Pragmatic & aspirational approaches to postoperative delirium & neurocognitive disorders

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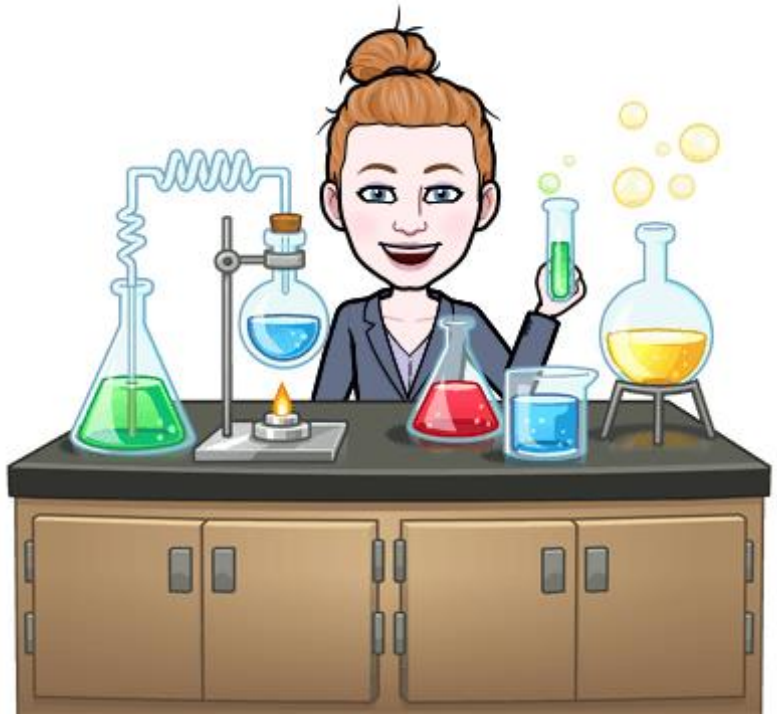
National Center for Advancing Translational Sciences (NIH)
Foundation for Anesthesia Education and Research

UCSF

Learning objectives

- Understand recommendations from international medical groups about risk stratification and prevention of delirium in older adults
- Describe components of a pragmatic delirium risk stratification and mitigation quality improvement pathway
- Assess the need for more comprehensive programs and/or the incorporation of long-term cognitive outcomes into local perioperative pathways for older adults

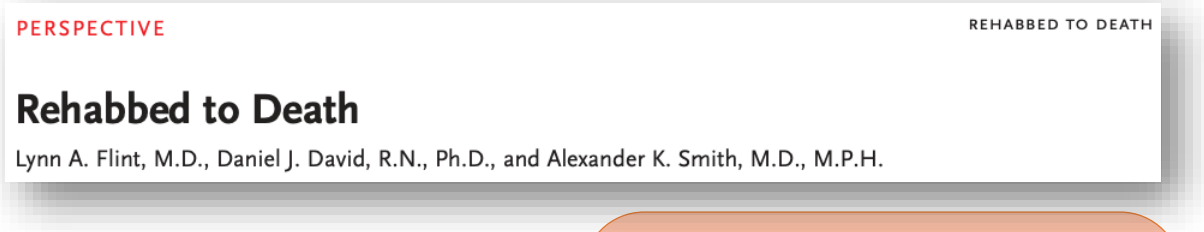


Which is the real postoperative cours

"[my mother] wasn't there at all, not at all. It's a shell."

78yo ASA3 woman s/p femur ORIF

- 143/85, HR 87, SpO2 95% on RA
- Ambulated with PT yesterday
- Ready for discharge to rehab


PERSPECTIVE REHABBED TO DEATH

Rehabbed to Death

Lynn A. Flint, M.D., Daniel J. David, R.N., Ph.D., and Alexander K. Smith, M.D., M.P.H.

She was doing OK before, so it must have been the surgery/anesthesia.

Mom broke her femur

- I've spent 3 days in the hospital trying to help her understand what happened
- Is there anything we could have done to keep her out of a nursing home?
- 6 months later: still cognitively unable to live independently

Day J & Higgins I Qual Health Res 2015 Dec;25(12):1700-18
N Engl J Med 2019; 380:408-409

Which is the real postoperative course?

78yo ASA3 woman s/p femur ORIF

- 143/85, HR 87, SpO2 95% on RA
- Ambulated with PT yesterday
- Ready for discharge to rehab

The nurse told me she's delirious, and the anesthesiologist warned me this could happen. It's scary but I hope it will improve as she gets better.

Mom broke her femur

- I've spent 3 da… in the hospital trying… wh…
- Is t… done t… nursing home
- 6 months later: still cognitively unable to live independently

The geriatrician who cleaned up Mom's med list said it sounds like she had moderate dementia before all this happened. We talked about her end-of-life wishes, and we know more about what to expect.

Centering the patient in perioperative care

For older adults, this means:

- Considering alternatives
- Surgical outcomes
- Function = Independence
- Talking about stuff you can't prevent
- Blocking other bad stuff

Oh, you mean like…
Delirium and **neurocognitive disorders**?

Perioperative Neurocognitive Disorders

Timing of diagnosis:

Prior to surgery	• Neurocognitive disorder (mild vs. major)
Emergence	• Emergence excitation OR
Immediately postop to 30 days	• **Delirium** • Delayed neurocognitive recovery
Expected recovery (30 days) to 12 months	• **Postoperative neurocognitive disorder** (mild vs. major)
Beyond 12 months	• Neurocognitive disorder (mild vs. major) • Postoperative neurocognitive disorder (if dx made prior to 12 months)

Unrecognized cognitive impairment:
Elective noncardiac: 37%
Urgent/emergent: 50%

Major risk factor for this

And this, too!

Evered L, et al. *Anesth Analg*. 2018. 127(5):1189.
J Clin Anesth. 2022 Feb;76:110574.

How common is delirium?

Inouye et al, *Lancet* 2013; Zenilman, *JAMA* 2017

Medical patients:

Prevalence: 18-35%

Incidence: 11-14%

Surgical patients:

Incidence: 5-52%

ICU patients:

Prevalence + Incidence: 80-85%

Postoperative Delirium as a Target for Surgical Quality Improvement

Julia R. Berian, MD, MS,† Lynn Zhou, PhD,* Marcia M. Russell, MD, FACS,‡ Melissa A. Hornor, MD,* Mark E. Cohen, PhD,* Emily Finlayson, MD, MS, FACS,§ Clifford Y. Ko, MD, MS, MSHS, FACS, FASCRS,*‡ Ronnie A. Rosenthal, MS, MD, FACS,¶ and Thomas N. Robinson, MD, MS, FACS||*

TABLE 1. Average Rates (Unadjusted) of Postoperative Delirium Overall and by Specialty

Specialty	N (Postop Delirium)/ N (Total)	%
Overall (all specialties)	2427/20,212	12.0
Cardiothoracic surgery	71/520	13.7
Orthopedic surgery	1217/9384	13.0
General surgery	743/5728	13.0
Vascular surgery	220/1934	11.4
Neurosurgery	90/1119	8.0
Plastics and otolaryngology	9/127	7.1
Urology	39/594	6.6
Gynecology	38/806	4.7

Ann Surg. 2018 July. 268(1):93.

Great data, no surprises:

- Patients with higher risk of delirium were…
  - **Older** (mean 80.7 years)
  - **Higher ASA Class** (Class IV-V 24.4% vs 8%)
  - More likely to undergo **emergency surgery**
  - More likely to have **preop cognitive impairment**

- 4 strongest predictors of postop delirium:
  - **Preoperative Cognitive Impairment** (OR 2.9)
  - **Surgery-specific Risk** (OR 2.4)
  - **ASA Class** (ASA3: OR 1.5, ASA4-5: OR 2.1)
  - **Age** (70-74 OR 1.4, 75-79 OR 1.9, 80+ OR 2.7)

Aren't your eyeballs already predicting something here?

What are the consequences of delirium?

Patient Harm

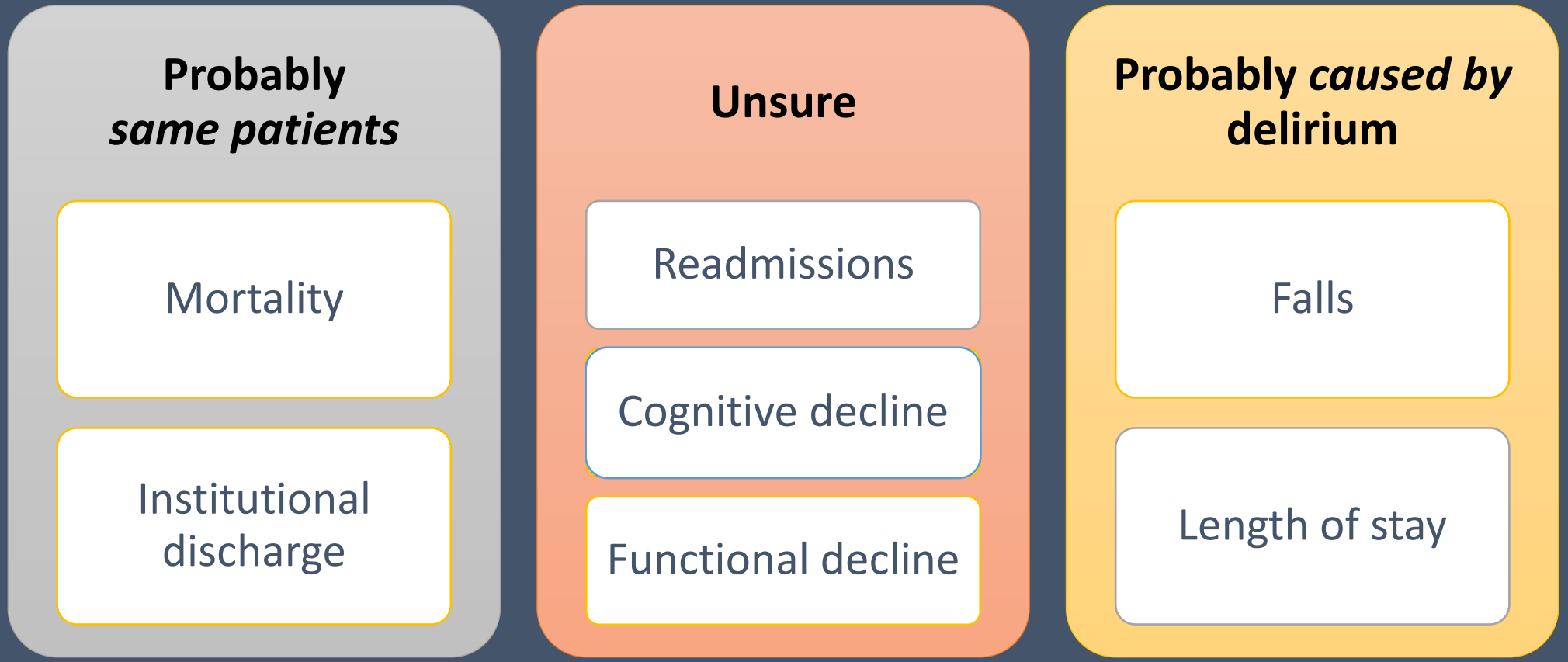
- Mortality
- Discharge to institution
- Accelerated cognitive decline
- Functional decline
- Falls

Increased Cost

- Length of stay
- Readmissions
- Staff time

Gleason et al, *JAMA Surg* 2015
Berian et al, *Ann Surg* 2018

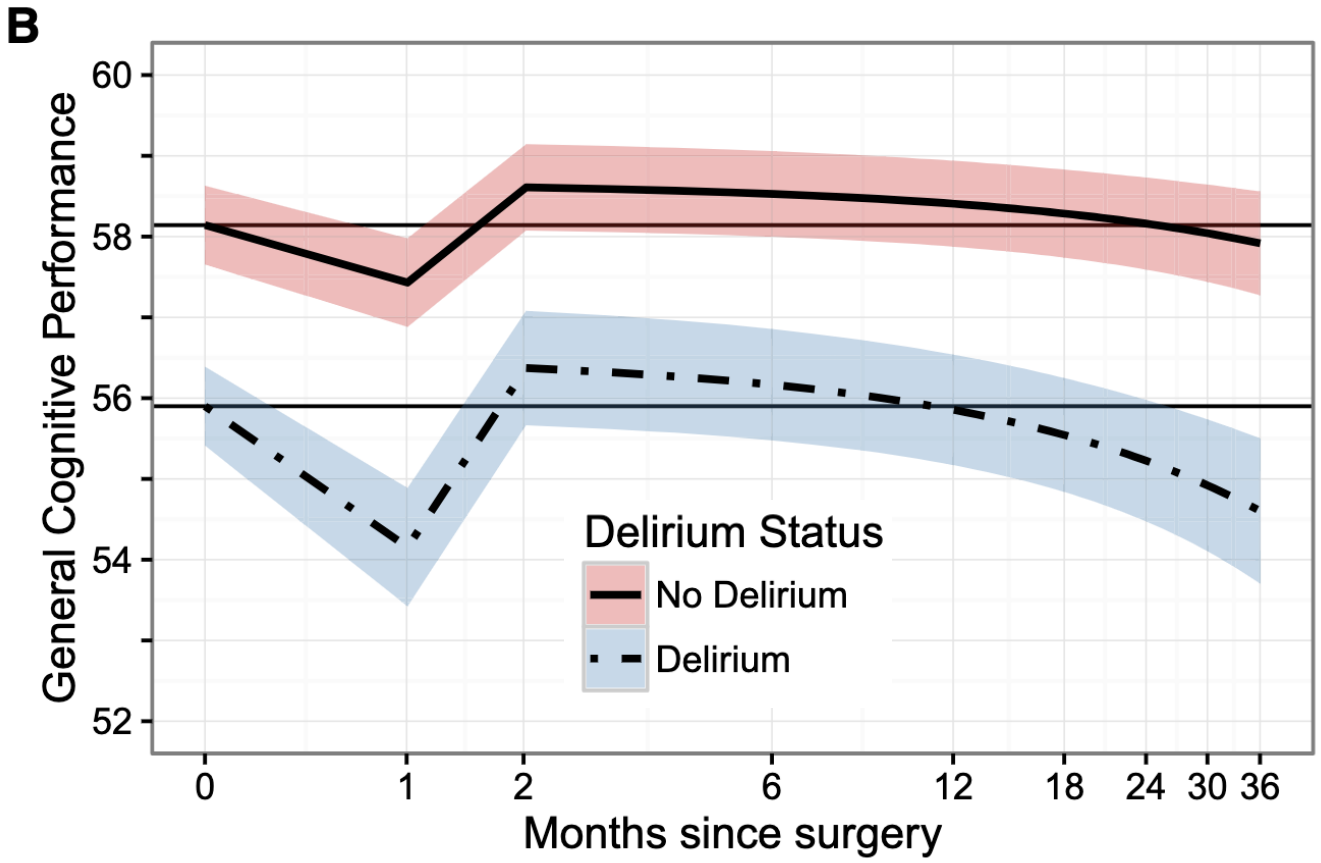
What are the consequences of delirium?



1
2

Gleason et al, *JAMA Surg* 2015
Berian et al, *Ann Surg* 2018

Accelerated cognitive decline after delirium



- Delirious patients…
  - Started off lower
  - Declined faster
- Causality not yet established… but it is still *important*

Inouye et al, Alz Dement 12:766-775, 2016

Delirium often has more than one victim

- Disconnect between clinical and observed scenario
- Isolation
- Psychological consequences (PTSD)

"[My father would] just look at me and there was nothing in his eyes, nothing, no recognition, just dead patches in his eyes."

"[my mother] wasn't there at all, not at all. It's a shell."

"The color purple was especially frightening. It had a hold on me and surrounded me. I tried to run, but it was there all the time, it followed me and swallowed me. The ceiling was right over my nose and the walls cracked like a spider web. I lost the sense of who I was, where I was – and the worst thing was that they all just stood there and laughed."

Day J & Higgins I Qual Health Res 2015 Dec;25(12):1700-18
Svenningsen H et al J Clin Nurs 2016 Oct;25(19-20):2807-15

What we *should* be doing

Everybody's got an opinion

Whoa!

If we wait for consensus, we'll wait forever.

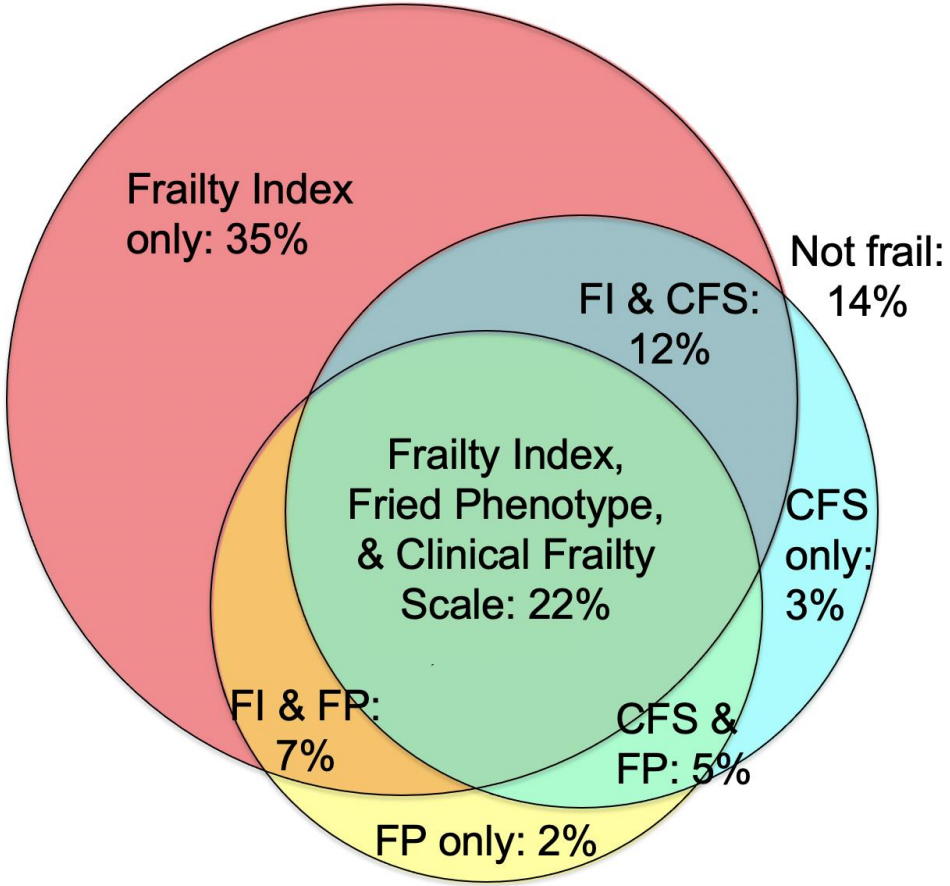
	Year published	Multicom-ponent intervention	Preoperative cognitive Screen	Depth of anesthesia monitoring	Regional anesthesia	Maintenance of cerebral perfusion	Mean	Management
AGS [12]	2015	Recommended	Recommended	Recommended	Consider	N/A	N/A	Avoid Beers medications
ACS/NSQIP [13]	2016	Recommended	Recommended	N/A	Consider	N/A	Goal-directed	Avoid Beers medications
ESA [14]	2017	Recommended	Recommended	Recommended	N/A	Recommended	N/A	Judicious BZ use
ASA Brain Health [2]	2018	N/A	Recommended	Recommended	Unable to recommend	Recommended	N/A	N/A
POQI-6 [15▪▪]	2020	Recommended	Recommended	Unable to recommend	Unable to recommend	N/A	N/A	Avoid Beers medications

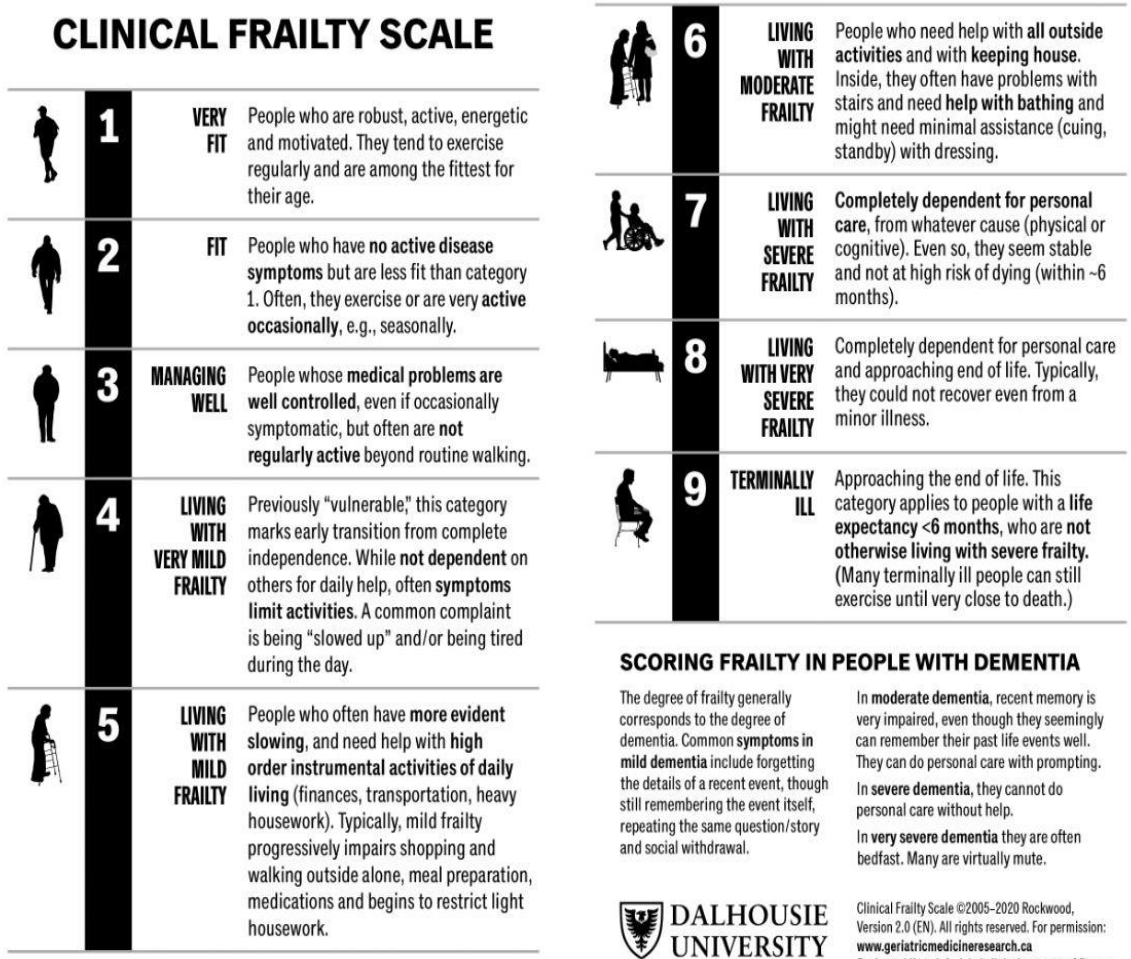
ACS/NSQIP, American College of Surgeons/National Surgical Quality Improvement Program; AGS, American Geriatrics Society; ASA, American Society of Anesthesiologists; BZ, benzodiazepine; ESA, European Society of Anaesthesiology; POQI-6, Perioperative Quality Initiative – Sixth Conference.

Curtis et al, Curr Opin Anesthesiol 2020 Oct 35(5): 668-73

So, obviously, we should all be doing cognitive screens.

- No consensus on *how*





CLINICAL FRAILTY SCALE

1	VERY FIT	People who are robust, active, energetic and motivated. They tend to exercise regularly and are among the fittest for their age.
2	FIT	People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g., seasonally.
3	MANAGING WELL	People whose **medical problems are well controlled**, even if occasionally symptomatic, but often are **not regularly active** beyond routine walking.
4	LIVING WITH VERY MILD FRAILTY	Previously "vulnerable," this category marks early transition from complete independence. While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being "slowed up" and/or being tired during the day.
5	LIVING WITH MILD FRAILTY	People who often have **more evident slowing**, and need help with **high order instrumental activities of daily living** (finances, transportation, heavy housework). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation, medications and begins to restrict light housework.
6	LIVING WITH MODERATE FRAILTY	People who need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.
7	LIVING WITH SEVERE FRAILTY	**Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~6 months).
8	LIVING WITH VERY SEVERE FRAILTY	Completely dependent for personal care and approaching end of life. Typically, they could not recover even from a minor illness.
9	TERMINALLY ILL	Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise living with severe frailty.** (Many terminally ill people can still exercise until very close to death.)

SCORING FRAILTY IN PEOPLE WITH DEMENTIA

The degree of frailty generally corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

In **very severe dementia** they are often bedfast. Many are virtually mute.

DALHOUSIE UNIVERSITY

Rockwood K et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489–495.

https://www.dal.ca/sites/gmr/our-tools/clinical-frailty-scale.html

Whitlock EL. Anesth Analg 2021. 133(5):1090-1093, *from* McIsaac et al, Anesth Analg 2020; 131:263-272.

So, are *you* doing cognitive screening? Or the other stuff?

Absolutely not.

Expensive

Whose problem is it?

Which test?

How do we talk about it?

UCSF is here-ish.

Clearly we are!

It’s the right thing to do

We use it to improve care

We picked a test

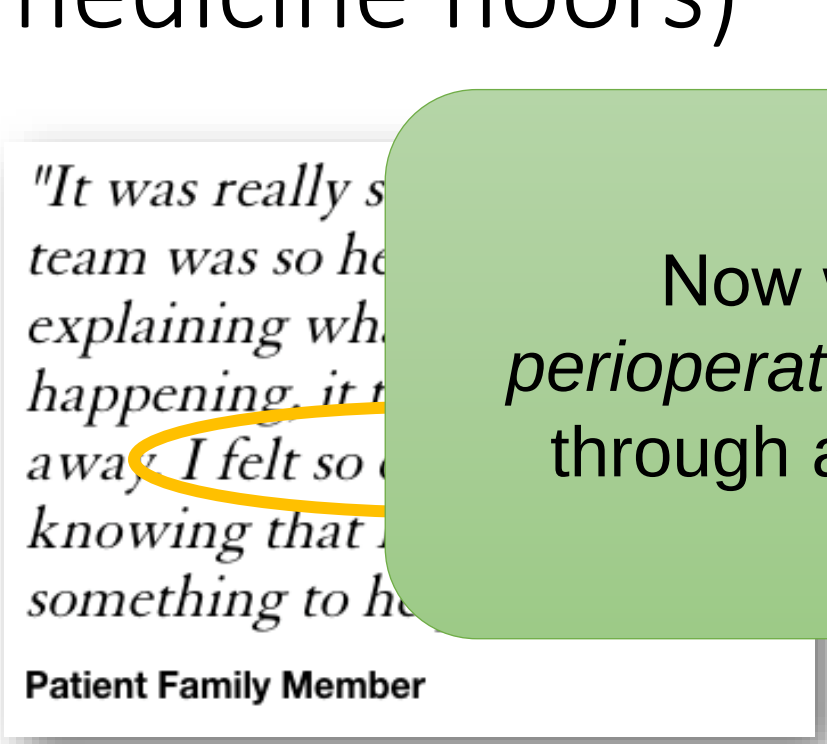
We’re muddling through

What we *can* be doing: talking!!

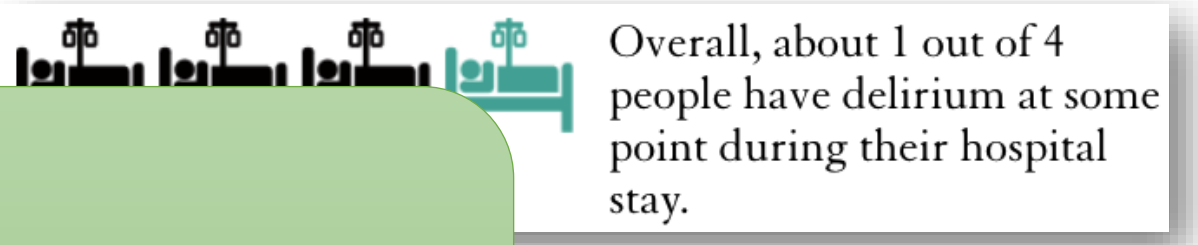
Here's your next patient, in preop, with her caregiver son

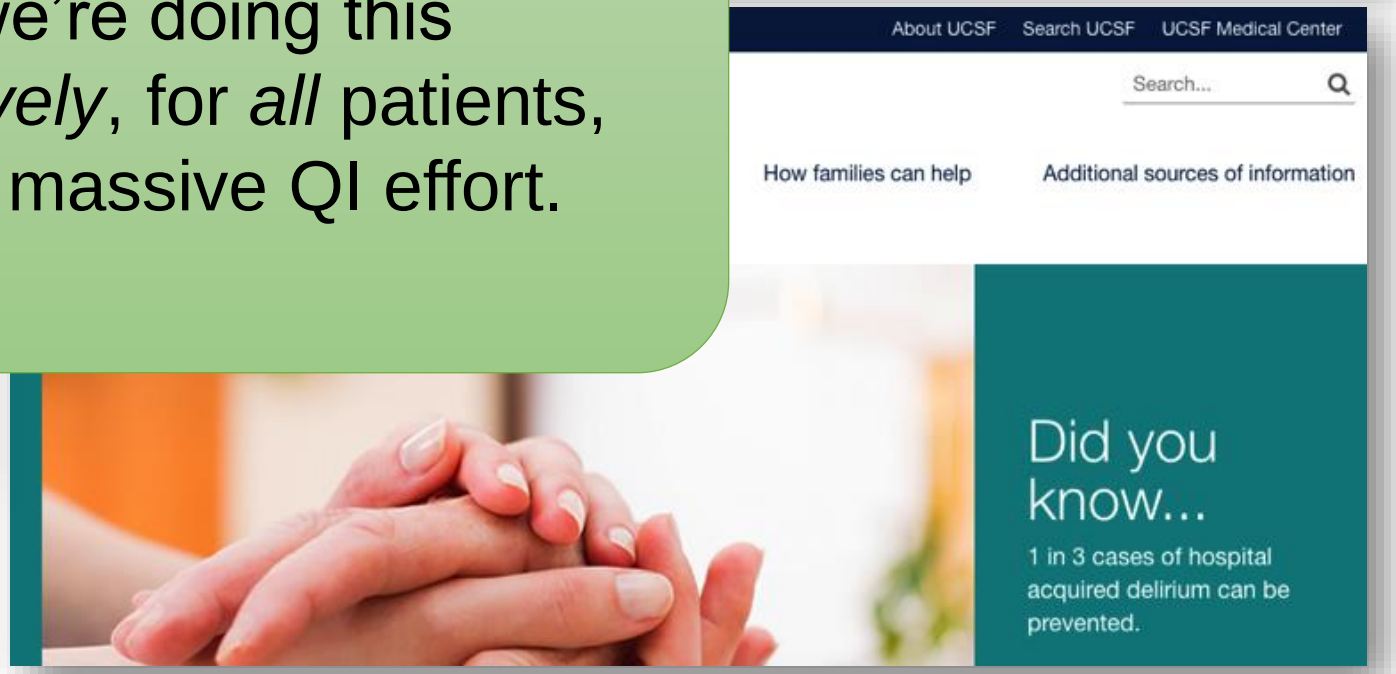
- You can *tell she's at high risk* (elderly, ASA 3, you suspect cognitive impairment, and she's getting a fem-fem bypass)
- Instead of ignoring it, you…
  - Tell her and her son she's at high risk
  - Explain that delirium is scary but temporary
  - Counsel them about what to look for
  - Explain what you'll do to try to minimize her risk
  - Describe what can be done after admission to prevent or treat

UCSF started doing this proactively (on medicine floors)



Now we're doing this *perioperatively*, for *all* patients, through a massive QI effort.





http://delirium.ucsf.edu

Postop delirium at UCSF

DELIRIUM PREVENTION AND MANAGEMENT

What we had

- Universal hospital delirium screening (NuDESC)
- A poorly-performing risk stratification instrument (AWOL)
- An electronic medical record & programming expertise

What we did

- Use routinely-collected data to develop a delirium risk instrument for periop
- Program it (largely automated) into the EMR
- Develop a pathway for high-risk surgical patients

How things changed

- Decreases in Beers List meds in older adults
  (3% relative decrease per month)
- Decreases in anticholinergics given to high-risk patients
  (20% relative decrease)

Donovan et al, Anesth Analg. 2020 Dec;131(6):1911-1922.
Whitlock et al, Anesth Analg. 2020 Dec;131(6):1901-1910.

AWOL-S and how it's used

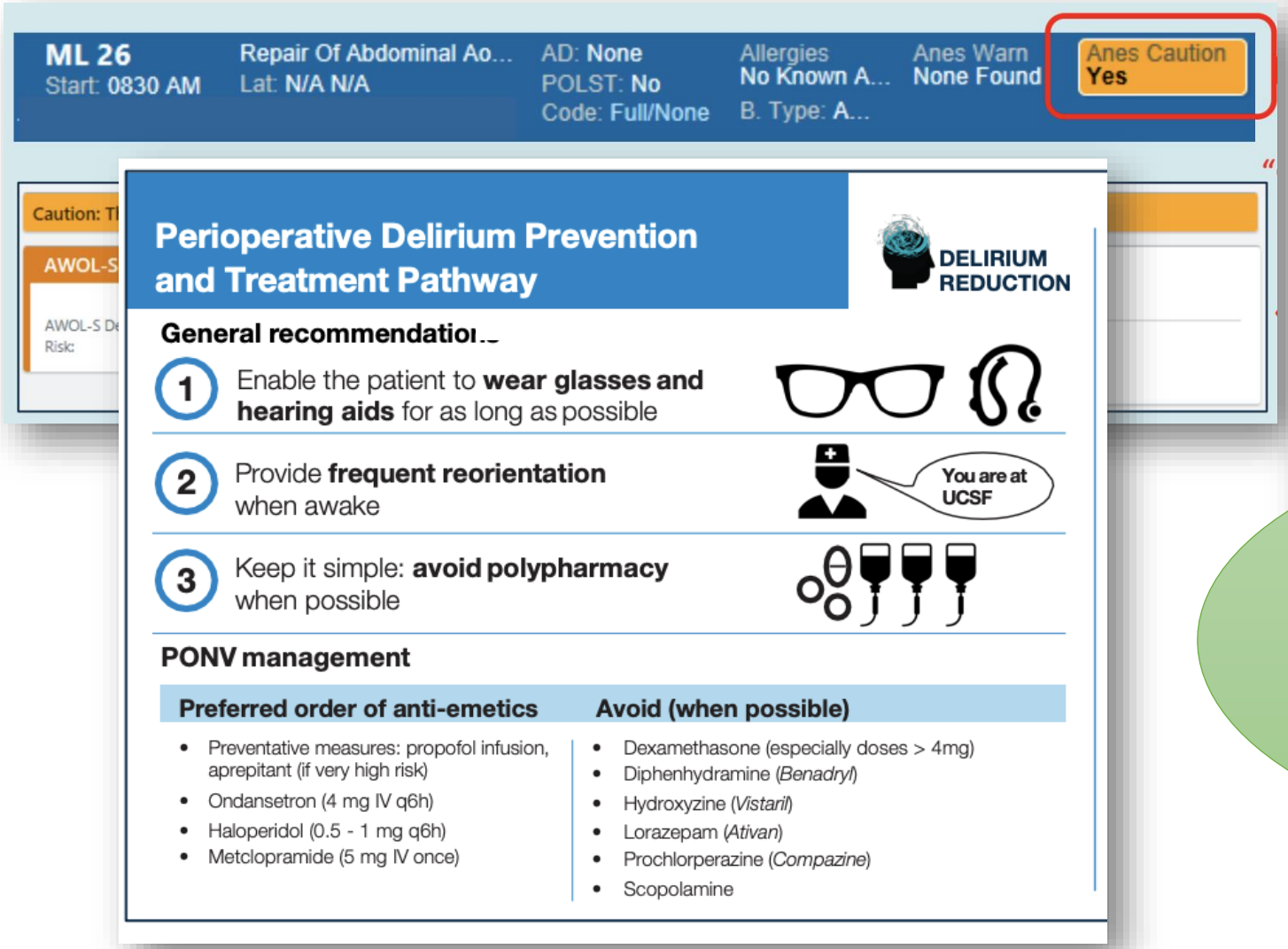


Table 3. Rounded Odds Ratios for Components in the AWOL-S Prediction Equation

Baseline Risk[a]	**0.28%**
Age	
Per year >65	Odds ratio 1.02
Per year >65	Odds ratio 0.98
Unable to spell WORLD backward	Odds ratio 1.5
DisOriented to place	Odds ratio 1.7
ILlness severity	
ASA II	Odds ratio 4.3
ASA III or higher	Odds ratio 8.3
Surgical risk	
Moderate risk	Odds ratio 3.4
High risk	Odds ratio 4.6

Abbreviations: ASA, American Society of Anesthesiologists; AWOL-S, Age, WORLD backwards, Orientation, iLlness severity, Surgery-specific risk.

[a]Baseline risk refers to the predicted probability of delirium for a hypothetical patient at the reference value for all categories; ie, a 65-y-old patient who is able to ... place, and is ASA I with a low ... the relevant odds

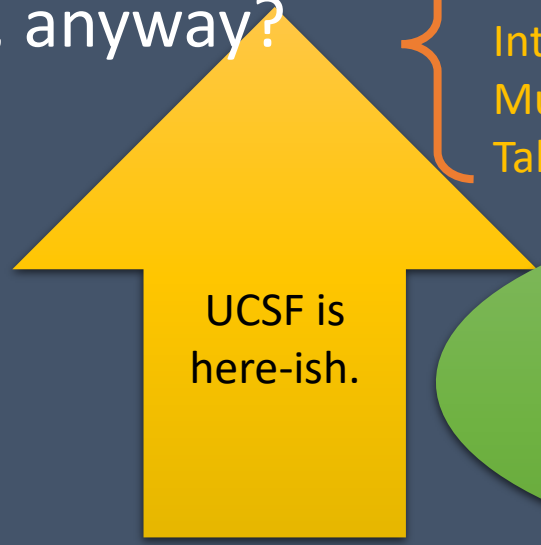
A machine learning model performs better but isn't clinically implementable (yet)

Bishara et al, BMC Anesthesiol. 2022 Jan 3;22(1):8
Whitlock et al, Anesth Analg. 2020 Dec;131(6):1901-1910.
Donovan et al, Anesth Analg. 2020 Dec;131(6):1911-1922.

But remember how we're only here?

- Our risk stratification tool isn't *amazingly* predictive
  - Misses 25% of patients who will be delirious
  - Overcalls delirium risk in 40% of those "at high risk"
- It only works if you do it
- And what are you going to do, anyway?

Avoid preoperative midazolam?
Avoid postop meperidine?
Intraoperative EEG monitoring?
Multicomponent interventions?
Talk people out of surgery?



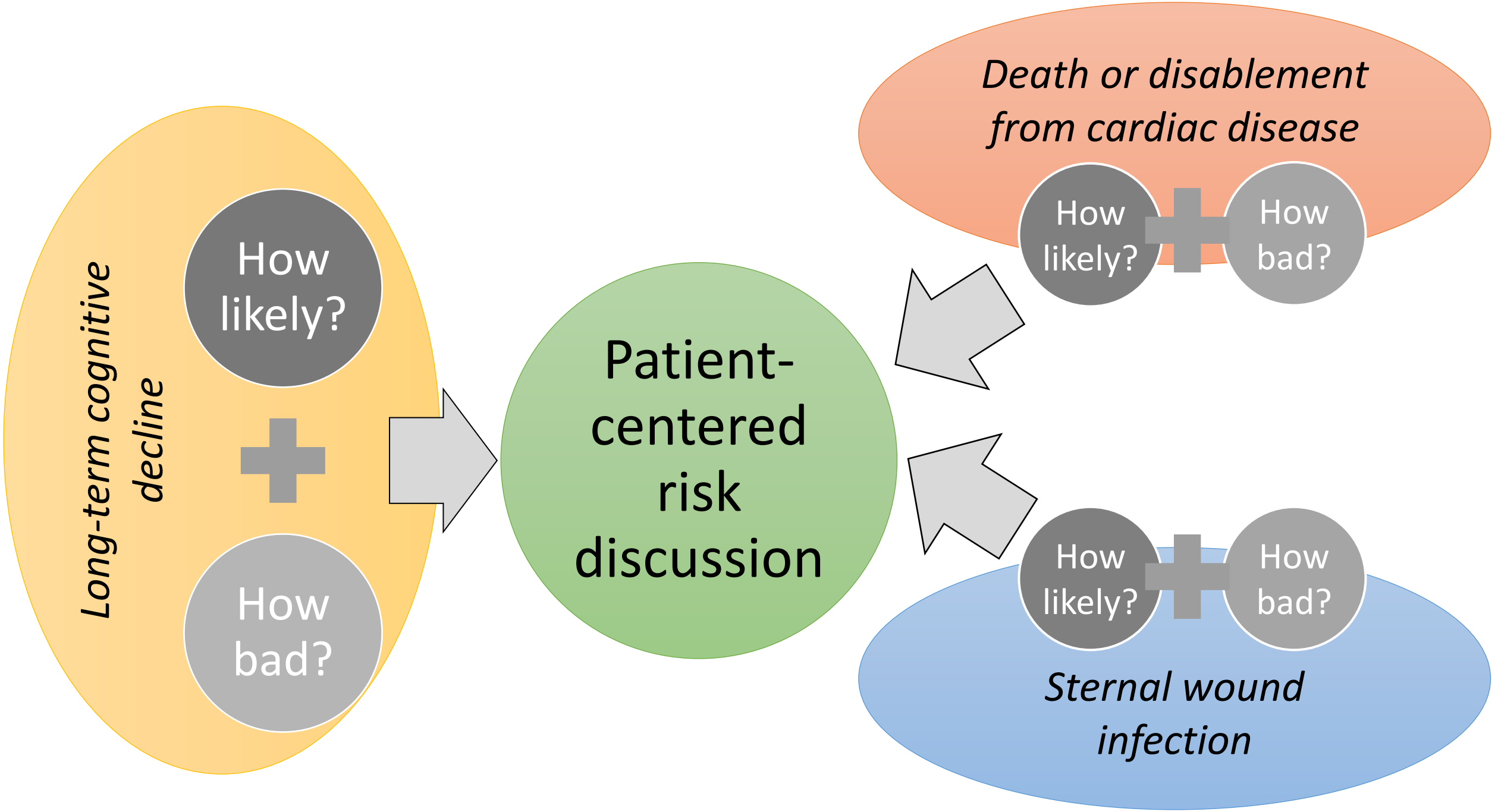
Seriously: how about we just *talk* about it, until we can do more?

Pragmatic & aspirational

approaches to postoperative delirium & neurocognitive disorders

Perfect is the enemy of good enough.

(the secret subtheme of my talk)


Long-term cognitive decline
How likely?
How bad?
Patient-centered risk discussion
Death or disablement from cardiac disease
How likely?
How bad?
How likely?
How bad?
Sternal wound infection

The current state: “POCD” in 10-15%

The Washington Post

Surgery can cause cognitive losses in some seniors

Many patients are not told of the risk of postoperative cognitive dysfunction during the process of informed consent. (iStock)

By Judith Graham

May 19, 2018

Two years ago, Daniel Cole’s 85-year-old father had heart bypass surgery. He hasn’t been quite the same since.

“He forgets things and will ask you the same thing s
Cole, a professor of clinical anesthesiology a
of the American Society of Anesthesiolog

“He never got back to his cognitive baseline,
that his father was sharp as a tack before the operat
80 percent.”

Popular news articles

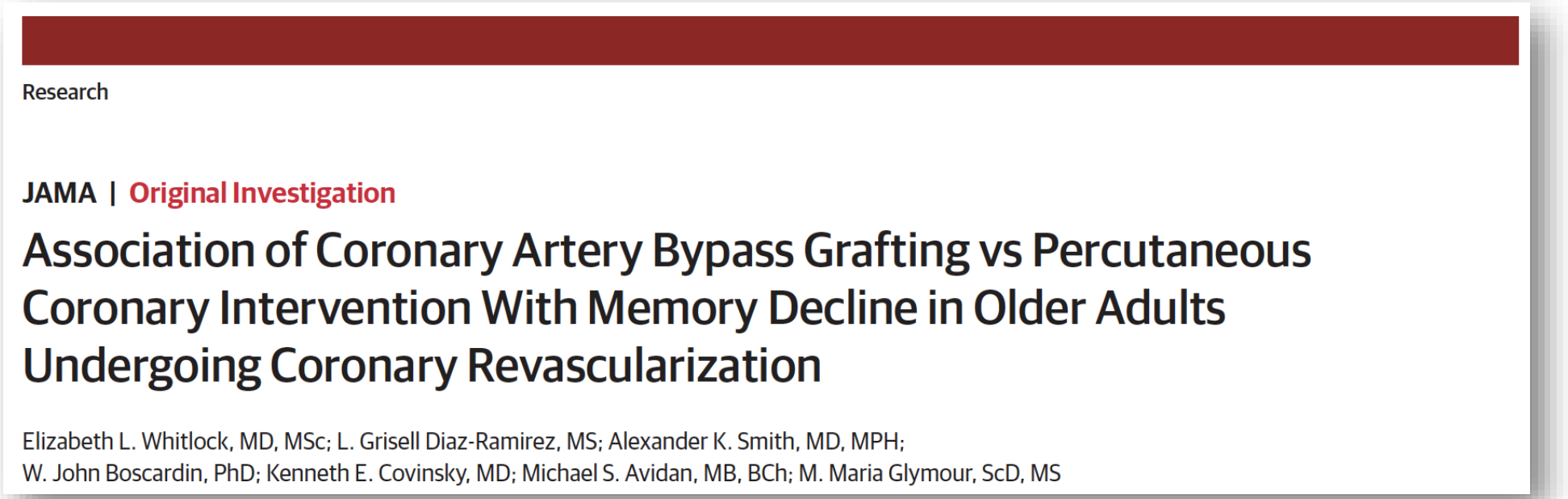
Anecdote

Medical literature

Put it together

“I have a 15% chance of *permanent*, *functionally impactful* cognitive decline after surgery: the *Post* said so!”

A pragmatic perspective on POCD (PND)



Research

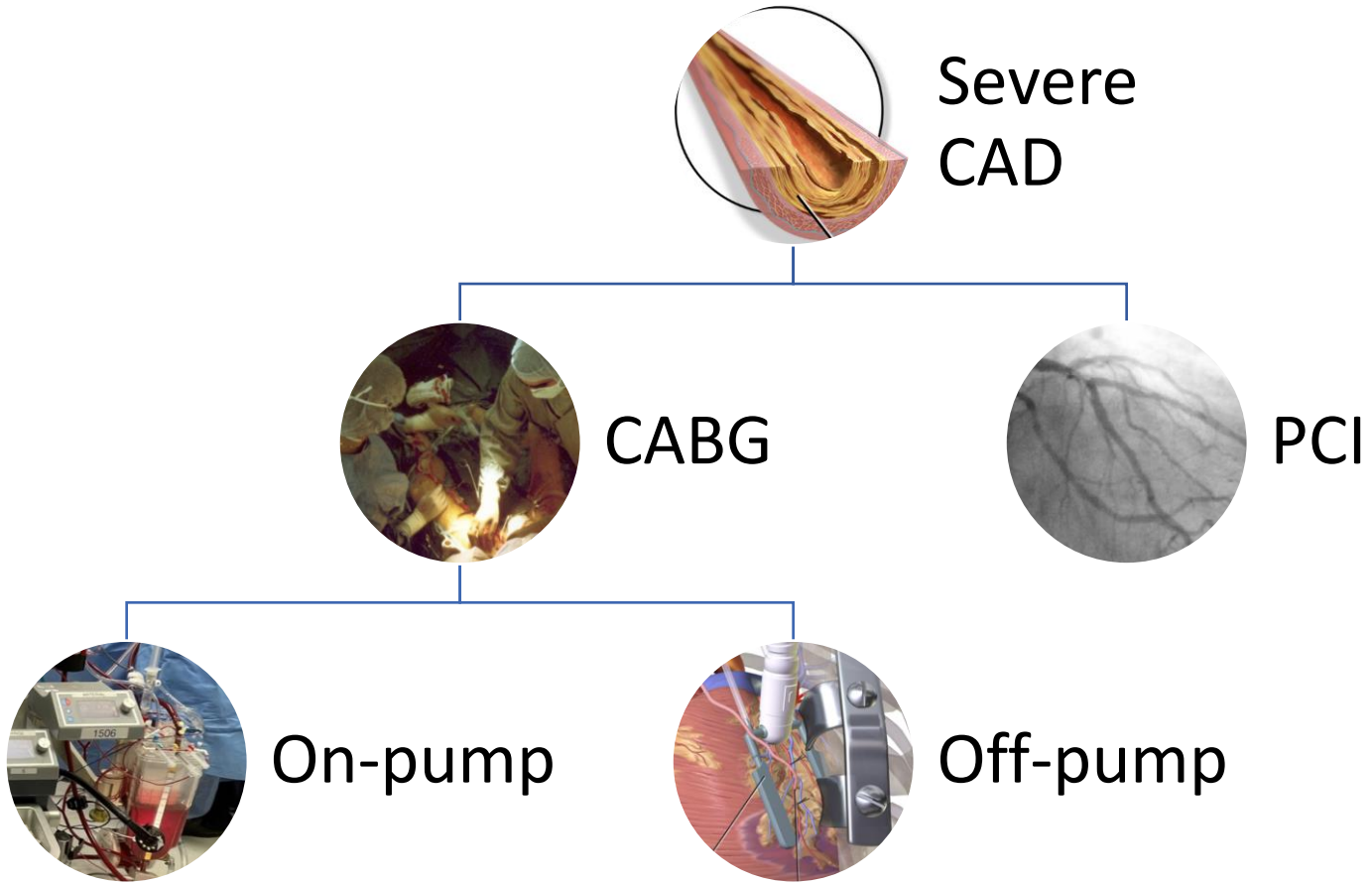
JAMA | Original Investigation

Association of Coronary Artery Bypass Grafting vs Percutaneous Coronary Intervention With Memory Decline in Older Adults Undergoing Coronary Revascularization

Elizabeth L. Whitlock, MD, MSc; L. Grisell Diaz-Ramirez, MS; Alexander K. Smith, MD, MPH; W. John Boscardin, PhD; Kenneth E. Covinsky, MD; Michael S. Avidan, MB, BCh; M. Maria Glymour, ScD, MS

- 15% risk of WHAT, exactly??
- Is major surgery/anesthesia *systematically harmful* to older adults' long-term cognition?
- What characteristics are associated with *clinically meaningful* late cognitive decline?

Options for coronary revascularization



AVOIDS:

Sternotomy (trauma)

Chronic pain

General anesthetic

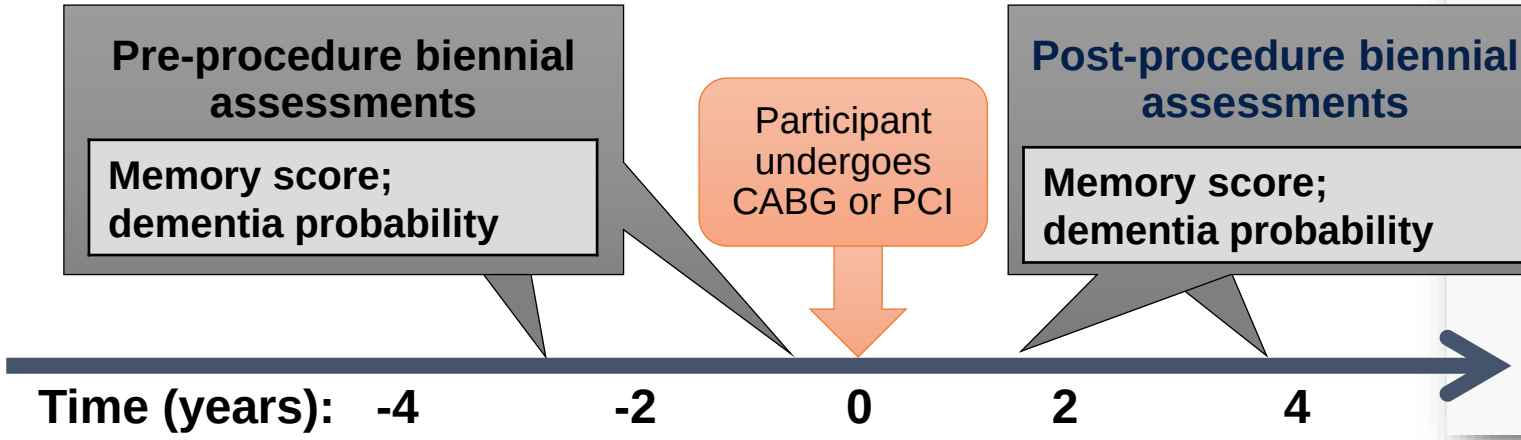
CPB exposure

Mechanical ventilation

ICU stay

Postoperative delirium

Whitlock et al. JAMA. 2021 May 18;325(19):1955-1964.


Pre-procedure biennial assessments
Memory score; dementia probability
Participant undergoes CABG or PCI
Post-procedure biennial assessments
Memory score; dementia probability
Time (years): -4 -2 0 2 4


HRS
HEALTH AND RETIREMENT STUDY
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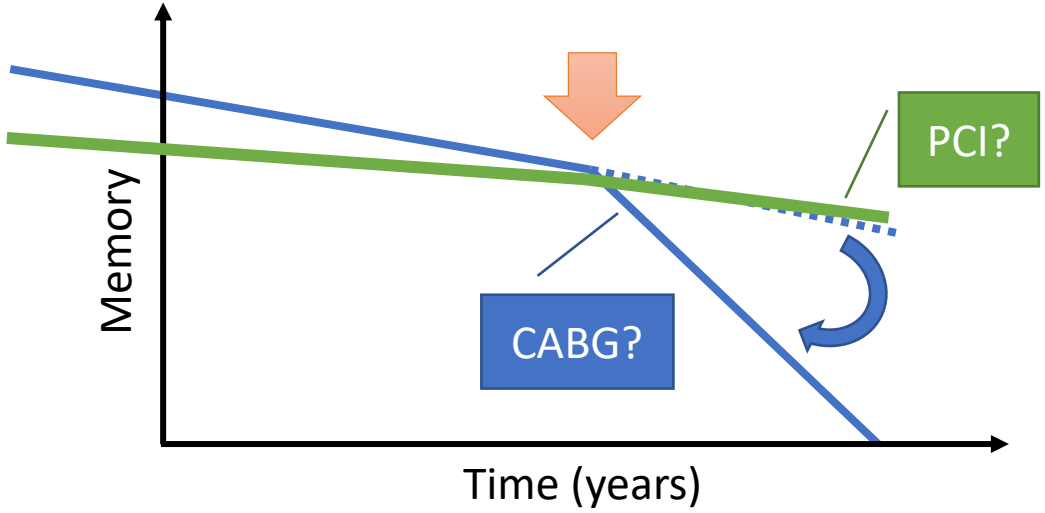
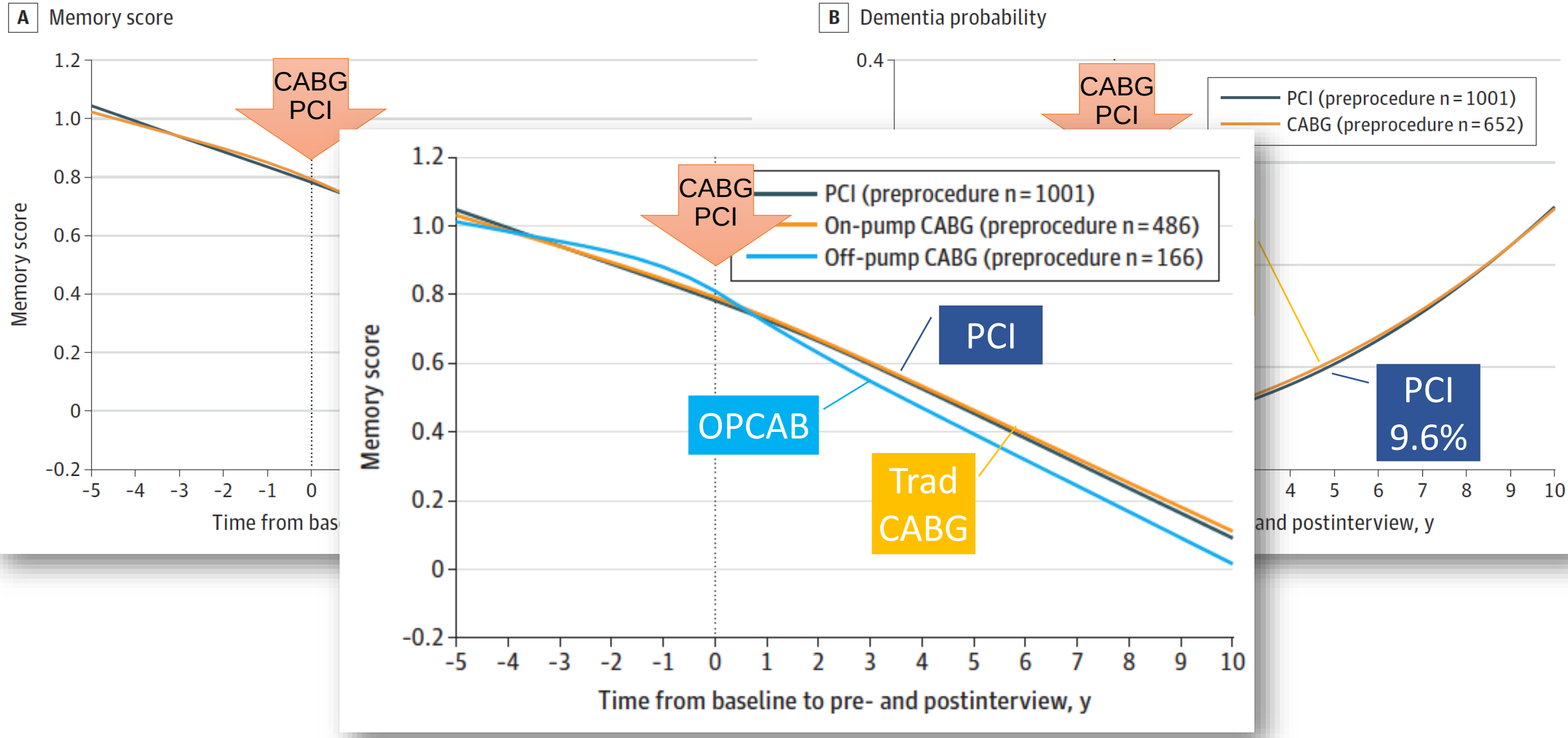
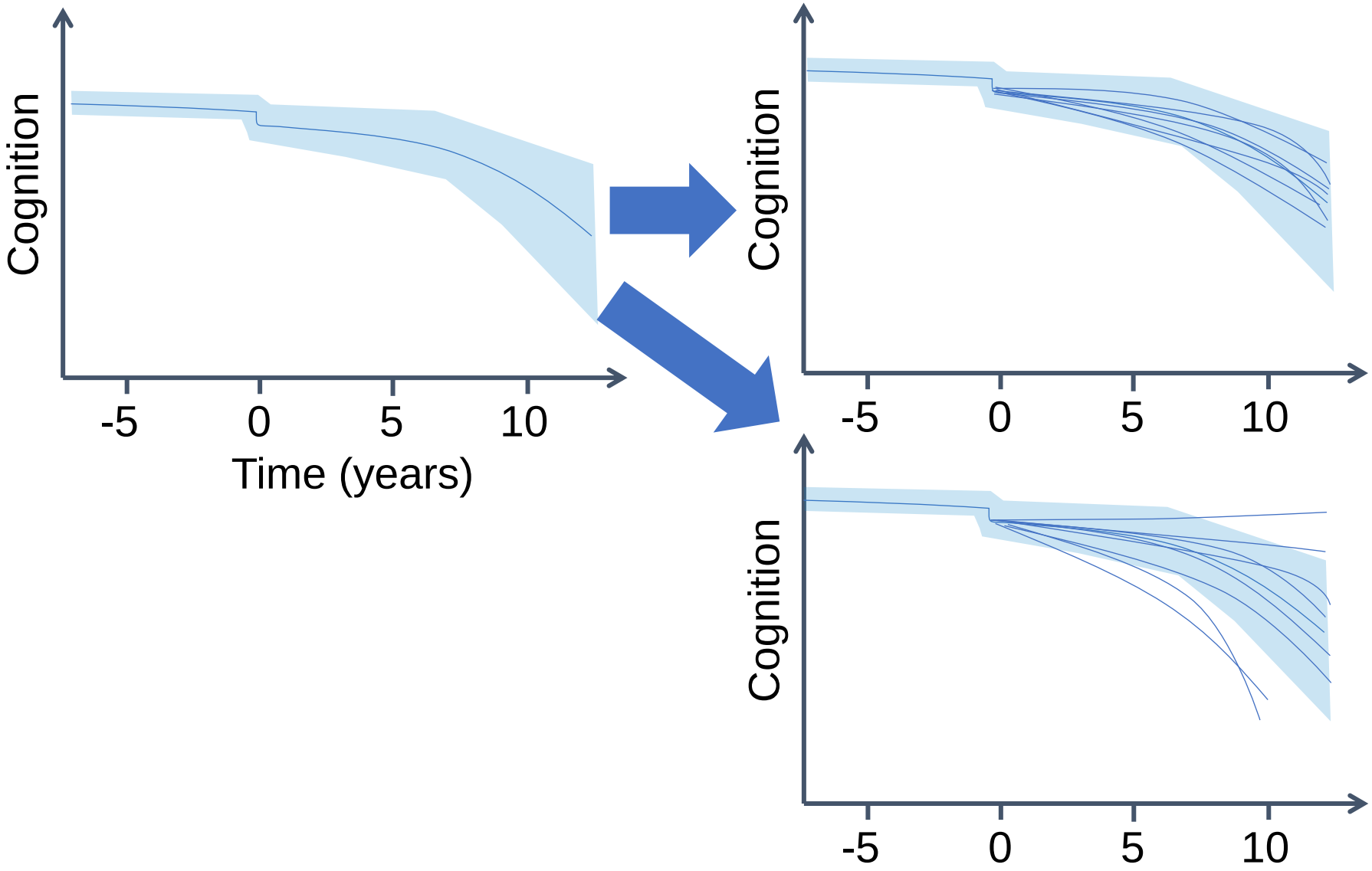

Memory
Time (years)
PCI?
CABG?

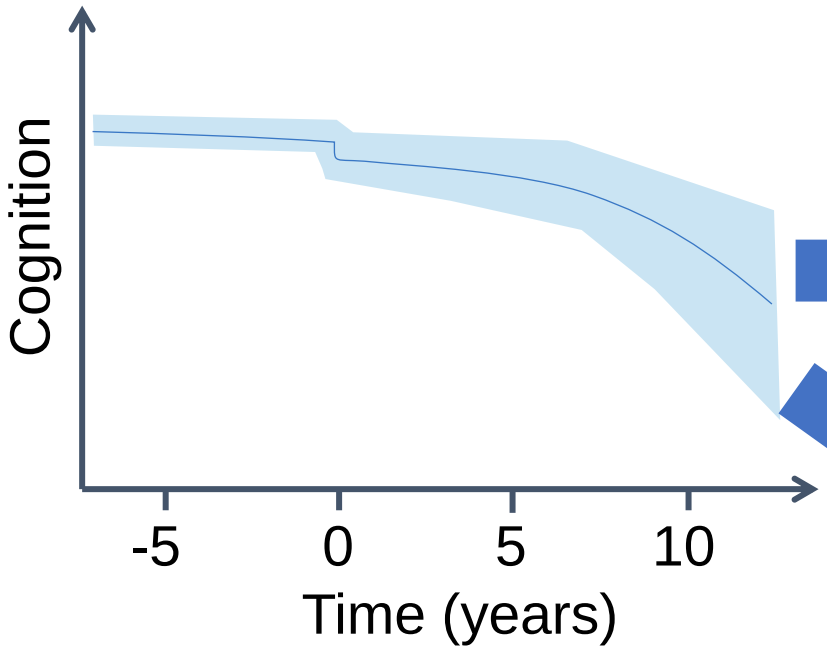
Figure 2. Adjusted Linear Mixed-Effects Models for Memory Score and Dementia Probability for CABG vs PCI Recipients

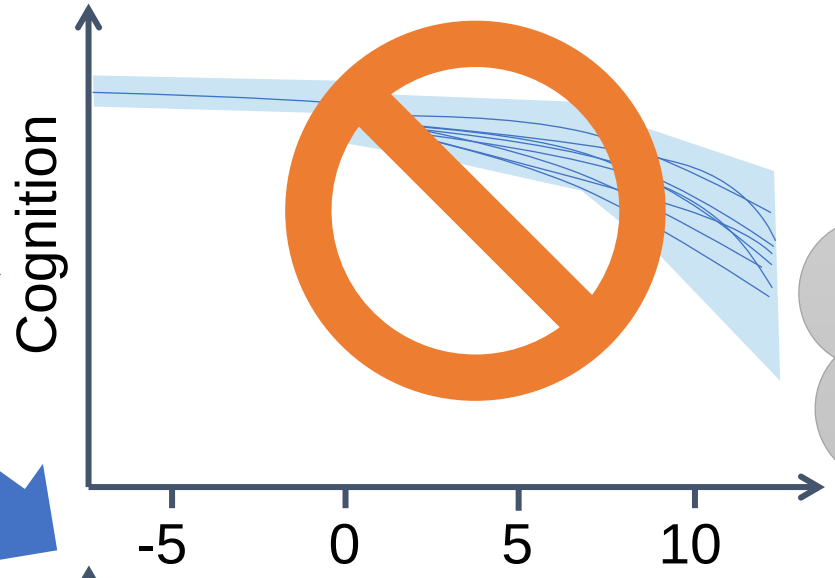


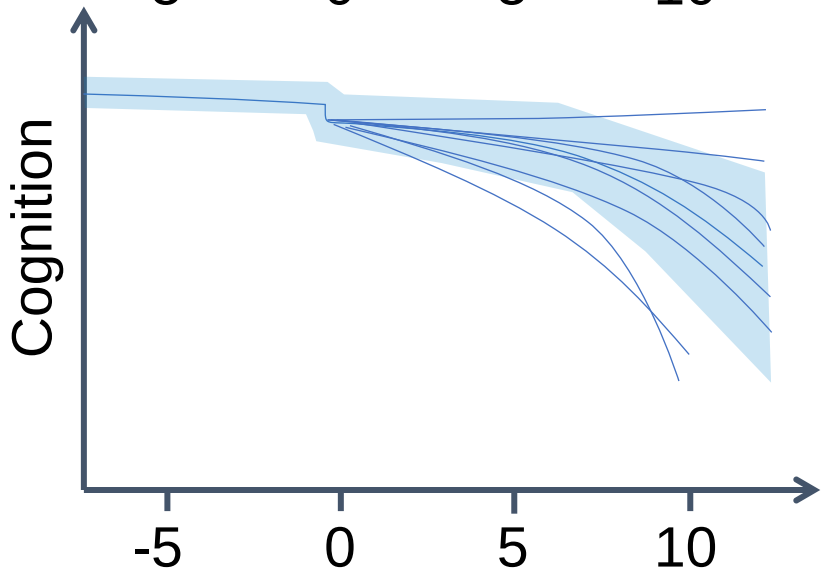
Criticism: Averages obscure meaningful differences



Moving from averages to individuals







(And we knew about this: it's the difference between "anecdote-POCD" and "research-POCD")

The Washington Post

Surgery can cause cognitive losses in some seniors

Many patients are not told of the risk of postoperative cognitive dysfunction during the process of informed consent. (iStock)

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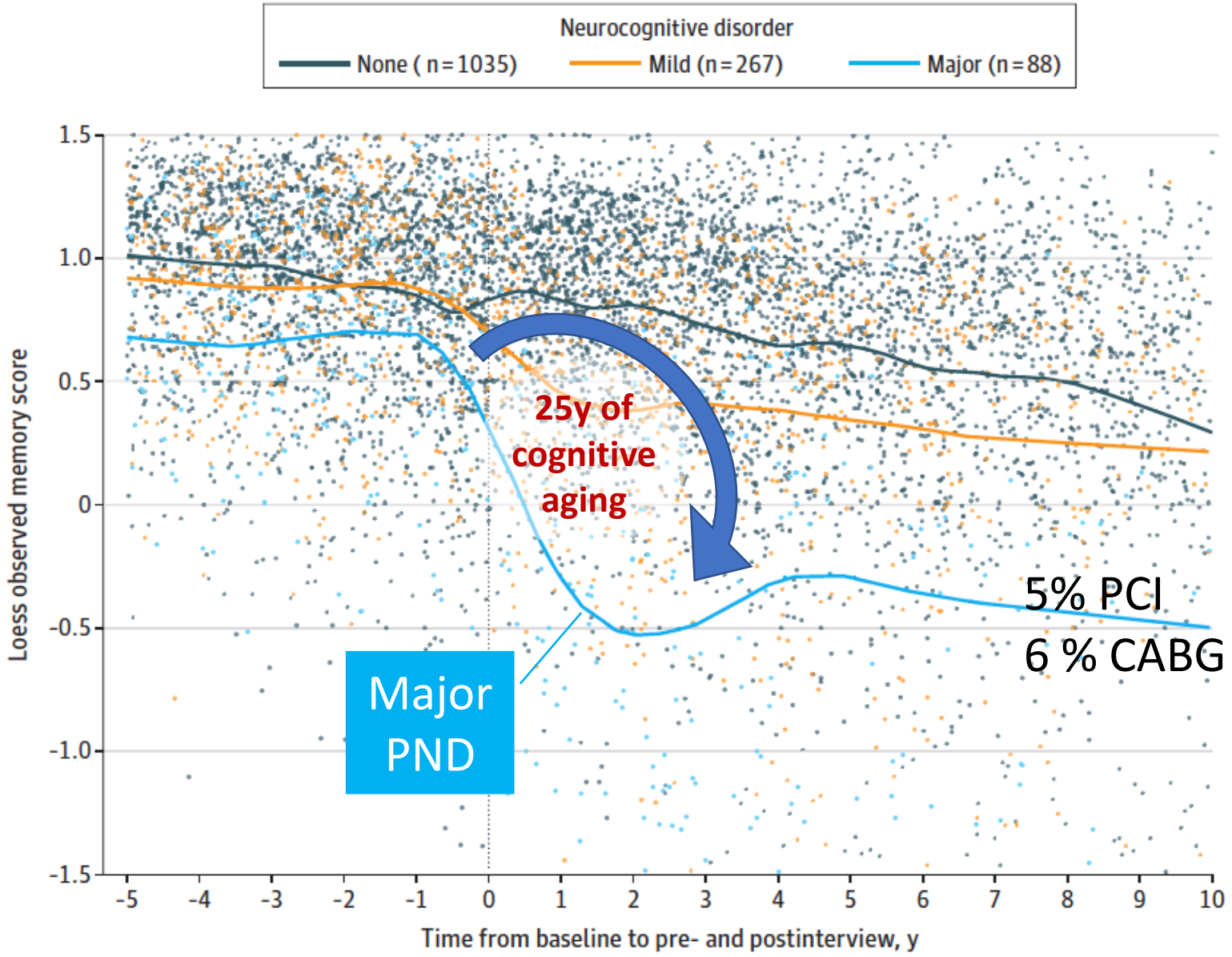
May 19, 2018

Two years ago, Daniel Cole's 85-year-old father had heart bypass surgery. He hasn't been quite the same since.

"He forgets things and will ask you the same thing several times," said Cole, a professor of clinical anesthesiology at UCLA and a past president of the American Society of Anesthesiologists.

"He never got back to his cognitive baseline," Cole continued, noting that his father was sharp as a tack before the operation. "He's more like 80 percent."



Prediction model for PND:

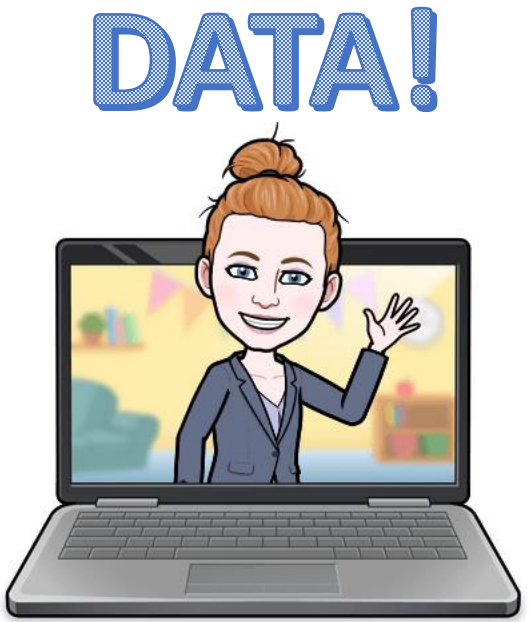
Older ages (~20% ↑ per year)

Frailty (doubles risk)

Overweight/obese (~30-40% ↓)

How likely? + How bad?

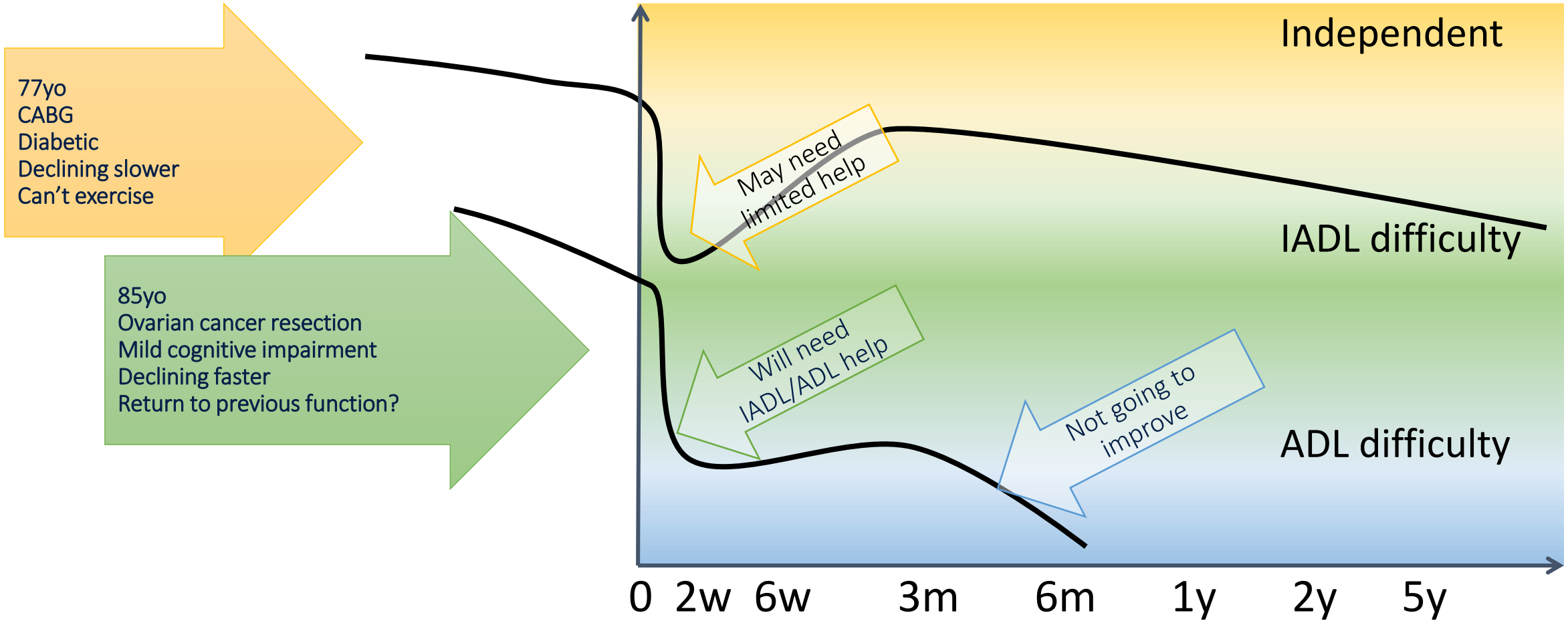
- Using this (*unpublished!*) model:
  - 25% risk of major PND if you screen high-risk
  - 4% risk of major PND if you screen low-risk
  - But… it only flags half the major PND people as high-risk
- Limitations: Validated? Clinical use? PND definition?
- What do we need to do to *do this better??*



Whitlock et al. *Unpublished data not for distribution*

With good data, there is so much more we could do

Outcomes risk prediction was revolutionized by data collection practices. So will NCDs be!



Universal buy-in

Specialty-level buy-in

Current

*"Postoperative delirium is important at my **institution**."*

Local initiatives

DELIRIUM PREVENTION AND MANAGEMENT

Local quality improvement

DATA None / local

Feasible

*"Postoperative delirium is important to **anesthesiologists**."*

Specialty initiatives

Perioperative Brain Health Initiative
American Society of Anesthesiologists

Focus on **delirium**

Limited best-practices for OR and critical care

MPOG, NACOR

Aspirational

*"Postoperative neurocognitive disorders are important to **all who provide perioperative care for older adults**."*

Multidisciplinary initiatives

Geriatric Surgery Verification

Focus on **cognitive recovery**

Generaliz-able best-practices study data

Medicare, NSQIP, STS

DATA

What I can leave you with:

- *Everything* is hard right now.
- Doing *something* is better than *nothing* – particularly when best evidence is for patient-centered care
- What can you, your department, your institution, or your specialty do to move things forward?

(Honestly, and from a caring place: I think this is a way to *help* with the burnout and moral injury we feel seeing older adults & families blindsided by NCDs!

"Avoid hypotension and hypoxia."
Love,Cardiology

Who's at risk → Name it → Talk about it → (Prevent it?)


UCSF