Is aging just an addition of chronic diseases?

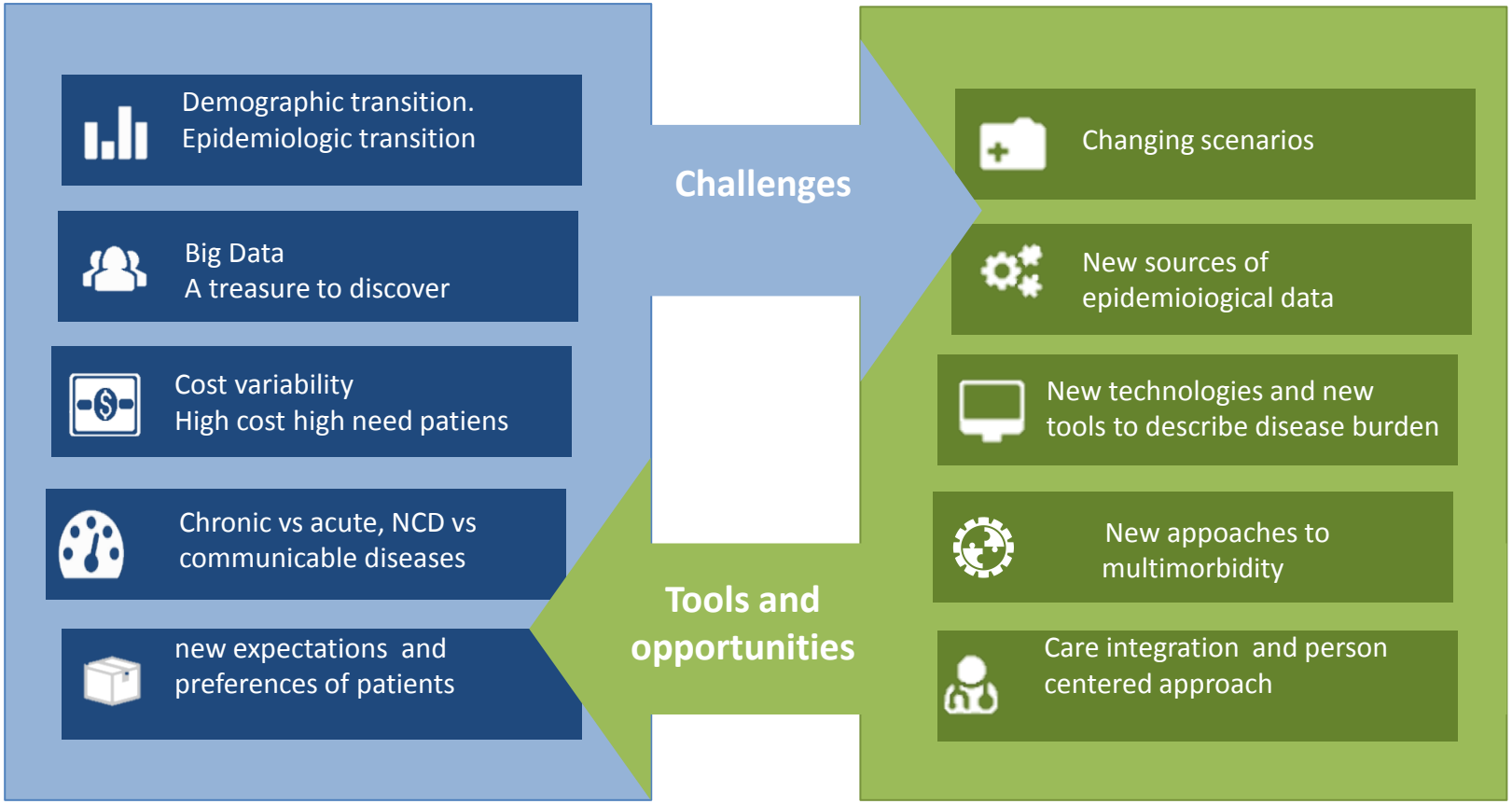
The impact of multimorbidity on health outcomes and health service use in the Veneto population

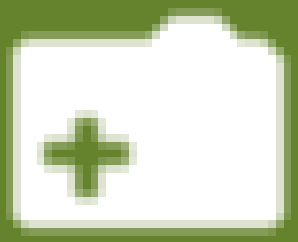
Maria Chiara Corti

Epidemiology Regional Service

Regione del Veneto

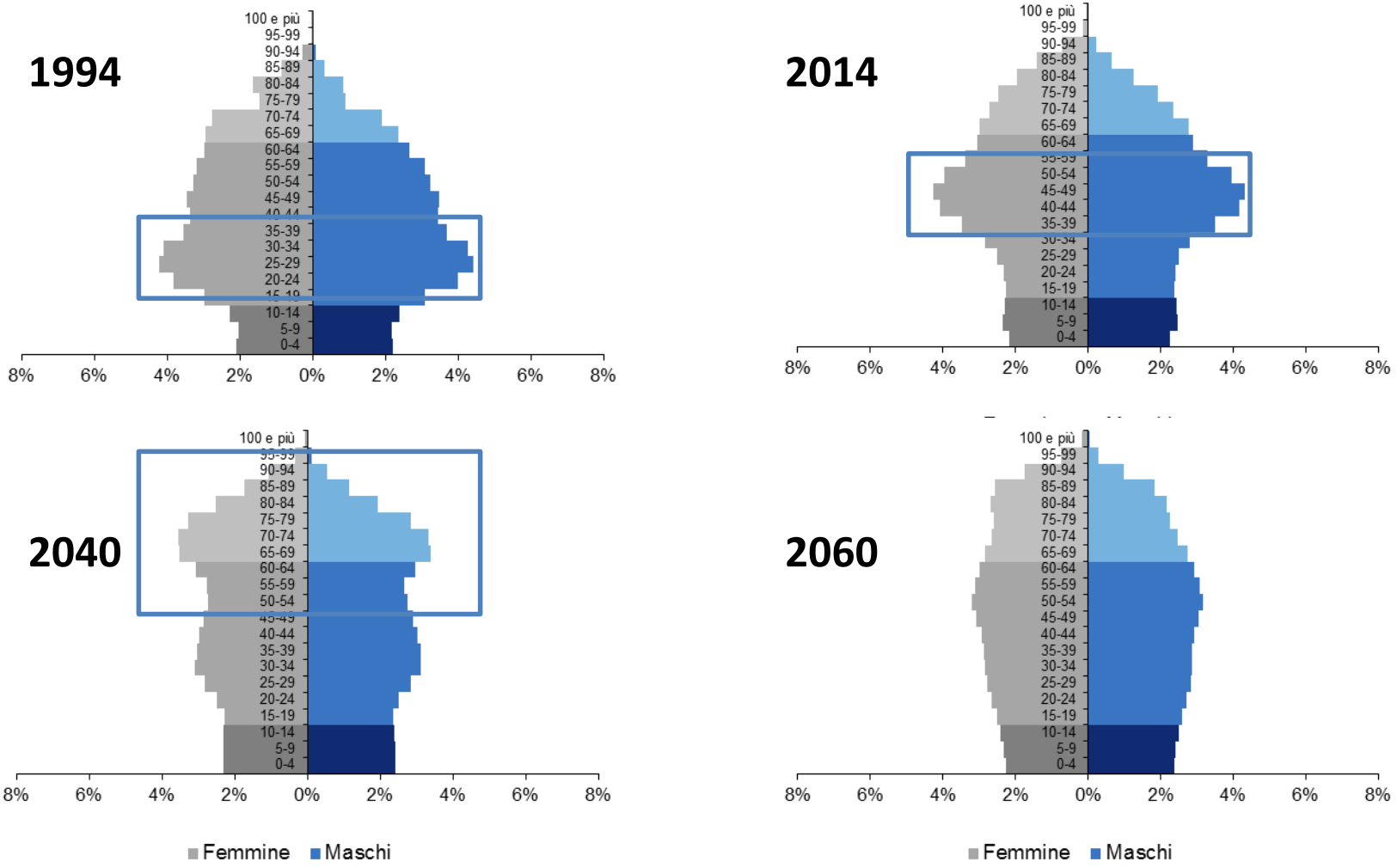
Multimorbidity and public health: challenges and opportunities





Changing scenarios

PERCENT DISTRIBUTION BY AGE AND GENDER: 1994, 2014 PROJECTIONS 2040 AND 2060



Fonte: Elaborazioni dell'Ufficio di Statistica della Regione del Veneto su dati Istat e previsioni Eurostat

Comorbidity is the concurrent existence of one or more unrelated conditions in an individual with any given condition. Multimorbidity is the co-occurrence of biologically unrelated illnesses.

Barbara Starfield 2006

The high frequency of

Comorbidity

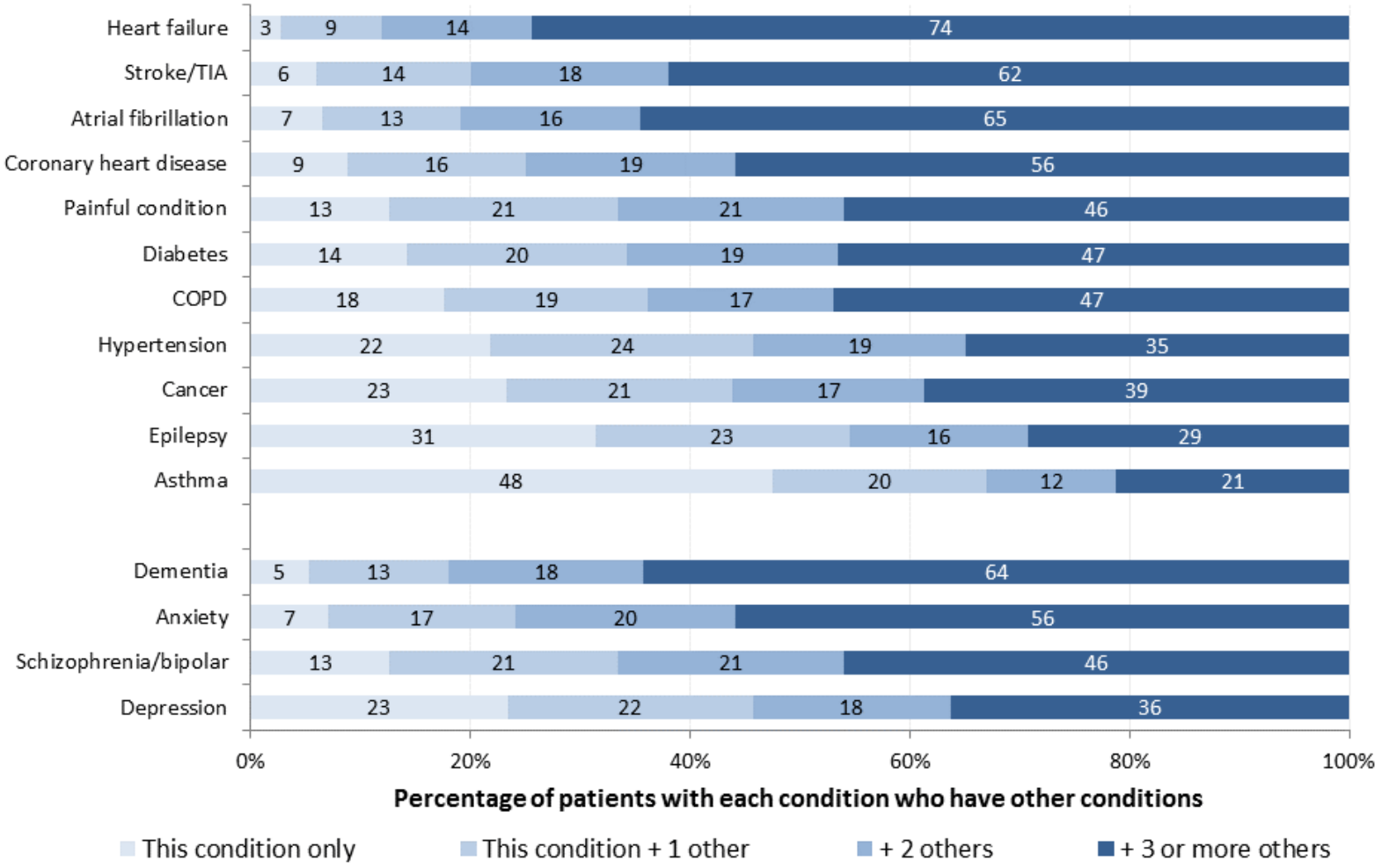
Multimorbidity

Morbidity burden

makes it inappropriate to focus on single diseases

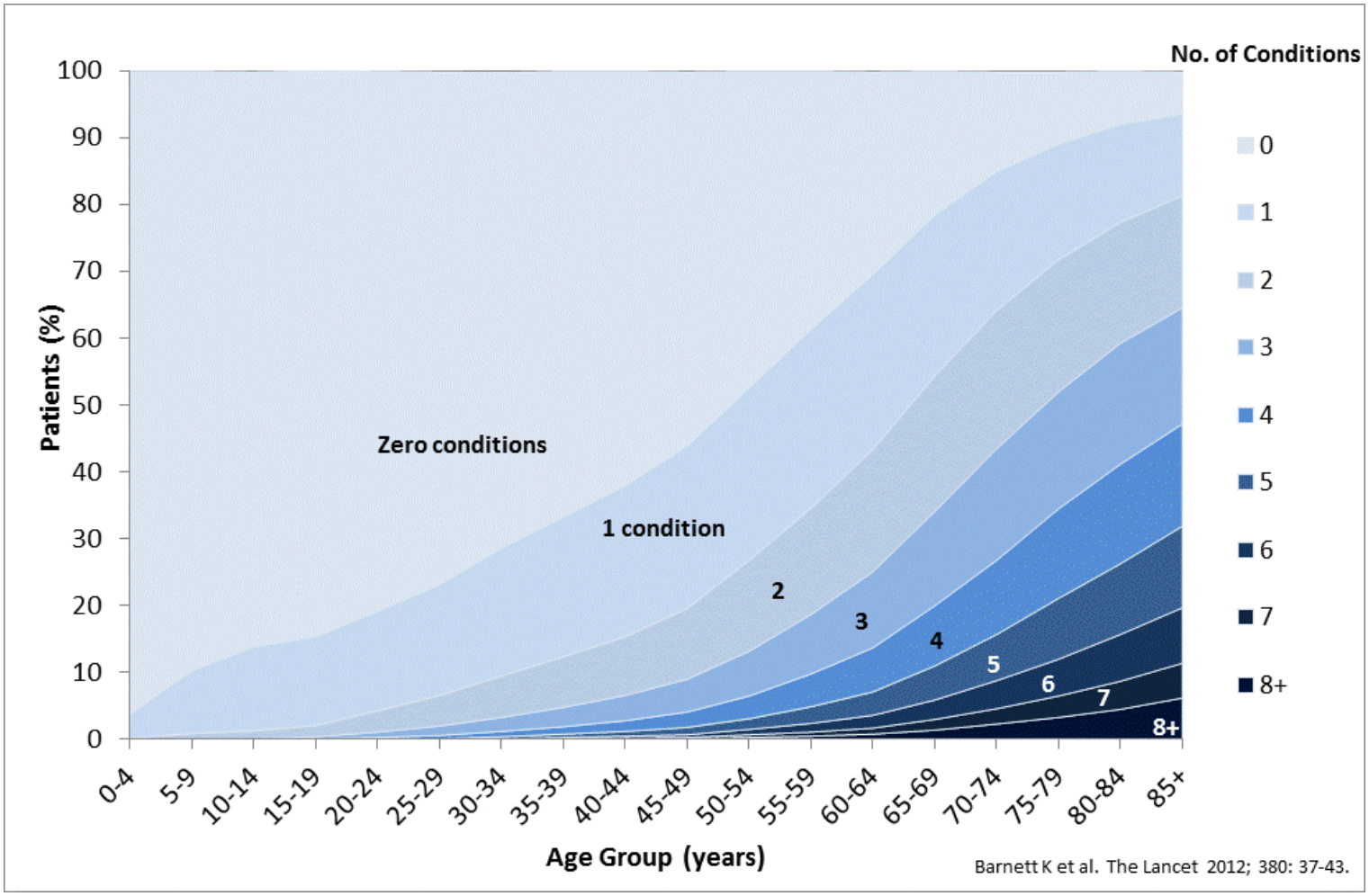
Barbara Starfield 2006

Most people with any long term condition have multiple conditions

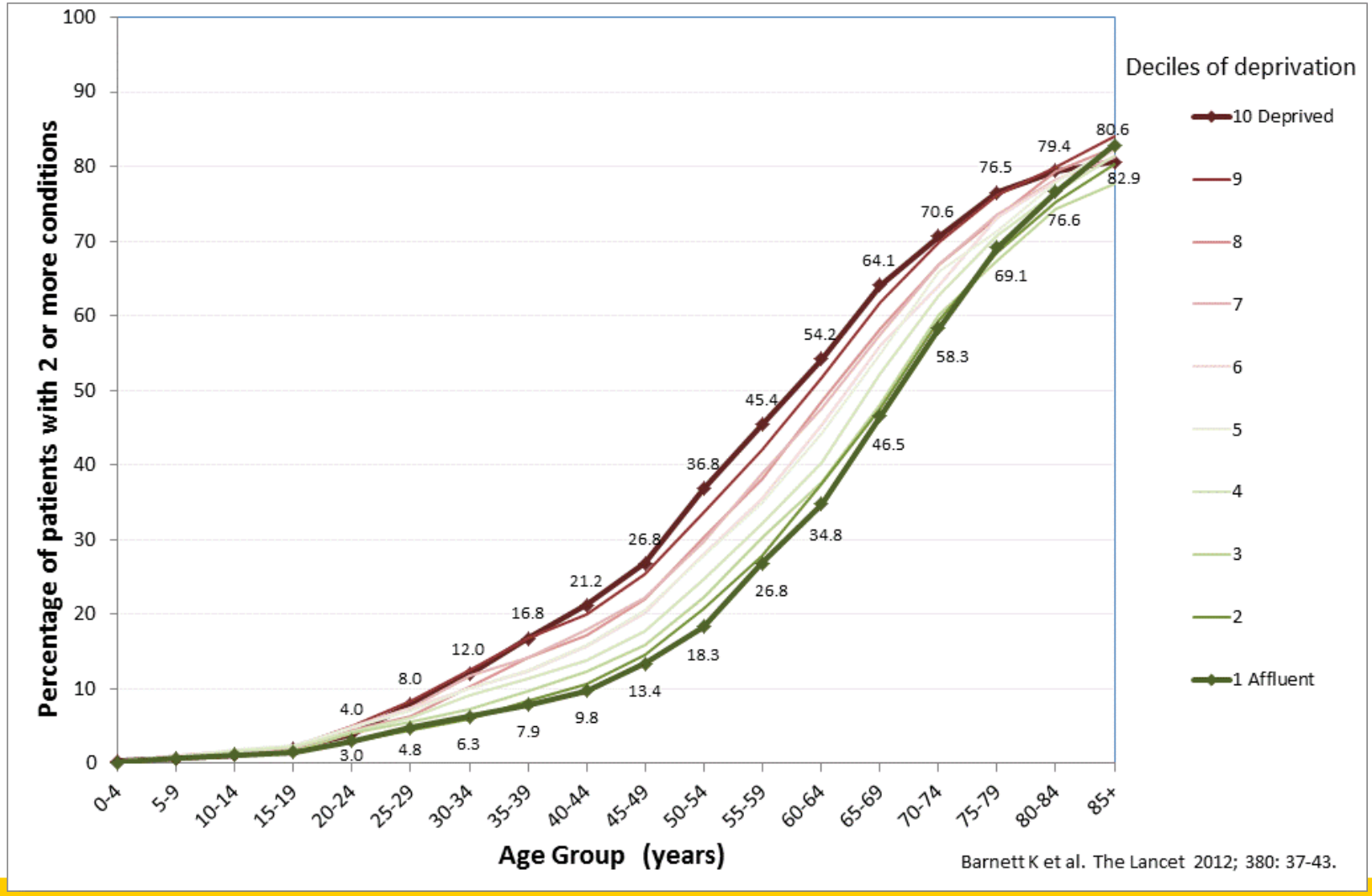


Barnett K et al. The Lancet 2012; 380: 37-43.

Multimorbidity is common

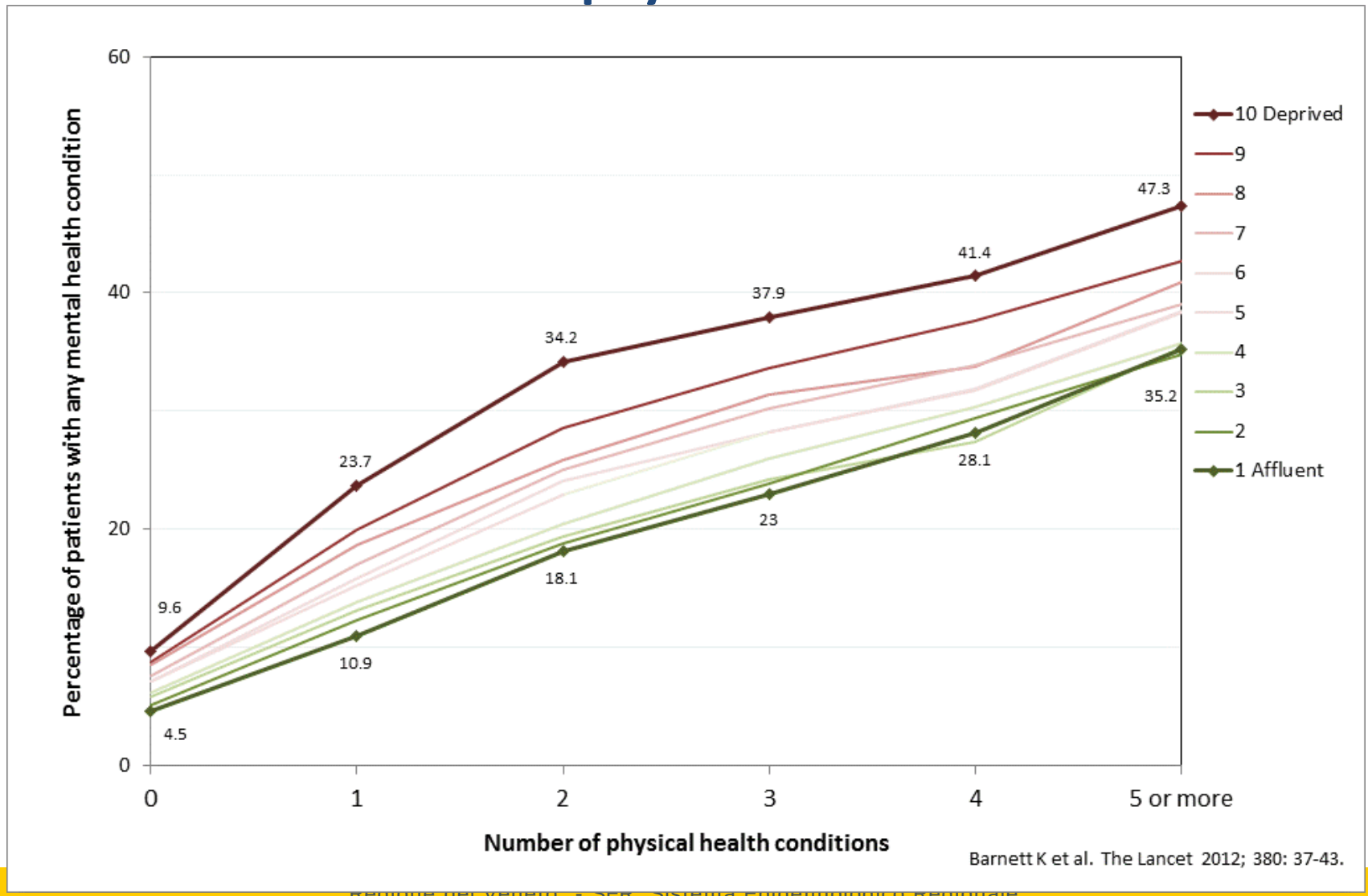


Multimorbidity is socially patterned



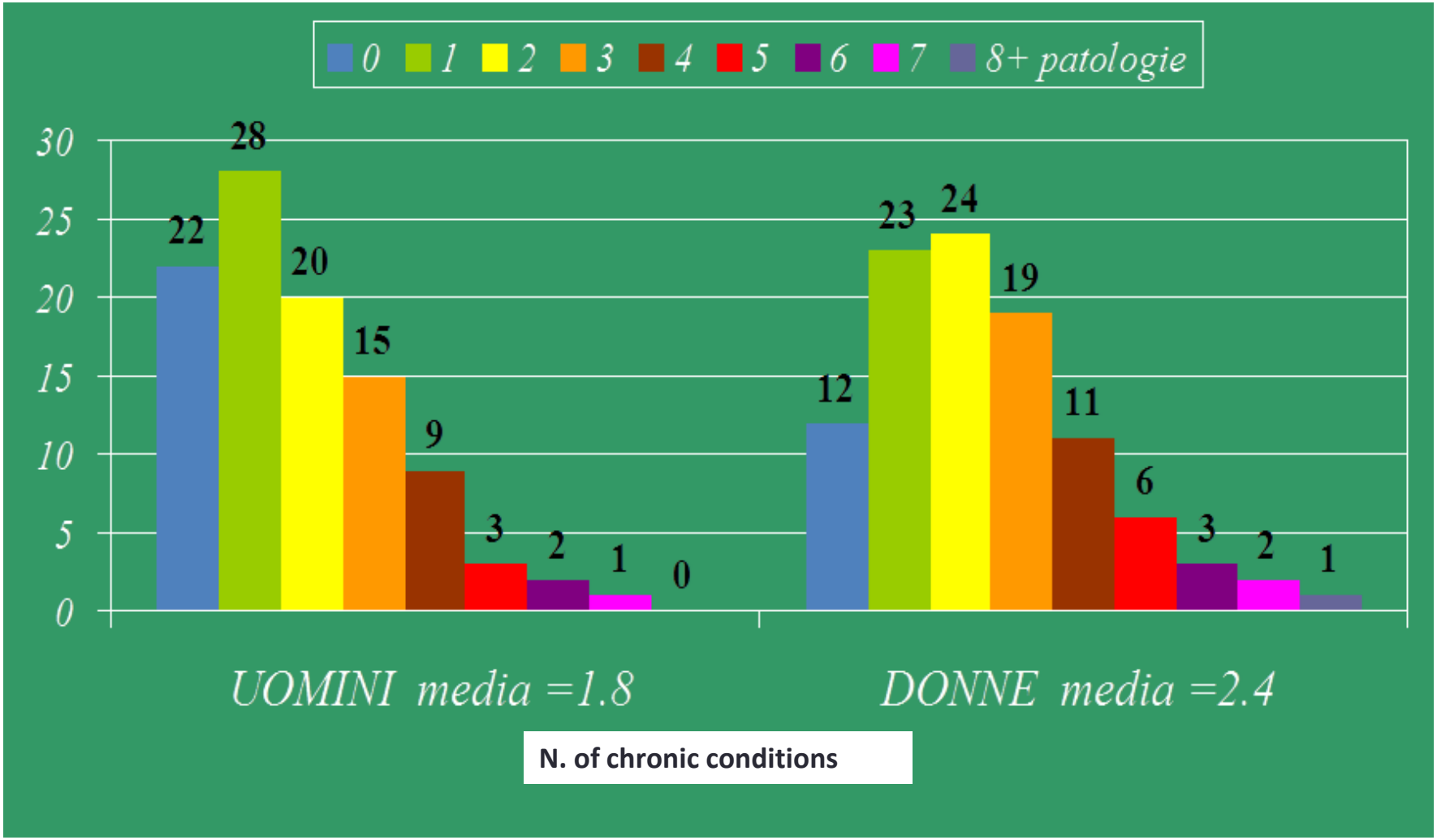
Barnett K et al. The Lancet 2012; 380: 37-43.

Mental health problems are strongly associated with the number of physical conditions



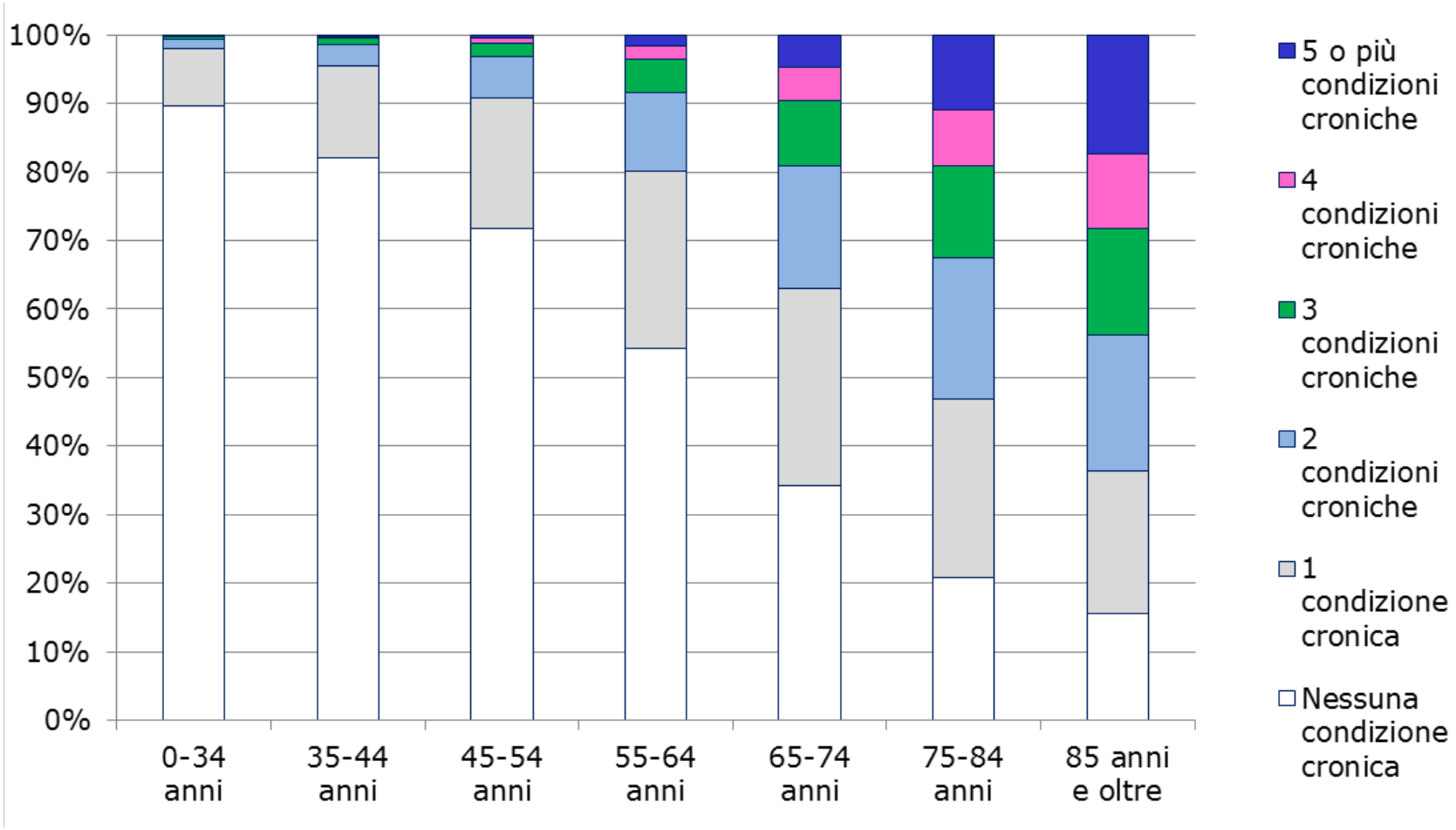
Barnett K et al. The Lancet 2012; 380: 37-43.

NCDs and multimorbidity are the norm in Regione Veneto

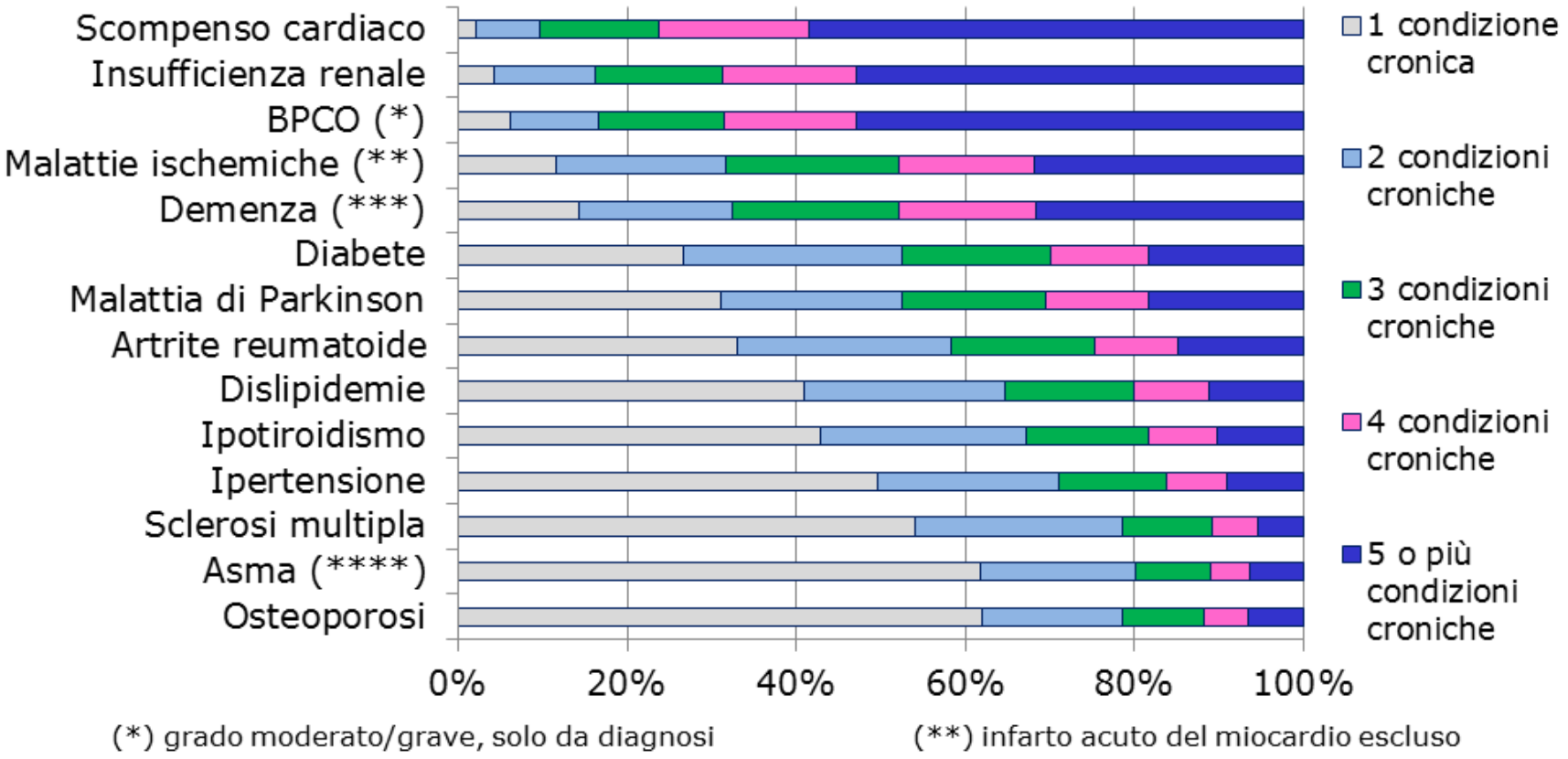


PROVA : Progetto Veneto Anziani (Corti, JAGS 2003)

Population by number of chronic conditons and age. Tutti gli assistiti. ACG data . Year 2015. Regione Veneto



Comorbidity in subjects with specific contidions
ACG data . Year 2015. Regione Veneto



(*) grado moderato/grave, solo da diagnosi

(**) infarto acuto del miocardio escluso

Signora Maria

79 year old widow

Retired, lives alone

Income: SS, pension

Daughter, lives 10 Km away with three teenagers

Five chronic conditions

1 GP

Eight medications

In 2015 she experienced:

20 prescriptions, 8 meds

19 outpatient visits

3 hospital admits

6 weeks sub acute care

5 months home care

4 ER visits

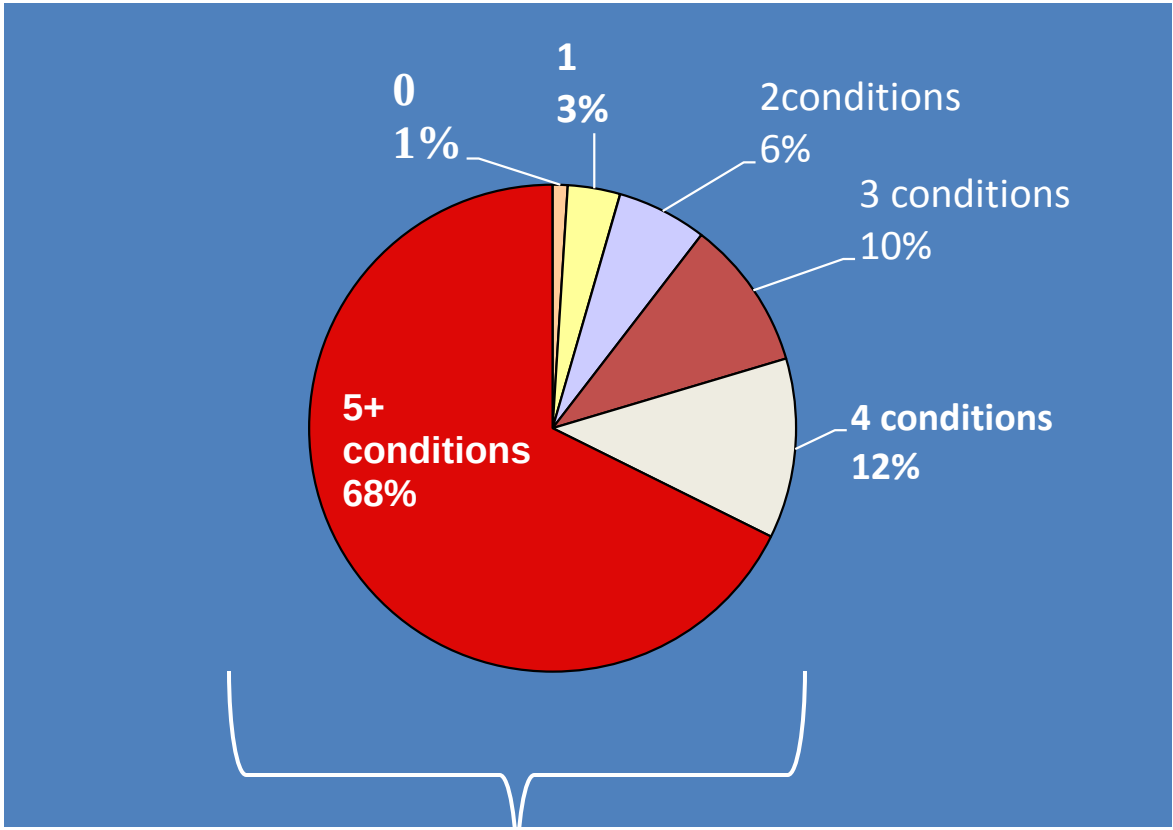
6 community referrals

Administered by: 8 Physicians, 3 Social Workers, 5 Physical Therapists, 4 personal assistants, 37 Nurses

TOTAL COST OF HEALTH CARE = 24.000 Euros

Today's Care for NCDs is:

- Fragmented
- Hard to access
- Inefficient
- Unsafe
- Expensive

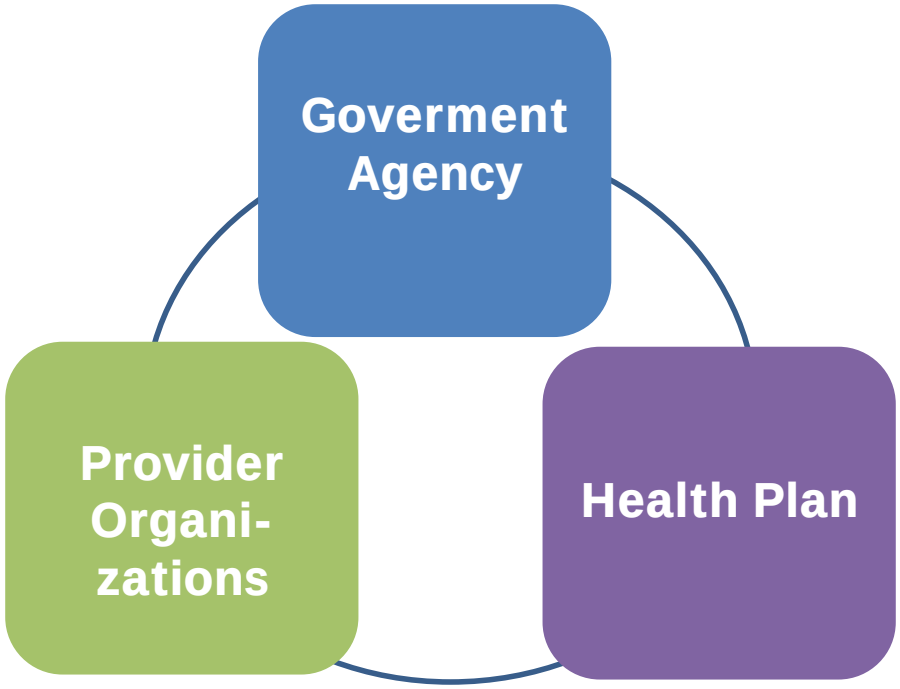


One quarter of all seniors have 4+ chronic conditions and account for 80% of health care spending

New technologies and new tools to describe disease burden

Use of ACG system

ACGs were designed as a way to measure the "medical need" of populations – recognizing that patients usually present with **"morbidity profiles"**, not a single specific disease



- ☑ Risk Adjusted Payments
- ☑ Population Stratification
- ☑ High Risk Case Identification
- ☑ Medical Homes and Primary Care support
- ☑ Comparative Effectiveness Research
- ☑ Performance measurement

Health-Care Datasets

Hospital Discharges (monthly)

ER Visits (monthly)

Ambulatory Visits (monthly)

Home Care visits (quarterly)

Medications (monthly)

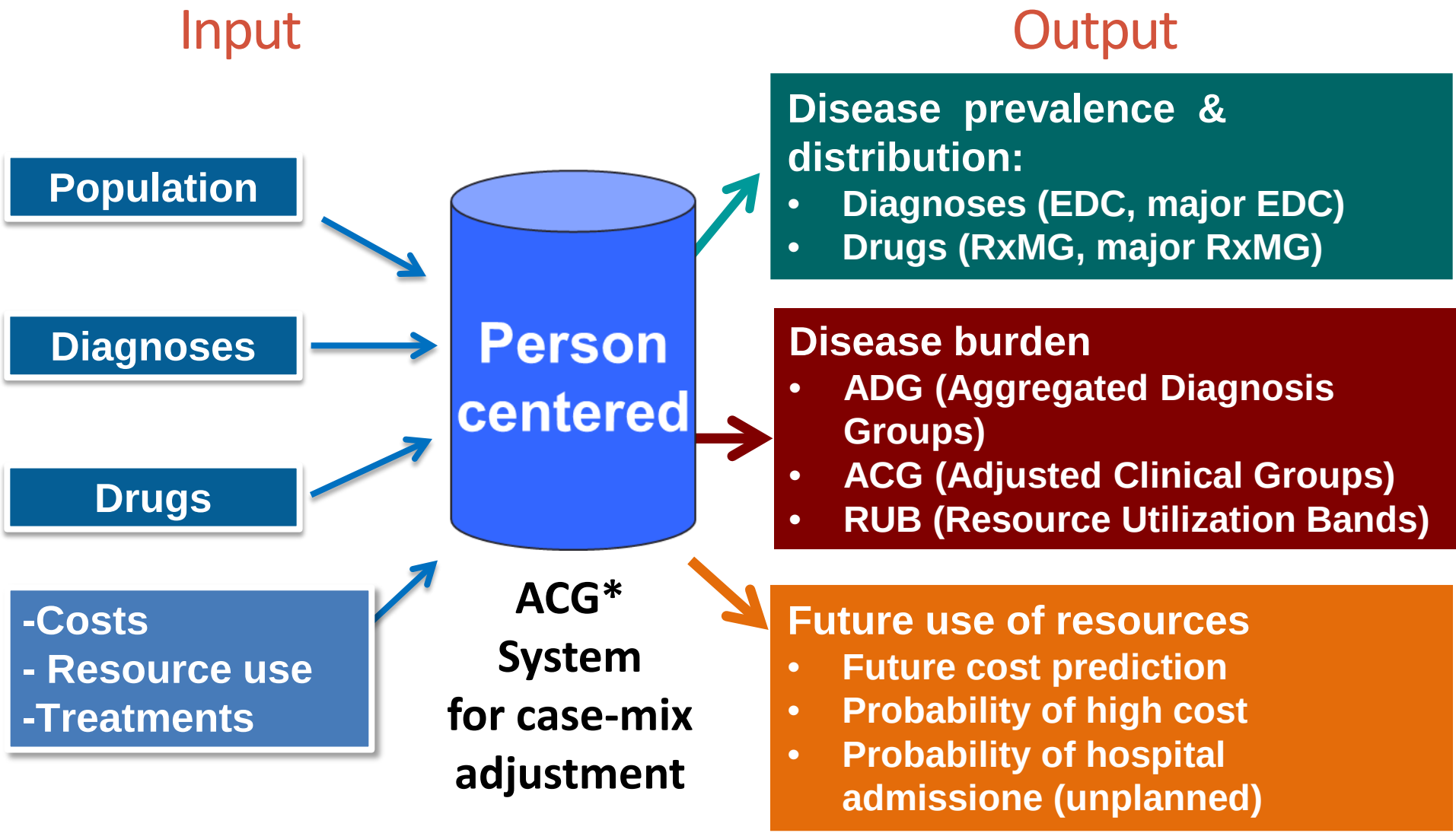
...

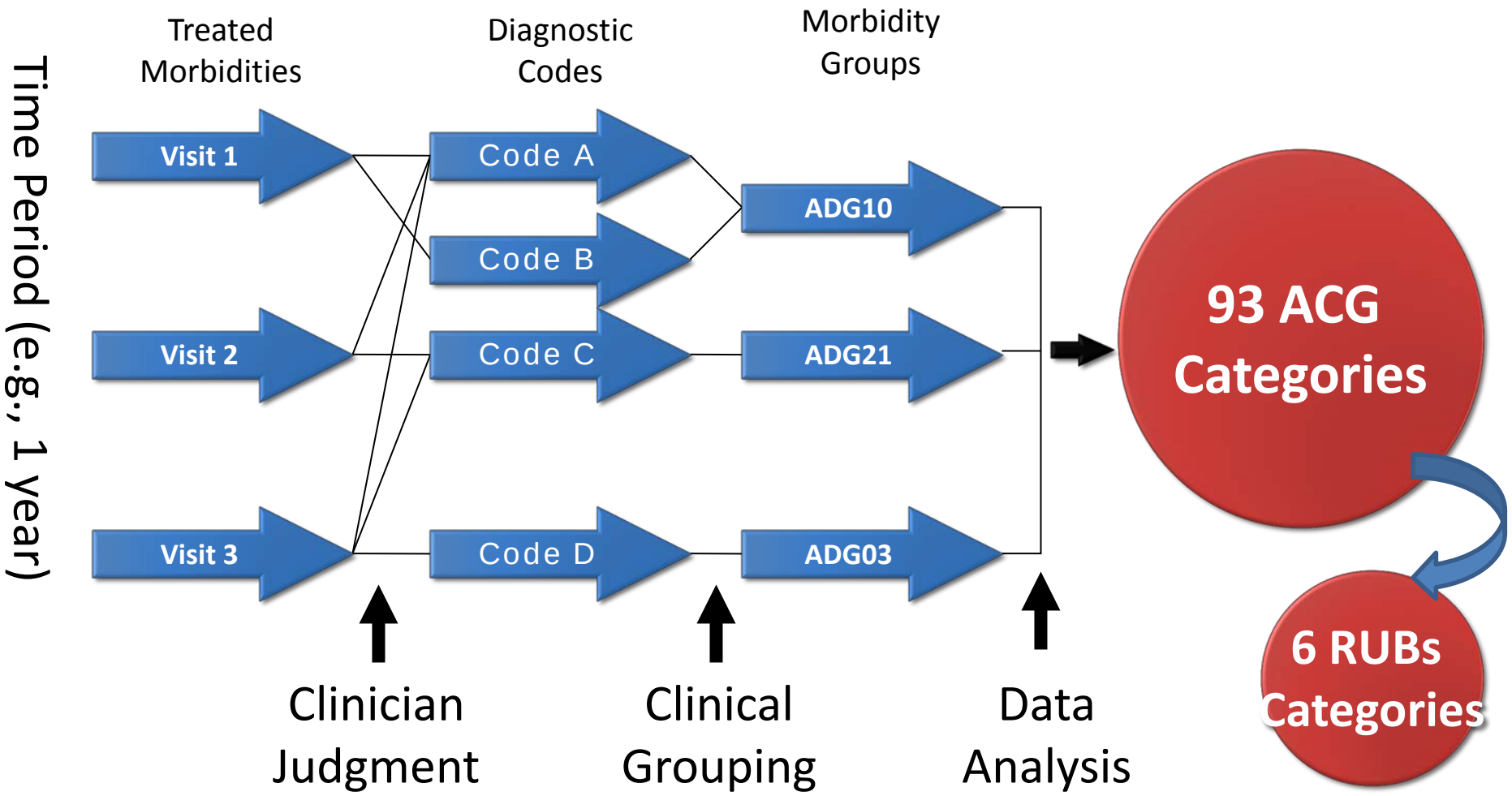
Local DWH

Regional DWH

QlikView

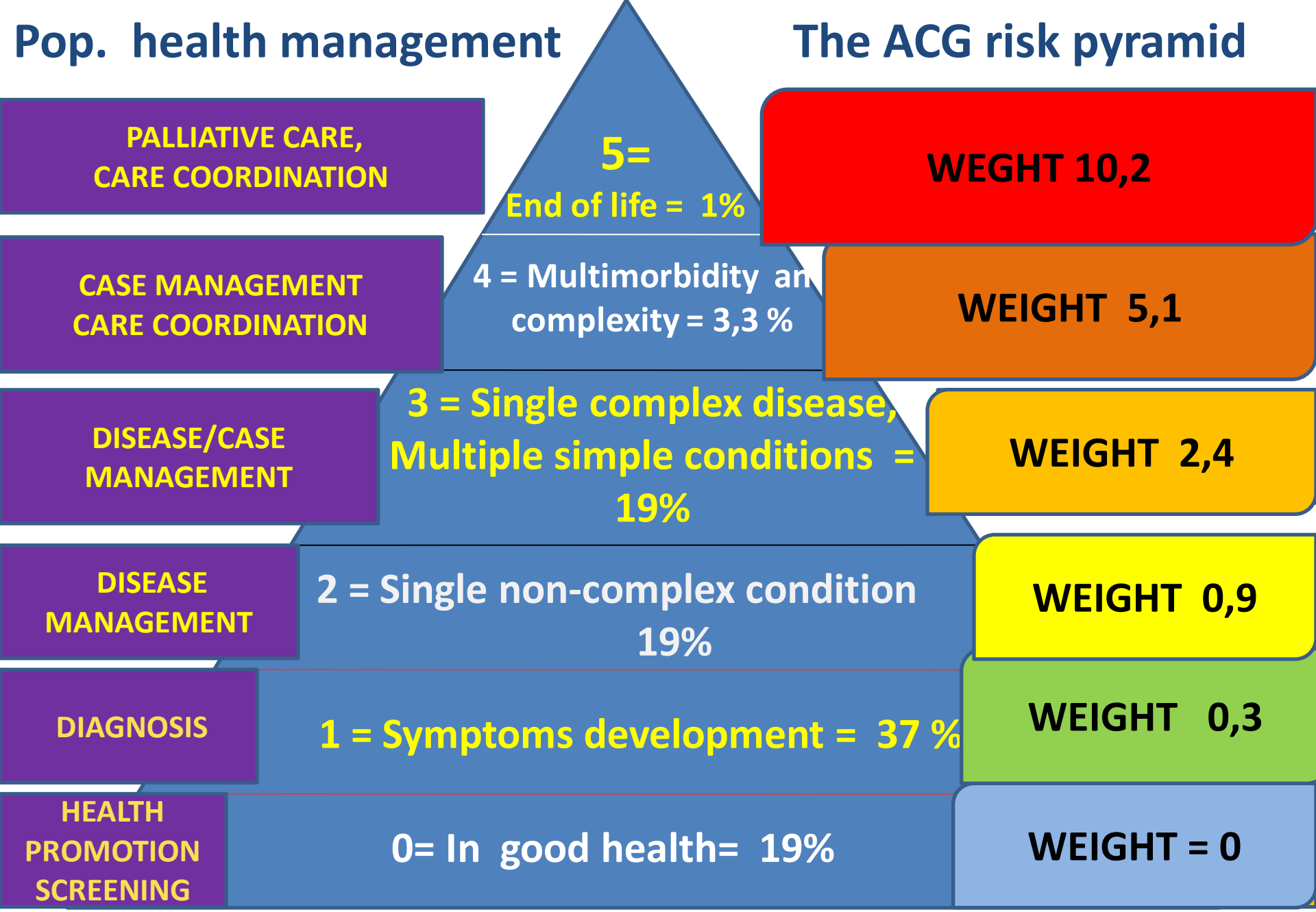
Integration starts from data : innovative tool for risk adjustement: ACG

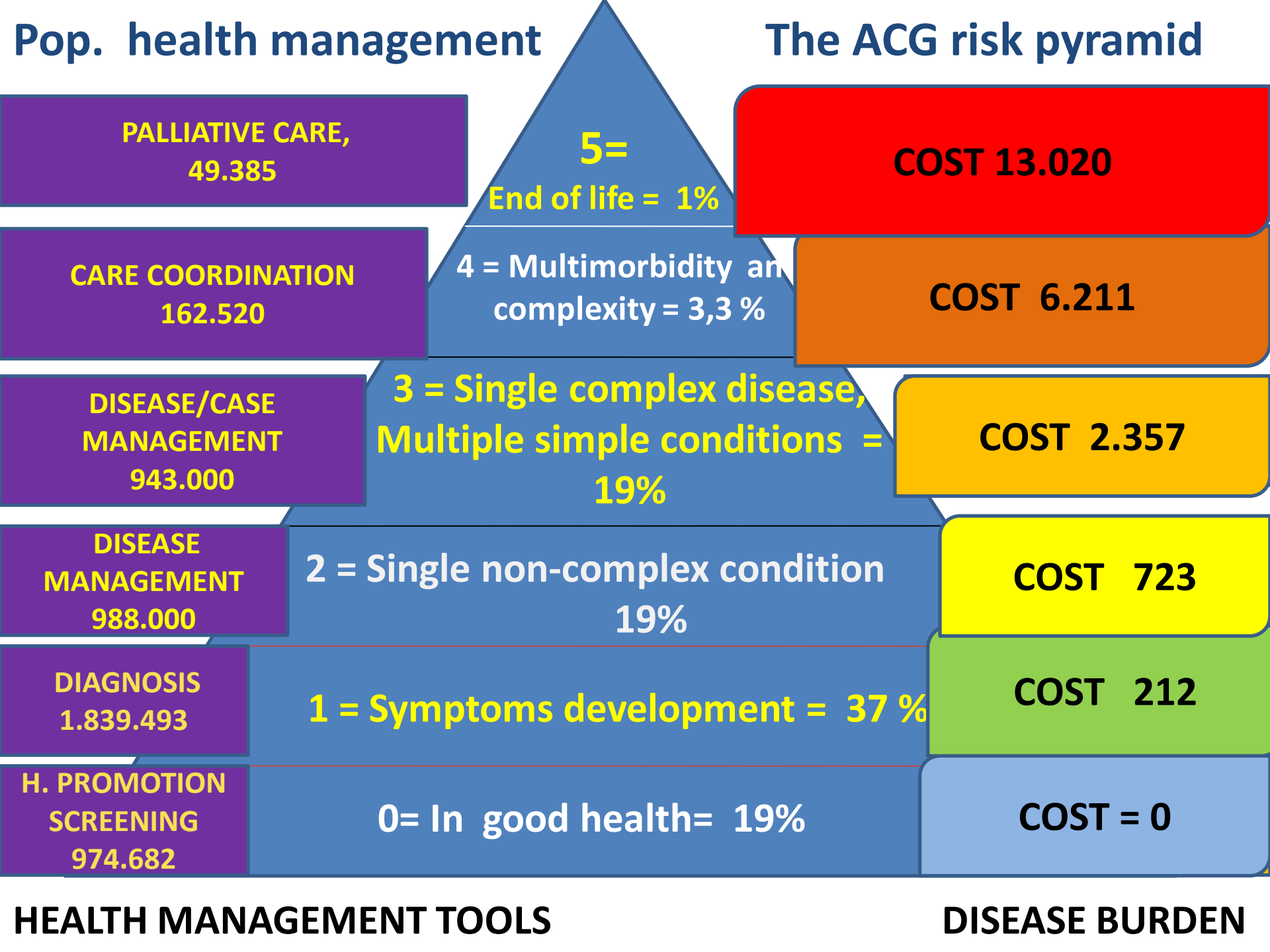




ACG 5110 Costs without diagnoses (healthy users)

ACG 5200 No costs , no diagnoses (non user)


Pop. health management
The ACG risk pyramid
PALLIATIVE CARE, CARE COORDINATION
5= End of life = 1%
WEGHT 10,2
CASE MANAGEMENT CARE COORDINATION
4 = Multimorbidity an complexity = 3,3 %
WEIGHT 5,1
DISEASE/CASE MANAGEMENT
3 = Single complex disease, Multiple simple conditions = 19%
WEIGHT 2,4
DISEASE MANAGEMENT
2 = Single non-complex condition 19%
WEIGHT 0,9
DIAGNOSIS
1 = Symptoms development = 37 %
WEIGHT 0,3
HEALTH PROMOTION SCREENING
0= In good health= 19%
WEIGHT = 0
HEALTH MANAGEMENT TOOLS
COST BY DISEASE BURDEN


Pop. health management
The ACG risk pyramid
PALLIATIVE CARE, 49.385
5= End of life = 1%
COST 13.020
CARE COORDINATION 162.520
4 = Multimorbidity an complexity = 3,3 %
COST 6.211
DISEASE/CASE MANAGEMENT 943.000
3 = Single complex disease, Multiple simple conditions = 19%
COST 2.357
DISEASE MANAGEMENT 988.000
2 = Single non-complex condition 19%
COST 723
DIAGNOSIS 1.839.493
1 = Symptoms development = 37 %
COST 212
H. PROMOTION SCREENING 974.682
0= In good health= 19%
COST = 0
HEALTH MANAGEMENT TOOLS
DISEASE BURDEN

ADG – Aggregated Diagnosis Groups (Esempi)

Diagnostic categoreis accounting for prognostic dimensions fo diseases or conditions

01-Time Limited: Minor
03-Time Limited: Major
06-Asthma
09-Likely to Recur: Progressive
10-Chronic Medical: Stable
11-Chronic Medical: Unstable
12-Chronic Specialty: Stable-Orthopedic
21-Injuries/Adverse Effects: Minor
22-Injuries/Adverse Effects: Major
23-Psychosocial: Time Limited, Minor
24-Psychosocial: Recurrent or Persistent, Stable
26-Signs/Symptoms: Minor
28-Signs/Symptoms: Major
31-Prevention/Administrative
32-Malignancy
33-Pregnancy

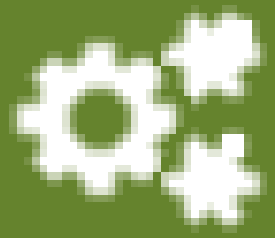
- **Duration**
- **Severity**
- **diagnostic certainty**
- **Etiologia**
- **Needs for specialistic care**

ACG aggregations based on disease burden

RUB	ACG
5-very high	5341-newborns; 6+ pat., 1+ major pat., low birth weight 4930-6/9 pat., age>34, 3 major pat.
4-high	4430-4/5 pat., age>34, 2+ patologie maggiori 1730-Pregnancy, 2/3 pat., 1+ pat. maggiori
3-moderate	4100-2/3 pat., age>34 0800-Cronica, instabile
2-low	0900-Cronic, stable 0400-Acute, major
1-healthy uses	5110-Costs , no diagnoses, 0300-Acute, minor, age>5
0-Non user	5200-No costs no diagnoses

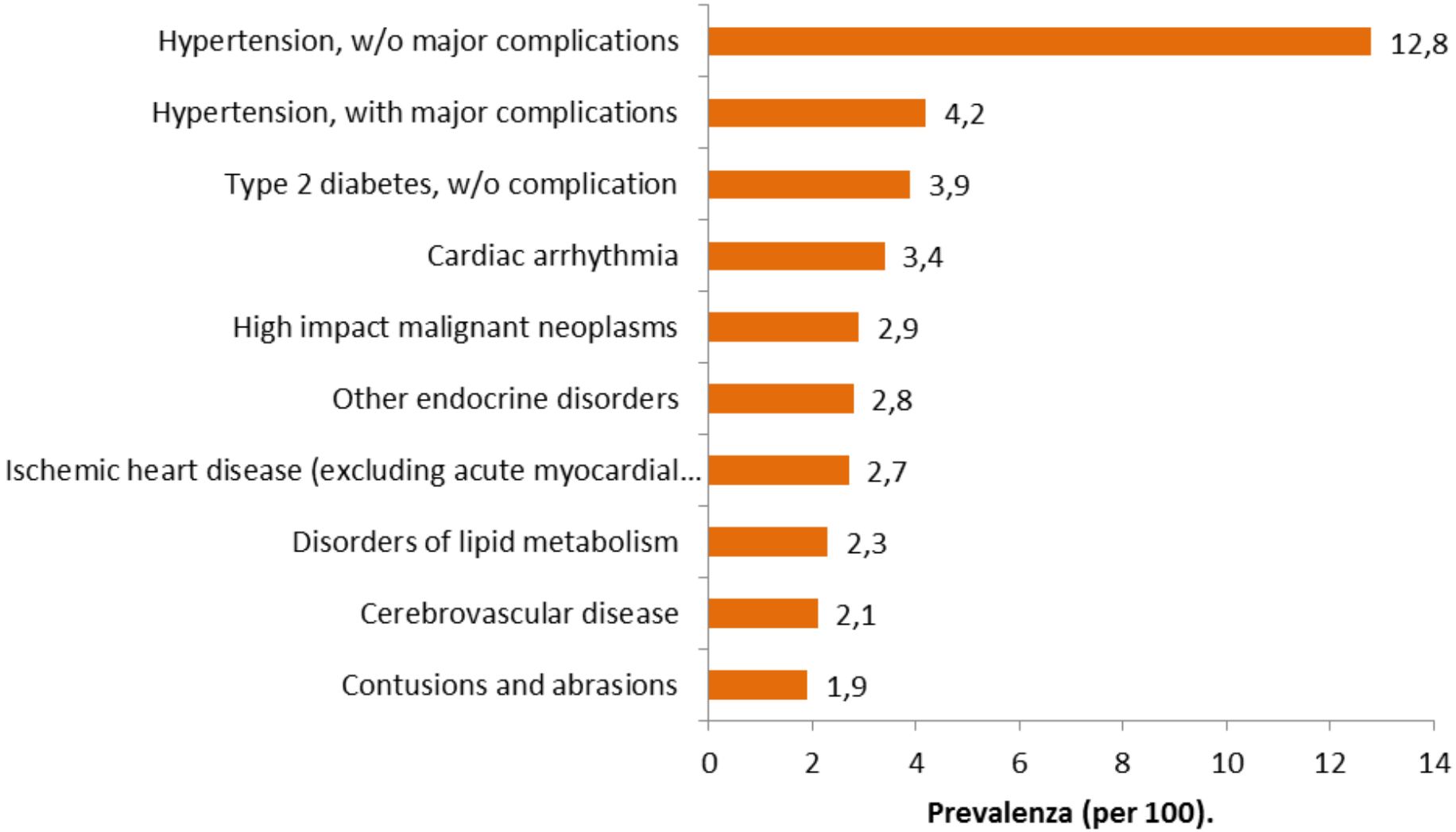
Criteria for assigning Diabetes diagnosis to ADG (Aggregated Diagnosis Groups)

ICD-9 Code	Description	ADG (32)
250.0	Diabetes Mellitus Uncomplicated	10: Chronic Medical Stable
250.03	Diabetes Mellitus without complications	11: Chronic Medical Unstable
250.1	Diabetes with Ketoacidosis	09: Likely to Recur, Progressive
362.0	Diabetes Retinopathy	18: Chronic Specialty, Unstable-Eye

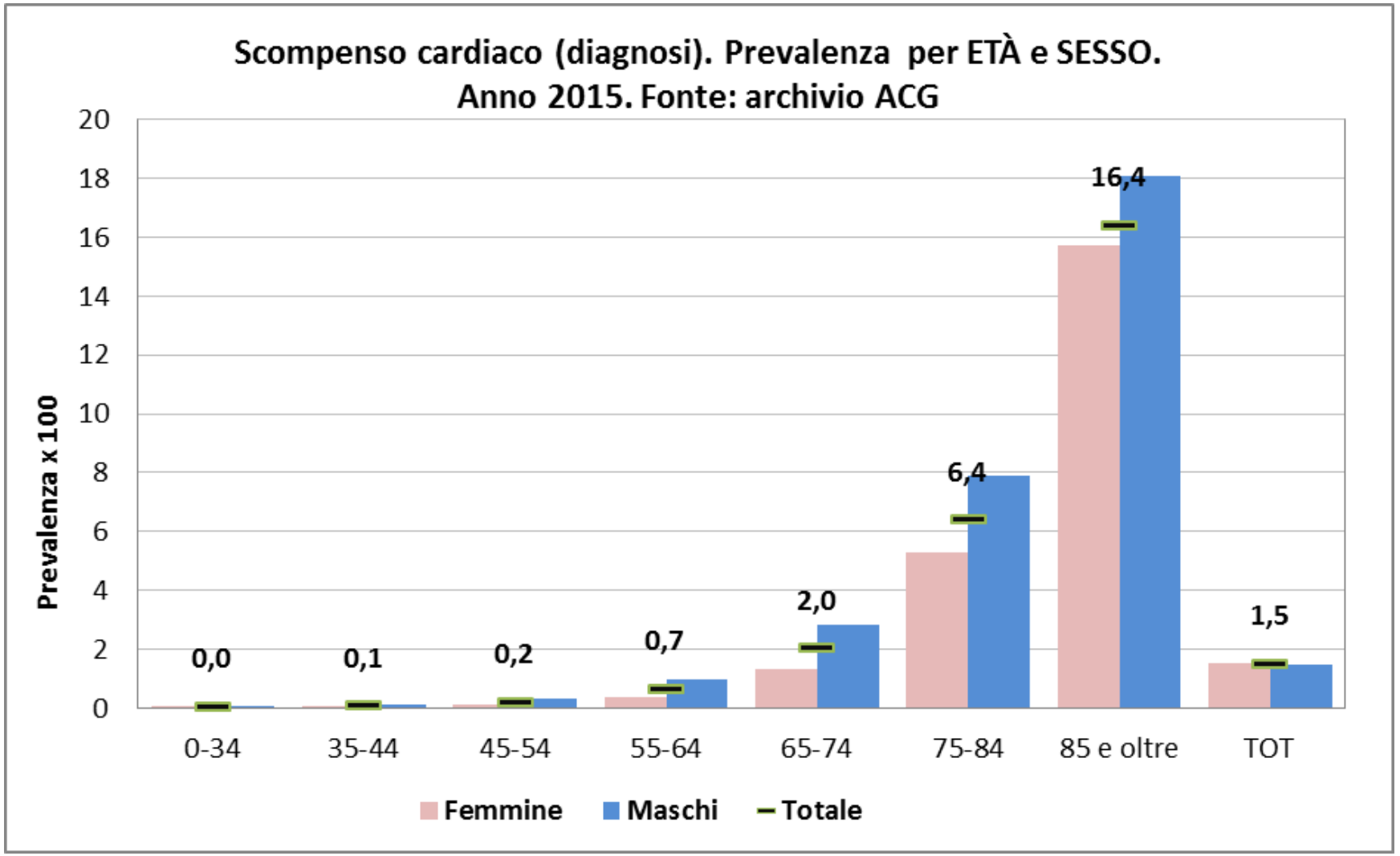


New sources of epidemiological data

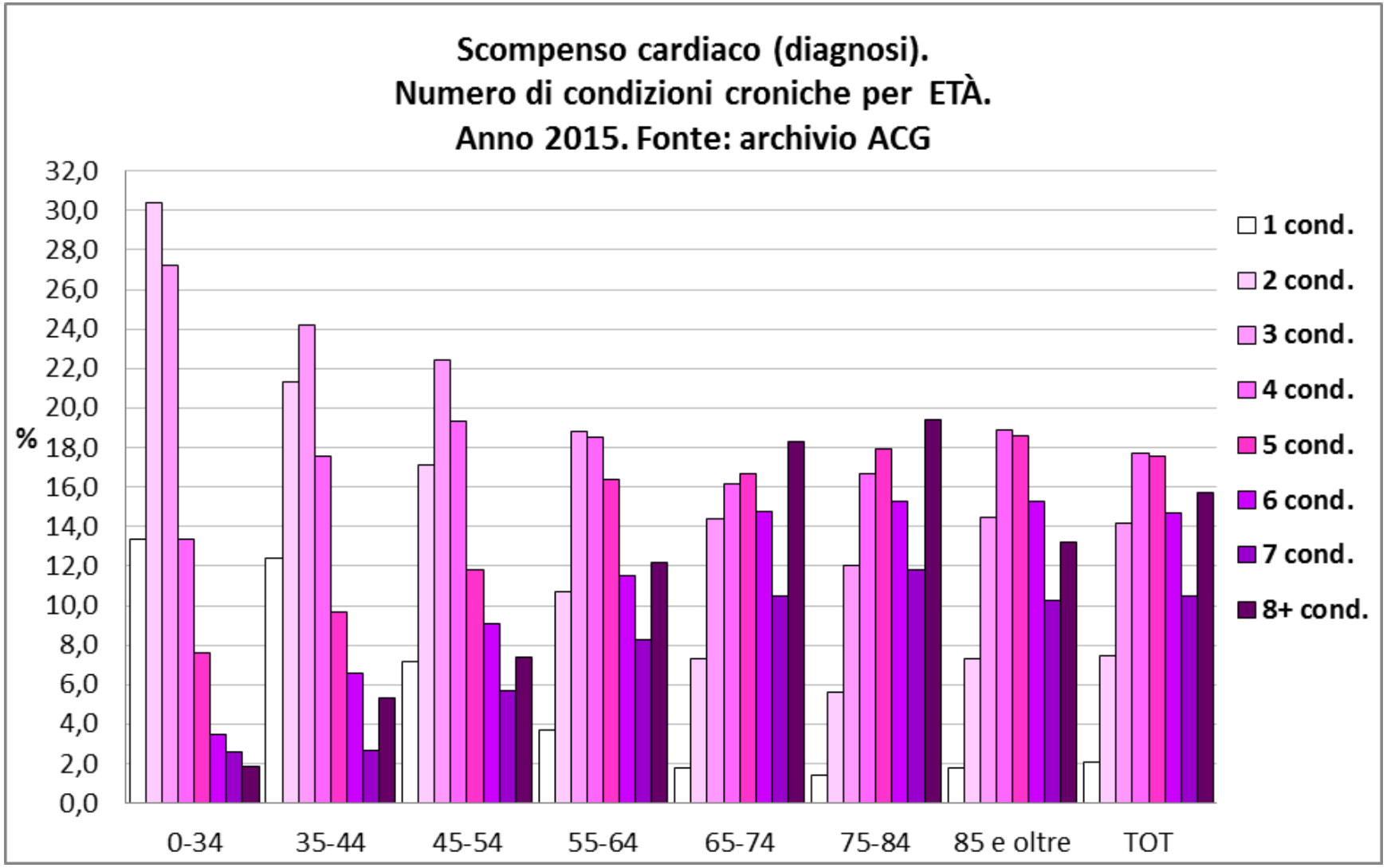
Expanded Diagnosis Clusters – EDCs



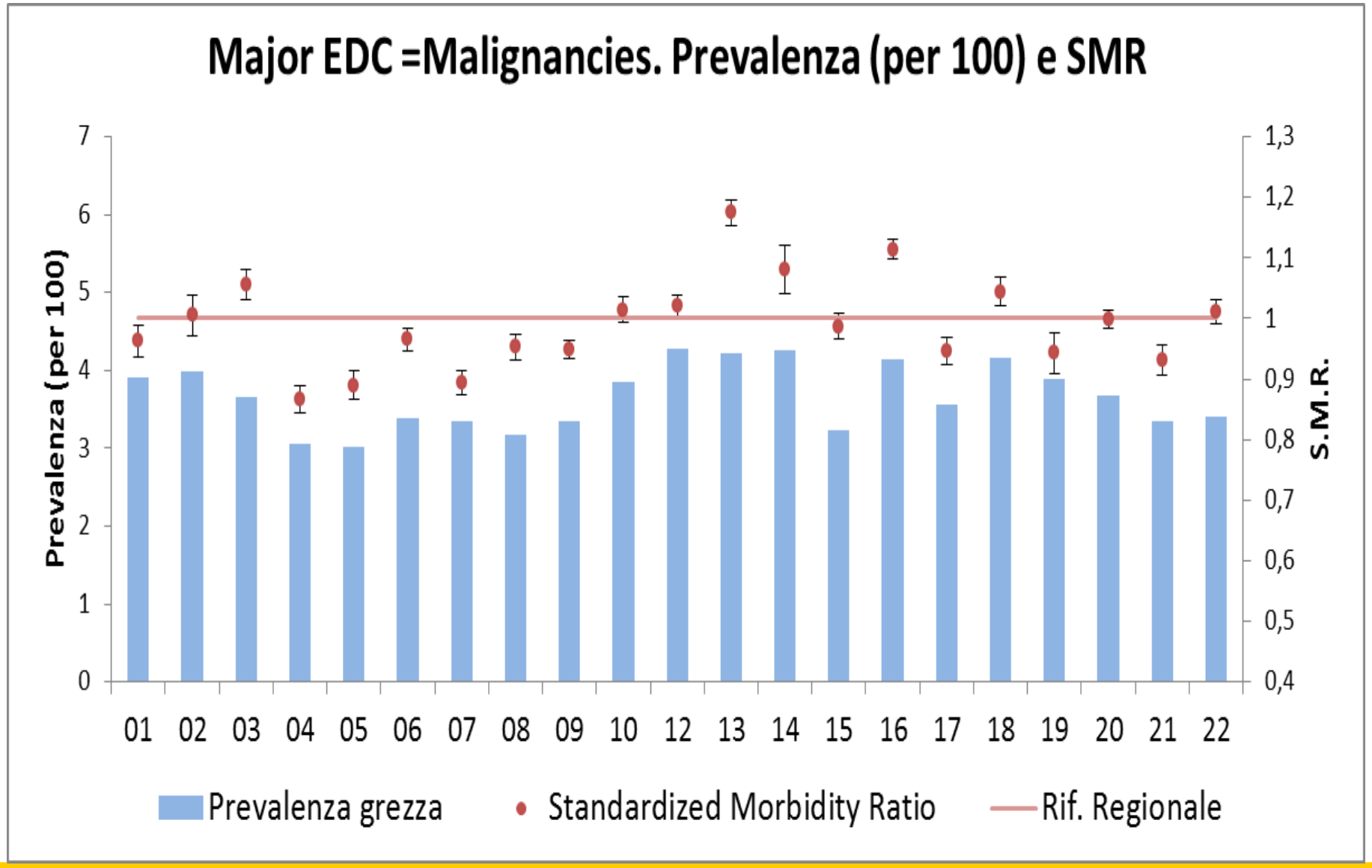
PREVALENCE OF CONGESTIVE HEART FAILURE



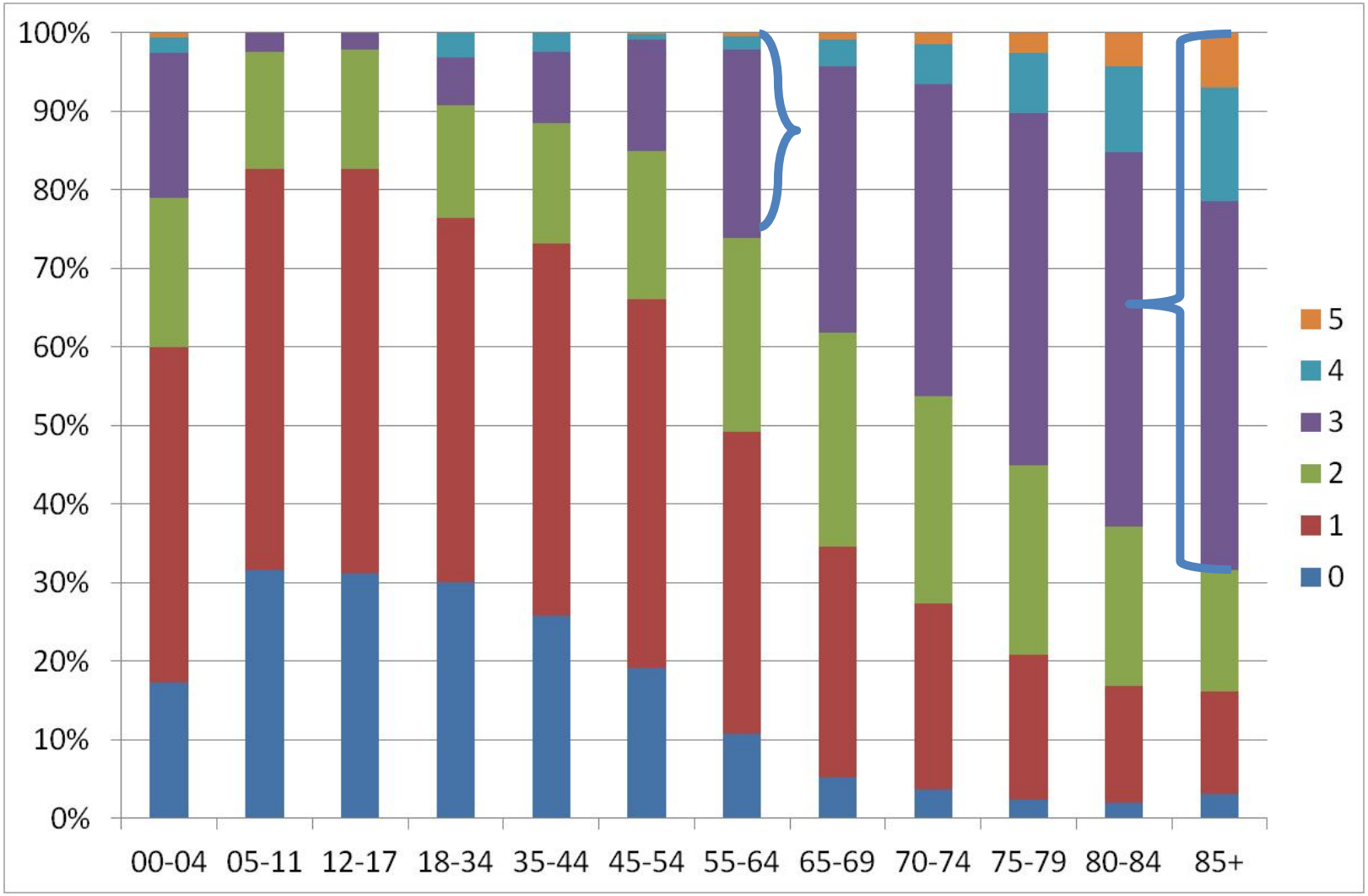
COMORBIDITY OF PATIENTS WITH CHF



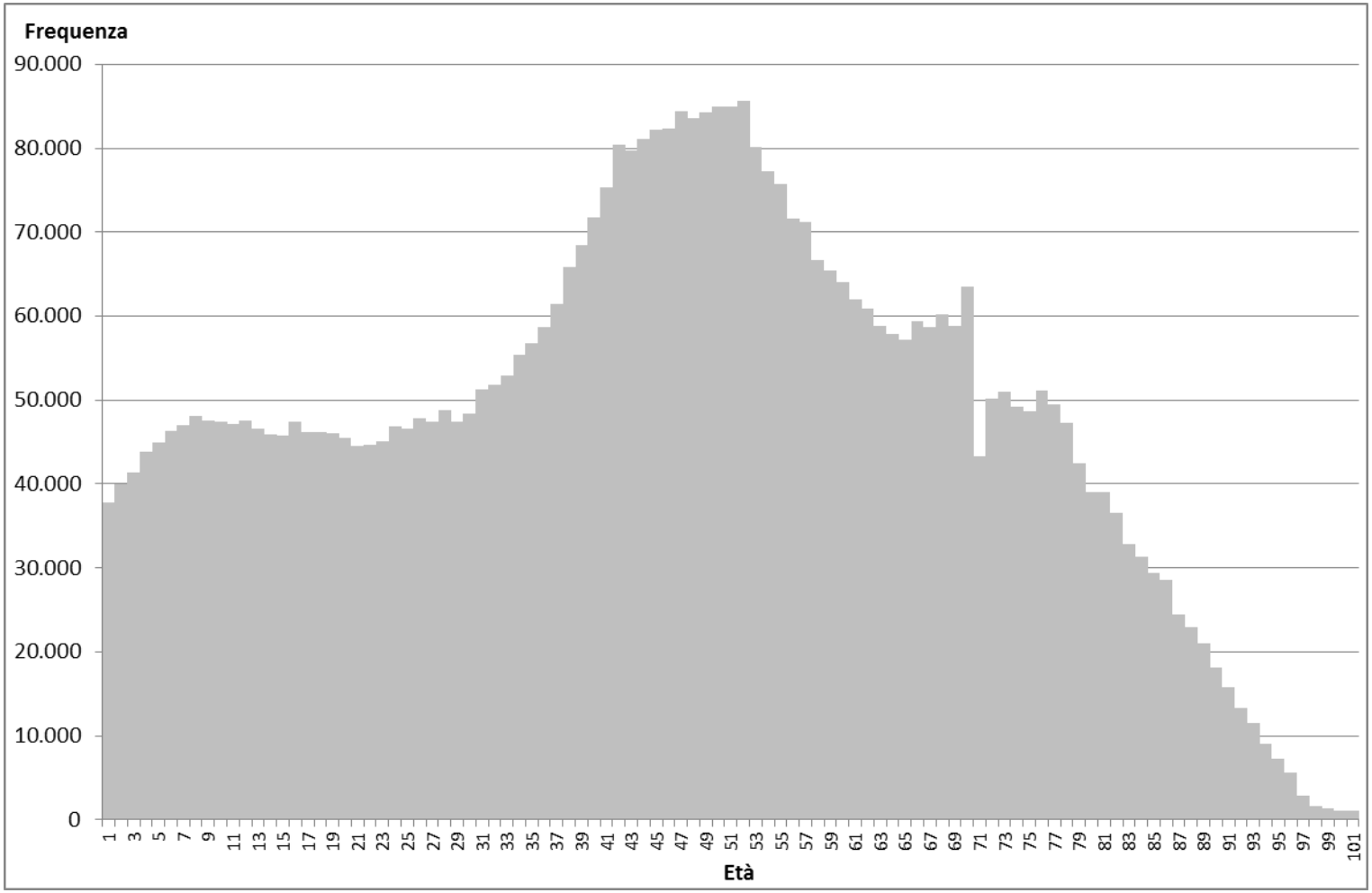
Population health: SMR



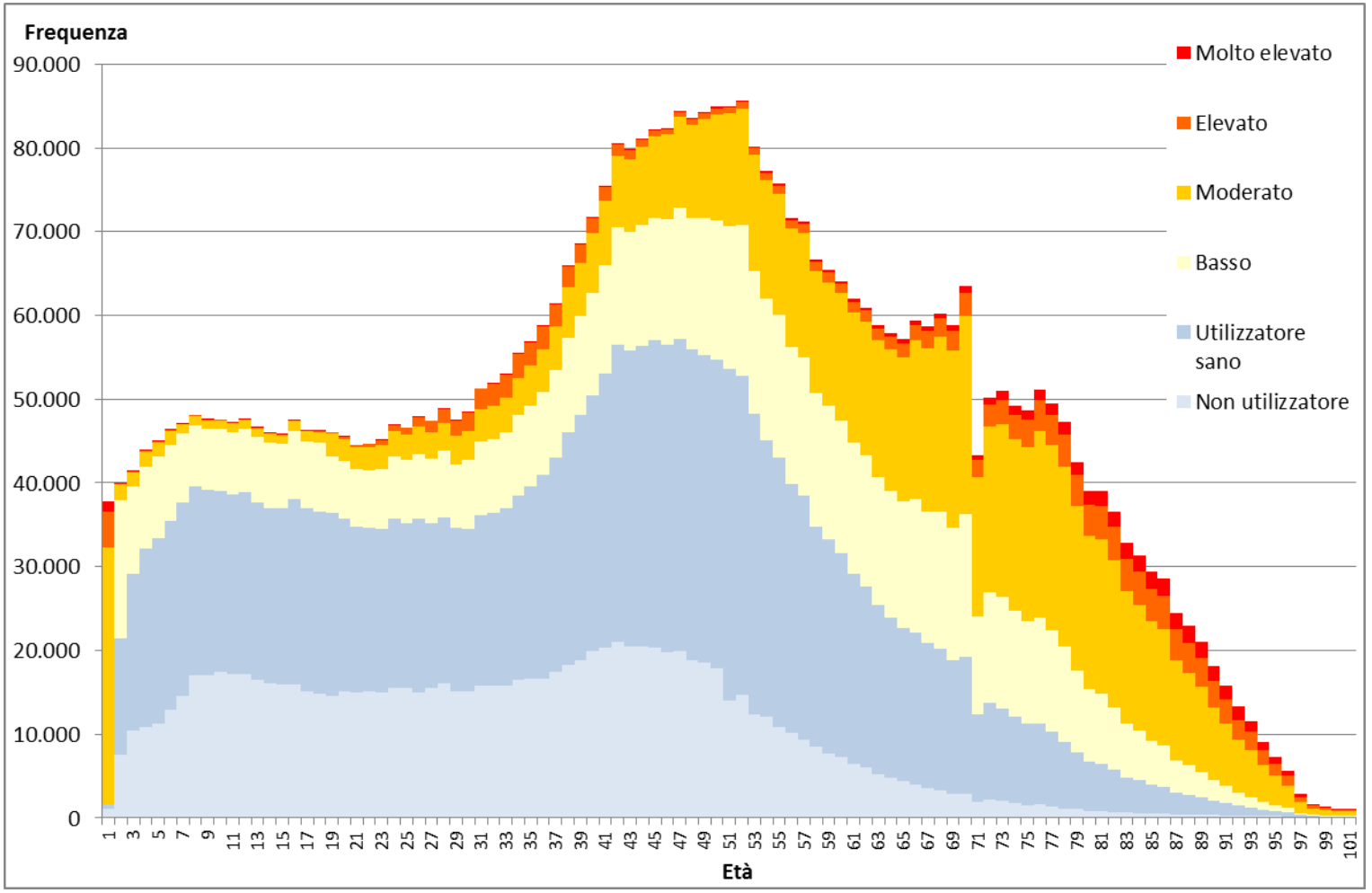
RUBs Distribution by age strata (RUBs measure of disease burden)



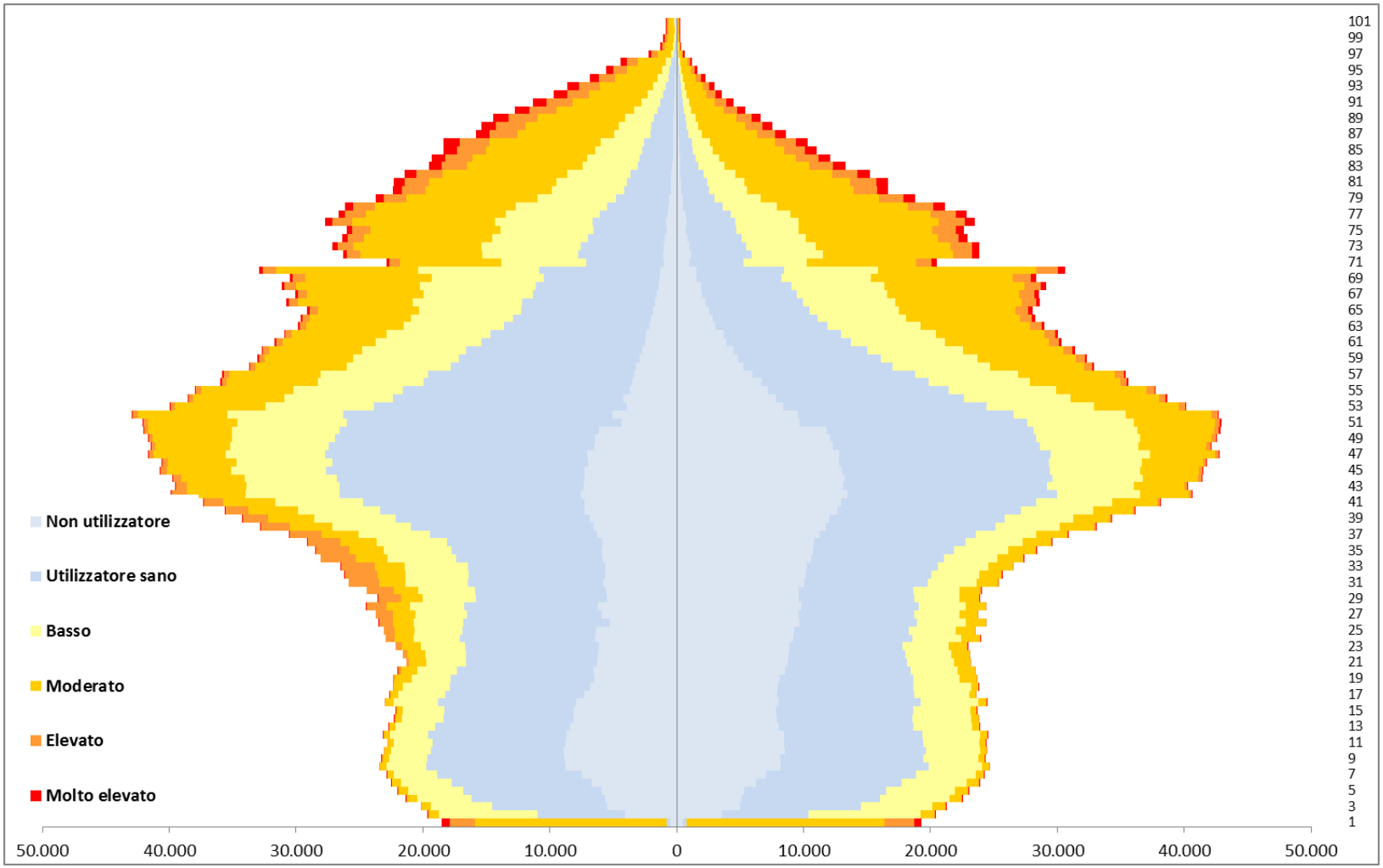
Distribution by age
ACG data. Year 2015. Regione Veneto



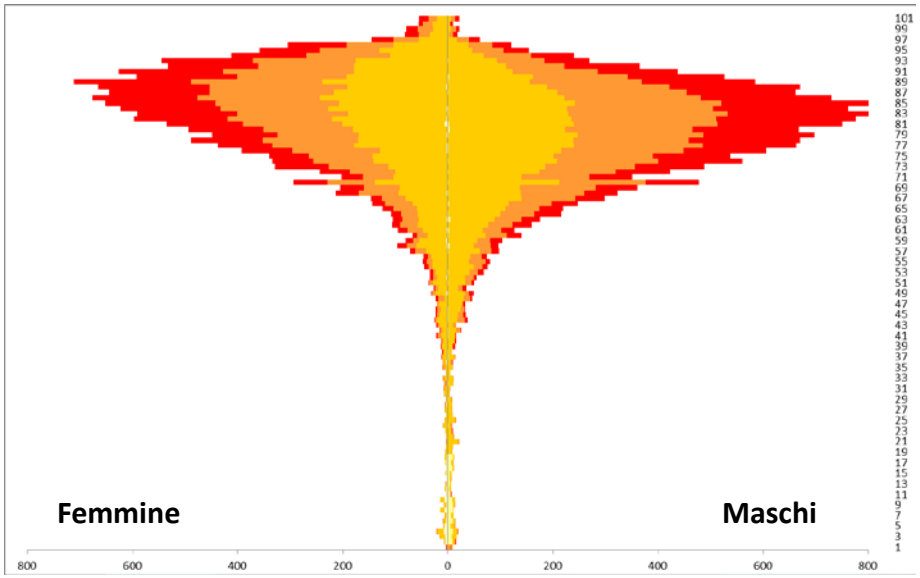
Distribution by age and disease burden (RUB)
ACG data. Year 2015. Regione Veneto



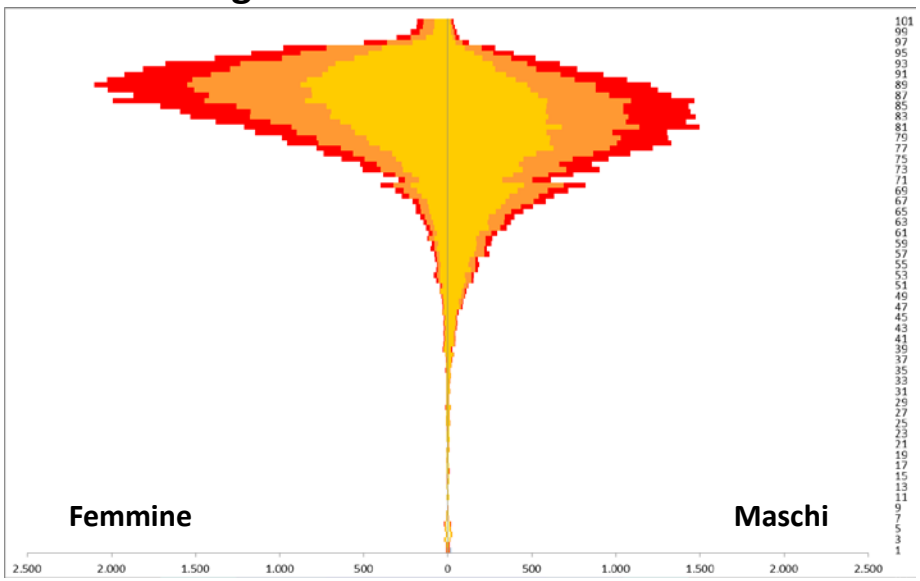
Population structure by age, gender and disease burden (RUB). ACG data. Year 2015. Regione Veneto



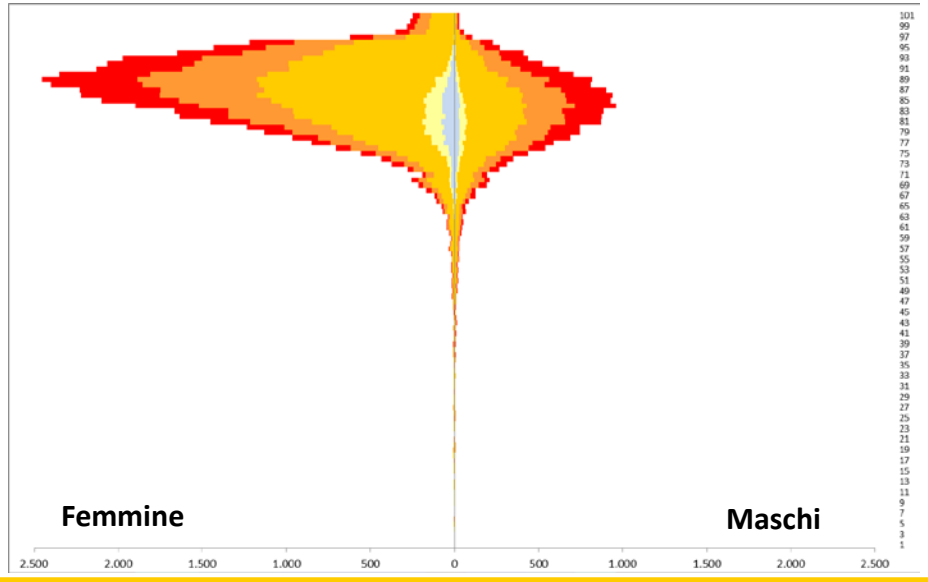
COPD



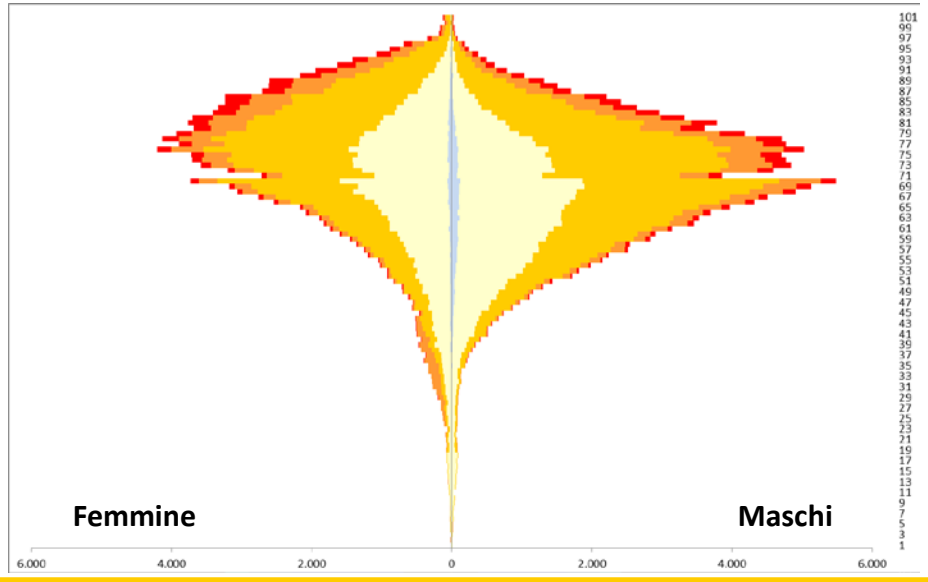
Congestive heart failure



Dementia

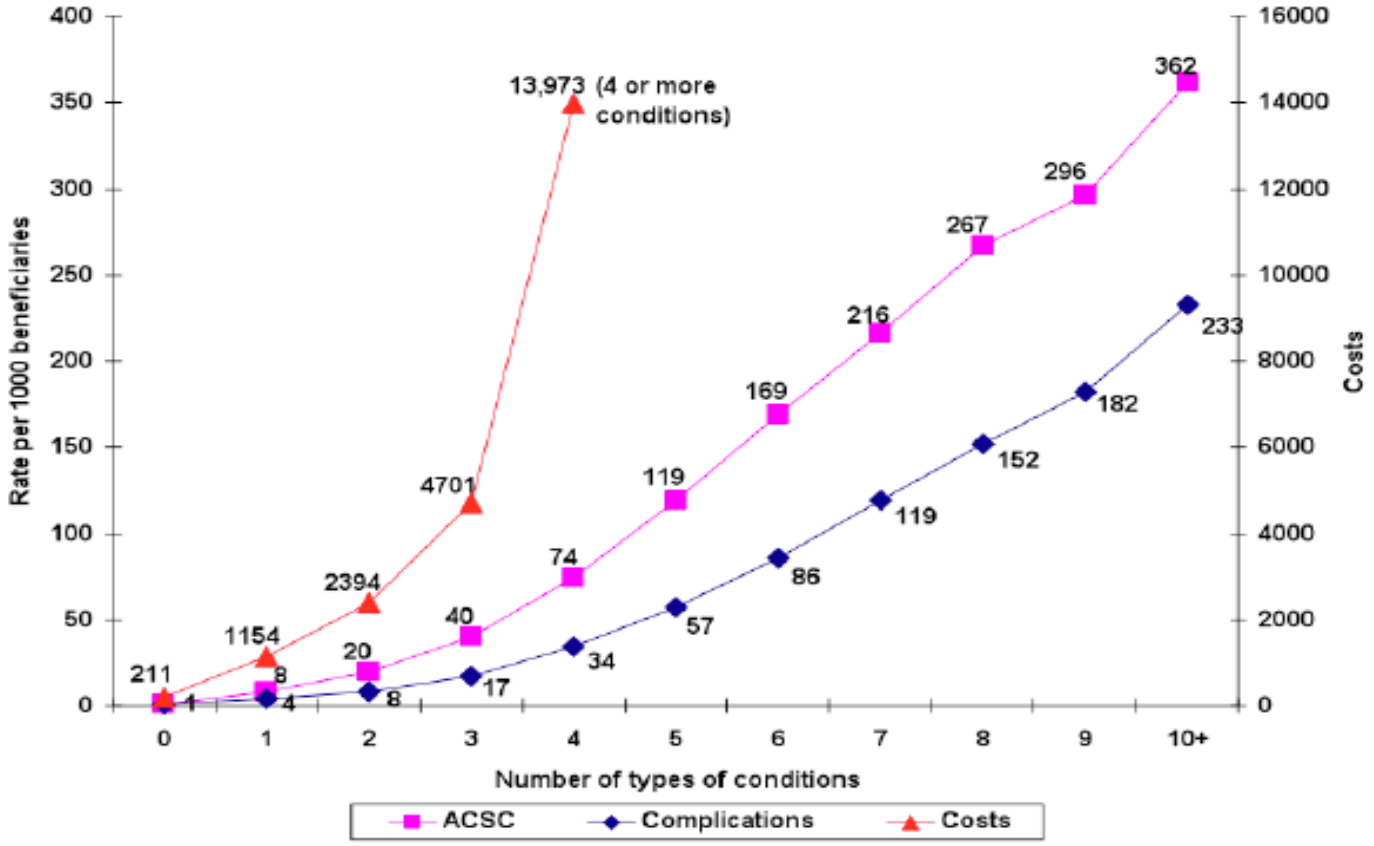


Diabetes



New approaches to multimorbidity and its impact on costs

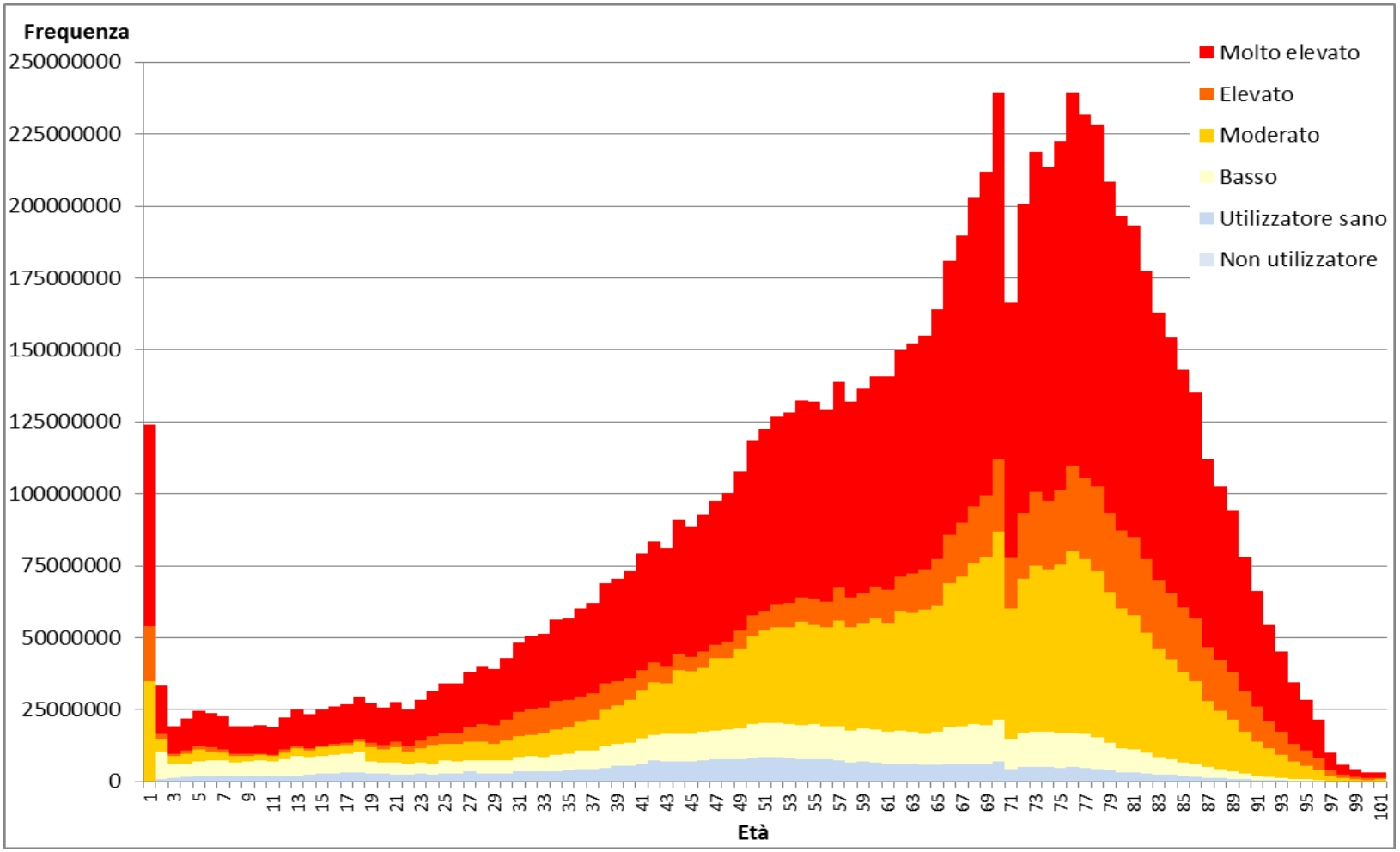
Comorbidity, Inpatient Hospitalization, Avoidable Events, and Costs*



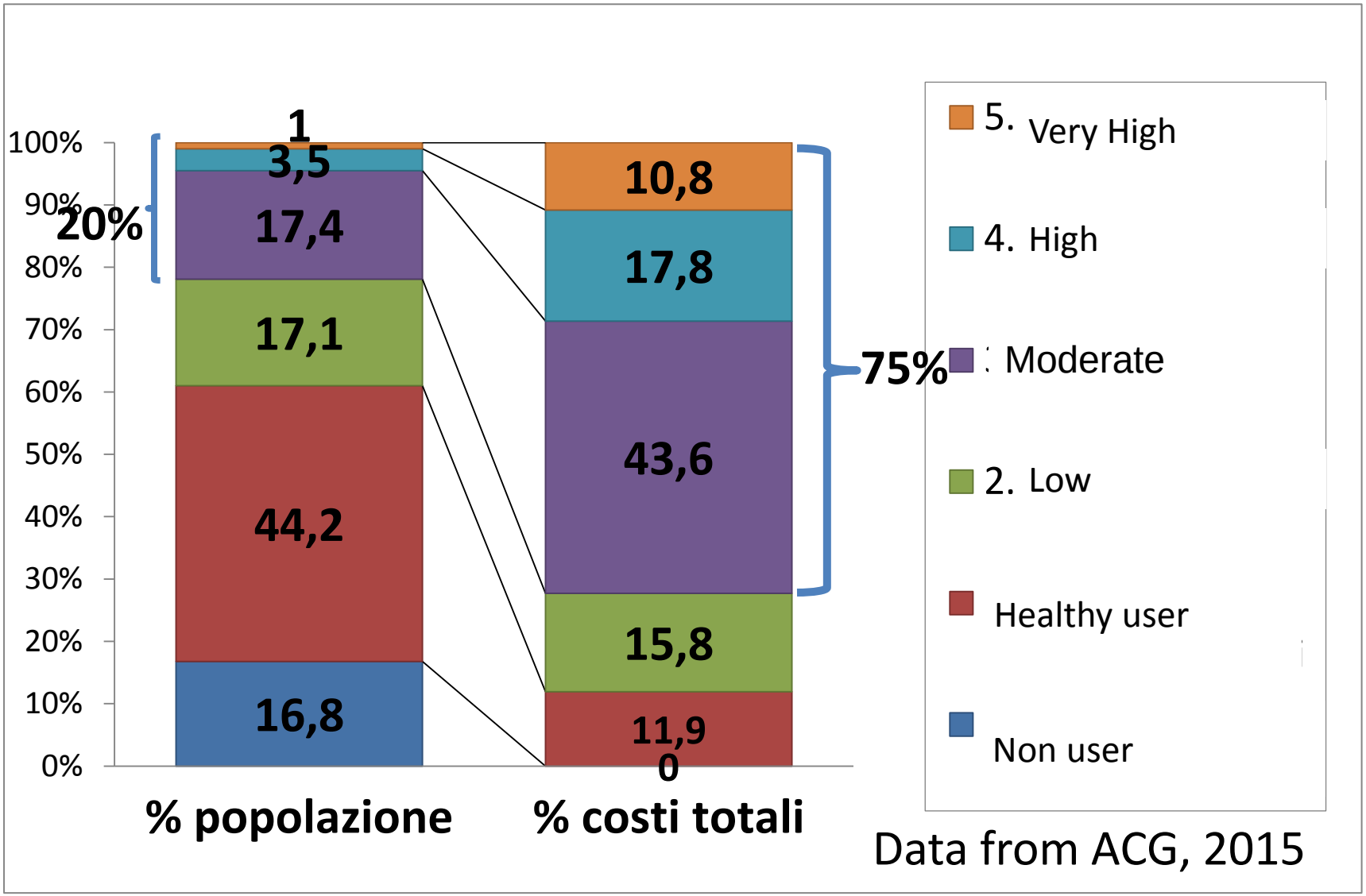
Source: Wolff et al, Arch Intern Med 2002; 162:2269-76.

*ages 65+, chronic conditions only

Total cost distribution by age and disease burden (RUB). ACG data. Year 2015. Regione Veneto

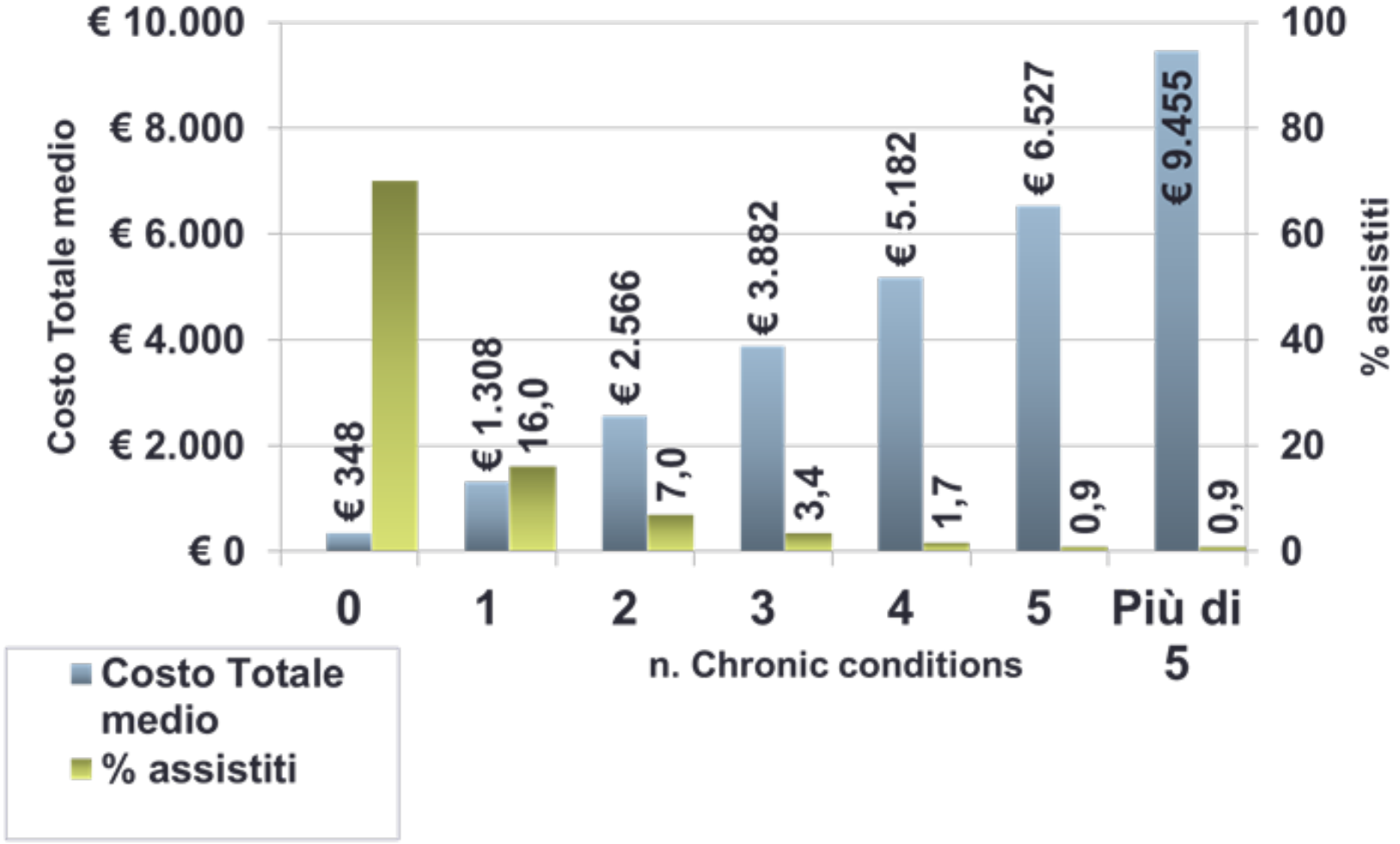


Population and costs by level of risk (RUBs)

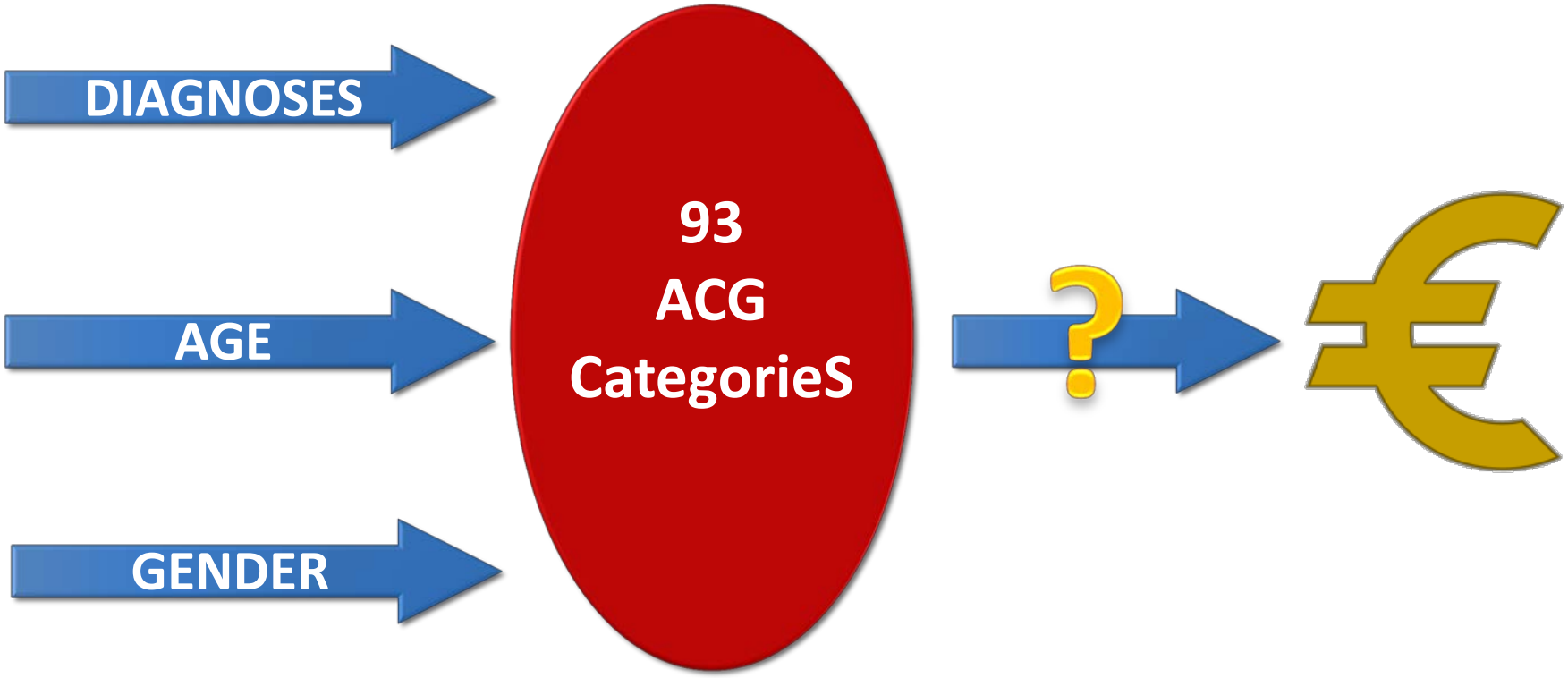


Data from ACG, 2015

Total average cost by number of chronic conditions. ACG data. Year 2015. Regione Veneto



Does multimorbidity explain cost variability?



How multimorbidity explains cost variability?

$$\text{costo} = a + b_1(\text{age}) + b_2(\text{sex}) + b_3(\text{ACG}) + b_4(\text{Rx-MG}) + e$$

Demographic variables

case-mix measures

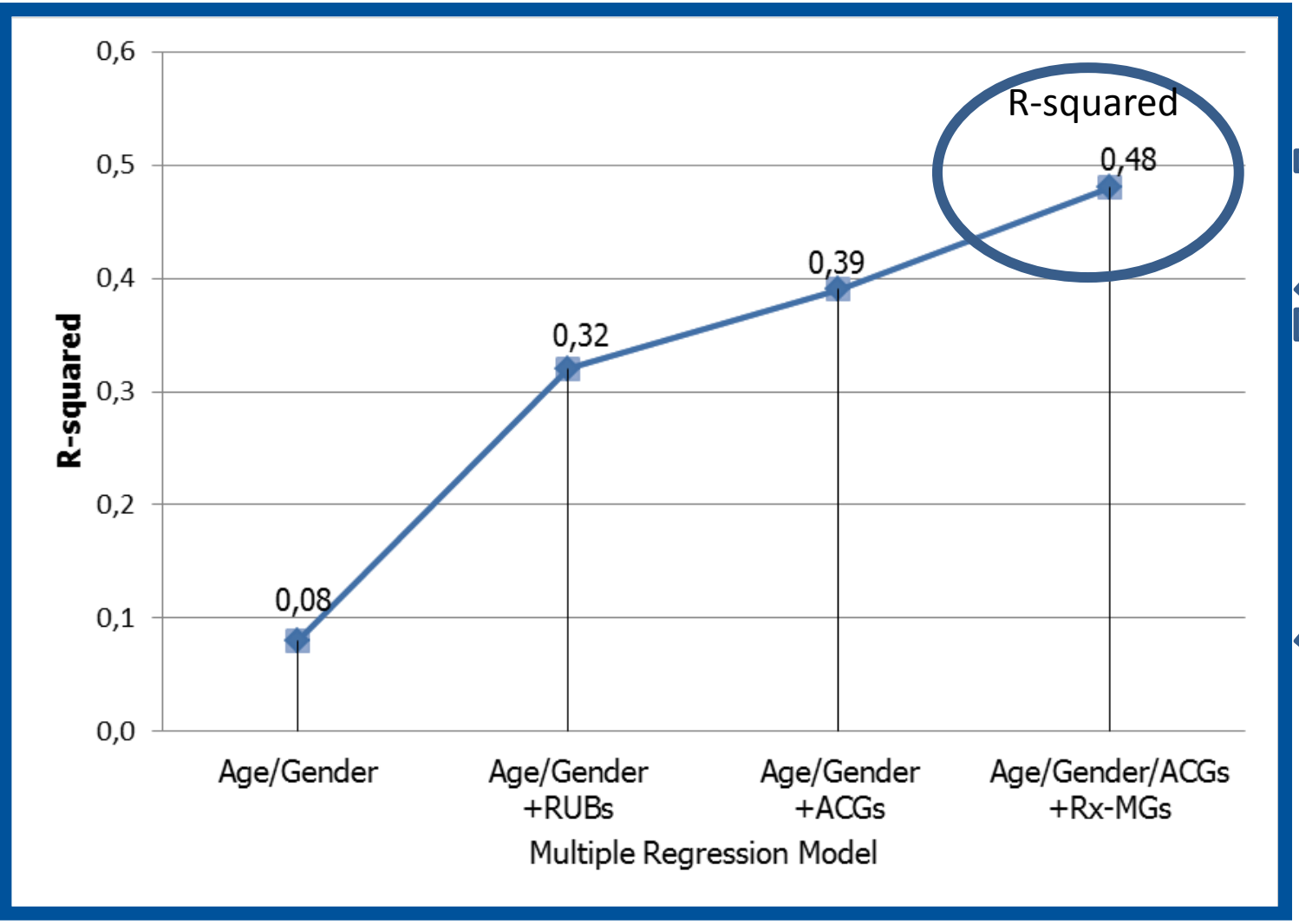
Dependent Variable

performance measure of the regression model

% Variance explained (R squared)

Explaining cost variability using ACG

R 2 = cost variability in multiple linear regression model



+24%
drugs

+ 52%
comorbidity

17%
age only

New approaches to multimorbidity and its chatacterization

The greater the morbidity burden, the greater the persistence of any given diagnosis.

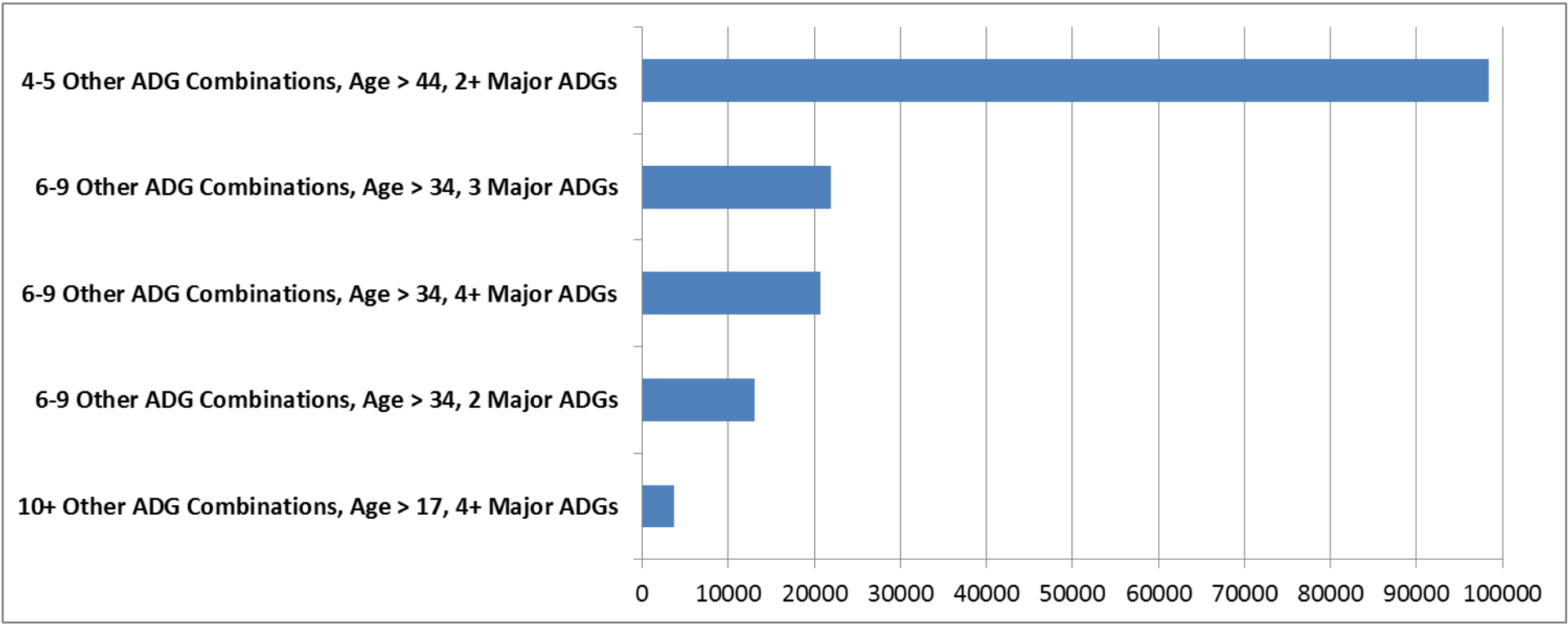
That is, with high comorbidity, even acute diseases are more likely to persist.

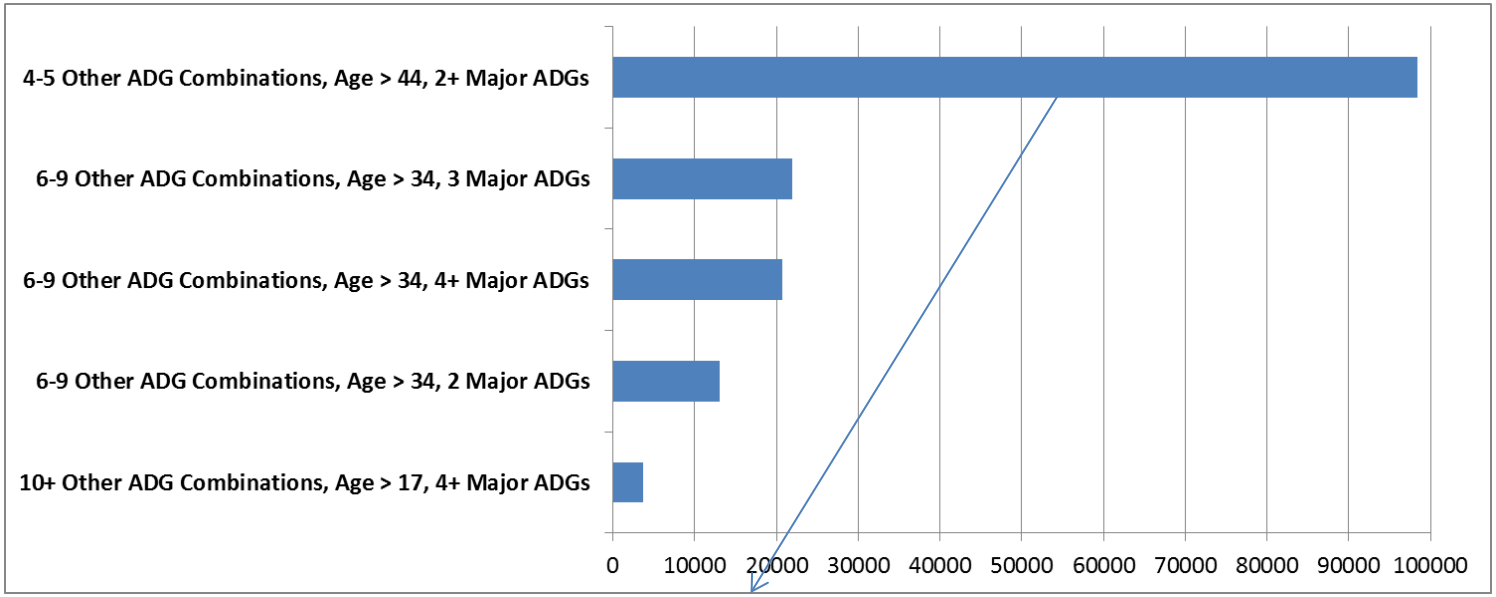
Starfield 08/06
CM 6598

Pateints with high and very high disease burden (RUB 4 and 5) age >= 50 years by Local trusts either community based or and in Nursing Homes. ACG data . Year 2015. Regione Veneto

Nuova Azienda ULSS	Non in struttura residenziale		In struttura residenziale	
	N	%	N	%
1-Dolomiti	6.192	4,6	1.689	7,1
2-Marca Trevigiana	22.696	16,8	4.662	19,7
3-Serenissima	18.765	13,9	2.962	12,5
4-Veneto Orientale	5.730	4,2	794	3,4
5-Polesana	9.134	6,8	1.359	5,7
6-Euganea	26.186	19,4	3.394	14,4
7-Pedemontana	7.746	5,7	2.010	8,5
8-Berica	11.211	8,3	2.990	12,7
9-Scaligera	27.187	20,2	3.775	16,0
Totale	134.847	100,0	23.635	100,0

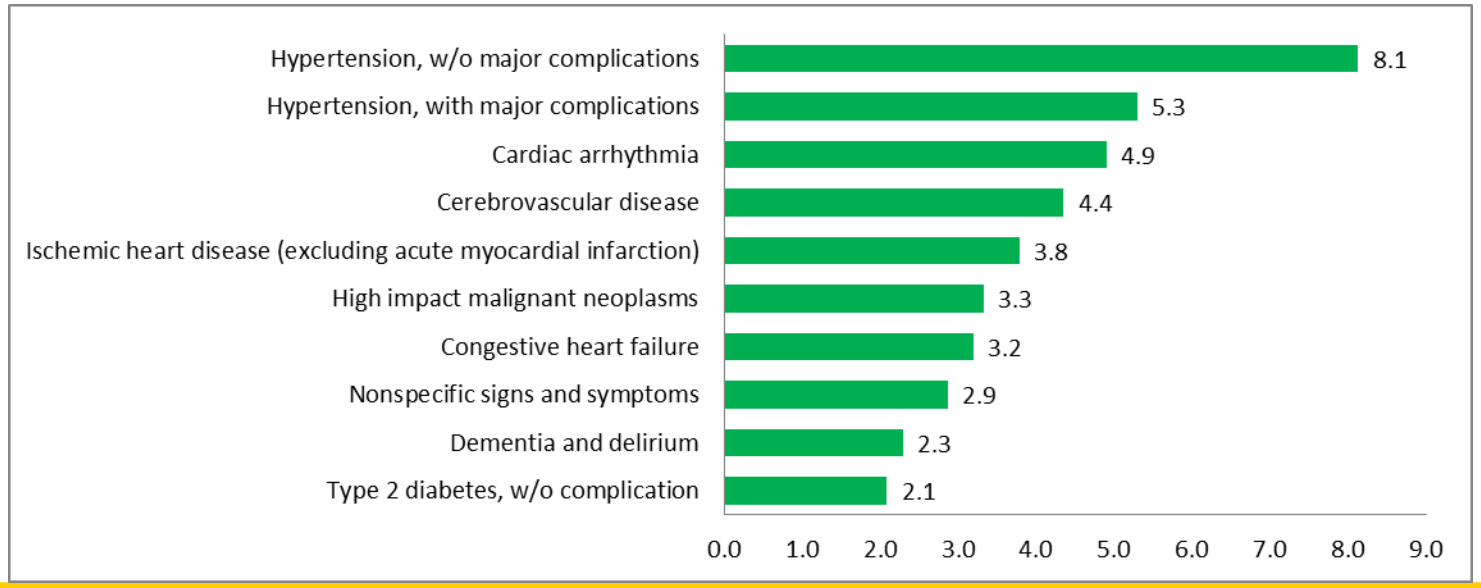
99,5% of subjects in RUB 4 and 5 (high and very high) age>=50 years falls into one of the following ACG categories

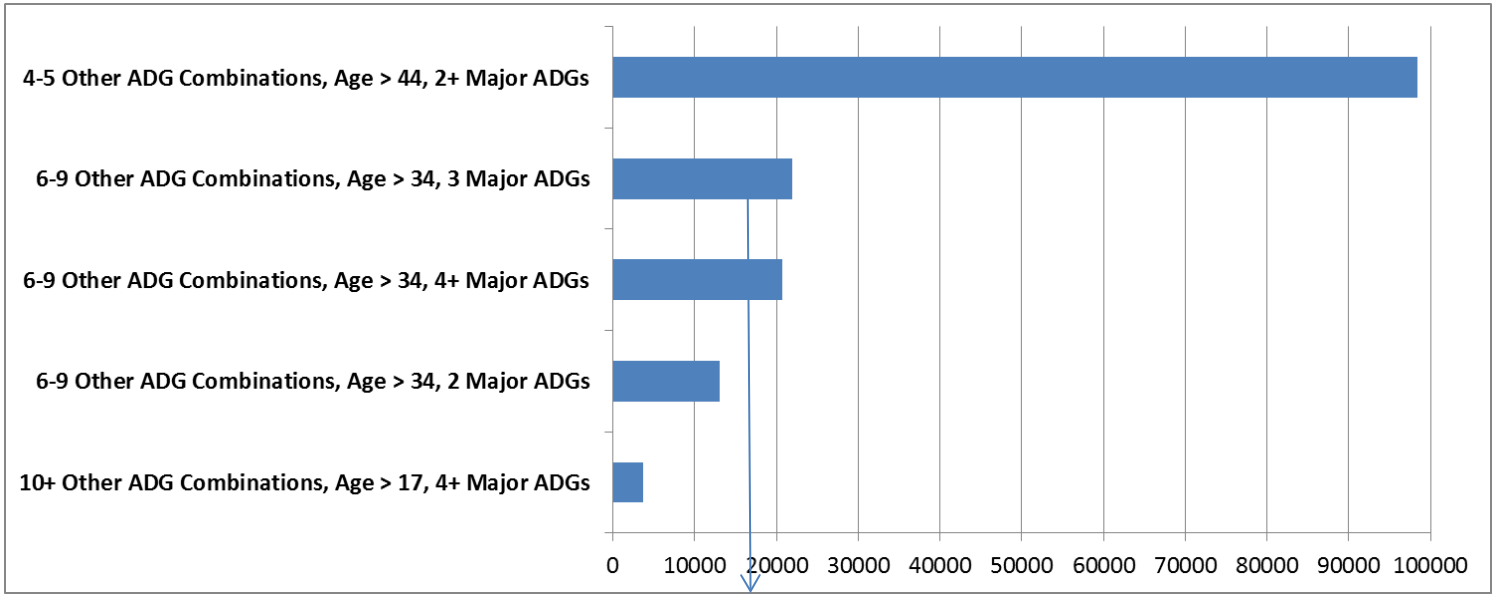




N=98.401 (62% of subjects in RUB 4 and 5 age>=50 years)

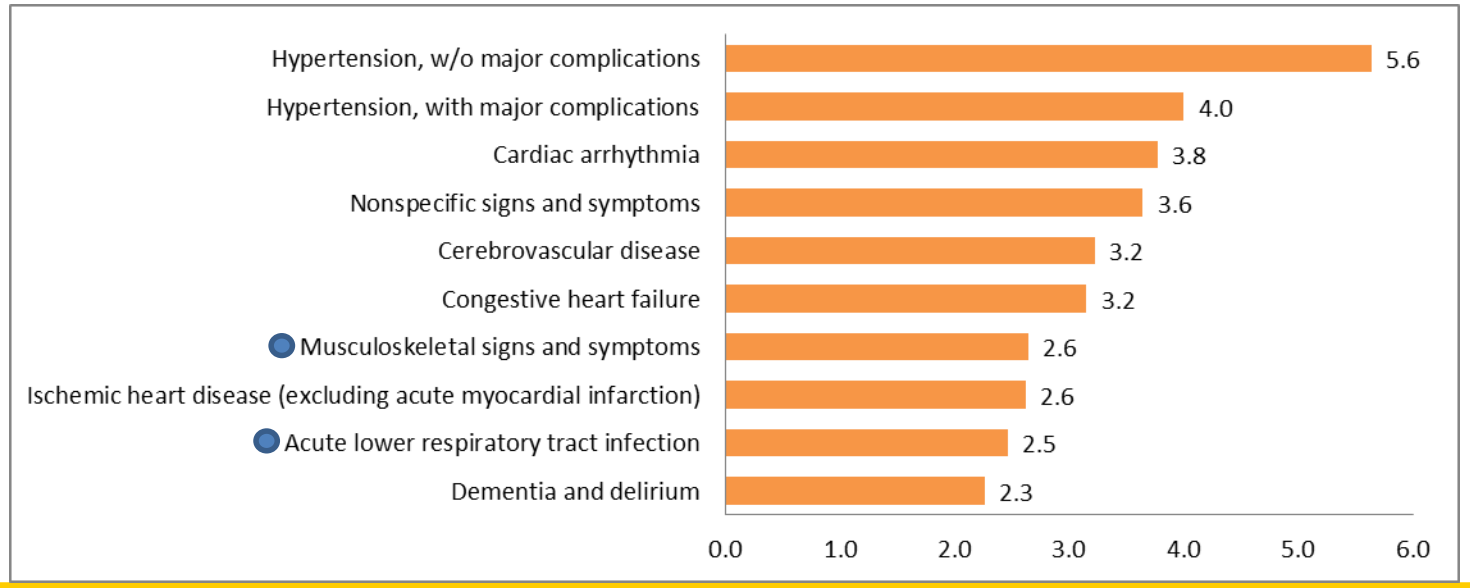
First 10 EDCs (% distribution)

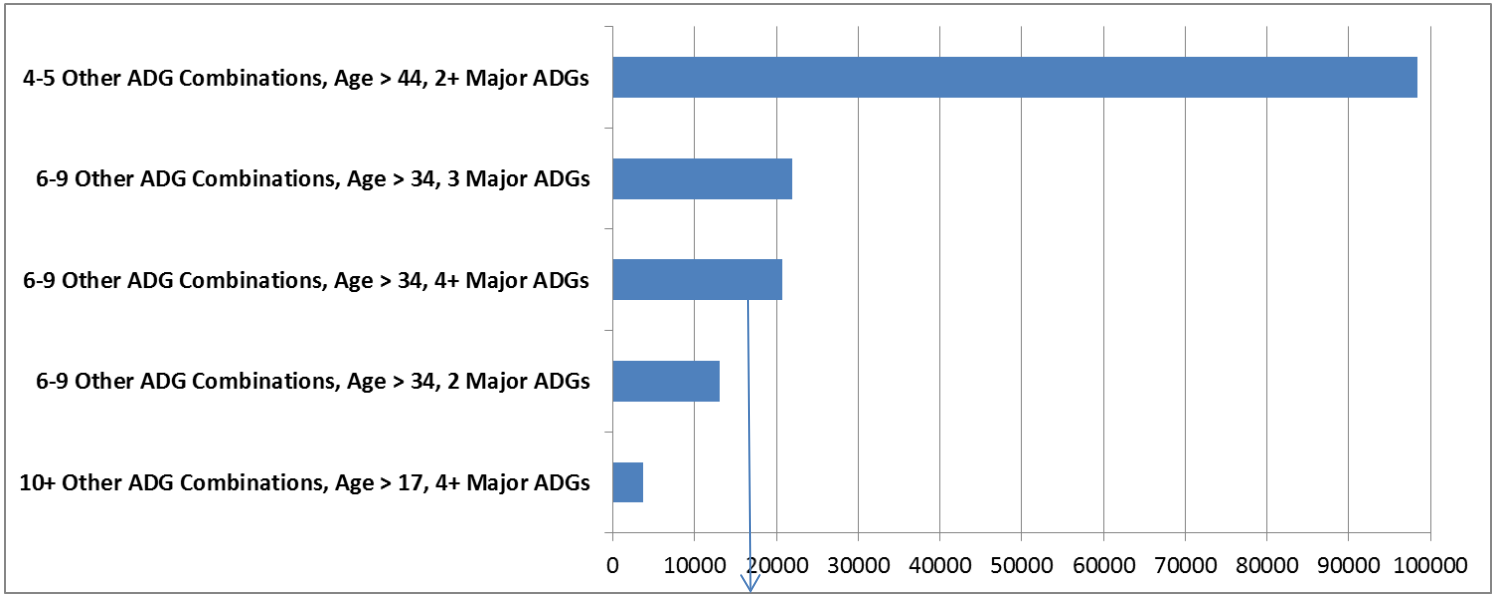




N=21.964 (14% of subjects in RUB 4 and 5 age>=50 years)

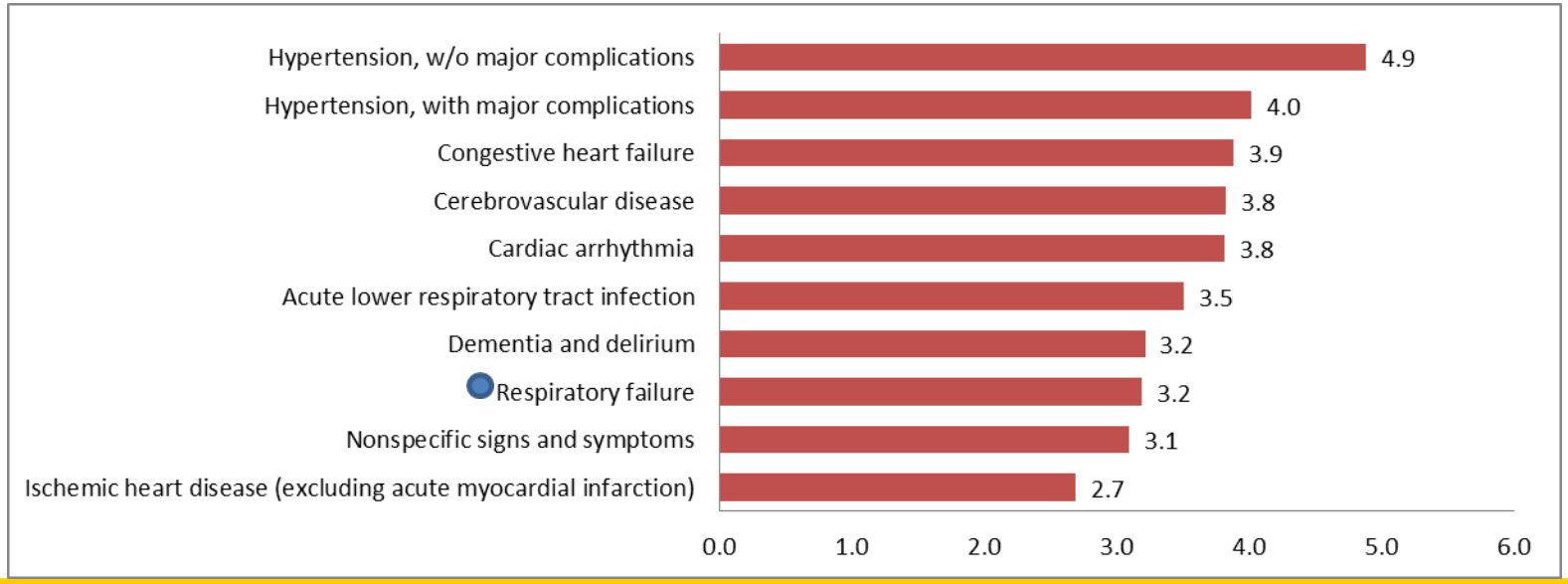
First 10 EDCs (% distribution)

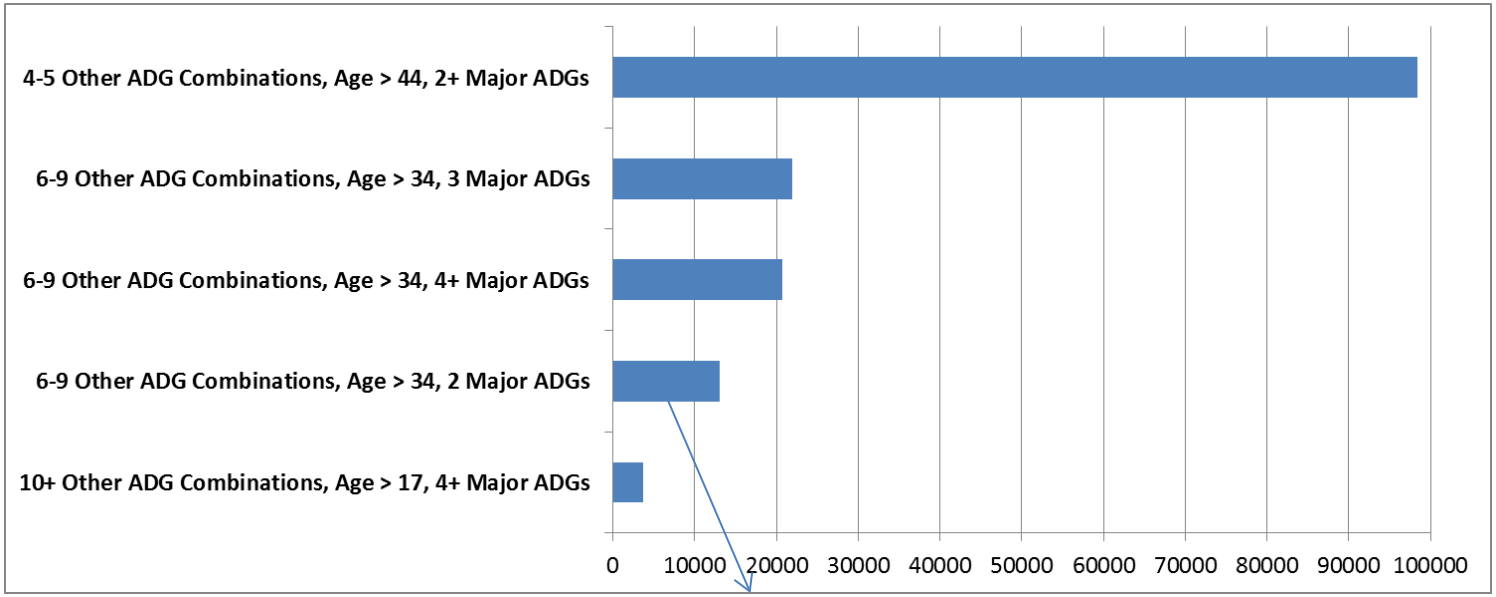




N=20.748 (13% of subjects in RUB 4 and 5 age>=50 years)

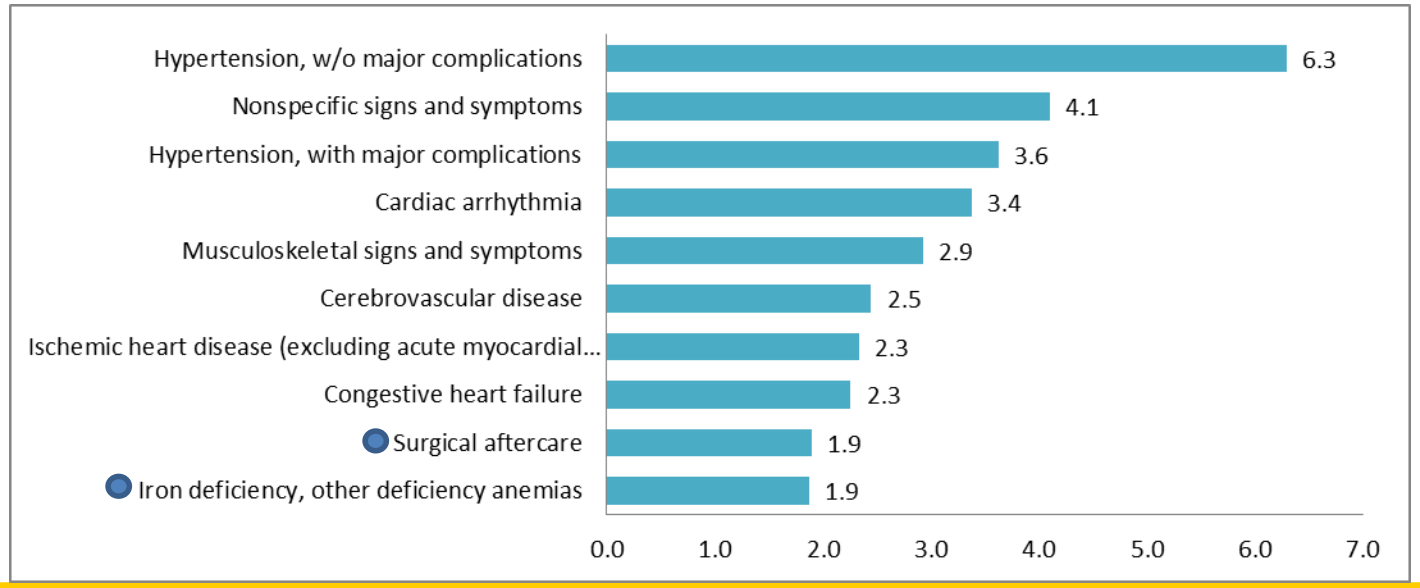
First 10 EDCs (% distribution)

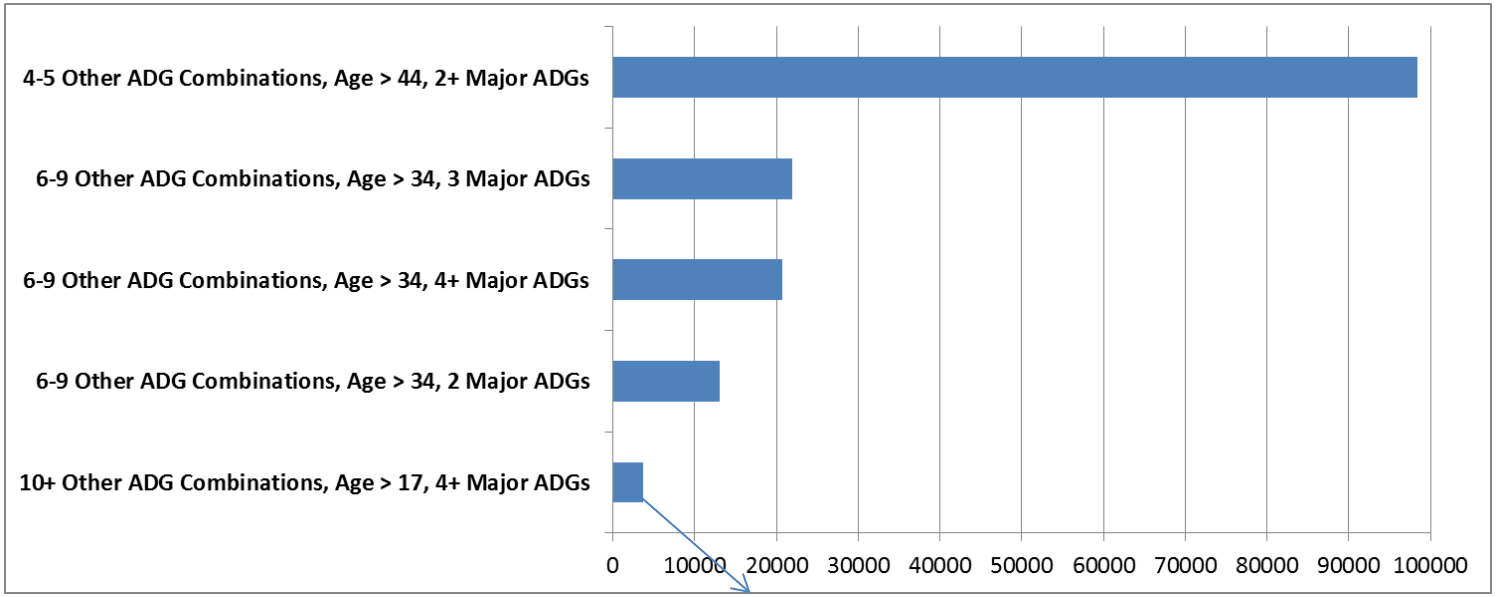




N=13.000 (8% of subjects in RUB 4 and 5 age>=50 years)

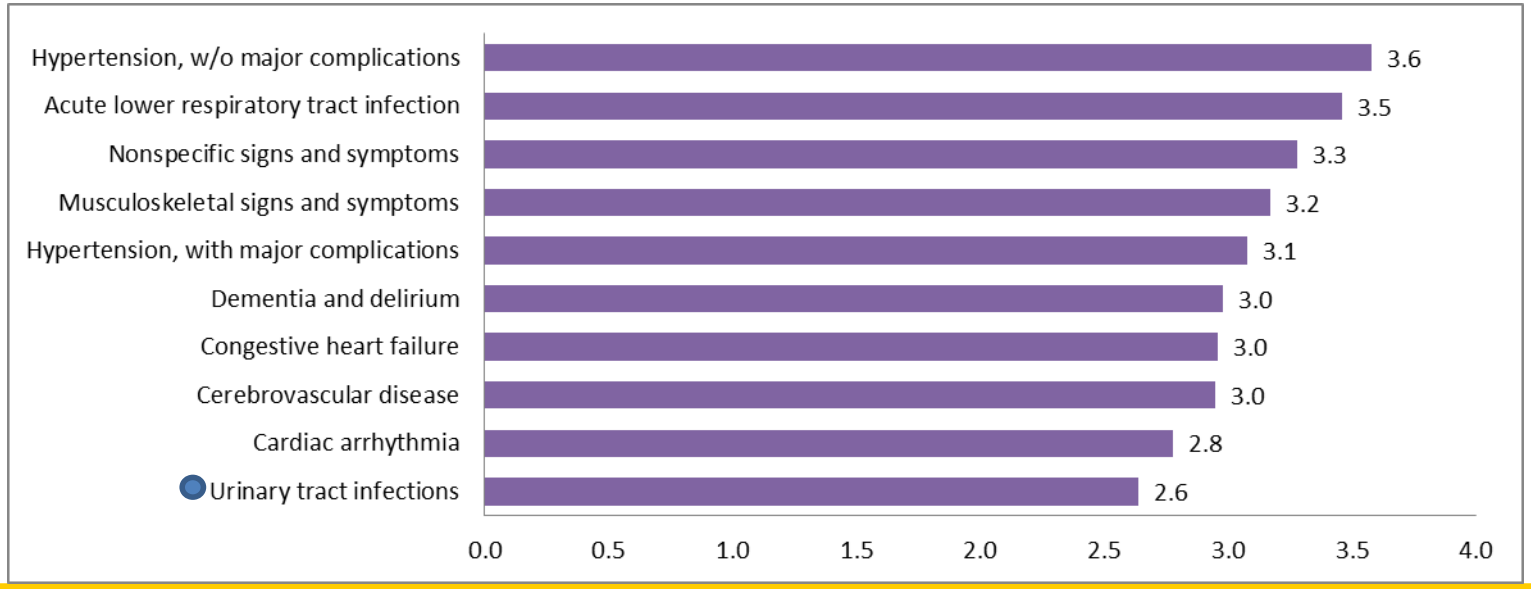
First 10 EDCs (% distribution)



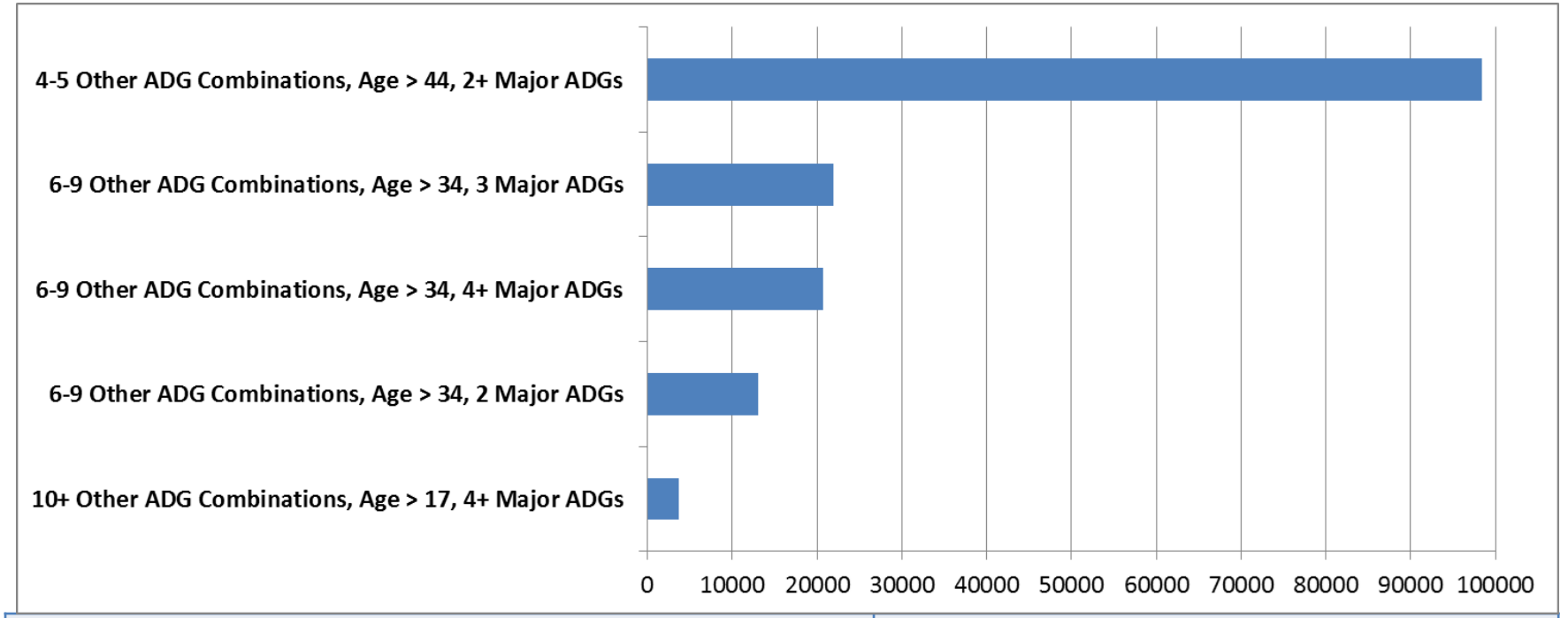


N=3.656 (2% of subjects in RUB 4 and 5 age>=50 years)

First 10 EDCs (% distribution)

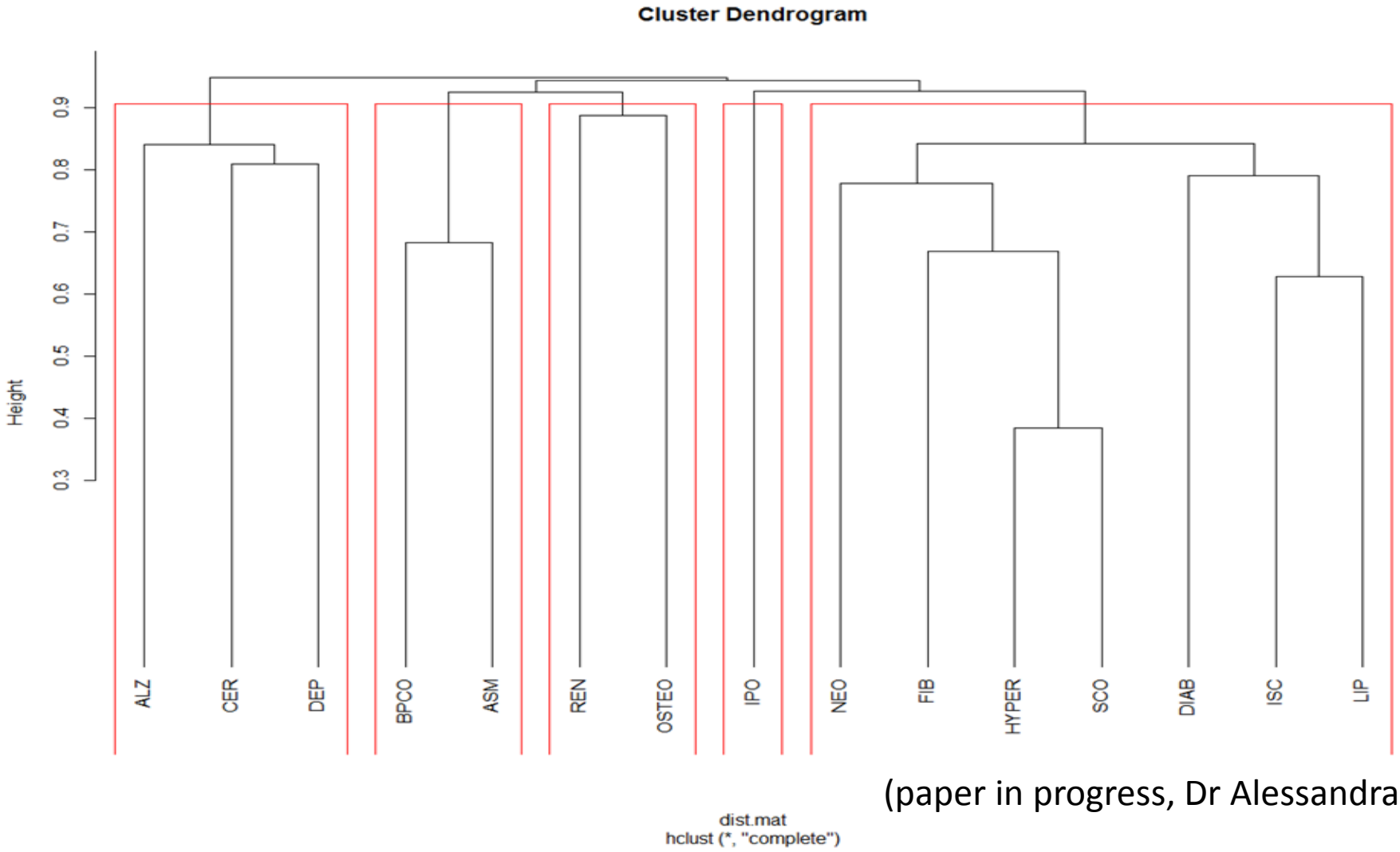


99,5% of subjects in RUB 4 and 5 (high and very high) age>=50 years falls into one of the following ACG categories



ACG	Average Cost in Euros population age >=50
4-5 diseases, two or more major conditions , age > 44	6.696
6-9, diseases, 2 major conditions , age >34	9.137
6-9 diseases, 3 major conditions , age >34	11.313
6-9 diseases, 4 major conditions age >34	13.261
10 or more diseases , 4 or more major conditions age >17	18.789

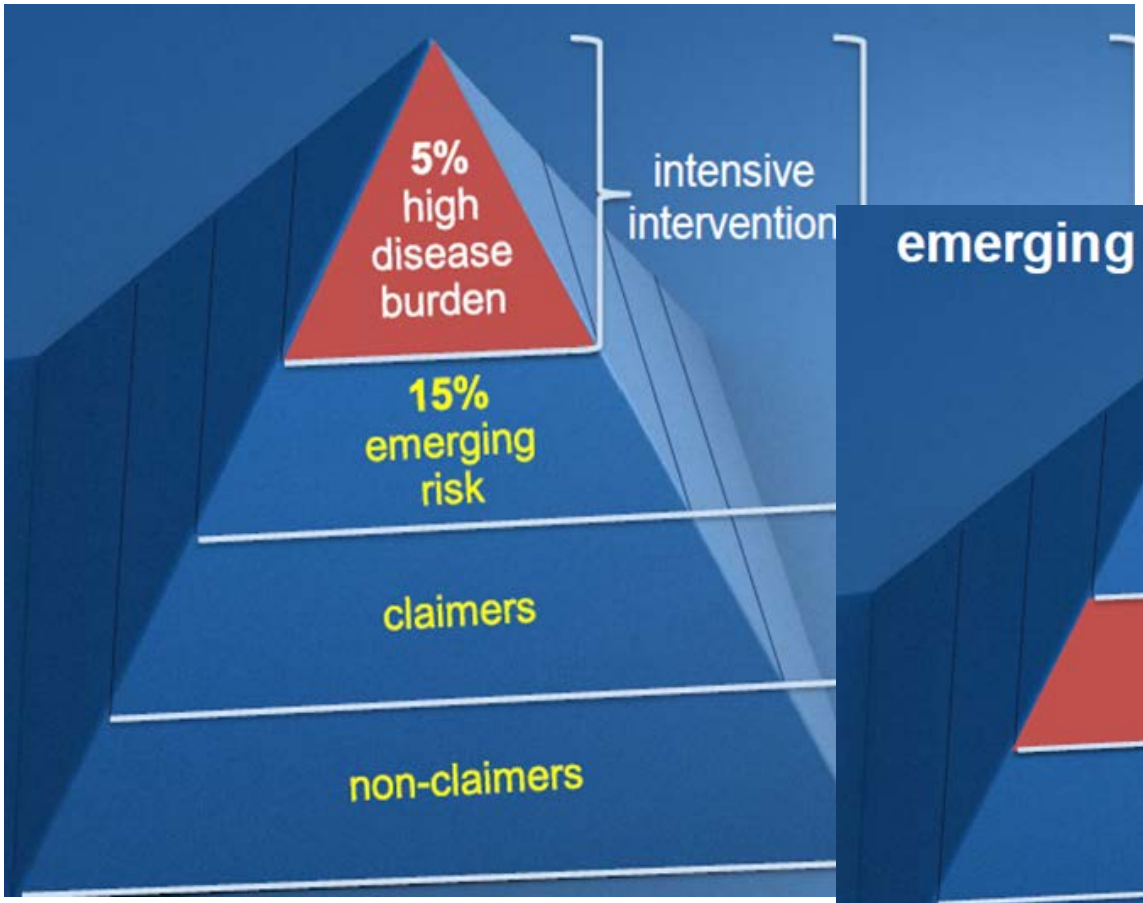
Dendrogramm for cluster analyses in ierarchical order of chronic diseases Fonte ACG

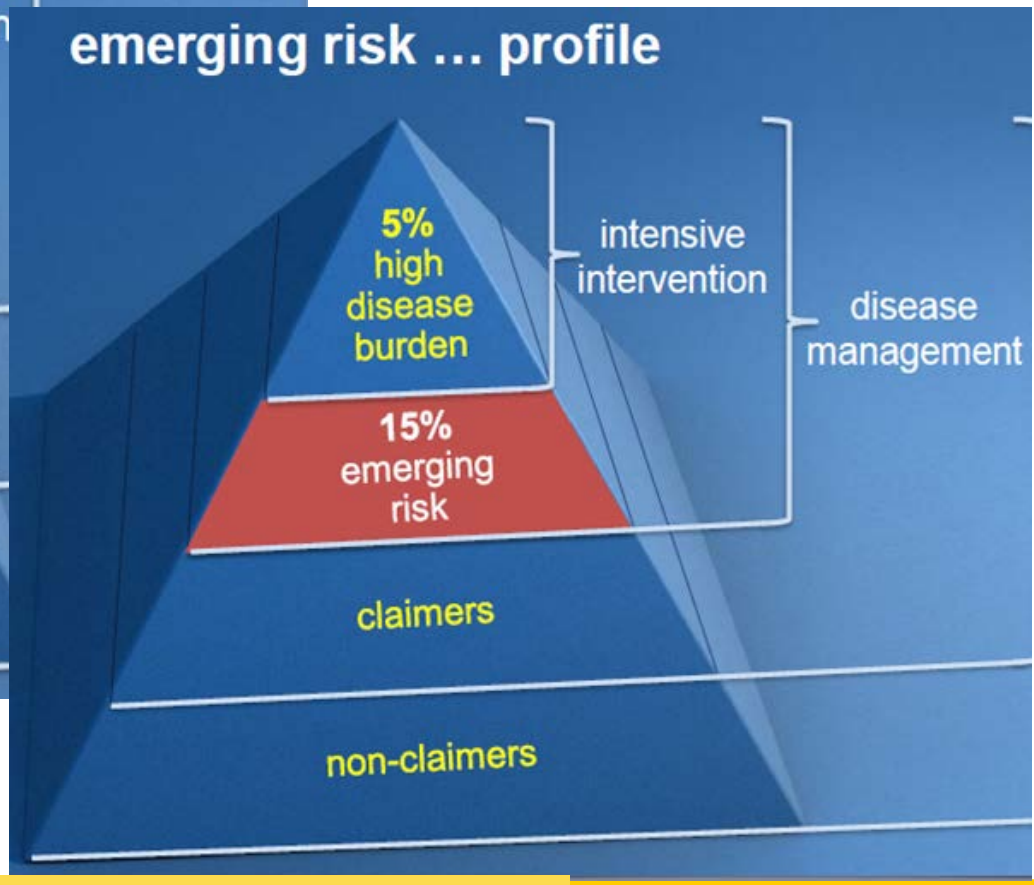


(paper in progress, Dr Alessandra Buja)

Care integration and person centered approach

Stratifying the population and targeting High risk and emerging risk populations





What is needed is person-focused care over time, NOT disease-focused care

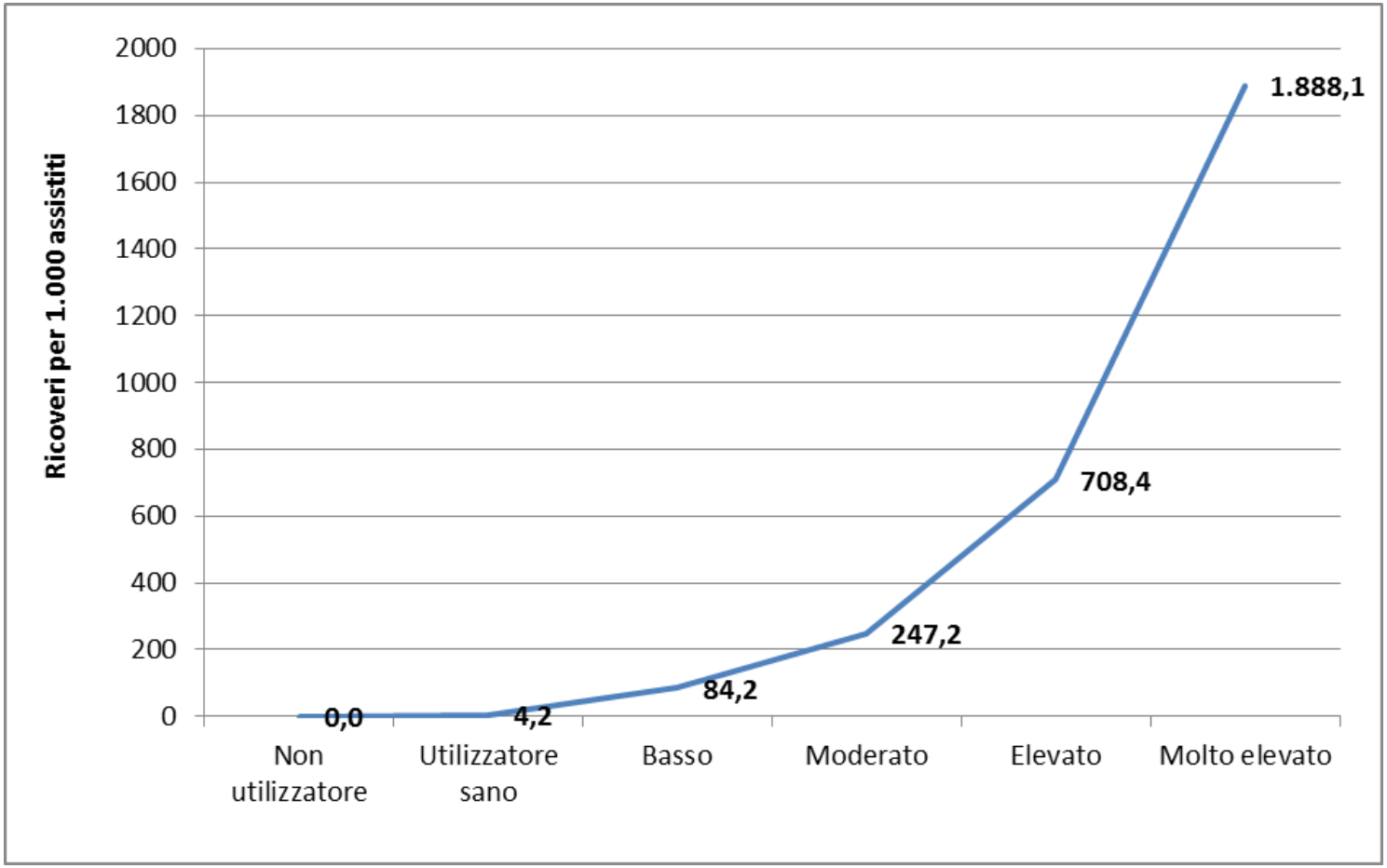
When people (not diseases) are the focus of attention

- Outcomes are better
- Side effects are fewer
- Costs are lower
- Population health is greater

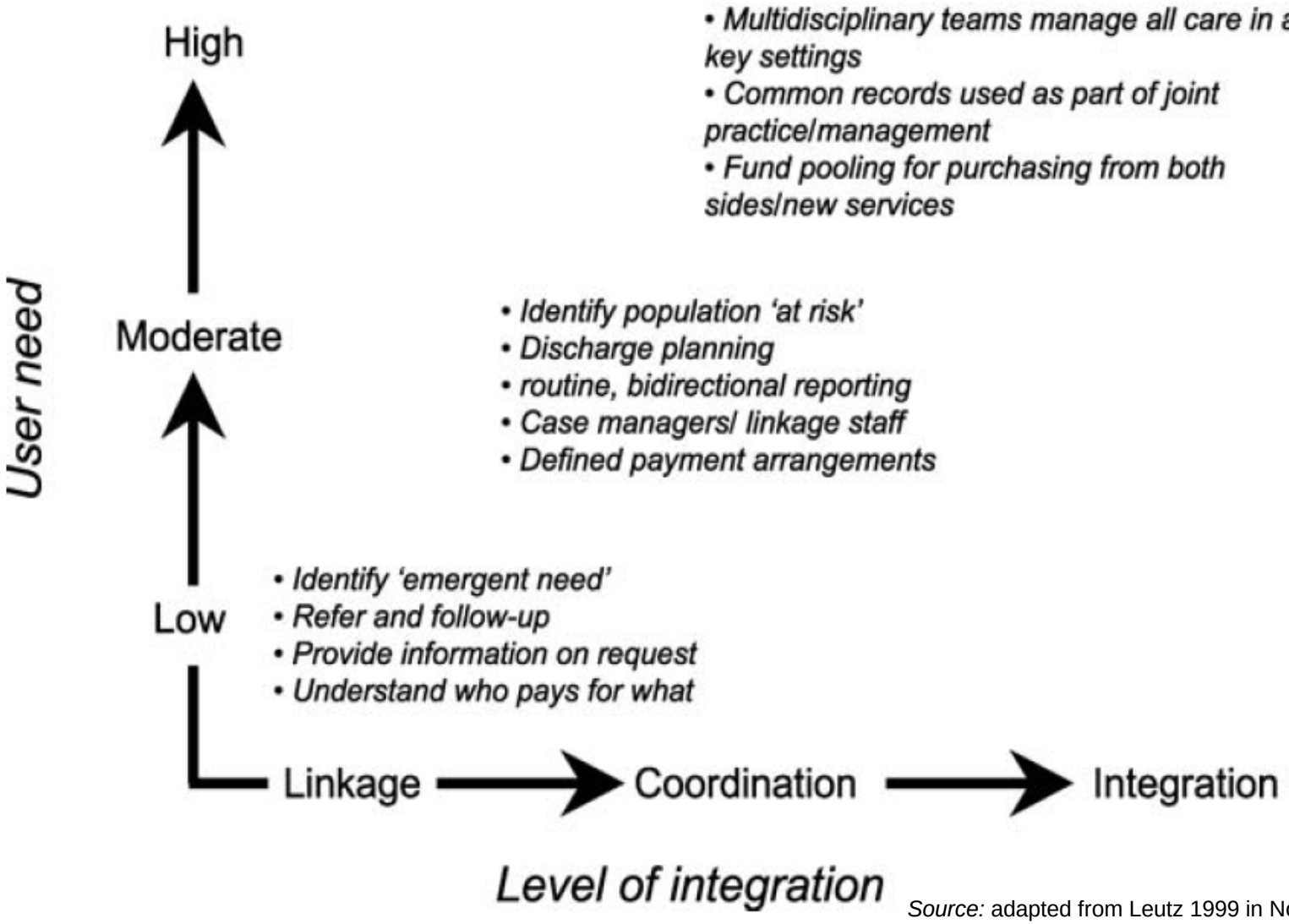
Source: Starfield et al, Health Aff 2005; W5:97-107.

Starfield 09/07
PC 6605 n

Hospitalization rate per 1.000 persons
ACG data. Year 2015. Regione Veneto



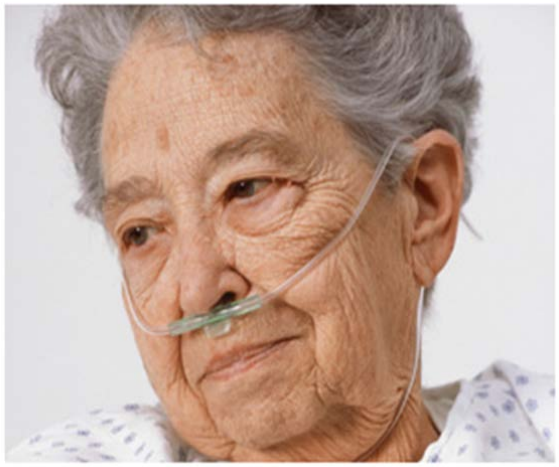
Care for multimorbidity demands higher integration



Source: adapted from Leutz 1999 in Nolte & McKee (2008)

Ridesign models of care : innovative intervention

- Population focused but person centered
- Targeting high and emerging risk persons
- Evidence based
- Adapted from validated models
- Comprehensive
- Personalized
- Based on team work
- Granting continuity



REGIONE DEL VENETO

Case finding of patients with multimorboidity with ACG care management lists

Patient Id	Age	RUB	Total Cost	Rescaled Total Cost Resource Index	Probability High Total Cost	Probability IP Hospitalization
1002050	46	4	53.454,74	22,85	0,95	0,49
1014372	76	5	38.975,03	18,97	0,95	0,60
1003706	63	4	14.089,49	20,87	0,95	0,25
1015610	87	3	19.267,75	23,35	0,95	0,60
1005655	81	4	18.749,54	24,50	0,95	0,63
1016156	58	5	53.476,02	21,61	0,95	0,34
1043878	70	4	10.215,42	19,32	0,95	0,48
1016580	84	4	12.638,04	18,64	0,95	0,47

Care Management Program

Patient's enrollment
Informed consent
Comprehensive assessment

Data from the initial assessment is compared with evidence based guidelines

Care Planning : Creation of the Care Plan

Translation into Action Plan for patients and caregivers

Follow up by phone calls, home visits and office visits

REVIEW

Intervention of Integrated Care in Primary Care

Integration of 40 care –manager nurses, 32 GPs with their MH team
300 patients with multimorbidity followed up for two years

<u>care management based on team work</u>.

- **The nurse follows a limited number of patients**
- **20-40 patients from care management lists**
- **Approx. 20 patients per nurse.**

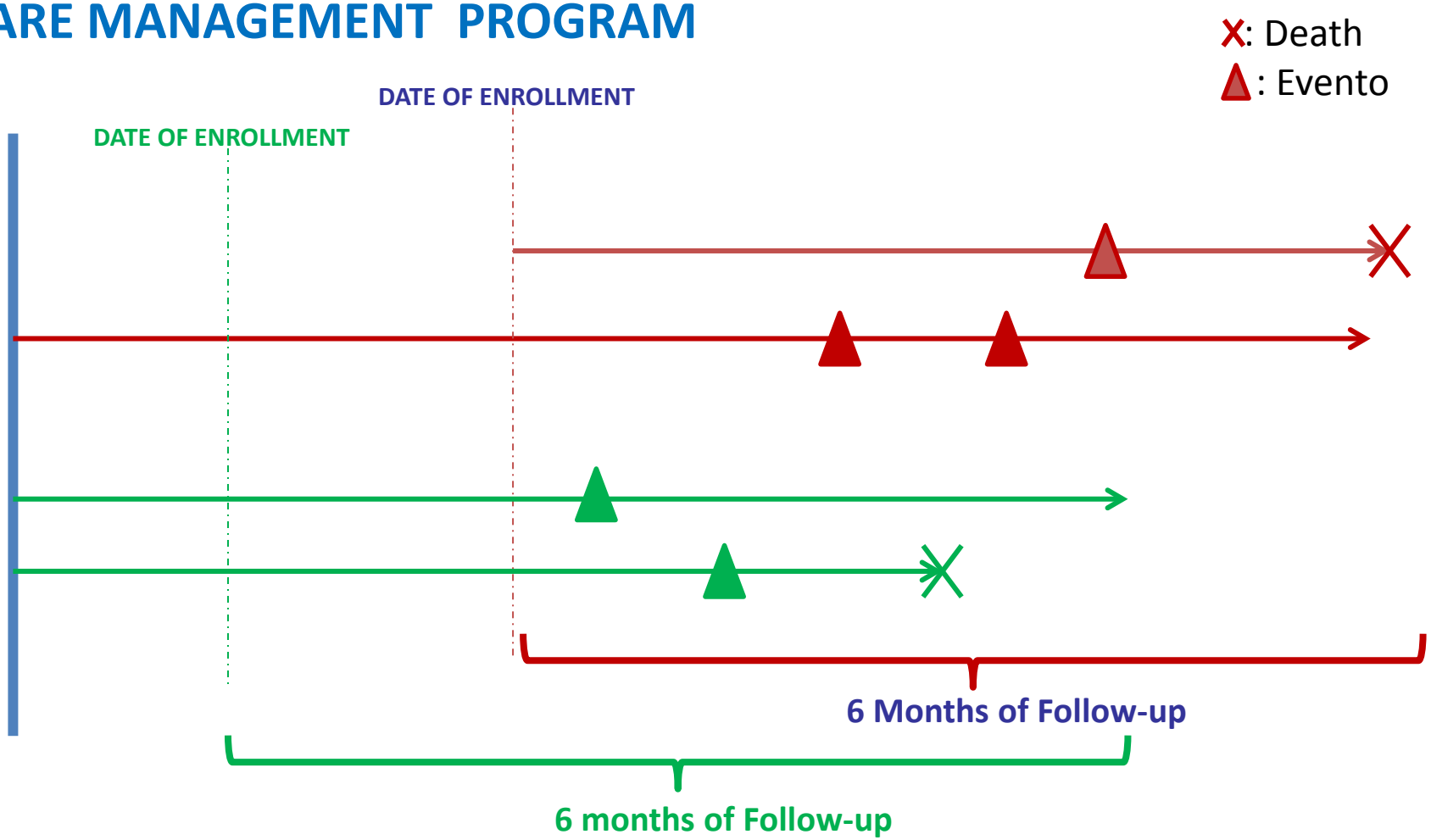
Invitation and consent (enrollment by GP)

Home visits by the case manager nurse

Integrated Care Planning

- Patient preferences
- Care plan shared by GP and Case-manager Nurse
- Action Plan for patient and care-giver .
- Active monitoring with calls, home visits and outpatient visits.
- Team meeting and follow-ups

CARE MANAGEMENT PROGRAM



Cases compared with controls matched from the general population using the propensity score method

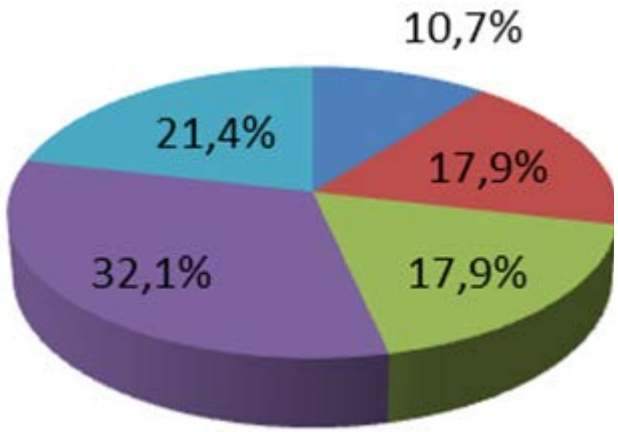
6 MONTHS F-UP RESULTS

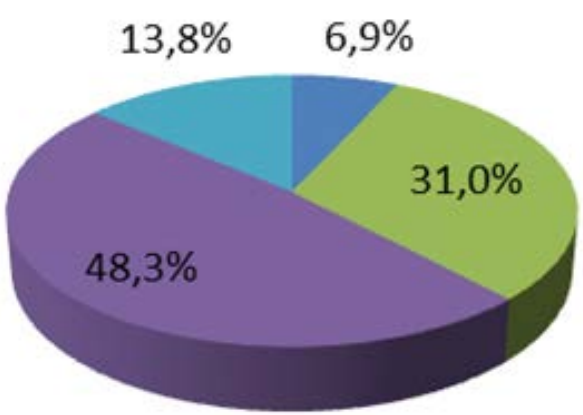
Outcomes : time to ER access and time to first hospitalization

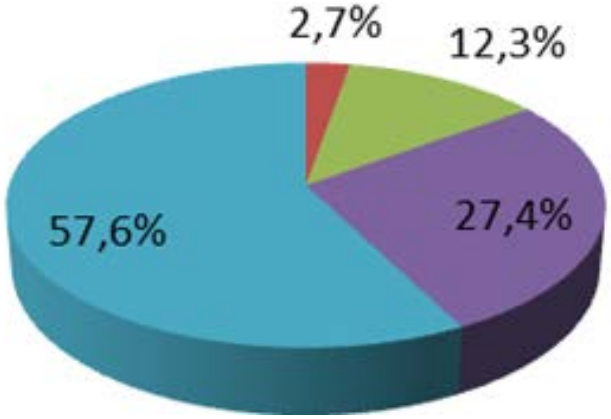
	RR ospedalizzazione	95% Confidence Limits	
Si PCM vs No PCM	0.91	0.6	1.5
	RR Pronto Soccorso	95% Confidence Limits	
Si PCM vs No PCM	1.0	0.7	1.4
	HR al primo ricovero	95% Confidence Limits	
Si PCM vs No PCM	0.81	0.6	1.2

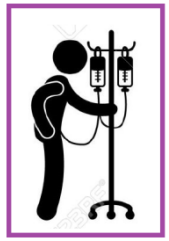
PRELIMINARY RESULTS FROM THE EVALUATION QUESTIONNAIRE: Recruited 300 patients

Satisfied or highly satisfied in participating in this program









GP (72%)

CM - Nurse (93%)

Patient (97%)

1 per nulla soddisfatto

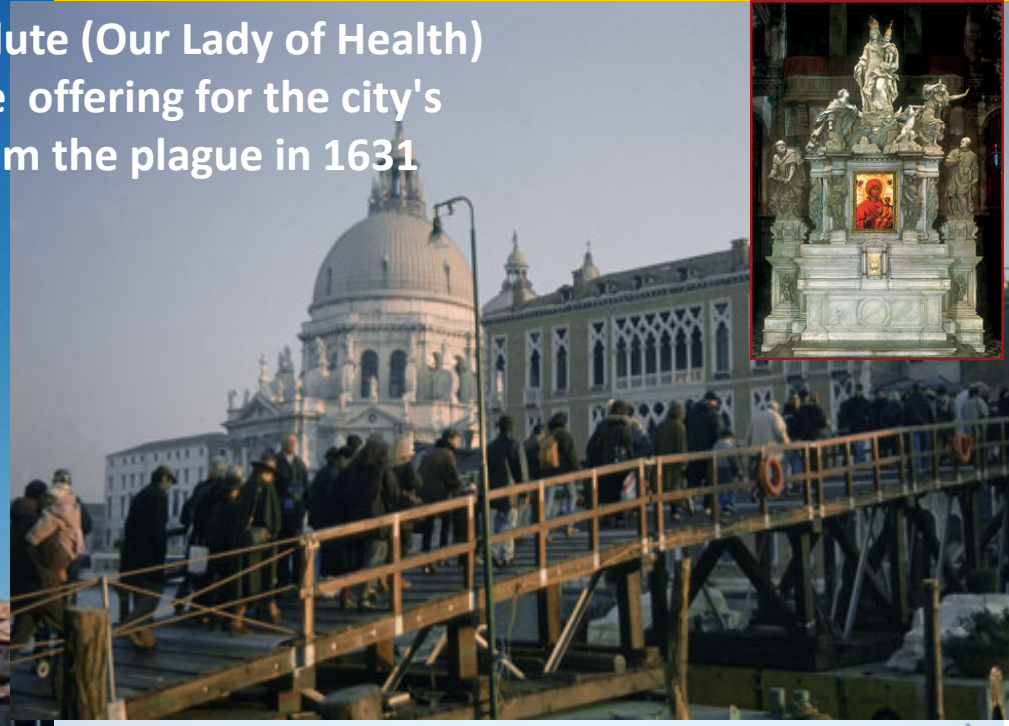
2 abbastanza insoddisfatto

3 mediamente soddisfatto

4 soddisfatto

5 molto soddisfatto

S. Maria della Salute (Our Lady of Health) built as a votive offering for the city's deliverance from the plague in 1631



mariachiara.corti@regione.veneto.it





mariachiara.corti@regione.veneto.it

Piano nazionale cronicità

EROGAZIONE DI INTERVENTI PERSONALIZZATI PER LA GESTIONE DEL PAZIENTE ATTRAVERSO IL PIANO DI CURA

4

MACRO ATTIVITA'

- Il piano di cura personalizzato e l'assistenza proattiva
- Il «patto di cura» e l'empowerment
- Educazione terapeutica strutturata

CASE-MANAGER

CENTRO SERVIZI

PAZIENTE

OBIETTIVI

- Garantire un'assistenza sanitaria e sociosanitaria centrata sui bisogni e le caratteristiche personali e socio-ambientali del paziente
- Promuovere l'empowerment della persona con cronicità e migliorare la capacità di gestione della malattia nel proprio contesto familiare e sociale attraverso lo strumento della terapia educazionale

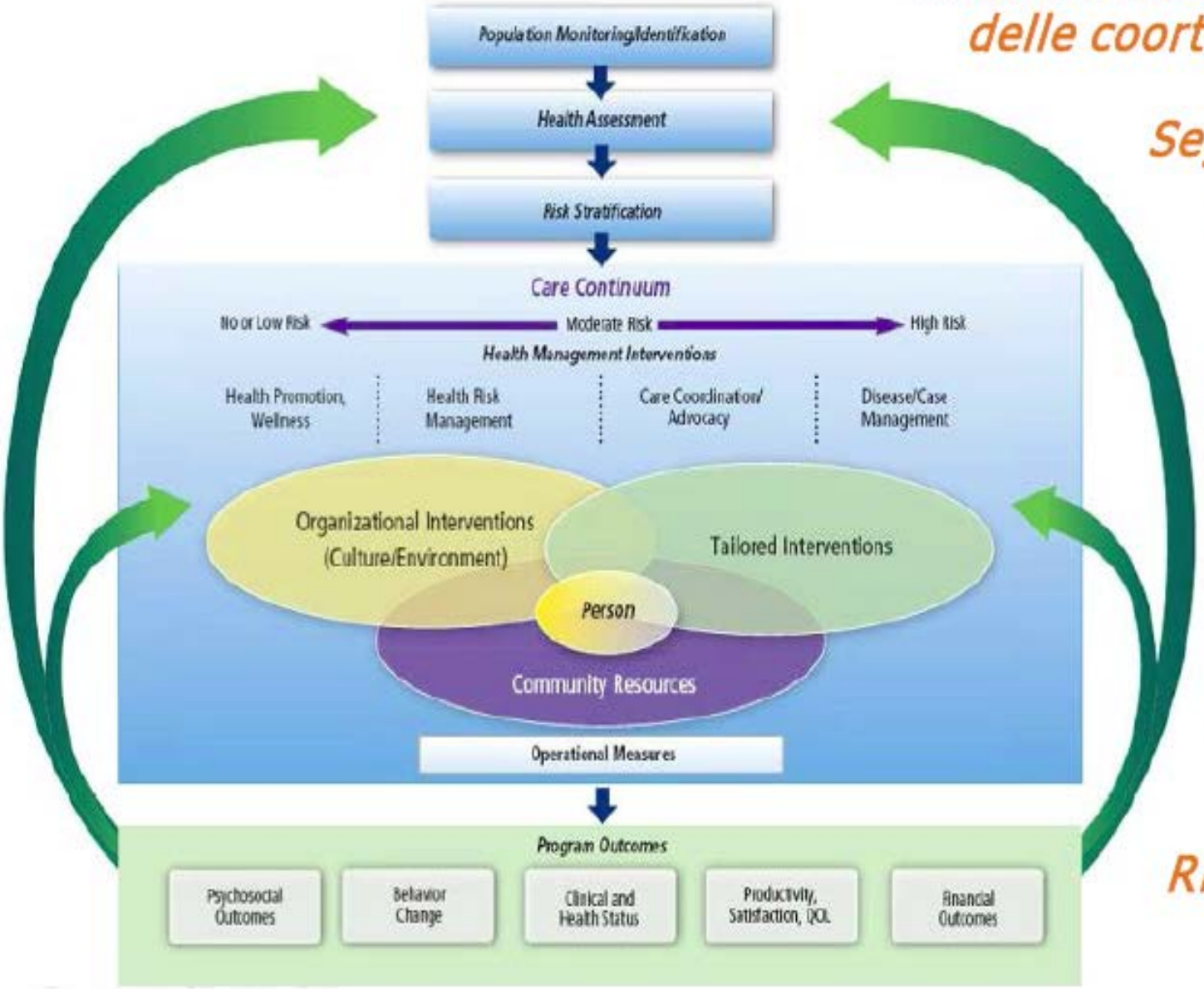
LINEE DI INTERVENTO PROPOSTE

1. sviluppare programmi di assistenza centrati sul paziente che tengano conto non solo della condizione clinica ma anche dei bisogni psicosociali
2. definire programmi di assistenza concepita e strutturata in una logica pro-attiva ('Managed Care'), attraverso la definizione di un Piano di cura personalizzato, condiviso tra i vari attori e consolidato attraverso il 'Patto di Cura
3. sperimentare modalità di intervento che favoriscono lo sviluppo dell'ability to cope e lo sviluppo delle abilità di auto-cura
4. sostenere le attività di formazione e informazione dei pazienti e delle loro famiglie
5. promuovere l'adozione di modelli e di percorsi di educazione terapeutica strutturata che coinvolgano il paziente e i suoi caregiver
6. promuovere l'utilizzo di metodi per l'empowerment del paziente per formare e informare le persone con cronicità e tutti gli operatori sanitari e non sanitari coinvolti (es. modello Stanford)
7. diffondere la capacità di praticare educazione terapeutica efficace
8. promuovere la creazione di un "knowledge network", tra le regioni, inteso come una rete di conoscenze sull'empowerment
9. favorire iniziative di ricerca e intervento, fondate su strategie validate, sulla valutazione dell'empowerment e sullo sviluppo di competenze degli operatori sanitari e delle comunità
10. individuare modelli di analisi e strumenti condivisi di rilevazione e monitoraggio dell'efficacia dell'empowerment del paziente

RISULTATI ATTESI

Miglioramento del livello di soddisfazione e della qualità della vita del paziente e del professionista e miglioramento dei risultati clinici.

Il framework del Population Health Management



Identificazione delle coorti

BIG DATA

Segmentazione della pop.

Modelli deliberati di servizio per la presa in carico

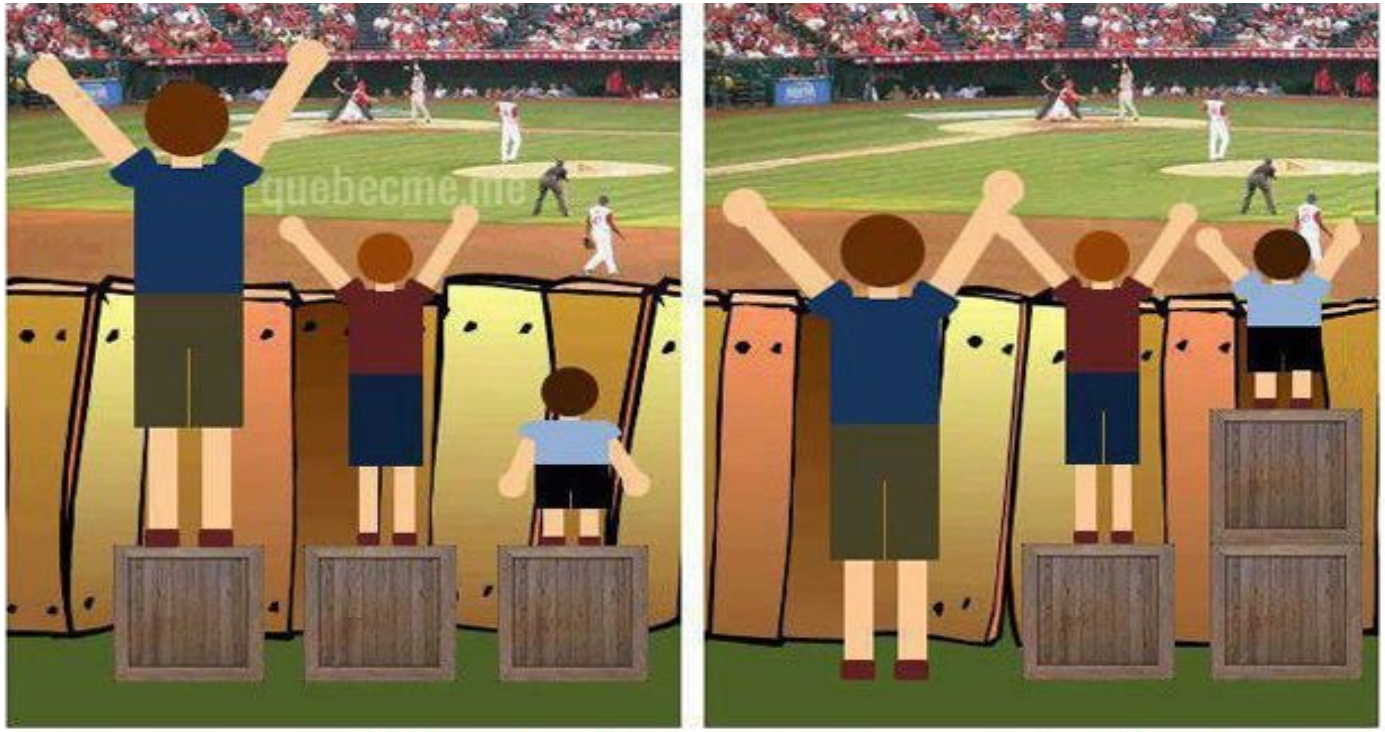
Piano di cure individuale

Valutazione degli outcome

Rivalutazione continua

(Fonte: Dutch Monitor, 2014)

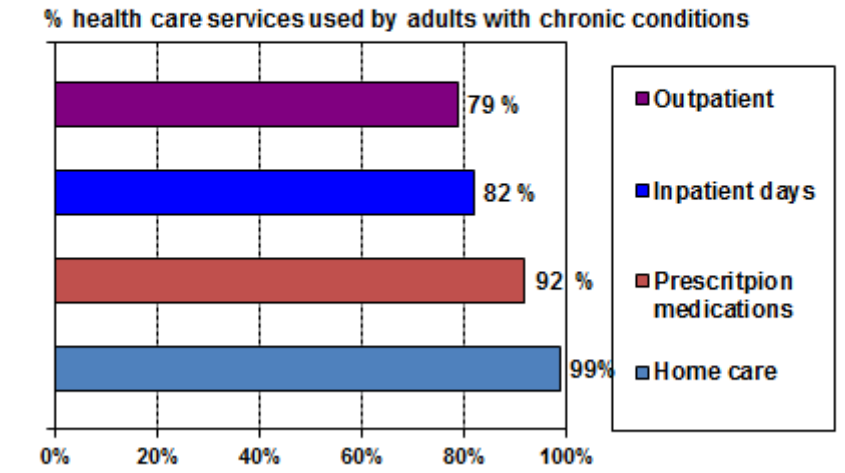
Morbidity adjusted capitation?



Equality – Equity

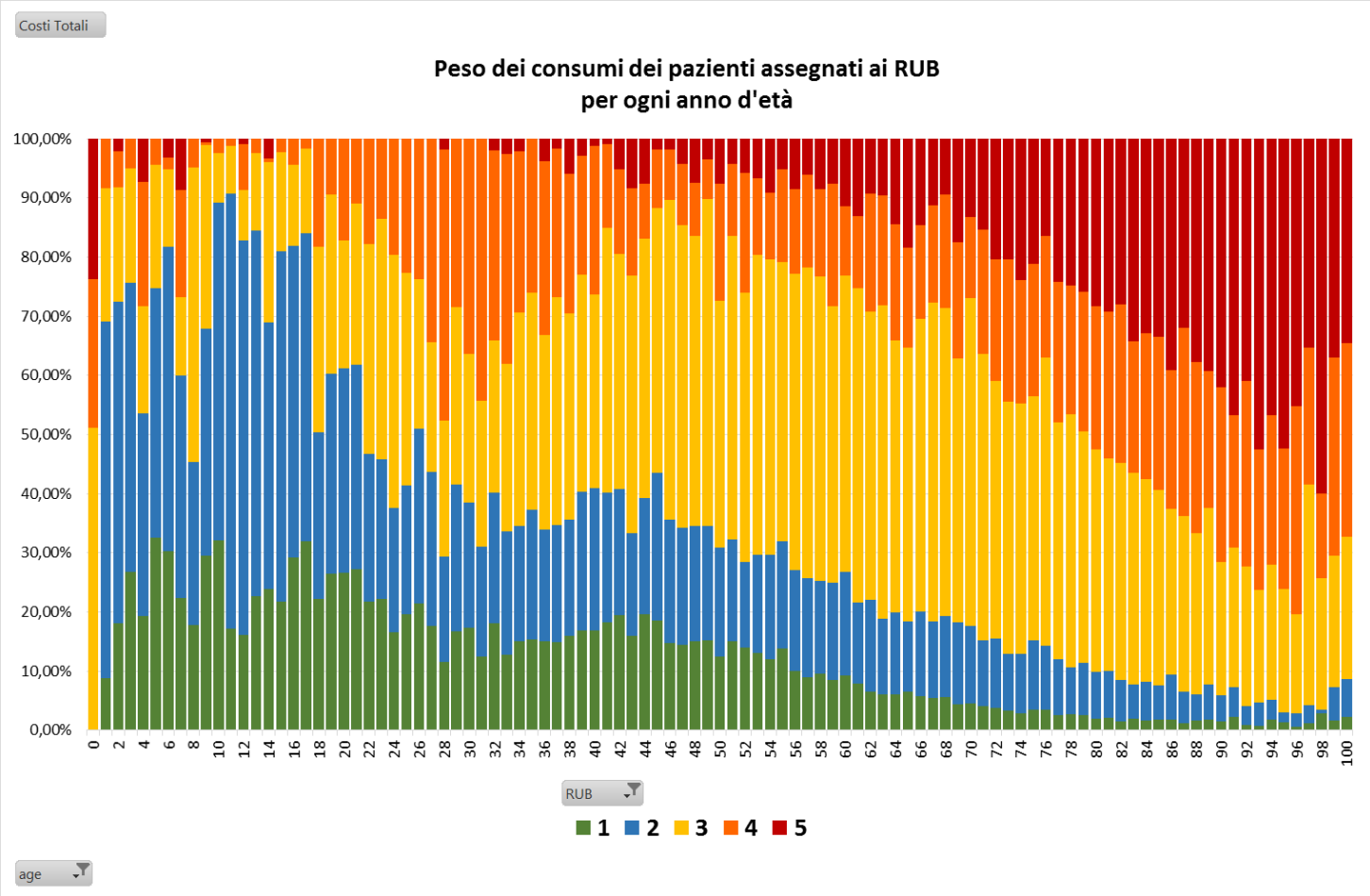
REGIONE DEL VENETO
SER

Chronic patients and not acute patients are the main users of health care services



Source: Anderson, G. Chronic Conditions: Making the case for ongoing care. Johns Hopkins University. November 2007.

Il peso dei consumi per RUB in ogni anno d'età



Deaths may be attributed to chronic diseases, but people still get sick from acute diseases and acute exacerbations.