



DEBATE PACK

Number CDP 2017/0074, 6 March 2017

O'Neill Review into Antibiotic Resistance

This pack has been produced ahead of the debate to be held in Westminster Hall on Tuesday 7 March 2017 at 2.30pm on the O'Neill Review into Antibiotic Resistance. The debate will be opened by Kevin Hollinrake MP.

The House of Commons Library prepares a briefing in hard copy and/or online for most non-legislative debates in the Chamber and Westminster Hall other than half-hour debates. Debate Packs are produced quickly after the announcement of parliamentary business. They are intended to provide a summary or overview of the issue being debated and identify relevant briefings and useful documents, including press and parliamentary material. More detailed briefing can be prepared for Members on request to the Library.

Dr Sarah Barber
Nikki Sutherland

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1. Library briefing: O'Neill review into antibiotic resistance

Summary

Antimicrobial resistance (AMR) is a significant and increasing threat to public health globally. It is estimated that in the US and Europe alone, antimicrobial-resistant infections currently cause at least 50,000 deaths per year with hundreds of thousands more dying in other areas of the world.

If we are unable to slow the acceleration of AMR, future consequences will be worse still. The Review on antimicrobial resistance has estimated that 10 million people a year could be dying as a result of AMR by 2050.¹ The Chief Medical Officer, Professor Dame Sally Davis has said it is possible we will return to a time where 40 per cent of the population die prematurely from infections we cannot treat.²

There is action that can be taken to slow the progression of AMR. Examples of these actions include:

- Improving infection control;
- Ensuring appropriate prescribing and use of antibiotics in both humans and animals;
- Investing in the research and development (R&D) of new drugs and diagnostic tools; and
- Ensuring adequate monitoring of prescribing and resistance on a national and international basis.

The independent review on antimicrobial resistance (the review) was launched by the former Prime Minister, David Cameron in July 2014 and was led by the economist Lord O'Neill of Gatley.³ The review board aimed to understand the global implications of AMR and propose international solutions for addressing it.⁴ It has published a number of reports both on the consequences and actions to tackle antimicrobial resistance. The final report was published in May 2016 and made ten recommendations, these included better surveillance of antimicrobial use and resistance, a global public awareness campaign on this issue, and new approaches to funding medicine and diagnostics development. The Government responded to the report in September 2016. It agreed with a need for improved investment in R&D, and said it would work to gain global support for the recommendations in the report.

1.1 Antimicrobial resistance

Infections caused by microbes (bacteria, viruses, parasites or fungi) can usually be treated using antimicrobial drugs. These drugs kill or limit the growth of microbes, thus controlling infection.

Antibiotic use alone has saved many lives - once life threatening infections can now be treated effectively and operations that would have been dangerous in the past, can now be performed safely. It has been estimated that the use of antibiotics has extended our life expectancy by an average of 20 years.⁵

¹ The Review on Antimicrobial Resistance, [Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations](#), December 2014

² Kings Fund, [What if antibiotics were to stop working?](#),

³ Department of Health and Prime Minister's Office, [Prime Minister warns of global threat of antibiotic resistance](#), 2 July 2014

⁴ The Review on Antimicrobial Resistance, [Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations](#), December 2014

⁵ Kings Fund, [What if antibiotics were to stop working?](#),

However, microbes can become resistant to the drugs that were once able to target them, rendering them ineffective. Antibiotic resistance develops in bacteria through genetic mutation.⁶ This resistance will be passed on to off-spring, and can also be passed between bacteria.

This natural process is accelerated by a number of actions, these include inappropriate prescribing, poor infection control practices and the excessive use of antimicrobials in agriculture.

As well as antibiotic resistance, antimicrobial resistance also encompasses other microbes that have developed resistance to the drugs that treat them - parasites (e.g. malaria), viruses (e.g. HIV) and fungi (e.g. Candida).

Antimicrobial resistance is a natural process but this is accelerated by inappropriate prescribing of antimicrobials, poor infection control practices and the unnecessary use of antimicrobials in agriculture.

Consequences of AMR

The consequences of antimicrobial resistance are often portrayed as being a future threat but the World Health Organisation is clear that antimicrobial resistance has already been detected in all parts of the world; it reports that "*it is one of the greatest challenges to global public health today, and the problem is increasing.*"⁷

The consequences of AMR include:

- reducing our ability to treat common infectious diseases, resulting in prolonged illness, increased mortality and a greater risk of complications;
- patients remaining infectious for longer due to ineffective treatments, making them more likely to pass infections on to others;
- compromising advances in modern medicine (such as organ transplantation, cancer chemotherapy, and major surgery) due to risk of infection; and
- increased economic burden on health care systems, families, and societies.

In 2013, the UK Chief Medical Officer (CMO), Professor Dame Sally Davies, described AMR as a 'catastrophic threat' that could, within 20 years, make routine operations life-threatening due to infection risk:

Antimicrobial resistance poses a catastrophic threat. If we don't act now, any one of us could go into hospital in 20 years for minor surgery and die because of an ordinary infection that can't be treated by antibiotics. And routine operations like hip replacements or organ transplants could be deadly because of the risk of infection.⁸

The Government added AMR to the Cabinet Office's National Risk Register of Civil Emergencies in 2015. The register warns that the number of infections complicated by AMR are expected to increase markedly over the next 20 years and estimates that a widespread

⁶ World Health Organisation, [Antimicrobial Resistance](#), April 2015

⁷ ibid

⁸ Department of Health, [Antimicrobial resistance poses 'catastrophic threat', says Chief Medical Officer](#), 12 March 2013

outbreak of a resistant bacterial blood infection could affect 200,000 people in the UK and lead to 80,000 deaths.⁹

The first report of the Review on antimicrobial resistance looked at the implications of AMR on global health and the economy. This estimated that in the US and Europe alone, antimicrobial-resistant infections currently cause at least 50,000 premature deaths per year with many more hundreds of thousands elsewhere in the world.

Independent studies, commissioned by the review, estimated that, by 2050, 10 million people could die due to AMR infections each year (more than cancer and diabetes currently combined). This is shown in the chart below:

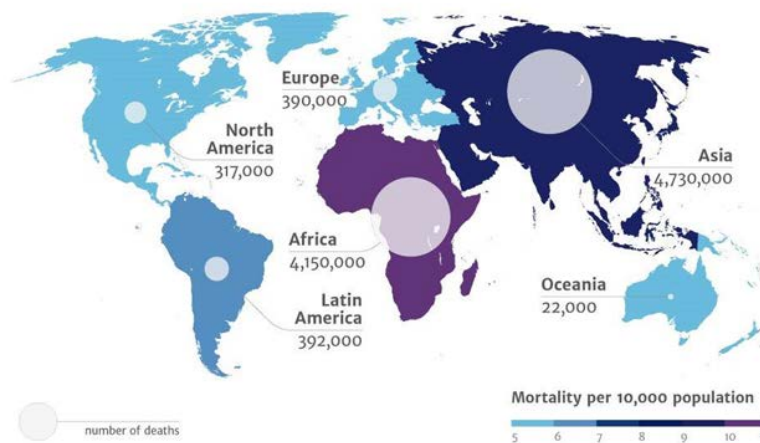


Figure 2 Annual deaths attributable to AMR by 2050 (Review on Antimicrobial Resistance 2014)

The studies also estimated the economic impacts of AMR:

[...] 300 million people are expected to die prematurely because of drug resistance over the next 35 years and the world's GDP will be 2 to 3.5% lower than it otherwise would be in 2050. This means that between now and 2050 the world can expect to lose between 60 and 100 trillion USD worth of economic output if antimicrobial drug resistance is not tackled. This is equivalent to the loss of around one year's total global output over the period, and will create significant and widespread human suffering. Furthermore, in the nearer term we expect the world's GDP to be 0.5% smaller by 2020 and 1.4% smaller by 2030 with more than 100 million people having died prematurely.¹⁰

⁹ Cabinet Office, [National Risk Register of Civil Emergencies](#), 2015

¹⁰ The Review on Antimicrobial Resistance, [Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations](#), December 2014

The review estimated that action in this area would also provide economic benefits- delaying the development of widespread resistance by 10 years could save US\$65 trillion between now and 2050.¹¹

What accelerates AMR?

AMR is a natural phenomenon that occurs when genetic changes make microbes resilient to antimicrobial drugs.^{12,13} It has been increased and accelerated by actions such as:

- 1 Inappropriate use of antimicrobial drugs in healthcare;
- 2 Poor infection prevention and control practices;
- 3 Excessive use of antimicrobial drugs in agriculture; and
- 4 Accelerated spread of AMR infections through global trade and travel.

Another concern here is that there are limited numbers of new drugs available to replace those that have become ineffective (particularly antibiotics). Factors cited as contributing to a lack of commercial appeal for antibiotic development in particular, include the unpredictable nature of emerging resistance, shorter courses of use (compared with for example, a medication to treat high blood pressure), and conservation measures that cause new drugs to be used primarily only after other treatments have not worked. By the time a new antibiotic becomes a first line treatment, it may be near or beyond the end of its patent life.¹⁴

1.2 The Review on Antimicrobial Resistance

The review on antimicrobial resistance (the review) was launched by the then Prime Minister, David Cameron in July 2014 and was led by the economist Lord O'Neill of Gatley.¹⁵ The review board aimed to understand the global implications of AMR and propose international solutions for addressing it.¹⁶

The review has produced a number of publications (available at amr-review.org/Publications) and presented their final report to the Prime Minister with recommendations for global solutions in 2016. The review aimed to explore five themes within its reports:

- 1 the impact of AMR on the world economy if it is not tackled;
- 2 changing how antimicrobial drugs are used in order to reduce the rise of resistance (informed by advances in genetics, genomics and computer science);
- 3 how to facilitate the development of new antimicrobial drugs;

¹¹ Ibid.

¹² World Health Organisation, [Antimicrobial Resistance](#), April 2015

¹³ [The Review on Antimicrobial Resistance, Background](#)

¹⁴ Review on Antimicrobial Resistance, [Securing New drugs for future generations: The pipeline of antibiotics](#), May 2015

¹⁵ Department of Health and Prime Minister's Office, [Prime Minister warns of global threat of antibiotic resistance](#), 2 July 2014

¹⁶ [The review on antimicrobial resistance](#)

- 4 the potential of alternative therapies to disrupt the rise in resistance; and
- 5 the need for international action on drug regulation and drug use across humans, animals and the environment.¹⁷

The [AMR review's final report](#) was published in May 2016 and made 10 recommendations relating to tackling AMR globally:

A global public awareness campaign on AMR with the aim of reducing demand for antimicrobials from patients and agriculture. The AMR review estimated that this awareness campaign could cost between \$40 and 100 million and this can be provided by public health programmes, support for programmes in middle and low income countries, and corporate sponsorship for events.

Improved hygiene and sanitation to reduce the number of infections. The report claims that all countries will need to act in this respect – developing countries may need to focus on ensuring access to clean water and sanitation, whereas developed countries should look to reducing infections in healthcare settings.

Reduce the unnecessary use of antimicrobials in agriculture for infection prevention, or growth promotion. The review recommended three steps to tackle this issue:

1. 10 year targets for antibiotic reduction. This will require Government support and improved surveillance
2. Restrictions on the use of antibiotics that are last-resort human treatments; and
3. Transparency in the food market should be increased. Consumers should be able to make informed choices about the meat they buy

Improved global surveillance of antimicrobial resistance in humans and animals is required to monitor use of antimicrobials, and the levels of resistance. This will require action from individual Governments with oversight from WHO.

Diagnostic technology needs to be improved to ensure antimicrobials are used appropriately. The Chair of the Review board called on the governments of rich countries to ensure that by 2020, all prescriptions for antibiotics will be on the basis of surveillance information and a rapid diagnostic test where one is available. The review recommended a diagnostic market stimulus to support the diagnostic technology market.

Vaccines and other alternative treatments should be promoted. Vaccines have an important role in preventing infection, which can reduce the need for antimicrobials, and slow the development of antimicrobial resistance. The Review suggest the following actions in this area:

¹⁷ The Review on Antimicrobial Resistance, [Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations](#), December 2014

- 1) Use existing vaccines and alternatives more widely in humans and animals;
- 2) Renew impetus for early-stage research; and
- 3) Sustain a viable market for vaccines and alternatives.¹⁸

Increase the numbers working in infectious disease, and improve pay and recognition. The review reports that in the US, infectious disease doctors are the lowest paid of medical specialties, and there are similar findings across other healthcare workers and researchers in this field.

A Global Innovation Fund is needed for early stage and non-commercial research. The review proposes a global fund of up to US\$2 billion. It proposes that this be used to fund early stage “blue sky” research and that which is unlikely to receive commercial support.

Incentives for the development of new treatments will increase production of much needed innovative antimicrobials. The review calls for Government to find new ways to make the production of new antimicrobial medicines attractive to the pharmaceutical industry:

The total market for antibiotics is relatively large: about 40 billion USD of sales a year, but with only about 4.7 billion USD of this total from sales of patented antibiotics (that is about the same as yearly sales for *one* top-selling cancer drug). So it is no wonder that firms are not investing in antibiotics despite the very high medical needs. This will not change until we align better the public health needs with the commercial incentives. Governments must change this at the national level by considering possible changes to their purchase and distribution systems for antibiotics, to find ways to support better rewards for innovation while helping to avoid over-use of a new product. This can be partly achieved through adjustments to national purchasing and distribution systems, to reflect the diversity of health systems around the world. At the same time, for the drugs that are most needed globally and for which global stewardship and global access are important, we need new ways to reward innovation while reducing the link between profit and volume of sales and ensuring that developers give access and promote stewardship globally.¹⁹

The review suggest the introduction of incentives (market entry awards) for the development or new antibiotics or alternative treatments.

The establishment of a global coalition on AMR. The review emphasises that action on AMR must be on a global basis in order to be successful. It calls on the UN and the G20 to lead on this issue.

The cost of global action on AMR

The review’s final report estimates that global action on AMR over a 10 year would be US\$40 billion. This includes:

- US\$16 billion to promote the development of new treatments, and invest in better use of existing treatments (including new market rewards);

¹⁸ Review on Antimicrobial resistance, [Tackling Drug-resistant infections globally: final report and recommendations](#), May 2016

¹⁹ Ibid.

- US\$2 billion for the AMR Global Innovation Fund over five years; and;
- US\$1-2 billion to support innovation in the development of new diagnostics and vaccines.

Further work will be required to look at the costs of reducing antibiotic use in agriculture, and improving hygiene and sanitation.

The Review concluded that the *“cost of action is tiny in comparison to the cost of inaction”*:

So in total, we estimate that the world can avert the worst of AMR by investing three to four billion USD a year to take global action. This is tiny in comparison to the cost of inaction. It is also a very small fraction of what the G20 countries spend on healthcare today: about 0.05 percent.²⁰

1.3 Responses to the Review

Government response

The Government published its response to the AMR review recommendations in September 2016. It agreed with the recommendations regarding a need for investment in R&D. It reported that it would work to gain global support for the proposals and that it had already committed £50 million over the next five years to establish a Global AMR Innovation Fund. It reported that it hoped this would encourage investment from other Governments, third sector and industry.

The response also highlighted the importance of choosing antimicrobials appropriately, and therefore the development of cost-effective and rapid diagnostic tools.

The Government committed to:

- reducing healthcare associated Gram-negative infections (such as E-coli) by 50% in England by 2020 through producing guidance and data, and supporting local teams to control these infections;
- Reducing inappropriate prescribing of antibiotics by 50% by 2020;
- Delivering high quality diagnostics in the NHS;
- Reducing the use of antibiotics in livestock and fish farmed for food;
- To run a campaign to look at the best ways to communicate AMR and drive behaviour change; and
- working internationally with other countries and organisations to tackle AMR.²¹

²⁰ Ibid.

²¹ Department of Health, [Antimicrobial resistance review: government response](#), September 2016

Stakeholder response

The Association of the British Pharmaceutical Industry, along with other representatives of the international pharmaceutical industry, welcomed the recommendations in the report. It reported that the industry is already leading action to tackle antimicrobial resistance, and highlighted the Davos declaration in January 2016, where over 100 pharmaceutical companies, and others signed up to three commitments on antimicrobial resistance:

- Reduce the development of AMR;
- Invest in R&D to meet public health needs; and
- Improve access to antimicrobials and vaccines for all.²²

The Royal College of General Practitioners (RCGP) agreed with recommendations in the final report regarding investment in the R&D of new drugs. The Chair of the RCGP, Dr Maureen Baker, also reported that doctors take warnings about inappropriate prescribing very seriously. However, to reduce pressure on doctors to prescribe antibiotics, more needed to be done to improve public awareness of antimicrobial resistance:

“Growing resistance to antibiotics continues to be a global threat, yet astonishingly, there hasn't been a new class of antibiotics produced in over 25 years.

“We agree with Lord O’Neill that more investment in the research and development of new drugs to tackle emerging diseases is desperately needed, and if offering incentives to pharmaceutical companies helps facilitate this, then it should be encouraged.

“Healthcare professionals across the UK are taking warnings about inappropriate antibiotics prescribing very seriously, with recent figures revealing that antibiotics prescribing rates are at their lowest in five years.

“But it is not only the healthcare sector that needs to play its part in reducing antibiotics prescribing - change needs to take place in agriculture and to tackle the overuse of drugs in farming.

“GPs also come under enormous pressure from patients to prescribe antibiotics, so we need to do more as a society to make the public realise that prescribing antibiotics is not always the answer to treating minor, self-limiting illness and that the inappropriate prescribing of antibiotics will only serve to do more harm than good.

The Responsible Use of Medicines in Agriculture Alliance (RUMA), whose members include the British Veterinary Association, the National Farmers Union and the Royal Society for the Prevention of Cruelty to Animals (RSPCA), stated that it supported the main findings of the report and acknowledged that tackling AMR required global action across human and animal health. However, the Secretary General of RUMA, John Fitzgerald stated that whilst long term targets on antibiotic

22 ABPI, [ABPI, EFPIA, IFPMA and JPMA issue joint statement following publication of the final report by the Review on AMR](#), May 2016

use can be useful, "*inappropriate targets can also be counterproductive and even lead to increased risk of resistance*". The organization announced the establishment of a task force to look at targets that would work for the sector, and protect animal health.²³

1.4 UK 5 Year Antimicrobial Resistance Strategy 2013 to 2018

The Government announced [its 5 Year Antimicrobial Resistance Strategy](#) in September 2013.²⁴ The strategy identifies antibiotic resistance as the greatest concern but aims to slow the spread and development of AMR in general via 3 strategic aims:

- 1 Improved knowledge and understanding of AMR
- 2 Ensuring existing treatments stay effective
- 3 New therapies

A number of Government departments and agencies are involved in the strategy, which is led by Public Health England (PHE), the Department of Health (DH), and the Department for Environment, Food and Rural Affairs (Defra).

A high level steering group that includes NHS England, the National Institute for Health and Care Excellence (NICE) and the Medicines and Healthcare Products Regulatory Agency (MHRA) is responsible for leading on the strategy. In addition, the [Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection \(ARHAI\)](#) provides scientific advice to support delivery of the AMR strategy.

The strategy proposes to achieve its strategic aims via 7 key areas for future action:

- 1 Improve infection prevention and control practices in human and animal health
- 2 Optimise prescribing practices
- 3 Improve professional education, training, and public engagement
- 4 Develop new drugs, treatments and diagnostics
- 5 Better access to and use of surveillance data
- 6 Better identification and prioritisation of AMR research needs
- 7 Strengthen international collaboration

Further information on the strategy is available on the [Antimicrobial Resistance \(AMR\) Collection webpage](#).²⁵

²³ RUMA, [RUMA welcomes O'Neill findings with announcement of targets 'task force'](#), 19 May 2016

²⁴ Department of Health and Department for Environment Food and Rural Affairs, [UK five year antimicrobial resistance strategy 2013 to 2018](#), September 2013

²⁵ DH, PHE, Defra, and Veterinary Medicines Directorate, [Antimicrobial Resistance \(AMR\)](#), 14 August 2014

1.5 UK progress

The most recent progress report to the UK AMR strategy was published in September 2016.²⁶ A full list of the key work and achievement in the 2015 period is provided in an annex to the report.

In human health, the Government reported that whilst the level of resistance in the five microorganisms monitored had generally remained stable, the incidence of some resistant infections was increasing.

In animal health, with reference to a list of infections and the drugs which can be used to treat them- it was reported that the UK has the lowest level of resistance for six of the treatment combinations and was in the lower level of resistance for all combinations.

The summary of the report provides an overview of activity in 2015. It reports that progress has been made putting in place the building blocks for success, and early signs suggested good results with some initiatives, but that there is yet to be unequivocal evidence that measures are making a difference:

We made considerable progress at a national level putting the building blocks for success in place including better data, guidance and a strengthened framework for antimicrobial stewardship. However, we were acutely aware that we had yet to see unequivocal evidence that we are making a difference, although, at the end of 2015, early signs suggested that initiatives begun earlier in the year were having good results. The challenge now is to shift focus from the development of national tools and guidance to local delivery. We have begun to empower and support local leaders to drive change and hold them to account for delivery, not least through increased transparency of the detailed data local teams need to understand their own performance; these local data are transparent, simple to understand and accessible by both professionals and members of the public. To support local action, we will continue to work to change behaviours around the demand for, and prescribing of, antibiotics by increasing the understanding of AMR among the public, and by supporting professionals to reduce prescribing for both humans and animals.

Internationally we will build on what has been achieved in 2015 by reinforcing the importance of AMR as a global economic and social threat, to secure wider international political support for tackling AMR. In particular, we are working with international partners to achieve a successful high level declaration or resolution on AMR at the United Nations General Assembly in 2016.

Our strategy rests on the three pillars of prevent, protect and promote: preventing infection, protecting the antibiotics that we have and promoting the development of new drugs and alternative treatments. This report is structured around those pillars. The pillars are underpinned by better surveillance, better identification of research needs and collaboration, improved

²⁶ Department of Health, [Progress report on the UK 5 year AMR strategy: 2015](#), September 2016

understanding and awareness of AMR and greater international collaboration.²⁷

As part of the strategy, PHE launched the [English surveillance programme for antimicrobial utilisation and resistance \(ESPAUR\)](#) in 2013.²⁸ The ESPAUR report is published annually and includes national data on antibiotic prescribing, resistance, and hospital antimicrobial stewardship implementation.²⁹ In November 2016, the ESPAUR report noted that whilst the people affected by resistant gram-negative infections had continued to increase, antibiotic use had reduced significantly across the whole healthcare sector in England in 2015. It also reported that adhering to antimicrobial stewardship practices was increasing, and more professional organisations and stakeholders were engaging with PHE to raise awareness and deliver aspects of the UK AMR strategy.³⁰ The Health Protection Scotland surveillance report for antimicrobial resistance was published in August 2016. This reported that antibiotic prescribing had also reduced in Scotland in both primary care, and in hospitals in 2015.³¹

1.6 WHO Global action plan

The World Health Organisation, working with the World Organisation for Animal Health (OIE), and the Food and Agriculture Organisation (FAO) has led the work to acknowledge, monitor and address the progress of AMR. Detailed information on this activity is provided on [the WHO website](#).

In 2014, the WHO published the first global surveillance report on AMR. The WHO express concern about the results of the report- noting that resistance to even to 'last resort' antibiotics was present globally.³²

The World Health Assembly endorsed a Global Action Plan on AMR in May 2015. This plan was developed in co-ordination with the FAO and OIE. The goal of the plan is to keep effective prevention and treatment of infectious diseases available to all for as long as possible. There are five strategic aims within the plan:

1. to improve awareness and understanding of antimicrobial resistance;
2. to strengthen knowledge through surveillance and research;
3. to reduce the incidence of infection;
4. to optimize the use of antimicrobial agents; and

²⁷ Department of Health, [Progress report on the UK 5 year AMR strategy: 2015](#), September 2016

²⁸ Public Health England, [English surveillance programme for antimicrobial utilisation and resistance \(ESPAUR\): Report 2014](#), September 2014

²⁹ Public Health England, [English surveillance programme for antimicrobial utilisation and resistance \(ESPAUR\) Report](#), 18 November 2015

³⁰ PHE, [ESPAUR Report 2016](#), November 2016

³¹ Health Protection Scotland, [Scottish Antimicrobial Use and Resistance in Humans in 2015](#), August 2016

³² WHO, [WHO's first global report on antibiotic resistance reveals serious, worldwide threat to public health](#), April 2014

5. develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.³³

An important action within the Global Action Plan is the monitoring of actions to address AMR in countries around the world. This will contribute to a report on global progress on AMR which will be presented at the World Health Assembly in May 2017.

The Organisation for Animal Health (OIE) provides further information about its role in tackling antimicrobial resistance on its [website](#), including intergovernmental standards on monitoring antimicrobial agent use, and guidelines on prescribing in animals.

In February 2017, the World Health Organisation published a list of the bacteria, where research and development into new therapies is urgently needed. The list aims to encourage governments to produce policies to incentivise R&D into new antibiotics.³⁴

United Nations High-Level meeting

On 21 September 2016, world leaders met at the United Nations in New York to commit to an approach on AMR. Commitments were made to develop national action plans in co-ordination with WHO global action plan. The WHO, FAO and OIE have been asked to work with other stake holders to co-ordinate planning and actions and report back to the UN Assembly in September 2018.³⁵

³³ WHO, [Global action plan on antimicrobial resistance](#)

³⁴ WHO, [WHO publishes list of bacteria for which new antibiotics are urgently needed](#), February 2017

³⁵ WHO, [At UN, global leaders commit to act on antimicrobial resistance](#), September 2016

2. Press Articles

Telegraph

Soaring antibiotic resistance fuels steep rise in use of 'last hope' drugs

Laura Donnelly Madlen Davies Andrew Wasley 24 February 2017

<http://www.telegraph.co.uk/science/2017/02/24/soaring-antibiotic-resistance-fuels-steep-rise-use-last-hope/>

Independent

British study's claim 10 million people a year could die because of antibiotic resistance dismissed as 'unreliable'

UK estimate of 10 million deaths a year globally 'undermines fight against antimicrobial resistance', say authors of new study as they warn against overuse of antibiotics

Hristio Boytchev and Victoria Parsons 17 December 2016

<http://www.independent.co.uk/news/science/antimicrobial-resistance-superbugs-death-toll-new-study-flawed-assumptions-british-amr-review-david-a7481396.html>

Guardian

Antibiotics leave children 'more likely to contract drug-resistant infections'

Public health official warns children's risk of drug-resistant infections 12 times higher in months following course of antibiotics

Hannah Devlin 30 November 2016

<https://www.theguardian.com/society/2016/nov/30/antibiotics-leave-children-more-likely-to-contract-drug-resistant-infections>

BMJ

EU to launch new antimicrobial resistance action plan

Rory Watson 23 November 2016

BMJ 2016; 355 doi: <https://doi.org/10.1136/bmj.i6328> Cite this as: BMJ 2016;355:i6328

<http://www.bmj.com/content/355/bmj.i6328>

BBC News Online

Global pledge to stamp out drug-resistant infections

21 September 2016

<http://www.bbc.co.uk/news/health-37420691>

Financial Times

US-UK partnership to tackle antibiotic resistance

Clive Cookson 28 July 2016

<https://www.ft.com/content/8af200f0-54b4-11e6-9664-e0bdc13c3bef>

Guardian

UK doctors told to halve inappropriate antibiotic prescriptions by 2020

David Cameron reveals tough new targets to curb overuse of the drugs and cut resurgence of killer diseases

Anushka Asthana and Sarah Boseley 26 May 2016

<https://www.theguardian.com/society/2016/may/26/uk-doctors-told-to-halve-inappropriate-antibiotic-prescriptions-by-2020>

Guardian

No antibiotics without a test, says report on rising antimicrobial resistance

Report by economist Jim O'Neill says global cost of problem could be loss of 10 million lives a year by 2050 and \$100tn a year

Sarah Boseley 19 May 2016

<https://www.theguardian.com/society/2016/may/19/no-antibiotics-without-a-test-says-report-on-rising-antimicrobial-resistance>

Guardian

Antimicrobial resistance a 'greater threat than cancer by 2050'

UK chancellor George Osborne to tell IMF that 10m people a year could die without radical action

Nicholas Watt 14 April 2016

<https://www.theguardian.com/society/2016/apr/14/antimicrobial-resistance-greater-threat-cancer-2050-george-osborne>

Financial Times

O'Neill 'superbug' review promotes wider use of vaccines

Andrew Ward February 11 2016

<https://www.ft.com/content/aa52a020-cff4-11e5-831d-09f7778e7377>

3. Press releases

World Health Organisation

WHO publishes list of bacteria for which new antibiotics are urgently needed

27 February 2017

WHO today published its first ever list of antibiotic-resistant "priority pathogens" – a catalogue of 12 families of bacteria that pose the greatest threat to human health.

The list was drawn up in a bid to guide and promote research and development (R&D) of new antibiotics, as part of WHO's efforts to address growing global resistance to antimicrobial medicines.

The list highlights in particular the threat of gram-negative bacteria that are resistant to multiple antibiotics. These bacteria have built-in abilities to find new ways to resist treatment and can pass along genetic material that allows other bacteria to become drug-resistant as well.

"This list is a new tool to ensure R&D responds to urgent public health needs," says Dr Marie-Paule Kieny, WHO's Assistant Director-General for Health Systems and Innovation. "Antibiotic resistance is growing, and we are fast running out of treatment options. If we leave it to market forces alone, the new antibiotics we most urgently need are not going to be developed in time."

The WHO list is divided into three categories according to the urgency of need for new antibiotics: critical, high and medium priority.

The most critical group of all includes multidrug resistant bacteria that pose a particular threat in hospitals, nursing homes, and among patients whose care requires devices such as ventilators and blood catheters.

They include *Acinetobacter*, *Pseudomonas* and various Enterobacteriaceae (including *Klebsiella*, *E. coli*, *Serratia*, and *Proteus*). They can cause severe and often deadly infections such as bloodstream infections and pneumonia.

These bacteria have become resistant to a large number of antibiotics, including carbapenems and third generation cephalosporins – the best available antibiotics for treating multi-drug resistant bacteria.

The second and third tiers in the list – the high and medium priority categories – contain other increasingly drug-resistant bacteria that cause more common diseases such as gonorrhoea and food poisoning caused by *salmonella*.

G20 health experts will meet this week in Berlin. Mr Hermann Gröhe, Federal Minister of Health, Germany says "We need effective antibiotics for our health systems. We have to take joint action today for a healthier tomorrow. Therefore, we will discuss and bring the attention of the G20 to the fight against antimicrobial resistance. WHO's first

global priority pathogen list is an important new tool to secure and guide research and development related to new antibiotics."

The list is intended to spur governments to put in place policies that incentivize basic science and advanced R&D by both publicly funded agencies and the private sector investing in new antibiotic discovery. It will provide guidance to new R&D initiatives such as the WHO/Drugs for Neglected Diseases initiative (DNDi) Global Antibiotic R&D Partnership that is engaging in not-for-profit development of new antibiotics.

Tuberculosis – whose resistance to traditional treatment has been growing in recent years – was not included in the list because it is targeted by other, dedicated programmes. Other bacteria that were not included, such as *streptococcus* A and B and chlamydia, have low levels of resistance to existing treatments and do not currently pose a significant public health threat.

The list was developed in collaboration with the Division of Infectious Diseases at the University of Tübingen, Germany, using a multi-criteria decision analysis technique vetted by a group of international experts. The criteria for selecting pathogens on the list were: how deadly the infections they cause are; whether their treatment requires long hospital stays; how frequently they are resistant to existing antibiotics when people in communities catch them; how easily they spread between animals, from animals to humans, and from person to person; whether they can be prevented (e.g. through good hygiene and vaccination); how many treatment options remain; and whether new antibiotics to treat them are already in the R&D pipeline.

"New antibiotics targeting this priority list of pathogens will help to reduce deaths due to resistant infections around the world," says Prof Evelina Tacconelli, Head of the Division of Infectious Diseases at the University of Tübingen and a major contributor to the development of the list. "Waiting any longer will cause further public health problems and dramatically impact on patient care."

While more R&D is vital, alone, it cannot solve the problem. To address resistance, there must also be better prevention of infections and appropriate use of existing antibiotics in humans and animals, as well as rational use of any new antibiotics that are developed in future.

WHO priority pathogens list for R&D of new antibiotics

Priority 1: CRITICAL

- *Acinetobacter baumannii*, carbapenem-resistant
- *Pseudomonas aeruginosa*, carbapenem-resistant
- *Enterobacteriaceae*, carbapenem-resistant, ESBL-producing

Priority 2: HIGH

- *Enterococcus faecium*, vancomycin-resistant
- *Staphylococcus aureus*, methicillin-resistant, vancomycin-intermediate and resistant
- *Helicobacter pylori*, clarithromycin-resistant

- *Campylobacter* spp., fluoroquinolone-resistant
- *Salmonellae*, fluoroquinolone-resistant
- *Neisseria gonorrhoeae*, cephalosporin-resistant, fluoroquinolone-resistant

Priority 3: MEDIUM

- *Streptococcus pneumoniae*, penicillin-non-susceptible
- *Haemophilus influenzae*, ampicillin-resistant
- *Shigella* spp., fluoroquinolone-resistant

Department of Health

Tackling antibiotics resistance in low income countries

14 November 2016

New partners will help manage improvements to preventing antimicrobial resistance (AMR) in low and middle income countries.

Following the [UN General Assembly AMR meeting](#) last month, we are announcing new delivery partners for the Fleming Fund and a range of early investment projects in Asia and Africa.

The Fleming Fund represents a £265 million government investment into improving laboratory capacity for diagnosis and surveillance of AMR in low-income countries where AMR has a disproportionate impact.

Mott MacDonald, a global leader in international development, after a competitive process, has been chosen to manage the fund's country and regional projects as well as the Fleming Fellowship Scheme.

Following existing early investment in Vietnam, the Fleming Fund will expand into 4 further countries. Both the Fleming Fund and Fellowship Scheme will support work in eligible countries across sub-Saharan Africa, south and south-east Asia.

Public Health Minister, Nicola Blackwood, said:

AMR is a global problem. We need all countries to collect reliable data on resistance and antibiotics use so we can confront the true scale of the issue.

The Fleming Fund will play a major role in supporting countries across the world to build up their capacity for AMR surveillance, and the appointment of our key delivery partners represents a critical juncture in this work.

We have also commissioned independent evaluation to run in parallel with the Fund's country and regional projects, supporting design for monitoring and evaluation right from the start. Itad, who work to make international development as effective as possible, has been selected to manage this evaluation and support continuous learning and improvement throughout the project.

Chief Medical Officer Professor Dame Sally Davies said:

Antimicrobial resistance has the potential to kill millions each year and become a massive burden on health systems across the world. By 2050, if left unchecked, drug-resistant infections will kill 10 million people a year and cost the worldwide economy \$100 trillion.

To combat this problem, we first need to understand it—and the Fleming Fund is a crucial step in creating a clearer global picture.

Having accurate information will make sure the right resources are deployed at the right time, in the right place, to make the maximum impact.

With lessons from early investment partner countries, the Fleming Fund expects to release the initial call for grant funding focus countries by spring/summer 2017. Funding will be rolled out in waves, with multiple opportunities to apply per year, allowing a phased roll-out of the programme across countries. We will consult experts around the world throughout the development and management of the programme.

United Nations

High-Level Meeting on Antimicrobial Resistance

21 September 2016

At UN, global leaders commit to act on antimicrobial resistance

Collective effort to address a challenge to health, food security, and development

World leaders today signaled an unprecedented level of attention to curb the spread of infections that are resistant to antimicrobial medicines.

Antimicrobial resistance (AMR) happens when bacteria, viruses, parasites, and fungi develop resistance against medicines that were previously able to cure them.

[For the first time, Heads of State committed to taking a broad, coordinated approach to address the root causes of AMR across multiple sectors, especially human health, animal health and agriculture.](#)

This is only the fourth time a health issue has been taken up by the UN General Assembly (the others were HIV, noncommunicable diseases, and Ebola). The high-level meeting was convened by the President of the 71st session of the UN General Assembly, H.E. Peter Thomson.

“Antimicrobial resistance threatens the achievement of the Sustainable Development Goals and requires a global response”, Mr. Thomson said. “Member States have today agreed upon a strong Political declaration that provides a good basis for the international community to move forward. No one country, sector or organization can address this issue alone.”

Countries reaffirmed their commitment to develop national action plans on AMR, based on the *Global Action Plan on Antimicrobial Resistance*—the blueprint for tackling AMR developed in 2015 by the World Health Organization (WHO) in coordination with the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE). Such plans are needed to understand the full scale of the problem and stop the misuse of antimicrobial medicines in human health, animal health and agriculture. Leaders recognized the need for stronger systems to monitor drug-resistant infections and the volume of antimicrobials used in humans, animals and crops, as well as increased international cooperation and funding.

They pledged to strengthen regulation of antimicrobials, improve knowledge and awareness, and promote best practices — as well as to foster innovative approaches using alternatives to antimicrobials and new technologies for diagnosis and vaccines.

“Antimicrobial resistance poses a fundamental threat to human health, development, and security. The commitments made today must now be translated into swift, effective, lifesaving actions across the human, animal and environmental health sectors. We are running out of time,” said Dr Margaret Chan, Director-General of WHO.

Common and life-threatening infections like pneumonia, gonorrhoea, and post-operative infections, as well as HIV, tuberculosis and malaria are increasingly becoming untreatable because of AMR. Left unchecked, AMR is predicted to have significant social, health security, and economic repercussions that will seriously undermine the development of countries.

The high levels of AMR already seen in the world today are the result of overuse and misuse of antibiotics and other antimicrobials in humans, animals (including farmed fish), and crops, as well as the spread of residues of these medicines in soil, crops and water. Within the broader context of AMR, resistance to antibiotics is considered the greatest and most urgent global risk requiring international and national attention.

“AMR is a problem not just in our hospitals, but on our farms and in our food, too. Agriculture must shoulder its share of responsibility, both by using antimicrobials more responsibly and by cutting down on the need to use them, through good farm hygiene,” said Dr José Graziano da Silva, Director-General of FAO.

“Effective and accessible antibiotics are as vital for protecting animal health and welfare and good veterinary medicine as they are for human health. We urge national authorities to strongly support all sectors involved, through promotion of responsible and prudent use, good practices and implementation of established standards and guidelines,” said Dr Monique Eloit, Director-General of OIE.

Leaders at the UN meeting called on WHO, FAO and OIE, in collaboration with development banks such the World Bank other relevant stakeholders, to coordinate their planning and actions and to report back to the UN General Assembly in September 2018.

Countries called for better use of existing, cost-effective tools for preventing infections in humans and animals. These include immunization, safe water and sanitation, and good hygiene in hospitals and animal husbandry. Putting in place systems to ensure more appropriate use of existing and new antibiotics is also essential.

In addition, they highlighted market failures, and called for new incentives for investment in research and development of new, effective and affordable medicines, rapid diagnostic tests, and other important therapies to replace those that are losing their power.

They stressed that affordability and access to existing and new antibiotics, vaccines and other medical tools should be a global priority and should take into account the needs of all countries.

Department of Health and DEFRA

Government's progress in preventing drug resistant infections

16 September 2016

The UK continues to work towards preventing antimicrobial resistance (AMR) by investing in new diagnosis tests and vaccines.

Lord O'Neill's review, 'Tackling drug-resistant infections globally' made 10 recommendations on how to best prevent the challenge of antimicrobial resistance (AMR). The recommendations include raising awareness of AMR globally, reducing the use of antibiotics in animals and improving hygiene to help stop the spread of infection.

The [UK government response](#) accepts these recommendations as part of its ongoing AMR strategy. The government also published its [second annual progress report](#) on the UK's 5 year AMR strategy.

Lord O'Neill's report also highlights the consequences if we do not act to prevent the growing crisis - predicting 10 million deaths a year by 2050, an effect on the world economy of \$100 trillion, and the potential end of modern medicine as we know it.

Chief Medical Officer, Professor Dame Sally Davies said:

Action on antimicrobial infections must be taken internationally. Jim O'Neill's review has made challenging recommendations for the world and I'm delighted that the UK is helping to lead the fight on this.

No country can afford to be complacent about the catastrophic risk we are facing. If drugs like antibiotics no longer fight infections, 10 million lives could be lost globally every year by 2050.

The UK is already leading on a range of measures aimed at preventing AMR across the globe. These include:

- investing £265 million to strengthen the surveillance of antimicrobial use and resistance, which is already helping 11 countries worldwide and will be expanding in 2017

- using a £50 million investment to start a global AMR innovation fund to develop new antimicrobials along with diagnostic tools and vaccines
- investing in the development of quick diagnosis tests, making sure people are given the right drugs for the right infection at the right time, the new tests, once proven to be effective, will be available in both the UK and internationally
- almost halving the British meat poultry industry's use of antibiotics between 2012 and 2015 through improvements in training, stewardship, and disease control

Chief Veterinary Officer Nigel Gibbens said:

Antimicrobial resistance is a critical global challenge and our commitment to reduce antibiotic use in livestock, in line with Lord O'Neill's recommendations, is an important part of the government's One Health strategy to tackle it.

We are already making good progress in monitoring and reducing the use of antibiotics across the farming industry - today's commitments mean we will remain at the forefront of the global effort to tackle this international challenge.

You can read more about AMR and the government's [5 year strategy](#).

Wellcome

New US-UK partnership to tackle antibiotic resistance

28 July 2016

Wellcome is part of a major new transatlantic partnership to tackle the growing threat of drug-resistant infections. It will speed up the development of new antibiotics, diagnostics and other therapies.

The Combating Antibiotic Resistant Bacteria Biopharmaceutical Accelerator (CARB-X) brings together leaders from industry, philanthropy, government and academia.

It could provide hundreds of millions of pounds over the next five years to boost the antimicrobial drug-development pipeline.

The international partnership will support a suite of products through early preclinical development. CARB-X aims to get products to a stage where private or public investors can then take them forward.

Wellcome will play a key role in selecting and overseeing projects funded through CARB-X.

Other partners include:

- the Biomedical Advanced Research and Development Authority, in the US government Office of the Assistant Secretary for Preparedness and Response

- the Antimicrobial Resistance Centre, a public-private initiative based in Alderley Park, Cheshire
- Boston University School of Law, which will host the CARB-X executive team made up of experts with decades of experience in antibiotic drug development
- the National Institutes of Health's National Institute of Allergy and Infectious Disease (NIAID)
- MassBio in Cambridge, Massachusetts, and California Life Sciences Institute in the San Francisco Bay Area
- the Broad Institute of MIT and Harvard in Cambridge, Massachusetts, which will host a new Collaborative Hub for Early Antibiotic Discovery
- RTI International.

Wellcome has invested £286.7m in drug-resistant infection activities since 2004-05 and will draw on our track record to provide guidance for product developers funded through CARB-X. We will help to monitor project progress and provide feedback and advice through each milestone.

"Drug-resistant infections are already costing lives all over the world," said Wellcome Director Dr Jeremy Farrar. "A problem of this scale can only be tackled through coordinated international effort to curb our massive over use of existing antibiotics, and to accelerate the development of new ones."

Read more on [Boston University's website \(opens in a new tab\)](#).

Wellcome will be accepting applications from early 2017. Potential applicants can visit the [CARB-X website \(opens in a new tab\)](#).

Wellcome Trust

O'Neill calls for action on drug-resistant infection

23 May 2016

The AMR Review team, chaired by Lord Jim O'Neill, has set out what the world needs to do to tackle the problem of drug-resistant infections.

Lord O'Neill estimates that by 2050 a drug-resistant infection will kill someone "every three seconds" unless we act now.

In its ten-point plan, the AMR Review team highlights different ways to stop the unnecessary use of antimicrobials (which include antibiotics) and increase the supply of new drugs.

Measures they suggest to reduce demand for drugs include:

- stricter limits on the use of antibiotics in farming
- better surveillance
- introducing rapid diagnostics in GP clinics and hospitals.

To encourage pharmaceutical companies to make new drugs they propose introducing 'market entry rewards', which would mean paying companies if they bring a new drug to market.

The team also recommend starting a global innovation fund, again to encourage the development of new drugs.

Finally, the report examines how these solutions can be paid for and how we can reach political agreement around them.

Reacting to the report, Dr Jeremy Farrar, Director of the Wellcome Trust, praised Jim O'Neill and the team for raising the global profile of the issue.

He added: "It is now up to world leaders, business and civil society to respond to this vital call for action."

Read the full report on the [Review on Antimicrobial Resistance](#)

Review on Antimicrobial Resistance

Jim O'Neill presents final international recommendations for the world to defeat superbugs

19 May 2016

Lord Jim O'Neill's global Review on AMR will set out its final recommendations, providing a comprehensive action plan for the world to prevent drug-resistant infections and defeat the rising threat of superbugs – something that could kill 10 million people a year by 2050, the equivalent of 1 person every 3 seconds, and more than cancer kills today. Building on eight interim papers, this is the final report from Lord O'Neill's Review, established by the UK Prime Minister David Cameron in 2014 to avoid the world being "cast back into the dark ages of medicine".

The costs of AMR

The report sets out why AMR is such a huge problem and that it must be tackled. AMR is a problem that is getting worse. Antimicrobial drugs are becoming less effective and the world is not developing enough new ones to keep up. The global costs if we do not take action now could be 10 million people dying every year by 2050, and a cumulative economic cost of around 100 trillion USD.

How AMR can be tackled

It then sets out 10 areas where the world needs to take action to tackle AMR. Many of these measures focus on how we can reduce the unnecessary use of antimicrobials, and so the rate at which resistance increases, making our current drugs last longer. Others look at how we can increase the supply of new antimicrobial drugs because, even if we reduce unnecessary use, our arsenal to defeat superbugs is running out and needs to be replenished. All 10 areas are important, and the full list

is available in the executive summary of the attached paper, but four are particularly important and are outlined in more detail here:

A global public awareness campaign to educate all of us about the problem of drug resistance.

This must be an urgent priority and the Review urges international campaign developers, industry experts, and non-governmental organisations to consider how they could help to support such a campaign. This should begin this summer if we are to really make progress, and could be launched formally by heads of state at the UN General Assembly in September.

The supply of new antibiotics needs to be improved so they can replace existing ones as they become ineffective. A truly new class of antibiotic has not been seen for decades because the lack of incentives for investment has led to reduced R&D, and many of the 'low hanging fruit' in terms of development have already been picked. We need a group of countries such as the G20 to reward new antibiotics after they are approved for use. These *market entry rewards*, of around one billion USD each, would be given to the developers of successful new drugs, subject to certain conditions that ensure they are not 'over-marketed' but are available to patients who need them wherever they live.

We need to use antibiotics more selectively through the use of rapid diagnostics, to reduce unnecessary use, which speeds the incidence and spread of drug resistance. To do this, we need a step change in the technology available. Doctors in most countries around the world still prescribe important medicines like antibiotics based only on their immediate assessment of a patient's symptoms, just like when antibiotics first entered common use in the 1950s.

Governments of the richest countries should mandate now that, by 2020, all antibiotic prescriptions will need to be informed by up to date surveillance and a rapid diagnostic test, wherever one exists. This would encourage investment and innovation, by showing developers that they will find a market for their products. Once the technology has improved, markets in developing countries should be supported with a system we have called a *diagnostic market stimulus*, which would provide top-up payments for successful products once they are purchased or used - not dissimilar to the great work that Gavi, the vaccine alliance, have done to improve global child vaccination.

We must reduce the global unnecessary use of antibiotics in agriculture. In the US, for example, of the antibiotics defined as medically important for humans by the US Food and Drug Administration (FDA), over 70 percent (by weight) are sold for use in animals. A number of other countries are also likely to use more antibiotics in agriculture than in humans but many do not even hold or publish the information. Firstly, surveillance needs to be improved in many parts of the world, so we know the extent of antibiotic use in agriculture. Then targets need to be set by individual countries for this use, enabling governments to have the flexibility to decide how they will reach lower levels. Alongside this,

we need to make much quicker progress on banning or restricting antibiotics that are vital for human health from being used in animals.

How solutions can be paid for

The paper then discusses how these solutions would be paid for. The costs of action are dwarfed by the costs of inaction: the proposals made by the Review on AMR would cost up to 40 billion USD over 10 years. However, the cost of AMR between now and 2050 could be as much as 100 trillion USD, that's 100,000 billion USD. The economic case for action is clear, as well as the tragic human consequences of inaction. The solutions could be paid for by one or more of the following:

- a) Allocating a very small percentage of G20 countries' existing healthcare spending to tackling AMR
- b) Reallocating a fraction of global funding from international institutions to AMR
- c) Apply an antibiotic investment charge to pharmaceutical companies who do not invest in research for AMR
- d) Implementing a tax on antibiotics
- e) Introducing transferrable 'vouchers' to reward new antibiotics

Different countries can choose different ways to pay for global action on AMR.

Next steps

International collaboration for real action via the World Health Assembly, G7, G20 and the UN is needed to deliver these policy proposals and turn discussions on AMR into action. This needs to build on promising steps made by governments, and by industry recently affirming its commitment to tackle AMR with a landmark declaration at Davos. Here, over 85 companies, including vaccine developers, large pharmaceutical companies, diagnostic developers and biotechs, committed to further action to reduce drug resistance, increase research and improve access. With this momentum, and 700,000 people already dying every year from AMR, 2016 is a crucial year.

Quotes about the report

See the full Press Notice https://amr-review.org/sites/default/files/20160517_PRESS_NOTICE_CURRENT.PDF

ABPI, EFPIA, IFPMA and JPMA issue joint statement following publication of the final report by the Review on AMR

19 May 2016

The Association of the British Pharmaceutical Industry (ABPI), the European Federation of Pharmaceutical Industries and Associations (EFPIA), the International Federation of Pharmaceutical Manufacturers & Associations (IFPMA), and the Japan Pharmaceutical Manufacturers

Association (JPMA) have today issued a joint statement following the publication of the final report by the Review on Antimicrobial Resistance (AMR), led by Lord O'Neill.

[Click here to read the report.](#)

"Lord O'Neill and the Review on Antimicrobial Resistance team have succeeded in bringing the world's attention that resistance to antibiotics is one of the greatest global health threats of our time. We welcome the ambition for global action mapped out in the Final Report, and the call for political leadership, global coordination and diversity in local action, as well as pragmatism in highlighting a range of potential new systems to deliver a lasting sustainable solution.

The publication of the Final Report does not mark the end of the work, but rather the start of the collaboration that must now begin to address drug resistance and the rise of the superbug. Detecting, preventing and controlling resistance requires a strategic, coordinated, and sustained global and local response dependant on action from government, academia, the pharmaceutical industry, healthcare providers, patients, and the agricultural community. Keeping antibiotics effective is everybody's responsibility.

The global pharmaceutical industry is already at the forefront of leading action to address antimicrobial resistance. In January this year, over 100 companies and 13 associations signed the Declaration by the Pharmaceutical, Biotechnology and Diagnostics industries on Combating Antimicrobial Resistance **[1]**.

The Davos Declaration set out three key commitments. First, to reduce the development of drug resistance; second, to increase investment in R&D to meet global public health needs; and third, to improve access to high-quality antibiotics and vaccines for all. We also called on governments to commit to allocating the funds needed to create a sustainable and predictable market for these technologies while also implementing the measures needed to safeguard the effectiveness of antibiotics. There is a clear need for global coordination of stewardship, conservation, hygiene, and the creation and use of new commercial and incentive models for antibiotics, vaccines and diagnostics, to be delivered through local action. We are pleased to see many of these objectives reflected and developed in the Final Report, and we welcome the collaboration called for by the Review team. Without collective action, we cannot expect real change.

Industry hasn't been standing still with regard to developing new medicines to address drug resistance. There are currently 34 antibiotics and infection preventing vaccines in our global pipeline **[2]** and in 2014 alone the industry spent more than \$137 billion collectively on all aspects of R&D **[3]**, with 3.7% focused on anti-infectives **[4]**. The investment, time and risk required by companies to discover and develop new antibiotics and vaccines needed for drug resistance is substantial and poses a unique challenge. For this reason, the industry has underscored the imperative need for a sustainable business model

for these critical medicines, without which any interventions to develop new medicines will be limited.

We welcome the critical link the Review on AMR team has made between research investment and market based incentives to create a sustainable market that will deliver the next generation antibiotics and vaccines. Such push and pull incentives have already delivered success in other disease areas and must be used as a starting point for similar collaboration in antibiotics and vaccines to fund innovation on a global scale.

The report highlights existing initiatives such as the Biomedical Advanced Research and Development Authority **[5]** (BARDA) in the US, and the Innovative Medicines Initiative **[6]** (IMI) in Europe, the biggest life sciences public private partnership in the world, targeting bottlenecks in drug discovery to deliver new cures and new ways to tackle infectious and rare diseases. As part of IMI, New Drugs for Bad Bugs **[7]** a €696 million fund where industry directly contributes €345 million 'in-kind' has led the way in combating the scientific, regulatory, and business challenges that are hampering the development of new antibiotics. Comparable public and private funded initiatives on a global scale will be fundamental in this fight, yet the impetus this Final Report provides should also ensure that all local partners act now and commit to allocating funding and finding paths that work for their situation.

The Final Report covers several options to raise the funding required to tackle resistance, we will look at all of these options with a view to whether they are balanced, sustainable, likely to encourage investment into the area and encourage good science in the interests of patients. One of the options highlighted is a 'pay or play' payment levy on pharmaceutical companies to fund market entry rewards. The potential imposition of a tax on just one segment of the life sciences sector to fix a supply-side issue will significantly undermine current goodwill, cooperation, and the large voluntary investment and initiatives that are already underway. Ultimately, this approach may lead to less productive collaboration and innovation, and ignores the universal responsibility for finding a solution that all of society relies on. We need to be working towards incentives that support additional investment rather than punitive payments.

In an age of global austerity and the unique scientific, economic and environmental challenges presented by AMR, a new sustainable model that rewards innovation and shares the risk equally will be challenging to implement, but the overwhelming benefit of solving this problem requires all partners to now come together as equals and define the right set of proportionate and fair solutions.

The world is rightly impatient for a resolution to antibiotic resistance. Resistance undermines both our ability to fight infectious diseases and much of modern medicine, which has rarely faced such a grave threat. Only by working together can we deliver an effective and sustainable global response."

Notes to Editors

[1] [Global Pharmaceutical Industry Calls On Governments To Work With Them To Beat The Rising Threat Of Drug Resistance](#), AMR Review, January 2016

[2] [Rethinking the way we fight bacteria](#), IFPMA, 2015

[3] International Federation of Pharmaceutical Manufacturers and Associations (IFPMA). The Pharmaceutical Industry and Global Health Facts and Figures 2014. 81 (Geneva, 2014)

[4] Thomson Reuters CMR International Pharmaceutical R&D Factbook 2014; Drawn from the Industry R&D Investment Programme and reproduced with permission in the Adapting the Innovation Landscape UK Biopharma R&D Sourcebook 2015.

[5] Biomedical Advanced Research and Development Authority: <http://www.phe.gov/about/BARDA/Pages/default.aspx>

[6] Innovative Medicines Initiative: <http://www.imi.europa.eu/>

[7] New Drugs for Bad Bugs: <http://www.imi.europa.eu/content/nd4bb>

RCGP response to Lord O'Neill's review of antibiotics resistance

19 May 2016

Dr Maureen Baker, Chair of the RCGP responds to Lord O'Neil's latest review on the global threat of antibiotics resistance and his proposals to reduce prescriptions of antibiotics.

Dr Maureen Baker, Chair of the Royal College of GPs, said: "Growing resistance to antibiotics continues to be a global threat, yet astonishingly, there hasn't been a new class of antibiotics produced in over 25 years.

"We agree with Lord O'Neill that more investment in the research and development of new drugs to tackle emerging diseases is desperately needed, and if offering incentives to pharmaceutical companies helps facilitate this, then it should be encouraged.

"Healthcare professionals across the UK are taking warnings about inappropriate antibiotics prescribing very seriously, with recent figures revealing that antibiotics prescribing rates are at their lowest in five years.

"But it is not only the healthcare sector that needs to play its part in reducing antibiotics prescribing - change needs to take place in agriculture and to tackle the overuse of drugs in farming.

"GPs also come under enormous pressure from patients to prescribe antibiotics, so we need to do more as a society to make the public

realise that prescribing antibiotics is not always the answer to treating minor, self-limiting illness and that the inappropriate prescribing of antibiotics will only serve to do more harm than good.

“The College has worked with Public Health England to develop the TARGET antibiotics toolkit to support GPs and other prescribing healthcare professionals to prescribe antibiotics appropriately.”

RUMA welcomes O'Neill findings with announcement of targets 'task force'

19 May 2016

In response to the O'Neill Review on Antimicrobial Resistance final report, published today (19 May 2016), the Responsible Use of Medicines in Agriculture (RUMA) Alliance has announced it is setting up a 'task force' to look at how meaningful targets can be developed to replace, reduce and refine antibiotic use in UK agriculture.

RUMA, which works independently with organisations involved in all stages of the animal food chain from 'farm to fork', supports the report's main findings¹, saying the battle to maintain the efficacy of antibiotics requires global focus combined with local action across both human and animal medicine.

John FitzGerald, RUMA's secretary general, said: “We also understand the report's ambition to develop long-term targets. The industry has long recognised the beneficial role targets can play, but is acutely aware that inappropriate targets can also be counterproductive and even lead to increased risk of resistance.

“So we are delighted to announce the setting up of this task force which will harness the expertise of specialists across different sectors and work proactively with the authorities to look at identifying effective, evidence-based goals that work for our UK livestock sectors and protect animal welfare.”

He added that the UK focus was especially important as while there were important lessons to learn from other countries' experiences in reducing antibiotic use, direct comparisons were never simple.

“It should be remembered that the Danish government invested heavily to allow its pig farmers to build new high-health premises; and in reducing its antibiotic usage by nearly 60%, the Netherlands is now at approximately the same level of use as the UK. So we must look at how we develop the right goals for our sectors.”

Mr FitzGerald said that RUMA was also pleased to see recognition of the importance of surveillance. “Our UK poultry meat sector set up detailed surveillance of antibiotic use five years ago and through this has been able to replace, reduce and refine antibiotic use and pass on its learnings to other sectors.

“These include the pig sector, which has just launched an online medicine book and stewardship programme to improve on pig usage data already collected through the Red Tractor scheme, which has been in place since October 2014; and the cattle sector, which announced last year it would be working with vets to collect usage data.”

For further information contact RUMA Secretary General John FitzGerald (rumasec@btinternet.com) or see the RUMA website www.ruma.org.uk

For press enquiries contact Amy Jackson (amy@oxtale.co.uk, 01993 880360, 07917 773756)

Notes to editors

Summary of the O'Neill report recommendations

- A massive global public awareness campaign
- Improve hygiene and prevent the spread of infection
- Reduce unnecessary use of antimicrobials in agriculture and their dissemination into the environment
- Improve global surveillance of drug resistance and antimicrobial consumption in humans and animals
- Promote new, rapid diagnostics to cut unnecessary use
- Promote development and use of vaccines and alternatives
- Improve the numbers, pay and recognition of people working in infectious disease
- Establish a Global Innovation Fund for early-stage and non-commercial research
- Better incentives to promote investment for new drugs and improving existing ones
- Build a global coalition for real action – via the G20 and the UN

RUMA is a unique, independent non-profit group involving 24 organisations representing all stages of the animal food chain from ‘farm to fork’ that have an interest in the stewardship of animal medicines in agriculture. This reflects the importance of traceability, transparency and accountability at all points in the chain: from primary food production, through processing, manufacturing and retailing to the final consumer. Its membership includes organisations representing interests in agriculture, veterinary practice, animal medicines, farm assurance, training, food processing, retailing, consumers and the public, and animal welfare. RUMA has formulated comprehensive guidelines for the responsible use of antimicrobials in livestock production. These give advice on all aspects from application and responsibilities of the farmer and veterinary surgeon, to strategies for reduced usage.

<http://www.ruma.org.uk/antimicrobials/guidelines/>

RUMA’s observers are the Food Standards Agency (FSA) and Veterinary Medicines Directorate (VMD). Its members are:

- The Agricultural Industries Confederation (AIC)
- AHDB Beef and Lamb
- AHDB Dairy
- AHDB Pork
- The Animal Health Distributors Association (AHDA UK Ltd)
- Animal Medicines Training Regulatory Authority (AMTRA)
- British Egg Industry Council (BEIC)
- The British Poultry Council (BPC)
- The British Retail Consortium (BRC) i
- British Veterinary Association (BVA)
- City and Guilds Land Based Services
- Dairy UK
- The Game Farmers' Association (GFA)
- LEAF (Linking Environment And Farming)
- The National Beef Association (NBA)
- National Farmers' Union (NFU)
- The National Office of Animal Health (NOAH)
- The National Pig Association (NPA)
- National Sheep Association (NSA)
- NFU Scotland
- Red Tractor Assurance (RTA)
- The Royal Association of British Dairy Farmers (RABDF)
- Royal Pharmaceutical Society
- The Royal Society for the Prevention of Cruelty to Animals (RSPCA) i
- The Scottish Salmon Producers' Organisation (SSPO)

4. Parliamentary material

Debates

Lords Debate: Drug-Resistant Infections

HL Deb 15 September 2016 | Vol 774 cc1584-1611

<https://hansard.parliament.uk/Lords/2016-09-15/debates/16091542000350/Drug-ResistantInfections>

Westminster Hall debate: Antibiotics: Research and Development

HC Deb 26 April 2016 | Vol 608 cc522-547WH

<https://hansard.parliament.uk/Commons/2016-04-26/debates/16042645000002/AntibioticsResearchAndDevelopment#contribution-FC90C549-DF16-4567-89CE-C4D24E00ADDB>

Commons adjournment debate: Antibiotics (Primary Care)

HC Deb 23 November 2015 | 602 cc1164-1172

<https://www.publications.parliament.uk/pa/cm201516/cmhansrd/cm151123/debtext/151123-0004.htm#1511243000001>

Parliamentary Questions

[Cancer: Medical Treatments](#)

Asked by: Shannon, Jim

To ask the Secretary of State for Health, what steps his Department is taking to ensure that superbugs do not make cancer untreatable.

Answering member: Nicola Blackwood | Department: Department of Health

The Government has been at the forefront of action to address antimicrobial resistance (AMR). The risk of infection from multidrug-resistant bacteria (or “superbugs”) is not confined to cancer treatment but has implications for a wide range of medical treatments and interventions, including routine surgery.

The UK Five Year Antimicrobial Resistance Strategy, published in 2013, set out an ambitious programme to slow the development and spread of AMR taking a “One-Health” approach spanning people, animals, agriculture and the wider environment.

The Strategy seeks to prevent infection, protect the antibiotics that we have and promote the development of new drugs and alternative treatments. Progress on these actions has been reported in the Second Annual Progress report available at:

<https://www.gov.uk/government/publications/progress-report-on-the-uk-5-year-amr-strategy-2015>

In September 2016, the Government published its response to the Independent Review on AMR, led by Lord O'Neill. This is available at:

<https://www.gov.uk/government/publications/government-response-the-review-on-antimicrobial-resistance>

The response sets out further ambitions to address the challenges of antimicrobial resistance, including the following domestic ambitions:

- A reduction in healthcare associated Gram-negative bloodstream infections in England by 50% by 2020; and
- A reduction in inappropriate antibiotic prescribing by 50%, with the aim of being a world leader in reducing prescribing by 2020.

Internationally, the UK continues to lead in tackling AMR through globally co-ordinated and sustainably funded action. In September 2016, the Government's leadership helped secure a UN declaration on AMR and a commitment from the G20 to look at solutions to the market failure on the development of new antimicrobials.

HC Deb 08 February 2017 | PQ 62546

[Antimicrobial Resistance](#)

Asked by: Daniel Zeichner

The O'Neill report was published some six months ago and included recommendations for national Governments. What practical progress have the Government made so far?

Answered by: Nicola Blackwood | Department: Health

On 19 September we published our comprehensive response to the report, which describes a range of actions that we will take on each of Lord O'Neill's recommendations. The most practical progress that I can report is the fact that the prescribing of antibiotics has fallen for the first time since records began. I think that we can all be proud of that progress.

HC Deb 20 December 2016 | Vol 618 c1296

[Antimicrobial Resistance](#)

Asked by: Thangam Debbonaire

One of the 10 recommendations of the O'Neill review on antimicrobial resistance was for a massive global public awareness campaign. Given that 700,000 people die each year as a result of AMR, and given the

review's estimate that that figure will rise to 10 million a year by 2050, what assurances can the Minister give that she is behind that awareness campaign?

Answered by: Nicola Blackwood | Department: Health

The hon. Lady is right to identify the scale of the challenge, which is why we have put AMR on our national risk register, and she is also right to point out that no one country can tackle AMR alone. The United Kingdom has played a global leadership role. We co-sponsored the World Health Organisation's 2015 global health plan and created the £265 million Fleming fund so that we could specifically help poor countries to tackle drug resistance, and we will continue to play that global leadership role.

HC Deb 20 December 2016 | Vol 618 c1295

Date answered: 20 Dec 2016

[Antimicrobial Resistance](#)

Asked by: Kevin Hollinrake

One of the 10 key recommendations of the O'Neill review was to improve the data and surveillance underlying antimicrobial resistance. What plans does the Minister have to routinely test all NHS patients for antibiotic resistance?

Answered by: Nicola Blackwood | Department: Health

My hon. Friend is absolutely right that it is essential that we improve diagnostics if we are to tackle this national threat. A routine part of the clinical management of patients showing symptoms of infections is to take a blood sample. When an infection is identified, those samples are indeed tested for resistance. Part of our AMR strategy is to improve diagnostics and to fund innovation in this area.

HC Deb 20 December 2016 | Vol 618 c1294

[Antibiotics: Drug Resistance](#)

Asked by: Shannon, Jim

To ask the Secretary of State for Health, what steps he is taking to tackle antimicrobial resistance.

Answering member: Jane Ellison | Department: Department of Health

The Government has been at the forefront of action to address antimicrobial resistance (AMR).

Our comprehensive UK Five Year AMR Strategy published in 2013, is an ambitious programme to slow the development and spread of AMR. The Strategy aims to prevent infection, protect the antibiotics that we have and promote the development of new drugs and alternative treatments. We are already seeing results: for example, between April

and December 2015, two million fewer prescriptions were dispensed by general practitioners in England compared to the same period in 2014, a reduction of around 7%.

Internationally, the United Kingdom supported successful negotiations of the AMR resolution at World Health Organization in 2015, mandating all countries to produce their own national action plans to tackle AMR. In the same year similar resolutions were passed relating to food and agriculture and animal health at the Food and Agriculture Organization and the World Organisation for Animal Health.

Lord O'Neill's independent review on AMR, commissioned by the Prime Minister in July 2014, published its final report in May. The Government will take forward its recommendations, as set out in its manifesto.

The Government is also aiming to raise the profile of AMR yet higher on the global stage through our work to support a successful high level meeting on AMR at the United Nations General Assembly in September this year.

HC Deb 13 July 2016 | PQ 41844

5. Useful links and further reading

O'Neill *Review on Antimicrobial Resistance*

<https://amr-review.org/>

Government response to the Review on Antimicrobial Resistance
September 2016

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/553471/Gov_response_AMR_Review.pdf

World Health Organisation *Global Action Plan on Antimicrobial Resistance*

<http://www.who.int/antimicrobial-resistance/global-action-plan/en/>

DEFRA, DoH, PHE, VMD *Information and resources on the government's plans to slow the growth of antimicrobial resistance*

<https://www.gov.uk/government/collections/antimicrobial-resistance-amr-information-and-resources>

Department of Health UK 5 Year Antimicrobial Resistance Strategy 2013 to 2018

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/244058/20130902_UK_5_year_AMR_strategy.pdf

Department of Health *Progress report on the UK 5 year AMR strategy: 2015*

<https://www.gov.uk/government/publications/progress-report-on-the-uk-5-year-amr-strategy-2015>

CARB-X (The Combating Antibiotic Resistant Bacteria Biopharmaceutical Accelerator)

The creation of CARB-X was prioritized in the [2015 US National Action Plan on Combating Antibiotic-Resistant Bacteria \(CARB\)](#), which called for a biopharmaceutical accelerator to spur pre-clinical product development

<http://www.carb-x.org/home>

Davos *Declaration by the Pharmaceutical, Biotechnology and Diagnostics Industries on Combating Antimicrobial Resistance*

January 2016

[https://amr-review.org/sites/default/files/Declaration of Support for Combating A MR Jan 2016.pdf](https://amr-review.org/sites/default/files/Declaration_of_Support_for_Combating_AMR_Jan_2016.pdf)

Public Health England Guidance *Health matters: antimicrobial resistance* 10 December 2015

<https://www.gov.uk/government/publications/health-matters-antimicrobial-resistance/health-matters-antimicrobial-resistance>

Wellcome *Evidence for action on antimicrobial resistance* September 2016

<https://wellcome.ac.uk/sites/default/files/evidence-for-action-on-antimicrobial-resistance-wellcome-sep16.pdf>

European Centre for Disease Prevention and Control *Antimicrobial resistance strategies and action plans*

http://ecdc.europa.eu/en/healthtopics/Healthcare-associated_infections/guidance-infection-prevention-control/Pages/antimicrobial-resistance-strategies-action-plans.aspx

BMJ Blog *Antimicrobial resistance—a local, national, and global threat* November 18, 2016

<http://blogs.bmj.com/bmj/2016/11/18/antimicrobial-resistance-a-local-national-and-global-threat/>

King's Fund *What if antibiotics were to stop working?* Professor Dame Sally Davies and Rebecca Sugden

<https://www.kingsfund.org.uk/reports/thenhsif/what-if-antibiotics-stopped-working/>

Longitude Prize Antibiotics Challenge

<https://longitudeprize.org/challenge/antibiotics>

BMJ *What to do about antimicrobial resistance* 6 June 2016

BMJ 2016; 353 doi: <https://doi.org/10.1136/bmj.i3087> Cite this as: BMJ 2016;353:i3087

<http://www.bmj.com/content/353/bmj.i3087>

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