
Frailty:
A useful concept in Long Term Care
Underwriting?

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An expert is someone who comes from
another place and brings slides

Michael O'Donnell

And speaks the language?

Elderly Underwriting: 1

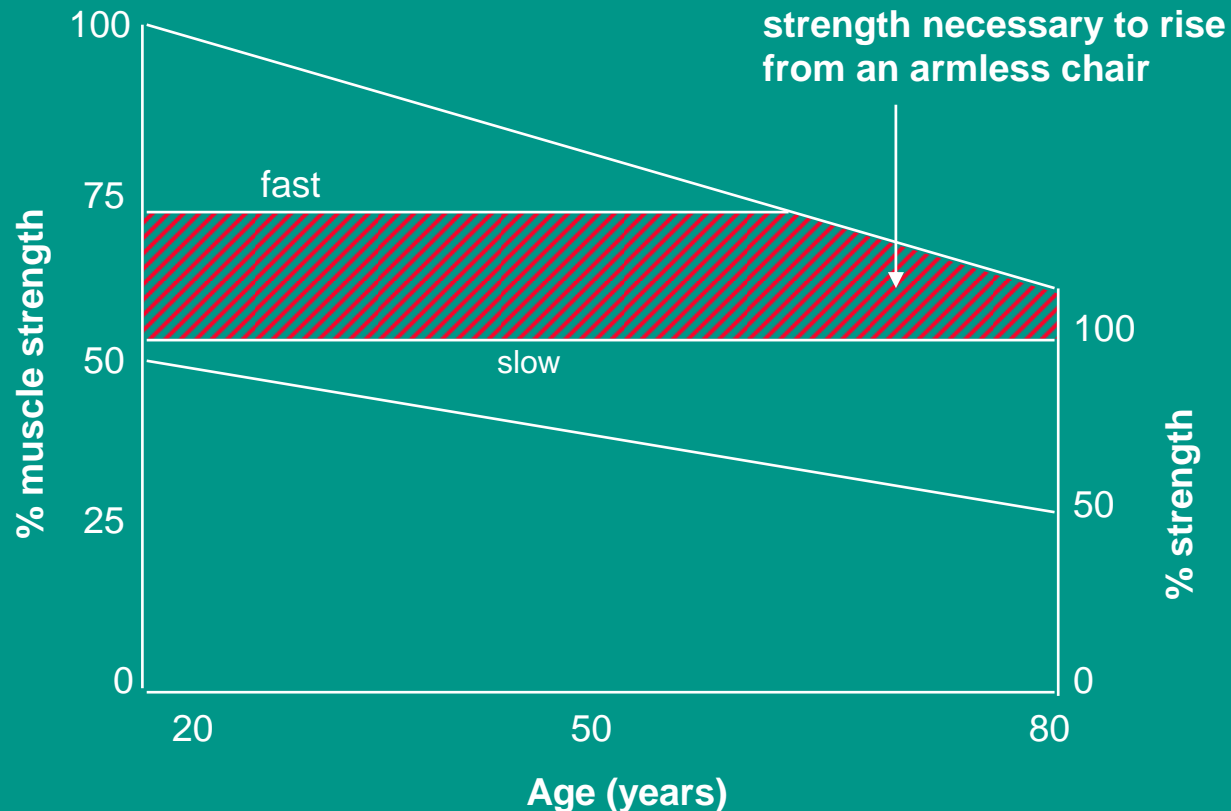
- Ageing & non-ageing processes
 - cohort effects
 - selective survival
 - differential challenge
 - period effects
- Reduced adaptability
 - functional decline
 - reduced reserve



Elderly Underwriting: 2

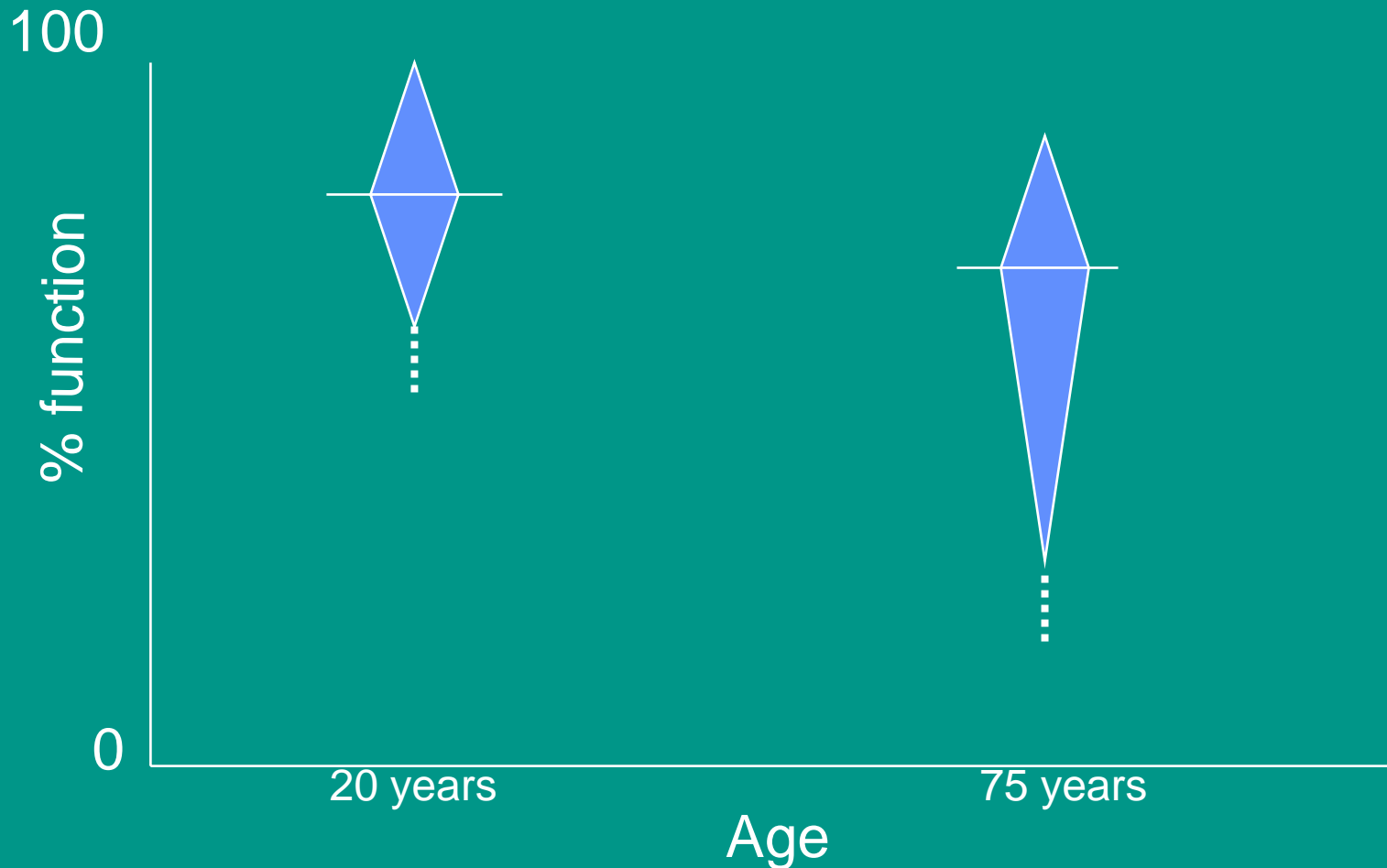
- Increased heterogeneity
- What is 'normal' for pricing purposes?
- Biological vs Chronological age
- Theoretical threshold v dynamics
- Importance of fitness (training)

Theoretical Threshold and Loss of Reserve

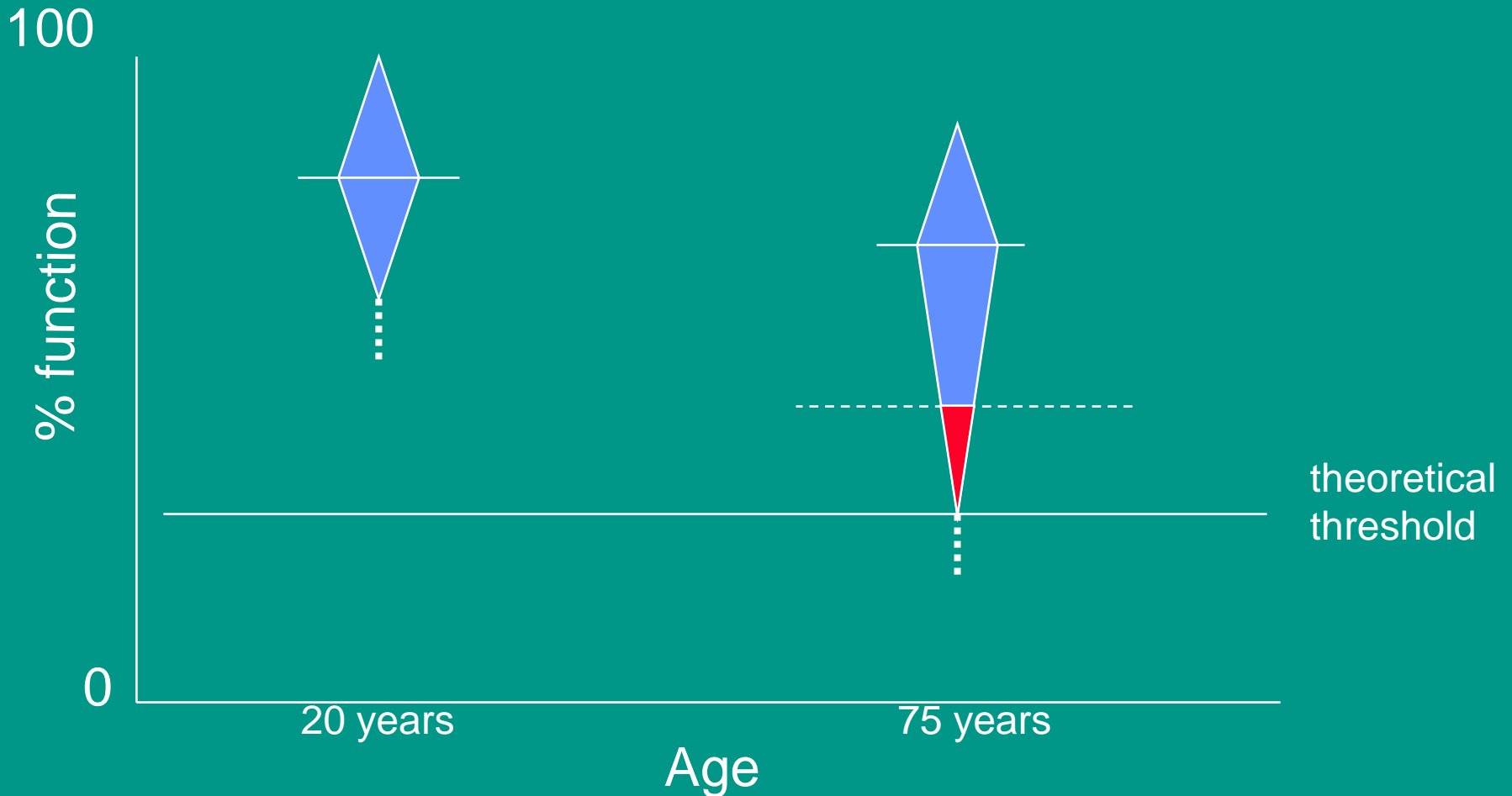


adapted from Young (1986)

The importance of heterogeneity and reduced function



The importance of heterogeneity and reduced function



Frailty: what is it?

Two Models

- **Dependency/dysfunction/disease**
 - Woodhouse et al, 1998; Winograd et al 1991
- **Multisystem reduced resistance/
adaptability**
 - Verbrugge 1991; Campbell & Buchner 1997

Frailty

- Consequence of ageing + disease
- Reduced resistance to minor stressors - often environmental
- Produces unstable disability or increased risk of disability
- Possibility of modification/improvement

Adapted from Campbell & Buchner, 1997

Frailty: a dynamic model

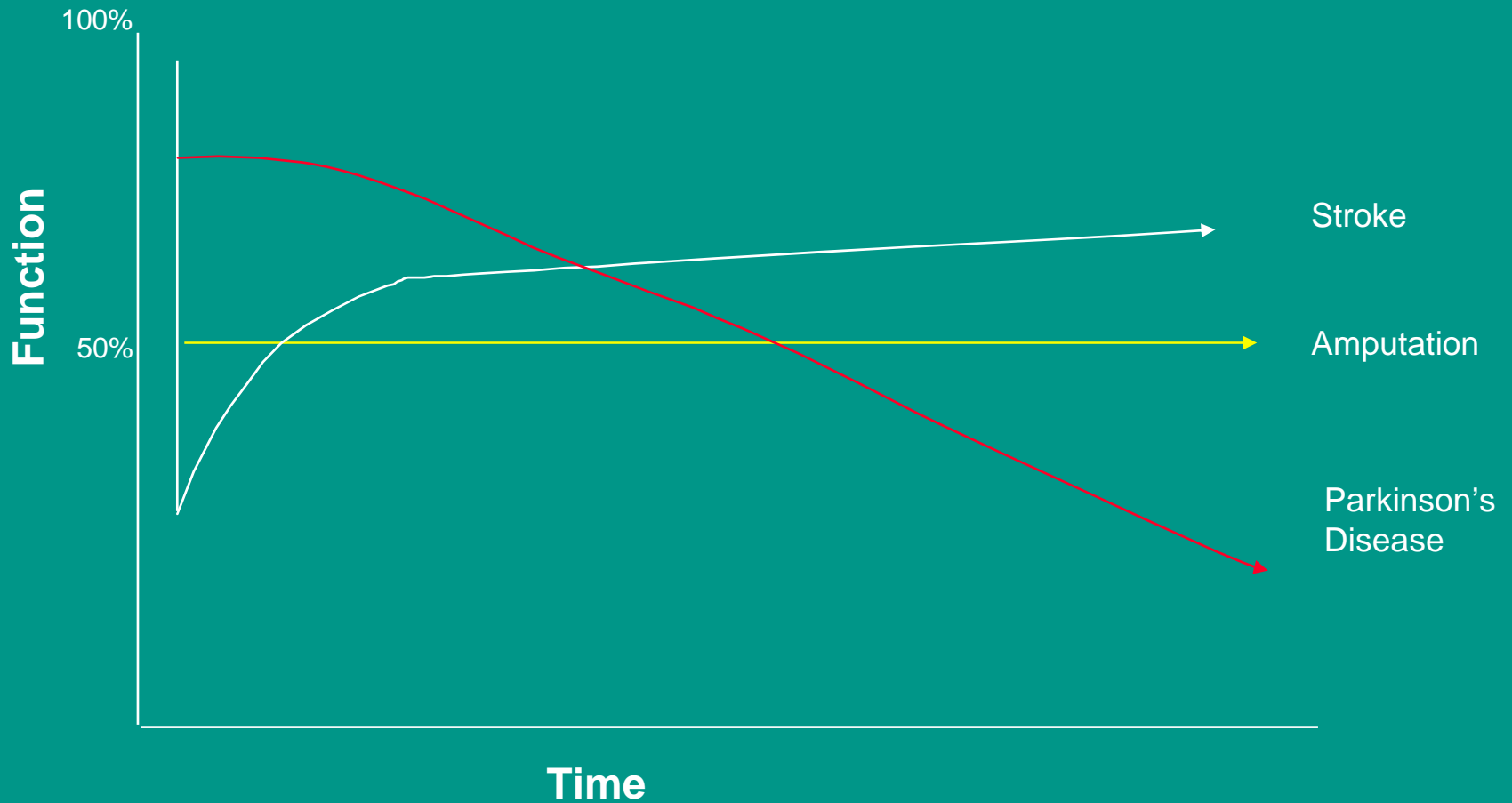
Positive Features

- **No impairments**
- **Functional Reserve**
- **Preserved Cognition**
- **Positive outlook**
- **Social Support**

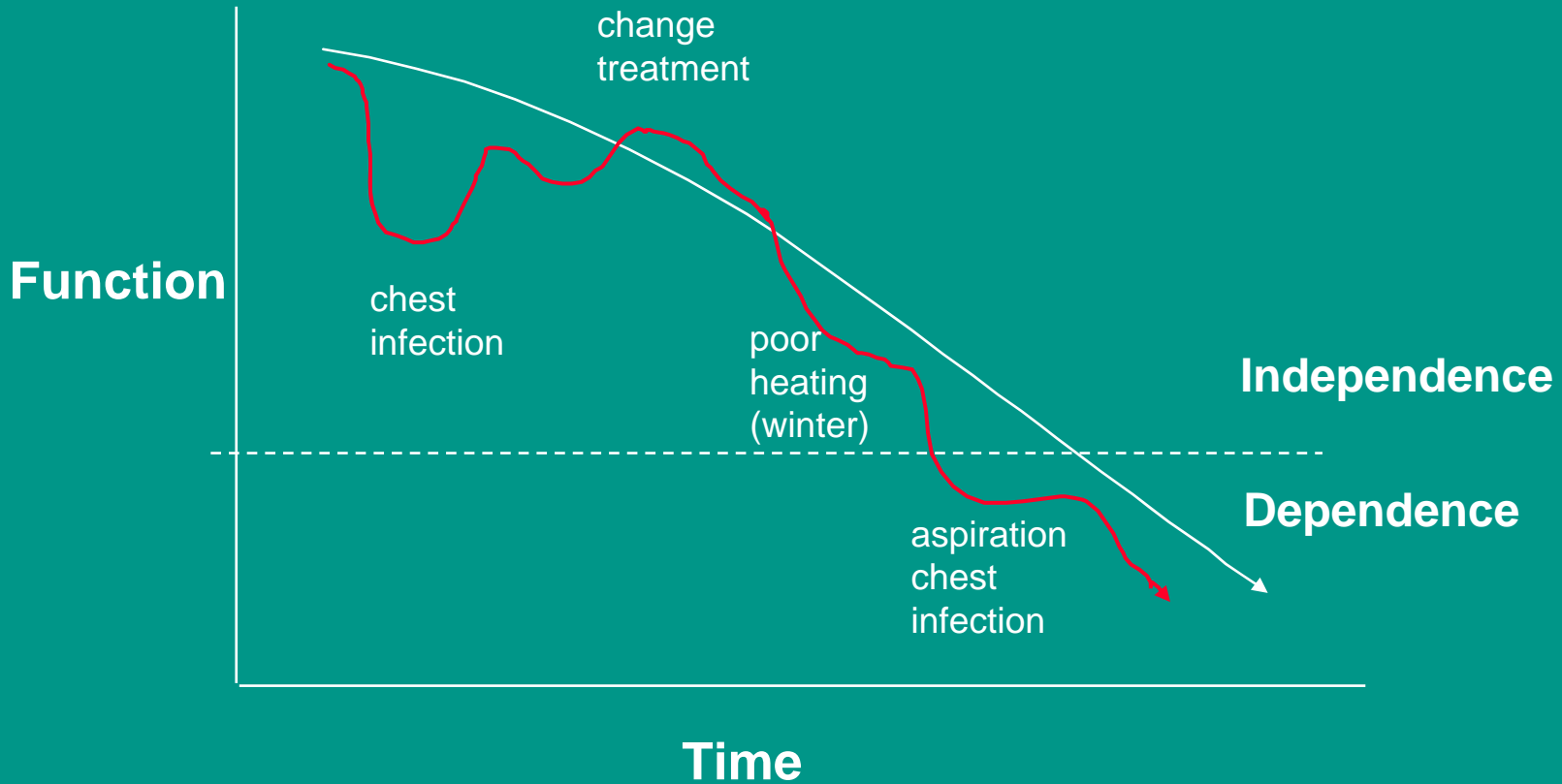
Negative Features

- **Impairments**
- **Poor reserve**
- **Forgetfulness**
- **Negative outlook**
- **Poor social**

Disability & time trends



Disability Time Trends



Components of frailty

musculoskeletal function

aerobic capacity

cognitive/neurological/motivation

nutrition

Modified from Campbell & Buchner, 1997

Musculoskeletal Function

- Components:
 - strength
 - power
 - suppleness & dexterity
 - reach
- Measurement
 - grip strength
 - chair stand
 - dressing

Musculoskeletal Function

Lower limb function and disability (>70 years)

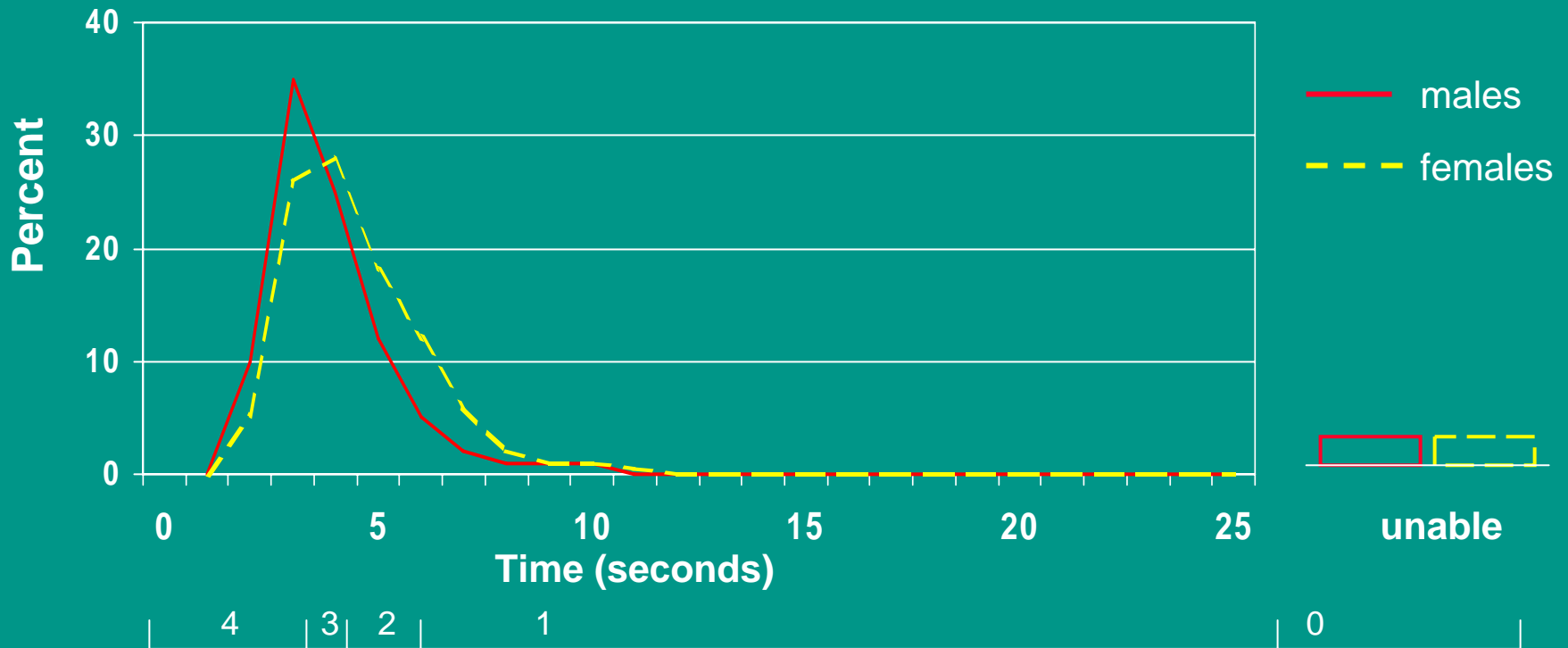
Rising from a Chair:	5x timed
2.4 m Walk	Timed
Standing balance	Tandem, semi tandem side by side- 10 sec's.

Lay assessors: 10-15 minutes

Guralnik et al, 1994

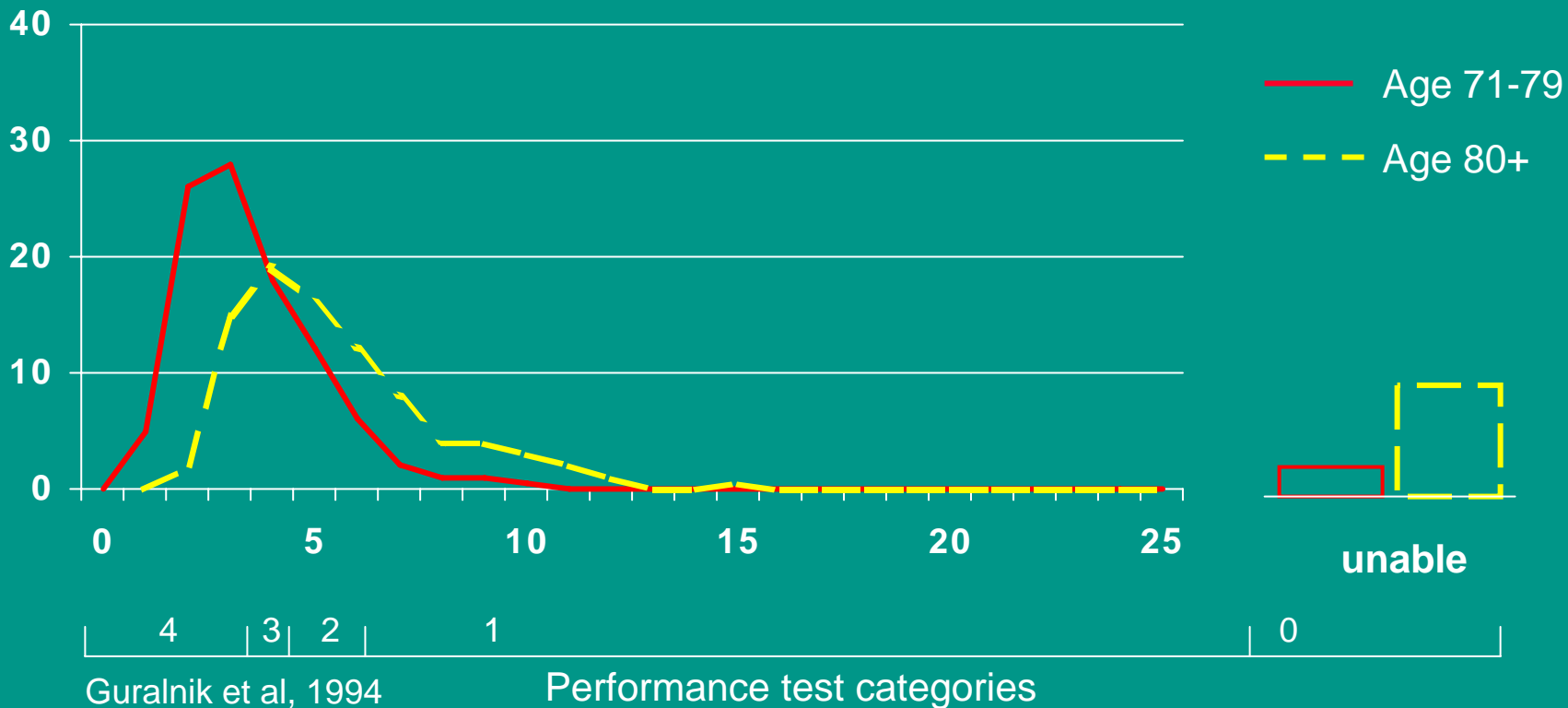
Distribution of times to walk 8 feet

Age 71-79

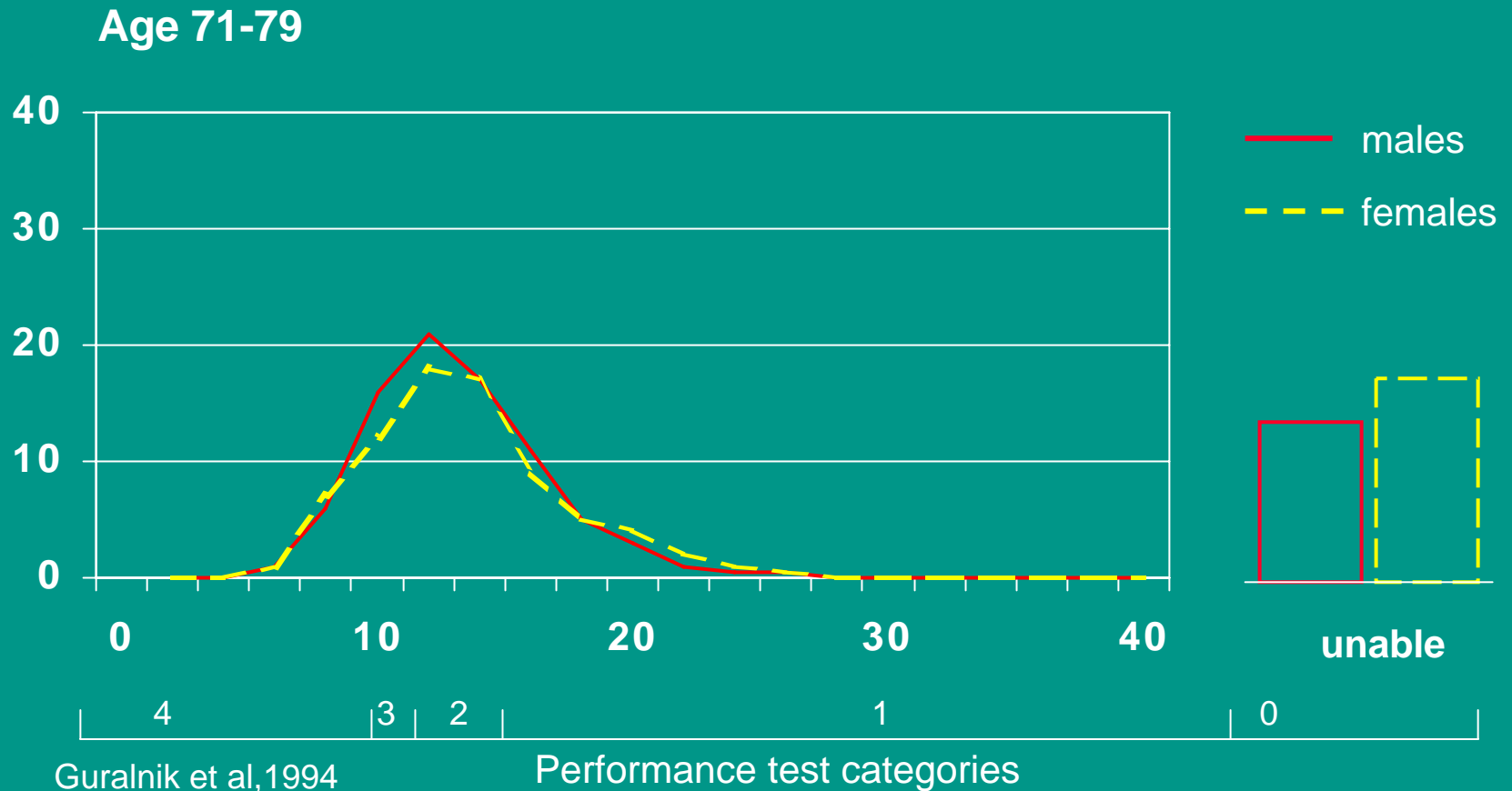


Guralnik et al, 1994

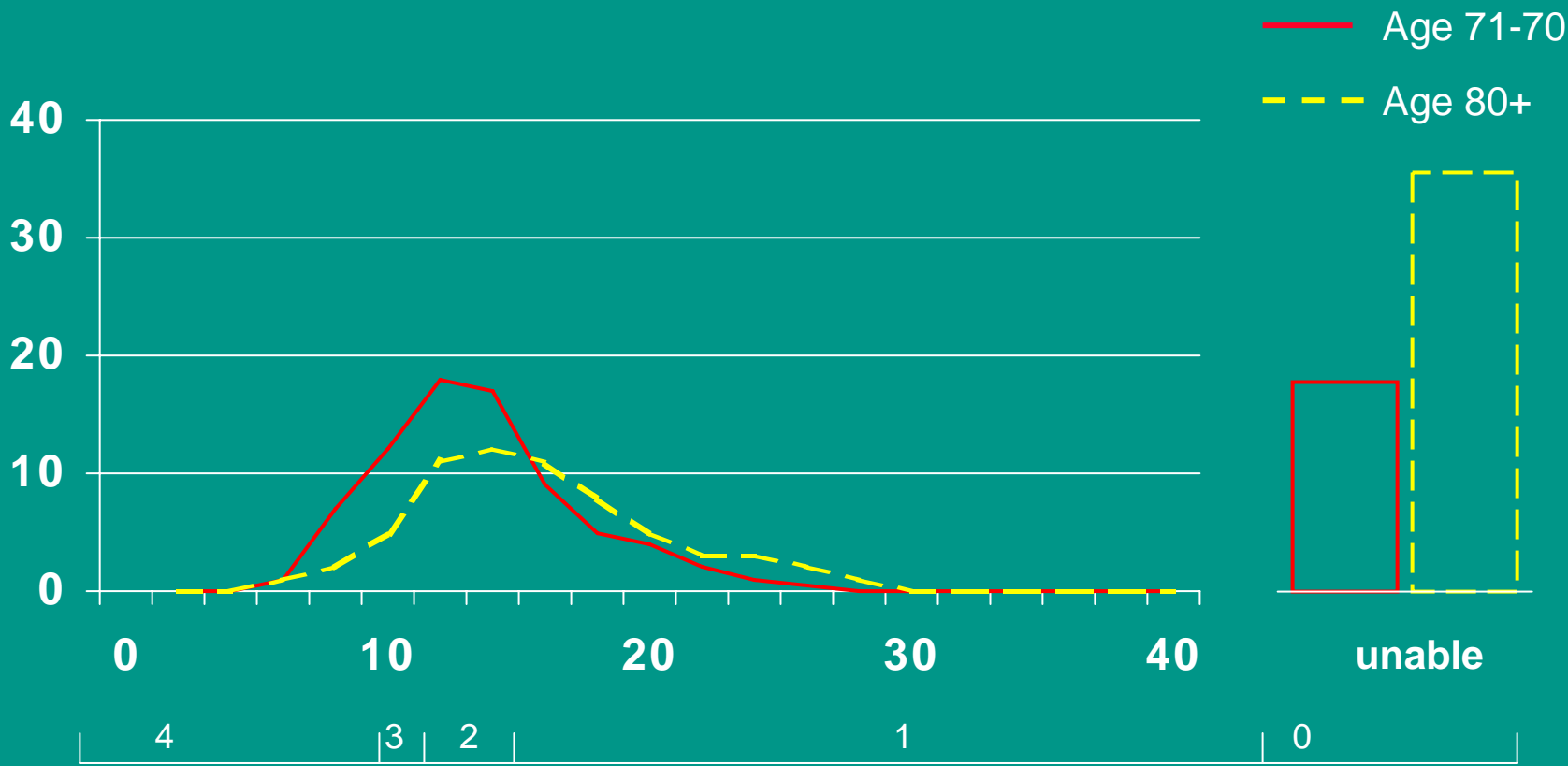
Distribution of times to walk 8 feet according to age group and sex: Females



Distribution of times to complete five chair stands



Distribution of times to complete five chair stands: Females



Guralnik et al, 1994

Performance test categories



Musculoskeletal Function

Lower limb function and disability (>70 years)

Rising from a Chair

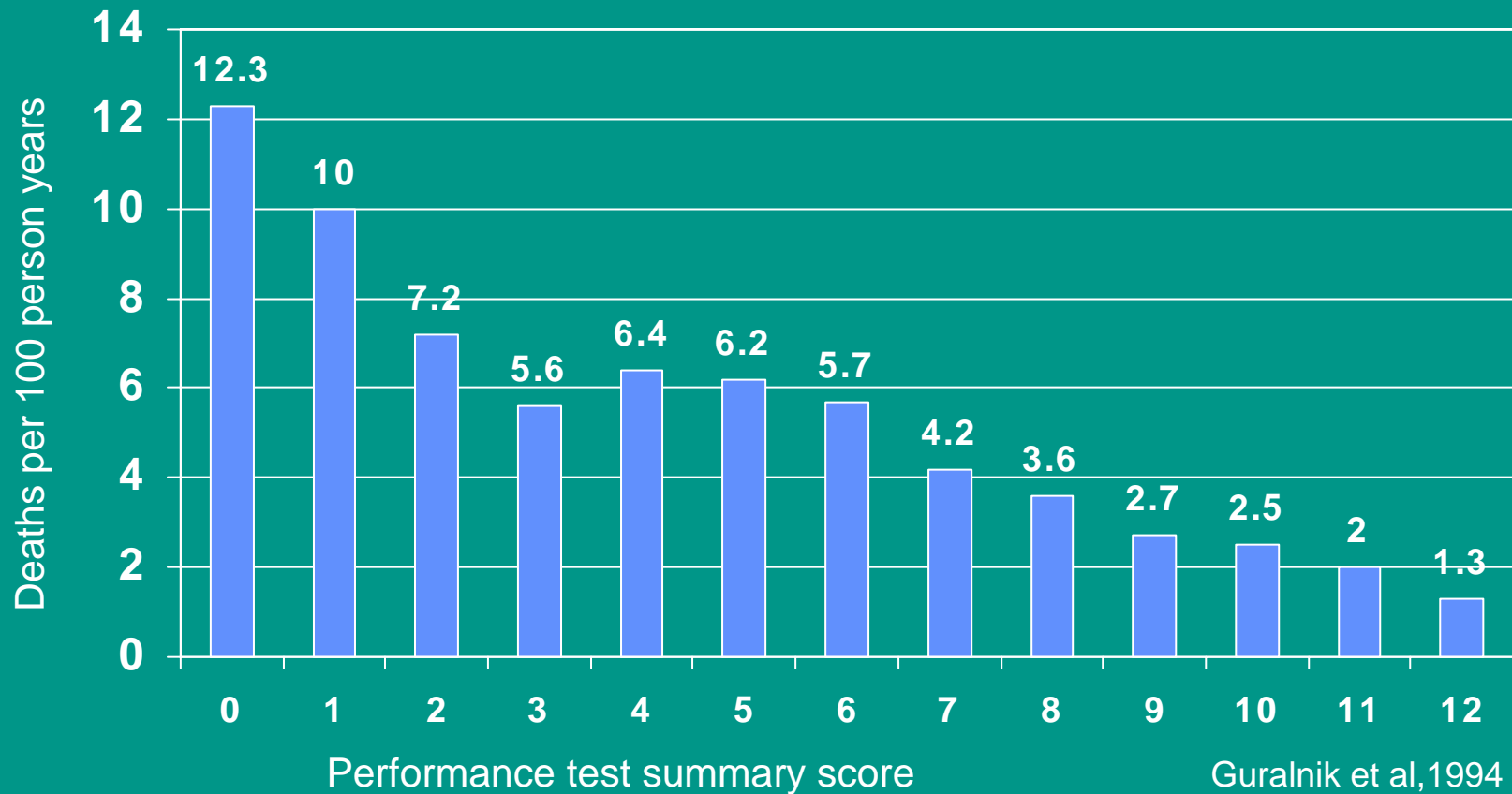
2.4 m Walk

Standing balance

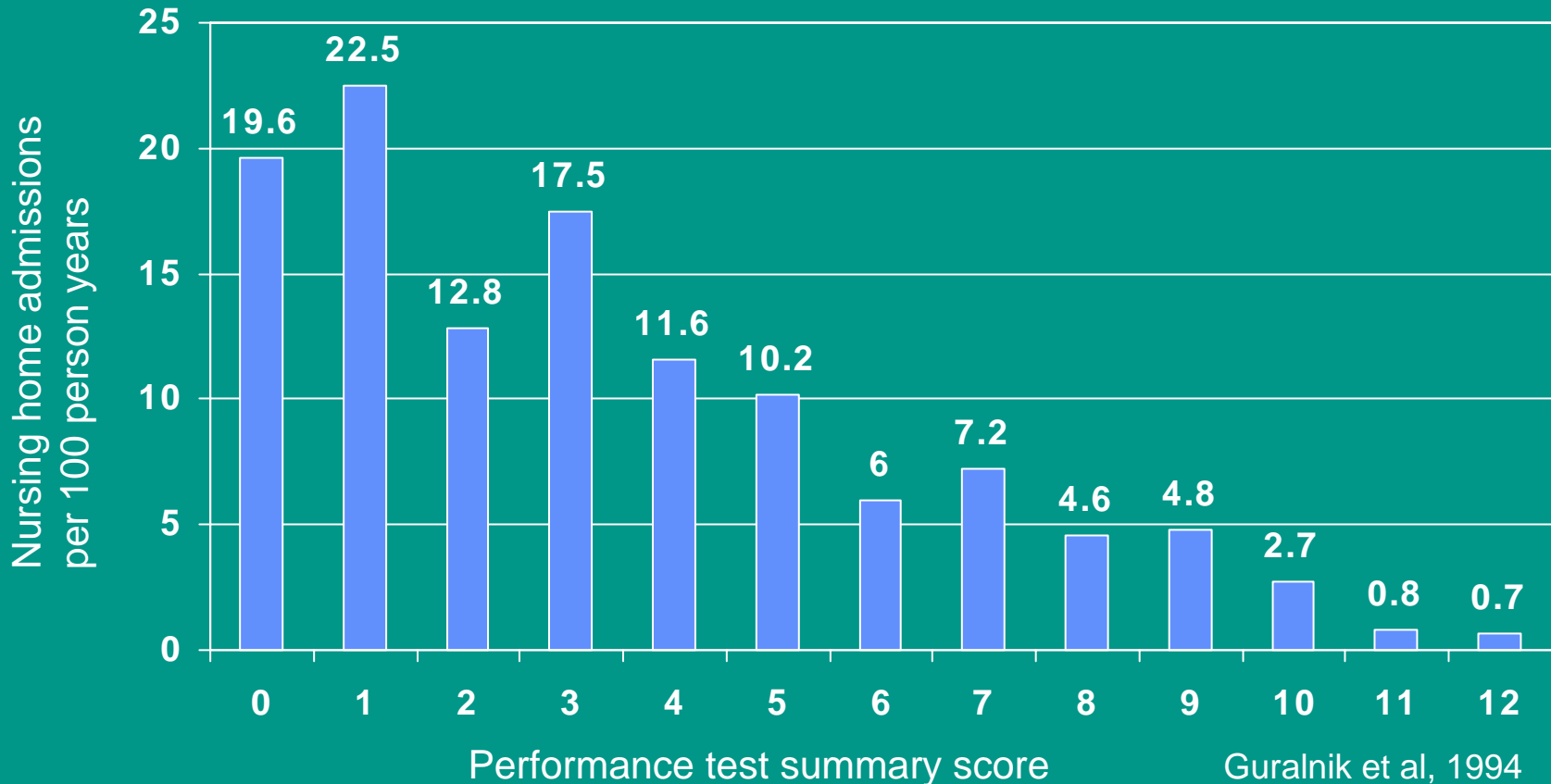
Graded from 0 (worst) to 4 (best): min 0/max 12

Guralnik et al, 1994 .

Age and sex adjusted death rate: Boston, Iowa and New Haven



Age and sex-adjusted nursing home admission rate: Iowa site (average 2.6 years follow up)

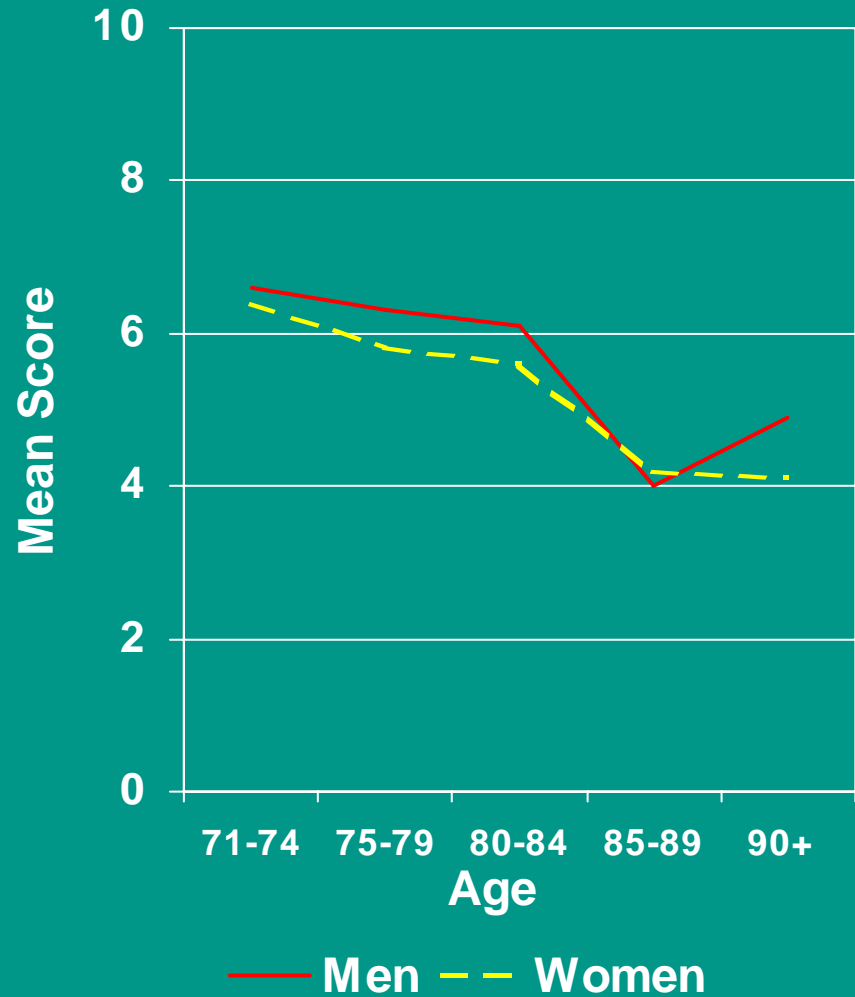


Mean scores on summary performance scale according for those who report needing no help: activities of daily living, climbing stairs and walking half a mile



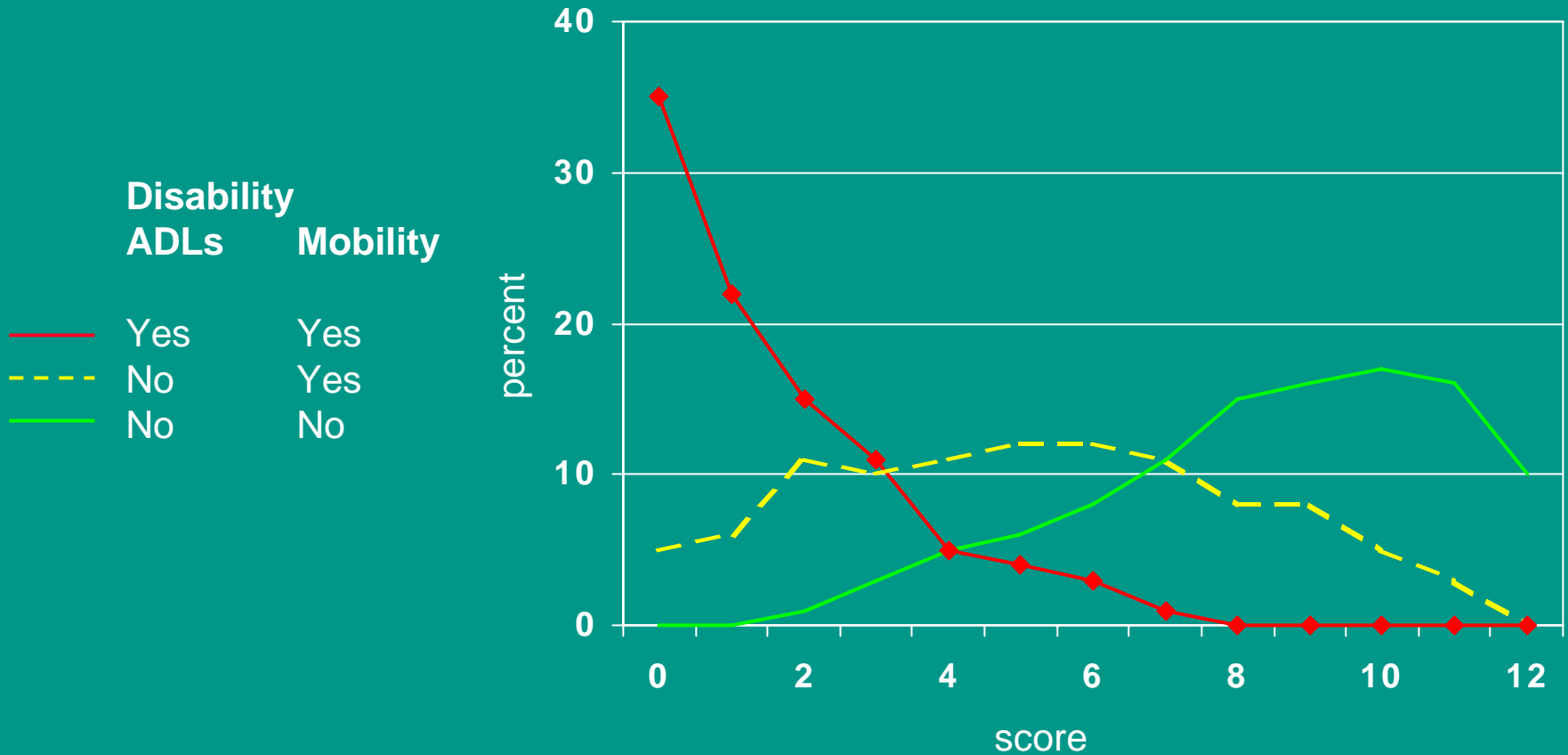
Guralnik et al, 1994

Mean scores on summary performance scale for those who report they cannot walk one half a mile without help but need no help with activities of daily living and climbing stairs



Guralnik et al,1994

Performance Scores and Self Reported Disability



Musculoskeletal Function: important?

**Lower limb function and disability (>70 years):
Adjusted risk estimates for ADL disability
4 year follow up**

Score	RR (95% CI)
4-6	4.2 (2.3 - 7.7)
7-9	1.6 (1.0 - 2.6)
10-12	1.0

Guralnik et al, 1995

Musculoskeletal Function: important?

**Lower limb function and disability
(>70 years):**

**Adjusted risk estimates for ADL disability- no
problems at baseline (n=400)**

Score	RR (95% CI)
4-6	7.1 (2.4 - 20.9)
7-9	1.3 (0.6 - 2.9)
10-12	1.0

Guralnik et al, 1995

Gait speed as a clinical sign

1 year adverse outcome; n=431

Gait speed	ADV (%)	unadj RR
<0.6m/sec	46	2.8 (2.2-3.8)
0.6-1.0m/sec	32	2.5 (2.1-3.1)
>1.0m/sec	19	1.0

Mean (±SD) walking speed: 0.89m/sec (0.25)

Studenski et al, 1998

Grip Strength & Physical Activity

Age 75 years at baseline

	Baseline	5 year FU
Men	393 (86)	369 (93) Newtons
Women	237 (53)	198 (56)
Men		
AA	417 (92)	387 (102)
SS	371 (76)	339 (91)

Rantanen et al, 1997

‘It is possible for anyone, given a lot of guts and a bit of luck, to overcome gigantic misfortunes and terrible illness’

Roald Dahl



Components of frailty: measurement

musculoskeletal function

grip strength

chairstand

timed walk

aerobic capacity

6 minute walk

submaximal treadmill

cognitive/neurological

MMSE/DWR

GDS

standing balance

locus of control/world view

nutrition

body mass index

arm muscle area

Modified from Campbell & Buchner, 1997

Frailty: a way forward?

musculoskeletal function

grip strength/chairstand
recreation (walking)

aerobic capacity

lifespace/6 minute walk
submaximal treadmill
FEV1/FVC

cognitive/neurological

4 item GDS
MMSE/DWR/Clock Drawing
standing balance test
Philadelphia Geriatric Morale
Scale

nutrition

body mass index
albumin

Life space: an index of Frailty?

- BUT HOW RELIABLE IS SELF REPORT?
 - 13.6% who couldn't walk 8ft said they could walk half a mile!
- Direct Measurement & Self Report are complementary?
 - Which would you choose?

IADL: Life space as an index of Frailty

- Driving
 - self-imposed restrictions?
 - recently stopped
 - accident profile
- Public Transport travel
- Crossing a busy street
- Visiting Relatives
- Regular exercise?

Risk of ADL Failure

- Aetiological factors
- Disease
- Disability
- Frailty
- Social/personality attributes
- Mental status

Examples

smoking, BMI, hypertension

stroke, CORD, foot problems, OA

reduced mobility, continence

timed walk/chair stand, aerobic capacity, balance

socialisation, recreation, IADL, AADL, world view

mood, cognitive impairment



Caution

- Know what the pricing assumptions are
- Beware over measurement
 - know how to interpret the data eg balance testing, timed walk
 - holism vs quantification
- Avoid needless repeated estimation of the same measures
- Changes in social function/ curtailment of activities suggest frailty/occult pathology

100%

100%

100%

100%