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Antibiotic research: the kryptonite of superbugs

By Barry Eisenstein

HOSPITAL-ACQUIRED infections are a scourge that kill and injure patients and impose a heavy cost burden on the nation's health care system, so much so that policy makers are debating the idea of rewarding hospitals that reduce their infection rate and punishing those that don't. This makes sense, but it will not solve an important corollary public health crisis — the shortage of antibiotics to treat the current and the coming wave of superbugs.

The incidence of infections from drug-resistant bacteria such as MRSA (Methicillin-resistant Staphylococcus aureus), commonly known as "staph" infection, continues to rise in hospitals and in community settings. In 1980, roughly 3 percent of staph infections were diagnosed as MRSA; today that number has reached 60 percent. The Centers for Disease Control and Prevention reported that nearly 19,000 deaths were associated with MRSA in 2005. And in a disturbing new development, the CDC has reported evidence of a link between bacterial infections such as pneumonia caused by MRSA and the H1N1 virus among patients who have died from the virus.

While the incidence of MRSA rises, the treatment landscape is shrinking. Today, many of our antibiotic medications are not as effective as they once were. Every use of an antibiotic, including the widespread use of some for non-therapeutic purposes in livestock and poultry, increases the selection of naturally resistant bacteria, the rare bacteria that mutate to the resistant state, and the transfer of resistance genes to formerly susceptible pathogens. As these organisms survive and multiply over time, the once small number of resistant organisms becomes dominant, resulting in an increasingly dangerous number of drug-resistant bacteria.

In the face of the rising wave of drug-resistant bacteria, one would think that drug manufacturers would be busy trying to develop new antibiotics. Sadly, this is not the case. Right now there are very few new antibiotics being developed in the United States or elsewhere. This dearth of new treatments was the subject of a recent report from the London School of Economics and Political Science. It warned that "only a handful of new antibiotics are in development, and all in the early stages."

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What has brought us to this perilous situation? Since doctors now recognize the need to be prudent with antibiotic use, newly approved antibiotics do not have the commercial success they once might have had. As a consequence, drug manufacturers have abandoned antibiotic development in favor of more commercially reliable medications, particularly ones given for chronic (rather than acute) diseases.

To confront this crisis Congress needs to take strong steps to increase the supply of new antibiotics. First, Congress should establish a federal anti-infective review board to guarantee antibiotics stewardship. Stewardship programs aim to ensure proper use of antibiotics in order to provide the best treatment outcomes, to lessen the risk of adverse effects (including antimicrobial resistance), and to promote cost-effectiveness. The review board would be responsible for compiling data on antibiotic use and setting guidelines, based on evidence-based medicine, for when certain drugs should be used or held.

Second, Congress should create a number of economic incentives specifically designed to foster innovation in antibiotic development. These incentives should include tax credits for research and development, which would enable manufacturers to take on the risks and costs associated with developing new treatments that otherwise may not be undertaken. These credits would also alleviate some of the hesitations manufacturers have about bringing a new product to market.

In the same context, Congress should extend the right of a manufacturer to be the sole producer of an antimicrobial product from the current five years to 10. Granting a manufacturer a longer period to offer a product increases the likelihood it can recoup its costs and in turn reinvest in delivering the next generation of antibiotics.

Taken together, these steps would help protect the current supply of antibiotics, and encourage more drug developers to invest in this crucial area of research. This is not a matter of industry economics, but of having the ability to protect public health from the threat posed by the current and future wave of drug-resistant bacteria.

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