

ditions, populations, physicians, and hospitals. Some of these data reflect processes — for example, which hospitals are better at giving aspirin to patients with acute myocardial infarction — but more and more data reflect outcomes, not just for patients within hospitals but for the populations surrounding them. The Mobilizing Action toward Community Health project has been publishing ratings of county-level population health. Employers increasingly focus on employee wellness, on one side, and disease management, on the other. Research funding increasingly supports efforts to improve these measures and effectively communicate outcomes. Each of these approaches has advanced incrementally over decades. This trend reveals an interest in what ultimately happens to individuals and populations.

A third signal is that health care financing is testing these pathways too. Payment systems that will not reimburse preventable readmissions or that bundle payments for goals or episodes of care rather than visits reflect a

population approach to health focused on outcomes rather than processes. Today's standard approach of reimbursing for office visits and hospitalizations is likely to be displaced once better measures of outcomes can provide a substitute that's more relevant to our key goals. If we can measure success, why pay for process? If we can get the images we want in a better way, why use photographic film, paper, and chemicals?

In the future, successful doctors, hospitals, and health systems will shift their activities from delivering health services within their walls toward a broader range of approaches that deliver health. Although we're seeing the earliest steps in this shift toward accountability for health, we currently lack both good tools for moving forward in any substantial way and more established pathways for redirecting financing toward those outcomes.⁵ What do we need to move from a product-oriented industry to a customer-oriented one?

Surely, Kodak's employees and shareholders lost something as their company lost business to other firms. But the world is at least

narrowly better thanks to the ways photographs are now produced. Doctors and hospitals who pay attention to the business they are actually in — defined by the outcomes their "customers" seek — will leave the doctors and hospitals who don't behind, captured in a Kodak moment.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

From the Center for Health Equity Research and Promotion, Philadelphia Veterans Affairs Medical Center; the Penn Medicine Center for Innovation; and the Wharton School, University of Pennsylvania — all in Philadelphia.

This article was published on August 29, 2012, at NEJM.org.

1. Levitt T. Marketing myopia: 1960. *Harv Bus Rev* 2004;82(7-8):138-49.
2. Marmot MG, Rose G, Shipley M, Hamilton PJ. Employment grade and coronary heart disease in British civil servants. *J Epidemiol Community Health* 1978;32:244-9.
3. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav* 1995;Spec No:80-94.
4. McGinnis JM, Williams-Russo P, Knickman JR. The case for more active policy attention to health promotion. *Health Aff (Millwood)* 2002;21(2):78-93.
5. Asch DA, Werner RM. Paying for performance in population health: lessons from health care settings. *Prev Chronic Dis* 2010;7:A98.

DOI: 10.1056/NEJMp1206862

Copyright © 2012 Massachusetts Medical Society.

From Sick Care to Health Care — Reengineering Prevention into the U.S. System

Farshad Fani Marvasti, M.D., M.P.H., and Randall S. Stafford, M.D., Ph.D.

Although the United States pays more for medical care than any other country, problems abound in our health care system. Unsustainable costs, poor outcomes, frequent medical errors, poor patient satisfaction, and worsening health disparities all point to a need for transformative change.¹ Simultaneously, we face widening epidemics of

obesity and chronic disease. Cardiovascular disease, cancer, and diabetes now cause 70% of U.S. deaths and account for nearly 75% of health care expenditures.² Unfortunately, many modifiable risk factors for chronic diseases are not being addressed adequately. A prevention model, focused on forestalling the development of disease before symptoms or

life-threatening events occur, is the best solution to the current crisis.

Disease prevention encompasses all efforts to anticipate the genesis of disease and forestall its progression to clinical manifestations. A focus on prevention does not imply that disease can be eliminated but instead embraces Fries's model of "morbid-

ity compression,”³ in which the disease-free life span is extended through the prevention of disease complications and the symptom burden is compressed into a limited period preceding death. Thus, a prevention model is ideally suited to addressing chronic conditions that take decades to develop and then manifest as life-threatening and ultimately fatal exacerbations.

Although the need for a prevention model was highlighted during the recent health care reform debate, efforts to expand prevention continue to be thwarted by a system better suited to acute care. A century after the Flexner report, the acute care model and its cultural, technological, and economic underpinnings remain securely embedded in every aspect of our health care system.

The organizational structure and function of our medical system is rooted in fundamental changes made at the beginning of the 20th century that emphasized an acute care approach and marginalized prevention and public health. Breakthroughs in laboratory sciences led by Koch and Pasteur provided powerful tools for mechanistically understanding and treating infectious diseases. Bolstered by philanthropy and the Flexner report, U.S. medicine became reliant on laboratory research.⁴ This strategy made sense 100 years ago, given the prominence of acute infectious diseases in a young population; it makes little sense now.

With the aging of the population, the shift in the burden of disease toward chronic conditions has accelerated. The most prevalent preventable causes of death are now obesity and smoking, which result in delayed but progressive disease.⁵ Even in the

developing world, increases in the prevalence of chronic disease are outstripping reductions in acute infectious diseases.¹ Such epidemiologic evolution demands a focus on public health and prevention.

Yet economic and technological factors dating from the early 20th century remain strong barriers to effective disease prevention. A key feature of U.S. health care is its use of a piecemeal, task-based system that reimburses for “sick visits” aimed at addressing acute conditions or acute exacerbations of chronic conditions. Economic incentives encourage overuse of services by favoring procedural over cognitive tasks (e.g., surgery versus behavior-change counseling) and specialty over primary care. The current model largely ignores subclinical disease unless risk factors are “medicalized” and asymptomatic persons are redefined as “diseased” to facilitate drug treatment. These mismatched economic incentives effectively preclude successful prevention through health maintenance.

Moreover, our reliance on ever newer, more advanced technology has perpetuated an expensive system in which costly new technology is widely adopted in the absence of comparative advantage. When combined with economic incentives for patenting devices and drugs, these technological factors become self-reinforcing. Although many preventive strategies may be cost-effective, they unfortunately have limited potential for wide adoption because they cannot be patented or made profitable. Therefore, the primacy of patentable therapies impedes research on prevention and diffusion of prevention approaches that could cost-effectively address the burden of chronic disease.

The cultural and social underpinnings of our system also inhibit optimal disease prevention. Faith in reductionism, which was infused into medicine in the 20th century, has empowered medical research to pursue only isolated problems and to yield targeted, immediately deployable solutions. Consequently, the model for treating acute infectious disease is being misapplied to the treatment of chronic disease. For example, cancer chemotherapy is modeled after antibiotic therapy, and coronary revascularization is modeled after abscess incision and débridement. Societal expectations of a “magic bullet” and a focus on symptom relief also reflect and reinforce the reductionist approach. These scientific and societal values emphasize discovering a “cure” for the major causes of death. With the advent of direct-to-consumer advertising for pharmaceuticals and surgical procedures, these cultural expectations of immediate, simplistic solutions have been bolstered by consumerism and fully exploited to generate demand for therapies that are marginally indicated and potentially unsafe. Our very culture thus devalues disease prevention.

Changing the system requires recognition of these cultural, technological, and economic obstacles and identification of specific means for overcoming them through alterations in medical education, medical research, health policy, and reimbursement. For example, to combat the primacy of technical knowledge and the profit-based system for medical technology, medical schools must teach prevention strategies alongside treatment approaches and emphasize motivational interviewing with a focus on lifestyle

modification. Payers and the federal government must fully reward use of appropriate nonpatentable therapies and support research on the development and dissemination of prevention strategies.

To change our reductionist way of thinking, we must teach aspiring physicians about systems science that addresses psychological, social, and economic determinants of disease. Taking a patient-centered, whole-person approach focused on long-term functional status will also help to address the current fragmentation of care and allow for standardization of prevention strategies.

Medical school curricula should emphasize homeostasis and health, rather than only disease and diagnosis, and provide training in the science and practice of cost-effective health promotion. In turn, payers will need to reimburse for health maintenance and prevention activities, primary care physicians will have to act as health coaches, and all health care professionals will need to embrace a coordinated multidisciplinary team approach. Systematic steps must also be taken to change the culture of medicine so that primary care is valued.

Renewing primary care will require increasing ambulatory care training in community settings and reallocating funding for residency training away from hospitals to reimburse appropriately for innovative models such as medical homes. Furthermore, we must compensate primary care physicians for their work as care coordinators by establishing reimbursement parity for cognitive and procedural care and accounting for long-term costs and benefits.

The new approach to medicine endorsed by the Flexner report succeeded because it was based on sound science and a radical restructuring of the way medicine was taught, organized, and practiced. Today, we face a similar challenge that requires another fundamental reordering of our health care system. Although the need for acute care will remain, centering our efforts on prevention is the only way to thwart the emerging pandemic of chronic disease.

Current health care reform efforts will bring incremental improvement, but reengineering prevention into health care will require deeper changes, including reconnecting medicine to public

health services and integrating prevention into the management and delivery of care. Though change is painful, the successful transformation of medicine at the turn of the last century shows that it is possible. Ultimately, embedding prevention in the teaching, organization, and practice of medicine can stem the unabated, economically unsustainable burden of chronic disease.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

From the Stanford Prevention Research Center and the Department of Medicine, Stanford University Medical School, Stanford, CA.

1. Fuster V, Kelly BB, eds. Promoting cardiovascular health in the developing world: a critical challenge to achieve global health. Washington, DC: National Academies Press, 2010.
2. Healthy People 2020. Washington, DC: Department of Health and Human Services, 2010 (<http://www.healthypeople.gov/2020/default.aspx>).
3. Fries JF. Aging, natural death, and the compression of morbidity. *N Engl J Med* 1980; 303:130-5.
4. Fleming D, William H. Welch and the rise of modern medicine. Boston: Little, Brown, 1954.
5. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA* 2004;291:1238-45. [Errata, *JAMA* 2005;293:293-4, 298.]

DOI: 10.1056/NEJMp1206230

Copyright © 2012 Massachusetts Medical Society.

BECOMING A PHYSICIAN

The Developing Vision of Primary Care

Kathleen A. Barnes, B.S., Jason C. Kroening-Roche, M.D., M.P.H., and Branden W. Comfort, B.S.

Reactive at best, unyielding at worst, the U.S. health care system has struggled over the past century to respond to the shifting burden of disease, improvements in technology, and population growth. But times are changing. Americans know that our system costs too much, reaches too few, and provides too little high-value

service. Ideas for improvement have been percolating.

The Affordable Care Act (ACA) expands coverage, emphasizes population health and primary care services, and establishes accountable care organizations that require strong primary care foundations.¹ The patient-centered medical home model that is

spreading across the country entails a commitment to promoting health rather than merely treating disease.² With funding available from the Center for Medicare and Medicaid Innovation for experimenting with new ways of delivering health care, we believe the revolution has begun and that primary care has