
Die in the hospital, time to say goodbye
Worst Case:
Obstruction doesn't resolve
Die in the hospital

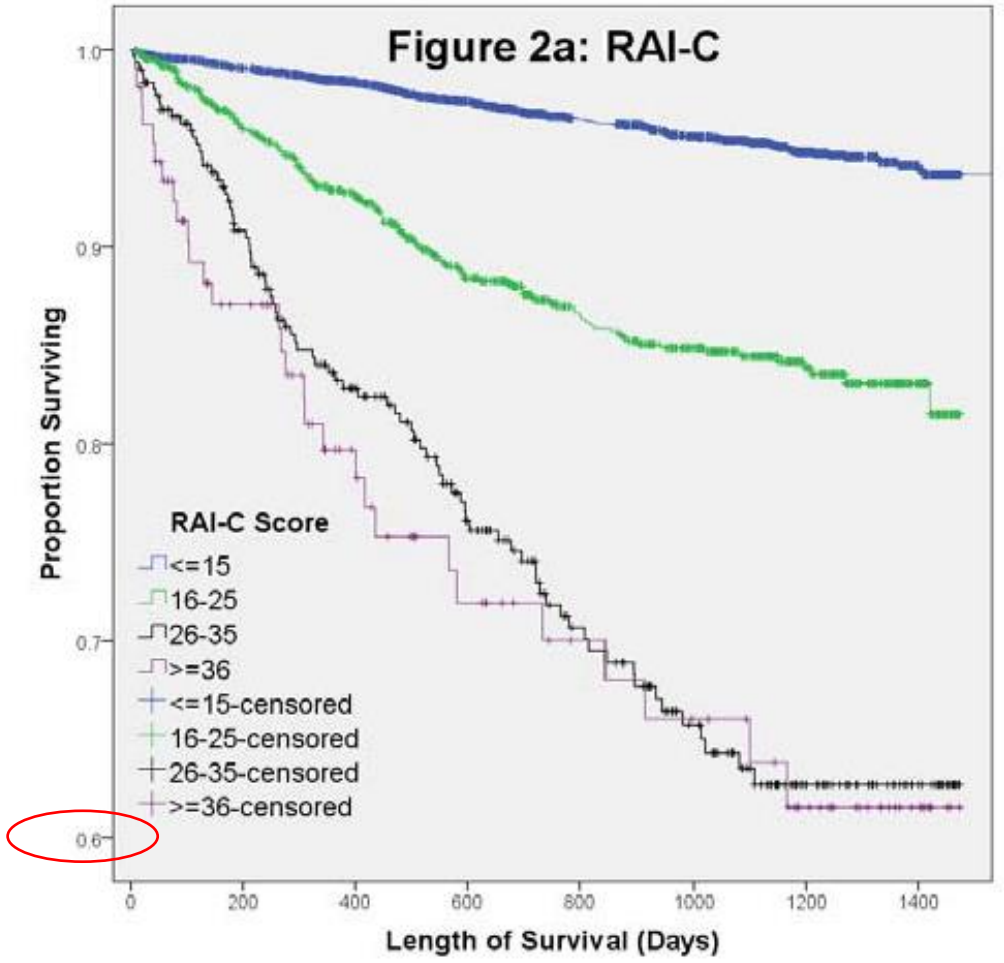
Older Woman with Cervical Spine Fracture

- Mrs. Goldstein is an 83 y/o woman with CAD with prior CABG, hypertension, COPD, CKD, and prior CVA who tripped and fell down a flight of stairs at home. She was brought to the ED by ambulance and found to have no feeling or movement in her legs and arms. Imaging reveals an unstable cervical spine fracture at C5. Prior to her fall she had been in usual health. She denies angina, palpitations, or syncope, and has some mild dyspnea on exertion. She lives with her husband, and was otherwise independent in her ADL's and IADL's. Husband is 7 years her junior and spry.
- Exam: Awake, alert, fully oriented, no acute distress. No elevated JVP. Lungs clear without use of accessory muscles. Cardiac rhythm regular, no murmurs. No leg edema. Neurologic exam consistent with C5 quadriplegia.
- VS: T 36.4 BP 128/76 P 92 RR 20 O2 sat 98% on 2 lpm
- Labs: CBC normal, BMP with baseline creatinine of 2.5
- EKG: Sinus tachycardia, no ischemic changes
- CXR: clear, no acute infiltrates

	With Surgery	Without Surgery
Best Case	• Long procedure in OR to stabilize cervical spine • Post-op stay in ICU • Evaluation by PM&R with transfer to the inpatient spinal cord rehab program • Eventual return home with adaptations to live with quadriplegia • Lives another 12-24 months with constant assistance from husband and visiting nurses.	• Avoidance of surgical risk • Focus on comfort managed by hospice • Family can remain near • C-collar removed after 6 weeks, except during transfers. • Likely pulmonary complications • Lives 4-12 months before terminal pneumonia
Worst Case	• Surgical complications requiring one or more additional surgeries • Prolonged ICU stay • Failure to wean from ventilator requiring tracheostomy • Post-op pneumonia • Complications of quadriplegia including skin breakdown, DVT • Death in the ICU in 2-4 weeks	• Pain requiring narcotics, possibly sedating • Phantom pain; spasms. • Never goes home because require inpatient hospice • Early pneumonia or mucous plugging • Death in 1-3 weeks
Most Likely Case	• Prolonged but technically successful stabilization surgery • Multiple days in ICU • Likely respiratory complications • Prolonged hospital stay • Extended rehab in a skilled setting • Permanent placement in SNF • Lives another 6-18 months	• Successful ability to control symptoms of pain and shortness of breath • Fracture remains unstable requiring C-collar most of the time. • Home hospice • Survives 2-6 months.

Risk Analysis Index (RAI)—Initial Validation

- Administrative RAI (RAI-A)
  - Computed from VASQIP/NSQIP variables
  - Predicts 180 day mortality (C= 0.823)
- Clinical RAI (RAI-C)
  - 14 Item survey instrument
    - Administered by RN, APP or MD
  - Linear scale from 0-81
  - < 2 minutes to complete
  - > 10,000 measurements from 2011-2014.
  - Predicts 180 day mortality (C= 0.772)
- Correlation RAI-A:RAI-C=0.547



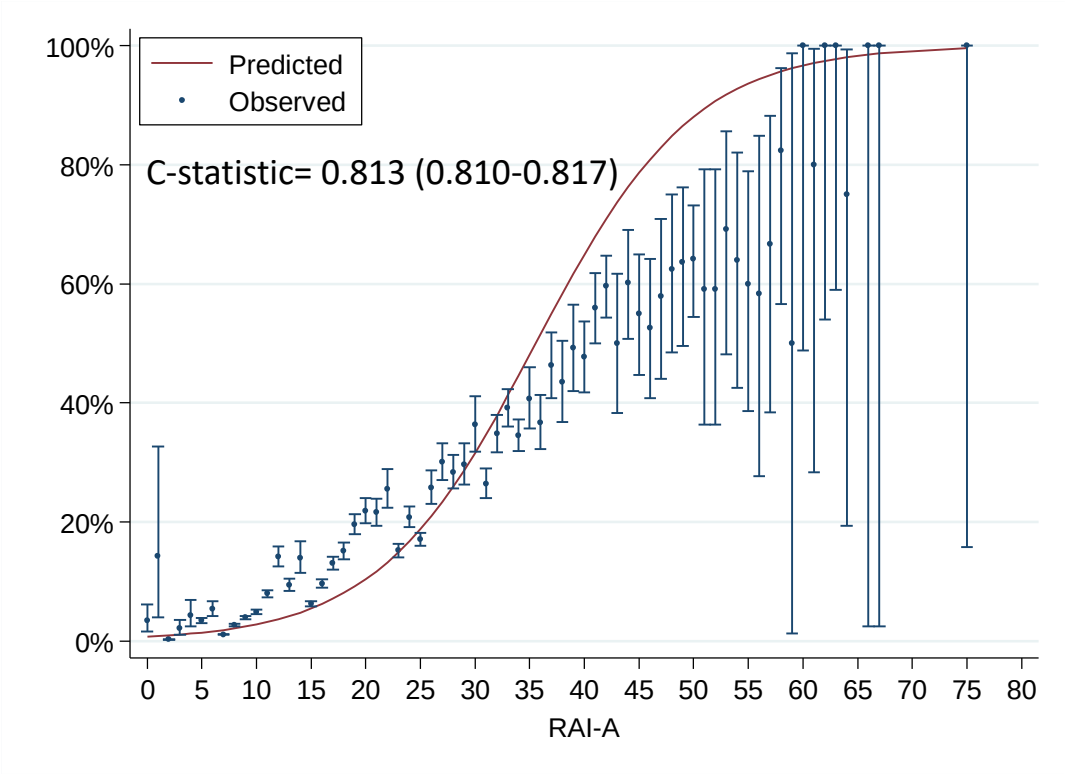
Hall, DE. et al. *JAMA Surgery* 152(2) doi:10.1001/jamasurg.2016.4202 (Nov 23).

RAI seems to work, but…..

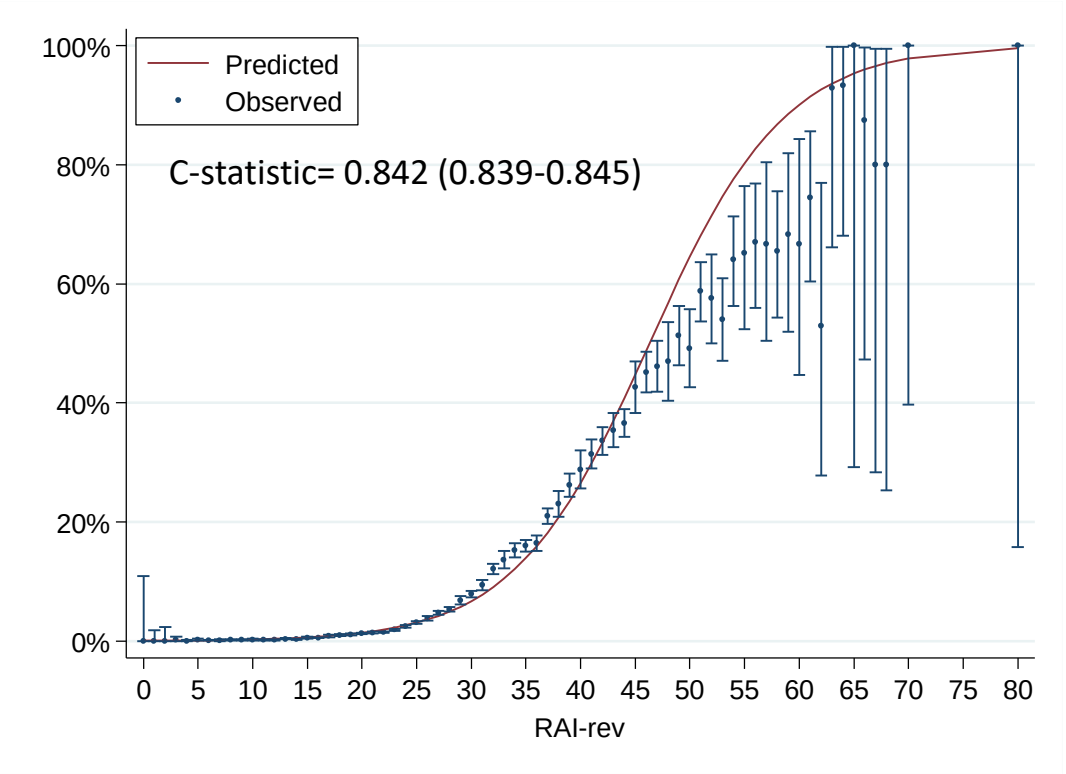
- Scoring system never calibrated in surgical population
- Validation limited to a single VA hospital
  - What about other VA hospitals
  - What about non-VA hospitals
  - What about women?
- Questions remain:
  - Would the “objectivity” of biomarkers help?
  - What procedures matter most (should everyone be screened)?
  - Are some specialties exempt?

RAI-A Validation in Veteran Patients (VASQIP) (N=480,731)

Original RAI-A (c=0.813)



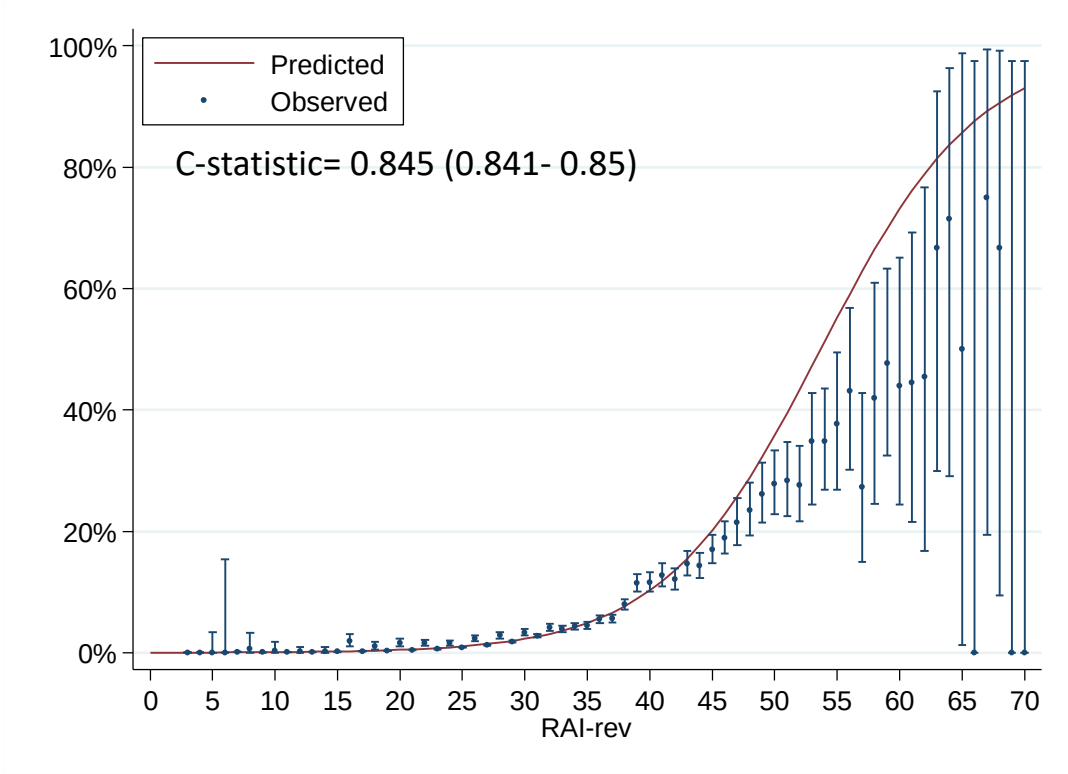
Revised RAI-A (c=0.842)



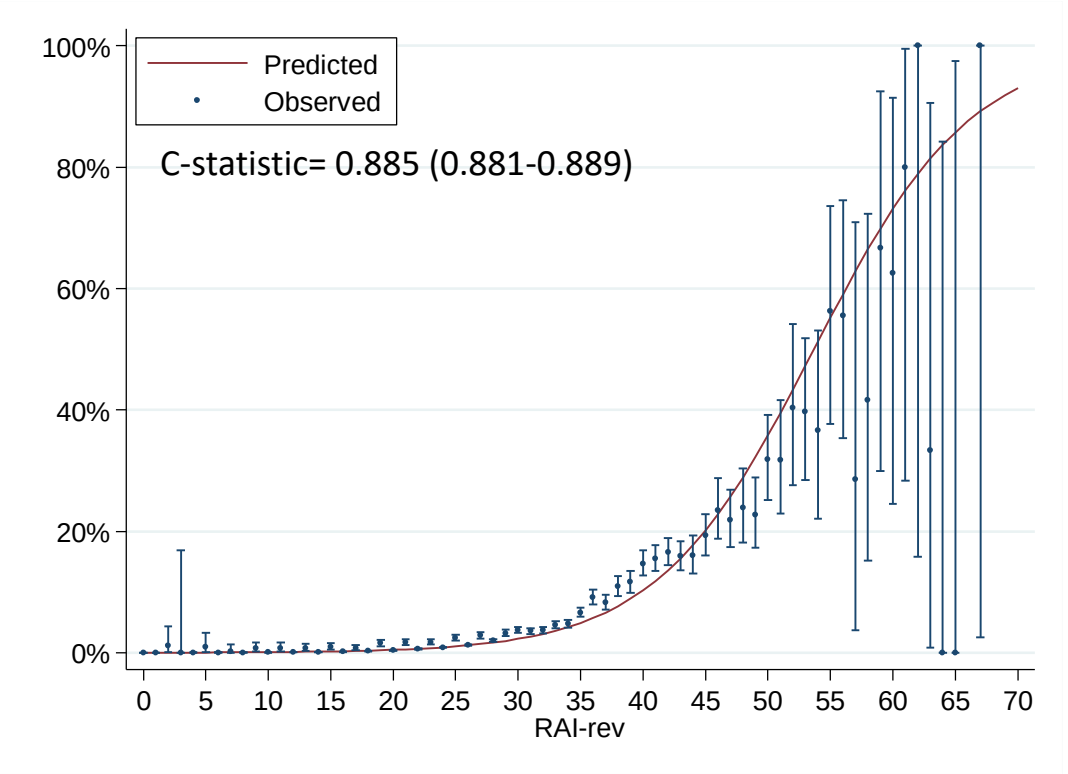
Arya, S. et al. *Annals of Surgery* doi 10.1097/SLA.0000000000003276 (2019, March 23).

RAI-A Validation in Men and Women ACS-NSQIP (N=1,391,785)

Men (c=0.845, N=584,698)



Women (c=0.885, N=807,087)



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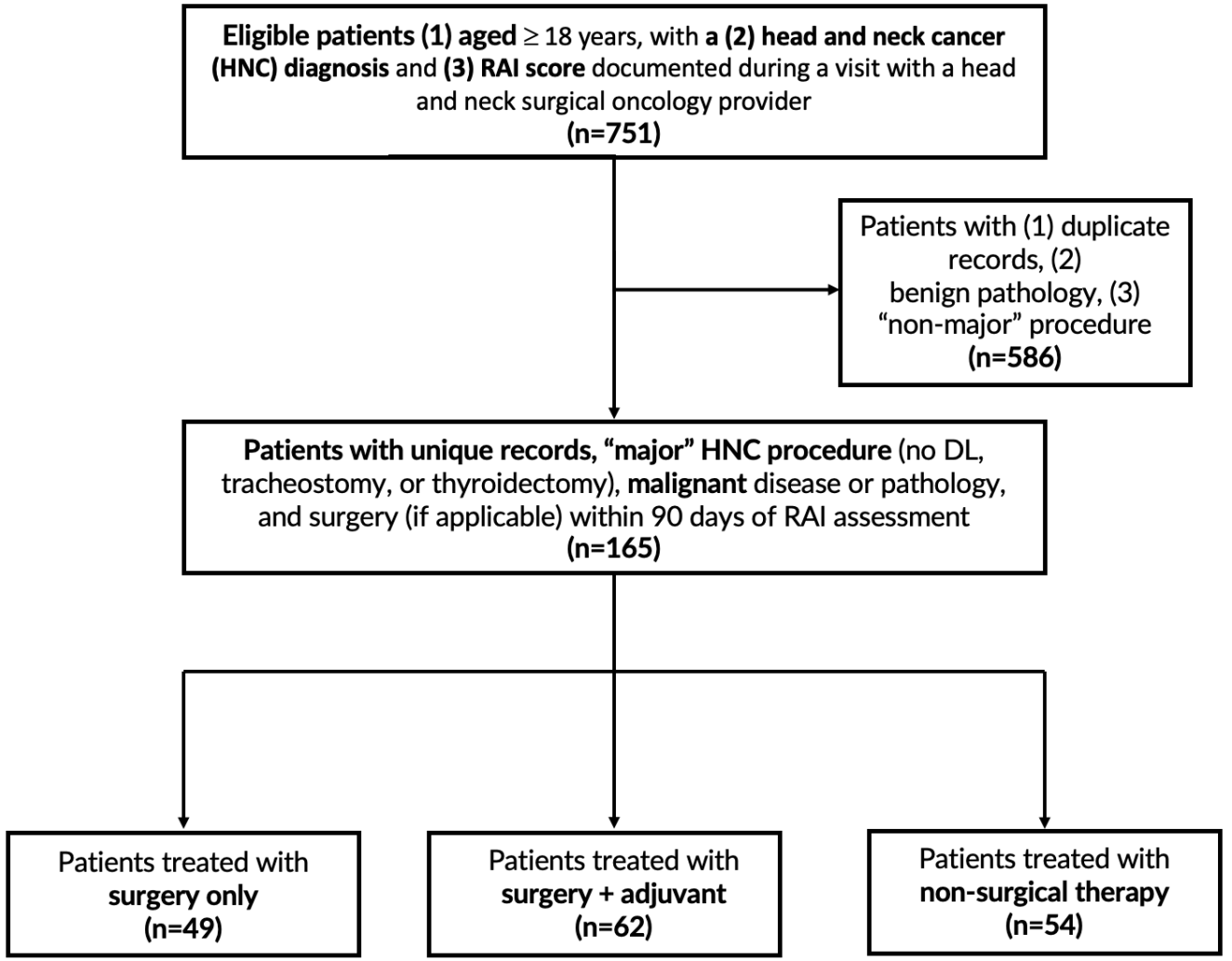
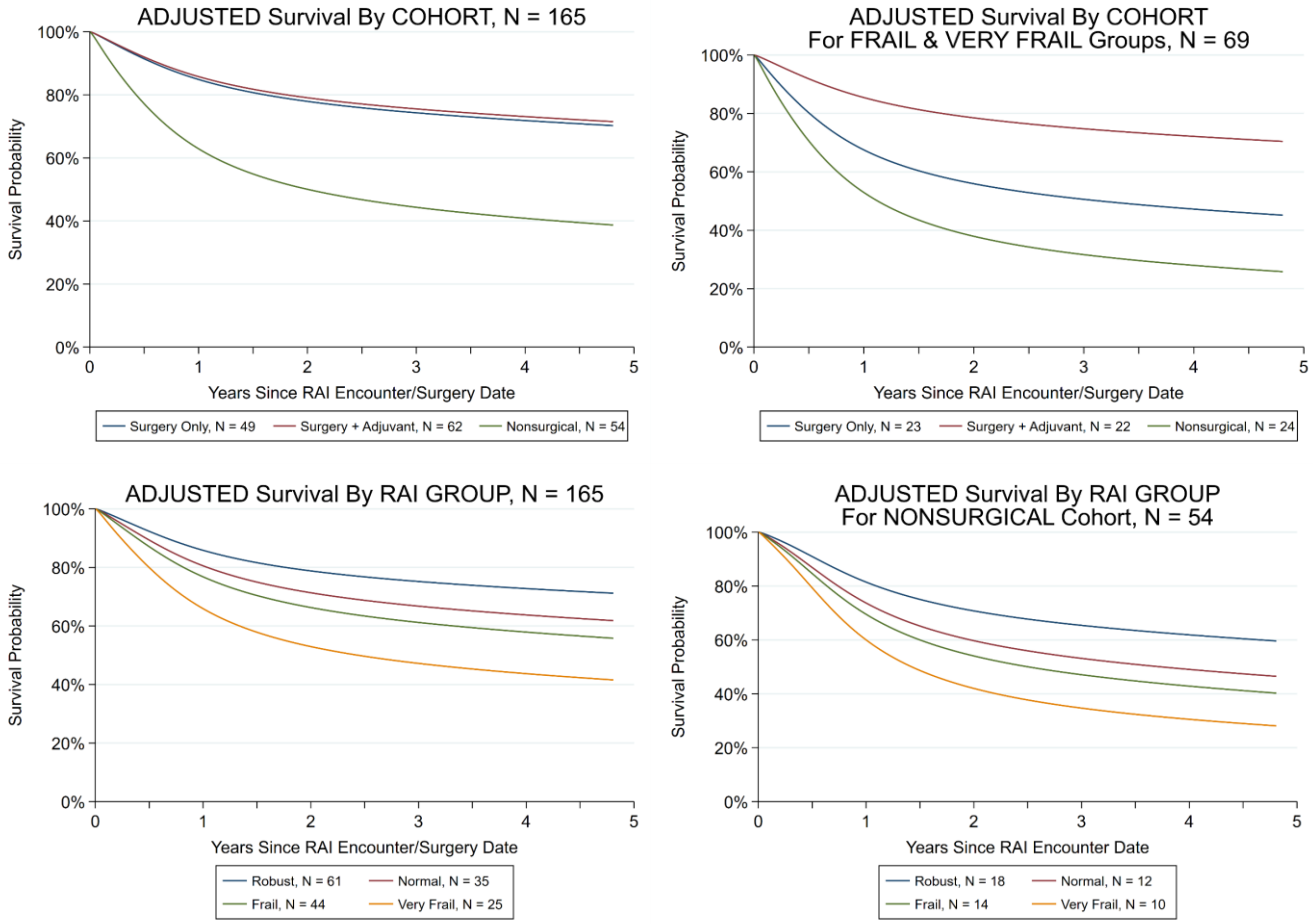
The impact of frailty on mortality in non-surgical head and neck cancer treatment: Shifting the paradigm.

- Objective: Compare survival treated with surgical and non-surgical management, stratified by frailty using RAI.
- Cohort: 165 patients with malignant disease & RAI
  - 59 Major Surgery
  - 62 Major Surgery + Adjuvant
  - 54 Non-surgical therapy



Mady LJ, et al., *Oral Oncol*. Mar 2022;126:105766. 10.1016/j.oraloncology.2022.105766

- Methods: Multivariable cox proportional hazard models
  - RAI, stage, tumor site, tumor type
- Results: ↓Survival Non-Surgical
  - Overall (N=165)
  - Among the Frail (69)
    - HR 2.5 (1.19,5.23) surgery
    - HR 3.91 (1.94,7.89) multimodal
  - ↓Survival with ↑Frailty
- Conclusions:
  - Non-surgical management is worse than surgical management *across all levels of frailty*
  - Challenge assumption of "too frail for surgery"
  - RCTs needed to clarify treatment of frail patients



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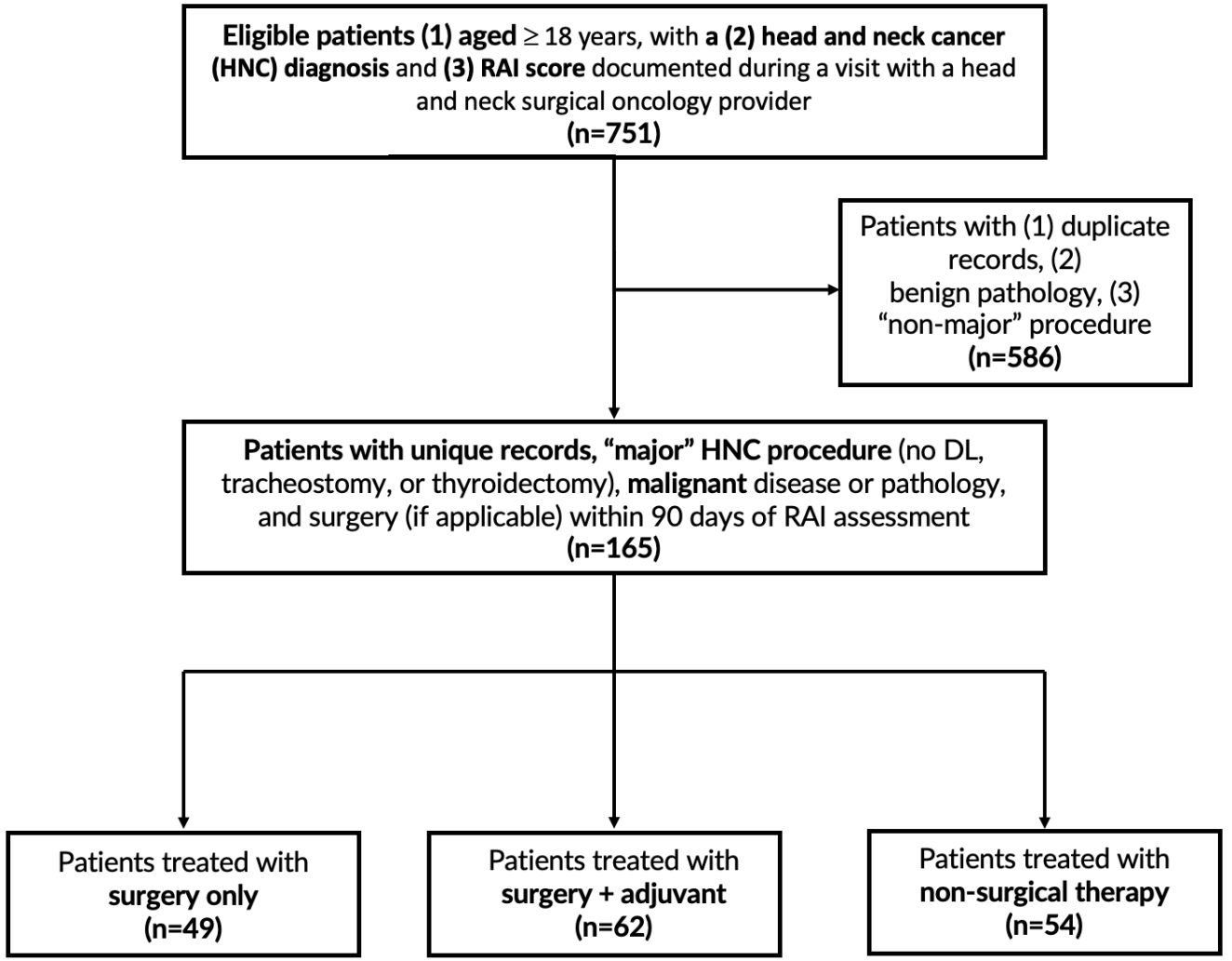

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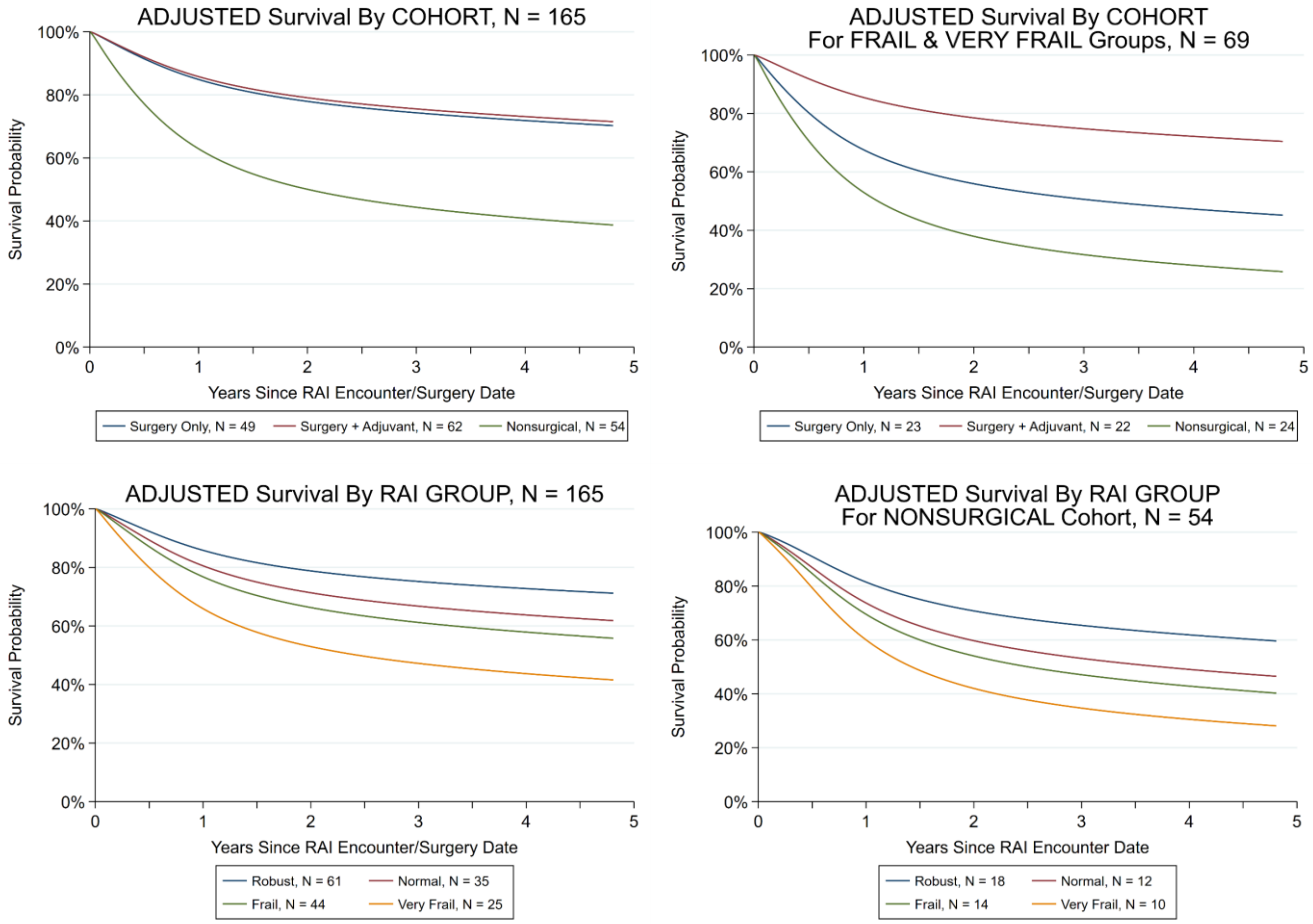

Mady LJ, et al., *Oral Oncol*. Mar 2022;126:105766. 10.1016/j.oraloncology.2022.105766

- Methods: Univariate and multivariable linear and logistic regression
  - RAI, stage, tumor site, tumor type
- Results:
  - Univariate ↑Flourishing with age, normal diet, employment, & income
  - ↓Flourishing associated with
    - ↑Depression
    - ↑Anxiety
    - ↑Swallowing Dysfunction
    - ↑Neck Disability
    - ↑Insomnia

		Flourishing Index (5 Domains)		Secure Flourishing Index (6 Domains)	
	Mean ± SD	Coefficient (95% CI)	*p* value[a]	Coefficient (95% CI)	*p* value[a]
Depression (PHQ8)	7.4 ± 6.0	−2.13 (−2.59, −1.66)	<0.001	−2.64 (−3.20, −2.08)	<0.001
Anxiety (GAD7)	4.8 ± 6.2	−1.76 (−2.25, −1.27)	<0.001	−2.22 (−2.81, −1.63)	<0.001
Swallowing (EAT10)	15.4 ± 11.8	−0.61 (−0.86, −0.36)	<0.001	−0.76 (−1.07, −0.45)	<0.001
Neck Disability (NDI)	10.2 ± 9.3	−0.94 (−1.25, −0.63)	<0.001	−1.20 (−1.57, −0.83)	<0.001
Insomnia (ISI)	7.8 ± 7.1	−1.08 (−1.50, −0.66)	<0.001	−1.35 (−1.86, −0.84)	<0.001

- Results (continued)
  - Interesting and meaningful patterns in sub-domains of flourishing
- Conclusions:
  - Common late-term side effects of HNC treatment associated with ↓Flourishing
  - Further data of this kind may inform treatment decisions consistent with patients' goals

	Domain 1 (Happiness and Life Satisfaction)		Domain 2 (Mental and Physical Health)		Domain 3 (Meaning and Purpose)	
	Coefficient (95% CI)	*p* value[a]	Coefficient (95% CI)	P value[a]	Coefficient (95% CI)	*p* value[a]
Depression (PHQ8)	−0.28 (−0.34, −0.23)	<0.001	−0.31 (−0.37, −0.26)	<0.001	−0.20 (−0.26, −0.14)	<0.001
Anxiety (GAD7)	−0.24 (−0.31, −0.19)	<0.001	−0.26 (−0.32, −0.21)	<0.001	−0.17 (−0.23, −0.11)	<0.001
Swallowing (EAT10)	−0.085 (−0.12, −0.05)	<0.001	−0.11 (−0.14, −0.07)	<0.001	−0.050 (−0.08, −0.02)	0.00135
Neck Disability (NDI)	−0.14 (−0.17, −0.1)	<0.001	−0.15 (−0.19, −0.11)	<0.001	−0.080 (−0.12, −0.04)	<0.001
Insomnia (ISI)	−0.16 (−0.21, −0.11)	<0.001	−0.16 (−0.22, −0.12)	<0.001	−0.085 (−0.14, −0.03)	<0.001
	Domain 4 (Character and Virtue)		**Domain 5 (Close Social Relationships)**		**Domain 6 (Financial and Material Stability)**	
	Coefficient (95% CI)	*p* value[a]	Coefficient (95% CI)	*p* value[a]	Coefficient (95% CI)	*p* value[a]
Depression (PHQ8)	−0.090 (−0.15, −0.03)	0.00372	−0.19 (−0.25, −0.12)	<0.001	−0.26 (−0.34, −0.18)	<0.001
Anxiety (GAD7)	−0.065 (−0.12, −0.01)	0.0325	−0.15 (−0.21, −0.08)	<0.001	−0.23 (−0.31, −0.15)	<0.001
Swallowing (EAT10)	−0.033 (−0.06, −0.01)	0.0177	−0.035 (−0.07, 0.00)	0.0266	−0.075 (−0.12, −0.04)	<0.001
Neck Disability (NDI)	−0.033 (−0.07, 0.00)	0.0692	−0.075 (−0.12, −0.04)	<0.001	−0.13 (−0.18, −0.08)	<0.001
Insomnia (ISI)	−0.036 (−0.08, 0.01)	0.124	−0.10 (−0.15, −0.05)	<0.001	−0.14 (−0.21, −0.07)	<0.001

Harris A, *Cancer Med*. Mar 11 2022;10.1002/cam4.4636

That's our story, and then there is peer review:

George EL, Hall DE, Youk A, Chen R, Kashikar A, Trickey AW, Varley PR, Shireman PK, Shinall MC, Massarweh NN, Johanning JM, Arya S. Patient frailty and postoperative mortality after noncardiac surgery—does specialty matter? JAMA Surgery (in press).

Agarwal N, Goldschmidt E, Taylor T, Souvik R, Altieri-Dunn S, Bilderback AL, Friedlander RM, Kanter AS, Okonkwo DO, Gerszten PC, Hamilton DK, Hall DE. Impact of Frailty on Outcomes following Spine Surgery: A Prospective Cohort Analysis of 668 Patients. *Neurosurgery* (in press).

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The CPRS RAI Reminder Dialogue Template

National Release 9/13/21

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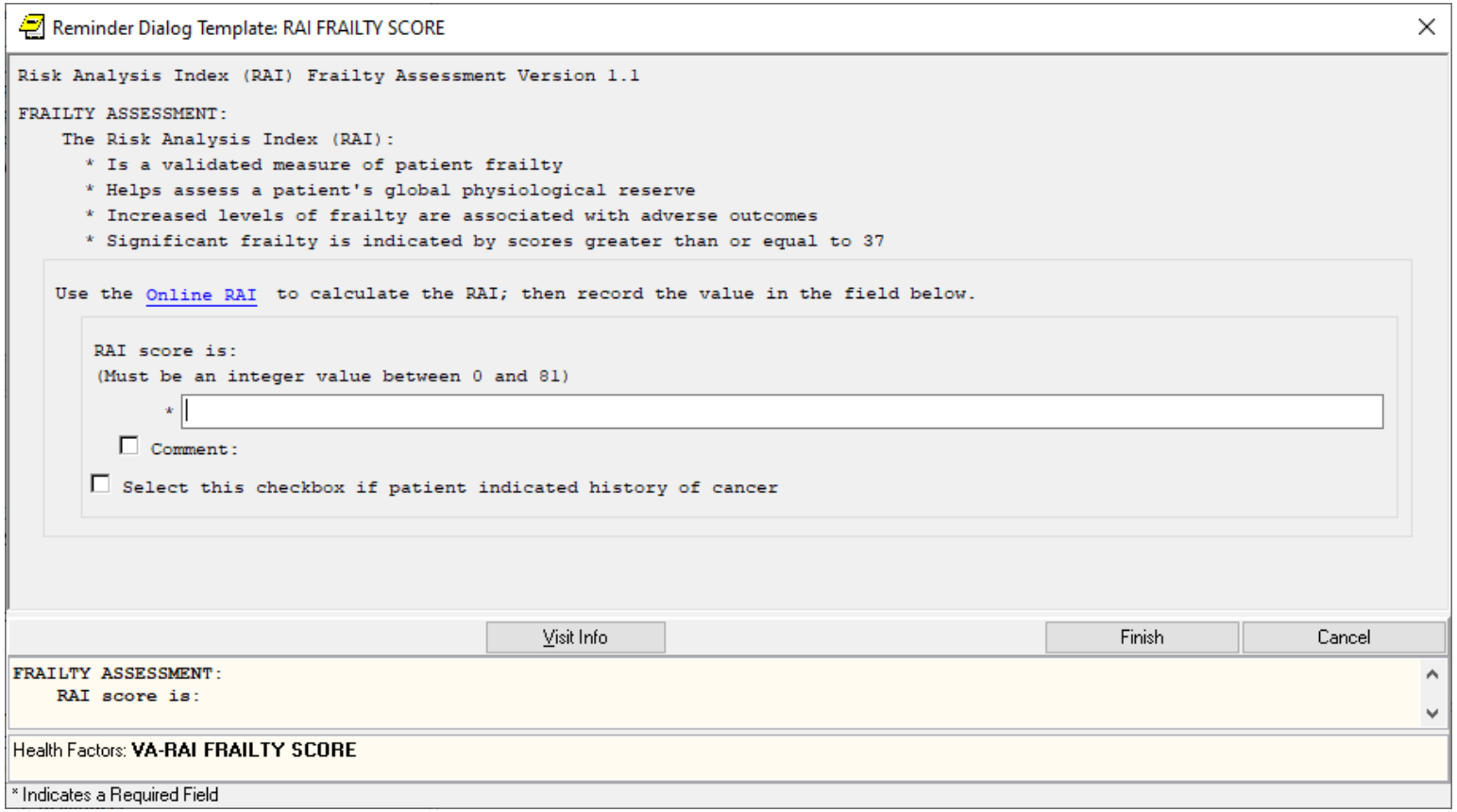
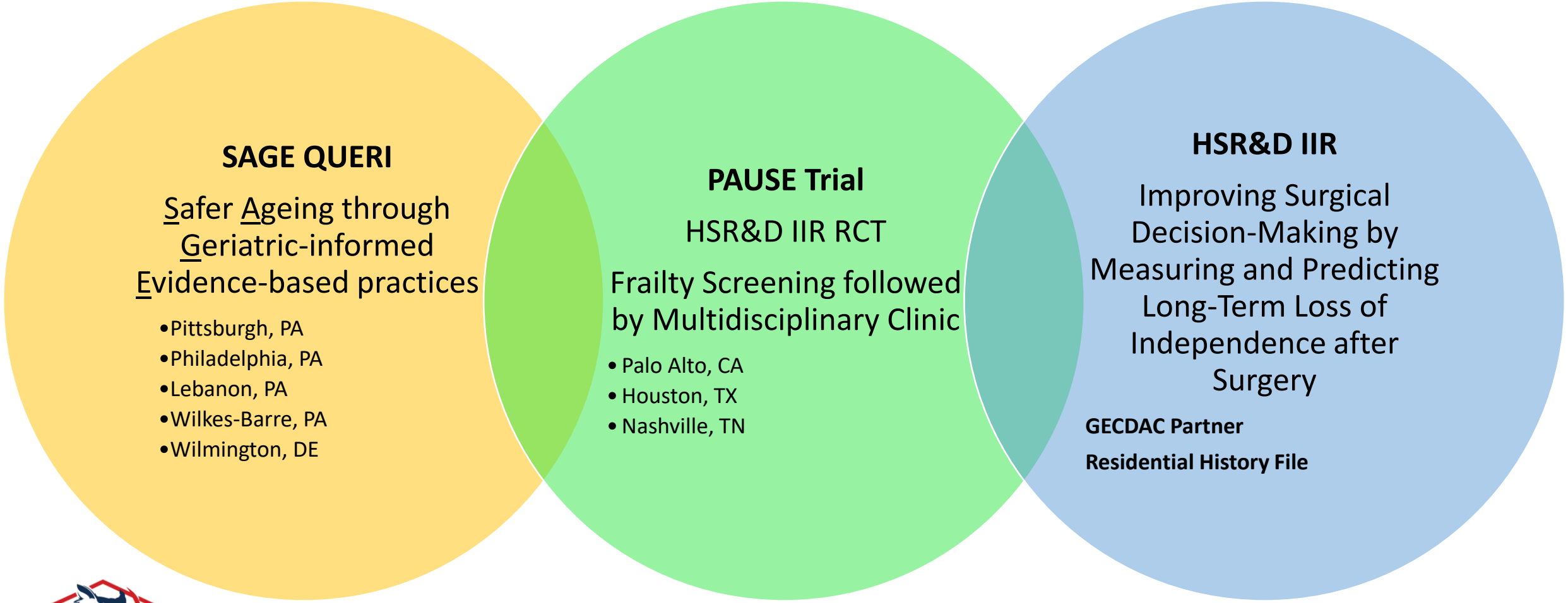


eScreening

Complimentary Initiatives



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