

Joint response to the consultation by the Commons S&T Committee on the lessons from the Ebola outbreak for the UK about the use of scientific advice in similar emergencies

September 2015

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## Summary

- We commend the UK government's significant contributions in bringing the Ebola crisis under control once a response was initiated. However the international response to the Ebola outbreak should have been mobilised sooner.
- We would strongly support long-term, sustainable efforts by the Government, in conjunction with WHO and other partners, to build improved surveillance and public health response capacity globally, especially in low-income countries where outbreaks are most likely to occur.
- The UK is fortunate in having some of the world's foremost scientific and medical experts on emergency preparedness. There are well developed systems in place to bring outbreaks under control through various government departments and arms-length bodies including the Department of Health, Public Health England (PHE), and the Cabinet Office. The Government must ensure that financial constraints faced by the health and public health system do not adversely affect the ability of the NHS and PHE to deal with future public health emergencies.
- The leading role played by PHE to deploy medical experts and epidemiologists to the affected areas was hugely valuable in managing the Ebola outbreak. However, more needs to be done to reduce the barriers to this deployment, in order to ensure a more effective response to similar emergencies in the future.
- The Government has established scientific advisory networks through the Chief Scientific Advisors, and advisory committees such as Scientific Advisory Groups for Emergencies and the Advisory Committee on Dangerous Pathogens. The membership of SAGE should be kept under review to ensure an appropriate balance of academic and agency representatives. It would be valuable to draw on the knowledge of front-line clinicians as a source of scientific advice to allow informed decision-making, in addition to advice from the existing public health, virological, epidemiological and modelling experts. National academies can play a valuable convening role for experts ahead of, during and after emergencies, and assist the horizon scanning efforts of government.
- It can be difficult to foresee infectious disease threats arising from previously unknown infections and the National Risk Register (NRR) should be kept under review in light of emerging disease threats. A more detailed appraisal of the risks posed by specific potential infectious diseases might be useful.
- On the whole we are pleased with the guidance and information provided by the Government to the UK public about the Ebola emergency. However the basis for the decision to introduce voluntary screening at airports is not clear to us. The

Government should be transparent about why certain decisions have been made, particularly if they appear not to be supported by scientific evidence.

- Rapid access to definitive diagnosis is crucial. Barriers that cause delays to timely access to diagnostic facilities, particularly logistics of transport arrangements should be addressed. We welcome the current research being undertaken by PHE scientists for the development of a rapid diagnostic system suitable for detection of Ebola virus infection in the field.
- The UK should capitalise on its strong research base to conduct research before, during and after an epidemic. The Department of Health and research agencies should agree in advance what research questions should be addressed during an epidemic. Appropriate mechanisms including pre-agreed protocols, relevant approvals, funding and infrastructure should be put in place beforehand to ensure that data gathering and research can be initiated within days in a public health emergency situation.
- It is crucial that research data on disease outbreaks are shared quickly and made openly available in a standardised format. The Government should work with partners to develop an appropriate system to collect and share real-time data to enable effective outbreak research modelling and clinical studies.
- While recent Government support for vaccines R&D has been encouraging, it does not go far enough, and vaccine biomanufacturing capacity in the UK is not on the same scale as in other countries. We urge the Government to continue to prioritise the rapid development of vaccines against the major outbreak pathogen threats.
- Given the unpredictable nature of emerging infectious diseases threats, it is important to invest in infrastructure to support research across a broad range of such threats in both human and animal populations.

## Introduction

1. The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure that these are translated into healthcare benefits for society. Our elected Fellowship comprises some of the UK's foremost experts in medical science, drawn from a diverse range of research areas, from basic research, through clinical application, to commercialisation and healthcare delivery.
2. The Royal Society is the national academy of science for the UK. It is a self-governing Fellowship of many of the world's most distinguished scientists working across a broad range of disciplines in academia, industry, charities and the public sector. The Society draws on the expertise of the Fellowship to provide independent and authoritative scientific advice to UK, European and international decision makers.
3. The Academy of Medical Sciences and the Royal Society welcome the opportunity to contribute to this inquiry on how government can mobilise scientific advice rapidly to prepare for and respond to emergencies. We have previously responded to a number of consultations that are relevant to this inquiry.<sup>1,2,3,4</sup> Our

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<sup>1</sup> Academy of Medical Sciences response to House of Lords Science and Technology Select Committee inquiry into 'pandemic influenza' (2005) <http://www.acmedsci.ac.uk/viewFile/publicationDownloads/Pandemic.pdf>

<sup>2</sup> Academy of Medical Sciences response to BIS Consultation (2010) *Guidelines on scientific analysis in policy making* <http://www.acmedsci.ac.uk/viewFile/publicationDownloads/Academy.pdf>

response is based on the views of our Fellows and other experts, many of whom have worked as advisers to Government, for example as members of scientific advisory groups. This response focuses on lessons learnt from the Ebola outbreak; however, many of the issues raised are likely to be of relevance to other infectious disease outbreaks.

**Question 1: How prepared is the Government for a similar type of emergency? Is it effectively mitigating and increasing resilience to the disease hazards identified in the National Risk Register?**

4. Emergencies are often hard to predict and it is important to improve preparedness by putting in place measures to improve the quality of evidence to build resilience in advance, and ensure that structures are in place to enable governments to act quickly when an emergency happens.
5. Mitigation and resilience to disease hazards rely on **effective detection and response**. Early detection is crucial since the earlier an outbreak is detected the easier it is to control. Our ability to detect outbreaks is dependent on the vigilance of front line medical and veterinary personnel and on the strength of our disease surveillance systems. Surveillance can be a 'hard sell' since it must balance the risk of an outbreak with the limited resources for monitoring. But the cost of surveillance has to be set against the enormous cost of an occasional pathogen establishing itself undetected, as with foot-and-mouth disease in the UK in 2001, or Ebola in West Africa in 2014. The information derived from infectious disease surveillance can be extremely valuable, notwithstanding that it may show absence of a disease threat.
6. In an increasingly interconnected world, the UK must consider ways to improve detection and containment of outbreaks that occur overseas before they reach UK shores. Some countries in the world need better healthcare and scientific infrastructure to deal with these sorts of threats. Supporting such improvements would help to ensure that the impact on countries elsewhere will be considerably lessened. In addition, future risk can be reduced by supporting the recovery of affected countries. This is already being done via training and laboratory capacity building in Sierra Leone, but it requires long-term funding and practical assistance. **The UK Government must invest in and strengthen detection and response capability globally, especially in places where additional support is needed.** Efforts should also be made to strengthen the global health governance system, and to develop new techniques to strengthen monitoring and evaluation of global health capacity building. We highlight the very effective leadership role played by the UK's Chief Medical Officer (CMO) in international efforts to respond to antimicrobial resistance. The recently announced Fleming Fund<sup>5</sup> to tackle the growing problem of drug-resistant infection by building laboratory capacity, surveillance networks and response capacity in low- and middle-income countries is also a very welcome contribution to this.

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<sup>3</sup> Royal Society and Academy of Medical Sciences (2006) *Pandemic influenza: Science into Policy* <http://www.acmedsci.ac.uk/viewFile/publicationDownloads/Pandemic.pdf>

<sup>4</sup> G7 Science Academies' statement (2015) *Infections Diseases and Antimicrobial Resistance: Threats and Necessary Actions* <https://royalsociety.org/-/media/news/2015/G7-2015-infectious-diseases.pdf>

<sup>5</sup> <http://www.wellcome.ac.uk/News/Media-office/Press-releases/2015/WTP058933.htm>

7. With respect to an effective response, the challenge is to be prepared for a very wide range of possible epidemiological scenarios. The UK government ordered a national exercise involving ministers, government departments, and expert medical professionals from ambulance services, hospitals and Public Health England (PHE) to test preparedness for Ebola in the UK as part of its contingency planning. Such contingency plans and exercises are helpful, but there needs to be an emphasis on flexibility and adaptability, without becoming too focussed on the specifics of the scenario under consideration.
8. There needs to be rapid access to definitive diagnosis since early recognition and isolation of cases are keys to case management. Rapid diagnostic tests, especially those that can be completed at the point of care, will improve our ability to detect and control Ebola outbreaks. We understand that PHE scientists are heading a consortium researching a rapid 'in the field' Ebola test, following the successful award of EU-funded Innovative Medicines Initiative (IMI) funding.<sup>6</sup> Currently, patient samples are sent to PHE for testing for quality assurance purposes. Barriers that cause delays to timely access of diagnostic facilities, particularly logistics of transport arrangements should be addressed, since timely laboratory confirmation can reduce opportunities for transmission.
9. The availability of vaccines is often crucial for rapid response in the event of an epidemic. Currently there are few, if any, effective vaccines for outbreak pathogens. The Ebola crisis has shown that vaccines can be developed quickly and effectively when there is a scientific basis, backed up by political support and funding. We welcome the UK Government's announcement at the G7 summit in Germany to commit £20 million investment towards a new UK Vaccines Research and Development Network. The fund is a small sum but a good start. **We urge the Government to continue to prioritise the rapid development of vaccines against the major pathogens that threaten the UK.** Vaccine biomanufacturing capacity in the UK is not on the same scale as in other countries. Efforts to increase the UK's large-scale vaccine manufacturing capacity should also be prioritised.
10. The UK is fortunate in having some of the world's foremost scientific and medical experts on emergency preparedness. The existence of national agencies such as the Department of Health (DH) and Public Health England (PHE), in addition to the Cabinet Office, scientific advisory committees such as Scientific Advisory Groups for Emergencies (SAGE) and the Advisory Committee on Dangerous Pathogens (ACDP) means that the UK government has the systems and processes in place to be in a good position to mobilise a rapid response to future pandemics. **The Government must ensure that financial pressures on the health and public health system do not adversely affect the ability of the NHS and PHE to deal with future public health emergencies.**
11. It is important to note that SAGE draws on expertise from other sources including scientific advice committees such as the ACDP. ACDP advises the Health and Safety Executive, and Ministers for the Department of Health and the Department

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<sup>6</sup> <https://www.gov.uk/government/news/ebola-1-million-grant-to-develop-in-the-field-test>

for the Environment, Food and Rural Affairs and their counterparts in the devolved administrations, on all aspects of hazards and risks to workers and others from exposure to pathogens and risk assessment advice on Transmissible Spongiform Encephalopathies (TSEs). In the case of the Ebola outbreak, the ACDP had already produced guidance on management of viral haemorrhagic fever (caused by viruses such as Ebola, Lassa, and Marburg) and updated this in 2014.<sup>7</sup> The document was hugely valuable as a framework for clinical management and guidance for the development of a detailed response to the outbreak. This means that there is now an enhanced viral haemorrhagic fever (VHF) management system to care for larger numbers of patients. This includes contingency measures should the High Level Isolation Unit become overwhelmed. The UK Department of Health also formulated an Ebola modelling group which provided advice to the SAGE for Ebola on the scale of capacity required in Sierra Leone.

12. The National Risk Register of Civil Emergencies (NRR) identifies several significant disease hazards, and lists pandemic influenza as one of the highest priority risks.<sup>8</sup> Much of the UK's efforts on emergency preparedness for diseases have been directed towards pandemic flu. However, it is important to acknowledge that the Risk Register is not comprehensive and could never be, given that many infectious disease emergencies involve previously unknown infectious agents (BSE, SARS and bluetongue are recent examples). There needs to be an acceptance of the unpredictable nature of some of these threats. It has been suggested that the National Risk Assessment is a 'broad brush' view of all risks, so it might be useful to have a more detailed technical appraisal of the risks posed by specific potential emerging infectious diseases. We highlight here that it is important to keep the risks in perspective. Many infectious diseases, such as tuberculosis, develop more slowly, but kill many more people than the acute epidemics such as Ebola that attract media attention, and garner huge public interest.
13. Although emergencies are hard to predict, we are able to use our current knowledge to identify areas of possible future risk. This knowledge enables governments to plan for such risks and build resilience to these to reduce the impact on people when they happen.
14. However there are challenges that must be overcome to build resilience to possible future risks. There is often limited information available on which governments can make these decisions, and often not in a form that is useful to decision makers. In its recent report on *Resilience to extreme weather* the Royal Society considered these challenges specifically for building resilience to extreme weather events around the globe. However the recommendations of this report are relevant to other emergencies. Specifically, the Society proposed that governments have a responsibility to develop and resource strategies that increase resilience, in doing so drawing on a range of expertise and considering

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<sup>7</sup> Advisory Committee on Dangerous Pathogens. (2015) *Management of Hazard Group 4 viral haemorrhagic fevers and similar human infectious diseases of high consequence* [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/377143/VHF\\_guidance\\_document\\_updated\\_19112014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377143/VHF_guidance_document_updated_19112014.pdf)

<sup>8</sup> Cabinet Office. *National Risk Register of Civil Emergencies: 2015 edition*. London: Cabinet Office; 2015. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/419549/20150331\\_2015-NRR-WA\\_Final.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/419549/20150331_2015-NRR-WA_Final.pdf)

all the factors likely to be impacted. In turn researchers need to provide information that is intelligible and suited to the needs of decision-makers and practitioners. The Society also highlighted that at the international level, governments will be more effective when they act together – sharing expertise, co-ordinating policy and pooling resources to confront common risks. International frameworks provide important opportunities to take coherent action on emergencies, whether that be in coordinating data collection to improve the evidence base or in taking specific steps to improve preparedness.

**Question 2: What lessons were, or should have been, drawn from the Ebola emergency for gathering, assessing, using and communicating scientific advice across Government during this type of emergency?**

15. There were a number of weaknesses in the international response which has been well-documented. One of which was the delay of the international community (including the UK) in recognising the scale of the crisis and the need to respond. Ebola first emerged in West Africa in December 2013, but the first laboratory confirmation of the virus did not appear until the following March, by which point the disease had already spread. Early warnings by Médecins Sans Frontières (MSF) were not acted on quickly enough. It has been suggested that, given our historical links with Sierra Leone and the available public health intelligence from Sierra Leone, the UK's public health and epidemiological experts could have raised the alarm sooner, and the government could have called on organisations such as WHO to act more quickly and in a coordinated fashion.
16. Another lesson of Ebola is the failure to pay heed to recommendations of previous reports which had already set out much of what needed to be done to plan for an Ebola-like event. This includes several major studies including a 2006 UK Foresight study and a 2009 US National Academy of Medicine report.<sup>9,10</sup> Indeed, Ebola itself had been highlighted as an emerging disease of particular concern in those publications.
17. The Ebola outbreak elicited a strong humanitarian response from healthcare workers. We commend the significant role played by PHE which included both staffing laboratories to increase the capacity to diagnose Ebola in affected countries, as well as providing technical advice and epidemiological support to the Sierra Leone government on managing the outbreak. The response from the UK healthcare workforce was very positive; however, some NHS Trusts lacked the capacity to release their staff or to manage their return. **More needs to be done to ensure that measures are in place to deploy staff quickly in response to an epidemic.**
18. **Once an international response was mounted, we believe that the UK made significant contributions to bring the crisis under control.** The Ebola

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<sup>9</sup> Nicoll, A. et. al (2006) Foresight. *Infectious Diseases: preparing for the future: Future Threats*. Office of Science and Innovation, London.  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/294762/06-761-infectious-diseases-futures.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/294762/06-761-infectious-diseases-futures.pdf)

<sup>10</sup> National Academy of Medicine (2009) *Sustaining Global Surveillance and Response to Emerging Zoonotic Diseases* <http://www.nap.edu/catalog/12625/sustaining-global-surveillance-and-response-to-emerging-zoonotic-diseases>

outbreak is the first health-related emergency since the 2009 pandemic flu outbreak where a SAGE was activated. We welcome the fact that, unlike the SAGE for pandemic flu, the SAGE for Ebola was co-chaired by the government's Chief Medical Officer (CMO) and Chief Scientific Advisor (CSA). This increased coherence in cross-department communications. The membership of SAGE should be kept under review to ensure adequate balance of academic and agency representatives.

**Question 3: How successful was the Government in communicating advice to the UK public about the emergency?**

19. We consider public understanding of the risks and effects of an epidemic to be crucial. Transparency and openness are necessary to reassure the public that the UK has the appropriate systems in place for managing infectious diseases such as Ebola. Public health measures will also operate more effectively if there is widespread understanding of the issues involved. Care should be taken to ensure that public messages regarding such outbreaks, especially in terms of risk and uncertainty, are accurate. This can be achieved by regularly briefing the media via government channels, emphasising the most likely scenarios and revising them in light of new information.
20. On balance, we are pleased with the guidance and information provided by the Government for the UK public regarding the recent Ebola outbreak through various internet resources such as NHS Choices. The message that the overall risk to the general public was low, and that there was a low risk from appropriately monitored Ebola workers returning to the UK were communicated well, and this in turn avoided creating unnecessary panic. In addition, while there are of course some exceptions, the reporting by the media was balanced and proportionate.
21. However, it is important to note that occasionally there are tensions between scientific evidence and immediate political concerns, and the government needs to show care and leadership in addressing such conflicts. **No substantial evidence has been raised with us to suggest that voluntary screening at UK ports of entry of travellers returning from Ebola-affected countries can help improve the UK's ability to identify and isolate Ebola cases.** Such measures are costly to enforce and may discourage people from admitting which countries they have been to, thus preventing early reporting of events of this kind, which is needed to facilitate an effective response. In addition, banning direct flights between the UK and the high risk areas may have hindered communications, unduly increased public anxiety, and potentially undermined African economies. We appreciate that the right balance between a precautionary approach and a proportionate response can be difficult to find. In cases where there is no strong consensus, or if knowledge is still tentative, these uncertainties should be reflected in the advice. We recognise that factors other than scientific evidence, play a legitimate role in shaping policy but **the government should be transparent about why decisions have been made and the relevant evidence base.**

**Question 4: Since the Ebola emergency, how well has scientific advice been used to inform or revise the Government's planned response to similar emergencies in future?**

22. The scale of the Ebola epidemic and fears about what might have happened if the epidemic had spread to other populous countries, such as Nigeria, has been a wake-up call. This has initiated new plans to deal with such epidemics should they occur in the future. From a UK perspective, PHE has put adequate national preparedness plans in place, given the uncertainties. We are encouraged that the Government has recognised the risks associated with the lack of vaccines to deal with epidemics, and the UK's lack of manufacturing capacity. We welcome the current research being undertaken by PHE scientists for the development of a rapid diagnostic system suitable for detection of Ebola virus infection within the field.
23. We think it is too early to comment on how well scientific advice has been used to inform the Government's planned response for future emergencies given that the response to the Ebola outbreak is still ongoing. We understand that discussions are underway to convene a formal committee or panel which can provide advice on how the UK can most effectively harness and coordinate its existing resources, should it choose to intervene in an epidemic-affected area in the future.
24. Given the largely unpredictable nature of infectious disease threats, there is a sense that to 'expect the unexpected' can be applied in this context. On this point, we note that the Risk Register (Section 2.10) identifies SARS and pandemic influenza as models to inform contingency planning for emerging infectious diseases. Both of these are respiratory infections and, while this has been identified as a worrisome category, it is far from the only one (as witnessed by Ebola or variant Creutzfeldt-Jakob disease).
25. In the case of emergencies such as the recent Ebola outbreak, it is important that this expert input can be accessed quickly. To ensure this is possible, expert advice should be embedded across government and the UK should work to promote the principles and practice of independent expert advice in UK, European and international policymaking<sup>11</sup>. Many global emergencies, such as Ebola, require international collaboration involving multiple partners to address them.
26. The Royal Society contributed to the development of an OECD paper outlining the roles and responsibility of expert bodies and individual scientists<sup>12</sup> that includes detail on the role of experts during crisis situations. This highlights the challenges of maintaining an authoritative voice and clarifying responsibilities during a crisis situation and proposed a few broadly applicable principles based on lessons learned:

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<sup>11</sup> Royal Society, British Academy, Royal Academy of Engineering, Academy of Medical Sciences (2015) *Building a stronger future: Research, innovation and growth*

<sup>12</sup> OECD (2015) *Scientific Advice for Policy Making: The Role and Responsibility of Expert Bodies and Individual Scientists*, OECD Science, Technology and Industry Policy Papers, No. 21, OECD Publishing, Paris.  
<http://dx.doi.org/10.1787/5js3311jcpwb-en>

- a. The need for permanent authoritative structures and/or mechanisms.
- b. The need for a central contact point.
- c. The need for clear reporting processes
- d. The need for a pre-defined public communication strategy
- e. The need for international co-ordination

**Question 5: Could the evidence base and sources of scientific advice to Government on emergency mitigation, planning and response be improved? If so, how?**

27. The need for robust scientific advice to inform the response to emergencies cannot be underestimated. It is important to acknowledge that the diversity of infectious diseases and the range of possible scenarios make it difficult to garner specialist knowledge pertaining to every possible eventuality. The Government should make use of the full range of expertise available, and use in-house expertise to critically evaluate the advice it receives from both internal and external sources. There may be value in greater representation from those with clinical expertise (including front line clinicians and representatives from aid organisations such as the MSF), in addition to advice from the existing public health, virological, epidemiological and modelling experts.
28. The UK should capitalise on its strong research base to conduct research before, during and after an epidemic. The Department of Health and research agencies should agree in advance what research questions should be addressed during an epidemic. Related to this, **efforts to collect and share data in a standardised electronic database, and to conduct scientific studies and clinical trials quickly are crucially needed**. The evidence produced would be used to inform our response to future outbreaks arising from similar pathogens. The five Ebola clinical trials conducted so far; research on point-of-care diagnostics; and in-country viral sequencing show that real-time outbreak research is achievable. However, there is still room for improvement. For example, none of the three patients treated in the UK were enrolled into a clinical characterisation protocol study or a clinical trial for potential treatments – this should not be the case for future outbreaks. We are sympathetic to the challenges that randomised control trials would raise for clinicians and patients in a pandemic scenario. However, appropriate mechanisms should be put in place to facilitate research and clinical trials quickly in a public health emergency situation, subject to ethical and regulatory approval. Pre-agreed protocols, relevant approvals, funding and infrastructure should be put in place beforehand. The aim should be to ensure that data gathering and research can be initiated within days. This approach should allow findings to be available rapidly to inform practice in a current outbreak, as well as in the future. It is clear from this outbreak that better systems need to be in place to transfer samples out of affected countries. Local staff must also be trained in outbreak research so they can be deployed immediately to conduct trials in the event of an epidemic.
29. Learning the right lessons from the Ebola outbreak requires doing the retrospective research on the recent epidemic. This can only be achieved through data sharing between researchers and national and international agencies. There

were several studies of the epidemic (including some making use of virus genome sequences) that could potentially have informed the public health response, but took too long to complete due to delays in obtaining specimens and data sharing. Preparation and response arrangements for future epidemics should include having appropriate mechanisms in place to collect data in real-time. The UK government, working in collaboration with partners, should ensure that appropriate systems are in place to collect real-time data.

30. There needs to be a standard plan for the health service to deal with imported infectious disease threats that can be rapidly adapted to rare diseases or common ones. In response to Ebola, many NHS trusts were having to develop new protocols separately, which led to duplication of efforts and a failure to access best practice early in an epidemic. There should be written protocols with contingency planning for the main threats identified via risk assessment. These must be reviewed at least on an annual basis such that planning and response are facilitated.
31. **National academies can play a valuable convening role for experts both ahead of, during and after emergencies, and assist the horizon scanning efforts of government.**
32. On 30th September 2015, the Royal Society, the Academy of Medical Sciences and the US National Academy of Medicine will host a meeting entitled: Governance for Global Health: reflections on the Ebola experience in West Africa. This is to disseminate the work and plans of an international Commission which has been set up to evaluate and learn from the global effort to end the Ebola outbreak in West Africa, and to assemble global experts to develop a plan for future preparedness and response to global infectious disease threats. The Commission's work is being coordinated by the US National Academy of Medicine, following a request from the World Bank. The Commission will be holding its second of three meetings on 1-2 October, and a report is expected at the end of 2015.
33. Many emerging infectious diseases are novel, unexpected events, making it difficult to evaluate the risks of a future Ebola-type emergency. There are sound ecological reasons to suppose that this will continue. At present, research and preparedness tend to be reactive. The UK has a reasonable Level 4 pathogen outbreak plan in place, but it is important not to make the focus too pathogen-specific. It can be assumed that the UK will be much better prepared to deal with an Ebola crisis in the near future. But the next infectious disease challenge we may be faced with may be something entirely different. Preparation is key but it should be noted that significant resilience and mitigation may not always be possible, given the uncertainties. It is therefore crucial to increase the attention we pay to the full range of infectious disease threats in both human and animal populations around the world.

For further information, please contact Dr Mehwaesh Islam ([mehwaesh.islam@acmedsci.ac.uk](mailto:mehwaesh.islam@acmedsci.ac.uk)).

### **Declaration of interests**

Many of the Academy's and the Society's Fellows and experts who contributed to this response are involved directly or indirectly as advisers to Government, as members of scientific advisory groups. Further details are available upon request.

### **Academy of Medical Sciences**

The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure these are converted into healthcare benefits for society. Our Fellows are the UK's leading medical scientists from hospitals and general practice, academia, industry and the public service. The Academy seeks to play a pivotal role in determining the future of medical science in the UK, and the benefits that society will enjoy in years to come. We champion the UK's strengths in medical science, promote careers and capacity building, encourage the implementation of new ideas and solutions – often through novel partnerships – and help to remove barriers to progress.

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