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MultiCare
multimorbidity in primary health care

Epidemiological features and problems in multimorbidity research

- An addendum to Martin Fortin -

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for the MultiCare Study Group

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Conflict of interest?

- The research on multi-morbidity of the MultiCare consortium is supported by the German Federal Ministry of Education and Research

Bundesministerium
für Bildung
und Forschung

- The statutory health insurance BARMER GEK provided the data of the MultiCare-Claims Study

BARMER GEK die gesund experten

Two epidemiologcal Studies in MultiCare

1. Multicare-Cohort Study:

- prospective observational cohort study
- 3,189 multimorbid elderly patients ≥ 65 years and their GPs recruited in 8 university centers
- Interviews every 15 months over 6 years
- Broad dataset:
  - ICD-10-codes
  - Utilization data
  - Sociodemographic data
  - Impact data (duration, svereity, function, psycho, patient problems etc.)
  - Data on patient and caregiver resources

Two epidemiologcal Studies in MultiCare

2. Multicare-Claims Study:

- Cohort of 123,224 members ≥ 65 years of one nationwide operating statutory health insurance.
- 62% multimorbid (≥ 3 chronic diseases)
- Time period: 2004 - 2009
- Dataset:
  - ICD-10-codes
  - Utilization data
  - Sociodemographic data

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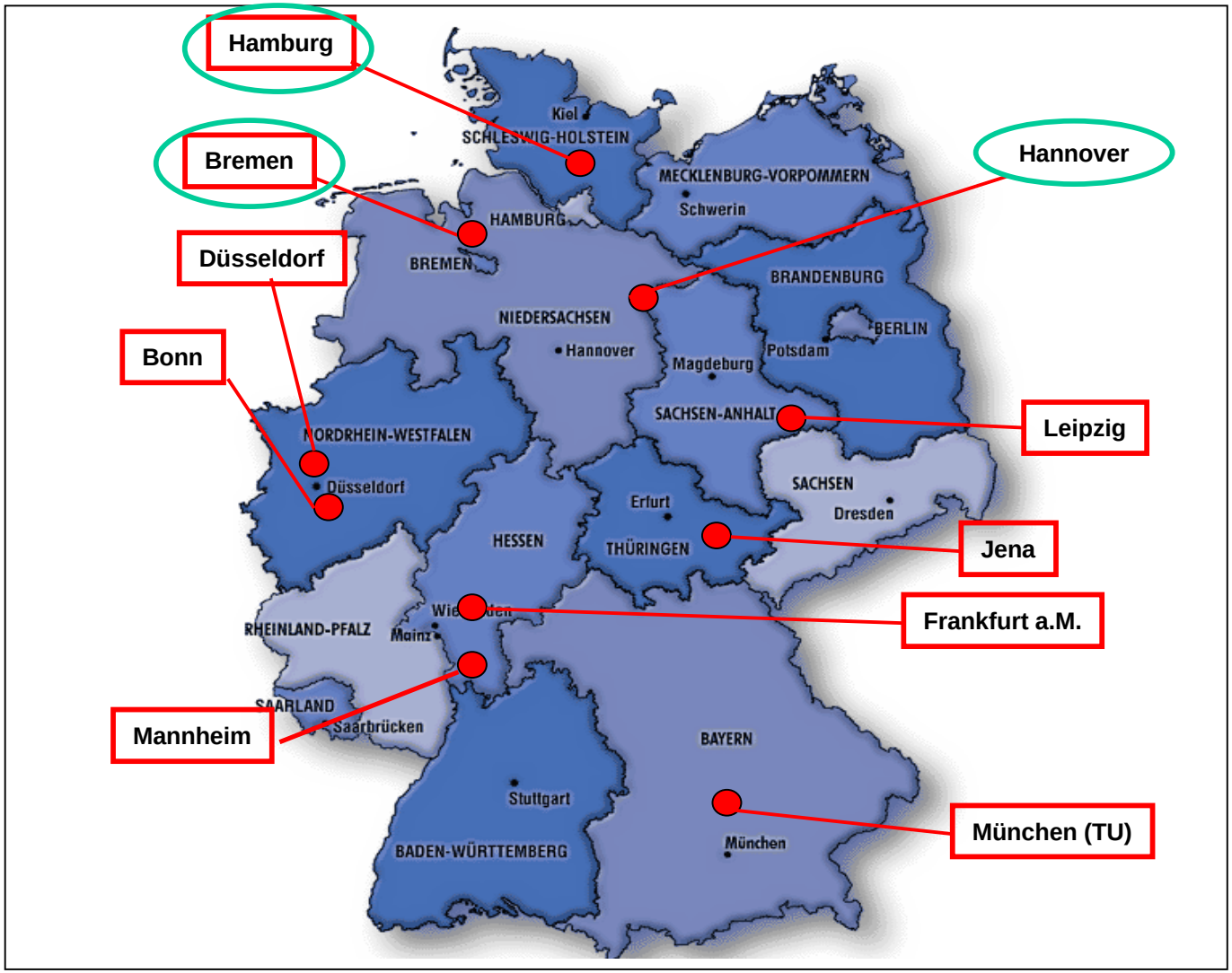
The MultiCare Study Centers



Common features of mc-cohort and mc-claims

- Inclusion: age ≥ 65 years.
- Morbidity: identical list of 46 highly prevalent chronic conditions.
- Inclusion: ≥ 3 chronic conditions.

The 46er list of chronic conditions

Chronic condi-tion	ICD-10-codes	Label
1	I10-I14	Hypertension
2	E78	lipid metabolism disorders
3	M40-M45, M47-M48, M50-M54	chronic low back pain
4	H25-H26, H28, H33-H36, H40, H43, H47 H53-H54	severe vision reduction
5	M15-M19	Joint arthrosis
6	E10-E14	Diabetes mellitus (all types)
7	I20, I25	chronic ischemic heart diseases
8	E01-E05, E06.1-E06.3, E06.5, E06.9, E07	thyroid diseases
9	I44-I49	cardiac arrhythmias
10	E66	Obesity
11	E79, M10	purine/pyrimidine metabolism disorders
12	N40	prostatic hyperplasia
13	I83	lower limb varicosis
14	F10, K70, K76	alcoholic liver disease/dependence
15	F32-F33	Depression
16	J40-J47	asthma/COPD
17	N81-N90, N93-N95	noninflammatory gynaecological problems
18	I70, I73.9	atherosclerosis/PAOD
19	M80-M82	Osteoporosis
20	N18-N19	Renal insufficiency

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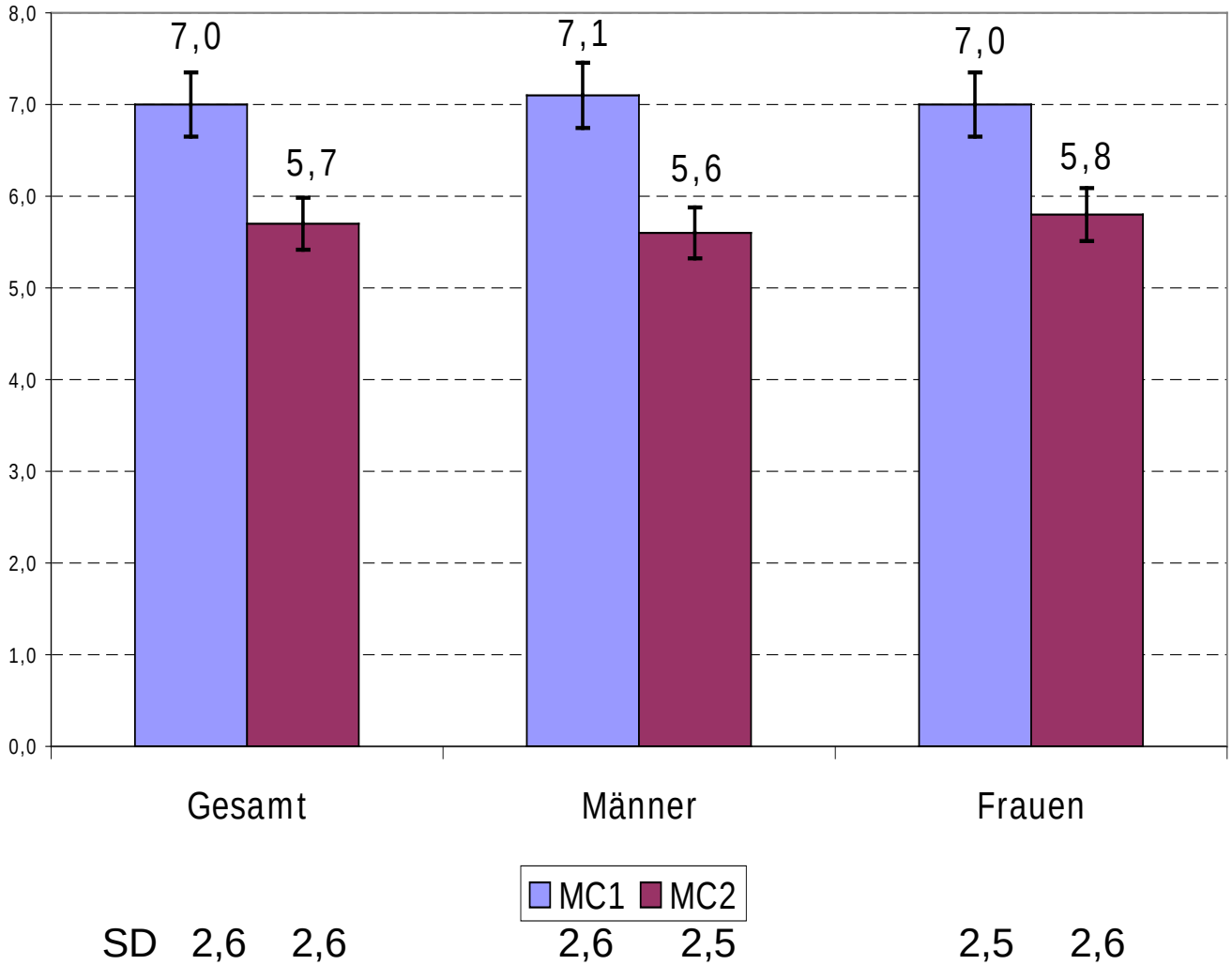
Comparison: number of chronic conditions



SD	2,6	2,6	2,6	2,5	2,5	2,6

Differences between mc-cohort and mc-claims

	mc cohort	mc claims (multimorbid sample)
Professionals	GPs	GPs + specialists in ambulatory care
Region of recruitment	8 regions with university hospital	Federal republic
Inclusion criteria	„actually“ ≥ 3 chronic conditions	≥ 3 chronic conditions in ≥ 3 out of 4 quarters
Exclusion criteria	Inability to consent (e.g. dementia, EOL, nursing home residency etc.)	Privately insured patients (10%)
Recruitment rate	46%	100%
Percentage of multimorbidity	100%	62%

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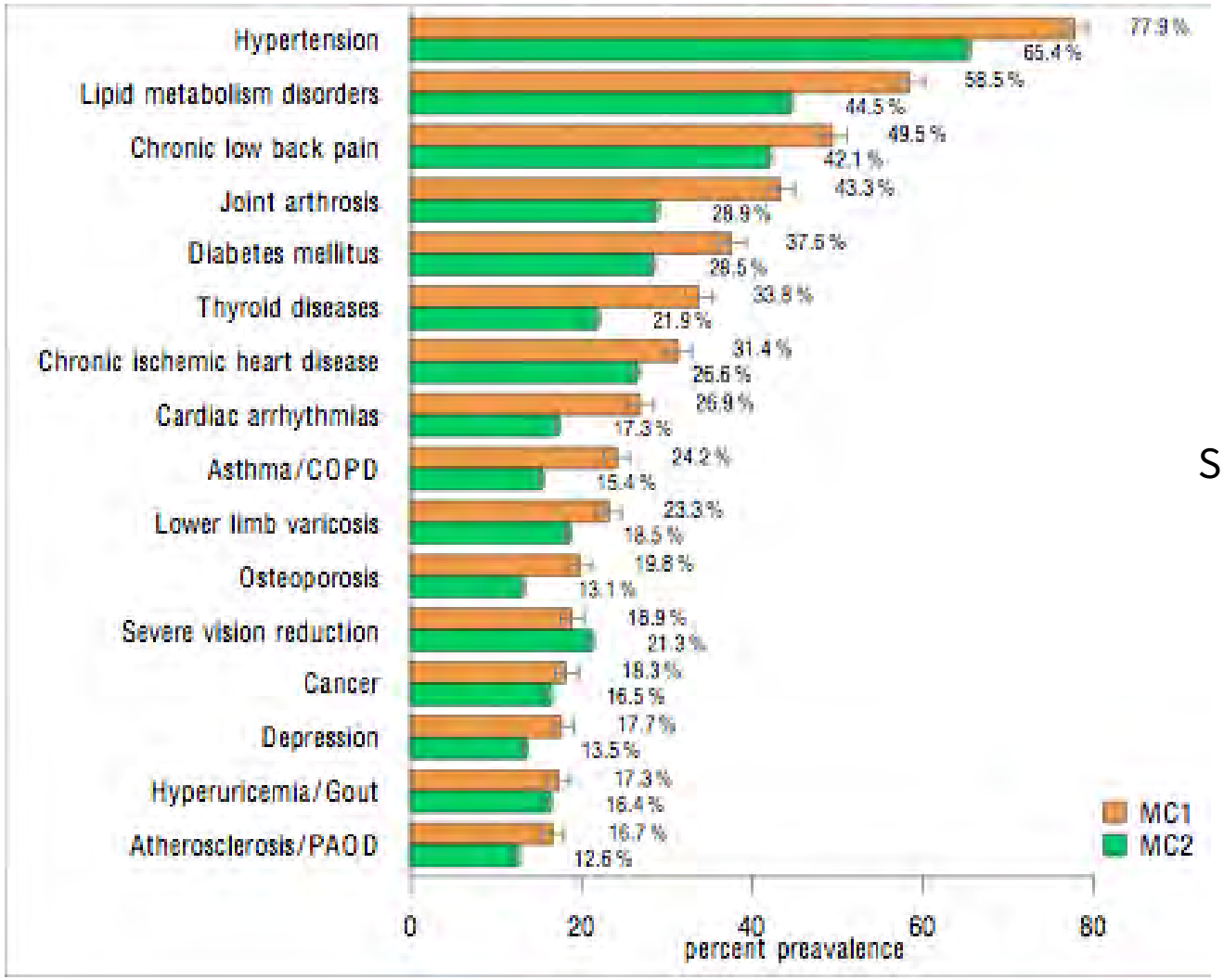
Prevalence (and CI) of 16 most prevalent chronic conditions (upper = mc-cohort, lower = mc-claims)



Spearman Rho = 0.90

Comparison so far

- Median number of chronic conditions: 5 - 6; small deltas for age and sex.
- Regularly higher prevalences of individual chronic conditions in mc cohort (underreporting in claims data? *Erler et al., 2009*)
- Greater prevalence differences in an heterogeneous group of conditions
- Correspondence of prevalence ranking of individual chronic conditions (r = 0.90); small deltas for age and sex.
- The number of associated chronic conditions varies between the index conditions.
- Correspondence of number of associated chronic conditions with each index condition (r = 0.91)

➡ *all-in-all-impression: pretty stable results, first glance validity of figures on prevalence*

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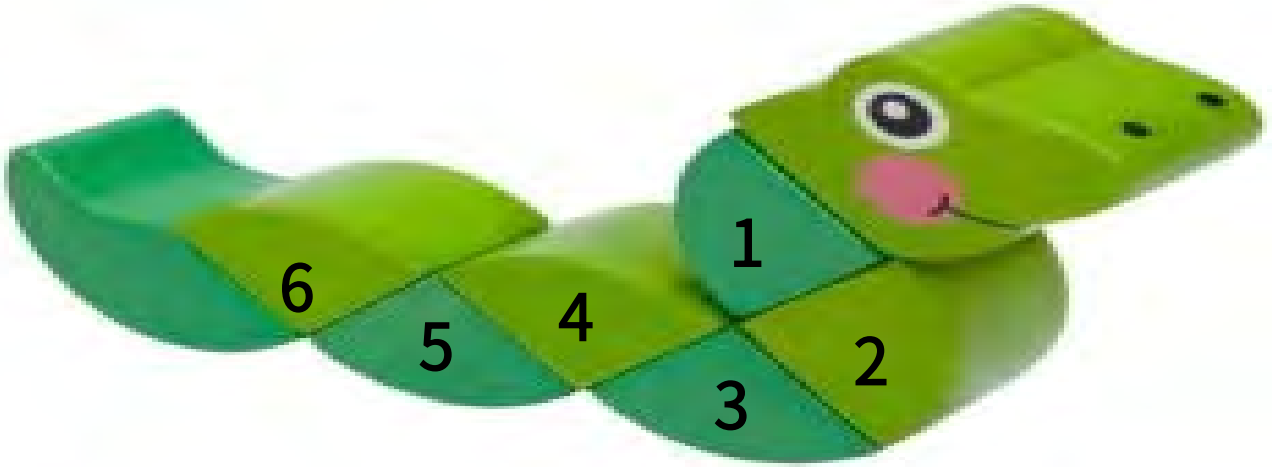
The worm problem of research on multimorbidity (in the elderly)



In this worm, the number of segments corresponds ± to the average number of chronic conditions in multimorbid elderly

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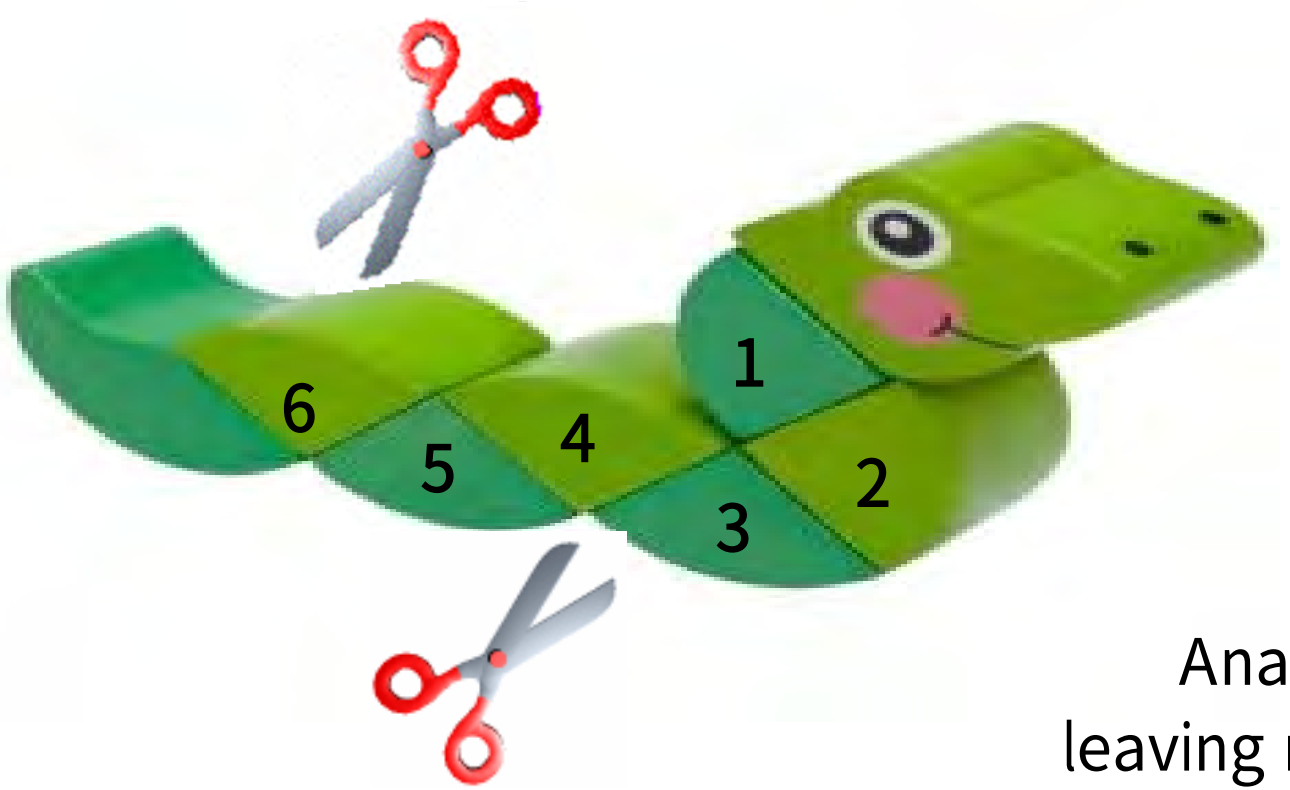
A typical research procedure



Analyzing pairs =
leaving major parts of the
disease patterns in the dark

Let‘s look at a larger part of the worm

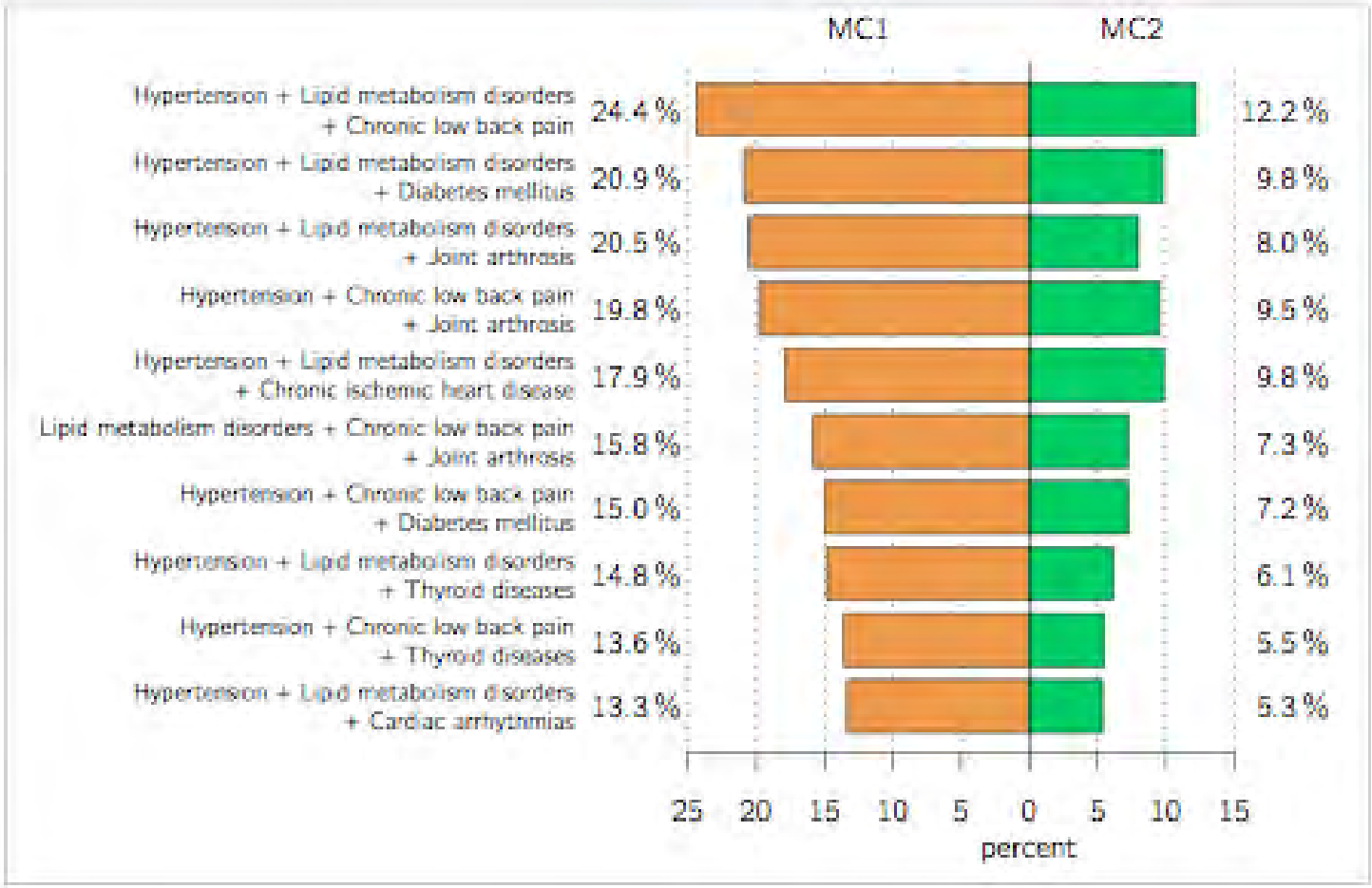
Combinations:

Triads

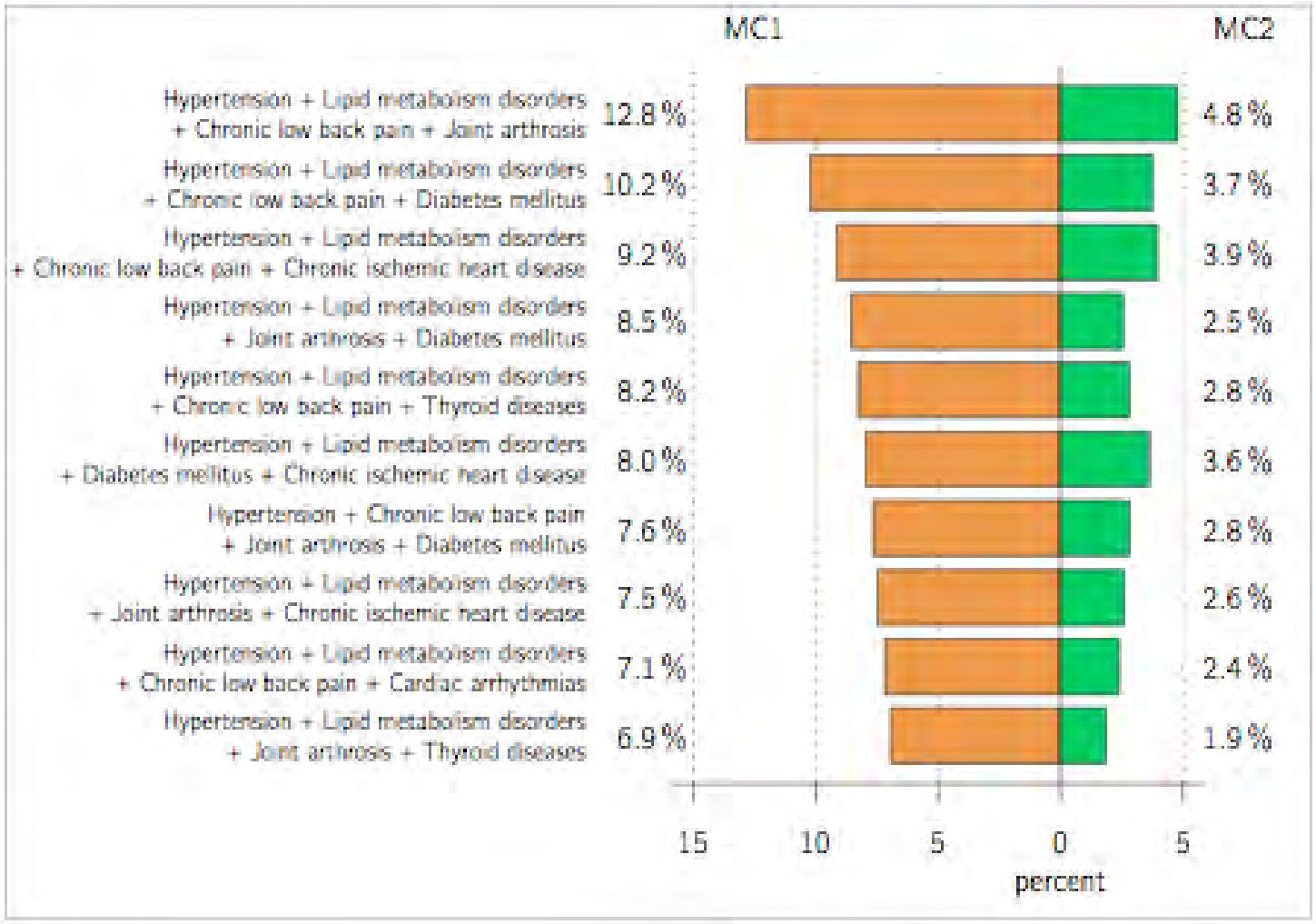
Quartets

Quintets

Triadic combinations of chronic conditions (left: mc-cohort; right: mc-claims)



Quartets of chronic conditions (left: mc-cohort; right: mc-claims)



Conclusions so far

- The greater the number of worm segments examined together, the lower the prevalences of individual combinations.
- The greater the number of worm segments examined together, the greater the differences between databases.
- The same problem was found for observed/expected-ratios (not shown)

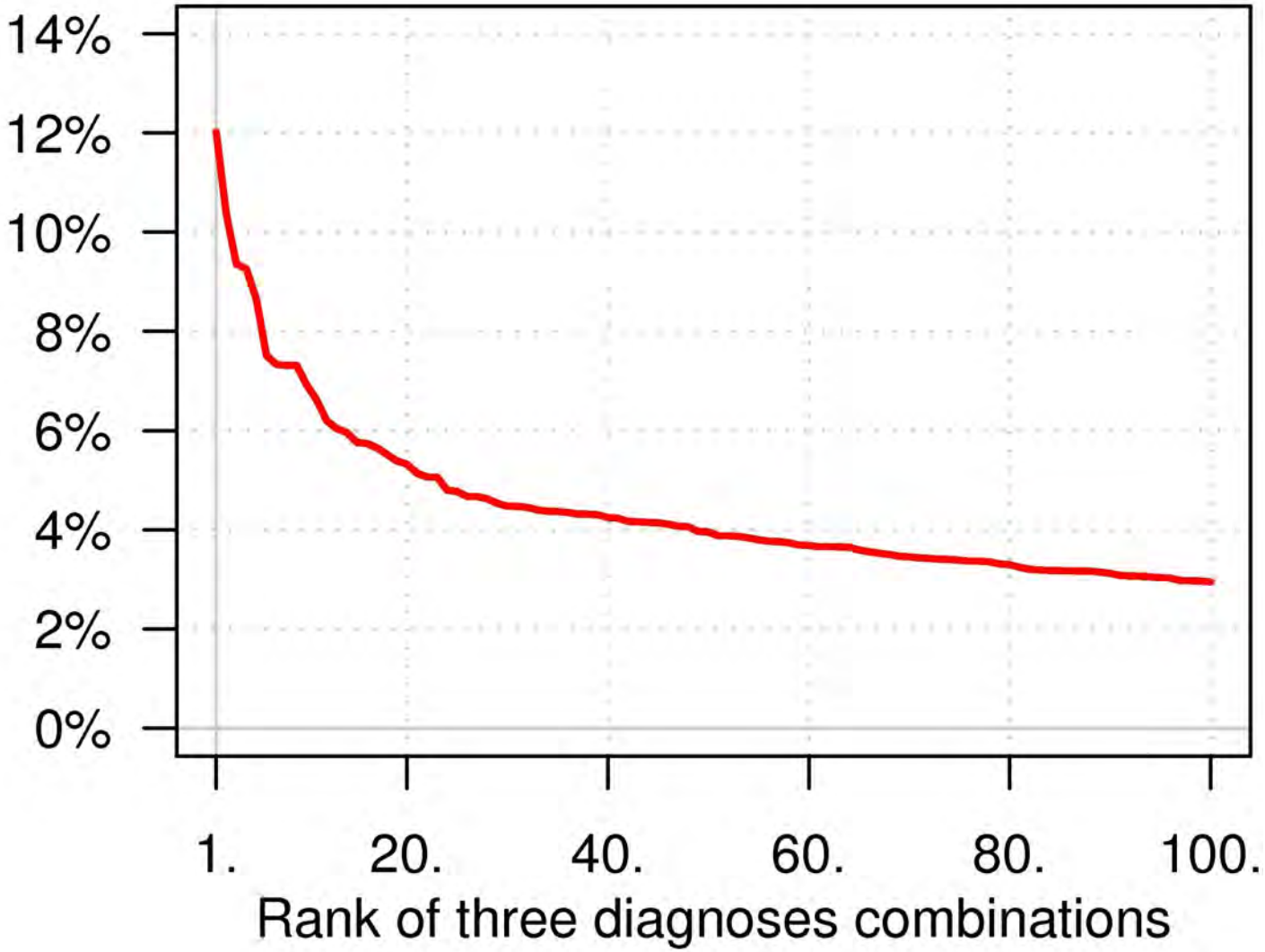
Conclusions so far

- The number of real combinations of chronic conditions is infinitely large:
  - MC-claims: 46 chronic conditions = 15,180 theoretical triads = 15,020 real triads (99%).
  - MC-cohort: 45* chronic conditions = 14,190 theoretical triads = 10,426 real triads (74%).

- Single databases give the impression of valid prevalence data.

* *without dementia*

Ranked prevalences of 100 most ferequent triads (MC-Claims



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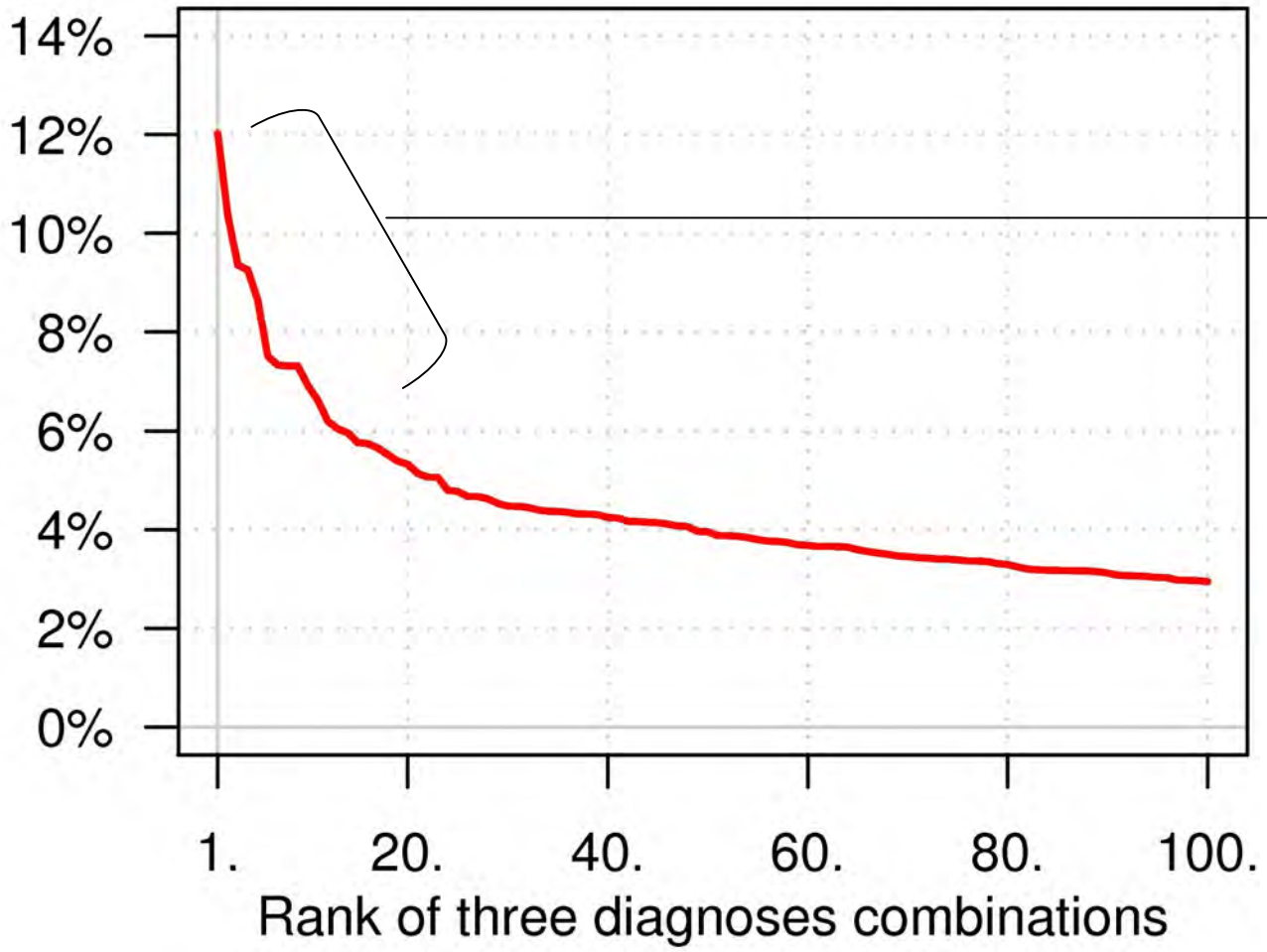
Pragmatic approach



Concentration on most prevalent combinations and their most prevalent chronic conditions

Another approach: associating diseases

- Clustering (the 46) diseases to groups by means of factor analysis.
- Work done by Ingmar Schäfer, Gerhard Schön and Birigtt Wiese.
- Results: Venn-diagrams for MC-Claims and MC-Cohort data.

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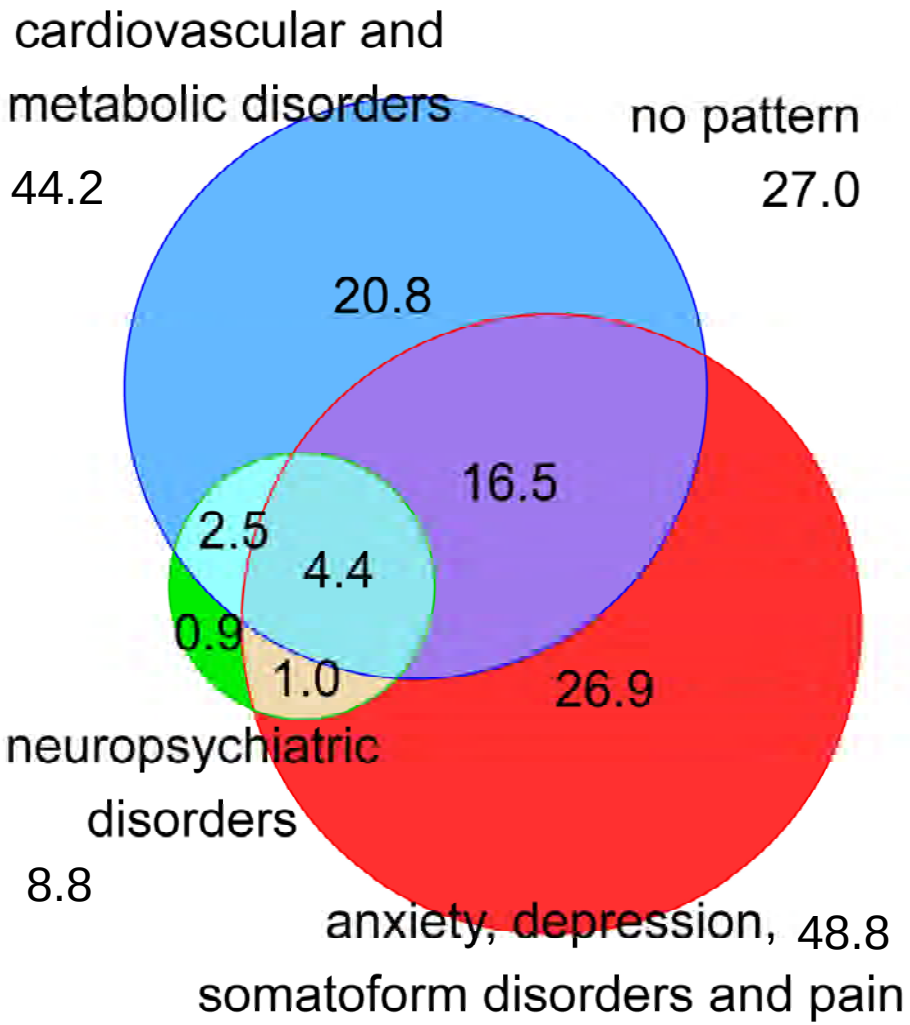
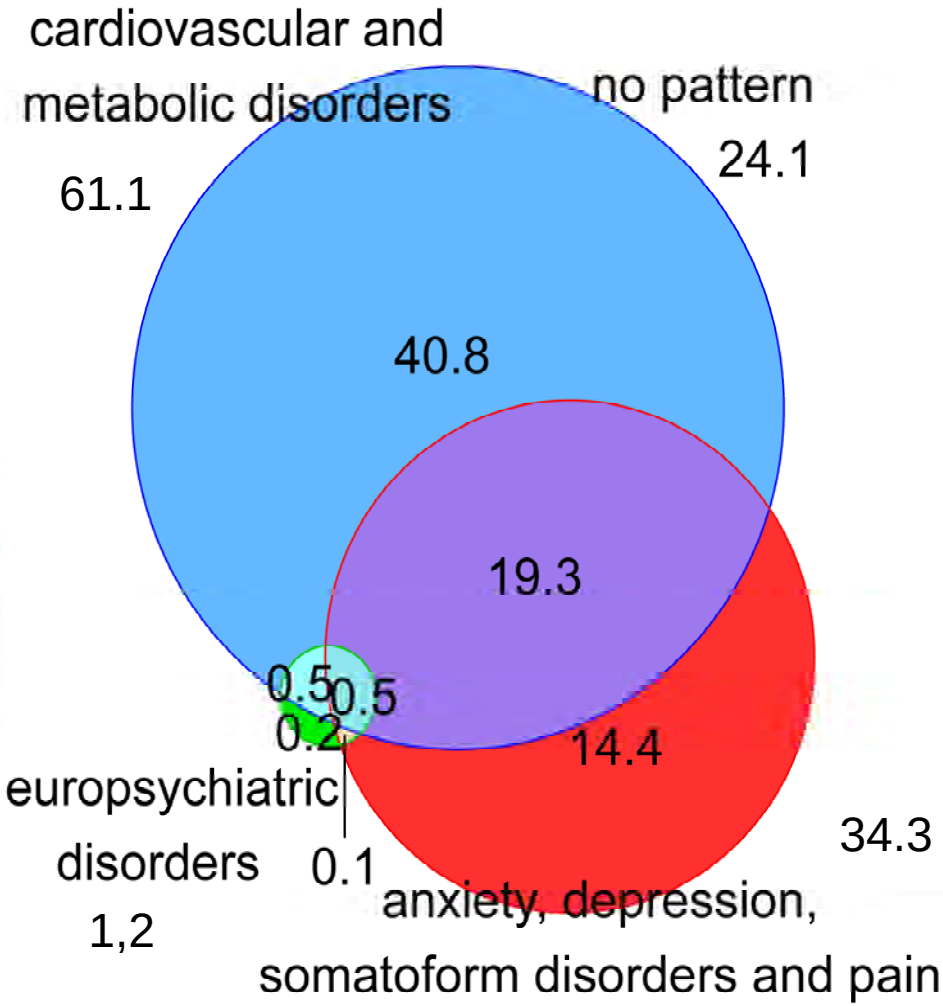
Multimorbidity cluster by factor analysis

mc claims multimorbid female



mc claims multimorbid male



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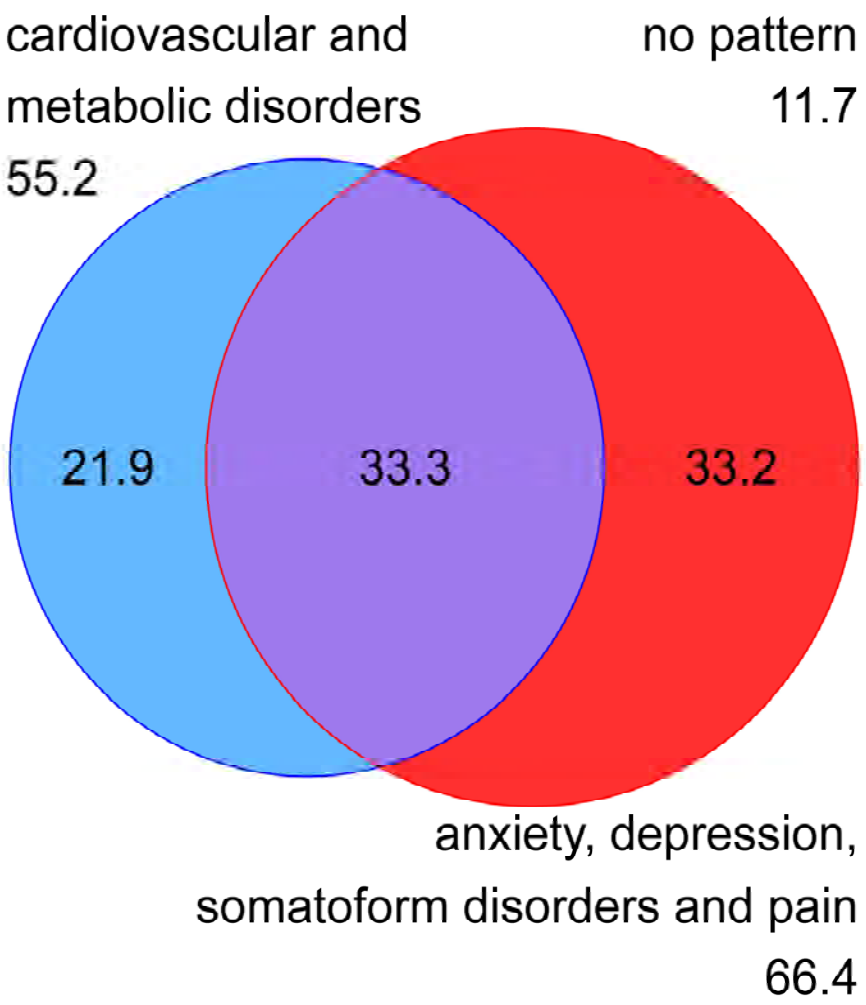
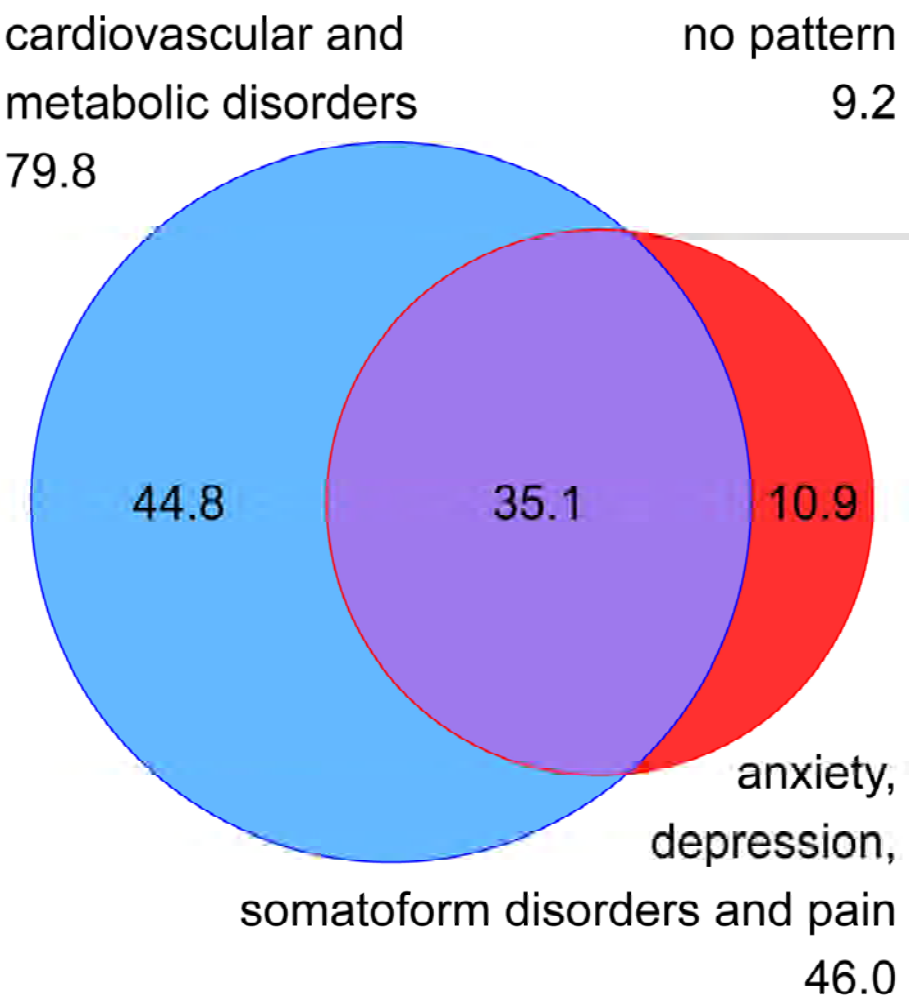
Multimorbidity cluster by factor analysis

mc cohort (multimorbid) female



mc cohort (multimorbid) male



Association of diseases by factor analysis

- Clusters by factor analysis show which diseases are often diagnosed together.
- Factor load expresses the intensity of the association of a single disease to the cluster.
- The procedure allows to detect the common factor behind the single diseases.
- Patients were assigned to a bubble, if they had at least three diagnoses within one bubble.
- The approach describes overlapping between clusters: patients can be assigned to more than one cluster.

Further investigations of associations of diseases

- "Bubbles in the bubble": associations of single diseases within one bubble.
- Differences between clusters and "subclusters":
  - for age, gender, region and socio-economic status.
  - regarding consequences for patients (e.g. burden, self-efficacy etc.),
  - concerning utilization of healthcare services.
- This technique allows to look at a larger part of the worm without the problem of small sample sizes.

Four take home messages

- Complex problems need complex approaches.
- Be careful to draw conclusions from single databases.
- We should look at larger combinations with
  - a possibly high number of chronic conditions,
  - prevalences high enough to be researchable, and
  - - last not least - relevant for clinicians,
  - and for patients.
- The solution is not to abstract from the diseases in form of disease counts or indexes.

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The MultiCare Study Group

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Hope you found something to take away !

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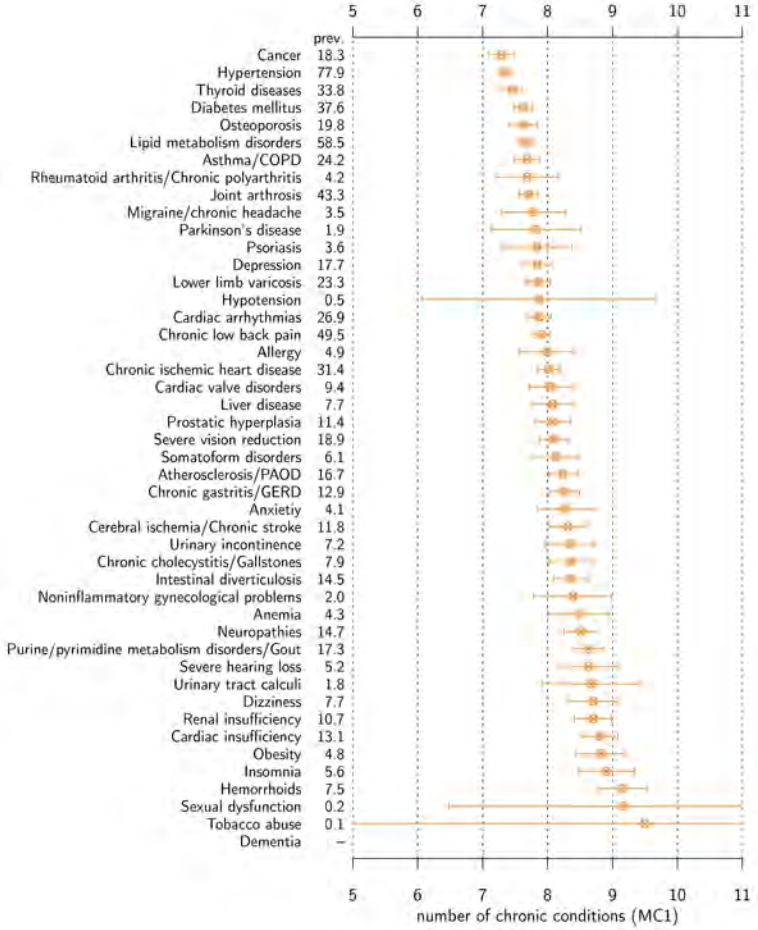
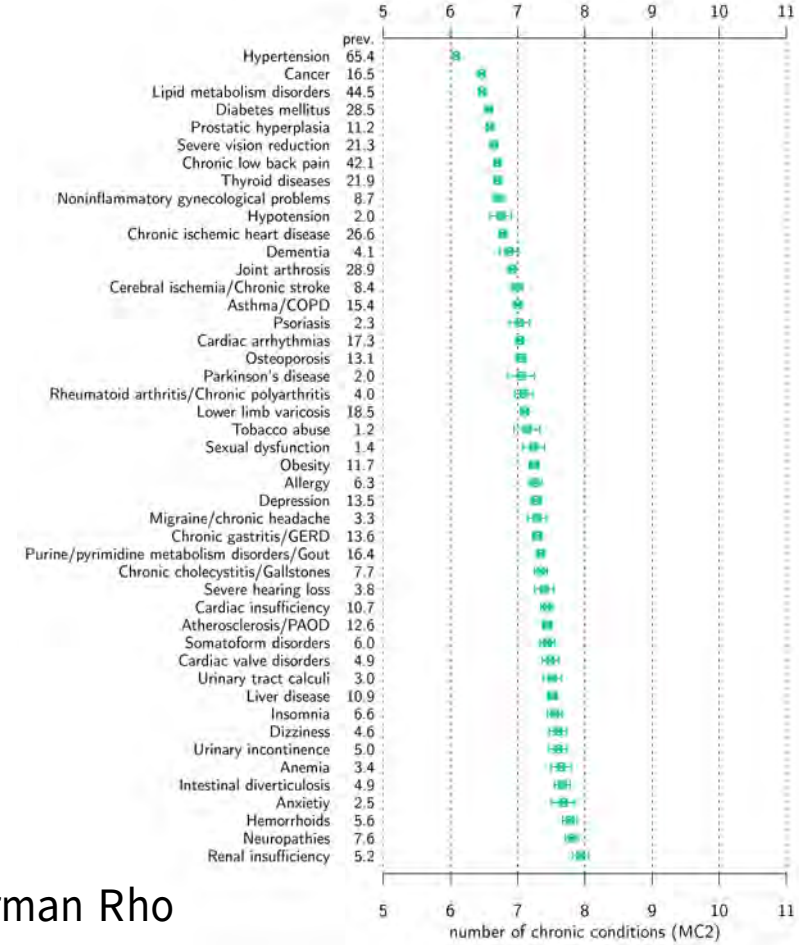
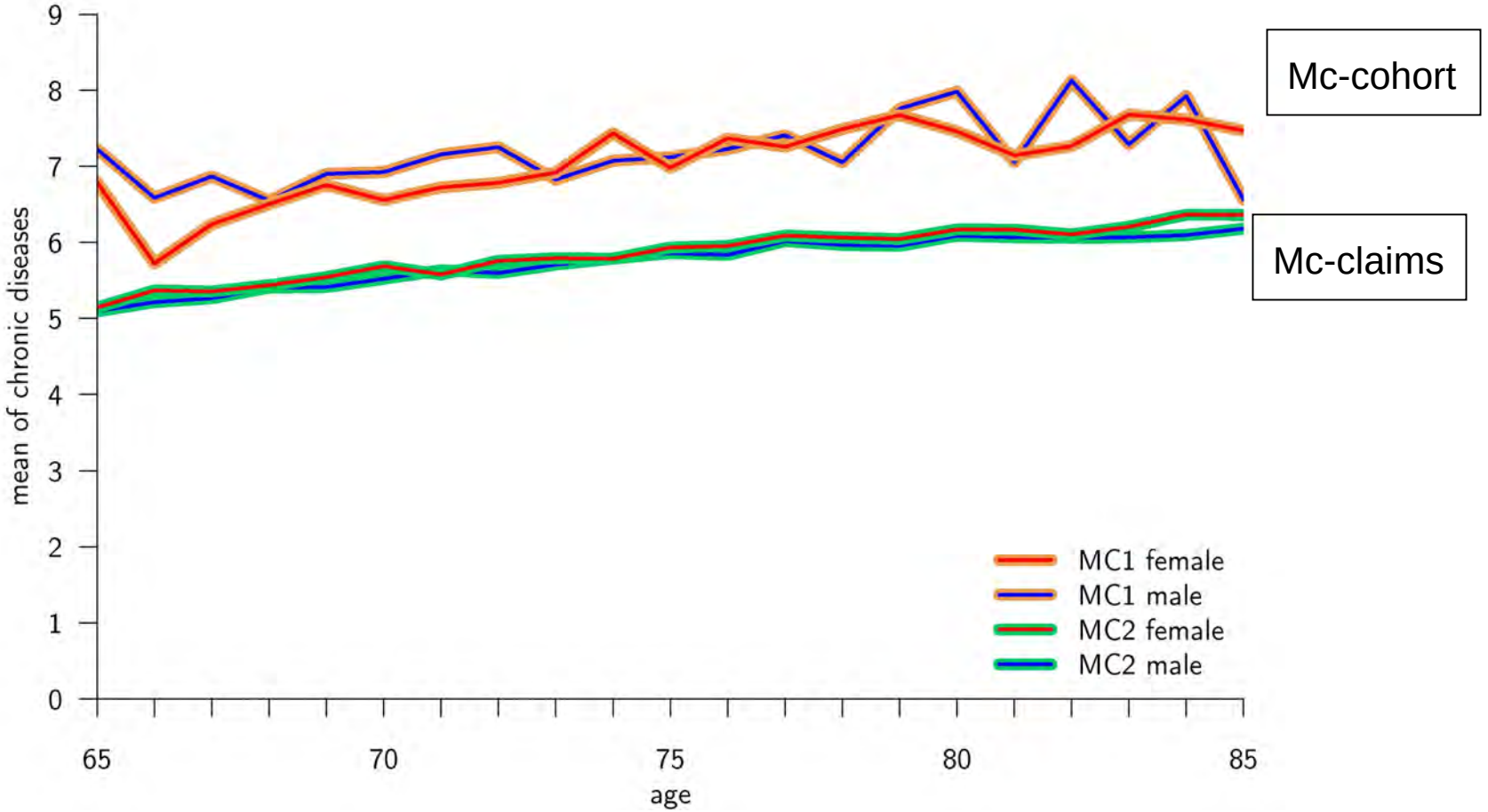
Number of associated chronic conditions with each index condition (left: mc cohort - right: mc claims)





Spearman Rho = 0.91

Comparison: number of chronic conditions according to age and sex