

National Institutes of Health Science Agenda: A Public Health Perspective

The United States spends \$2 trillion per year on health care, 2 to 3 times per capita than that of other developed nations.¹ Despite this staggering financial investment, our citizens have a lower life expectancy than those in many other countries,^{1,2} and it has been reported that patients receive only about half the evidence-based care that they should.³ To lead us out of this dilemma, the National Institutes

of Health (NIH) have set national health research funding priorities to investigate approaches that are predictive, personalized, preemptive, and participatory—the “4 P’s.”^{4,5} These words represent succinct talking points that have broad appeal. However, source documents suggest that the vast majority of NIH dollars will be steered toward technological interventions,^{4,6} especially pharmacogenetics. The NIH’s version of

the 4 P’s curiously ignores another important “P”: prevention.

Central to views of prediction and preemption are identifying individual genetic risks and developing pharmacogenetic treatments that would preempt disease before it starts. These are exciting and promising areas of research. However, although the United States already leads the world in high-tech health care, it trails in most indicators



On August 8, 1946, in Washington, DC, President Harry S. Truman signs a health bill authorizing federal agencies and departments to establish health programs for their employees. Looking on, from left to right, are: Thomas Parran, surgeon general of the Public Health Service; Henry B. Mitchell, president of the Civil Service commission; and Watson B. Miller, Federal Security Agency administrator. Printed with permission of AP Wide World.

of population health.^{1,2} This is, in part, because NIH research has been focused predominantly on the evaluation and treatment with technological interventions of the *individual patient*.⁶ To produce societal impact, prevention and health care programs need to be disseminated through and work in systems and populations^{6,7} and attend to the economic, social, and behavioral determinants of population risk and health. Applying the results of individual-based research to population-based public health issues and health policy has several problems^{7,8} and can result in an overestimation of benefits and an underappreciation of the risks and costs.

As NIH pursues research on the 4 P's, it is hoped that the approach will be transdisciplinary and will consider the public health implications of various solutions so that we can narrow the gap between research and practice. For example, predictive research should include behavioral and environmental risk factors, including socioeconomic and policy issues.⁶ Personalized medicine should include approaches that are truly patient-centered, such as the tailoring of behavioral interventions, and should address health literacy, and other communication barriers, as well as personal, family, and cultural preferences and values. Collaborative, preventive (rather than preemptive) research

should include primary prevention, behavioral, community, policy, and environmental approaches. Participatory approaches should involve research conducted in real-world settings and should respect the contributions of all stakeholders, including clinicians, patients, and citizens. Finally, both research and research applications occur in contexts, and study of contextual factors is essential to judge applicability and relevance.^{6,7}

It is also important that the 4 P's include broad-based approaches that integrate successful contributions from public health and the behavioral and social sciences, such as reducing smoking prevalence and promoting

screening and treatment for high blood pressure, which have substantially reduced the rates of heart disease over the past 50 years. A major NIH investment, the Diabetes Prevention Program,⁹ showed that modest weight loss and physical activity could reduce diabetes onset by 58% among those at high risk.

THE 4 W'S AS ADDITIONAL CRITERIA

We live in a world of limited resources, and a high priority has to be finding a way to extend affordable health care to the 45–50 million persons in the United States without any health care coverage.^{1,2} We must ask some key questions to guide our national investment in research funding and to judge whether specific investments are likely to improve or heighten health disparities and our health care crisis. In addition to the 4 P's, we recommend that NIH also focus on the "4 W's," questions that consider the public health impact of research investments and the probability that a given approach will be translated successfully into practice.

- *Who pays (and how much)?* Currently the American public, employers, and taxpayers pay \$2 trillion (2×10^{12}) annually for health care.¹ Research needs to address intervention costs and cost-effectiveness.
- *Who benefits?* Often medical advances primarily benefit a small percentage of the population who are the least needy and exclude the population at large, particularly those least able to afford health care.¹⁰ Researchers should evaluate new interventions for breadth of benefit.

- *Who suffers?* Currently, future generations, especially those who are most vulnerable and most needy—the rural, the poor, the elderly, and racial and ethnic minorities—are left out of medical advances, exacerbating health disparities. Research needs to document any adverse consequences and analyze effects by subgroup to ensure that disparities are not enhanced.
- *Who profits?* Currently, a small number of private companies and those providing expensive technology-driven services profit from individual-focused technology and pharmacological innovations. Developing only drugs and technology can result in overtreatment, further exacerbating health care costs.⁸ Funding agencies should consider the breadth of return on investment and who will receive this profit.

The NIH should invest more in effective ways to reach and enable the majority of Americans to take advantage of proven, cost-effective interventions that are already available.⁷ Gains in biotechnology are important but are frequently costly, inequitably distributed, and likely to accelerate our health care crisis. Unless the US health research system addresses the 4 W's, it is likely that Americans will pay even more—and for lower-quality health care—than other advanced nations' populations and that Americans will continue to experience large health disparities. We will not get out of the hole we are in by digging deeper.

If we are to improve health care as envisioned by the Institute of Medicine¹⁰—care that is safe, effective, timely, equitable, efficient, and patient-centered—NIH and the

nation need to consider the 4 W's and invest in research that will benefit the entire population. ■

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