



House of Commons Science and Technology Committee Science in emergencies: UK lessons from Ebola inquiry:

A joint response from the Microbiology Society and the Society for Applied Microbiology

Summary

1. In this response, we highlight the vital role that microbiology expertise has played in the UK Government's response to the Ebola epidemic in West Africa, and lessons that can be learned from these experiences to improve preparedness for future disease emergencies, including those identified in the *National Risk Register of Civil Emergencies*.
2. In particular, it is important to note the broader fundamental role that microbiology science plays in providing national and international resilience against infectious disease threats.
 - Proactive and responsive research and development in:
 - Surveillance and detection.
 - Understanding host-pathogen interactions.
 - Developing diagnostics, vaccines and antivirals.
 - Outbreak control measures.
 - The provision of expertise to inform Government and the wider public.
 - Clinical microbiology expertise needed during a response, including in diagnostics and infection control.
3. We emphasise that it is important for Government to continually build upon current support for these activities and work with the microbiology community to improve preparedness for future disease emergencies in the UK or abroad. Through consultation with microbiologists who volunteered in Ebola diagnostic laboratories in West Africa, and those who have conducted responsive research during this epidemic, or past disease outbreaks, we suggest how Government can work with funders, research institutions and other stakeholders to support the rapid mobilisation of microbiology expertise in future disease emergencies.
4. The Microbiology Society and the Society for Applied Microbiology collectively represent the UK microbiological science community, including researchers based in academic and government institutions and professional microbiologists working in public health and industry. Our response has been developed in consultation with infectious disease and public health experts, including individuals who have contributed to the UK response to the Ebola epidemic in West Africa.
5. The **Microbiology Society** is a membership organisation for scientists who work in all areas of microbiology. It is the largest learned microbiological society in Europe, and has a worldwide membership based in universities, industry, hospitals, research institutes and

schools. The Society publishes six key academic journals in microbiology and virology, organises international scientific conferences and provides an international forum for communication among microbiologists and supports their professional development. The Society promotes the understanding of microbiology to a diverse range of stakeholders, including policy-makers, students, teachers, journalists and the wider public, through a comprehensive framework of communication activities and resources.

6. The **Society for Applied Microbiology (SfAM)** is the oldest microbiology society in the UK, serving microbiologists around the world. As the voice of applied microbiology, SfAM works to advance, for the benefit of the public, the science of microbiology in its application to the environment, human and animal health, agriculture, and industry. It works in collaboration with other organisations to ensure evidence-based policymaking and, in partnership with Wiley-Blackwell, publishes five internationally acclaimed journals. Value for money and a modern, innovative and progressive outlook are the Society's core principles. A friendly society, SfAM values integrity, honesty and respect, and seeks to promote excellence and professionalism and to inspire the next generation of microbiologists.

General comments

7. The Ebola epidemic has highlighted the importance of drawing on and utilising scientific expertise if we are to prepare effectively for future epidemics or pandemics. There is also a need to support fundamental and translational research to mitigate these threats. From a microbiology perspective, scientific expertise in this context does not just apply to the expertise utilised by government for informing policy decisions, but also to the public health and research expertise that needs to be mobilised rapidly in the event of a national or international disease emergency.
8. In terms of preparedness within the UK for another Ebola-type outbreak, the Government generally appeared to have good mechanisms in place to deal with the small number of imported cases. Discussions about increasing high containment medical facilities in the north of the UK were highlighted, but it is appreciated that maintaining such facilities would exert a significant cost that needs to be balanced against risk and other public health needs. Coordination of preparedness against public health threats between the UK Government and the devolved governments is also important in this context.
9. The delay of several months in launching an international response to the Ebola outbreak highlighted the fact that the UK, and international community as a whole, were not adequately prepared to respond to this type of disease emergency. Once a response was in place the UK Government played a key role and implemented an effective strategy to help tackle the outbreak in Sierra Leone. It is important that the discussions Government is having nationally and internationally to strengthen emergency response to infectious disease outbreaks result in long-term action being implemented and supported.
10. When considering how prepared the UK Government is for emergencies similar to the Ebola outbreak, although many of the issues overlap, some distinction is needed between pathogens posing different risks at the national and international levels. From a UK perspective, Ebola and other viral haemorrhagic fevers pose a relatively low direct threat, but they are important in an international context. Experience from the current Ebola outbreak will hopefully place the UK in a much better position to respond to a similar scenario in the future. In contrast, as recognised in the *National Risk Register of Civil Emergencies*, some severe respiratory diseases, such as pandemic influenza, pose a much

more significant direct threat to the UK. The UK *Pandemic influenza response plan*¹ and experience from the 2009 H1N1 influenza pandemic mean that the Government is probably fairly well placed to respond to a similar influenza outbreak. A more severe influenza pandemic is possible, and lack of contemporary experience means that making judgements about optimal mitigation and resilience strategies is difficult. The sudden emergence of infectious diseases, such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS), also highlight the importance of ensuring that preparedness and surveillance strategies consider the emergence of unexpected disease threats.

11. Given the context of this inquiry and overlap in the issues raised we recommend that the Select Committee revisits recommendations made in the report² of the independent review of the UK response to the 2009 influenza pandemic.
12. A key lesson to be learned from the Ebola crisis is the need to strengthen systematic worldwide surveillance for disease. We welcome activity by the UK Government, the European Union, the World Health Organization and others to address this issue. Supporting low-income countries to develop surveillance and diagnostic capacity is a key need. The Society for Applied Microbiology has resources that can support such setups, such as the Virtual Microbiology Laboratory and the Tropical Microbiology Network, which provide detailed information and advice.
13. A further lesson to be learnt from the Ebola crisis is the need to continually assess threats to public health posed by the illegal importation of bushmeat into the UK. Although no specific threat from such importation has as yet been identified, some of the animals from which bushmeat is derived are natural hosts of the Ebola virus, and consequently foodborne transmission is a possibility that should be considered, with any necessary steps put in place to minimise the illegal importation of such meat.

Government sourcing and use of scientific evidence and expertise

14. We consulted microbiology and public health experts who have a good knowledge of the Government's structures and mechanisms for collecting and processing scientific advice. In general, they considered that the current structure, in which lower-level advisory committees with various expertise feed upwards to higher-level committees and chief scientists was effective in getting timely and appropriately evaluated information to policy-makers. One respondent also highlighted the method used by the Scottish Parliament Information Centre to seek advice from academic experts via the JiscMail list ASK-ACADEMIA@JISCMail.AC.UK – a system that could be applied to other contact points.
15. The introduction of UK airport arrival screening for Ebola in October 2014 was highlighted as an instance when Government appeared to go against World Health Organization guidance and expert consensus. This resulted in debate in the media as many experts noted that it was unlikely to be effective, caused an unnecessary allocation of resources, and may have made the risk appear disproportionately large to the public. It is appreciated that there was a need for Government to be seen to take action and that there was also a public health education value to screening. If similar decisions are taken in future, it may be beneficial for

¹ Public Health England (2014). *Pandemic influenza response plan*. <https://www.gov.uk/government/publications/pandemic-influenza-response-plan>. Last accessed: 16/09/15.

² Hine, D. (2010). *The 2009 Influenza Pandemic - An independent review of the UK response to the 2009 influenza pandemic*. <https://www.gov.uk/government/publications/independent-review-into-the-response-to-the-2009-swine-flu-pandemic>. Last accessed: 16/09/15.

the Government to communicate more effectively to the expert community and wider public about the value of screening and the evidence on which the decision to introduce it is taken.

16. Some of the infectious disease experts we consulted noted that they had limited knowledge of the Government processes for collating and processing expert advice. How the different advisory committees are joined up was sometimes unclear. It may be beneficial, in terms of promoting engagement and understanding, for Government to communicate to the wider scientific community the structure for drawing on and using expertise to promote engagement and understanding between public health science and policy.
17. Some experts noted that while the Government appeared effective at seeking their expertise it was unclear how they could proactively submit ideas or information for consideration. The Government may want to consider putting in place, or more clearly highlighting, an avenue for this, although it is appreciated that openness needs to be balanced against ensuring that timely and well-reviewed evidence is passed on to decision-makers, particularly during emergencies.
18. Learned societies are well-placed to advertise vacancies on advisory committees or wider calls for expert advice to the scientific community. We welcome direct requests from Government to highlight such activities.

Mobilising scientific expertise and research in emergencies

Mobilising and supporting microbiology diagnostics expertise

19. The microbiology community played a vital role in providing diagnostic capabilities to the UK's emergency response contribution in West Africa. Microbiologists employed by Public Health England (PHE) and other government agencies, and also from the academic sector and NHS, volunteered to work in the PHE diagnostics laboratories in Sierra Leone.
20. In the event of a future national or international disease emergency, there is now a large pool of microbiologists with appropriate scientific training and invaluable field experience of working in an emergency response setting. The volunteers we consulted emphasised that they would be willing to participate in a future disease emergency response. It was also noted that PHE could offer annual refresher training to maintain this experience base. **The Government has announced that it will be establishing a 'reservist force' to be called up during future outbreak emergencies³. We recommend that this initiative should include a formalised voluntary register of microbiologists who could be called upon from government laboratories and the wider research community (see also paragraphs 23-24).**
21. Volunteers highlighted that they felt well supported by PHE and charities such as the International Medical Corps, including training prior to travelling, and while they were in Sierra Leone. There was also a perception that coordination of the operation continually strengthened during the outbreak, meaning that the UK would likely be well placed to conduct diagnostics activities if a similar outbreak were to occur. **It was noted that some form of debrief may have been beneficial for some volunteers, given the nature of the work from which they were returning.**

³ Prime Minister's Office. News story: Prime Minister calls for 'wake-up to the threat from disease outbreak' . <https://www.gov.uk/government/news/prime-minister-calls-for-wake-up-to-the-threat-from-disease-outbreak>. Last accessed: 16/09/15.

22. **It was highlighted to us that the initial call for volunteers from the wider microbiology community could have been made earlier and advertised more widely.** As learned societies with thousands of members in academic, industry and public health positions, we are well placed to disseminate requests and information to the community. Both Societies received a joint request from the Government Chief Scientific Adviser and Chief Medical Officer to assist in recruiting volunteers for the three diagnostic laboratories in Sierra Leone, but would have willingly done so earlier than late November 2014. Both societies would certainly be willing to help Government disseminate requests for expertise and information to the microbiology community in preparedness for, and during, future disease emergencies.
23. Some volunteers noted that they encountered problems with professional support from their employers to volunteer. For example, an academic researcher noted that their request to volunteer was initially declined by their university due to uncertainty about duty of care and coverage of their salary and professional responsibilities. Subsequently, mechanisms were put in place whereby the Department for International Development (DFID) reimbursed employers the salaries of volunteers. **In preparation for future outbreaks, it may be beneficial for PHE, employers such as universities and the microbiology community to establish a clear framework for volunteering that takes into account the needs of all parties. We note that the model used by employers for armed forces reservists may be useful to consider.**
24. It was highlighted to us that Research Councils could be better prepared to support researchers with existing research grant obligations who wish to volunteer. One volunteer noted that engagement with a funder of their research was challenging, with no option to postpone or extend the grant to allow for their time volunteering, or to remotely supervise project staff while volunteering. In this instance they were required to appoint a primary investigator to cover the project and supervision of staff while they were away. There was also a challenging requirement to send important paper correspondence between the UK and West Africa. **If a similar need for volunteers arises in the future it may be beneficial for dialogue between the research community, funders and government to propose a mechanism to deal with such issues.**

Mobilising rapid research and development

25. The Ebola epidemic also highlighted a need to mobilise R&D rapidly during future outbreaks, including clinical trials of vaccines and antivirals on the ground, and allied research within UK research institutions such as assay and diagnostic development and epidemiological and genomic research. This requires both the support of proactive R&D in advance of outbreaks and also the funding and support needed to mobilise strategic research when outbreaks occur. There is also a need to ensure that frameworks are in place for the timely sharing of data.

Open Access to Data

26. One lesson learned from the Ebola epidemic is that data need to be freely and quickly available if the best scientific advice and research are to be developed. We welcome the announcement from Government³ that the UK will be requiring clinical trials, disease control operations and other UK-funded outbreak research and data to be made transparent and openly accessible, and that it will be working to develop an international agreement on this. It was noted to us that such an agreement could be similar to the *Pandemic Influenza*

*Preparedness Framework*⁴. It was also noted that to encourage compliance, any framework should ensure that ownership of data is not lost when data are made accessible. Timely, international sharing of influenza genomic data via the GISAID EpiFlu database⁵ was highlighted as an example of good practice.

Rapid research funding

27. Fast-track funding made available during the Ebola outbreak by the Medical Research Council (MRC), DFID and other funders such as the Wellcome Trust, was highlighted as important and welcome. For example, Microbiology Society member Dr Edward Wright (University of Westminster) highlighted the use of such grants to develop an assay used for activities, including support of ChAd3 EBOZ vaccine clinical trials and development of antibody-based therapies.
28. The availability of grants⁶, part-sponsored by the MRC, to develop further research from the epidemic was noted as an example of good practice. More generally, it was highlighted that it is important to ensure that successful applications for fast-track grants, be they government or non-government funded, receive funds as swiftly as possible to ensure their impact can be maximised. This may also require specific engagement with research institutions to implement the research quickly (see paragraphs 29-31).

Mobilising and supporting the wider research community

29. In the case of Ebola, relevant UK research expertise was already in place at PHE Porton Down, and also in some academic institutions. Government must not take it for granted that research outside public sector laboratories relating to a particular pathogen and its spread will be already in progress at the start of an outbreak. In such an event, Government needs to support universities and research institutes to allow research expertise and infrastructure to be diverted in aid of an emergency response. The availability of fast-track funding (see paragraphs 27-28) to researchers with relevant skill in universities and research institutes could be complemented by an agreement between Government and these institutions related to the deployment of resource for later compensation. We note that responsive research capacity is already built into the funding of some strategic research centres.
30. Some of the suggestions raised in paragraphs 23-24 concerning the improvement of employer and funder support to mobilise expert volunteers during outbreaks may also be of benefit to researchers who voluntarily initiate responsive research in addition to their existing research and teaching responsibilities during outbreaks.
31. We suggest that it would be beneficial for Government, universities, research institutes and other stakeholders proactively to discuss mechanisms for better mobilisation and utilisation of academic research expertise and capacity in emergencies to improve preparedness.

Preparedness through proactive research and development

⁴ World Health Organization (2011). *Pandemic influenza preparedness framework*. http://www.who.int/influenza/resources/pip_framework/en/. Last accessed: 16/09/15.

⁵ GISAID Initiative. <http://platform.gisaid.org/epi3/frontend#8b03a>. Last accessed: 16/09/15.

⁶ European and Developing Countries Trials Partnership. Research capacity development in support of the EVD response call for funding proposals. <http://www.edctp.org/call/research-capacity-development-support-evd-response/>. Last accessed: 16/09/15.

32. The UK has a strong research base and international profile in infectious disease research. Strength in research is the foundation on which the UK's national and international resilience against the threat of infectious disease is based.
33. Infectious disease research in the UK is conducted by: individual research groups and larger strategic research centres within universities (e.g. the MRC–University of Glasgow Centre for Virus Research and the MRC Centre for Outbreak Analysis and Modelling, Imperial College London); research institutes (e.g. The Pirbright Institute and The Francis Crick Institute); and directly-funded laboratories run by the Ministry of Defence, PHE and the Animal and Plant Health Agency (APHA). Funding sources include the Research Councils, direct funding from government departments, industry and non-governmental organisations, such as the Wellcome Trust and the Bill and Melinda Gates Foundation.
34. Areas of fundamental and translational microbiology research that provide resilience to emerging disease threats and outbreaks include:
- National and international disease detection, diagnosis and surveillance. For example, UK Government agencies and research institutes host internationally important human and animal disease reference laboratories that conduct and develop diagnostics. UK researchers also conduct proactive disease surveillance in human and animal populations using serological and genomic methods alongside clinical and veterinary reporting. A challenge for policy-makers to consider, aided by scientific expertise, is how to allocate limited resources to the surveillance of emerging, or as yet undetected disease threats, balanced against current public health needs.
 - Understanding how pathogens infect and cause disease in animals and humans, including how they can change genetically to become more virulent, transmissible, or switch hosts, including from animals to humans.
 - Epidemiology and modelling.
 - Development of diagnostics and assays to diagnose infection and inform vaccine and drug development.
 - Development of vaccines, antivirals, antimicrobials and drugs.
 - Informing and evaluating the development of infection control strategies.
35. It is important to emphasise the principle that tackling emerging infectious diseases is a 'One Health' issue, requiring support for fundamental and translational infectious disease research in both humans and animals. This is because the majority of recent emerging infectious disease outbreaks are zoonotic in origin, arising from pathogens that can be passed from animals to humans (e.g. Ebola; H1N1, H5N1 and H7N9 influenza viruses; SARS and MERS coronaviruses)⁷. Many zoonotic diseases cause additional impacts as a cause of disease in livestock. For example, Microbiology Society member Dr Mike Skinner highlighted that BBSRC-funded fundamental research into the replication of avian influenza virus in chickens at Imperial College London had serendipitously provided insights into how the virus could potentially adapt to infect new bird species and mammals, providing new possibilities for the control of these viruses in poultry and as an emerging pre-pandemic virus in humans.
36. It was highlighted to us that the UK public funding environment for research on zoonoses and animal health can be challenging, especially when it falls through the gaps between Research Council portfolios. In recent history, almost all emerging human viruses have

⁷ Microbiology Society (2015). *Emerging Zoonotic Diseases*.
<http://www.microbiologysociety.org/policy/briefings.cfm/publication/emerging-zoonotic-diseases>.

originated in animals. Therefore, the balance of priorities in research funding should be shifted towards this area as part of a wider focus on public health and the mitigation of infectious disease threats.

37. Concern was also raised that cuts to Government departments could further reduce capacity for proactive and responsive research on emerging infectious diseases, particularly given the prospective nature of the threats posed by many such diseases. Therefore, it is important that scientific expertise and foresight regarding these threats is considered in any Government spending reviews. The Pirbright Institute noted that they had already been affected by funding changes at DEFRA.
38. In terms of vaccine development, the Government's announcement³ of the UK Vaccines Research and Development Network was welcome, although it is important that this funding is maintained and built upon over time.
39. Developing support and funding for fundamental and translational research activities also increases resilience through building current and future capacity of the core-skills and expertise needed to mitigate and respond to disease emergencies.

Academic–government research collaboration

40. Several experts highlighted the concept that UK resilience to disease threats could also be improved by further building capacity for research collaboration between directly-funded Government laboratories, universities and research institutes. For example, The Pirbright Institute highlighted the potential for it to coordinate more closely core-skills and expertise with the APHA's Weybridge laboratory, and develop stronger links with PHE.
41. National Institute for Health Research (NIHR) Health Protection Research Units (HPRUs)⁸ were cited as an example of good practice of building partnerships between universities and PHE around strategic research themes relevant to increasing our resilience to epidemics and pandemics. Several HPRUs were heavily involved in the Ebola response.
42. It was suggested to us that the breadth and impact of academic research on some dangerous pathogens, such as pandemic influenza, could be improved through facilitating greater access to high-containment laboratories in Government facilities. Access can be restricted by the extensive training requirements needed, and because training may not be transferable between different laboratories. Collaboration, through strategic funding of joint studentships or projects between laboratories with high-containment facilities and academic partners with shared interests, is one way that increased high-containment access and training could be facilitated. The costs and risks associated with running high containment facilities are a likely barrier to universities establishing their own facilities.
43. A recent debate at the Microbiology Society's 2015 Annual Conference highlighted the idea that broader dialogue between the UK research community, the Government and other stakeholders, concerning biosecurity regulations and dual use issues relating to research on dangerous pathogens, would be beneficial.

Public communication during disease emergencies

44. Government communication to the wider public on the Ebola epidemic, including press releases and public health poster campaigns, was generally perceived to have been measured and appropriate, given the level of threat posed to the UK.

⁸ NIHR Health Protection Research Units. <http://www.nihr.ac.uk/funding/health-protection-research-units.htm>. Last accessed: 16/09/15.

45. As detailed in paragraph 15, many experts perceived the introduction of UK airport arrival screening for Ebola to be an overreaction by the Government, which could have unnecessarily increased public concern. The basis for this decision could have been better communicated to the expert community and the wider public.
46. It is also important to highlight that the wider science community, including individual experts, learned societies and the Science Media Centre, also played a role in disseminating measured information to the public through media engagement. Public engagement on microbiology issues is an important aspect of both microbiology societies' charitable work, and we would certainly be willing to work with Government to aid the dissemination of authoritative information.
47. It is important that public behaviour and trust in Government mitigation measures are factored into response planning for any future epidemic in the UK. An example of good practice using scientific evidence to inform this is the Department of Health-funded *Improving National Influenza Engagement and Communication Effectiveness (INfluENCE)*⁹ multidisciplinary project, which is analysing data from the 2009 H1N1 pandemic to develop evidence-based guidelines for improving public communication about antivirals and vaccination in a future outbreak.

⁹ Improving National Influenza Engagement and Communication Effectiveness (INfluENCE). <http://www.influenceproject.org/>. Last accessed: 16/09/15.