

Editorial on Preventive Medicine: The Need **Umme Rumana***

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MBBS, MS New York Institute of
Technology, College of Medicine Old
Westbury, New York, USA

Editorial Note

We are currently facing a health crisis worldwide, with the associated comorbidities worsening the condition in many, which has largely been brought about by preventable risk factors. Specifically, physical inactivity, poor nutrition, psychologic stress, and excess body mass, the risk factors most intricately linked to chronic disease, are alarmingly high and on the rise. Moreover, these unhealthy trends are increasing in low- to middle-income countries. Seemingly, we have become efficient in prolonging the lifespan through traditional healthcare and managing chronic disease. It is now being broadly recognized that preventing an unhealthy lifestyle by appropriate interventions is the global way forward to prevent and reduce the burden of chronic disease. In this regard, we need to rethink the traditional model of a hospital and outpatient clinics. Prevention of chronic diseases largely takes place outside of hospitals and outpatient clinics. To promote lifelong wellness, prevent chronic disease risk, and prolong the health span, a number of other settings must become part of the future healthcare enterprise.

Healthcare must also focus on prolonging the health span as the costs of treating those who lead an unhealthy lifestyle and develop high chronic disease risk or, most commonly ultimately have one or more confirmed chronic disease diagnoses, are much more costly to care for through hospitalizations, surgeries, and pharmacotherapy. Regardless of the economic model that covers healthcare in a given country (i.e., government vs private funded or a mix), reduced amounts of a country's economy devoted to the management of chronic disease are highly desirable.

Healthcare education and practice, across the disciplines, commonly follow a reductionist approach with a strong focus on single organs and organ-focused specialties. Complex interactions, nonlinearity, and convex responses have been neglected in the science and clinical practice of medicine. Convexity in medicine is at 2 levels: Understanding the effect of dosing and its nonlinearity and at the level of risk analysis for patient interventions. The human body is arguably the most complex system known to

mankind; we only understand a fraction of its functionality and interactions.

A grand challenge impeding optimal prevention and treatment of chronic diseases, such as cancer, arises from the complex nature of the disease: the cellular heterogeneity and the myriad of dysfunctional molecular and genetic networks as a result of genetic (somatic) and environmental perturbations. Systems biology involves a holistic approach to understanding the fundamental principles in biology and the empowering technologies in genomics, proteomics, single-cell analysis, microfluidics, and computational strategies. It also enables a comprehensive approach to medicine, which strives to unveil the pathogenic mechanisms of diseases, identify disease biomarkers, and begin thinking about new strategies for drug target discovery. Embracing complex system expertise and technology will help improve health and advance medicine. Systems biology and the digital revolution combined transform healthcare to systems medicine.

Studying complex biological systems in a holistic manner as opposed to a "one organ, one gene, or one protein" approach requires the concerted effort of scientists from a wide variety of disciplines.

*Corresponding author:

Umme Rumana

 umme.rumana.mbbs@gmail.com

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