How can we assess the value of new antibiotics?

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Antimicrobial resistance is making infections harder to treat with existing antibiotics. To encourage the development of new antibiotics, governments internationally are exploring ways to reward manufacturers who produce them.

A pilot of a new payment system for two new antibiotics (cefiderocol and ceftazidime-avibactam) was undertaken in the NHS in England. Instead of the usual approach where manufacturers' revenue depends on how many medicines they sell, in the new system they are paid a fixed annual sum. The size of the payment is based on the long-term health benefits of the new medicine across current and future populations. The aim is to encourage careful prescribing of antibiotics while still guaranteeing financial returns to manufacturers of new medicines.

Our research investigated how to assess the value of the two new antibiotics to the NHS and calculate the right annual payment for manufacturers. Value assessment involved estimating the health benefits to all patients treated with the antibiotics as well as the wider health benefits and costs if, for example, the antibiotics were expected to change patterns of infections in the future. We used data from research reviews, national sources and expert opinion to model their impact. Our research highlighted several challenges to value assessment:

- It was difficult to pinpoint what types of patients would be likely to receive the new antibiotics and how much they would benefit from treatment, especially as they would be prescribed to patients with many different types of infections.
- The number of patients who would benefit was hard to assess because of a lack of data about the current numbers of drug-resistant infections or how drug resistance may change over time.
- There was a lack of information on how well the antibiotics work in practice, so we had to make predictions based on laboratory data.

Our study found that while both antibiotics have the potential to treat highly drug-resistant infections, the benefits were limited. This is because infections with complete drug resistance - where none of the antibiotics currently on the market work - are rare, so the added benefits of the new antibiotics were modest. Even when they prevented immediate infection-related deaths, the age and other health conditions of the patients meant that many were not expected to live very long.

The NHS used the estimates of value to calculate the level of payment for the antibiotics, but the evidential challenges made this exercise very uncertain. The analysis was very complex and intensive, and we concluded that it was unlikely to be feasible to repeat such an exercise for all new antibiotics.

Our research identified steps to improve and streamline future evaluations, including building better national data systems to provide key information on how antibiotics are likely to be used, the number of patients who could benefit, and how effective they are compared to other treatments. Less complex approaches could then be used to provide policymakers with the evidence they need to devise payment systems that encourage manufacturers to develop new medicines to target currently untreatable infections.

Read the full paper, funding sources and disclaimers in Applied Health Economics and Health Policy.

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