



Department
of Health

Government response to the
House of Commons
Science and Technology
Committee report *Ensuring
access to working antimicrobials*



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Presented to Parliament
by the Secretary of State for Health
by Command of Her Majesty

September 2014



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Government response to the House of Commons Science and Technology Committee report *Ensuring access to working antimicrobials*

INTRODUCTION

This document sets out the Government's response to the report on antimicrobial resistance by the House of Commons Science and Technology Committee chaired by Andrew Miller MP. Detailed responses to each of the recommendations contained in the Committee's report are provided in this response.

We welcome the Committee's report which identifies a number of areas where further action is required to build on the call for action to address human and environmental aspects of antimicrobial resistance (AMR) set out in the UK Antimicrobial Resistance Strategy¹. The report is particularly timely and will contribute to the work being carried out to develop an action plan which will be published in November 2014. Responsibility for the delivery of the UK AMR Strategy, its metrics and action plan lies with the High Level Steering Group (HLSG), which is accountable to Ministers. The HLSG has considered the Committee's conclusions and recommendations and been involved in the development of this response.

UPDATE ON UK ACTION TO ADDRESS AMR

As widely agreed, AMR is a global problem that needs concerted action at both a national and global level using a "One Health" approach that spans work across the human, veterinary, environment and defence and national security sectors. We recognise that we will make greater progress faster and have a bigger impact if we pool our efforts and work together for the common good. For this reason the UK Government and the Chief Medical Officer, have successfully focussed their activity since the UK Strategy was published in September 2013 on actively raising awareness of antimicrobial resistance issues at a global level. This approach has been highly effective and has resulted in widespread support for stronger international collaboration to tackle AMR. This culminated in May 2014 with the adoption of a new World Health Assembly Resolution on antimicrobial resistance which the UK and Sweden had a leading role in shaping. This global-enabling measure is a significant development.

The Resolution advocates a "One Health" approach to combat AMR with action being taken on several fronts in parallel to accelerate progress and provides a mandate to the WHO to produce a Global Action Plan in 2015. This is a major achievement which provides us with the mechanism to drive forward change on a global scale. The focus of the UK's international work is now directed towards actively leading and contributing

1 UK Five 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

to work with others which will support the development of the WHO Global Action Plan by 2015.

The extremely limited number of new antibiotics under development is a cause of significant international concern. The UK Government is determined to ensure that there is a sustainable supply of antibiotics available in the future so that we can protect the gains made by modern medicine. This is a global problem that needs a global solution.

It is for this reason that the Prime Minister has asked Jim O'Neill, an economist of considerable international standing, to explore the actions which may be taken by governments around the world to stimulate and incentivise investment in new antimicrobial drugs. The Prime Minister's initiative is both timely and proactive. When he starts work this autumn, Dr O'Neill will be looking at the full range of issues associated with the development, use and regulation of antibiotics and will be consulting with a wide range of international stakeholders including foreign governments, academia, NGOs and the biopharmaceutical industry. While this important work is going on the UK Government will continue to build capability and capacity across the research and innovation sectors in a coordinated manner to be better placed to address the need for new antibiotics, therapies, diagnostics and novel treatments.

Also of particular note is the progress we are making in improving the quality of the available data to better measure antibiotic use and resistance trends across the health sector. In October 2014 Public Health England (PHE) will be publishing prescribing data for both secondary and primary care for the first time. This report will also provide information on resistance trends for certain key infections and allow us to track changes over time. Work is also underway to explore

options for linking this to clinical information and to produce an integrated surveillance report spanning human and animal sectors. Over time this will enable us to track antibiotic use and resistance trends in a more comprehensive and detailed manner than has previously been possible. This is a significant development because it will provide readily available data to enable us to assess the impact of our interventions to improve prescribing.

Finally, the Government will continue to actively address AMR under the guidance of the HLSG which has been focusing its first year's activities on strengthening the architecture and infrastructure needed to provide the mechanism to deliver an integrated and comprehensive action plan which will reduce the spread of AMR. The conclusions and recommendations of the Science and Technology Committee's report have been discussed by the HLSG and provides a useful contribution to supplement the work it has been doing to develop its action plan.

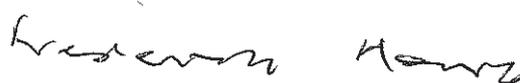
In progressing this work the HLSG has been focusing on improving our infection prevention and control practices, improving our data sources, strengthening capability and capacity to optimise the stewardship of antibiotics, and developing the measures it will use to assess the impact of the Strategy. It has also been encouraging the research community to work together more effectively to develop new antibiotics, therapies, diagnostics and novel treatments, considering how best to engage with others to seek their involvement in driving forward changes in behaviour at all levels of society, which will collectively contribute to delivery of the AMR agenda. A separate response to complement our own is being submitted by the Research Councils to highlight the breadth of the research activities being undertaken and

show where they are addressing specific concerns raised by the Committee.

The HLSG will publish its first year's progress report and detailed action plan for the AMR Strategy in November 2014. The Government very much looks forward to receiving its advice on how best to drive forward work to tackle AMR in the most impactful and cost effective manner over the 5 year term of this AMR Strategy which ends in 2018.



Jane Ellison
Parliamentary Under
Secretary of State
for Public Health



Earl Howe
Parliamentary Under
Secretary of State
for Quality

Conclusions and Recommendations

COMMUNICATING THE DANGER

1. We are convinced that greater public awareness surrounding the necessity for stewardship of antibiotics is crucial in reducing pressure on practitioners to prescribe antibiotics. We welcome the awareness of the Government of the need for sustained campaigns to educate new generations. However, the previous Strategy would appear to have had insufficient impact in achieving a high enough public awareness and the current Strategy has no definitive targets or measures of success. We recommend that the Action Plan set challenging targets for improvement of public awareness against which success may be measured and reported. These targets should be re-evaluated, and communicated to this Committee, once a rigorous evaluation of the 2014 European Antibiotic Awareness Day has been conducted. (Paragraph 16)

As the Committee acknowledges, the Government has shown a sustained commitment to increasing public and professional awareness of AMR. We agree that more work is needed to create a societal change in attitudes to antibiotics. Previous European Antibiotic Awareness Day (EAAD) activities have been found to be effective in terms of raising awareness and knowledge of the AMR issue with the public and health

professions². Knowledge of antibiotic efficacy is higher in the UK than the EU as a whole. For instance, 52% of the UK public compared to 40% in the EU, are aware that antibiotics are ineffective against viruses; 70% are aware that antibiotics are ineffective against cold and flu, compared to the EU average of 52%³.

The recent public response to the vote for the Longitude prize promoted by the BBC and NESTA (National Endowment for Science Technology and the Arts) and co-funded by Innovate UK⁴ is an example of how alternative approaches can be successfully used to engage with the public on important issues. The fact that of the six issues eligible for the public's vote, they considered work to develop a new diagnostic for antibiotic resistant infections to be the most important, suggests that the public are increasingly seeing the relevance of AMR to them and to society at large and becoming more concerned in seeing AMR addressed.

We will be building on this and finding new ways to engage with the public more actively through the increased use of digital and social media and other channels which

2 European Antibiotic Awareness Day evaluation 2013 <https://www.gov.uk/government/publications/european-antibiotic-awareness-day-evaluation-2013>

3 Special Eurobarometer 407: Antimicrobial Resistance. European Commission November 2013. http://ec.europa.eu/public_opinion/archives/ebs/ebs_407_en.pdf

4 Until 18th August 2014 the Technology Strategy Board

have been found to be effective in changing attitudes and behaviours. In addition, we are undertaking research to inform our views on how best to target our interventions to have the greatest impact in terms of delivering sustained change with key audiences as there is limited evidence that awareness raising activities alone significantly change behaviour. We will be harnessing the learning from other Government sponsored activities which have a behaviour change component, such as Change4Life and the Responsibility Deal, to see how we can best adapt this to begin to create the societal shifts in the public attitudes to antibiotic use and changes in behaviour.

This year, as part of the PHE led EAAD activities an on-line pledge campaign to encourage both the public and professionals to become antibiotic guardians will be introduced. We will be encouraging people to make a personal commitment to tackling AMR. Indicators of behaviour change will be measured by follow-up of the 'antibiotic guardians'. We will report back to the Committee on the outcome of the initiative once the 2014 EAAD activities have been evaluated.

We also expect that the independent Review on Antimicrobial Resistance⁵ will play an important role in bringing together, developing and raising awareness (in the UK as well as more widely) of the evidence base about the economic burden of AMR, and the costs over the longer term of a failure to act effectively to contain the spread of resistance globally.

2. It is essential that responsible antimicrobial stewardship is practised

5 Independent review on the economics surrounding AMR that will seek international consensus on how the international community can ensure a sustainable pipeline of new antimicrobial drugs. The economist Jim O'Neill will lead this Review. www.amr-review.org

in the animal sector. The Government should, in the Action Plan, outline its plans to ensure that veterinarians, farmers and other animal carers have a stronger focus on antimicrobial resistance. (Paragraph 60)

The Government continues to promote messages about appropriate use of antibiotics with the veterinary and farming communities, and where necessary, challenges them about their use of antibiotics and encourage best practice. Where there is robust evidence to indicate that there is a need for increased measures to tackle AMR in the farming and animal sector the Government will take the necessary steps to ensure effective and proportionate action. The specific mechanisms through which Government will do this, along with arrangements for engaging and challenging veterinary surgeons and animal keepers to practise responsible use of antibiotics and play their part in controlling antimicrobial resistance, will be detailed in the action plan.

ANTIMICROBIAL RESISTANCE WITHIN THE NHS

3. Given the focus on antibiotic resistance since 2000, we found it difficult to understand how the Government has failed to act decisively to address the issue of inappropriate prescription of antibiotics. We recommend that, as a matter of public interest, the Government drives the development of clinically proven alternative, safe and effective strategies to ease the demand placed on General Practitioners by people with acute infections so that they can develop an appropriate response to these requests without creating further antimicrobial resistance. We support calls for better education of

medical students and greater focus on antimicrobial resistance during clinical career development. It is essential that the Government, as a matter of urgency, puts measures in place to drastically reduce the unnecessary prescription of antibiotics. (Paragraph 20)

While progress has not been as rapid as we would have wished there has been significant activity to address inappropriate prescribing and some local successes. The Government pump primed the appointment of antimicrobial stewardship pharmacists in hospitals in 2003. Working as part of a team, typically alongside medical microbiologists and/or infectious disease physicians, these professionals have been effective in helping to introduce and enhance systems and policies aimed at controlling antimicrobial use in hospitals. As set out in the UK AMR Strategy⁶ we will be exploring how their skills and expertise can be utilised in primary care too.

The Government and others including the Royal Colleges and professional bodies, as well as the former National Prescribing Centre (now the Medicines and Prescribing Centre within NICE) have been using a range of mechanisms to support the primary care sector to generally improve prescribing and use of medicines for a number of years. The work sponsored by the Department of Health has also encouraged the development of local prescribing or pharmaceutical advisers in primary care who can be effective in reducing and improving primary care prescribing.

These professionals have a key role in delivering change in primary care in terms of optimising prescribing practice, medicines

use and working across professional boundaries. Local interventions have shown that adopting a team approach is an important part of antimicrobial stewardship⁷. We would expect Clinical Commissioning Groups to make best use of pharmaceutical and other expert advice available to them to embed best practice.

Where possible we are also harnessing the learning from interventions across all parts of the health economy to improve the quality of prescribing.

In the light of feedback on the TARGET toolkit⁸, which was developed to assist GPs to improve their antibiotic prescribing, we have worked with the Royal College of General Practitioners (RCGP) to provide additional support to encourage GPs to engage patients in an informed dialogue about antibiotics which would improve public-professional relations and reduce unnecessary prescribing of antibiotics. Additionally, we are piloting other new approaches to deliver change in GP and public behaviour. For instance, a randomised control trial of two populations of GP practices is being planned to test the impact of a feedback letter on their antimicrobial prescribing rates compared to similar populations and national norms in reducing the unnecessary prescription of antimicrobials in primary care. If successful, the intervention will be scaled-up and rolled out nationally. A similar approach is being taken to drive down the unnecessary use of antibiotics with the

6 UK Five 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

7 Initiatives to improve appropriate antibiotic prescribing in primary care Diane J. Harris* J. Antimicrob. Chemother. (2013) <http://jac.oxfordjournals.org/content/68/11/2424.full?sid=7aab87b9-1153-4ad7-8b02-9446f68a58b7>

8 (Treat Antibiotics Responsibly, Guidance and Education Tool), <http://www.rcgp.org.uk/clinical-and-research/target-antibiotics-toolkit.aspx>

aid of GP tailored education and audit tools in NHS Scotland.

The need for improving prescribing in General Practice was reinforced recently by the publication of research showing that despite the availability of guidance on best practice, total antibiotic prescribing for coughs and colds was higher in 2011 than the 1990s⁹.

Similar work is underway to monitor and strengthen implementation of the “Start Smart Then Focus”¹⁰ guidance by hospital prescribers and promote a multidisciplinary approach to embed good stewardship practices.

Some localities are using community pharmacies to deliver services to patients for minor ailments, rather than making an unnecessary visit to the GP. NHS England’s review of urgent and emergency care expects community pharmacies to play an even greater role as the first port of call for minor ailments, to free up capacity in General Practices. This has the potential to reduce the unnecessary prescribing of antibiotics.

The use and development of prescribing indicators for general practitioners is also expected to deliver improvements in their prescribing practice. This is being complemented by work being led by the DH expert advisory committee on Antimicrobial Resistance and Healthcare Associated Infections (ARHAI) to improve our ability to ensure that those with infections receive the

appropriate antibiotic treatment and minimise the risk of complications. Furthermore, Innovate UK is supporting the development of diagnostic tools to decrease the inappropriate use of antibiotics.

EDUCATION

On the education side, work is underway to promote the use of the joint ARHAI/ PHE national antimicrobial prescribing and stewardship competencies¹¹ amongst trained and trainee medical and non-medical prescribers working within primary and secondary care. This is being supplemented by the work by the UK Clinical Pharmacy Association who will be promoting its expert curriculum on antimicrobial stewardship to support the professional development of pharmacists working within the speciality of antimicrobial stewardship. In addition, PHE and Health Education England (HEE), in collaboration with partners across the health and social care sector in England, are exploring mechanisms to further improve professional education and training on infection prevention and control (IPC), AMR, antimicrobial stewardship and to optimise prescribing.

The Government recognises the importance of supporting and investing in the NHS workforce. The HEE’s mandate¹² includes a specific requirement to ensure that workforce capability, capacity and planning mitigates the

9 Trends in antibiotic prescribing in primary care for clinical syndromes subject to national recommendations to reduce antibiotic resistance, UK 1995-2011: analysis of a large database of primary care consultations. Hawker JI, Smith S, Smith GE, Morbey R, Johnson AP, Fleming DM, Shallcross L, Hayward AC. *J Antimicrob Chemother.* 2014 Aug 4.

10 Antimicrobial stewardship: Start smart -- then focus <https://www.gov.uk/government/publications/antimicrobial-stewardship-start-smart-then-focus>

11 Antimicrobial prescribing and stewardship competencies https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253094/ARHAIprescrcompetencies__2_.pdf

12 Delivering high quality, effective, compassionate care: Developing the right people with the right skills and the right values A mandate from the Government to Health Education England: April 2014 to March 2015 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310170/DH_HEE_Mandate.pdf

risk for AMR and covers the following areas; infection prevention and control, prescribing, administration of medicines and antimicrobial stewardship. In addition it is considering how best to embed antimicrobial prescribing competencies into medical and non-medical prescribers' clinical priorities as an early priority. A similar approach is being applied in Scotland.

4. *It is inevitable that strategic goals such as stewardship of antimicrobials will get lost in the daily tactical decisions made by healthcare staff. We consider it necessary that there are clear responsibilities within all levels of the NHS for better antimicrobial stewardship and we recommend that the Government outline, in its Action Plan for the Strategy, how they will embed those responsibilities across all roles within the NHS and how compliance with the Strategic goals will be monitored and reported. We have concerns that the implementation of new structures and chains of command may exacerbate those difficulties in the short term. (Paragraph 23)*

NHS England provides national leadership for improving outcomes and the quality of care and is committed to tackling key patient safety priorities such as AMR and HCAI (as outlined in Putting Patients First: The NHS England business plan for 2014/15 – 2016/17). NHS England is working to strengthen clinical leadership and promote antimicrobial stewardship and IPC best practice in NHS England and CCGs by the secondment of expert clinicians into each of the four regions, utilisation of existing clinical networks and collaboration with partner organisations. The Patient Safety Domain of NHS England and Regional Patient safety leads are collaborating to align national work with local initiatives.

The NHS Standard Contract is a key enabler for commissioners to secure improvements in

the quality of services for patients and to hold providers of NHS funded care to account. Each provider is required to have an HCAI reduction plan for each contract year (and to comply with its obligations under that plan) that must reflect local and national priorities relating to HCAI including AMR. Under the NHS Standard Contract, commissioners must impose financial sanctions where providers fail to achieve HCAI reduction targets.

CCGs have access to pharmaceutical expertise, leadership and advice. In hospitals, specialist antimicrobial stewardship pharmacists, working alongside microbiologists, infectious disease physicians and infection control teams, have been developing and implementing antimicrobial prescribing policies.

There are examples of local good practice initiatives within CCGs such as whole health economy AMR meetings and the use of local CQUINs to promote antimicrobial stewardship. NHS England will work to share these local initiatives and promote useful resources such as TARGET and Start Smart then Focus, which are designed to support safe, effective, appropriate and responsible antibiotic prescribing and usage in the primary and secondary care sectors respectively.

Quality Surveillance Groups (QSGs) established at a local and regional level across the country regularly bring together local commissioners, regulators and other bodies to provide multi agency surveillance and response to quality and safety issues in all areas of healthcare being provided to their communities.

NHS England's Medicines Optimisation strategy is helping the NHS, professionals and patients to optimise medicines use. The recently published prototype "medicines optimisation dashboard" brings together a

range of medicines-related data in a way never previously done to help CCGs explore how well their local populations are supported to improve medicines use. The dashboard includes two key indicators about antibiotic use.

NHS England is working with Academic Health Science Networks (AHSNs) to establish 15 Patient Safety Collaboratives, that will work across whole local systems and all health care sectors, to deliver locally designed safety improvement programmes drawing on recognised evidence based methods. They will begin their work later in the year. AMR and HCAI / IPC will be included in the key priority areas that each collaborative can choose to focus on. In addition, medication safety networks are being established and will be a further resource to promote good antimicrobial stewardship.

NHS England is actively working with partners to create 5,000 respected, enthusiastic and effective Patient Safety Fellows who will become the backbone of patient safety improvement over the coming decade, making an active contribution to improving safety. The group will launch later this year and may provide further opportunity to share good practice and local initiatives.

In addition, the work by the DH, NHS England and PHE to update the Code of Practice on the prevention and control of infections which applies to all healthcare providers will refocus attention and priority on healthcare associated infections and AMR issues across the healthcare system. Antimicrobial stewardship aspects are already included in the Code but they will be given greater prominence in the updated Code. The Code is an important instrument as it is used by both the Care Quality Commission and providers of regulated activities to check that suitable policies and practice are in place to maintain a focus on HCAI. Further details of

how this is being achieved will be provided in the action plan.

5. *Diagnostics are a key tool in limiting and targeting use of antibiotics. The Government should indicate in its response to this report how it intends to ensure better use of current diagnostic facilities, how it intends to speed up diagnostic provision and how it will ensure that the Catapult for Precision Medicine delivers diagnostics for infectious diseases. (Paragraph 30)*

Work to identify priority areas for improved diagnostics and susceptibility testing to inform and drive antibiotic stewardship is being progressed by an expert subgroup of the HLSG. Work is also under way to accelerate the introduction of new technologies and the future routine use of whole genome sequencing as a priority area for action and a programme of work has been established to address this issue. It will identify priority areas, such as diagnostics for specific infections, point of care tests, explore barriers to the use of diagnostics, identify levers to support systematic adoption of new technologies, consider the future role of new technologies like gene sequencing in routine care and address implications for national and local data collection as well as any research needs.

In addition, the Research Councils have sought research proposals, which build on the expertise of the academic sector and link strongly with the private sector, across a range of areas including accelerating development of new treatments and diagnostics. Up to £20m has been ring-fenced to fund proposals through this research call plus a further £5m for EPSRC to engage engineering and physical sciences (EPS) researchers with the AMR challenge and to develop networks. Further details can be found in the Research Councils response.

Innovate UK has also been working with multiple stakeholders, including industry, the NHS, DH, the Research Councils and Devolved Administrations to consider the scope and focus of the Precision Medicine Catapult and will provide further information on this work over the coming months.

6. We are concerned that Infection Prevention and Control (IPC) does not appear to be delivered in a coherent fashion within the National Health Service. Our key concern is that the integration of antimicrobial resistance measures will be more difficult in the absence of a coherent IPC policy across the NHS. (Paragraph 33)

We note the Committee's concerns about the delivery of IPC across the NHS. PHE is undertaking a review involving specialists in IPC across the NHS to consider this issue. It has identified a number of actions to improve delivery of IPC across health and social care and has been asked by the HLSG to work them into proposals which could be incorporated into the action plan for AMR Strategy.

As mentioned in our response to recommendation 4, the Code of Practice for the Prevention and Control of infections is being updated to help improve delivery of IPC practice and antimicrobial stewardship across the health and care system. We consider that the Director of Infection Prevention and Control has an important role to play in ensuring collaboration and good working practice with others, such as the antimicrobial pharmacist and Drugs and Therapeutics Committee, across the establishment and this point will be re-emphasised when the Code is updated.

7. We acknowledge the success that introducing Healthcare Associated Infection Targets has achieved in reducing the incidence rates of infectious diseases like MRSA and C. difficile. However, it is

now time to design a more sophisticated approach to infection prevention and control that avoids undue reliance on particular antibiotics, thus exacerbating the problem of antibiotic resistance. (Paragraph 36)

We accept the Committee's view that a broader approach to HCAI prevention and control strategies, which goes beyond MRSA and *C. difficile*, is needed. The Department of Health has been working with PHE and NHS England to develop a new framework to drive improvements in infection prevention, antimicrobial resistance and healthcare associated infections in healthcare settings (primary and secondary care). We are currently exploring how best to use readily available data sources in a new way to develop criteria to help improve standards of clinical practice, track trends in infection, share best practice and learning, foster better collaboration across the healthcare system, reduce overall levels of AMR and HCAs and improve patient safety.

DEALING WITH THE INFORMATION GAP

8. It is essential that the Department of Health develop a system for monitoring post-prescription behaviour of patients who have been prescribed a course of antibiotics. That system should be outlined in the Government's Action Plan for Antimicrobial Resistance and should include data from community-based patients. (Paragraph 40)

We understand the intention behind this recommendation but for a number of practical reasons do not think that it is feasible as described. Where administration of antibiotics is supervised by health professionals, for example in hospitals, it is possible to monitor the consumption

of antibiotics and ensure that they are administered as prescribed. However, this may be less feasible for prescriptions issued in primary care.

Community pharmacists routinely advise patients how to take their medicines properly, often supplemented with instructions on the dispensed medicine packaging and the patient information leaflet that comes with the medicine.

The UK AMR Strategy advocates that the lessons of stewardship in hospitals should be extended to primary care and we will be considering how the services provided by antimicrobial stewardship pharmacists could be extended to link with their Clinical Commissioning Group medical and pharmacy colleagues. We will also explore if data from behavioural insights work mentioned in response to recommendation 1 and 3 could provide us with a meaningful indication of antibiotic use in primary care. We will consider if we could make further use of the Clinical Practice Research Datalink to gather data on the clinical effectiveness of antibiotics taken in the community and information on adherence.

9. *The Government recognises that there is a lack of information concerning environmental drivers of antimicrobial resistance. We recommend that the Government publish, in its Action Plan, a research programme that will recruit expertise across the UK to fill the knowledge gaps on how antimicrobial resistance exists and may be transmitted via environmental routes. Hoping that research grant applications to Research Councils will serendipitously gather this necessary information leaves too much to chance. Research Council funding should be, in this important field of study, complementary to Government directed,*

and funded, research programmes. (Paragraph 45)

The Government acknowledges the importance of improving the information on environmental influences on AMR, and this is an area that the Research Councils are addressing. Full details of the Councils research activities will be laid out in their own response to the report but highlights include: the formation of a UK-wide Antimicrobial Resistance Funders Forum (AMRFF), led by the MRC, to coordinate and align efforts in AMR research across all major research funders in the UK; calls for proposals across the range of AMR topics including research into the environmental issues raised on page 23 of the report, as well as human/animal transmission, identifying new targets and potential treatments for bacterial infection and development of new diagnostics. To date, £25m has been ring-fenced from the Biotechnology & Biological Sciences Research Council, EPSRC and MRC funds to support this research. The Natural Environment Research Council (NERC) is leading on behalf of the Research Councils to scope the research questions around the role of the environment and AMR. This is new additional spend on top of the £9m per annum spent on AMR research across the Councils

10. *There is circumstantial evidence that antimicrobial resistance can be transmitted from animal pathogens to human pathogens although the evidence base is incomplete. The Government needs to ensure that this is addressed. We recommend that this is an additional focus of research in the action plan and that in the meantime, the Government takes action to ensure the use of antibiotics in farm animals is strictly required for therapeutic use. (Paragraph 51)*

We agree that the evidence, especially at the level of detailed genetic analysis, shows that all combinations of animal to human, (zoonoses), human to animal, (reverse zoonoses), and recycling of bacteria happen, with acquisition of resistance occurring at any point. The Government recognises the need to strengthen the evidence base to better understand these complex issues, but does not underestimate the extent of the challenge in doing this.

The Government is funding a three year study examining extended spectrum beta-lactamases (ESBLs) associated with *E. coli* bacteria from humans, animals, food, and the environment. The findings of this study are expected to provide additional clarity on transmission of resistance between human and animal bacterial populations. In addition, the Research Councils have recently commissioned new work which aims to tackle AMR research in both humans and animals and the interaction of the two. The Research Councils will respond further to this recommendation.

The Veterinary Medicines Directorate (VMD) has recently expanded the Government surveillance programme that monitors resistance in bacteria of veterinary origin, in line with revised EU legislative requirements, and this contributes to the EU wide surveillance of resistance in zoonotic and commensal bacteria from humans and animals. The VMD also participates in the PHE led English Surveillance Programme for Antibiotic Use and antibiotic Resistance, (ESPAUR), and provides the secretariat for the Defra Antimicrobial Resistance Co-ordination group (DARC). The cross-departmental membership of these committees strengthens antibiotic resistance and antibiotic use surveillance programmes conducted across Government and helps improve integration of human and veterinary data. Arrangements for the future

collection and publication of data from these surveillance programmes are being reviewed and details of the new arrangements will be included in the Strategy's action plan.

The Government is clear that additional controls on the use of antibiotics in animals must be based on evidence, be proportionate to risk, and be aligned with EU controls for veterinary medicines. These are expected to be strengthened as part of the future revision of the EU veterinary medicines legislation. In the meantime Government will continue to emphasise to the veterinary and farming communities that routine preventative use of antibiotics is not acceptable. Specific mechanisms through which Government will further its efforts to engage and challenge veterinary surgeons and animal keepers to focus on responsible use of antibiotics and on antimicrobial resistance will be detailed in the action plan.

11. With regard to the transmission of resistance from animal to human pathogens it is clear that the Government does not hold and is not collating the necessary information. The Action Plan should detail how the Government intends to collect, collate and share this data and have target dates for when this will be achieved. (Paragraph 56)

The Government recognises that there are evidence gaps with regards to understanding the transmission of resistance from animal to human pathogens. Government activity in this area is summarised in the response to paragraph 51. Government notes that in the body of the Select Committee report the text preceding this recommendation highlights a lack of available data regarding which antibiotics are being used, and where, in the veterinary sector.

The VMD is currently exploring options for cost effective Government data collection on veterinary antibiotic use, in order to better

determine antibiotic consumption by livestock sector and production category. Improved and transparent data collection will highlight high consumers, permit benchmarking, and underpin future interventions to address any suboptimal application of antibiotic in livestock production. Detail on how Government intends to collect and share this data, together with target milestone dates, will be included in the action plan.

12. *As the development of new antibiotics and new technologies is dependent on private enterprise working closely with academia, we were disappointed to find that the membership of the Government's High Level Steering Group for the Strategy did not incorporate voices from industry or learned societies. We recommend that the membership of the High Level Steering Group be expanded to include those voices. (Paragraph 66)*

The High Level Steering Group (HLSG) is a cross-Government forum whose role is to oversee the delivery of the AMR Strategy. Since publication of the Strategy in September 2013 industry and learned societies have met with DH to explore how they can best engage and contribute to work to reduce AMR. Industry is actively participating in the EU Innovative Medicines Initiative designed to facilitate the development of safe and better medicines and work with Chatham House to consider alternative business models to stimulate the antibiotic development pipeline. Industry is also contributing to work led by the Department of Health on diagnostics and new business models, as well as work led by the Research Councils. The learned societies have been encouraged to consider how best to contribute to the AMR research agenda, especially with respect to work being led by the Research Councils on new antibiotics, therapies, diagnostics and novel treatments.

The HLSG considered this recommendation and was of the view that industry and other stakeholders are adequately engaged in various fora taking forward work to deliver the Strategy and it was not appropriate for them to be represented on the High Level Steering Group which is comprised of Government bodies.

ECONOMICS OF NEW ANTIBIOTICS

13. *Antimicrobial resistance has the potential to send medicine back to the early 20th century, severely limiting the use of what are now considered basic and routine surgical procedures. The best current defence against this scenario is a strong global pipeline of new drugs, possibly using a range of solutions as described above. But that is dependent on the infrastructure that provides financial incentive to the industries that deliver these technologies including means of compensating for the uncertainties inherent in research and development. (Paragraph 82)*

The Government agrees that we need a sustainable pipeline of new antibiotics so that we can protect the gains made by modern medicine. This is a global problem that needs concerted action at a global level. It is for this reason that the Prime Minister has seized the initiative and requested Jim O'Neill, an economist of international standing, to explore the actions which may be taken by governments around the world to stimulate investment in new antimicrobial drugs. When he starts work this autumn, he will be looking at the full range of issues associated with the development, use and regulation of antibiotics, and will be consulting with a wide range of international stakeholders including

foreign governments, academia, NGOs and the biopharmaceutical industry.

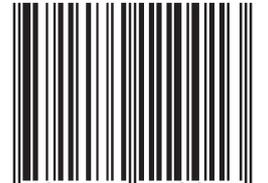
In parallel with this work, the Government is actively encouraging other strands of activity to strengthen research capability and capacity and improved collaborative working through the newly established Health Protection Research units. In addition, the newly established research funder's forum will provide a new mechanism by which to develop new antibiotics, therapies, diagnostics and novel treatments, and will make a significant contribution to this objective. The increased emphasis on diagnostics through the HLSG sub-group, the recent research funder's call and the Longitude prize will also move us nearer to having new techniques to inform prescribing.

14. We agree with the Prime Minister that, if there is no change to the economic landscape for developing new antimicrobials, the pipeline of new antimicrobials will run dry. We also agree that the Government needs to work with researchers, investors, small and medium sized enterprises, large pharmaceutical companies and other Governments to urgently identify appropriate economic models that might encourage the development of new antimicrobials. We hope that the review, which will take almost two years to report back with recommendations, will not delay work on any pricing alternatives that could be agreed with the pharmaceutical industry over a shorter timescale. (Paragraph 83)

We are pleased that the Committee is supportive of our timely and proactive approach to resolve the business model for the development of new drugs and to inform global thinking on how best to achieve a lasting, long-term solution which will ensure a sustainable supply of antibiotics.

Interim conclusions are expected to be published by the Review by the summer of next year, with work to refine and build international consensus around them following and publication of a final report with recommendations in 2016. The Government is, also actively exploring what more can be done nationally to stimulate diagnostics and drug development in the intervening period.

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