Preface

In general, one might conclude that relatively too much scientific effort has been expended hitherto in the production of new devices and too little in the proper use of what we have got.

Patrick Maynard Stuart Blackett, Baron Blackett OM CH PRS [1]

In the opening salvos of the Second World War, Britain, which fully believed in its own superiority and prowess, found itself totally stymied by the creative attacks of the Germans by sea and by air. A group of British scientists, armed primarily with knowledge of probability, statistics, and the ability to analyze and understand data, and using existing technology, developed new methods of implementation which dramatically increased effectiveness and turned the tide of the war. This new field (called operations research, which later evolved into Systems Engineering) TRANSFORMED how the military engaged in war. This book is intended to stimulate and encourage like-minded physicians to use measurement and analysis of existing “operations” to implement new strategic approaches to transform healthcare delivery [2].

About 15 years ago, after over 3 decades as an academic physician, most of them in leadership and management positions, I reached the conclusion that the problems with US healthcare were NOT management and finance problems but rather system and process problems. This was in stark contrast to the traditional belief that the solution to healthcare for a physician was to get an executive MBA. The Institute of Medicine had recently published “To Err Is Human,” in which they convincingly demonstrated that US healthcare was manifestly unsafe, and “Crossing the Quality Chasm,” in which they laid out the six goals for quality in healthcare: safe, effective, patient centered, timely, efficient, equitable (SEPTEE). I had recently been asked to serve on the thesis committee for a graduate student in the Department of Industrial and Management Systems Engineering. I had previously served on a number of thesis and dissertation committees in other colleges and departments, presumably because I could serve as a link between the underlying basic discipline and the healthcare world. In this case, the graduate student wanted to determine if reengineering could be applied to graduate medical education and I was the Associate
Dean for GME. This adventure opened my eyes to the possibility that formal industrial engineering concepts could be adapted and applied to healthcare. Shortly after, I was asked to co-chair a committee to create a new joint degree program (MD-PhD) in biomedical engineering, which put me in close contact with the Dean of the College of Engineering. One day, I suggested to him that he needed a “stalking horse” to go through the engineering program and offered to be that person. To my surprise, he responded that if I could meet the admission requirements, I was in. More surprisingly, the rest is history.

When I completed my PhD in Industrial Engineering, already a tenured full professor in the College of Medicine, I was eligible for a sabbatical. I was given the opportunity to spend a semester at Northwestern University, with highly regarded colleges of Medicine and Engineering that were physically separated by a dozen difficult Chicago miles, allowing me to introduce a “bridge” between two entities that while part of the same university were geographically and culturally separate. More importantly, Chicago served as the headquarters of nearly every major medical organization and association. With these “collaborators,” I set out to develop a needs assessment and a curriculum for a graduate degree program in Health Systems Engineering. Returning to the University of South Florida, I was asked to teach an engineering course in Linear Programming and Operations Research. I embraced this as an opportunity to begin to meld the medical approach to learning and understanding with the rigorous mathematics and computer science of Industrial Engineering. I was subsequently asked to create a new course in Engineering Analytics. And again, the rest is history.

Over the ensuing years, I was asked to teach other fundamental engineering courses, while each time looking for ways to “reinterpret” the material in ways acceptable and understandable to physicians and other clinicians. This background allowed me to develop and institute a “Scholarly Concentration” within the medical school entitled Health Systems Engineering, which included four 1-year courses taught concurrently with the medical school curriculum: Human Error and Patient Safety; Systems Modeling and Optimization; Data Mining and Analytics; and Quality Management, LEAN, Six Sigma. As of this date, over 50 medical students have enrolled in this program, with only a handful having prior education in engineering. Based on their experiences, several of these medical students elected to pursue advanced degrees in engineering while in medical school, one without having had any prior engineering education.

With these prototypes in the Colleges of Medicine and Engineering, I approached the American College of Surgeons with the idea of creating a program in Health Systems Engineering for practicing surgeons. Surprisingly, they embraced the concept and we created a series of postgraduate courses, DVDs, and educational curricula in Health Systems Engineering specifically for surgeons.

Based on these endeavors, I now propose a textbook whose purpose is to present difficult analytical concepts and approaches to motivated physicians who are willing to embrace the challenge of creating a “toolbox” to help them fix healthcare. This toolbox includes new ways to approach quality and safety, new understanding of data analysis and statistics, and new tools to analyze and understand healthcare.
delivery and how it can be improved. All of this is predicated on the well-accepted engineering principle—if you can’t measure it, you can’t improve it.

The intent of this book is NOT to turn physicians into engineers. Rather, it is to create physicians who are “bilingual,” who can speak the language of statistics and systems engineering, and who can become active participants in the transformation of healthcare.

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References

1. Blackett PMS. Scientists at the operational level, notes on statement to Admiralty Panel on 9/16/1941 on the function of the operational research station. Blackett Papers, PB 4/7/1/2.
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