

Estimating Prognosis in the Elderly: Why and How?

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 - Sei Lee
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Overview

- Why is estimating prognosis in the elderly important?
- How can we estimate prognosis in clinical settings?

Learning Objectives

After attending this activity, participants will have the ability to:

- Describe at least 2 scenarios in which estimating prognosis in the elderly is important
- Identify 3 separate mechanisms to estimate prognosis in clinical settings
- Discuss whether prognostic tools should be freely available to patients

What is Prognostication?

- The Two parts:
 1. Estimating the probability of an individual developing a particular outcome over a specific period of time (prognosis).
 2. Communicating the prognosis with the patient and/or family.

Case: Ms A

- Ms. A is a 68 year old clinic patient with congestive heart failure, COPD, dependence on others for shopping, and difficulty walking a quarter mile.
- Should you recommend that Ms. A have colon cancer screening?

1. Yes
2. No



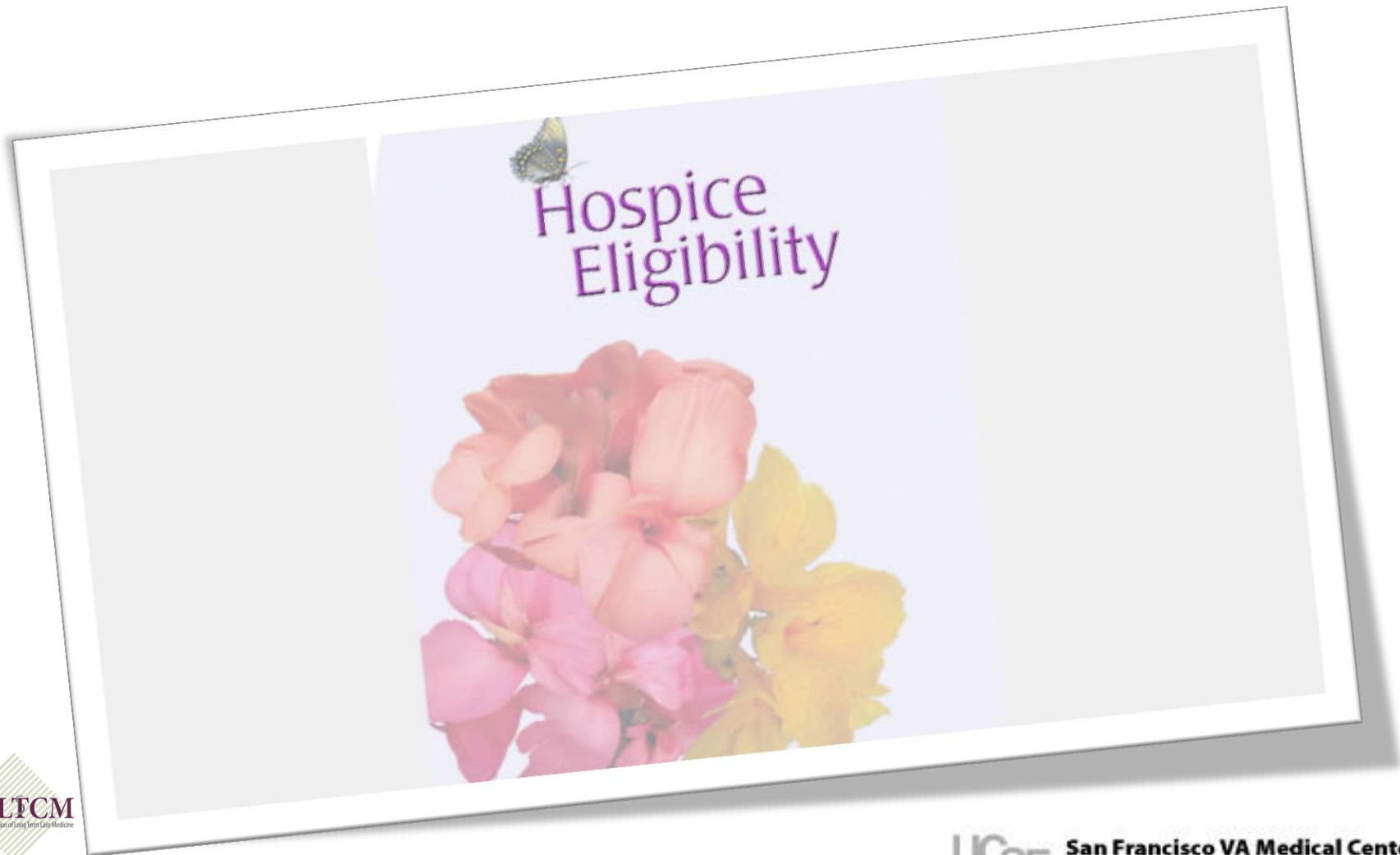
Why
Prognosticate?



Why Do it?

- Provides information to determine realistic, achievable goals of care
- Gives likelihood that an intervention will be consistent with these goals
 - “If your heart stops, do you want electrical shocks and chest compressions to try to get your heart beating again?”

Medicare Benefits / Services



Preparation for Advanced Stages of Disease and End Of Life

**CARE OF THE AGING PATIENT:
FROM EVIDENCE TO ACTION**

CLINICIAN'S CORNER

Finances in the Older Patient With Cognitive Impairment "He Didn't Want Me to Take Over"

Eric Widera, MD

Veronika Steenpass, MD

Daniel Marson, JD, PhD

Rebecca Sudore, MD

THE PATIENT'S STORY

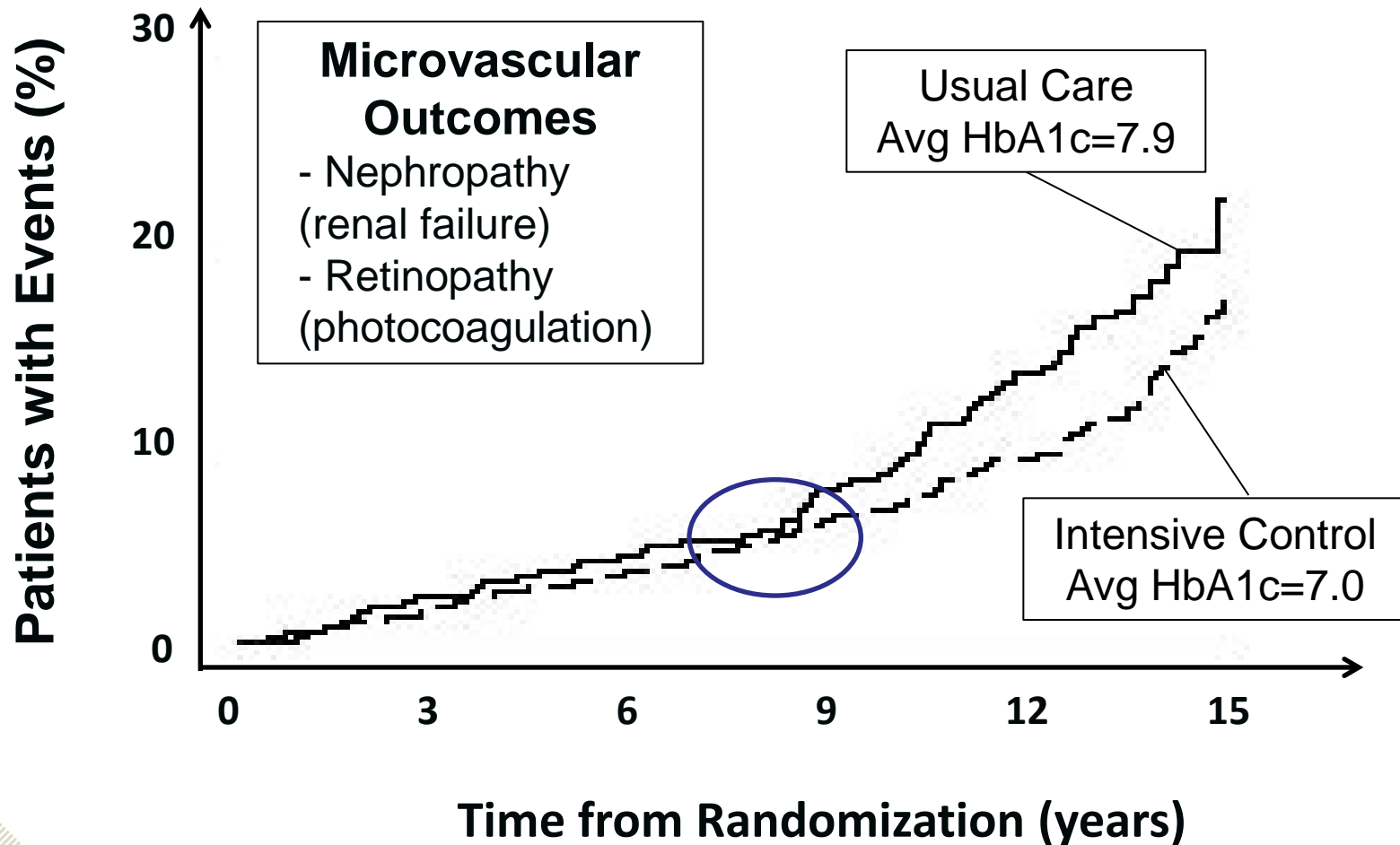
Mr L is a 76-year-old retired salesman. He is of Japanese descent and has a history of Alzheimer dementia, transient ischemic attacks, carotid stenosis, type 2 diabetes, hypertension, dyslipidemia, presbycusis, and radiation treatment for parotid carcinoma (4 years ago). He presented as a new patient to a geriatrics primary care clinic accompanied by his daughter. He had been diagnosed with Alzheimer dementia 2 years earlier at a memory disorders clinic and had been taking donepezil, 10 mg and memantine, 10 mg twice a day

Financial capacity can be defined as the ability to independently manage one's financial affairs in a manner consistent with personal self-interest. Financial capacity is essential for an individual to function independently in society; however, Alzheimer disease and other progressive dementias eventually lead to a complete loss of financial capacity. Many patients with cognitive impairment and their families seek guidance from their primary care clinician for help with financial impairment, yet most clinicians do not understand their role or know how to help. We review the prevalence and impact of diminished financial capacity in older adults with cognitive impairment. We also articulate the role of the primary care clinician, which includes (1) educating older adult patients

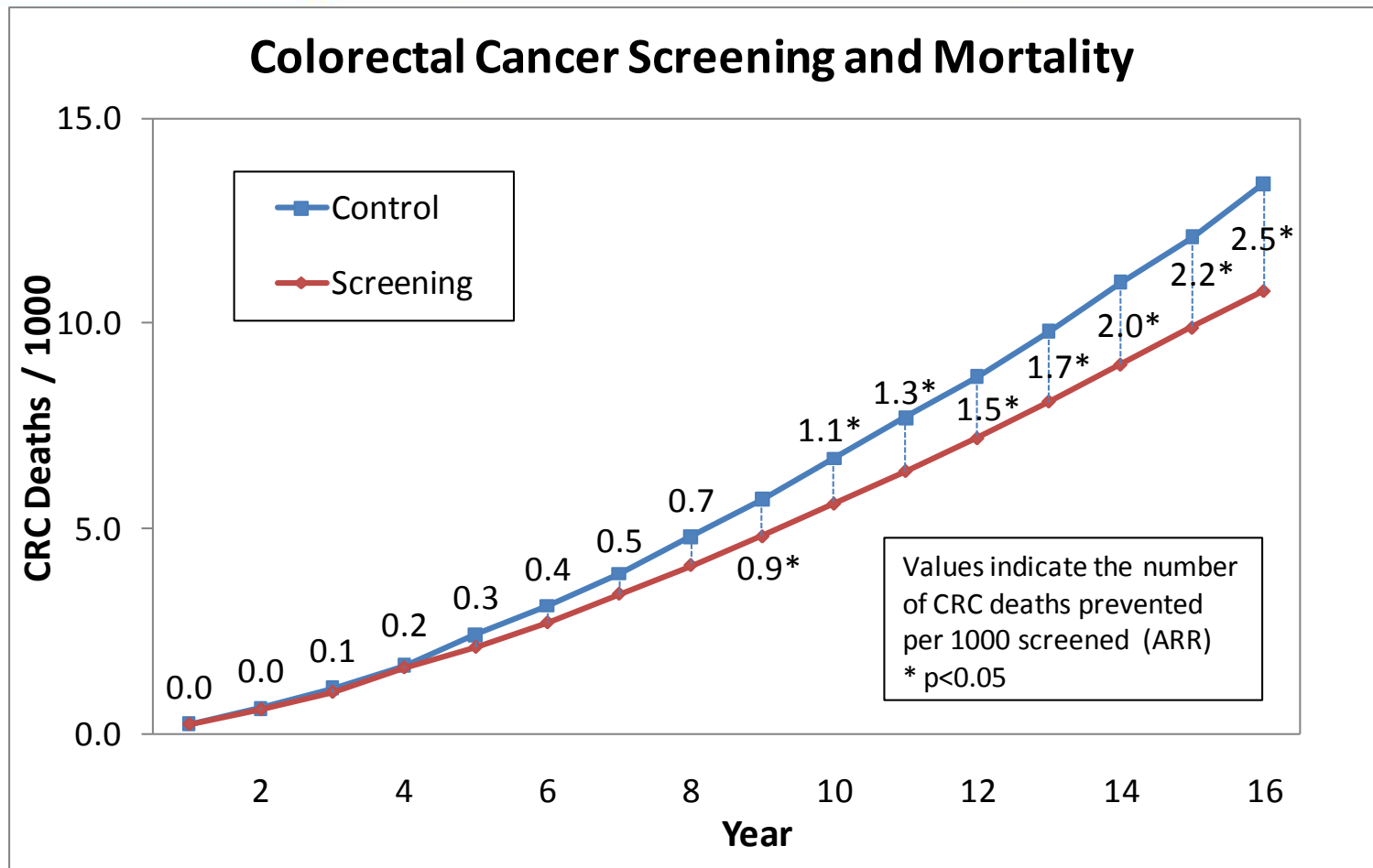
Identifies Patients Most Likely to Benefit from Preventative Care

- Patients with poor prognosis are
 - unlikely to survive to benefit for interventions that have delayed benefits
 - Yet they are exposed to the risks
- Intervention should be targeted to patients whose life expectancy $>$ time to benefit.

Glycemic Control: UKPDS



Colorectal Cancer Screening




USPSTF Guidelines

- Age 50-75: Routine screening
- Age 75-85: Small or Marginal Benefit, recommend against routine screening
- Age 85+: Recommend against screening
- These are guidelines, which should be filtered through clinical judgment
- USPSTF also recommends clinicians target screening to healthier patients with good prognosis

Guidelines and Prognosis

- “One-size-fits-all” approach to medical care based on age does not work in diverse elderly population
 - Great variation in life expectancy/preferences
- More guidelines now base recommendations on prognosis rather than age alone
 - Ex. Cancer screening (Stop if limited life expectancy)
 - Ex. Diabetes Care (Higher A1c if limited life expectancy)

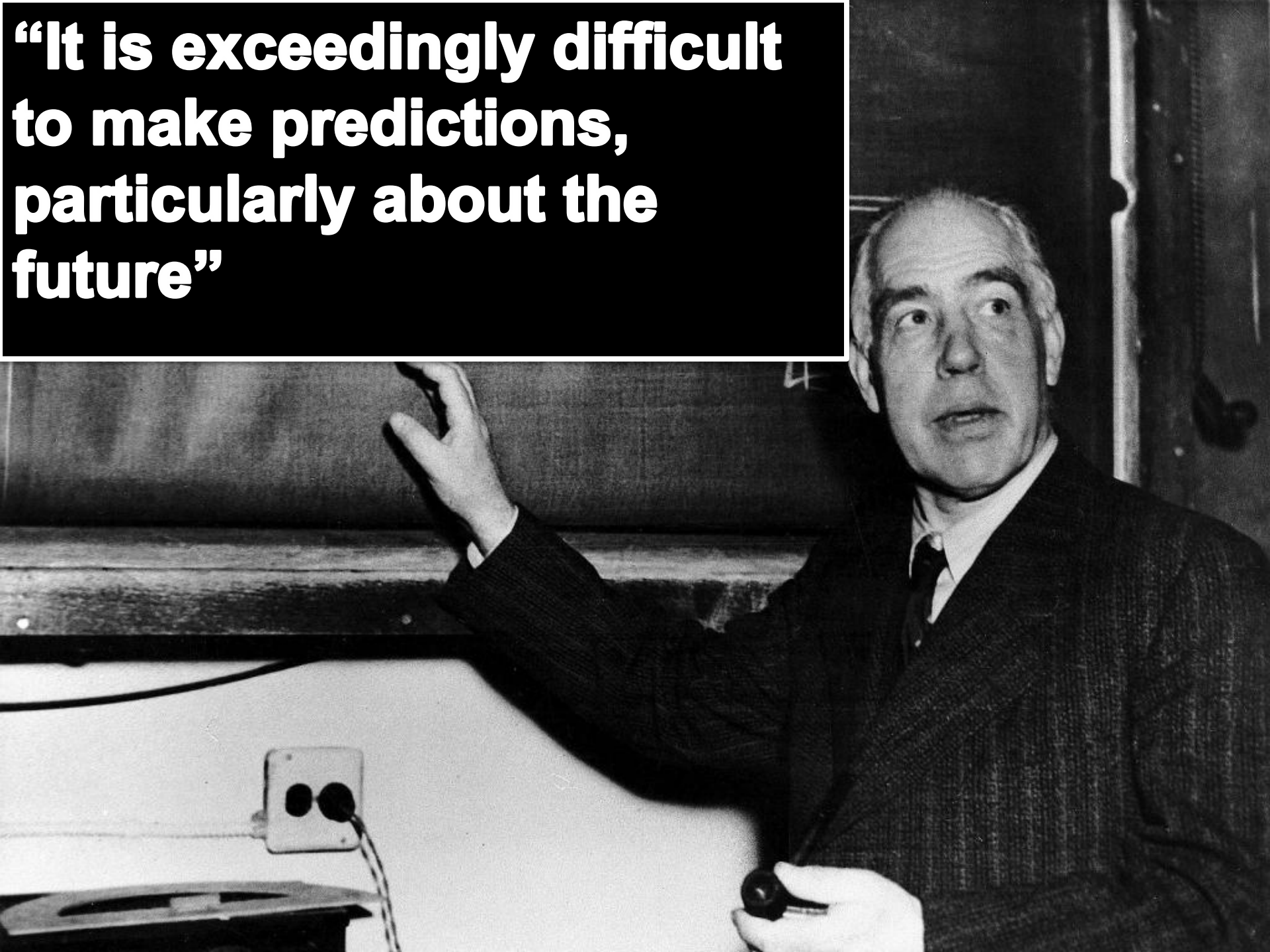


If guidelines say we are
supposed to estimate
prognosis, do they say how?

Why is Estimating Prognosis so Hard?


- In general?
- In the elderly?

“It is exceedingly difficult to make predictions, particularly about the future”



Challenges to Prognostication in Older Adults

- Younger patients with cancer: clearer trajectory
- Older adults:
 - Absence of dominant terminal condition
 - age + functional + cognitive + multimorbidity



What is the best way to
estimate prognosis for our 68
year old patient?

Ways to Prognosticate

OPTION
1

OPTION
2

OPTION
3

Clinical Judgement



Clinical Judgment

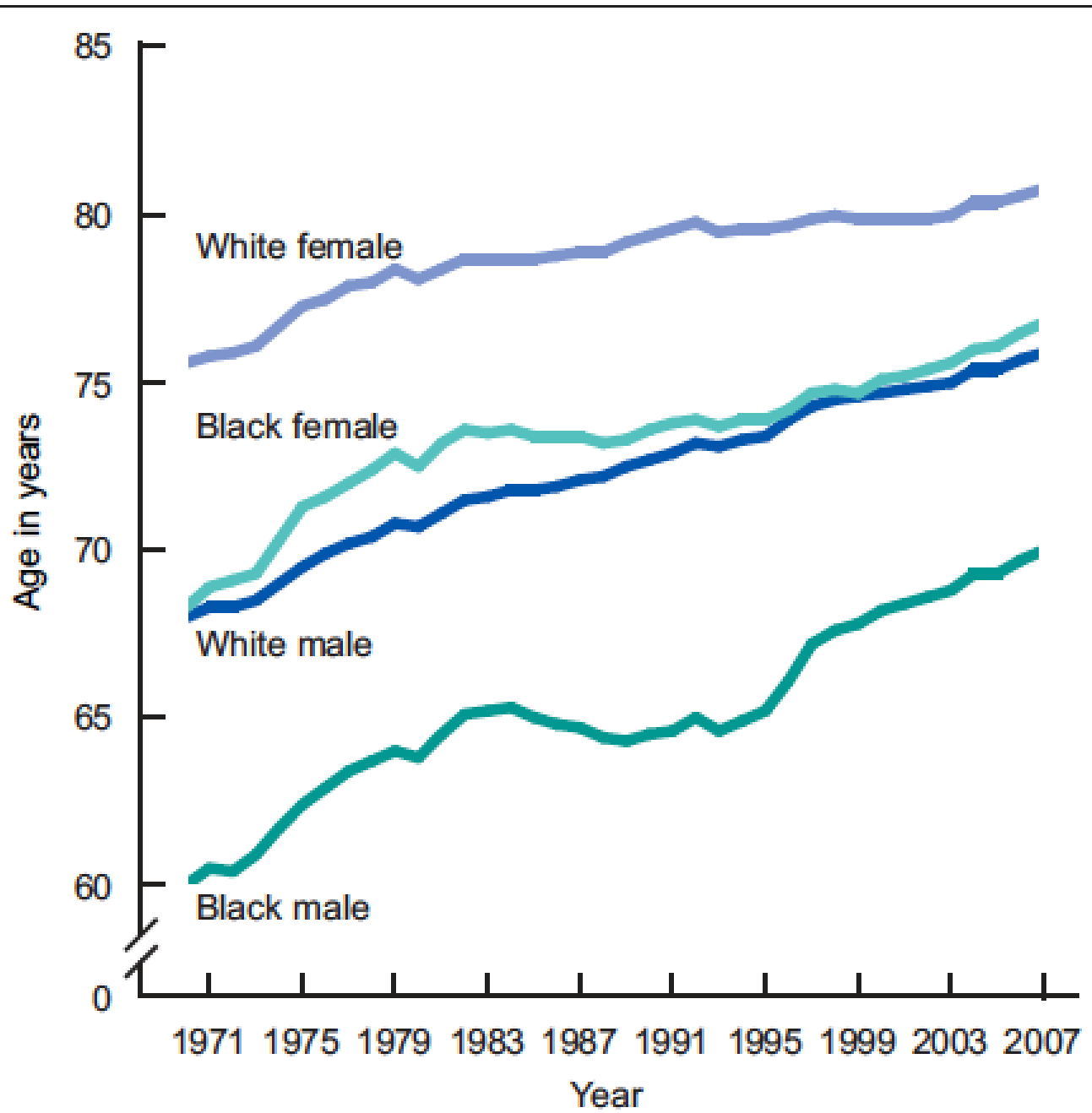


Shortcomings of Clinical Predictions

- Tend to overestimate patient survival by a factor of between 3 and 5.
- Tend to be more accurate for very short-term prognosis than long-term prognosis.
- Influenced by relationships
 - The length of doctor patient relationships increases the odds of making an erroneous prediction.

Life Tables



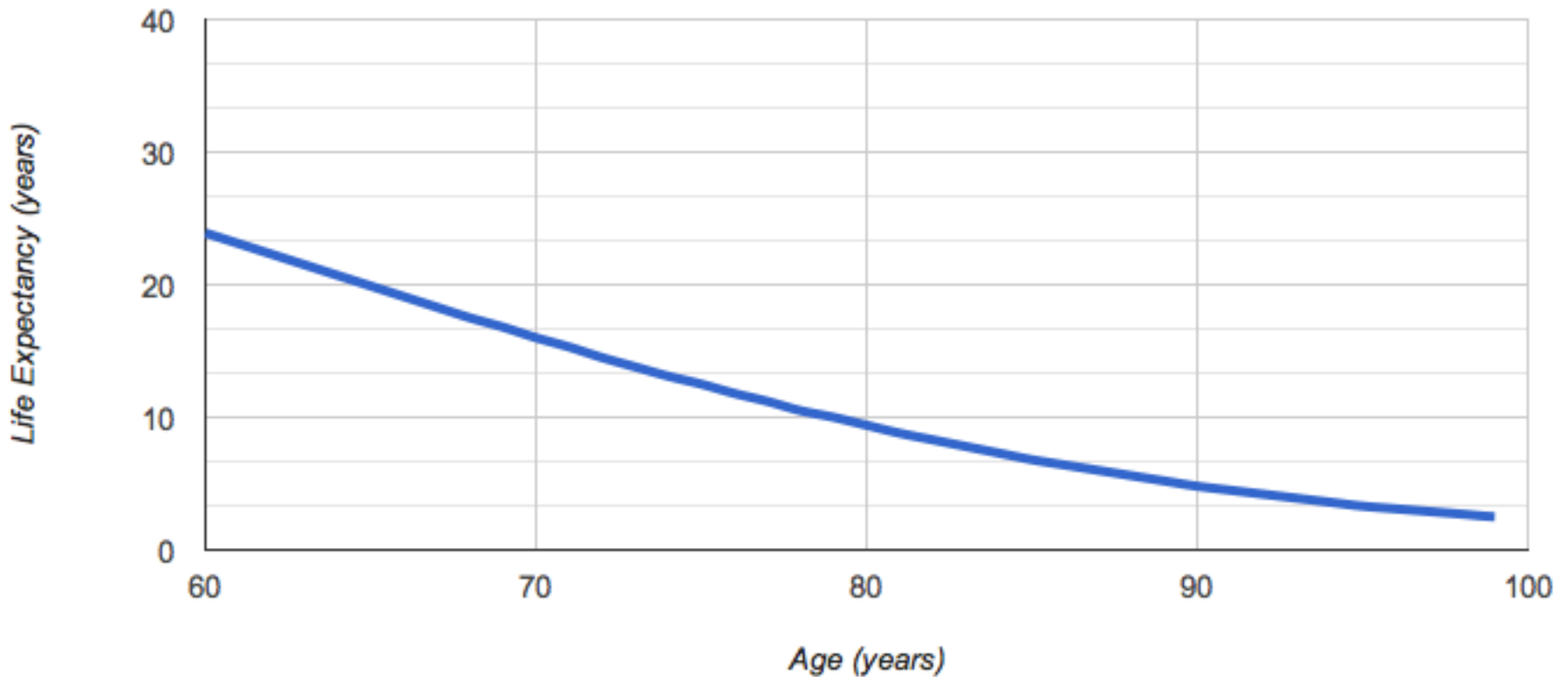


SOURCE: CDC/NCHS, National Vital Statistics System.



US Life Tables

Life table for females: United States, 2007



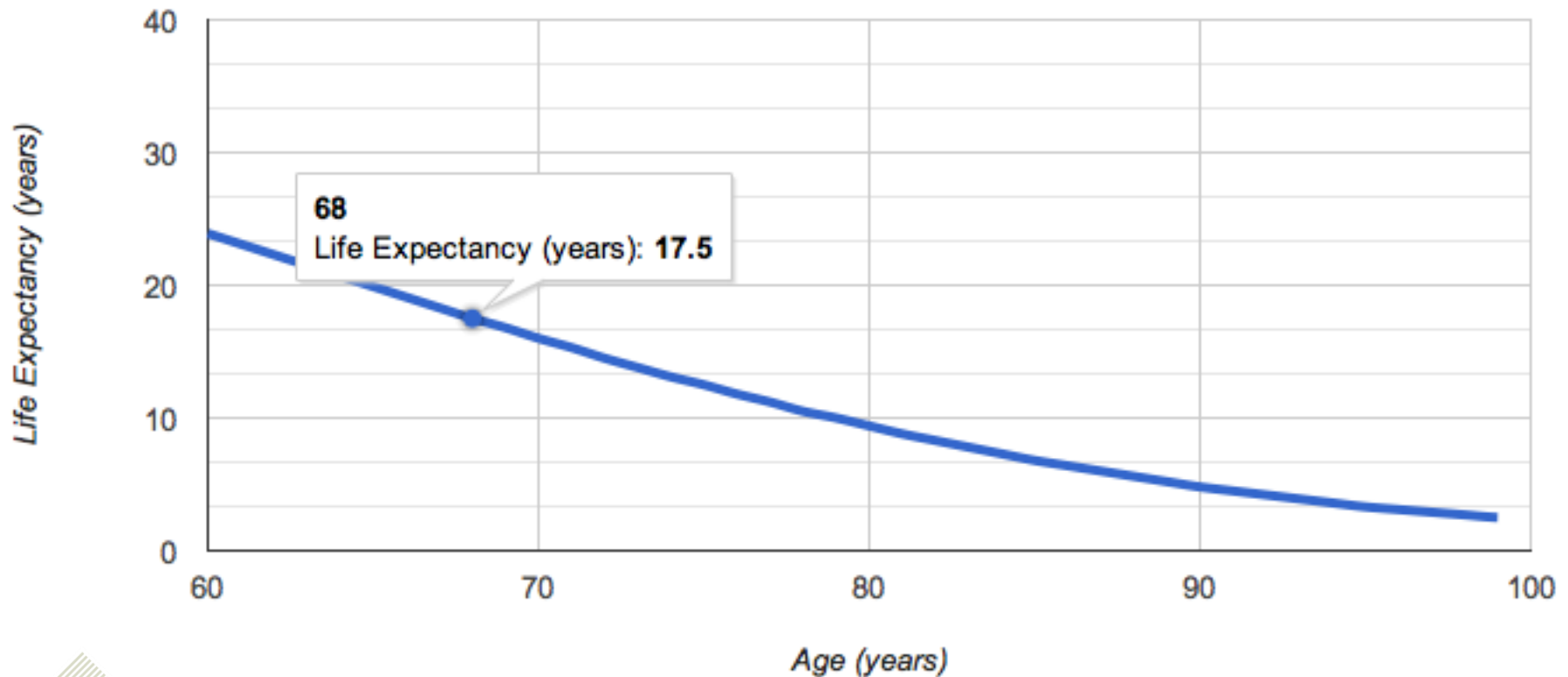
Case: Ms A

- Ms. A is a 68 year old clinic patient with congestive heart failure, COPD, dependence on others for shopping, and difficulty walking a quarter mile.



Life Expectancy For Mrs A

Life table for females: United States, 2007



Case: Ms A

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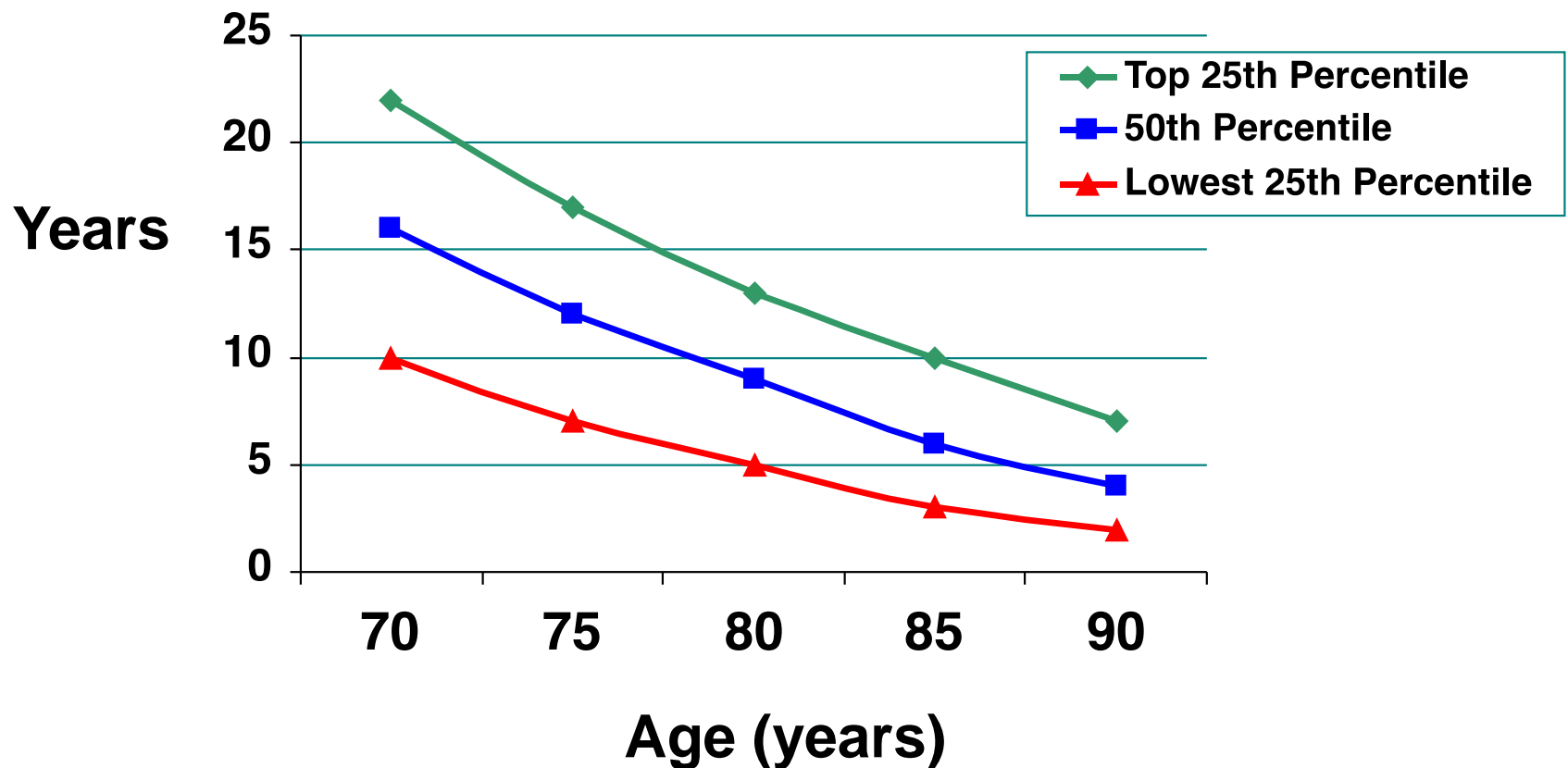
Case: Ms A

- Ms. A is a 68 year old clinic patient with congestive heart failure, COPD, dependence on others for shopping, and difficulty walking a quarter mile.
- Should you recommend that Ms. A have colon cancer screening?
 - Just based on age = yes



Great Variation in Life Expectancy for People of Similar Ages

Life Expectancy for Women



How to determine who is in the bottom or top quartile?



Clinical Judgment

Use Functional Status

Life Expectancy (years)			
Age	Independent	Mobility disabled	ADL disabled
70	16.7	15.7	11.5
75	13.2	12	8.2
80	10.3	9	6
85	8	6.9	4.6

Use Functional Status

Life Expectancy (years)			
Age	Independent	Mobility disabled	ADL disabled
70	16.7	15.7	11.5
75	13.2	12	8.2
80	10.3	9	6
85	8	6.9	4.6

Use Comorbid Conditions

- CHF (Class III, IV)
- ESRD
- Dementia
- Severe COPD (home O2)
- Cancer

Prognostic Indices



Prognostic Indices

- Physicians can use prognostic indices to lend confidence to their judgments about prognosis
 - National survey of 697 physicians: 57% felt inadequately trained in prognostication
- Prognostic indices provide an objective measure to support clinical intuition
- Combining clinical estimates with prognostic indices results in more accurate estimates than either alone.

What is a Prognostic Index?

- Definition:
 - *A clinical tool that quantifies the contributions that various components of the history, physical exam, and laboratory findings make towards a diagnosis, prognosis, or likely response to treatment.*
- Examples:
 - Charlson comorbidity index, CHADS2 for atrial fibrillation stroke risk, Dukes staging system for colorectal cancer mortality, NYHA CHF classification scheme, etc...

Prognostic Information is Hard to Find

- Generally, less than 30% of medical textbook chapters discuss prognosis (instead focus on etiology, diagnostic criteria and treatment)
- Tools developed for mortality prediction in older people may be difficult for busy clinicians to remember or use

Prognostic Indices for Older Adults

A Systematic Review

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Context To better target services to those who may benefit, many guidelines recommend incorporating life expectancy into clinical decisions.

Objective To assess the quality and limitations of prognostic indices for mortality in older adults through systematic review.

Data Sources We searched MEDLINE, EMBASE, Cochrane, and Google Scholar from their inception through November 2011.

- Systematic review
- No Pubmed MeSH term
- Identified 16 validated non-disease specific prognostic indices for older adults
- Evaluated quality: Accuracy and generalizability

Accuracy: Discrimination

- Discrimination (sort dead from living)
- Most no better than 70%
- Coin flip is 50%

Accuracy: Calibration

- How well does predicted risk match observed risk?
- Example:
 - Prediction is 15% 1 year mortality in lowest risk group
 - Observed a 17% 1 year mortality
- But most indices had $>10\%$ difference in predicted:observed mortality at some level of risk

Generalizability: Transportability

- Fine if index performs well in a research dataset
- How well does it perform in settings that differ in important respects?
 - Geographic settings
 - Severity of Illness
 - Time
- Most indices not been tested in heterogeneous settings

Impact on Clinical Outcomes

- Does index impact:
 - Clinical decisions
 - Outcomes for patients
- None evaluated clinical impact

Systematic Review Findings

- A few indices: accurate, developed and tested in large and diverse settings
- Recommended:
 - Cautious use of highest quality indices
 - In conjunction with
 - Clinical factors not captured in index
 - Patient preferences
 - Prognostic indices + clinical judgment better than clinical judgment alone

Case A

- Ms. A is a 68 year old clinic patient with congestive heart failure, COPD, dependence on others for shopping, and difficulty walking a quarter mile. What is your best guess of 9 year mortality risk?
 1. 15%
 2. 40%
 3. 60%
 4. 75%
 5. 90%

Source	Index	Generalizability ^a		Accuracy		
		Development Cohort	Validation Cohort	Discrimination (95% CI) ^b	Calibration ^c	
					Predicted Mortality (95% CI), % ^b	Observed Mortality (95% CI), % ^b
Gagne et al. ⁵⁵ 2011	1-y index for low-income elders	n = 120 679 Average age 80 y 83% Female 29% Hospitalized in last year 9% Nursing home residents Median 18 distinct ICD-9 diagnoses 9% 1-y Mortality	Community-Dwelling Patients n = 123 855 Average age 79 y 77% Female 27% Hospitalized in last year 9% Nursing home residents Median 12 distinct ICD-9 diagnoses 8% 1-y Mortality	Validation C = 0.79 (0.79-0.79)	<7 7-17 >17	3 12 29
Mazzaglia et al. ⁵² 2007	15-mo index	n = 2470 Mean age 75 y 56% Female 5% 15-mo Mortality	n = 2926 Mean age 75 y 59% Female 4% 15-mo Mortality	Derivation C = 0.75 (0.72-0.78) Validation C = 0.75 (0.73-0.78)	0 (0.04-1.1) 1 (0.4-3.6) 1 (0.4-2.3) 10 (7.9-11.5)	0 (0.03-1.1) 1 (0.1-2.1) 1 (0.2-1.1) 8 (6.7-9.8)
Carey et al. ⁴⁵ 2004	2-y index	n = 4516 Mean age 78 y 61% Female 84% White 13% Dependent in ≥1 ADL 28% Difficulty with stairs 13% Diabetes 14% Cancer 31% Heart disease 10% Mortality	n = 2877 Mean age 78 y 61% Female 73% White 17% Dependent in ≥1 ADL 41% Difficulty with stairs 14% Diabetes 13% Cancer 32% Heart disease 12% 2-y Mortality	Derivation C = 0.76 Validation C = 0.74	3 11 34	5 12 36
Carey et al. ⁴⁵ 2008	3-y index for nursing-home eligible elders	n = 2232 Mean age 79 y 68% Female 62% Difficulty bathing on own 23% Diabetes 23% Coronary artery disease 37% 3-y Mortality	n = 1667 Mean age 79 y 76% Female 72% Difficulty bathing on own 27% Diabetes 27% Coronary artery disease 36% 3-y Mortality	Derivation C = 0.66 Validation C = 0.69	21 36 54	18 35 55
Lee et al. ²⁹ 2006	Lee 4-y index	n = 11 701 Mean age 67 y 57% Female 81% White 15% Diabetes 12% Cancer 17% Coronary artery disease 12% 4-y Mortality	n = 8009 Mean age 67 y 57% Female 71% White 16% Diabetes 11% Cancer 19% Coronary artery disease 13% 4-y Mortality	Derivation C = 0.84 Validation C = 0.82	<5 4-9 12-19 22-24 43-48 54-67	<5 6-9 15-20 20-28 44-45 59-64
Schonberg et al. ⁵⁶ 2009	5-y index	n = 16 077 27% Age >80 y 60% Female 85% White 18% Dependent in at least 1 ADL or IADL 15% Diabetes 15% Cancer 11% Coronary artery disease 17% 5-y Mortality	n = 8038 Validation cohort reported as "similar" to development	Validation C = 0.75	2 (1-4) 8 (6-9) 25 (23-28) 47 (32-42) 71 (65-77)	3 (1-6) 8 (6-10) 29 (25-33) 49 (43-55) 62 (54-70)

Table 4. Potential Sources of Bias for 16 Validated General Prognostic Indices

Index	Sample Described (Participation) ^a	Prognostic Variables Defined ^b	Blinded Measurement ^c	Potential Predictors Complete ^d	Mortality Outcome Complete ^e	Conceptual Model, Stability Tested ^f
	Community-Dwelling Patients					
Gagne et al, ⁵⁶ 2011	Partly; race/ethnicity not described (participation not optional in this administrative data set)	Partly; ICD-9 codes have limited reproducibility	Yes	NR	NR	Partly; stability not tested
Mazzaglia et al, ⁵² 2007	Partly; race/ethnicity not described; Italian sample (participants not compared with nonparticipants)	Partly; "inadequacy of income" not well described	Yes	NR	99%	Yes
Carey et al, ⁴⁵ 2004	Partly; no comparison of respondents with nonrespondents	Yes	Yes	99.3%	NR	Yes
Carey et al, ⁴⁵ 2008	Yes (participation not optional in this administrative data set)	Yes	Yes	92%	NR	No; not conceptually based; stability not tested
Lee et al, ³⁹ 2006	Partly; participants not compared with nonparticipants (81% participation rate)	Yes	Yes	NR	98%	Yes
Schonberg et al, ⁵⁵ 2009	Partly; participants not compared with nonparticipants (74% participation rate)	Yes	Yes	95%	97%	Yes

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Schonberg MA, Davis RB, McCarthy EP, Marcantonio ER.
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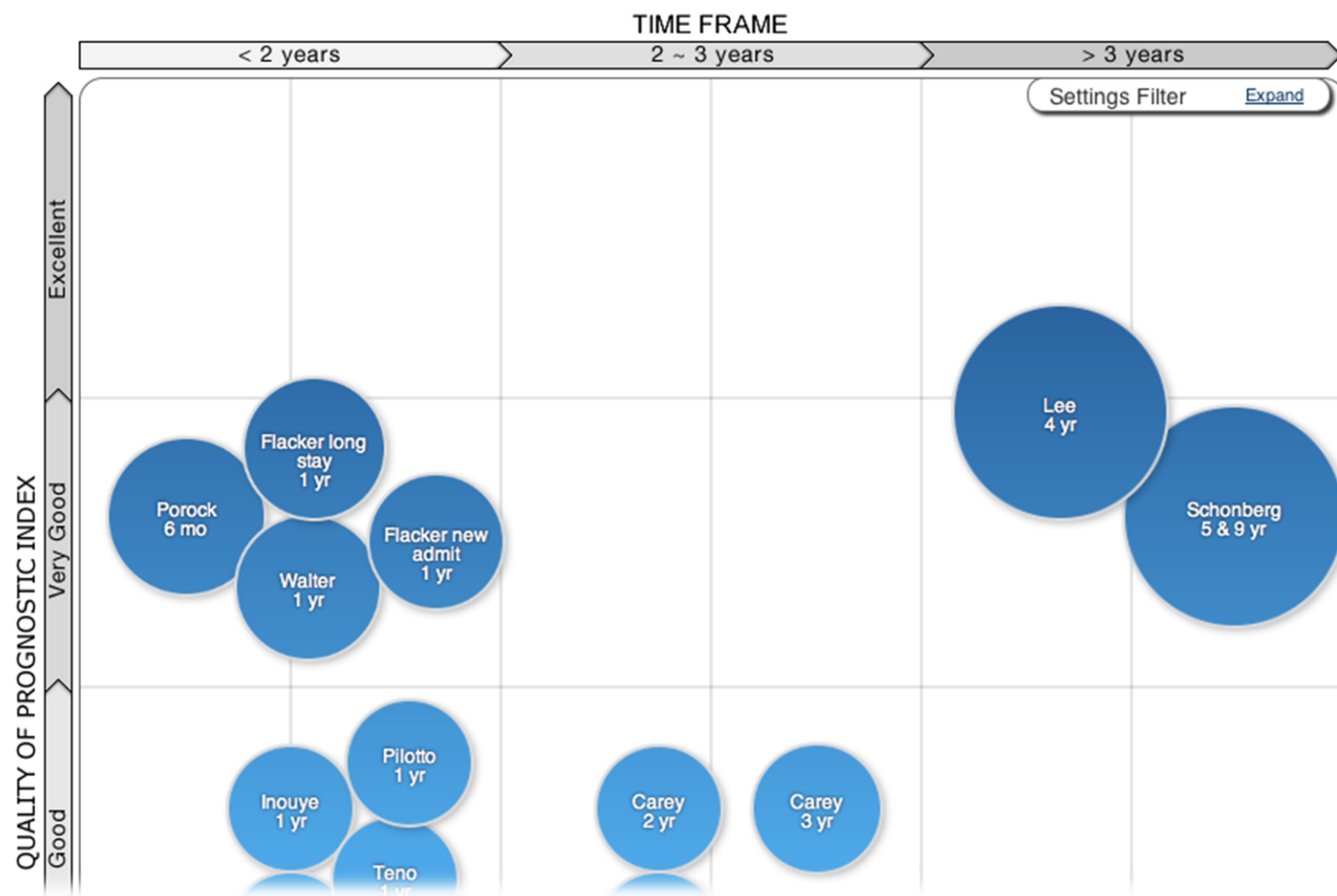


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 $703 \times (\text{weight in pounds} / \text{height in inches}^2)$
Body Mass Index (BMI) = _____
4. Would you say your health in general is: Excellent/Very Good: 0 points
Good: 1 point
Fair/Poor: 2 points
5. Have you ever been told by a doctor or health professional that you had:
a. Emphysema/Chronic Bronchitis? No: 0 points Yes: 2 points
b. A cancer? (do not include skin cancer unless it was melanoma)
No: 0 points Yes: 2 points
c. Diabetes (include borderline diabetes)
No: 0 points Yes: 2 points
6. Because of a physical, mental, or emotional problem, do you need the help of other persons in handling routine needs such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?
No: 0 points Yes: 2 points
7. By yourself, and without using any special equipment, how difficult is it for you to walk a quarter of a mile-about 3 city blocks?
a. Not at all difficult: 0 points
b. A little difficult to very difficult : 3 points
c. Can't do at all/do not do: 3 points
8. Which best describes your cigarette use?
a. Never smoked (Less than 100 cigarettes in your entire life): 0 points
b. Former smoker: 1 point
c. Current smoker (smoke some days or every day): 3 points
9. During the past 12 months, how many times were you hospitalized overnight?
None: 0 points
Once: 1 point
Twice or more: 3 points





Each bubble represents a prognosis calculator. Click on a bubble to view the calculator.



TIME FRAME

< 2 years

2 ~ 3 years

> 3 years

Settings Filter [Expand](#)

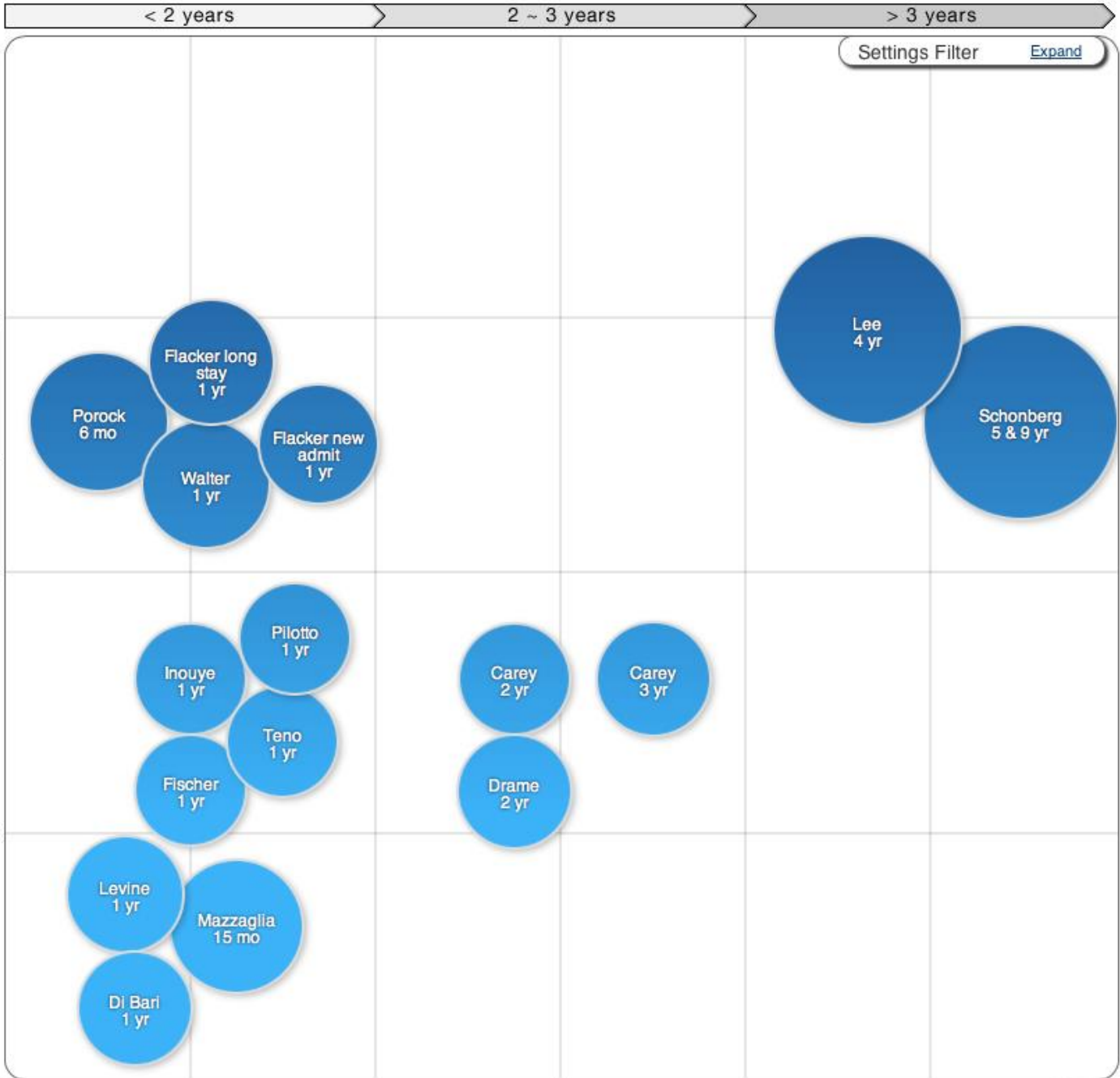
QUALITY OF PROGNOSTIC INDEX

Excellent

Very Good

Good

Moderate



TIME FRAME

< 2 years

2 ~ 3 years

> 3 years

Settings Filter [Expand](#)

QUALITY OF PROGNOSTIC INDEX

Excellent

Very Good

Good

Moderate



Schonberg 5 and 9 year index for community dwelling adults
(click bubble to view calculator)

TIME FRAME

< 2 years

2 ~ 3 years

> 3 years

QUALITY OF PROGNOSTIC INDEX

Excellent

Very Good

Good

Moderate

Settings Filter [Collapse](#)

[Show All](#) [Clear All](#)

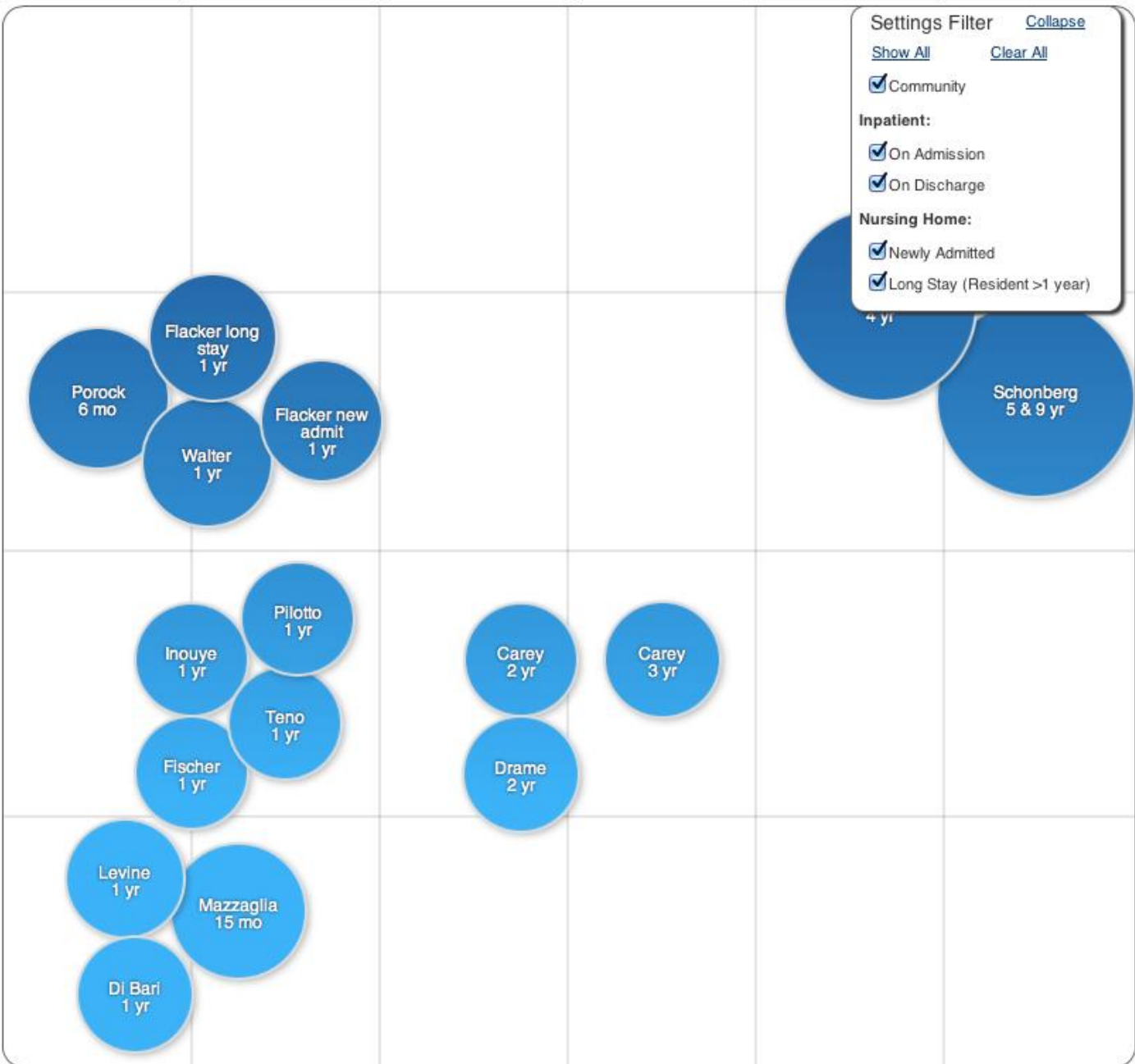
- Community

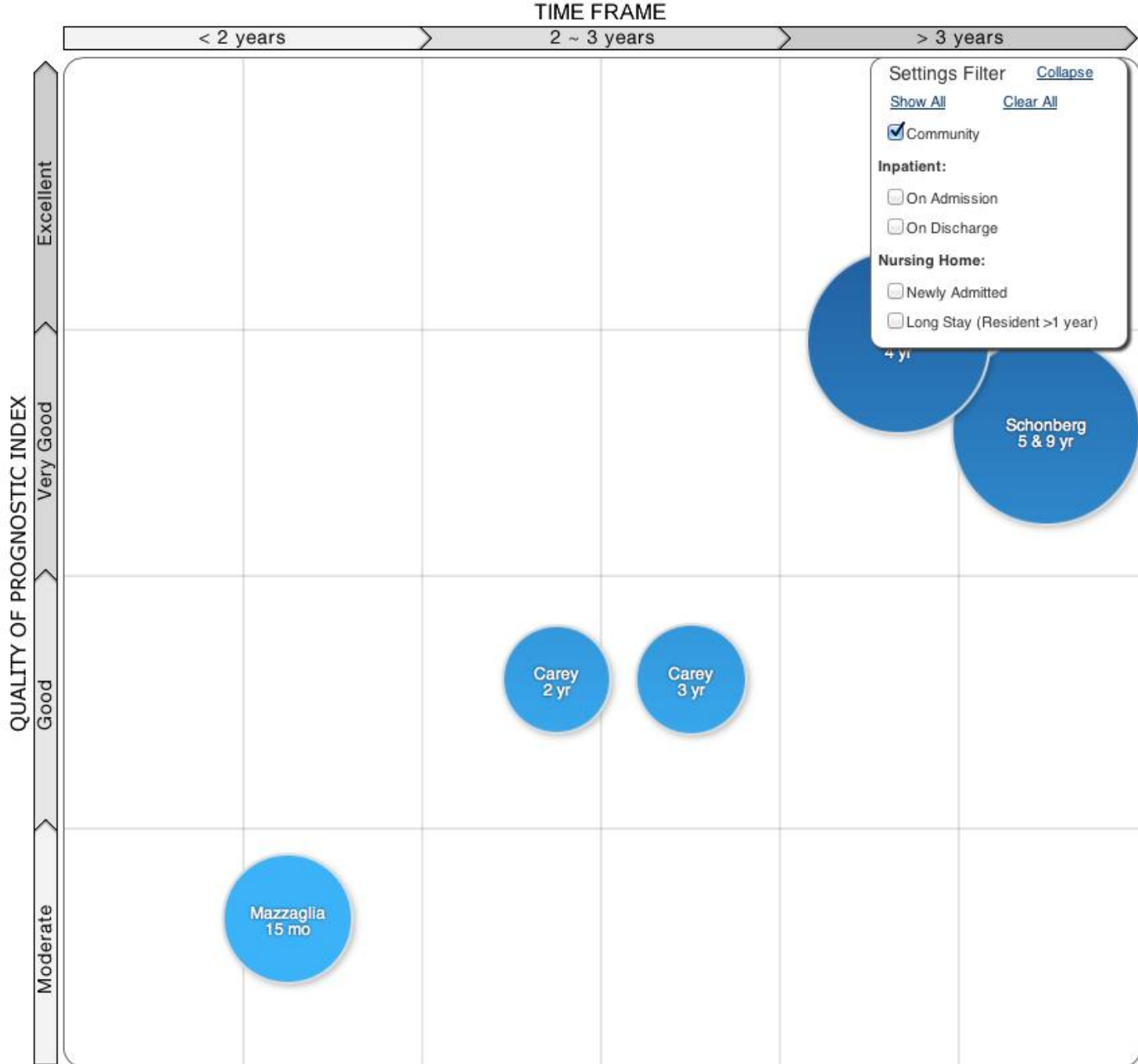
Inpatient:

- On Admission
- On Discharge

Nursing Home:

- Newly Admitted
- Long Stay (Resident >1 year)





Ms. A

68 year old clinic patient with congestive heart failure, COPD, dependence on others for shopping, and difficulty walking a quarter mile.

Risk Calculator

1. How old is your patient?
2. What is the sex of your patient? Female Male
3. Is your patient a former or current smoker? (> 100 cigarettes smoked in his or her lifetime)
4. Does your patient have a BMI score of less than 25? Yes No
BMI = 703 x (weight in pounds / height in inches²)
[BMI calculator](#)
5. Does your patient have a history of cancer (including melanoma but not other skin cancers)? Yes No
6. Does your patient have diabetes mellitus? Yes No
7. Does your patient have COPD? Yes No
8. How many times has your patient been hospitalized overnight in the past year?
9. How does your patient self-rate his or her health?
10. Is your patient dependent in at least one Instrumental Activity of Daily Living (IADL)? (IADLs include light housework, preparing meals, shopping, taking medication, using the telephone, arranging own travel, and managing money.) Yes No
11. Does your patient have difficulty walking ¼ mile (approximately a few city blocks)? Yes No

Total Points: 15

Your best guess of five year mortality risk

Calculate Risk ▶

Results Based on Score:

Your total score is 15

FIVE AND 9 YEAR MORTALITY:

Points	Risk of 5 year mortality (95% CI)	Risk of 9 year mortality (95% CI)
0 - 1	2% (1-3)	7% (4-13)
2 - 3	4% (3-5)	8% (6-11)
4 - 5	6% (5-7)	16% (13-19)
6 - 7	9% (7-10)	26% (23-29)
8 - 9	13% (12-15)	33% (29-37)
10 - 11	23% (20-25)	52% (48-56)
12 - 13	35% (32-38)	58% (53-62)
14 - 15	43% (39-47)	75% (69-80)
16 - 17	59% (54-63)	83% (78-88)
≥ 18	69% (63-73)	92% (86-96)

Given 100 people with similar answers to the index, 75 will die and 25 will survive over the next 9 years.

Should she get colon cancer screening?

1. Yes
2. No

Should ePrognosis be accessible to the public?

1. Yes
2. No
3. It shouldn't even be accessible to physicians

Harms/Benefits of Making ePrognosis Public

- Harms
 - Statistical results: numeracy skills
 - Psychological harm
 - Clinicians interpret information
- Benefits
 - Patient activation
 - Promote mature national dialogue than “death panels”
- This information is public, its just hidden

Opened ePrognosis to Public

- Considerable media attention
 - 6 NYT stories
 - USA Today
 - The Daily Beast
 - AARP blog
- First week: over half a million pageviews
- First two months: nearly three quarters of a million

Reaction

“...this provides a useful tool to help with the dialogue on discussing various screening modalities and to give the patient an idea about life expectancy.”

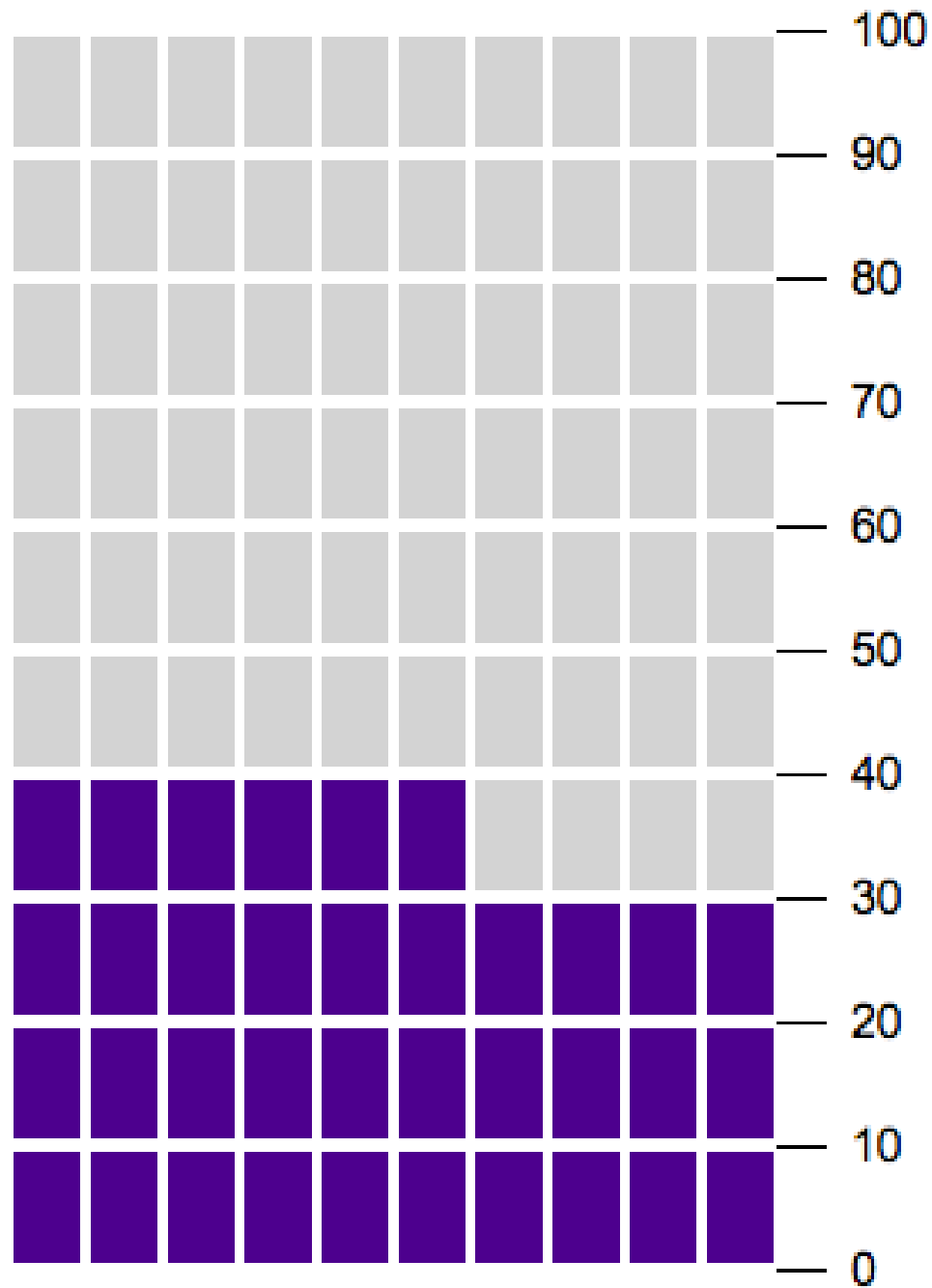
VS.

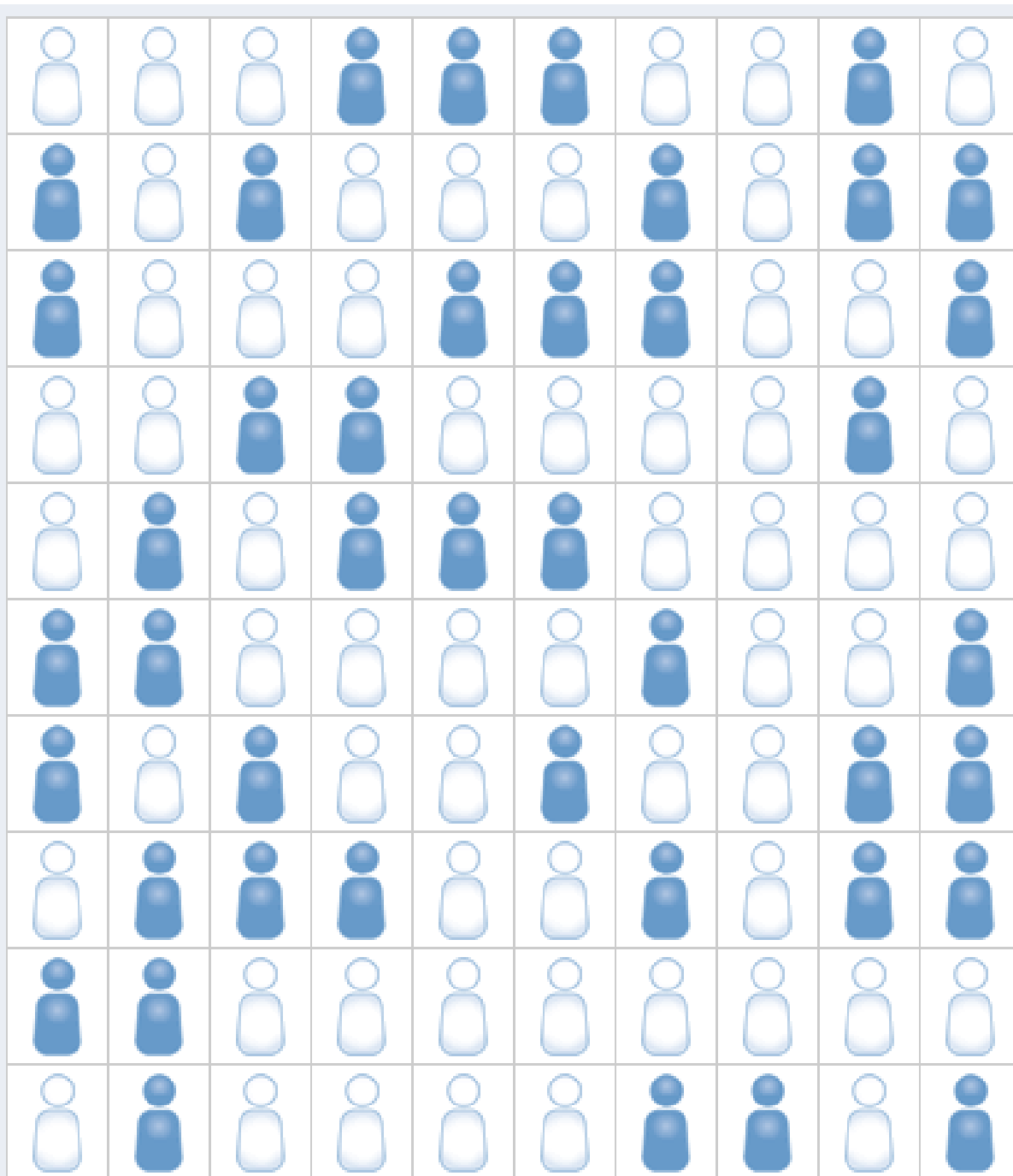
“The punctilious quantification of the amorphous”

Faith Fitzgerald

ePrognosis: Next Steps

- Who is using ePrognosis?
- Improve risk communication: decision support intervention
- How does risk information compare with risk perception? Impact risk perception? Clinical decision making?
- Add content:
 - Predict functional decline
 - Predict mortality in dementia
 - Predict life expectancy





Graphic adapted from [Han 2011](#).

“Difficult
to see.
Always in
motion is
the future”

