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Commentary on "Homeland Security: From Mathematical Models to Policy Implementation" by Lawrence M. Wein

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Engineers seem to have an interesting, and somewhat unique, definition of "fun." Ask your doctor or a local public health official what defines a good time, and you are not likely to hear about the logistics of mass antibiotic distribution or mathematical models of influenza transmission. Larry Wein's opus over the last decade has been, to use a hackneyed phrase, deadly serious, and yet he notes that a personal criterion for his engagement in a project is that it be enjoyable. For those of us in public health emergency response, this provides an important insight into the workings of the engineering mind, since it is precisely those things that we often avoid (i.e., the nitty gritty, and by that I mean quantitative, evaluation of the feasibility and performance of the programs we plan and carry out in the name of health protection) that appeal to Prof. Wein and a relatively small number of colleagues. Capitalizing on that sense of adventure into the unknown could bring about important advances not only in public health, but in medical care more generally. What is needed is a new generation of engineers who can speak the language of health care (and vice versa), and who then step into the unknown in much the way Prof. Wein describes to discover the important unsolved (or avoided, as the case may be) problems.

The particular frontier between health care, emergency response, and engineering science is in many ways analogous to the Wild West of old: few rules (physics excepted), not much authority, and an outsized appetite for dramatic stories from the Border. Some days it seems that anyone able to publish a model describing the next disaster to befall us is guaranteed a spot on the evening news. Prof. Wein's article does a great service in describing the much less felicitous reaction that can occur when models produce unanticipated or unwanted information. In a model-poor environment like public health emergency response, any modeling result can be dismissed by policy-makers as just an agglomeration of assumptions run through with math or computers. One of my junior colleagues had a trick of asking modeling skeptics at national meetings how they had arrived at the conference. Since most attendees had flown, this typically led to a series of questions and answers about aerodynamic models of the mathematical and balsa wood type, and how much more

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comfortable the questioner felt knowing that the aluminum tube that had conveyed them there was backed up by some quantitative results showing it was airworthy.

Prof. Wein notes that he has been extremely fortunate in securing a steady, impartial funding source for his forays into health and national security-his own university. If there is one major obstacle that I see impeding the full development of a new field of public health operations research, it is that to date the U.S. Federal research funding system has no true home for such work. Too medical for the National Science Foundation, too engineering-heavy and not molecular enough for the National Institutes of General Medical Sciences at NIH, not solely focused on health care quality and patient safety to qualify for the Agency for Healthcare Research and Quality ... the list goes on. Those agencies with major operational responsibilities (e.g., the Centers for Disease Control and Prevention, home of the Strategic National Stockpile) typically have had little or no funding for operationally-oriented research about what they do. This picture is changing slowly (e.g., with the establishment of a number of CDC-funded Centers for Preparedness and Emergency Response Research), but one gets the sense that, given the major role of operations research and quantitative modeling in making the rest of the world go 'round, there is a boat that is being missed here. Prof. Wein's accounts of past "fun" will, perhaps, lay the groundwork for a new chapter in this story, in which the public health establishment recognizes the unique and vital contributions that engineers have and might continue to provide to make sure that we can do what it is that we need to.