Els Torreele: The search for new antibiotics—market based solutions are not the answer

July 11, 2019

The pipeline for innovative antibiotics is in bad shape, but offering billion dollar rewards to pharmaceutical companies is not the answer, says Els Torreele

In the face of the growing crisis of drug resistant "superbugs," the UK recently appointed Professor Dame Sally Davies, the country's chief medical officer, as the first special envoy on antimicrobial resistance (AMR). In appointing its first "superbugs tsar," the UK is taking a central role in addressing this global health threat.

Yet as opinion leaders lament the shortcomings of the antibiotics business model, they are calling for expensive fixes to the market. Although these commentators are sounding a much needed alarm, both their diagnosis of the problem and proposed solutions of offering billion dollar rewards to pharmaceutical companies are missing the mark.

At Medecins Sans Frontieres (MSF) we are extremely worried. In several of our medical programmes, we have found high rates of drug resistant infections—from people with tuberculosis in South Africa, to patients with burns injuries in Haiti, to war wounded people from Syria. We're running out of options to treat these patients. To tackle existing drug resistance and control the spread of multidrug resistant pathogens, we need a truly novel portfolio of affordable antibiotics that can cure people with difficult to treat infections.

The current market-based research and development (R&D) business model fails when it comes to antibiotic development. This model—in which the goal is to maximise the financial return on medical products—is made possible by allowing companies to charge exorbitant prices with little to no transparency. It has led to price gouging in multiple health areas, such as cancer and hepatitis C, and threatens to bankrupt even the wealthiest health systems. Yet somehow many commentators believe that the only way to "fix" the lack of R&D in less profitable areas such as antibiotics is to try to encourage these clearly unhealthy dynamics in the development of antibiotics. We disagree.

Let's take a look at the story of Achaogen. This company developed a new antibiotic, plazomicin, benefitting from substantial taxpayer and philanthropic investment from the US and UK. While governments and charities were happy to finance this research, they were banking on the assumption that the market would take care of the rest. But this wasn't the case. Despite receiving marketing approval for plazomicin, Achaogen found it could not survive because the stock market investors it needed to attract weren't interested—not

because the drug was failing medically, but because it was unlikely to generate enough financial return compared to other more profitable investments. Achaogen filed for bankruptcy, and the fate of plazomicin is now up in the air.

Why must we allow the stock market, rather than clinicians and public health systems, to decide which new lifesaving medicines are developed and made available to patients? In focusing on how to incentivise the market to provide the answers that it cannot, we will throw away billions and still be left empty handed. Recent calls for large cash rewards upon the delivery of a new antibiotic to the market, in order to attract investors and thereby create a "viable" business model for antibiotics, are not only throwing money at financiers but assume that we already have the right drug candidates in the pipeline, ready to be pulled out. We don't.

There are 42 antibiotic candidates targeting priority pathogens in development, but only five of these meet even one of the four criteria that the World Health Organization (WHO) uses to define a drug as "innovative." Of these five, only one targets what are known as gram-negative bacteria, for which new drugs are desperately needed. The majority of these candidate drugs are modifications of existing classes of antibiotics and are thus unlikely to be useful in overcoming resistance that bacteria have already developed to these classes. This is a serious concern for our healthcare teams. In our postoperative care facility in East Mosul, Iraq, almost 40% of patients arrive with multidrug resistant infections. In short, the pipeline for innovative antibiotics is in bad shape.

Totally different strategies for developing and delivering effective new antibiotics must be considered — ones that rely on public responsibility instead of incentives for commercial markets. In the UK's 2016 Review on Antimicrobial Resistance, the economist Lord Jim O'Neill called for market entry rewards (MERs) of around USD$1 billion each. However, three years on, he has changed his mind. Realising that even this type of financial incentive is unlikely to get results, he now wants to explore the idea of a public utility with public purpose ownership for antibiotics, likening it to the way some banks were taken over by the government after the 2008 global financial crash. Public utility drug manufacturing already exists in some countries, and could be expanded to encompass public interest medical R&D.

The remedy for a deeply flawed innovation ecosystem resides in directing R&D towards improving patient health outcomes and collaboration towards affordable and sustainable access for people in need wherever they live. The building blocks of such collaboration include open source compound libraries that accelerate non-duplicative drug discovery research, and clinical trials networks, which allow for a greater pool of patients with difficult to enrol indications. Many researchers today are keen to work in a capacity where health needs are prioritised over profit, including through open source and not for profit initiatives. We need to create the frameworks of collective ownership and responsibility in which these scientific breakthroughs can thrive.

This is the kind of new thinking we need, supported by enlightened governments who seek to take responsibility in tackling one of the greatest challenges in global health today. We must find the courage to explore radical solutions beyond business as usual because medicines shouldn't be a luxury.