Les rencontres de Santé Publique France
16-17 Juin

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Assessing and addressing multimorbidity in epidemiological research and clinical practice: how far have we gotten?

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CONFLICT OF INTEREST DISCLOSURE

This presentation is done in total independence from the event organizer.
I have no conflict of interest to declare regarding the current presentation.

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What do we already know?
Multimorbidity 1.0

What are we less certain about?
Multimorbidity 2.0

1) It is the most common chronic condition

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Review

Aging with multimorbidity: A systematic review of the literature

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ABSTRACT

A literature search was carried out to summarize the existing scientific evidence concerning occurrence, causes, and consequences of multimorbidity (the coexistence of multiple chronic diseases) in the elderly as well as models and quality of care of persons with multimorbidity. According to pre-established inclusion criteria, and using different search strategies, 41 articles were included (four of these were methodological papers only). Prevalence of multimorbidity in older persons ranges from 55 to 98%. In cross-sectional studies, older age, female gender, and low socioeconomic status are factors associated with multimorbidity, confirmed by longitudinal studies as well. Major consequences of multimorbidity are disability and functional decline, poor quality of life, and high health care costs. Controversial results were found on multimorbidity and mortality risk. Methodological issues in evaluating multimorbidity are discussed as well as future research needs, especially concerning etiological factors, combinations and clustering of chronic diseases, and care models for persons affected by multiple disorders. New insights in this field can lead to the identification of preventive strategies and better treatment of multimorbid patients.

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1. Introduction

Thousands of persons turn 65 years of age every day (Cohen, 2003; Kinsella and Velkoff, 2005). Life expectancy has already exceeded age 75 in 57 countries (World Health Organization, WHO, 2010), and it is expected to continue to rise (Oeppen and Vaupel, 2002). In the world, the proportion of 60+ year-old people has gradually increased from 8.1% in 1960 to 10% in 2000. Despite the worldwide aging phenomenon, data regarding health and time trends in the health of the elderly are still inadequate. What is certain is that over the last century, chronic health problems have replaced infectious diseases as the dominant health care burden, and almost all chronic conditions are strongly related to aging. Only in the last few years many health care planners and governments have becoming aware of this phenomenon and population-based studies regarding age-related chronic diseases have been implemented.

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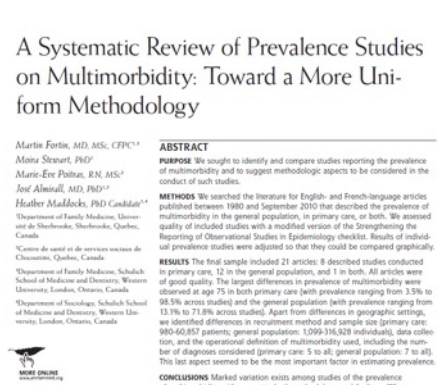
The majority of the available studies have focused on specific



A Systematic Review of Prevalence Studies on Multimorbidity: Toward a More Uniform Methodology

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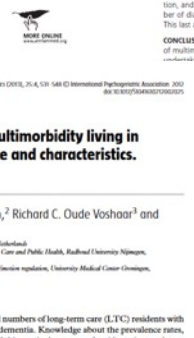
ABSTRACT

PURPOSE We sought to identify and compare studies reporting the prevalence of multimorbidity and to suggest methodologic aspects to be considered in the conduct of such studies.

METHODS We searched the literature for English- and French-language articles published between 1980 and September 2010 that described the prevalence of multimorbidity in the general population, in primary care, or both. We assessed quality of included studies with a modified version of the Strengthening the Reporting of Observational Studies in Epidemiology checklist. Results of individual prevalence studies were adjusted so that they could be compared graphically.

RESULTS The final sample included 21 articles: 8 described studies conducted in primary care, 12 in the general population, and 1 in both. All articles were of good quality. The largest differences in prevalence of multimorbidity were observed at age 75 in both primary care (with prevalence ranging from 3.5% to 98.5% across studies) and the general population (with prevalence ranging from 13.1% to 71.8% across studies). Apart from differences in geographic settings, we identified differences in recruitment method and sample size (primary care: 980-60,857 patients; general population: 1,099-316,928 individuals), data collection, and the operational definition of multimorbidity used, including the number of diagnoses considered (primary care: 5 to all; general population: 7 to all). This last aspect seemed to be the most important factor in estimating prevalence.

CONCLUSIONS Marked variation exists among studies of the prevalence of multimorbidity with respect to both methodology and findings. When



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PLOS ONE

Prevalence, Determinants and Patterns of Multimorbidity in Primary Care: A Systematic Review of Observational Studies

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Abstract

Introduction: Multimorbidity is a major concern in primary care. Nevertheless, evidence of prevalence and patterns of multimorbidity, and their determinants, are scarce. The aim of this study is to systematically review studies of the prevalence, patterns and determinants of multimorbidity in primary care.

Methods: Systematic review of literature published between 1961 and 2013 and indexed in Ovid (CINAHL, PsycINFO, Medline and Embase) and Web of Knowledge. Studies were selected according to eligibility criteria of addressing prevalence, determinants, and patterns of multimorbidity and using a pretested proforma in primary care. The quality and risk of bias were assessed using STROBE criteria. Two researchers assessed the eligibility of studies for inclusion (Kappa = 0.86).

Results: We identified 39 eligible publications describing studies that included a total of 70,057,611 patients in 12 countries. The number of health conditions analysed per study ranged from 5 to 335, with multimorbidity prevalence ranging from 12.9% to 95.1%. All studies observed a significant positive association between multimorbidity and age (odds ratio (OR), 1.26 to 227.46), and lower socioeconomic status (OR, 1.20 to 1.91). Positive associations with female gender and mental disorders were also observed. The most frequent patterns of multimorbidity included osteoarthritis together with cardiovascular and/or metabolic conditions.

Conclusions: Well-established determinants of multimorbidity include age, lower socioeconomic status and gender. The most prevalent conditions shape the patterns of multimorbidity. However, the limitations of the current evidence base means that further and better designed studies are needed to inform policy, research and clinical practice, with the goal of improving health-related quality of life for patients with multimorbidity. Standardization of the definition and assessment of multimorbidity is essential in order to better understand this phenomenon, and is a necessary immediate step.

et al. (2014) Prevalence, Determinants and Patterns of Multimorbidity in Primary Care: A st.0102149

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from the National Institute for Health Research, Department of Health, United Kingdom. e of patient reported outcome measures in Primary Care. Period: 01/1/2011-01/1/2016. tovation through the Institute Carlos III (ISCIII as part the Primary Care Prevention and MICI) and by a grant for research projects ISCIII (PI13/00423). QFB is supported by a Ministra Jordi Gol (IDIAP Jordi Gol). The funders had no role in the study design, data script.

Interests exist.

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REVIEW

Residents with mental–physical multimorbidity living in long-term care facilities: prevalence and characteristics. A systematic review

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ABSTRACT

Background: Aging societies will be confronted with increased numbers of long-term care (LTC) residents with multimorbidity of physical and mental disorders other than dementia. Knowledge about the prevalence rates, medical and psychosocial characteristics, and care needs of this particular group of residents is mandatory for providing high-quality and evidence-based care. The purpose of this paper was to review the literature regarding these features.

Methods: A systematic literature search was conducted in PubMed, EMBASE, PsycINFO, and CINAHL from January 1, 1988 to August 16, 2011. Two reviewers independently assessed eligibility of studies on pre-established inclusion criteria as well as methodological quality using standardized checklists.

Results: Seventeen articles were included. Only one small study describes multimorbidity of a wide range of chronic psychiatric and somatic conditions in LTC residents and suggests that physical–mental multimorbidity is rather rule than exception. All other studies show prevalence rates of comorbid physical and mental illnesses (range, 0.5%–64.7%), roughly in line with reported prevalence rates among community-dwelling older people. LTC residents with mental–physical multimorbidity were younger than other LTC residents and had more cognitive impairment, no dementia, and problem behaviors. Care needs of these residents were not described.

Conclusions: Although exact figures are lacking, mental–physical multimorbidity is common in LTC residents. Given the specific characteristics of the pertaining residents, more knowledge of their specific care needs is essential. The first step now should be to perform research on symptoms and behavior, which seem more informative than diagnostic labels as well as care needs of LTC residents with mental–physical multimorbidity.

Key words: long-term care, neuropsychiatric symptoms, medical comorbidity, residential facilities

Introduction

The world's population is aging. Ten-year projections suggest that the annual net increase of the number of people over the age of 65 years will be about 23 million (Kinsella and He, 2009). Because the prevalence of many health problems increases with age, this demographic trend will also lead to a rising prevalence of multimorbidity in the upcoming years and probably also to an increased need for long-term care (LTC) (Schram *et al.*, 2008; Singh, 2010a).

Multimorbidity is defined as the simultaneous occurrence of several medical conditions in the same person (van den Akker *et al.*, 1996). Reported prevalence rates of multimorbidity vary widely across studies, from around 20% to 30% in the general population to 55% to 98% when only older persons were included (Marengoni *et al.*, 2011). The prevalence of multimorbidity in the elderly population is much higher than the prevalence of the most common diseases of the elderly such as

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Review Article

JOURNAL OF COMORBIDITY

Prevalence of multimorbidity in community settings: A systematic review and meta-analysis of observational studies

Hai Nguyen, Gergana Manolova, Christina Daskalopoulou, Silia Vitoratou, Martin Prince and A Matthew Prina

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SAGE

Abstract

Background: With aging world populations, multimorbidity (presence of two or more chronic diseases in the same individual) becomes a major concern in public health. Although multimorbidity is associated with age, its prevalence varies. This systematic review aimed to summarise and meta-analyse the prevalence of multimorbidity in high, low- and middle-income countries (HICs and LMICs).

Methods: Studies were identified by searching electronic databases (Medline, Embase, PsycINFO, Global Health, Web of Science and Cochrane Library). The term 'multimorbidity' and its various spellings were used, alongside 'prevalence' or 'epidemiology'. Quality assessment employed the Newcastle-Ottawa scale. Overall and stratified analyses according to multimorbidity operational definitions, HICs/LMICs status, gender and age were performed. A random-effects model for meta-analysis was used.

Results: Seventy community-based studies (conducted in 18 HICs and 31 LMICs) were included in the final sample. Sample sizes ranged from 264 to 162,464. The overall pooled prevalence of multimorbidity was 33.1% (95% confidence interval (CI): 30.0–36.3%). There was a considerable difference in the pooled estimates between HICs and LMICs, with prevalence being 37.9% (95% CI: 32.5–43.4%) and 29.7% (26.4–33.0%), respectively. Heterogeneity across studies was high for both overall and stratified analyses ($I^2 > 99\%$). A sensitivity analysis showed that none of the reviewed studies skewed the overall pooled estimates.

Conclusion: A large proportion of the global population, especially those aged 65+, is affected by multimorbidity. To allow accurate estimations of disease burden, and effective disease management and resources distribution, a standardised operationalisation of multimorbidity is needed.

Keywords
Multimorbidity, prevalence, HICs, LMICs

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Introduction

As the world's populations are ageing rapidly, multimorbidity is becoming a major concern in public health. According to a recent report by the Academy of Medical Science,[1] in most high-income countries (HICs), multimorbidity is considered the norm, not the exception. Multimorbidity also appears to be increasingly prevalent in low- and middle-income countries (LMICs).[2] Patients experiencing multiple chronic conditions often have poorer health

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2) It is related to negative health outcomes

RESEARCH

OPEN ACCESS

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

Siobhan Dumbreck,[1] Angela Flynn,[1] Moray Nairn,[2] Martin Wilson,[3] Shaun Treweek,[4] Stewart W Mercer,[5] Phil Alderson,[6] Alex Thompson,[7] Katherine Payne,[2] Bruce Guthrie[1]

ABSTRACT

OBJECTIVE

To identify the number of drug-disease and drug-drug interactions for exemplar index conditions within National Institute of Health and Care Excellence (NICE) clinical guidelines.

DESIGN

Systematic identification, quantification, and classification of potentially serious drug-disease and drug-drug interactions for drugs recommended by NICE clinical guidelines for type 2 diabetes, heart failure, and depression in relation to 11 other common conditions and drugs recommended by NICE guidelines for those conditions.

SETTING

NICE clinical guidelines for type 2 diabetes, heart failure, and depression.

MAIN OUTCOME MEASURES

recommended in the guideline for depression and 10 for drugs recommended in the guideline for heart failure. Of these drug-disease interactions, 27 (84%) in the type 2 diabetes guideline and all of those in the two other guidelines were between the recommended drug and chronic kidney disease. More potentially serious drug-drug interactions were identified between drugs recommended by guidelines for each of the three index conditions and drugs recommended by the guidelines for the 11 other conditions: 133 drug-drug interactions for drugs recommended in the type 2 diabetes guideline, 89 for depression, and 111 for heart failure. Few of these drug-disease or drug-drug interactions were highlighted in the guidelines for the three index conditions.

CONCLUSIONS

Drug-disease interactions were relatively uncommon with the exception of interactions when a patient also has chronic kidney disease. Guideline developers could

RESEARCH

OPEN ACCESS

Association between guideline recommended drugs and death in older adults with multiple chronic conditions: population based cohort study

Mary E Tinetti,[1] Gail McAvay,[2] Mark Trentalange,[2] Andrew B Cohen,[2] Heather G Allore[2]

ABSTRACT

OBJECTIVE

To estimate the association between guideline recommended drugs and death in older adults with multiple chronic conditions.

DESIGN

Population based cohort study.

SETTING

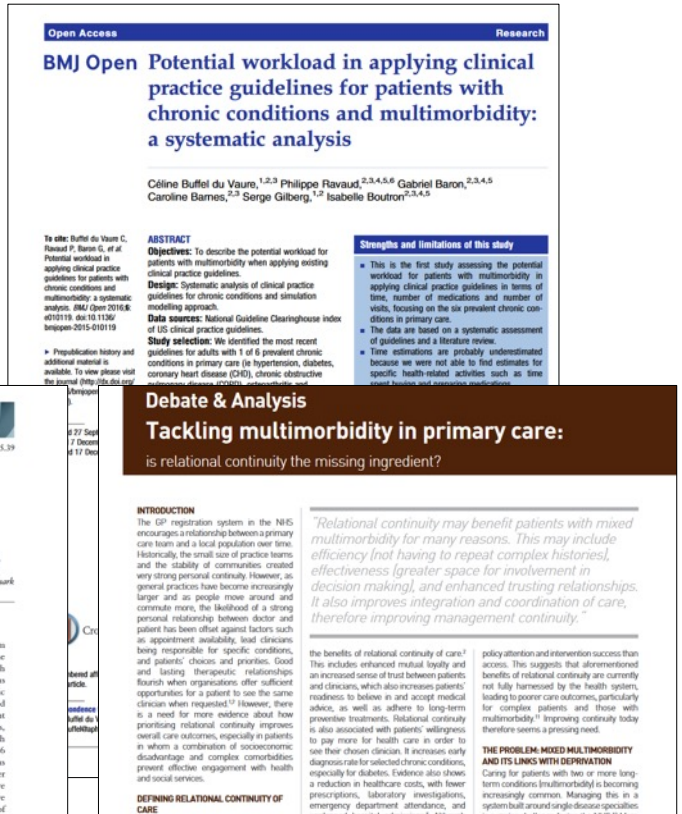
Medicare Current Beneficiary Survey cohort, a nationally representative sample of Americans aged 65 years or more.

PARTICIPANTS

8578 older adults with two or more study chronic conditions (atrial fibrillation, coronary artery disease, chronic kidney disease, depression, diabetes, heart failure, hyperlipidemia, hypertension, and thromboembolic disease), followed through 2011.

EXPOSURES

Drugs included β blockers, calcium channel blockers, the three years of follow-up. Among cardiovascular drugs, β blockers, calcium channel blockers, RAS blockers, and statins were associated with reduced mortality for indicated conditions. For example, the adjusted hazard ratio for β blockers was 0.59 (95% confidence interval 0.48 to 0.72) for people with atrial fibrillation and 0.68 (0.57 to 0.81) for those with heart failure. The adjusted hazard ratios for cardiovascular drugs were similar to those with common combinations of four coexisting conditions, with trends toward variable effects for β blockers. None of clopidogrel, metformin, or SSRIs/SNRIs was associated with reduced mortality. Warfarin was associated with a reduced risk of death among those with atrial fibrillation (adjusted hazard ratio 0.69, 95% confidence interval 0.56 to 0.85) and thromboembolic disease (0.44, 0.30 to 0.62). Attenuation in the association with reduced risk of death was found with warfarin in participants with some combinations of coexisting conditions.



Open Access Research

BMJ Open Potential workload in applying clinical practice guidelines for patients with chronic conditions and multimorbidity: a systematic analysis

Céline Buffel du Vaure,[1,2,3] Philippe Ravaud,[2,3,4,5,6] Gabriel Baron,[2,3,4,5] Caroline Barnes,[2,3] Serge Gilberg,[1,2] Isabelle Boutron[2,3,4,5]

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► Prepublication history and additional material is available. To view please visit the journal (http://dx.doi.org/

ABSTRACT

Objectives: To describe the potential workload for patients with multimorbidity when applying existing clinical practice guidelines.

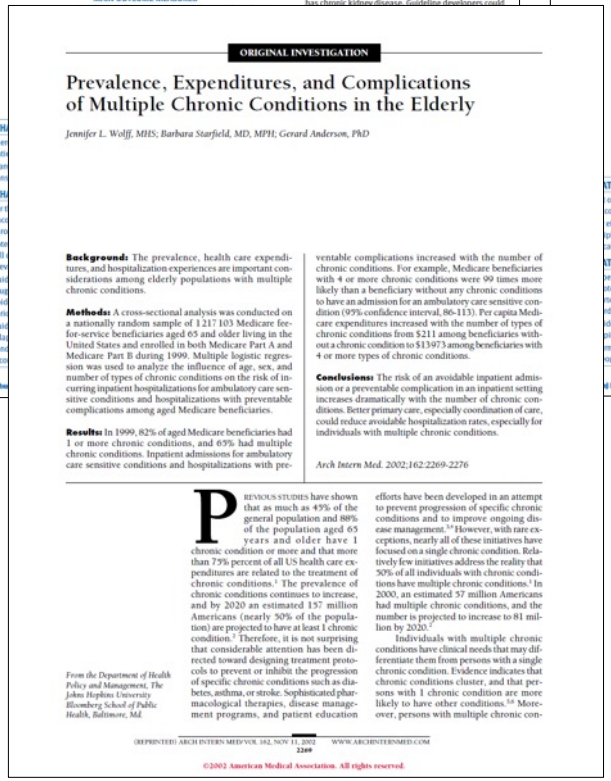
Design: Systematic analysis of clinical practice guidelines for chronic conditions and simulation modelling approach.

Data sources: National Guideline Clearinghouse index of US clinical practice guidelines.

Study selection: We identified the most recent guidelines for adults with 1 of 6 prevalent chronic conditions in primary care (ie hypertension, diabetes, coronary heart disease (CHD), chronic obstructive

Strengths and limitations of this study

- This is the first study assessing the potential workload for patients with multimorbidity in applying clinical practice guidelines in terms of time, number of medications and number of visits, focusing on the six prevalent chronic conditions in primary care.
- The data are based on a systematic assessment of guidelines and a literature review.
- Time estimations are probably underestimated because we were not able to find estimates for specific health-related activities such as time



ORIGINAL INVESTIGATION

Prevalence, Expenditures, and Complications of Multiple Chronic Conditions in the Elderly

Jennifer L. Wolff, MHS; Barbara Starfield, MD, MPH; Gerard Anderson, PhD

Background: The prevalence, health care expenditures, and hospitalization experiences are important considerations among elderly populations with multiple chronic conditions.

Methods: A cross-sectional analysis was conducted on a nationally random sample of 1 217 103 Medicare fee-for-service beneficiaries aged 65 and older living in the United States and enrolled in both Medicare Part A and Medicare Part B during 1999. Multiple logistic regression was used to analyze the influence of age, sex, and number of types of chronic conditions on the risk of incurring inpatient hospitalizations for ambulatory care sensitive conditions and hospitalizations with preventable complications among aged Medicare beneficiaries.

Results: In 1999, 82% of aged Medicare beneficiaries had 1 or more chronic conditions, and 63% had multiple chronic conditions. Inpatient admissions for ambulatory care sensitive conditions and hospitalizations with preventable complications increased with the number of chronic conditions. For example, Medicare beneficiaries with 4 or more chronic conditions were 99 times more likely than a beneficiary without any chronic conditions to have an admission for an ambulatory care sensitive condition (95%-confidence interval, 86-113). Per capita Medicare expenditures increased with the number of types of chronic conditions from $211 among beneficiaries without a chronic condition to $13 973 among beneficiaries with 4 or more types of chronic conditions.

Conclusions: The risk of an avoidable inpatient admission or a preventable complication in an inpatient setting increases dramatically with the number of chronic conditions. Better primary care, especially coordination of care, could reduce avoidable hospitalization rates, especially for individuals with multiple chronic conditions.

Arch Intern Med. 2002;162:2269-2276

PREVIOUS STUDIES have shown that as much as 45% of the general population and 88% of the population aged 65 years and older have 1 chronic condition or more and that more than 75% percent of all US health care expenditures are related to the treatment of chronic conditions.[1] The prevalence of chronic conditions continues to increase, and by 2020 an estimated 157 million Americans (nearly 50% of the population) are projected to have at least 1 chronic condition.[2] Therefore, it is not surprising that considerable attention has been directed toward designing treatment protocols to prevent or inhibit the progression of specific chronic conditions such as diabetes, asthma, or stroke. Sophisticated pharmacological therapies, disease management programs, and patient education efforts have been developed in an attempt to prevent progression of specific chronic conditions and to improve ongoing disease management.[3,4] However, with rare exceptions, nearly all of these initiatives have focused on a single chronic condition. Relatively few initiatives address the reality that 50% of all individuals with chronic conditions have multiple chronic conditions.[5] In 2000, an estimated 57 million Americans had multiple chronic conditions, and the number is projected to increase to 81 million by 2020.[2]

Individuals with multiple chronic conditions have clinical needs that may differentiate them from persons with a single chronic condition. Evidence indicates that chronic conditions cluster, and that persons with 1 chronic condition are more likely to have other conditions.[5,6] Moreover, persons with multiple chronic con-

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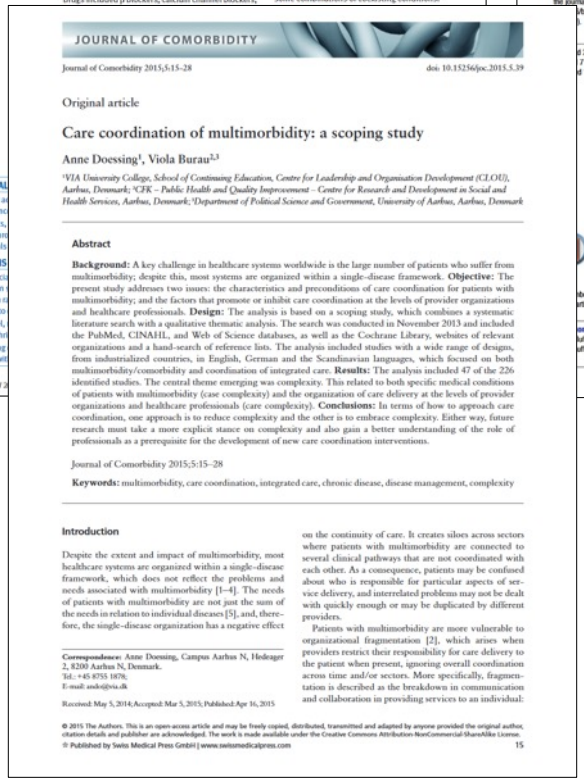

JOURNAL OF COMORBIDITY

Journal of Comorbidity 2015;5:15–28 doi: 10.15256/joc.2015.5.39

Original article

Care coordination of multimorbidity: a scoping study

Anne Doessing[1], Viola Burau[2,3]

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Abstract

Background: A key challenge in healthcare systems worldwide is the large number of patients who suffer from multimorbidity; despite this, most systems are organized within a single-disease framework. **Objective:** The present study addresses two issues: the characteristics and preconditions of care coordination for patients with multimorbidity; and the factors that promote or inhibit care coordination at the levels of provider organizations and healthcare professionals. **Design:** The analysis is based on a scoping study, which combines a systematic literature search with a qualitative thematic analysis. The search was conducted in November 2013 and included the PubMed, CINAHL, and Web of Science databases, as well as the Cochrane Library, websites of relevant organizations and a hand-search of reference lists. The analysis included studies with a wide range of designs, from industrialized countries, in English, German and the Scandinavian languages, which focused on both multimorbidity/comorbidity and coordination of integrated care. **Results:** The analysis included 47 of the 226 identified studies. The central theme emerging was complexity. This related to both specific medical conditions of patients with multimorbidity (case complexity) and the organization of care delivery at the levels of provider organizations and healthcare professionals (care complexity). **Conclusions:** In terms of how to approach care coordination, one approach is to reduce complexity and the other is to embrace complexity. Either way, future research must take a more explicit stance on complexity and also gain a better understanding of the role of professionals as a prerequisite for the development of new care coordination interventions.

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Keywords: multimorbidity, care coordination, integrated care, chronic disease, disease management, complexity

Introduction

Despite the extent and impact of multimorbidity, most healthcare systems are organized within a single-disease framework, which does not reflect the problems and needs associated with multimorbidity [1–4]. The needs of patients with multimorbidity are not just the sum of the needs in relation to individual diseases [5], and, therefore, the single-disease organization has a negative effect on the continuity of care. It creates siloes across sectors where patients with multimorbidity are connected to several clinical pathways that are not coordinated with each other. As a consequence, patients may be confused about who is responsible for particular aspects of service delivery, and interrelated problems may not be dealt with quickly enough or may be duplicated by different providers.

Patients with multimorbidity are more vulnerable to organizational fragmentation [2], which arises when providers restrict their responsibility for care delivery to the patient when present, ignoring overall coordination across time and/or sectors. More specifically, fragmentation is described as the breakdown in communication and collaboration in providing services to an individual:

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Debate & Analysis

Tackling multimorbidity in primary care:

is relational continuity the missing ingredient?

INTRODUCTION

The GP registration system in the NHS encourages a relationship between a primary care team and a local population over time. Historically, the small size of practice teams and the stability of communities created very strong personal continuity. However, as general practices have become increasingly larger and as people move around and commute more, the likelihood of a strong personal relationship between doctor and patient has been offset against factors such as appointment availability, lead clinicians being responsible for specific conditions, and patients' choices and priorities. Good and lasting therapeutic relationships flourish when organisations offer sufficient opportunities for a patient to see the same clinician when requested.[1,2] However, there is a need for more evidence about how prioritising relational continuity improves overall care outcomes, especially in patients in whom a combination of socioeconomic disadvantage and complex comorbidities prevent effective engagement with health and social services.

DEFINING RELATIONAL CONTINUITY OF CARE

The term 'continuity of care' refers to a complex and multifaceted concept that has been difficult to define.[3] Three types of continuity of care are generally accepted: 1) informational continuity, which describes the sharing of patient information between professionals and service providers; 2) management continuity, which describes a timely and complementary delivery of services from different providers; and 3) relational continuity, which describes an ongoing therapeutic relationship between a patient and one or more providers. Relational continuity is associated with improved patient satisfaction, care coordination, and selected patient outcomes.[4] It implies a sense of affiliation and mutual commitment between patient and clinician. This affiliation promotes reciprocal trust and responsibility, and reduces the 'collusion of anonymity', where a succession of clinicians deals only with the most immediately pressing problem. Relational continuity is therefore not only seeing the same clinician over time (known as longitudinal continuity) but also includes a dimension of 'trust' and 'confidence' in the clinician (known as interpersonal continuity).[5]

A recent King's Fund report has outlined

"Relational continuity may benefit patients with mixed multimorbidity for many reasons. This may include efficiency [not having to repeat complex histories], effectiveness [greater space for involvement in decision making], and enhanced trusting relationships. It also improves integration and coordination of care, therefore improving management continuity."

the benefits of relational continuity of care.[2] This includes enhanced mutual loyalty and an increased sense of trust between patients and clinicians, which also increases patients' readiness to believe in and accept medical advice, as well as adhere to long-term preventive treatments. Relational continuity is also associated with patients' willingness to pay more for health care in order to see their chosen clinician. It increases early diagnosis rate for selected chronic conditions, especially for diabetes. Evidence also shows a reduction in healthcare costs, with fewer prescriptions, laboratory investigations, emergency department attendance, and unplanned hospital admissions.[5] Although caution suggests that relational continuity may sometimes lead to problems, such as 'loyal' patients tolerating inappropriate and detrimental waits for their chosen clinician, it is largely seen as a good thing.[6–8] Indeed, when care is fragmented (care discontinuity), patients will often choose to attend an emergency department instead of their usual GP.

Despite these benefits, relational continuity is actually declining in the UK. It is suggested that this is the fact of more policies prioritising access, usually to the detriment of continuity, general practices merging into larger 'super practices', making it harder to maintain continuous personal contact with the same clinician, and the increasing move of the primary care workforce towards seasonal and part-time work.[9] Work pressures are also listed, encouraging practices to adopt models of care such as exclusive triage systems, which may improve access but affect continuity adversely. Although access and continuity are not necessarily incompatible, especially if both are seen as equally important,[10] in recent years continuity has received less policy attention and intervention success than access. This suggests that aforementioned benefits of relational continuity are currently not fully harnessed by the health system, leading to poorer care outcomes, particularly for complex patients and those with multimorbidity.[11] Improving continuity today therefore seems a pressing need.

THE PROBLEM: MIXED MULTIMORBIDITY AND ITS LINKS WITH DEPRIVATION

Caring for patients with two or more long-term conditions (multimorbidity) is becoming increasingly common. Managing this in a system built around single-disease specialties is a major challenge facing the NHS.[12] More than 15.4 million people in England live with a long-term condition, accounting for about 70% of total national healthcare spending. Disease-related disability amplifies this economic impact, particularly for younger patients. Approximately 40% of these patients also suffer from a mental health problem, raising their individual care cost by at least 45%. Resulting disability is greatest for those suffering from both mental health and physical health issues (mixed mental and physical health multimorbidity or 'mixed multimorbidity'), especially when they are economically deprived.[13]

Current government strategies to tackle multimorbidity are difficult to implement in this group, as they are hard to engage, and there are currently no direct incentives to increase relational continuity at practice level. For example, a recent policy aimed at assigning a named GP for all patients aged 75 or older in England, in order to improve relational continuity and care outcomes, was not successful.[14] Similarly, and as primary care teams expand, clinicians other than GPs (such as practice nurses or community matrons) are increasingly taking similar roles

3) Patient-centred medicine should guide practice

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Review

Minimally Disruptive Medicine: A Pragmatically Comprehensive Model for Delivering Care to Patients with Multiple Chronic Conditions

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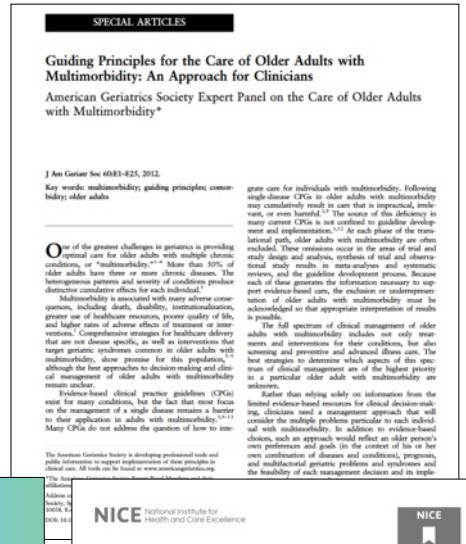
Abstract: An increasing proportion of healthcare resources in the United States are directed toward an expanding group of complex and multimorbid patients. Federal stakeholders have called for new models of care to meet the needs of these patients. Minimally Disruptive Medicine (MDM) is a theory-based, patient-centered, and context-sensitive approach to care that focuses on achieving patient goals for life and health while imposing the smallest possible treatment burden on patients' lives. The MDM Care Model is designed to be pragmatically comprehensive, meaning that it aims to address any and all factors that impact the implementation and effectiveness of care for patients with multiple chronic conditions. It comprises core activities that map to an underlying and testable theoretical framework. This encourages refinement and future study. Here, we present the conceptual rationale for and a practical approach to minimally disruptive care for patients with multiple chronic



SPECIAL ARTICLES

Guiding Principles for the Care of Older Adults with Multimorbidity: An Approach for Clinicians

American Geriatrics Society Expert Panel on the Care of Older Adults with Multimorbidity*

J Am Geriatr Soc 60:E1–E25, 2012.

Key words: multimorbidity; guiding principles; comorbidity; older adults

One of the greatest challenges in geriatrics is providing optimal care for older adults with multiple chronic conditions, or "multimorbidity."[1–4] More than 50% of older adults have three or more chronic diseases. The heterogeneous patterns and severity of conditions produce distinctive cumulative effects for each individual.[5]

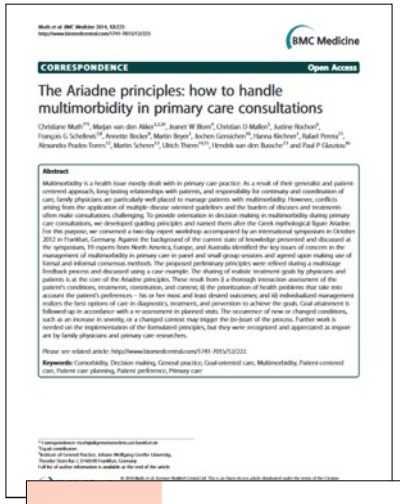
Multimorbidity is associated with many adverse consequences, including death, disability, institutionalization, greater use of healthcare resources, poorer quality of life, and higher rates of adverse effects of treatment or interventions.[6] Comprehensive strategies for healthcare delivery that are not disease specific, as well as interventions that target geriatric syndromes common in older adults with multimorbidity, show promise for this population,[7–9] although the best approaches to decision-making and clinical management of older adults with multimorbidity remain unclear.

Evidence-based clinical practice guidelines (CPGs) exist for many conditions, but the fact that most focus on the management of a single disease remains a barrier to their application in adults with multimorbidity.[3,9–13] Many CPGs do not address the question of how to integrate care for individuals with multimorbidity. Following single-disease CPGs in older adults with multimorbidity may cumulatively result in care that is impractical, irrelevant, or even harmful.[3,9] The source of this deficiency in many current CPGs is not confined to guideline development and implementation.[3,11] At each phase of the translational path, older adults with multimorbidity are often excluded. These omissions occur in the areas of trial and study design and analysis, synthesis of trial and observational study results in meta-analyses and systematic reviews, and the guideline development process. Because each of these generates the information necessary to support evidence-based care, the exclusion or underrepresentation of older adults with multimorbidity must be acknowledged so that appropriate interpretation of results is possible.

The full spectrum of clinical management of older adults with multimorbidity includes not only treatments and interventions for their conditions, but also screening and preventive and advanced illness care. The best strategies to determine which aspects of this spectrum of clinical management are of the highest priority in a particular older adult with multimorbidity are unknown.

Rather than relying solely on information from the limited evidence-based resources for clinical decision-making, clinicians need a management approach that will consider the multiple problems particular to each individual with multimorbidity. In addition to evidence-based choices, such an approach would reflect an older person's own preferences and goals (in the context of his or her own combination of diseases and conditions), prognosis, and multifactorial geriatric problems and syndromes and the feasibility of each management decision and its imple-

The American Geriatrics Society is developing professional tools and public information to support implementation of these principles in clinical care. All tools can be found at www.americangeriatrics.org.



BMC Medicine

CORRESPONDENCE Open Access

The Ariadne principles: how to handle multimorbidity in primary care consultations

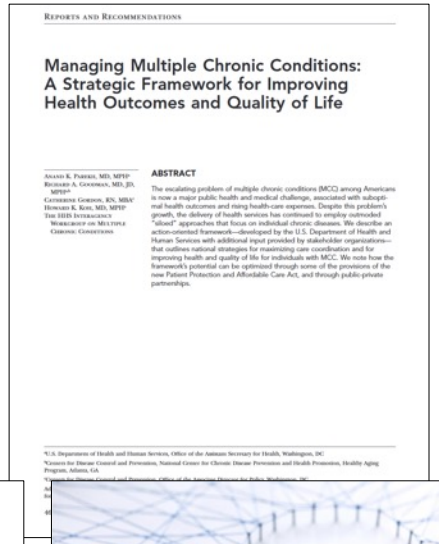
Christiane Muth[1*†], Marjan van den Akker[2,3,4†], Jeanet W Blom[5], Christian D Mallen[6], Justine Rochon[7], François G Schellevis[8,9], Annette Becker[4], Martin Beyer[1], Jochen Gensichen[10], Hanna Kirchner[1], Rafael Perera[11], Alexandra Prados Torres[12], Martin Scherer[13], Ulrich Thiem[14,15], Hendrik van den Bussche[16] and Paul P Glasziou[17]

Abstract

Multimorbidity is a health issue mostly dealt with in primary care practice. As a result of their generalist and patient-centered approach, long-lasting relationships with patients, and responsibility for continuity and coordination of care, family physicians are particularly well placed to manage patients with multimorbidity. However, conflicts arising from the application of multiple disease oriented guidelines and the burden of diseases and treatments often make consultations challenging. To provide orientation in decision making in multimorbidity during primary care consultations, we developed guiding principles and named them after the Greek mythological figure Ariadne. For this purpose, we convened a two-day expert workshop accompanied by an international symposium in October 2012 in Frankfurt, Germany. Against the background of the current state of knowledge presented and discussed at the symposium, 19 experts from North America, Europe, and Australia identified the key issues of concern in the management of multimorbidity in primary care in panel and small group sessions and agreed upon making use of formal and informal consensus methods. The proposed preliminary principles were refined during a multistage feedback process and discussed using a case example. The sharing of realistic treatment goals by physicians and patients is at the core of the Ariadne principles. These result from i) a thorough interaction assessment of the patient's conditions, treatments, constitution, and context, ii) the prioritization of health problems that take into account the patient's preferences – his or her most and least desired outcomes, and iii) individualized management realizes the best options of care in diagnostics, treatment, and prevention to achieve the goals. Goal attainment is followed-up in accordance with a re-assessment in planned visits. The occurrence of new or changed conditions, such as an increase in severity, or a changed context may trigger the (re-)start of the process. Further work is needed on the implementation of the formulated principles, but they were recognized and appreciated as important by family physicians and primary care researchers.

Please see related article: http://www.biomedcentral.com/1741-7015/12/222.

Keywords: Comorbidity, Decision-making, General practice, Goal-oriented care, Multimorbidity, Patient-centered care, Patient care planning, Patient preference, Primary care



REPORTS AND RECOMMENDATIONS

Managing Multiple Chronic Conditions: A Strategic Framework for Improving Health Outcomes and Quality of Life

ANAND K. PARIKH, MD, MPH[a]
RICHARD A. GOODMAN, MD, JD, MPH[b]
CATHERINE GORDON, RN, MBA[c]
HOWARD K. KOH, MD, MPH[a]
THE HHS INTERAGENCY WORKGROUP ON MULTIPLE CHRONIC CONDITIONS

ABSTRACT

The escalating problem of multiple chronic conditions (MCC) among Americans is now a major public health and medical challenge, associated with suboptimal health outcomes and rising health-care expenses. Despite this problem's growth, the delivery of health services has continued to employ outmoded "siloed" approaches that focus on individual chronic diseases. We describe an action-oriented framework—developed by the U.S. Department of Health and Human Services with additional input provided by stakeholder organizations—that outlines national strategies for maximizing care coordination and for improving health and quality of life for individuals with MCC. We note how the framework's potential can be optimized through some of the provisions of the new Patient Protection and Affordable Care Act, and through public-private partnerships.

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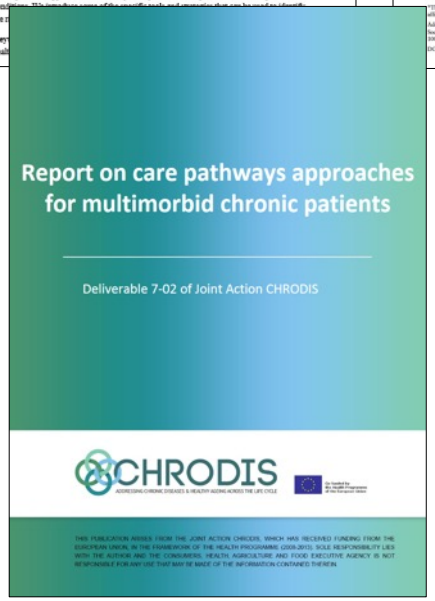


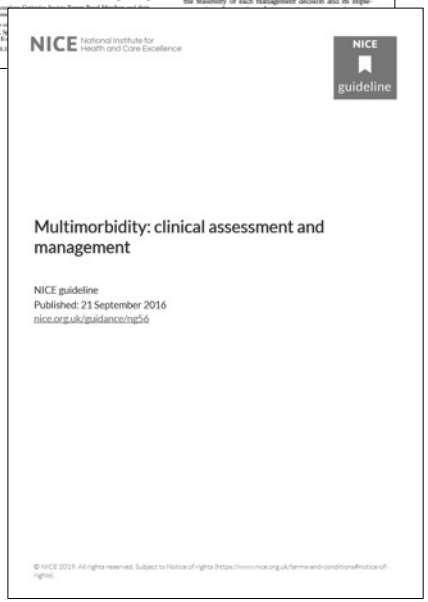
Report on care pathways approaches for multimorbid chronic patients

Deliverable 7-02 of Joint Action CHRODIS

CHRODIS

ADDRESSING CHRONIC DISEASES & HEALTHY AGEING ACROSS THE LIFE CYCLE

THIS PUBLICATION ARISES FROM THE JOINT ACTION CHRODIS, WHICH HAS RECEIVED FUNDING FROM THE EUROPEAN UNION, IN THE FRAMEWORK OF THE HEALTH PROGRAMME (2008-2013). SOLE RESPONSIBILITY LIES WITH THE AUTHOR AND THE CONSUMERS, HEALTH, AGRICULTURE AND FOOD EXECUTIVE AGENCY IS NOT RESPONSIBLE FOR ANY USE THAT MAY BE MADE OF THE INFORMATION CONTAINED THEREIN.



NICE National Institute for Health and Care Excellence

NICE guideline

Multimorbidity: clinical assessment and management

NICE guideline
Published: 21 September 2016
nice.org.uk/guidance/ng56

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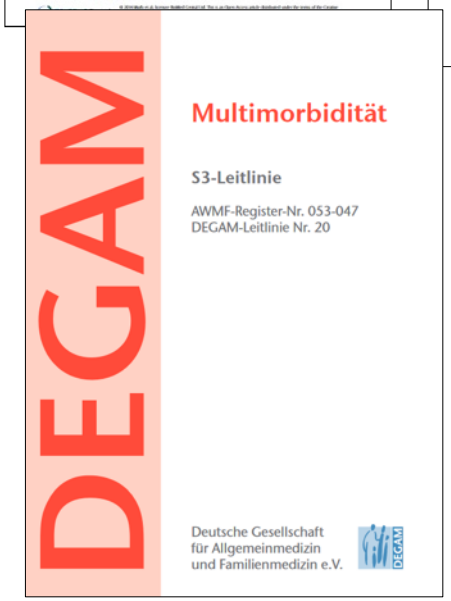

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Multimorbidität

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AWMF-Register-Nr. 053-047
DEGAM-Leitlinie Nr. 20

Deutsche Gesellschaft für Allgemeinmedizin und Familienmedizin e.V.

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Linea guida inter-societaria per la gestione della multimorbilità e polifarmacoterapia

2021

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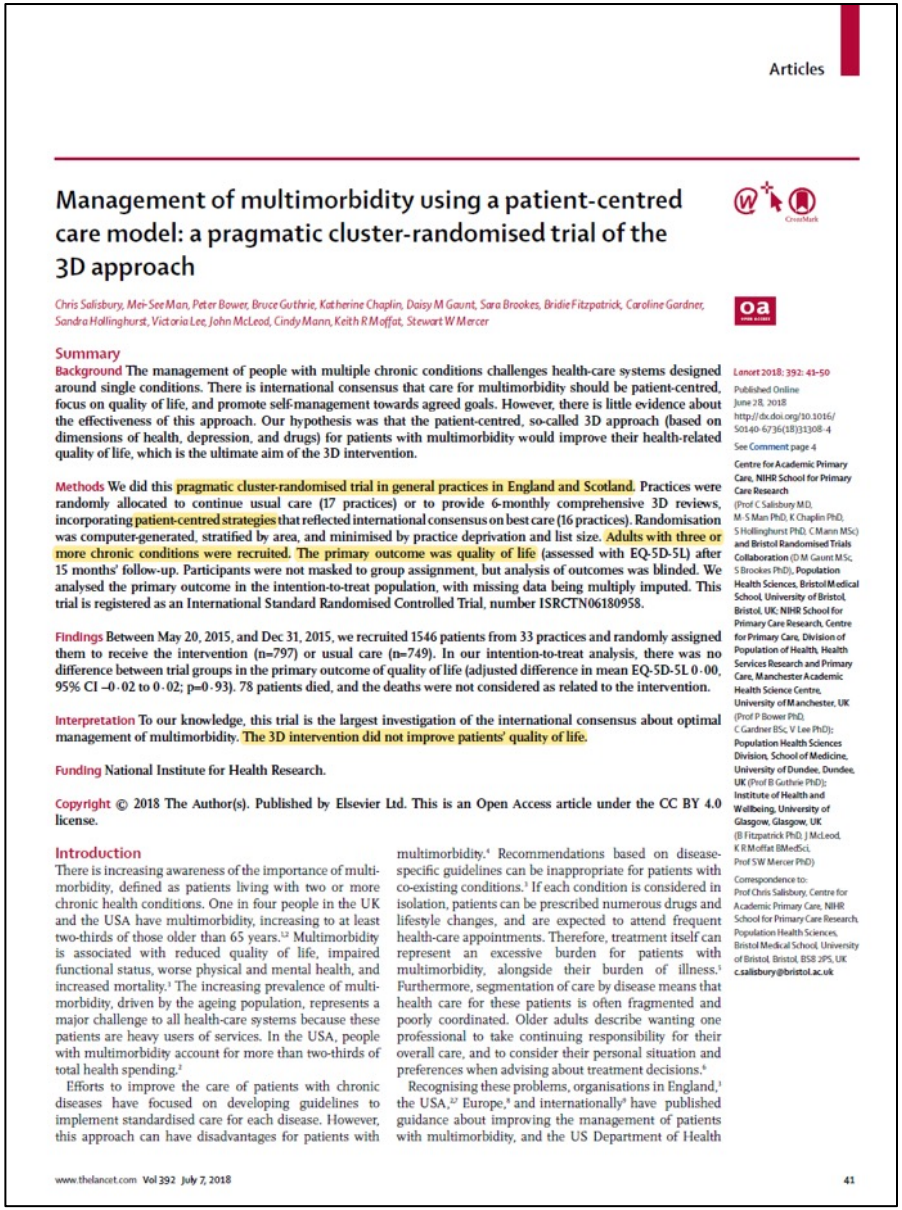
3) Patient-centred medicine should guide practice



Articles

Management of multimorbidity using a patient-centred care model: a pragmatic cluster-randomised trial of the 3D approach

Chris Salisbury, Mei-See Man, Peter Bower, Bruce Guthrie, Katherine Chaplin, Daisy M Gaunt, Sara Brookes, Bridie Fitzpatrick, Caroline Gardner, Sandra Hollinghurst, Victoria Lee, John McLeod, Cindy Mann, Keith R Moffat, Stewart W Mercer

Summary

Background The management of people with multiple chronic conditions challenges health-care systems designed around single conditions. There is international consensus that care for multimorbidity should be patient-centred, focus on quality of life, and promote self-management towards agreed goals. However, there is little evidence about the effectiveness of this approach. Our hypothesis was that the patient-centred, so-called 3D approach (based on dimensions of health, depression, and drugs) for patients with multimorbidity would improve their health-related quality of life, which is the ultimate aim of the 3D intervention.

Methods We did this pragmatic cluster-randomised trial in general practices in England and Scotland. Practices were randomly allocated to continue usual care (17 practices) or to provide 6-monthly comprehensive 3D reviews, incorporating patient-centred strategies that reflected international consensus on best care (16 practices). Randomisation was computer-generated, stratified by area, and minimised by practice deprivation and list size. Adults with three or more chronic conditions were recruited. The primary outcome was quality of life (assessed with EQ-5D-5L) after 15 months' follow-up. Participants were not masked to group assignment, but analysis of outcomes was blinded. We analysed the primary outcome in the intention-to-treat population, with missing data being multiply imputed. This trial is registered as an International Standard Randomised Controlled Trial, number ISRCTN06180958.

Findings Between May 20, 2015, and Dec 31, 2015, we recruited 1546 patients from 33 practices and randomly assigned them to receive the intervention (n=797) or usual care (n=749). In our intention-to-treat analysis, there was no difference between trial groups in the primary outcome of quality of life (adjusted difference in mean EQ-5D-5L 0·00, 95% CI −0·02 to 0·02; p=0·93). 78 patients died, and the deaths were not considered as related to the intervention.

Interpretation To our knowledge, this trial is the largest investigation of the international consensus about optimal management of multimorbidity. The 3D intervention did not improve patients' quality of life.

Funding National Institute for Health Research.

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See Comment page 4

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Correspondence to: Prof Chris Salisbury, Centre for Academic Primary Care, NIHR School for Primary Care Research, Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, BS8 2PS, UK
c.salisbury@bristol.ac.uk

Introduction

There is increasing awareness of the importance of multimorbidity, defined as patients living with two or more chronic health conditions. One in four people in the UK and the USA have multimorbidity, increasing to at least two-thirds of those older than 65 years.[1,2] Multimorbidity is associated with reduced quality of life, impaired functional status, worse physical and mental health, and increased mortality.[3] The increasing prevalence of multimorbidity, driven by the ageing population, represents a major challenge to all health-care systems because these patients are heavy users of services. In the USA, people with multimorbidity account for more than two-thirds of total health spending.[2]

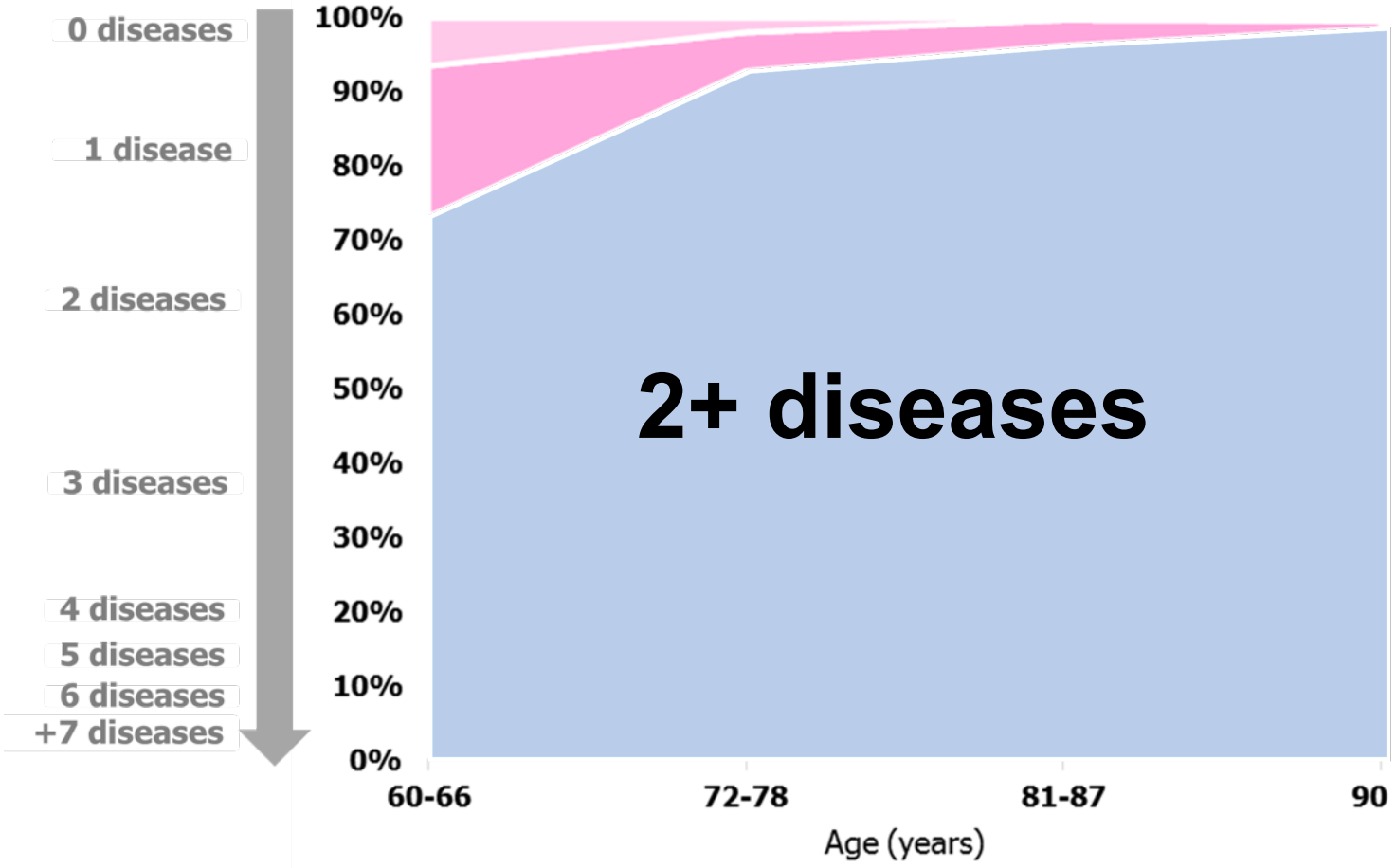
Efforts to improve the care of patients with chronic diseases have focused on developing guidelines to implement standardised care for each disease. However, this approach can have disadvantages for patients with multimorbidity.[4] Recommendations based on disease-specific guidelines can be inappropriate for patients with co-existing conditions.[3] If each condition is considered in isolation, patients can be prescribed numerous drugs and lifestyle changes, and are expected to attend frequent health-care appointments. Therefore, treatment itself can represent an excessive burden for patients with multimorbidity, alongside their burden of illness.[3] Furthermore, segmentation of care by disease means that health care for these patients is often fragmented and poorly coordinated. Older adults describe wanting one professional to take continuing responsibility for their overall care, and to consider their personal situation and preferences when advising about treatment decisions.[6]

Recognising these problems, organisations in England,[1] the USA,[3,7] Europe,[8] and internationally[9] have published guidance about improving the management of patients with multimorbidity, and the US Department of Health

Some questions…

- Is the threshold of 3+ diseases clinically relevant?
- Is targeting multimorbidity enough?

…the 2+ cut-off poorly captures the heterogeneity in older adults' health status…



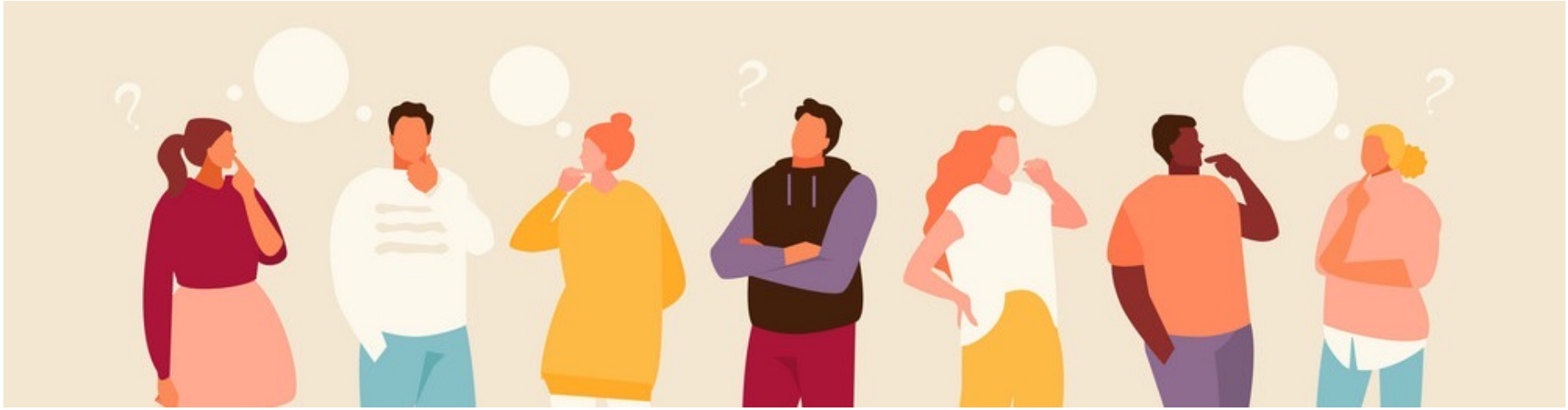
Calderón-Larrañaga, J Gerontol A Biol Sci Med Sci (2016)

What do we already know?
Multimorbidity 1.0

What are we less certain about?
Multimorbidity 2.0

Multimorbidity 2.0

How should the burden of multimorbidity be operationalized to make it a meaningful concept both from the research and clinical perspectives?



Swedish National Study on Aging and Care – Kungsholmen

SNAC-K

https://www.snac-k.se/

How should multimorbidity be operationalized?

I **Data-driven identification of multimorbidity patterns**

- Diseases are NOT distributed randomly
- Diseases CLUSTER
- The global burden of morbidity is HIGHER that the simple sum of isolated diseases

ARTICLE

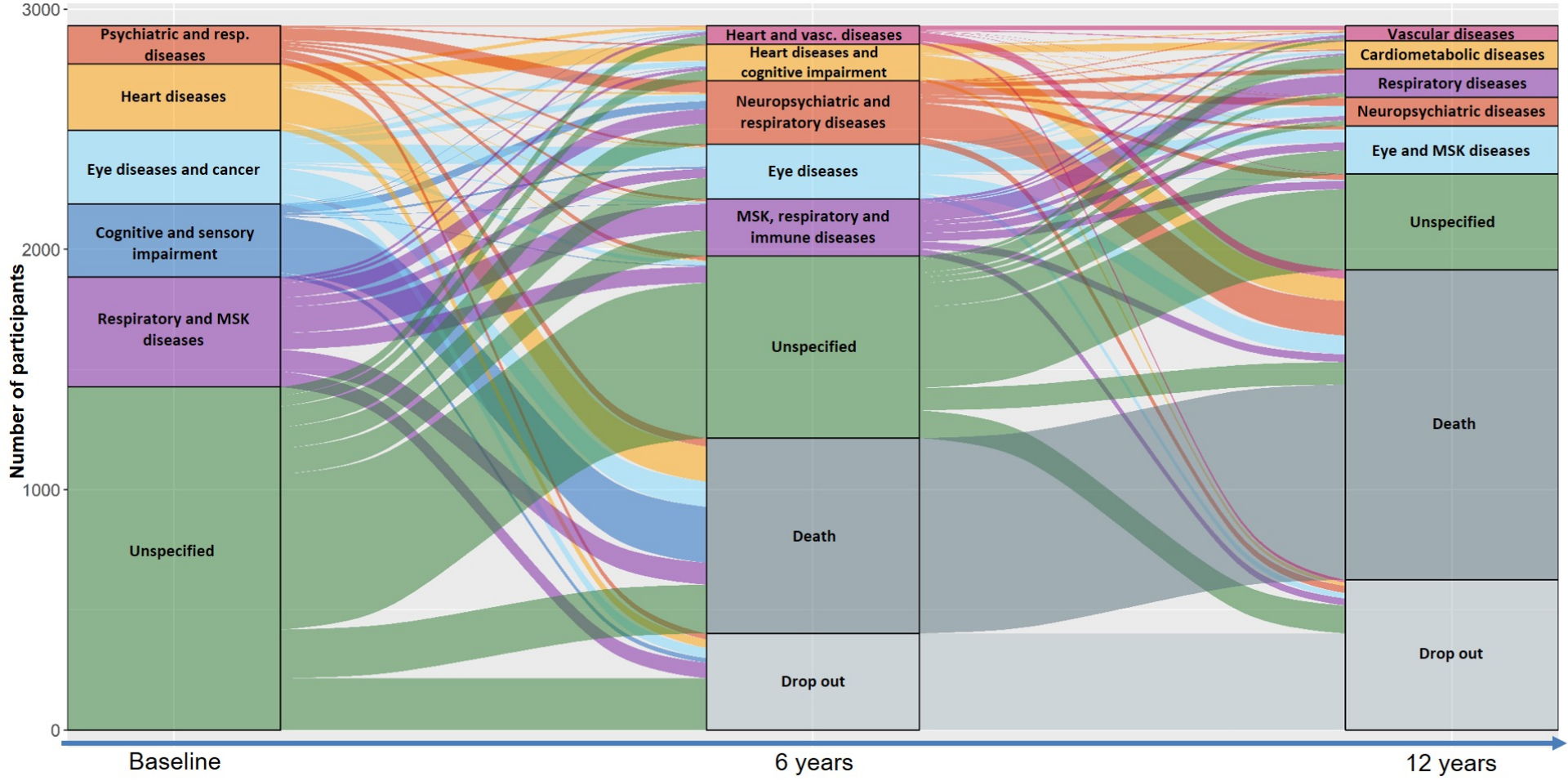
https://doi.org/10.1038/s41467-020-16780-x OPEN

Check for updates

Twelve-year clinical trajectories of multimorbidity in a population of older adults

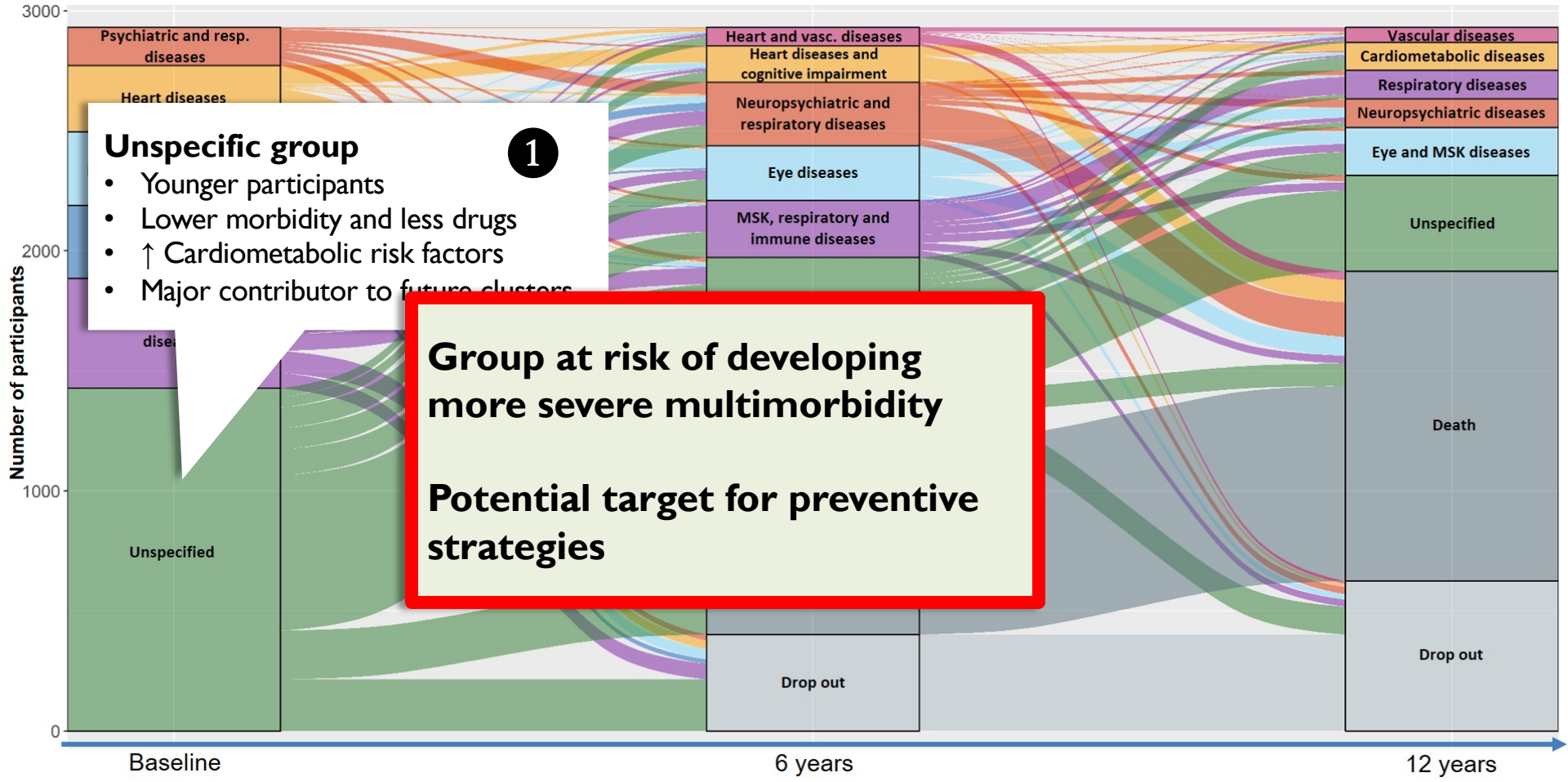
Davide L. Vetrano[1,2,8✉], Albert Roso-Llorach[3,4,8], Sergio Fernández[3,4], Marina Guisado-Clavero[3,4], Concepción Violán[3,4], Graziano Onder[5], Laura Fratiglioni[1,6], Amaia Calderón-Larrañaga[1,9] & Alessandra Marengoni[1,7,9]

Trajectories of multimorbidity patterns



Vetrano DL, ..., Calderón-Larrañaga A & Marengoni A, Nat Communications (2020)

Trajectories of multimorbidity patterns



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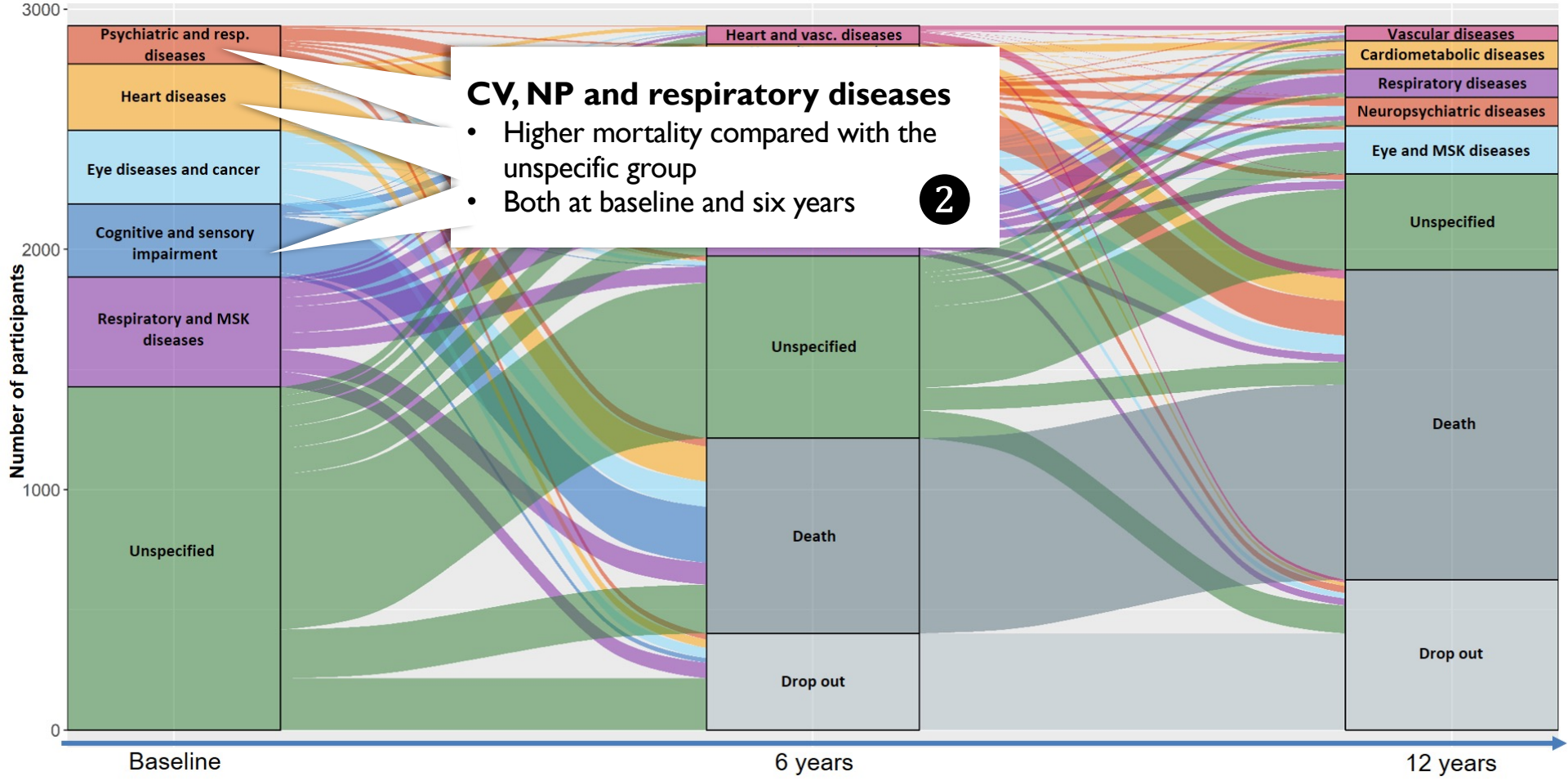
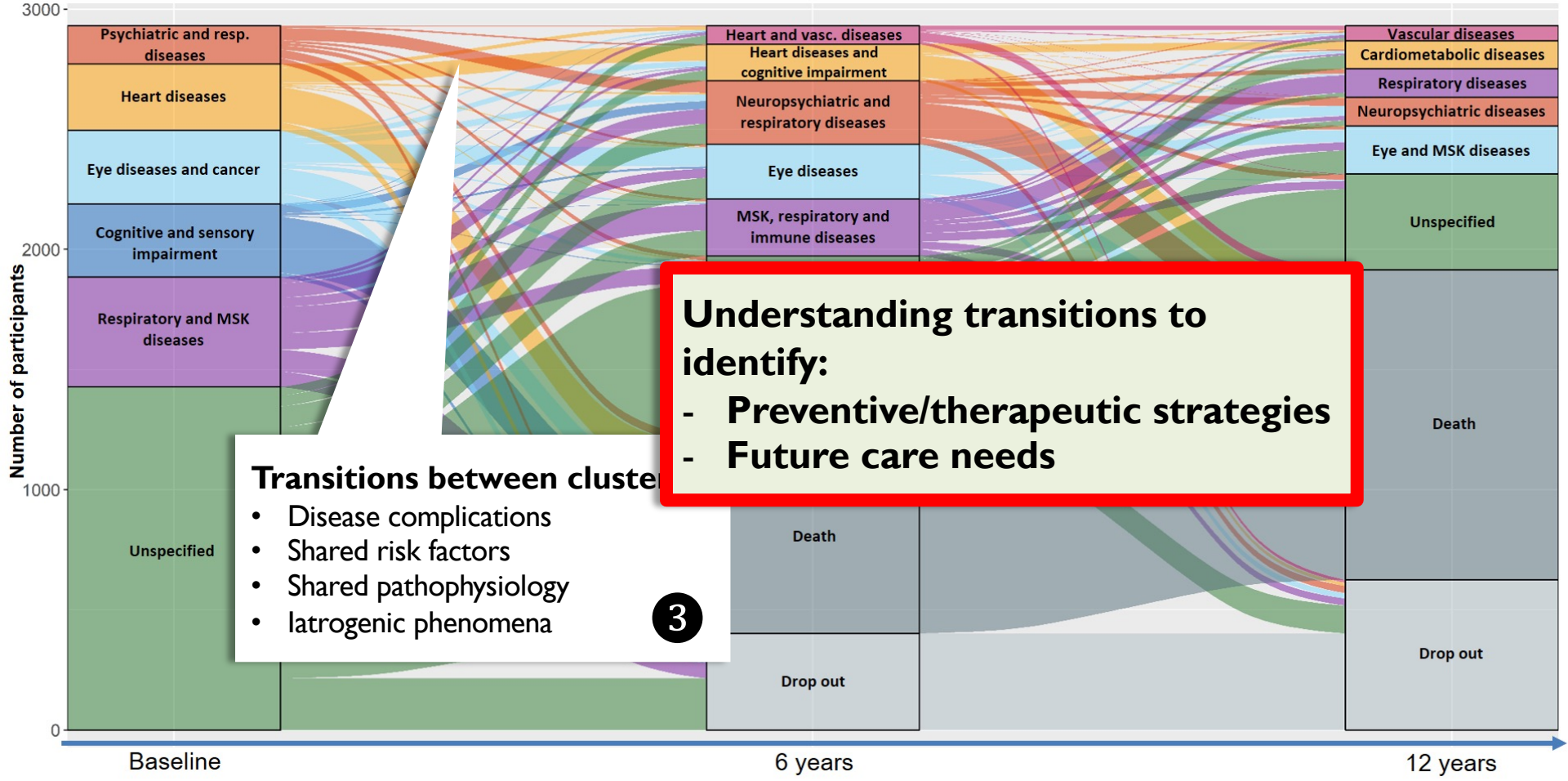
Trajectories of multimorbidity patterns



Vetrano DL, ..., Calderón-Larrañaga A & Marengoni A, Nat Communications (2020)

Trajectories of multimorbidity patterns

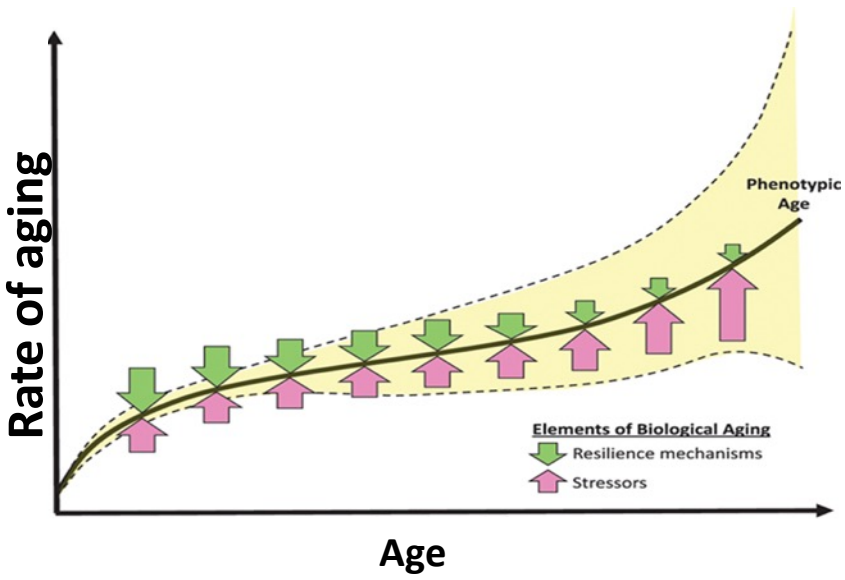


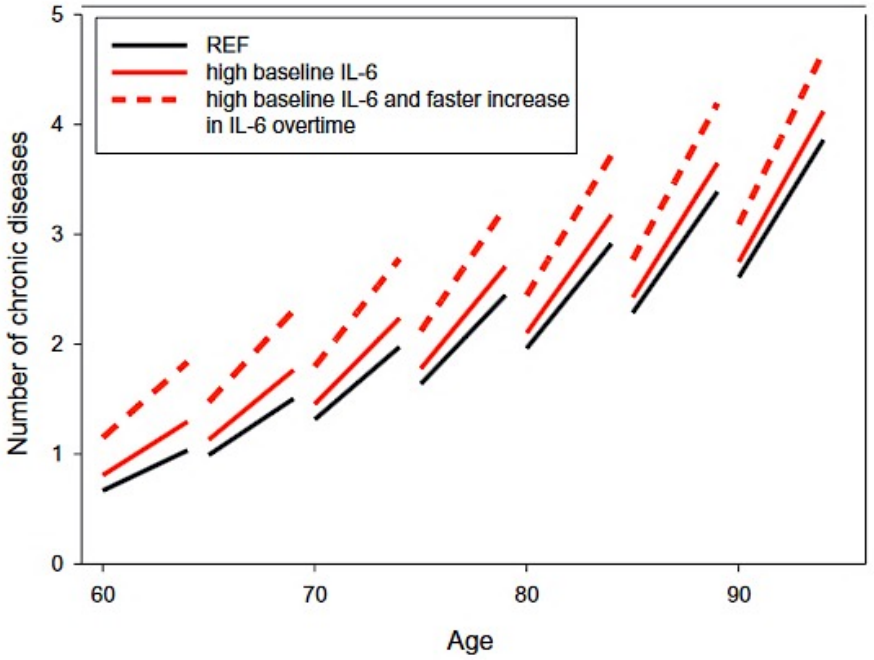
Vetrano DL, ..., Calderón-Larrañaga A & Marengoni A, Nat Communications (2020)

How should multimorbidity be operationalized?

2 Speed of multimorbidity accumulation

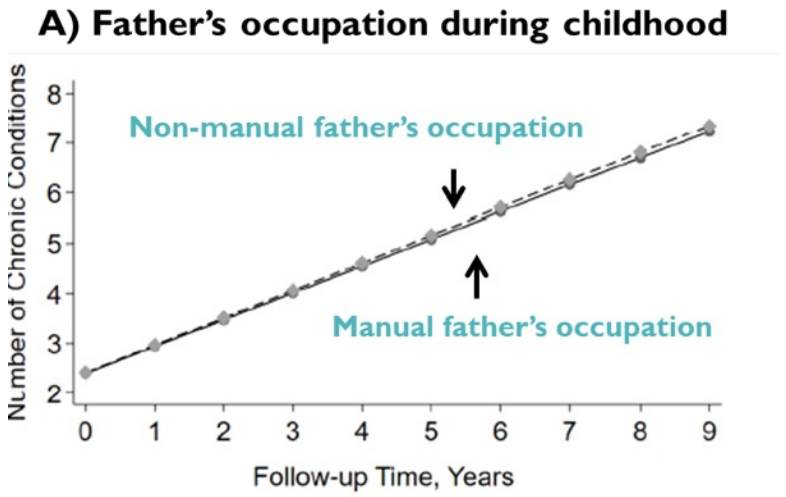
- Underlying mechanism: progressive loss of resilience and homeostatic multisystem dysregulation
- Proxy for the speed of biological aging

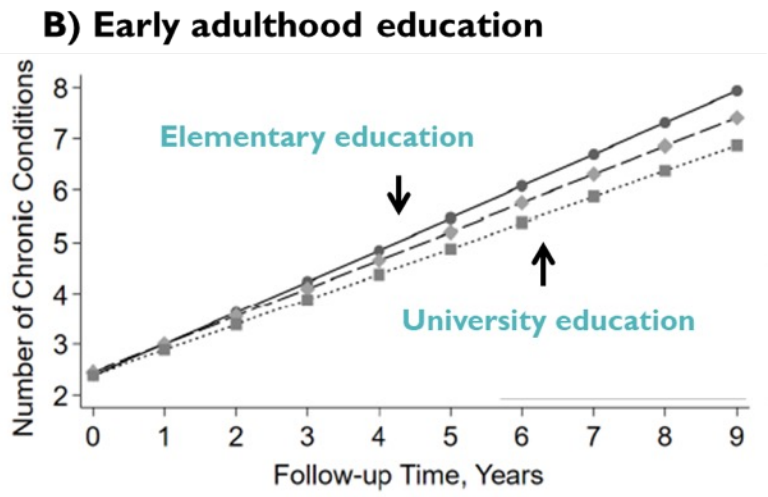


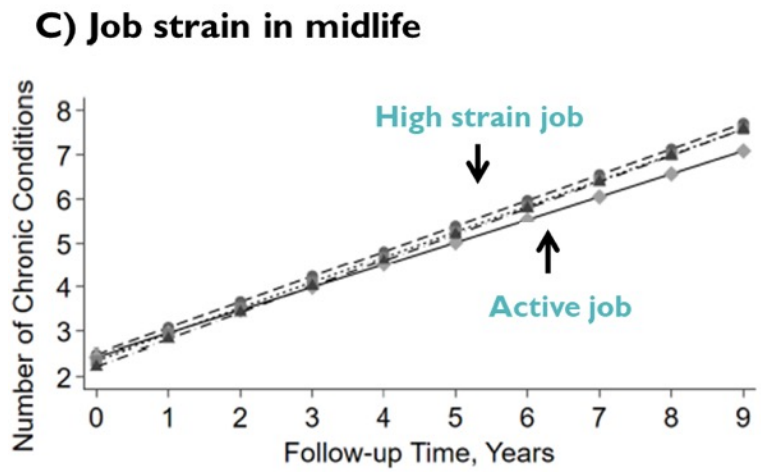


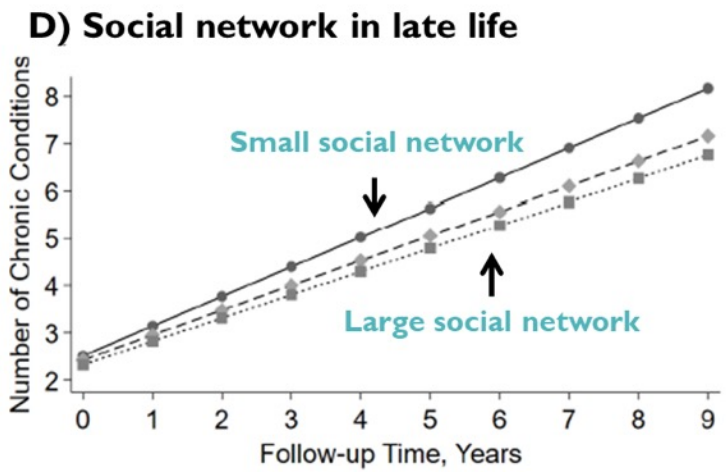
Ferrucci L et al. Circ Res (2018); Fabbri E et al. J Gerontol A Biol Sci Med Sci (2015)

Association with life-long risk factors







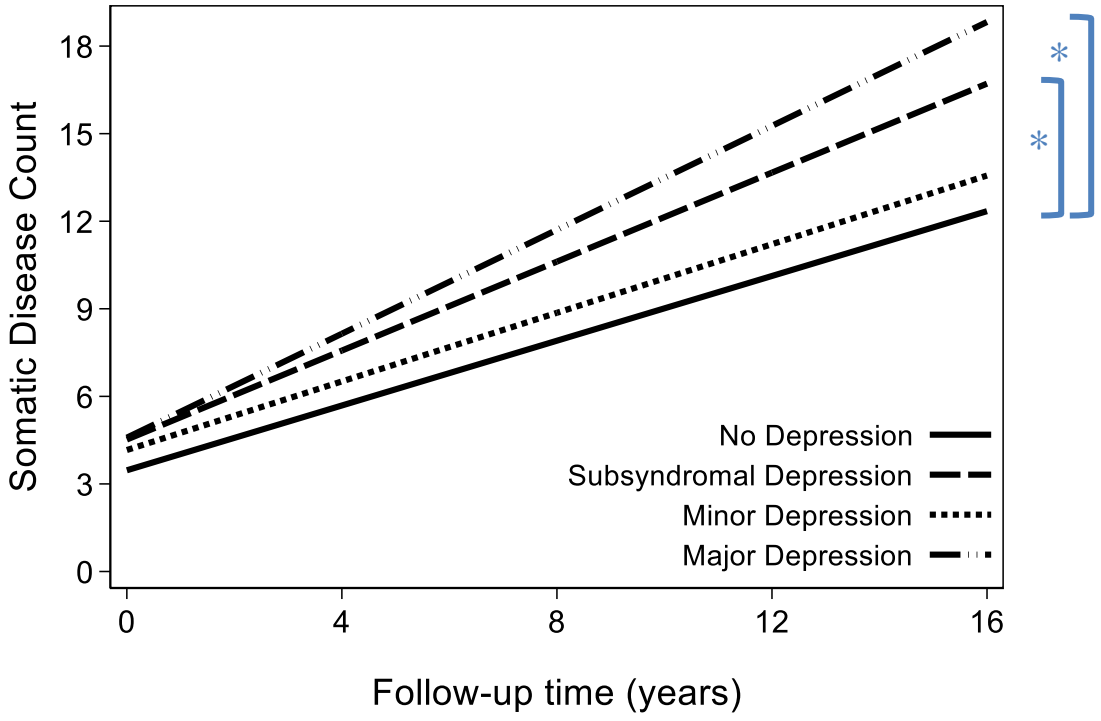


Dekhtyar S, ..., Calderón-Larrañaga A, Am J Epi (2019)

Association with depression severity

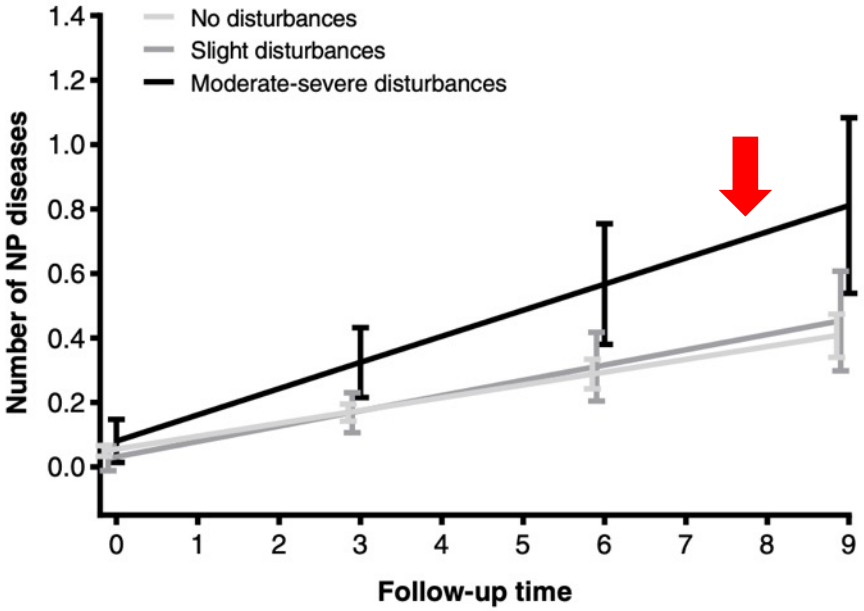
Depression status	N=3042
No Depression	90%
Subsyndromal Depression	4%
Minor Depression	5%
Major Depression	1%

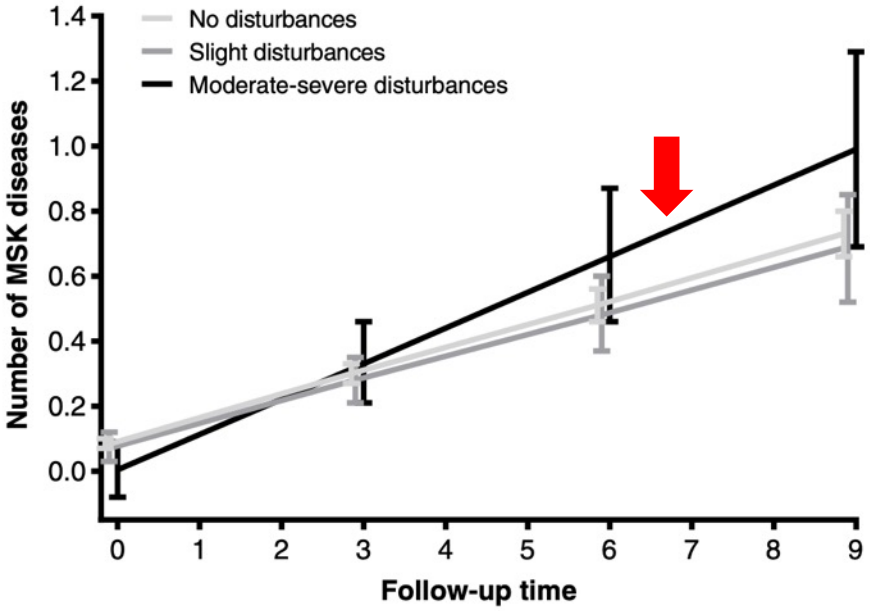
Models adjusted for: time, age, sex, education, marital status, SES, smoke, alcohol, BMI



Triolo F et al, Unpublished

Association with sleep disturbances

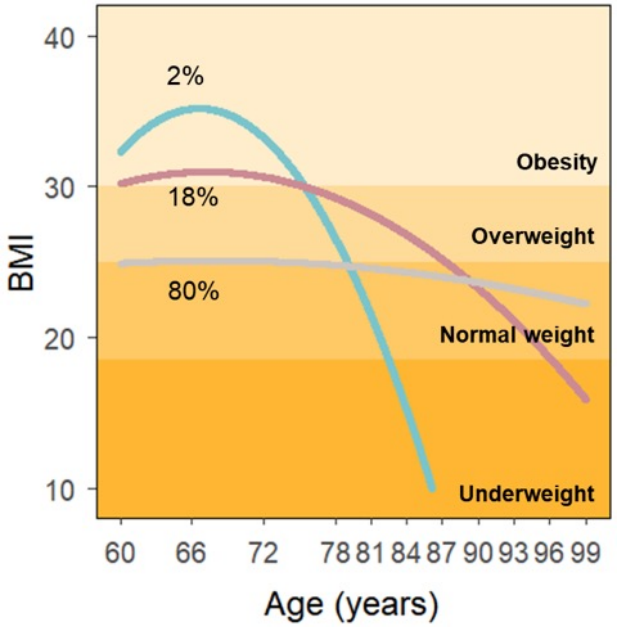


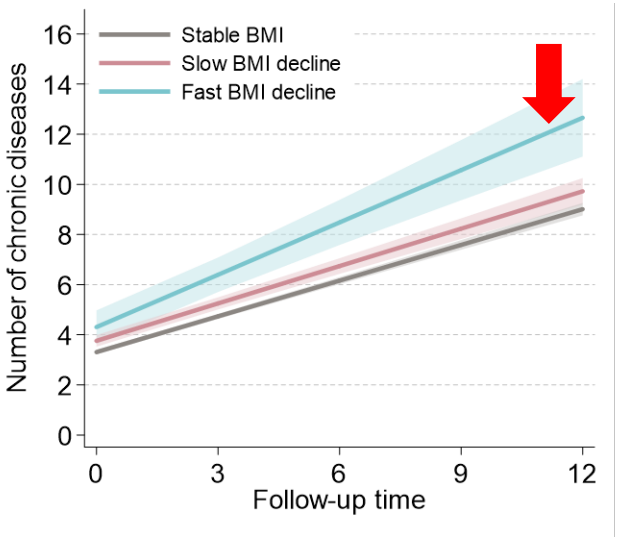


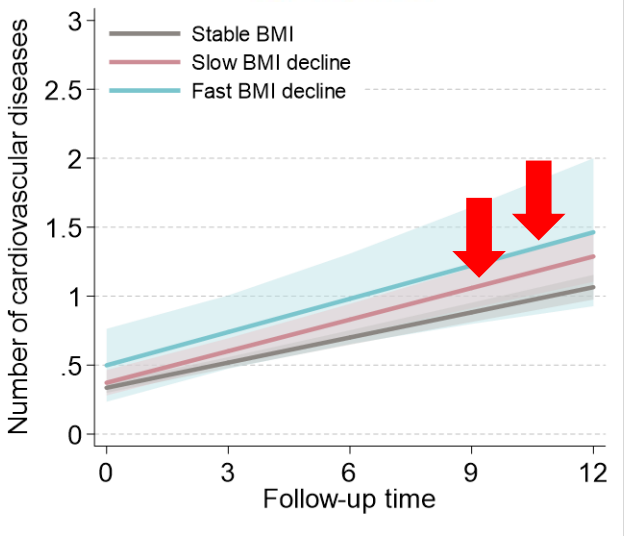
Models adjusted by sex, age, education level, physical activity, smoking, alcohol consumption, BMI, presence of depression (MADRS score > 9) except for the model with NP diseases as the outcome, presence of pain, psychotropic medication, and presence of any chronic disease.

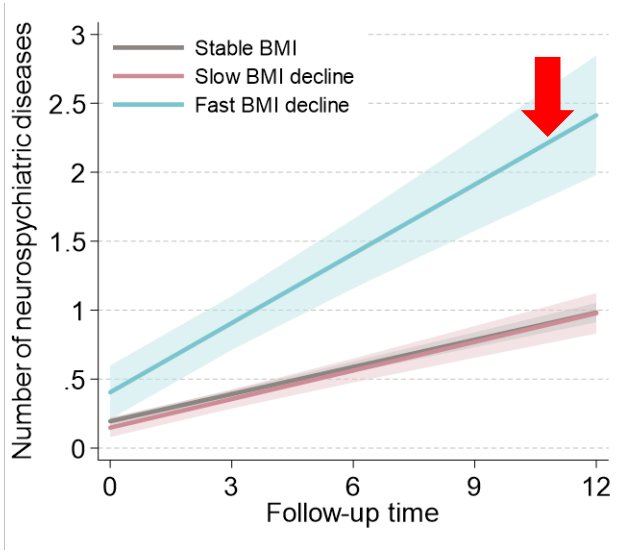
Sindi S, ..., Calderón-Larrañaga A, BMC Medicine (2020)

Association with BMI trajectories





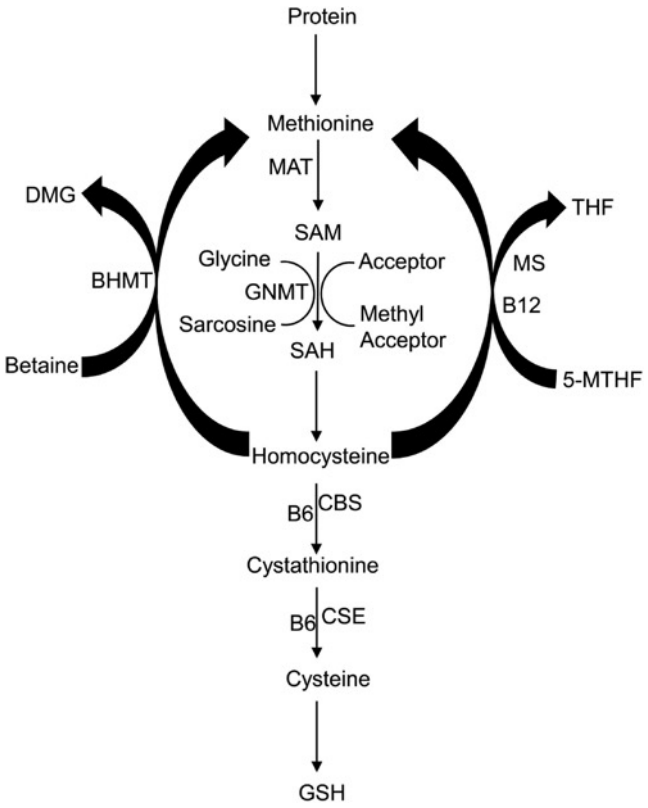


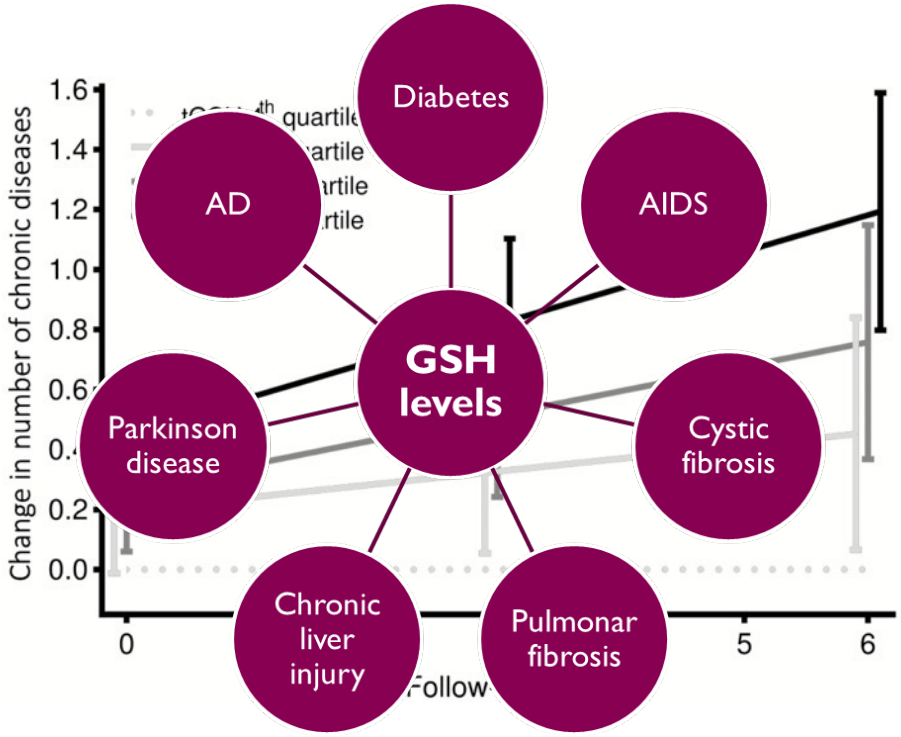


Models are adjusted by education, age at baseline, sex and time to death during follow-up.

Calderón-Larrañaga A, Clin Nutr (2021)

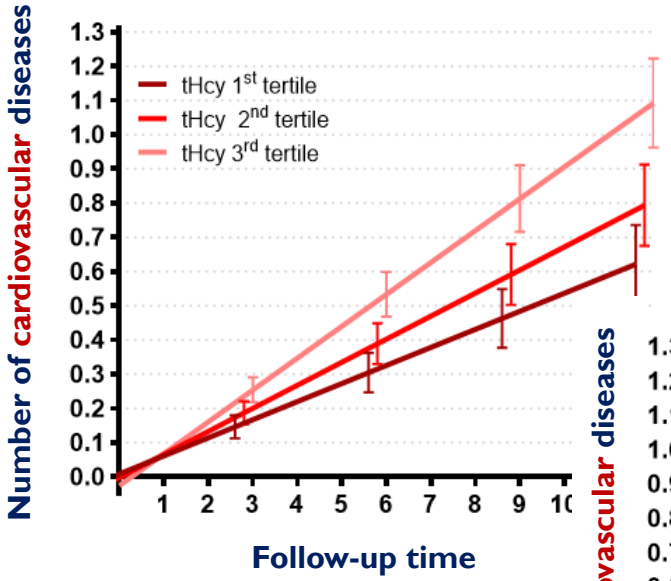
Serum biomarkers: total gluthatione

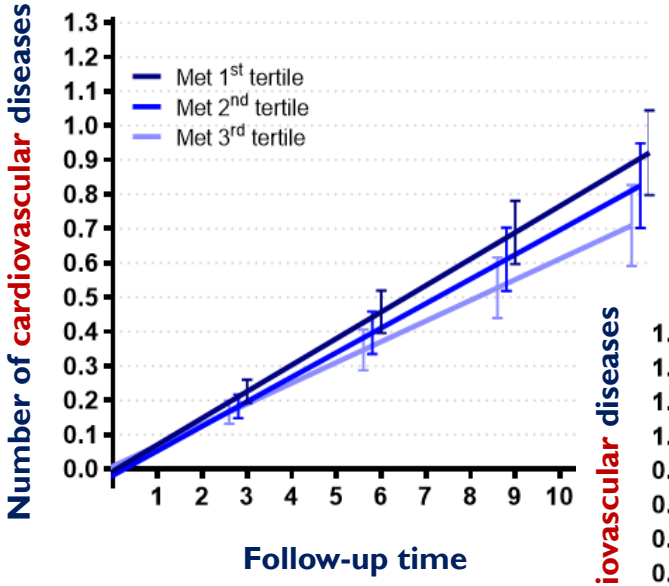


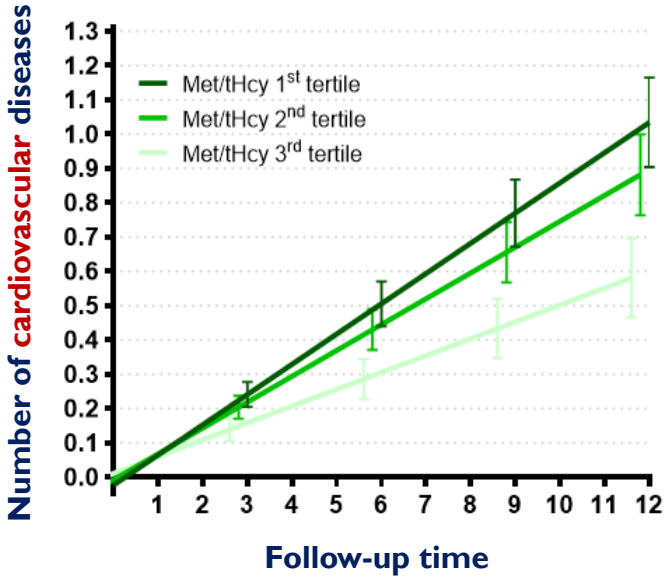


Pérez LM, ..., Calderón-Larrañaga A, J Gerontol A Biol Sci Med Sci (2019)

Serum biomarkers: homocysteine and methionine







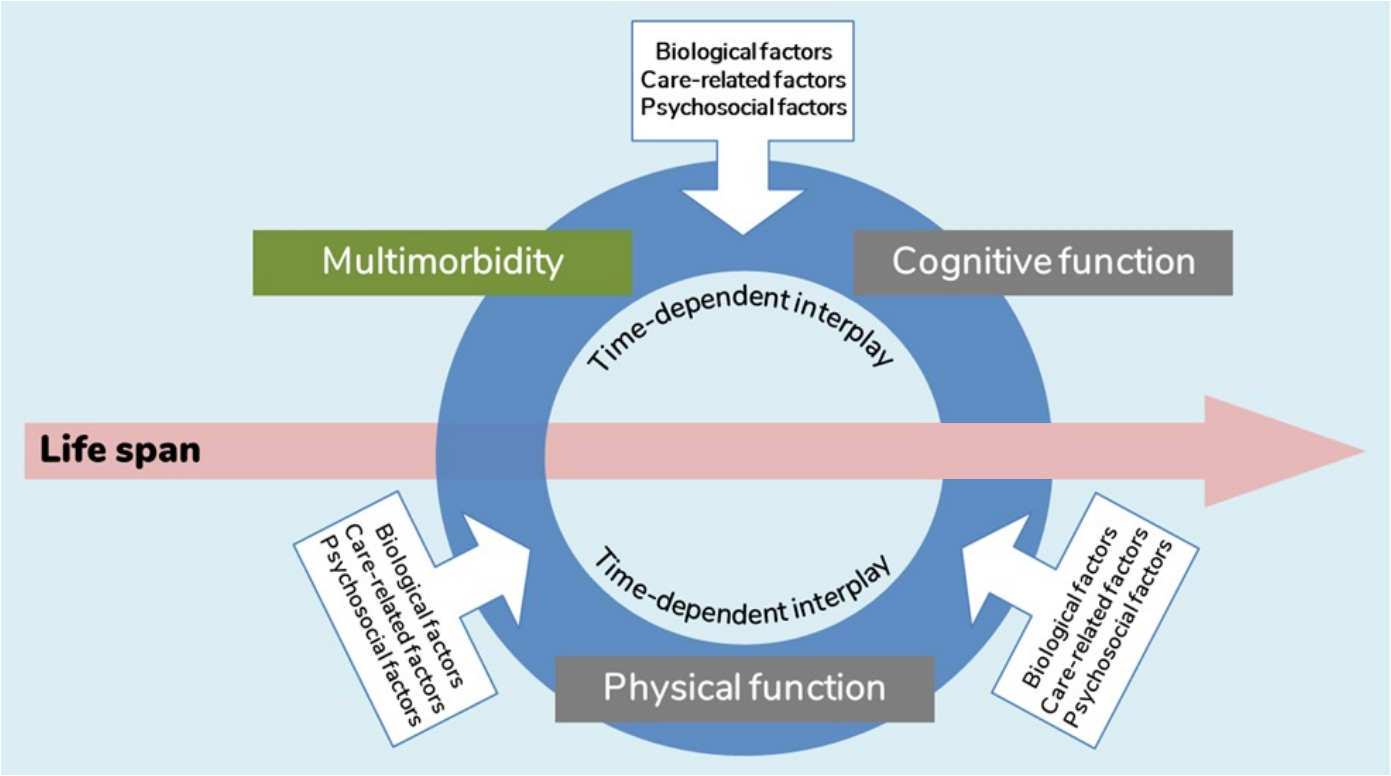
Pleiotropic functions:

- DNA synthesis and repair
- Lipidic metabolism
- Telomere length
- Oxidative stress
- Inflammation
- DNA methylation

Calderón-Larrañaga A, JAMA Netw Open (2020)

How should multimorbidity be operationalized?

3 **Interplay with function/frailty**



Multimorbidity and functional impairment: bidirectional interplay, synergistic effects and common pathways

Calderón-Larrañaga A, Vetrano DL et al. JIM (2019)

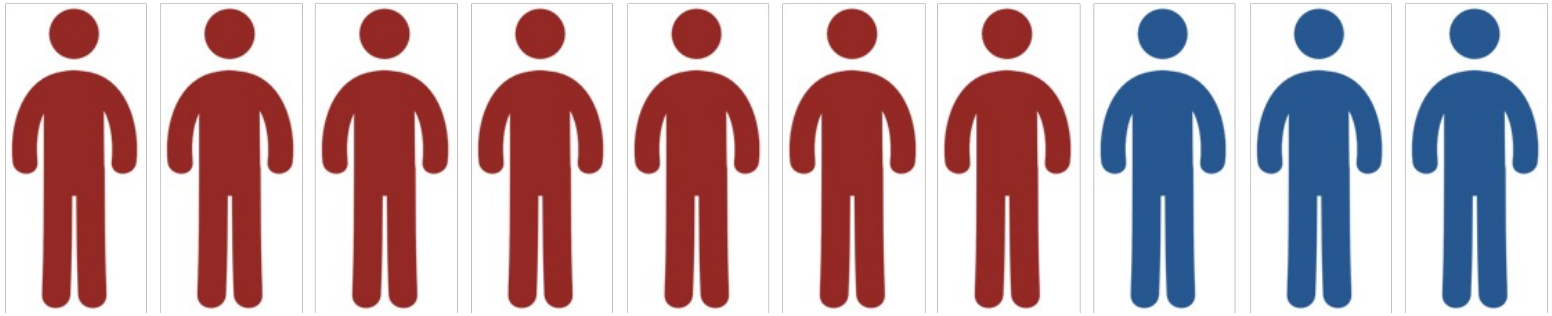
INTERNATIONAL SYMPOSIUM

Multimorbidity research at the cross-roads

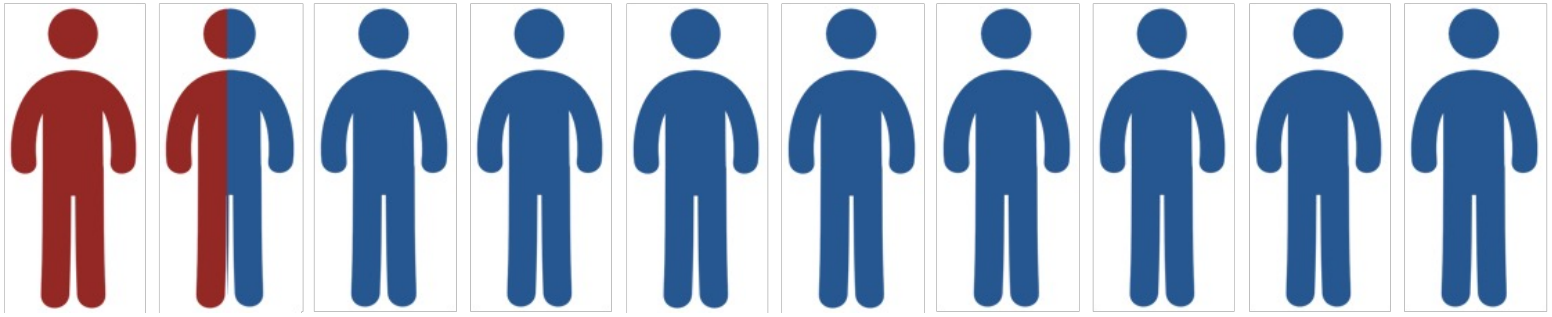
Stockholm | 21 May 2018

http://www.multimorbidity2018-stockholm.se/

Out of 10 frail individuals 7 are multimorbid

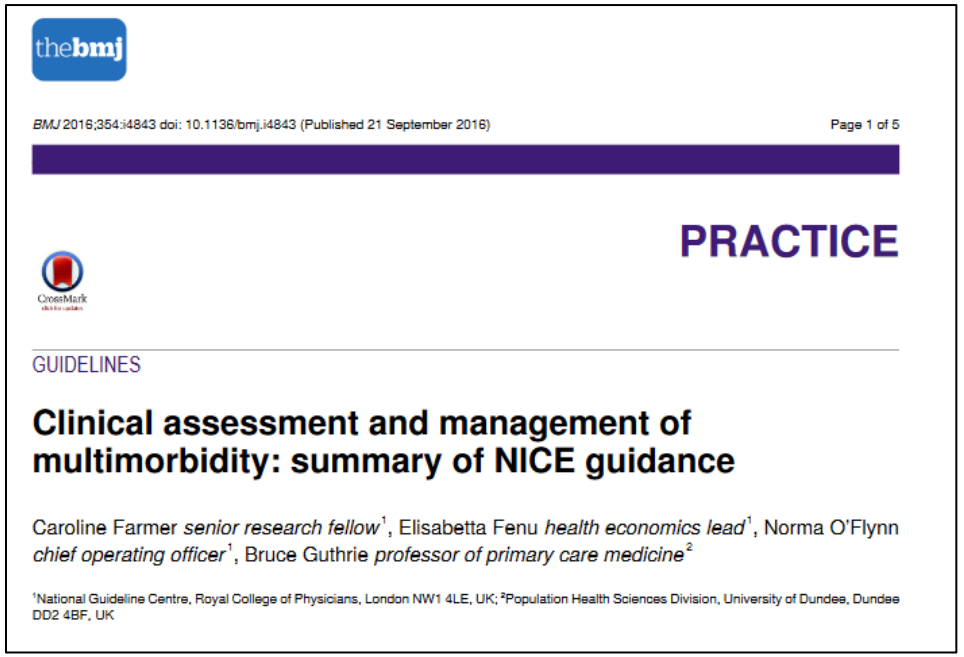


Out of 10 multimorbid individuals <2 are frail



Vetrano DL et al. Adapted from J Geront Med Sci (2018)

NICE guideline (summary)



thebmj

BMJ 2016;354:i4843 doi: 10.1136/bmj.i4843 (Published 21 September 2016)

PRACTICE

GUIDELINES

Clinical assessment and management of multimorbidity: summary of NICE guidance

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[1]National Guideline Centre, Royal College of Physicians, London NW1 4LE, UK; [2]Population Health Sciences Division, University of Dundee, Dundee DD2 4BF, UK

Box 2: Identifying people for an approach to care that takes account of multimorbidity

- In primary and community care settings consider assessing frailty in adults with multimorbidity using one of the following:
  - An informal assessment of gait speed (such as time taken to answer the door or to walk from the waiting room)
  - Self reported health status (that is, "How would you rate your health status on a scale from 0 to 10?" with scores of ≤6 indicating frailty)
  - A formal assessment of gait speed, with >5 seconds to walk 4 metres indicating frailty
  - The PRISMA-7 questionnaire, with scores of ≥3 indicating frailty
  - [*Based on low to high quality evidence from diagnostic accuracy studies and GDG consensus*]

Conclusions

- In older people, considering multimorbidity as a yes/no phenomenon has low discriminative power
- Clinical trajectories of older adults with multimorbidity are complex and dynamic, but can be assessed
- Exploring patterns and speed of disease accumulation are promising models to study the dynamics of aging
- Functional status provides complementary prognostic information, especially among the oldest old

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SNAC-K staff

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- Stonhes Stiftelse

Thanks for your attention!

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