60° Congresso Nazionale SIGG

Napoli, Stazione Marittima 25-28 novembre 2015

Simposio
"UPDATE SULLA FRAGILITA': NUOVI STRUMENTI DI VALUTAZIONE APPLICATI AI VARI SETTING DI CURA"

Strumenti per la valutazione della fragilità

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A PROGRAM TO PREVENT FUNCTIONAL DECLINE IN PHYSICALLY FRAIL, ELDERLY PERSONS WHO LIVE AT HOME

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Persons were considered PHYSICALLY FRAIL if

they required more than 10 seconds to perform a rapid-gait test (i.e., to walk along a 10-ft [3.0-m] course and back as quickly as possible)

or

if they could not stand up from a seated position in a hardback chair with their arms folded.

Strumenti per la valutazione della fragilità

- **Pre-clinical and clinical frailty**
- **Frailty factors**
- **Instruments**
- **Studies and outcomes**
- **Frailty index: an "Italian" edition**

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LIFE COURSE DETERMINANTS

age, sex, education, income, ethnicity, marital status, living environment, lifestyle, life events, biological (genetic)

PRE-CLINICAL FRAILTY

decline in physiologic reserve (vulnerability)

CLINICAL FRAILTY

physical, nutritional, mental, social

ADVERSE OUTCOMES

disability, health care utilization, death

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Pre-clinical factor

Vulnerability

Physical

Nutritional

Clinical factors

Mental

Social

“physical” FRAILTY - 1

MOBILITY

- Balance tests
- Gait speed (4 or 3 meters)
- Chair stand test

} **Short Physical Performance Battery (*SPBP*)**

- Physical Activity Scale for the Elderly (*PASE*)

“physical” FRAILTY - 2

STRENGTH

- Lifting an object that weighs over 5 kg
- Weakness in arms and/or legs
- Climbing stairs
- Calf muscle circumference
- Muscle strength (grip strength)
- Muscle mass (bioimped.or DEXA)

} ***SARCOPENIA***

“physical” FRAILTY - 3

COMORBILITY

- Diseases' number
- Cumulative Illness Rating Scale (*CIRS-Comorbility, CIRS-Gravity*)
- Charlson Comorbility Index

“mental” FRAILTY - 1

COGNITION

– Diagnosed dementia or cognitive impairment (Mini Mental State Examination, *MMSE*)
– Hachinski Ischemic Score

“mental” FRAILTY - 2

MOOD

- Depression(Geriatric Depression Scale, *GDS*)
- Anxiety/Depression (Hospital Anxiety and Depression Scale, *HADS*)
- SF-36 quality of life

“nutritional” FRAILTY

NUTRITIONAL STATUS

- Appetite
- Body weight
- Body Mass Index
- Waist circunference
- Mini Nutritional Assessment (*MNA*)

“social” FRAILTY

RELATIONS/SOCIAL SUPPORT

- Social recourses
- Emptiness/missing people around
- Social support score

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Assessment of clinimetric properties

Study	*Number subjects*	*Settings*	*Reliability*	*Construct validity*	*Content validity*
Frailty Phenotype Fried et al, 2001	5317	Community dweeling	X	X	
Frailty Index, Mitnitski et al, 2001	2740	Community dweeling	X	X	
Groningen, GFI Schuurmans et al, 2004	1338	Community dweeling	X	X	
Frailty Staging System by Cacciatore et al, 2005	1332	Community dweeling	X		
SOF Ensrud KE et al, 2009	265	Community dweeling	X	X	X
TILBURG Gobbens RJJ et al, 2010.	275	Community dweeling	X	X	X
Multi-prognostic index, MPI By Pilotto et al, 2012	2033	In-hospital	X		
INTER-FRAIL Di Bari et al., 2014	15774	Community dwelling	X	X	X

De Vries NM et al., Ageing Res Rev, 2011

What are we looking for?

PRE-CLINICAL FRAILTY
decline in physiologic reserve (vulnerability)

?

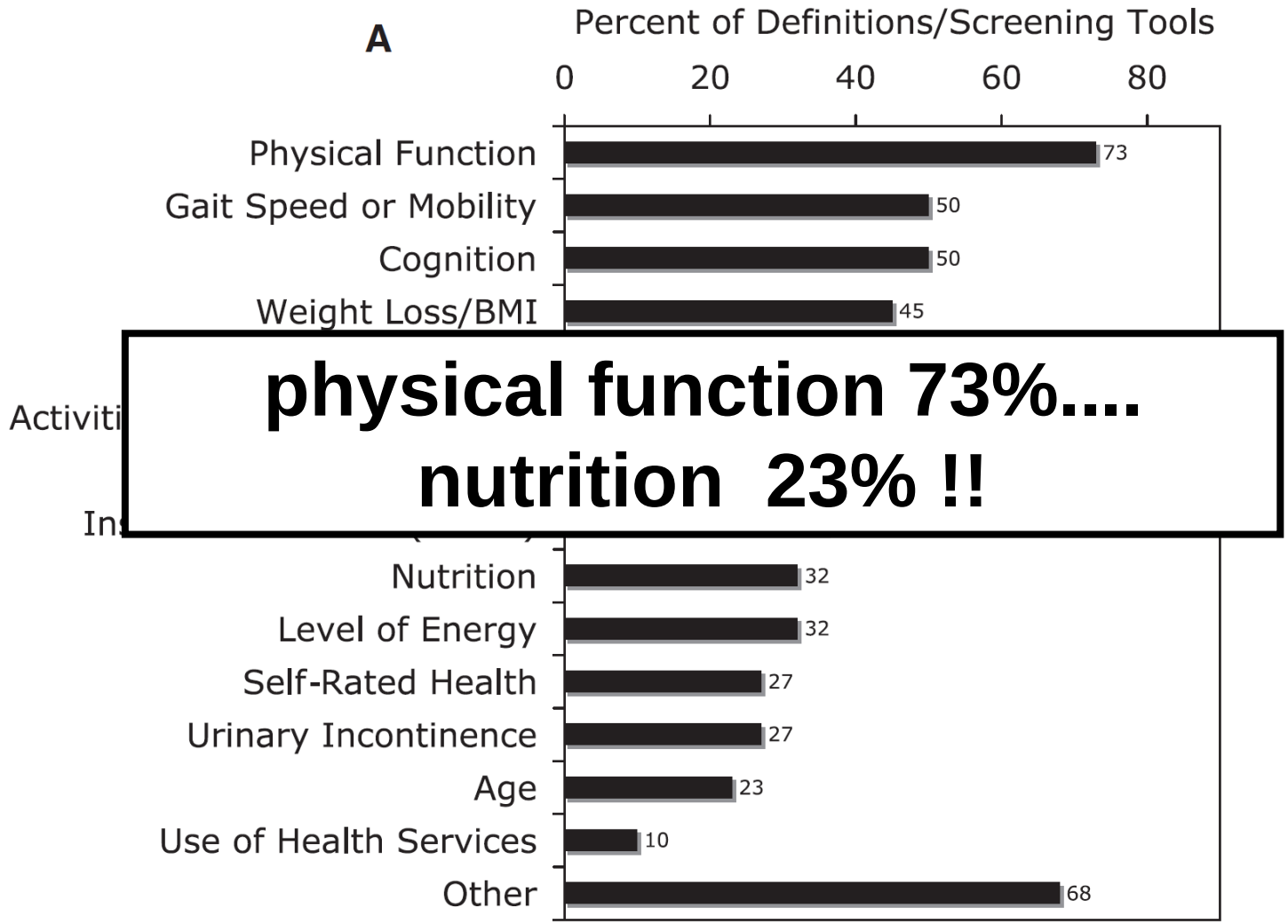
CLINICAL FRAILTY
physical, nutritional, mental, social

FRAILTY FACTORS

Study	***Physical***			***Nutritional***	***Mental***		***Social***
	Mobility	Strength	Comorbility		Cognition	Mood	
Frailty Phenotype Fried et al, 2001	X	X					
Frailty Index, Mitnitski et al, 2001	X	X	X	X	X	X	X
Groningen, GFI Schuurmans et al, 2004	X		X	X	X	X	
Frailty Staging System Cacciatore et al, 2005	X				X		X
SOF Ensrud KE et al., 2009	X			X		X	
TILBURG Gobbens et al, 2010	X	X		X	X	X	X
MPI Pilotto et al, 2012			X	X	X		
INTER-FRAIL Di Bari et al, 2014	X			X	X		X

Pialoux T et al., Ger Gerontol Int , 2012

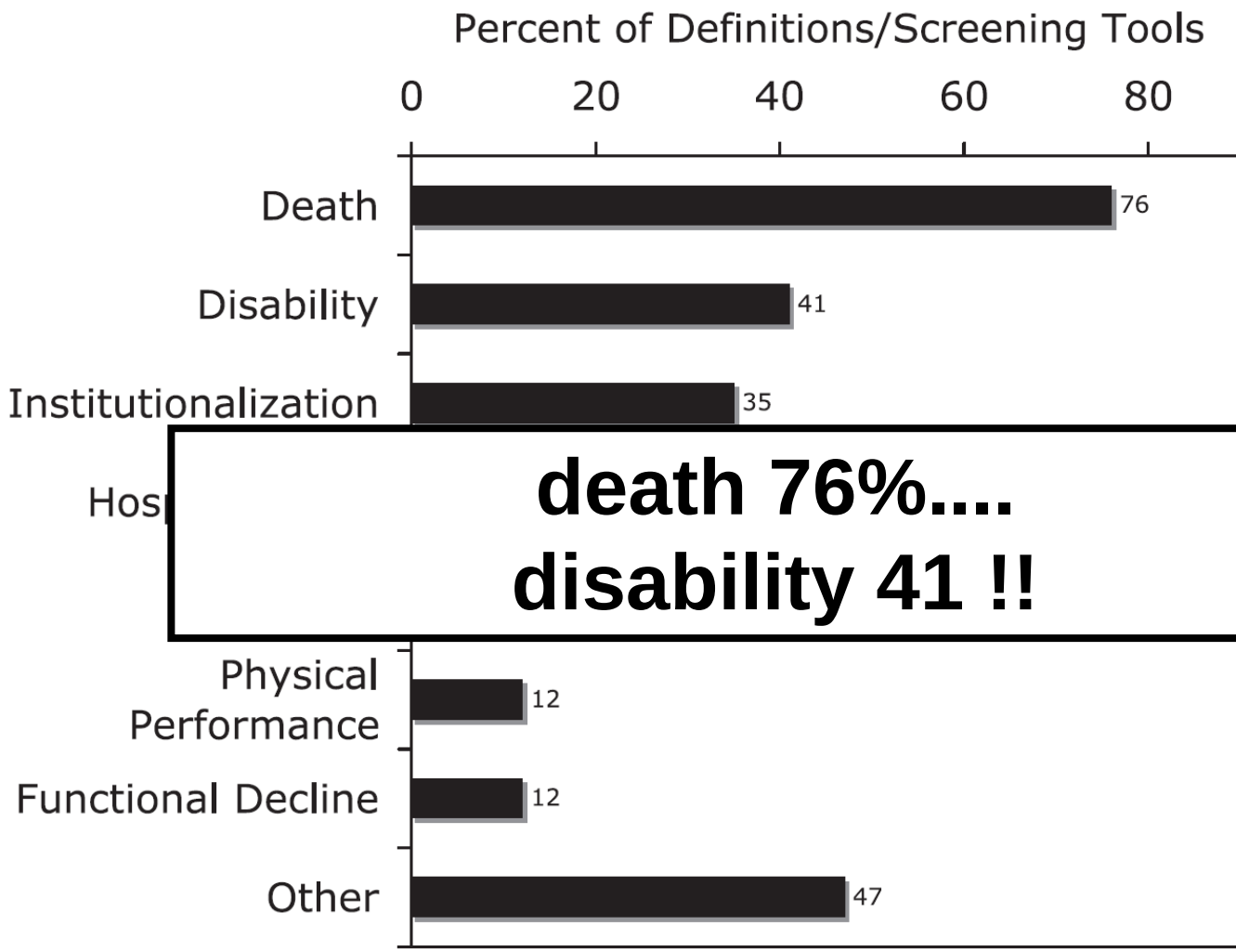
Prevalence of identifying factors for frailty in definitions and screening tools



physical function 73%....
nutrition 23% !!

Sternberg SA et al., J Am Geriatr Soc 2011

Prevalence of outcomes of frailty predicted by definitions and screening tools



death 76%....
disability 41 !!

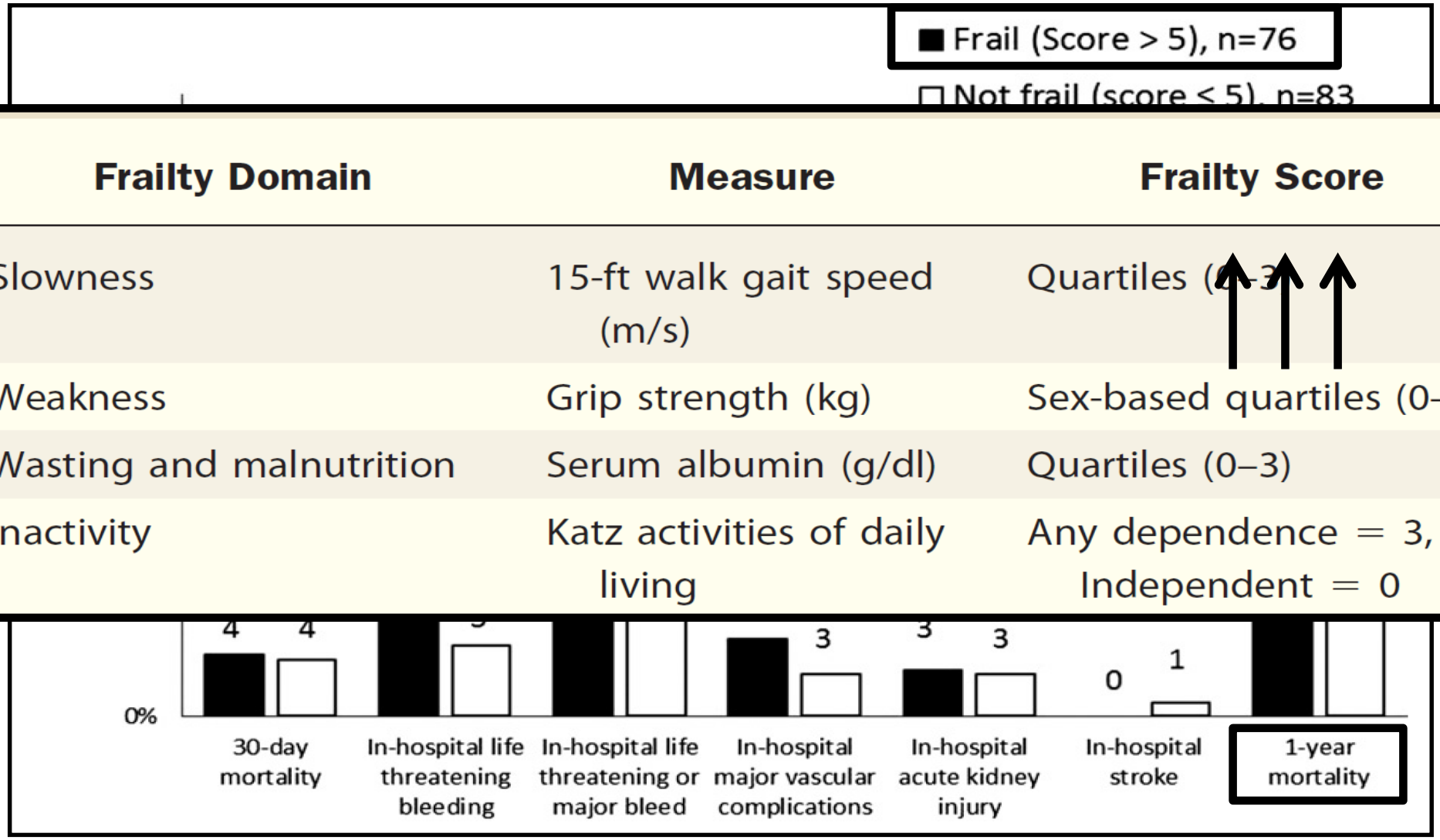
Sternberg SA et al., J Am Geriatr Soc 2011

Probability of surviving survival in elderly patients with CHF stratified for NYHA and FRAILTY

Survival (%)	NYHA				FRAILTY		
	I	II	III	IV	1	2	3
	(n=32)	(n=43)	(n=28)	(n=17)	(n=55)	(n=47)	(n=18)
1 year	90.6	90.5	100.0	82.4	97.5	94.9	99.3
6 years	46.9	50.0	32.1	22.5	59.3	52.2	12.6
9 years	37.5	23.8	28.6	15.0	45.5	25.2	0.0
12 years	34.4	17.1	21.4	7.5	26.1	12.9	0.0

Cacciatore F et al., Eur J Clin Invest 2005

The Impact of Frailty Status on Survival After Transcatheter Aortic Valve Replacement (TAVI) in Older Adults With Severe Aortic Stenosis



Frailty Domain	Measure	Frailty Score
Slowness	15-ft walk gait speed (m/s)	Quartiles (0–3)
Weakness	Grip strength (kg)	Sex-based quartiles (0–3)
Wasting and malnutrition	Serum albumin (g/dl)	Quartiles (0–3)
Inactivity	Katz activities of daily living	Any dependence = 3, Independent = 0

Green P et al JACC Cardiovasc Interv. 2012

Association between frailty and mortality from four large prospective cohort studies

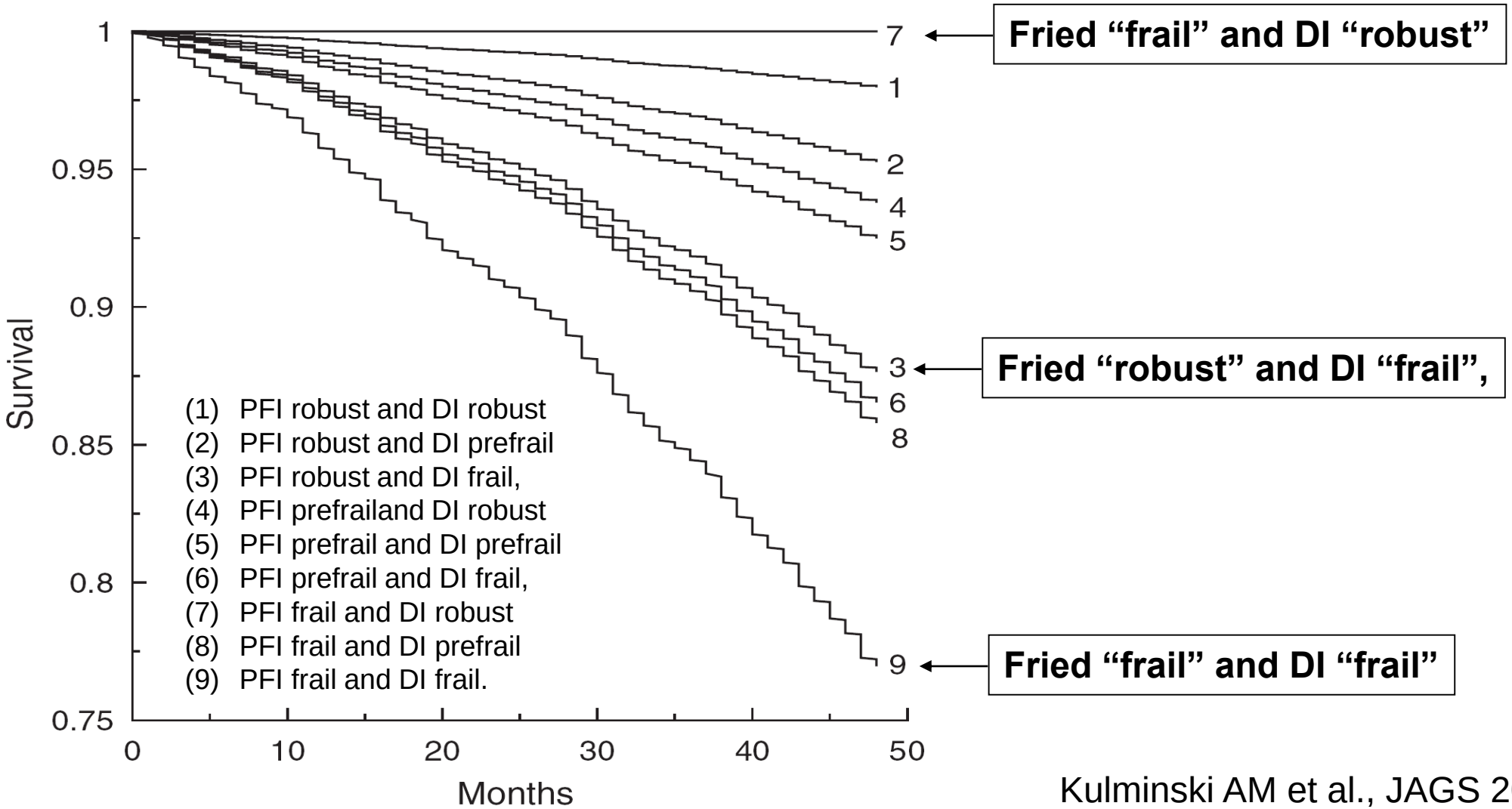
	Year	Country	Participants (n)	Length of follow-up (years)	Mortality (HR*/OR† [95% CI])	
					Inter-mediate frailty	Severe frailty
Cardiovascular Health Study (CHS)[3]	2001	USA	5317	7	1·32* (1·13–1·55)	1·63* (1·27–2·08)
Study of Osteoporotic Fractures (SOF)[94]	2008	USA	6701	4·5	1·54† (1·40–1·69)	2·75* (2·46–3·07)
Canadian Study of Health and Aging (CSHA)[92]	2004	Canada	9008	5	2·54† (1·92–3·37)	3·69† (2·26–6·02)

Fried's method

Rockwood's method

Clegg A et al., Lancet 2013

Cox regression for each of the nine selected subgroups defined on the basis of the phenotypic frailty index (PFI) and deficit index (DI) into three categories



Kulminski AM et al., JAGS 2008

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BMC Geriatrics

BioMed Central

Research article

Open Access

A standard procedure for creating a frailty index

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Published: 30 September 2008

BMC Geriatrics 2008, **8**:24 doi:10.1186/1471-2318-8-24

Received: 9 May 2008

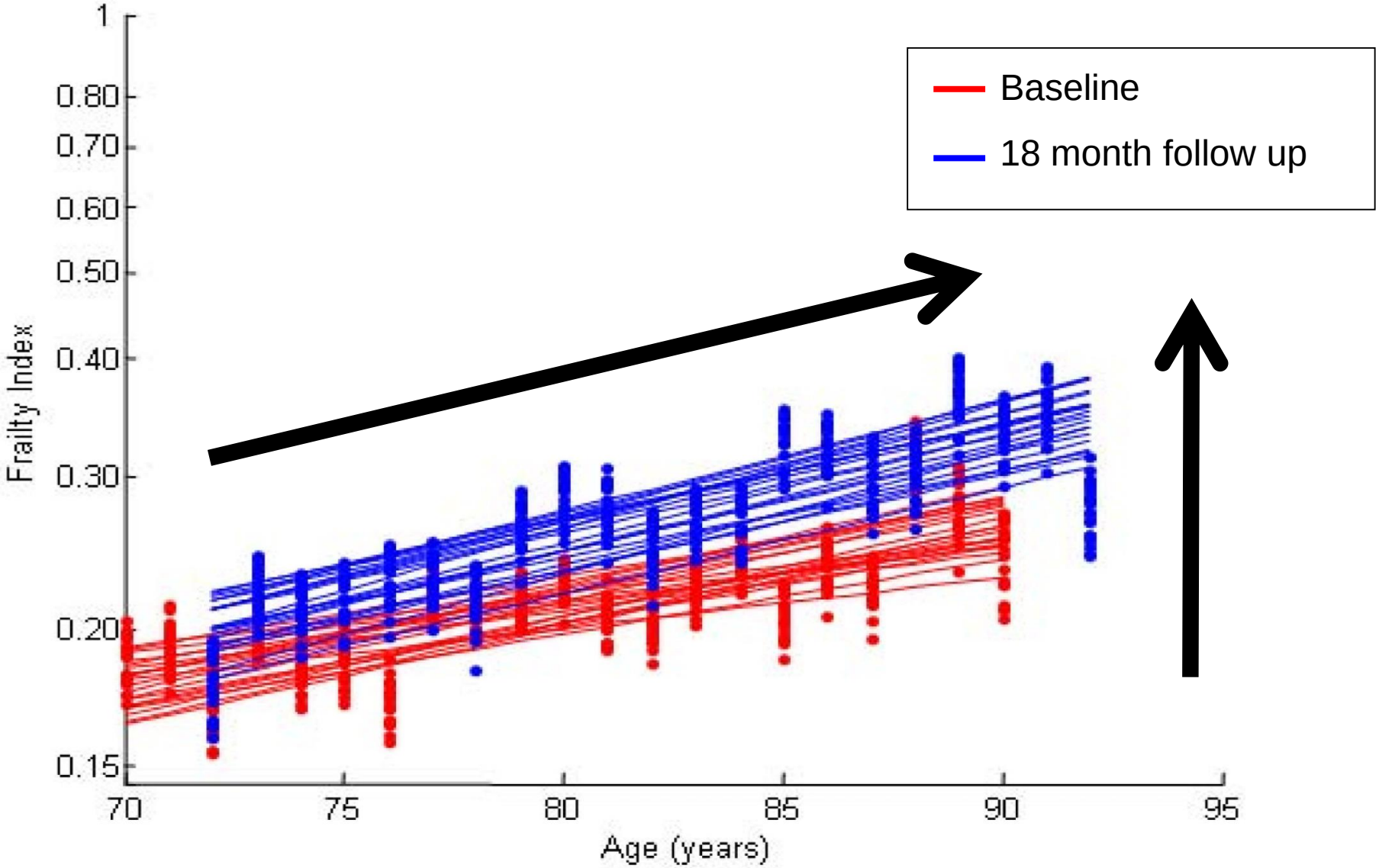
Accepted: 30 September 2008

This article is available from: http://www.biomedcentral.com/1471-2318/8/24

List of "40" Variables included in the "Frailty index" with related cut-point

Help Bathing	Yes = 1, No = 0
Help Dressing	Yes = 1, No = 0
Help getting in/out of Chair	Yes = 1, No = 0
Help Walking around house	Yes = 1, No = 0
Help Eating	Yes = 1, No = 0
Help Grooming	Yes = 1, No = 0
Help Using Toilet	Yes = 1, No = 0
Help up/down Stairs	Yes = 1, No = 0
Help lifting 10 lbs	Yes = 1, No = 0
Help Shopping	Yes = 1, No = 0
Help with H	
Help with m	
Help taking	
Help with F	
Lost more t	
Self Rating c	
How Health	
Stayed in Be	
Cut down o	
Walk outsic	
Feel Everyth	
Feel Depres	
Feel Happy	
Feel Lonely	
Have Troub	
High blood	
Heart attac	
CHF	
Stroke	
Cancer	Yes = 1, Suspect = 0.5, No = 0
Diabetes	Yes = 1, Suspect = 0.5, No = 0
Arthritis	Yes = 1, Suspect = 0.5, No = 0
Chronic Lung Disease	Yes = 1, Suspect = 0.5, No = 0
MMSE	<10 = 1, 11–17 = 0.75, 18–20 = 0.5, 20–24 = 0.25, >24 = 0
Peak Flow	See Table 2
Shoulder Strength	See Table 2
BMI	See Table 2
Grip Strength	See Table 2
Usual Pace	See Table 2
Rapid Pace	See Table 2

Variance in the Slope of the Frailty Index.



Searle SD et al., BMC Geriatrics 2008

Cox Analyses on 9-years mortality

		BASELINE		FOLLOW-UP	
Analysis	**Variables**	**HR**	**CI 95%**	**HR**	**CI 95%**
Bi-variate	**Age**	1.09	1.07 – 1.11	1.09	1.06 – 1.11
	Frailty Index	1.03	1.02 – 1.04	1.05	1.04 – 1.05
	Male Sex	1.46	1.16 – 1.82	1.37	1.07 – 1.74
Multi-variate	**Age**	1.08	1.06 – 1.10	1.06	1.04 – 1.09
	Frailty Index	1.03	1.02 – 1.04	1.04	1.04 – 1.05
	Male Sex	1.80	1.42 – 2.27	1.71	1.33 – 2.20

Searle SD et al., BMC Geriatrics 2008

li, _____/_____/_____

from September 2009 to September 2015

1215 outpatients ≥ 65 years enrolled

69.6% follow-up at 24 months

"A standard procedure for creating a frailty index"
Searle SD, Mitnitski A, Gahbauer EA, Gill TM, Rockwood K.
BMC Geriatrics 2008, 8:24

FRAILTY INDEX

"Italian" edition

Physical frailty - 1

MOBILITA'

2-3 MINUTI

18.	**Persistenza a letto almeno 1/2 giornata per motivi di salute, nell'ultimo mese?**	SI=1	NO=0	
20.	**Uscire durante la settimana**	<3 giorni=1	≥3 giorni=0	
22.	**Avere difficoltà a mettersi in moto**	Spesso=1	Qualche volta=0.5	Raramente=0
39.	**Tempo impiegato per percorrere 4 metri con passo solito (sec.) =**	>16 =1	≤16=0	
40.	**Tempo impiegato per percorrere 4 metri con passo rapido (sec.) =**	>10=1	≤10=0	

Abete P et al., submitted 2015

FRAILTY INDEX

"Italian" edition

Physical - 2

FORZA MUSCOLARE

4 MINUTI

37.	**Forza muscolare nel sollevamento (Kg)**	≤12 (uomo), ≤9 (donna) = 1		>12 (uomo), >9 (donna) = 0	
38.	**Forza muscolare nella presa (Kg)**	Uomo =1		Uomo = 0	
		BMI ≤24,	kg ≤29	BMI ≤24	kg >29
		BMI 24.1-28	kg ≤30	BMI 24.1-28	kg >30
		BMI >28	kg ≤32	BMI >28	Kg >32
		Donna = 1		Donna = 0	
		BMI ≤23	kg ≤17	BMI ≤23	kg >17
		BMI 23.1-26	kg≤17.3	BMI 23.1-26	kg >17
		BMI 26.1-29	kg ≤18;	BMI 26.1-29	kg >18
		BMI >29	kg ≤21	BMI >29	kg >21

Abete P et al., submitted 2015

FRAILTY INDEX

"Italian" edition

Physical frailty - 3

COMORBILITA'

3-4 MINUTI

26.	**Ipertensione**	SI = 1	sospetta = 0.5	NO = 0
27.	**Angina pectoris**	SI = 1	sospetta = 0.5	NO = 0
28.	**Insufficienza cardiaca cronica**	SI = 1	sospetta = 0.5	NO = 0
29.	**Ictus**	SI = 1	sospetta = 0.5	NO = 0
30.	**Cancro**	SI = 1	sospetta = 0.5	NO = 0
31.	**Diabete**	SI = 1	sospetta = 0.5	NO = 0
32.	**Artrosi**	SI = 1	sospetta = 0.5	NO = 0
33.	**Broncopneumopatia cronica**	SI = 1	sospetta = 0.5	NO = 0

Abete P et al., submitted 2015

FRAILTY INDEX

“Italian” edition

Mental frailty

DEFICIT COGNITIVO

10-12 MINUTI

34.	**MMSE**	<10 = 1	11–17 = 0.75	18–20 = 0.5	20–24 = 0.25	>24 = 0

TONO DELL’UMORE

2 MINUTI

22.	**Sentirsi depresso**	spesso=1	qualche volta=0.5	raramente=0
23.	**Sentirsi infelice**	raramente=1	qualche volta=0.5	spesso=0

Abete P et al., submitted 2015

FRAILTY INDEX

“Italian” edition

Nutritional frailty

INDICI ANTROPOMETRICI

1 MINUTO

35.	**Indice di massa corporea - BMI**	<18.5 ≥ 30 = 1	25-<30 = 0.5	18.5-24.9 = 0

MINI NUTRITIONAL ASSESSMENT

4 MINUTI

24	≥ 24 punti: normonutrito = 0	da 17 a 23.5 punti: paziente con indici di rischio di malnutrizione = 0.5	< 17 punti: paziente con indici evidenti di malnutrizione = 1

FRAILTY INDEX

"Italian" edition

Social frailty

SUPPORTO SOCIALE

5 MINUTI

Stato civile	Vedovo o celibe = 1	Coniugato = 0
Figli viventi	No = 1	Sì = 0
Fratelli e sorelle viventi	No = 1	Sì = 0
Frequenza di rapporti familiari	Mai, raramente = 1	Spesso = 0
Con chi abita	Solo = 1	In compagnia = 0
Aiuto finanziario da parte dei familiari	No = 1	Sì = 0
Rapporti stretti con parenti non familiari	No = 1	Sì = 0
Aiuto concreto da parte dei familiari	No = 1	Sì = 0
Con quante persone si vede almeno una volta a settimana?	Nessuno = 1	Almeno una = 0
Ha amici intimi?	No = 1	Sì = 0
Frequenza rapporti?	Mai, raramente = 1	Spesso, = 0
Frequenta posti pubblici?	Mai, raramente = 1	Spesso, = 0
Frequenta cinema-teatri?	Mai, raramente = 1	Spesso = 0
Frequenta associazioni di volontariato-ricreative?	Mai, raramente = 1	Spesso= 0
Legge i giornali?	Mai, raramente = 1	Spesso= 0
Ascolta radio e/o vede TV?	Mai, raramente = 1	Spesso= 0
Si prende cura dei bambini?	Mai, raramente = 1	Spesso= 0

FRAILTY INDEX

"Italian" edition

Frailty factors	Time (min)
Physical frailty	10
Mental frailty	10
Nutritional frailty	5
Social frailty	5
Totale	**≈ 30 (*)**

(*) If preceded by Comprensive Geriatric Assessment ≈ 15 min.

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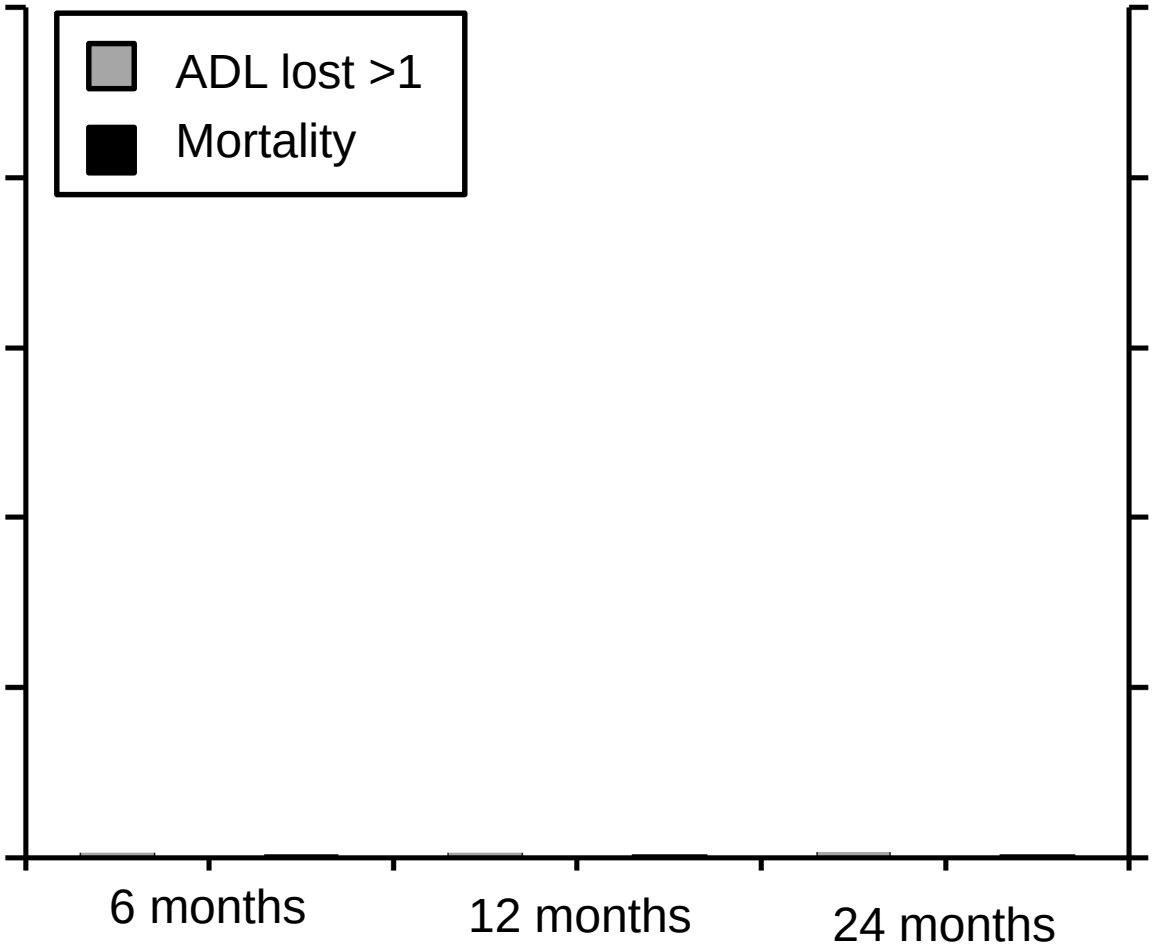
FRAILTY INDEX "Italian" edition

ADL lost >1 and MORTALITY at follow-up



*p<0.05 vs. 6 months

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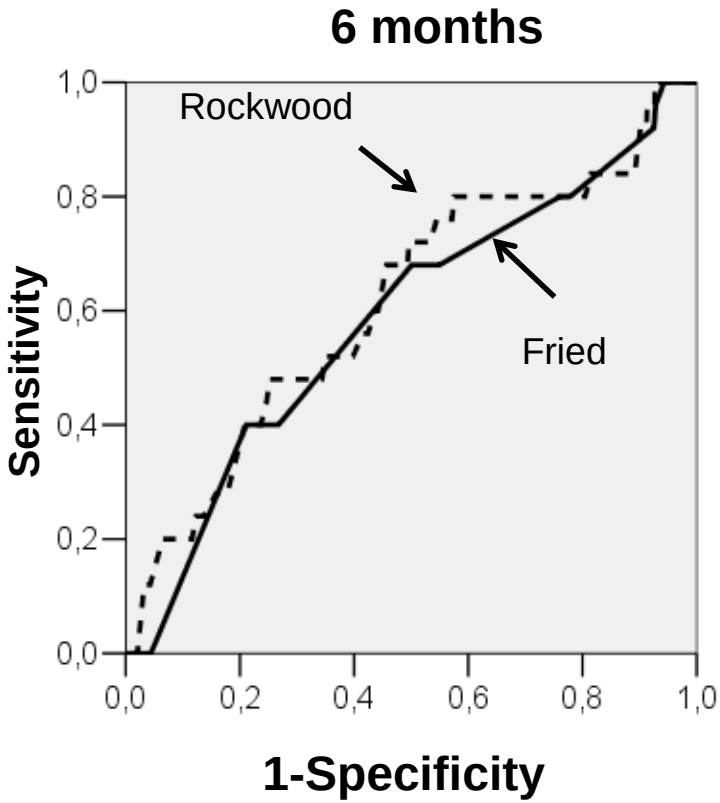
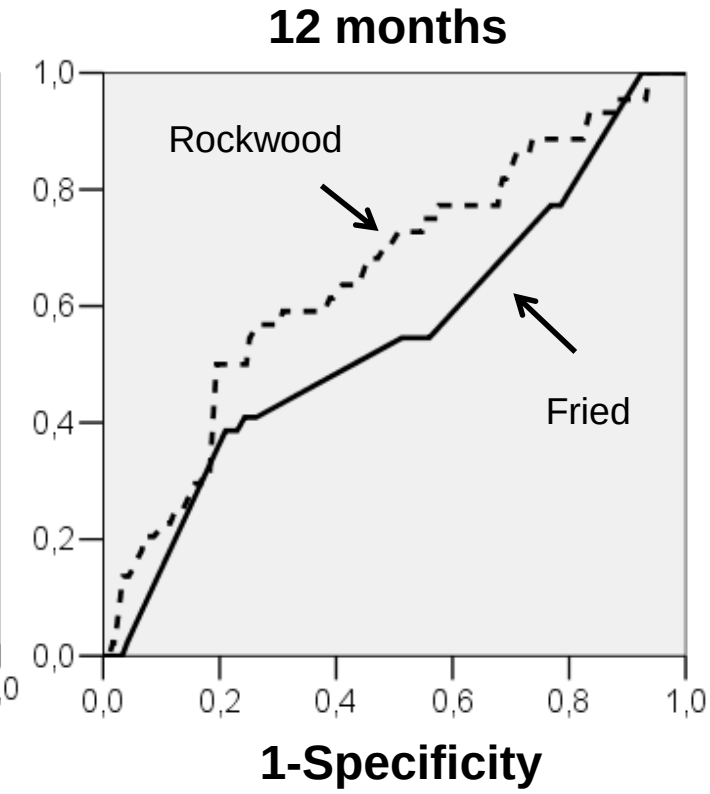
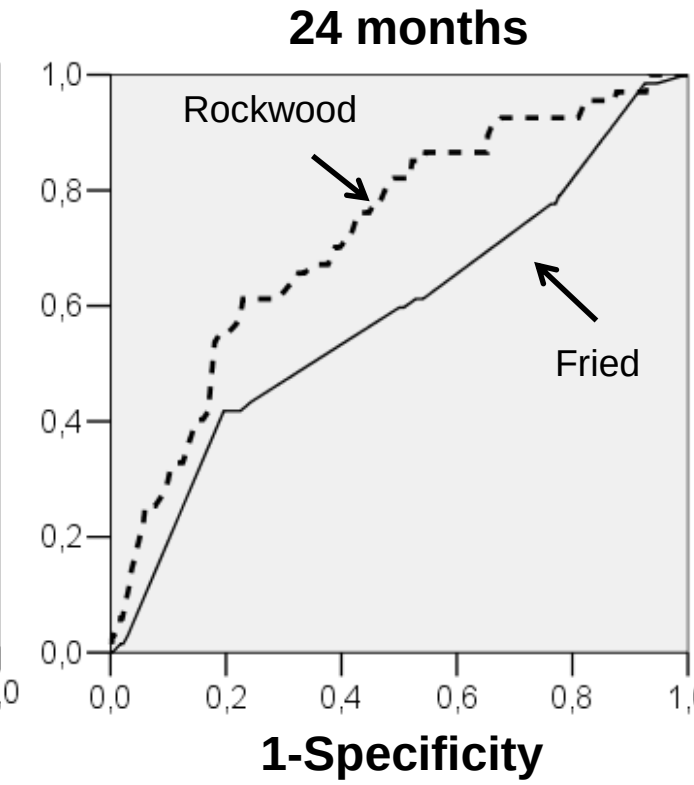
FRAILTY INDEX "Italian" edition

ROC curves on "MORTALITY" at follow-up







Index	AUC	p
Fried	0.586	0.143
Rockwood	0.614	0.053

Index	AUC	p
Fried	0.550	0.266
Rockwood	0.653	0.001

Index	AUC	p
Fried	0.585	0.022
Rockwood	0.723	0.001

Abete P et al., submitted 2015

Take messages

- Pre-clinical and clinical frailty are different entities, and therefore, should be evaluated by different methods, i.e Fried's method for pre-clinical and Rockwood's method for the clinical frailty.

- Clinical Frailty is characterized by 4 factors (physical, mental, nutritional and social frailty).

- Each frailty factor should be evaluated by definite instruments.

- Italian "edition" of Rockwood's method seems to be a reliable and feasible method, especially if preceded by Geriatric Comprehensive Assessment.