Understanding and Managing the Complexity of Health Care

Dr. William B. Rouse

Dr. Rouse is the Alexander Crombie Humphreys Chair in Economics of Engineering at the Stevens Institute of Technology and a member of the U.S. National Academy of Engineering. He served on the President's Council of Advisors on Science and Technology Systems Engineering in Health Care Working Group, whose Report to President Obama was released in May 2014.

Breakthroughs in medical science, innovations in medical technologies, and improvements in clinical practices occur today at an increasingly rapid rate. Yet because of a fragmented healthcare delivery system, many Americans are unable to benefit from these developments. How can we design a system that can provide high-quality, affordable healthcare for everyone? In their book, Understanding and Managing the Complexity of Health Care, William Rouse and Nicoleta Serban introduce concepts, principles, models, and methods for understanding, and improving, healthcare delivery. Approaching the topic from the perspectives of engineering and statistics, they argue that understanding healthcare delivery as a complex adaptive system will help us design a system that is more efficient, effective, and equitable.

The authors use multilevel simulation models as a quantitative tool for evaluating alternate ways of organizing healthcare delivery. They employ this approach, for example, in their discussions of affordability, a prevention and wellness program, chronic disease management, and primary care accessibility for children in the Medicaid program. They also consider possible benefits from a range of technologies, including electronic health records and telemedicine; data mining as an alternative to randomized trials; conceptual and analytical methodologies that address the complexity of the healthcare system; and how these principles, models, and methods can enable transformational change.

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