Optimising antibiotic prescribing: Collective approaches to managing a common-pool resource

Carolyn Tarrant,1 Andrew M Colman,1 Edmund Chattoe-Brown,1 David Jenkins,2 Shaheen Mehtar,3 Nelun Perera,2 Eva M Krockow.1
1University of Leicester, 2University Hospitals Leicester, 3University of Stellenbosch

Antimicrobial resistance as a social dilemma

Antimicrobial resistance (AMR) is one of the greatest threats in 21st century medicine. Antibiotic overuse in medicine is a significant contributing factor. AMR has been characterised as a social dilemma: a situation in which a public good (in this case, antibiotic efficacy) is exhausted due to over-exploitation. The dilemma arises because individuals are motivated to maximise individual payoffs, although the collective outcome is worse if all act in this way.

Three complicating features that make optimising antibiotic prescribing challenging ...

Lack of visibility and imminence: the depletion of antibiotic efficacy is relatively invisible, and lacks immediacy for doctors working at the frontline and their patients.

‘Problem of many hands’: each individual prescriber’s action makes a negligible and indirect contribution to the problem. Individual accountability or blameworthiness for the collective outcome of AMR is blurred.

Complex agency relationships: Doctors are mediators of antibiotic use but are acting as agents for multiple parties. There may be tensions in balancing the interests of society for conservative antibiotic prescribing, against the responsibility for minimising the risks of morbidity and mortality for their own individual patients.

Theory-based solutions?

Theory and evidence suggest that enabling consensus based, cooperative approaches are most effective for limiting use of a common-pool resource; but solutions need to reflect the particular challenges of optimising antibiotic prescribing.

<table>
<thead>
<tr>
<th>Clause of theory-based AMR intervention</th>
<th>Description of intervention</th>
</tr>
</thead>
</table>
| 1. Establish clearly defined boundaries and access rights | Define for common resource that needs protecting (e.g., all antibiotic drugs).

Fully specify who can access antibiotics (e.g., fully trained doctors; microbiologists; antimicrobial pharmacists), and whether that differs between different types of antibiotics. This latter is a measure item ‘open access’ into a single antibiotic.

Ensure formal training requirements for antibiotic prescribers to ensure they are fully qualified to make difficult antibiotic prescribing decisions.

Ensure prescribing daily to society and their responsibility for protecting antibiotic efficacy is explicit in formal contracts and professional codes. |
| 2. Erase the problem’s visibility and highlight incentives | Collect and communicate information about local resistance levels.

Establish a minimum aggregate amount of antibiotics available for use.

Increase a sense of urgency by highlighting existing treatment complications and demonstrating the imminence of harm. |
| 3. Make collective choice arrangements | Ensure rules about antibiotic prescribing are consensus-based, incorporating views of different stakeholders.

Ensure that external authorities (e.g., government) respect local, consensus-based rules about antibiotic prescribing.

For prescribing rules in the local context, consider the aggregate for local resistance levels, harming the population, and overall selection resistance, and the local challenges and resources for individual hospitals and healthcare organizations.

Ensure all parts of the system have appropriate antibiotic prescribing guidelines and there is communication and consensus across different parts of the system. |
| 4. Conduct behaviour-based monitoring | Monitor against collectively agreed rules or guidelines.

Use systems to control and make transparent information on overall prescribing levels and individual prescribing behavior.

Enable behavior based monitoring by members of the prescribing community and the officials to whom they are accountable; placing the emphasis on prescribing choices of individual healthcare staff rather than their (often coupled) outcomes (i.e., a shift to increased awareness of AMR). |
| 5. Use social and reputational incentives and sanctions | Use graduated sanctions enabled to scale and frequency of inappropriate behaviors.

Make use of social and reputational incentives and sanctions (for example through individual and organizational awards for cooperative action, and reputational sanctions for non-engagement with consensus rules.

Capitalize on the power of social norms feedback. |
| 6. Address unaligned goals and incentives | Identify and address organizational and national goals and incentives that are inconsistent with stewardship.

Manage risks for doctors acting in the interests of society, e.g., through organizational protection from litigation. |
| 7. Provide conflict resolution mechanisms | Ensure arrangements are in place to resolve conflicts about antibiotic prescribing (e.g., display about appropriate treatment in situations of uncertainty). |