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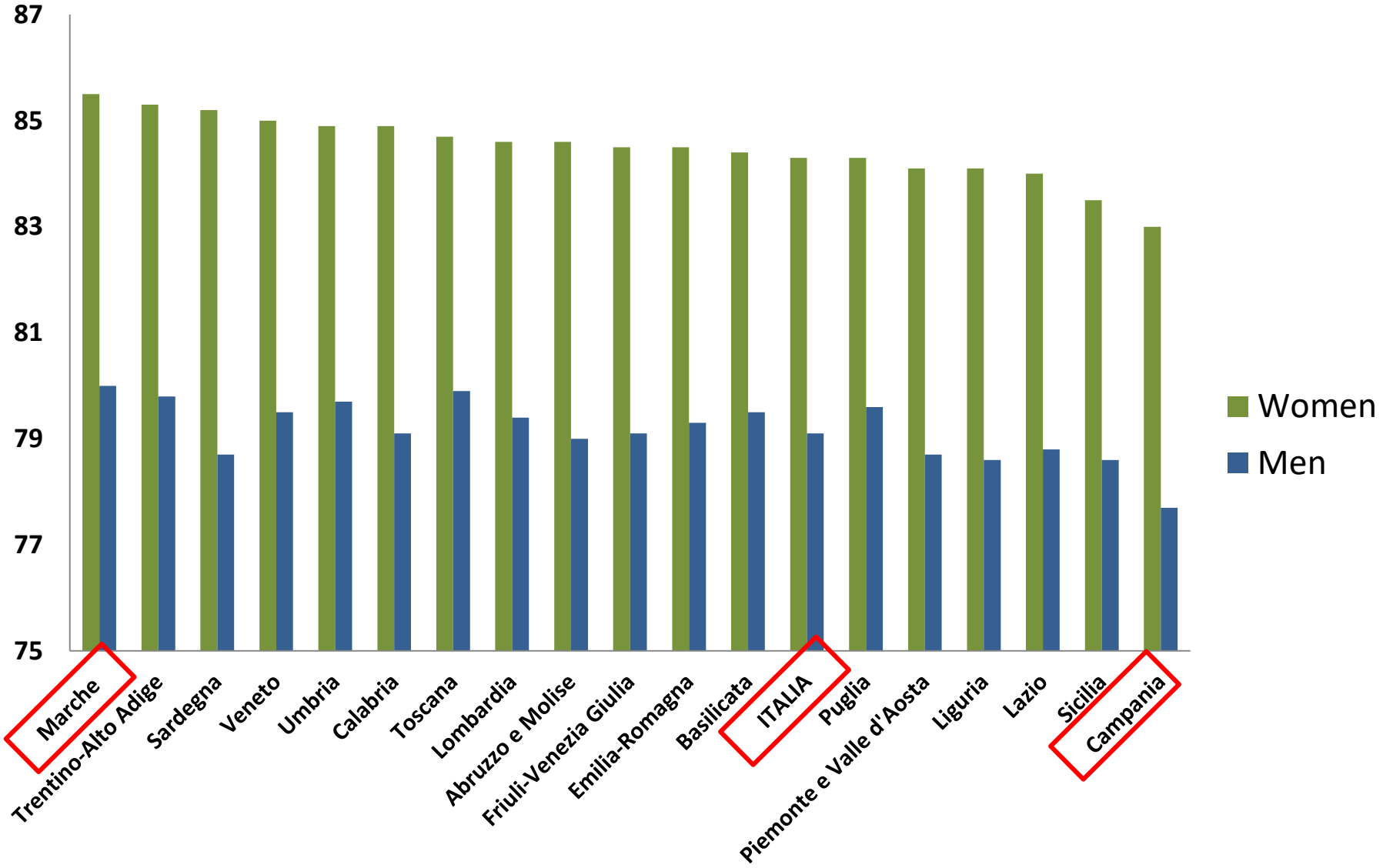
La fragilità inceppa la medicina moderna

Roberto Bernabei

Napoli 26 novembre 2015

Life expectancy in Italy (2014)



The "Modern" Patient

FRAILTY

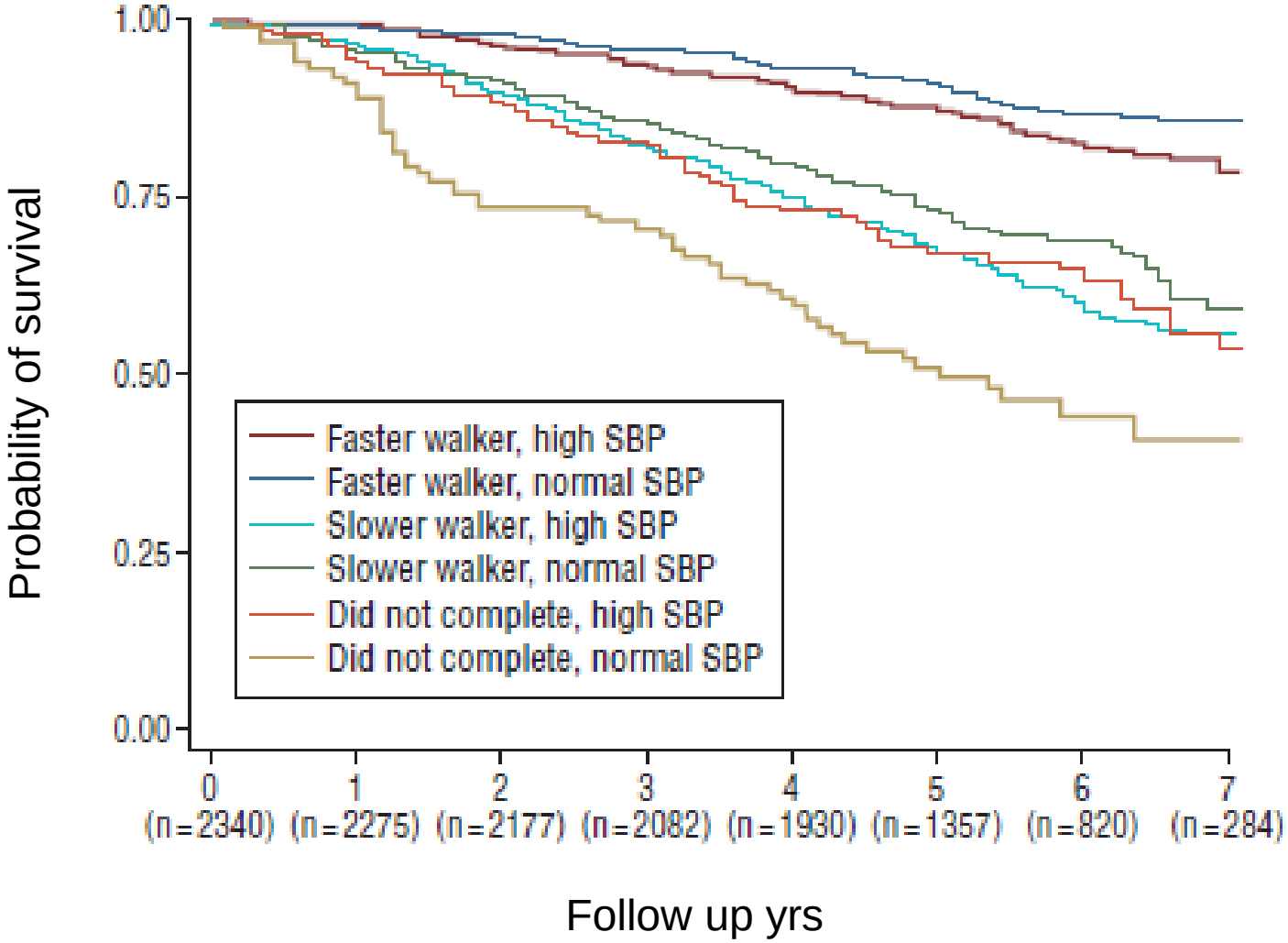
- **>75♀ Multimorbidity**
- **Multiple drugs**
- **Function**
  - Cognitive status
  - Physical function
  - Affective status
  - Social status
- **Incontinence**
- **Malnutrition**
- **Anemia**
- **Falls**
- **Osteoporosis**

Fragilità: definizione

- Sindrome multifattoriale, determinata dalla riduzione della fisiologica riserva funzionale e della capacità di resistere a eventi stressanti ambientali (capacità di omeostasi)
- Comporta un aumentato rischio di eventi clinici: disabilità, ospedalizzazione, istituzionalizzazione, morte
- Condizione complessa e dinamica, della quale si sono proposti numerosi modelli

GAIT SPEED AS VITAL SIGN IN OLD AGE

Arch Int Med 2012; 172: 1162-68



Outline

- ✓ EBM and the “Modern”, frail Patient
- ✓ The Target of Intervention in Geriatrics
- ✓ An evolving, “revolutionary” medicine: from CGA/CER to the LIFE study and the SPRINTT project. WHO and RCP statements

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Medical Practice: the New Way

The past three decades have urged physicians to become familiar with the data from RCTs, systematic reviews, meta-analyses.

"Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values"

Dr. Sackett called for a new approach to the practice of medicine. The era was born of

EVIDENCE BASED MEDICINE

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Researchers have largely shied away from the complexity of multiple chronic conditions — avoidance that results in expensive, potentially harmful care of unclear benefit.

NEJM FREE FULL TEXT Tinetti M. NEJM2011

Eligibility Criteria of Randomized Controlled Trials

Modified by JAMA. 2007;297:1233-1240

Exclusion Criteria No. (%) of Trials

Inability to give informed consent 242 (85.5%)

Age, 204 (72.1%)

- <16 170 (60.1%)
- **>65 109 (38.5)%**

Sex 133 (47.0)

- Related to female sex 111(39.2%)
- Related to male sex 22 (7.8%)

Medical comorbidities 230 (81.3%)

Medication-related 143 (54.1%)

Socioeconomic status 139 (3.8%)

Communication or language barrier 30 (10.6%)

Participation in other trials 20 (7.1%)

Ethnicity 6 (2.1%)

HYVET

The Trial:

International, multi-centre, randomised double-blind placebo controlled

Inclusion Criteria:

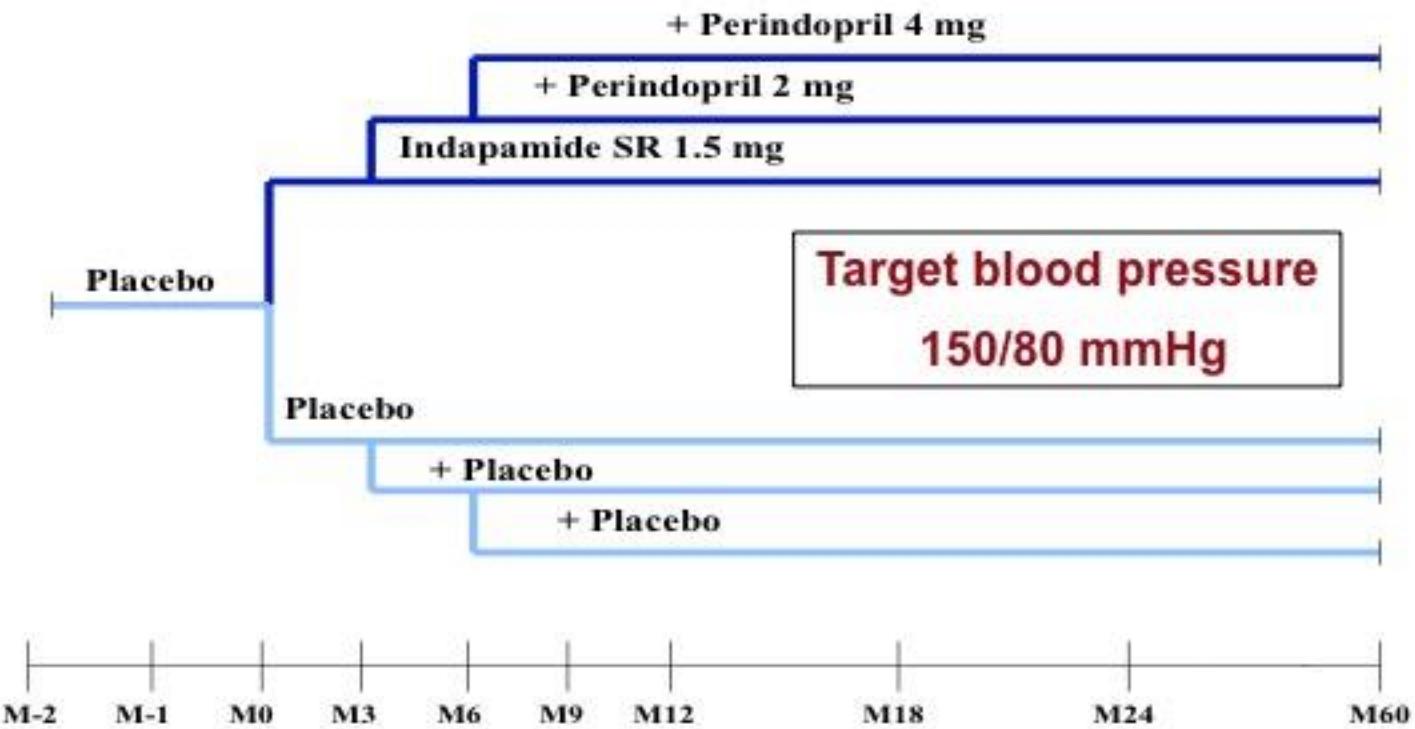
Aged 80 or more,
Systolic BP; 160 -199mmHg
+ diastolic BP; <110 mmHg,
Informed consent

Exclusion Criteria:

Standing SBP < 140mmHg
Stroke in last 6 months
Dementia
Need daily nursing care

Primary Endpoint:

All strokes (fatal and non-fatal)



IS ALSO GERIATRIC MEDICINE IN A PRE-EVIDENCE BASED MEDICINE ERA ? (JAGS 2011; 59: 376-77)

No evidence exists to produce guidelines for treating geriatric patients. As a consequence, the most authoritative literature in the field of treatments of the geriatric complex patient (“*the modern patient*”) is currently based on recommendations derived from common belief and anecdotal experiences.

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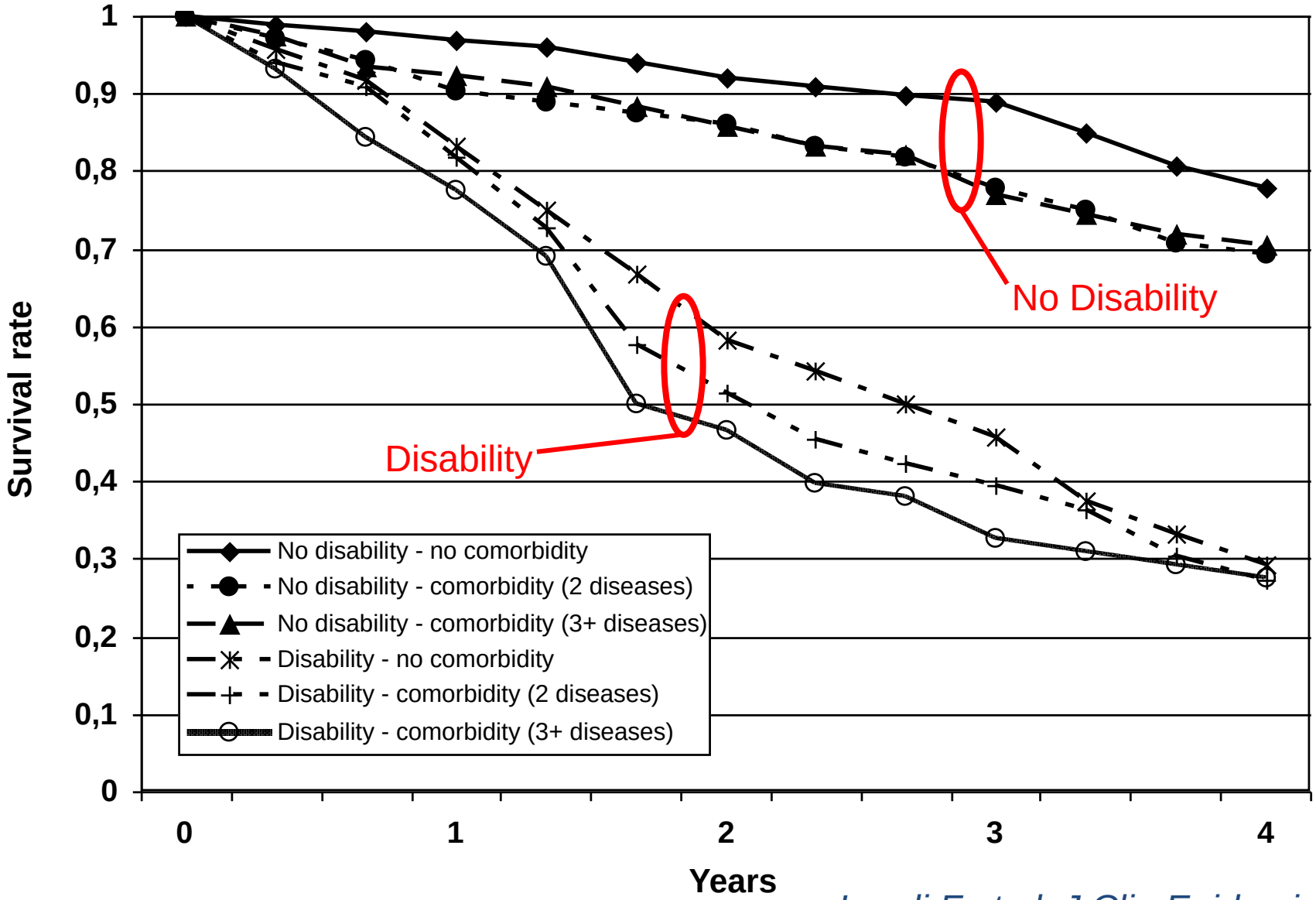
Researchers have largely shied away from the complexity of multiple chronic conditions — avoidance that results in expensive, potentially harmful care of unclear benefit.

NEJM FREE FULL TEXT Tinetti M. NEJM2011

Disability, more than multimorbidity, was predictive of mortality among older persons aged 80 years and older.



Landi F et al. J Clin Epidemiol. 2010

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Acute care for frail older people: time to get back to basics?

Age and Ageing 2014; 43: 448–449

- Many UK AMUs [acute medical units] run an integrated system, yet there is a robust evidence base to support the care of frail older people in acute care within dedicated services that deliver CGA [comprehensive geriatric assessment].
- The time to rediscover geriatric medicine has come!

The breaktrough of geriatric medicine in EBM era

1. COMPREHENSIVE GERIATRIC ASSESMENT (CGA).
2. COMPARATIVE EFFECTIVENESS RESEARCH (CER)

After CGA, CER for a definitive breaktrough vs an evidence based geriatric medicine

Goals of Patient Centered Outcomes Research Institute:

- [to provide]"an opportunity to correct disparity [that] such patients account for more than 80% of Medicare costs and are overrepresented in Medicaid..Ironically, this is also the least studied population."…..
- "The aim of comparative effectiveness research (CER) is …..to include representative populations and healthcare providers, to examine treatment effects within various subpopulations, and to compare interventions head to head."…..
- "To accurately inform decision making for patients with multiple chronic conditions, CER must include large, diverse populations representative of those cared for in clinical practice,"….
- "If data on these characteristics are available, then relatively homogeneous subgroups can be created for assessing stratum-specific benefits and harms" …..
- "Governamental data sources such as the MCBS, the Long-Term Care Minimum Data Set, and the Outcome and Assessment Information Set for home care also include data on relevant universal health outcomes…."

Mary E. Tinetti, and Stephanie A. Studenski; CER and Patients with Multiple Chronic Conditions; NEJM; 2011;364:2478-81

World Health Organization

WORLD REPORT ON **AGEING AND HEALTH**

http://www.who.int/ageing/publications/global_health.pdf

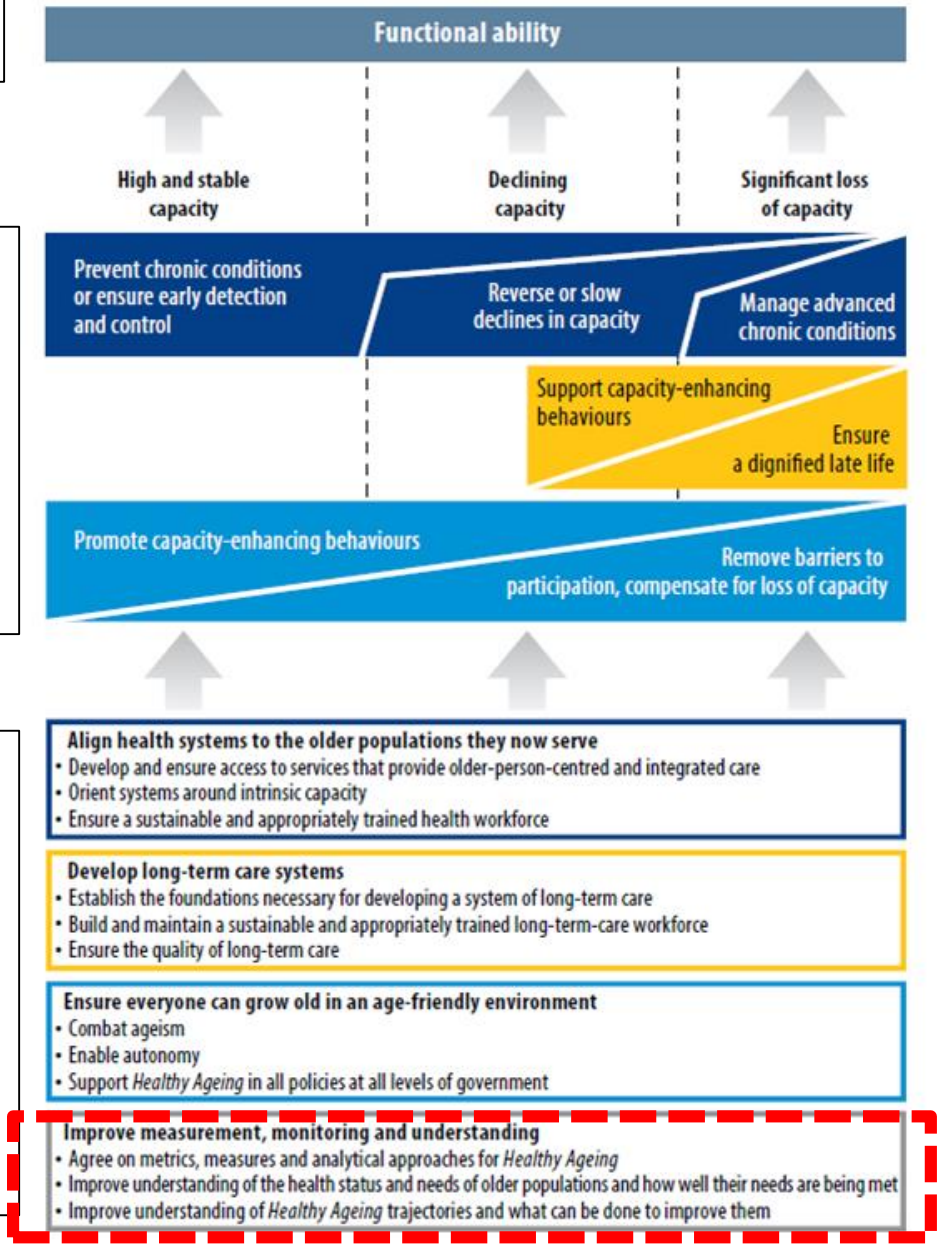
Opportunities for taking public-health action to ensure Healthy Ageing

GOAL

STRATEGIES

NEXT STEPS

PRIORITY AREAS FOR ACTION



AGREE ON METRICS, MEASURES AND ANALYTICAL APPROACHES FOR HEALTHY AGEING

- Developing and reaching **consensus on metrics, measurement strategies, instruments, tests and biomarkers** for key concepts related to Healthy Ageing, including for **functional ability, intrinsic capacity, subjective well-being, health characteristics, personal characteristics, genetic inheritance, multi- morbidity and the need for services and care;**
- Reaching consensus on approaches for assessing and interpreting trajectories of these metrics and measures during the life course. It will be important to demonstrate how the information generated can serve as inputs for policy, monitoring, evaluation, clinical or public-health decisions;
- Developing and applying improved approaches for testing clinical interventions that take account of the diferent physiol- ogy of older people and multimorbidity.

The RCP's five-point plan

1. Remove the financial and structural barriers to joined-up care for patients.
2. Invest now to deliver goood care in the future.
3. Prioritise what works in the NHS and improve what doesn't.
4. Promote public health through evidence-based legislation.
5. Adopt the Future Hospital model as a template for service redesign.

Lancet 2014; 384: 1552-53

Towards a comprehensive public health response to population ageing

knowledge gaps that urgently need to be filled:

- our understanding of the actual and potential contributions and costs of older populations;
- changing patterns of morbidity in older populations;
- optimum clinical interventions in older age, specially pharmacological interventions;
- optimum ways to manage comorbidities and complex issues such as frailty;
- quality of the additional years engendered by increased life expectancy; and effect of strategies to create more age-friendly environments;
- to extend the collection and analysis of routine data to older ages in both institutional and home settings;
- Identification of the best way to obtain relevant data on functioning will also help.

Beard JR, Bloom DE; Lancet 2015; 385: 658–61

Second and third generation assessment instruments: the birth of standardization in geriatric care

the Journals of gerontology
BIOLOGICAL SCIENCES AND MEDICAL SCIENCES

Bernabei R, Landi F, Onder G, Liperoti R, Gambassi G.

The systematic adoption of "second-generation" comprehensive geriatric assessment instruments, initiated with the Minimum Data Set (MDS) implementation in U.S. nursing homes, and continued with the uptake of related MDS instruments internationally, has contributed to the creation of large patient-level data sets. In the present special article, we illustrate the potential of analyses using the MDS data to: (a) identify novel prognostic factors; (b) explore outcomes of interventions in relatively unselected clinical populations; (c) monitor quality of care; and (d) conduct comparisons of case mix, outcomes, and quality of care. To illustrate these applications, we use a sample of elderly patients admitted to home care in 11 European Home Health Agencies that participated in the AgeD in HOme Care (AD-HOC) project, sponsored by the European Union. The participants were assessed by trained staff using the MDS for Home Care, 2.0 version. We argue that the harmonization by InterRAI of the MDS forms for different health settings, referred to as "the third generation of assessment," has produced the first scientific, standardized methodology in the approach to effective geriatric care

J Gerontol A Biol Sci Med Sci. 2008 Mar;63(3):308-13

InterRAI – Third generation assessment instruments

InterRAI has recently released a suite of 18 instruments, revised, validated and standardized.

These instruments share a substantial amount of information (core elements) and are intended for older patients in all health care settings and to improve the transfer of information (third generation instruments).

The inter*RAI* Suite

- Nursing Home Care, Long Term Care
- Home Care
- Community Health Assessment
  - ✓ CHA
  - ✓ Functional Supp
  - ✓ Mental Health Supp Psych
  - ✓ Assisted Living Supp
- Mental Health
  - ✓ Inpatient
  - ✓ Community Mental Health
- Post-Acute Care
- Palliative Care
- Assisted Living
- Intellectual Disability

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Frailty in elderly people

Andrew Clegg, John Young, Steve Iliffe, Marcel Olde Rikkert, Kenneth Rockwood

Various **International Resident Assessment Instrument (interRAI)** devices are widely used internationally to standardise the assessment of elderly people. Nine items that are embedded in many of the instruments can be extracted and form the changes in health, end-stage disease and signs and symptoms scale. Although not explicitly a frailty measure, this scale has proved a strong predictor of mortality, and further validation studies are in progress.

www.thelancet.com Vol 381 March 2, 2013

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Hubbard *et al. BMC Geriatrics* (2015) 15:27
DOI 10.1186/s12877-015-0026-z

BMC Geriatrics

RESEARCH ARTICLE Open Access

Derivation of a frailty index from the interRAI acute care instrument

Ruth E Hubbard[1*], Nancye M Peel[1], Mayukh Samanta[2], Leonard C Gray[1], Brant E Fries[3], Arnold Mitnitski[4] and Kenneth Rockwood[4]

Conclusions: Quantification of frailty status at hospital admission can be incorporated into an existing assessment system, which serves other clinical and administrative purposes. This could optimise clinical utility and minimise costs. **The variables used to derive the FI-AC are common to all interRAI instruments, and could be used to precisely measure frailty across the spectrum of health care.**

Comprehensive Geriatric Assessment (inter*RAI* suite)

Patient → **Better Physical Exam**

Better Care Plan

Population → **Data-base**

- **Risk Factors**
- **Outcome Measurement**
- **Quality of Care**
- **Comparison**

Original Investigation

JAMA

Effect of Structured Physical Activity on Prevention of Major Mobility Disability in Older Adults

The LIFE Study Randomized Clinical Trial

Marco Pahor, MD; Jack M. Guralnik, MD, PHD; Walter T. Ambrosius, PhD; Steven Blair, PED; Denise E. Bonds, MD; Timothy S. Church, MD, PhD, MPH; Mark A. Espeland, PhD; Roger A. Fielding, PhD; Thomas M. Gill, MD; Erik J. Groessl, PhD; Abby C. King, PhD; Stephen B. Kritchevsky, PhD; Todd M. Manini, PhD; Mary M. McDermott, MD; Michael E. Miller, PhD; Anne B. Newman, MD, MPH; W Jack Rejeski, PhD; Kaycee M. Sink, MD, MAS; Jeff D. Williamson, MD, MHS; for the LIFE study investigators

OBJECTIVE To test the hypothesis that a long-term structured physical activity program is more effective than a health education program (also referred to as a successful aging program) in reducing the risk of major mobility disability.

DESIGN, SETTING, AND PARTICIPANTS The Lifestyle Interventions and Independence for Elders (LIFE) study was a multicenter, randomized trial that enrolled participants between February 2010 and December 2011, who participated for an average of 2.6 years. Follow-up ended in December 2013. Outcome assessors were blinded to the intervention assignment. Participants were recruited from urban, suburban, and rural communities at 8 centers throughout the United States. We randomized a volunteer sample of 1635 sedentary men and women aged 70 to 89 years who had physical limitations, defined as a score on the Short Physical Performance Battery of 9 or below, but were able to walk 400 m.

SPRINTT

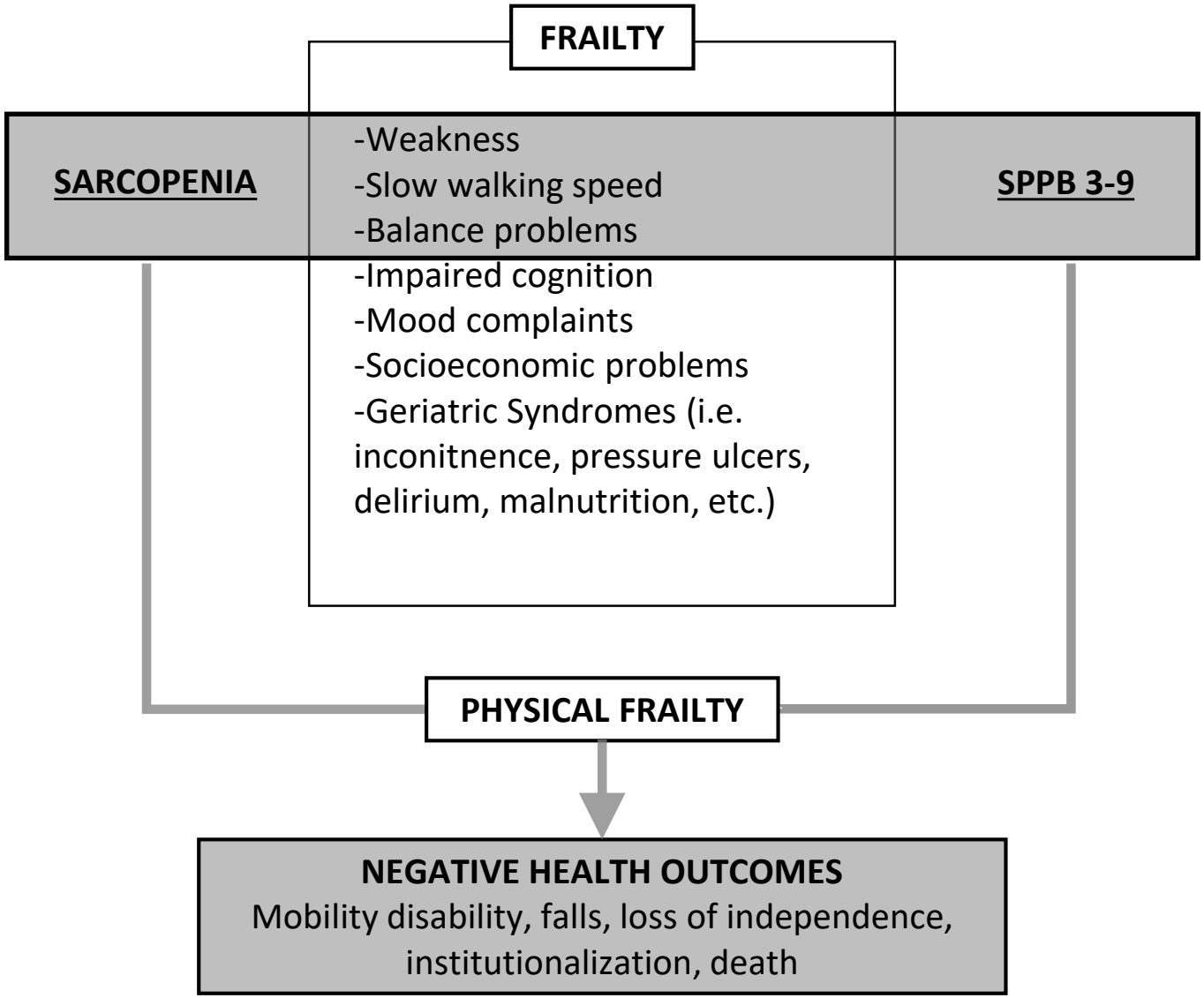
Sarcopenia & Physical fRailty IN older people:
multi-componenT Treatment strategies

A private - public partnership – will be a good approach to answer these complex questions

"Developing innovative therapeutic interventions against physical frailty and sarcopenia (ITI-PF&S) as a prototype geriatric indication"

IMI Call n.9
(call for interest) was published on July 9th, 2013

Identification of a target population and operationalization of frailty



Implementation of physical frailty in clinical practice

Condition	Measurable biological substrate	Measurable clinical manifestations	Measurable function
CHF	Myocardial dysfunction (echocardiography)	- Shortness of breath - Fatigue	6-min walking test
COPD	Airways destructive changes (spirometry)	- Dyspnoea - Cough - Sputum	6-min walking test
PAD	Arterial stenosis (Doppler echocardiography)	- Intermittent claudication - Numbness - Ulcers	Treadmill walking distance
PF	Reduced muscle mass (DXA)	- Slow walking speed - Poor balance - Weakness	SPPB

Eligibility criteria

INCLUSION CRITERIA

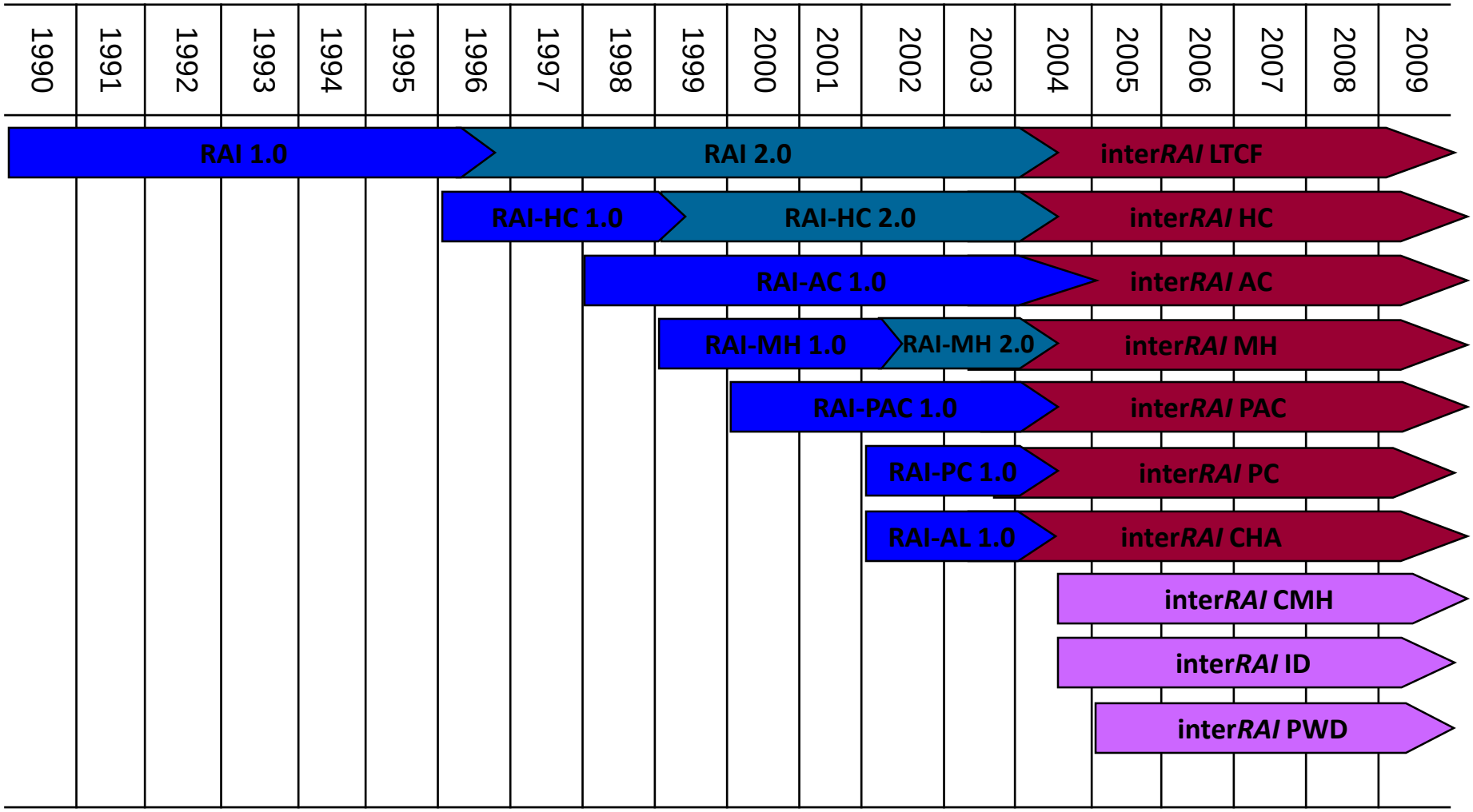
Demographic characteristics

Age ≥70 years

Physical function, body composition, and lifestyle criteria

- Able to complete the 400-meter walk test
- SPPB score between 3 and 9
- Presence of low muscle mass (DXA) according to FNIH
- Sedentary lifestyle
- Willingness to be randomized to either intervention group

Developmental Time Line for inter*RAI* Suite



interRAI Long-Term Care Facility (LTCF) ©

SECTION C. COGNITION

1. **COGNITIVE SKILLS FOR DAILY DECISION MAKING**
Making decisions regarding tasks of daily life—e.g., when to get up or have meals, which clothes to wear or activities to do
   0. ***Independent***—Decisions consistent, reasonable, and safe
   1. ***Modified independence***—Some difficulty in new situations only
   2. ***Minimally impaired***—In specific recurring situations, decisions become poor or unsafe; cues/supervision necessary at those times
   3. ***Moderately impaired***—Decisions consistently poor or unsafe; cues / supervision required at all times
   4. ***Severely impaired***—Never or rarely makes decisions
   5. ***No discernable consciousness, coma [Skip to Section G]***

2. **MEMORY/RECALL ABILITY**
Code for recall of what was learned or known
   0. Yes, memory OK 1. Memory problem
   a. **Short-term memory OK**—Seems / appears to recall after 5 minutes
   b. **Long-term memory OK**—Seems / appears able to recall distant past
   c. **Procedural memory OK**—Can perform all or almost all steps in a multitask sequence without cues
   d. **Situational memory OK**—Both: recognizes caregivers' names / faces frequently encountered AND knows location of places regularly visited (bedroom, dining room, activity room, therapy room)

3. **PERIODIC DISORDERED THINKING OR AWARENESS**
[Note: Accurate assessment requires conversations with staff, family or others who have direct knowledge of the person's behavior over this time]
   0. Behavior not present
   1. Behavior present, consistent with usual functioning
   2. Behavior present, appears different from usual functioning (e.g., new onset or worsening; different from a few weeks ago)
   a. **Easily distracted**—e.g., episodes of difficulty paying attention; gets sidetracked
   b. **Episodes of disorganized speech**—e.g., speech is nonsensical, irrelevant, or rambling from subject to subject; loses train of thought
   c. **Mental function varies over the course of the day**—e.g., sometimes better, sometimes worse

4. **ACUTE CHANGE IN MENTAL STATUS FROM PERSON'S USUAL FUNCTIONING**–*e.g., restlessness, lethargy, difficult to arouse, altered environmental perception*
   0. No 1. Yes

5. **CHANGE IN DECISION MAKING AS COMPARED TO 90 DAYS AGO (OR SINCE LAST ASSESSMENT)**
   0. Improved 2. Declined
   1. No change 8. Uncertain

interRAI Home Care (HC)©

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interRAI Long-Term Care Facility (LTCF) ©

SECTION F. PSYCHOSOCIAL WELL-BEING

1. SOCIAL RELATIONSHIPS
[Note: Ask person, direct care staff, and family, if available]
0. Never
1. More than 30 days ago
2. 8 to 30 days ago
3. 4 to 7 days ago
4. In last 3 days
8. Unable to determine

a. **Participation in social activities of long-standing interest**
b. **Visit with a long-standing social relation or family member**
c. **Other interaction with long-standing social relation or family member**—e.g., telephone, e-mail

2. SENSE OF INVOLVEMENT
0. Not present
1. Present but not exhibited in last 3 days
2. Exhibited on 1-2 of last 3 days
3. Exhibited daily in last 3 days

a. **At ease interacting with others**
b. **At ease doing planned or structured activities**
c. **Accepts invitations into most group activities**
d. **Pursues involvement in life of facility**—e.g., makes or keeps friends; involved in group activities; responds positively to new activities; assists at religious services
e. **Initiates interaction(s) with others**
f. **Reacts positively to interactions initiated by others**
g. **Adjusts easily to change in routine**

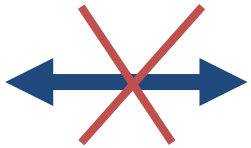
3. UNSETTLED RELATIONSHIPS
0. No 1. Yes

a. **Conflict with or repeated criticism of other care recipients**
b. **Conflict with or repeated criticism of staff**
c. **Staff report persistent frustration in dealing with person**
d. **Family or close friends report feeling overwhelmed by person's illness**
e. **Says or indicates that he/she feels lonely**

4. MAJOR LIFE STRESSORS IN LAST 90 DAYS—
e.g., episode of severe personal illness; death or severe illness of close family member / friend; loss of of home; major loss of income/assets; victim of a crime such as robbery or assault; loss of driving license/car
0. No 1. Yes

5. STRENGTHS
0. No 1. Yes

a. **Consistent positive outlook**
b. **Finds meaning in day-to-day life**
c. **Strong and supportive relationship with family**



interRAI Home Care (HC)©

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1. SOCIAL RELATIONSHIPS
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2. 8 to 30 days ago
3. 4 to 7 days ago
4. In last 3 days
8. Unable to determine

a. **Participation in social activities of long-standing interest**
b. **Visit with a long-standing social relation or family member**
c. **Other interaction with long-standing social relation or family member**—e.g., telephone, e-mail
d. **Openly expresses conflict or anger with family or friends**
e. **Fearful of a family member or close acquaintance**
f. **Neglected, abused, or mistreated**

2. LONELY
Says or indicates that he / she feels lonely
0. No 1. Yes

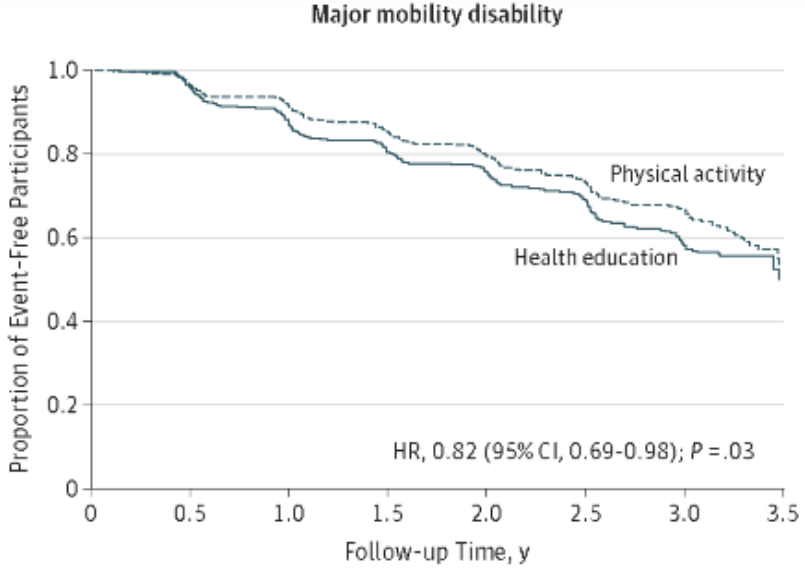
3. CHANGE IN SOCIAL ACTIVITIES IN LAST 90 DAYS (OR SINCE LAST ASSESSMENT IF LESS THAN 90 DAYS AGO)
Decline in level of participation in social, religious, occupational or other preferred activities
IF THERE WAS A DECLINE, person distressed by this fact
0. No decline
1. Decline, not distressed
2. Decline, distressed

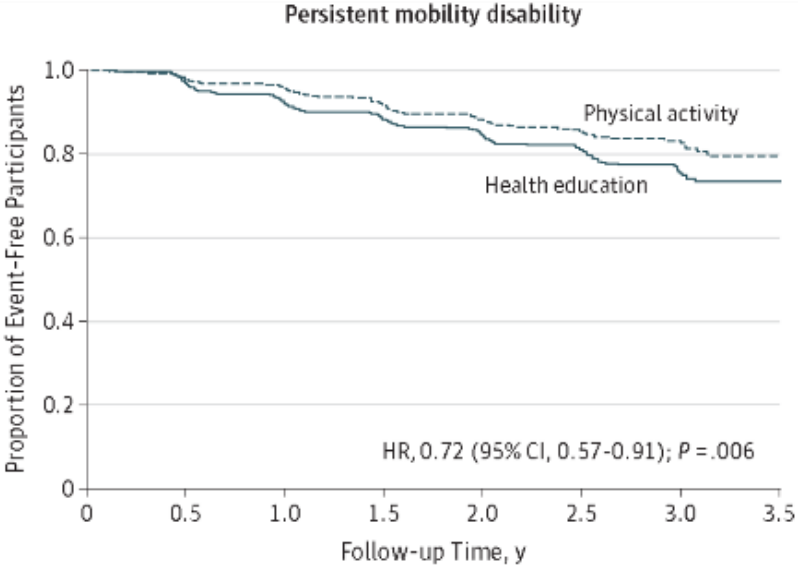
4. LENGTH OF TIME ALONE DURING THE DAY (MORNING AND AFTERNOON)
0. Less than 1 hour
1. 1-2 hours
2. More than 2 hours but less than 8 hours
3. 8 hours or more

5. MAJOR LIFE STRESSORS IN LAST 90 DAYS—*e.g., episode of severe personal illness; death or severe illness of close family member / friend; loss of home; major loss of income / assets; victim of a crime such as robbery or assault; loss of driving license/car*
0. No 1. Yes

The LIFE Study

JAMA





No. at risk																
Physical activity	818	758	706	646	559	378	182	11	818	761	726	673	579	393	188	12
Health education	817	765	680	617	540	358	162	13	817	762	707	655	567	371	178	10
Events																
Physical activity	0	29	67	115	155	197	224	246	0	18	32	64	88	104	113	120
Health education	0	33	105	155	190	232	277	286	0	25	64	91	118	138	158	162

Effect of a Moderate Physical Activity Intervention on the Onset of Major Mobility Disability and Persistent Mobility DisabilityHR indicates hazard ratio. The graph for major mobility disability was truncated at 3.5 years and the health education group had 4 additional failures between 3.5 and 3.6 years of follow-up. Number of events represents cumulative events and adjusted HRs and P values are from proportional hazards regression models defined in the Methods section.

Comprehensive Geriatric Assessment (inter*RAI* suite)

Patient → **Better Physical Exam**

Better Care Plan

Population → **Data-base**

- **Risk Factors**
- **Outcome Measurement**
- **Quality of Care**
- **Comparison**

SHELTER study: dual sensory impairment vs cognitive decline or behavioral symtoms

Research Article

Dual Sensory Impairment and Cognitive Decline: The Results From the Shelter Study

Yukari Yamada,[1,2] Michael D. Denkinger,[3] Graziano Onder,[4] Jean-Claude Henrard,[5] Henriëtte G. van der Roest,[6,7] Harriet Finne-Soveri,[8] Tomas Richter,[1] Martina Vlachova,[1] Roberto Bernabei,[4] and Eva Topinkova[1]

COGNITIVE DECLINE 1 YEAR OBSERVATION

		One Year Changes in CPS†(95% CI)	
Status	*n**	Model 1	Model 2
No impairment + engagement	2769	0.50 (0.42: 0.58)	0.50 (0.42: 0.58)
Single impairment + engagement	798	0.50 (0.38: 0.63)	0.51 (0.38: 0.64)
DSI + engagement	210	0.75 (0.44: 1.06)	0.75 (0.44: 1.06)
No impairment + no engagement	552	0.80 (0.58: 1.02)	0.80 (0.57: 1.02)
Single impairment + no engagement	238	1.19 (0.82: 1.57)	1.21 (0.83: 1.59)
DSI + no engagement	88	1.87 (1.24: 2.51)	1.87 (1.23: 2.51)

J Gerontol A Biol Sci Med Sci. 2015 Apr 13. pii: glv036

SHELTER study: dual sensory impairment vs cognitive decline or behavioral symptoms

Impact of Dual Sensory Impairment on Onset of Behavioral Symptoms in European Nursing Homes: Results From the Services and Health for Elderly in Long-Term Care Study

Yukari Yamada PhD [a,b,*], Michael D. Denkinger MD [c], Graziano Onder MD [d], Harriet Finne-Soveri MD [e], Henriëtte van der Roest PhD [f], Martina Vlachova MD [a], Tomas Richter MD [a], Jacob Gindin MD [g], Roberto Bernabei MD [d], Eva Topinkova MD [a]

BEHAVIORAL SYMPTOMS 1 YEAR OSERVATION

Baseline Sensory Impairment	Cases	Model 1* OR (95% CI)	Model 2† OR (95% CI)
No impairment	54	1.00 (reference)	1.00 (reference)
Single impairment	59	1.40 (1.01–1.96)	1.42 (1.01–2.00)
Mild DSI	20	2.09 (1.29–3.37)	2.12 (1.29–3.48)
Moderate DSI	24	2.54 (1.61–3.99)	2.64 (1.66–4.21)
Severe DSI	13	2.13 (1.22–3.73)	2.13 (1.20–3.83)

J Am Med Dir Assoc. 2015;16: 329-33

Comprehensive Geriatric Assessment (inter*RAI* suite)

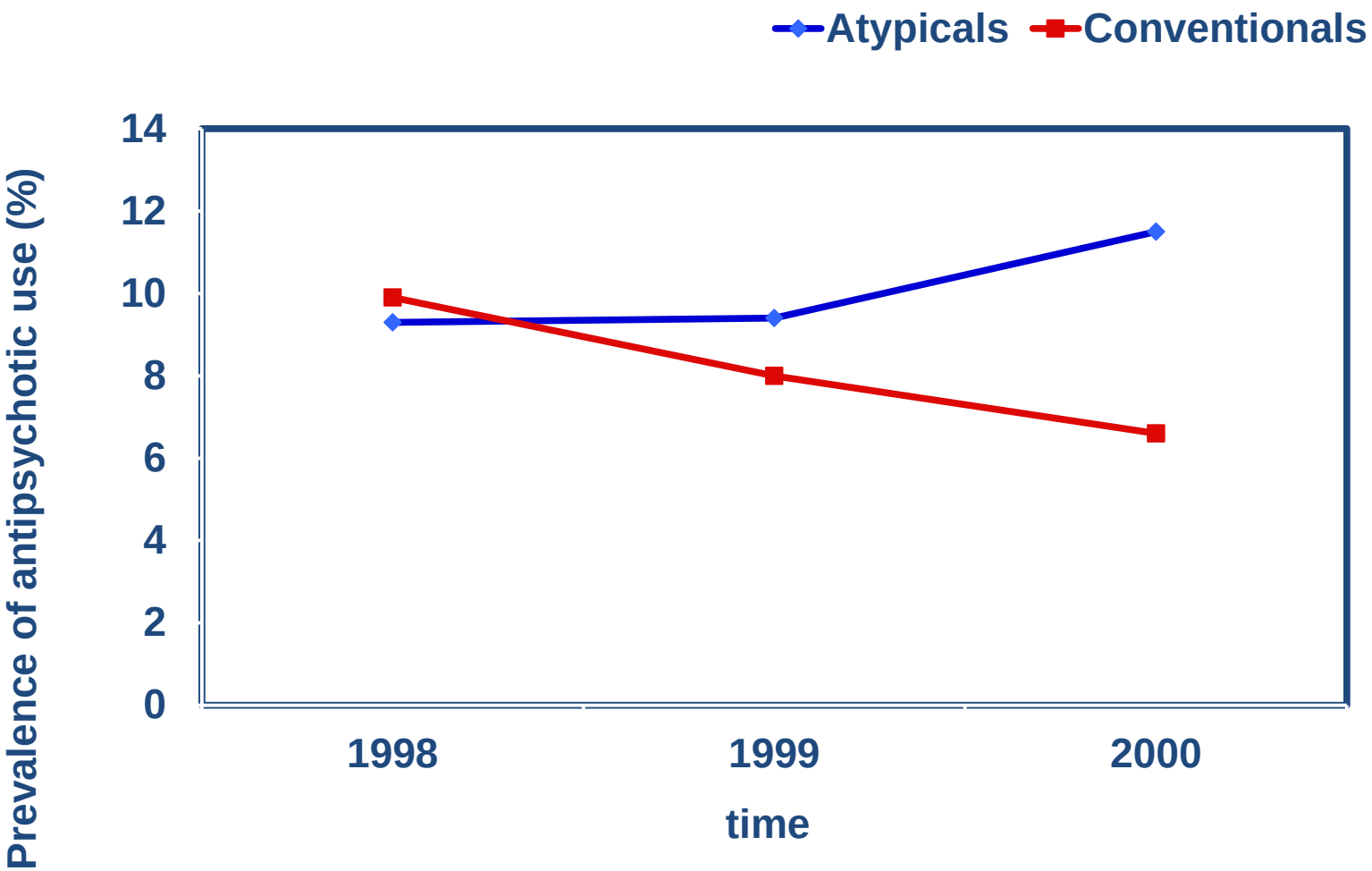
Patient → **Better Physical Exam**

Better Care Plan

Population → **Data-base**

- **Risk Factors**
- **Outcome Measurement**
- **Quality of Care**
- **Comparison**

Temporal Trend in Antipsychotic Prescription among Ohio NH residents



*mean number of residents per year 120,105

Liperoti et al. JAGS 2004; 52: 2148-9

Department of Health and Human Services

1906 - 2006 FDA Centennial

U.S. Food and Drug Administration

CENTER FOR DRUG EVALUATION AND RESEARCH

FDA Public Health Advisory

Deaths with Antipsychotics in Elderly Patients with Behavioral Disturbances

- **The treatment of behavioral disorders in elderly patients with dementia with atypical antipsychotic medications is associated with increased mortality.**
- **Most were either due to heart related events (e.g., heart failure, sudden death) or infections (mostly pneumonia).**
- **The Agency will ask the manufacturers of these drugs to include a Boxed Warning in their labeling describing this risk and noting that these drugs are not approved for this indication.**

April 11, 2005

Crude, adjusted odds ratios and 95% confidence intervals of being hospitalized with diagnosis of ventricular arrhythmias or cardiac arrest in residents using antipsychotics on a standing order

	Crude OR	Adj. OR	95% CI
Atypical vs. no use	0.70	0.87	0.58-1.32
Conventional vs. no use	1.53	1.86	1.27-2.74
Conventional vs. Atypical	2.19	2.13	1.27-3.60

Liperoti et al. Arch Intern Med 2005; 165: 696-701

Modification of antipsychotic effect by cardiac disease on the risk of being hospitalized for ventricular arrhythmias or cardiac arrest

649 cases; 2,962 controls	Adj. OR	95% CI
Cardiac Disease and Atypical Use	1.54	0.88-2.70
Cardiac Disease and Conventional Use	**3.27**	**1.95-5.47**
No Cardiac Disease and Atypical Use	0.98	0.52-1.85
No Cardiac Disease and Conventional Use	2.05	1.14-3.68
Cardiac Disease and No Use	1.86	1.45-2.39
No Cardiac Disease and No Use	1.00	-

Liperoti R et al. Arch Intern Med 2005

Comprehensive Geriatric Assessment (inter*RAI* suite)

Patient → **Better Physical Exam**

Better Care Plan

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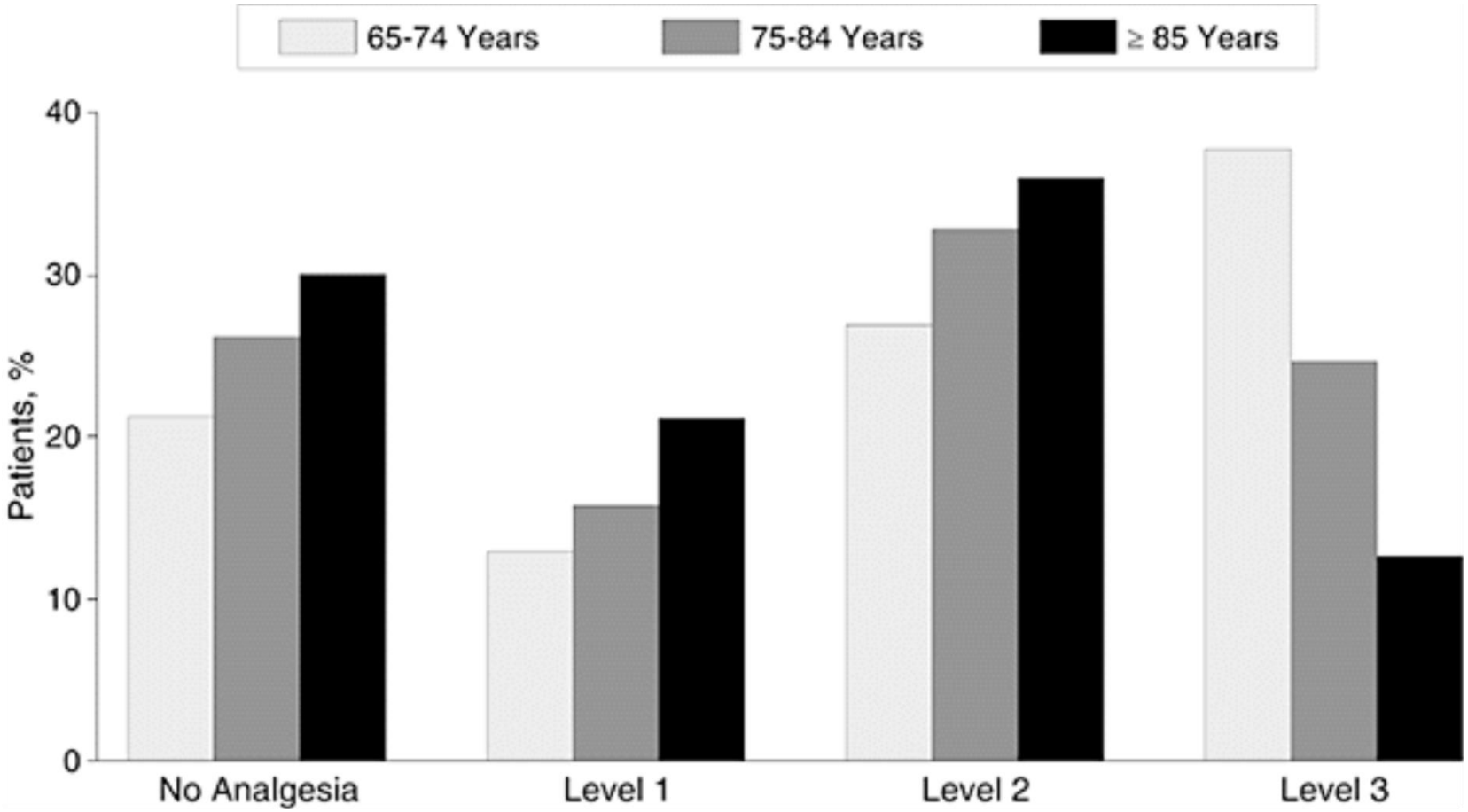
- **Comparison**

Pharmacological treatment of pain in cancer patients



No narcotics *Weak opioids* *Morphine or like*

Bernabei et al. JAMA 1998; 279: 1877-1882

Comprehensive Geriatric Assessment (inter*RAI* suite)

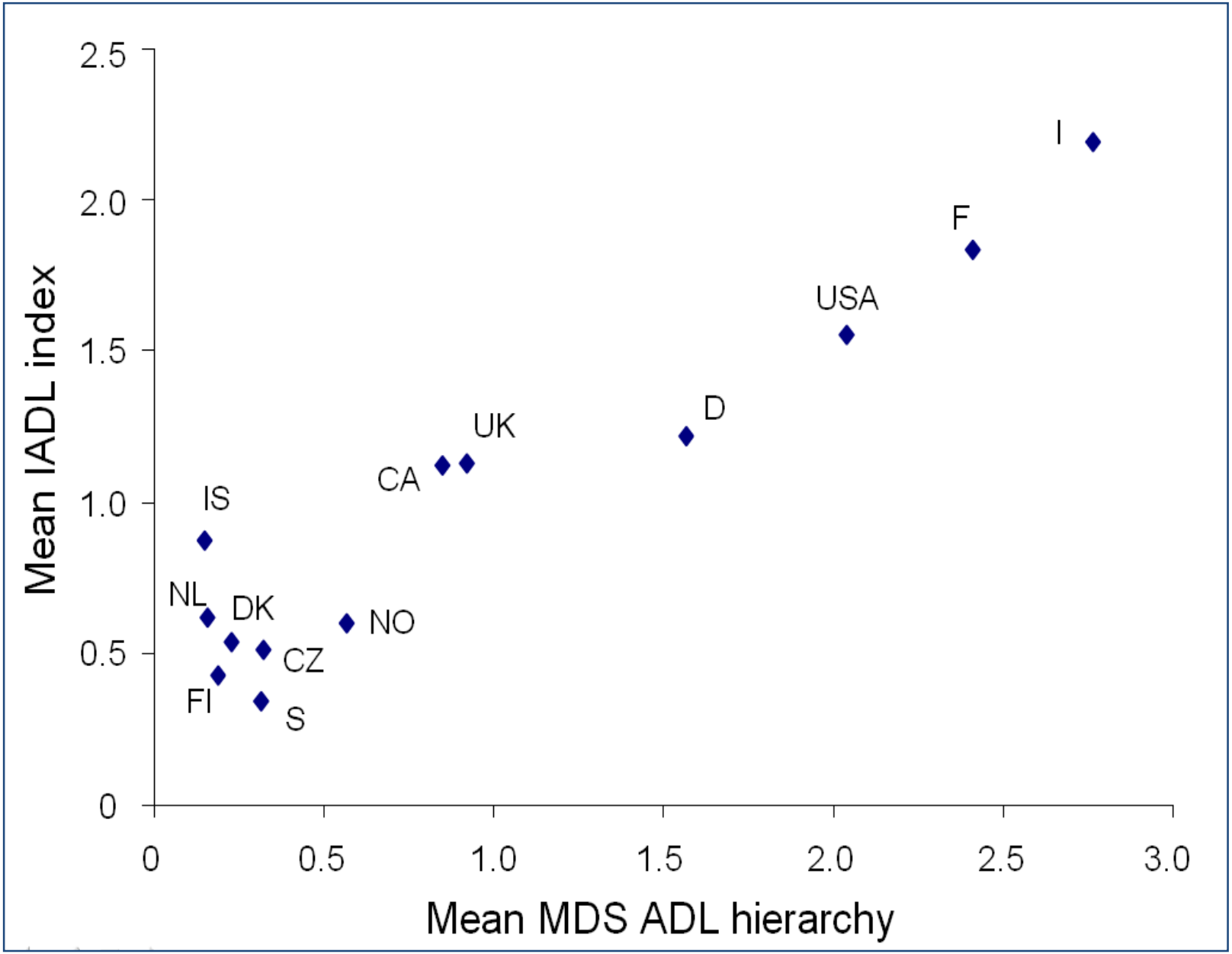
Patient → **Better Physical Exam**

Better Care Plan

Population → **Data-base**

- **Risk Factors**
- **Outcome Measurement**
- **Quality of Care**
- **Comparison**

Bernabei R et al 'International Gerontology' in Hazzard's Principles of Geriatric Medicine and Gerontology, Sixth Edition, 2009.

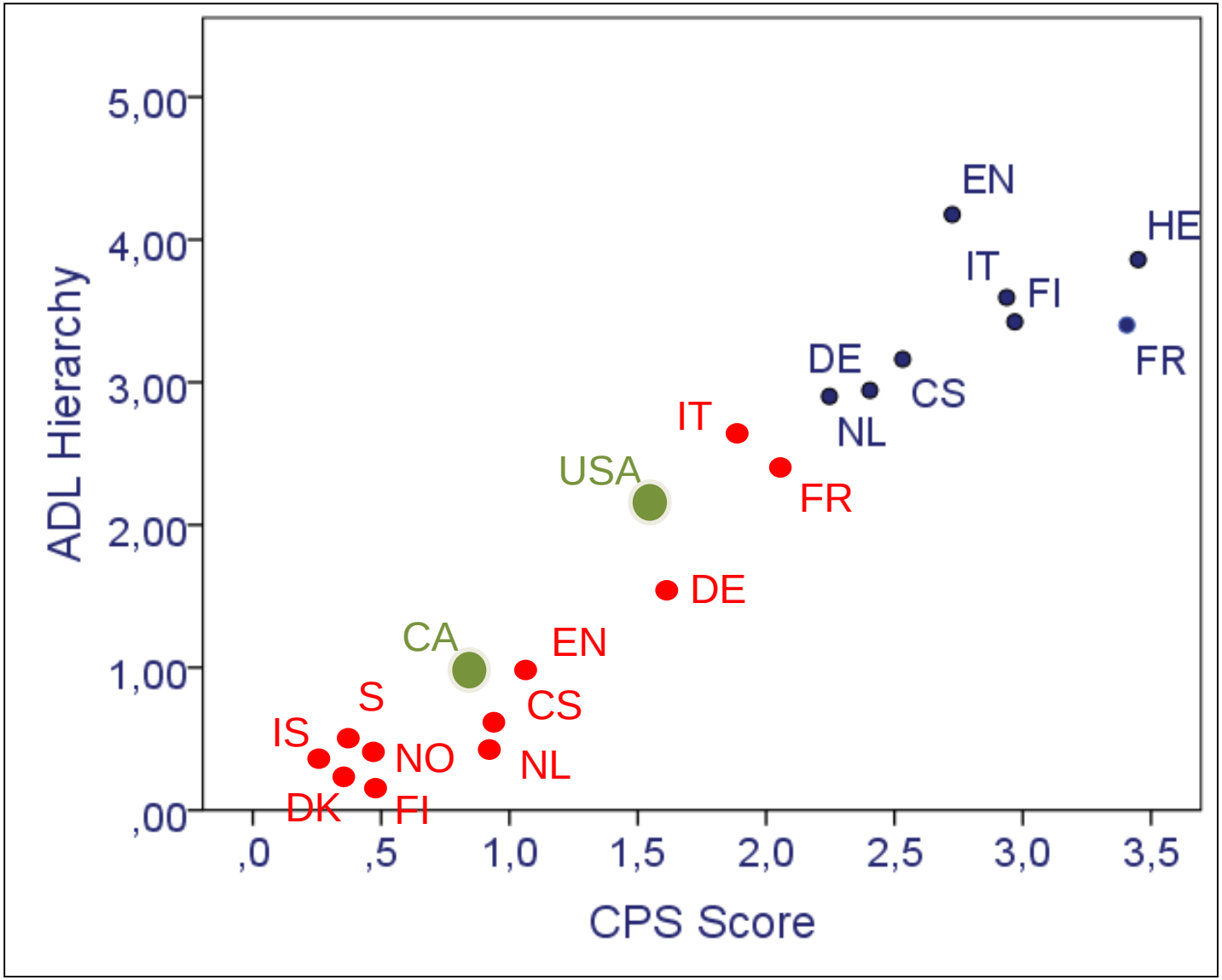


Residents characteristics by country

SHELTER
NH residents

ADHOC
HC patients

Non EU countries
HC patients



Review Article

J Am Med Dir Assoc. 2015;16:173.e1-10

Evaluations of Home Care Interventions for Frail Older Persons Using the interRAI Home Care Instrument: A Systematic Review of the Literature

Johanna De Almeida Mello MSEcon [a,*], Kirsten Hermans MSPsy [a], Chantal Van Audenhove MSPsy, PhD [a], Jean Macq MD, PhD [b], Anja Declercq MSEcon, MSSoc, PhD [a,*]

***RESULTS*: A total of 349 articles were identified. Eighteen studies met our inclusion criteria describing 18 interventions in home care evaluated with the interRAI HC instrument.**

***CONCLUSIONS*: The interRAI HC instrument proves to be a comprehensive tool to measure outcomes and can serve as an evaluation instrument for interventions. It can also be used as an intervention itself, when care-givers use the tool and its outcome measures to implement a care plan.**

The "Modern" Patient

FRAILTY

- **>75♀ Multimorbidity**
- **Multiple drugs**
- **Function**
  - Cognitive status
  - Physical function
  - Affective status
  - Social status
- **Incontinence**
- **Malnutrition**
- **Anemia**
- **Falls**
- **Osteoporosis**

Researchers have largely shied away from the complexity of multiple chronic conditions — avoidance that results in expensive, potentially harmful care of unclear benefit.

NEJM FREE FULL TEXT Tinetti M. NEJM2011

The interRAI Acute Care instrument incorporated in an eHealth system

STRENGTHS

InterRAI AC as CGA

- multidimensional evaluation of the patient;
- extensive picture of the patients needs and remaining capabities;
- promotion of multidisciplinary teamwork;
- povides a timely understanding of the patients' condition early after admission;
- improvement of the collaboration and consultation between care settings;
- accurate information from home care organisations anf nursing homes immediately after admission;
- the first introduction to an automatic transfer documentation at discharge.

BelRAI web-based software

- centralization of medical, paramedical and nursing data;
- patient details are consultable anywhere;
- optimal security and privacy protection;
- integrated in the Belgium eHealth platform;
- health summary report offers a clear and interpretable summary;
- links to the online manual (wiki-site).

BMC Geriatrics 2013, 13:90

The interRAI Acute Care instrument incorporated in an eHealth system

WEAKNESSES

InterRai as CGA

- time-consuming process;
- organizational difficulties make timely assessment difficult resulting in inaccurate data (e.g. Meanwhile the clinical profile has changes, discharge is planned);
- overlap with other intruments (e.g. MMSE, Katz) records and registration systems (e.g. diagnosis, medication);
- data quality and use of the clinical output is strongly dependable on conditions (e.g. partecipation of physicians, staffing, integration of RAI on team meetings);
- insufficient partecipation of all care settings blocks the transfer of data;
- interRAI has the image of a “purely registration system lacking clinical value”.

BelRAI web-based software

- user-friendliness of particular features;
- some adptations are needed to function in the acute setting optimally;
- the BelRAI software has a complex architecture due to privacy and security regulations;
- electronic imput of data requests an extra time investment;
- dependent on the accessibility of the eHealth platform and the internet connection.

BMC Geriatrics 2013, 13:90

The interRAI Acute Care instrument incorporated in an eHealth system

OPPORTUNITIES

InterRAI AC as CGA

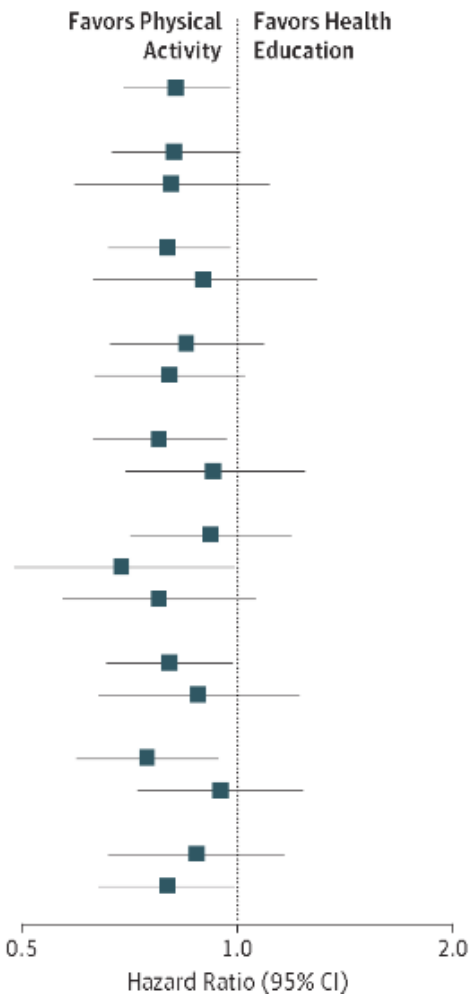
- CAP'S suggest individual care needs and a fast detection of problems;
- the BelRAI outcomes can lead to an individual care plan;
- standardization of items guarantee an uniform scoring;
- realization of the continuity of data collection across care settings;
- data transfer and interaction between care sectors in transizional care;
- education about clinical problems (e.g. delirium) and the approach by spreading clinical protocols and the web-site;
- anticipation in detecting problems that are not overt and not spontaneously reported by the patient;
- screening the patient systematically and in standardized way (on the condition that the assessment is performed within 48 h after admission);
- benchmarking on ward and organization level;
- further development of output (e.g. quality indicators);
- measurement of caregiver burden.

BMC Geriatrics 2013, 13:90

The LIFE Study

JAMA

Subgroup	Physical Activity Events, No.	Physical Activity Total Participants	Health Education Events, No.	Health Education Total Participants	Hazard Ratio (95% CI)	Interaction P Value
Overall	246	818	290	817	0.82 (0.69-0.98)	
Sex						
Women	171	547	204	551	0.82 (0.67-1.01)	.95
Men	75	271	86	266	0.81 (0.59-1.11)	
Ethnicity/race						
Non-Hispanic white	182	604	234	635	0.80 (0.66-0.98)	.58
Other	64	211	56	180	0.90 (0.63-1.29)	
Age, y						
70-79	123	477	138	455	0.85 (0.67-1.09)	.76
≥80	123	341	152	362	0.81 (0.63-1.03)	
History of CVD						
No CVD	155	582	187	563	0.78 (0.63-0.97)	.34
CVD	91	236	103	254	0.93 (0.70-1.24)	
History of diabetes						
None	114	406	126	414	0.92 (0.71-1.19)	.41
Impaired fasting glucose	59	192	68	165	0.69 (0.49-0.99)	
Diabetes	73	220	96	238	0.78 (0.57-1.06)	
Gait speed						
<0.8 m/s	173	485	210	508	0.81 (0.66-0.99)	.63
≥0.8 m/s	73	333	80	309	0.88 (0.64-1.22)	
SPPB						
<8	135	353	177	378	0.75 (0.60-0.94)	.19
8 or 9	111	465	113	439	0.95 (0.73-1.23)	
3MSE (post hoc)						
<90	95	261	108	261	0.88 (0.66-1.16)	.58
≥90	151	557	182	556	0.80 (0.64-0.99)	



Hazard Ratio of Major Mobility Disability for Physical Activity vs Health Education According to Subgroups3MSE indicates Modified Mini-Mental State Examination; CVD, cardiovascular disease; SPPB, Short Physical Performance Battery. P values were obtained from likelihood ratios tests of the interaction terms added to the Cox regression model.

Incomplete Assessments: The Case of the interRAI Home Care Instrument

'Responsible' Health Professionals[a]	Proportion % (N = 5,117)	95% CI
Nurses	62.18	0.6086–0.6351
Occupational therapists	21.46	0.2033–0.2258
Social workers	9.87	0.0905–0.1069
Psychologists	4.77	0.0418–0.0535
Physiotherapists	1.43	0.0110–0.0175
Speech therapists	0.28	0.0013–0.0042
Physicians	0.02	-0.0002–0.0006

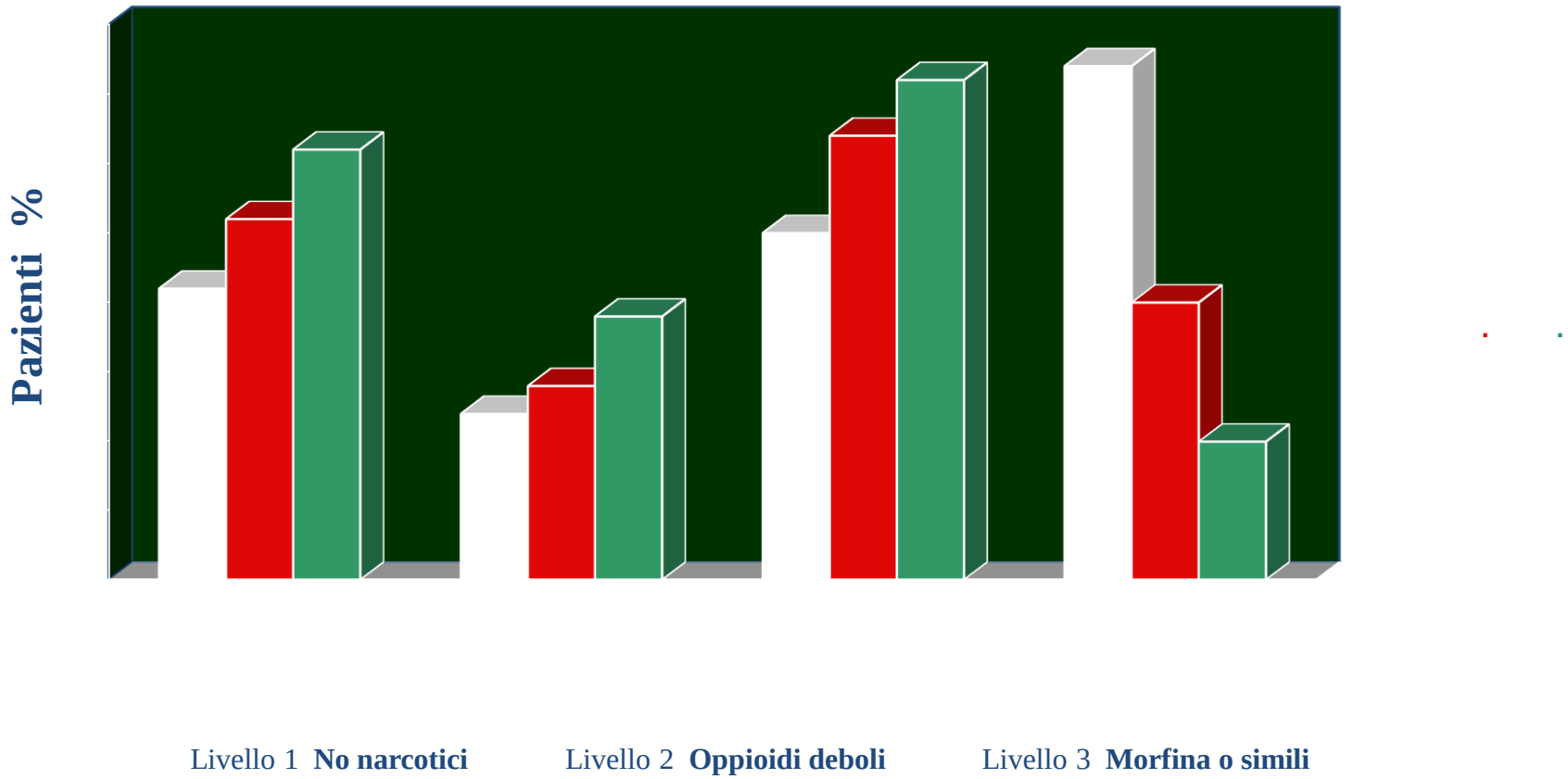
* These health professionals have assumed responsibility for ensuring the completion of the assessments.

CONCLUSIONS

"multidisciplinary cooperation is an important prerequisite to establishing high-quality assessments aimed at improving the quality of care."

PLOS ONE | DOI:10.1371, April 13, 2015

Trattamento farmacologico del dolore in pazienti con tumore



Bernabei et al. JAMA 1998; 279: 1877-1882

INTERRAI-HC INTEGRATED CARE AND HOSPITALIZATION

Hospital admissions during the 12 months before and after home care implementation

	Pre-intervention	Post-intervention	P
No. of persons admitted at least once (%)	536 (44.5)	317 (26.3)	<0.001
Total no. of hospital days	15490	6417	0.001
No. of hospital days (mean ± SD)			
Per user	28.9 ± 24.8	20.8 ± 22.1	<0.001
Per admission	17.7 ± 15.1	12.8 ± 11.7	<0.001

J Clin Epidemiol 2001; 54: 968–970

Incidence Of Reported Cerebrovascular Events In Placebo-controlled, Dementia Trials In Elderly Patients Taking Risperidone

	RISPERIDONE	PLACEBO
Study	pts w/events	pts w/events
AUS-5	9% (15/167)	2% (3/170)
INT-24	8% (9/115)	2% (2/114)
USA-63	1% (5/462)	1% (2/163)
BEL-14	0% (0/20)	0% (0/19)
Total	4% (29/764)	2% (7/466)

Risperidone **used** within the approved dosage range, for 4 to 12 weeks

J Clin Psychiatry. 2005 Sep;66:1090-6

interRAI suite

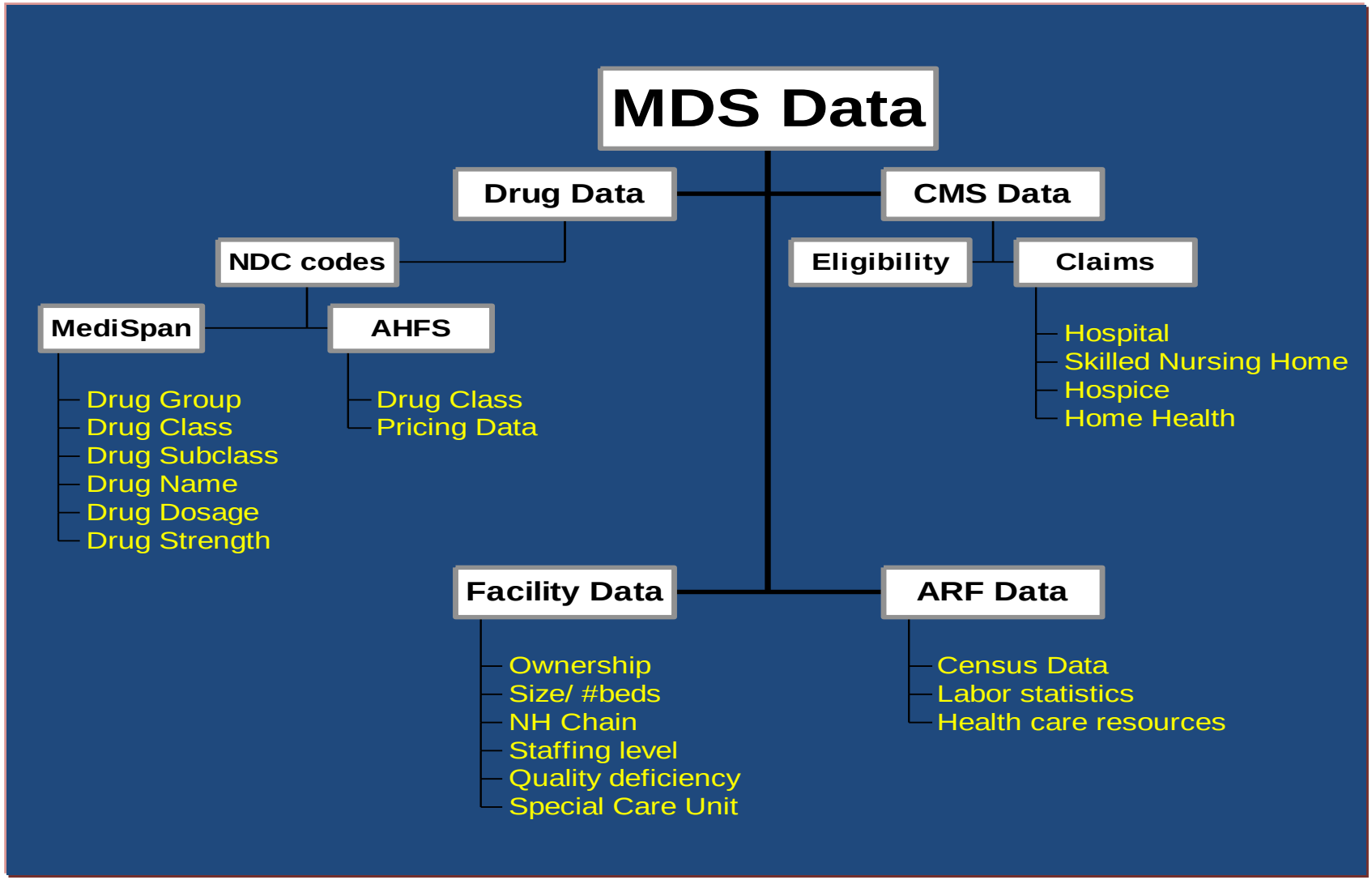
Patient level → Make the physical exam complete

Better care plan

Population level → Database

- Prognostic factors
- Outcome measurements
- Quality control indicators
- Comparisons

The SAGE database



Numbers of the SAGE database

- Longitudinal (1992-2001)
- Nearly 2.000.000 pts
- Mean age: 83 yrs (8% 95+ yrs old)
- About 5 million interRAI LTCF assessments
- About 50 million of drug records

Geriatric Assessment Technology:

The State of the Art

L.Z. Rubenstein
D. Wieland
R.Bernabei

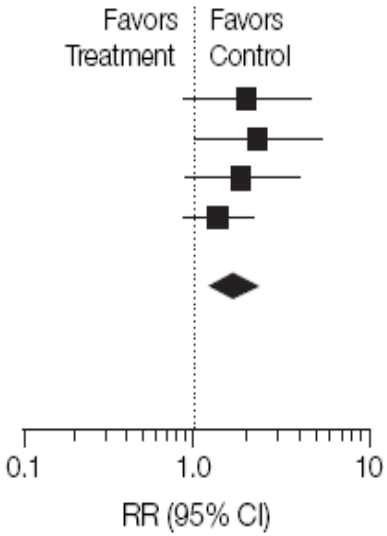
Risk of Death With Atypical Antipsychotic Drug Treatment for Dementia

Meta-analysis of Randomized Placebo-Controlled Trials

Drug	Death: Treatment, No. of Events/ Total No.	Death: Placebo, No. of Events/ Total No.	RR (95% CI) (Random-Effects Model)
Aripiprazole	21/95	6/54	1.99 (0.86-4.62)
Olanzapine	31/217	6/97	2.31 (1.00-5.35)
Quetiapine	21/58	7/36	1.86 (0.88-3.93)
Risperidone	45/201	22/133	1.35 (0.85-2.14)
Overall	118/571	41/320	1.65 (1.19-2.29)

Test for Heterogeneity $\chi^2_3 = 1.63$, $I^2 = 0\%$ ($P = .65$)

Test for Overall Effect $z = 3.01$ ($P = .003$)



Schneider LS et al. JAMA 2005; 294:1934-43

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Risk of Death in Elderly Users of Conventional vs. Atypical Antipsychotic Medications

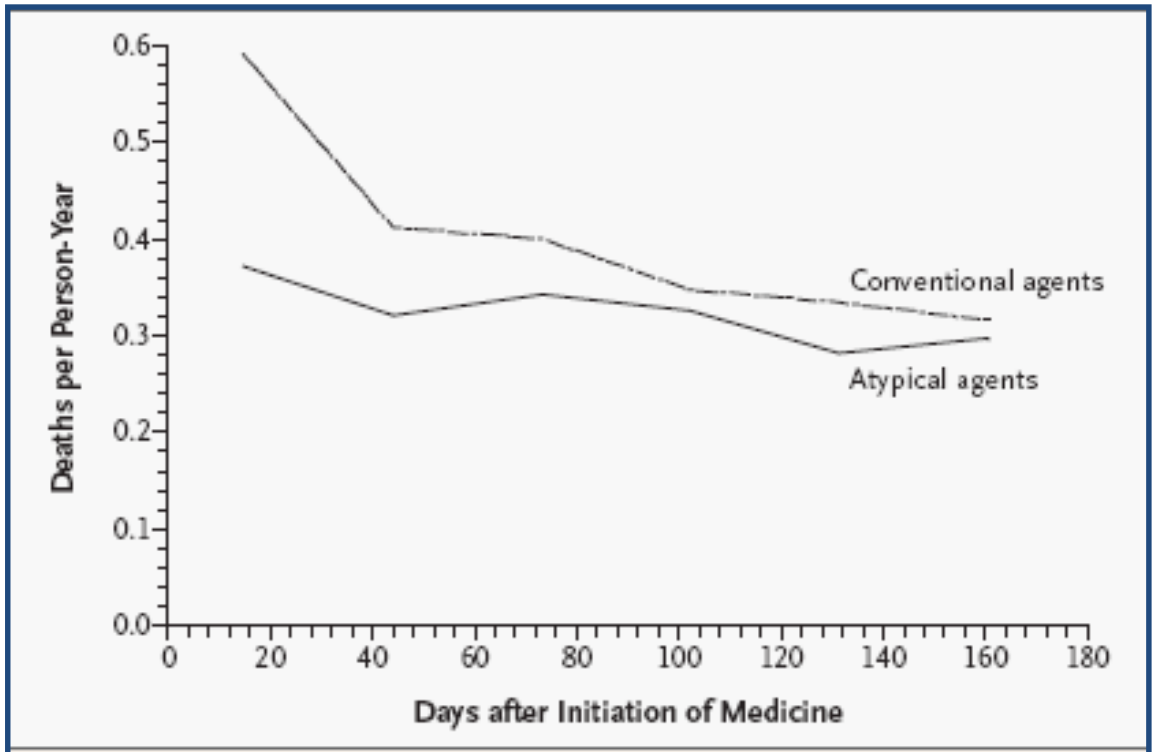


Figure 1. Rates of Death after the Initiation of Conventional and Atypical Antipsychotic Medications.

The rate of death before 10 days was not calculated, owing to insufficient data.

Wang et al., NEJM 2005; 353:2335-41.

Convenzionali vs. atipici

Adj . HR (95% CI)

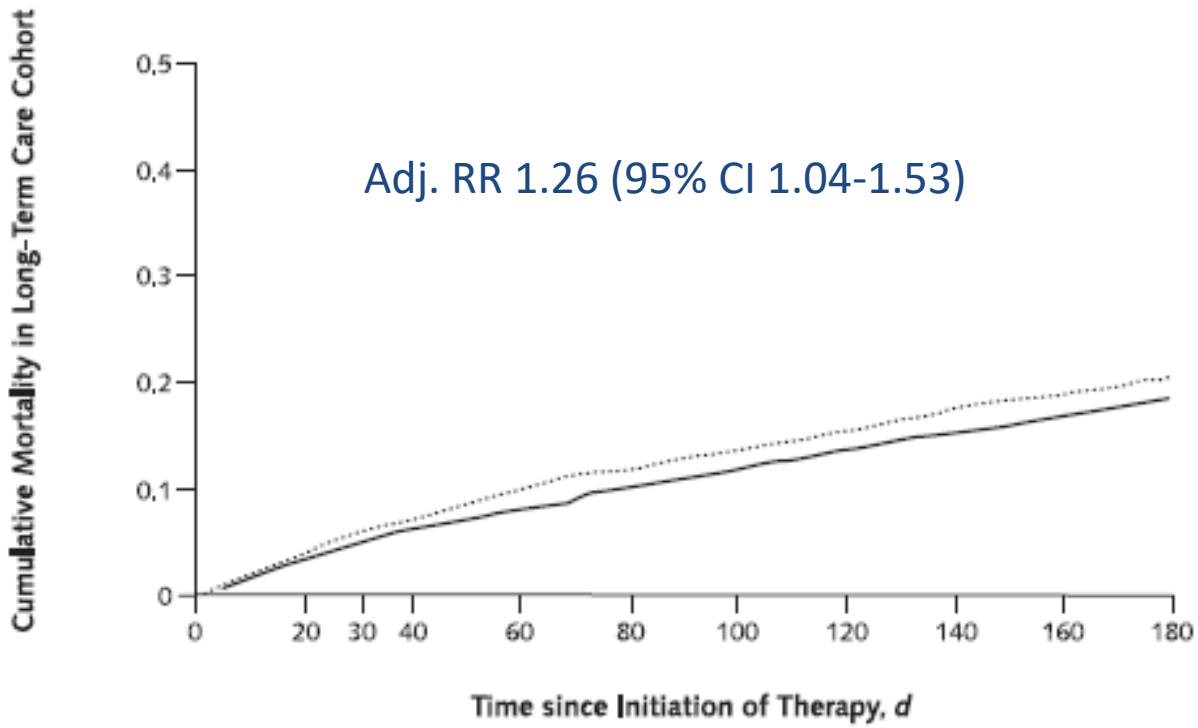
1.37 (1.27-1.49)

n=22,890

Annals of Internal Medicine | ARTICLE

Antipsychotic Drug Use and Mortality in Older Adults with Dementia

Sudeep S. Gill, MD, MSc; Susan E. Bronskill, PhD; Sharon-Lise T. Normand, PhD; Geoffrey M. Anderson, MD, PhD; Kathy Sykora, MSc; Kelvin Lam, MSc; Chaim M. Bell, MD, PhD; Philip E. Lee, MD; Hadas D. Fischer, MD; Nathan Herrmann, MD; Jerry H. Gurwitz, MD; and Paula A. Rochon, MD, MPH



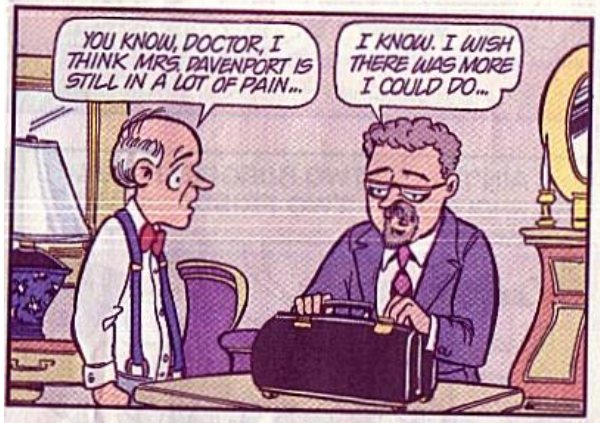
Patients at risk, *n*					
Atypical antipsychotic users	7235	5327	3873	3158	1861
Conventional antipsychotic users	7235	4419	2557	1841	932

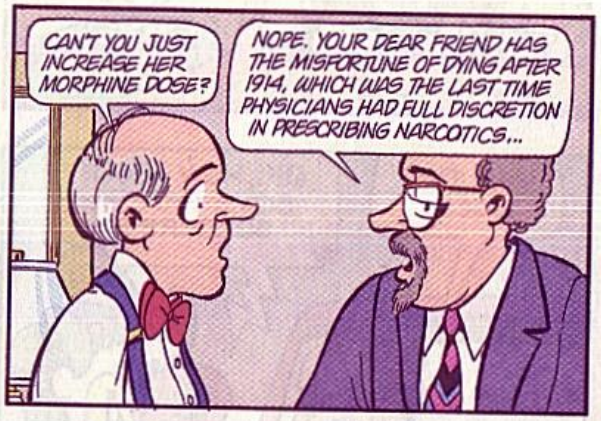
JULY 26, 1998

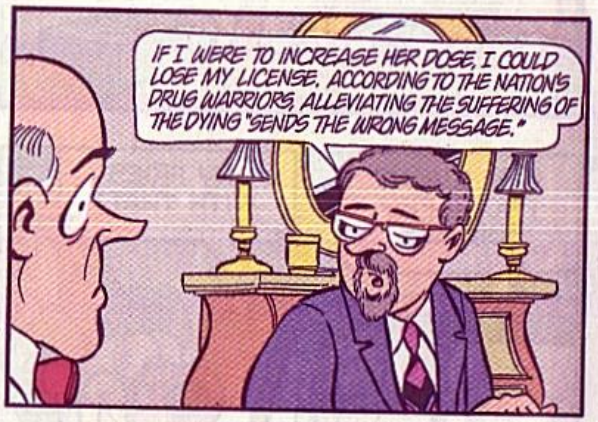
Boston Sunday Globe

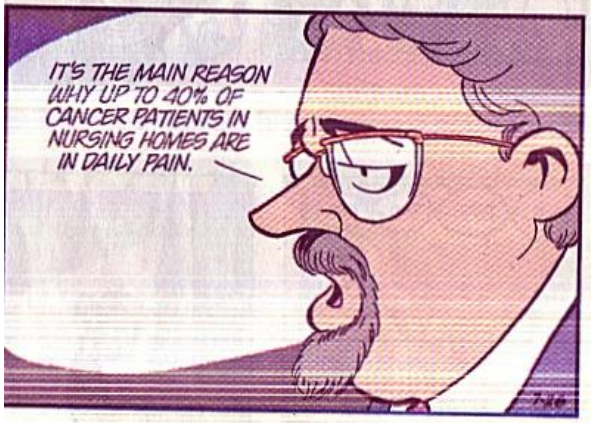
NEW ENGLAND'S LARGEST NEWSPAPER

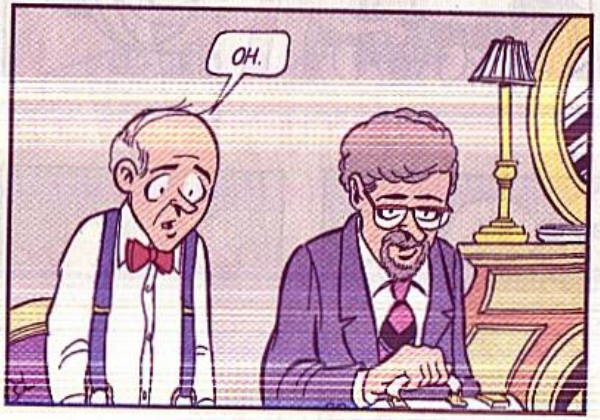
DOONESBURY by Garry Trudeau

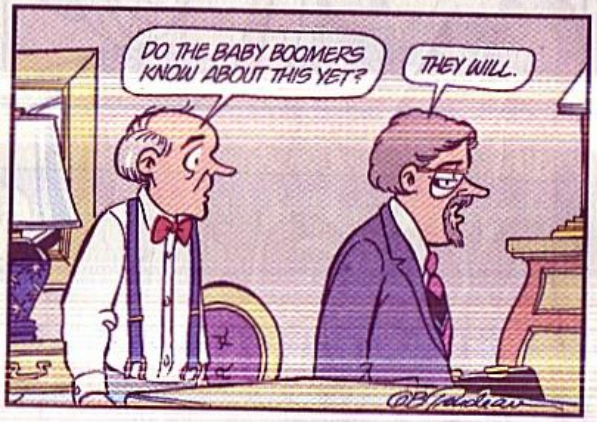




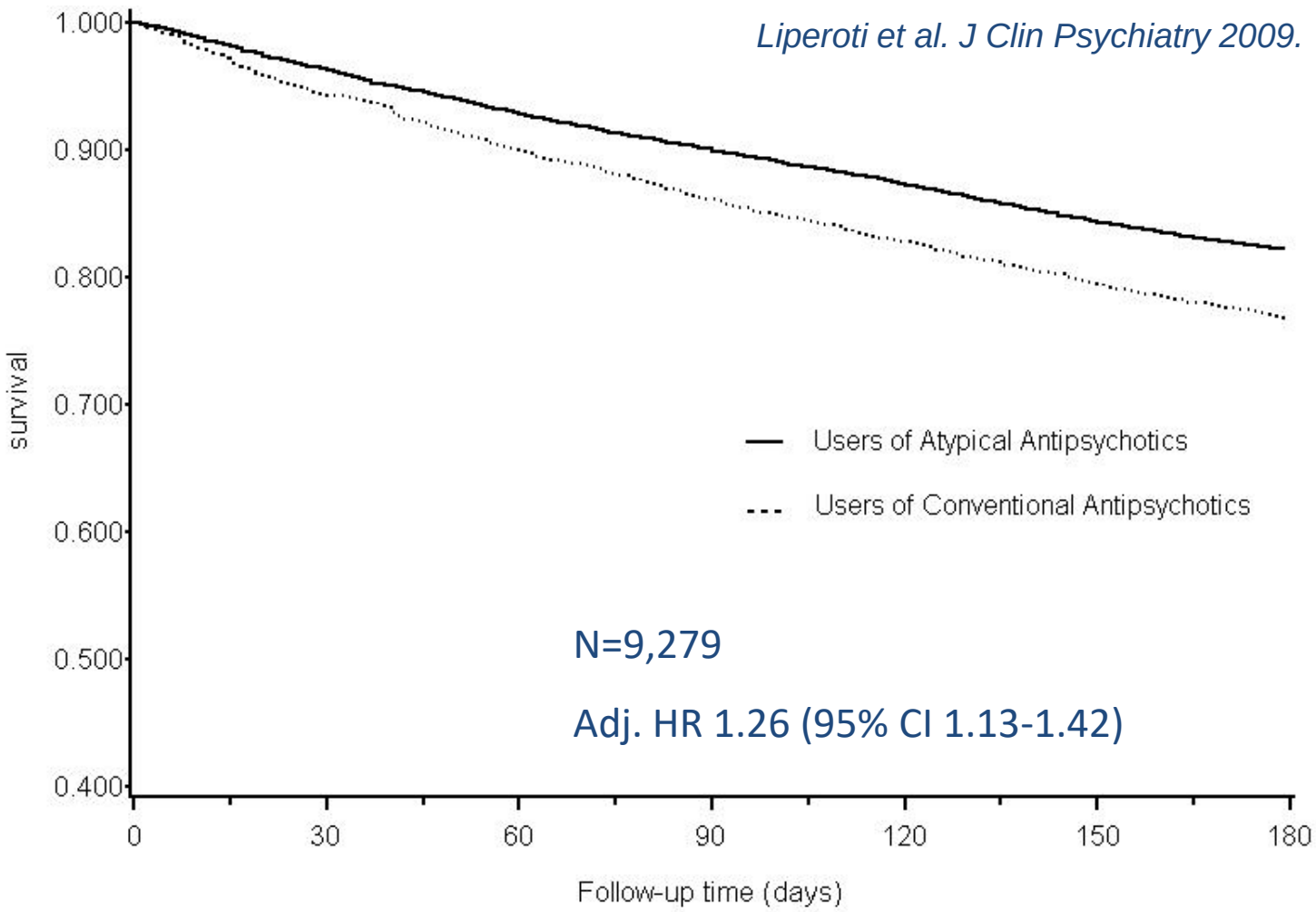








All-Cause Mortality Associated With Atypical and Conventional Antipsychotics Among Nursing Home Residents With Dementia: A Retrospective Cohort Study



U.S. Food and Drug Administration

Information on Antipsychotics

Audience: *Neuropsychiatric and geriatrics healthcare professionals*

[Posted 06/16/2008] FDA notified healthcare professionals that **both conventional and atypical antipsychotics** are associated with an **increased risk of mortality in elderly patients treated for dementia-related psychosis.** In April 2005, FDA notified healthcare professionals that patients with dementia-related psychosis treated with atypical antipsychotic drugs are at an increased risk of death. Since issuing that notification, **FDA has reviewed additional information that indicates the risk is also associated with conventional antipsychotics.** Antipsychotics are not indicated for the treatment of dementia-related psychosis. The prescribing information for all antipsychotic drugs will now include the same information about this risk in a BOXED WARNING and the WARNINGS section.

COMPREHENSIVE GERIATRC ASSESSMENT (CGA) OUTCOMES

- Meta-analysis of randomised controlled trials in hospitalized or comunity elderly patients.: mortality reduction and quality of life improvement.
- Semeiotics of a geriatric patient: hystory + physical examination + CGA.
- Health service organisation.

Steps for Enhancing CER's Applicability to Patients with Multiple Chronic Conditions.

Include heterogeneous populations with multiple chronic conditions in sufficient numbers to measure benefits and harms of interventions.

Develop and implement risk-stratification models and report harms and benefits according to risk strata.

Examine universal health outcomes that are relevant across diseases (e.g., function, symptom burden, activity, survival, active life expectancy).

Account for health transitions over time.

Employ analytical methods that account for biases such as confounding by indication (i.e., the indication for treatment is related to the risk of the outcome; those with greater disease severity are more likely to receive a treatment and more likely to have bad outcomes regardless of treatment).

Evaluate longer-term changes in benefits and harms of treatments as patients age and acquire additional conditions.

Compare usual care or disease-guideline–driven care with

- single interventions that affect multiple conditions.
- innovative models of care.

Evaluate disease pairs, especially those with potential for therapeutic competition (i.e., treatment of one disease may exacerbate a coexisting disease).

CER= comparative effectiveness research

NEJM 2011; 364: 2478-81

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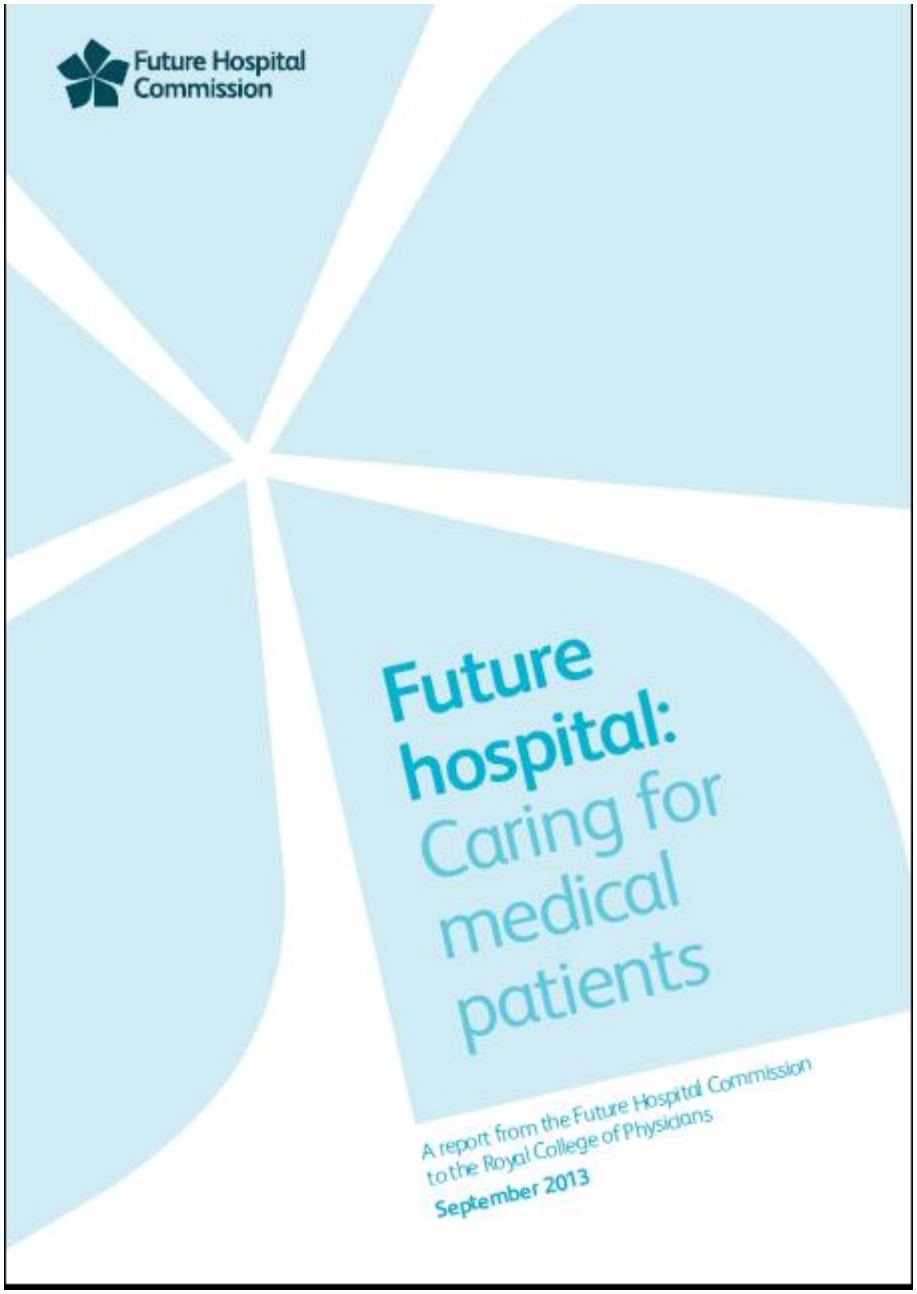
NEJM 2011; 364: 2478-81

Comprehensive geriatric assessment

Geriatricians have a unique role as the only specialty with a focus on acute illness and rehabilitation of frail older people. The evidence-based application of comprehensive geriatric assessment (CGA) is central to this specialist practice. There is strong evidence for specialist units (eg wards) for the post-acute optimisation of patients' recovery, using a multidisciplinary CGA approach. There is no established 'best model' to bring multidisciplinary CGA expertise to all patients who need it at the 'front door' and onwards in the acute hospital medical service, but the key components are:

- **> assessment to target individuals into community-based services in lieu of hospital admission**
- **> age-attuning acute medical admission units, with both the environment and processes of care**
- **> early recognition and response to geriatric syndromes: delirium, falls, immobility, functional loss**
- **> proactive identification of suitable patients for rapid follow-up in specialist clinics**
- **> end-of-life care is a core medical skill but geriatricians can be expected to provide expert support**
- **> multidisciplinary rehabilitation and expert discharge planning for patients with complex needs**



Slowly, almost imperceptibly, the numbers of patients coming through the doors have kept rising year on year, a cumulative rise of 37% over 10 years, and they are older and have more comorbidities. Physicians noticed, and struggled, and coped with these gradual increases in the number and complexity of emergency admissions by reducing the length of stay in hospital. But we can no longer do that. Our patients deserve better than the care we can now deliver under current pressures.....

acute care is only one part of a hospital, but vital nevertheless, and we need all parts of the health and social care system to work together to deliver sustainable change, whether working in surgery, obstetrics and gynaecology, general practice or social care...

SHELTER STUDY: DUAL SENSORY IMPAIRMENT VS COGNITIVE DECLINE OR BEHAVIORAL SYMPTOMS

COGNITIVE DECLINE 1 YEAR OBSERVATION

		One Year Changes in CPS†(95% CI)	
Status	*n**	Model 1	Model 2
No impairment + engagement	2769	0.50 (0.42: 0.58)	0.50 (0.42: 0.58)
Single impairment + engagement	798	0.50 (0.38: 0.63)	0.51 (0.38: 0.64)
DSI + engagement	210	0.75 (0.44: 1.06)	0.75 (0.44: 1.06)
No impairment + no engagement	552	0.80 (0.58: 1.02)	0.80 (0.57: 1.02)
Single impairment + no engagement	238	1.19 (0.82: 1.57)	1.21 (0.83: 1.59)
DSI + no engagement	88	1.87 (1.24: 2.51)	1.87 (1.23: 2.51)

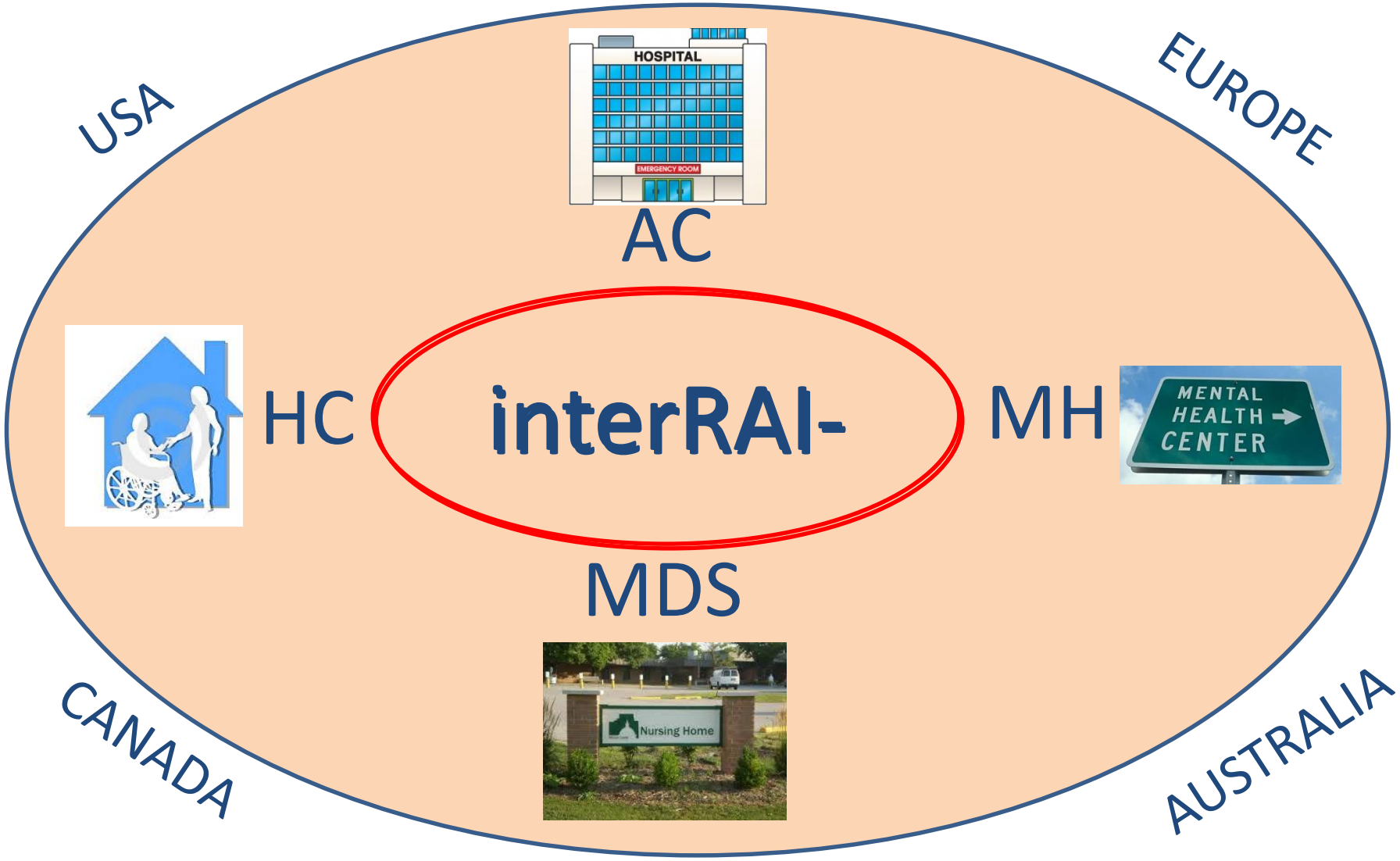
J Gerontol A Biol Sci Med Sci. 2015 Apr 13. pii: glv036

BEHAVIORAL SYMPTOMS 1 YEAR OSERVATION

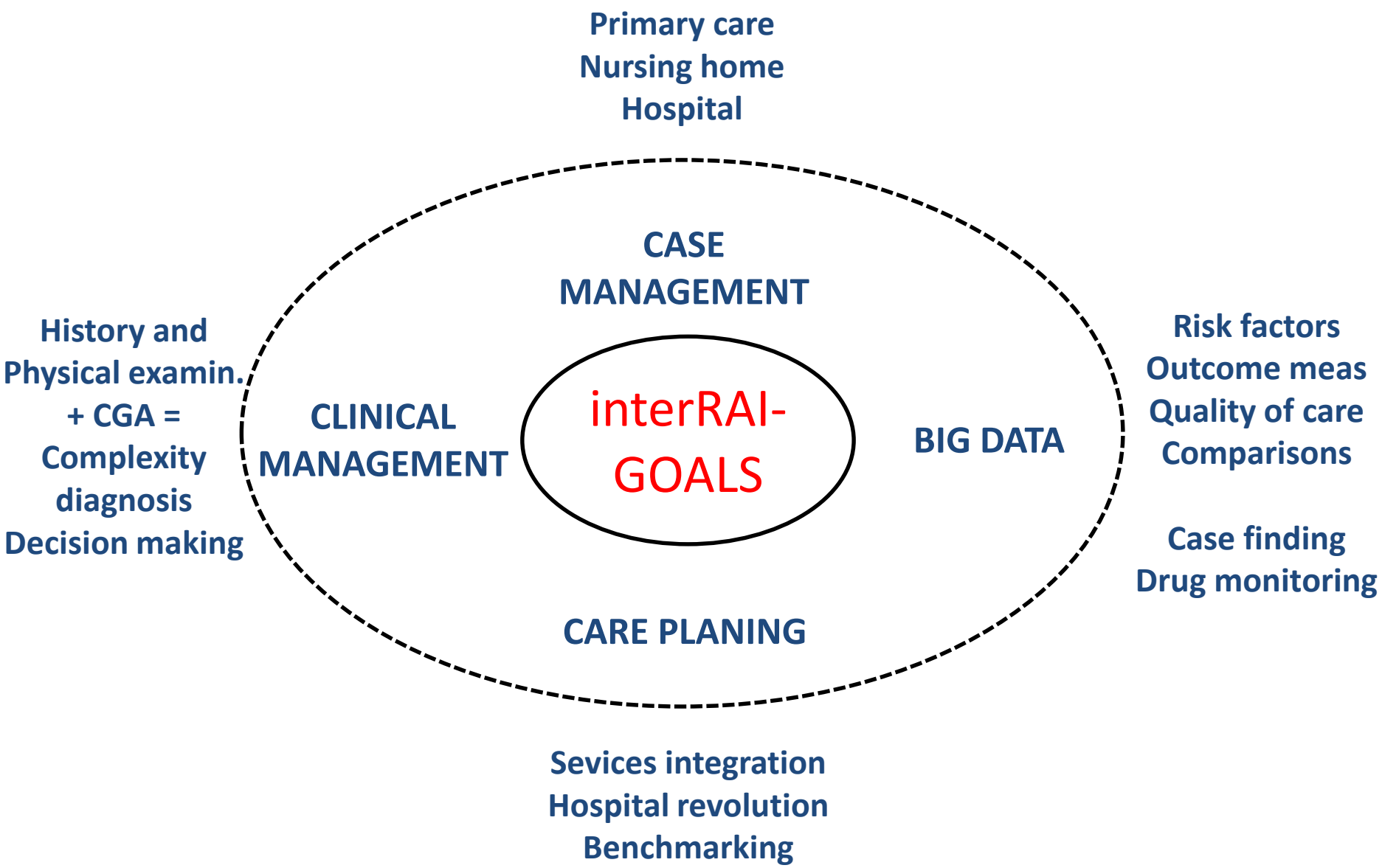
Baseline Sensory Impairment	Cases	Model 1* OR (95% CI)	Model 2† OR (95% CI)
No impairment	54	1.00 (reference)	1.00 (reference)
Single impairment	59	1.40 (1.01–1.96)	1.42 (1.01–2.00)
Mild DSI	20	2.09 (1.29–3.37)	2.12 (1.29–3.48)
Moderate DSI	24	2.54 (1.61–3.99)	2.64 (1.66–4.21)
Severe DSI	13	2.13 (1.22–3.73)	2.13 (1.20–3.83)

J Am Med Dir Assoc. 2015;16: 329-33

The interRAI suite and continuity of care

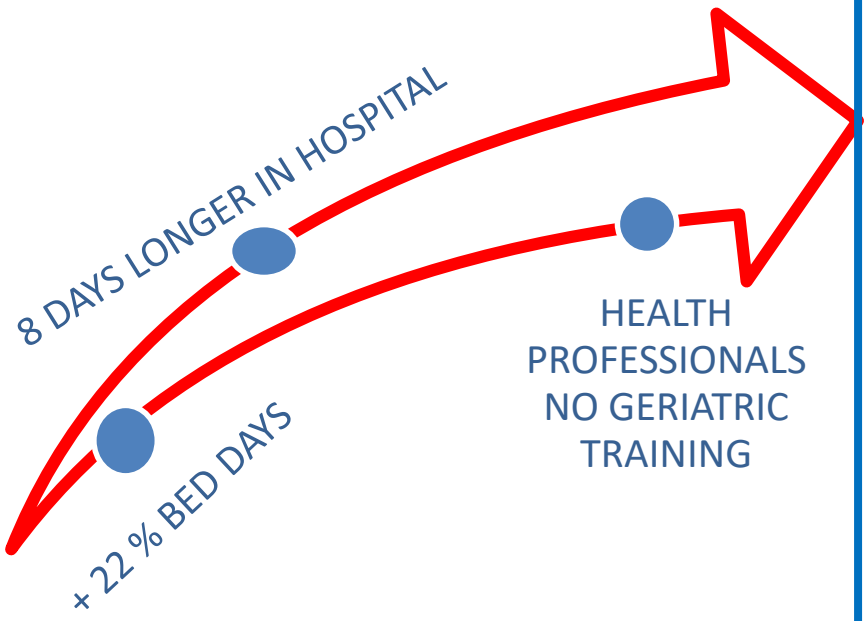


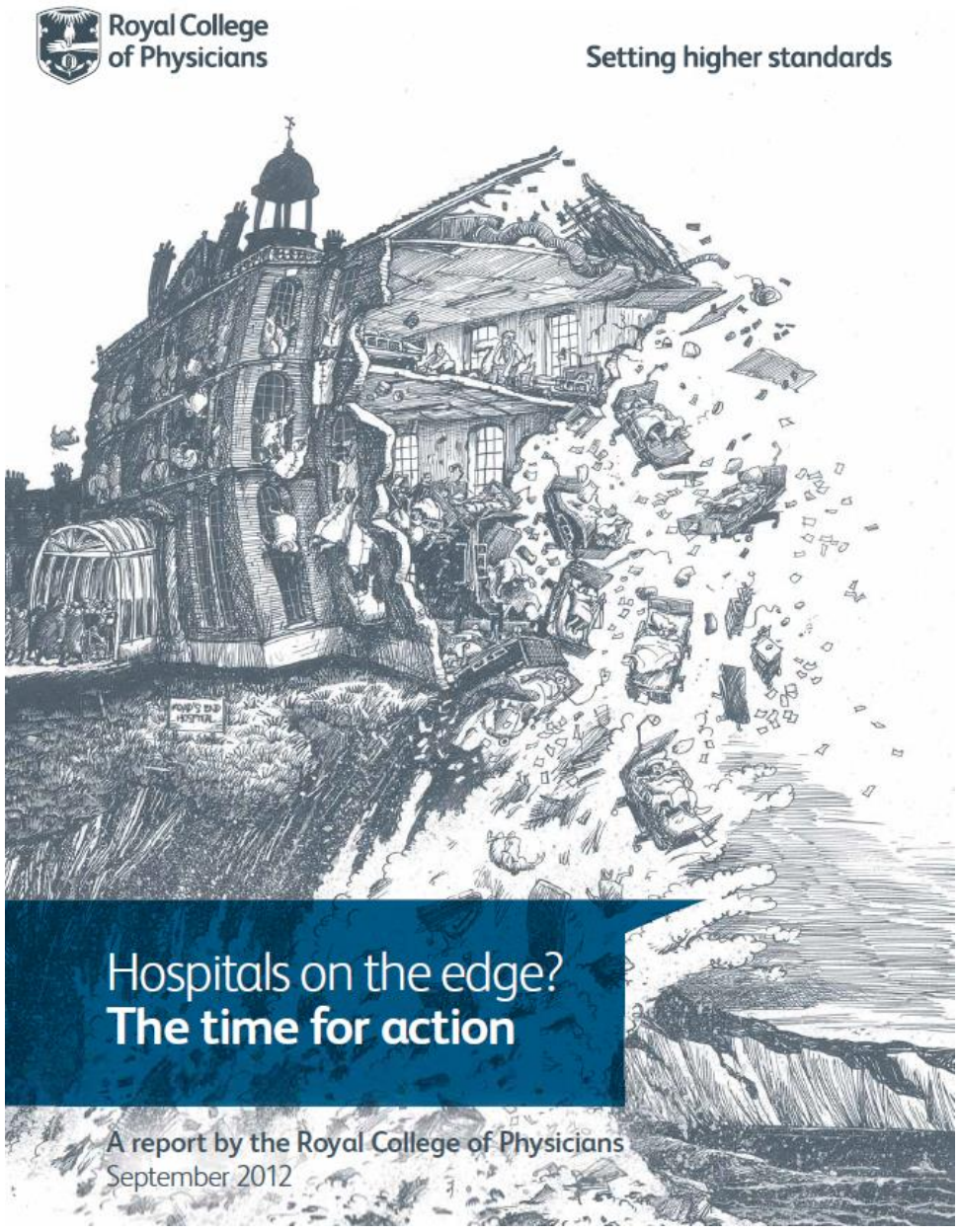
CGA and the interRAI suite



CHANGING PATIENTS, CHANGING NEEDS

PATIENTS OVER 80: OVER THE PAST 10 YEARS





For patients with acute conditions that affect a single organ or are confined to a single medical specialty, the opportunity to intervene effectively and safely has never been greater. However, it is older patients with multiple comorbidities who make up a growing proportion of emergency medical admissions and presentations.

Increased and early specialisation among medical staff in training, a national focus on improving outcomes in very specific clinical arenas (eg stroke, heart attacks) and process-driven targets (eg to reduce waiting times) has, in many hospitals, led to the fragmentation of hospital activity and services. This propagates waste and, most importantly, compromises the delivery of coordinated care to patients.

.. management of patients with multiple comorbidities. The challenge is to ensure that *all patients, including those with multiple and complex conditions, receive the* benefits brought about by advances across the medical specialties. This means developing models of care and a cohort of healthcare professionals focused on providing early expert holistic assessment and management of health and care needs for this group of patients... hospitals not only must bring together the skills of staff, supported by equipment and technology, but also need a system of process control to ensure that they function as organisations made up of genuinely interconnected and coordinated activities.

Short Physical Performance Battery (SPPB)

1. Repeated Chair Stands

Time: _____sec (if five stands are completed)

Number of Stands Completed: 1 2 3 4 5

Chair Stand Ordinal Score: _____
0 = unable
1 = > 16.7 sec
2 = 16.6-13.7 sec
3 = 13.6-11.2 sec
4 = < 11.1 sec

2. Balance Testing

a. Semitandem Stand

Circle one number

2. Held for 10 sec
1. Held for less than 10 sec; number of seconds held _____
0. Not attempted

b. Side-by-Side stand

Grading

2. Held of 10 sec
1. Held for less than 10 sec; number of seconds held_____
0. Not attempted

c. Tandem Stand

Grading

2. Held of 10 sec
1. Held for less than 10 sec; number of seconds held_____
0. Not attempted

Balance Ordinal Score: _____

0 = side by side 0-9 sec or unable
1 = side by side 10, <10 sec semitandem
2 = semitandem 10 sec, tandem 0-2 sec
3 = semitandem 10 sec, tandem 3-9 sec
4 = tandem 10 sec

3. 8' Walk (2.44 meters)

Time: _____ sec

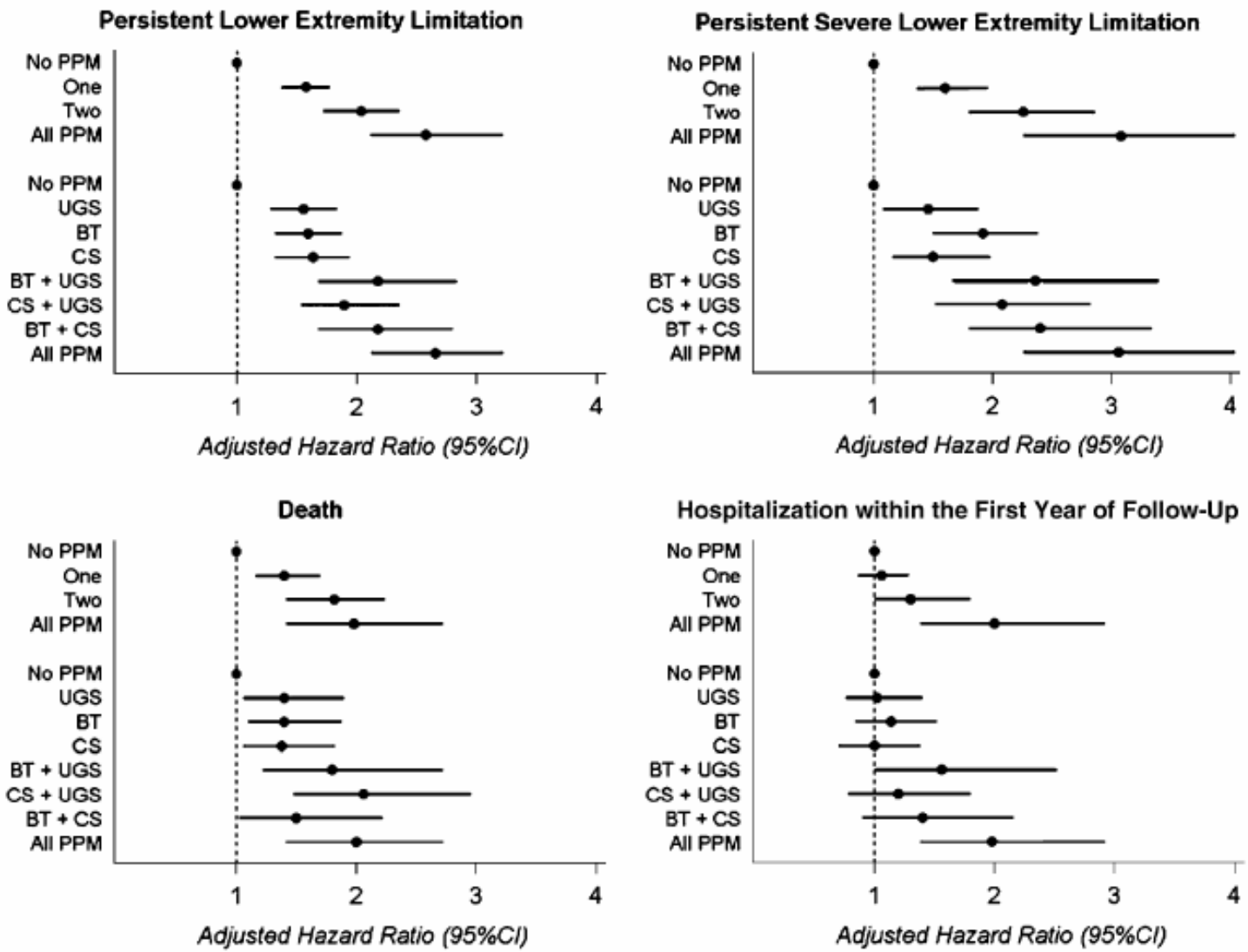
Gait Ordinal Score: _____
0 = could not do
1 = >5.7 sec (<0.43 m/sec)
2 = 4.1-6.5 sec (0.44-0.60 m/sec)
3 = 3.2-4.0 (0.61-0.77 m/sec)
4 = <3.1 sec (>0.78 m/sec)

Summary Ordinal Score: _____

Range: 0 (worst performance) to 12 (best performance). Shown to have predictive validity showing a gradient of risk for mortality, nursing home admission, and disability.

Guralnik JM J Gerontol. 1994

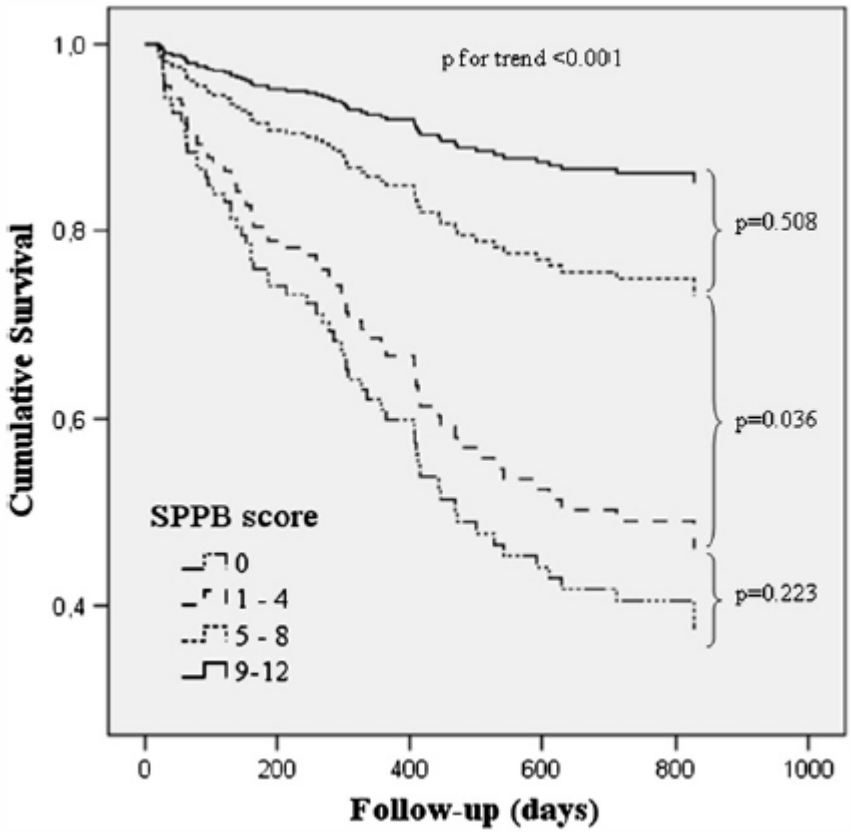
Added Value of Physical Performance Measures in Predicting Adverse Health-Related Events.



PPM = Physical Performance Measures; UGS = usual gait speed; BT = balance test; CS = chair stand test

J Am Geriatr Soc 57:251–259, 2009

Lower Extremity Performance Measures Predict Long-Term Prognosis in Older Patients Hospitalized for Heart Failure



Survival of 157 heart failure patients by Short Physical Performance Battery (SPPB) score quartiles. P values to the right of the survival curves are calculated from binary contrasts across adjacent quartiles from a multivariable Cox regression model, adjusted for age, gender, study site, New York Heart Association class, comorbidity, pharmacological therapy, and functional status before hospitalization.

Journal of Cardiac Failure Vol. 16 No. 5 2010

Care of the older patient with frailty: optimal assessment in hospital

Older patients with frailty who come to hospital as medical emergencies frequently have complex needs which can lead to an atypical presentation. Optimally, a comprehensive geriatric assessment (CGA) should be performed on arrival . This permits the development of a multifaceted therapeutic plan to enhance recovery and promote independence. One model of CGA involves admission to a specialist geriatric ward where assessment, acute care and rehabilitation are managed by a specialist team.

There are significant workforce implications for the expanded use of CGA. Many more geriatricians would be needed to see all these patients on the acute medical unit (AMU), which would mean embedding members of the geriatric multidisciplinary team (therapists, specialist nurses) to be available over extended 12-hour shifts

Crude, adjusted Hazard ratios and 95% confidence intervals of being hospitalized for VTE among antipsychotic users (ref. cat. non users of antipsychotics)

	Crude HR	Adj. HR	95% CI
Risperidone	1.52	1.98	1.40-2.78
Olanzapine	1.54	1.87	1.06-3.27
Clozapine/Quetiapine	2.08	2.68	1.15-6.28
Phenothiazines	0.95	1.03	0.60-1.77
Other Conventionals	0.91	0.98	0.52-1.87
Multiple antipsychotics	3.42	4.80.82	2.28-10.10

Liperoti et al. Arch Int Med 2005

IMPROVE MEASUREMENT, MONITORING AND UNDERSTANDING

- What are the current patterns of Healthy Ageing and are they changing over time?
- What are the determinants of Healthy Ageing? Are inequalities increasing or narrowing?
- Which interventions work to foster Ageing?
- In which population subgroups do they work?
- What is the appropriate timing and sequencing of these interventions to maintain and increase intrinsic capacity and functional ability?

IMPROVE MEASUREMENT, MONITORING AND UNDERSTANDING

- Agree on metrics, measures and analytical approaches for healthy ageing;
- Improve understanding of the health status and needs of older populations and how well their needs are being met;
- Increase understanding of trajectories and what can be done to improve them.

Improve understanding of the health status and needs of older populations and how well their needs are being met

- Establishing regular population surveys of older people that can refect in detail the functional ability; intrinsic capacity; specifc health states; need for health care or long- term care or broader environmental changes, and whether these needs are being met;
- Mapping trends in intrinsic capacity and functional ability in different birth cohorts and determining whether increas ing life expectancy is associated with added years of health;
- Identifying indicators and mechanisms for the continuous surveillance of Healthy Ageing trajectories.

INCREASE UNDERSTANDING OF TRAJECTORIES AND WHAT CAN BE DONE TO IMPROVE THEM.

- Identifying the range and types of trajectories of intrinsic capacity and functional ability, and their determinants in diferent populations;
- Quantifying the impact of health care, long-term care and environmental interventions on trajectories of Healthy Ageing, and identifying the pathways through which they operate;
- Better quantifying the economic contribution of older people and the costs of providing the services they require, and developing rigorous, valid and comparable ways of analysing returns on investments.

The Example of Heart Failure

	ACE-i Metanalysis Pts 12763	ACE-i vs AR-AT1 ELITE II Pts 3150	AR-AT1 VAL-HeFT Pts 5011	ß-block. Metanalysis Pts 9711	Anti-Aldost. RALES Pts 822	Digoxin DIG Pts 3397	Anti Aldost. TOPCAT Pts 3445
Age	**61**±11	**71**±7	**67**±10	**61**±10	**65**±12	**63**±11	**68**
Males (%)	81%	70%	71%	73%	73%	78%	48%
NYHA III-IV	no IV	48%	40% (III)	46%	95%	33%	34%
Comorbidity	**no**	**no**	**no**	**no**	**no**	**no**	**no**
Disability	**no**	**no**	**no**	**no**	**no**	**no**	**no**

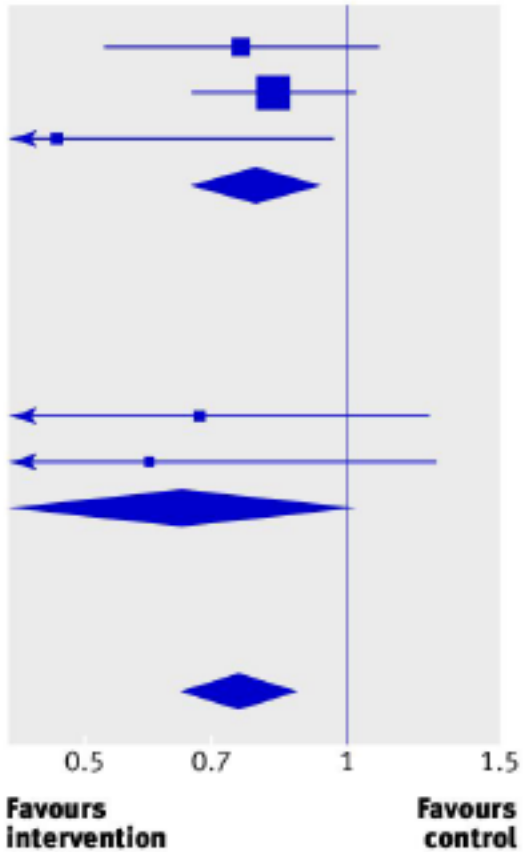
EBM and Geriatrics

- ✓ Frail elderly are systematically excluded from RCTs
- ✓ Those included are "superfit", "young-old" randomized patients
- ✓ A new form of EBM is in place

EVIDENCE BIASED MEDICINE

CGA for older adults admitted to hospital: meta-analysis of RCTs

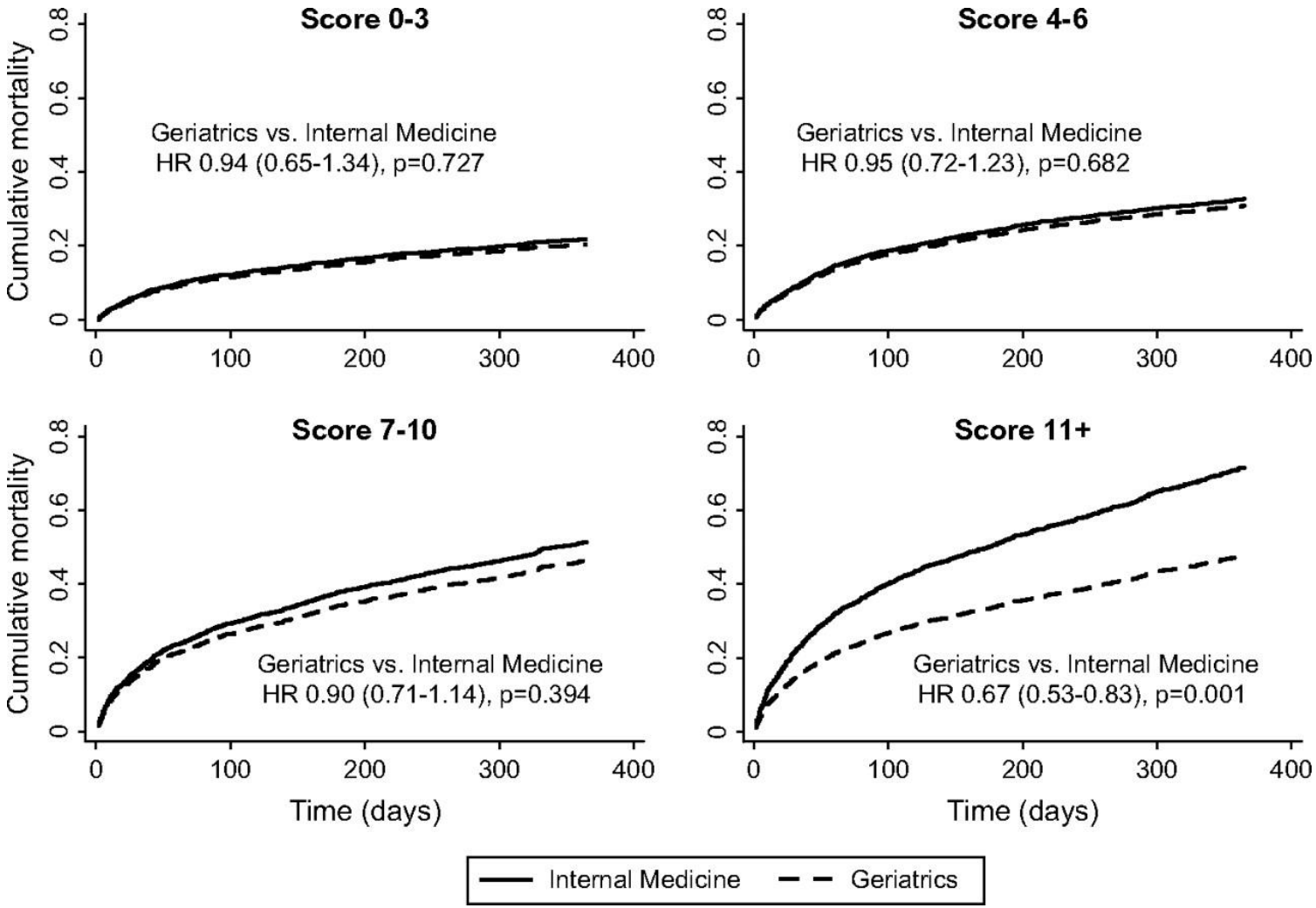
	No of events/total				
	Comprehensive geriatric assessment	Control	Mantel-Haenszel fixed odds ratio (95% CI)	Weight (%)	Mantel-Haenszel fixed odds ratio (95% CI)
Ward					
Landefeld 1995[35]	72/327	88/324		21.5	0.76 (0.53 to 1.08)
Counsell 2000[26]	237/767	269/764		58.0	0.82 (0.66 to 1.02)
Rubenstein 1984[45]	26/63	36/60		6.7	0.47 (0.23 to 0.96)
Subtotal (95% CI)	335/1157	393/1148		86.2	0.78 (0.65 to 0.93)
Test for heterogeneity: χ^2=2.19, df=2, P=0.33, I^2=9%					
Test for overall effect: z=2.76, P=0.006					
Team					
McVey 1989[38]	32/93	40/92		8.2	0.68 (0.38 to 1.24)
Thomas 1993[51]	17/68	23/64		5.5	0.59 (0.28 to 1.26)
Subtotal (95% CI)	49/161	63/156		13.8	0.65 (0.41 to 1.03)
Test for heterogeneity: χ^2=0.08, df=1, P=0.78, I^2=0%					
Test for overall effect: z=1.84, P=0.07					
Total (95% CI)	384/1318	456/1304		100.0	0.76 (0.64 to 0.90)
Test for heterogeneity: χ^2=2.81, df=4, P=0.59, I^2=0%					
Test for overall effect: z=3.24, P=0.001					



Odds ratios for death or deterioration at the end of follow-up (median 12 months) in elderly patients according to comprehensive geriatric assessment (ward, team) after emergency admission at baseline

BMJ 2011;343:d6553

One-year survival as a function of hospital admission to an acute geriatrics or internal medicine ward, after stratification by risk of death score



J Gerontol A Biol Sci Med Sci 2009;65A:159-164