are interwoven with models such as DeBono’s thinking hats and King and Kitchener’s Reflective Judgment Model, which may be new to some readers.

This well-researched and extensively referenced book covers an amazing amount of territory. It is a treasure trove of strategies for re-examining how to assess a learner’s current state, collaboratively set goals, create a favorable learning environment, and use different tools to align the teacher’s style with the learner’s needs. In addition to offering perspectives from many sources, this work prompts readers to be reflective about all facets of the teacher-learner interface. At the same time, the amount and intricacy of the content can seem overwhelming. This is by no means a “quick read” if the goal is to absorb, process, and apply the multidimensional content. That said, it is possible to focus on different sections related to specific learning situations. I have found several practical applications for this resource. Among them, I incorporate pieces of the material as educational “pearls” during our Program Evaluation Committee (PEC) meetings, where various curricular elements are discussed in detail. The three pillar model opens options for effectively assessing and engaging individual growth areas learners are pursuing. I would recommend it to anyone teaching health professional students across disciplines (undergraduate and graduate), as the content is widely applicable. Personally, I find this invaluable reference book to be engaging and thought-provoking.

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**References**


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**The Laws of Medicine: Field Notes From an Uncertain Science (TED Books)**

Siddhartha Mukherjee

*New York, Simon & Schuster/TED 2015, 96 pp., $16.99, hardcover*

When a Pulitzer Prize-winning physician pens a new book exploring the modern laws of the very “uncertain science” of medicine, and it is done so in under 100 pages? No brainer—I’m reading it! After a brief few hours of investment, Dr Mukherjee’s latest offering proves both fulfilling and thought-provoking. Although I am not sure any of his ideas are groundbreaking for a moderately seasoned academician, they are presented in such a well-reasoned and readable manner that they are likely to provide “light bulb moments” for younger physicians while reinforcing the cache of a more experienced physician educator.

Siddhartha Mukherjee, MD, is a staff physician at Columbia University where he is an assistant professor of medicine, hematology, and oncology. His most celebrated writing is *The Emperor of All Maladies: A Biography of Cancer*, for which he was awarded the Pulitzer in 2011 for general nonfiction. Interestingly, this book is produced in conjunction with TED where the author has a companion TED Talk that could serve to augment a lecture on this new offering, its individual topics, or a book club.

*Laws of Medicine* is broken up into an opening section followed by “Three Laws.” The first section offers well-delivered anecdotes to set up the theme of medicine being an imperfect science. In one story Mukherjee tells of a surgical case that experienced an unexpected twist but is recovered under the watchful eyes of a revered attending who subsequently states, “It’s easy to make perfect decisions with perfect information. Medicine asks you to make perfect decisions with imperfect information.” Mukherjee goes on to detail how during his own medical education he was simultaneously amazed by modern medical advances while admitting a rising discomfort, “The profusion of facts obscured a deeper and more significant problem: the reconciliation between knowledge (certain, fixed, prefect, concrete) and clinical wisdom (uncertain, fluid, imperfect, abstract).” Throughout the opening section Mukherjee weaves threads that support his three “laws
of medicine,” which he states are “really laws of uncertainty.”

“Law One: A strong intuition is much more powerful than a weak test.” This serves as an absolutely wonderful discussion of diagnostics, probabilities, and Bayesian analysis. Indeed, this chapter can stand alone to support a lecture or curriculum on physician numeracy. Mukherjee conjures wonderful maxims like “A test can only be interpreted sanely in the context of prior probabilities” and “There is no absolute knowledge; there is only conditional knowledge.” Again, throughout this chapter he laces apt and understandable tales into a flowing narrative to support his edicts.

“Law Two: ‘Normals’ teach us rules; ‘outliers’ teach us laws.” This demands that we understand the powerful influence of past dogma in the context of current science. The introduction of this section utilizes the trite (but fitting) account of the Catholic Church’s shifts in “cosmological truths” over time (earth versus sun-centered universe) to “prove” that “facts” can change. Mukherjee details how at a similar level even today “[There is] the illusion of a systematic understanding of disease—but the understanding is, in fact, incomplete.” He proceeds to challenge our dogma of dismissing trials that don’t achieve statistical significance, shifting our focus toward the outliers of success—those “anecdotal” patients with distinctively positive responses to a therapy. He states, “Every outlier represents an opportunity to refine our understanding of illness.” He goes on to say, “Inliers’ allow us to create rules—but ‘outliers’ act as portals to understand deeper laws.”

“Law Three: For every perfect medical experiment, there is a perfect human bias.” This law humbles our objectivity to the bone. Mukherjee argues, “In medicine, the biases are particularly acute (because) we want our medicines to work.” In this section he shares a wonderful plea by Dr Bernie Fisher hypothesizing that Halsted’s doctrinal radical mastectomy was no more successful than conservative localized breast cancer surgery. Fisher boldly stated, “In God we trust. All others must bring data.” Indeed, a quantum change in breast surgery subsequently ensued because a classically fixed human bias was overturned by solid statistics.

In summary, Dr Mukherjee’s newest offering is enjoyable. As with Emperor, his writing remains both lucid and detailed. With brevity optimistically in mind, however, this book pleasurably reads more as an essay than a tome—and for a quick, inspiring read, I am grateful!

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