Policy Document

Antimicrobial Resistance (2026)

Executive Summary

The Australian Medical Students' Association (AMSA) affirms antimicrobial resistance (AMR) is a continually growing global health, health security, and economic challenge that threatens the effective treatment of bacterial, viral, fungal, and parasitic infections. AMR increases morbidity and long-term disability, mortality, healthcare costs, and treatment complexity, while undermining modern healthcare including surgery, intensive care, transplantation and cancer treatment. Globally, the AMR burden is projected to increase substantially over coming decades, whilst current Australian surveillance already demonstrates increasing critical antimicrobial resistance alongside persistently high antimicrobial use. This demonstrates that AMR is a contemporary health systems challenge requiring sustained action.

AMSA reinforces AMR as inherently a One Health issue. Resistant organisms and genes move between humans, animals, and the environment through interconnected healthcare, agricultural, food, wastewater, and ecological systems. Australia has established mechanisms including the Antimicrobial Use and Resistance in Australia (AURA) surveillance program, and participation in the World Health Organization Global Antimicrobial Resistance and Use Surveillance System (GLASS). However, gaps remain in the integration, completeness and timeliness of surveillance across human and non-human domains, alongside fragmented responsibilities and accountability for implementation. The recent establishment of the Australian Centre for Disease Control provides an opportunity to strengthen national coordination, surveillance, data sharing, and accountability for AMR.

AMR is also an issue of health equity. The risks of infection, antimicrobial exposure, and treatment failure are not distributed equally across the global, and Australian, population. People with disability, immunosuppression, or chronic health conditions face disproportionate AMR risk, due to more frequent healthcare contact, repeated antimicrobial exposure, and reduced capacity to fight resistant infections. Rural and remote communities experience reduced access to pathology, and antimicrobial stewardship expertise, whilst First Nations communities experience a disproportionately high burden of infectious disease and antimicrobial exposure. Socioeconomic disadvantage and barriers to culturally safe and timely healthcare further influence infection burden and antimicrobial use. Culturally and linguistically diverse communities may additionally experience barriers to accessible AMR information and health communication. Effective AMR policy should thus address the structural drivers of infection and antimicrobial use alongside prescribing behaviour, with targeted investment and community-led approaches where equal implementation would otherwise risk perpetuating existing inequities.

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AMSA calls for a coordinated, adequately funded, evidence based and equitable One Health response to AMR. Priorities include strengthening integrated national surveillance and measurable accountability; using evidence-based health communication approaches to address community health literacy; improving antimicrobial stewardship and infection prevention and control (IPC); expanding access to timely diagnostics and vaccination; improving antimicrobial literacy; and supporting research into novel antimicrobials, vaccines, diagnostics and emerging technologies. We also advocate for Australia to also maintain strong international and regional collaboration through global surveillance and cooperation with neighbouring countries to detect and respond to emerging resistant organisms.

Importantly, addressing AMR requires reducing both inappropriate antimicrobial use and the underlying need for antimicrobials. Prevention through vaccination, IPC, Water Sanitation and Hygiene (WASH), and timely diagnostics can reduce infectious disease burden and subsequently reduce antimicrobial consumption and selection pressures. Antimicrobial stewardship should extend beyond hospitals to primary care, residential aged care, veterinary practice, as well as agriculture.

Preserving antimicrobial effectiveness is a shared responsibility requiring coordinated action from the federal government, the Australian CDC, healthcare systems, clinicians, researchers, industry, agriculture, universities, communities, and future health professionals. AMSA advocates for sustained investment in AMR as an essential component of preventative healthcare, and as a matter of national health security. Australia's response should move from a reactive approach to a proactive and locally tailored approach to detecting resistance early, addressing inequities that increase antimicrobial burden, and preserving effective antimicrobial therapy for future generations.

Policy Points

AMSA calls upon:

1. **The WHO-FAO-WOAH-UNEP Quadripartite to:**
    a. Strengthen interoperable One Health AMR surveillance and cross-border data sharing across human, animal, food, agricultural, and environmental sectors;
    b. Build equitable AMR surveillance, laboratory, diagnostic and stewardship capacity in resource-limited settings; and
    c. Address upstream drivers of AMR through environmental regulation, vaccination, WASH, IPC and agricultural biosecurity.

2. **The Australian Centre for Disease Control (CDC) to:**
    a. Strengthen and coordinate national One Health AMR surveillance and reporting by:
        i. Standardising national AMR data collection methods and monitoring resistant organisms of concern;
        ii. Integrating human health data with animal, agricultural, food and environmental surveillance, including relevant climate indicators;
        iii. Strengthening timely data sharing across jurisdictions and sectors;
        iv. Continuing Australian participation and reporting through AURA and GLASS; and
        v. Publishing annual national AMR reports evaluating the impact of funded actions and comparing trends geographically and across healthcare settings.
    b. Coordinate accessible, evidence-based national AMR education by:
        i. Promoting appropriate antimicrobial use and IPC;
        ii. Addressing misinformation about antimicrobials and AMR, including misinformation disseminated through traditional and digital media; and
        iii. Ensuring public health campaigns are accessible across different levels of health literacy, accessibility needs, languages, and cultural contexts.

3. **The Australian Federal, State, and Territory Governments to:**
    a. Uphold, implement, and review the strategies detailed in ‘Australia's National Antimicrobial Resistance Strategy 2020 and beyond’;
    b. Continue to endorse and maintain a One Health approach to AMR;
    c. Strengthen accountability within existing One Health AMR governance by increasing support to sector-specific responsibilities, measurable targets, and reporting requirements;
    d. Provide secure and recurrent funding for the implementation of the National AMR Strategy and One Health Master Action Plan;
    e. Invest in sustainable cross-border control, through:

i. Adequate funding and empowerment of local communities, such as Papua New Guinea; and
ii. Integration of travel or migration history with genomic AMR surveillance.

f. Provide sufficient support and encouragement to hospitals, health services, and all health professionals to participate in AMR stewardship, through:
i. Free access to therapeutic guidelines;
ii. Continual education and recertification on AMR protocols;
iii. Clinical and therapeutic guidelines within prescribing software; and
iv. Readily available evidence-based information toolkits regarding antimicrobial use and prescribing.

g. Develop and maintain contemporary, evidence-based guidelines on AMR.

4. Australian Hospital and Health Services at all levels and geographical locations to:

a. Strengthen IPC measures to reduce healthcare-associated transmission of antimicrobial-resistant organisms by:
i. Ensuring appropriate adherence to hand hygiene, personal protective equipment (PPE), isolation, and other transmission-based precautions;
ii. Ensuring the timely identification of antimicrobial-resistant organisms and implementation of appropriate transmission-based precautions;
iii. Providing regular IPC education and training for healthcare workers; and
iv. Routinely monitoring and evaluating compliance with IPC practices.

b. Strengthen multidisciplinary antimicrobial stewardship programs by:
i. Supporting regular review of antimicrobial choice, dose, route and duration, including timely intravenous-to-oral switching where clinically appropriate;
ii. Facilitating multidisciplinary input from pharmacists, infectious diseases and microbiology services, treating teams and other relevant healthcare professionals;
iii. Improving timely access to diagnostic testing, microbial identification and antimicrobial susceptibility testing to support targeted antimicrobial therapy; and
iv. Ensuring equitable access to antimicrobial stewardship expertise and diagnostic support across metropolitan, regional and remote health services.

c. Incorporate AMR into clinical risk and service planning for antimicrobial-dependent and high-risk care by:
i. Considering the impact of AMR on surgery, cancer treatment, transplantation, intensive care and other antimicrobial-dependent healthcare;

ii. Supporting appropriate antimicrobial prophylaxis and timely diagnostic and susceptibility testing; and
iii. Ensuring timely and equitable access to appropriate alternative antimicrobial therapy where resistance limits first-line treatment.

5. **Medical Regulatory Bodies and Specialty Colleges to:**
    a. Develop, provide, and implement tailored, evidence-based resources and approaches to antimicrobial stewardship across all sectors, including regular assessment and appraisal of certification and skills; and
    b. Monitor and audit adherence of general practitioners to antibiotic therapeutic guidelines.

6. **All Australian Medical Professionals to:**
    a. Recognise AMR as a significant health and economic burden;
    b. Collaborate with other sectoral professionals to strengthen the One Health approach to prevention, public health policies, and public communication on AMR;
    c. Make antimicrobial stewardship an integral part of their practice through:
        i. Engaging in ongoing AMR professional development;
        ii. Utilising appropriate, evidence-based antimicrobial prescription practices;
        iii. Better educate patients and communities on the spectrum of antimicrobial usage; and
        iv. Promoting preventative methods, such as vaccination and IPC.

7. **The Australian Medical Council (AMC) to:**
    a. Explicitly incorporate antimicrobial stewardship competencies within the AMC Graduate Outcome Statements, requiring medical graduates to demonstrate competency in:
        i. Appropriate antimicrobial selection, prescribing, dosing, route, duration, and review; and
        ii. The principles of AMR, AMS, and their application within a One Health context.

8. **Australian Medical Schools to:**
    a. Integrate and assess AMR and AMS longitudinally throughout medical curricula, including:
        i. Clinical application of appropriate antimicrobial prescribing and stewardship;
        ii. The human, animal, and environmental determinants of AMR through a One Health approach; and
        iii. Interprofessional learning in AMS and opportunities for student engagement in AMR education and advocacy.

9. **Australian Medical Students to:**
    a. Recognise that AMR is a significant health and economic burden;
    b. Consider how they will contribute to antibiotic stewardship in the future, including challenging situations where they may feel pressured to inappropriately prescribe antibiotics;
    c. Recognise that AMR encompasses antibacterial, antiviral, antiprotozoal, and antifungal resistance, and raise awareness of this among colleagues; and
    d. Actively engage in One Health and antimicrobial stewardship programs within universities and across communities.

10. **Pharmaceutical, Biotechnology, and Industrial Companies to:**
    a. Support the development of new approaches to preventing, diagnosing, and treating antimicrobial-resistant infections by:
        i. Collaborating with governments, research institutions, and public-private partnerships to develop priority antimicrobials, vaccines, diagnostics and non-antibiotic therapies; and
        ii. Supporting responsible development of emerging technologies including artificial intelligence-assisted tools.
    b. Reduce the contribution of pharmaceutical and industrial activity to environmental AMR by:
        i. Implementing and transparently reporting measures to minimise the release of antimicrobial residues through effluent; and
        ii. Reducing unnecessary use of persistent antimicrobial agents in household and industrial products.

Background

ANTIMICROBIAL RESISTANCE

Antimicrobial resistance (AMR) occurs when bacteria, viruses, fungi, and parasites no longer respond to antimicrobial medicines.[1] The global burden of AMR is increasing, with bacterial AMR associated deaths projected to rise from 4.7 million in 2021 to 8.2 million by 2050.[1,2] The 2024 WHO Bacterial Priority Pathogens List identified 24 antibiotic-resistant pathogens across 15 families as critical priorities.[3] Within the Australian context, the major resistant organisms of concern are carbapenemase-producing *Enterobacterales* (CPE), *Neisseria gonorrhoeae*, methicillin-resistant *Staphylococcus aureus* (MRSA) and drug-resistant *Mycobacterium tuberculosis* (Mtb).[3-6] Appendix A provides a summary of these organisms and their implications for global and national public health. AMR also threatens the effectiveness of antimicrobial-reliant complex cares, including organ transplantation and cancer treatment.[7,8] Drug-resistant infections are associated with increased mortality, prolonged hospitalisation, and a greater demand for intensive care,[9,10] all of which impose substantial economic costs, which are highlighted in the For More Information section.

ONE HEALTH APPROACH

Resistant microorganisms and AMR genes move between humans, animals, and the environment through interconnected pathways, including healthcare, agriculture, food systems, wastewater, wildlife, and ecosystems. Consequently, AMR requires a One Health approach that recognises the interdependence of human, animal, and environmental health and promotes coordinated action across these sectors. The One Health High-Level Expert Panel whose definition has been adopted by the World Health Organisation, Food and Agricultural Organisation, World Organisation for Animal Health, United Nations Environmental Program Quadripartite, defines One Health as an integrated unifying approach that aims to sustainably balance and optimise the health of peoples, animals, and ecosystems.[11-14] Evidence increasingly demonstrates that collaborative, multisectoral approaches are more effective than siloed strategies in reducing the emergence and spread of AMR. While antimicrobial stewardship (AMS) remains fundamental within human healthcare, stewardship efforts in veterinary medicine, agriculture, and environmental management are equally important. Importantly, a One Health approach is not about attributing blame to individual sectors or assuming one sector contributes disproportionately to resistance. Rather, it acknowledges that each sector faces distinct challenges and has unique expertise, resources, and opportunities to contribute to joint solutions.[13-15]

Australia's National Antimicrobial Resistance Strategy similarly adopts a One Health approach, recognising that meaningful progress depends upon collaboration between healthcare professionals, veterinarians, environmental scientists, policymakers, researchers, industry, and communities.[14-16]

SURVEILLANCE AND MONITORING

Existing AMR Surveillance Systems.

Australia's national AMR surveillance is primarily coordinated through the Antimicrobial Use and Resistance in Australia (AURA) program, drawing on data from 4 programs to monitor antimicrobial resistance.[2] While these methods deliver key temporal regional insights to guide stewardship and public health policy, surveillance remains inadequately integrated in the linkage of social determinants and data across human, animal, agricultural, food, and environmental sectors.[14,17,18] Australian assessments of potential One Health surveillance models have identified that its fragmented and siloed structure is an obstacle to data harmonisation and the tracking of cross-sectoral transmission pathways.[19] Establishing an interoperable national One Health surveillance framework is essential to connect disparate data and detect risks earlier.

Addressing AMR further requires strong integration with international frameworks, as resistance spans national borders. Australia has participated in the WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS) since 2019, enabling standardised monitoring and international comparison of resistance trends.[20-23] While WHO suggests genomic surveillance to enhance detection, existing Australian notification frameworks primarily capture diseases rather than resistance patterns in imported infections.[16,24] Sustained GLASS and AURA engagement, alongside enhanced cross-border genomic monitoring, is vital to detect and evaluate domestic trends. The establishment of the Australian Centre for Disease Control (CDC) in 2026 provides the opportunity to address these gaps through stronger national coordination, data integration, and One Health AMR surveillance.[25,26] Surveillance should also include standardised longitudinal reporting, to enable changes in resistance to be compared geographically, helping determine whether funded AMR interventions are producing measurable improvements. Annual national AMR reporting should therefore evaluate resistance and antimicrobial-use trends alongside the implementation and outcomes of funded actions, allowing emerging gap identification and policy responses adjustment.

Emerging Infectious Threats.

Australia's geographic proximity with Papua New Guinea (PNG) creates important AMR considerations, particularly for TB. Genomic surveillance has identified multidrug- and extensively drug-resistant TB (MDR/XDR-TB) strains circulating across the Torres Strait-PNG border, while PNG continues to experience a high burden of TB, MDR-TB and TB-HIV co-infection.[27-30] Cross-border transmission has required prolonged management within Australian health services, including treatment of XDR-TB cases in Far North Queensland and decreased access-related drivers to TB drug resistance. Recent efforts to expand access to TB diagnosis and treatment for people within PNG may reduce cross-border movement for care; however, sustained funding and coordination between Australian and PNG health systems will be important to support long-term regional TB control.

Drug-resistant *N gonorrhoeae* represents a further emerging concern. Cefixime-resistant isolates in Melbourne have reached 6.3%, exceeding the WHO 5% threshold, prompting review of empirical treatment recommendations.[31-33] Additionally, extensively drug-resistant strains have been identified in Australia. The regional spread of resistant gonococcal lineages further highlights the importance of travel-associated transmission and regional surveillance.

THE COMMUNITY SECTOR

Access to Healthcare and Geographical Inequality.

Geographical disparities in AMR are evident across Australia, with remote communities experiencing a higher burden of resistant infections, such as community-associated MRSA, compared with metropolitan populations.[2,34] Systemic barriers include the reduced access to diagnostic testing, and specialised treatments, resulting in a delayed diagnosis and overutilisation of empirical broad-spectrum antibiotics.[35-37] There are substantial disparities in AMS and surveillance capacity between metropolitan and regional or remote Australia. Limited coordination, historically sparse AMR and antimicrobial-use data, and unequal access to stewardship resources have contributed to gaps in regional responses.[2,35] The One Health Lancet Commission recommends strengthening integration of geographic data in surveillance systems, expanding community level diagnostic capacity, and ensuring an equitable distribution of resources, training, and improved infrastructure to enhance early detection and address disparities.[38]

Socioeconomic Disadvantage and Financial Pressure.

Socioeconomic disadvantage also contributes towards a disparity in AMR across Australia. People experiencing socioeconomic disadvantage face greater barriers to timely and continuous healthcare, increasing the risk of delayed presentation, complications, and subsequent broad-spectrum antibiotic use.[39] Additionally, disadvantage can also increase the underlying need for antimicrobials. Overcrowding, inadequate sanitation, unstable housing, and limited access to care can increase exposure to infectious diseases that require treatment with antibiotics.[40] According to the One Health Lancet Commission, policies that strengthen infrastructure to improve quality of life, provide financial and resource support, and improve community-level education on AMS are critical steps towards reducing inequity-driven AMR.[38]

Disability Inequity.

People living with disabilities or chronic health conditions face a disproportionately high AMR risk due to recurrent infections and healthcare contact, and frequent antimicrobial exposure [41,42]. These clinical vulnerabilities are compounded by social factors such as challenges of communication, limited access to primary care, and socioeconomic disadvantage. Stigmatization can also lead to poorer access to healthcare.[41,43] Integrated policy action is required to coordinate continuous care, provide accessible, community-based diagnostics, enhanced support for carers, and targeted strategies on stewardship for immunocompromised patients.[38,42]

First Nations Health Inequity.
The historical and structural determinants of health compound the AMR burden experienced by First Nations communities. Historical experiences of discrimination, geographical isolation, and socioeconomic inequality drive the disproportionately high burden of infectious disease.[44,45] This elevated disease burden increases antimicrobial exposure, increase in antimicrobial use and hence a greater risk of AMR.[46] Clinicians often prescribed antibiotics as they were unsure if patients would receive follow-up care if the condition deteriorated.[47] Culturally-safe, community-led and First Nations-led health systems and stewardship programs, as well as improved local diagnostic capacity can address these inequities.[38]

THE FOOD, AGRICULTURE, AND INDUSTRIAL SECTORS

Agriculture is a major contributor to antimicrobial selection pressure in Australia due to frequent antimicrobial use in the industry. Antimicrobials are used as a cheap practical treatment to prevent rapid spread of infectious disease due to poor hygiene and ventilation of highly dense livestock facilities.[48] Introducing antimicrobials into surrounding waters, sediments and soil increases environmental selection pressure for AMR. BAC promotes emergence of AMR bacteria such as polymyxin resistant Pseudomonas aeruginosa.[49] The current siloed approach to AMR governance creates challenges for inconsistent regulation, accountability, and slows adoption of best-practice biosecurity which highlights the importance of implementing and transparently reporting measures to minimise release of antimicrobial residues.[50]

The industrial sector contributes to AMR through the environmental release of inadequately treated effluent-containing antimicrobial residues from common household products like triclosan and resistance genes.[51] Triclosan leaves antimicrobial residues on household surfaces and leads to the development of resistant bacteria, highlighting the importance of limiting unnecessary use of persistent disinfectants in routine cleaning.[52] Several water-treatment processes remain ineffective at removing AMR genes, contributing to agricultural and human exposure.[53] Current regulation of antibiotic pollution from pharmaceutical waste is complicated by inconsistent discharge standards and non-mandatory reporting requirements.[54,55] Thus, it is very important to establish regulation which reduces unnecessary use of persistent antimicrobial agents in household and industrial products.

THE HUMAN HEALTH SECTOR

Infection Prevention and Control in Hospitals and Health Services.
Hospital settings remain high risk areas of transmission and persistence of resistant pathogens through inappropriate antimicrobial prescribing, particularly among vulnerable patient populations.[56-58] Aged care homes further drive antimicrobial resistance (AMR) primarily through high rates of inappropriate and empirical antibiotic prescribing coupled with communal living environments that accelerate the spread of resistant strains.[59] Infection prevention and control (IPC) has proven to be effective as an approach in managing AMR, with an estimated prevention of 337,000 deaths annually.[60] Water, sanitation, and

hygiene (WASH) interventions can disrupt the transmission of pathogens, reducing the risk of AMR and preventing illness.[61] Proper hand hygiene has been recognised as the single most important measure to prevent transmission of infections.[62]

Vaccinations.

Vaccination is an important but underutilised strategy for reducing AMR by preventing infections and decreasing antimicrobial use.[63-65] Globally, vaccination has saved an estimated 154 million lives and could reduce antibiotic consumption by 22%, or approximately 2.5 billion defined daily doses annually.[63,64,66] Modelling also suggests vaccination could prevent around one-third of the estimated AUD 1.02 trillion annual hospital costs associated with drug-resistant infections.[65,66] Despite this potential, vaccination remains under-recognised and underfunded within AMR strategies.[63-65,67] In Australia, childhood vaccination coverage has declined since 2020, falling below 90% at 24 months in 2025, while influenza and pneumococcal vaccination remain suboptimal.[68,69] This decline is increasingly driven by vaccine acceptance barriers.[70] In 2025, negative beliefs on vaccines safety and lack of trust in vaccine information from healthcare providers were the most common acceptance barriers. Greater investment in the provision of accessible, credible vaccine information and communication is therefore required to address vaccine hesitancy, misinformation and the declining trust. Vaccination of livestock and poultry could further reduce antimicrobial use across animal health, but investment and coverage remain limited.[71]

PUBLIC HEALTH AND STEWARDSHIP

Public Perception of Antimicrobials.

The Australian public currently lacks critical knowledge about AMR.[72,73] Many patients misunderstand the development and severity of AMR, with minimal awareness regarding the household transmission of resistant pathogens.[72] Mainstream and digital media also amplify misconceptions about antimicrobials.[73] Many view antibiotics as strong medications that cure upper respiratory conditions, irrespective of the underlying pathogen. Conversely, some individuals exhibit antimicrobial hesitancy. These individuals fear AMR and potential adverse effects, leading them to favour alternative medicine. Gaps in health literacy drive antibiotic misuse in households and primary care settings. Without targeted public health initiatives that provide clear evidence-based information, these public perspectives will continue to exacerbate the burden of AMR.

Public Health Campaigns.

Public health campaigns and healthcare professionals serve as critical pathways for education. Successful international AMR campaigns, such as The Antibiotic Guardian in the UK, demonstrated improvements in AMS literacy among consumers and healthcare professionals.[74] While existing Australian initiatives provide a framework, they achieve limited public engagement.[26]

AMR programs should address the needs of culturally and linguistically diverse (CALD), rural and First Nations communities, people with disabilities, and those with varying health literacy in Australia, as significant knowledge gaps remain.[75] Many of these patients are unaware of antimicrobial adverse effects, treatment duration and stewardship. This is often due to a lack of targeted information in healthcare. Public health programs developed during the COVID-19 pandemic provide effective strategies for communication.[76] Adopting similar approaches would improve health literacy among these patients, and support healthcare professionals to deliver accessible information on AMR.

Education for Healthcare Professionals and Students.
Direct communication from clinicians to patients strongly influences public behaviours and attitudes.[75,77] In primary care, doctors frequently overprescribe antibiotics.[72] This arises from perceived patient expectations influencing antimicrobial prescribing, low physician understanding of AMR, and a lack of clinical guidelines.[75,77] Stewardship programs should therefore support the education of healthcare professionals across all health and veterinary disciplines.[74-76] These programs should be integrated into university curricula, including assessments.

Antibiotic Stewardship Programs.
Among the most effective strategies includes antibiotic stewardship programs (ASPs) involving a team of experts who oversee and optimise antimicrobial use ensuring correct drug choice, dose and duration.[78] This encompasses IV-to-oral switching, diagnostic tests for targeted approaches, and microbial identification and susceptibility tests.[78,79] These programs can be implemented in hospitals to guide prescribing and care practices. A 5-year study found that after implementation of ASPs in hospitals, targeted broad-spectrum antimicrobial use decreased by 27%. In addition, antimicrobial expenditures and rates of hospital acquired illnesses decreased significantly.[80] As a result, expenses arising from inappropriate antimicrobial use, such as treatment of adverse effects and length of hospital stays, should also decrease.

Significant challenges remain in rural and remote areas with high AMR burden. These include insufficient AMR education, and limited access to specialist advice and microbiology expertise. Although implementation of ASPs in these areas improves outcomes, there is a lack of published and available materials. Therefore, further research is required on the use of ASPs in rural and remote areas.[81,82]

NOVEL THERAPEUTIC APPROACHES TO AMR

The antibiotic pipeline remains critically limited, with WHO highlighting inadequate innovation despite 90 new antibacterial agents being in preclinical or clinical development in 2025. However, few clinical candidates targeted the most critical bacterial threats, and even those represent limited novelty.[83] Researchers argue that relying solely on new antibiotics has failed, generating pan-resistant "monster bacteria," and that AMR must be tackled through differentiated strategies.[84] Some of these approaches are already progressing

through clinical trials. Progress in bacteriophage therapy and human monoclonal antibody treatments demonstrate alternative options are clinically viable.[84-86]

Pharmaceutical companies have an important role in combating AMR through investment in antimicrobial research, development of new therapies, and support for AMS.[87] However, antibiotic research and development has declined significantly because the current market model provides limited financial return on antibiotics compared with other medicines, prompting many large pharmaceutical companies to withdraw from the field.[88] Combined "push" and "pull" incentive models offer an evidence-based solution to this market failure. Pushing funding sustains early-stage research and development, while pulling incentives, such as delinking manufacturing revenue from sales volume, can restore commercial viability for this market.[89] Momentum for this approach already exists in Australia, with a 2024 government-engaged roundtable and subsequent report recommending a pilot subscription model for novel antimicrobials, tailored to Australian setting.[90] This dual-incentive approach, rather than reliance on market forces alone, highlights the need for coordinated collaboration between government, research institutions and industry.

Current methods for removing antibiotics and AMR genes, have variable effectiveness depending on the antimicrobial-resistant bacteria and genes present.[53] Their inconsistent performance and uncertain cost-effectiveness limit comprehensive removal of pharmaceutical contaminants, while environmentally preferable antimicrobials remain underdeveloped as an additional mitigation strategy.[55]

Artificial Intelligence and AMR.

Artificial intelligence (AI) has emerging applications across AMR surveillance and antimicrobial development. Genomic and machine-learning approaches may enable earlier prediction of resistance markers, while AI-assisted drug discovery can screen substantially larger chemical libraries than conventional methods.[91,92] Generative AI can also design novel compounds rather than only screen existing libraries.[93] However, the same barriers limiting other novel therapies apply here, as fragmented data access and inconsistent standards currently prevent machine-learning tools from being meaningfully combined with existing national surveillance systems.[94] Realising AI's potential in this time therefore depends on standardized data collection and clear regulatory frameworks to guide safe clinical adoption.

THE FUTURE OF AMR

Cost of Inaction.

Secure and recurrent funding towards the National AMR Strategy and One Health Master Action Plan is supported by the avoidable health and economic burden associated with resistance. Over 10 years, an Australian hospital model estimated that a theoretical 95% reduction across three Gram-negative pathogens and three hospital-acquired infections generating up to A$412.1

million in total monetary benefit, including A$10.5 million in hospitalisation costs.[95] However, this estimate remains narrow as it excludes transmission dynamics and the wider value effective antimicrobials have towards procedures such as surgery and chemotherapy.

Underinvestment may also have greater impacts towards regional, remote and First Nations communities, where gaps within surveillance, delayed susceptibility results and limited local resistance data can increase reliance on empirical treatment.[96,97] Presently, global investment towards AMR also remains limited. In 2023, only 27% of WHO Member States reported effectively monitoring and implementing national AMR action plans, while only 11% had allocated national budgets.[98] This is particularly relevant towards Australia's role within the Western Pacific, where AMR was projected to cause up to 5.2 million AMR-related deaths and US$148 billion in excess costs between 2020 and 2030.[99] Pacific Island countries also experience limitations within diagnostic capacity, information systems, laboratories and trained workforces, increasing reliance on empirical treatment within some settings.[100,101] Together, this evidence demonstrates that sustained Australian investment towards prevention, surveillance, diagnostic capacity and regional laboratory systems may reduce future burden while strengthening earlier detection across Australia and neighbouring countries.

Climate Change.
Integrating climate-related indicators within AMR surveillance is supported by the growing evidence surrounding the impacts climate change has towards infection pressure and the conditions within which resistance can emerge and spread. Rising temperatures, altered rainfall and extreme weather can increase the incidence of climate-sensitive infections, while also disrupting water, sanitation and health services. Through increasing infection incidence and disrupting health services, these changes can increase healthcare presentations and reliance on empirical antimicrobial treatment, particularly within areas where rapid diagnostics are unavailable, therefore creating greater selection pressure.[101] Higher temperatures may also increase bacterial growth and transmission, while favouring horizontal gene transfer.[101] A global analysis involving more than 28 million bacterial isolates collected between 2000 and 2023 found measurable associations between climate indices and resistance rates across common hospital pathogens.[102] Moreover, WHO recognises that linking disease and weather surveillance can improve early warning and health-system preparedness towards climate-sensitive outbreaks.[103] Within Australia, this may involve linking AURA resistance and antimicrobial-use data alongside temperature, rainfall, flooding and wastewater indicators through the Australian CDC.[25,26] Although the available evidence does not establish causation, acting on these signals earlier may enable prevention and stewardship measures to reduce avoidable antimicrobial use and limit the further emergence and spread of resistance.[101,102,104] Together, this evidence supports climate-informed One Health surveillance as a central component of Australia's future AMR response.

For More Information

AMR WITHIN AUSTRALIA

Reports of critical antibiotic resistance in Australia rose 25% in 2024 alone, while antimicrobial use also remained high with 23.2 million prescriptions being dispensed to 37.1% of the population. Residential aged care prescribing rose by 14.4% with more than a third of those prescriptions run for more than six months. In addition, fewer than half of surgical antimicrobial prophylaxis prescriptions were considered appropriate. Refer to:

> ***AURA Report: Sixth Australian Report on Antimicrobial use and Resistance in Human Health.*** Australian Centre for Disease Control. 2026. Accessed August 11, 2026. https://www.amr.gov.au/sites/default/files/2026-02/sixth-australian-report-on-antimicrobial-use-and-resistance-in-human-health-aura-report_0.pdf

AMR GLOBALLY

As per global modelling, 39.1 million deaths are projected to be directly attributable to bacterial AMR between 2025 and 2050, with adults aged 70 and older expected to represent an increasing proportion of this burden. Refer to:

> **Naghavi M, Vollset S, Ikuta K, et al. Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050.** *The Lancet*, 2024;404(10459):1199-1226. doi:10.1016/S0140-6736(24)01867-1

ORGANISMS OF CONCERN IN AUSTRALIA

Rifampicin-resistant *Mycobacterium tuberculosis* (Mtb) remains particularly important because multi drug resistant *Tuberculosis* (MDR-TB) and extensively drug resistant *Tuberculosis* (XDR-TB) undermine elimination efforts and account for a substantial proportion of TB mortality. Refer to:

> **Tan EL, Qin Y, Yang J, et al. Global burden of MDR-TB and XDR-TB: trends, inequities, and future implications for public health planning.** *BMC Infect Dis*. 2025;25(1):1225. doi:10.1186/s12879-025-11566-2
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> **Farhat M, Cox H, Ghanem M, et al. Drug-resistant tuberculosis: a persistent global health concern.** *Nat Rev Microbiol*. 2024;22(10):617-635. doi:10.1038/s41579-024-01025-1

Gonococcal resistance is similarly concerning given the organism's capacity to progressively acquire resistance to successive antibiotic classes and the resulting risks of infertility, ectopic pregnancy and enhanced HIV transmission. In 2024, 30% of tested gonococcal isolates were resistant to penicillin and 57% to ciprofloxacin, with resistant infection disproportionately affecting men who have sex with men, and First Nations people in remote communities. Refer to:

> **Multi-drug resistant gonorrhoea.** World Health Organization. October 22, 2025. Accessed August 17, 2026. https://www.who.int/news-room/fact-sheets/detail/multi-drug-resistant-gonorrhoea
>
> **Lahra M, Hurley S, Van Hal S, Hogan T. Australian Gonococcal Surveillance Programme annual report, 2024.** *Commun Dis Intell (2018)*. 2025;49. doi:10.33321/cdi.2025.49.056

Recent surveillance demonstrates a continuing burden of carbapenemase-producing *Enterobacterales* (CPE) accounting for 45.1% of critical resistance reports in 2024, and continuing as the most frequently reported critical AMR pathogen in 2025. Refer to:

> ***CARAlert Annual Report: 2025.*** Australian Commission on Safety and Quality in Health Care. May, 2026. Accessed August 23, 2026. https://www.safetyandquality.gov.au/resources/caralert-annual-report-2025

Methicillin resistant *Staphylococcus aureus* (MRSA) remains an important healthcare-associated pathogen, and sporadic reports of vancomycin-resistant *S aureus* demonstrate the potential loss of last-line treatment options. Refer to:

> **Miyakis S, Brentnall S, Masso M, et al. Key predictors and burden of meticillin-resistant Staphylococcus aureus infection in comparison with meticillin-susceptible S. aureus infection in an Australian hospital setting.** *J Hosp Infect*. 2022;129:41-48. doi:10.1016/j.jhin.2022.07.004

> **Cong Y, Yang S, Rao X. Vancomycin resistant Staphylococcus aureus infections: A review of case updating and clinical features.** *J Adv Res*. 2019;21:169-176. doi:10.1016/j.jare.2019.10.005

AMR SURVEILLANCE

The scope of the Global Antimicrobial Resistance and Use Surveillance System (GLASS) program incorporates several surveillance modules: GLASS-AMR for routinely collected antimicrobial resistance data, GLASS-AMC for antimicrobial consumption, GLASS-EAR for the early detection of emerging resistance, and GLASS-FUNGI for invasive fungal infections, alongside targeted studies. Refer to:

> **World Health Organization. Global Antimicrobial Resistance and Use Surveillance System (GLASS).** WHO. Accessed August 23, 2026. https://www.who.int/initiatives/glass

AMR AS AN EQUITY ISSUE

The National Antimicrobial Resistance Strategy failed to include remote First Nations communities, despite the disproportionately high AMR rates. There is significant data insufficiency as surveillance systems have historically under-captured remote and First Nations communities, limiting evidence-based policy. Refer to:

> **Thorpe R. Alarming Rates of AMR in Remote Indigenous Communities.** AMR Action+Insights. September 12, 2024. Accessed September 20, 2026. https://amr-action.au/alarming-rates-of-amr-in-remote-indigenous-communities/

AMR also presents a challenge in equitable healthcare as it disproportionately impacts populations with limited access to timely diagnostics, effective antimicrobials, infection prevention, vaccination, and high-quality healthcare. These disparities are pronounced in low-resource, rural, and remote settings where treatment failure can compound existing social and health inequities, increasing risks of preventable morbidity and mortality. Refer to:

> **Davis K, Limato R, Monga M, et al. Antimicrobial resistance, equity and justice in low- and middle-income countries: an intersectional critical interpretive synthesis.** *Nat Commun*. 2025;16(9078). doi:10.1038/s41467-025-64137-z

Point-of-care diagnostics and quality-improvement initiatives may support more targeted prescribing, although implementation in remote settings remains constrained by workforce and resource limitations, demonstrating uniform policy requirements do not necessarily produce equitable outcomes. Refer to:

> **Antimicrobial Stewardship Clinical Care Standard.** Australian Commission on Safety and Quality in Health Care. April, 2026. Accessed August 23, 2026. *https://www.safetyandquality.gov.au/clinical-care-standards/antimicrobial-stewardship*

> **Shephard M, Shepherd A, Matthews S, Andrewartha K. The benefits and challenges of point-of-care testing in rural and remote primary care settings in Australia.** *Archives of Pathology and Laboratory Medicine*. 2020;144(11). doi:10.5858/arpa.2020-0105-RA

> **Stekelenburg N, Gilbert M. Bridging healthcare gaps in rural Australia through AMR data.** *CSIRO*. January 9, 2024. Accessed August 23, 2026. https://www.csiro.au/en/news/all/articles/2024/january/amr-in-remote-and-regional-areas

AMR IN THE FOOD, AGRICULTURE, AND INDUSTRIAL SECTORS

Campylobacter isolated from retail chicken was found to have moderate levels of ciprofloxacin resistance, an antibiotic not registered for use in Australia. These reflect concern for AMR's migration ability and suggest that resistant strains circulated globally and entered via international trade. Refer to:

> **National surveillance of antimicrobial resistant bacteria in raw retail beef, chicken and pork meat, 2022–23.** Food Standards Australia New Zealand (FSANZ). February 6, 2026. Accessed September 20, 2026. https://www.foodstandards.gov.au/publications/national-surveillance-antimicrobial-resistant-bacteria-raw-retail-beef-chicken-pork

Pharmaceutical wastewater has been reported to contain antibiotic resistance genes up to 25-fold higher than municipal wastewater, whilst another study detected 324 antibiotic resistance gene subtypes in landfill leachate and surrounding groundwater. An AMR Benchmark assessment found that only 142 of 1,057 manufacturing and supplier sites met antibacterial discharge limits. Refer to:

> **Kotwani A, Joshi J, Kaloni D. Pharmaceutical effluent: a critical link in the interconnected ecosystem promoting antimicrobial resistance.** *Environ Sci Pollut Res Int*. 2021;28(25):32111-32124. doi:10.1007/s11356-021-14178-w

AMR IN THE HUMAN HEALTH SECTOR

The emergence of near resistant species and transmission is frequently amplified by invasive medical procedures and devices such as mechanical ventilators, central venous catheters and urinary catheters, prolonged hospitalisations, high patient turnover and overcrowding and inadequate isolation capacity and caps in infection prevention and control (IPC). This is intensified in intensive care units particularly due to the high prevalence of immunocompromised and critically ill patients, invasive medical equipment. Refer to:

> **da Fonseca Pestana Ribeiro JM, Park M. Less empiric broad-spectrum antibiotics is more in the ICU.** *Intensive Care Med*. 2020;46(4):783-786. doi:10.1007/s00134-019-05863-z

Strategies such as minimising the use of unnecessary invasive devices, continuous hand and hospital hygiene, surveillance and safety cultures form a comprehensive IPC framework. Isolation of patients carrying multidrug-resistant organisms through targeted screening also contribute to mitigating the risk of AMR-infections. Refer to:

> **Sartelli M, Marini CP, McNelis J, et al. Preventing and controlling healthcare-associated infections: the first principle of every antimicrobial stewardship program in hospital settings**. *Antibiotics*. 2024;13(9):896. doi:10.3390/antibiotics13090896

Although current efforts to reduce and prevent AMR are ongoing, focused, higher-quality interventions are needed to prevent up to 247,800 AMR-associated global deaths annually, 5.7% of all AMR-associated mortality. Refer to:

> **Lewnard J, Charani E, Gleason A, et al. Burden of bacterial antimicrobial resistance in low-income and middle-income countries avertible by existing interventions: an evidence review and modelling analysis.** *The Lancet*. 2024;403(10442):2439-2454. doi:10.1016/S0140-6736(24)00862-6

Hospital environments with a high risk of multi-drug resistant organisms should be cleaned daily using effective methods and equipment; however recent studies show that more than 50% of surfaces are inadequately decontaminated when chemical products are used with several microbes persisting on treated surfaces. It has been concluded that conventional sanitisers are unable to prevent continuous recontamination. Refer to:

> **Abban MK, Ayerakwa EA, Mosi L, Isawumi A. The burden of hospital acquired infections and antimicrobial resistance.** *Heliyon*. 2023;9(10):e20561.doi:10.1016/j.heliyon.2023.e20561

Alternative treatments are available such as Hydrogen Peroxide or UV light which is germicidal and can be emitted by portable automated units with demonstrated efficacy against *Clostridium difficile spores*, MRSA and VRE. However, both systems at present are unsustainable economically, require trained staff and cannot substitute daily cleaning as they are only usable between patient discharge and admission. Refer to:

> **D'Accolti M, Soffritti I, Mazzacane S, Caselli E. Fighting AMR in the healthcare environment: microbiome-based sanitation approaches and monitoring tools.** *Int J Mol Sci*. 2019; 20(7):1535. doi:10.3390/ijms20071535

NOVEL AMR THERAPIES

Bacteriophage therapy utilises viruses that recognise specific bacteria, allowing targeted responses to bacterial infections. Currently, the majority of data is limited to compassionate-use cases and uncontrolled case series, whereas clinical validation requires large randomised controlled trials. CRISPR-enhanced phage products have entered Phase I/II human studies, including LBP-EC01, a CRISPR-Cas3-enhanced bacteriophage cocktail targeting E. coli that has shown favourable safety and pharmacodynamic profiles in urinary tract infections. Randomised controlled trials for phage cocktails in drug-resistant pneumonia are also now underway. Refer to:

> **Alzahrani AJ. Bacteriophage therapy against multidrug resistant bacterial infections demonstrates clinical advances and engineering innovations between 2020–2026.** *Front Microbiol*. 2026;17:1865548. doi:10.3389/fmicb.2026.1865548

Human monoclonal antibodies continue to be a distinct strategy from antibiotics. Bispecific antibodies, antibody-drug conjugates, and antibiotic-combination therapies are being developed to improve efficacy against multidrug-resistant infections while preserving host microbiota. Refer to:

> **Ridelfi M, Zucconi Galli Fonseca V, Sala C, et al. Human antibodies as emerging drugs for antimicrobial resistance.** *Trends in Immunology.* Published online May 27, 2026. doi:10.1016/j.it.2026.04.003

FINANCIAL IMPLICATIONS OF AMR

The EcoAMR analysis further estimates that antibiotic resistance could cause over 39 million deaths between 2025 and 2050, while impacts on livestock and zoonotic transmission could cost the global economy up to U$7.3 trillion. Refer to:

> **McDonnell A, Countryman A, Laurence T, et al. (2024). Forecasting the fallout from AMR: economic impacts of antimicrobial resistance in humans.** World Organisation for Animal Health and World Bank. *https://www.woah.org/app/uploads/2024/09/forecasting-fallout-amr-economic-impacts-antimicrobial-resistance-humans-27924-compressed.pdf*

Modelling across 34 OECD and EU/EEA countries found that a mixed One Health intervention package would cost approximately US$4 purchasing-power-parity per person each year, whilst returning around US$5 for every US$1 invested. Refer to:

> **OECD. Embracing a One Health Framework to Fight Antimicrobial Resistance.** OECD Health Policy Studies. 2023. https://doi.org/10.1787/ce44c755-en

ANTIMICROBIAL STEWARDSHIP INITIATIVES

Students from The University of Michigan developed the OHSC to target the development of AMR stewardship into the medical curriculum. The OHSC currently demonstrates high levels of engagement among students, suggesting the implementation of similar programs into Australian universities.

> **Cheung AW, Cormier M, Grace D, Scruggs-Wodkowski EA, Power L. Integrating One Health into medical education: a student-led, practice-based interdisciplinary approach to building collaborative health preparedness.** *Open Forum Infect Dis*. 2026;13(Suppl1):ofaf695.2058. doi:10.1093/ofid/ofaf695.2058

Appendix A.

Table. Types of Antimicrobial Resistance and the Implications for Public Health.

AMR type	Key resistant organisms	Implications for public health
Antibiotic resistance	Resistance has been identified to all major antibiotic classes, threatening routine care including surgery, cancer treatment and transplantation.[105,106] Major global threats include rifampicin-resistant *Mycobacterium tuberculosis*, carbapenem-resistant *Acinetobacter baumannii* and *Pseudomonas aeruginosa*, third-generation cephalosporin-resistant *Klebsiella pneumoniae* and *Escherichia coli*, fluoroquinolone-resistant *Salmonella typhi*, and MRSA.[3,106]	Antibiotic resistance increases treatment failure, mortality, hospital length of stay and healthcare costs, while also increasing the risk of outbreaks of difficult-to-treat infections in hospitals and the community. At a population level, it threatens the safety of procedures that depend on effective antibiotics, including surgery, chemotherapy, intensive care and organ transplantation, and increases reliance on broader-spectrum or more toxic second-line treatments. [88,106]
Antiviral resistance	Key pathogens include influenza and HIV.[1] HIV resistance has emerged to multiple antiretroviral agents, including dolutegravir, a WHO-recommended first-line therapy.[107-109] Transmitted HIV drug resistance in high-income countries is estimated at 9-14%.[110]	Resistance may compromise treatment of chronic viral infections and limit the effectiveness of first-line antiviral therapies, reinforcing the need for ongoing surveillance and development of new treatments.[107-109, 110,111]
Antifungal resistance	Multidrug-resistant *Candidozyma auris* and azole-resistant *Aspergillus fumigatus* are major concerns.[1] Approximately 90% of *C. auris* isolates are resistant to at least one antifungal and 40% to two classes; resistance includes fluconazole (~90%), amphotericin B (~50%) and echinocandins (~5%).[112,113]	Antifungal resistance is particularly concerning because treatment options are already limited. *C auris* candidemia has reported mortality of 30-60%,[114] while *A fumigatus* contributes substantially to invasive fungal disease, particularly among immunocompromised patients.[114,115]
Antiprotozoal and antiparasitic resistance	The most significant threat is antimalarial resistance, particularly resistance in *P falciparum* and *P vivax* to artemisinin and partner drugs.[116,117] Resistance is also emerging to treatments for Neglected Tropical Diseases including human African trypanosomiasis and leishmaniasis.[1]	Malaria caused more than 600,000 deaths in 2024, predominantly affecting young children in sub-Saharan Africa.[116] Widespread resistance to both artemisinin and partner drugs has been estimated to potentially cause an additional 16 million malaria cases and nearly 80,000 deaths annually.[117]

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