

Foreword

Introduction to Engineering Healthcare

In October, 1957, western countries were stunned when the Soviet Union launched Sputnik, the first human-made satellite to orbit the earth. Subsequently, the United States worked feverishly to launch a satellite into space using a Vanguard Missile. Unfortunately, each time the Vanguard began to lift from the launch pad, it fizzled and exploded. It was very embarrassing. The Vanguard was assembled from components, each of which was well designed and performed its function with near perfection. The problem was that the designers had concentrated on the components and had failed to think through all the ways in which they interacted with each other. So, some parts were overheated by a neighboring part, others were disturbed by vibrations of a third component, etc. The system as a whole failed, injuring our national pride, and undoubtedly amusing Soviet Premier Nikita Khrushchev.

Today, the U.S. healthcare system has many wonderful parts: an amazingly strong input of fundamental life science; extraordinary technology for diagnosis and treatment; dedicated doctors, nurses, and technicians; many fine hospital facilities; emergency transport units; widely distributed pharmacies; and a great deal of useful information available on the World Wide Web. But like the Vanguard, the many interactions of these and other components with each other, and with our populace, have not been carefully thought through; the healthcare system has evolved rather haphazardly over time. The system has not failed entirely, but it has left us with an obesity epidemic, scant attention to wellness and disease prevention, disparities in access and outcomes, persistent deficiencies in safety and quality, and the highest costs in the world – while dozens of other countries boast lower infant mortality and longer life expectancy. If this has not injured our national pride, it should.

The Vanguard Missile went back to the drawing board, and was carefully rethought from a systems perspective, i.e. all the interactions of the components were understood, and they were modified to meet the end goal of launching a satellite effectively, and without failure. We could say that the system was “engineered.” As a result, the U.S. moved rapidly to become the greatest space-faring nation.

This is what must now be done with our healthcare system, and William B. Rouse and Denis A. Cortese, together with a team of highly-experienced experts, show us how to go about it. Engineering healthcare is a much more complex process than engineering a missile, because the healthcare system includes people, as individuals, as a society, and as a body politic. Healthcare depends on a myriad of organizations working in concert, including hospitals, specialty clinics, insurers, drug and device manufacturers, pharmacies, regulatory bodies, educational institutions, and more. The healthcare system must obey the laws of economics as well as those of biology, chemistry, and physics, and it must meet human aspirations, and respond appropriately to human needs and foibles. In the first instance, the framework of the system must align the incentives to each person and organization involved, from patient to care provider, to pharmaceutical company, to public health officials, to basic scientist with the goal of healthy, high-quality lives throughout the lifespan.

But a future system that will provide quality and affordable care for everyone can be designed and established. The principles are understood. An engineering approach, as espoused in this book, takes account of the system as a whole and each of its parts, their interactions and interdependencies. An

engineering approach enables one to work on making each component of the health care system do its job without losing sight of the whole, and thus enable the health system as a whole to produce high-value care.

New models of care delivery have the potential to add value in caring for people with chronic diseases, keeping them out of hospitals and as well as possible. Value can be realized through primary care and the use of non-traditional providers in non-traditional settings. In these and other instances, achieving high value in health care requires that payment reforms align incentives with the goals of individuals, organizations, and society. A systematic approach to gathering, analyzing, and acting on errors – at individual hospitals and clinics and at an aggregate level – can increase safety and enhance the quality of care. More generally, an engineered health system that is efficient and effective depends on information capture, access, and use. And finally, as most modern industries have demonstrated, an engineered approach can drive out substantial waste, reduce costs, and slow the rise of spending.

As this book goes to press, the nation is engaged in a vigorous political debate about reforming healthcare. Most of the debate focuses on expanding insurance coverage and who will pay for it. This is important, as far as it goes, but it does not go far enough. Beyond additional health insurance, the American people need and deserve a health system that is dramatically improved in its operation, cost, and outcomes. This book tells how to make a high-value health system a reality.

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