

Rehabilitation in medically complex populations: A US perspective

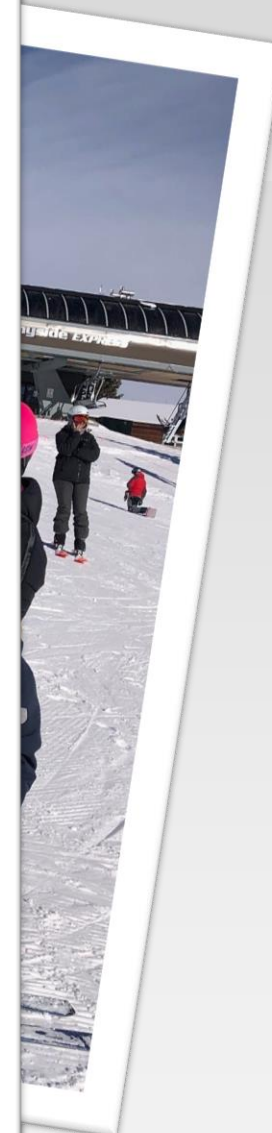


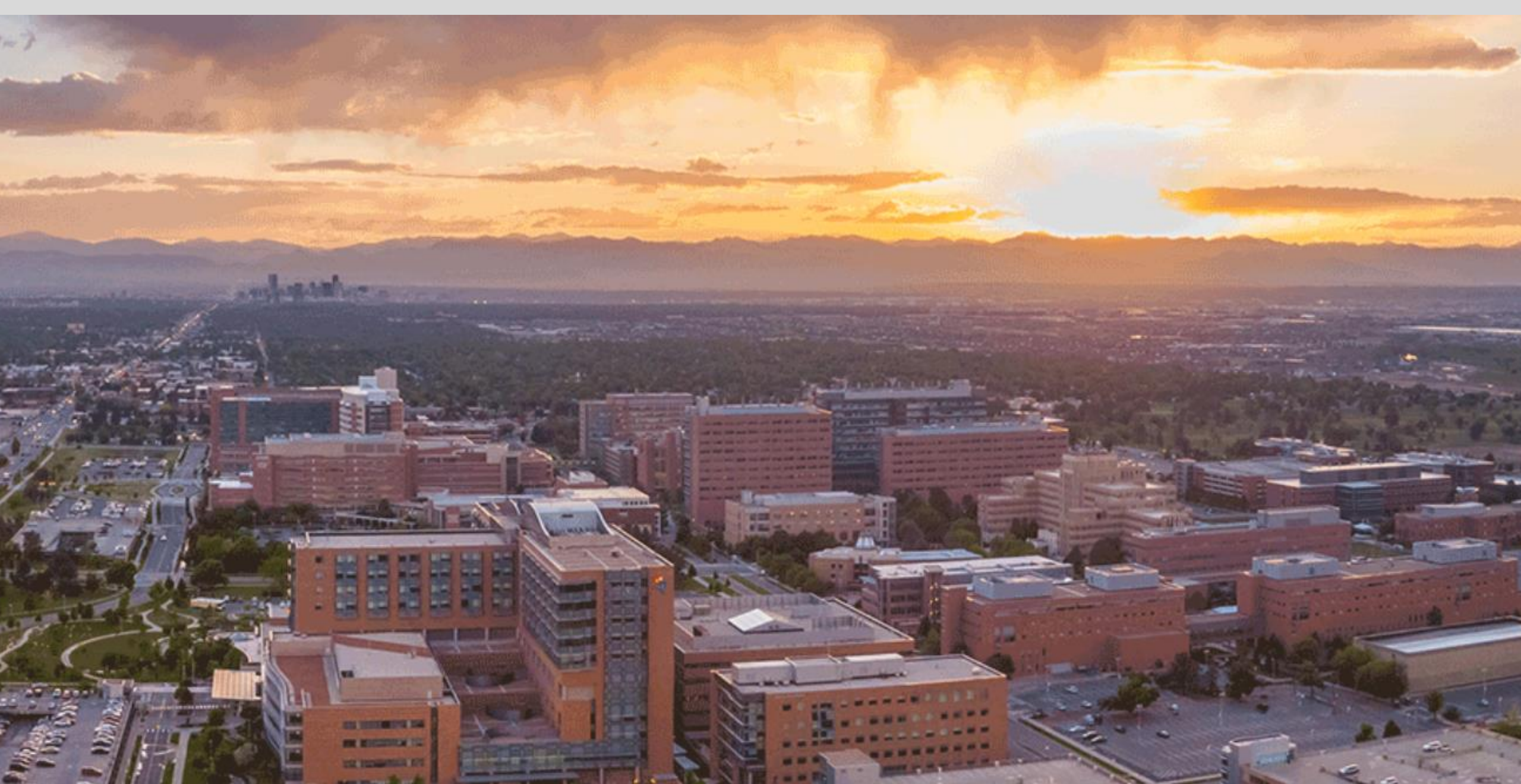
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Associate Director of Research
Geriatric Research, Education and Clinical Center
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RESTORE TEAM AT UNIVERSITY OF COLORADO

Objectives

- Appreciate how **medical deconditioning** in older adults impairs functional mobility and increases rehospitalization risk
- Understand the **barriers to implementation** of best rehabilitation practices; a US perspective
- Appreciate the value of **high-intensity rehabilitation** interventions to improve patient outcomes and optimize value



Impaired Function in Older Adults Following Hospitalization



Patients walk only 7 minutes per day in hospital ¹



68% of discharged are below pre-hospitalization function²



No improvement in outcomes compared to past ³



SNF residents only walk 849 steps a day ⁴

1. Villumsen et al, 2015; 2. Gill TM 2009; 3. Loyd 2020; 4. Stutzbach 2021



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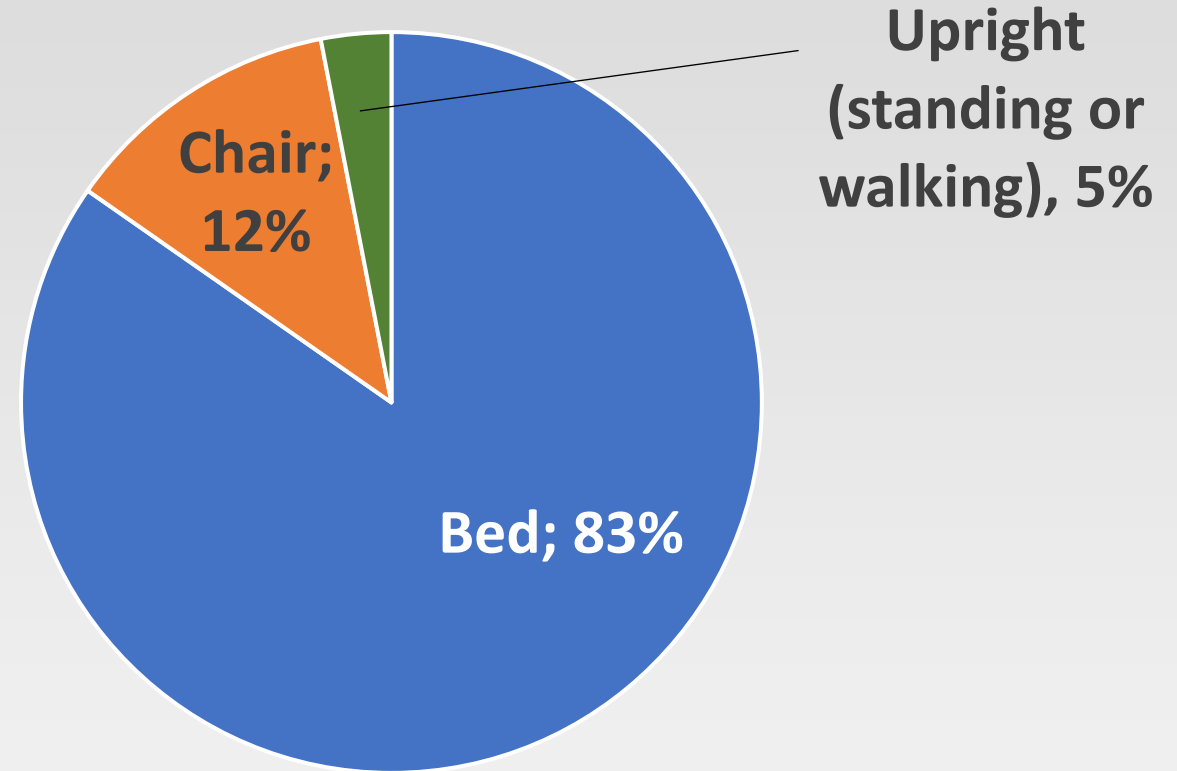


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Physical activity is low in the hospital

Postural State, 24 hr

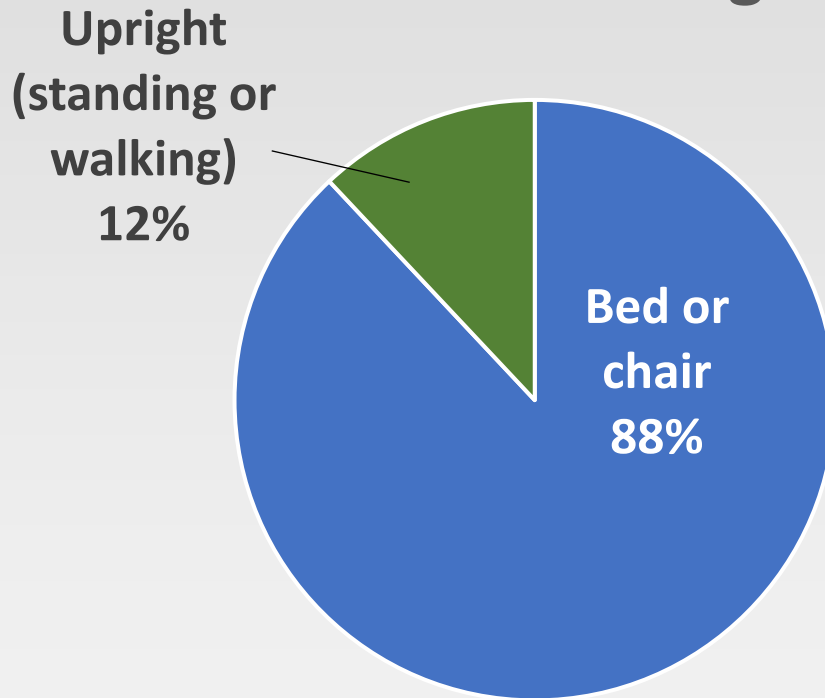


Brown et al., *JAGS*. 2009; 57(9). 1660-1665

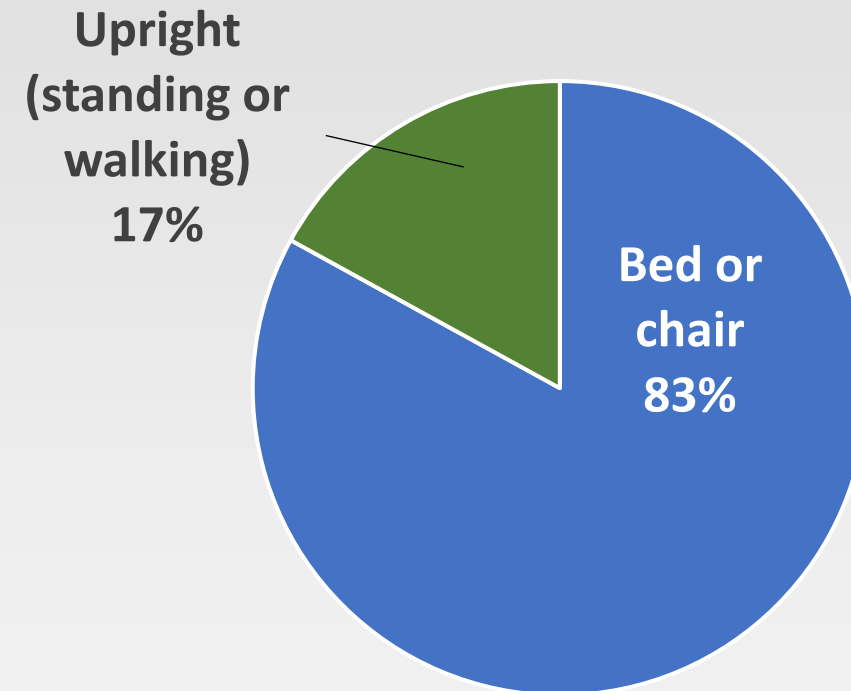


Physical activity continues to be low in the SNF and immediately after discharge

Postural state during waking hours near discharge (SNF)



Postural state during waking hours (home)



Stutzbach et al. *Disability & Rehabilitation* 2021; 1-6.



Archives of Physical Medicine and Rehabilitation

Volume 94, Issue 10, October 2013, Pages 1951–1958



Original article

Functional Status Impairment Is Associated With Unplanned

Arch Phys Med Rehabil. 2018 Jun;99(6):1067-1076. doi: 10.1016/j.apmr.2017.05.001. Epub 2017 Jun 3.

Functional Status Is Associated With 30-Day Potentially Preventable Hospital Readmissions After Inpatient Rehabilitation Among Aged Medicare Fee-for-Service Beneficiaries.

Middleton A¹, Graham JE², Ottenbacher KJ².

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Functional Status Predicts Acute Care Readmissions ... Inpatient Rehabilitation in the Stroke Population

Original Research
Journal of General Internal Medicine
November 2015, Volume 30, Issue 11, pp 1688-1695
First online: 09 May 2015

Functional Status Outperforms Comorbidities in Predicting Acute Care Readmissions in Medically Complex Patients



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Physical Function's relationship with **Rehospitalization**

Highest functional
independence group



15%
rehospitalization

Middle functional
independence group



20%
rehospitalization

Lowest functional
independence group

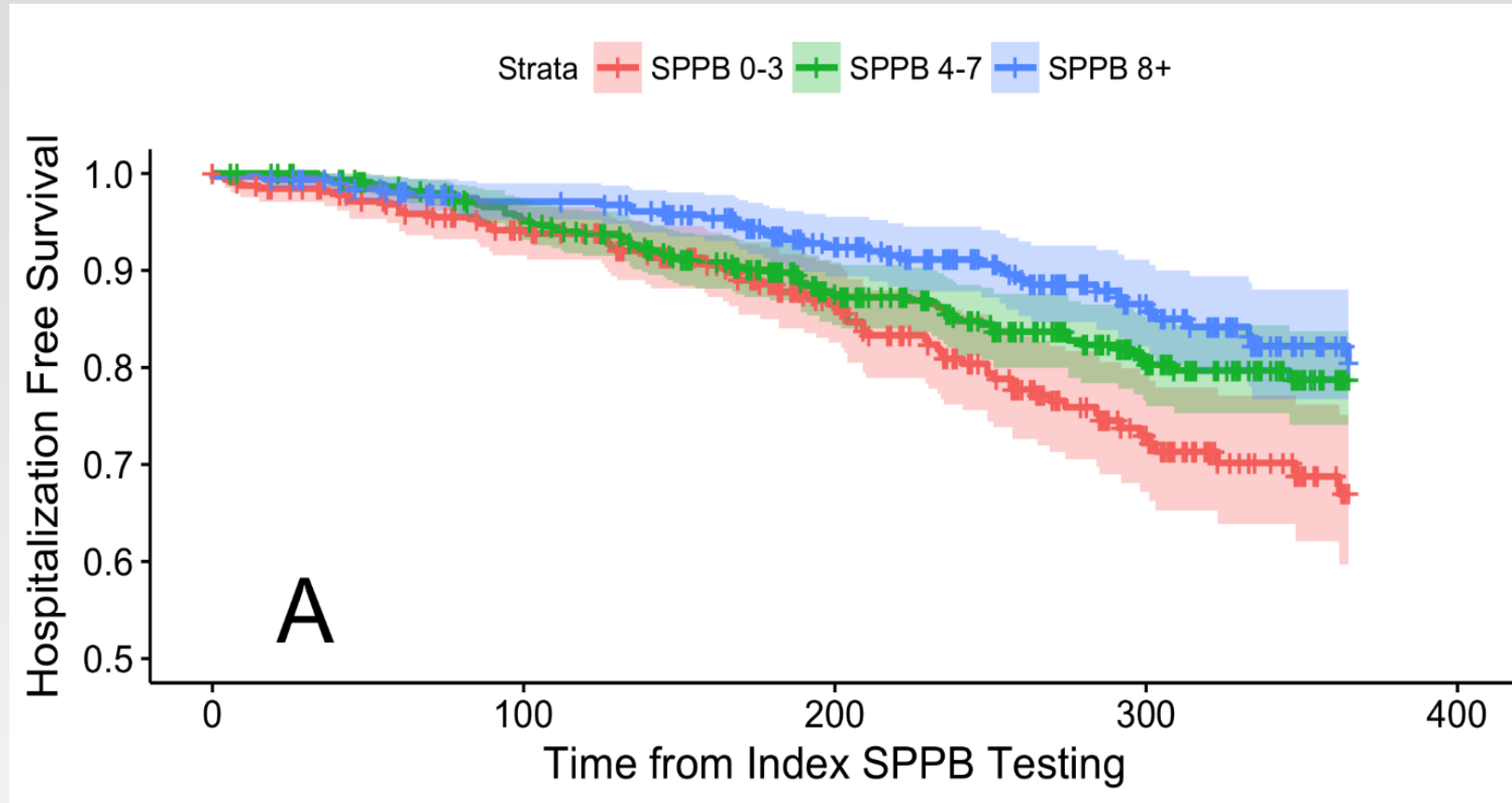


30%
rehospitalization

Functional performance measured with the **Functional Independence Measure (FIM)** by Hoyer et al. Arch. Phys Med & Rehabil. 2013;94;1951-8



Hospitalization Risk Across Different Levels of Function



Falvey JR, Burke RE, Levy CR, Gustavson AM, et. al. Phys Ther. 2019 Jan 1;99(1):28-36

Physical function and low physical activity

SNF

- 88% of day in bed or sitting
- 849 steps a day



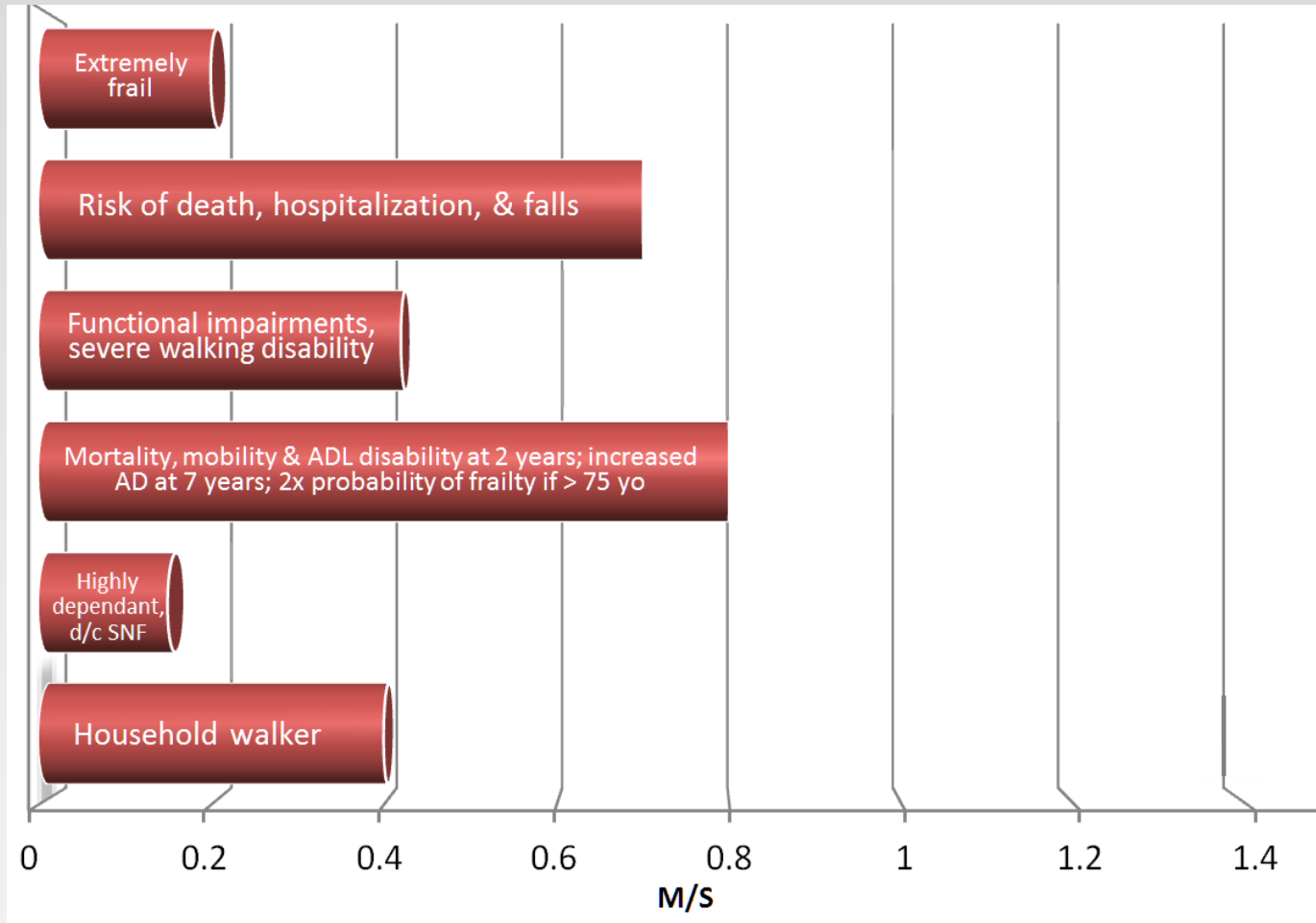
Stutzbach et al. *Disability & Rehabilitation* 2021; 1-6.

Home

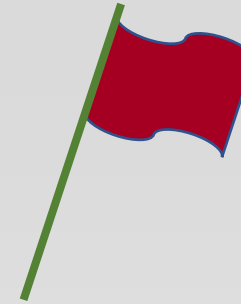
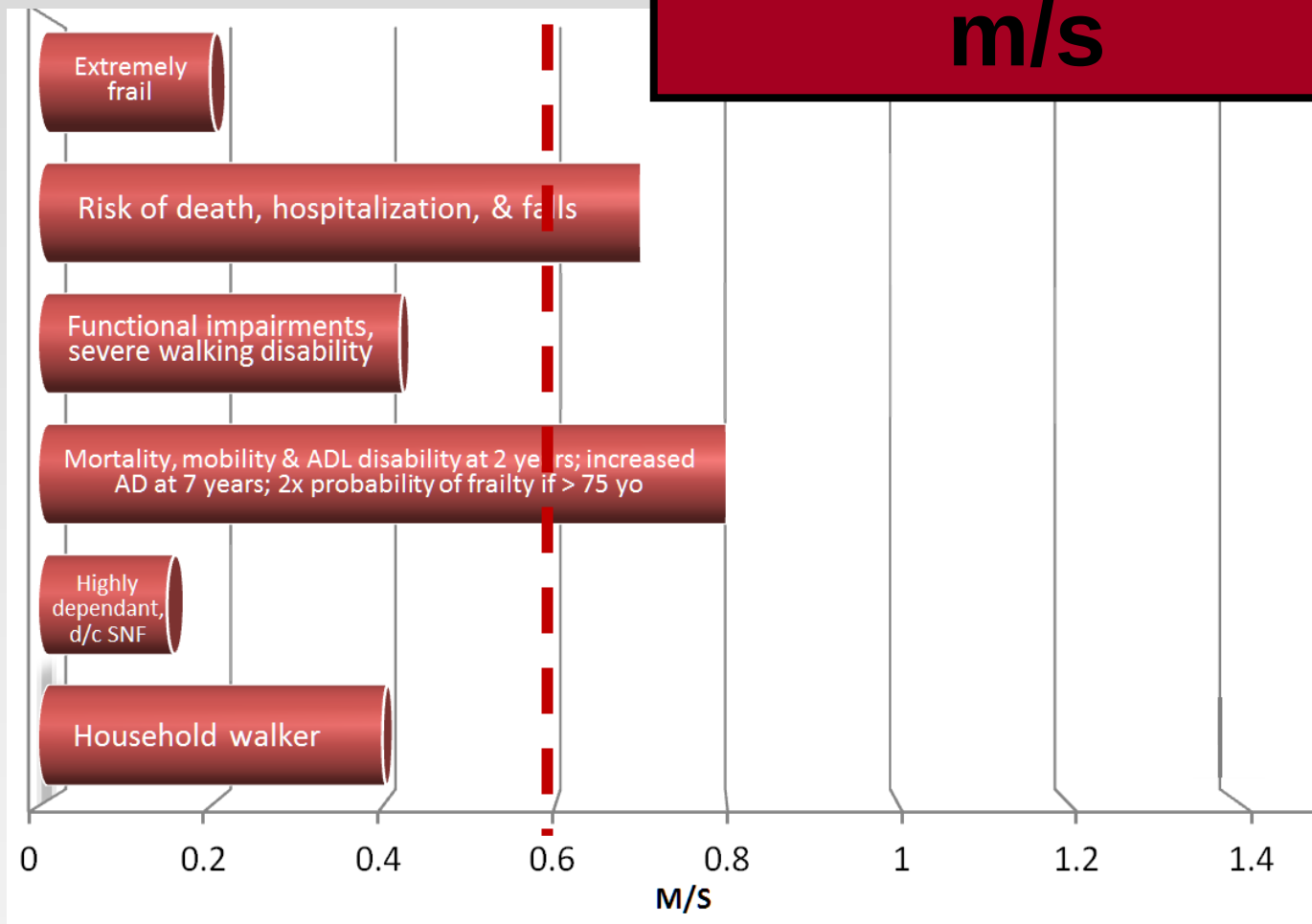
- 83% of day in bed or sitting
- 922 steps a day (<10% of target)

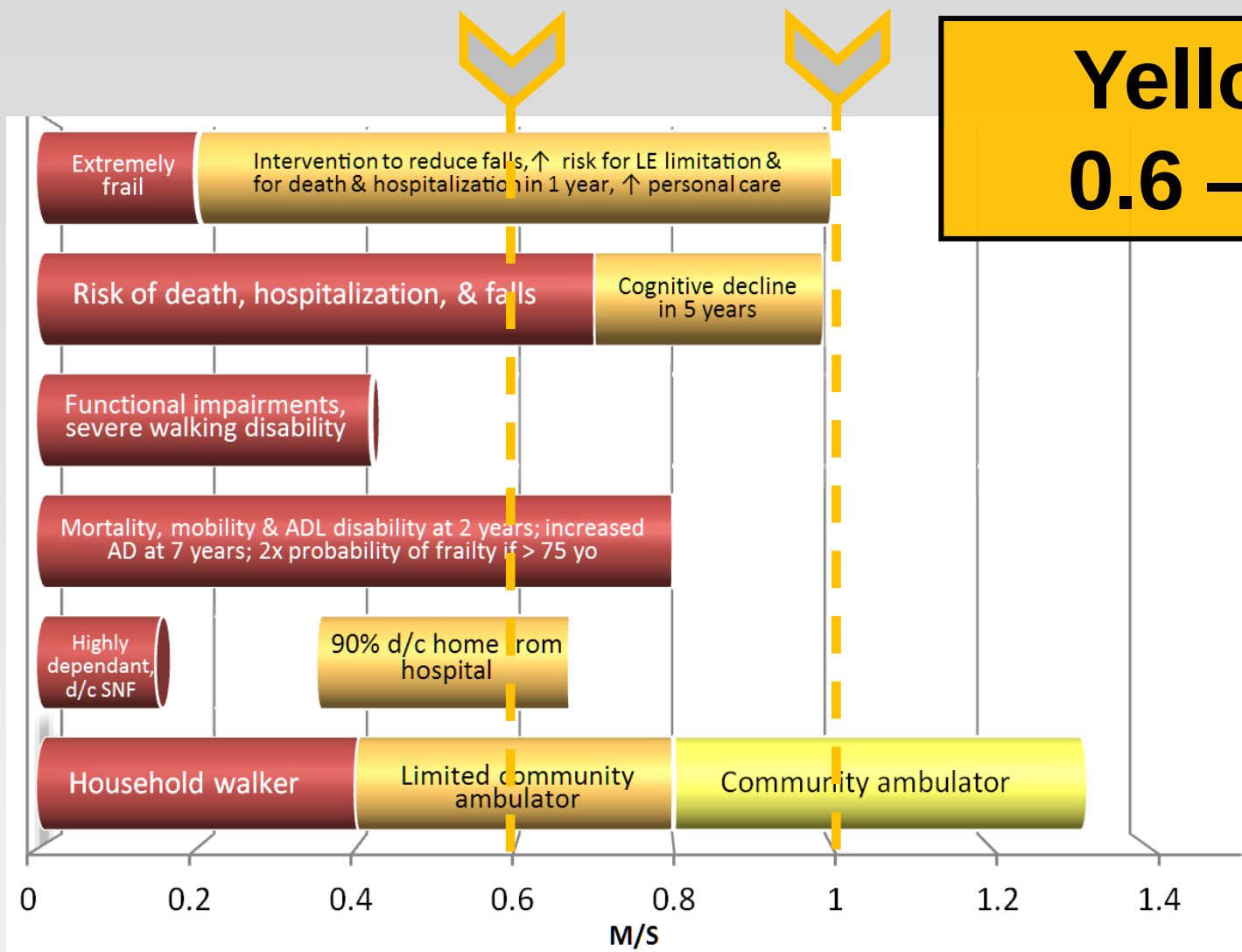


Walking Speed...Evidence across studies

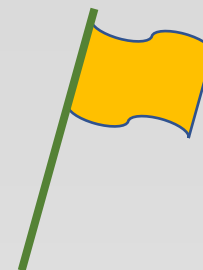


**Red Flag: ≤ 0.6
m/s**



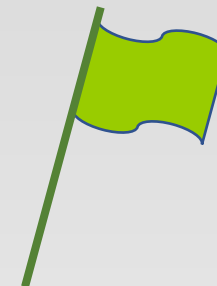
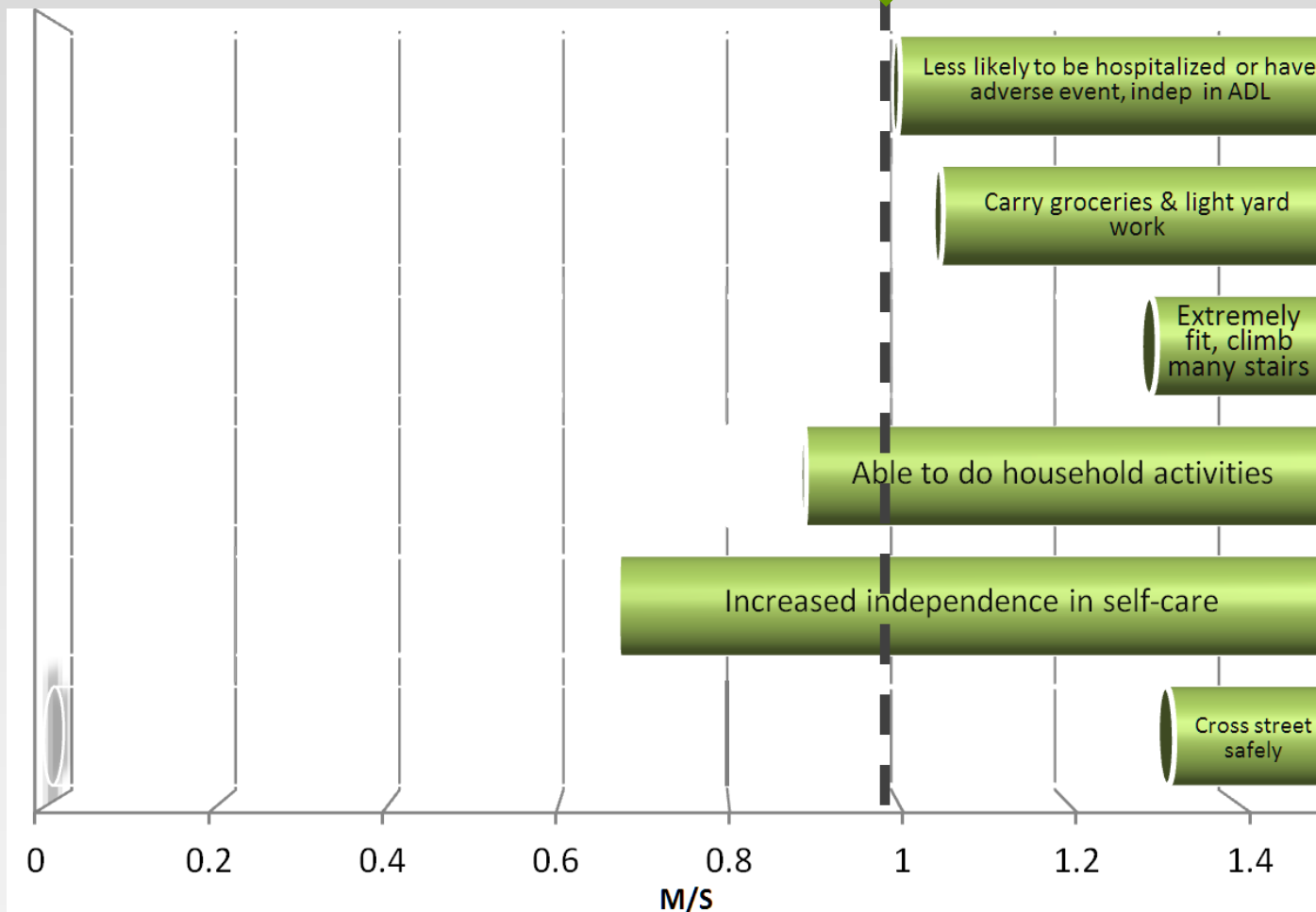


Yellow Flag:
0.6 – 1.0 m/s

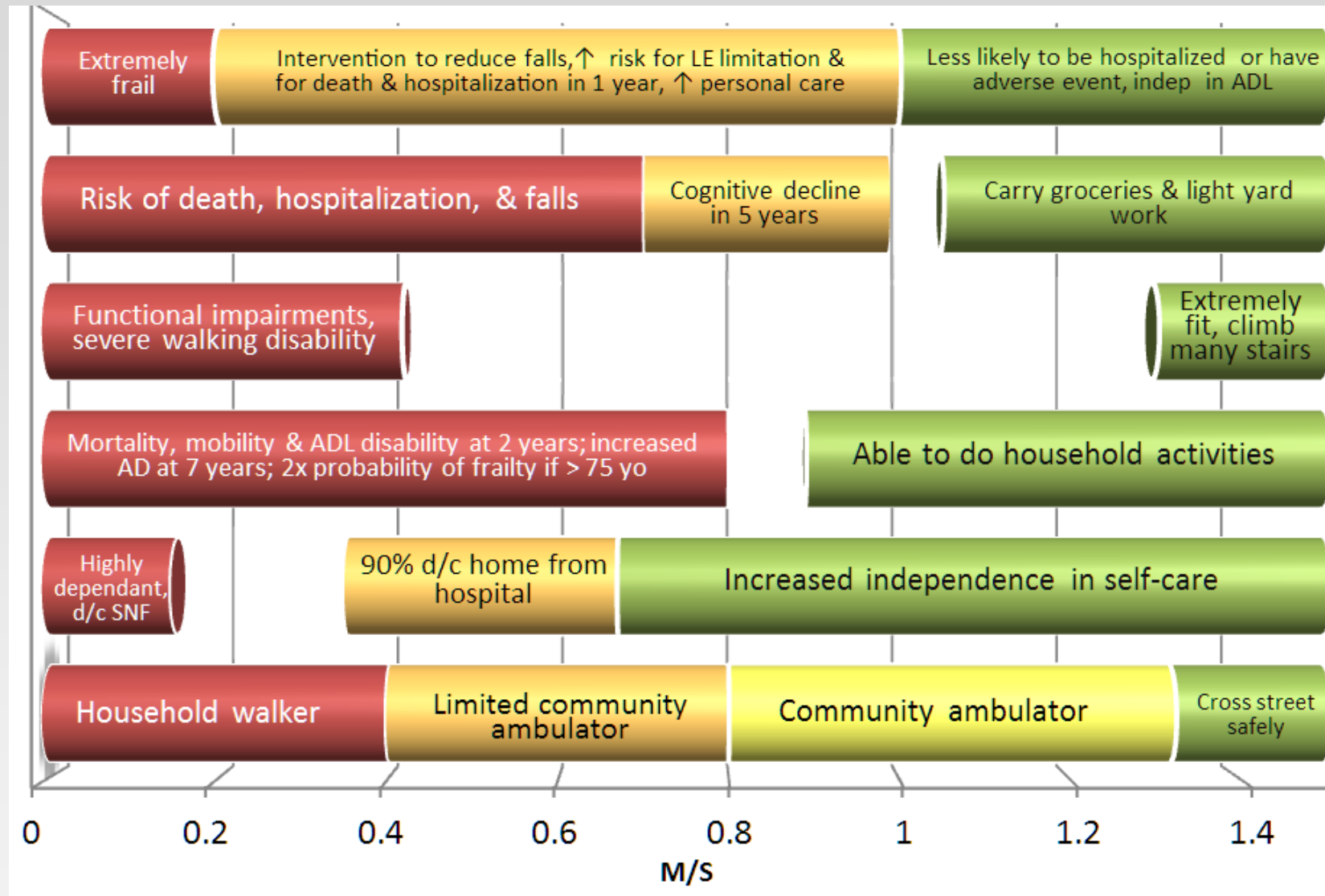




Green Flag: > 1.0 m/s

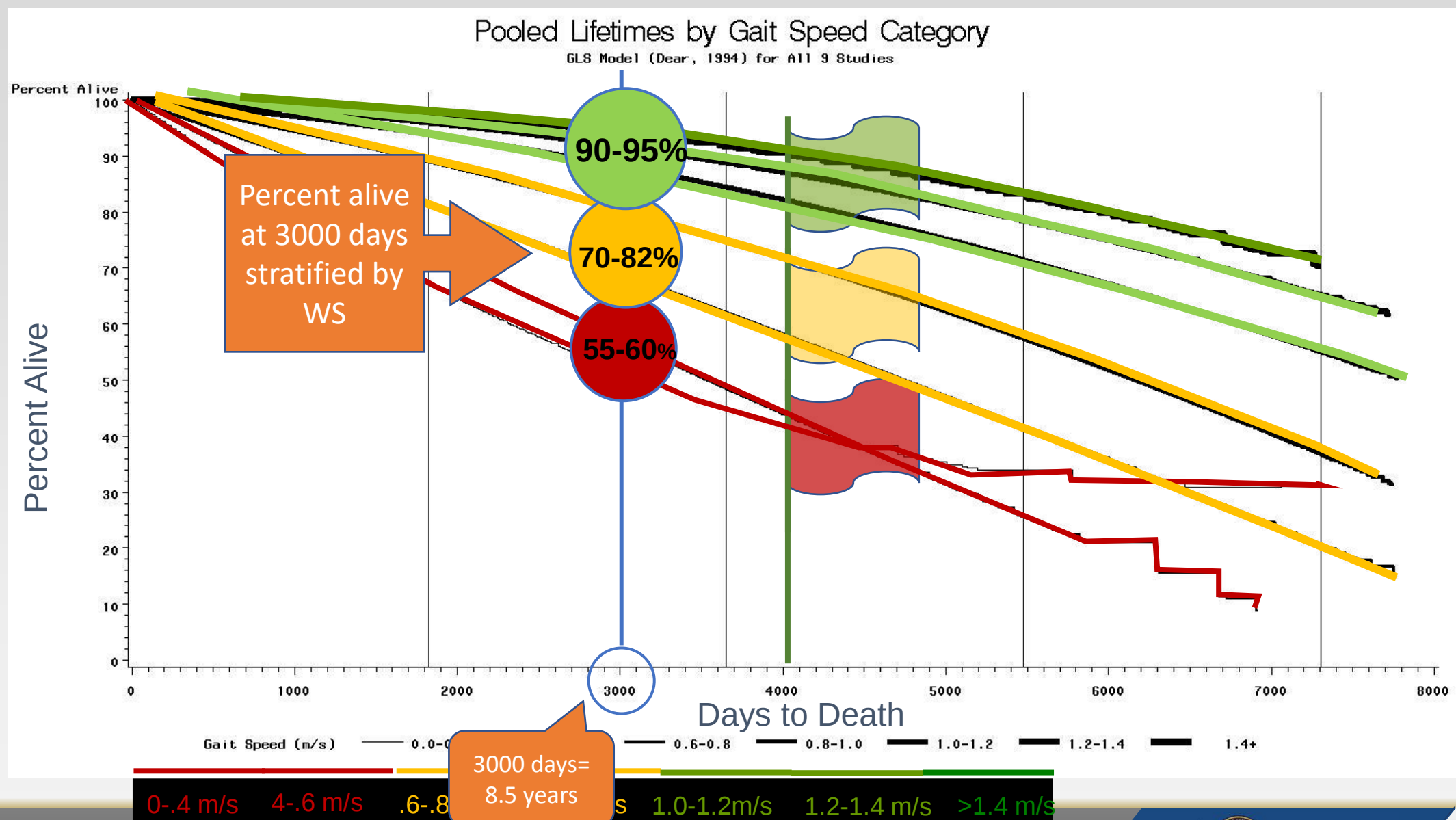


Walking Speed...Evidence across studies

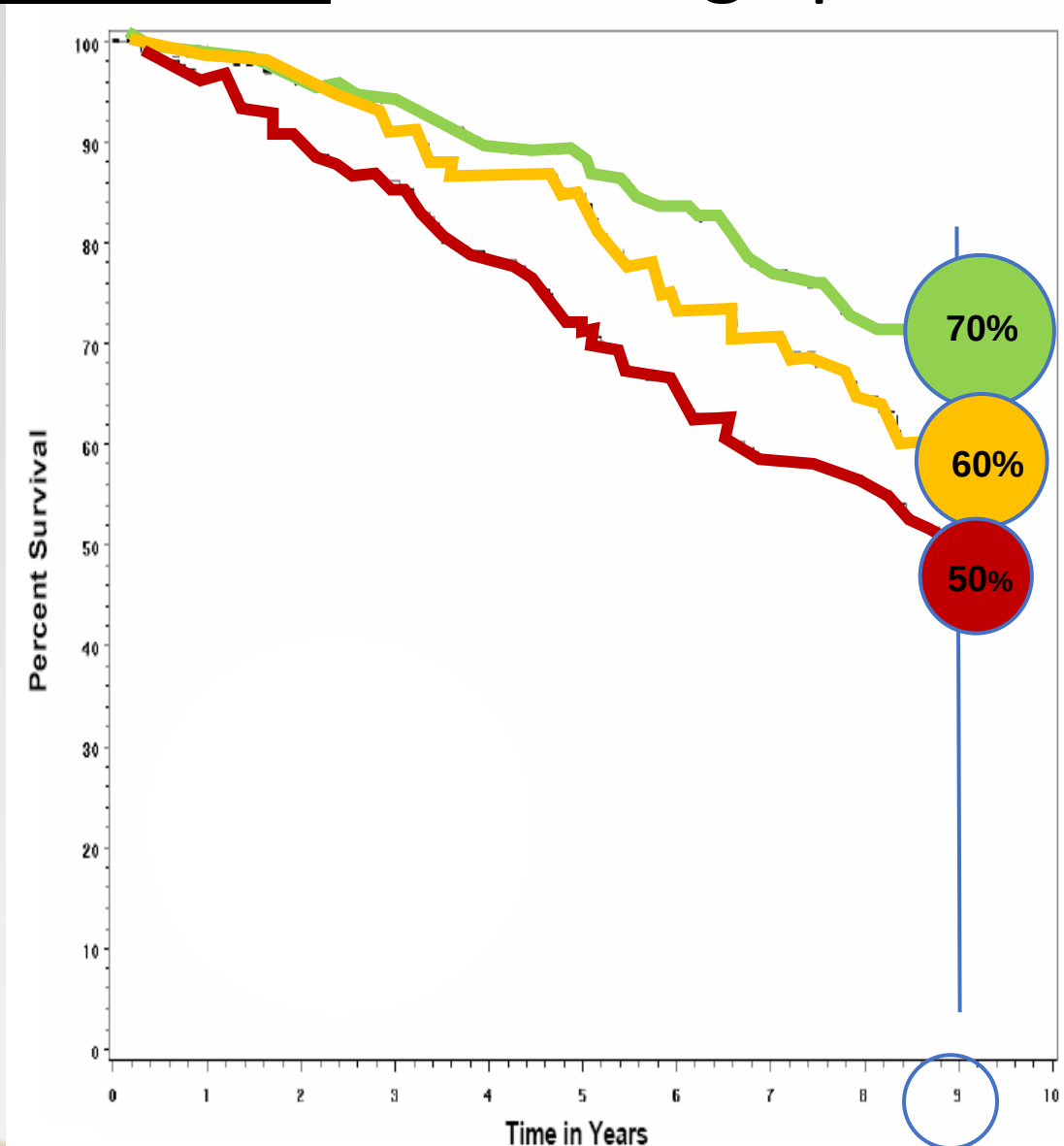


Middleton, Fritz, Lusardi JAPA 11-13

Walking Speed is Predictive of Life Expectancy



Improvement in Walking Speed improves Mortality



Monitored Gait Speed Over 1 year:

Improved at 1 year by 0.1 m/s

Transient improvement

Never improved

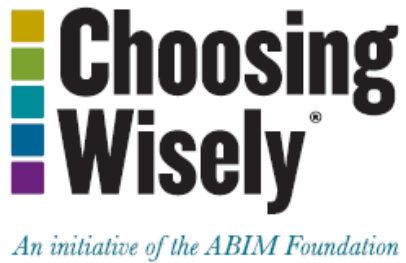
Walking speed is a
Modifiable Risk Factor

Hardy 2007

How do we improve walking speed?

Aiming for "**Failure**" using progressive strengthening





Don't let older adults lay in bed or only get up to a chair during their hospital stay.

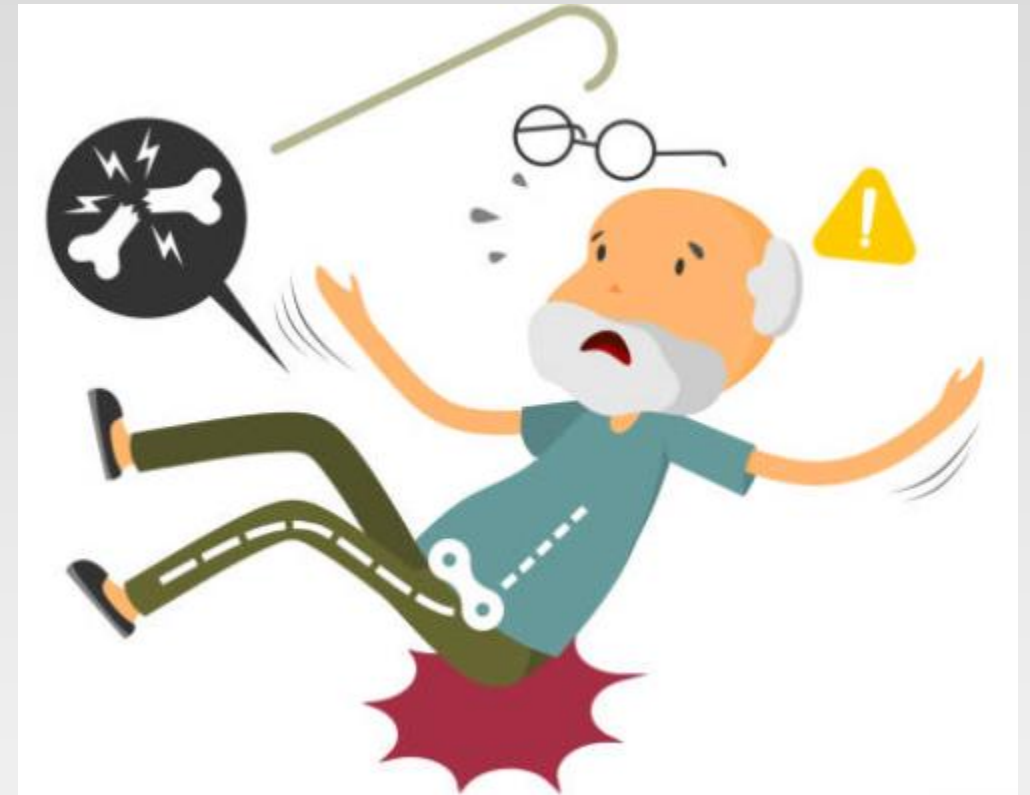
Don't prescribe under-dosed strength training programs for older adults. Instead, match the frequency, intensity and duration of exercise to the individual's abilities and goals.



Barriers for implementation of optimal practice patterns

- Fear of adverse events, penalties, or litigation
- Practice of “negative defensive medicine”

“I don’t want a fall on my shift.”



Fear of Litigation



- Have we taken the “above all else...do no harm principle” to an extreme?
- Would more evidence-based guidelines help decrease litigation fear?



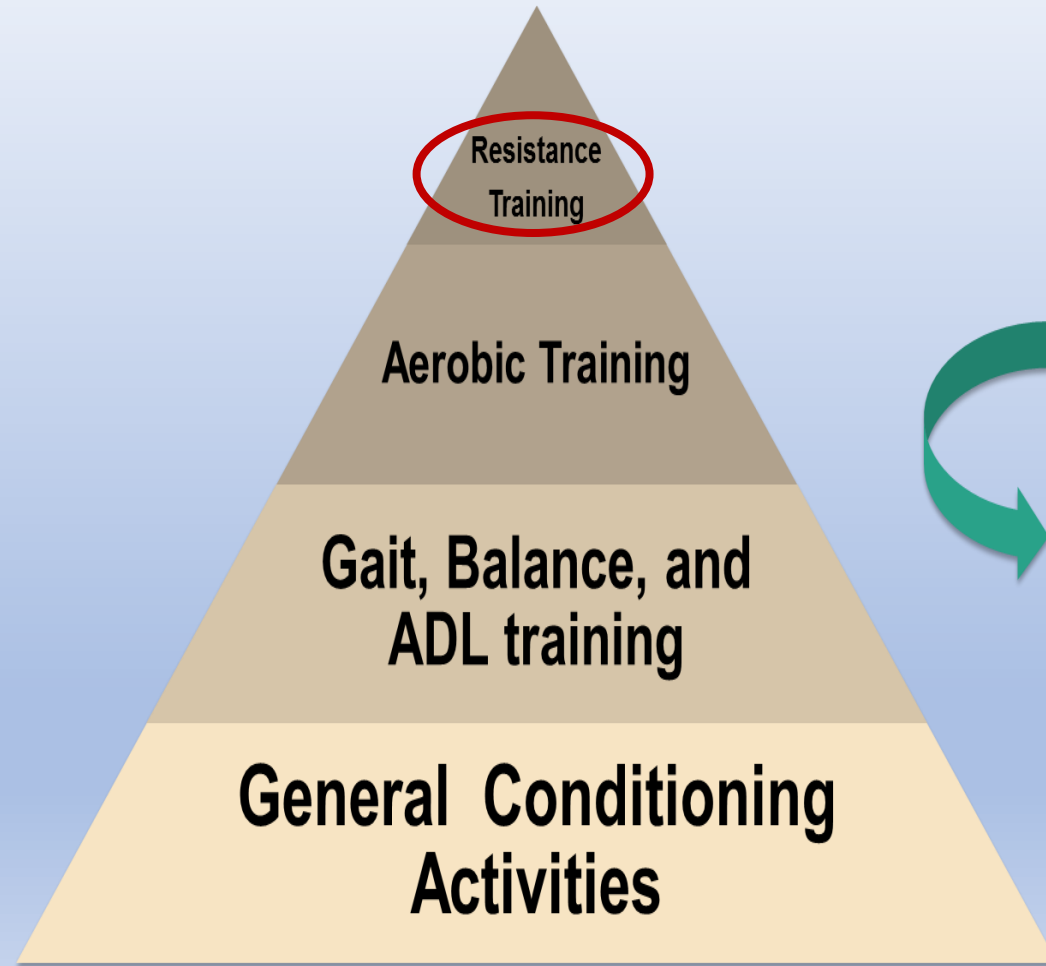
Do Light Weights Generate Forces Equivalent to Daily Functional Activities?



≠



Current Rehabilitation



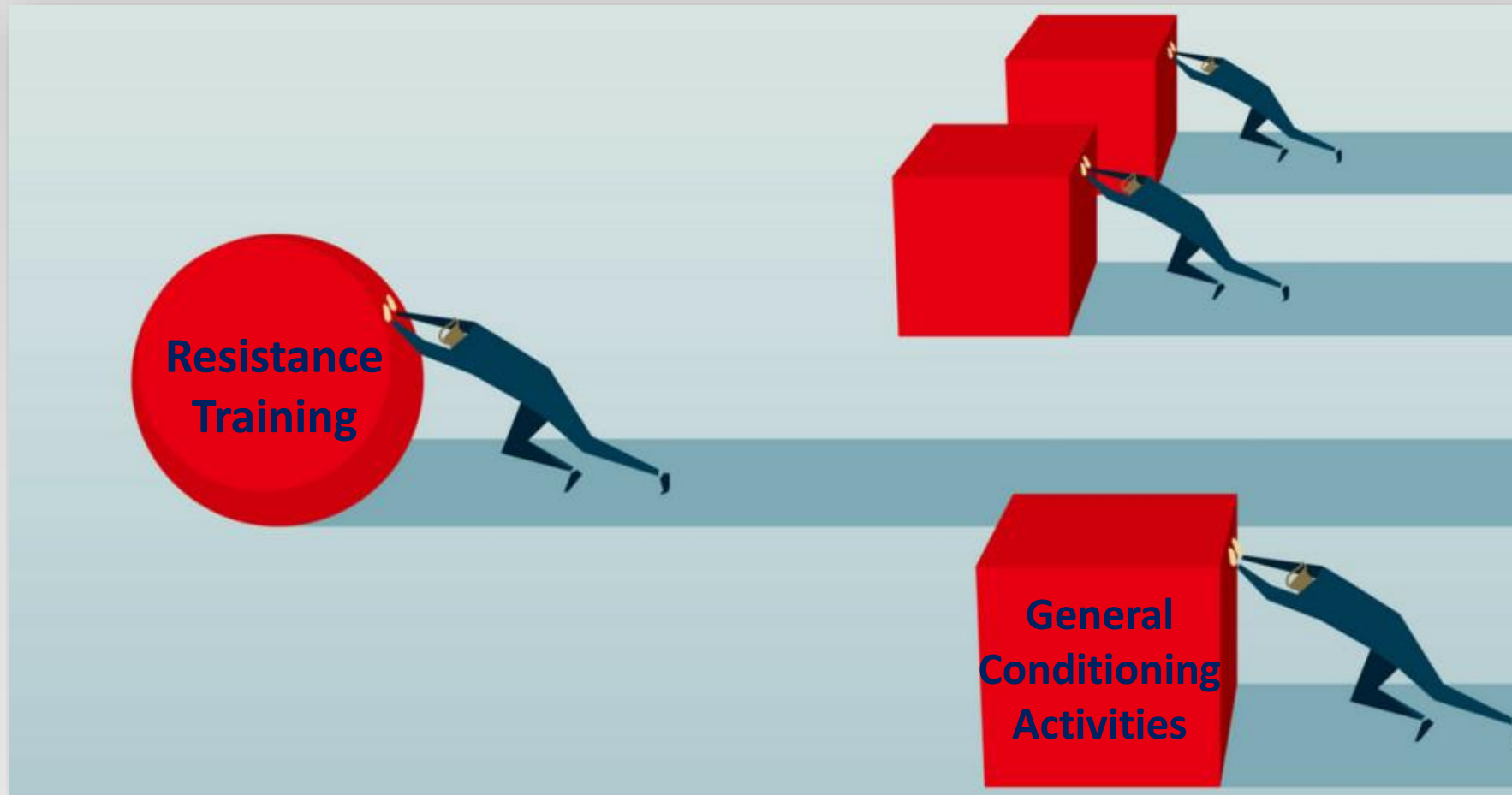
Low-Physiologic Intensity

Progressive Rehabilitation



High-Physiologic Intensity

Work Smarter, Not Harder



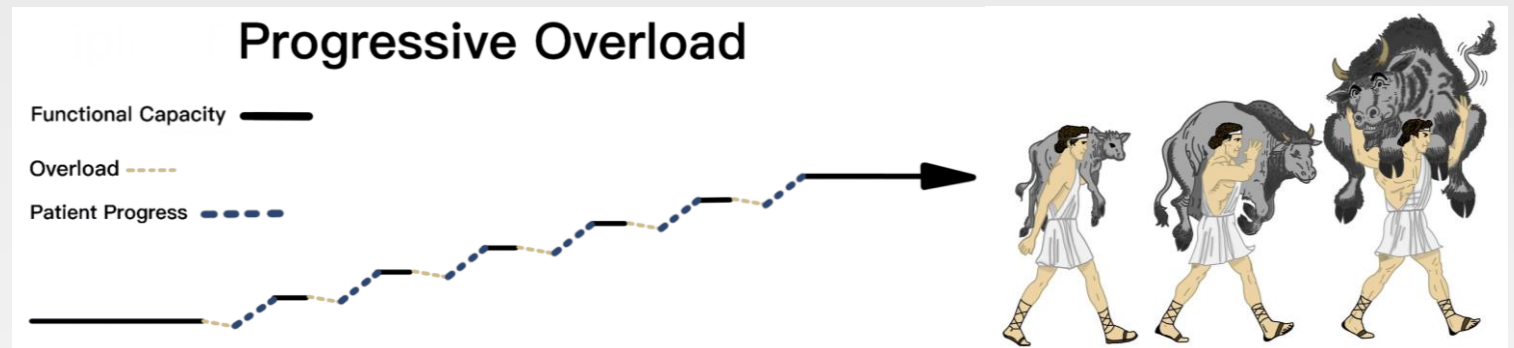
i-STRONGER



Practical framework for safely delivering **high-intensity rehabilitation** to patients with complex medical needs

Patients are inactive for **41%** of a rehab session

Dosing is traditionally based on time rather than **physiological principles**



FOR MUSCLE STRENGTHING

MORE THAN

8

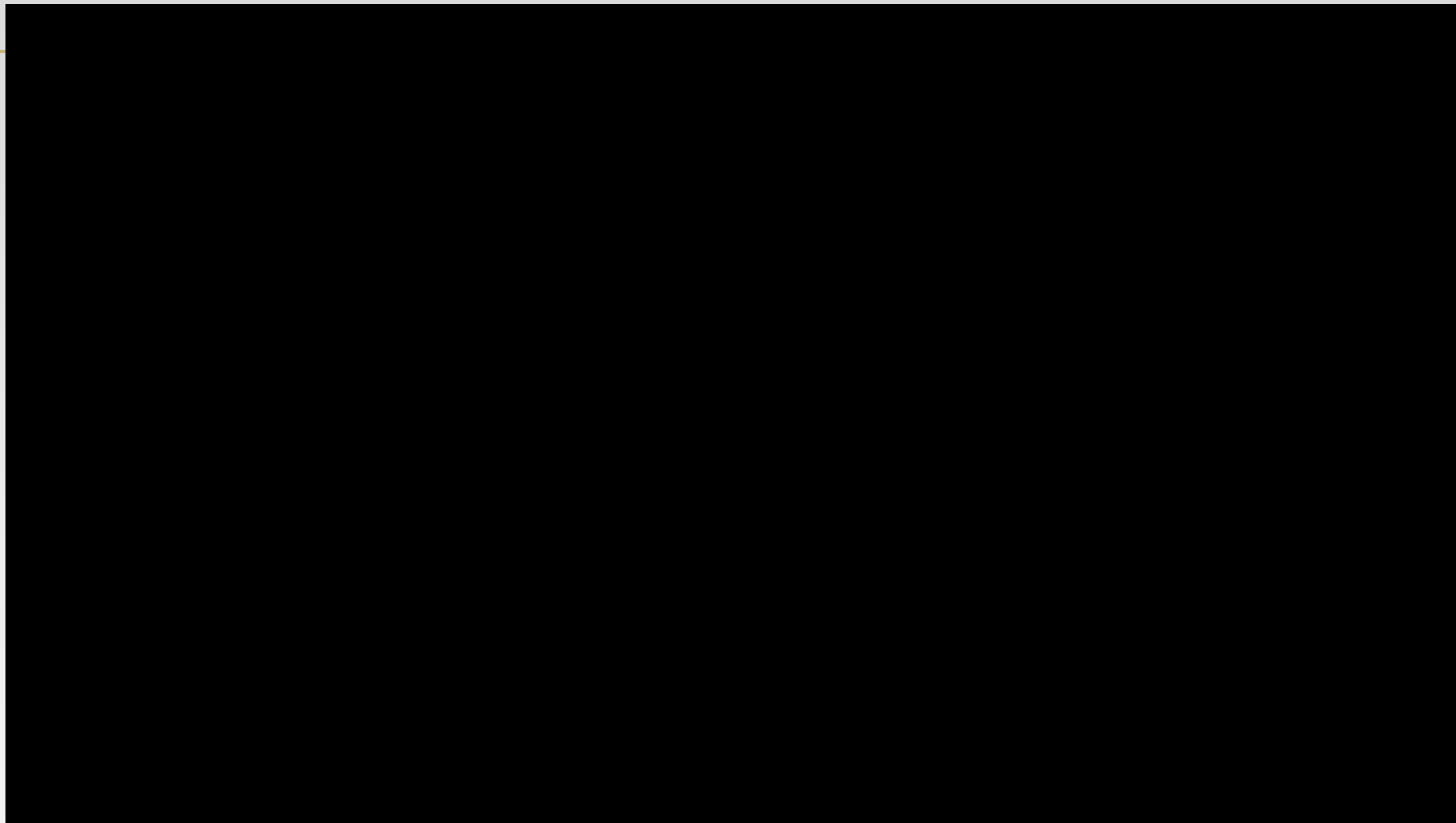
UP THE WEIGHT!



**EXERCISE FORM FAILURE ON
THE 9TH REPETITION IS GOOD**

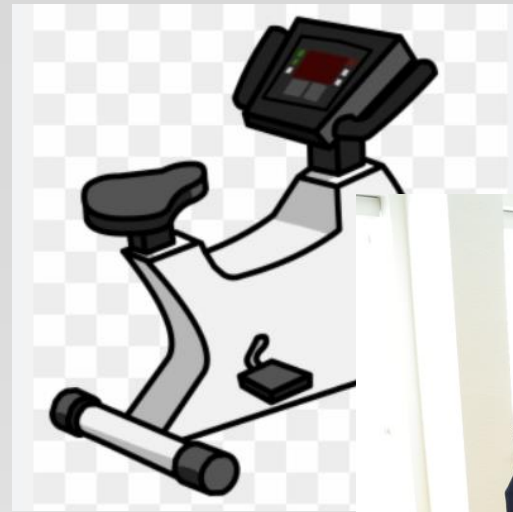


Video of sit to stand



RPE SCALE

1	Nothing
2	Very Easy
3	Easy
4	Comfortable
5	Somewhat Difficult
6	Difficult
7	Hard
8	Very Hard
9	Extremely Hard
10	Maximal/Exhaustion



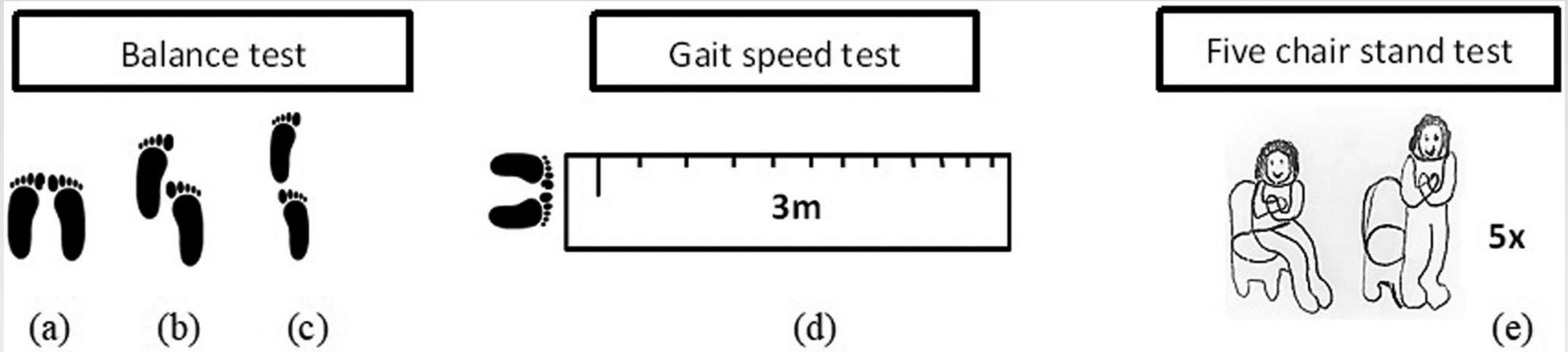
Implementation of a rehabilitation model in a Program of All-Inclusive Care for the Elderly (PACE): Preliminary data

2022

Allison M. Gustavson DPT, PhD^{1,2} | Cherie V. LeDoux DPT, PhD¹ |
Michael Himawan DPT¹ | Jennifer E. Stevens-Lapsley MPT, PhD^{1,3}  |
Kathryn A. Nearing PhD^{3,4,5}



6 weeks of high-intensity training



Safe

2x the Clinical meaningful
change seen after 6 weeks

Gustavson et. al. 2022 J of
American Geriatrics Society

➤ [Phys Ther.](#) 2020 Sep 28;100(10):1746-1758. doi: 10.1093/ptj/pzaa126.

Application of High-Intensity Functional Resistance Training in a Skilled Nursing Facility: An Implementation Study

Allison M Gustavson¹, Daniel J Malone², Rebecca S Boxer³, Jeri E Forster⁴,
Jennifer E Stevens-Lapsley⁵



High-Intensity is Feasible and Effective in the SNF

	High-Intensity vs Usual Care
Short Physical Performance Battery (SPPB)	↑0.64 points
Walking/Gait Speed	↑0.13 meters/second
Community Discharge Rate	↑20%
SNF Length of Stay Estimated Cost Savings	↓3.5 days ~\$1500 per patient



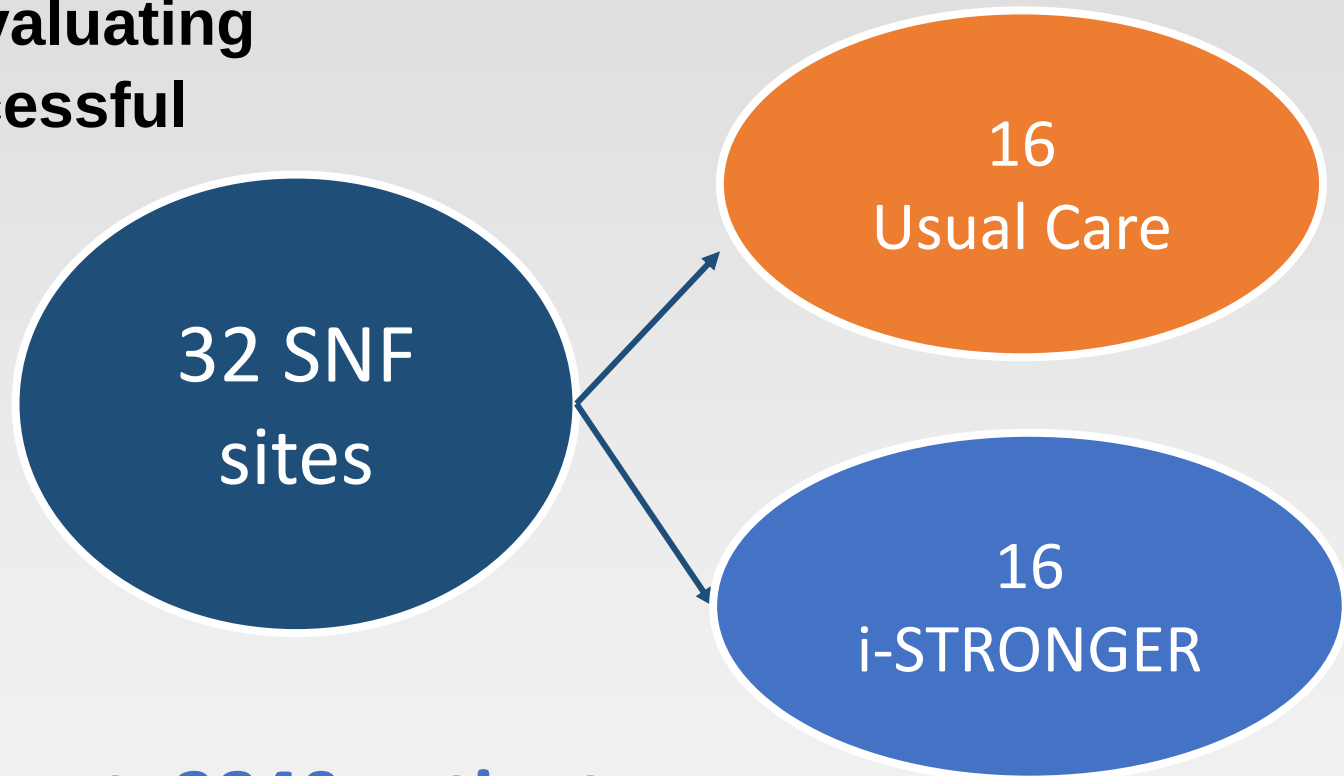
Therapists Lessons learned so far...

- i-STRONGER is **safe** with vitals monitoring and adherence to precautions
- “[Patients] have really taken to [HIR]...they seem to **participate more readily.**”
- Therapist **productivity does not decrease**
- Need to alter strategies for certain subsets of patients



Pragmatic Clinical Trial (NIH R01 AG072693)

**Determine effectiveness of i-STRONGER
at multiple sites, while evaluating
characteristics of successful
implementation**



Target: 3840 patients

Therapist Impressions

“I had no idea how much I was **under dosing** my patients. They not only tolerated the high intensity training, but I was tailoring the intervention to each person’s capabilities.”

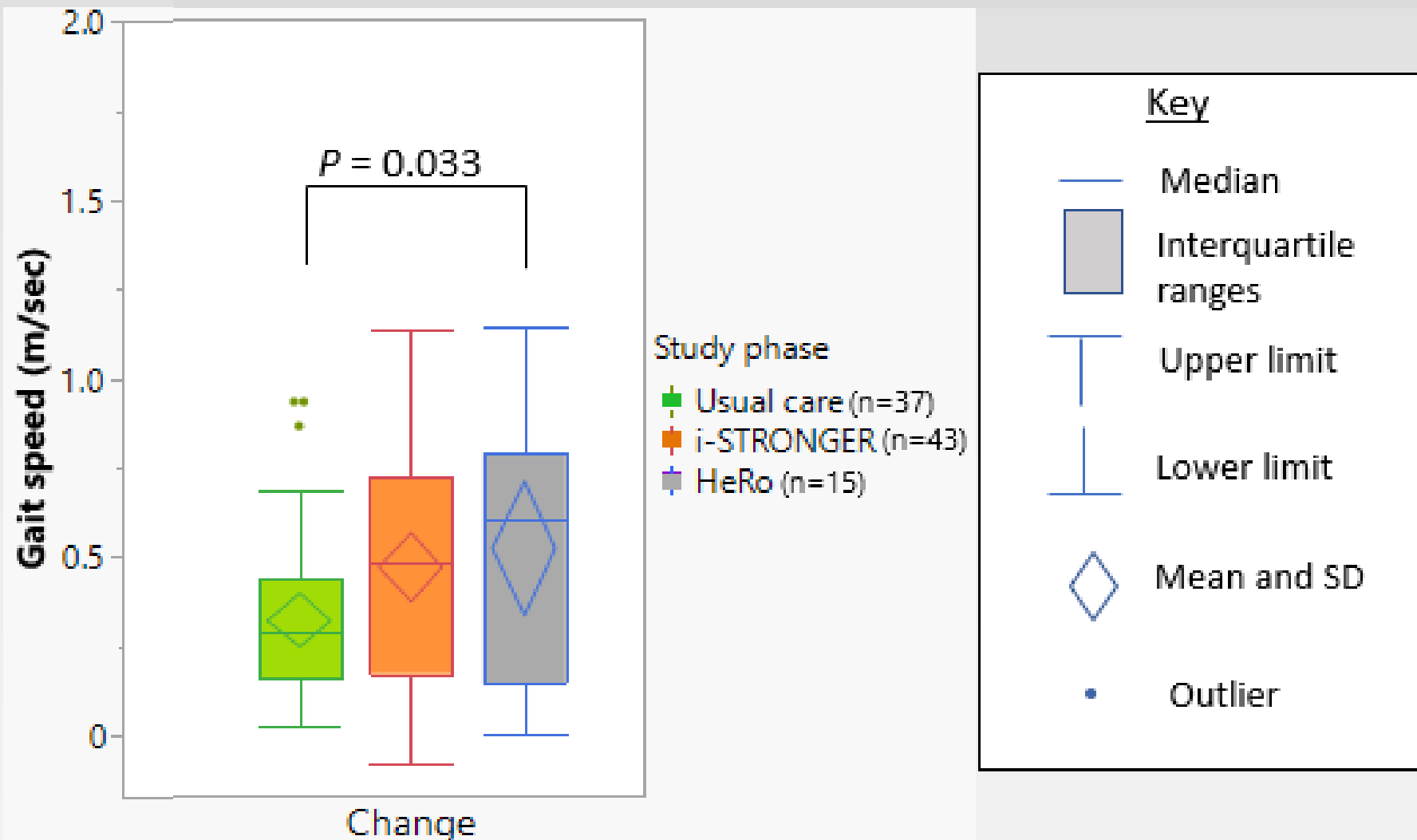
“It’s been a good way to motivate our patients to do more and even **improve our expectations** of what they can do...and to move them forward towards the things that are going to make their life easier once they discharge.”



High-Intensity Rehabilitation **plus Mobility** (HeRo) Behavioral economics



Mobility program further improved walking speed



Improving the Lives of Older Adults

i-STRONGER

- High-Intensity Rehabilitation = **better lives**
- Value of measuring **functional outcomes** (e.g. walking speed)





Center on Health Services Training and Research



VA RR&D I21 RX002193

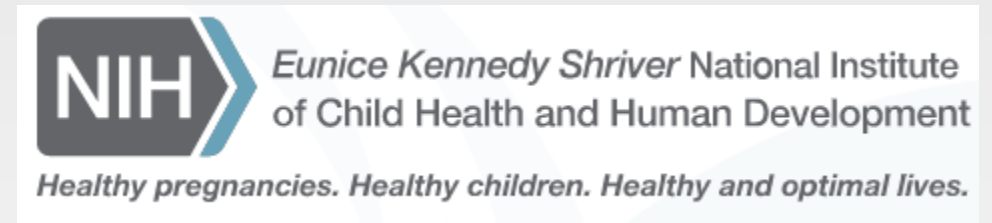
VA RR&D I01 RX001978

NIH R01 NR016209

NIH R01 AG054366



Foundation for Physical Therapy
CoHSTAR



Rehabilitation Research & Development Service (RR&D)



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MD



Ethan Cumbler
MD



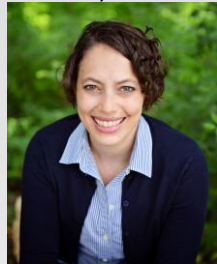
Jason Falvey, PT,
DPT, GCS



Jeri Foster
PhD



Jeff Wallace, MD



Katie Butera,
PT, DPT



Wendy Kohrt
PhD



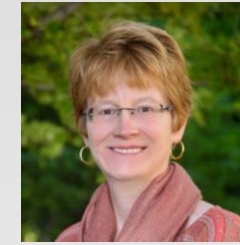
Cari Levy, MD,
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Dan Malone, PT,
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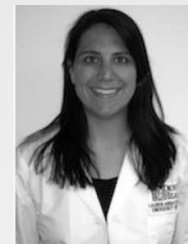
Christine Jones,
MD



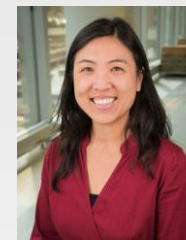
Katie Seidler, MS,
DPT



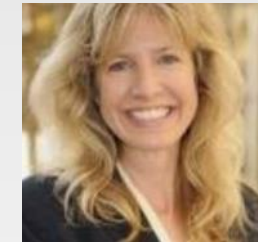
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