

COMMENTARY

Multimorbidity, chronic disease, and community health science

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1 | INTRODUCTION

The central thesis of Sturmberg et al in "*Multimorbidity as a Manifestation of Network Disturbances*" is that multimorbidity and its symptoms are the end product of complex physiological processes—most notably stress activation and mitochondrial energetics. The authors present evidence for conceptualizing the way we think about disease and how the health care system might respond to managing disease in the light of this evidence. According to their reconceptualization, disease processes and outcomes can only be understood—and managed—when the human organism is taken as a whole and not as a collection of distinct organ systems to be treated individually. Accordingly, multimorbidity is a complex adaptive systems response to biobehavioral and socio-environmental (respectively, internal and external stimuli) networks, and successfully managing multimorbidity requires a care delivery response that can address the underlying disease processes, resulting from physiological dysregulation. Thus, care delivery must respond to biobehavioral and socio-environmental factors by combining personalized biotechnology interventions with community-embedded interventions that address care needs in the context of the patients' illness experience.

This thoughtful treatise and the evidence in support of its major propositions are timely, topical, accurate, important, and needed. In the following commentary I will briefly address the reasons why I feel the reconceptualization is needed in light of the growing worldwide prevalence of chronic disease. I will then describe community health science and translational science as necessary approaches that can go beyond traditional biomedical research approaches for investigating chronic disease, the social determinants of health, and disease prevention. Finally, I will offer closing thoughts relevant to systems thinking and the human organism.

2 | RETHINKING HEALTH AND HEALTH CARE

The need for reforming health care, improving our understanding about disease processes, and intervening to better manage and prevent chronic diseases has never been greater. Chronic illnesses like cancer, heart disease, and diabetes have reached global epidemic proportions and now cause more deaths than all other diseases

combined.¹ The Global Burden of Disease Project forecasts that from 2004 to 2030, infectious diseases (eg, respiratory infections, tuberculosis, and malaria) will continue to decline steadily, and noncommunicable chronic conditions (eg, cancers, ischemic heart disease, and stroke) will continue to increase exponentially.² In the United States where chronic illnesses have become a way of life for multiple generations, chronic disease is the number 1 cause of death and disability (accounting for more than 70% of deaths), 50% of American adults have at least 1 chronic disease, and 25% have multiple chronic conditions (75% among those aged 65 and older).^{3–5}

Although multiple factors contribute to the global growth in chronic disease prevalence (see, for example, epidemiological transition theory⁶), a major contributor has been society's overreliance on the health care system (especially but not exclusively in the United States) for *managing and preventing* chronic disease. Large health care systems are ill equipped for this role, because these systems are designed to address morbidity, mortality, and health outcomes for individual organs or organ systems: treatment is directed primarily at resolving *existing disease symptoms*, and mortality is considered a function of organism-specific mechanisms.⁷ Consequently, health care systems are not well suited to the task of managing and preventing the *underlying causes of disease*. Up until very recently, there has been little understanding within health care systems that although heart disease may appear on person's death certificate, it is often smoking, poor nutrition, and lack of exercise that precipitate death.⁸

Because of the disease specific treatment-oriented approach of traditional health care systems, the contribution of medical care to improving health remains modest and at the margin, because factors such as education, lifestyle, the environment, and income are the major contributing factors to poor health.⁹ Health care accounts for only about 10% of premature death and genetics only 30%, whereas social factors associated with the environment account for 20% and individual behaviors account for 40%.¹⁰ While this understanding has only recently permeated the thinking that guides decisions in health care systems, contemporary experts in population health have understood these principles for decades,¹¹ and as far back as 1848 Rudolf Virchow advocated reforming medicine to account for the effects of social and economic conditions of disease.¹² Indeed, estimates by the World Health Organization and the Centers for Disease Control and Prevention indicate that as much as 80% of chronic disease can be prevented through interventions aimed at improving social and behavioral

factors. Accordingly, reducing chronic disease prevalence will require implementing broad-based prevention strategies addressing biological, lifestyle and behavioral, and societal variables.¹³

3 | ADDRESSING PERSISTENT CHRONIC DISEASE PREVALENCE THROUGH COMMUNITY HEALTH SCIENCE

As a community medicine division chief in 3 major US cities, I have witnessed firsthand the devastating effects of unchecked chronic disease on the health of largely low-income urban populations, who suffer disproportionately from chronic illnesses.¹⁴ During the past 20 years, our research team has tested approaches for reducing chronic disease risk (especially heart disease and diabetes) in the community setting (with funding from the Centers for Disease Control and Prevention, and the National Institutes of Health) using a community health science approach. Community health science is a scientific approach for improving health outcomes in mostly low-resource communities, by linking together clinical care and epidemiology with community partnerships and organizations. The approach recognizes that health is a social outcome resulting from systematically combining clinical science, collective responsibility, and informed social action.¹⁵

Community health science is an alternative but complementary approach to the more traditional approach used by biomedical researchers.^{16,17} Traditional biomedical research has several limitations when it comes to preventing chronic diseases—it does not address the underlying social causes of disease, is rarely used in the community setting, and does not generally address the health problems of greatest concern to the community. In contrast, community health science is more concerned with understanding the social determinants of health than the pathology of specific diseases, is more concerned clinically with health promotion and disease prevention than diagnosing and treating disease, and uses community-based participatory research (CBPR) approaches rather than clinic-based trials.¹⁵

The use of CBPR provides several distinct advantages for community health scientists compared to traditional biomedical scientists concerned with reducing chronic disease, because it allows researchers to address community priorities in partnership with community members, builds on existing community assets while acknowledging the role of cultural factors, and provides evidence that can be used to mobilize and advocate for policies directed at reducing disease risk.¹⁸

Another advantage of community health science and the use of CBPR is that it conducts research in the *real world* setting where people with multiple medical diagnoses are common. Multimorbidity refers to the coexistence of 2 or more long-term conditions in an individual. Traditional biomedical research tends to focus on easily defined medical problems or single diseases, and *complicated* patients with multiple conditions are usually not eligible for clinical research trials.¹⁹ The medical system and associated research approach in the West is built on a reductionist foundation that tends to focus attention on distinct pieces of the system rather than the system as a whole.²⁰ While the reductionist approach has produced extraordinary knowledge about the working and processes of the human organism, it is very limited in its ability to address concepts such as the social determinants of

health that contribute to persistent chronic disease. The result is like the tale of the men in a dark cave who each touch an elephant to learn what it is like. Each one feels a different part, but only 1 part, such as the side or the tusk. They then compare notes and learn that they are in complete disagreement, because each is only seeing a part of the whole.²¹

Although the benefits of community-engaged research and intervention programs have been known for decades, the ability to achieve meaningful and impactful community engagement for improving health among populations in the United States in the near future continues to face important and significant challenges. In 2006, the National Institutes of Health formally acknowledged the importance of *community engagement* by designating it 1 of 8 *essential key functions* of its Clinical and Translational Science Awards (CTSAs). These awards were initiated and tied to a significant funding stream, to provide training and research support for up to 60 medical schools for translational science—from proof-of-concept studies, to efficacy and effectiveness studies, to behavioral research and community engagement. However, a recent study among community engagement stakeholders expressed skepticism about the current role of the community in the CTSA program because the requirement for engaging the community has been removed from the most recent funding announcement, and other studies have found a reduced role for the community in CTSA leadership activities.^{22,23}

A similar challenge to community engagement and population health has characterized the passage and implementation in March 2010 of the US Patient Protection and Affordable Care Act (ACA). The ACA is the first piece of national legislation in the United States to institute a focus on prevention, and call attention to the need bridge health care and community health. However, since its passage the ACA has faced a constant barrage of attacks on its specific components and conceptual foundation. The resistance in the United States to a rational approach to health care focused on population health principles, prevention, community engagement, and the social determinants of health is ongoing and constant. Overcoming the resistance is possible—but it will take time and occur only through concerted and persistent efforts to reform our approach to science and health care delivery.

4 | CONCLUDING REMARKS

Since 2008, our team has been working with physicians at Harbin Medical School (HMS) in Heilongjiang Province, China, developing a community-based approach for reducing the rapidly increasing prevalence of chronic disease through a community health science approach.²⁴ My collaborators practice at the highly regarded HMS 4th Affiliated Hospital, which coincidentally is adjacent to the largest affiliated hospital of the renowned Heilongjiang University of Chinese Medicine. As experts in Western Medicine and biomedical science, my collaborators treat patient symptoms and diseases using modern methods such as drugs, radiation, and operation, and increasingly social interventions addressing lifestyle changes in the community. However, practitioners of Traditional Chinese Medicine approach health care differently—using an ancient set of practices designed to treat the whole patient instead of just the disease.

The juxtaposition of these 2 hospitals—and their differing philosophies on the causes and means for treating disease—is germane to a discussion of multimorbidity and health care system reform. The need for changing our approach to health care articulated by Sturmberg et al is consistent with the practices of Traditional Chinese Medicine that the processes of the human body are interrelated and connected to the environment and that health care approaches must be holistic and address the underlying imbalances and disharmonies behind an illness. However, consistent with the scientific approach of my colleagues at the HMS 4th Affiliated Hospital, the authors support their case based on hard science data produced through reducing the human organism to its essential chemical processes. Thus, the approach of the authors combines the best of both worlds. They have taken the best science produced by the Western reductionist model to argue quite convincingly that the science of understanding our interconnected physiological networks demands that we review the way we understand and manage disease. And their conclusion—the need for person-centered holistic strategies—is the only logical one dating back thousands of years.

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