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SAFEGUARDING PUBLIC HEALTH AT UK AIRPORTS: AN EXAMINATION OF CURRENT HEALTH SECURITY PRACTICES

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Abstract

In response to the H1N1 influenza outbreak and the role of air travel in facilitating the virus's rapid spread around the world, this paper contributes to debates concerning the governance of infectious disease by examining the role of the Port Health Regulations and associated health security practices that are enacted at UK airports. While airports have been at the forefront of measures to prevent the importation of 'foreign' infectious diseases since the early 1930s, the present scale of international aeromobility combined with heightened awareness of the role air travel plays in the global spread of human pathogens, the epidemiological obsolescence of many early aeronautical sanitary regulations, and a dearth of academic studies on health security at airports, provide compelling reasons to examine the development, content, and implications of the existing Port Health Regulations and associated health security practices that are performed at UK airports.

Drawing on extensive archival research and fieldwork interviews with key stakeholders in the aviation and health care sectors (including airport managers, 'front line' customer-facing airline personnel, and medical practitioners), we chart the development of sanitary regulations at UK airports and explore the current practices of health security that are performed at individual sites. We then identify the main challenges involved in safeguarding global public health against the dissemination of 'foreign' infectious diseases by air through UK airports and conclude by offering recommendations for improved practice.

Introduction

Owing to its status as one of the most aerially interconnected nations on earth, it could be argued that the United Kingdom is particularly vulnerable to the risk of 'foreign' infectious diseases being imported by air through its airports. In line with international trends, passenger air travel to and from the UK has grown significantly in recent years, not only resulting in more UK residents being potentially exposed to 'foreign' infectious diseases for which they may no natural immunity but also increasing the risk of overseas visitors importing such 'foreign' diseases into the country (HPA, 2007, House of Lords, 2007). In 2008, approximately 189 million international passengers used UK airports (CAA, 2008a, 2008b) and, while the majority (125 million) travelled between the UK and countries of the European Union, significant numbers of people also travelled to and from destinations further afield. Figures from the UK Civil Aviation Authority (CAA) indicate that, in 2008, 5.4 million people flew to/from the Middle East, 5.1 million travelled between the UK and the Far East, and 3.6 million flew to/from destinations in North Africa (CAA, 2008b), regions in which all manner of infectious diseases may be endemic. Such high volumes of long-distance international aeromobility pose unique challenges to airports, airline operators, and decision-makers and make the provision of effective health security practices at UK airports inherently challenging.

Building on our previous examination of the historical 'biogeopolitics' of passenger aviation during the twentieth century (Budd et al, in press), this paper explores one aspect of global airline passenger health security that has received relatively scant academic attention to date - the health security practices that are performed at UK airports to safeguard public health. Given contemporary concerns relating to the H1N1 'swine' influenza epidemic (which is believed to have arrived in the UK at Birmingham International Airport in the West Midlands on a charter flight from Mexico), our research is particularly timely. The paper begins by briefly describing the development of the Port Health Regulations in the UK and how they apply to airports. Drawing on extensive archival research and in-depth interviews with key stakeholders in the aviation and health care sectors (including airport managers, 'front line' airline personnel and medical practitioners), we then outline the current practices and identify the main problems associated with safeguarding public health at UK airports and offer tentative recommendations as to how these challenges may be addressed.

Aviation and the development of early international health security measures

As the SARS epidemic of 2003 and, more recently, the 2009 H1N1 'swine flu' epidemic, demonstrated, the movement of infectious diseases by air can have profound implications for human health and international mobility (Pang and Guindon, 2004; Bowen and Laroe, 2006; Ali and Keil, 2006). Indeed, numerous scholars (Royal and McCoubrey, 1989; Gerard, 2002; Mangili and Gendreau, 2005; Singer, 2005; Colizza et al., 2006; Tatem et al., 2006; and Tatem and Hay, 2007) have attested to air travel's important role in the global spread of infectious disease. However, while the potential for air passengers to incubate disease and/or carry vectors of infection between countries was first recognised in the early 1920s, it was not until the introduction of regular long-haul passenger services in the 1930s that any coordinated attempts were made to regulate the movements of air passengers and air cargo to safeguard (initially Western but later global) public health from the threat of 'foreign' infectious diseases being transmitted to different countries by air (see Budd *et al*, in press). These measures, which took the form of international agreements which prescribed for the routine disinsection of aircraft (the eradication of insects using chemical insecticides), the isolation or quarantine of individual travellers, and mandatory vaccination certificates, inevitably invoked political, as well as epidemiological, issues. As a result, individual nations often adopted very different prophylactic measures to try and counter the same biological threats (Baldwin, 1999).

The first multilateral international public health agreement to deal expressly with air travel was devised in November 1924 at the Pan American Sanitary Conference. Here, 18 countries in North, Central, and South America signed a code which called for the "prevention of the international spread of communicable infection of human beings" and, in the event such infections should occur, stipulated the cooperative measures that should be

implemented to prevent "the introduction and spread of disease" into hitherto unaffected territories by all means, including air travel (cited in García et al., 1999: 28). However, it was not until May 1929, when representatives of 38 countries attended a Congress on Sanitary Aviation in Paris, that the first truly international*,* as opposed to regional, assembly concerned with the public health implications of commercial aviation convened (Flight, 1930). Four years later, in April 1933, following extensive debate at the First International Sanitary Convention, an agreement that provided for the first international sanitary control of aerial navigation was prepared and ratified at The Hague (Massey, 1933).

The resulting Convention, which became effective in August 1935, contained over 65 separate Articles and dealt with threats posed by Typhus, Smallpox, Plague, Cholera, and Yellow Fever. The relative merits of providing specific facilities for the medical inspection of individual passengers at airports, as well as the control of certain 'exotic' tropical diseases around aerodromes, were debated. From an aviation perspective, the disease that caused the most concern was yellow fever and detailed suggestions on how to eradicate the vector of Yellow Fever, the *Aëdes aegypti* mosquito, were proposed (Mance, 1943). The Convention also established common international sanitary standards for commercial aircraft and landing grounds and provided, amongst other things, details for the construction of anti-amaryl aerodromes, the control and/or isolation of air passengers originating in endemic yellow fever areas, preventative inoculation, and the destruction of insects in aircraft and around aerodromes (Whittingham, 1938). Many of these controls relied on quasi-scientific or medical interventions which were to be performed before passengers reached the airport, including quarantine, vaccination, and chemical prophalyxis. Other techniques for disinfection and disinsection were prescribed for airports and aircraft. However, as Budd et al (in press) demonstrate, enforcement of the regulations was logistically and politically problematic as those who were unaware of the rules, or deliberately chose to ignore them, undermined their effectiveness.

The outbreak of the Second World War disrupted efforts to strengthen international measures for sanitary aviation. However, in 1944, the international community, through the auspices of the recently formed International Civil Aviation Authority (ICAO) and the World Health Assembly, attempted to standardise the control of infectious diseases that were known to be transmitted by air through a package of internationally binding measures. Chapter II Article 14 of the 1944 Chicago Convention on Civil Aviation, the document that provided for the post-war development of global civil aviation, stipulated that each contracting State must "take effective measures to prevent the spread by means of air navigation of cholera, typhus (epidemic), smallpox, yellow fever, plague, and other communicable diseases" (ICAO, 1944), while the International Sanitary Convention for Aerial Navigation (1944) called for 'special measures to prevent the spread by air across frontiers of epidemic or other communicable diseases' (United Nations, 1948: 250). Nevertheless, these directives were not implemented immediately and, in 1946, 13 separate international conventions relating to preventing the spread of international disease were still simultaneously in force (Cheng, 1962).

The development of health security regulations in the UK

While the provisions in the Chicago Convention undoubtedly advanced efforts to standardise aviation health security at the international level, individual states continued to actively devise their own protocols and debate how best to enshrine international directives into national law. At the time of the introduction of the First Sanitary Convention for aviation in the mid 1930s, the relatively small numbers of long-haul air travellers to/from the UK and the limited number of UK airports hosting international air services, meant that it was comparatively easy for UK-based airlines, airport personnel, immigration officials, and customs officers to comply with the health regulations. In 1948, four years after the Chicago Convention was signed, only eight UK airports (and one marine air terminal) supported scheduled international air services. However, by far the majority of these flights were short haul services to/from the near continent and the Irish Republic and only two airports, London and Prestwick (the latter simply by virtue of the fact that all transatlantic aircraft had to stop there to refuel), handled long haul intercontinental air traffic (see Table 1 overleaf).

Table 1: Foreign destinations served from London Airport in 1948

Accra	Calcutta	Knocke/Le Zoute	Prague
Amsterdam	Colombo	Madrid	Rio de Janeiro
Antwerp	Delhi	Montreal	Santiago
Bahrein [sic]	Eindhoven	Nairobi	Sydney
Bombay	Frankfurt	Nassau	Tanganyika
Brussels	Havana	New York	Tehran
Buenos Aires	Istanbul	Nice	Vienna
Cairo	Johannesburg	Paris	Washington

Source: derived from Thetford (1948)

However, as the networks of long-haul passenger services grew throughout the latter half of the twentieth century, the need to introduce specific public health legislation for air travel became increasingly acute. At London Airport (now Heathrow), a dedicated Health Control Unit was established in 1947 (a year after the airport first opened to commercial air traffic) to deal with the public health risks posed by international air travel. Initially, this comprised a medical examination room and offices staffed by a dedicated team of health practitioners but, as medical technology developed, more advanced x-ray machines and other diagnostic equipment was progressively installed. However, by the early 1950s, rising numbers of international airline passengers, combined with a growing number of airports offering international services, made the intensive surveillance and policing of individual travellers, which had been a cornerstone of international civil aviation health policy in the 1920s and 1930s, increasingly impractical. Moreover, a 'moral panic' which arose from an alleged link between rising levels of immigration to the UK, particularly from former British colonies in the Indian subcontinent, and rising rates of tuberculosis, resulted in the implementation of a Port of Arrival (or Port of Entry) system. Under this regime, particular groups of travellers, who were believed to represent a heightened disease risk by virtue of their nationality, were targeted for additional screening and examination on arrival in the UK. Significantly, a provision of the 1962 Commonwealth Immigrants Act empowered Port Health agents and immigration officials to refer certain categories of travellers for medical inspection before they were formally admitted to the UK. However, while this Act detailed the treatment and examination of potentially infected travellers, it did not explicitly state the precise nature of the health security measures that should (or could) be employed at airports or on aircraft (see Welshman and Bashford, 2006).

In England, the first specific national powers for applying health controls on commercial aircraft and at UK airports were contained within the Public Health (Aircraft) Regulations Act 1979 and the Public Health (Control of Disease) Act 1984. In 2007, these regulations were revised and updated. The resulting Public Health (Aircraft) (Amendment) (England) Regulations 2007 forms one part of a package of legislative measures that are commonly termed the 'Port Health Regulations'. Similar legislation exists, or is planned, for the devolved administrations. The Port Health Regulations define the measures that should be taken at airports against both arriving and departing passengers, crew, and aircraft to limit any potential risks to public health and reduce the spread of infection. These interventions include the medical examination of potential entrants to the UK, the grounding of aircraft and, if required, the detention of passengers, crew, cargo, and equipment until local health authorities are satisfied that no disease threat exists (HPA, 2006a). Under the 1971 Immigration Act, immigration officers at UK ports and airports are also empowered to refer prospective entrants (who are subject to immigration control) for medical examination by a dedicated Port Medical Inspector (PMI). PMIs are appointed by the UK's Health Protection Agency (an independent organisation established to protect public health in the UK), to defend the UK border from the importation of infectious disease. While an Immigration Officer can, in principle, refuse a potential applicant entry to the UK on public health grounds in light of a PMI's findings, there is little provision within the Port Health Regulations for actually applying health measures (other than offering certain vaccinations) to prospective entrants (HPA, 2006a).

The main statutory responsibility for implementing the Port Health Regulations at UK entry points, which include seaports, international railway stations, and airports, rests with the local authority in which the facility is sited. Some local authorities in areas of heightened transportation activity are specifically designated as Port Health Authorities (PHAs). These PHAs were created in the second half of the nineteenth century to perform Port Health functions at entry points to the UK with the aim of preventing the international dissemination of dangerous communicable diseases, initially by ships, but now also by international rail and air services (see Hawker *et al*, 2005). The task of providing or commissioning specialist staff to implement the Port Health Regulations at (air/sea)ports in the UK rests with the Local Authority, the local Primary Care Trust (a division of the NHS in England that provides some primary and community health services), or the Health Protection Agency. The majority of personnel employed by these institutions are either registered medical practitioners or certified environmental health officers. Out-of-hours cover is usually operated on a rota basis with General Practitioners (GPs) being contracted to perform medical checks in the event of an out-of-hours public health incident.

As Budd et al (forthcoming) highlight, the recent introduction of regular international air services to and from UK regional airports has meant that some local authorities (simply by virtue of having an airport located within their administrative boundaries) have had to rapidly assume a Port Health function for which they often had no prior experience. Indeed, in the 60-year period between 1948 and 2008, the number of UK airports handling international services increased from eight to 41, with the majority of these new services being inaugurated within the last five years (see DfT, 2005). This fundamental change in the spatial pattern of international air services from the UK was result of deliberate Government policy which sought to promote the growth of UK regional airports by liberalising the bilateral air service agreements that had previously regulated the routes that could be flown from each individual airport (DfT, 2003). As well as opening up new international markets for existing UK carriers, the UK Government also invited applications from foreign airlines who wished to operate new international services from regional airports (DfT, 2005). As a result, foreign airlines, including Emirates of the UAE, Pakistan International Airlines, and Continental Airlines of the United States, now operate regular long-haul international services to/from a number of regional UK airports (see CAA, 2007). As a direct result of assuming this relatively new role as sites that facilitate long distance international aeromobility, the provisions for safeguarding public health at these smaller regional airports may be less well defined than those at major London airports which have had more experience at dealing with the public health challenges associated with regular long-haul air travel (Budd et al, forthcoming). In the following section we discuss the health security procedures that are currently employed at UK airports and examine the public health challenges 21st century patterns and practices of aeromobility pose.

Enacting Port Health Regulations at UK airports

Despite recent debates concerning the efficacy, effectiveness, and ethics of installing health screening technologies at UK airports to detect possible signs of infection in travellers, the majority of the existing UK Port Health surveillance strategy at airports remains covert and relies on the visual inspection of passengers by check-in agents or cabin crew, irrespective of origin or destination. However, owing to long-standing concerns relating to tuberculosis (TB) infection, travellers arriving in the UK from TB prevalent areas receive more targeted screening. Though the motivation for, and practices of, screening potential entrants for tuberculosis have been widely described and debated (Hardie and Watson, 1993; Ormerod, 1998; Hogan et al, 2005; Welshman and Bashford, 2006), the implications for airports that receive flights originating in TB prevalent areas have received far less attention. Given that all UK airports are obliged to provide a (often costly) Port Health response to flights arriving from TB prevalent overseas destinations, this situation warrants considered investigation.

Owing to the procedural architecture of modern airports, there are only two funnelling points – immigration and customs – through which all arriving passengers pass. This obliges any point of entry health screening to be performed at one of these two locations. Currently, the responsibility for identifying potentially infected/infectious travellers rests with individual immigration officers, who must evaluate not only the originality and veracity of immigration

documents but also assess whether individual travellers pose a disease risk. The existing protocols mean that travellers not holding EU, North American, Australian, New Zealand or other 'Western' passports will be subject to more scrutiny (from both an immigration and an epidemiological perspective) than those that do. Under the current system, certain groups of travellers can be quickly identified and referred for additional immigration and/or health checks before being admitted to the UK.

At the time of writing, UK Department of Health guidelines require UK airports to screen potential entrants from tuberculosis prevalent areas, who cannot provide evidence of BCG inoculation, using chest x-rays[1]. However, only two UK airports – London/Heathrow and London/Gatwick – have the facilities to undertake chest radiography on site and even then only in certain terminals. At all other UK airports, information on new entrants who may represent a TB risk is passed to the local Health Protection Agency office for follow up. However, this system is far from perfect as entrants may become 'lost to the system' or fail to attend follow-up appointments at local medical centres. Moreover, our research indicates that the existing Port Health procedures are inconsistent and the practices performed at one site may differ substantially from those at another (Budd et al, forthcoming).

Interestingly, chest radiography represents the only medical screening technology that is routinely employed to safeguard public health at UK airports. The benefits of introducing other screening technologies, particularly thermal imaging cameras, have been debated in response to new and emerging disease threats and some commentators have called for technologies that are used at some overseas airports to be installed in the UK (see Warren et al, forthcoming). However, the potential introduction of any new screening technology invokes all manner of ethical, financial, technological, and practical concerns. Indeed, as we discuss in later sections of this paper, we have discovered evidence of considerable disagreement within individual stakeholder communities, with positions being polarised between those who feel that all possible measures should be taken to prevent the transmission of infectious disease and those who believe that some of the proposed new screening technologies go far beyond what is reasonable and infringe the privacy and dignity of individual travellers. In the remaining sections of this paper we consider in more detail some of the logistical challenges involved in safeguarding public health from the dissemination of 'foreign' infectious diseases through UK airports and conclude by offering recommendations for improved practice.

Safeguarding public health at UK airports – problems and potential

The empirical material presented in this section of the paper was obtained through extensive in-depth interviews that the research team conducted with key stakeholders in the aviation and health care sectors during 2009. Interviewees included airport managers and/or operations directors at four UK airports (including a major airport in the southeast), airline personnel (including cabin crew and flight dispatchers), and medical practitioners who had a Port Health responsibility. The latter group included both 'front line' clinical staff and senior managers and/or policy directors at regional health headquarters. All the interviews lasted a minimum of one hour and, as they were all conducted at the interviewee's place of employment, many were accompanied with guided tours of the Port Health facilities. This enabled us to gain an appreciation of how the existing health security practices are enacted on a daily basis at different sites. At the request of our interviewees, no airports or individual staff members are identified. From the interviews and the action research, three key areas of concern for stakeholders emerged. The first relates to organisational complexity, which is perceived to obfuscate clear lines of command and responsibility. The second relates to inadequate communication between agencies involved in Port Health provision, while the

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[1] In an attempt to mitigate some of the problems associated with Port of Entry screening of arrivals from endemic tuberculosis areas, the UK currently conducts pre-embarkation health screening in a number of overseas countries, including India and Pakistan, which have high population mobility to the UK and are able to perform the required medical screening to an acceptable standard.

third arises from both financial and practical constraints. Each of these areas is now addressed in turn.

The liberalisation and privatisation of UK airports, combined with the outsourcing of UK health care providers, has meant that Port Health has become highly complex with numerous local, national, and international agencies and companies involved in its provision. Many of the practitioners to whom we spoke indicated that this complexity stemmed, at least in part, from the combined effects of: the 1974 reorganisation of the National Health Service and the subsequent creation (and recreation) of different agencies including Strategic Health Authorities, Primary Care Trusts, and the Health Protection Agency; the interaction between the Home Office, the Departments for Health and Transport, the UK Border Agency, the police, and HM Revenue and Customs; and the diverse pattern of airport and airline ownership in the UK.

With respect to this last point, Humphreys and Francis (2002), among others, have attested to the diverse pattern of airport ownership in the UK. At the time of writing, seven UK airports are owned and operated by BAA (a company that is itself owned by a Spanish construction firm), four are owned and operated by Manchester Airports Group, while the remainder are owned and operated by a mixture of private enterprise and/or local authorities. As a result of this fragmentation of ownership, airports that are not part of a bigger airport group have little or no access to 'best practice' frameworks and cannot easily benchmark their own Port Health protocols or evaluate their performance with other similarly-sized facilities. Tellingly, several interviewees actually asked the research team how their own Port Health strategies and practices of intervention compared with those of other UK airports. All spoke of their desire to facilitate dialogue between neighbouring airports and of the need to improve the quality, clarity, and flow of documents between different agencies.

The existence of some many different departments and agencies, each with its own priorities, acronyms and sets of internal working procedures, was identified as a particular problem by our interviewees. Many alleged that the scope of jurisdiction and/or the remit of responsibility of individual (often new or restructured) agencies was not always clear and hence staff were often unsure of which agency they should be working with at any point during an emerging Port Health incident. This uncertainty was made manifest by almost half of our interviewees (significantly all of whom were relatively 'junior' or front line customer-facing staff) who used the terms 'Strategic Health Authorities', 'Primary Care Trusts', 'Local Health Authorities', and 'Port Health Authorities' interchangeably and often incorrectly during the course of their interview. However, all respondents, from junior to senior staff, also perceived there to be a lack of stability within individual organizations and several interviewees recounted incidents where valuable time was wasted trying to establish who they should be liasing with and verifying whether a particular individual had the authority to take decisions.

The second major area of concern for our interviewees relates to communication. In addition to negotiating the bureaucracy associated with the complex organisational structure of contemporary Port Health provision, many front-line airport and airline staff claimed that existing communication channels were convoluted and ambiguous. While some departments and companies operating within particular airports appear to have clearly prescribed and well rehearsed checklists of Port Health procedures, this appears to be the exception rather than the norm and we were struck by the apparent lack of consistency both within and between different airports. While the Health Protection Agency has assumed the operational lead for ensuring that there is a single point of contact for Port Health and medical inspection services at all UK airports, our research indicates that further investment may be required to realise this goal. Finally, and in addition to the issues discussed above, there are a number of financial and practical difficulties associated with safeguarding public health at UK airports that need to be highlighted.

The third and final area of concern we discuss in this section of the paper arises from issues associated with financial cost and practicality. The progressive privatisation and commercialisation of UK airports that followed the 1986 Airports Act resulted in a new emphasis being placed on revenue generation from non-aviation related business (Humphreys, 1999). As a consequence, many airports have evolved into vast retail and entertainment spaces that have little, if anything, to do with flying. While the increased

commercialisation of airport space has enabled airport operators to extract maximum revenue from their assets, the implications for Port Health and health security provision have been largely overlooked. Indeed, though the provision of Port Health facilities is a statutory requirement for all UK airports supporting international services, Port Health does not represent a revenue stream for the airport operator and many health practitioners complained insufficient space was reserved for Port Health activities as a consequence. Moreover, we discovered that airport operators routinely charge rent on the space Port Health organisations occupy. Indeed, one interviewee, based in the southeast of England, reported that his organisation paid almost a quarter of its annual budget to the operator of the local airport in rent so as to secure continued space for a medical examination room. When challenged, he remarked that the existing requirements only state that Port Health facilities have to be present at international airports and, reflecting perhaps the age in which they were drafted, they do not say that airports have to provide rent-free space for these facilities.

In addition to issues of cost, there are also practical problems that exacerbate the challenges of providing effective Port Health safeguards. As a direct consequence of recent terrorist attacks against commercial aircraft and airports, all available space in the security search area is devoted to anti-terrorist security measures meaning there is insufficient scope to provide Port Health with any space in which to conduct exit screening. Likewise, the immigration hall is designed to expedite the processing of potential entrants into the UK and very few airports have space in which entry screening technologies could be installed. Having said that, there may be scope for introducing some sort of mobile screening technology that could be moved to different boarding gates as required to screen passengers as they disembark from 'high risk' flights.

Provisional recommendations

Our interviews and action research – albeit from a small sample of UK airports - provide compelling evidence that stakeholders believe the efficacy of the existing Port Health system at UK airports is being compromised by financial and practical issues. Indeed, the complexity of the existing Port Health regulations, combined with the multifaceted pattern of airport ownership and health service provision in the UK, renders the challenge of delivering effective Port Health safeguards considerable. We gained a sense of frustration in which stakeholders, who want to 'do the right thing' by their employers and the travelling public, often feel that their actual impact is hindered by inefficient working practices and outdated public health priorities. For example, with respect to the latter point, medical practitioners expressed concern that the continued emphasis on the epidemiological risks associated with tuberculosis may mean the threats new and emerging infectious diseases pose to human health are not prioritised to the extent that they feel is required. While there is a clear need for further research in this area, we suggest that improving the clarity of the existing Port Health documentation to make the responsibility of different agencies explicit and fostering closer working links and dialogue between and among stakeholder groups, may help to alleviate some the difficulties that are currently associated with the existing regulations.

We also suggest there would be considerable merit in assessing the health security practices that are performed at airports overseas and we foresee significant scope for future research that seeks to explore their application in a UK context. It is clear that many Port Health practitioners informally compare UK practices with those undertaken abroad. Two senior managers voluntarily made reference to the health declaration questionnaire that the United States administer to some airline passengers alongside conventional landing cards, while four other managers voluntarily assessed the relative merits of different screening technologies and quarantine practices. For certain medical practitioners, antigen mediated nasal swabs and, ultimately, molecular testing, are the preferred means of screening for influenza, but they recognise that these procedures would: be expensive and time consuming to produce and process; require trained staff to administer the swabs and analyse the results; and raise ethical concerns. In the short to medium term, therefore, we suggest that the introduction of a structured three-tier system of health screening may (depending on the nature of the disease threat) be appropriate for use in UK airports. At this

stage in our research, the information presented in Table 2 represents work in progress that is intentionally designed to generate public debate.

Table 2: Proposed three-tier system of health screening for use in UK airports

Level one – a questionnaire-based health declaration form (similar to a landing card). This would be distributed to all arriving airline passengers who require a landing card (i.e. non-EU passport holders). This questionnaire could include brief questions relating to the passenger's recent travel history and their inoculation record. Potential health security risks could be identified and level two screening invoked if required.
Level two – this phase would involve near-patient rapid testing that is quick, cheap, accurate, and non-invasive. Such processes may, for example, include the use of thermal imaging cameras. Passengers who show an elevated core body temperature (or another symptom of infection) may then be referred for level three screening.
Level three – this final level would involve a physical examination by a doctor and/or x-ray and blood cultures. However, these methods are expensive, time consuming and invasive, raising numerous practical, legal, and ethical issues. We envisage that this level of screening would only ever be used in a minority of cases.

Conclusion

Recent outbreaks of highly infectious human diseases, including SARS and the H5N1 and H1N1 strains of influenza, have illustrated the continued epidemiological vulnerability associated with mass international air travel to and from the UK. Drawing on extensive archival research and fieldwork interviews with key stakeholders in the aviation and health care sectors, this paper charted the development of sanitary regulations at UK airports and explored the current practices of health security that are performed at individual sites. In many cases, we noted that the Port Health procedures and individual staff responsibilities are often poorly understood by airline and airport employees. In an effort to heighten awareness of the difficulties Port Health stakeholders face in trying to ensure health security at UK airports, we have highlighted three key areas of concern that require additional research to ensure their effective resolution. Finally, in order to generate debate, we have offered a number of tentative recommendations that may improve current practice.

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