



## Fixing the Antibiotic Pipeline

David Shlaes

Anti-Infectives Consulting, USA

Most experts who have examined the subject agree that our antibiotic development pipeline is not sufficient by a long shot. The days when there was always a new antibiotic just around the corner that would allow treatment of the latest superbug are long gone.

Fixing the antibiotic pipeline is not rocket science. The main difficulty lies in finding molecules that enter the bacterial cell, stay there and inhibit growth of the bug without being toxic to us. One thing that prevents us from overcoming this difficulty is that the number of people working on the problem has shrunk to historically low levels.

The continuing consolidation (mergers and acquisitions) within large pharmaceutical companies, plus the outright abandonment of antibiotic research by these companies has severely impacted our ability to come up with new ideas, new approaches and new molecules. In addition, the lack of experience and training of well-meaning academics in the science of drug discovery undermines current efforts in the public sector.

So how can we fix this? We can't make scientific discovery any easier. But there are three areas over which we have some control.

First and foremost we need regulatory reform. One of the reasons industry has abandoned the area has been the increasing regulatory stringency, which translates into larger clinical trials and greater development expense, and the accompanying regulatory uncertainty for antibiotics. Regulators are working on the use of small, streamlined trials to get antibiotics specifically targeting specific resistant bacteria to the market quickly to help those patients who truly need these life-saving drugs. Of course this approach may increase the safety risk to patients. Europe

has been leading the way in this effort with a transparent process. The US is making great strides but this is still all behind closed doors. This leads to continued uncertainty within the industry. Finally – Asia and emerging markets have not really focused on this problem yet from a regulatory perspective. For example, NEWDIGS does not focus on antibiotics yet.

Secondly, we need to attack the economic factors that have led industry to leave antibiotic R&D. Push incentives such as funding to support expensive stages of research and development are important. A good example is BARDA in the US and the Wellcome Trust in the UK.

The other economic factor we can control is drug pricing. We are happy to pay tens of thousands of dollars for oncology drugs that prolong life maybe a few months, while we expect to pay only a few dollars for antibiotics that can be incredibly effective in curing disease, but that are only taken for days. As a global society, we must value new antibiotics appropriately. This means that for those new drugs developed to serve a small population of patients with highly resistant infections for whom other effective options do not exist, we have to be willing to allow industry to recoup its costs and to make a small profit. Prices for such drugs could range from \$2000 to \$30,000 for a course of therapy.

One area we do not think we need to fix is the market itself. There has been discussion of “pull” incentives where government would provide a guaranteed market for antibiotics active against key drug-resistant superbugs. Given the evolving dominance of emerging economies in the global antibiotic market and the high incidence of superbugs in many of these countries, we think that the market will provide enough incentive in this regard.

Finally, we need to train our academic researchers in the science of drug discovery. We support using government funds to provide such training within industry in exchange programs. Academics should be allowed, even encouraged to spend time with partner pharmaceutical companies and ‘learn by doing’.

So a five point plan to fix the antibiotic pipeline –

- 1) regulatory reform
- 2) streamlined clinical trials for antibiotics against resistant superbugs
- 3) better antibiotic pricing policies
- 4) getting needed and appropriately valued new antibiotics to emerging economies
- 5) training for academic researchers