Precision Medicine Can Benefit Population Health

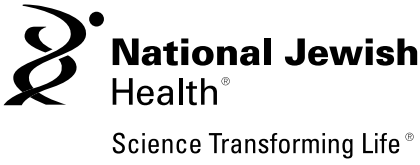
Michael Salem, M.D.

Medical care today is moving uncomfortably toward a one-size-fits-all proposition. A person diagnosed with asthma, influenza or heart disease is generally treated according to guidelines designed for the "average" person. Very few of us, however, are truly average. Our unique genes, the environments we have lived in and the lifestyle choices we have made all interact to determine our individual susceptibility to disease and response to treatment.

An emerging approach to health care, called personalized, or precision, medicine, seeks to tailor medical care to these individual differences. It harnesses the explosive growth in biological knowledge and rapidly advancing technology to deliver the right care to more people more quickly with fewer side effects. Early detection and new targeted medications for cancer offer striking examples of revolutionary care aimed at subsets of patients whose cancer has specific genetic mutations. The National Institutes of Health has embarked on an ambitious project, called the Precision Medicine Initiative, to foster the advance and development of precision medicine. It is planning to recruit a cohort of one million people to understand how individual differences in genes, environment and lifestyle affect human health.

Recently, some observers have raised concerns that precision medicine will advance at the expense of population health and cost-effective care. While precision medicine is focused on treating the individual, it can benefit population health as well.

Precision medicine will help us define subgroups of patients who are being poorly served by generic treatments for disease. For instance, about 30 percent of the 25 million asthma patients in America do not respond to inhaled corticosteroids, the mainstay controller medication for the disease. About half of those patients have high levels of a specific cell, known as an eosinophil. A newly approved medication, which targets asthma patients unresponsive to corticosteroids, with high levels of eosinophils, cuts asthma attacks in half. Many other common diseases have large subsets of patients who could benefit from targeted treatments.



Precision medicine also promises to shed light on environmental and lifestyle causes of disease. COPDGene, a massive, 10-year study of 10,000 smokers, seeks to discover why some smokers get chronic obstructive pulmonary disease (the third-leading cause of death in America) but others do not. Recent research at my institution, National Jewish Health, has identified specific biological mechanisms that link diesel exhaust and asthma. Discoveries in these areas could lead not only to new treatments but also to prevention of major public health threats. After all, the tremendously successful public health effort to reduce tobacco use in America did not begin until after researchers proved that tobacco smoke causes cancer.

Precision medicine will not solve population health, which is a much broader field shaped largely by social and environmental policies. It can, however, contribute to population health by helping to better understand the biological underpinnings of many public health threats and suggest strategies to combat them.

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*One in a series of commentaries by leading physicians and researchers at **National Jewish Health** in Denver, Colorado. National Jewish Health is in New York City at the **Mount Sinai – National Jewish Health Respiratory Institute**.*