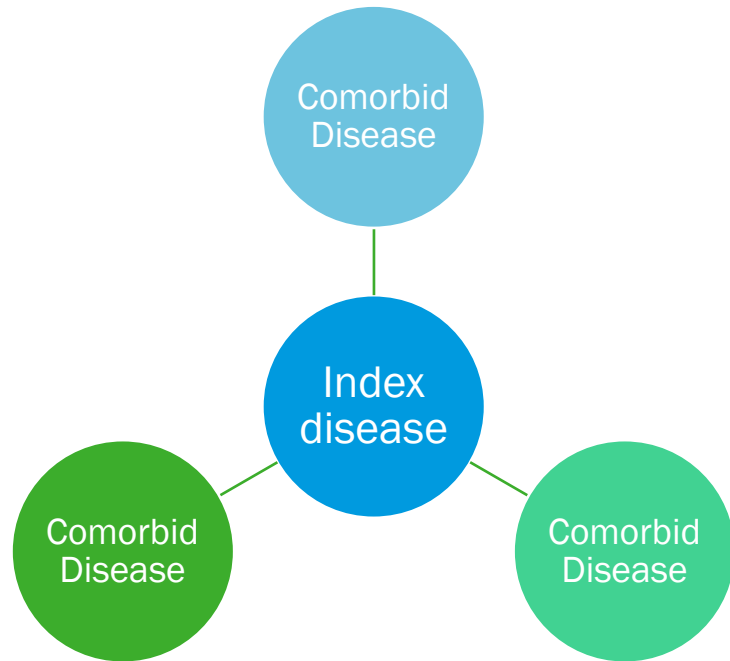# MULTIMORBIDITY VERSUS CO-MORBIDITY? WHY IT MATTERS

Jerry Suls, PhD, MA
Institute for Health System Science
Feinstein Institute for Medical Research
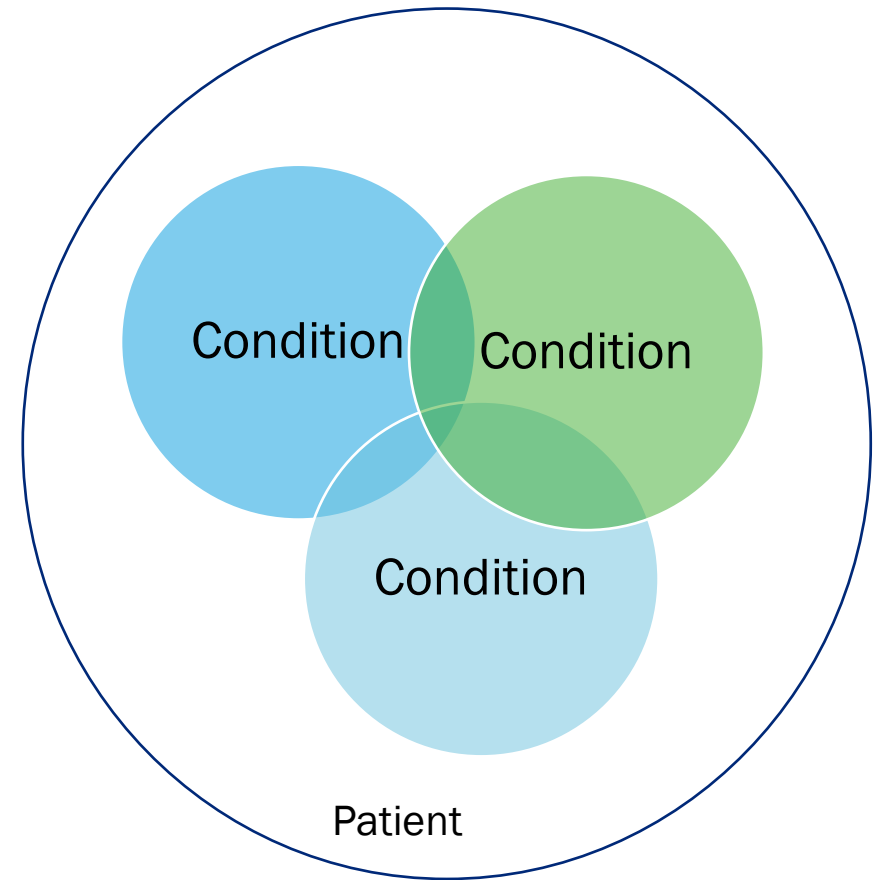Northwell Health

Northwell Health®

May 23, 2022

NO CONFLICTS OF INTEREST

No Conflicts to Report

COMORBIDITY VS. MULTIMORBIDITY

Disease-Centered

Patient-centered

Boyd C, Fortin M. Public Health Reviews 2010;32

COMORBIDITY VS. MULTIMORBIDITY

Maintaining a distinction between "Multimorbidity" and "co-morbidity" is preferable.

Co-morbidity refers to the presence of other diseases in addition to an index disease.* For example, specialty care clinicians may be interested in a patient's heart disease as a primary condition and consider any coexistent diseases as subsidiary.

The term, "multimorbidity," especially in primary care is appropriate where someone has multiple disease conditions and no particular illness is the exclusive focus.

Feinstein AR. The pre-therapeutic classification of co-morbidity in chronic disease. J Chron Dis. 1970;23:455-68.

COMORBIDITY VS. MULTIMORBIDITY

Multimorbidity includes traditional diseases and syndromes but also may be extended to refer to conditions such as chronic bursitis of the hip, rotator cuff problems, dyspepsia, migraines, sleep disturbances, functional bowel syndrome or constipation, disability, falls, hearing impairment, and sarcopenia, for example.

Boyd & Fortin (2010)

MULTIPLE CHRONIC CONDITIONS VERSUS MULTIMORBIDITY?

Terms often used synonymously.

Multiple Chronic Conditions (MCCs) defined as "**person is living with two or more chronic conditions at the same time**."

"Chronic" defined as a disease or condition that usually lasts for 3 months or longer and may get worse over time.

MULTIMORBIDITY IN THE OLDER POPULATION: PREVALENCE
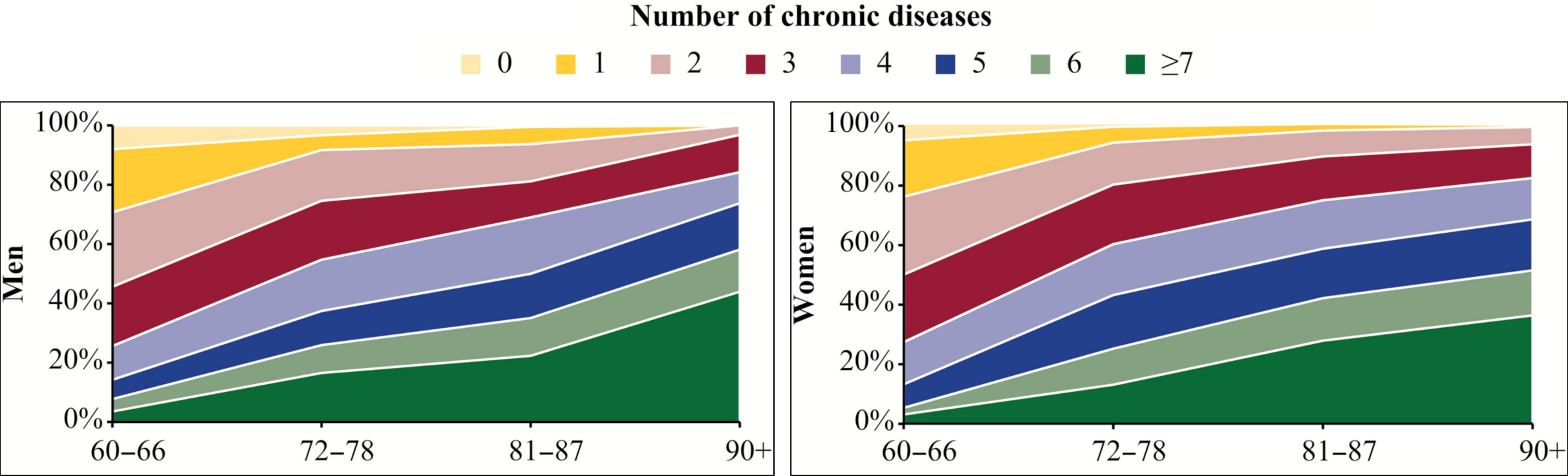
Assessing and Measuring Chronic Multimorbidity in the Older Population: A Proposal for Its Operationalization J Gerontol A Biol Sci Med Sci. 2016;72(10):1417-1423

DIFFERENT TYPES OF MULTIMORBIDITY

Multiple diseases whose co-occurrences would be expected from base-rate probabilities (i.e., simple multi-morbidity) versus co-occurrences exhibited at greater than expected probability (i.e., associative multi-morbidity).

Simple Multimorbidity -- hypertension often co-occurs with other conditions because it is a highly prevalent disorder.

Associative multi-morbidity- - Nonrandom associations of health disorders.

Subsumed under associative multi-morbidity: **Causal multi-morbidity** for which shared risk factors, genetic, physiological and psychosocial disease pathways may be operating (e.g., hypertension, diabetes and chronic renal insufficiency).*

Prados-Torres A, et al. J Clin Epidem. 2014; 67:254–266. 2014.

MULTIMORBIDITY: CONCORDANT OR DISCORDANT
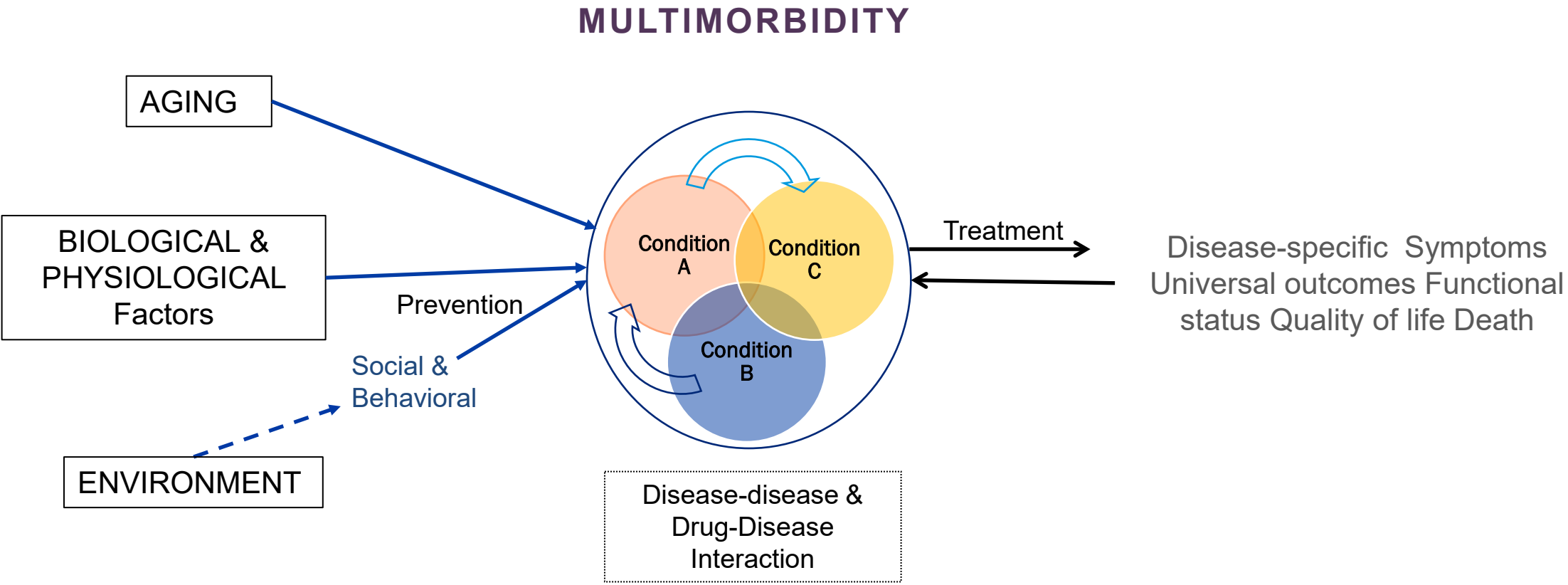
Concordant

Part of same overall pathophysiology

May have related management plans

Discordant

Unrelated to each other in pathogenesis or management

Although concurrent conditions may be discordant, that does not mean that patient's medical regimen, functional status, stress level, etc., will not be complicated by having 2 or more conditions.

Piette JD, Kerr EA. The impact of comorbid chronic conditions on diabetes care. Diabetes Care. 2006;29:725-31.

MULTIMORBIDITY RESEARCH FRAMEWORK

MULTIMORBIDITY

Salive et al. *Medical Care* 2021;59: 622-624. adapted from Clin Geriatr Med. 2016 May;32:399-407.

TREATMENT DECISION-MAKING

In cases of people with multimorbidity, decisions should be made within the context of a person.

Some decisions may be reducible to a single decision (i.e., Will a statin benefit this patient, and is she willing and able to take it?).

More commonly, decisions involve several clinical questions at the same time (Should a patient start a statin, anti-depressant, and pursue rehabilitation?).

A need for prioritization – i.e., what is most important if not everything can be done and what should be done first if everything cannot or should not be done at one time. Some co-occurring conditions may be managed synergistically, and guidelines and quality standards sometimes recognize this overlap of clinical management. In other cases, discordance, decision-making is more complex.

CO-MORBIDITY/MULTIMORBIDITY DISTINCTION IS IMPORTANT FOR HEALTH CARE

Reflects the way different parts of the healthcare system view and interact with patients who have multimorbidity. The concept of comorbidity is more useful in secondary and tertiary care settings, which have traditionally been structured around diseases or body systems, while the concept of multimorbidity is more useful in a primary care or other generalist setting, which can easily change focus according to patients' priorities.

Example: A patient with diagnosed chronic kidney disease, Type 2 Diabetes and hypertension, when seeing their nephrologist is considered by the specialist to have chronic kidney disease with comorbidities of Type 2 Diabetes and hypertension.

When seeing their endocrinologist, they are considered to have Type 2 diabetes with comorbid chronic kidney disease and hypertension.

However, a primary care physician or other generalist such as a geriatrician would view the patient as having multimorbidity as they provide holistic care that is not determined by the presence of any specific condition and focuses on the patient's presenting symptoms, preferences and priorities for their healthcare.

INTERVENTIONS FOR MULTIMORBIDITY MUST HAVE A MORE GENERIC FOCUS THAN CO-MORBIDITY WITH DISEASE-SPECIFIC OUTCOMES. SOME GUIDANCE PROVIDED BY SMITH ET AL. (2018)

A Core Outcome Set for Multimorbidity Research (COSmm)

Susan M. Smith, Emma Wallace, Chris Salisbury, Maxime Sasseville, Elizabeth Bayliss, & Martin Fortin
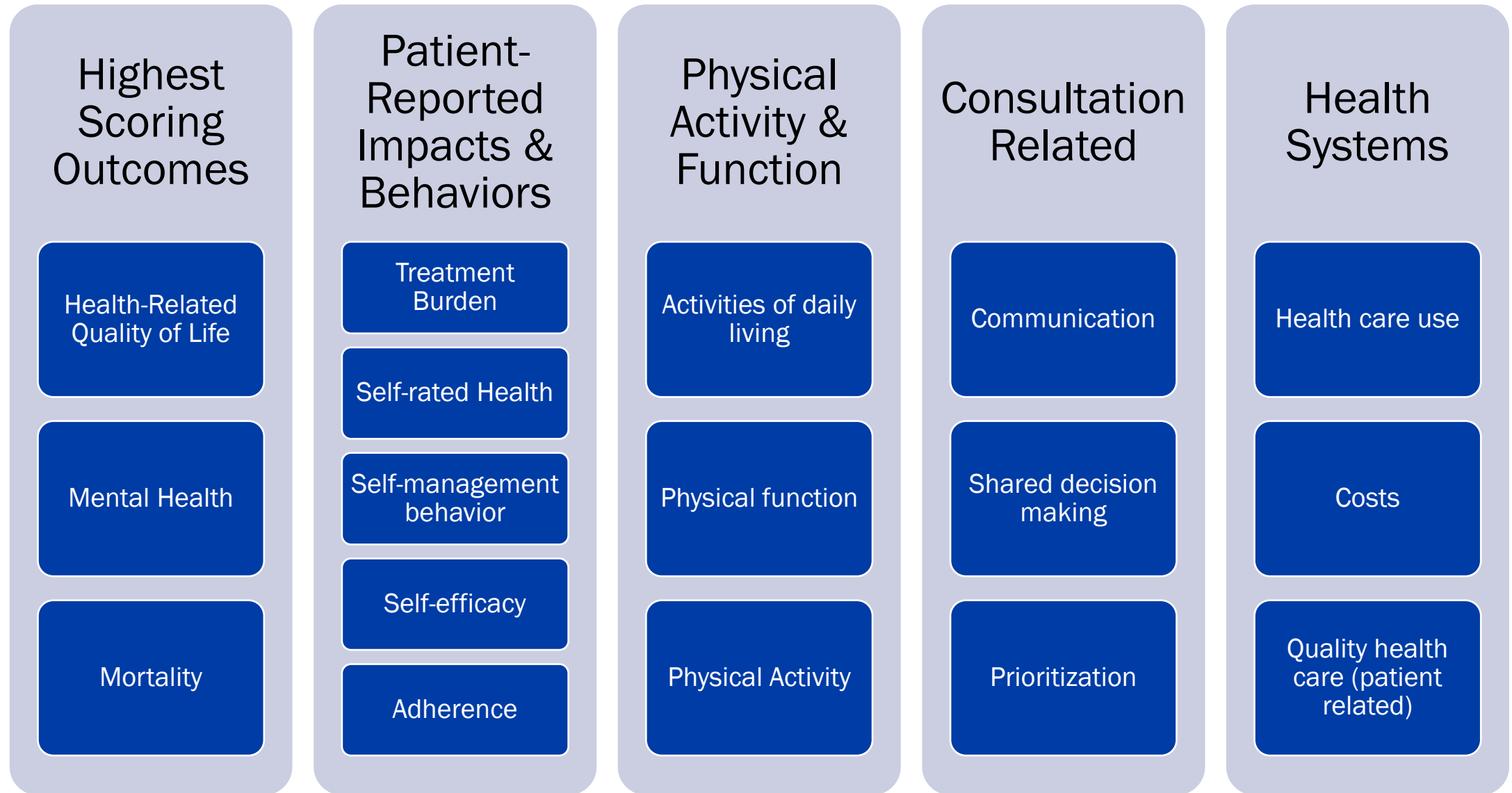
PURPOSE:

To develop a consensus-based set of core outcomes specifically for studies in multimorbidity.

METHODS

Conducted a consensus study following the COS-STAR (Core Outcome Set-STAndards for Reporting) guidelines for the design and reporting of core outcome sets.

CORE OUTCOME SET FOR MULTIMORBIDITY (COSMM): 17 OUTCOMES BY GROUP

Highest Scoring Outcomes

- Health-Related Quality of Life
- Mental Health
- Mortality

Patient-Reported Impacts & Behaviors

- Treatment Burden
- Self-rated Health
- Self-management behavior
- Self-efficacy
- Adherence

Physical Activity & Function

- Activities of daily living
- Physical function
- Physical Activity

Consultation Related

- Communication
- Shared decision making
- Prioritization

Health Systems

- Health care use
- Costs
- Quality health care (patient related)

Smith et al .(2016)

ACC/AGS/NIA MULTIMORBIDITY IN OLDER ADULTS WITH CVD WORKSHOP

Approaches for Integrating [Multimorbidity](#) into [Clinical Practice](#)

Routinely assess for the presence of multimorbidity and geriatric syndromes [incl. dementia]

Maintain list in the EHR of all chronic conditions for each patient

Infrastructure that facilitates pragmatic trials embedded in routine clinical care focused on multimorbidity and patient-centered outcomes

Forman et al (2018) J American College of Cardiology, 28, 17 (19), 2149-2161.

NOT ONLY DISEASES *PER SE*

The health system should focus on people with multimorbidity, and recognize that some issues are consequences of the multimorbidity and not diseases *per se*, but may have further adverse effects themselves.

Examples: **Polypharmacy** is associated with greater rates of adverse events and drug interactions.

Falls are most often multi-factorial in etiology, and yet can have dramatic impact on patient important outcomes like function and independence.

Boyd & Fortin (2010)

AN EMERGING PERSPECTIVE--OMICS AND NETWORK MEDICINE— TO ELUCIDATE, MEASURE AND ASSESS MULTIMORBIDITY

Human systems comprise molecular and phenotypic networks, which are related to, but distinct from, each other. The **human diseasome** represents a collection of subnetworks, the disease modules, the molecular network, or the functional and structural network.
Omics involved – genome, proteome, transcriptome, metabolome — biological molecules involved in the structure, function and dynamics of a cell, tissue or organism.

Assembly of disease modules into the **diseaseome** can be determined by bioinformatics-based approaches—the shared genes, shared metabolic pathways or the disease comorbidity.

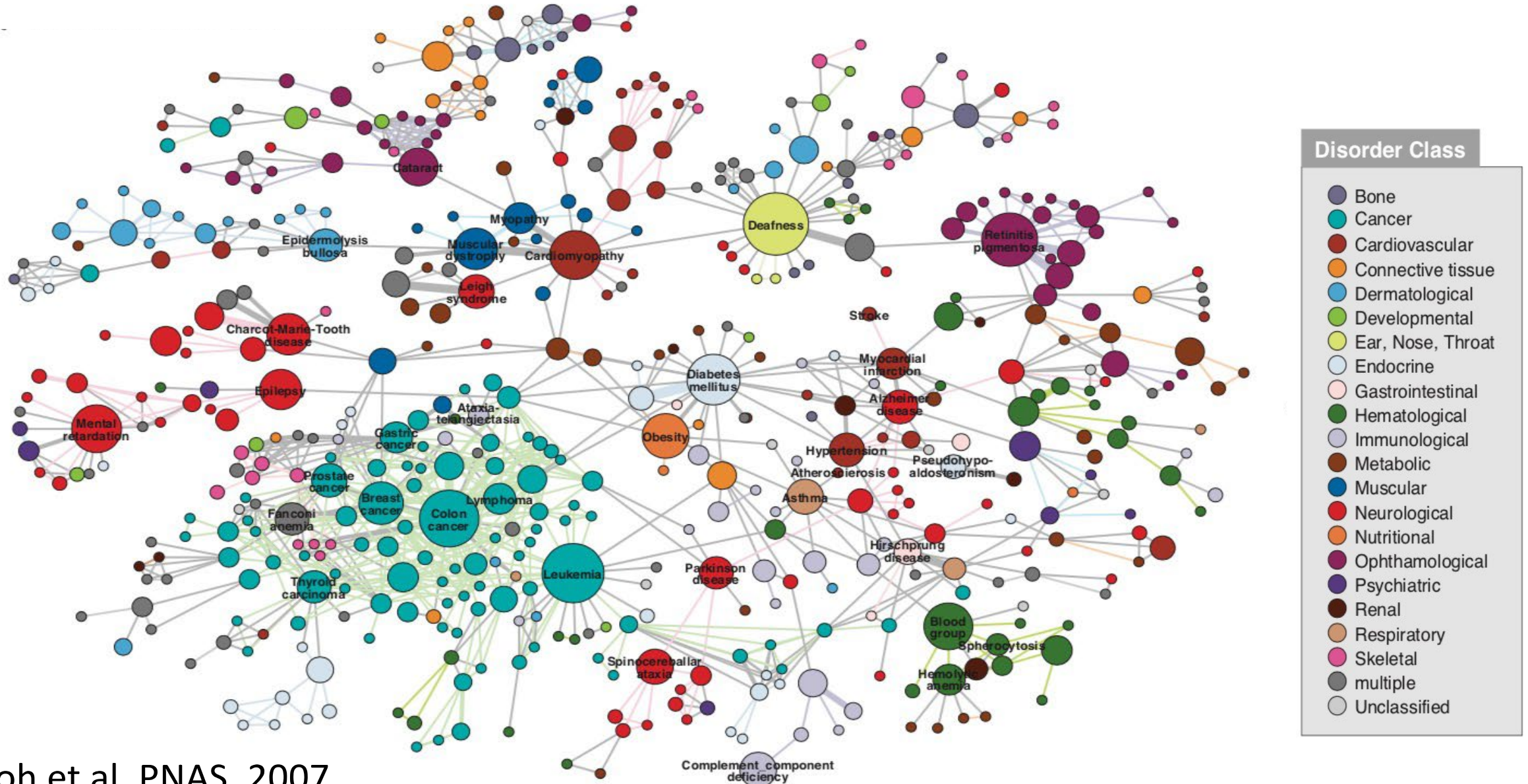Gene-based and metabolism-based disease networks resemble disease-co-occurrence networks.

PHENOTYPE DISEASE NETWORK

Summarizing correlations obtained from the medical records for the disease history of more than 30 million patients resulted in a large Phenotypic Disease Network (PDN) of disease phenotypes with unique ICD9 codes.

Overlaying the PDN structure with longitudinal information on patient disease trajectories showed that patients, over time, develop diseases more highly connected in the PDN. Moreover, patients diagnosed with a disease that is highly connected in the network died sooner than those affected with less connected diseases.

Demonstrating the value of such data-driven disease maps for understanding progression to multimorbidity.

Hidalgo CA, Blumm N, Barabási A-L, Christakis NA. A dynamic network approach for the study of human phenotypes. PloS Comput Biol 2009; 5(4): e1000353; Goh KI, Cusick ME, Valle D, Childs B, Vidal M, Barabási AL. The human disease network. Proc Natl Acad Sci U S A.2007;104(21):8685-8690.
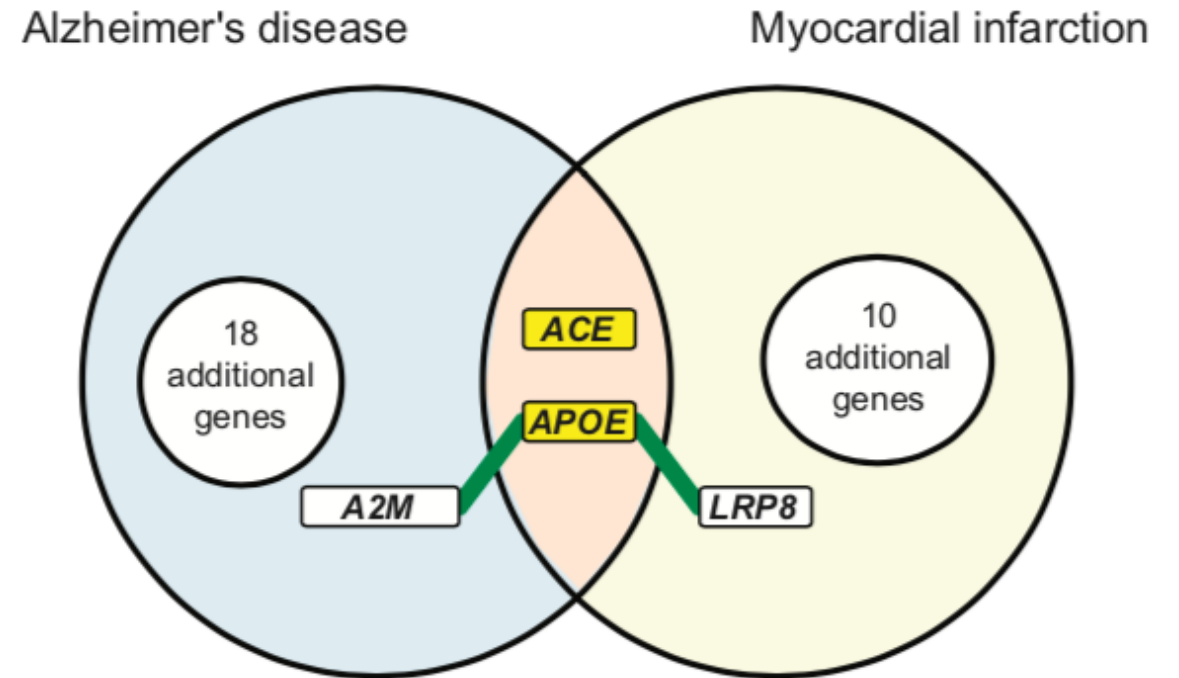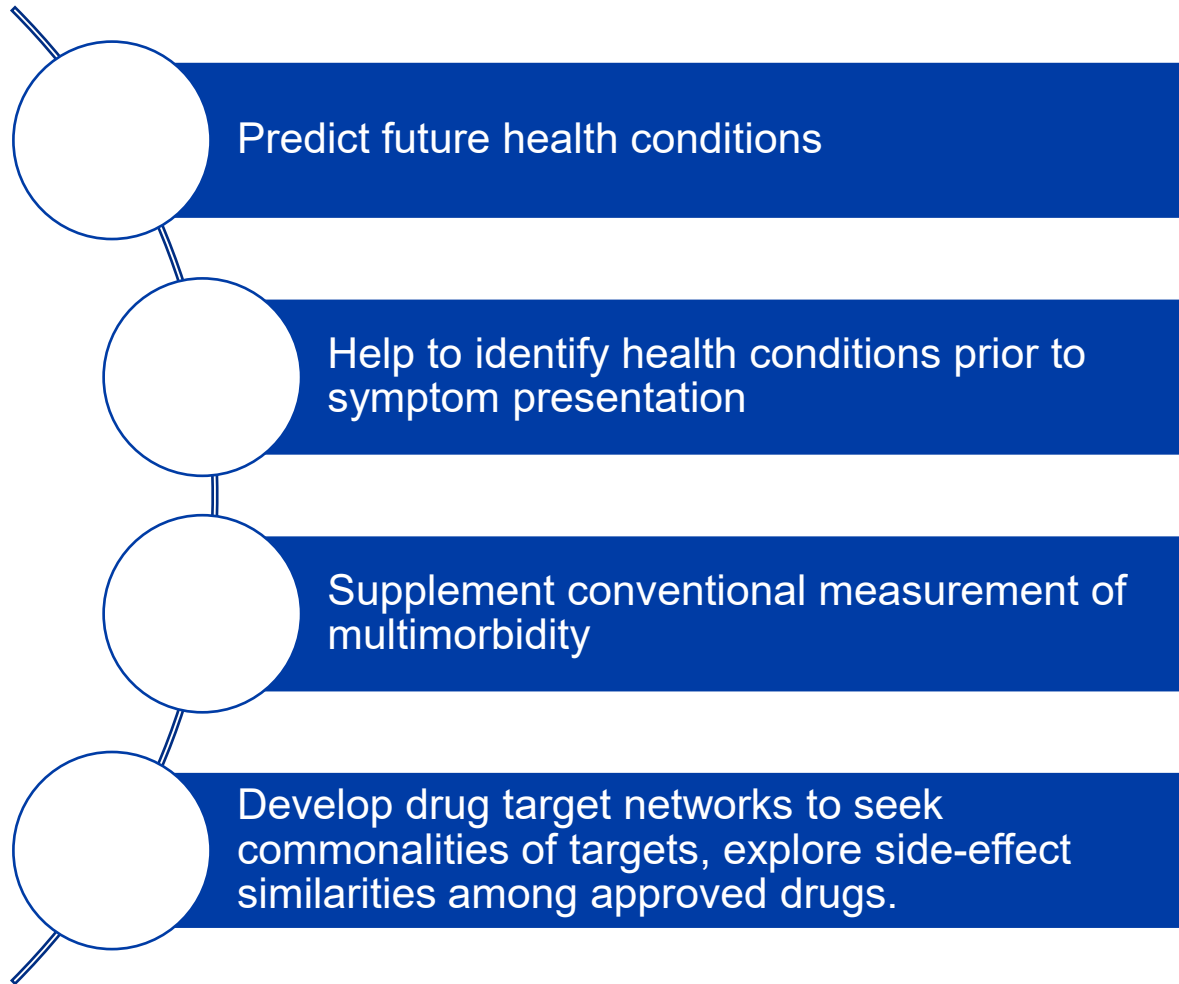
HUMAN DISEASE NETWORK: DISEASE- GENE ASSOCIATIONS

Goh et al, PNAS, 2007

SO, WHAT'S THE VALUE OF THESE NETWORKS?

Gene-based and metabolism-based
disease networks provide insights
in WHY diseases co-occur!

POTENTIAL USES OF OMICS AND NETWORK MEDICINE

Predict future health conditions

Help to identify health conditions prior to symptom presentation

Supplement conventional measurement of multimorbidity

Develop drug target networks to seek commonalities of targets, explore side-effect similarities among approved drugs.

Application of omics and network medicine has the potential to *radically* improve diagnosis and better understand pathogenesis by going beyond conventional clinical, epidemiological, and medical records data. Network science may also incorporate demographic, psychosocial and lifestyle factors to create a comprehensive matrix to advance patient-centered care of multimorbidity.

ACKNOWLEDGEMENTS

THANK YOU

Northwell
Health®