



## House of Commons Health and Social Care Select Committee: Antimicrobial Resistance Inquiry

A jointly written response from the Microbiology Society and the Society for Applied Microbiology (SfAM)

### Introduction

1. The Microbiology Society and the Society for Applied Microbiology (SfAM) (see Appendix 1) welcome the opportunity to jointly reflect and make recommendations on the UK Government's antimicrobial resistance (AMR) strategy. AMR is a global microbiological challenge for public health, animal health, food safety and security and sustainable development. Microbiologists in universities, research institutes, the NHS, industry and government are playing a fundamental role in the research, surveillance and control of AMR across all sectors, nationally and internationally.<sup>1</sup>
2. Our response reflects the views expressed by the Societies' expert members working in research and clinical microbiology, in relation to the seven areas for future action presented in the Government's UK Five Year Antimicrobial Resistance Strategy 2013 to 2018.<sup>2</sup>
3. Both Societies are founding members of the Learned Society Partnership on Antimicrobial Resistance (LeSPAR), a partnership of seven learned societies collectively representing around 75,000 scientists. LeSPAR aims to provide a single, unified voice and mobilise the UK's collective research community in order to enhance understanding and knowledge sharing between academia, industry and clinicians.<sup>3</sup>
4. The Microbiology Society is also represented on the Chief Medical Officer's UK AMR Human Health Stakeholder Group.

### Key recommendations

5. While we welcome progress made against the current strategy over the past five years, AMR remains a key immediate and long-term global challenge. The updated strategy should **commit to longer-term action and investment towards the strategic aims in the current Strategy to: "improve knowledge and understanding of AMR"; "conserve and steward the effectiveness of existing treatments"; and "stimulate the development of new antibiotics, diagnostics and novel therapies"**.
6. **A strengthened joined-up 'One Health' approach across human health, agri-food and environmental sectors must be central to both the new strategy and**

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<sup>1</sup> Microbiology Society (2017) Briefing: Antimicrobial Resistance <https://microbiologysociety.org/publication/briefing/antimicrobial-resistance.html>

<sup>2</sup> UK Government (2013) UK 5 Year Antimicrobial Resistance Strategy 2013 to 2018 <https://www.gov.uk/government/publications/uk-5-year-antimicrobial-resistance-strategy-2013-to-2018>

<sup>3</sup> Learned Society Partnership in Antimicrobial Resistance (LeSPAR). Microbiology Society <https://microbiologysociety.org/policy/campaigns/learned-society-partnership-on-antimicrobial.html>

**the considerations of the Health and Social Care Committee's inquiry.** As acknowledged by the Government, Lord O'Neill's AMR Review and the United Nations, non-human dimensions of AMR have a significant impact on public health. Drug-resistant micro-organisms and microbial genes conferring resistance readily arise in and are transmitted between humans, animals, plants and environments such as soil and water sources.

7. **Supporting cross-disciplinary research and innovation on AMR, including through funding, skills, infrastructure and investment incentives must remain a key focus of the updated UK AMR Strategy.** Fundamental and applied research is vital for the understanding and surveillance of AMR, informing policy and interventions, and the development of new antimicrobial drugs, therapies and diagnostics. Support for international research collaborations should also continue, to build on the UK's status as a global leader in AMR research.
8. **The revised UK AMR Strategy should have a broadened focus on addressing emerging threats from resistance to all antimicrobials, especially antifungals<sup>4</sup> and antivirals,** alongside the current predominant focus on the larger challenge of antibiotic resistance.
9. **Embedded within all aspects of the new strategy should be robust evidenced approaches and evaluation of these, including standardised and open data collection and sharing.**
10. **The new UK AMR Strategy should undergo a period of public consultation, and ongoing evaluation in consultation with stakeholders** Success will depend on buy-in from, and collaboration with, stakeholders and the public, including the scientific, public health and veterinary communities.

## **Better identification and prioritisation of AMR research needs**

### *Research Priorities*

11. **The new UK AMR Strategy should ensure sufficient support in terms of funding, networks, infrastructure and skills to address research priorities and gaps that have been identified for AMR across One Health, for example, by the Antimicrobial Resistance Funders' Forum (AMRFF) and other bodies such as the Food Standards Agency's AMR 'Task and Finish' group.<sup>5,6</sup>**

### *Interdisciplinary research*

12. **The new UK AMR Strategy should commit to further specific funding and support for interdisciplinary AMR research, building on collaborative links and research enabled by previous initiatives.** Members have welcomed the Research Councils' Cross-Council Initiative (CCI) funding for interdisciplinary AMR research under the current AMR strategy, stating it has facilitated research outcomes, ongoing collaboration and new ways of thinking. Members of both societies have expressed a concern that there is now no additional funding available through this initiative.
  - a. For example, our members were involved in the EPSRC 'Bridging the Gaps' funding call. This £5 million fund was successfully utilised by 11 UK Universities to pump prime research projects, bringing together

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<sup>4</sup> Microbiology Society (2016) Briefing: Human Fungal Diseases  
<https://microbiologysociety.org/publication/briefing/human-fungal-diseases.html>

<sup>5</sup> Antimicrobial Resistance Funders' Forum (AMRFF)  
<https://mrc.ukri.org/research/initiatives/antimicrobial-resistance/antimicrobial-resistance-funders-forum/>

<sup>6</sup> Advisory Committee on the Microbiological Safety of Food (2018) 'Task and finish group'  
[https://acmsf.food.gov.uk/sites/default/files/acm\\_1255\\_a\\_amr\\_paper.pdf](https://acmsf.food.gov.uk/sites/default/files/acm_1255_a_amr_paper.pdf)

microbiologists, engineers, physicists, chemists and social scientists.<sup>7</sup> Such cross-disciplinary projects would have been difficult to wholly fund before the establishment of the CCI.

13. It is important also to note that the AMR Funders Forum (AMRFF) has played a crucial role in facilitating communication between the Research Councils and other funders including BEIS, PHE and the Wellcome Trust.

#### *Research skills and capacity*

14. **The new UK AMR Strategy should address fundamental and applied scientific skills and capacity needs for tackling AMR, including in microbiology.** The AMRFF has reviewed AMR research skills and capacity in the UK, identifying microbiology, data science and interdisciplinary research as key vulnerabilities.<sup>8</sup> The review noted “...shortages of veterinary and clinical microbiologists. Current leadership in these fields is reaching retirement and recruitment is proving challenging.” Lord O’Neill’s AMR Review also highlighted the need to strengthen the pipeline of scientific talent and skills needed to tackle infectious diseases and AMR.<sup>9</sup>
15. In November 2017 LeSPAR convened a multi-disciplinary workshop for early career researchers on diagnostics for infectious disease. Participants identified a number of career development challenges at the workshop, including a lack of support for the transition to independent researcher status and limited engagement with social scientists, clinicians and industry.

#### *Government engagement with the scientific community*

16. **We encourage the Government to engage more closely with learned Societies and the wider scientific community over the course of the new strategy to better enable our communities to engage with the strategy, opportunities arising, and help work towards its aims.** Both Societies have been proactive in supporting the microbiology community to tackle AMR, including engaging with research funders and policy-makers and providing support for public engagement, professional development, networking and knowledge exchange. For example:
  - a. As members of LeSPAR we have held interdisciplinary workshops involving researchers and funders to identify the research communities’ needs and scientific challenges, and to support early career researchers.<sup>10</sup>
  - b. The Microbiology Society has also listened to researchers engaged in interdisciplinary research and launched a pop-up journal to provide a home for publications arising from interdisciplinary projects - *X-AMR*.<sup>11</sup> We hope to provide a platform for supporting, developing and educating this research community.

### **Improving infection prevention and control practices**

17. **Prevention of infection, not just for specific pathogens but for the overall burden of infection, must remain a key focus to maximise benefits from better**

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<sup>7</sup> ‘Bridging The Gaps’ Universities

<https://www.southampton.ac.uk/namrip/namra-uk.page>

<sup>8</sup> AMR Funders Forum (2018) Research capacity and skills review

<https://mrc.ukri.org/documents/pdf/amr-research-capacity-and-skills-review-2018/>

<sup>9</sup> Review on Antimicrobial Resistance (2016) Tackling drug-resistant infections globally

[https://amr-review.org/sites/default/files/160525\\_Final%20paper\\_with%20cover.pdf](https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf)

<sup>10</sup> LESPARE (2015) Workshop series summary

<https://microbiologysociety.org/uploads/assets/uploaded/7459c22b-e9d3-4d72-a2dc05ffdb0cc1d3.pdf>

<sup>11</sup> Microbiology Society (2018) About X-AMR

<http://www.microbiologyresearch.org/about/x-amr>

**stewardship and use of antimicrobials and novel therapeutics.** Both Societies welcome the progress made within the NHS to tackle *C. difficile* and MRSA infections.<sup>12</sup> Despite this, there is still a need to reduce *all* infections – as resistance is not yet decreasing overall. For example, infections caused by Gram-negative bacteria are increasing and sexually-transmitted drug-resistant gonorrhoea is a growing problem, with the UK's first pan-drug resistant infection case reported in 2017.<sup>13,14</sup>

18. **The Government also needs to provide further funding and support for research that improves the evidence base for Infection Prevention and Control measures;** a clinical microbiologist specialising in Infection Prevention and Control raised a concern that the lack of available evidence may be impeding the pace of change in healthcare practices.

## **Optimising prescribing practice**

### *Clinical settings*

19. **The new UK AMR Strategy must continue to focus efforts on development of rapid, point of care diagnostics** (see paragraph 22), **tools and information for patients and prescribers, and improved collection of data and evidence to further optimise prescribing practices.** Specific examples of current good practice highlighted by our members included:
- Public Health England's (PHE) TARGET Antibiotic Toolkit provides prescribers with tools to have a discussion with patients about antibiotics, managing expectation and attitude toward antibiotics.<sup>15</sup> This should be incorporated into routine clinical practice for all GPs.
  - The Health Improvement Network (THIN) database has proved a rich source of patient data which are being used to understand potential gaps in prescribing practices. An analysis from February 2018 reported that nearly one-third of antibiotic prescriptions between 2013-2015 in English primary care centres could not be linked to a clinical condition, indicating that efforts to improve documentation may be required.<sup>16</sup>

### *Stewardship and prevention in agriculture and aquaculture*

20. **The new UK AMR Strategy should further promote and build on antimicrobial stewardship efforts made within the agricultural and aquaculture industries by increasing support for knowledge exchange and best practice development between farmers, veterinarians and scientific experts.**
- For example, a member helped inform the non-profit Responsible Use of Medicines in Agriculture Alliance's (RUMA) 2017 Target Task Force Report, which advocated the use of appropriate vaccines to reduce antibiotic usage, based on the success of vaccinating salmon against furunculosis.<sup>17</sup>

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<sup>12</sup> UK Government (2016) Reducing infections in the NHS

<https://www.gov.uk/government/news/reducing-infections-in-the-nhs>

<sup>13</sup> Public Health England (2017) Preventing healthcare associated Gram-negative bloodstream infections

[https://improvement.nhs.uk/documents/984/Gram-negative\\_IPCresource\\_pack.pdf](https://improvement.nhs.uk/documents/984/Gram-negative_IPCresource_pack.pdf)

<sup>14</sup> WHO (2017) Antibiotic-resistant gonorrhoea on the rise

<http://www.who.int/news-room/detail/07-07-2017-antibiotic-resistant-gonorrhoea-on-the-rise-new-drugs-needed>

<sup>15</sup> RCGP TARGET Antibiotic Toolkit

<http://www.rcgp.org.uk/clinical-and-research/resources/toolkits/target-antibiotic-toolkit.aspx>

<sup>16</sup> Journal of Antimicrobial Chemotherapy (2018) Antibiotics in primary care in England

[https://academic.oup.com/jac/article/73/suppl\\_2/ii2/4841822](https://academic.oup.com/jac/article/73/suppl_2/ii2/4841822)

<sup>17</sup> Ruma (2017) Targets task force report

<https://www.ruma.org.uk/wp-content/uploads/2017/10/RUMA-Targets-Task-Force-Report-2017-FINAL.pdf>

## **Improving professional education, training and public engagement**

21. **Public engagement and awareness raising, and professional education and training must remain a key focus of the new UK AMR Strategy.** Both the Microbiology Society and SfAM work to support the microbiology community to raise awareness of AMR and key issues among scientific and policy communities and the public. We welcome efforts by the Government in this area, including the Public Health England antibiotic awareness and Antibiotic Guardian campaigns. However, there is evidence that further work is needed to raise awareness and understanding, including a survey carried out by the Wellcome Trust.<sup>18</sup>
22. **The Government could collaborate further with Royal Colleges, professional bodies, learned societies and higher education institutions to ensure AMR, including content on wider public health implications and stewardship, is embedded into curricula and streamlined across disciplines.** Examples of good practice highlighted by our members included:
  - a. A Microbiology Society member working at St George's University, London, is involved in running a new MRes course on AMR, the first stand-alone course in the UK.<sup>19</sup>
  - b. An SfAM member highlighted that their institution's veterinary school had been quick to actively engage students on issues relating to AMR. This can help embed antibiotic stewardship practices early in a veterinary career.

## **Developing new drugs, treatments and diagnostics**

### *Diagnostics*

23. **Funding and incentivising research into rapid diagnostics tests should remain a Government priority within the next AMR strategy. Furthermore, the new strategy should promote and support clear pipelines for translating diagnostic research into routine clinical practice.**
24. The 2013-18 Strategy and O'Neill review identified significant gaps in the development of rapid and point-of-care diagnostics. Major efforts are still needed in this area. Innovation in diagnostics development must be set in the context of One Health as the veterinary and agricultural sectors remain in dire need of rapid diagnostics. Examples provided by members identified a number of areas requiring support.
25. *Technology:* Point-of-care and rapid diagnostics are currently not accurate, fast or cheap enough. Technology must be improved so that fundamental questions, such as whether a sore throat is due to a bacterial or viral infection, may be answered in a GP's office or at the bedside. By contrast, microbiologists and technicians in clinical laboratories can answer hundreds of questions over a longer timeframe, but require increased capacity. Advances in genome sequencing technologies have signalled some positive developments, including:
  - a. The launch of the National Mycobacterial Reference Whole Genome Sequencing service by Public Health England.<sup>20</sup>

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<sup>18</sup> Wellcome Trust (2015) Exploring the consumer perspective on antimicrobial resistance  
<https://wellcome.ac.uk/sites/default/files/exploring-consumer-perspective-on-antimicrobial-resistance-jun15.pdf>

<sup>19</sup> St George's University of London, Biomedical Science MRes – Antimicrobial Resistance  
<https://www.sgul.ac.uk/study/postgraduate/taught-degrees-postgraduate/biomedical-science-mres-antimicrobial-resistance>

<sup>20</sup> UK Government (2017) England world leaders in the use of whole genome sequencing to diagnose TB  
<https://www.gov.uk/government/news/england-world-leaders-in-the-use-of-whole-genome-sequencing-to-diagnose-tb>

- b. The development of computer programmes such as the Mykrobe Predictor software,<sup>21</sup> which can quickly analyse bacterial DNA from a patient's infection and predict which antibiotics will work, and which will fail due to drug resistance.
26. *Research support*: Members highlighted that diagnostics research requires more promotion and incentivisation. Furthermore, stimulating collaboration between patients, clinicians, and researchers from academia and industry is essential.
- a. The creation of the NIHR-funded Diagnostic Evidence Co-operative centres (now labelled the NIHR Medtech and In vitro diagnostics Co-operatives) signalled an important step towards improved collaboration.<sup>22</sup>
  - b. Funds such as the Longitude Prize are crucial to incentivise new research into game changing technologies.<sup>23</sup>
27. *Implementation*: There are a number of barriers to uptake of new diagnostics, including cost, cooperation and lack of standardisation.
- a. SfAM is represented on the UK Antimicrobial Diagnostics Collaborative (ADC), which has been recently formed by NHS England to assess the possibility and feasibility of rapid diagnostics in the NHS.
  - b. A recent European Commission report that points to issues affecting the utilisation of diagnostic and susceptibility tests in agriculture, including time, cost and availability constraints.<sup>24</sup>
  - c. Clinicians, hospital and public health staff need to be better integrated with microbiology clinicians and diagnostic lab technicians, to promote better understanding of the strengths, weaknesses and interpretation of different diagnostic tests.
  - d. Clinical tests for AMR remain only partly standardised across Europe and globally. The European Committee on Antimicrobial Susceptibility Testing (EUCAST)<sup>25</sup> was noted as one development addressing this, as was the Standards for Microbiology Investigations (SMI), which are an important tool to standardise laboratory practices across the UK.<sup>26</sup>

#### *Vaccine and therapeutics development*

28. **The urgent need for new antimicrobial drugs and therapies has not shifted, and the UK Government Strategy should continue to emphasise the importance of R&D efforts in this area.** Members indicated that economic incentives to develop new drugs on a grand scale are still lacking, but highlighted promising initiatives to accelerate innovation in this field, such as CARB-X, the Global Antibiotic Research

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<sup>21</sup> Mykrobe Predictor

<http://www.mykrobe.com/>

<sup>22</sup> NIHR Medtech and In vitro diagnostics Co-operatives (MICs)

<https://www.nihr.ac.uk/about-us/how-we-are-managed/our-structure/infrastructure/Documents/medtech-and-in-vitro-diagnostic-co-operatives.htm>

<sup>23</sup> Longitude prize

<https://longitudeprize.org>

<sup>24</sup> European Commission (2018) Measures to tackle antimicrobial resistance through the prudent use of antimicrobials in

animals <https://publications.europa.eu/en/publication-detail/-/publication/aa676ddd-2d87-11e8-b5fe-01aa75ed71a1/language-en>

<sup>25</sup> <http://www.eucast.org>

<sup>26</sup> UK Government (2014) Standards for microbiology investigations (SMIs)

<https://www.gov.uk/government/collections/standards-for-microbiology-investigations-smi>

and Development Partnership (GARDP) and the New Drugs for Bad Bugs project.<sup>27,28,29</sup>

29. Our members are involved in a variety of research in this area, but highlighted that more focus is needed on what are currently still under-researched areas including vaccines, the development of alternatives to antibiotics (e.g. phage therapy: using viruses that target bacteria) and antifungal treatments.<sup>30 31</sup>

### **Better access to and use of surveillance data**

30. **Members of both Societies have emphasised that there is a continued need for new approaches for the collection of AMR surveillance data, along with better access to and use across human health, agriculture and the environment.**
31. Participants at the Microbiology Society's Focused Meeting on AMR and One Health identified that surveillance data for the same resistant organism or gene in humans, animals and environments is often not joined up or may not be collected in a non-human health context making it challenging to advise on One Health policies and interventions. They called for experts across all sectors to agree to common methods, standards and data sharing for enhanced One Health monitoring of AMR.<sup>32</sup>
32. Members welcomed the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) initiative,<sup>33</sup> highlighting it as a world-leading and positive step forward for improving AMR surveillance. PHE has also led the way by making this data publicly accessible through the online 'Fingertips' tool, which presents public health data and indicators at the local level.<sup>34</sup>
33. There should be more emphasis on the use of new technologies and approaches to collect and utilise surveillance data. For example, there is now evidence from pilot studies that it is possible to use genome sequencing to trace the source of MRSA outbreaks in hospital and community settings. This technology is potentially important for AMR surveillance and epidemiology, but further work is needed to scale up to larger populations.<sup>35</sup> A Microbiology Society member also noted work by PHE implementing whole genome sequencing for surveillance of AMR in gastrointestinal pathogens, including *E. coli*, *Salmonella*, *Shigella* and *Campylobacter* species.

### ***Agriculture***

34. It is encouraging that the latest the UK Veterinary Antibiotic Resistance and Sales Surveillance (VARSS) report indicates reduced sales of veterinary antibiotics below

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<sup>27</sup> Wellcome (2017) We are pledging \$155m to tackle drug-resistant infections

<https://wellcome.ac.uk/news/we-are-pledging-155m-tackle-drug-resistant-infections>

<sup>28</sup> Wellcome (2017) Wellcome joins £52 million global drive on antibiotic resistance

<https://wellcome.ac.uk/news/wellcome-joins-52-million-global-drive-antibiotic-resistance>

<sup>29</sup> New Drugs for Bad Bugs

<https://www.imi.europa.eu/projects-results/project-factsheets/nd4bb>

<sup>30</sup> LESPAP (2015) Workshop series summary

<https://microbiologysociety.org/uploads/assets/uploaded/7459c22b-e9d3-4d72-a2dc05ffdb0cc1d3.pdf>

<sup>31</sup> Microbiology Society (2017) Unlocking the Microbiome: Opportunities and Challenges of Microbiome Research for Health, Agriculture, Environment and Biotechnology. <https://microbiologysociety.org/policy/microbiome-policy-project/unlocking-the-microbiome-report.html>

<sup>32</sup> Microbiology Society (2018) Antimicrobial resistance and One Health

<https://microbiologysociety.org/publication/past-issues/imaging/article/policy-antimicrobial-resistance-and-one-health.html>

<sup>33</sup> Public Health England (2017) English Surveillance Programme for Antimicrobial Utilisation and Resistance

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/656611/ESPAUR\\_report\\_2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/656611/ESPAUR_report_2017.pdf)

<sup>34</sup> Public Health England, AMR local indicators

<https://fingertips.phe.org.uk/profile/amr-local-indicators>

<sup>35</sup> NCBI (2017) Longitudinal genomic surveillance of MRSA in the UK reveals transmission patterns in hospitals and the community

<https://www.ncbi.nlm.nih.gov/pubmed/29070701>

the government target of 50mg/kg, 2 years ahead of the deadline.<sup>36</sup> However, usage measurements are based on registered sales of antibiotics, and so more work can be done to understand how veterinary drugs are used once they are sold.

### *AMR in the environment*

35. The measurement and surveillance of AMR spread in the environment remains an overlooked area that requires much more work. Focusing on wastewater as an example, we need a joined-up understanding of how waste from hospitals, pharmaceutical factories, municipal wastewater treatment plants and farms affect the rise and spread of drug-resistant microorganisms in our rivers and waterways.
- a. Data-collection and modelling projects, such as the Centre for Ecology & Hydrology's (CEH) investigation of AMR in the Thames catchment area, are crucial to understanding environmental impact.<sup>37</sup>
21. Appropriate legislation is a powerful tool to promote surveillance:
- a. The EU Water Framework Directive has a watch list of pollutants to monitor in water systems, which has recently been revised to include three macrolide antibiotics, amoxicillin and ciprofloxacin.<sup>38</sup>
  - b. However, there is no requirement to monitor the release of drug-resistant microbes (and hence AMR genes) into water systems.
22. **The future AMR strategy should provide a plan to increase monitoring of AMR threats in the environment. This should be closely linked with the development of the government's new Agricultural Bill.**

### **Strengthened international collaboration**

36. **The new UK Government AMR Strategy should seek to promote and strengthen the UK's position as an international leader in research and data sharing efforts.** Tackling AMR is a significant global priority that requires effective international cooperation. A key example is the detection of the transferrable colistin resistance gene (*mcr1*) in 2015 across China, the UK and Europe, leading to efforts by the EU to reduce colistin use in animals.<sup>39</sup>
37. The UK is a key driver behind international research efforts, particularly through Official Development Assistance (ODA) funding. This contribution has been important to support AMR research and antibiotic stewardship in low and middle-income countries. Members cited the Newton Fund and UK Global AMR Innovation Fund as key funders of multinational research projects.<sup>40</sup>
38. **In light of the UK leaving the European Union, it is crucial that the new strategy focuses on maintaining links with initiatives across Europe as well as globally, to prepare for and respond to antimicrobial resistance threats.** Key examples highlighted by our members include:

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<sup>36</sup> UK Government (2017) Veterinary Antimicrobial Resistance and Sales Surveillance 2016

<https://www.gov.uk/government/publications/veterinary-antimicrobial-resistance-and-sales-surveillance-2016>

<sup>37</sup> CEH (2017) AMR in the Environment

<https://www.ceh.ac.uk/our-science/projects/amr-environment>

<sup>38</sup> Official Journal of the European Union (2018) Commission implementing decision (EU)

<https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32018D0840>

<sup>39</sup> GOV.UK blog APHA science (2016) Colistin: an antibiotic of last resort

<https://aphascience.blog.gov.uk/2016/11/18/colistin-an-antibiotic-of-last-resort/>

<sup>40</sup> (a) MRC, The Newton Fund <https://mrc.ukri.org/funding/science-areas/international-and-global-health-research/the-newton-fund/>; (b) UK Government, £30 million of funding to tackle antimicrobial resistance

<https://www.gov.uk/government/news/30-million-of-funding-to-tackle-antimicrobial-resistance>

- a. *Multinational funding initiatives* such as the Joint Programming Initiative on AMR (JPI-AMR).<sup>41</sup> The UK (through the Medical Research Council) has co-funded three out of eight funding calls, enabling UK researchers to coordinate and contribute to 26 international research projects to date.<sup>42</sup>
- b. *Joint surveillance programmes* including the EU Horizon 2020 Compare project and the Harmonised Monitoring Programme.<sup>43</sup>
- c. *Data and material sharing networks* such as the European Reference Laboratory Network (EURL) on AMR and the European Antimicrobial Resistance Surveillance Network (EARS-Net).<sup>44</sup>

## **Appendix 1**

### **About the Microbiology Society**

39. The Microbiology Society is a membership charity for scientists interested in microbes, their effects and their practical uses. It is one of the largest microbiology societies in Europe with a worldwide membership based in universities, industry, hospitals, research institutes and schools.
40. Our principal goal is to develop, expand and strengthen the networks available to our members so that they can generate new knowledge about microbes and ensure that it is shared with other communities. The impacts from this will drive us towards a world in which the science of microbiology provides maximum benefit to society.

### **About the Society for Applied Microbiology**

41. The Society for Applied Microbiology (SfAM) is the oldest microbiology society in the UK, representing a global scientific community that is passionate about the application of microbiology for the benefit of the public. Our Members work to address issues involving the environment, human and animal health, agriculture and industry. SfAM works in partnership with sister organizations and microbiological bodies towards enabling microbiologists to inform policymaking within the UK, in Europe and worldwide.

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<sup>41</sup> Jpiamr, <https://www.jpiamr.eu/>

<sup>42</sup> Based on announcements of funded projects on the JPIAMR website, as of 04 July 2018.

<sup>43</sup> See recent responses to the House of Lords EU Energy and Environment Sub-Committee inquiry on Brexit: Plant and Animal Biosecurity inquiry (a) Microbiology Society: <https://microbiologysociety.org/uploads/assets/uploaded/3d8b031f-e5aa-4777-99927926e515ce24.pdf>; (b) SfAM: <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-energy-and-environment-subcommittee/brexit-plant-and-animal-biosecurity/written/81399.pdf>

<sup>44</sup> a) EURL: <https://www.eurl-ar.eu/>; (b) EARS-Net: <https://ecdc.europa.eu/en/about-us/partnerships-and-networks/disease-and-laboratory-networks/ears-net>