Written evidence submitted by British Society for Immunology

Introduction

1.1. The British Society for Immunology (BSI) is the largest immunology society in Europe. We represent the interests of over 5000 immunologists working in academia, clinical medicine, and industry. Our main objective is to promote and support excellence in research, scholarship and clinical practice in immunology for the benefit of human and animal health.

1.2. Immunological science underpins many aspects of human health and the progression of disease. The application of immunological research extends across communicable disease and vaccination to the management and treatment of chronic diseases such as diabetes, asthma, allergies, and even cancer. It is also now becoming clear that immune responses are key to the development of many common disorders not traditionally viewed as immunologic, including metabolic, cardiovascular, and neurodegenerative conditions.

1.3. As a nation we are world leading in our immunological research and rank first for research in infection and immunology amongst our G7 partners.[i] Immunology therefore makes a vitally important contribution to the UK science base and the research of our members is of critical value to the overall health, wellbeing, and economic prosperity of the UK.

1.4. Immunologists are also at the centre of enhancing domestic resilience to national and global health crises, particularly from emerging and re-emerging infectious diseases. Immunology plays a critical role in understanding the pathogenesis of communicable diseases and the application and development of novel treatments and vaccines against these conditions. In this evidence to the Science and Technology Committee, the BSI would like to focus on what lessons the Government can learn from the Ebola outbreak from an immunological perspective, and how these can be applied to increase resilience against future health emergencies of a similar nature.

Summary

2.1. Emergent, re-emergent, and novel infectious disease outbreaks are a significant challenge to national and international health security. Thanks to modern demographic and societal factors, regional health crises elsewhere in the world are a threat to the UK. These outbreaks are inevitable, though very difficult to predict in both scale and nature in the short to medium term.

2.2. The UK's capacity to respond to the Ebola outbreak was severely undermined by the lack of licensed medicines and vaccines. With the exception of influenza, we lack a truly effective and co-ordinated platform for the research, development, and manufacturing of new vaccines and treatments against novel or emerging disease threats, such as Ebola.

2.3. The Government must learn from the experience of Ebola and reform how the UK research and manufacturing infrastructure organises itself in preparation for future outbreaks of known or unknown communicable diseases. We believe this is best achieved through the creation of an integrative network of research centres (a "UK Vaccines Network") where academia, the NHS, and the private sector collaborate to build a pipeline of new vaccines and treatments under a common programme and following a nationally agreed framework.

2.4. Doing so would enable the UK to capitalise on its strengths in immunological research and better harness world-class academic and industrial centres of excellence, significantly enhancing national resilience to priority global health threats.

How prepared is the Government for a similar type of emergency?

3.1. Emergent or re-emergent infectious diseases present a significant challenge to the UK's health security and are a serious risk to the economic and social wellbeing of the country. Future outbreaks of infectious disease which threaten global health security are inevitable, although difficult to predict in terms of both scale and nature in the short to medium term. Modern demographic factors, particularly globalised travel, favour rapid transmission of infectious pathogens across international borders and mean that regional health crises elsewhere in the world have the potential to threaten UK health security. The risk to the UK from communicable disease outbreaks is therefore considerable and enhancing preparedness should be a priority endeavour.

3.2. The UK's response to the Ebola crisis included actions both at home and abroad, with overseas activities centred in Sierra Leone.[ii] Domestically, established protocols and the implementation of measures such as entry port screening meant that the overall risk to British citizens was considered low. Readiness was enhanced through the action of local resilience forums and the conduct of national and local exercises to test contingency plans and assess the effectiveness of communication and management procedures, including contact tracing and follow up, in the event of transmission of disease in the UK. These civil contingency plans are likely to have improved considerably the UK's ability to deal with the prospect of Ebola transmission into or within our borders.

3.3. Nevertheless, the Ebola outbreak exposed critical vulnerabilities in national and international preparedness, namely due to our inability to offer safe and effective treatments or vaccines to those infected or at-risk of infection. Strict adherence to protocols and strong case management are central pillars in national preparedness for Ebola, yet our ability to manage and control an outbreak – and offer assistance to those infected – is significantly undermined by the lack of licensed medicines and treatments.

3.4. The National Risk Register identifies emerging infectious diseases as one of the highest risks facing the UK.[iii] However, with the possible exception of influenza (for which the Government maintains a stockpile of antivirals sufficient to treat 50% of the population) our capacity to design, test, and manufacture large doses of vaccine against infectious threats is poor, and the planning for such instances largely ad hoc. This may be down to the impossibility in predicting some of these threats (see the recent outbreak of MERS[iv]) but this does not preclude work to enhance resilience against known potential threats, such as Ebola or other emerging or re-emerging diseases, or indeed to ensure the UK has the proper infrastructure to allow for rapid development of new vaccines or therapies against unknown threats.

3.5. We believe that with vested interests in both regional and global health security, and considering the inevitability of future outbreaks of known or unknown pathogens, the UK must bolster national preparedness against future disease hazards. Investment in a platform to enable the timely development of novel vaccines and treatments in response to new, emerging, or re-emerging infectious diseases is therefore a necessity.

How can the Government successfully mitigate and increase resilience to future disease hazards?

4.1. The Government should learn from the experience of Ebola to reform how the UK organises itself in preparation for similar emergencies. We believe this is best achieved through the creation of a network of vaccine research centres spread throughout the country. This network would bring together expertise from across academia, the NHS, and the private sector to co-ordinate and build a pipeline of new vaccines and medical treatments. The proposed coalition of centres would share data and resources and integrate multiple clinical trials units to follow a coordinated strategy according to nationally agreed priorities, with each centre working along existing areas of expertise. This proposed framework would undoubtedly enhance national resilience to future health emergencies.

4.2. As a global leader in immunological research with world-class academic and industrial facilities, the UK is well placed to become a global centre for the design and development of new vaccines. There are several internationally recognised centres of excellence in the UK undertaking vaccines research, including those central to efforts to elucidate effective drugs and vaccines against the present Ebola outbreak. Each centre in the UK will have different focuses and strengths, from fundamental research to better understand the basic immune response to undertaking advanced clinical trials in human volunteers. The work of major academic centres is further complemented by valuable collaboration with the private sector, including small and medium sized spin off companies as well as major pharmaceuticals.

4.3. The aim of a "vaccines network" would be to consolidate this landscape under a co-ordinated national plan. It may be organised in different ways. For example, disease surveillance from agencies such as Public Health England and the WHO could be used to inform prioritisation of research and development. A co-ordinated effort by an integrated network of academic centres, each focussing on its own individual aspect of analysis, would dedicate themselves to researching the most concerning pathogens. Human trials would be conducted through a coalition of trials centres, perhaps harnessing the unique resources and access to patient volunteers that are available within the NHS. In future the care.data[v] programme could also feed into the network, providing further data on patterns of disease and the effects of new drugs. Finally, closer links with industry through enhanced data sharing and a new financial model that better promotes public/private partnership would deliver valuable expertise at all stages and enhanced scope for the rapid up-scaling of manufacturing capability.

4.4. The above approach is especially applicable in instances where there is a critical need to develop new vaccines and treatments quickly, for example during an outbreak of a disease for which there currently exists no licensed intervention (such as is the case for Ebola). However significant regulatory, legal, and financial obstacles must first be overcome. At a speech to the G7 earlier this year the Prime Minister urged better global preparedness for the next potential pandemic and announced that the UK would be the first country in the world to require all clinical trials results and data to be made fully transparent.[vi] This is a welcome step, with the removal of barriers to data sharing and promoting transparency in research data and outcomes vital to collaboration in research and development. The creation of a network of centres would be a natural environment for improved data flow between partners.

4.5. However further assurances are required, for example to clarify indemnification for manufacturers where vaccines are fast-tracked in emergency situations, as well as creating a

financial model that supports partnerships between academia and industry where there is little financial incentive to invest in a particular vaccine or disease. Despite this, innovative funding mechanisms, such as the World Bank's Pandemic Emergency Facility, show that pioneering financial instruments for such work are possible.

4.6. International linkage and communication during these types of health crises is vital and the creation of a network of research centres in the UK does not preclude such a network collaborating closely with other centres overseas. Enhancing global preparedness and resilience against disease threats, and ensuring there is an effective framework that best harnesses global resources to manage and contain outbreaks, helps ensure the scale of future outbreaks is mitigated as much as possible. Preserving global health security is also one of the best ways of protecting UK borders from the transmission of infectious disease threats.

References

[i] APPG on Global Health (2015). The UK's Contribution to Health Globally.
[ii] Prime Minister's Office (2015). Ebola virus: UK government response.
[iii] Cabinet Office (2015). National Risk Register of Civil Emergencies.
[iv] WHO (2015). Middle East respiratory syndrome coronavirus (MERS-CoV)
[v] NHS England (2015). The care.data programme.
[vi] Prime Minister's Office, 10 Downing Street (2015). Prime Minister calls for 'wake-up to threat from disease outbreak'.