Public Health England

Protecting and improving the nation's health

Ebola 2015 Symposium

Challenging Ebola with a united front

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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Introduction

The Ebola virus disease (EVD) outbreak in West Africa was an unprecedented grave humanitarian crisis, with over 10,000 recorded deaths. On 13-14 January 2015, Public Health England in collaboration with the Wellcome Trust, hosted the ‘Ebola 2015: Challenging Ebola with a united front’ symposium to bring together those involved in Ebola containment and research onto a single platform, to share experiences and plan future work to find the way forward in the current outbreak and beyond. The result was a fantastic meeting tackling the challenges of Ebola virus disease case management and therapeutics to anthropology and outbreak containment.

Acknowledgements are given to the staff at PHE, the Wellcome Trust and the Oxford Symposia of Emerging Infections responsible for hosting this incredible event, and many thanks to the speakers for assisting with bringing together such a fantastic programme.

Professor Maria Zambon BSc BM BCh PhD FRCPath FMedSci

Session one: Challenges of Ebola virus disease

Research during and between outbreaks in Africa and Asia – a historical perspective

Professor David Heymann BA MD CBE:

- the first documented outbreaks of EVD occurred simultaneously in Zaire and Maridi in 1976
- transmission of the virus is amplified through healthcare workers
- outbreaks can be contained through clear leadership and rapid response (patient identification, isolation and infection control), community engagement (surveillance, contact tracing and rapid diagnosis and isolation) and an understanding and means of safe burial and decontamination
- prospective and retrospective research during outbreaks is of paramount importance
- clinical trials should be thoughtfully and efficiently established.
- research protocols and vaccines need to ready on the shelf with pre-existing governmental and ethics agreement on protocols so that they can be implemented rapidly in the next outbreak

The UK response to the Ebola epidemic

Professor Chris Whitty DSc FMedSci FRCP:

- Ebola is a disease of panic that has led to irrational public health responses in some countries
- there was a significant delay in the international response to this outbreak between March and August 2014 but a strong UK response since then, once the World Health Organization (WHO) and Sierra Leone called an emergency. Once this outbreak is over we need to look self critically about why this outbreak was able to gather such momentum and how we can do better next time
- current interventions being used to control the current outbreak aim to reduce transmission in healthcare settings, in the community and around death and safe burial in a socially acceptable way
- UK government commissioned research aims with the strategic aim to reduce the reproductive number to below one. Such research includes mathematical modelling, anthropology, vaccines and diagnostics

- for all research there must be ethical approval from both governmental bodies involved and ideally interventions must be taken from the WHO list of priority interventions
- eradication is impossible as there is an animal reservoir, therefore we must eliminate this outbreak and ensure it is the last on this scale

The response within the UK to the Ebola outbreak in West Africa

Professor John Watson MB BS, MSc, FRCP, FFPH:

- there is a small risk to the UK from cases from returning workers, relatives and expatriates
- repatriation is resource intensive and time consuming. Early, aggressive and well-monitored supportive therapy at the Kerry Town treatment facility remains the key to successful treatment of healthcare workers with Ebola. Exceptional cases may be repatriated
- identifying active cases of disease through entry screening is recognised to be a blunt instrument unless used in conjunction with a pathway of community follow up throughout the 21 day disease incubation period as in England. However, the process does enable returning workers to be risk assessed and categorised to enable appropriate follow up and rapid assessment if they become unwell
- national exercises conducted to test our preparedness demonstrated a robust system for managing this disease
- central government has dedicated facilities to ensure a co-ordinated response between central government, local government and national bodies, including healthcare and academic bodies, to provide a coordinated response to this unprecedented outbreak
- communications teams have been an integral component to the response by delivering consistent and accurate information to the public regarding the situation, the risk to the public and the UK response when incidents do occur

The political and economic dynamics of Ebola virus disease in Sierra Leone

Dr Julia Amos DPhil:

- Sierra Leone has a close relationship to the history of slavery, dating back to the inception of the international slave trade. However, domestic slavery was not banned until 1927, leaving a post-colonial legacy of great intra-ethnic status differentials. Mende and Temne are the two main ethic groups. The transition to independence saw the gradual emergence of two political traditions; the All People's Congress, which become associated with the Temne group, and the Sierra Leonean People's Party, which has become associated with the Mende group

- esoteric associations affect everything from naming conventions to politics, but it is strictly taboo to discuss them with non-society members. The fertility of the land is affected by the people buried in it. Your claim to land can be affected by your ancestors being buried there, which may affect people's willingness to let EVD workers remove bodies. Knowledge is powerful. People will tell you what they think they should tell you, which may involve complex calculations about what you want to hear and how to secure resources in a very resource-poor environment
- there is also an important Lebanese business community. Ethnic and class divides can cause mistrust of the state, and the exclusive behaviour of expatriates working in Sierra Leone plays into post and neo-colonial tensions, partly by benefiting the Lebanese community through the use of their supermarkets, services and restaurants
- before the epidemic happened health provisions were inadequate, with approximately 100 doctors and fewer than 1,000 nurses and midwives serving a population of over 6 million. There is an ongoing economic crisis in Sierra Leone associated with the world slowdown in demand for its exports, such as iron. This has political consequences for the governing party which was re-elected at the height of the iron ore price boom, from whence prices have halved
- there is a golden opportunity to use the aftermath of this outbreak to create a stronger, permanent health infrastructure that benefits and safeguards everyone in Sierra Leone, but also a real risk that Sierra Leone is left in a worse place: with an economic crisis undermining its healthcare budget, temporary EVD facilities that cannot be repurposed and with even fewer healthcare professionals as the influx of foreign staff reverses and the many Sierra Leonean doctors and nurses who died are not replaced

Developing laboratory capability in Sierra Leone

Dr Amanda Semper PhD:

- since September 2014, three PHE laboratories have been established in Kerry Town, Makeni and Port Loko. Each lab is co-located with a UK non-governmental organisation (NGO) sponsored treatment unit
- samples are received from Ebola treatment units and community care units with a six-hour turnaround time from sample receipt
- samples are inactivated in a flexible film isolator, undergo manual or automated extraction and are then processed using a real time polymerase chain reaction (PCR) assay (Altona) run on smart cyclers
- the copious amounts of chlorine used for cleaning and decontamination are causing problems for operators and equipment. The flexible film isolators are not robust enough against the copious amounts of chlorine being used

- the sample reception has not been effective. Samples have been received in a generally poor condition; samples can be unlabelled, spilled and sent with needles in situ
- the main aim of the PHE laboratories is to reduce the reproductive number. The next steps involve conducting operationally relevant research that commissioned by the Department for International Development (DFID)

European mobile laboratories in West Africa: supporting EVD diagnosis

Dr Christopher Logue PhD:

- the European Mobile Laboratory (EMLab) was formed in 2011 and is founded by the European Union (DevCo). It consists of nine members from the European consortium and two Sub-Saharan African members
- they are small laboratories, designed specifically to handle viral haemorrhagic fever pathogens, with the capability to be deployed rapidly to the source of an outbreak
- the equipment consists of one collapsible class three cabinet and two smart cyclers, which can all be transported on a normal commercial flight
- on 24-25 March 2014, WHO acknowledged reports of the Ebola outbreak and requested EMLab deployment to support a Médecins Sans Frontières (MSF) established isolation centre in Guéckédou. On 26 March 2014, the EMLab was mobilised and four days later the first patient was tested for Ebola
- the laboratory has been involved with the assessment of novel WHO approved Ebola rapid tests and has been training Guinean staff to operate the lab to facilitate capacity building
- a second EMLab was established in Foya, Liberia in September 2014. In November this laboratory was moved to Freetown

Session two: EVD case management

Overview of Ebola therapeutics

Professor Fred Hayden MD:

- intensive supportive care contributes significantly to survival. Standards of care have been variable over time and across treatment centres in affected countries, and clinical trials need to be conducted at sites providing consistently high standards of supportive care
- the Ebola virus affects almost all cell types, has high levels of virus replication and causes suppression of host immune responses leading to cytokine deregulation, loss of vascular integrity, coagulopathy, and organ failure. The association between viral replication levels and survival indicates that early use of sufficiently potent antivirals should improve outcomes
- therapeutic approaches include direct-acting antiviral agents that block viral replication, agents that augments host immunological defenses, and host response-directed agents treat the organ or physiological dysfunction
- the WHO ethics advisory panel have approved testing of unregistered products conducted under appropriate international standards
- use of convalescent whole blood or plasma has shown mixed results in past studies, and clinical trials in this area are ongoing. Combinations of Ebola-specific monoclonal antibodies are therapeutically effective in non-human primate models of Ebola infection and have been used in some patients cared for in well-resourced settings. However, availability is very limited and further clinical studies are required
- current clinical trials for Ebola also include two orally administered small molecules (favipiravir, brincidofovir) that are under study or have been approved for other serious viral infections
- many agents have been proposed for treatment of Ebola. For candidate therapeutics we need demonstrated efficacy and safety in animal models of Ebola, preferably in non-human primates, and when available, experience using drugs in treating other diseases. There also needs to be a rationale for proposed dosing regimen, as well as information on purity, stability and scalability of production

Treating EVD patients in the field

Dr Colin S Brown:

- the Kings Sierra Leone partnership has been present in Sierra Leone for two years as a development organisation, capacity building and improving governmental structures and healthcare systems. It operates isolation units at five hospital sites,

the largest of which is at Connaught Hospital, the adult tertiary referral hospital, with a 16 bedded (and two paediatric cots) facility
- infection prevention and control is challenging due to staff unfamiliarity with infection prevention and control procedures, and a disease onset that mimics most febrile disease
- there is often diagnostic delay and treatment challenges are difficult. More evidence is needed on electrolyte replacement, antimicrobial resistance, appropriate symptomatic relief and use of palliative care
- operational challenges have included maintaining adequate staffing levels, contact tracing, safe burial and getting suspect patients out of the community
- there have been many cultural issues including distrust of the government due to political and ethnic differences, mistrust of hospitals and mistrust in humanitarian aid
- before the outbreak there were 10 consultants in Connaught hospital, which has the majority in the country, now there are seven. There are ongoing difficulties to obtain accreditation for postgraduate training in Sierra Leone and they have lost much expertise. Extensive work will need to occur to rebuild the healthcare infrastructure in this country

Case management at the British Army Ebola treatment centre in Sierra Leone

Lt Col (Dr) Mark S Bailey MD FRCP FFTM DTM&H RAMC:

- the British Army Ebola treatment centre was established for the treatment of local healthcare workers and repatriates. The centre occupies the same site as the Save the Children treatment centre and the PHE laboratory in Kerry Town
- the centre has the ability to perform rapid tests for malaria, dengue and HIV infection and can perform blood and faecal cultures. Routine haematology and biochemistry is also available
- patients admitted to the centre receive peripheral cannulation, intravenous fluid resuscitation and electrolyte replacement to prevent sudden cardiac death. Central lines are utilised early to enable safer blood sampling and more aggressive therapy. Patients are catheterised and bowel management systems are used where appropriate
- antiemetics, antibiotics, malaria treatment, vitamin K and ranitidine are also used in the management of confirmed patients. In later stages of disease, vasopressors are considered alongside treatment for specific complications. During recovery patients are given low molecular weight heparin to reduce the risk of venous thromboembolism
- the main challenges have included language and cultural barriers, a poor understanding of the disease and limited continuity of care
- research being conducted at the centre includes; a review of the clinical guidelines bundle, laboratory markers of EVD severity and prognosis, the role of central lines, intra-osseous needles and bowel management systems and the role of echocardiography and ultrasound in fluid resuscitation

Session three: Laboratory diagnosis

Filovirus research at PHE and the EML lab in Guinea

Roger Hewson PhD**:**

- microbiological containment was established at Porton Down before the first outbreaks of Ebola. Specialised containment structures were development to handle such viruses after the first outbreak. Following the first and second outbreaks of EVD in 1976, samples were sent to Porton Down for isolation work
- there were several firsts at Porton Down, such as molecular cloning. Research at Porton Down has also included work with primates (Rhesus macaques) and guinea pigs in the CL4 laboratory, where important advancements were made. However, work with macaques, the gold standard animal model for EVD, is no longer possible at CL4 in the UK
- most recently Porton Down has been working on assay development supported by the Department of Health and have been involved with European partners to develop the EMLab
- Porton Down has also been involved in a number of externally funded programmes and collaborations including; basic translational research, public health orientated research, sequence changes relating to increased pathogenicity, identification of new therapeutic targets and rapid diagnostics

EMLab Ebola research

Professor Miles Carroll PhD:

- the first diagnosis, isolation and sequence were conducted by EMLab in March 2014. The EMLab performed more than 50% of the diagnostics in Guinea and more than 4,000 clinical samples have been shipped to Europe to the BioBank
- in collaboration with MSF, the EMLab is conducting the European Union research funding horizon 2020 project, developing information on viral genetic change during the course of the outbreak, virus shedding and risk of transmission, biomarkers of disease progression/survival and correlates of protection in Ebola survivors
- the EMLab is working to generate a BioBank from EVD survivors. The project involves a committee of Ebola survivors who advertise the project through local radio stations and local meetings
- dogma suggests that Ebola survivors are protected against further infection
- a further study called REACTION, funded by the European Union and Inserm, is being conducted in EVD care centres in Guinea. This study will evaluate the efficacy of high-dosed favipiravir in reducing mortality in EVD

- the 150 Ebola genomes project aims to monitor the development of mutations and adaptations during the epidemic. This study will assess the potential for immune escape by assessing GP genetic stability and the stability of Ebola genes used as therapeutic targets. The study will enable modelling of the true rate of incidence of infection

Reference materials for Ebola

Dr Philip Minor PhD:

- the aim is to create a specified standard to enable reliability of results allowing comparison of results between laboratories and treatment centres
- common run controls used on a regular basis allow monitoring of results within a laboratory and comparison of performance and data between laboratories. Reference materials as established by WHO allow calibration of run controls and quantitative comparison of results, eg limit of quantitation, limit of detection
- a PCR reference needs to be safe and non-infectious, represent all relevant target sequences, serve as a control for the whole process including extraction and amplification and be commutable
- types of Ebola nucleic acid run controls include: live virus, plasmids, killed virus and armoured nucleic acid. All three candidates (plus perhaps plasmids) will be made as lyophilised preparations
- antibody references are used to evaluate responses to vaccination, antibody spectrum in plasma for transfusion and seroprevalence. Types of sample acquired to date include convalescent plasma from repatriated cases; convalescent plasma from West Africa, post vaccination samples, animal and monoclonal antibodies
- the proposal is to send out everything for whatever assay is available and compare results, establish what the assays can do compared to each other and identify a reference material for establishment through WHO

Session four: EVD Immunotherapy and Antivirals

Rapid evaluation of potential therapies for Ebola in clinical trials in West Africa

Professor Trudie Lang PhD:

- an open label non-randomised single arm trial to investigate the efficacy of brincdofovir has been established in Liberia in partnership with MSF. All patients unable to tolerate oral therapy and pregnant women are excluded from the trial. Children are treated but excluded from analysis
- patients who are discharged following successful treatment are experiencing stigma upon return to their communities and may be reluctant to engage in follow up. Community engagement is essential from the onset of establishing research in outbreak settings
- typically it takes 18 months to establish a clinical trial in these settings. The process is difficult and cumbersome with many obstacles
- research during disease outbreaks is important and drug trials in such outbreaks are rare. However, there is a recognised need for evidenced based treatments, prevention and care
- the Ebola clinical trials open collaborative platform (www.ebolaclinicaltrials.org) is open, where all those interested and involved in Ebola research can find information on planned, ongoing and completed clinical trials of vaccines or treatments for Ebola

Vaccine candidates and their selection for phase two and three trials based on phase one immunological data

Professor Sarah Gilbert PhD:

- design of field trials is developing in correlation with the evolution of the outbreak. Phase one trials have been conducted to determine safety and immunogenicity as fast as possible
- currently a monovalent vaccine expressing the Zaire glycoprotein is being trialled in Oxford. The aim is to provide clinical safety data and compare immunogenicity data to non-human primate trials. Phase one began mid-September
- the first ChAd vaccination was administered in September 2014 at the lowest dose. The research team are experienced using this vector and are therefore testing a limited range of doses
- following safe immunisation of the first five volunteers at medium and high doses, a further trial was initiated in West Africa. The Mali trail was approved and started vaccination in October 2014. The last ChAd vaccination was administered in

November 2014, and a booster MVA-vectored vaccine was given to half of the volunteers in December 2014

- early results demonstrate responses in all doses tested. In humans we are seeing less of an immune response than in non-human primate trials which is to be expected. T cell and antibody responses boost substantially post-MVA
- there are challenges for implementation in the wider public. The shorter the interval between the primer and the booster dose, the better and more successful it is likely to be. Current trials are assessing a one or two week interval between doses

ISARIC and convalescent plasma studies in West Africa

Dr Calum Semple PhD FRCPE FRCPCH:

- historically there has been a delayed, isolated and fragmented clinical research response to severe infectious disease outbreaks. We need rapid, integrated and harmonised clinical research response to severe infectious disease outbreaks.
- the International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC) was launched in December 2011 to facilitate a rapid research response to emerging diseases, understand pathogenesis and to conduct trials during outbreaks
- we need open-access protocols, prior approval and data sharing, a tiered approach, common outcome measures to aggregate data and a rapid response facilitated by preparedness
- ISARIC uses common outcome measures allowing aggregation of data from independent studies and comparison of disparate interventions in different settings
- tiered protocols have been created which are disease independent and could be pre-approved with governments and WHO so they can be deployed rapidly in outbreaks
- currently there are two studies evaluating the use of convalescent antibodies: Ebola_Tx in Guinea (Johan van Griensven: EU Horizon 2020 and Wellcome Trust) and ECP001 in Liberia (ClinicalRm: Gates foundation). A further study is in preparation of Sierra Leone. Ebola_Tx is being conducted in collaborations with MSF in Guinea. The main outcome for Ebola_Tx is to establish whether convalescent plasma improves day 14 survival. ECP001 is being conducted in Liberia with a virological endpoint comparing viral load pre and post convalescent plasma therapy and correlating the change with neutralising antibody levels in the donor plasma

Serology support for EVD convalescent plasma studies

Professor the Honourable Richard Tedder FRCPath FRCP:

- the current public health response has been prioritised towards containing the epidemic by preventing onward transmission. There is currently no licensed vaccine and no proven anti-viral medication
- improving standards of supportive care is of societal importance
- passive immunisation with neutralising antibody can be achieved with a natural source ie convalescent donors, which are immediately available, and derivatised ex-human sources
- conventional assays are of limited are of limited applicability
- there are four assay formats that can be used and recombinant EBOV GP has been incorporated into each: type 1 indirect or anti-globulin assay, type 2 γ or μ globulin capture assay, type 3 competitive assay and type 4 immunometric or antigen sandwich
- capture assays give the advantage for the adaptation to detect antibody in oral fluid, competitive assays are of high specificity and can be used as surrogate neutralising antibody
- the assays have been successfully trialled in The Gambia and with oral fluid and plasma samples from the one UK patient and from vaccinees

Engineering of human monoclonal antibodies to Ebola

Professor Antonio Lanzavechhia PhD:

- monoclonal antibodies (MAb) are useful for prophylactic therapy and treatment
- neutralising antibodies can be sourced from survivors or vaccinated individuals. With broadly neutralising antibodies the target epitope is very conserved
- for prophylactic use MAbs are extraordinarily efficient (0.6mg/kg provides protection)
- there are two types of Ebola virus glycoprotein, GP1 and GP2, and their functions are not clear. There has been little evidence of antigenic drift in the current epidemic
- three neutralising MAbs have been demonstrated; EVB 114, EVB 100 and EVB166
- from DNA to GMP product development time required is approximately 18 months
- a fast-track production of GMP lots is achievable in six months in case of urgent need (but we need to establish a path with regulatory agencies)

Plans for making human monoclonal antibodies during the current outbreak

Professor Alain Townsend MD PhD FRS FRCP:

- the development of a human MAb to treat EVD is important. There is a need to use as many techniques as possible. Each technique will select a different subgroup of antibodies
- Ebola virus glycoprotein express constitutionally in MDCK SIAT-1 cells. EH-SIAT cells support replication of S-FLU, a disabled influenza virus now coated in Ebola glycoprotein. These reagents provide simple tools for screening human MAbs for binding and neutralisation and small molecules for inhibition of entry
- isolation of these reagents could be a continuous nationally funded activity linked to PHE and ISARIC
- the first human MAbs from vaccinated volunteers are appearing

Session five: EVD modelling and transmission

Chains of transmission and control of EVD in Conakry, Guinea in 2014

Dr Simon Cauchemez PhD:

- the target of the UK effort has been to reduce the reproductive number (R0) to below one. This number needs to be broken down into target areas in order to prioritise available resources and to have the largest impact on reducing transmission
- however, the R0 is insufficient to guide strategic decision making on interventions. This requires a good understanding of what is happening in the field and how EVD transmission progresses
- Conakry was the first large urban centre affected by EVD. Chains of transmission expanded to Boffa and Télimélé
- an epidemiological study conducted in Conakry highlighted that hospital transmission in Conakry was elevated in March 2014 but quickly declined to relatively low levels and the contribution of healthcare workers to spread was limited. Transmission at funerals played a minor role in transmission once controls were implemented. A majority of transmissions took place in the community and in families and the hospitalisation of cases substantially reduced the transmission in the community. Cases with elevated viraemia infected on average more people in the community

Modelling of Ebola wave spread: the current EVD outbreak could have been predicted

Dr Peter Walsh PhD:

- WHO should have predicted this outbreak
- by plotting the spread of EVD outbreaks from 1976 to 2005 it became evident that EVD outbreaks were moving across the continent. All outbreaks fit on a progression line which indicates each outbreak moves 50km per year across the continent. All outbreaks since have fell on this regression line
- the current Ebola outbreak falls on the regression line, however, bats appear to be flying further and quicker. The distance travelled is twice as far in areas that are not as forested
- ten years ago an Africa bat monitoring programme in areas where EVD outbreaks are likely to occur was proposed to the WHO. The proposal was not accepted on the basis that EVD is endemic and emergence is unpredictable

- there is clear evidence that bat sampling would be beneficial and would enable to predict and therefore prevent future EVD outbreaks.

Mapping the zoonotic niche of Ebola virus disease in Africa

Mr David Pigott:

- humans are not the sole host of EVD. There is a high case fatality in gorilla populations, who seem to be susceptible but not a reservoir of the disease. Fruit bats are considered as the likely reservoir species
- animal outbreaks are highly localised
- studies have been able to create a predicted zoonotic niche map, with representation of areas of high suitability of transmission should Ebola be introduced. Vegetation is one of the most significant factors, including presence of noted bat species. In total 22 countries are predicted to be environmentally suitable for Ebola virus transmission, some of whom have never seen Ebola case before
- the map cannot have directly predict outbreak starting locations as need to better understand the epidemiology of transmission within reservoir populations and nature of human-animal interactions
- however, the map can be used to suggest survey locations for not only testing bat populations, but also anthropological studies to better understand the nature of risk in these areas
- this map can be used to aid differential diagnoses of haemorrhagic fever across Africa and can be used to aid future preparedness operations
- public health measures include public health education, establishment of alert systems and pre-existing arrangements between governments and world health organisations

Session six: Containment and risk assessment

Speaking for: Port screening in the UK is a useful public health intervention

Dr Jenny Harries, BSc, MB ChB, MPH, MBA, FFPH, FCMI:

- the current system established at ports of entry into the UK is not an exclusive entry screening programme but also a returning workers programme. It is a gateway process to a risk management pathway. It does not stand alone and includes follow up by local health protection teams and clinical teams where necessary
- highly accurate tympanic thermometers are used with a non-touch technique, in combination with a risk assessment of exposure
- for the recent Texan case, it took four days for the individual to reach the required services. In comparison, in the UK it took 16 hours, involving several teams and administrations
- overall the returning workers scheme and entry screening processes enables risk management of the highest risk returnees, services as an information gateway to facilitate improved public knowledge of the disease and its symptoms and ensure early access to isolation and treatment where necessary. There is a further advantage in visibly managing public risk perception

Speaking against: Port screening in the UK is not a useful public health intervention

Professor David Mabey:

- on 8 October 2014 a government spokesman said that the government had no plans for airport screening in the UK because the Chief Medical Officer and her advisors had said it would not be effective. This was followed by a media frenzy accusing the government of a lack of action. That evening the government advised it would introduce entry screening
- exit screening for people leaving affected countries is established and infected individuals are prohibited from flying. Therefore entry screening will only identify people who become unwell in transit. The chance of developing symptoms in this period is 10% and at best the screening will pick up these 10%
- there is evidence of ineffective airport entry screening for other infectious disease, for example for SARS in Canada in 2003. More than one million individuals filled in questionnaires and more than 2,000 answered ‘yes’ to screening questions. Of these individuals, more than 200 had a raised temperature and none were diagnosed with SARS. The cost of this programme was 17 million Canadian dollars

- recently we have had one returning worker infected with Ebola who developed symptoms on the flight and was not detected at Heathrow and sent for an assessment
- as implemented at present it is not an efficient system. We need information and a clear message to returning workers to inform them of what to do if they become unwell, rather than airport screening