REPOSI 2013

Multimorbidity and disabilities in acutely hospitalised patients

Sophia de Rooij
s.e.derooij@amc.nl

Professor of Medicine
Academic Medical Center
University of Amsterdam

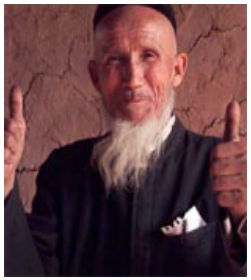
acutely hospitalised



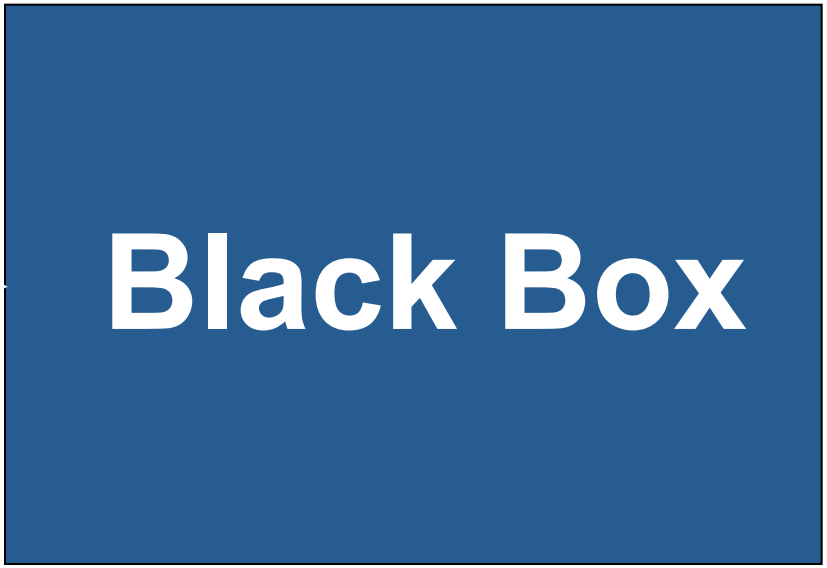












Black Box

acute hospitalisation









acute hospitalisation

who should receive a CGA


© r.de jong

what should be part of a CGA ?

- DEFENCE I

Activities of Daily Living Impairments

- 50 % develops progressively in combination with chronic disease and comorbidity
- 50 % develops acutely, with an acute clinical event and hospital admission

- 20-30 % of older patients has impairments in ADL functioning

LP Fried, J geront med sci, 2004; 59; 255-263

ADL as outcome

1. patient perspective: maintenance of functioning, **independent** living
2. community perspective: Higher health care **costs**, hospital admissions
3. important outcome in **research** in older patients

functional decline

- 30-60% of all older patients develop functional decline after hospital admission (Boyd, 2009, Covinsky 2003)
- functional decline: ADL decline
- not related to medical reason for admission

consequences

- increased Length Of Stay
- increased readmission (up to 30%)
- decreased quality of life and autonomy
- increased mortality rate
- increased institutionalisation (nursing home)
  (Fortinsky 1999, Covinskt 1997, Buurman 2012)
- increased risk for development geriatric syndromes and further decline (o.a.Inouye 2007)
- increased personal and health care costs

decline measurement

1 point decline is equal to a decline in ADL functioning ranging between 4% and 20% of patients actual level of functioning

(Buurman et al J Clin Epidemiol. 2010)

identification of increased risk for functional decline in older hospitalized patients and tailormade interventions to prevent adverse hospital outcomes

Design

DEFENCE I (n=639)

Cohort study- single center –nov 2002-2005

DEFENCE II (n=639)

Cohort study-multicenter-april 2006 - 2008

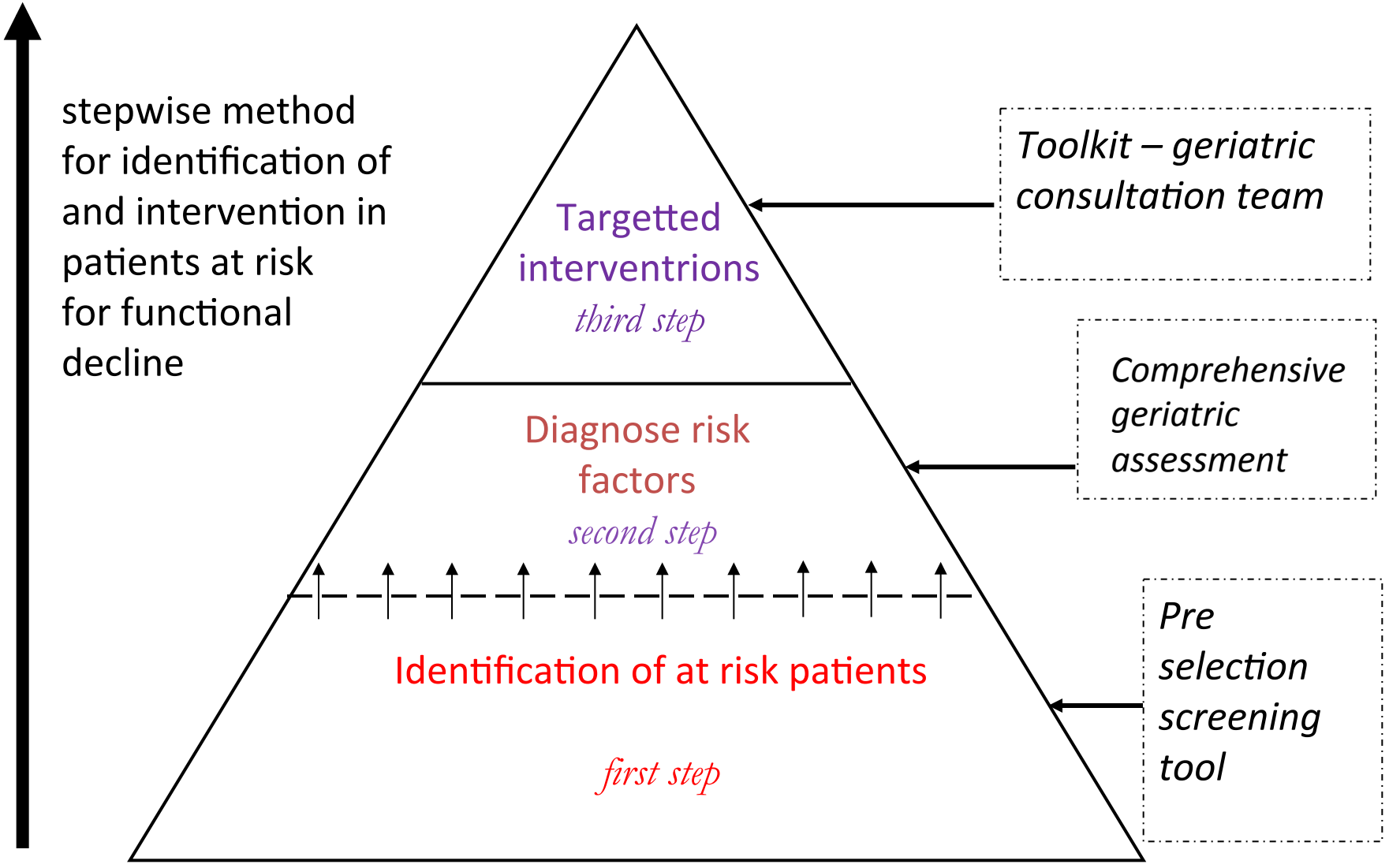
TRANSITIONAL CARE BRIDGE (n=674)

Randomised clinical trial-multicenter- jan 2010-2013

Both:

Follow up 3 and 12 months after hospital admission

DEFENCE model



www.defencestudy.nl

Methods

- Setting:
  - general internal medicine wards of (1) 2 academic and 1 general teaching hospital
- Participants
  - All consequetive patients 65 and older acutely admitted
  - Admitted for at least 48 hours
  - Written informed consent

Exclusion criteria

- too ill to participate (somnolent)
- transferred to another ward
- transferred to ICU within 48 hours after admission
- unable to speak or understand the language

Buurman et al Plos One 2011
Buurman et al. Plos One 2012
Hoogerduijn et al. A&A 2013 in press

Measurements

- baseline at admission (interview)
- follow up 3 and 12 months after admission (telephone and in TZB personal interview)

- demographics: age, sex race, living and social situation
- premorbid functional status, diseases (2 weeks before admission) and cognitive status
- all potential predictors of functional decline
  - From literature
  - Existing instruments
  - Clinical expertise

Measurement instruments

- **Katz ADL index**: 6 items (bathing, dressing, toileting, transferring, eating and use of incontinence materials (Katz 1963)
- **Lawton scale**: 8 IADL (Lawton, 1969)
- **MMSE:** cognition (Folstein, 1975)
- **SNAQ** (Short Nutritional Assessment Questionnaire) (Kruizenga, 2005)
- **Prepurse** (pressure ulcers)
- Also other measures like pain, depression, delirium polifarmacy, ICD10

Outcome

Functional decline:

a decline of **at least one point** on the Katz ADL index at three months after admission compared to premorbid functional status (Katz, 1963)

Patient Characteristics DEFENCE II

Age in years mean (SD)	**78 (88)**
Male	44%
Independent living	77%
Living alone	49%
Cognitive impaired (MMSE < 24)	34%
Functional status before admission; independent	54%
Functional status after 3 months ; independent	44%
Functional decline	35%

Prediction model: Independent predictors of functional decline

	Beta	Beta after shrinkage	P value	OR (95%CI)
Pre admission need for assistance in IADL	.52	.48	0.03	1.7 (1.1-2.6)
Use of a walking device	.87	.81	<0.01	2.4 (1.5-3.7)
Need for assistance in traveling	.61	.57	<0.01	1.8 (1.2-2.9)
No education after age 14	.45	.42	0.03	1.6 (1.0-2.3)

Identification of Seniors at Risk-Hospitalized Patients (ISAR-HP)

ISAR-HP		
	yes	no
Before hospital admission, did you need assistance in IADL (e.g. housekeepng, preparing meals, shopping etc.) on a regular base?	1	0
Do you use a walking device (e.g. cane, rollator, walking frame, crutches etc)?	**2**	0
Do you need assistance for travelling?	1	0
Did you pursue education after age 14	0	1
Total score		
Total score 0 or 1 = not at risk Toatal score ≥2 = at risk for functional decline		

validation in an independent population

- secondary analysis of DEFENCE I cohort study
- nov 2002-2005
- internal medicine patients acutely admitted to hospital

Psychometric properties

AUC in the development cohort : 0.71 (95% CI 0.66-0.76)

AUC in the validation cohort: 0.68 (95% CI 0.63-0.73)

Scorecard, cut off at 2:	Develop	Validation
• Sensitivity	87%	89%
• Specificity	39%	41%
• Positive predictive value	43%	41%
• Negative predictive value	85%	89%

risk for negative health outcomes

- not all patients are at equal risk
- depending on risk factors including geriatric conditions, present at admission
- risk status is associated with negative health outcomes
- risk status however not equal to benefitting of interventions

LP Fried, J geront med sci, 2004; 59; 255-263

geriatric conditions

- besides medical reason for hospital admission: often geriatric conditions
- defined as **frequently encountered** health problems in older patients

- associated with **negative** outcomes
- early recognition might lead to better health outcomes

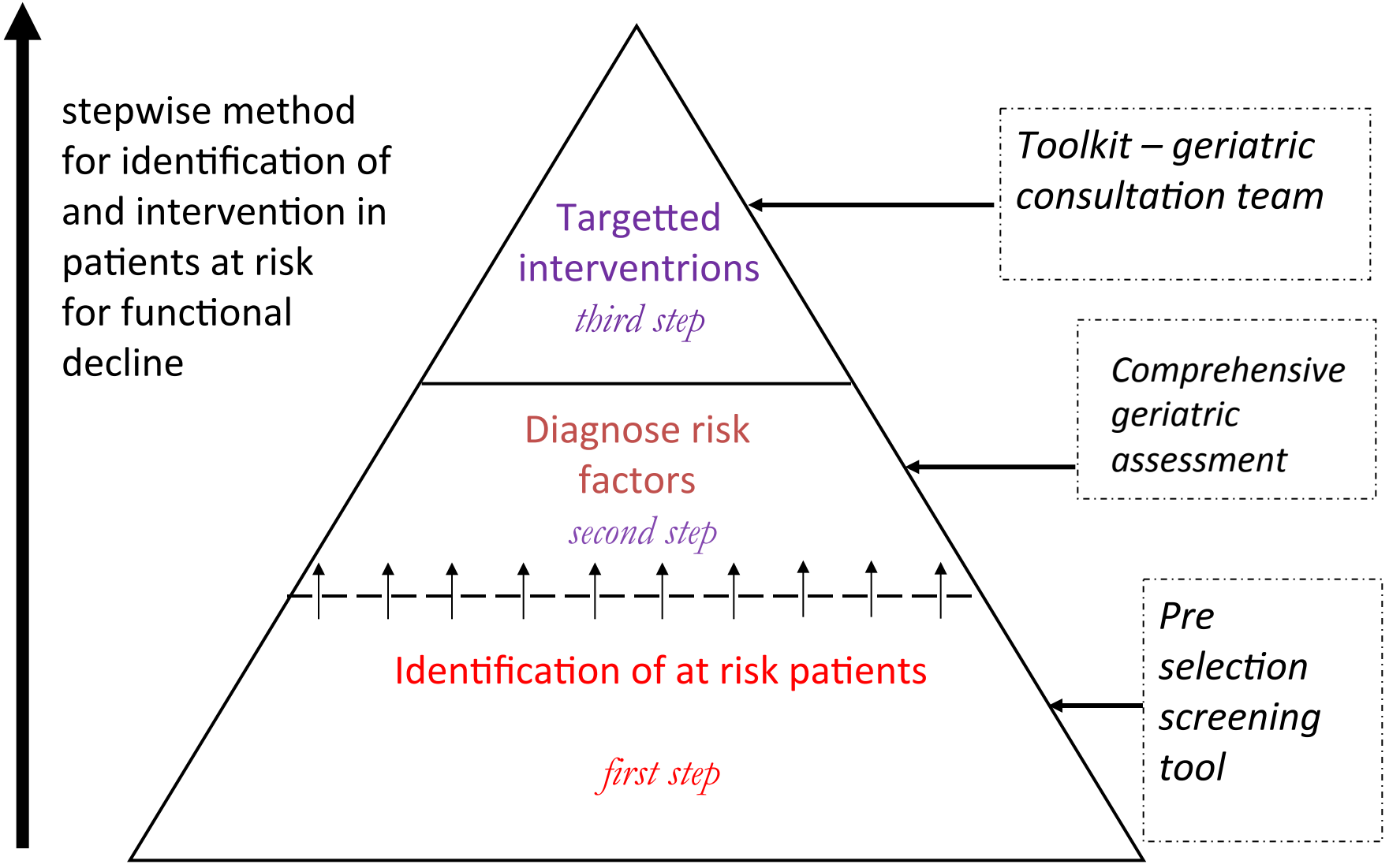
DEFENCE II

- What is the prevalence of 18 geriatric conditions in acutely hospitalized patients?
- What is the presence of multimorbidity?

- Is there a difference in prevalence of geriatric conditions in patients at low, intermediate and high risk for functional decline?

- Are there differences in outcomes in these subgroups?

DEFENCE model



www.defencestudy.nl

Methods

All hospitals had a geriatric consultation team available consisting of a Clinical Nurse Specialist in Geriatrics and a Geriatrician

Comprehensive Geriatric Assessment

- all patients were screened within 48 hours after admission
- by a clinical nurse specialist

- on four domains of functioning:

  somatic

  psychological

  functional

  social

Measurement instruments

Geriatric condition	Measurement instrument	Range of scores	Cut-off score
Somatic domain			
Polypharmacy	Counting the number of different medications ATC classification	Continuous	≥5
Malnutrition	Short Nutritional Assessment questionnaire (SNAQ) (54)	0-7	≥2 moderately malnourished ≥3 severely malnourished
Obesity	Body Mass index	Continuous	≥30
Pain *	Visual analogue scale (55)	0-10	≥4
Fall risk	Have you fallen two or more times in the past three months? (56)	Yes or no	Yes
Presence of a pressure ulcer	Observation by the research nurse	Yes or no	Yes
Indwelling urinary catheter	Observation by research nurse on the presence of a catheter at admission	Yes or no	Yes
Incontinence	Self-report of incontinence for urine or feces at admission	Yes or no	Yes
Constipation	Self-report of constipation at admission	Yes or no	Yes

Measurement instruments

Psychological domain			
Cognitive impairment	Mini-Mental State Examination (21)	0-30	≤ 24 is cognitive impairment
Depressive symptoms *	Two questions, namely: (57) 1. Did you feel sad, depressed or hopeless in the past month? 2. Did you lose interest in daily activities? When patient answered both questions with yes, the GDS-15 screening instrument was administered (58)	0-2	2
Delirium	Confusion Assessment Method (22)	0-4	Item 1 and 2 and item 3 and/or 4 are present
Functional domain			
Premorbid ADL functioning	Katz ADL index score (24)	0-6	≥1
Premorbid IADL functioning	IADL questions of the modified Katz ADL index score (59)	0-8	≥1
Vision impairment	Do you have problems with your vision, regardless of the use of glasses?	Yes or no	Yes
Hearing impairment	Do you have problems with hearing, regardless of the use of a hearing aid?	Yes or no	Yes
Mobility difficulty	Are you using a walking device?	Yes or no	Yes
Social domain			
High perceived burden of caregivers	Experienced burden of primary care givers (EDIZ) (60)	0-9	≥4

risk assessment

- with the ISAR-HP
- three risk profiles

risk of functional decline after hospitalisation

- low risk: score 0-1
- intermediate risk: score 2-3
- high risk: score 4-5

results: baseline characteristics

Variable	Total group (n=639)
Age in years, mean (SD)	78 (7.8)
Sex	
Male, % (No.)	46 (295)
Ethnicity	
Caucasian, % (No.)	93 (593)
Living arrangement	
Independent, % (No.)	72 (463)
Social status	
Living with partner or child, % (No.)	48 (306)
Education in years, mean (SD)	10 (3.9)
Main reason for admission, %, (No.)	
Infectious disease	41 (261)
Charlson comorbidity index*,mean (SD)	3.7 (2.4)

geriatric conditions

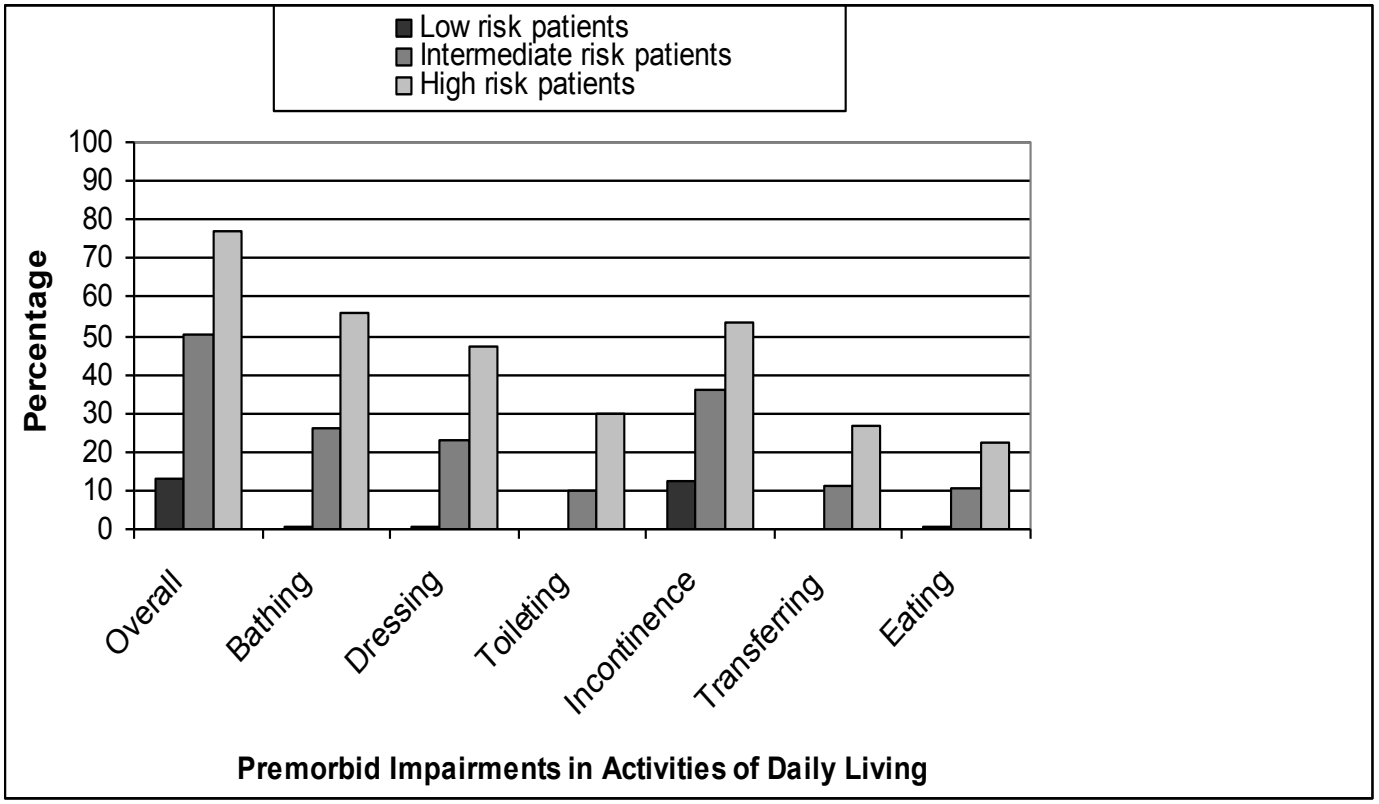
geriatric condition	Prevalence (%)
IADL-impairment	83
Polypharmacy (5 of meer)	60
Mobility difficulty	58
ADL impairment	50
Malnutrition	50
Pain	43
High burden of caregiver	42
Indwelling urinary catheter	23
Fall risk	22
Cognitive impairment (IQcode)	22
Depressive symptoms	22
Incontinence	21

risk profiles

- Low risk: 27%
- Intermediate risk: 33%
- High risk: 40 %

- Significant difference between the groups with respect to age, living arrangement, marital status

premorbid impairments in the risk groups



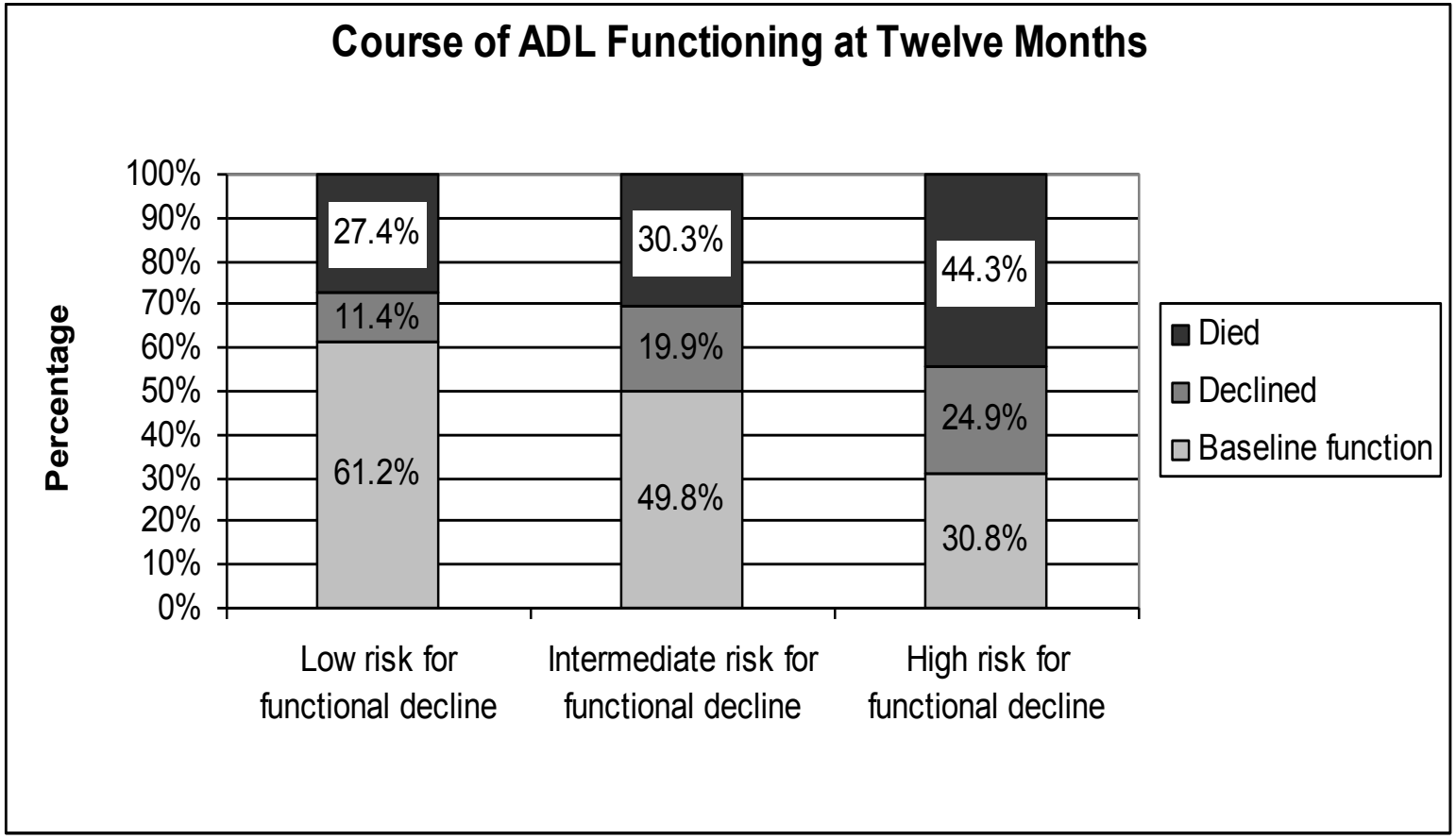
geriatric conditions

significant differences in the three subgroups in the number of geriatric conditions ($p<0.001$)

- Low risk: 3 geriatric conditions
- Intermediate risk: 6 geriatric conditions
- High risk: 7 geriatric conditions

- No differences in malnutrition, obesity, pain and constipation

outcomes


Course of ADL Functioning at Twelve Months
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
27.4%
11.4%
61.2%
30.3%
19.9%
49.8%
44.3%
24.9%
30.8%
Low risk for functional decline
Intermediate risk for functional decline
High risk for functional decline
Died
Declined
Baseline function

risk profiles

- being at risk for functional decline is not equivalent to benefit most from interventions
- expert opinion: 3 groups might be identified with different targets at hospital admission

Health council of the Netherlands, 2008

LP Fried, 2004

risk groups

- Low risk group might not benefit from specialized geriatric care
- Intermediate risk group might profit most from interventions to regain function or to prevent functional decline
- High risk group demonstrated many clinical characteristics of ‘frailty’: interventions aimed at prevention of complications and to maintain function

Current reseach: Transitional Care bridge

Implementing these risk profiles into daily practice **in a large randomised trial** to reveal the feasibility of this approach

Outcomes: functional decline, 30-days mortality, costs, length of stay, HRQoL

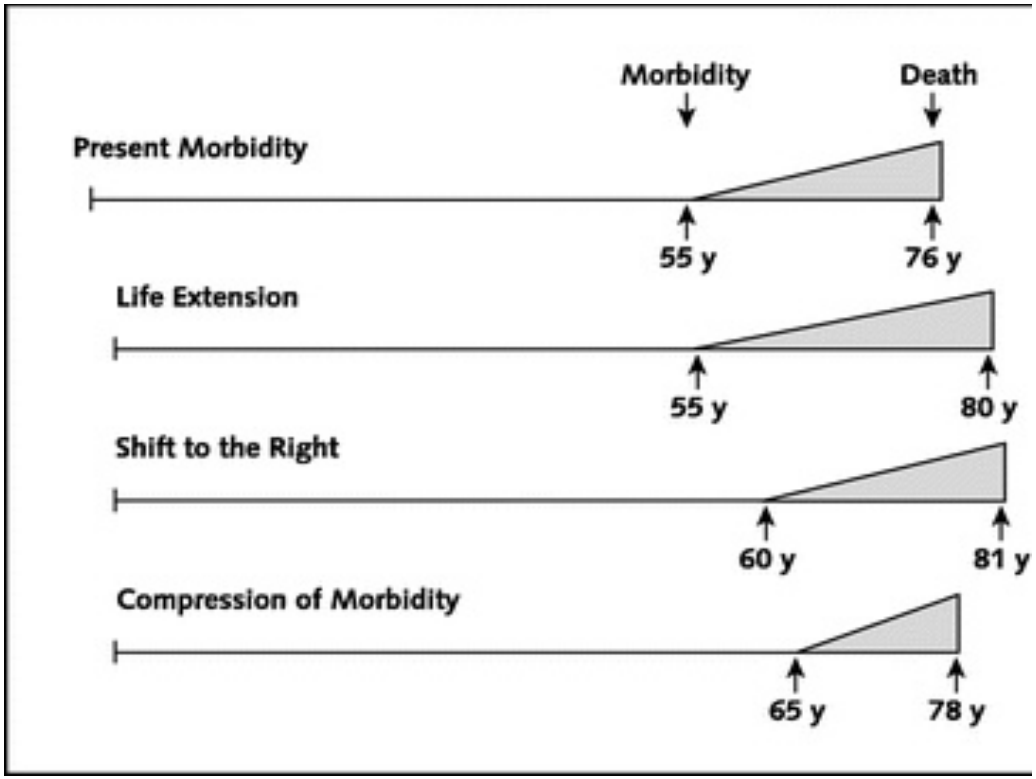
multimorbidity in acutely admitted older hospital patients in DEFENCE I and II

- prevalence
- outcome
- opportunities

multimorbidity is..

- two or more diseases at the same time
- acute (ICD10) and chronic diseases (CCI)

compression of morbidity ?



JF Fries, Ann Intern Med, 2003, 139; 455-459

consequences of multimorbidity

- functional status ↓
- use of health care services ↑ (ADE)
- quality of care ↓
- complications ↑
- mortality ↑

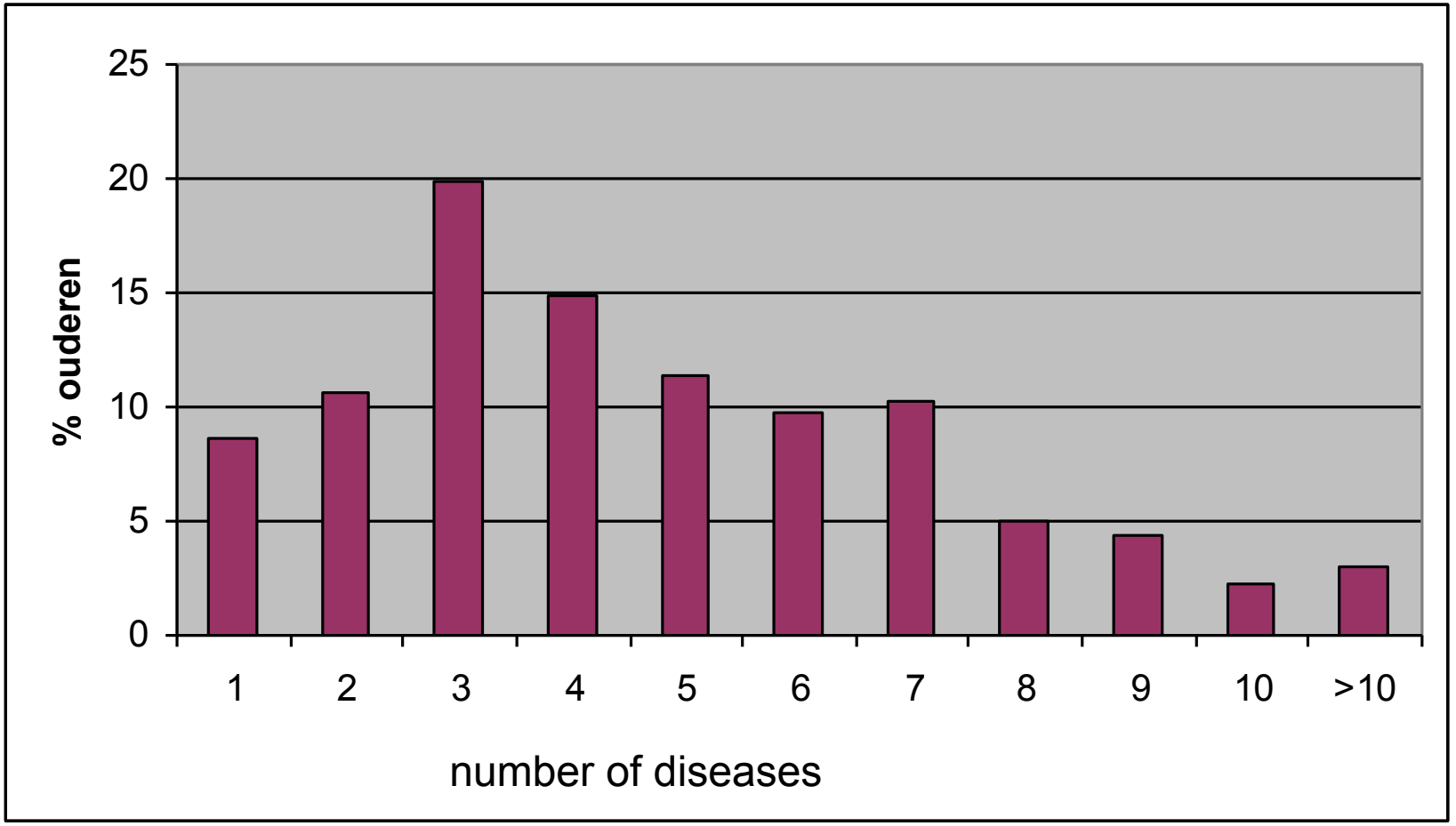
compression of morbidity by

- improved detection of diseases
- improved treatment: delay of disabilities?
- improved labour circumstances;
- effect obesity
- increase of patients with multimorbidity

top 5 acute diseases

disease	prevalence (%)
Infection	53
Kidney failure (kreat>150 mmol/l)	27
Anemia (Hb< 6 mmol/l)	26
ADE	17
Dehydration	14

multimorbidity in hospital



multimorbidity

Condition	Prevalence (%)	Intervention needed during hospital stay* (% yes)
Chronic		
Hypertension	46.6	40.0
Diabetes	26.3	30.4
Solid tumor	23.8	61.7
Visual impairment	20.7	0.0
Stroke	17.4	1.1
Hearing impairment	17.4	0.0
Dyslipidemia	17.1	
Heart failure	15.2	65.7
Myocardial infarction	15.0	0.0
Atrial fibrillation	14.9	55.0
Obesity	13.6	0.0
Osteoporosis	13.3	8.3
Gastric ulcer	10.7	
COPD	8.6	44.0
Depression	6.9	13.0
Dementia	5.7	0.0
Acute		
Infection	53.1	na
Renal failure	27.2	na
Anaemia	25.7	na
Adverse drug event	17.4	na
Dehydration	14.2	na
Gastro-intestinal bleeding	11.4	na
Diarrhoea	11.3	na

clusters and outcome

Disease cluster	Prevalence rate (%)	Mean length of stay	Mean rate of Functional decline (%)	Mean Mortality rate within three months after admission (%)
Infection and dementia	3.6	11.0	66.7	43.5
Solid tumour and myocardial infarction	3.6	8.0	30.1	43.5
Solid tumour and dehydration	3.6	9.0	38.5	39.1
Heart failure and myocardial infarction	4.9	8.0	22.2	38.7
Diabetes and myocardial infarction	4.5	10.0	35.3	37.9
Solid tumour and visual impairment	4.4	8.0	17.7	35.7
Myocardial infarction and atrial fibrillation	3.6	6.0	13.3	35.8
Heart failure and hearing impairment	4.1	9.5	50.0	34.6
Solid tumour and adverse drug event	4.5	6.0	29.4	34.5
Diabetes and osteoporosis	3.8	7.0	66.7	33.3

Clusters and functional decline

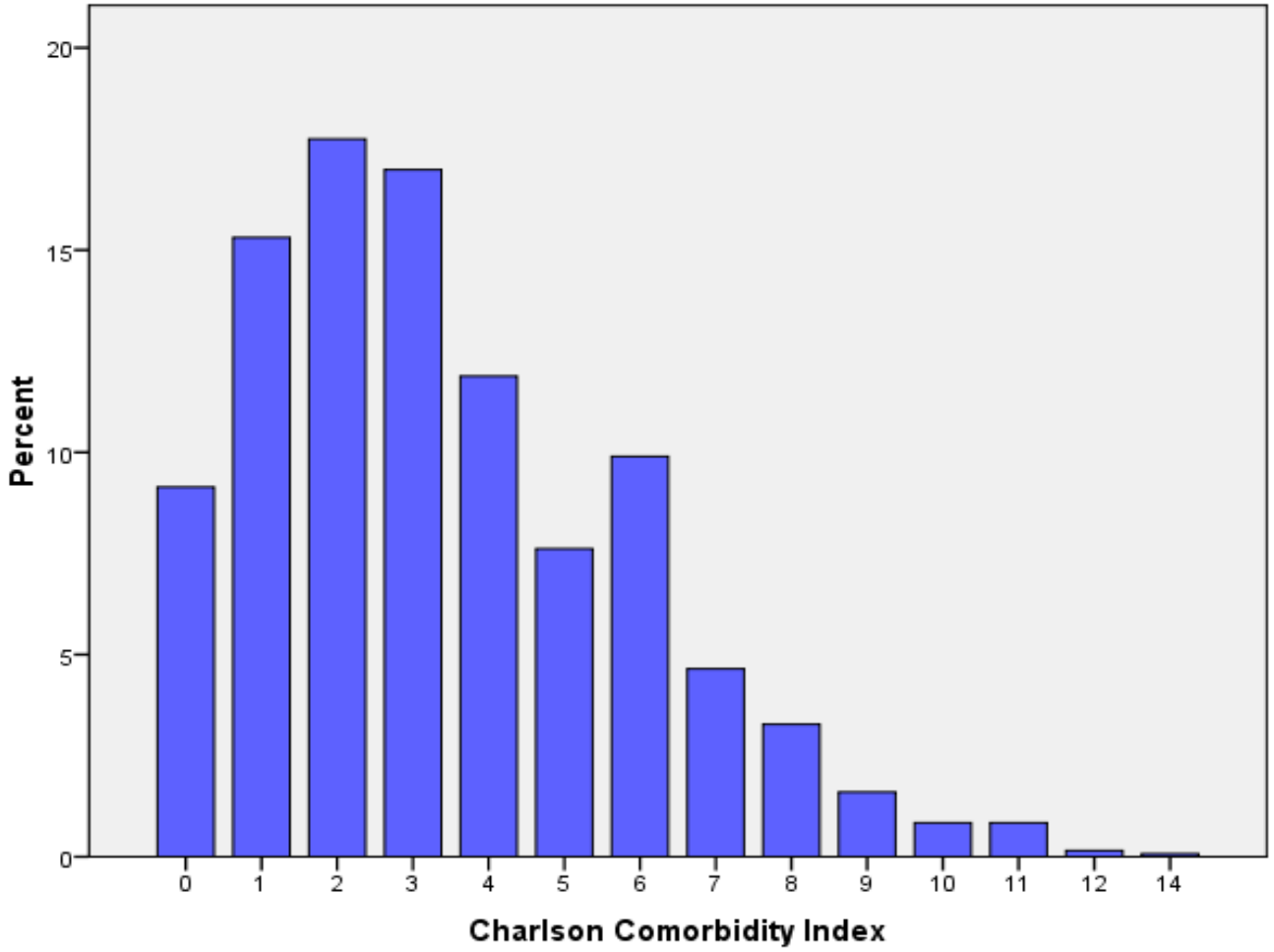
Disease cluster	Prevalence rate (%)	Median length of stay (in days)	Mean mortality rate (%)	Functional decline three months after admission (%)
Diabetes and osteoporosis	3.8	7.0	33.3	66.7
Infection and dementia	3.6	11.0	43.5	66.7
Dehydration and hearing impairment	3.6	10.0	21.7	58.8
Renal failure and hearing impairment	4.7	9.0	30.0	55.0
Renal failure and heart failure	7.0	10.0	28.9	51.7
Infection and hearing impairment	10.3	9.0	18.0	51.0
Heart failure and hearing impairment	4.1	9.5	34.6	50.0
Anemia and diabetes	6.9	7.0	25.0	50.0
Osteoporosis and dyslipedemia	3.9	6.0	28.0	50.0
Anemia and heart failure	5.8	8.0	32.4	50.0

CCI validation

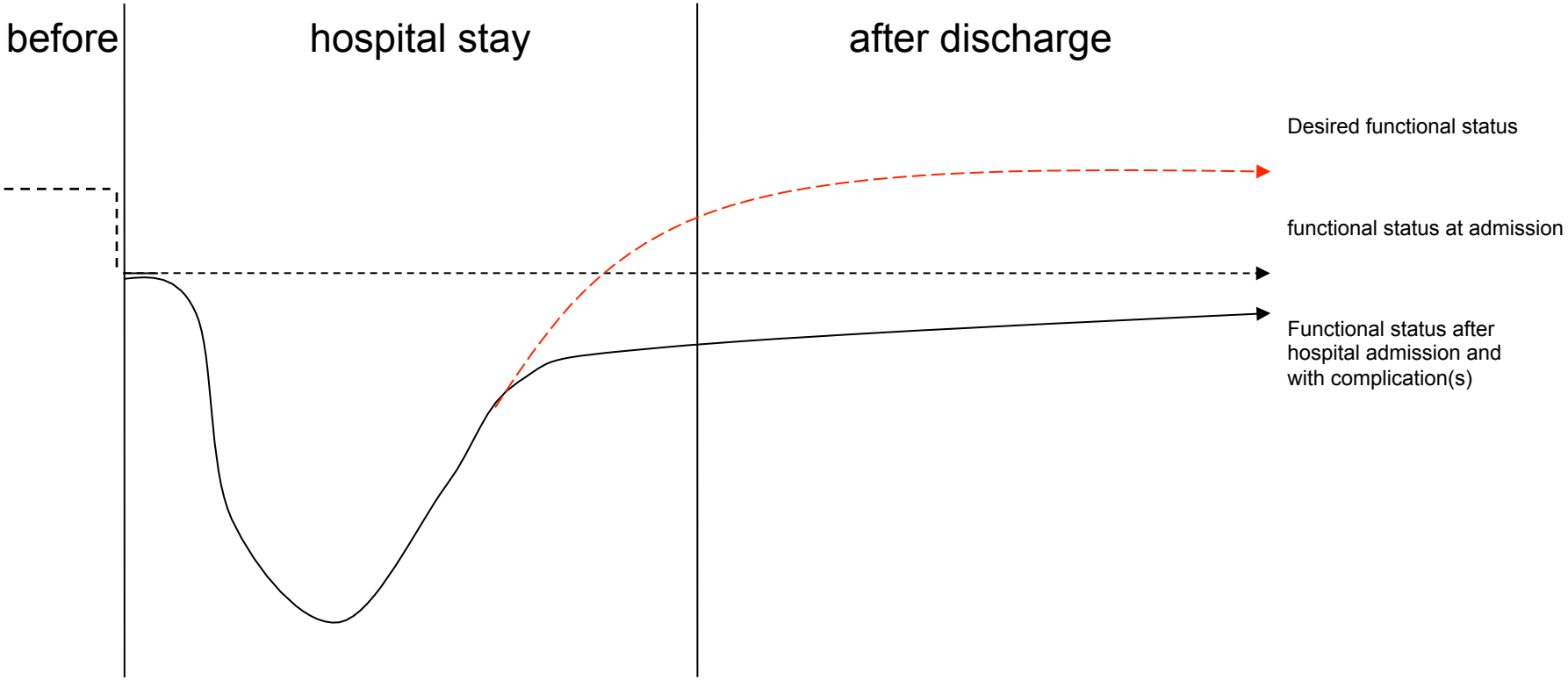
- DEFENCE I and II

In press JAGS

distribution of CCI scores



course functional status



improving…

multimorbidity : delay of disabilities

multimorbidity and disabilities : prevent ADE

causes of multimorbidity

- Determinants, associations
- Pathophysiological pathways
- Genetic determinants
- Identification of risk groups → prevention

research conditions

- multimorbidity (and age) no longer exclusion criterion in rcts
- innovation in methodology
  - heterogeneous study populations
  - gold standard RCT not always feasible
- large study populations for sufficient power → expensive research so joint efforts

Horizon 2020 ?

acknowledgements

besides the patients and their relatives:

- The Spaarne hospital
- The University Medical Center of Utrecht
- The Academic Medical Center of Amsterdam
- The Flevo hospital Almere
- The OLVG hospital Amsterdam
- The Tergooij hospitals Amsterdam