Antimicrobial Resistance - The UN Resolution And How Economists Have Weighed In

By Chuck Dinerstein, MD, MBA — September 21, 2016

Last week we saw a video of bacteria evolving to resist two common antibiotics. It was a chillingly accurate visualization of the horrifying reality of antimicrobial resistance (AMR). This week is the United Nations’ annual meeting in New York and along with the typical gridlock it causes, the UN is hosting a panel discussion and resolution regarding a growing global threat, AMR - which has been enabled by certain poor policies, as well as difficult science. Here is the substance of the resolution:

“Acknowledge that resistance of bacterial, viral, parasitic, and fungal microorganisms to antimicrobial medicines that were previously effective for treatment of infections, is mainly due to inappropriate use of antimicrobial medicines in human, animal, food, agriculture and aquaculture sectors; lack of access to health services, including to diagnostics and laboratory capacity; as well as residues of antimicrobials into soil, crops and water. Within the broader context of AMR, resistance to antibiotics which are not like other medicines, including medicines for the treatment of tuberculosis, is the greatest and most urgent global risk that requires increased attention and coherence at the international, regional, and national levels.”

In a separate report, there was a suggestion to decouple the costs of research and development from the price of a drug.

“Our report calls on governments to negotiate global agreements on the coordination, financing,
and development of health technologies to complement existing innovation models, including a binding R&D Convention that delinks the costs of R&D from end prices.”

As with all big bureaucracies, the devil is in the details. Who is going to pay those R&D costs? And how does this decoupling fight antimicrobial resistance? A few answers can be found in an excellent review [4] undertaken by the British government and funded by the Wellcome Trust [5] published in May of this year. Before sharing a few of their recommendations that provide a path forward I wanted to discuss the chair of the committee, Jim O’Neill, a British economist, and the man who coined the term BRIC referring to the developing nations of Brazil, Russia, India, and China.

It is an interesting choice to have an economist oversee a worldwide health effort; even O’Neil questioned his lack of expertise.

“My initial response was to ask, ‘Why should an economist lead this? Why not a health economist?’ The answer was that many of the urgent problems are economic, so we need an economist, especially one versed in macro-economic issues and the world economy, to create the solutions.”

Jim O’Neil does not disappoint, seeing AMR “as the economic and security threat that it is…” and bringing a pragmatic economic sensibility to the recommendations. Six market derived rules guided the reality based recommendations:

- **The solution to the problem must … benefit as many people as possible, not one country or one group of countries.**
- **The solutions should be cost-effective, affordable and support economic development.**
- **AMR is a global problem … but we seek to avoid creating new institutions …Whenever possible our interventions coexist seamlessly with current international institutions and national health systems.**
- **The solutions should aim to increase the number and types of organisations and individuals undertaking research relevant to AMR, and reduce barriers to entry...**
- **The solutions should make best use of the respective strengths of the public sector, the private sector, civil society and academia.**
- **The solutions should identify market failures and address them by allocating resources and risk effectively, via price mechanisms where possible or regulation if required.**
O’Neil casts the problem in economic rather than medical terms:

“To stop the global rise of drug-resistant infections, there is a supply and demand problem that needs to be fixed. The supply of new medicines is insufficient to keep up with the increase in drug resistance as older medicines are used more widely and microbes evolve to resist them. At the same time, the demand for these medicines is very badly managed: huge quantities of antimicrobials, in particular antibiotics, are wasted globally on patients and animals who do not need them, while others who need them do not have access.”

Perfect markets, in economic terms, balance supply and demand. When supply exceeds demand, price drops and demand increases until a balance is achieved. Similarly, when demand exceeds supply, the price rises and demand is reduced returning balance to the market. A persistent imbalance in supply and demand is a “market failure.” From an economic point of view, AMR is, in part, a market failure driven by externalities, imperfect information, and the role of the public good. Let me expand on these economic concepts as they pertain to AMR.

Externalities are “costs or benefits to a third party for a decision over which they have no control.” The individual decision to use antimicrobials by a physician helps their patient. But what is the effect of that decision upon a third party uninvolved in the decision - in this instance, society? Prescribing antimicrobials for the patient may have a positive externality, stopping the spread of an infection to others; or it can have a negative externality, increasing antimicrobial resistance - especially when antibiotics are used inappropriately. While we can debate the balance of these positive and negative externalities on others; the report believes “the negative externality of resistance is more pronounced.” Classically, governments seek to control externalities by taxing or regulating the negative and subsidizing the positive; these measures are difficult to apply in this setting.

Imperfect or incomplete information refers to two parties have different information about the same issue. For example, when we buy a new car we see the sticker price, the dealer knows the cars more discounted real cost to them. For antimicrobial use, there are two suppliers physicians and manufacturers. Both make decisions with imperfect information. Physician prescribing may be imperfect when treating viral diseases with antibacterial agents; or when prescribing less effective agents over ‘first-line’ choices, especially in the instance of unsuspected drug resistance. These decisions, have a negative externality, increasing AMR. For pharmaceutical companies, because it’s hard to predict patterns of AMR, they must make decisions regarding R&D with imperfect information. Companies see little economic reward in making investments in the setting of uncertainty that incomplete information creates.

Public goods are our commonly held assets that benefit large groups of people who do not directly
pay for them. Bridges and roads, in fact, all of our infrastructures are public goods. Governments struggle to find equitable ways to share the cost of public goods, to provide collective funding for infrastructure. That is why there are tolls on New York City’s bridges and New Jersey’s turnpike, and why there is a highway tax on gasoline. Antimicrobials improve health outcomes and support healthcare systems that provide surgery and other invasive treatments and chemotherapy. Our use of antimicrobials impacts many other aspects of our lives, our access to food, our ability to work, healthcare costs and our environment. All of these benefits, these positive externalities are public goods. Antimicrobial resistance is a negative externality of our use of antimicrobials, but it too is public goods. Like other public goods, we must find equitable ways to share costs; AMR requires a global means to mitigate this very harmful and threatening reality.

In the second of this series, we will consider a few of the reports’ recommendations “that either improve the supply of new antimicrobial medicines or reduce the demand for existing ones, prolonging their life.”