



**Venerdi, 19 gennaio 2007**

**Mini corso pratico sulla  
valutazione multidimensionale  
*(parte seconda)***

**Renzo Rozzini**

# **Comprehensive Geriatric Assessment**

**A multidimensional process designed to assess an elderly person's functional ability, physical health, cognitive and mental health, and socioenvironmental situation.**

## SCALA DI VALUTAZIONE DELL'EQUILIBRIO E DELL'ANDATURA

### A) EQUILIBRIO.

Il soggetto è seduto su una sedia rigida, senza braccioli. Se il soggetto non sta in equilibrio il punteggio è 0.

1) Equilibrio da seduto	-si inclina o scivola dalla sedia	0
	-è stabile, sicuro	1
2) Alzarsi dalla sedia	-è incapace senza aiuto	0
	-deve aiutarsi con le braccia	1
	-si alza senza aiutarsi con le braccia	2
3) Tentativo di alzarsi	-incapace senza aiuto	0
	-capace, ma richiede più di un tentativo	1
	-capace al primo tentativo	2
4) Equilibrio stazione eretta (primi 5sec.)	-instabile (vacilla, marcate oscillazioni tronco)	0
	-stabile grazie all'uso del bastone o altri ausili	1
	-stabile senza ausili per il cammino	2
5) Equilibrio stazione eretta prolungata	-instabile (vacilla, marcate oscillazioni tronco)	0
	-stabile, ma a base larga (malleoli mediali distano >10cm)	1
	-stabile a base stretta senza supporti	2
6) Romberg	-instabile	0
	-stabile	1
7) Romberg sensibilizzato	-incomincia a cadere	0
	-oscilla, ma si ripiglia da solo	1
	-stabile	2
8) Girarsi di 360°	-a passi discontinui	0
	-a passi continui	1
	-instabile (si aggrappa, oscilla)	0
	-stabile	1
9) Sedersi	-insicuro (sbaglia la distanza, cade sulla sedia)	0
	-usa le braccia o ha un movimento discontinuo	1
	-sicuro, movimento continuo	2

non eseguibile \_\_\_\_

\_\_\_\_/16

**B) ANDATURA.** Il paziente sta in piedi di fronte al rater; cammina lungo il corridoio o attraverso la stanza, all'inizio con il suo passo usuale, poi con un passo rapido, ma sicuro. Può usare gli abituali ausili per il cammino. Se il soggetto non deambula il punteggio è 0.

**10) Inizio della deambulazione (immediatamente dopo il via)**

-una certa esitazione o più tentativi	0	-nessuna esitazione	1
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**11) Lunghezza ed altezza del passo**

<b>Piede dx</b>		<b>Piede sx</b>	
-durante il passo il piede dx non supera il sx	0	-durante il passo il piede sx non supera il dx	0
-il piede dx supera il sx	1	-il piede sx supera il dx	1
-il piede dx non si alza complet. dal pavimento	0	-il piede sx non si alza complet. dal pavimento	0
-il piede dx si alza complet. dal pavimento	1	-il piede sx si alza complet. dal pavimento	1

**12) Simmetria del passo**

-il passo dx e sx non sembrano uguali	0	-il passo dx e sx sembrano uguali	1
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**13) Continuità del passo**

-interrotto o discontinuo	0	-continuo	1
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**14) Traiettorie**

-marcata deviazione	0
-lieve e moderata o uso di ausilio	1
-assenza di deviazione e di uso di ausili	2

**15) Tronco**

-marcata oscillazione o uso di ausili	0
-non oscillazione, ma flessione delle ginocchia, della schiena o allargamento delle braccia durante il cammino	1
-non oscillazione, flessione, uso delle braccia o ausili	2

**16) Cammino**

-i talloni sono separati	0	-i talloni quasi si toccano durante il cammino	1
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non eseguibile \_\_\_\_

\_\_\_\_/12

# **A hierarchical exercise scale to measure function at the Advanced Activities of Daily Living (AADL) level.**

Reuben DB, Laliberte L, Hiris J, Mor V  
Jags, 1990; 38:855-861

**Standard functional assessment instruments often fail to capture subtle impairment in community-dwelling older persons.**

**To create a scale to measure function at the Advanced Activities of Daily Living (AADL) level, we chose three questions to separate a community sample into four levels: frequent vigorous exercisers (8.0%), frequent long walkers (10.8%), frequent short walkers (23.7%), and nonexercisers (57.5%).**

**These levels of exercise formed a hierarchical scale that correlated positively in a graduated manner with progressively advanced social activities of daily living, current health status, and mental health. At 1-year follow-up, 20% of persons declined in exercise level, 63% showed no change in exercise level, and 17% improved their exercise level. Changes in exercise level in both directions were associated with changes in mental health status.**

**The Advanced Activities of Daily Living scale may be a sensitive measure of earlier functional decline, but longer follow-up will be necessary to determine its clinical usefulness.**

# **An objective measure of physical function of elderly outpatients.**

## **The Physical Performance Test.**

**Reuben DB, Siu AL.**

**Jags, 1990; 38:1105-1112**

**Direct observation of physical function has the advantage of providing an objective, quantifiable measure of functional capabilities. We have developed the Physical Performance Test (PPT), which assesses multiple domains of physical function using observed performance of tasks that simulate activities of daily living of various degrees of difficulty. Two versions are presented: a nine-item scale that includes writing a sentence, simulated eating, turning 360 degrees, putting on and removing a jacket, lifting a book and putting it on a shelf, picking up a penny from the floor, a 50-foot walk test, and climbing stairs (scored as two items); and a seven-item scale that does not include stairs. The PPT can be completed in less than 10 minutes and requires only a few simple props. We then tested the validity of PPT using 183 subjects (mean age, 79 years) in six settings including four clinical practices (one of Parkinson's disease patients), a board-and-care home, and a senior citizens' apartment. The PPT was reliable (Cronbach's alpha = 0.87 and 0.79, interrater reliability = 0.99 and 0.93 for the nine-item and seven-item tests, respectively) and demonstrated concurrent validity with self-reported measures of physical function. Scores on the PPT for both scales were highly correlated (.50 to .80) with modified Rosow-Breslau, Instrumental and Basic Activities of Daily Living scales, and Tinetti gait score. Scores on the PPT were more moderately correlated with self-reported health status, cognitive status, and mental health (.24 to .47), and negatively with age (-.24 and -.18). Thus, the PPT also demonstrated construct validity. The PPT is a promising objective measurement of physical function, but its clinical and research value for screening, monitoring, and prediction will have to be determined.**

# PHYSICAL PERFORMANCE TEST

	sec.	score
1) Scrivere una frase "Il sole tramonta nel mare"	_____	_____
2) Alimentazione simulata	_____	_____
3) Sollevare un libro e metterlo su una mensola	_____	_____
4) Indossare e togliersi una giacca	_____	_____
5) Prendere una moneta dal pavimento	_____	_____
6) Ruotare su se stesso	_____	_____
7) Camminare per 15 m	_____	_____

punteggio \_\_\_\_/28

8) Salire le scale (una rampa)	_____	_____
9) Salire le scale (quattro rampe)	_____	_____

punteggio \_\_\_\_/36

## Codifica

### item 1-2-4

≤10sec. =4  
10.5-15sec.=3  
15.5-20sec.=2  
>20sec. =1  
incapace =0

### item 3-5

≤2sec. = 4  
2.5-4sec.= 3  
4.5-6sec.= 2  
>6sec. = 1  
incapace = 0

### item 6

discontinuo = 0  
continuo = 2  
instabile = 0  
stabile = 2  
incapace = 0

### item 7

≤15 sec = 4  
15.5-20sec = 3  
20.5-25sec = 2  
>25 sec = 1  
incapace = 0

### item 8

≤5 sec = 4  
5.5-10 sec = 3  
10.5-15sec = 2  
>15 sec = 1  
incapace = 0

### item 9

4 rampe = 4  
3 rampe = 3  
2 rampe = 2  
1 rampe = 1  
incapace = 0

# **Disease-Disability**

# **The Relationship between Disease and Function and Perceived Health in Very Frail Elders**

*C.D. Mulrow, M.B. Gerety, J.E. Cornell, V.A. Lawrance, D.N. Kanten*

**J Am Geriatr Soc 42:374-380, 1994**

**... "the a priory hypothesis was that biomedical burden of disease has only a weak to moderate association with function and perceived health status".**

# **PHYSICAL DISABILITY IN OLDER ADULTS: A PHYSIOLOGICAL APPROACH**

**L.P.FRIED, W.H.ETTINGER, B.LIND, A.B.NEUMAN and J.GARDING  
FOR THE CARDIOVASCULAR HEALTH STUDY RESEARCH GROUP**

*J Clin Epidemiol Vol. 47 No. 7 pp. 747-760, 1994*

**..."While diseases are strongly associated with the presence of disability, it is clear that they are not the only contributors".**

# **Physical Performance Test and Activities of Daily Living Scales in the assessment of health in elderly people**

**Rozzini R., Frisoni GB., Bianchetti A., Zanetti O., Trabucchi M.  
J Am Geriatr Soc, 1993; 41:1109-113.**

**The prevalence of chronic conditions and their age and gender adjusted associations with BADL, IADL and PPT in multiple linear regression analysis (Age and Aging, 1996)**

Independent variables	%	Dependent variables		
		BADL (B)	IADL (B)	PPT (B)
Heart diseases	33.2	0.02	0.09	-2.75***
Hypertension	36.2	0.04	0.05	-0.05
Anemia	8.9	0.00	-0.01	-2.26*
Diabetes mellitus	14.0	-0.07	-0.11	-0.89
COPD	21.7	0.08	0.24	-1.58*
Previous bone fractures	9.5	0.06	0.04	-1.83
Liver diseases	6.7	-0.04	-0.28	-0.46
Parkinsonism	2.2	0.47	0.13	-7.31***
Previous stroke	5.1	-0.04	0.14	-11.37***
Degenerative joint disease	62.5	0.11	0.09	-0.69
Poor hearing	14.9	0.42**	0.54	-3.00***
Poor vision	14.6	0.21	0.35	-6.88***
Depression	25.7	0.75***	1.11***	-1.55*
Cognitive deterioration	14.0	1.02***	2.19***	-2.91**
Cancer	4.0	0.16	0.21	-3.59*

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

**Multiple analysis of the relationship between BADL, IADL, and PPT and the chronic conditions which were found to be associated to disability after adjustment for age and gender (Age and Aging, 1996)**

	<b>B</b>	<b>SE B</b>	<b>Sig T</b>
<b>BADL</b>			
Cognitive deterioration	<b>0.85</b>	<b>0.14</b>	<b>0.000</b>
Depression	<b>0.63</b>	<b>0.11</b>	<b>0.000</b>
Poor hearing	<b>0.29</b>	<b>0.13</b>	<b>0.033</b>
<b>IADL</b>			
Cognitive deterioration	<b>2.03</b>	<b>0.19</b>	<b>0.000</b>
Depression	<b>0.87</b>	<b>0.15</b>	<b>0.000</b>
<b>PPT</b>			
Previous stroke	<b>-9.00</b>	<b>1.34</b>	<b>0.000</b>
Poor vision	<b>-5.53</b>	<b>0.86</b>	<b>0.000</b>
Heart diseases	<b>-2.34</b>	<b>0.62</b>	<b>0.000</b>
Cognitive deterioration	<b>-2.77</b>	<b>0.86</b>	<b>0.001</b>
Parkinsonism	<b>-5.40</b>	<b>1.97</b>	<b>0.006</b>
Cancer	<b>-3.34</b>	<b>1.53</b>	<b>0.021</b>

## **Physical health:**

**The approach to the history and physical examination must be geriatric-specific. In particular, vision, hearing, continence, gait, and balance must be considered.**

Comorbidità in alcuni studi epidemiologici condotti dal nostro gruppo.

		numero malattie			
	n	0-2	3-4	>5	età
<b>Nel territorio:</b>					
Brescia (1986)	1201	19.2	36.5	44.3	70-75
Ospitaletto (1992)	549	30.5	28.1	41.4	>70
Tirano (1993)	183	25.8	32.0	42.2	>60
Coccaglio (1995)	420	32.6	30.2	37.2	>70
<b>In ambulatorio medico:</b>					
PEQOL (1992)	462	10.4	43.8	45.8	>75
<b>In RSA :</b>					
PROLOGUS (1994)	178	7.2	41.5	51.3	>70
<b>In Ospedale:</b>					
GERU (1996)	493	5.7	31.6	62.7	>65
ACE (2002)	3082	16.6	29.7	56.4	>65
UCSI (2003)	230	16.1	27.0	57.3	>65

## **Modified Cumulative Illness Rating Scale-CIRS**

*Each system is rated as follows:*

- 1 = NONE:** No impairment to that organ/system.
- 2 = MILD:** Impairment does not interfere with normal activity; treatment may not be required; prognosis is excellent (examples: skin lesions, hernias, hemorrhoids)
- 3 = MODERATE:** Impairment interferes with normal activity; treatment is needed; prognosis is good (examples: gallstones, diabetes, fractures)
- 4 = SEVERE:** Impairment is disabling; treatment is urgently needed; prognosis is guarded (examples: respectable carcinoma, pulmonary emphysema, congestive heart failure)
- 5 = EXTREMELY SEVERE:** Impairment is life threatening; treatment is urgent or of no avail; prognosis is grave (examples: myocardial infarction, cerebrovascular accident, gastrointestinal bleeding, embolus).

## Modified Cumulative Illness Rating Scale

Value 1-5

- a. Cardiac (heart only) \_\_\_\_
- b. Hypertension (based on severity; systems rated separately). \_\_\_\_
- c. Vascular (blood, vessels and cells, marrow, spleen, lymphatics). \_\_\_\_
- d. Respiratory (lungs, bronchi, trachea below the larynx). \_\_\_\_
- e. EENT (eye, ear, nose, throat, larynx). \_\_\_\_
- f. Upper GI (esophagus, stomach, duodenum, biliary and pancreatic trees; \_\_\_\_ do no include diabetes). \_\_\_\_
- g. Lower GI (intestines, hernias). \_\_\_\_
- h. Hepatic (liver only). \_\_\_\_
- i. Renal (kidneys only). \_\_\_\_
- j. Other GU (ureters, bladder, urethra, prostate, genitals). \_\_\_\_
- k. Musculo-skeletal-integumentary (muscles, bone, skin) \_\_\_\_
- l. Neurological (brain, spinal cord, nerves; do not include dementia). \_\_\_\_

# COMBINED COMORBIDITY INDEX

*Charlson et al., J Clin Epidemiol, 1994*

myocardial infarction	1	hemiplegia	2
congestive heart failure	1	moderate or severe renal disease	2
peripheral vascular disease	1	diabetes with end organ damage	2
cerebrovascular disease	1	malignancy	2
dementia	1		
chronic pulmonary disease	1	moderate or severe liver disease	3
connective tissue disease	1		
ulcer disease	1	metastatic solid tumor	6
mild liver disease	1	AIDS	6
diabetes	1		

Each decade of age over 40 adds 1 point to risk.

# Comorbidity Score of Covinsky et al (2001)

- |   |                          |
|---|--------------------------|
| (1) arthritis                             | (7) diabetes             |
| (2) asthma                                | (8) liver disease        |
| (3) chronic obstructive pulmonary disease | (9) kidney disease       |
| (4) hypertension                          | (10) cancer              |
| (5) coronary artery disease               | (11) stroke              |
| (6) peripheral vascular disease           | (12) Parkinson's disease |

Extent of Condition	Points
none	0
mild or moderate	1
severe	2

comorbidity score =SUM (points for all 12 conditions) (minimum score: 0; maximum score: 24)  
• The higher the score the greater the degree of comorbidity.

Score	Degree of Comorbidity
0	none
1	minimal
2 to 4	moderate
>= 5	severe

# **Functional and Biomedical Components in the Measures of Disease Severity in the Elderly.**

**Rozzini R, Barbisoni P, Trabucchi M.**

**J Am Geriatr Soc, 1995;43:1321.**

**Means (SD) and percent reporting moderate (IDS=2) or greater impairment of different IDS items.**

	<b>Mean</b>	<b>(SD)</b>	<b>% with moderate or worse impairment</b>
<b>Cardiac (ischemic, organic)</b>	<b>1.22</b>	<b>(1.11)</b>	<b>37.1</b>
<b>Rhythm</b>	<b>.14</b>	<b>(.49)</b>	<b>5.8</b>
<b>Congest</b>	<b>.08</b>	<b>(.46)</b>	<b>3.2</b>
<b>Hypertension</b>	<b>1.07</b>	<b>(1.19)</b>	<b>44.4</b>
<b>Vascular</b>	<b>.53</b>	<b>(.93)</b>	<b>20.8</b>
<b>Respiratory</b>	<b>.65</b>	<b>(.89)</b>	<b>14.1</b>
<b>Gastrointestinal</b>	<b>.47</b>	<b>(.69)</b>	<b>5.8</b>
<b>Hepatic</b>	<b>.56</b>	<b>(.78)</b>	<b>9.3</b>
<b>Renal</b>	<b>.52</b>	<b>(.86)</b>	<b>12.2</b>
<b>Musculoskeletal</b>	<b>1.39</b>	<b>(1.10)</b>	<b>48.2</b>
<b>Stroke</b>	<b>.54</b>	<b>(1.02)</b>	<b>20.2</b>
<b>Parkinsonism</b>	<b>.13</b>	<b>(.52)</b>	<b>5.8</b>
<b>Anemia</b>	<b>.53</b>	<b>(.68)</b>	<b>8.9</b>
<b>Diabetes</b>	<b>.48</b>	<b>(.94)</b>	<b>0.2</b>
<b>Tumors</b>	<b>.27</b>	<b>(.82)</b>	<b>6.6</b>
<b>BOD*</b>	<b>.55</b>	<b>(.22)</b>	

\*Summary score based on the average of all IDS items.

**Research papers**

# **Geriatric Index of Comorbidity: validation and comparison with other measures of comorbidity**

**Renzo Rozzini, Giovanni B. Frisoni, Luigi Ferrucci, Piera Barbisoni, Toni Sabatini, Piera Ranieri, Jack M. Guralnik and Marco Trabucchi**

*Age and Ageing* 2002; **31**: 277-285

# Individual Disease Severity

- IDS 0** Assenza della malattia. Anamnesi, esame obiettivo e indagini strumentali negativi per presenza di malattia).
- IDS 1** Asintomaticità. Il paziente è attualmente asintomatico ma:
- a) la malattia è presente ad uno stadio asintomatico; il paziente, pur non lamentando sintomi, presenta minimi reperti obiettivi e risultati positivi delle indagini strumentali;
  - b) ha contratto la malattia in passato; il paziente è attualmente asintomatico grazie ad un trattamento medico o chirurgico effettuato con successo;
- N.B. Una storia di infarto miocardico acuto, di edema polmonare, di ictus, la presenza di aneurisma nel cerebrale o periferico, costituiscono un'eccezione: visto l'alto rischio che tali condizioni rappresentano esse saranno considerate in IDS 2 anche in caso di attuale asintomaticità del paziente.
- IDS 2** Sintomi lievi-moderati. Il paziente lamenta sintomi lievi-moderati, controllabili dal trattamento.
- IDS 3** Sintomi gravi. Il paziente presenta manifestazioni di severa entità, scarsamente controllate dal trattamento.
- IDS 4** Stadio terminale. La malattia è presente al suo massimo livello di gravità e non e' controllabile con la terapia.

*Greefield S et al, Clin Res, 1987*

# Individual Disease Severity

- Level 0:*** absence of disease
- Level 1:*** asymptomatic disease
- Level 2:*** symptomatic disease controlled by therapy
- Level 3:*** symptomatic disease uncontrolled by therapy
- Level 4:*** life-threatening disease or the greatest severity achievable by the diseases

*Greenfield S et al, Clin Res, 1987*

## **GIC: comorbidity is defined both as number and severity of diseases**

- Class I:** includes patients with one or more conditions with IDS =1 or lower.
- Class II:** includes patients with one or more conditions with IDS =2.
- Class III:** includes patients with one condition with IDS =3, other conditions having IDS =2 or lower.
- Class IV:** includes patients with two or more conditions with IDS =3 or one or more conditions with IDS =4.

## Characteristics of 493 hospitalized elderly patients (GERU).

	n	%	Mean	(SD)
Females	349	70.8		
Age (years)			78.9	(7.4)
Education (years)			5.2	(2.6)
Mini Mental State Examination			21.8	(6.3)
Geriatric Depression Scale			13.2	(6.4)
Drugs (n.)			4.7	(1.9)
Prognostic Nutritional Index			35.6	(16.5)

# Characteristics of 493 hospitalized elderly patients (GERU).

	n	%	Mean (SD)
<b>Basic Activities of Daily Living (lost functions)</b>			<b>2.6 (1.9)</b>
No	75	15.2	
1	128	26.0	
2	63	12.8	
>2	227	46.0	
<b>Physical Performance Test</b>			<b>11.8 (6.6)</b>
>21	30	6.1	
15-21	150	30.4	
8-14	175	35.5	
0-7	138	28.0	

## Characteristics of 493 hospitalized elderly patients (GERU).

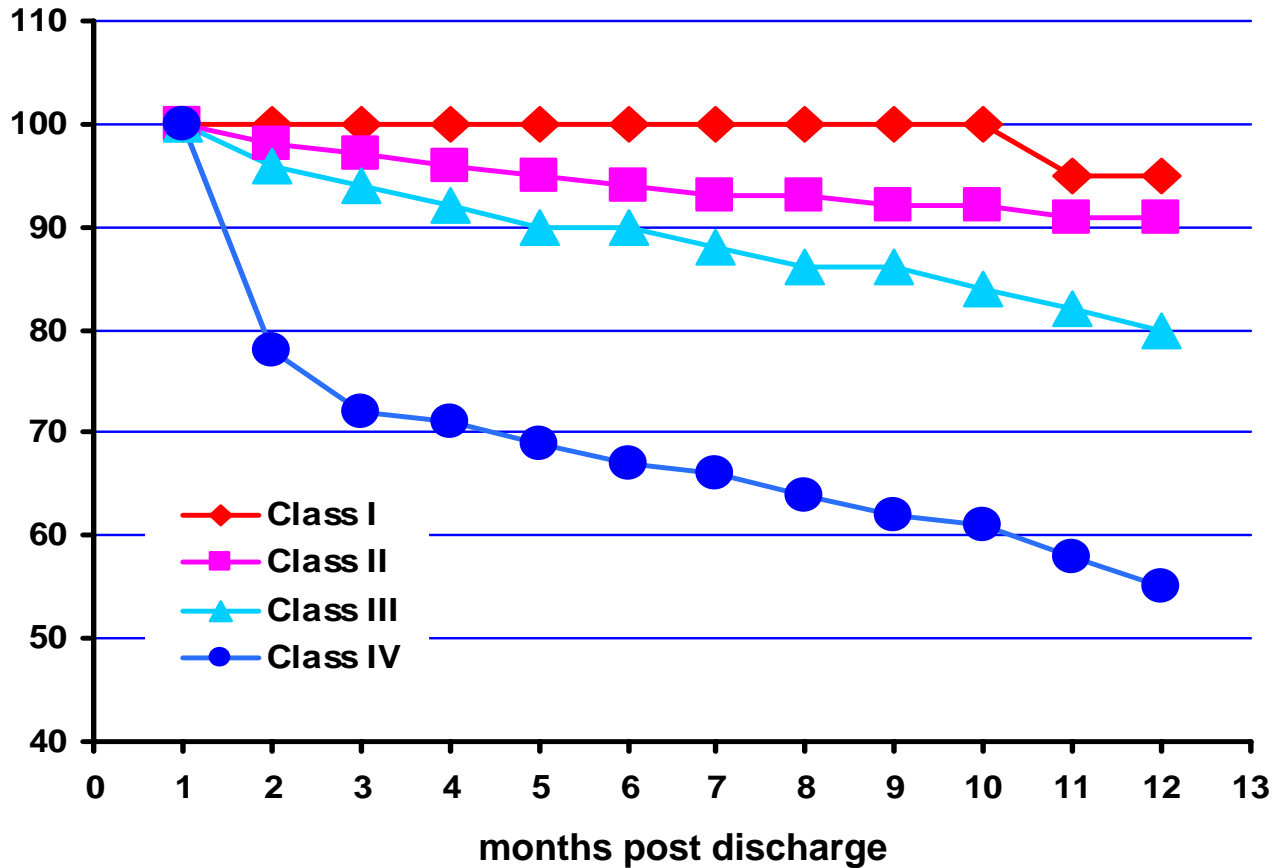
	n	%	Mean (SD)
<b>Diseases (n.)</b>			<b>5.0 (1.7)</b>
0-2	28	5.7	
3-4	156	31.6	
5-6	214	43.4	
7-9	95	19.3	
<b>Disease Burden</b>			<b>8.5 (3.1)</b>
0-4	37	7.5	
5-8	216	43.8	
9-11	169	34.3	
12-19	71	14.4	
<b>Geriatric Index of Comorbidity</b>			
Class I	16	3.2	
Class II	195	39.6	
Class III	206	41.8	
Class IV	76	15.4	

**Value of functional status variables (BADL lost functions and PPT score) across the four levels of comorbidity detected by number of diseases, Disease Burden, and classes of the Geriatric Index of Comorbidity in 493 elderly hospitalized patients.**

	BADL lost functions		PPT score	
	Mean	(SD)	Mean	(SD)
<b>Disease levels</b>				
0-2	1.7	(1.8)	15.7	(5.9)
3-4	2.5	(2.1)	12.2	(6.7)
5-6	2.7	(2.0)	11.5	(6.8)
7-9	3.0	(1.9)	10.6	(5.7)
	F(3,489)=2.97*		F(3,489)=4.82**	
<b>Disease Burden</b>				
0-4	1.4	(1.4)	16.3	(5.5)
5-8	2.4	(2.0)	12.6	(6.6)
9-11	2.9	(1.9)	10.8	(6.4)
12-19	3.4	(1.9)	9.2	(5.7)
	F(3,489)=10.15**		F(3,489)=12.90***	
<b>GIC Classes</b>				
Class I	1.1	(1.1)	18.2	(4.4)
Class II	2.1	(1.8)	13.6	(5.9)
Class III	2.9	(2.1)	10.7	(6.5)
Class IV	3.6	(1.9)	8.8	(6.7)
	F(3,489)=16.45***		F(3,489)=19.19***	

F values are computed in one-way ANOVA  
 \*p<.05; \*\*p<.001; \*\*\*p<.0001

# Survival in Geriatric Index of Comorbidity (GIC) classes in older patients consecutively admitted to a GERU



- $p < 0.0001$  for different survival GIC classes on log-rank test

## Characteristics of 1402 hospitalized elderly patients according to the Geriatric Index of Comorbidity classes.

	<b>Class II</b> N=429 M±SD(%)	<b>GIC</b> <b>Class III</b> N=479 M±SD(%)	<b>Class IV</b> N=494 M±SD(%)	<b>P*</b>
Age	79.0±7.3	80.2±6.9	80.8±7.1	<0.001
MMSE	24.1±5.8	22.7±7.0	19.9±8.8	<0.0001
GDS	5.2±3.6	4.8±3.4	5.3±2.1	NS
Diseases (n)	4.7±1.8	5.3±1.9	6.1±2.1	<0.0001
Drugs (n)	3.8±1.7	4.1±1.8	4.7±2.0	<0.0001
IADL (15 days before adm)	2.6±2.7	3.2±2.8	3.9±2.9	<0.0001
BADL (15 days before adm)	89.9±16.2	84.5±21.6	73.5±30.7	<0.0001
BADL (on admission)	84.8±21.2	75.5±28.7	56.6±36.0	<0.0001
BADL (on discharge)	86.6±20.0	79.4±26.2	59.6±36.5	<0.0001
Serum albumin (g/dl)	4.1±0.6	4.0±0.6	3.7±1.0	<0.0001
Serum cholesterol (mg/dl)	218.8±45.9	206.2±52.4	182.8±47.8	<0.0001
Apache II score	5.9±1.9	8.1±3.6	11.9±5.9	<0.0001
Length of stay (days)	5.7±2.4	6.4±3.1	7.9±4.8	<0.0001
6 month mortality	55 (12.8)	80 (16.7)	173 (35.0)	<0.0001

*P denotes significance on ANOVA test*

*Rozzini et al. J Clinical Epidemiology, 2003*

**The comorbidity that can accompany severe conditions could not be captured by GIC; in fact the hierarchical construction of the GIC does not allow one to discriminate degrees of comorbidity of conditions whose severity is below that of the most severe conditions.**

**For example, a patient with IDS=3 heart disease is classified as GIC class III as well as a patient with IDS=3 heart disease plus IDS=2 arthritis, IDS=2 stroke, etc.**

# **COMPARISONS AMONG COMORBIDITY INDEXES**

**The 50<sup>th</sup> Annual Scientific Meeting  
The Gerontological Society of America  
Cincinnati, Ohio  
November 14-18, 1997**

**Characteristic of 590 hospitalized disabled elderly patients.**

	<b>n</b>	<b>(%)</b>	<b>Mean</b>	<b>(SD)</b>	<b>Observed range</b>
<b>Gender (female)</b>	<b>416</b>	<b>(70.5)</b>			
<b>Age</b>			<b>79.6</b>	<b>(7.3)</b>	<b>65-97</b>
<b>Mini Mental State Examination</b>			<b>17.7</b>	<b>(9.9)</b>	<b>0-30</b>
<b>Geriatric Depression Scale</b>			<b>13.6</b>	<b>(6.3)</b>	<b>2-28</b>
<b>Activities of Daily Living (functions lost)</b>			<b>3.3</b>	<b>(1.8)</b>	<b>0-6</b>
<b>Instrumental Activities of Daily Living (functions)</b>			<b>5.8</b>	<b>(2.2)</b>	<b>0-8</b>
<b>Length of stay</b>			<b>29.2</b>	<b>14.6</b>	<b>7-95</b>
<b>Alive at 12 months</b>	<b>464</b>	<b>(78.6)</b>			

**Association of comorbidity scores obtained using the sum of diseases and the Burden of diseases evaluated in a sample of 590 elderly hospitalized disabled patients with 12 months mortality**

	<b>n/evnts</b>	<b>RR</b>	<b>95% CI</b>	<b><i>p</i></b>	<b>RR(adj.)</b>	<b>95% CI</b>	<b><i>p</i></b>
<b>Diseases</b>							
0-4	204/40	1.0 (ref.)			1.0 (ref.)		
5-6	266/57	1.1	0.7,1.6	.58	1.1	0.7,1.7	.55
7-8	103/28	1.5	0.9,2.4	.11	1.4	0.8,2.3	.22
9+	17/1	0.3	0.1,2.1	.21	0.2	0.1,1.4	.11
<b>Burden of diseases</b>							
0-5	202/30	1.0 (ref.)			1.0 (ref.)		
6-10	226/46	1.3	0.9,2.3	.12	1.3	0.8,2.1	.26
11-13	114/30	1.9	1.2,3.2	.01	1.6	0.9,2.6	.09
14+	48/20	3.6	2.1,6.3	.00	2.1	1.2,3.9	.01

**Adj.: Adjusted for age, gender, number of drugs, mental status, malnutrition**

**Association of comorbidity scores obtained using the Charlson Index and the Geriatric Index of Comorbidity evaluated in a sample of 590 elderly hospitalized disabled patients with 12 months mortality**

	<b>n/evnts</b>	<b>RR</b>	<b>95% CI</b>	<b><i>p</i></b>	<b>RR(adj.)</b>	<b>95% CI</b>	<b><i>p</i></b>
<b>Charlson Index</b>							
0-1	230/27	1.0 (ref.)			1.0 (ref.)		
2-3	236/50	1.9	1.2,3.1	.01	1.3	0.9,2.1	.28
4-5	94/29	2.9	1.7,5.0	.00	1.5	0.8,2.7	.19
6+	30/20	9.8	5.5,17.6	.00	4.4	2.3,8.4	.00
<b>Geriatric Index of Comorbidity</b>							
Class I	218/23	1.0 (ref.)			1.0 (ref.)	.	
Class II	263/53	1.9	1.2,3.2	.00	1.7	1.1,2.9	.03
Class III	82/35	5.0	2.9,8.5	.00	3.3	1.9,5.9	.00
Class IV	24/15	10.7	5.5,20.5	.00	6.3	3.1,12.3	.00

**Adj.: Adjusted for age, gender, number of drugs, mental status, malnutrition**

**-The study, among the first to compare different measures of comorbidity, documents that comorbidity indices provide useful information regarding prognosis of elderly hospitalized patients.**

**-Among the indices considered in the study the Charlson Index and the Geriatric Index of Comorbidity (a newly developed index taking into account both number and severity of diseases) seem provide the most powerful information.**

# **APACHE II: (Acute Physiology And Chronic Health Evaluation): A severity disease classification**

**The basis for APACHE's development was the hypothesis that the severity of acute disease can be measured by quantifying the degree of abnormality of multiple physiologic variables. This approach was used because it is believed that one of intensive care's major functions is to detect and treat life-threatening acute physiology derangements, and that a severity classification system must be based on objective physiologic measurement and be as independent of therapy as possible. Finally, the index should be valid for a wide range of diagnosis, easy to use, and based upon data available in most hospitals.**

**Knaus WA et al., Critical Care Medicine, 1985**

# **APACHE II (Acute Physiology And Chronic Health Evaluation)**

## **APS**

**Temperatura rettale (°C)**

**PA media (mmHg)**

**Frequenza cardiaca ventricolare**

**Frequenza respiratoria**

**PO<sub>2</sub>**

**pH**

**Sodiemia (mEq/l)**

**Potassiemia (mEq/l)**

**Creatininemia (mg/dl)**

**Ematocrito (%)**

**Globuli Bianchi (x 1.000)**

**Glasgow Coma Score (15-GCS)**

# Severe chronic disease criteria (APACHE II)

- CHF** (a) medication prior to admission include two of the following: diuretic, vasodilator, inotrope, ACE-inhibitors  
(b) NYHA Class IV symptoms, or LVEF  $<.25$
- COPD** two of four conditions:  
(a) baseline  $PCO_2 > 45$   
(b) cor pulmonale  
(c) respiratory failure within preceding year  
(d)  $FEV_1 < 0.5$  liters
- Cancer** (a) biopsy proven  
(b) metastatic by imaging or biopsy
- Cirrhosis** (a) diagnosis (CT, liver-spleen scan, endoscopy).  
One of three conditions:  
(b) hepatic coma, or  
(c) Child's class C or  
(d) Child's class B and UGI bleed within 6 months
- Renal failure** (a) ESRD on dialysis

## Crude associations of different clinical conditions with 6-month mortality in 650 hospitalized elderly patients

	<i>R.R.</i>	95% C.I.
HF (ischemic-valvular) (n=66)	1.4	0.7-2.9
COPD (n=93)	2.4	1.4-4.3
Parkinson D./neurological non-vasc diseases (n=48)	1.6	0.7-3.5
GI disease (n=57)	2.5	1.3-4.9
Stroke (n=67)	1.2	0.5-2.5
Cancer (n=59)	7.3	4.0-13.4
Muskuloskeletal diseases (n=30)	1.5	0.6-4.1
Peripheral vascular diseases (n=25)	0.6	0.1-2.8
Diabetes mellitus (n=39)	4.3	2.1-8.9
Liver and gallbladder diseases (n=30)	1.9	0.8-5.1
Anemia (n=23)	3.5	1.4-8.9
Kidney diseases (n=20)	3.4	1.3-9.2
HF (due to extracardiac diseases) (n=20)	4.3	1.7-11.3
Dementia (n=143)	3.5	2.1-5.9
Serum albumin (<3.5g/dl) (n=117)	3.6	2.2-6.1
Disability (BI<60) (n=182)	5.6	3.4-9.2
Negative events (1+) (n=67)	1.9	1.1-3.9
Charlson Index (<6)	4.1	1.9-8.5

Disease were considered at their IDS-Level 3 (i.e. symptomatic disease uncontrolled by therapy)  
 RR: risk ratio. C.I.: confidence interval.

## Crude associations of APACHE II score with 6-month mortality in 650 hospitalized elderly patients

	n	events	R.R.	95% C.I.
<b>APACHE II</b>				
<b>Class 1 (4-9)</b>	<b>495</b>	<b>38</b>	<b>1.0 (reference)</b>	
<b>Class 2 (10-13)</b>	<b>104</b>	<b>18</b>	<b>1.9</b>	<b>1.1-3.4</b>
<b>Class 3 (14-17)</b>	<b>36</b>	<b>12</b>	<b>3.1</b>	<b>1.5-6.5</b>
<b>Class 4 (18+)</b>	<b>15</b>	<b>8</b>	<b>6.0</b>	<b>2.5-14.3</b>

RR: risk ratio. C.I.: confidence interval.

## Adjusted associations of different clinical conditions with 6-month mortality in 650 hospitalized elderly patients


	<i>R.R.</i>	<i>95% C.I.</i>
Parkinson D./neurological non-vasc. disease	<b>1.6</b>	<b>0.7-3.5</b>
Cancer	<b>6.8</b>	<b>3.7-12.7</b>
Diabetes mellitus	<b>3.7</b>	<b>1.7-7.9</b>
HF (due to extracardiac diseases)	<b>2.7</b>	<b>1.1-6.9</b>
Disability (B.I.<60)	<b>3.4</b>	<b>1.8-6.1</b>
Negative events (1+)	<b>1.8</b>	<b>1.0-4.3</b>
<b>APACHE II</b>		
Class 1 (4-9)	<b>1.0</b>	<b>(reference)</b>
Class 2 (10-13)	<b>1.6</b>	<b>0.9-3.1</b>
Class 3 (14-17)	<b>2.5</b>	<b>1.1-5.9</b>
Class 4 (18+)	<b>2.5</b>	<b>1.1-8.6</b>

Adjusted for age, gender, severity of diseases (ischemic or valvular heart diseases, respiratory, kidney diseases, anemia, dementia, GI diseases,) serum albumin, and comorbidity.

RR: risk ratio. C.I.: confidence interval.

## **Cognitive and mental health:**

**Several screening tests for cognitive dysfunction have been validated; the Mini-Mental State Examination is popular because it efficiently tests most of the major aspects of cognitive function. Of the several validated screening instruments for depression, the Geriatric Depression Scale and the Hamilton Depression Scale are the easiest to use and most widely accepted. However, a two-question screening instrument ("During the past month, have you been bothered by feelings of sadness, depression, or hopelessness? Have you often been bothered by a lack of interest or pleasure in doing things?") is as effective as these longer scales. Specific psychiatric symptoms (eg, paranoia, delusions, behavior abnormalities) are evaluated in the psychologic assessment, but they are less easily quantified and are rarely included in rating scales.**

	Score	Points		Score	Points
<b>Orientation</b>			<b>Repetition</b>		
What is the			Have the patient repeat		
Year?	_____	1	"No ifs, ands, or buts."	_____	1
Season?	_____	1	<b>Comprehension</b>		
Date?	_____	1	Have the patient follow		
Day?	_____	1	a three-stage command:		
Month?	_____	1	"Take the paper in your		
Where are we			right hand. Fold the		
County/Neighborhood?	_____	1	paper in half. Put the		
State?	_____	1	paper on the floor." Give		
Town/city?	_____	1	1 point for each stage		
Name/address of	_____		the patient can perform.	_____	3
building?	_____	1	<b>Reading</b>		
Floor?	_____	1	Have the patient read		
<b>Registration</b>			and obey the following		
Name three objects,			written command:		
with 1-sec and pause			"Close your eyes."	_____	1
between each. Give			<b>Writing</b>		
1 point for each object			Have the patient write		
the patient can name.			a sentence of his or		
Repeat the objects until			her choice. Give 1 point		
the patient learns all three.			if the sentence contains		
Score for first trial	_____	3	a subject and an object		
<b>Attention and Calculation</b>			and makes sense.		
Ask the patient to			Ignore spelling errors.	_____	1
subtract 7 from 100			<b>Drawing</b>		
and continue to subtract			Enlarge the design		
7 from the remainder			printed below to 1 to		
(ie, serial 7's). Give 1			5 cm per side and		
point for each correct			have the patient copy		
answer. Stop after			it. Give 1 point if all		
5 answers.	_____	5	of the sides and angles		
<b>Recall</b>			are preserved and if		
Ask the patient to name			the intersecting sides		
the three objects learned			form a quadrangle.	_____	1
during registration. Give					
1 point for each object			<b>Total score</b>		
the patient can name.	_____	3	_____		30
<b>Naming</b>					
Point to a pencil and					
a watch. Give 1 point					
for each object the					
patient can name.	_____	2			

**FIGURE 38-1.** The Annotated Mini-Mental State Examination form. **NOTE:** A score of < 26 may indicate a need for further evaluation. However, cognitive performance as measured by this test varies according to the patient's age and educational level, as described in Crum RM, et al: "Population-based norms for the Mini-Mental State Examination by age and educational level." *Journal of the American Medical Association* 269:2386-2391, 1993. (Adapted from the Mini-Mental State Examination, copyright 1975 and 1998 Mini Mental LLC.)

**TABLE 33-4. GERIATRIC DEPRESSION SCALE (SHORT FORM)**

1.	Are you basically satisfied with your life?	Yes	No
2.	Have you dropped many of your activities and interests?	Yes	No
3.	Do you feel that your life is empty?	Yes	No
4.	Do you often get bored?	Yes	No
5.	Are you in good spirits most of the time?	Yes	No
6.	Are you afraid that something bad is going to happen to you?	Yes	No
7.	Do you feel happy most of the time?	Yes	No
8.	Do you often feel helpless?	Yes	No
9.	Do you prefer to stay at home rather than go out and do new things?	Yes	No
10.	Do you feel you have more problems with memory than most?	Yes	No
11.	Do you think it is wonderful to be alive now?	Yes	No
12.	Do you feel pretty worthless the way you are now?	Yes	No
13.	Do you feel full of energy?	Yes	No
14.	Do you feel that your situation is hopeless?	Yes	No
15.	Do you think that most people are better off than you are?	Yes	No
<i>Score: ___/15</i>			
	One point for "No" to questions 1, 5, 7, 11, 13	Normal	3 ± 2
	One point for "Yes" to other questions	Mildly depressed	7 ± 3
		Very depressed	12 ± 2

Adapted from Sheikh JL, Yesavage JA: "Geriatric depression scale (GDS): Recent evidence and development of a shorter version," in *Clinical Gerontology: A Guide to Assessment and Intervention*, edited by TL Brink. Binghamton, NY, Haworth Press, 1986, pp. 165-173. By The Haworth Press, Inc. All rights reserved. Reprinted with permission.

## **Socio-environmental situation:**

**Factors that affect the patient's socio-environmental situation are complex and difficult to quantify.**

**They include the social interaction network, available social support resources, special needs, and environmental safety and convenience, which influence the treatment approach used. Such information can readily be obtained by an experienced nurse or social worker.**

**Several assessment instruments are available, but none is quantitative or clinically useful.**

**A checklist can be used to assess home safety.**

# Assessing Older Adults

Assessment Domain	Screening Methods	Further Assessment (if screen is positive)	see:
<b>Medical</b>			
Medical illnesses	Hx, screening physical examination	Additional targeted physical examination, lab&imaging tests	
Medications	Medications review	Pharmacy referral	<b>Appropriate Prescribing</b>
Nutrition	Inquire about weight loss weigh patient	Dietary hx, malnutrition evaluation	<b>Malnutrition</b>
Dentition	Oral examination	Dentistry referral	
Hearing	Handheld Audio Scope, BHLS, whisper test	Ear examination, audiology referral	<b>Hearing Impairment</b>
Vision	Inquire about vision changes, Snellen chart testing	Eye examination, ophthalmology referral	<b>Brief Screener</b>
Pain	Inquire about pain	Pain inventory	<b>Visual Impairment</b>
Urinary incontinence	lost urine >5 in past year	UI evaluation	<b>Pain Scales</b>
<b>Mental</b>			
Cognitive status	3-item recall, MMSE	Mental status exam,	
Emotional status	GDS, or other scales	In-depth interview	<b>PHQ-9, GDS</b>
Spiritual status	Spiritual hx	In-depth interview,	
<b>Physical</b>			
Functional status	ADLs, IADLs	PT/OT referral	<b>ADLs, IADLs</b>
Balance and gait	Observe patient getting up and walking, orthostatic BP	POMA scale	<b>POMA</b>
Falls	Inquire about falls in past year	Falls evaluation	<b>Falls evaluation</b>
<b>Environmental</b>			
Social, financial status	Social hx	In-depth interview, social work referral	
Environmental hazards	Inquire about living	Home evaluation situation	

## **Housing conditions and ill health in the elderly**

**Rozzini R., Bianchetti A., Franzoni S., Trabucchi M.**

**Br Med J, 1987; 294:1694.**

**The data showed a greater prevalence of somatic symptoms in the group of elderly people living in poor houses in comparison with those living in non poor houses, with significant differences for dyspnoea, tiredness, dyspepsia, insomnia and aches.**

**Lastly, a higher mood depression score was found in those living in poor houses.**

# **Altri strumenti valutativi**

# **Palliative Performance Scale (PPSv2)**

*version 2*

<b>PPS Level</b>	<b>Ambulation</b>	<b>Activity &amp; Evidence of Disease</b>	<b>Self-Care</b>	<b>Intake</b>	<b>Conscious Level</b>
100%	Full	Normal activity & work No evidence of disease	Full	Normal	Full
90%	Full	Normal activity & work Some evidence of disease	Full	Normal	Full
80%	Full	Normal activity <i>with</i> Effort Some evidence of disease	Full	Normal or reduced	Full
70%	Reduced	Unable Normal Job/Work Significant disease	Full	Normal or reduced	Full
60%	Reduced	Unable hobby/house work Significant disease	Occasional assistance necessary	Normal or reduced	Full or Confusion
50%	Mainly Sit/Lie	Unable to do any work Extensive disease	Considerable assistance required	Normal or reduced	Full or Confusion
40%	Mainly in Bed	Unable to do most activity Extensive disease	Mainly assistance	Normal or reduced	Full or Drowsy +/- Confusion
30%	Totally Bed Bound	Unable to do any activity Extensive disease	Total Care	Normal or reduced	Full or Drowsy +/- Confusion
20%	Totally Bed Bound	Unable to do any activity Extensive disease	Total Care	Minimal to sips	Full or Drowsy +/- Confusion
10%	Totally Bed Bound	Unable to do any activity Extensive disease	Total Care	Mouth care only	Drowsy or Coma +/- Confusion
0%	Death	-	-	-	-

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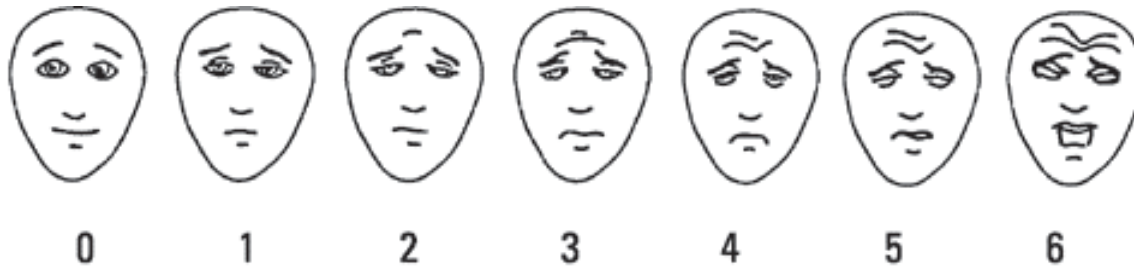
*The Palliative Performance Scale version 2 (PPSv2) tool is copyright to Victoria Hospice Society and replaces the first PPS published in 1996 [J Pall Care 9(4): 26-32]. It cannot be altered or used in any way other than as intended and described here. Programs may use PPSv2 with appropriate recognition. Available in electronic Word format by email request to judy.martell@caphealth.org  
Correspondence should be sent to Medical Director, Victoria Hospice Society, 1900 Fort St, Victoria, BC, V8R 1J8, Canada*

## **Karnofsky Score Description**

- 100** Able to work; normal, no complaints, no evidence of disease
- 90** Able to work; able to carry on normal activity, minor symptoms
- 80** Able to work; normal activity with effort, some symptoms
- 70** Unable to work or carry on normal activity, cares for self independently
- 60** Mildly disabled, dependent; requires occasional assistance, cares for most needs
- 50** Moderately disabled, dependent; requires considerable assistance and frequent care
- 40** Severely disabled, dependent; requires special care and assistance
- 30** Severely disabled; hospitalized, death not imminent
- 20** Very sick; active supportive treatment needed
- 10** Moribund; fatal processes rapidly progressing

## Faces Pain Scale

Place an X under the face that best represents the severity or intensity of your pain right now.



Source: Reprinted from *Pain*, 41(2), Bien D, Reeve R, Champion G, et al. The Faces Pain Scale for the self-assessment of the severity of pain experienced by children: development and initial validation, and preliminary investigation for ratio scale properties. 139–150, 1990

## **Sensory impairment and quality of life in a community elderly population**

**Carabellese C., Appollonio I., Rozzini R., Bianchetti A., Frisoni G.B., Frattola L., Trabucchi M.**

**J Am Geriatr Soc, 1993; 41:401-407.**

**Single sensory impairments (either visual or auditory) were significantly and independently associated with increased risk for depression (OR: 2.3, 95% C.I.=1.5-3.4; OR: 1.8, 95%C.I.=1.1-2.7 respectively).**

# 1

## Choosing and Using an Assessment Tool

ROBERT L. KANE

**Assessment has become a central technology in the care of older persons. It is safe to argue that, at any age and in a variety of contexts (medical and social services), systematic assessment is preferred over haphazard practice.**

**Despite the banality of such a simple statement, traditional care is not systematic. For many cases the lack of a systematic approach may not be critical, but in the care of and delivery of service to older persons, where presenting problems are often complex and multidimensional, systematic approaches are not merely preferable, they are necessary.**

**Assessment is seen as the basis for sorting out problems and assigning clients to their appropriate place. If only it were that easy!**  
**Assessment is a means of identifying client characteristics.**

**Translating assessment into actions is still more an art than a science.**

## Lo stato di salute premorbo

- Non disabile (BADL=0/6)
- Non demente (MMSE>24)

- Disabile (BADL=1+/6)

- Demente (MMSE<24)

- Disabile (BADL=1+/6)
- Demente (MMSE<24)

**Heart Failure:** an example of the  
role of the underlying health status  
in the decision process

## Association between heart failure and 6 month mortality in hospitalized elderly patients according to increasing frailty (Cox regression analysis)

		<i>Crude</i>	<i>Adjusted*</i>
	n/events	<i>RR (95% C.I.)</i>	<i>RR (95% C.I.)</i>
<b>(a) Not disabled&amp;not demented</b>			
No Heart Failure	430/13	1.0 (ref.)	1.0 (ref.)
Heart Failure (NYHA III-IV)	60/9	4.1 (1.2-13.3)	4.1 (1.3-15.1)
<b>(b) Disabled or demented</b>			
No Heart Failure	266/26	1.0 (ref.)	1.0 (ref.)
Heart Failure (NYHA III-IV)	36/10	3.1 (1.3-7.4)	2.7 (1.1-6.7)
<b>(c) Disabled&amp;demented</b>			
No Heart Failure	137/35	1.0 (ref.)	1.0 (ref.)
Heart Failure (NYHA III-IV)	21/9	1.4 (0.3-5.9)	1.3 (0.3-5.6)
p for trend**		0.014	0.005

*RR: relative Risk. C.I.: Confidence Interval.*

\*Confounders: low albumin level (<3.5 g/dL), low serum cholesterol (<160mg/dL), low hemoglobin level (<12 g/dl), high Acute Physiology Score (APS>3) and Charlson Index (8+).

\*\* Test for the linear decrease of the RR between heart failure and mortality through groups of increasing frailty.

*Rozzini et al. Arch Int Med, 2003*

# Treatment targets

**Examples of treatment targets include life prolongation, prevention of morbidity and mortality, maintenance of current state of function, and treatment of acute illness as well as palliative care.**

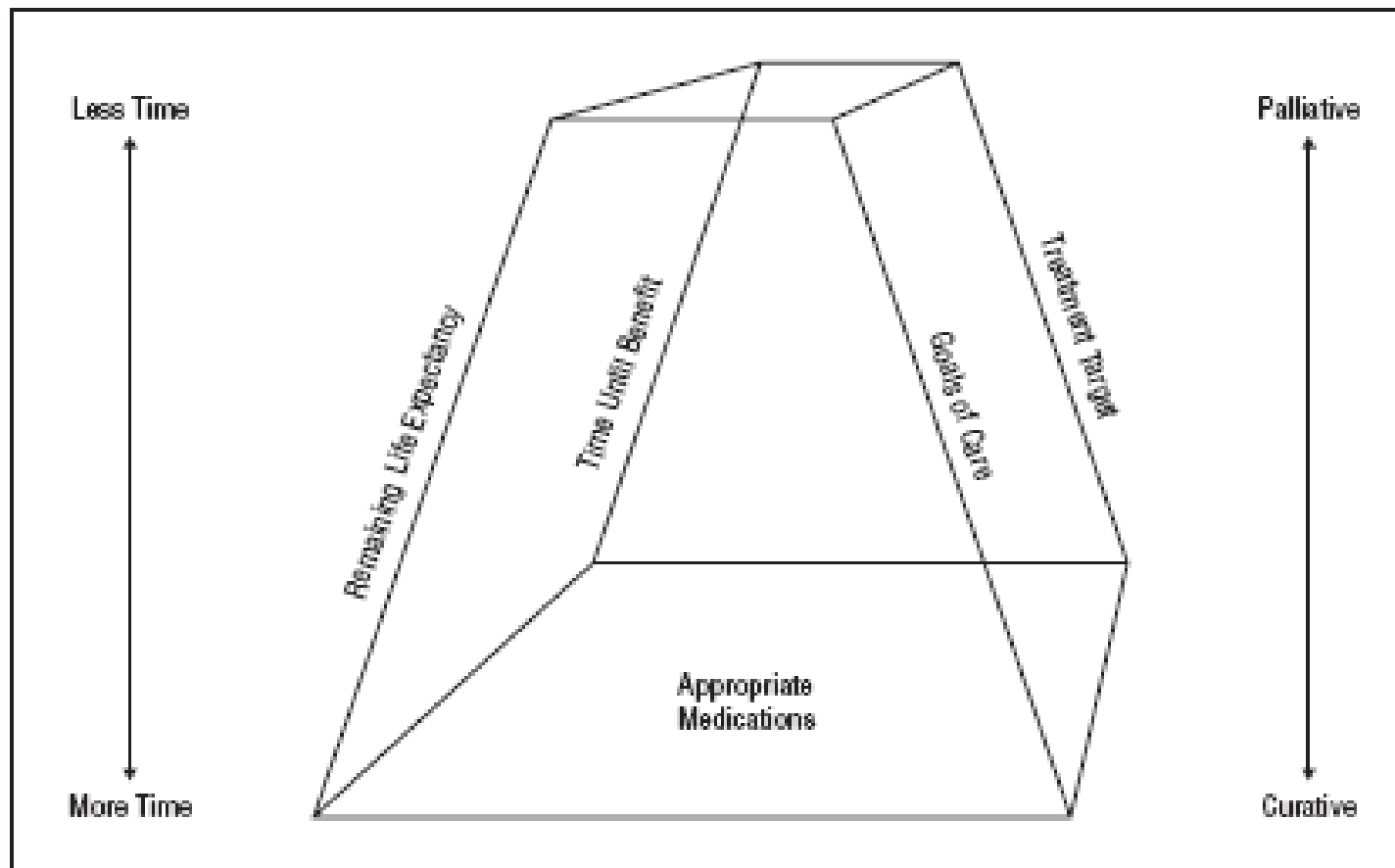
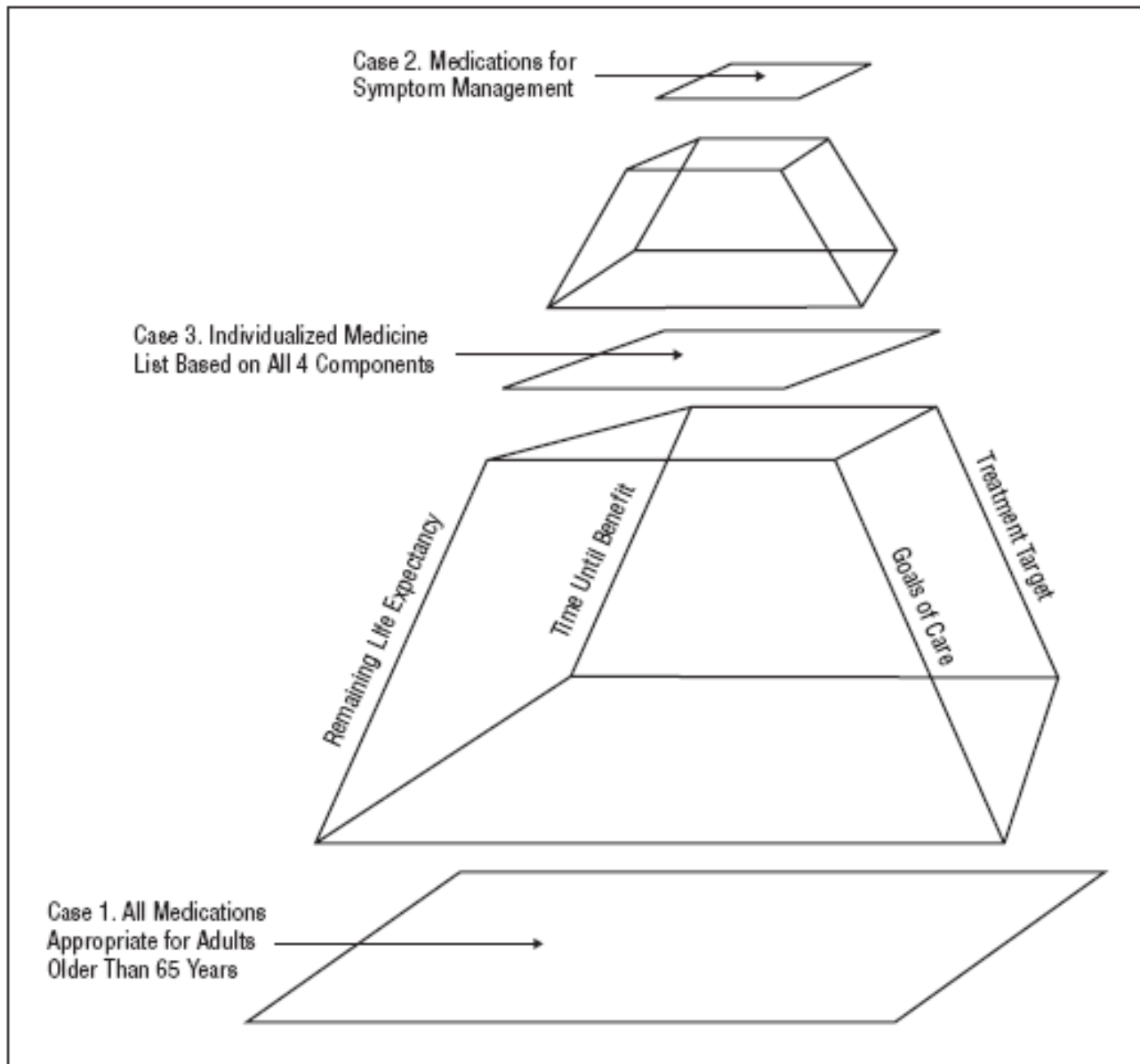
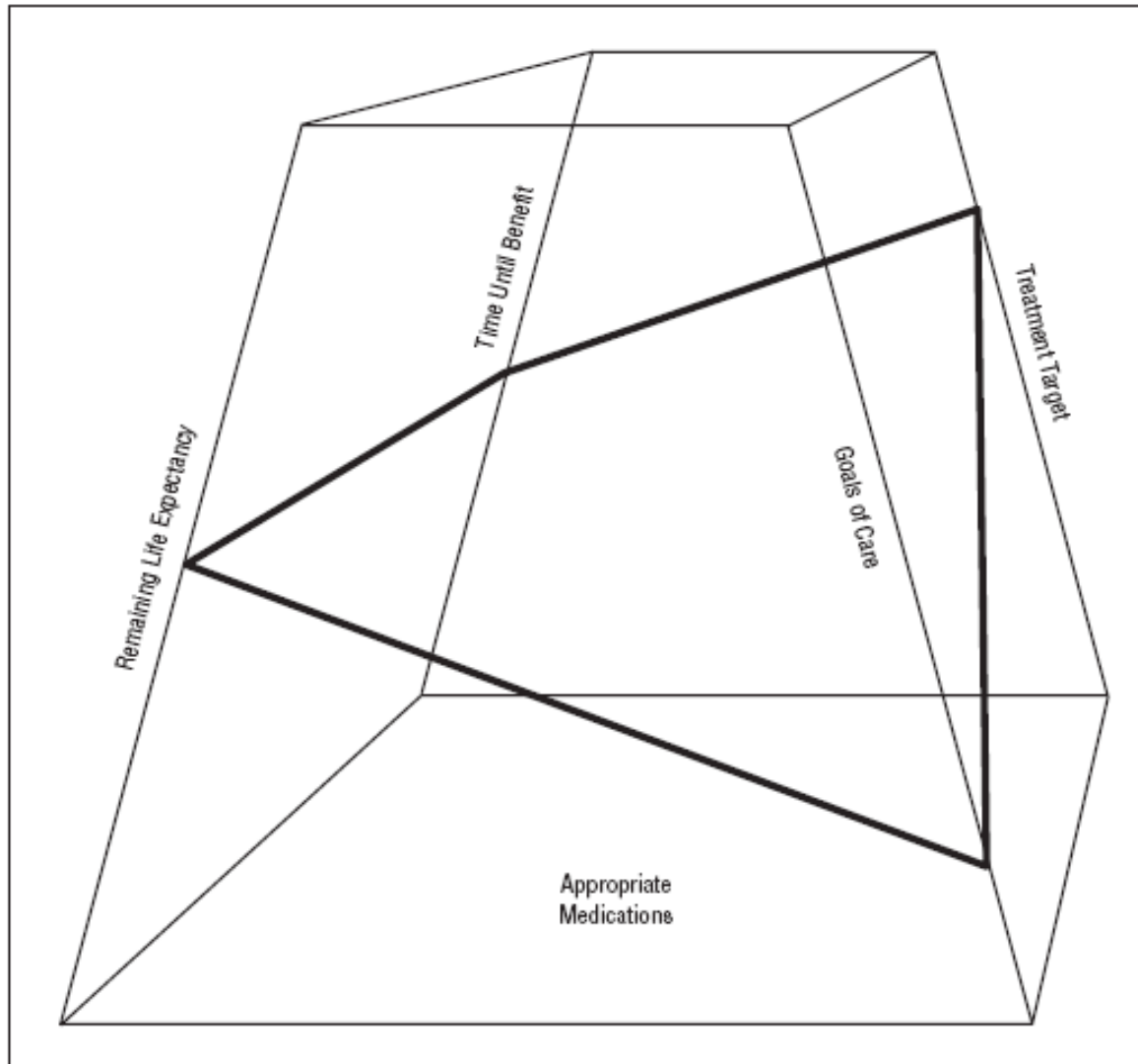


Figure 3. The model shows that the 4 steps in medication decision making form a pyramid, visually representing the appropriate medications at any level. At the top are represented patients for whom remaining life expectancy is limited, drugs should have the shortest time until benefit, goals of care are palliative, and treatment targets are focused on symptom management. Moving toward the bottom, the base of appropriate medications expands as the patient's life expectancy is longer, time until benefit may be longer, goals of care are more aggressive, and treatment targets are aimed more at preventive strategies. The bottom of the pyramid therefore contains all medications that are otherwise appropriate according to existing criteria for patients 65 years and older.



**Figure 4.** Use of the model in 3 distinct cases illustrates how it is used depending on the 4 components.



**Figure 5.** An example of a distorted model shows that all 4 components may not readily agree. Sometimes the time until benefit of a particular medicine will be considerably longer than a patient's estimated remaining life expectancy. Aggressive goals of care despite advanced disease may result in consideration of unrealistic treatment targets. When all 4 components are not consistent with each other, the resulting figure is a visually distorted, nonplanar slice of the model.

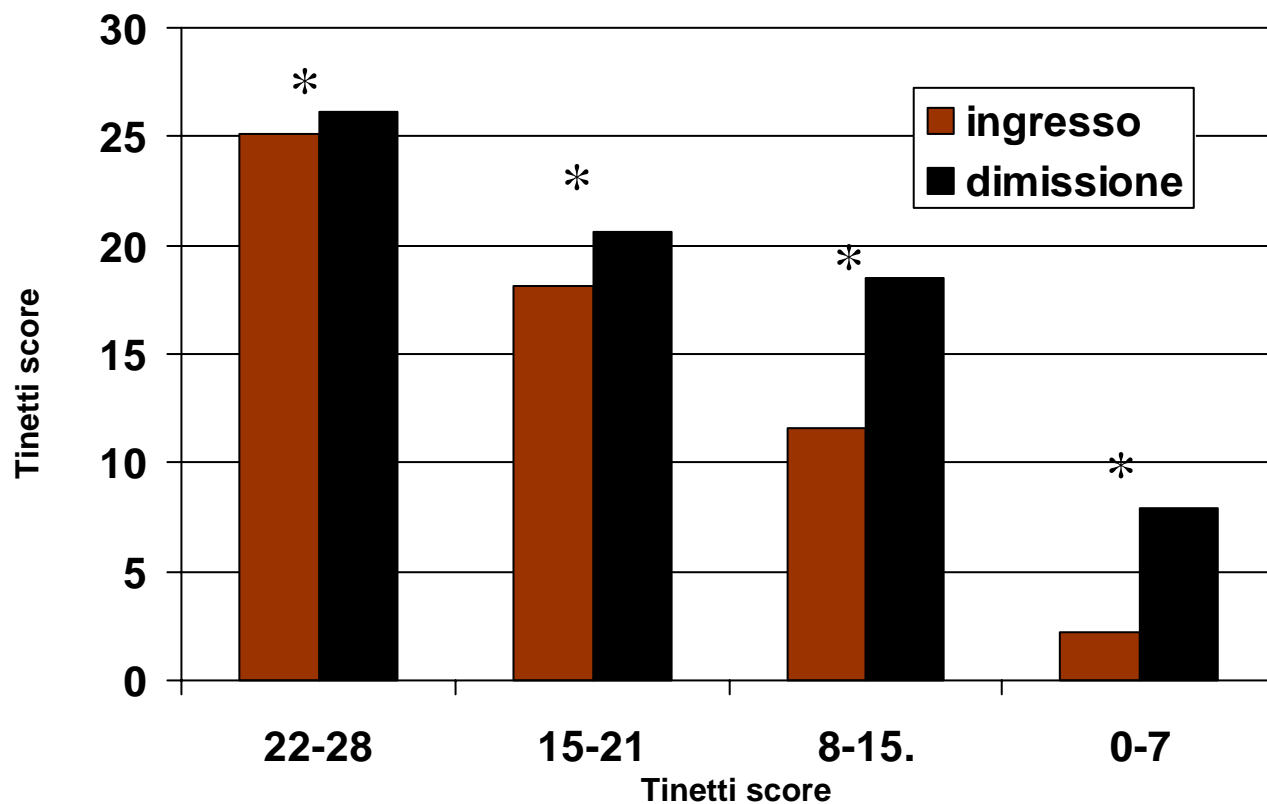
# Medical Planning: the needed clinical information

- **Organ-related diseases**
- **Underlying health status**
- **Biological markers of frailty**
- **Patients preferences** (*frank discussion of treatment options*)
- **Extraclinical conditions** (*family support, social support, environment*)

# Le risposte non date

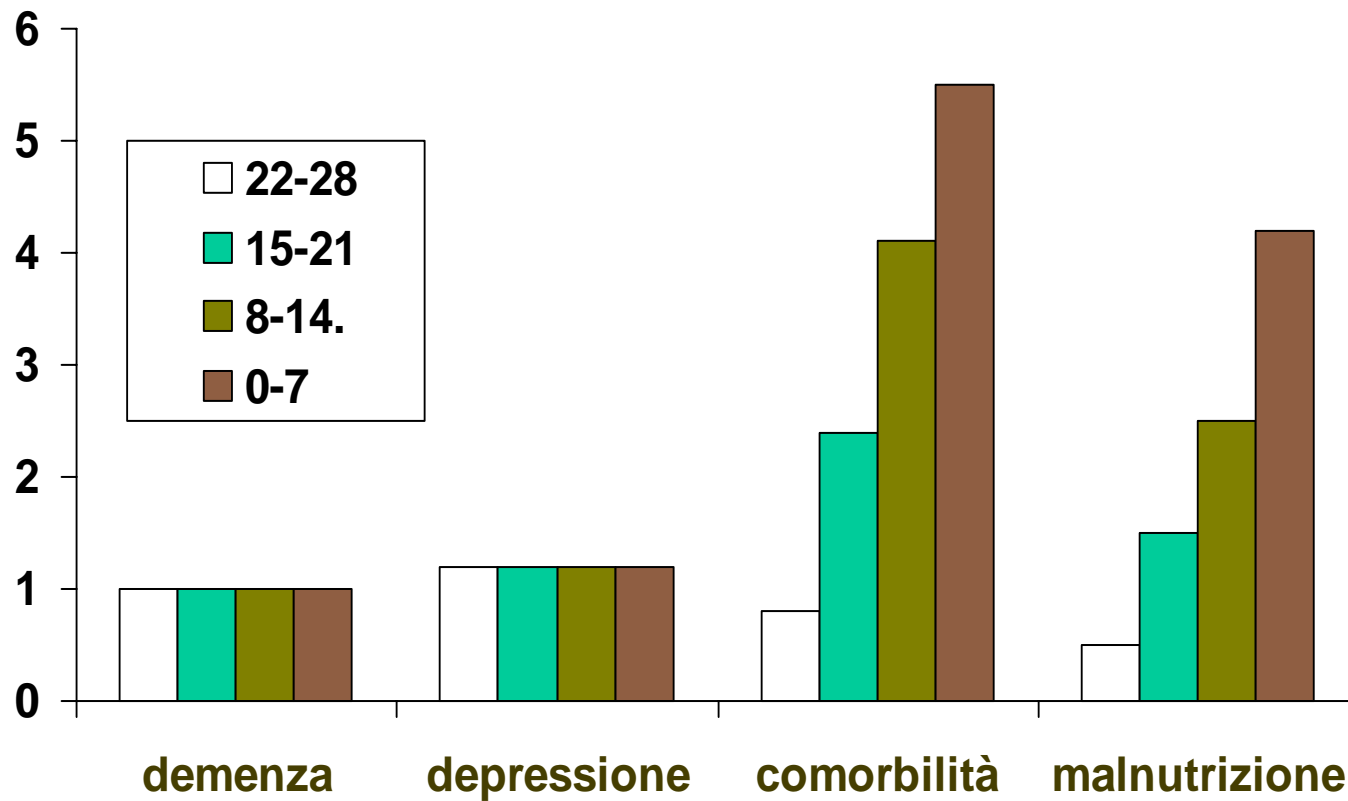
**La multidimensionalità**  
**aree note e da definire:**  
**l'informazione utile clinicamente**  
**Tinetti, Barthel (quali cut-off)**

## Miglioramento dell'equilibrio e dell'andatura in pazienti anziani ricoverati e trattati in reparto di riabilitazione secondo 4 classi di disabilità (valutata all'ingresso)



\*p<0.001 differenza tra i punteggi alla dimissione e ingresso (T test per campioni appaiati).

**Stima dell'entità di mancato miglioramento alla dimissione nell'equilibrio e nella marcia a causa della demenza, depressione, comorbidità e malnutrizione (secondo 4 gradi di disabilità determinata all'ingresso)**

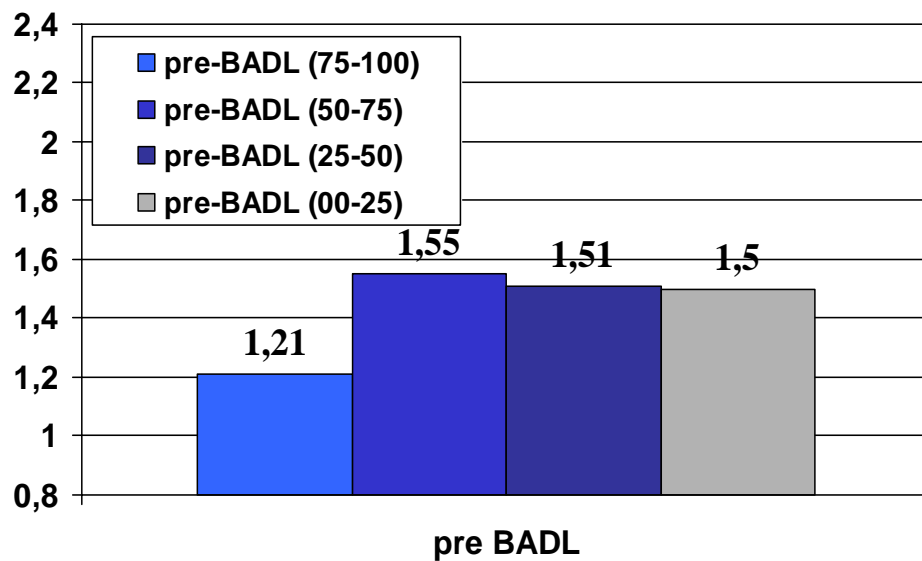
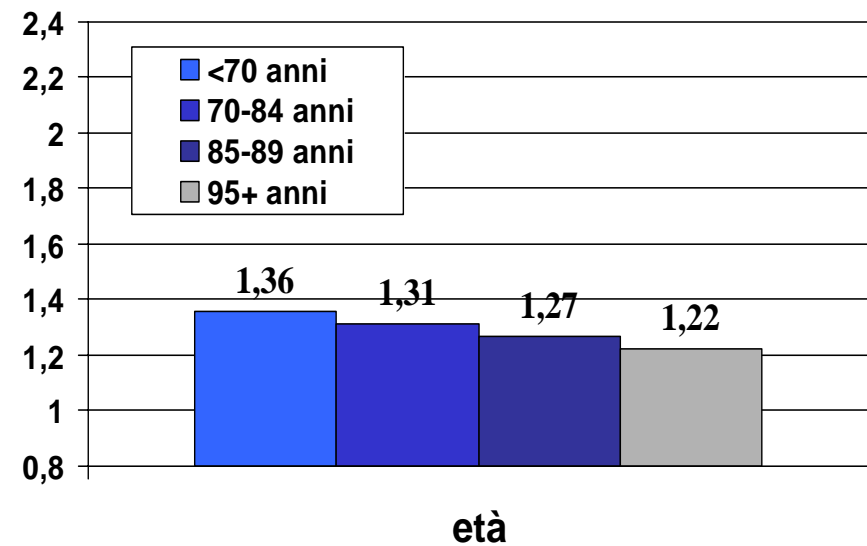


**Characteristics of 1250 hospitalized elderly patients according to age stratification.**

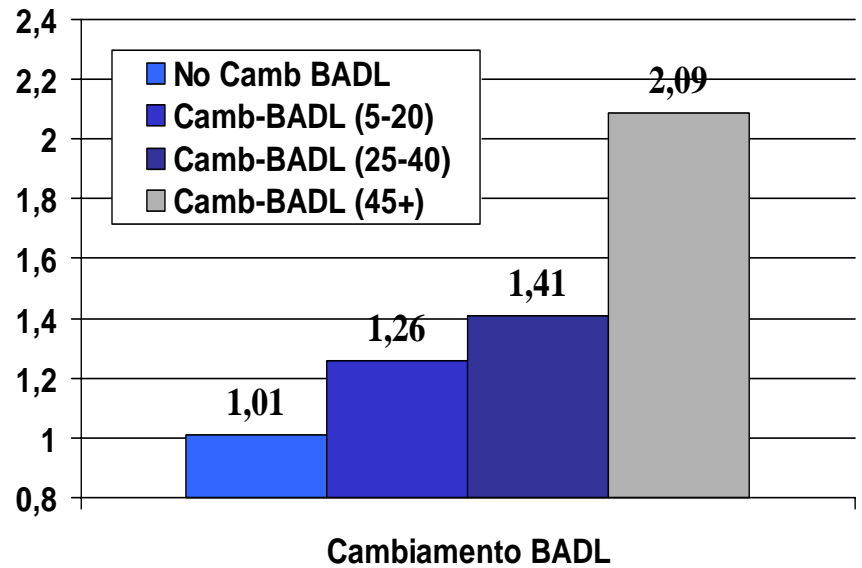
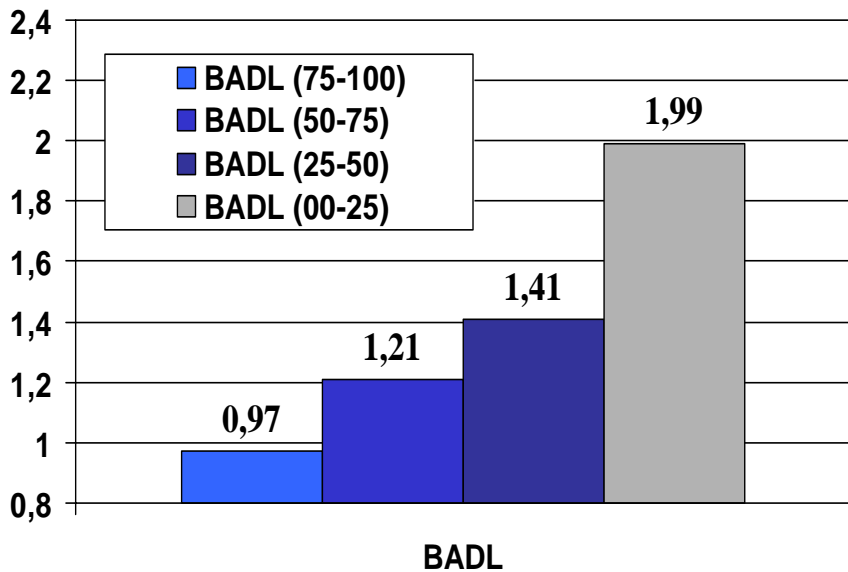
	Total N=1250 N (%) / M ± sd	<70 N=194 N (%) / M ± sd	70-74 N=196 N (%) / M ± sd	75-79 N=265 N (%) / M ± sd	80-84 N=312 N (%) / M ± sd	85-89 N=142 N (%) / M ± sd	90+ N=141 N (%) / M ± sd
Age	79.1±8.2	65.5±3.9	72.2±1.4	78.0±1.4	83.1±1.4	86.8±0.8	91.4±2.5
Gender (male)	405 (32.4)	94 (48.5)	67 (34.2)	87 (32.8)	83 (26.8)	38 (26.8)	35 (24.8)
Living alone	376 (30.2)	36 (18.7)	61 (31.6)	81 (31.3)	110 (35.4)	36 (25.5)	50 (35.0)
Geriatric Depression Scale-GDS*	5.2±3.6	4.3±3.6	4.8±3.6	5.8±3.7	5.4±3.4	5.2±3.7	5.3±3.6
Depressed (GDS 5+)	410 (40.4)	44 (28.4)	65 (36.1)	106 (46.5)	113 (44.3)	44 (41.5)	38 (41.3)
Mini Mental State Examination-MMSE	22.8±7.6	25.8±5.7	24.5±6.2	23.2±7.2	22.1±7.1	19.9±7.9	17.4±9.3
Dementia (MMSE <18)	263 (22.2)	19 (11.1)	23 (11.9)	46 (17.8)	70 (23.5)	47 (34.3)	58 (45.3)
IADL functions lost (2 wks pre adm.)	3.3±2.9	1.6±2.5	2.7±2.8	2.9±2.7	3.8±2.8	4.3±2.8	5.2±2.6
Barthel Index (2 wks before adm.)	83.2±24.4	92.9±17.0	88.4±19.7	86.0±22.1	81.1±24.1	75.8±27.6	69.4±30.4
Barthel Index (<85) (2 wks before adm.)	381 (30.5)	26 (13.4)	47 (24.1)	67 (25.4)	108 (34.5)	60 (42.3)	73 (51.8)
Barthel Index (on admission)	74.1±31.0	86.6±25.4	83.3±25.4	78.4±28.1	70.2±30.3	62.1±32.9	55.2±32.1
Funct. status change (before and on adm.)							
No change in Barthel index score	(70.3)	(84.0)	(82.6)	(71.9)	(64.2)	(58.5)	(56.7)
Change 5-25 points in Barthel index score	(14.5)	(8.8)	(9.2)	(14.8)	(16.6)	(18.3)	(20.6)
Change 30+ points Barthel index score	(15.2)	(7.2)	(8.2)	(13.3)	(19.2)	(23.2)	(22.7)
Barthel Index (on discharge)	76.3±29.9	89.3±23.2	84.9±24.1	79.7±27.9	73.5±28.8	66.1±32.2	56.9±34.4
Chronic diseases (n)	5.4±2.0	4.6±1.7	4.8±1.7	5.4±2.0	5.8±1.9	5.8±2.2	5.9±2.4
Charlson score	7.1±2.9	5.4±2.7	6.5±2.4	6.7±2.4	7.9±2.3	8.0±2.2	8.4±2.1
APACHE II score	8.3±4.8	6.2±3.4	7.1±4.4	8.4±4.9	8.8±4.4	9.8±6.1	9.8±4.9
Acute Physiology Score-APS	1.9±2.9	1.3±2.2	1.6±2.6	1.9±3.1	2.0±2.6	2.6±4.1	2.5±2.9
APS (4+)	253 (20.5)	24 (12.4)	35 (17.9)	49 (19.1)	68 (21.9)	34 (24.3)	43 (30.5)
Serum albumin	4.0±0.7	4.2±0.6	4.1±0.6	4.0±0.8	3.9±0.6	3.9±0.6	3.8±0.6
Serum albumin (< 3.5g/dl)	266 (21.5)	32 (16.7)	26 (13.4)	56 (21.5)	74 (23.7)	33 (23.4)	45 (32.4)
Drugs (n)	4.2±1.9	4.3±1.9	4.2±1.7	4.4±1.9	4.2±1.8	4.2±1.7	3.9±2.1
Major procedures (n)**	3.2±3.0	3.1±3.0	3.3±2.9	3.2±2.7	3.2±3.2	3.2±3.0	3.0±3.5
Length of stay (days)	6.9±3.3	6.8±3.6	6.3±2.8	7.2±3.5	7.2±3.4	7.0±3.3	6.4±3.0
In hospital mortality	55 (4.5)	3 (1.6)	9 (4.6)	8 (3.1)	10 (3.3)	18 (8.7)	13 (9.6)
Six months mortality	209 (16.7)	23 (11.9)	27 (13.8)	35 (13.2)	54 (17.3)	32 (22.5)	38 (27.0)
Six months hospital readmission (1+)	496 (41.5)	73 (38.0)	73 (38.8)	127 (49.5)	131 (43.5)	52 (42.0)	45 (35.2)

\*On 1062 patients with MMSE>14; \*\* Major procedure considered are: endoscopy, CT or MRI, ultrasound (abdomen, heart, peripheral vascular); ECG, EEG.

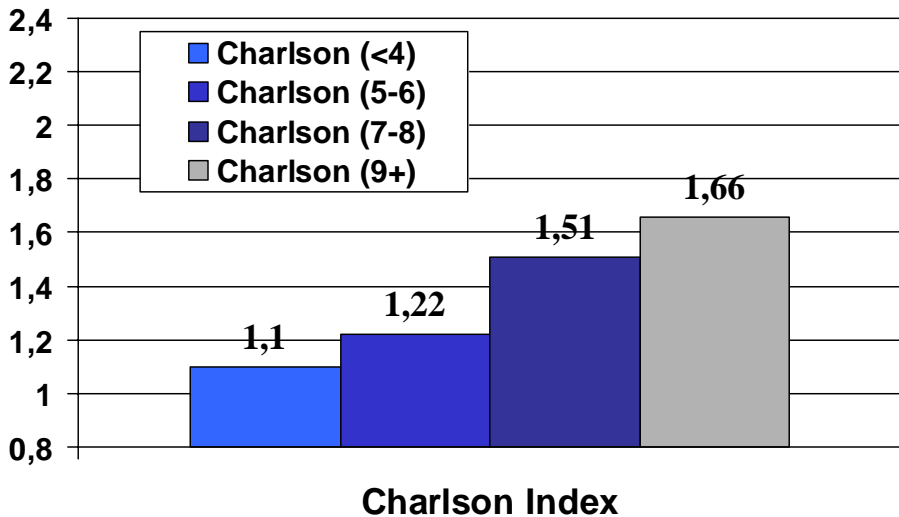
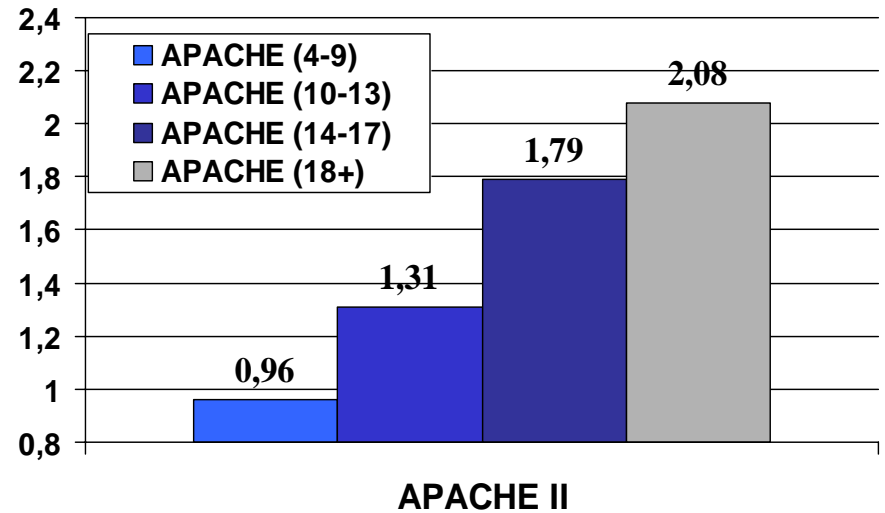
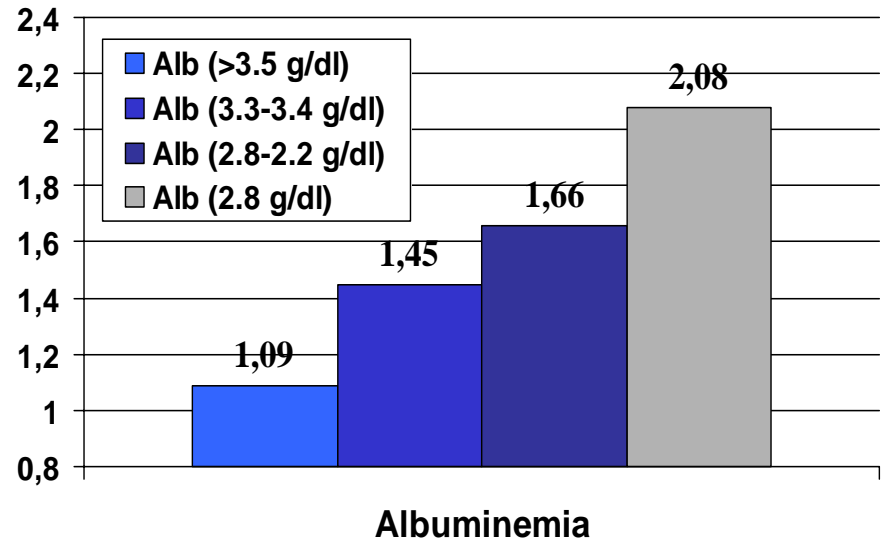
## Correlazione tra peso DRG ed età e BADL premorbose in 4095 anziani ospedalizzati.



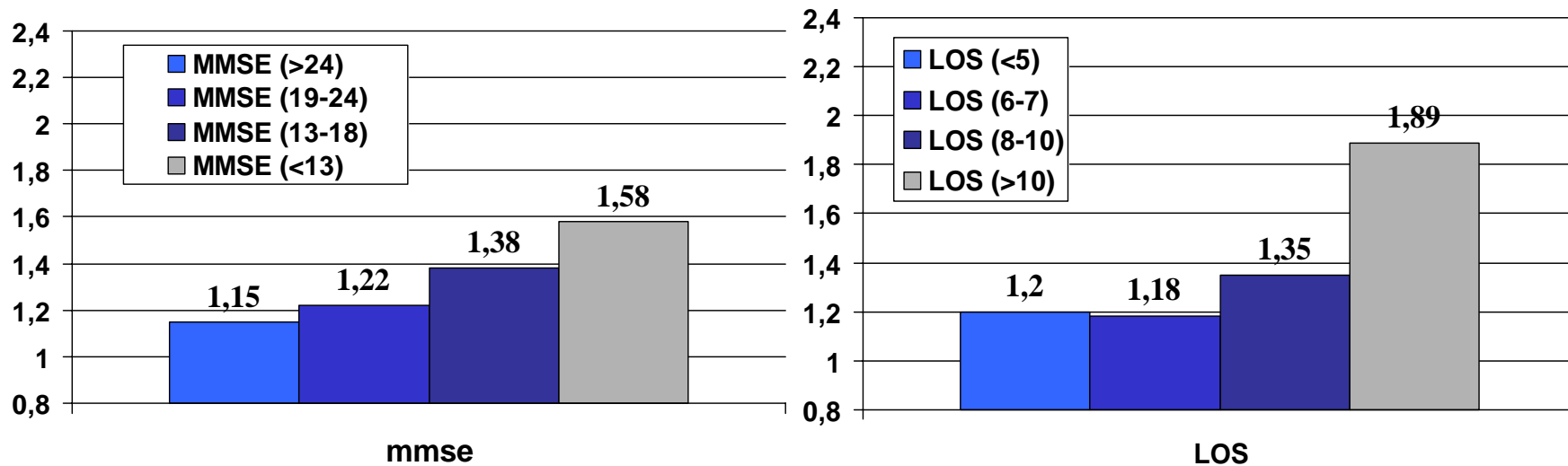
**Correlazione tra peso DRG e BADL e cambiamento BADL dopo malattia in 4095 anziani spedalizzati.**



**Correlazione tra peso DRG e albumina, Charlson Index e APACHE score in 4095 anziani spedalizzati.**



## Correlazione tra peso DRG ed età cognitività (MMSE), LOS in 4095 anziani spedalizzati.



- **La valutazione multidimensionale può essere fatta in ogni setting medico (chirurgico?) dell'ospedale.**
- **La valutazione multidimensionale permette il controllo dell'appropriatezza.**
- **La valutazione multidimensionale dà informazioni che correlano con variabili “di valore” amministrative (peso DRG).**
- **La valutazione multidimensionale è dà informazioni anche in pazienti già all'interno del sistema assistenziale (ad es. Indice di Charlson come determinante del ricovero).**

**La **V**alutazione multi-dimensionale  
dell'anziano ricoverato in **O**spedale:  
alcuni esempi per indirizzare la  
pratica clinica**

- **Malattie, stato funzionale e prognosi**
- **Malattie, fragilità, prognosi e scelte terapeutiche.**

**Table 1. Characteristics of 2,850 Elderly Patients Admitted to a Geriatric Ward According to Activity of Daily Living (Barthel Index) Function on Admission to Hospital**

Characteristic	Barthel Index on Admission			P-value
	100 (n = 921)	40–95 (n = 1,496)	0–35 (n = 434)	
Age, mean ± SD	72.4 ± 9.7	80.3 ± 8.0	82.4 ± 7.0	<.001
Female, %	58.4	72.2	70.3	<.001
Mini-Mental State Examination score, mean ± SD (0–30)	27.2 ± 5.1	23.3 ± 7.8	14.6 ± 10.1	<.001
Geriatric Depression Scale score, mean ± SD (0–15)	3.9 ± 3.3	5.5 ± 3.6	5.6 ± 3.6	<.001
Number of instrumental activities of daily living lost, mean ± SD <sup>†</sup>	0.8 ± 1.6	3.6 ± 2.6	5.5 ± 2.8	<.001
Barthel Index on admission, mean ± SD	100	76.9 ± 16.5	11.6 ± 12.1	<.001
Charlson Comorbidity Index, mean ± SD (0–33)	5.6 ± 2.2	7.1 ± 2.5	8.4 ± 2.7	<.001
Number of drugs, mean ± SD	4.0 ± 1.9	4.3 ± 1.8	4.5 ± 2.0	.005
Acute Physiology and Chronic Health Evaluation II score, mean ± SD (0–71)	6.5 ± 3.1	8.2 ± 4.1	11.4 ± 5.9	<.001
Serum albumin <3.5 g/dL, %	14.2	21.8	58.1	<.001
Chief reason for admission, %				
Acute dyspnea/other pulmonary problem	16.7	19.5	34.6	<.001
GI bleeding or other GI problem	15.7	12.2	14.4	NS
Congestive heart failure or other cardiac problem	24.8	16.2	8.1	<.001
Length of stay, mean ± SD	5.9 ± 2.8	6.6 ± 3.2	7.1 ± 4.6	<.001

Analysis of variance.

<sup>†</sup>Detected 2 weeks before admission.

SD = standard deviation; GI = gastrointestinal; NS = nonsignificant.

# Characteristics of 950 not bedridden hospitalized elderly patients and according to change in functional status

## Functional status changes

	No change N=722 N (%) / M $\pm$ SD	Minor (5-30) N=133 N (%) / M $\pm$ SD	Major (35+) N=95 N (%) / M $\pm$ SD
Gender (female)	489 (67.7)	99 (74.4)	70 (73.7)
Age	77.2 $\pm$ 8.4	80.9 $\pm$ 7.6	82.8 $\pm$ 7.9
MMSE	25.0 $\pm$ 5.2	21.3 $\pm$ 7.1	19.1 $\pm$ 8.9
GDS	4.9 $\pm$ 3.6	5.8 $\pm$ 3.6	5.8 $\pm$ 3.8
BADL (2 wks before)	90.6 $\pm$ 14.7	85.2 $\pm$ 16.7	81.7 $\pm$ 17.7
BADL (on admission)	90.7 $\pm$ 14.7	68.3 $\pm$ 20.6	31.3 $\pm$ 23.2
BADL change	-0.7 $\pm$ 0.8	16.9 $\pm$ 9.5	50.4 $\pm$ 16.0
IADL (2 wks before)	2.2 $\pm$ 2.5	3.7 $\pm$ 2.7	4.6 $\pm$ 2.7
Charlson score	6.1 $\pm$ 1.8	6.5 $\pm$ 1.9	7.2 $\pm$ 2.0
Drugs (n)	4.1 $\pm$ 1.8	4.2 $\pm$ 1.9	4.1 $\pm$ 2.1
APACHE II score	6.8 $\pm$ 3.2	8.6 $\pm$ 4.4	10.8 $\pm$ 5.9
APS (4+)	93 (13.0)	27 (20.5)	37 (38.8)
Serum albumin (< 3.5g/dl)	80 (11.1)	23 (17.3)	33 (34.7)
Length of stay	6.4 $\pm$ 2.7	7.0 $\pm$ 3.1	8.3 $\pm$ 5.4
Six month mortality	43 (6.0)	15 (11.3)	28 (29.5)

(Rozzini et al. J Gerontol, 2005)

## Crude and adjusted associations of clinical variables and 6-month mortality in 950 hospitalized elderly patients.

	n/events	A RR (95% C.I.)	B* RR (95% C.I.)
Gender (male)	335/61	1.6 (1.0-2.9)	1.5 (0.9-2.6)
Age (>80)	470/78	1.5 (1.1-2.2)	1.0 (0.9-1.1)
Dementia (MMSE <18)	167/41	3.6 (2.0-6.4)	1.9 (1.1-3.8)
Depression (GDS>4)	547/71	1.4 (0.9-2.1)	-----
APS (>4)	185/57	3.6 (2.1-6.4)	2.3 (1.3-4.3)
Serum Albumin (<3.5 g/dl)	177/52	4.5 (2.6-8.0)	2.3 (1.3-4.6)
Anemia (Hb <10g/dl)	97/28	3.4 (1.7-6.6)	2.2 (0.9-5.4)
Charlson Index (8+)	199/75	2.5 (1.3-4.8)	-----
<b>Change in functional status</b>			
No change	670/58	1.0 (ref.)	1.0 (ref.)
Minor change (5-25)	130/24	1.8 (1.0-4.0)	1.3 (0.6-3.0)
Major change (30+)	148/48	6.2 (3.5-11.5)	2.8 (1.3-5.7)
Cancer	170/66	2.7 (1.8-5.5)	-----
Heart failure (ischemic/organic)	123/24	1.6 (0.8-3.9)	-----
Heart failure (extracardiac)	40/11	2.5 (0.9-7.0)	-----
Pulmonary disease	364/69	1.7 (1.0-3.2)	-----
Chronic renal failure	155/31	2.7 (0.9-8.9)	-----

*(Rozzini et al. J Gerontol, 2005)*

## Characteristics and 6-Month Mortality Rate of 1297 Inpatients According to Their Dementia and Disability Status\*

Characteristic	Patients With Pneumonia†			Patients With Acute Noninfectious Conditions‡		
	A (n = 100)	B (n = 26)	C (n = 15)	A (n = 1033)	B (n = 90)	C (n = 33)
Age, y	81.5 ± 6.6	83.3 ± 6.9	83.9 ± 7.8	79.4 ± 4.9	84.3 ± 7.1	85.6 ± 6.0
MMSE score	23.5 ± 4.5	8.3 ± 7.6	ND	24.5 ± 4.4	8.5 ± 5.4	ND
Barthel Index‡	84.1 ± 18.0	49.0 ± 26.1	5.5 ± 6.9	88.9 ± 15.3	57.9 ± 30.2	5.0 ± 6.2
APACHE II score§	14.0 ± 5.9	14.9 ± 5.6	17.4 ± 6.8	7.3 ± 3.8	9.4 ± 5.2	11.6 ± 6.6
Diseases, No.	6.0 ± 2.0	6.6 ± 1.6	7.5 ± 4.1	5.3 ± 1.9	6.1 ± 2.3	5.6 ± 2.3
Drugs, No.	4.4 ± 2.2	4.5 ± 1.7	3.3 ± 1.6	4.2 ± 1.8	4.1 ± 1.9	4.3 ± 1.8
Length of stay, d	8.5 ± 4.0	9.1 ± 4.2	5.9 ± 6.0	6.8 ± 3.4	5.9 ± 2.3	6.4 ± 4.9
6-mo mortality, % (No.)	21 (21)	31 (8)	80 (12)	15 (152)	34 (31)	64 (21)

Abbreviations: APACHE, Acute Physiology and Chronic Health Evaluation; MMSE, Mini-Mental State Examination; ND, nondetectable.

\*Data are mean ± SD unless otherwise specified.

†A, Patients with absent to moderate cognitive impairment (MMSE score >12); B, not bedridden patients with severe dementia (MMSE score ≤12); C, bedridden demented patients.

‡Barthel Index establishes the degree of disability (the lower the score, the higher the degree of functional impairment).

§APACHE II is a severity disease classification that quantifies the degree of abnormality of multiple physiologic variables (the higher the score, the higher the severity).

**Table 1. Characteristics and 6-Month Mortality Rate of 1803 Inpatients Consecutively Admitted in a Geriatric Ward for Pneumonia or Other Acute Noninfectious Diseases\***

Characteristic	Pneumonia (n = 241)	Acute Noninfectious Diseases (n = 1562)	P Value
Age, y	83.3 ± 6.9	79.7 ± 7.0	.001
Male, %	24.5	19.3	.001†
MMSE score	19.7 ± 9.1	22.9 ± 7.1	.001
GDS score	5.1 ± 3.2	5.1 ± 3.6	.98
Barthel Index (15 days before admission)	72.6 ± 31.5	83.8 ± 23.2	.001
Barthel Index (on admission)	55.3 ± 37.9	74.5 ± 30.0	.001
IADL (functions lost)	3.9 ± 3.0	3.1 ± 2.8	.001
Diseases, No.	6.1 ± 2.1	5.3 ± 2.0	.001
Charlson Index	8.3 ± 2.5	7.0 ± 2.6	.001
Drugs, No.	4.5 ± 2.3	4.3 ± 1.9	.19
APACHE II score	13.3 ± 6.3	7.9 ± 4.1	.001
APS-APACHE II subscore	3.8 ± 4.2	1.9 ± 2.7	.001
Serum albumin, g/dL	3.6 ± 1.3	3.9 ± 0.6	.001
Hemoglobin, g/dL	11.7 ± 2.3	12.3 ± 2.0	.02
Serum cholesterol, mg/dL	186.2 ± 51.9	204.7 ± 51.1	.001
CRP, mg/dL	7.5 ± 5.6	2.6 ± 7.8	.001
Creatinine, mg/dL	1.2 ± 0.8	1.1 ± 0.8	.20
Length of stay, d	8.1 ± 5.1	6.4 ± 3.3	.001
6-mo mortality, %	27.4	20	.001†

Abbreviations: APACHE, Acute Physiology and Chronic Health Examination; APS, Acute Physiology Score; CRP, C-reactive protein; GDS, Geriatric Depression Scale; IADL, Instrumental Activities of Daily Living; MMSE, Mini-Mental State Examination.

SI conversion factors: To convert cholesterol to millimoles per liter, multiply by 0.0259. To convert creatinine to micromoles per liter, multiply by 88.4.

\*Data are mean ± SD value unless otherwise specified.

†P value derived from  $\chi^2$  test. Other P values were derived from the t test.

**Table 2. Six-Month Mortality Risk in 1803 Hospitalized Elderly Patients (Cox Regression Analysis)**

	No. of Patients/ No. of Events	RR (95% CI)	
		Crude	Adjusted
Pneumonia	241/66	1.5 (1.1-2.1)	1.0 (0.5-2.1)
Cancer	302/111	2.6 (2.0-3.4)	2.1 (1.1-4.1)
Anemia	202/60	2.2 (1.6-2.9)	2.1 (1.2-3.5)
Dementia	319/98	1.9 (1.4-2.5)	1.8 (1.0-4.8)
APS-APACHE II ( $\geq 4$ )	524/150	1.8 (1.4-2.3)	1.7 (1.0-2.9)
Charlson Index ( $\geq 4$ )	303/126	3.5 (2.7-4.6)	2.4 (1.3-4.5)
Chronic renal failure	266/26	1.7 (1.0-2.8)	...
Chronic heart failure	228/69	1.7 (1.3-2.4)	...
Cor pulmonale	137/44	1.8 (1.3-2.7)	...
COPD	662/166	1.4 (1.1-1.8)	...
Stroke	231/65	1.5 (1.1-2.1)	...
Depression	716/141	1.2 (1.0-1.6)	...
Hepatic diseases	101/33	1.8 (1.2-2.8)	...
Diabetes mellitus	356/91	1.3 (1.0-2.7)	...
Serum albumin (<3.5 g/dL)	365/128	2.7 (2.1-3.5)	...
Disability	137/35	1.6 (1.3-2.0)	...
Age ( $\geq 80$ y)	867/199	1.2 (1.0-1.6)	...
Male	592/145	1.3 (1.1-1.7)	...

Abbreviations: APACHE, Acute Physiology and Chronic Health Examination; APS, Acute Physiology Score; CI, confidence interval; COPD, chronic obstructive pulmonary disease; RR, risk ratio. Ellipses indicate not significantly associated with mortality in the adjusted analysis.

- **La valutazione multidimensionale dà informazioni che correlano con parametri clinici tradizionali.**
- **La valutazione multidimensionale permette di ottenere informazioni che integrano il giudizio prognostico.**
- **La valutazione multidimensionale consente di sostenere e orientare le scelte terapeutiche.**

**Un assessment formalizzato, sistematico e concretamente attuabile, senza un peso eccessivo per l'attività clinica, permette di identificare -rispetto a outcome rilevanti- il ruolo dell'età, dell'incapacità di mantenere l'omeostasi biologica (perdita di autosufficienza come conseguenza di una malattia acuta), in generale dell'autosufficienza rispetto alle diverse malattie.**

**L'assessment standardizzato non è un'aggiunta alla normale attività clinica, ma un'utile modalità di lavoro sistematico in un ambito dove sono frequenti i pregiudizi, la dispersione senza obiettivi, lo spreco di energie.**

# Model for Chronic Disease

- Chronic disease is **THE** major issue in health care
- Is current organization of health care appropriate?