

Combating antimicrobial resistance demands nation-wide action and global governance

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Antimicrobial resistance is a growing threat to global health and health systems everywhere. Curbing this threat demands both nation-wide action and strong international governance. The Royal Australasian College of Physicians, New Zealand College of Public Health Medicine and New Zealand Medical Association call for comprehensive, well-funded measures across New Zealand's veterinary medicine, agriculture, human community and healthcare settings. International action is needed in parallel—with effective governance structures, rules and targets.

Antimicrobial resistance (AMR) increasingly threatens New Zealanders' health and our health system. International recognition is growing; in recent weeks we have seen:

- The United Nations (UN) convening a special one-day meeting (only the fourth time the General Assembly has ever held a high-level meeting on a health issue), with global leaders committing to fighting antimicrobial resistance together.^{1,2,3}
- The UN's Food and Agriculture Organization (FAO) releasing its action plan on AMR and the food chain.⁴
- The UN Secretary-General's High-Level Panel on Access to Medicines highlighting antimicrobials and AMR in particular.⁵
- In New Zealand, the New Zealand College of Public Health Medicine (NZCPHM) releasing the NZCPHM policy statement on AMR,⁶ endorsed by the New Zealand Medical Association (NZMA), calling for national planning to be comprehensive, well-funded and monitored in the face of New Zealand's looming crisis.^{6,7,11}
- And in today's issue of the *Journal*,⁸ Humphrey Pullon and colleagues for The Royal Australasian College of Physicians (RACP) are strongly reiterating

the RACP's explicit call^{9,10} (supported by the NZMA¹¹) for measures based on the World Health Organization (WHO)'s 2011 six-point plan.^{12,13}

AMR is described as a leading global health issue that “threatens the very core of modern medicine”.¹⁴ Some common infections may become very difficult to manage and some forms of surgery and chemotherapy could become untenable or unsafe.¹⁵ As the RACP cites,^{8,9} left unchecked, AMR could cause 10 million deaths globally each year (more than from cancer) by 2050 and cost \$US100 trillion in lost economic output (as context, the world's current annual GDP being \$US107–113 trillion, see endnote *)—although fuller modelling of underlying cumulative incidence/future prevalence is needed (endnote ÷).^{15–18}

The genie of AMR is already well and truly out of the bottle, with AMR impacts now widespread. Pan-resistant (or very close to pan-resistant) gram-negative organisms are found already in many countries, with drug-resistant infections thought responsible now for at least 700,000 deaths each year.^{15,16} Given our increasingly interconnected world, these organisms are now being introduced and detected in New Zealand. The scale and extent are described by the RACP, NZCPHM, WHO and the O'Neill Review.^{6,8,9,12–16}

Tackling AMR is both national and global. In response to a commitment to the WHO, New Zealand (co-led by the Ministry of Health and Ministry for Primary Industries) is developing a comprehensive national strategic plan for AMR, due by the end of May 2017.^{19,20} Directions called for by the WHO, NZCPHM and RACP include:^{6,8,9,12–14}

- financed national AMR plans and guidelines
- national quality improvement programmes^{8,9}
- clinical governance
- enhanced AMR surveillance
- new antimicrobials and vaccines
- optimising existing antimicrobials
- preventing infections in community and healthcare settings (eg, immunisation; infection prevention and control (IPC)—including isolation and screening for multi-drug resistant organisms in patients previously hospitalised overseas⁶)
- wise use of antimicrobials in human health and animal health/horticulture—with education and governance; a single national antimicrobial prescribing guideline^{8,9}
- education/governance/regulation of antimicrobial used in veterinary medicine, agriculture and horticulture.⁶

Successful implementation will need widespread leadership and commitment across the healthcare, veterinary and agricultural sectors—using a ‘One Health’ approach.^{6,21} This ‘One Health’ approach recognises that ecosystems and AMR development in humans and other species are inextricably linked, as are the solutions.⁶

Global efforts are needed beyond national action

National action is important but remains largely confined within countries. International action is essential to complement and coordinate local and national AMR efforts.²² Globally, countries’ AMR impacts, access to antimicrobials and abilities to address AMR

vary widely,^{22–25} yet all our health and health systems will depend on strong consistent action. The unwise and injudicious use of antimicrobials across and within nations has effectively ‘depleted’ them as a common resource for humankind (endnote †)—we are all affected and vulnerable. Like climate change,²⁶ with AMR the practices of some affect many others.^{27–31}

Decisive AMR action is also justified from a health equity perspective.^{23,32–34} Low- and middle-income countries suffer disproportionately from AMR-related disease, while also lacking resources and capabilities to mitigate this growing problem.^{23–25,34–37} Unchecked, AMR is likely to significantly worsen the health of future generations in ways that are not yet conceivable.^{23,32} Lack of effective action now has potentially serious implications for intergenerational equity.²³

The high level UN Panel report⁵ highlights the failure of the conventional market model to adequately stimulate the antimicrobial research and development (R&D) pipeline^{5,15,38}—which is another reason for international cooperation and governance. To address this market failure, the UN Panel recommends countries negotiate a binding global Health R&D convention that delinks the costs of research and development from end prices, so that access can be universal. In particular, the UN Panel calls for such a global treaty focussing on public health needs, including neglected diseases and AMR.⁵

Equitable access to appropriate antimicrobial treatment is also essential in any international governance framework. Concerns about excess human antimicrobial consumption globally must balance against absent, or delayed, antimicrobial access—which is currently killing more children than AMR does.^{34,39,40} Ironically, while children are dying because of lack of access, the same antimicrobials are used liberally to maximise commercial productivity in high intensity agriculture.³⁴

But most importantly, resistant strains spread rapidly across borders,^{41–44} and international cooperation and governance structures (eg, rules and targets) will be critical to tackling AMR.^{22,27,34} These measures include:

- Improved and standardised international integrated systems of surveillance of antimicrobial use (both human and animal), AMR patterns and disease burden (and infectious diseases generally)—including data consistency and sharing.^{15,45}
- Addressing the supply of poor-quality and falsified antimicrobial drugs^{46,47} (endnote §) and the online sale of antimicrobials without prescription—which transcend borders.⁴⁷
- Stricter regulation of antimicrobial use in agriculture,^{6,48} in line with internationally agreed principles and including the revision of international standards.⁴
- Perhaps most crucially, global efforts might eventually include a new supra-national UN-level coordinating body and an international treaty with strong implementation mechanisms^{15,31,22} that include rules, setting targets and holding nations to account.^{22,27,34}

New Zealand can and should take leadership within this global response—with action both by government agencies and professional organisations. By being a relatively respected country internationally with good governance, and with our large agricultural export sector to future-proof with ‘One Health’,^{6,21} we could be a key player. In particular we could help broker larger nations putting their weight into international action²²—including governance structures, rules and targets^{6,22,27,34}—to address the AMR threat.

Pullon et al⁸ are absolutely right; we need to do much more in New Zealand now, to establish and follow best practice for control of AMR. Yet at the same time, we must not forget the wider picture. AMR is a big, tough, worldwide problem—and demands both nation-wide action and global governance.

Endnotes

* Purchasing parity power (PPP) gross domestic (US\$–PPP) calculations by IMF, World Bank, CIA World Factbook, compiled at [http://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(PPP\)](http://en.wikipedia.org/wiki/List_of_countries_by_GDP_(PPP))

† The Review on Antimicrobial Resistance^{15,16} estimates of AMR burden (year 2050 10 million AMR deaths and US \$100 trillion cost) are broad-brush,¹⁶ being notional scenarios of underlying cumulative incidence/future prevalence that need fuller modelling. The estimates were derived from commissioned reports by Rand Europe (http://www.rand.org/pubs/research_reports/RR911.html)¹⁷ and KPMG (<http://www.kpmg.com/UK/en/IssuesAndInsights/ArticlesPublications/Documents/PDF/Issues%20and%20Insights/amr-report-final.pdf>),¹⁸ which were high-level assessments of future impacts of AMR, based on notional scenarios for rising resistance and economic growth to 2050 (undiscounted). Costs were confined to labour force effects (but not including social or health sector costs), and deaths and costs confined to a subset of resistance (being just three (*K. pneumoniae*, *E. coli*, *S. aureus*) of seven priority drug-resistant bacteria highlighted by WHO as key concerns, and three public health issues (HIV, TB, malaria)), using notional 40% to 100% resistance scenarios, estimating by 2050 world productivity being between 2% and 3.5% less than projected if AMR kept at 2014 levels.^{16,17,18} Costs were not discounted.

‡ Addressing the challenge of AMR is complicated by the ‘tragedy of the commons’. This form of market failure is where, within any shared-resource system, no person, organisation or nation state is (or has incentive to be) responsible,^{27,28,29,30} to the detriment of the global common good.⁴⁹

§ According to The Review on Antimicrobial Resistance, poor quality and falsified antimicrobials fuel the development of AMR by delivering sub-therapeutic antimicrobial doses, providing sufficient exposure to start to develop resistance without adequately treating the infection. Growing numbers of online pharmacies also exploit gaps in the global regulatory mechanisms to offer antimicrobials for sale around the world, often without prescription or clinical guidance—which fuels self-medication and encourages the development of drug-resistant strains of infection by increasing unnecessary and excessive antimicrobials use.⁴⁷

Competing interests:

SM is an observer on the joint Ministry of Health/Ministry for Primary Industries AMR action plan development group.²⁰ SM and PM are employed by PHARMAC; the views expressed do not necessarily represent those of PHARMAC.

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<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1444-28-october-2016/7042>

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