2026 California Thoracic Society Annual Educational Conference

& Chronic Obstructive Pulmonary Disease Symposium

Thursday March 12, 2026-Sunday March 15, 2026

Earn up to 19 CME/CEU/MOC Credits

Jointly Provided by AKH Inc., Advancing Knowledge in Healthcare and the California Thoracic Society

PORTOLA HOTEL & SPA
AT MONTEREY BAY

Thursday March 12, 2026 (6 CME/CEU/MOC Credits)
COPD Symposium
Friday March 13, 2026 (6.5 CME/CEU/MOC Credits):
Advances in Interventional Pulmonary, Remote Monitoring in Pulmonary and Sleep Medicine, Approach to Symptom Management in Chronic Lung Disease and Critical Care
Saturday March 14, 2026 (6.5 CME/CEU/MOC Credits)
Sepsis and Shock, Extracorporeal Membrane Oxygenation, Inpatient Pulmonary Complications of Cancer Care
Sunday March 15, 2026
Fellow and Resident Track Symposium

California Thoracic Society
ATS Chapter Serving California and Arizona

AKH INC.
ADVANCING KNOWLEDGE IN HEALTHCARE

California Thoracic Society
Annual Conference
March 12-15, 2026
Portola Hotel and Spa, Monterey, CA

Friday March 13, 2026

Advances in Interventional Pulmonary

8:00 am – 8:10 am: Welcome and Introduction

8:10 am – 8:55 am: Keynote Address – Evolution of Bronchoscopy in Diagnosing Lung Nodules

- **Christine Argento, MD (Johns Hopkins) -** This speaker will discuss the recent advances in bronchoscopy from radial EBUS, to electromagnetic navigation, to robot technologies, and how advancement has improved lung nodule diagnosis.

8:55 am – 9:20 am: Implications of the new TNM9 staging for lung cancer

- **Colleen Channick, MD (UC Los Angeles) -** This speaker will discuss the new TNM staging system, how staging is currently performed, and how to approach staging in the patient with suspected lung cancer.

9:20 am – 9:45 am: Management of Central Airway Obstruction

- **Raed Alalawi, MD (Arizona-Phoenix)-** This speaker will discuss how interventional pulmonary practitioners can manage and treat central airway obstruction.

9:45 am – 10:10 am: The Changing Landscape of Pleural Disease Management

- **Joon Chang, MD (Stanford) -** This speaker will discuss advances in management of pleural disease by the interventional pulmonologist including when to use an intrapleural catheter, and when to use

10:10 am – 10:20 am: Question and Answer

10:20 am – 10:50 am: Break

Remote Monitoring in Lung Disease and Sleep Medicine

10:50 am – 11:15 am: Developing a home spirometry program

- **Steven Hays, MD (UC San Francisco) -** This speaker will discuss how to approach the development of a home spirometry program to monitor lung disease, how to use digital health technologies to integrate results into the EHR.

11:15 am – 11:40 am: Home Non-Invasive Ventilator Monitoring

- **Christal Hawkins, RRT (UC San Diego) -** This speaker will review how to monitor home non-invasive ventilators for compliance and for adequate control of sleep disordered breathing.

11:40 am – 11:55 am: Pro: Virtual Pulmonary Rehabilitation is Ready for Prime Time

- **Aimee Kizziar, RRT (UC Davis) -** This speaker will argue in favor of virtual pulmonary rehabilitation programs.

11:55 am – 12:10 pm: Con: Virtual Pulmonary Rehabilitation is not ready for Prime Time

- **Julia Rigler, BA. RRT (UC San Francisco) -** This speaker will argue against virtual pulmonary rehabilitation programs.

12:10 pm – 12:20 pm: Question and Answer

12:20 pm – 1:00 pm: Awards Ceremony

1:00 pm – 2:00 pm: Lunch

Hands On Session:

2:00 pm – 3:00 pm: Robotic Bronchoscopy **Raed Alalawi, MD (Arizona-Phoenix) & Joon Chang, MD (Stanford)** Cough Monitoring **Lauren Eggert, MD (UCSF)**; Endobronchial Ultrasound **Pranjal Patel, MD (Stanford)**; Home NIV **Krystle Leung, MD (Stanford)**

3:00 pm – 3:20 pm: Break

Approach to Symptom Management in the Pulmonary Patient

3:20 pm – 3:45 pm: Addressing the Unmet Needs of Refractory Chronic Cough

- **Krishna Sundar, MD FCCP FAASM ATSF (UC Davis) -** This speaker will discuss the etiology behind refractory chronic cough and the treatment approaches for management

3:45 pm – 4:10 pm: Frailty in Pulmonary and Critical Care Medicine

- **Jonathan Singer, MD MPH (UC San Francisco) -** This speaker will discuss the concept of frailty and how it impacts health in patients with lung disease. The speaker will also discuss how frailty can change as lung disease is treated.

4:10 pm – 4:35 pm: Palliative Care for the Patient with Chronic Lung Disease

- **Grace Amadi, MD (UC Davis) -** This speaker will discuss how palliative care teams can benefit patients with chronic various lung disease including ILD, COPD, and pulmonary hypertension.

4:35 pm – 5:00 pm: Palliative Care for the Patient with Critical Illness

- **B. Corbett Walsh, MD, MBE (UC Los Angeles) -** This speaker will discuss how palliative care teams can benefit the inpatient with advancing lung disease, the importance of advance care planning, and palliative care in the intensive care unit.

5:00 pm – 5:10 pm: Question and Answer

5:30 pm – 7:00 pm: Women in Pulmonary, Critical Care, and Sleep Medicine (NON-CME) – Food and beverages will be served

Dr. Jonathan Singer is a Professor of Medicine in the Division of Pulmonary, Critical Care, Allergy and Sleep Medicine. He specializes in the care of adults with advanced lung disease and lung transplant recipients. He is the Associate Medical Director of the Advanced Lung Disease and Lung Transplant clinical program and also founded and now co-Directs the UCSF Advanced Lung Disease and Lung Transplant Research Program. Dr. Singer received his undergraduate degree from Stanford University. He completed a combined Masters in Health and Medical Sciences from the School of Public Health at UC Berkeley and a medical degree at UCSF as part of the Joint Medical Program. He remained at UCSF, where he completed a residency in Internal Medicine, and fellowships in Pulmonary, Critical Care Medicine, and Lung/Heart-Lung Transplantation.

Frailty in Pulmonary and Critical Care Medicine

Jonathan Singer, MD MS

Professor of Medicine

UC San Francisco

Disclosures

- I have the following relationships with ACCME defined ineligible companies:
- **XVIVO: consultant; Krystal Biotechnology: chair, DSMB**
- I **WILL NOT** discuss off-label use and/or investigational use of any drugs or devices.

Outline

1. Define frailty
2. The impact of frailty on those with lung disease and the critically ill
3. What to do about frailty once identified

The original stimulus

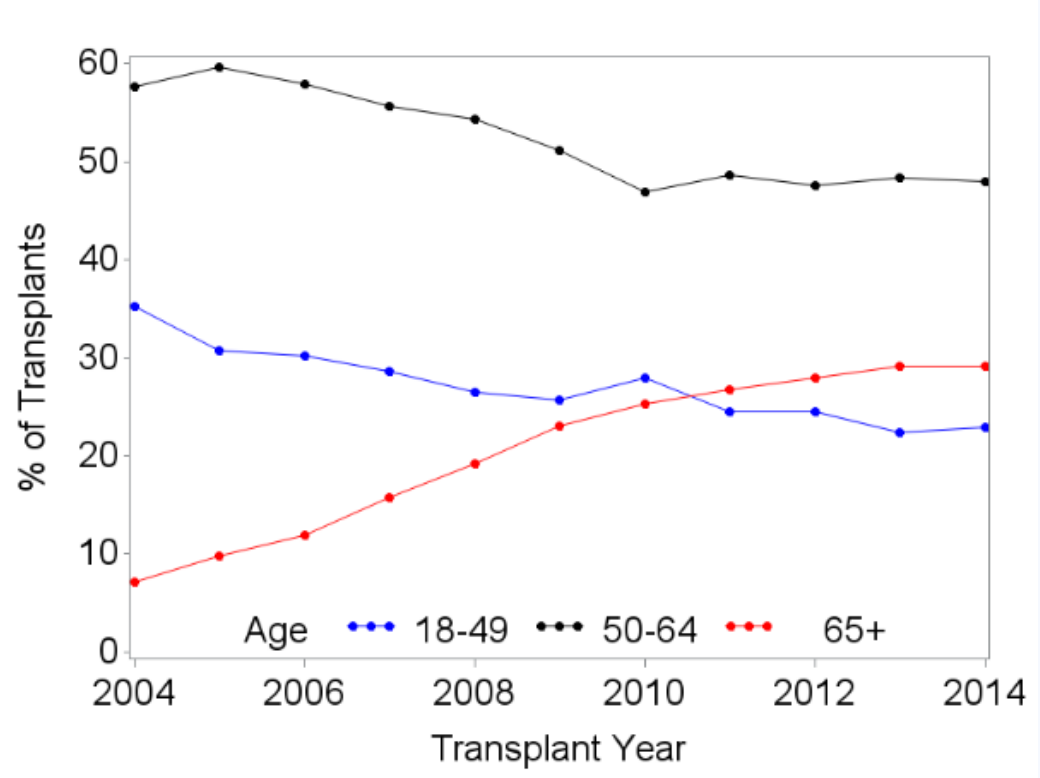
CONSENSUS REPORT

International Guidelines for the Selection of Lung Transplant Candidates: 2006 Update—A Consensus Report From the Pulmonary Scientific Council of the International Society for Heart and Lung Transplantation

Jonathan B. Orens, MD,[a] Marc Estenne, MD,[b] Selim Arcasoy, MD,[c] John V. Conte, MD,[a] Paul Corris, MD,[d] Jim J. Egan, MD,[e] Thomas Egan, MD,[f] Shaf Keshavjee, MD,[g] Christiane Knoop, MD,[b] Robert Kotloff, MD,[h] Fernando J. Martinez, MD,[i] Steven Nathan, MD,[j] Scott Palmer, MD,[k] Alec Patterson, MD,[l] Lianne Singer, MD,[g] Gregory Snell, MD,[m] Sean Studer, MD,[n] J. L. Vachiery, MD,[b] and Allan R. Glanville, MD[o]

Relative contraindications.

- Age older than 65 years. Older patients have less optimal survival,[2] likely due to comorbidities, and therefore, recipient age should be a factor in candidate selection. Although there cannot be endorsement of an upper age limit as an absolute contraindication (recognizing that advancing age alone in an otherwise acceptable candidate with few comorbidities does not necessarily compromise successful transplant outcomes), the presence of several relative contraindications can combine to increase the risks of transplantation above a safe threshold.



Older recipients have the poorest survival

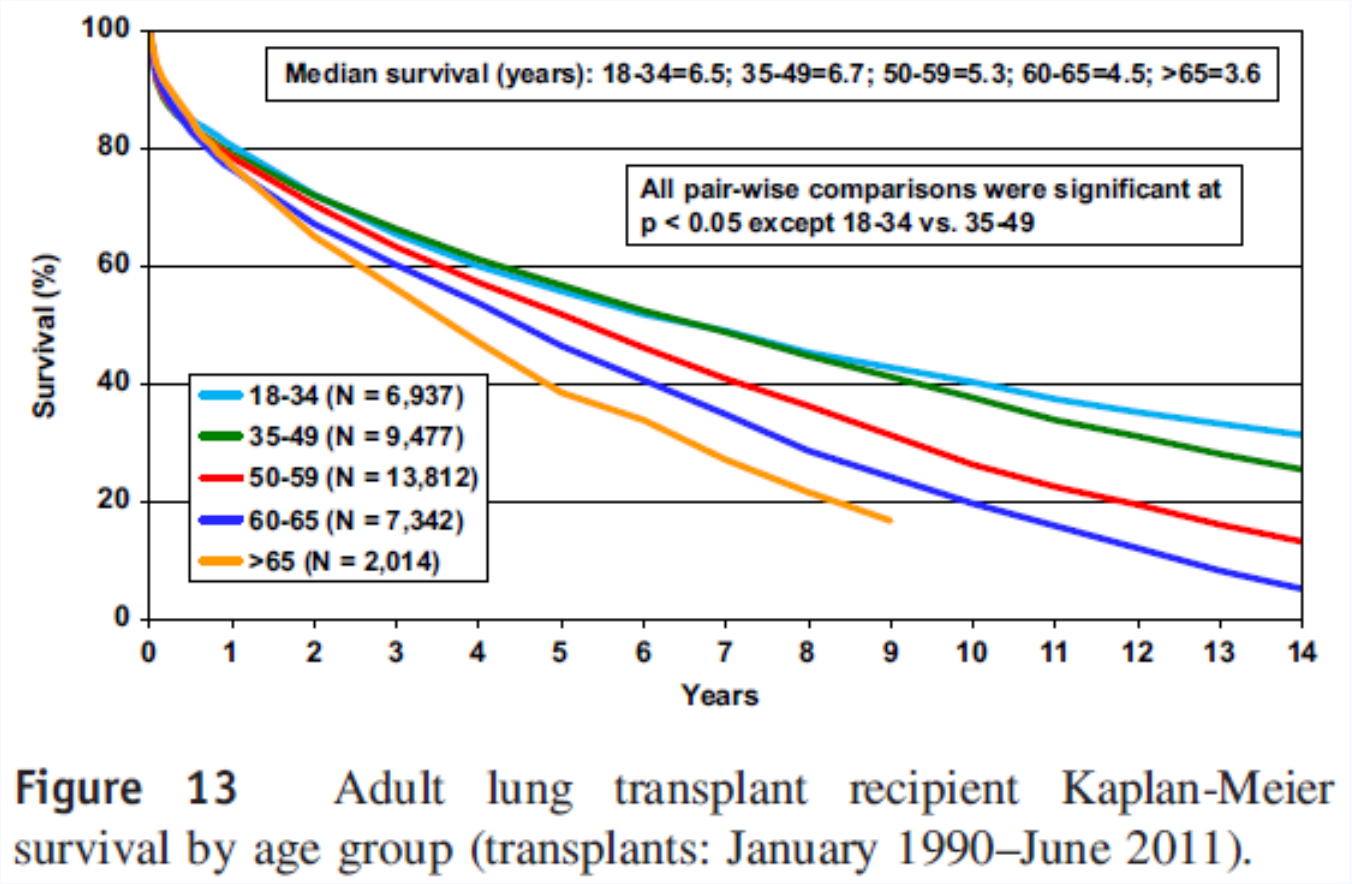


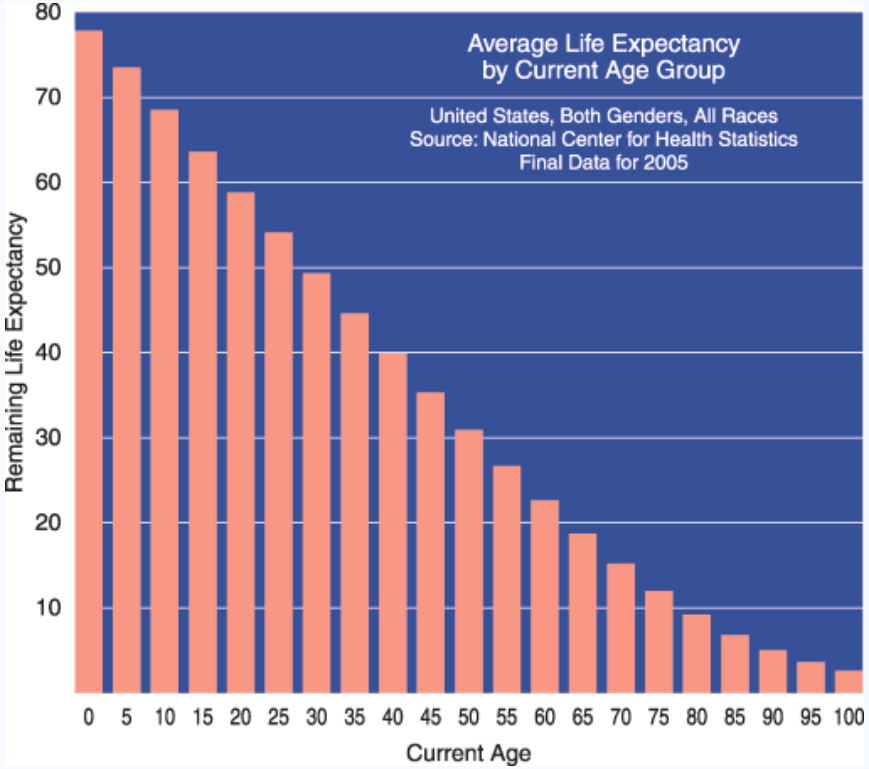
Figure 13 Adult lung transplant recipient Kaplan-Meier survival by age group (transplants: January 1990–June 2011).

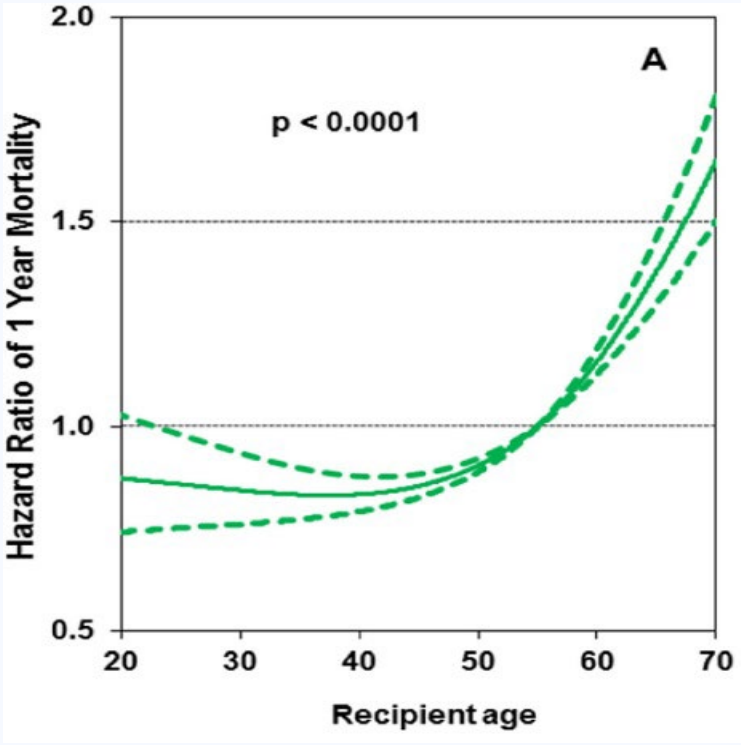
Yusen. *J Heart Lung Transplant.* 2013

But many older patients did really well.

For transplant eligibility we use chronologic age for listing decisions

Age is a strong risk factor for mortality





Yusen R. *J Heart Lung Transplant.* 2016

Aging → degradation across systems

Progressive loss of tissue/organ/organism integrity

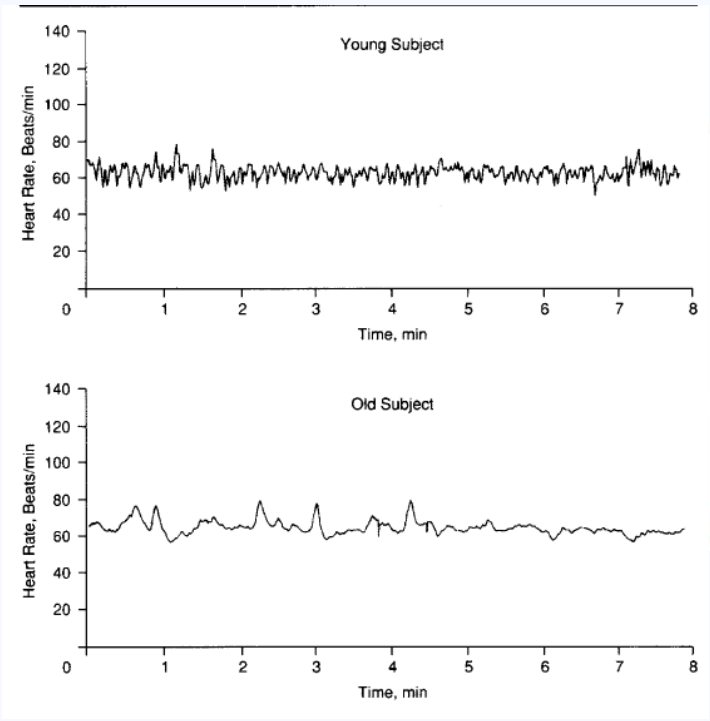
Vulnerability to environmental challenges

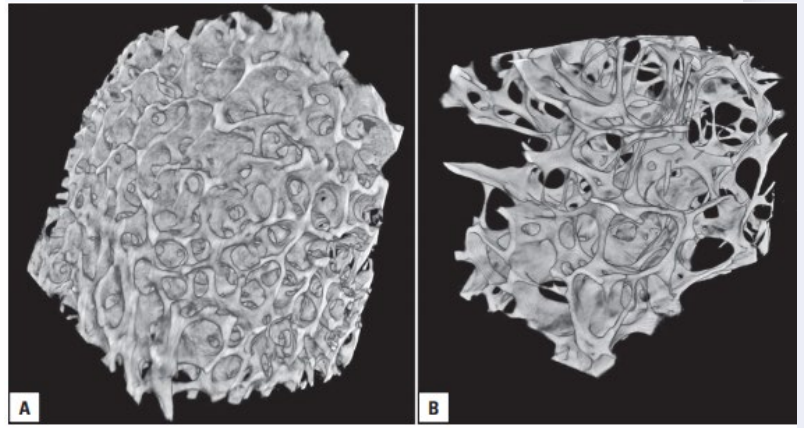
Increased risk of disease and death.

Accumulation of aging-related diseases

Lopez-Otin, Cell. 2013

Aging and loss of complexity





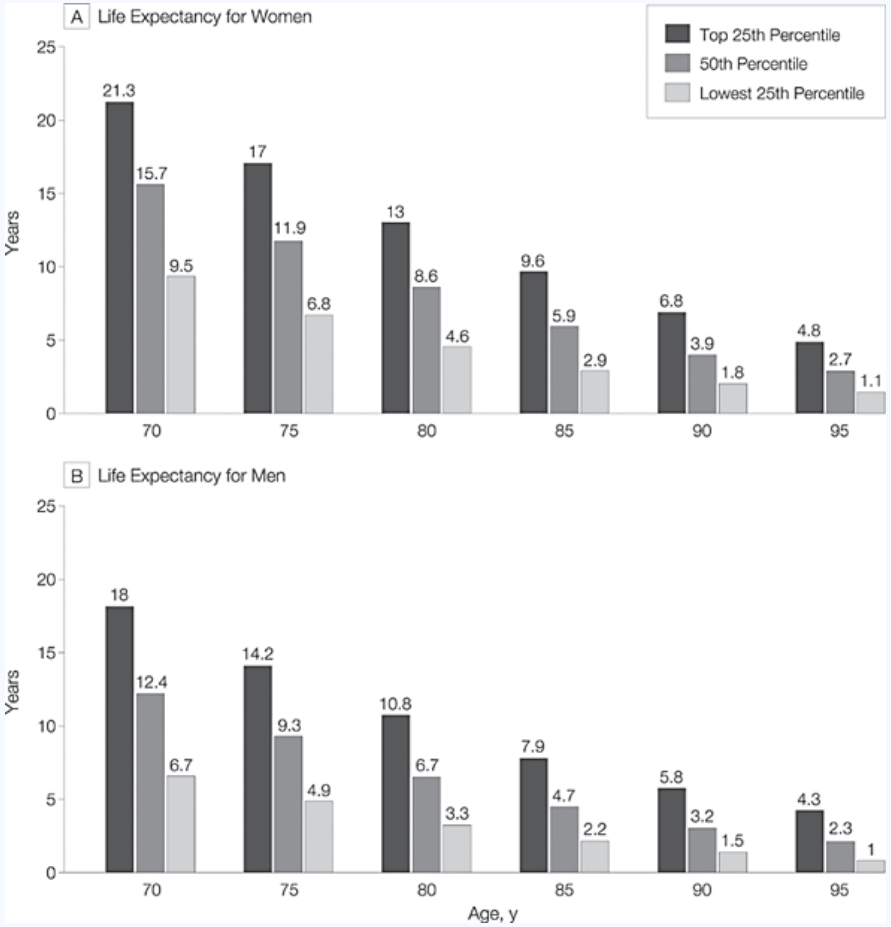
Lipsitz LA. *JAMA*. 1992; Leszczyński. *Folia Morphol*. 2014

Accumulation of diseases

We use chronologic age as a surrogate for whole organism senescence

(senescence: process of deterioration with age)

But, age is a poor measure of *individual* risk



Are there geriatric constructs that may better assess “organism senescence” than age?

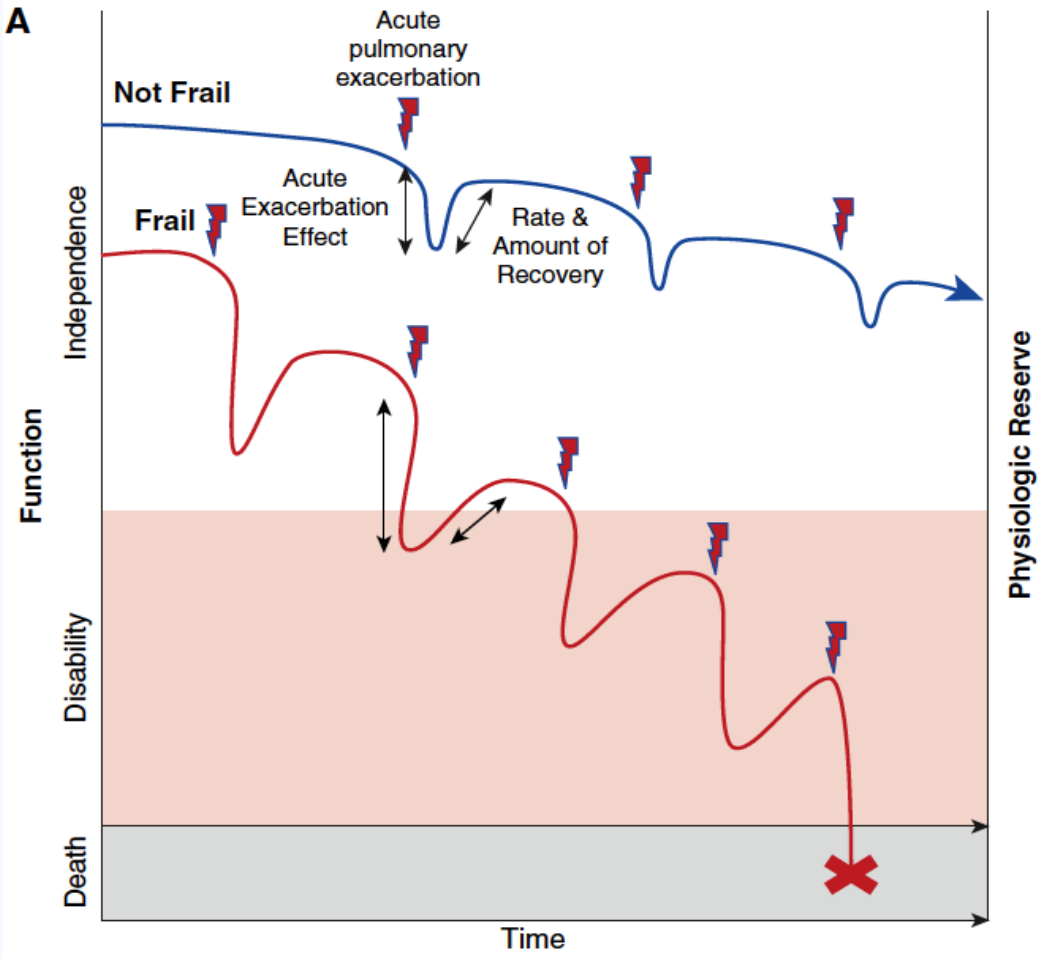
Frailty

We use this concept already

- “They just don’t look like they’ll do well”
- “Too frail”
- “Body isn’t put together”
- “I know it when I see it”

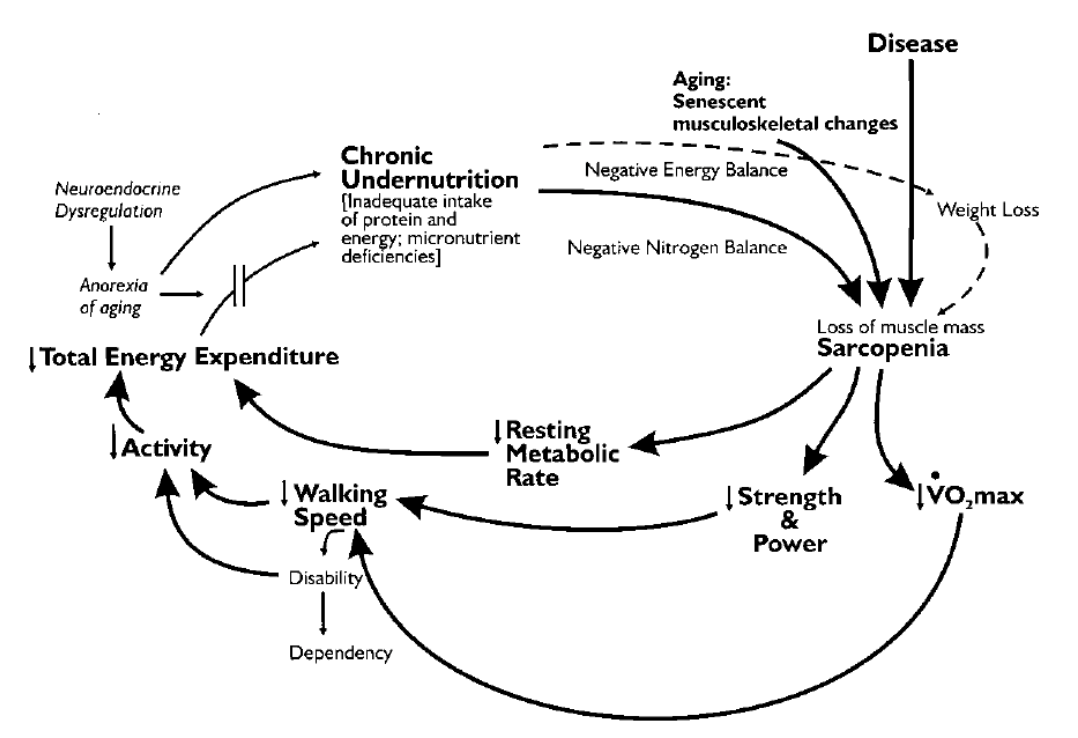
Frailty: A formal construct

"A distinct biologic syndrome of decreasing physiologic reserve and increasing vulnerability to health stressors"



Singer JP. *AnnalsATS.* 2016

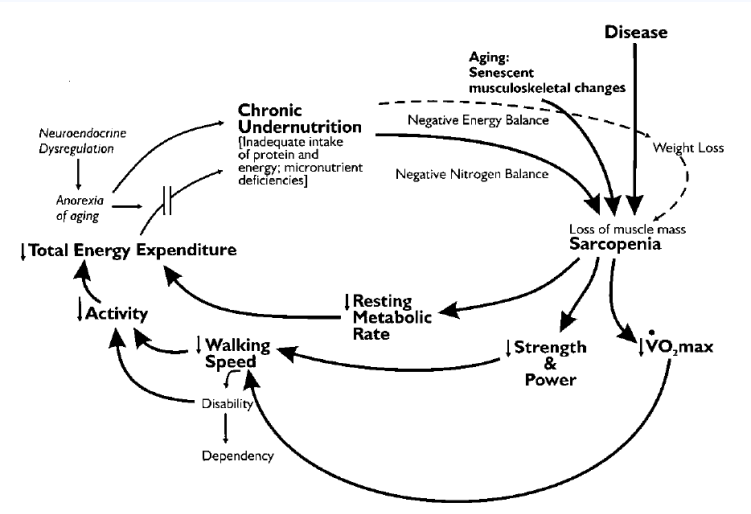
Concepts underpinning frailty



Fried. J Gerontol A Biol Sci Med Sci. 2001

To build physical frailty measures: map concepts to constructs to operational measures

Concepts



Constructs	**Operational measures**
Mobility	Gait speed
Physical Activity	Activity monitors, survey
Energy	Exhaustion/fatigue questions
Strength	Chair stands, grip strength, get up and go
Nutritional status	BMI, albumin, body weight
Cognition	Memory problems, diagnosed dementia
Mood	Depression, anxiety
Social support	Social resources, “emptiness”

To build cumulative deficit models: enumerate medical problems, laboratory and clinical test abnormalities

Domain	Deficit Count (Y/N) (44)
Comorbidities	• Hypertension, stroke, diabetes • Arthritis • Parkinson's • Problems with: lungs, breathing, heart, stomach, kidney, feet, skin, thyroid, teeth
Physical	• Hospitalization • Health, exhaustion, weakness, loss of appetite, weight loss, dizziness • Problems with: speech, hearing, eyesight • Falls, assistance with waking aid, hold onto furniture to prevent falls • Difficulties getting out of bed on own, walking, eating, bathing, dressing, shopping, cleaning, cooking, managing finances, managing medications • Problems with: balance, walking, bowel, bladder
Cognition	• Memory problems
Psychological	• Depression, anxiety

$$\text{Frailty Index} = \frac{\text{\# of deficits in an individual}}{\text{Total \# of deficits measured}}$$

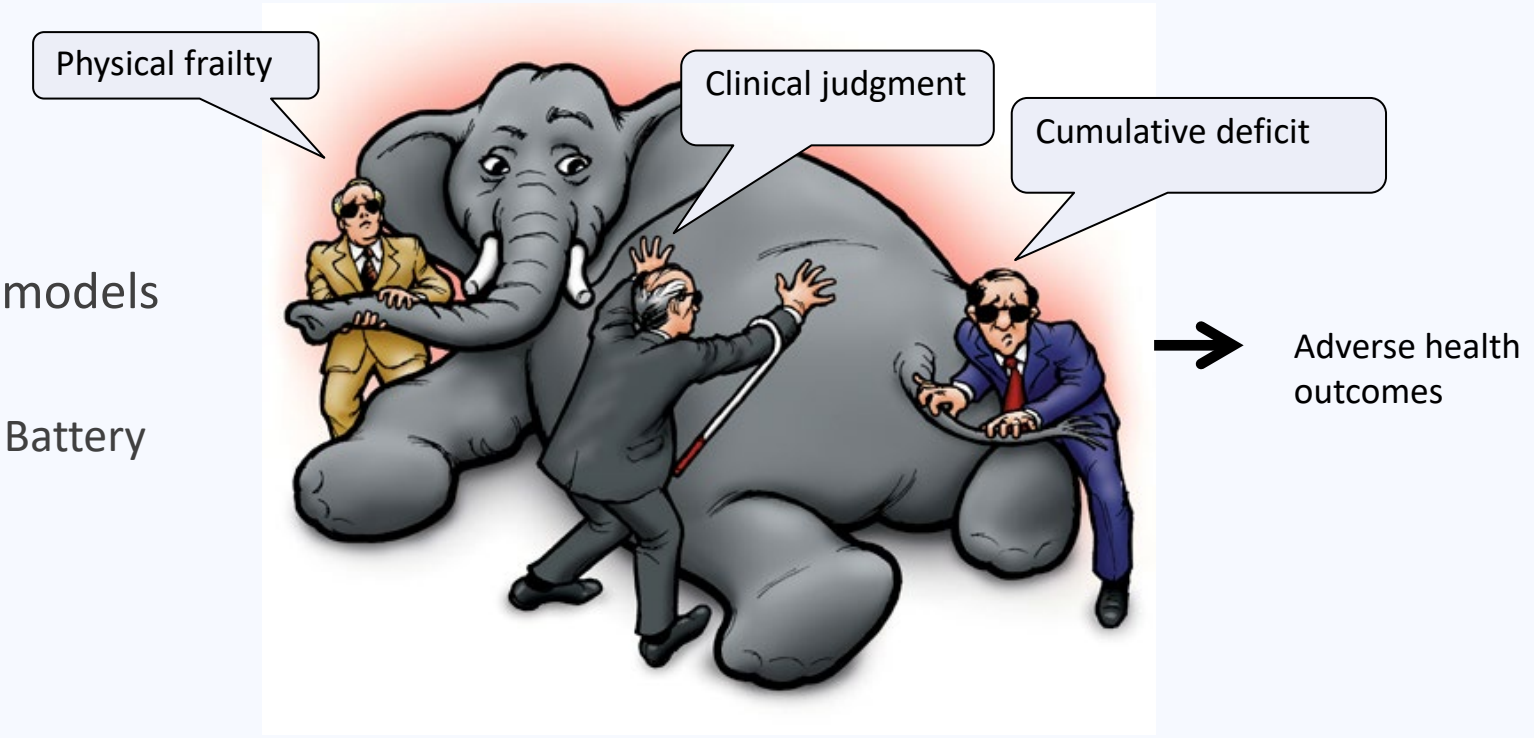
Frailty Index	
Not frail	<0.25
Frail	≥0.25

Rockwood et al., Clin Geriatr Med 2011;27:17; Rockwood et al., Age and Ageing 2015;44:327

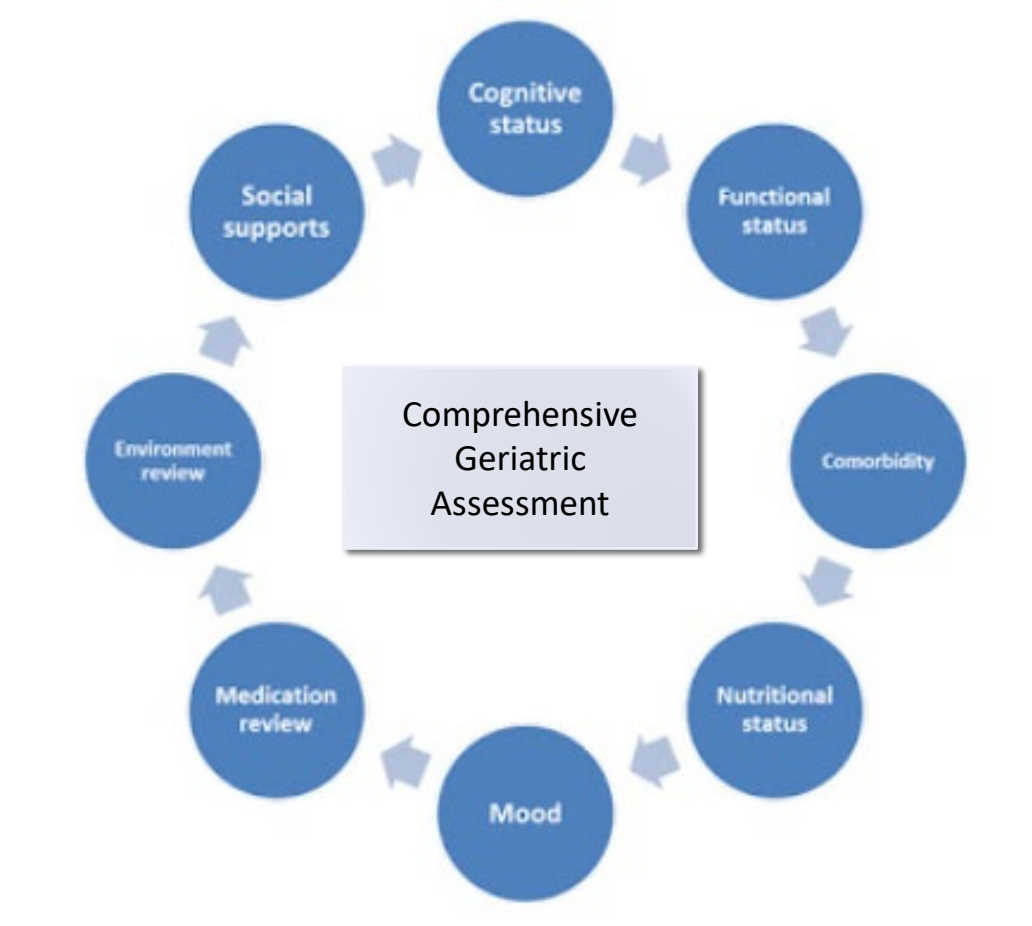
Operationalizing Frailty

**dozens of measures*

- Clinical judgment
  - The eyeball test
  - Clinical frailty scale
- Physical frailty (phenotype) models
  - Fried Frailty Phenotype
  - Short Physical Performance Battery
  - …and *many* others
- Cumulative deficits
  - Frailty Index



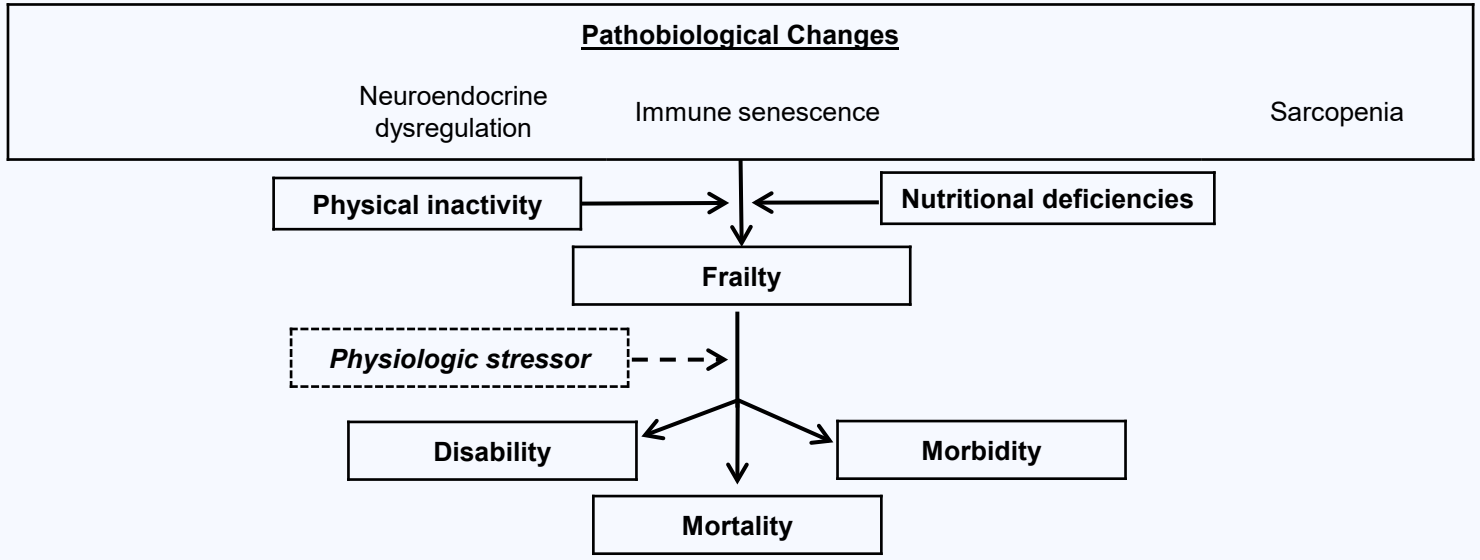
Gold Standard



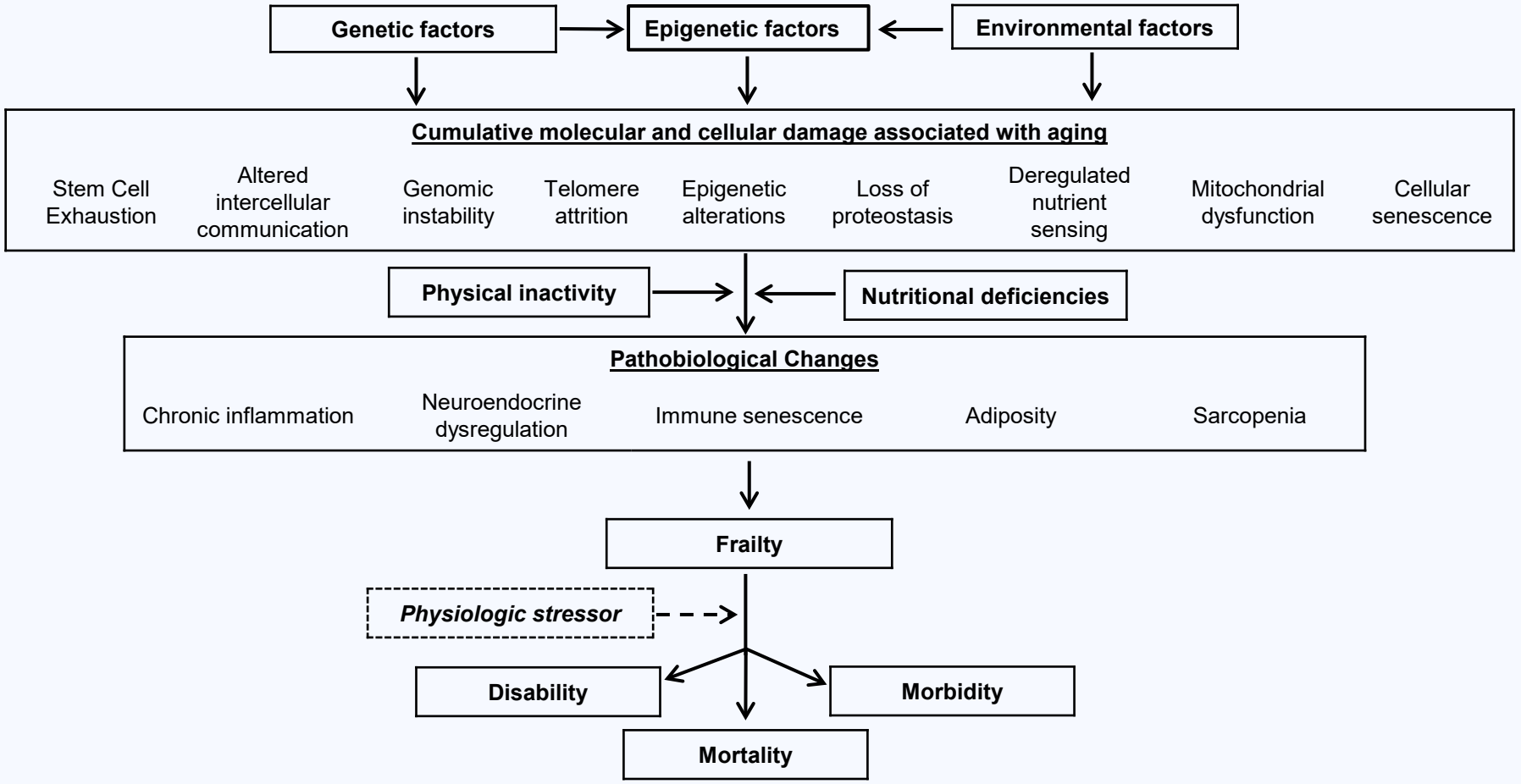
Time to complete: ~30 min

A definition of physical frailty
(in the 1990s and early 2000s)

Distinct underlying pathophysiology



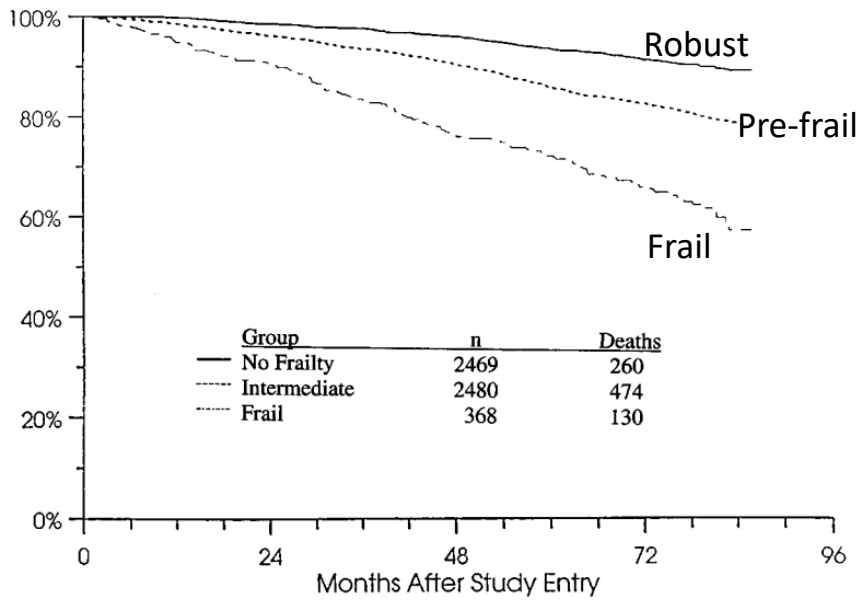
Advances in geroscience→ deeper understanding of putative pathways



From Singer, *AnnalsATS* 2016, Adapted from Waltson *J, et al. Am Geriatr Soc.* 2006. Clegg A,, *et. al. Lancet.* 2013, Lopez-Otin C, *et al. Cell.* 2013

Outline

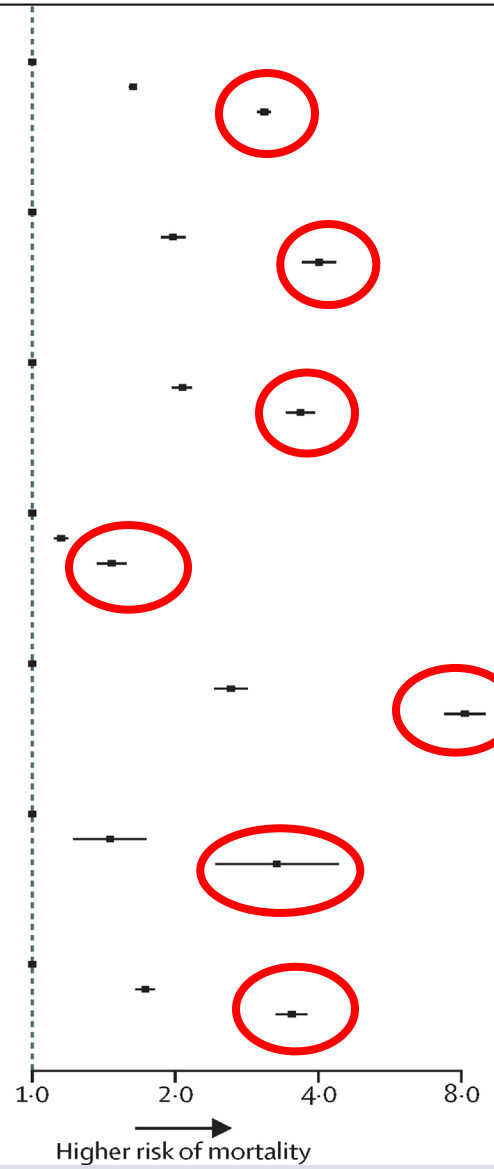
1. Define frailty
2. **The impact of frailty on those with lung disease and the critically ill**
3. What to do about frailty once identified



Fried L, *et al*. J Gerotol A Biol Sci Med Sci 2001.

N=512,723

	Deaths	Mortality (deaths per 1000 person-years)	HR (95% CI)
All causes			
Robust	15166	4·7	1 (ref)
Prefrail	28710	13·2	1·63 (1·60–1·66)
Frail	5495	36·7	3·08 (2·98–3·18)
Per 0·1 incremement			1·68 (1·66–1·71)
Ischaemic heart diseases			
Robust	1760	0·5	1 (ref)
Prefrail	4677	2·1	1·98 (1·87–2·10)
Frail	1051	7·0	4·02 (3·70–4·36)
Per 0·1 incremement			1·89 (1·83–1·94)
Cerebrovascular diseases			
Robust	2647	0·8	1 (ref)
Prefrail	6961	3·2	2·07 (1·97–2·17)
Frail	1325	8·9	3·67 (3·42–3·93)
Per 0·1 incremement			1·84 (1·79–1·89)
Cancer			
Robust	6456	2·0	1 (ref)
Prefrail	8269	3·8	1·15 (1·11–1·19)
Frail	1025	6·9	1·47 (1·37–1·58)
Per 0·1 incremement			1·19 (1·16–1·22)
Respiratory diseases			
Robust	828	0·3	1 (ref)
Prefrail	2845	1·3	2·62 (2·42–2·84)
Frail	979	6·5	8·14 (7·38–8·99)
Per 0·1 incremement			2·54 (2·45–2·63)
Infections			
Robust	247	0·1	1 (ref)
Prefrail	322	0·1	1·46 (1·22–1·74)
Frail	60	0·4	3·27 (2·43–4·42)
Per 0·1 incremement			1·78 (1·59–2·00)
All other causes			
Robust	3228	1·0	1 (ref)
Prefrail	5636	2·6	1·73 (1·65–1·81)
Frail	1055	7·1	3·52 (3·26–3·79)
Per 0·1 incremement			1·78 (1·73–1·83)



Fan J, et al. Lancet Public Health 2020.

EUROPEAN RESPIRATORY *journal*
FLAGSHIP SCIENTIFIC JOURNAL OF ERS

European Respiratory Society statement on frailty in adults with chronic lung disease

Christian R. Osadnik, Lisa J. Brighton, Chris Burtin, Matteo Cesari, Lies Lahousse, Will D.C. Man, Alessandra Marengoni, Andreja Sajnic, Jonathan P. Singer, Lies ter Beek, Ioanna Tsiligianni, Janos T. Varga, Stefano Pavanello, Matthew Maddocks

Prevalence:

- **COPD**: Ranges from 9–64%, depending on disease severity and assessment method. Higher prevalence with severe airflow limitation and frequent exacerbations.
- **ILD**: Ranges from 12–55%. Associated with dyspnea severity, reduced muscle mass, and higher hospitalization rates.
- **Lung Transplant**: Up to 58% of candidates and is linked to higher waitlist mortality and post-transplant complications.

Patient perspectives:

- Need for greater awareness of concurrent lung disease and frailty. Patients felt overlooked and judged
- Increased attention for social support, social networks, “safety nets” to provide services in home or remote from hospital

Osadnik CR, et al. *Eur Resp Journal* 2023.

EUROPEAN RESPIRATORY *journal*

FLAGSHIP SCIENTIFIC JOURNAL OF ERS

European Respiratory Society statement on frailty in adults with chronic lung disease

COPD

- Frailty increases risk of acute exacerbations, mechanical ventilation, longer hospital stays, and readmission
- Associated with sarcopenia, fatigue, falls, and reduced physical activity.
- Higher levels of anxiety, depression, social isolation, and reduced illness acceptance.
- Frail COPD patients have up to four times higher mortality risk, even accounting for disease severity and comorbidities.
- COPD may cause worse frailty and frailty may worsen COPD (shared mechanism?)

ILD

- Two-fold increase in hospital admissions and prolonged hospital stay.
- Worse HRQL, symptom burden

Lung Transplant

- Waitlist and post-transplant mortality
- Worse functioning, disability, HRQL
- Frailty after transplant → worse functioning, HRQL, CLAD, and death

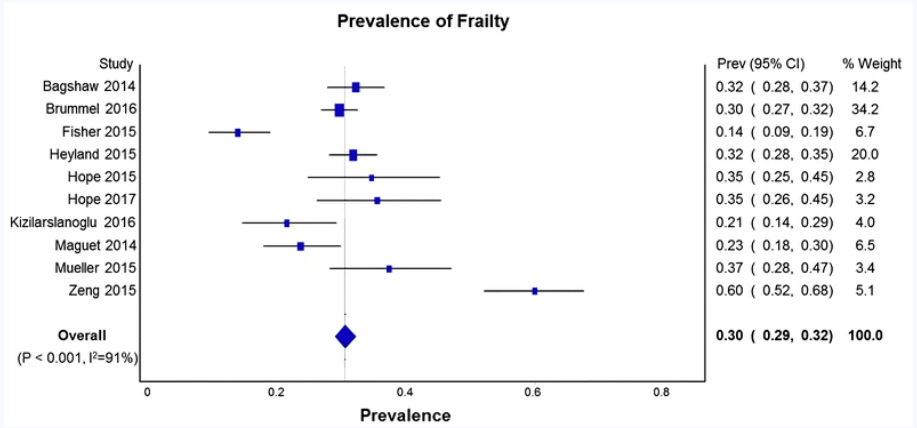
Pulmonary hypertension

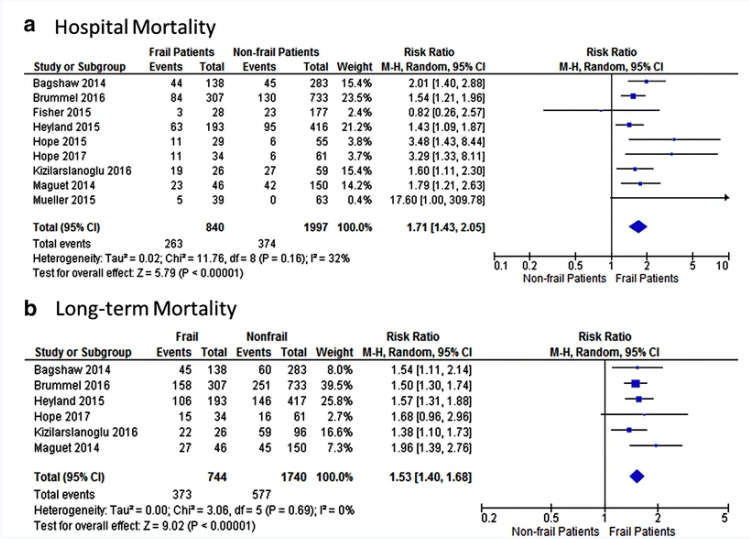
- Worse dyspnea, HRQL, functional status
- Increased risk of hospitalization

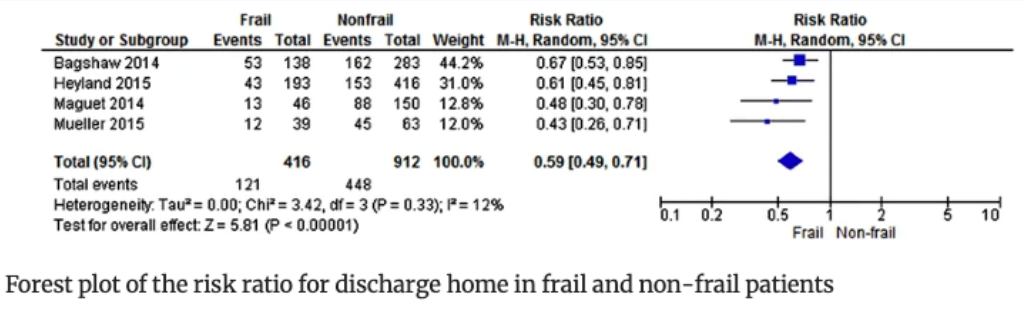
Osadnik CR, et al. *Eur Resp Journal* 2023. Sridhar M, et al. *Annals ATS.* 2025

Frailty in the ICU

Meta analysis of 10 studies, >3000 adults







Forest plot of the risk ratio for discharge home in frail and non-frail patients

Increased risk of delirium, worse HRQL and functional status

Muscadere, J, et al. *Intensive Care Med.* 2017

Outline

1. Define frailty
2. The impact of frailty on those with lung disease and the critically ill
3. **What to do about frailty once identified**

Frailty is treatable

Contents lists available at ScienceDirect

Experimental Gerontology

journal homepage: www.elsevier.com/locate/expgero

Review article

Effects of multicomponent exercise on frailty status and physical function in frail older adults: A meta-analysis and systematic review

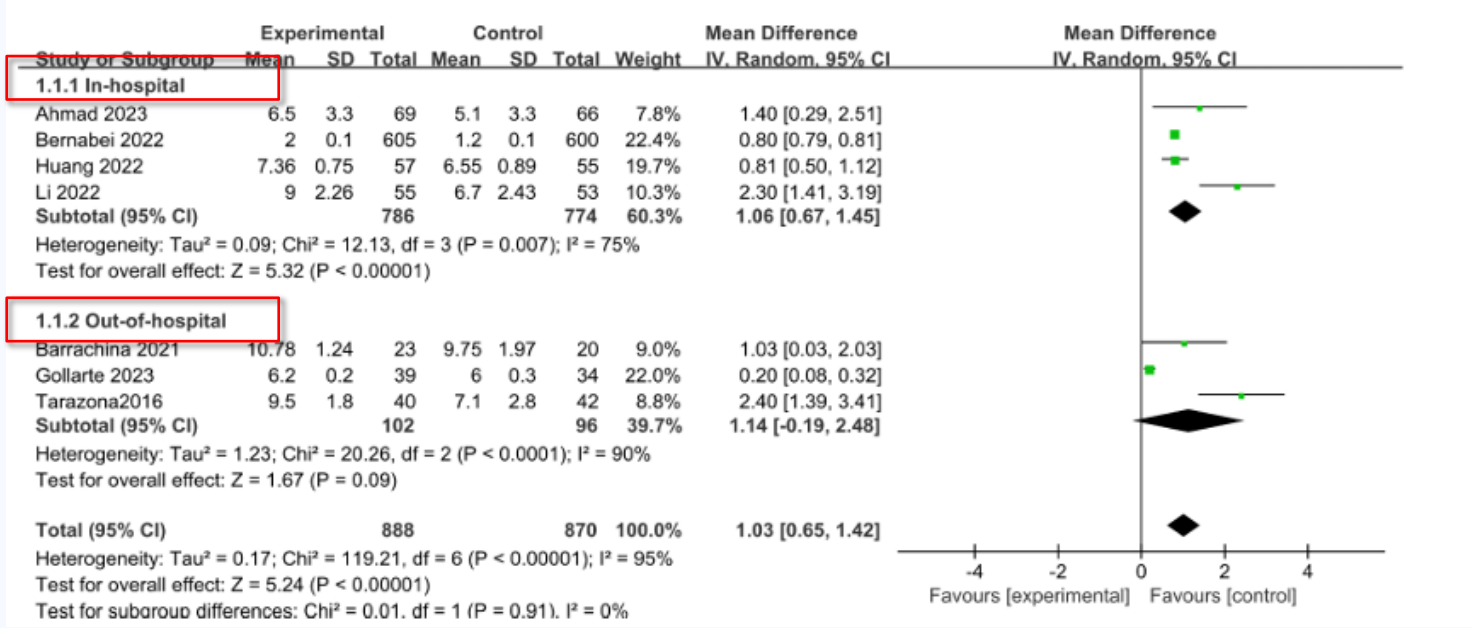
Xinyu Yang [a,1], Shasha Li [a,*,1], Lingfen Xu [b], Haibing Liu [c], Yue Li [a], Xiaofang Song [a], Jianyi Bao [a], Shufang Liao [a], Yingxue Xi [a], Guojing Guo [a]

[a] Department of Nursing, College of Medical Science, Huzhou University, 759 Second Ring Road, Huzhou District, Zhejiang 313000, China
[b] Department of Nursing, Huzhou Central Hospital, 1558 Sanhuan North Road, Wuxing District, Huzhou, Zhejiang 313000, China
[c] Rehabilitation medicine department, The First People's Hospital of Huzhou, No.158, Back Square Road, Wuxing District, Huzhou, Zhejiang 313000, China

- 28 RCTs of 4857 adults age ≥ 60 across the world
- Physical Frailty (FFP, SPPB, other performance-based measures)
- At least 3 exercises, both aerobic and strength, 1-7x/wk (most 2-3x) for avg of 12 wks
- Outcomes: frailty, gait speed, strength, timed get up and go

Frailty is treatable, esp in hospitalized patients

Results: Twenty-eight randomized controlled trials with 4857 older adults were included. Multicomponent exercise significantly improved frailty status (SMD = −1.40, 95 % CI:−2.05 to −0.75, P < .05) and had a significant impact on physical function (muscle strength: SMD = 0.31, 95 % CI: 0.01–0.61, P < .05; gait speed: SMD = 0.27, 95 % CI: 0.02–0.52, P < .001; balance: SMD = 0.27, 95 % CI: 0.05–0.49, P = .02; Short Physical Performance Battery [SPPB]: SMD = 1.03, 95 % CI: 0.65–1.42, P < .001; and Timed Up and Go [TUG]: SMD = −3.05, 95 % CI: −3.90 to −2.19, P < .001). Subgroup analysis suggested that a 12-week duration is optimal for multicomponent exercise interventions, demonstrating significantly greater effectiveness in hospital compared with out-of-



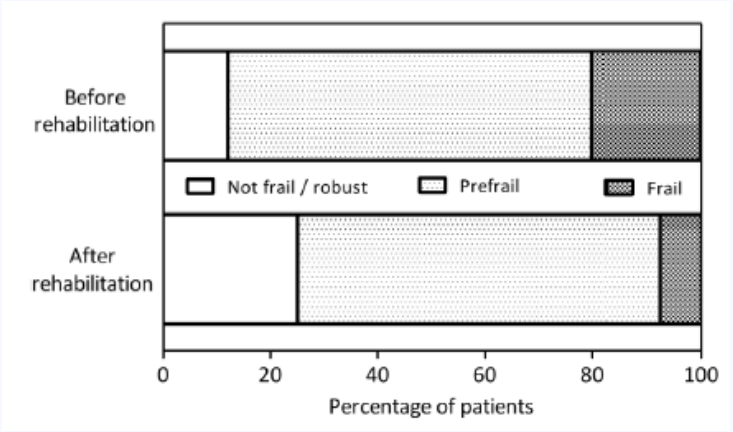
So, just prescribe pulmonary rehabilitation for all?

AMERICAN THORACIC SOCIETY DOCUMENTS

Rehabilitation for People with Respiratory Disease and Frailty
An Official American Thoracic Society Workshop Report

Matthew Maddocks, Lisa J. Brighton, Jennifer A. Alison, Lies ter Beek, Surya P. Bhatt, Nathan E. Brummel, Chris Burtin, Matteo Cesari, Rachael A. Evans, Lauren E. Ferrante, Oscar Flores-Flores, Frits M. E. Franssen, Chris Garvey, Samantha L. Harrison, Anand S. Iyer, Lies Lahouse, Suzanne Lareau, Annemarie L. Lee, William D.-C. Man, Alessandra Marengoni, Hamish J. C. McAuley, Dmitry Rozenberg, Jonathan P. Singer, Martijn A. Spruit, and Christian R. Osadnik; on behalf of the American Thoracic Society Assembly on Pulmonary Rehabilitation

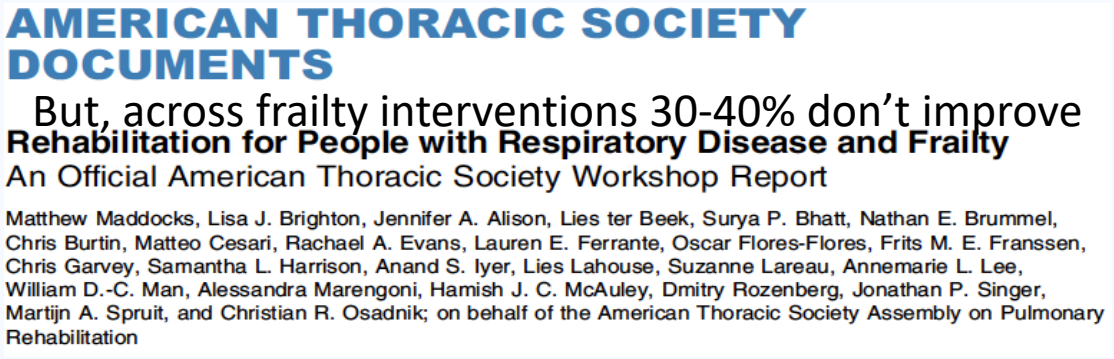
- Improves physical frailty markers (e.g., gait speed, sit-to-stand performance).
- Reduces symptom burden (dyspnea, fatigue), improves quality of life, and decreases hospitalizations.
- Larger benefits seen in frail patients compared to non-frail participants.



Maddocks M, et al. *AnnalsATS.* 2023

Maddocks M, et al. *Thorax. 2016*

But, across frailty interventions 30-40% don’t improve


AMERICAN THORACIC SOCIETY
DOCUMENTS

But, across frailty interventions 30-40% don’t improve

Rehabilitation for People with Respiratory Disease and Frailty

An Official American Thoracic Society Workshop Report

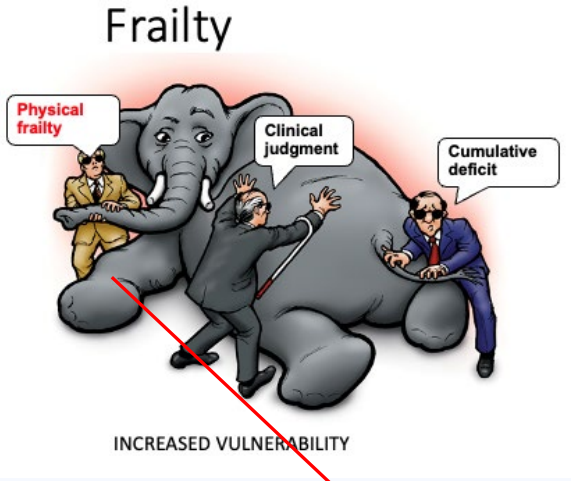
Matthew Maddocks, Lisa J. Brighton, Jennifer A. Alison, Lies ter Beek, Surya P. Bhatt, Nathan E. Brummel, Chris Burtin, Matteo Cesari, Rachael A. Evans, Lauren E. Ferrante, Oscar Flores-Flores, Frits M. E. Franssen, Chris Garvey, Samantha L. Harrison, Anand S. Iyer, Lies Lahouse, Suzanne Lareau, Annemarie L. Lee, William D.-C. Man, Alessandra Marengoni, Hamish J. C. McAuley, Dmitry Rozenberg, Jonathan P. Singer, Martijn A. Spruit, and Christian R. Osadnik; on behalf of the American Thoracic Society Assembly on Pulmonary Rehabilitation

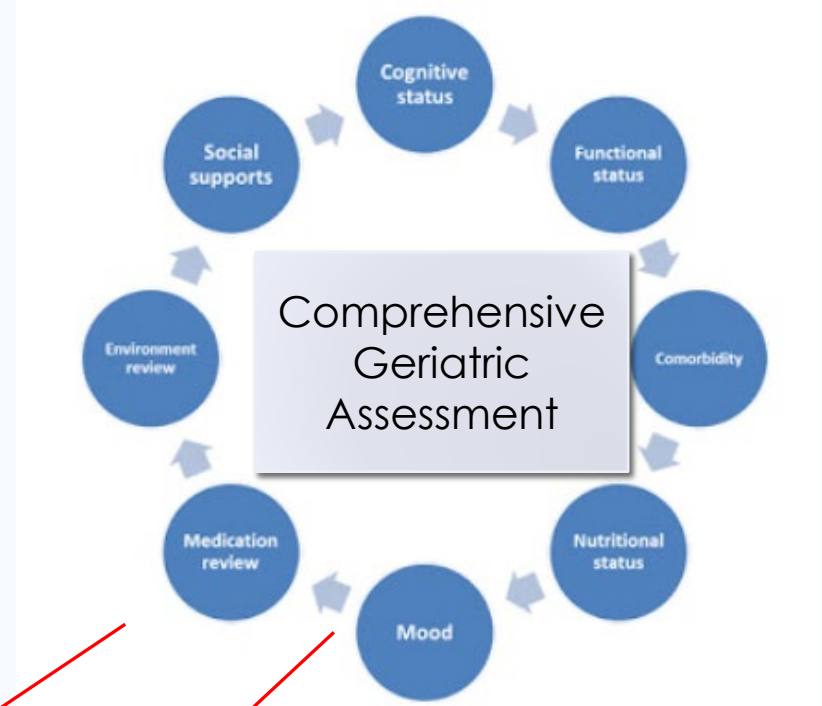
The “frailty rehabilitation” paradox

People with lung disease + frailty:

- ↓ likely to initiate PR if referred
- ↑ likely to not complete PR if initiated
- Hold ↑ negative self-perception
- Hold ↑ negative perception of exercise-based services

Not all frailty is the same

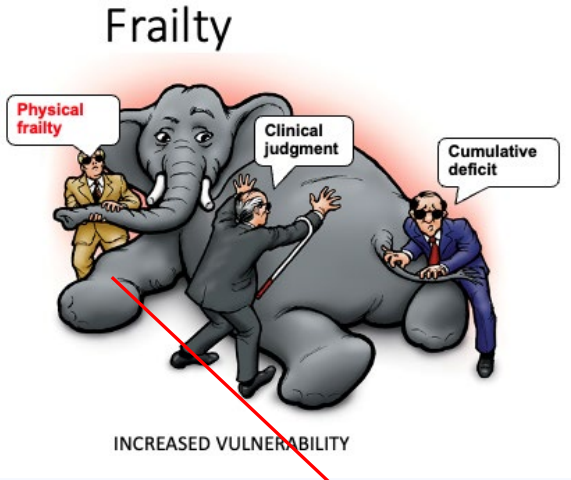


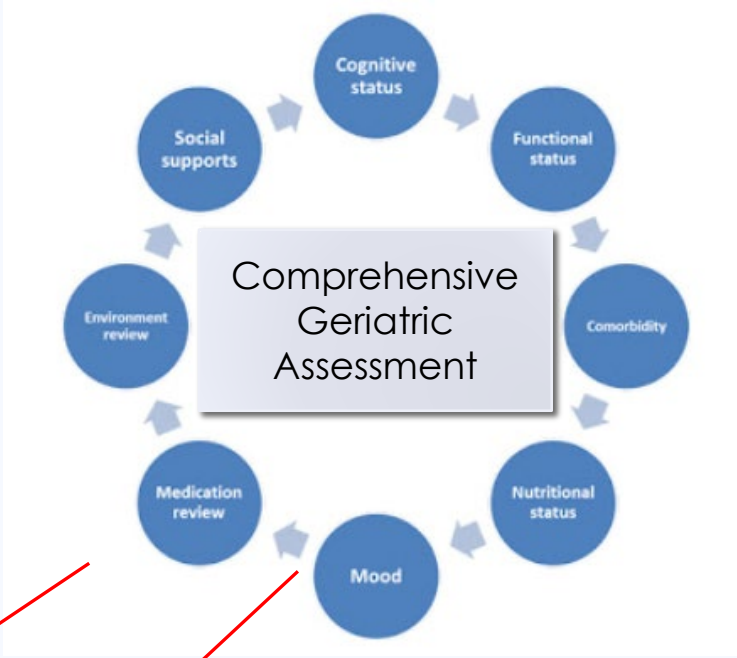


Multidomain Frailty

Physical Domain	Psychological Domain	Social Domain
· Sarcopenia · Physical dysfunction · Oral dysfunction · Malnutrition	· Cognitive impairment · Dementia · Depression	· Social isolation · Living alone · Lack of social support · Economic deprivation

Failure to address prevalent domains –> less effective intervention





Multidomain Frailty

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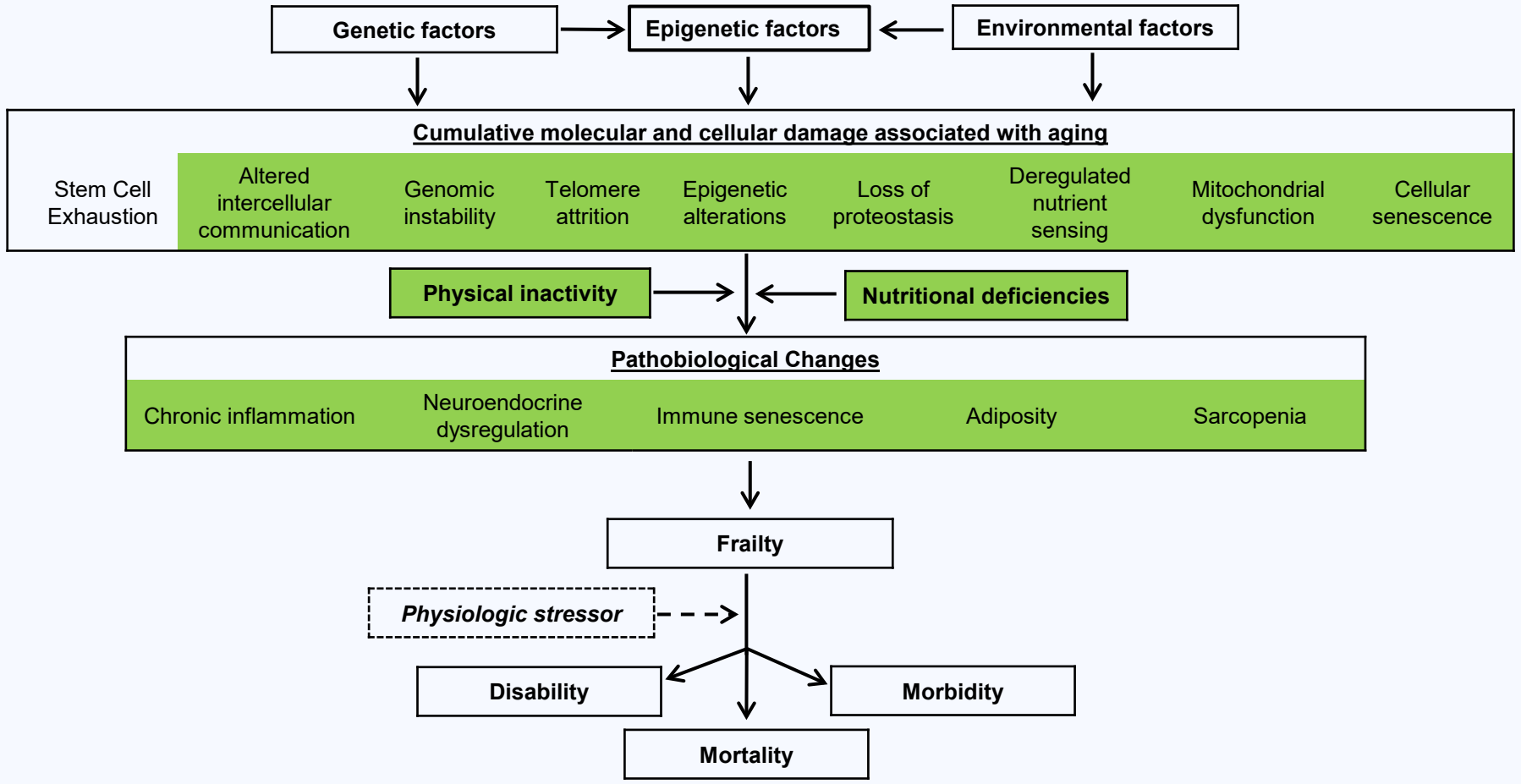
Interventions *should* target frailty mechanisms

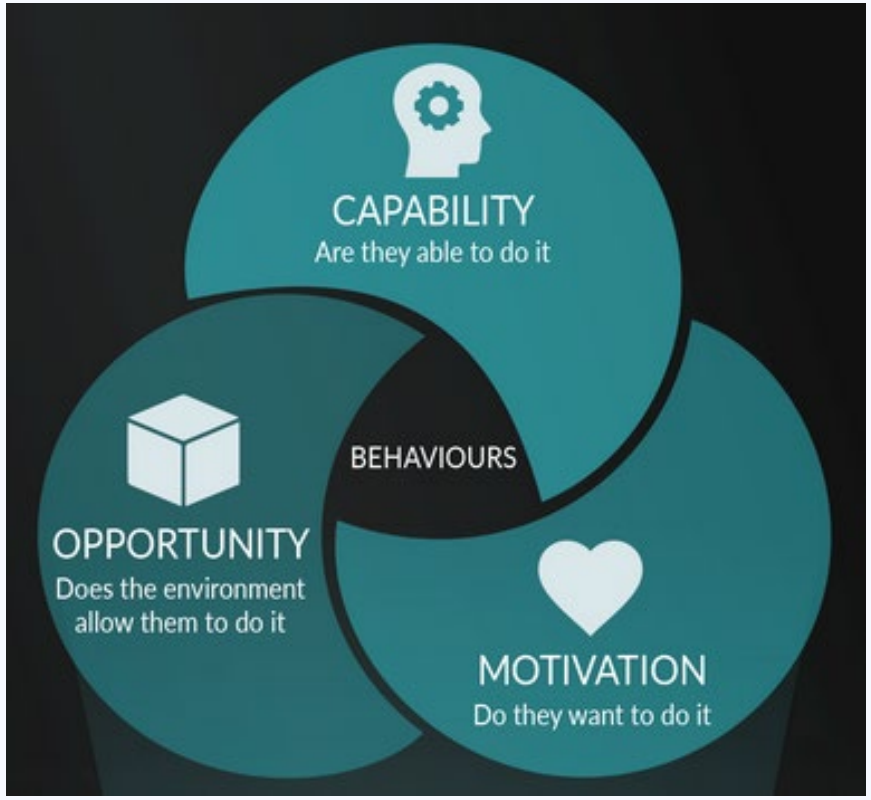
+/-

Many putative pathways respond to exercise +/- nutrition (resistance training is important)



From Singer, *AnnalsATS* 2016, Adapted from Waltson *J, et al. Am Geriatr Soc.* 2006. Clegg A,, *et. al. Lancet.* 2013, Lopez-Otin C, *et al. Cell.* 2013

Why might exercise +/- nutrition not work in all?
Exercise and diet require *behavior change*



Multidomain Frailty

Physical Domain	Psychological Domain	Social Domain
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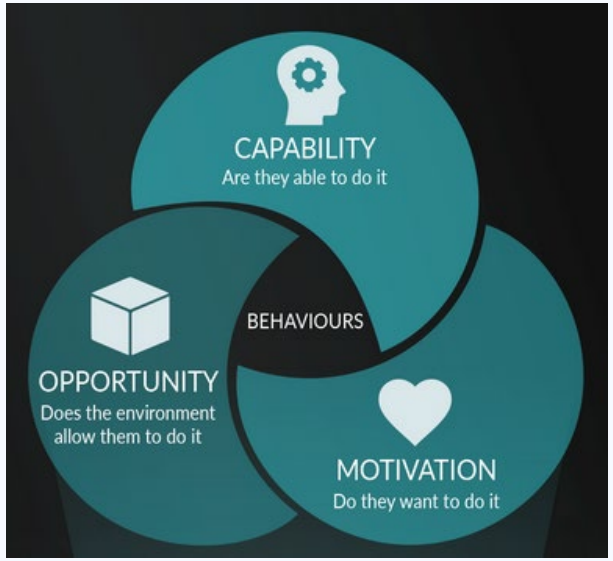
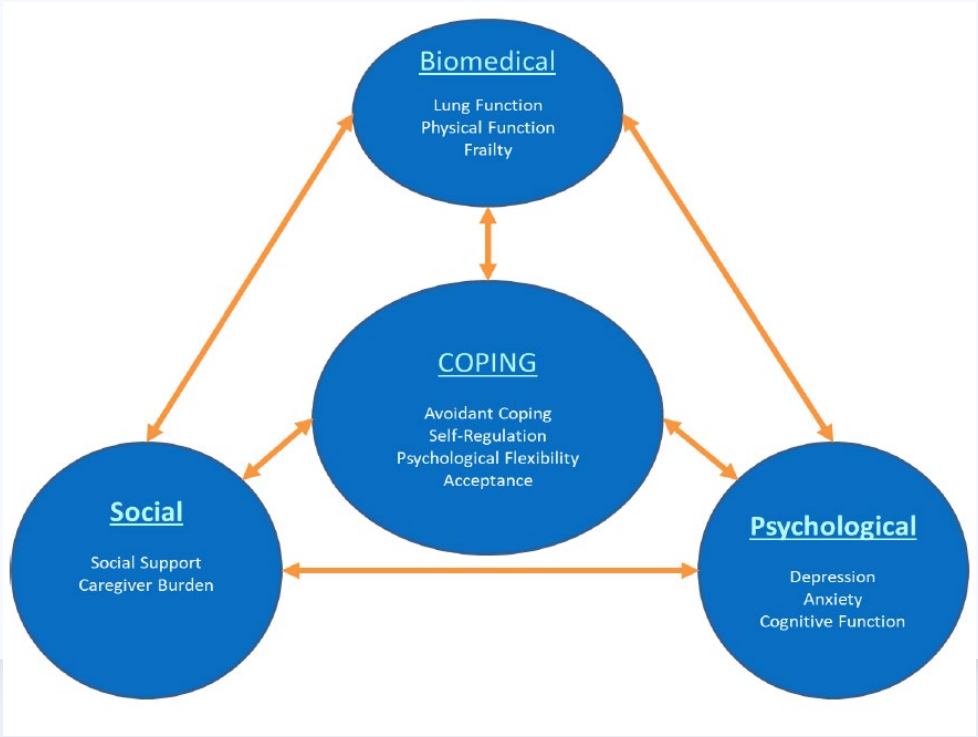
Why might exercise +/- nutrition not work in all? Exercise and diet require *behavior change*

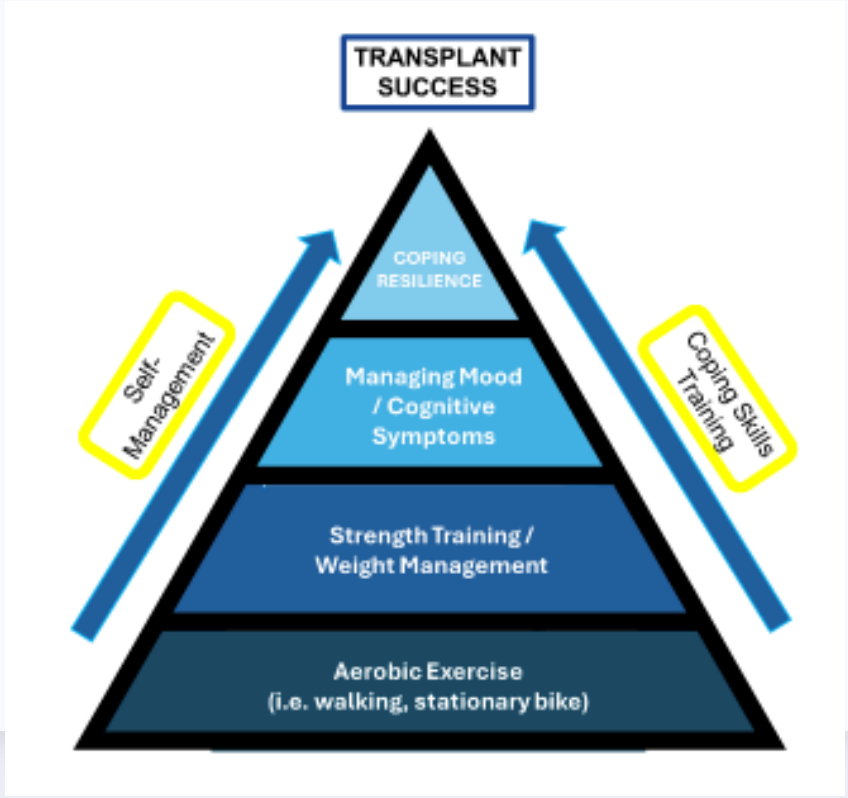
<u>New behaviors are hard +</u>

- Cognitive limitations
- Psychological impairments: depression, anxiety, maladaptive response to aversive symptoms, PTSD
- Not confident about exercising at home
- Not a priority (esp if already not feeling well)
- Not convinced benefits are worth it
- Time commitment
- Other responsibilities



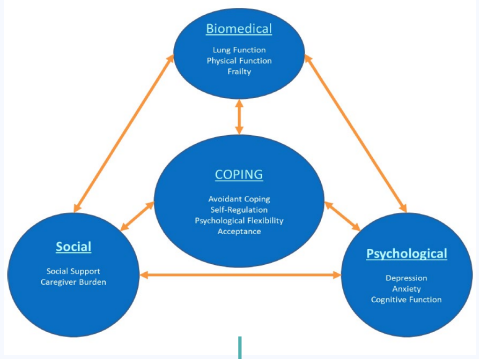
XFIT: an eXercise-based Frailty Intervention in lung Transplantation (targets frailty mechanisms + barriers to behavior change)



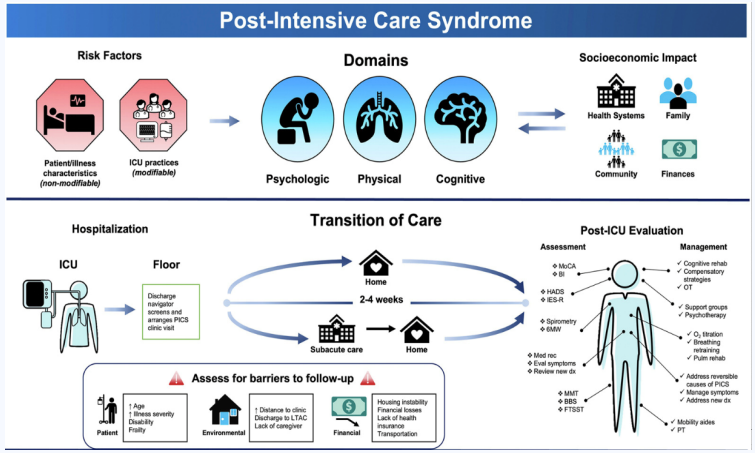


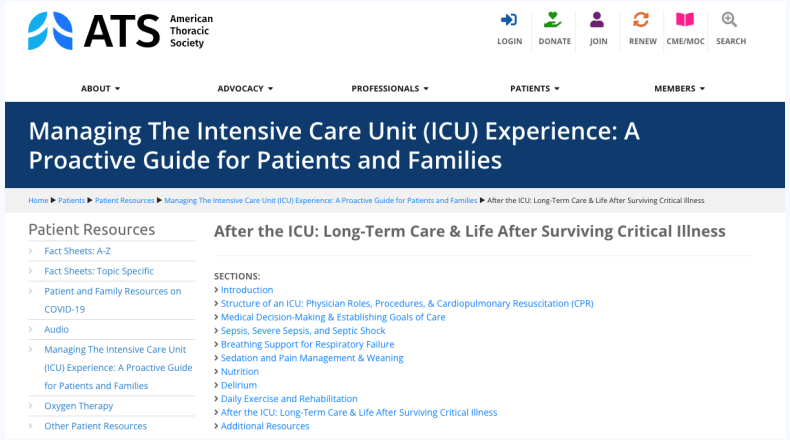
A rose by any other name: frailty interventions in critical care

Critical care <-> Geriatrics



PICS Clinics





What to do about frailty today?

- Consider it as a co-factor
- Treating frailty can improve fixed respiratory limitations
- Refer to pulmonary rehabilitation, noting frailty paradox.
- Exercise: multicomponent, progressive, includes resistance training
  - *Align with patients' and caregivers' motivations and goals*
  - *Acknowledge and address aversive symptoms*
- Nutrition
- Consider and address delirium, depression, psychological trauma
- For ICU recovery, link to outpatient PICS clinic, physical therapy
- For older patients, link with geriatricians with transition to home

Summary