Hospital-Associated Disability

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NEW ORLEANS, LOUISIANA

HAD Defined

- Loss of one or more ADLs during/after hospitalization.
- Known by several names:
  - Hospital-Associated Disability
  - Hospital Associated Deconditioning
  - Post-hospital syndrome
- Typically measured via ADLs on or before admission and discharge/post discharge

Scope of the Problem:
Hospital Associated Disability

Prevalence of HAD

JAMDA 21 (2020) 455–461

JAMDA

journal homepage: www.jamda.com

Review Article

Prevalence of Hospital-Associated Disability in Older Adults: A Meta-analysis

Check for updates

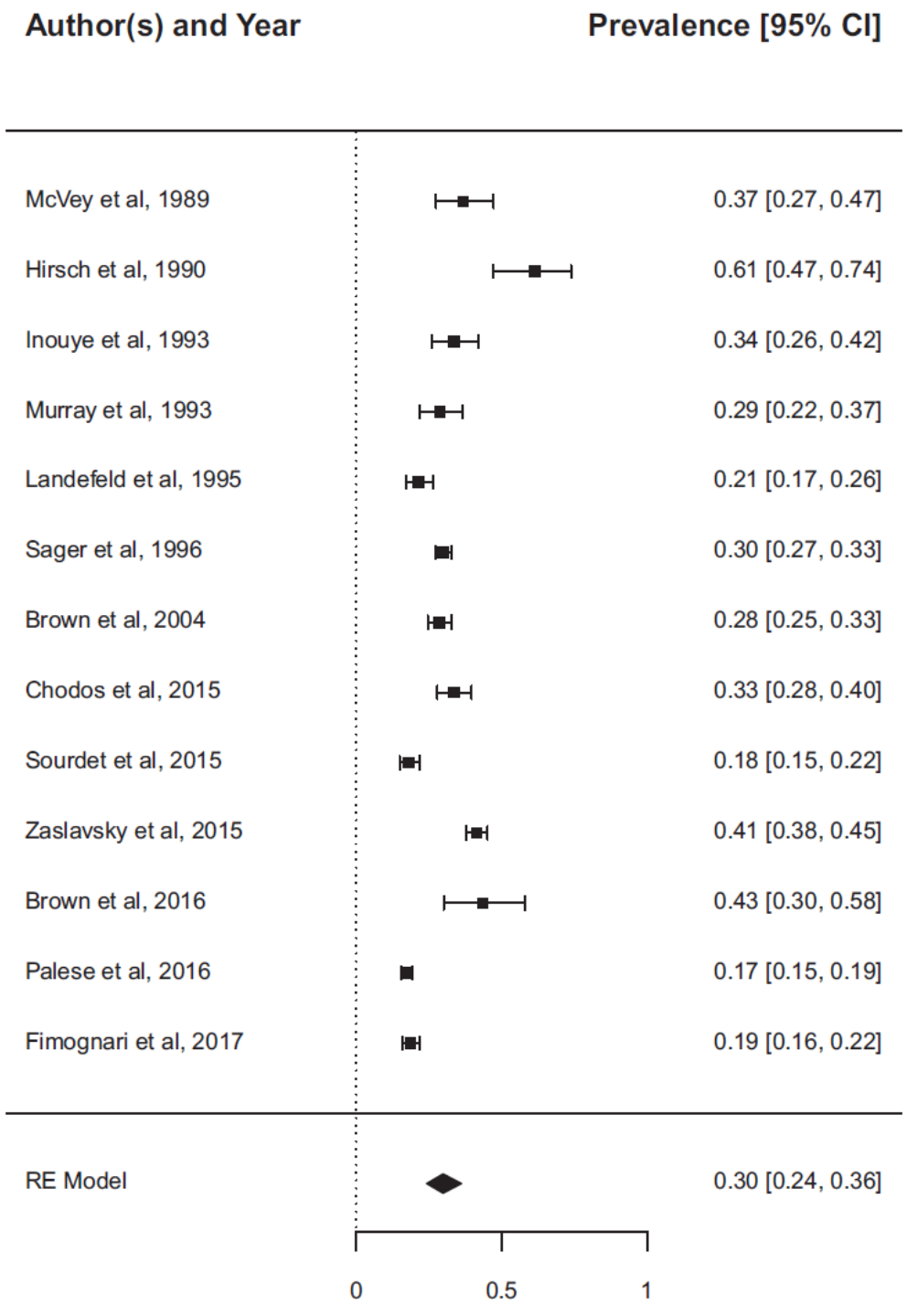
Christine Loyd PhD [a,b], Alayne D. Markland DO, MSc [a,b,*], Yue Zhang PhD [a], Mackenzie Fowler MPH [c], Sara Harper PhD [a], Nicole C. Wright PhD, MPH [c], Christy S. Carter PhD [a], Thomas W. Buford PhD [a], Catherine H. Smith MLS, MPH [d], Richard Kennedy MD, PhD [a,b], Cynthia J. Brown MD, MSPH [a,b]

Meta-Analysis of Prevalence of HAD

- From RCTs, quasi experimental, prospective cohort studies.
- Aged > 65 years hospitalized in acute care
- Measured ADL at ≥ 2 time points before/during, after hospitalization.
- Independence measured using:
  - Katz Index of Independence in ADL
  - Barthel Index of Independence in ADL
- Reported prevalence of ADL decline

Data Extraction

- 164 abstracts screened; 15 fit review criteria and used for meta-analysis
- Studies occurred 1983 to 2013
- 11 US-based; 4 in other countries (2 Italy, 1 France, 1 Israel)
- Sample sizes ranges from 71 to 1279 participants
- Total sample size across included studies: 7375



Results

- Combined prevalence 30% (95% CI 24%, 33%; P<.001)
- Effect of study initiation year minimal
- Large amount heterogeneity observed.

Conclusions

- Hospitalization poses significant risk of HAD
- Risk unchanged despite changes in care over 3 decades
- Need hospital-based programs that:
  - Assess functional ability
  - Identify at-risk older adults
  - Treatment or prevention of HAD

Disability and Recovery After Hospitalization for Medical Illness Among Community-Living Older Persons: A Prospective Cohort Study

Kumar Dharmarajan, MD, MBA,[*†‡] *Ling Han, MD, PhD,*[§] *Evelyne A. Gahbauer, MD, MPH,*[§] *Linda S. Leo-Summers, MPH,*[§] *and Thomas M. Gill, MD*[§]

J Am Geriatr Soc 68:486–495, 2020

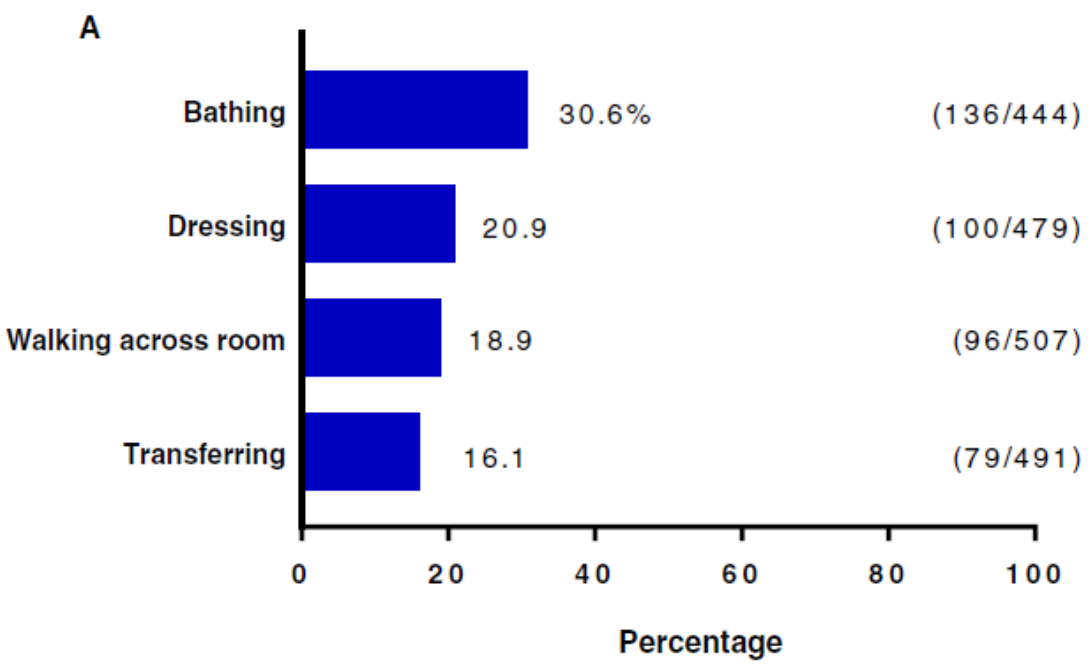
Specific Aims

- Disability prevalence before and monthly after hospitalization
- Disability incidence 1 month after hospitalization
- Recovery time from incident disability during months 2 to 6

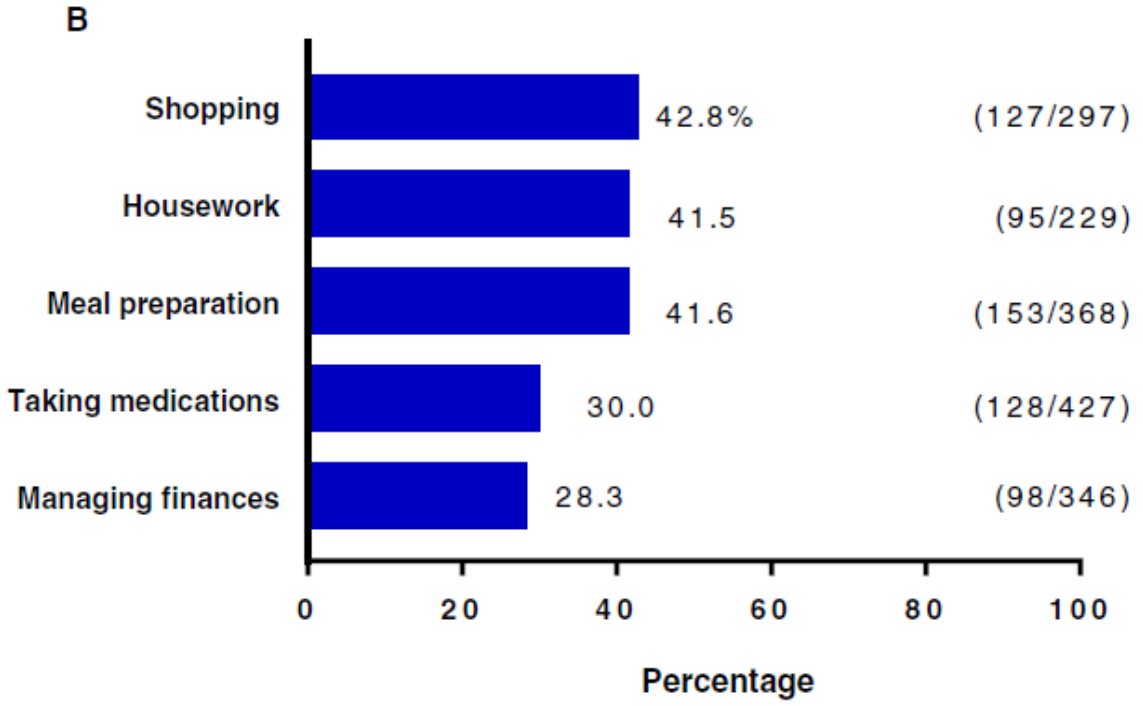
Methods

- 515 community-living persons, mean age 82.7, hospitalized for acute medical illness, alive within 1 month of discharge
- Trained research staff collected data during monthly telephone interviews based on self-report.
- Disability defined for each activity as needing help from another person to complete the activity.
- Driving disability was defined as not driving a car in prior month.

Disability Defined

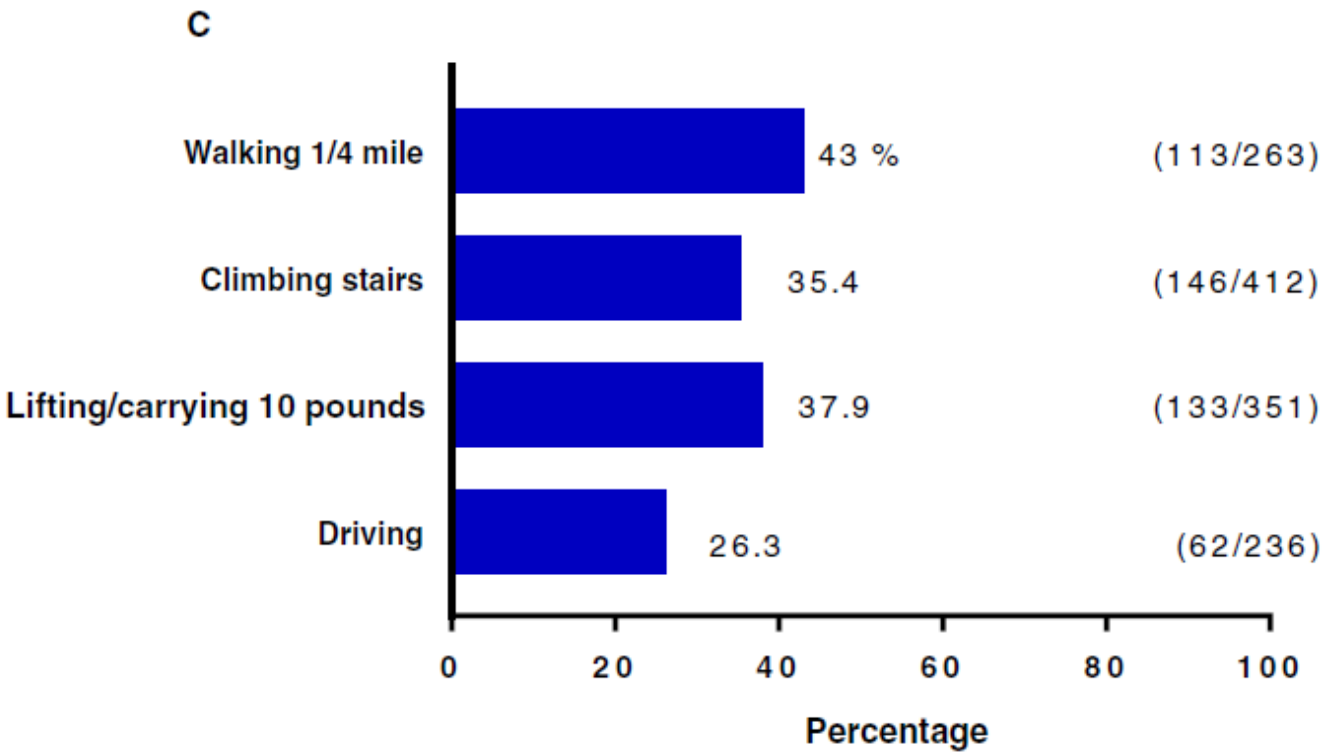


Newly Disabled at One Month: Basic ADLs



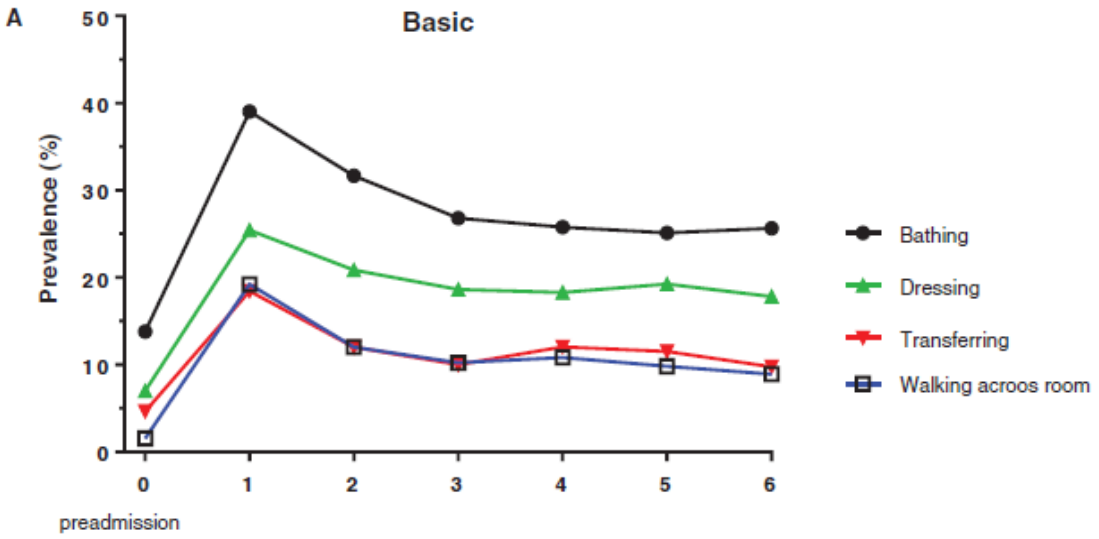
Newly Disabled at One Month: Instrumental ADL

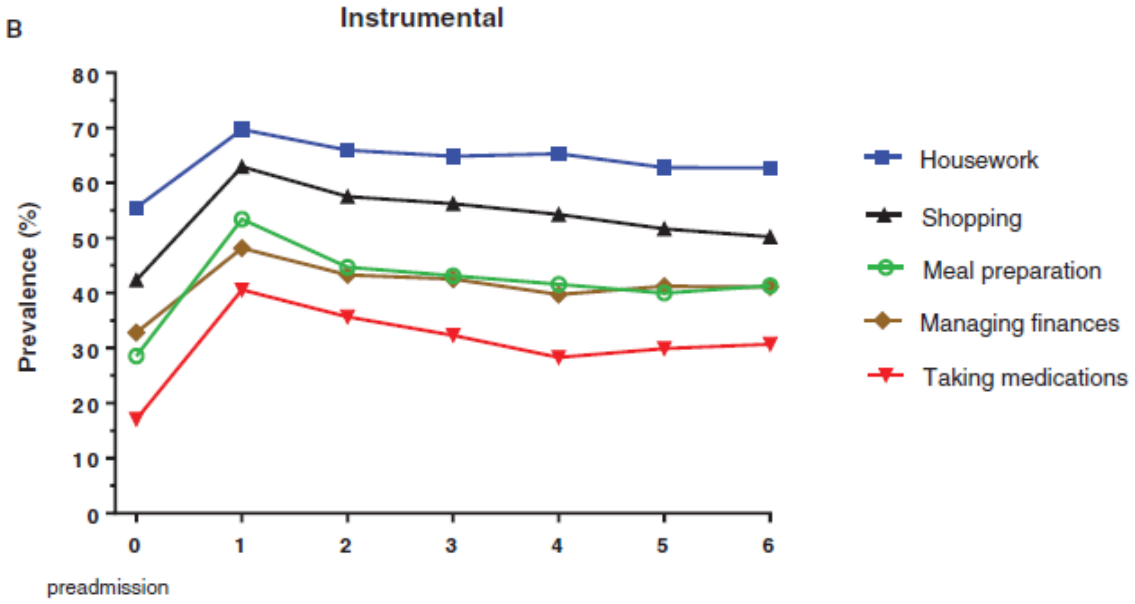
Disability Defined

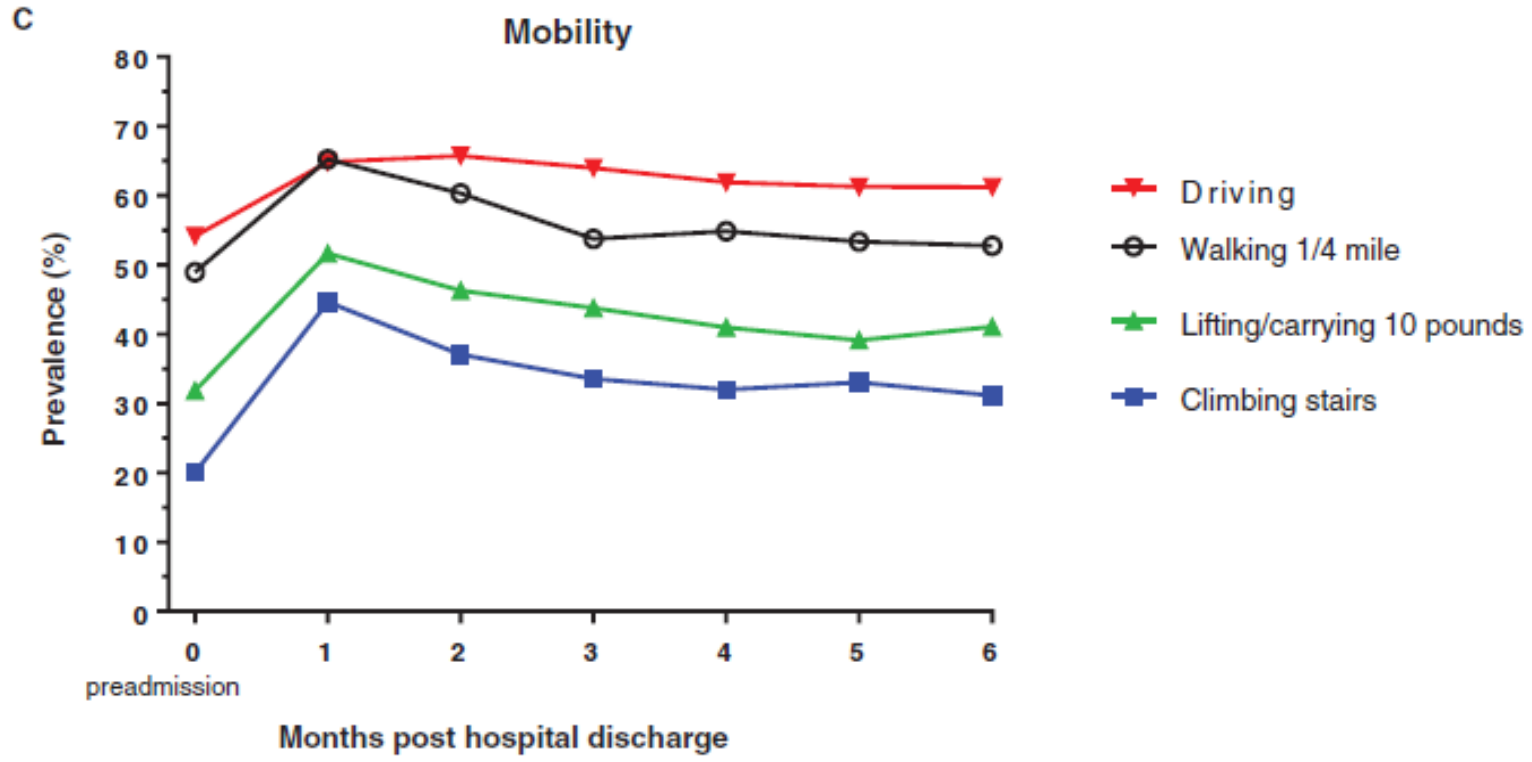


Newly Disabled at One Month: Mobility Activities

Prevalence of Disability Before and After Hospitalization






C
Mobility
Prevalence (%)
80
70
60
50
40
30
20
10
0
0
preadmission
1
2
3
4
5
6
Months post hospital discharge
Driving
Walking 1/4 mile
Lifting/carrying 10 pounds
Climbing stairs

ARTICLE

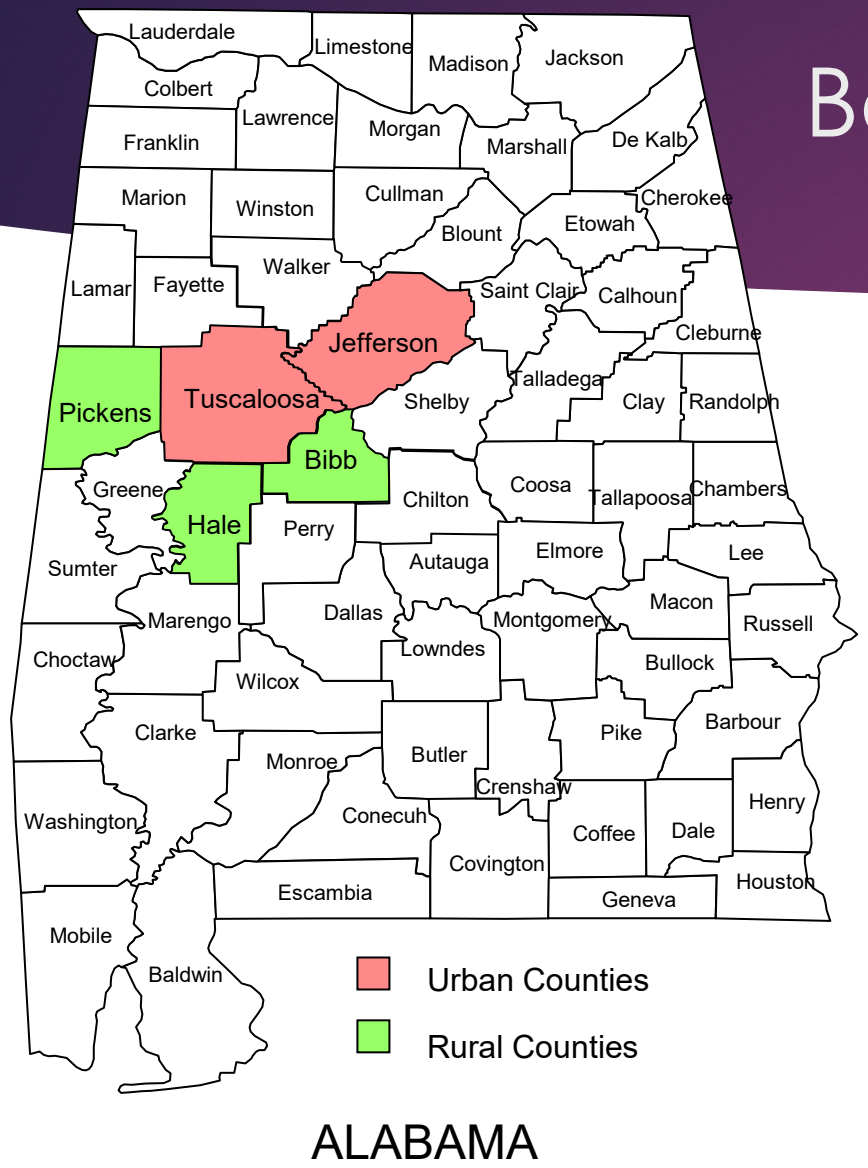
Annals of Internal Medicine

Trajectories of Life-Space Mobility After Hospitalization

Cynthia J. Brown, MD, MSPH; David L. Roth, PhD; Richard M. Allman, MD; Patricia Sawyer, PhD; Christine S. Ritchie, MD, MSPH; and Jeffrey M. Roseman, MD, PhD, MPH

Annal Intern Med 2009;150:372-378

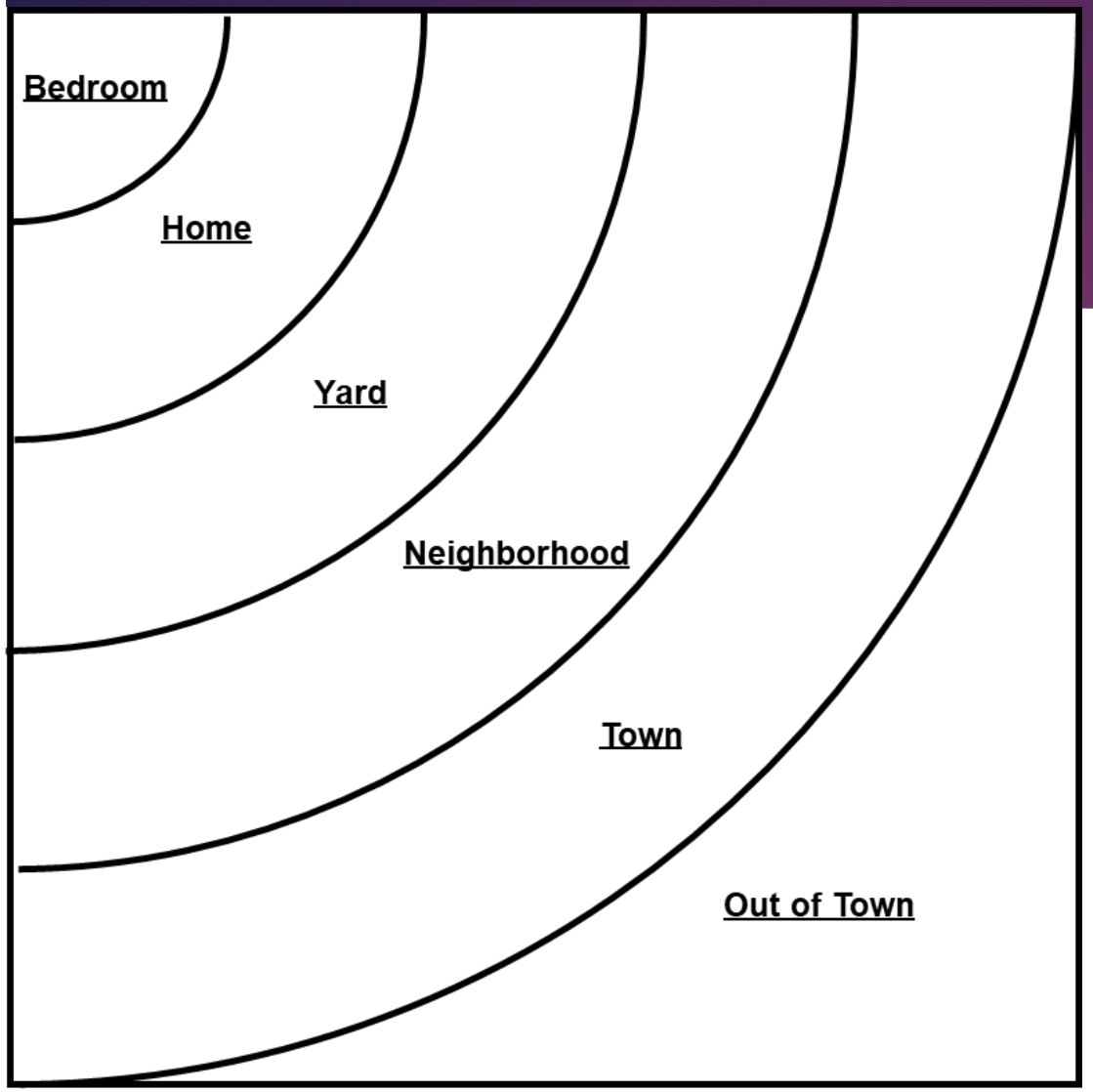
Beyond Functional Decline



Study of Aging I:

1000 Subjects, stratified, random sample of Medicare beneficiaries living in 5 counties in central Alabama

Study over-sampled males, African Americans, and rural residents



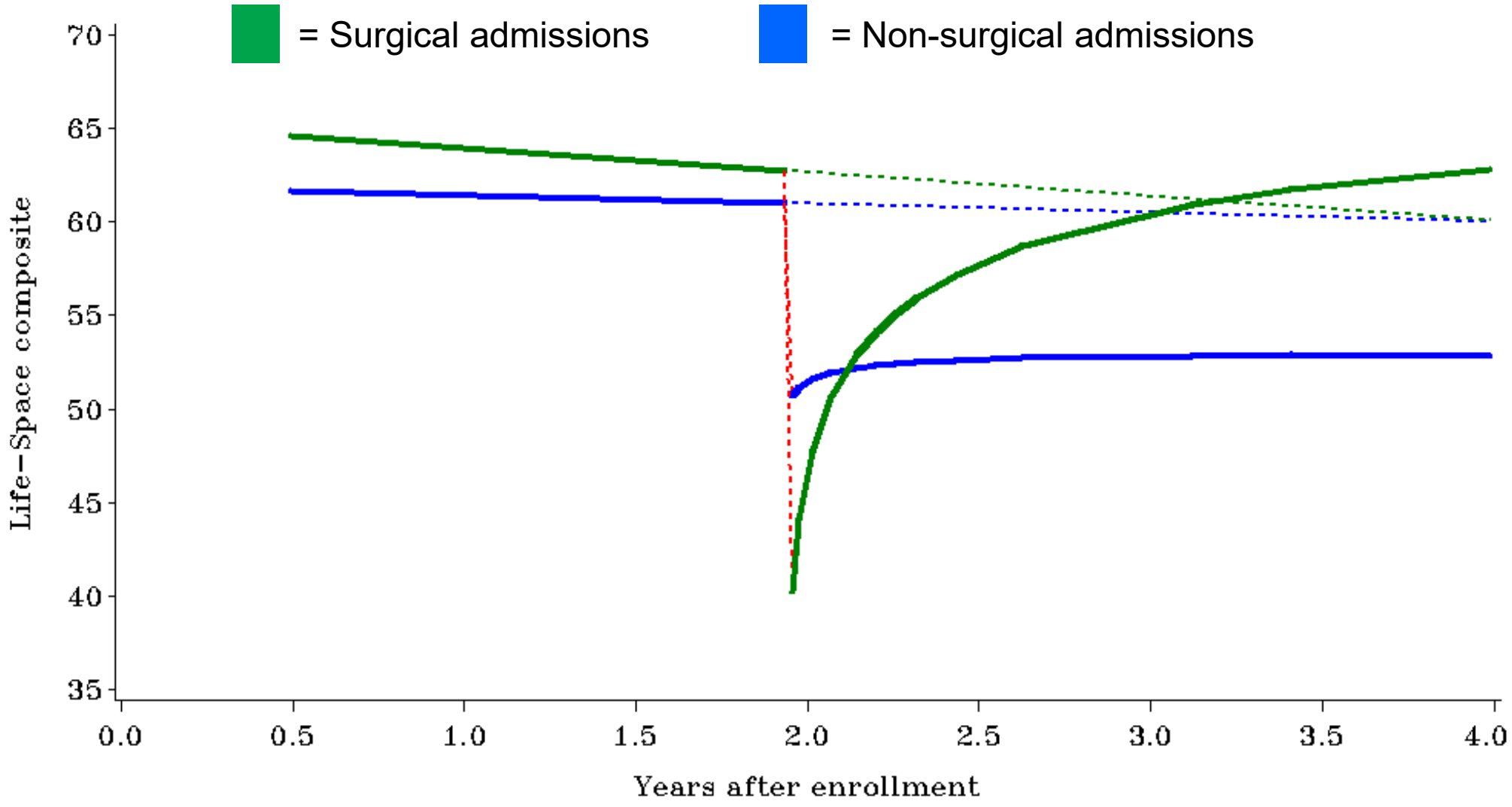
Measuring Life-Space

- Measures community mobility
- Scores range 0 – 120
- Asks frequency; need for help from equipment or another person
- Validated for in-person and telephone interview
- MCID = 5 points

Methods

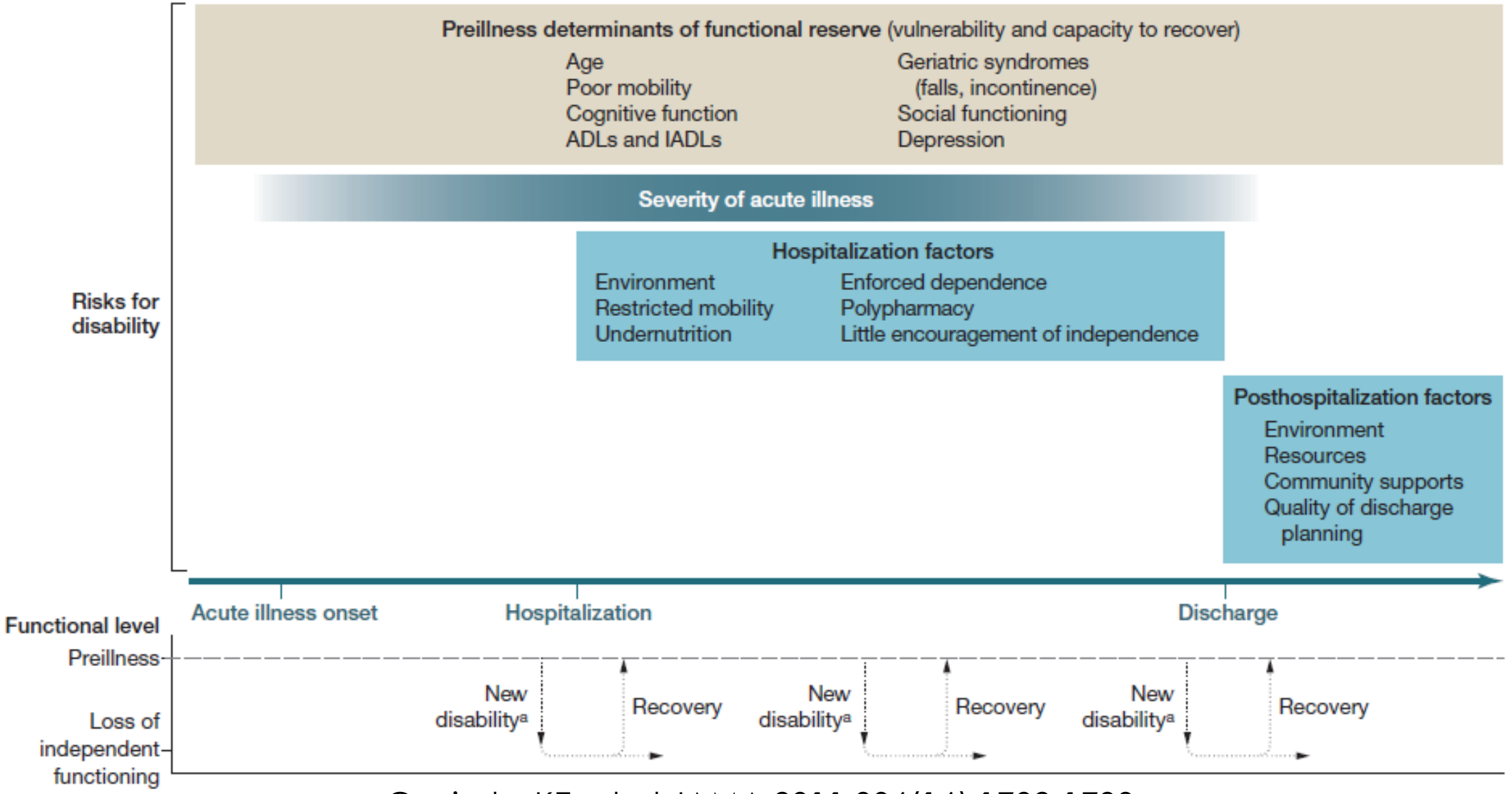
- 211 hospitalizations among 687 participants over 4 years
  - Surgical admissions = 44;
  - Non-surgical admissions = 167
- Life-Space Assessment every 6 months
- Using multilevel change model to determined trajectory of Life-Space before and after hospitalization.

Brown CJ, et al. *Ann Intern Med*, 2009


= Surgical admissions
= Non-surgical admissions
Life−Space composite
70
65
60
55
50
45
40
35
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Years after enrollment

Who is at Risk?

Figure. Factors Contributing to the Development of Hospitalization-Associated Disability



Covinsky KE, et al JAMA 2011;306(16):1782-1793.

Journal of the
American Geriatrics Society

Hospital-associated disability due to avoidable hospitalizations among older adults

Rachel M. Skains MD, MSPH[1] | Yue Zhang MS, PhD[2] | John D. Osborne PhD[2] |
Tobias O'Leary BS[2] | Mackenzie E. Fowler PhD[2] |
Alayne Markland DO, MSc[2,3] | Thomas W. Buford PhD[2,3] |
Cynthia J. Brown MD, MSPH[4] | Richard E. Kennedy MD, PhD[2]

Journal of the American Geriatrics Society 2023;71:1395-1405

Methods

- Objective: Compare incidence of HAD between older adults hospitalized for Ambulatory Care Sensitive Conditions (ACSCs) versus other conditions.
- Retrospective cohort study, N=38,960 older adults ≥ 65 years
- Katz ADL done on admission and at discharge
- Used generalized linear mixed models to examine differences between hospitalization for an ACSC versus other conditions, adjusting for covariates and repeated hospitalizations.

HAD Predictors

- Age
- Non-white race
- Female gender
- Increased Comorbidities
- Dementia
- Pre-admission Katz score
- Longer LOS

TABLE 2 Predictors of HAD

	HAD
Age (65–74)	Reference
Age (75–84)	1.75 [1.66, 1.86]
Age (85–94)	2.15 [1.99, 2.33]
Age (95+)	3.18 [2.66, 3.80]
Race, White	Reference
Race, Black or African American	0.90 [0.85, 0.96]
Race, Other	0.91 [0.79, 1.04]
Gender, Female	1.16 [1.10, 1.22]
Elixhauser score	1.88 [1.68, 2.10]
Dementia	1.45 [1.33, 1.59]
Admission SIS	0.97 [0.95, 0.99]
Admission Katz score	1.20 [1.19, 1.21]
Length of stay, 1–2 days	Reference
Length of stay, 3–4 days	5.22 [4.78, 5.69]
Length of stay, 5–7 days	13.46 [12.28, 14.76]
Length of stay, 8+ days	24.95 [22.61, 27.54]
ACSC (Purdy)	0.61 [0.56, 0.66]
Observations	62,154
Subjects	38,960
Conditional R2	0.42
Marginal R2	0.31
AIC	52196.50

Comparing ACSC Admissions to Other

- 10% of admissions for ACSC; 16% of ACSC admissions developed HAD.
- HAD risk among ACSCs lower (OR 0.48, 95% CI 0.48-0.53)
- Association of LOS substantially lower
- Association for age (age > 95 years, OR 4.64, 95% CI 1.49-1.92) and Dementia (OR 1.69, 95% CI 1.49 – 1.93)were higher.

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DOI: 10.1002/alz.12527

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

FEATURED ARTICLE

Lean mass, grip strength, and hospital-associated disability among older adults in Health ABC

Rebecca J. Y. Abay[1] | Laura S. Gold[2] | Peggy M. Cawthon[3] | James S. Andrews[1]

Alzheimer's & Dementia 2022;18:1898-1906

Methods & Results

- Data from Health ABC examine association of pre-hospital appendicular lean mass (ALM) and grip strength with new ADL disability after hospitalization
- Health ABC: 3075 Black & White men and women ages 70-79, hospitalized during first 5 years of study (1997-98)
  - Reported no difficulty walking ¼ mile, climbing 10 steps or performing basic ADLs at enrollment
- 1711 used for this study

Proportion Who Died or Developed ADL Disability

TABLE 3 Number and proportion of participants who died and, among survivors, who developed new ADL disability by the next annual Health ABC assessment[a]

	Cognitive impairment,N = 201 (12%)	No cognitive impairment, N = 1510 (88%)	*P*-value*	Total N = 1711
Death	26 (13%)	147 (10%)	0.16	173 (10%)
ADL Disability*				
Any ADL	12 (6.9%)	50 (3.7%)	0.04	62 (4.0%)
Transferring	4 (2.3%)	22 (1.6%)	0.52	26 (1.7%)
Bathing	6 (3.4%)	32 (2.4%)	0.39	38 (2.5%)
Dressing	7 (4.0%)	25 (1.8%)	0.06	32 (2.1%)

[a]Activity of daily living (ADL) disability defined as newly being unable or needing help to bathe, dress, or transfer.

**P*-value comparing those with and without cognitive impairment.

Results

Results:

- Grip strength but not appendicular lean mass was negatively associated with ⇧ risk of HAD
  - Weaker baseline grip strength associated with increased risk of HAD
- Association greater among those with cognitive impairment

Recent Interventions

ARTICLE | Annals of Internal Medicine

Trajectories of Life-Space Mobility After Hospitalization

Cynthia J. Brown, MD, MSPH; David L. Roth, PhD; Richard M. Allman, MD; Patricia Sawyer, PhD; Christine S. Ritchie, MD, MSPH; and Jeffrey M. Roseman, MD, PhD, MPH

Hospital Mobility Program

- 100 patients at Birmingham VAMC
- Not delirious or demented, walking 2 weeks PTA
- Randomly assigned to Mobility Program or Usual Care
- Twice daily walks with daily motivational interviewing; focused on barriers and goals
- One-month telephone follow-up

Hospital Mobility Program

Table 2. Analysis of Mean ADL and Life-Space Assessment Scores by Intervention Group[a]

Variable	Mean (SD)		*P* Value
	MP	UC	
ADL			
2 Weeks prior	8.0 (0.21)	8.0 (0.26)	.83
Admission	8.4 (0.27)	8.7 (0.33)	.47
Discharge	8.1 (0.29)	8.0 (0.25)	.96
After hospitalization	8.2 (0.30)	8.2 (0.32)	.99
Life-Space Assessment			
Admission	53.9 (4.15)	51.5 (2.99)	.46
After hospitalization	52.6 (4.39)	41.8 (3.15)	.02

Brown CJ, et al. JAMA Intern Med. 2016

Research

JAMA Internal Medicine | Original Investigation

Effect of a Ward-Based Program on Hospital-Associated Complications and Length of Stay for Older Inpatients
The Cluster Randomized CHERISH Trial

Alison M. Mudge, MBBS, PhD; Prue McRae, BPhty, MPhil; Merrilyn Banks, PhD; Irene Blackberry, PhD; Sally Barrimore, MNutrDiet; John Endacott, MBBS; Nicholas Graves, PhD; Theresa Green, RN, PhD; Gill Harvey, PhD; Ruth Hubbard, MBBS, MD; Sue Kurrle, MD, PhD; Wen Kwang Lim, MBBS, MD; Karen Lee-Steere, BSci(OccThy); Phil Masel, MBBS; Shaun Pandy, MBBS; Adrienne Young, PhD; Adrian Barnett, PhD; Sharon K. Inouye, MD, MPH

- Ward based improvement program (Eat Walk Engage) to deliver age friendly care during hospitalization
- Cluster randomized trial enrolled 539 patients age > 65 years with 6-month follow-up
- Trained facilitator supported multidisciplinary work group to improve care practices, environment and culture to support age friendly care principles.

Key Study Principles

- Adequate nutrition and hydration
- Early and progressive mobility and functional independence
- Meaningful cognitive and social engagement
- Multidisciplinary team communication

Table 3. Proportion of Patients Experiencing HAC-OPs

Complication	Patients, No./total No. (%)		Adjusted OR (95% CI)[a]
	Intervention group	Control group	
Any HAC-OP	115/248 (46.4)	129/249 (51.8)	1.07 (0.71-1.61)
Hospital-associated disability[b]	80/252 (31.7)	86/253 (34.0)	1.23 (0.80-1.89)
Hospital-associated delirium[c]	37/233 (15.9)	69/220 (31.4)	0.53 (0.31-0.90)
Hospital-associated incontinence[d]	30/225 (13.3)	30/221 (13.6)	1.25 (0.69-2.24)
Hospital-associated pressure injury	18/265 (6.8)	18/274 (6.6)	1.56 (0.73-3.31)
Hospital-associated fall	11/265 (4.2)	12/274 (4.4)	1.44 (0.57-3.60)

JAMA Network Open

Original Investigation | Geriatrics

Exercise Intervention and Hospital-Associated Disability
A Nonrandomized Controlled Clinical Trial

Carlos Rodriguez-Lopez, PhD; Jennifer Mayordomo-Cava, PhD; Teresa Zarralanga-Lasobras, PT, MSc; Vicente Romero-Estarlich, MD; Maria Teresa Vidan, MD, PhD; Javier Ortiz-Alonso, MD; Pedro L. Valenzuela, PhD; Gabriel Rodriguez-Romo, PhD; Alejandro Lucia, MD, PhD; Jose Antonio Serra-Rexach, MD, PhD

JAMA Network Open 2024;7(2):

Intervention

- Open label, nonrandomized clinical trial
- Patients age > 75 years, n=260, hospital in Spain
- Intervention: Supervised multicomponent exercise program
  - Daily strength, balance, and walking exercises plus inspiratory muscle training
  - Health education on exercise at home
  - Telephone counseling follow-up

Results

In the intervention group using Barthel Index:

- Lower incidence of HAD at discharge (OR 0.47; 95% CI 0.27-0.81; *P*= .01) and at follow-up (OR 0.36; 95% CI 0.20-0.66; *P*= .001)
- Lesser decline in ambulatory capacity (OR 0.55; 95%CI 0.32-0.65; *P*= .03
- Improved physical performance at discharge (Cohen d, 0.39; 95%CI 0.12-0.65; *P*= .004
- No significant associations for readmissions, falls, or mortality

Potential Paradigm Shift

Perspective

Rethinking Hospital-Associated Deconditioning: Proposed Paradigm Shift

Jason R. Falvey, Kathleen K. Mangione, Jennifer E. Stevens-Lapsley

Physical Therapy Journal 2015;95(9):1307-1315.

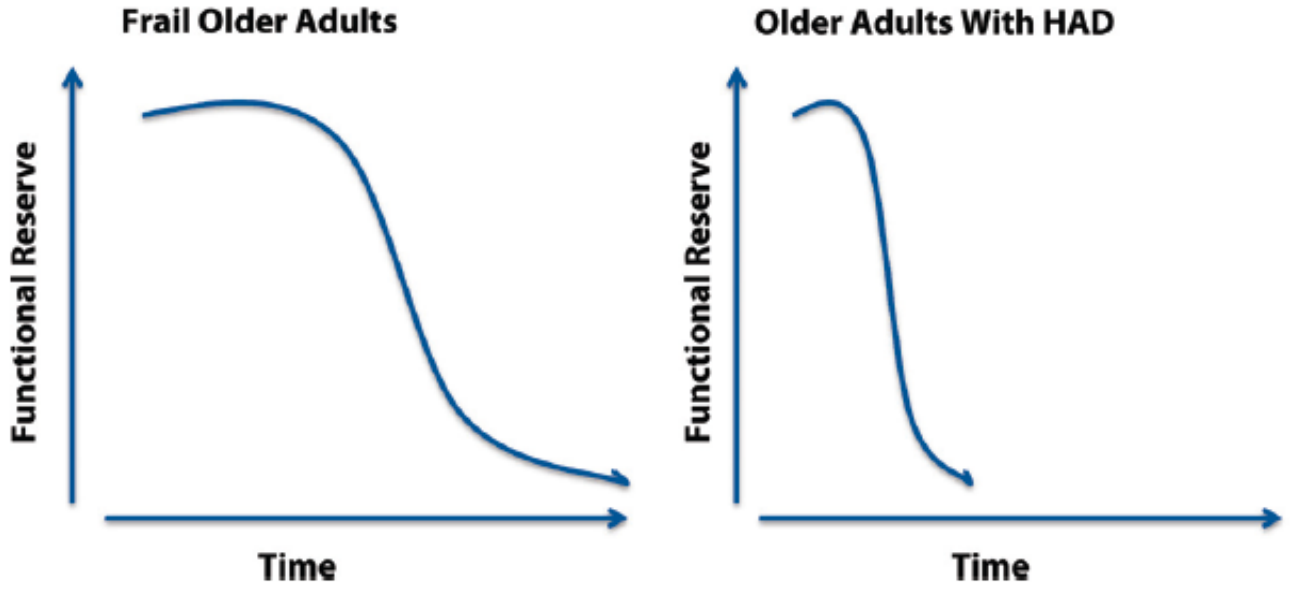

Figure 1.

Differing trajectories leading to a loss of functional reserve in older adults. HAD=hospital-associated deconditioning.

Current Rehabilitation Hierarchy versus Updated Rehabilitation Hierarchy for patients with HAD

Current Rehabilitation Hierarchy for Older Adults With HAD

Updated Rehabilitation Hierarchy for Older Adults With HAD

Summary

- In study of older adults who developed HAD[1]:
  - 41% died by 1 year;
  - 29% remained disabled at 1 year; and
  - 30% returned to pre-illness level of function
- Risk factors have been identified
- Exercise interventions are promising
- Paradigm shift may be required to reduce or prevent HAD

1 Boyd CM, et al. J Am Geriatr Soc. 2008;56(12):2171-2179.