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Model of health? Distributed preparedness and multi-agency interventions surrounding UK regional airports

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Abstract

The liberalisation of the European aviation sector has multiplied paths of entry into the United Kingdom (UK) for the international traveller. These changing mobilities necessitate a reconceptualisation of the border as a series of potentially vulnerable nodes occurring within, and extending beyond, national boundaries. In this paper, we consider the border through the lens of port health, the collective term for various sanitary operations enacted at international transport terminals. In the UK, a critical player in the oversight of port health is the Health Protection Agency (HPA), which became a non-Departmental public body in 2005. A major part of port health is preparedness, a set of techniques aimed at managing, and responding to, emergencies of public health concern. More recently, certain jurisdictions have embarked on public health preparedness work across a number of different geographical scales. Using methods pioneered by the military, this form of 'distributed preparedness' is of increased interest to social science and medical scholars. With reference to case studies conducted in localities surrounding two UK regional airports following the 2009-10 H1N1 influenza pandemic, we consider the extent to which distributed preparedness as a concept and a set of practices can inform current debates - in the UK, and beyond - concerning interventions at the border 'within'.

Introduction

At a time when global outbreaks of Severe Acute Respiratory Syndrome (SARS) and H1N1 pandemic influenza have coincided with regulatory and structural changes within the United Kingdom (UK) aviation industry, the challenges of safeguarding public health have been exacerbated. Scholars have long considered international air, rail and sea ports as potential sites of entry for threats to human health (Meyers, 1981; Gushulak and MacPherson, 2000; Katz et al, 2006). However, recent transformations of individual mobility brought about by more diffuse air travel have highlighted the existence of multiple

'borders within' states through which an infectious disease may enter or leave a country (Budd et al, 2011). An emerging literature considers the concept of 'preparedness' (Collier and Lakoff, 2008; Ingram, 2009), which – unlike other anticipatory actions such as preemption and precaution – aims to stop the *effects* of an event from 'disrupting the circulations and interdependencies that make up a valued life' (Anderson, 2010: 15). In the United States (US), Collier and Lakoff have drawn attention to the development of 'distributed preparedness', an 'organizational framework and set of techniques for approaching security threats' across a number of geographical scales (2008: 7). The practices associated with it include: the coordination of planning and response interventions across a number of public and private actors; mapping the vulnerability of vital systems to a potentially catastrophic event; and the use of scenarios to test joint working amongst local, regional and national agencies.

This paper argues that there is scope to explore the meaning of distributed preparedness both in the UK and in relation to managing the global threat of infectious disease. We focus on the airport as a key node for entry and exit, and examine the concept of distributed preparedness as a series of measures put in place to enable the management of changing patterns of infectious disease spread. The paper builds on international research from the social sciences and epidemiology, and makes reference to official, 'grey', literature, to conduct an empirical examination of distributed preparedness interventions in geographical locations surrounding selected international airports in the UK. We draw on in-depth interviews conducted with emergency planners, environmental health officers and healthcare practitioners employed by airports, local authorities, Primary Care Trusts (PCTs) and Health Protection Units (HPUs) in order to analyse the multi-agency interactions that were in play during the 2009-2010 H1N1 pandemic influenza outbreak. In conclusion, we highlight three ways in which our empirical research develops

conceptions of distributed preparedness to inform the management of an emerging infectious disease outbreak at the 'borders within' the UK.

Reconceptualising the border

Progressive liberalisation of the European air transport sector during the last two decades has resulted in a dramatic increase in international air traffic in the UK, particularly at smaller regional airports that historically handled few (if any) international flights (Budd et al, 2011). In Europe, a series of measures, beginning in the early 1990s, allowed new airlines to enter the marketplace and airport operators to engage in more effective competition. The reforms dissolved traditional bilateral and multilateral air service agreements that specified which airlines could fly individual routes, the frequency with which the services could operate, the airports that could be served, and the airfares that could be charged (Goetz and Graham, 2004). One, arguably unintended, consequence of the sudden 'opening up' of regional airports in Europe (Maertens, 2010) to regular long-haul services has been the dramatic increase in the number of sites through which potentially infected travellers and unwanted pathogens can enter or leave a country. In 1990, fewer than 100 scheduled international destinations were served from UK regional airports, but by 2010 the figure had increased to over 450, with particularly significant growth occurring at Liverpool, Bristol and East Midlands (CAA, 2011). While the majority of international flights at UK regional airports are short-haul European services, many of these airports – crucially, from a public health perspective - also now support a significant number of long-haul 'spoke', or feeder, services to airports in the eastern United States, the Middle East, and the Indian subcontinent (Budd et al, 2011). These services, combined with the growing number of transfer passengers they carry, have significant implications for public health provision and border control in the UK by both compounding and also obfuscating the geographical complexities of individual journeys. We argue that this has

fundamentally altered the spatiality of Port Health provision in the UK and exacerbated the challenges of discharging effective health security safeguards at every new point of entry in the UK.

Practices of sanitary pre-emption and preparations at UK airports are, of course, not new. Indeed, there has been a dedicated Health Control Unit at London Heathrow since 1947 to handle the health risks posed by international aeromobility. Moreover, considerable scholarly work evaluates the role of air travel in the spread of infectious disease (Gerard 2002; Ali and Keil 2006; Warren et al. 2010). The threat posed to a nation's health by global infectious disease has been widely theorised as 'biosecurity', a concept given to various technical and political efforts that aim to safeguard human, animal and plant health (for example, Hinchliffe and Bingham, 2008). Yet, although such academic work has sought to understand the various forms of expertise and practices through which particular disease threats are identified, articulated, and managed, there has arguably been less focus on the preparations undertaken to manage the spread of human pathogens in the localities surrounding airports and the social relationships that result from this process. We contend that contemporary disease preparedness, which increasingly involves the study of individual airline passengers' mobility, is creating new geographies of containment and control which often begin before a passenger enters an airport and continue long after their arrival at their final destination (Warren et al, 2010).

The significance of these geographical divides in determining health interventions, and the practices of control that occur within these settings, have been increasingly researched over the last decade, resulting in a burgeoning literature on 'border health' (Barnes, 2008; Monk et al, 2009). Whilst the study of sanitary control at geopolitical borders is important, we wish to consider preparedness practices resulting from significant spatial realignments

within the UK following the liberalisation of the European aviation industry, and the implications for the social and professional relationships within and between the affected organisations. Borders are increasingly being extended to nodes within national territories beyond the major international airports and, of particular significance to this paper, they are entering the localities within which these airports are situated.

Accordingly, we aim for a more nuanced understanding of the border 'within', recognising that borders are not just 'abstract lines on maps, but a set of practices on the ground' (Bashford, 2006: 7). Building on this statement, we focus on 'new' international airports 'within', as sites exposed to infectious disease threats. Increasingly, theoretical and empirical literature has identified the airport as a site in which mobile bodies can be mapped and through which infectious diseases may enter a country (Adey, 2009; St Michael's Hospital, 2009; Warren et al, 2010). For example, the *BIO.DIASPORA* project, undertaken by a team of Canadian researchers and medical practitioners, examined the airport as a point of vulnerability and as one which exposed the nation to infectious disease threats (St Michael's Hospital, 2009). Yet, although that study considered the extent to which public health preparedness may be strengthened to manage these threats, it gave little detail on the types of intervention to be enacted at these sites. Gaber et al (2009) have developed detailed guidelines for entry and exit screening at international airports, arguing that infectious disease transmission is more likely to occur at the airport before or after, rather than during, the flight. Therefore, a flexible approach is required in relation to community mitigation measures, corresponding to 'specific characteristics of individual biological agents' (Gaber et al, 2009: 595). According to Dickmann et al (2011), risk communication forms an integral part of these interventions. In particular, attention should be paid to the provision of information to inbound and outbound passengers and to airport staff, taking account of their different needs (Dickmann et al, 2011).

These contributions, whilst important, focus on major points of entry as opposed to expanding regional airports. In this paper, we seek to place the theoretical debate on border health in the context of recent and ongoing changes in the UK aviation sector and developments in pandemic preparedness planning at the local scale. The growth of international services at UK regional airports - and the resultant re-siting (or localisation) of the national border within UK territory - has resulted in a dispersal of public health protection interventions. Regional airports are particularly vulnerable as, following liberalisation of the UK aviation industry during the 1990s, they handle increasing volumes of international air travel, and hence become part of the re-situated border.

At UK airports, a framework of preparedness has been established in which the response to potential, health-related, emergencies is one of *port health*. Port health is the collective term for the management of health activities at international transport terminals under various public health regulations. It aims to manage health risks associated with the movement of people and goods through air, sea and rail ports (HPA, 2006: 7). The resultant practices are overseen by the UK Health Protection Agency (HPA) across national, regional and local scales, and enacted in localities by various public, private and voluntary sector agencies. Significantly, the appointment of Port Medical Officers (PMOs) - medically-qualified staff responsible for communicable disease control at ports – is the responsibility of local authorities (HPA, 2006). Other partners include local police, general practitioners, airline and airport staff, PCTs, and national security and immigration services (for example, private security contractors and the UK Border Agency (UKBA)) (HPA 2006).

Internationally, the HPA's interventions at these sites are informed by the regulatory framework set out by the World Health Organization's (WHO's) 2005 *International Health*

Regulations (IHR) (WHO, 2008). Moreover, guidelines for managing communicable disease spread at airports have been developed by industry bodies such as the International Civil Aviation Organization (ICAO) (ICAO, 2009) and Airports Council International (ACI) (ACI, 2009). In England, health controls on aircraft and at airports are contained within three statutes: Public Health (Aircraft) Regulations 1979, the Public Health (Control of Disease) Act 1984 and the Public Health (Aircraft) (Amendment) (England) Regulations 2007. The regulations define the measures that should be taken at airports with respect to 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 2006).

At this juncture, there is a need to analyse critically the extent to which this existing framework of preparedness - potentially under threat - works in practice. To achieve this, we draw on the concept of distributed preparedness, examining recent UK initiatives aimed at improving local interventions during a particular event - the 2009-10 H1N1 influenza pandemic. Distributed preparedness considers preparedness interventions enacted across a number of geographical scales within a state's territory. The majority of work in this field has been conducted in the US, where distributed preparedness has been described as 'the development of an organizational framework and set of techniques for approaching security threats' (Collier and Lakoff, 2008: 7). Its antecedents are located in the broader post World War Two civil defence planning, where it was developed to counter the possibility of nuclear attack. In this context, it 'presented a new model of coordinated planning for catastrophic threats', with a spatial focus on interventions utilising resources and infrastructure situated in the locality, as well as nationally (Collier and Lakoff, 2008: 7,

11). In recent decades, distributed preparedness work has broadened to consider domains such as floods, earthquakes, hurricanes, financial regulation and pandemic influenza (Collier and Lakoff, 2008; Thompson, 2010).

Although the system of governance in the UK clearly differs from that of the US, we argue that the distributed preparedness concept is instructive in the context of recent epidemiological and political developments. The former comprise not only the H1N1 pandemic, but also outbreaks of SARS and H5N1 avian influenza earlier in the decade. These disease occurrences focused attention on measures enacted in specific localities against pathogens that could enter the country at multiple sites and the extent to which communities could prepare for 'biological 'unknown unknowns' which may appear from anywhere and could have potentially catastrophic effects (Braun, 2007: 18). Political developments include contentious reforms of UK healthcare provision by the Conservative-Liberal Democrat administration which took office in May 2010. Although the scale, and pace, of implementation of these measures has been reduced following a public consultation during April - June 2011, the changes will result in the abolition of the HPA in April 2013 and the transfer of its functions to the Department of Health (DH). Moreover, from April 2013, primary healthcare provision will be devolved to GP-led clusters, with current PCTs ceasing to exist (DH, 2011).

This raises key questions over the location and nature of responsibility for the assessment and preparation of emergency response. In the UK, there has been a dearth of scholarly research into distributed preparedness measures enacted by civil authorities including airports, HPUs, local authorities and PCTs. This matters as their work came under considerable scrutiny in national and regional news outlets, and epidemiological journals, during the early weeks of the 2009-2010 H1N1 pandemic (Warren et al, 2010). In this

paper, we contend that the distributed preparedness practices of these organisations have affected conceptions of the border 'within', defining it as a geographically contested area. Our evidence is based on analysis of the relations between these organisations at multiple sites across national, regional and local scales.

National measures and joint working in the locality

Networks of port health preparedness developed in localities surrounding UK regional airports during the second half of the last decade. These are represented diagrammatically in Figure 1. (See also Table 1 for an explanation of the acronyms for different agencies.)

At a national level, in 2005, the HPA, in conjunction with the DH and the Home Office, undertook a review of port health operations across England (hereafter '*Review*'). The *Review* acknowledged the 'massive expansion in air travel' and sought to clarify local agency responsibilities in this domain, giving new authority to ports, especially in the regions, as part of the UK border (HPA, 2006). The final report outlined various recommendations, including the need for closer working with LAs and PCTs to ensure a port response to potential or actual public health threat and devise 'emergency plans for public health emergencies' (HPA, 2006: 34).

The *Review* complemented other legal and policy measures. The Civil Contingencies Act 2004 gave emergency planning a higher profile by establishing a framework requiring local responders (for example, emergency services, local authorities, NHS bodies, the HPA, the Health and Safety Executive, transport and utility companies) to collaborate through one of 46 'Local Resilience Forums' (LRFs) within England and Wales (Cabinet Office, WWW). By May 2010, every LRF in England and Wales had developed a multi-agency pandemic influenza plan (Cabinet Office, WWW). Moreover, the Cabinet Office and DH, in November 2007, produced a *National Framework for Responding to an Influenza Pandemic*

(hereafter *National Framework*), outlining central government's proposed response to an influenza pandemic, and seeking to 'inform the development of community and organisational arrangements' appropriate to local circumstances (Cabinet Office and DH, 2007: 6). Its actions included plans for a national pandemic flu service to enable symptomatic people to be treated at home, clear policies on maintaining open borders, and the need to keep under review the case for health screening at major travel nodes (Hine, 2010: 21; Cabinet Office and DH, 2007).

Insert Table 1 about here

Insert Figure 1 about here

Methods

Our empirical work focused on the immediate localities surrounding two, expanding, regional airports, situated within different regions of England. The airports hosted direct flights to 'international' (i.e. non-European Economic Area (EEA)) destinations and provided low cost scheduled and charter services within the EEA. Both airports supported a significant number of long-haul 'spoke', or feeder, services to airports in the eastern US, the Middle East, and the Indian subcontinent. The two airports were owned by separate organisations and, for reasons of confidentiality, the airports (and their surrounding localities) will be hereafter referred to as 'A' and 'B'. The empirical data presented in this paper was obtained from 18 participants. They were selected on the basis of their job role, in particular, the extent to which it incorporated port health and / or emergency preparedness duties. On occasion, this presented difficulties, as individuals' responsibilities were not always clear from their job title. As a result, we communicated with identified persons prior to interview to ascertain the nature of their duties. We also

acted on recommendations from previous contacts. The fieldwork was conducted over a four month period, from late April to mid-August 2010. Ethical approval for this study was received from Loughborough University, and the research was undertaken in accordance with the University's Code of Practice relating to investigations on human participants (LU, WWW). The exact number of PCTs and local authorities in each locality has been masked to avoid identifying the two case study areas.

The interviewees comprised managers, researchers and practitioners based at the two airports and within the surrounding local authorities, PCTs and HPUs, as well as at a HPU serving a third regional airport and a regional Public Health Observatory (refer Table 2). Data were collected through semi-structured interviews. Where it was not possible to interview participants, we compiled detailed questionnaires, which were sent electronically to the relevant individual. The questions, in the interview schedules and questionnaires, covered four general areas. Data from both the interviews and the questionnaires are presented in this paper. First, the context to the existing port health and / or emergency preparedness work at the interviewee's organisation was established. In particular, we wished to understand more fully: participant role; whether the participant worked alone, or with colleagues within the organisation; and the history of the role, including any changes in remit affected during the term being served by the existing postholder. Second, we considered collaborative working with external organisations across local, regional and national scales. Potential partners included local authorities, PCTs, HPUs, Strategic Health Authorities (SHAs), the Department for Health and the UKBA. In this section of the interview schedule / questionnaire, we asked questions about the history of any collaborative working and sought clarity on professional boundaries and organisational responsibilities. Third, we investigated organisational port health and pandemic preparedness enactments in greater detail by asking questions relating to: (i) policies in

these areas; (ii) steps taken to safeguard the local population against pandemic risk during the 2009-10 H1N1 influenza outbreak. Fourth, we asked the participants to consider lessons learnt from the H1N1 pandemic outbreak, and any other port health incidents. In addition, we sought their views on future challenges in relation to port health / pandemic preparedness.

****Insert Table 2 about here****

Data analysis was conducted on interview transcripts and completed questionnaires. Each text was independently assessed by two of this paper's authors to identify areas of significance for participants. Key words and themes (for example, 'H1N1', 'airport', 'preparedness', 'collaborative working') were highlighted. Due to the relatively small size of the sample, this work was undertaken within Microsoft Word. The findings from our empirical research are discussed in the next section.

Case studies: Distributed preparedness and the management of H1N1 surrounding two regional airports

Both case study areas were considered representative of the new border 'within' and agencies located at these sites had, to varying degrees, worked on pandemic planning. With reference to the 2009-2010 H1N1 outbreak, we briefly consider the international connectivity of the airports within each case study area, before discussing preparedness work undertaken by various local agencies and the extent to which it resulted in actions within their communities.

Airport A

Airport A worked directly with one local authority (LA), one PCT and one HPU. However, the geographical areas for which these organisations were responsible varied enormously, with the HPU having both rural and urban PCTs and over 10 local authorities within its border. In the localities, interviewees in the organisations surrounding Airport A were particularly conscious of their port health duties and were keen to detail the efforts they had made to develop a coordinated approach within their locality. For instance, the HPU Port Health Lead in this case study area had established '*two or three years ago*' a port health meeting, held every 12 weeks. Attendants at this forum discussed 'normal' (i.e. non-emergency) port health functions, for example,

'...assessing the structures and partnerships in place, the funding available, how they had operated in the past, how they were going to operate in the future' (HPU, Port Health Lead)

This meeting replaced an informal network where people '*spoke to each other*' but there had been, significantly, '*no formally appointed medical officers in place*'. They had progressed to a situation where Airport A had continuous PMO cover. The revised system had been tested by three incidents, two involving children with rashes ('*suspected chickenpox*') and the third concerning an adult passenger who appeared to be '*quite drowsy*' and '*unresponsive*'. In these cases, standard procedure involved the airline pilot radioing in to the airport Terminal Duty Manager, who in turn telephoned the HPU, using a specific contact number. This system of a single point of contact at each port - a recommendation of the 2005 *Review* - had been in place in case study A for 'two, maybe three' years. Only one of the three incidents (the first suspected chickenpox call) resulted in a direct intervention at the airport, a '*high level*' response which the interviewee implied was unnecessary and, ostensibly, due to the '*inexperience*' of the HPU practitioner who

took the call. This view on the general robustness of port health procedures in the particular locality was shared, to varying degrees, by the partner organisations interviewed. Airport A and the neighbouring LA were trenchant in their support for the port health measures. At the same time, a Deputy Director based at the PCT in direct contact with Airport A stated that, whilst his organisation *'did not have formal responsibility for port health'*, it would be *'as helpful as it can'* during port health incidents, providing *'surge capacity when necessary'* in the form of additional staff, including district nurses. The provision of relief staffing was perceived by the interviewee to be one of the significant port health challenges faced by the PCT.

Airport B

With respect to Airport B, the organisational geographies were more fragmented than those surrounding Airport A. Like Airport A, Airport B also worked directly with one LA, one PCT and one HPU. Yet, the HPU incorporated a higher number of PCTs, and a similar number of local authorities, within its geographical border. It was perhaps as a consequence of this that there appeared to be less understanding amongst interviewees of the port health procedural set-up in this locality. Whilst interviewees at one PCT within the locality were clear that port health was the HPU's role, they openly admitted that as an organisation they were *'not fully aware of where [their] responsibilities lie'* in this area. Although clear measures were in place for emergencies such as crashes, fires, and hijacks, the PCT was:

...not aware of any formal arrangement to provide for a health response if a disease entered the country, or aware of any documentation outlining a PCT response or what the lines of communication were with [Airport B] and the HPU (PCT Manager, Airport B)

In addition, anxiety about risk communication was expressed by the airport, with a manager stating that they were '*not as sharp on health as we could be*'. Nevertheless, the airport's designated Port Contact, an experienced environmental health officer employed at a LA, demonstrated full awareness of port health procedures whilst expressing unhappiness at his organisation's reduced port health role. Indeed, port health did not appear to be as high a priority in this locality as in case study A. The HPU Port Health Lead for case study area B reported that there was '*very little*' going on in the locality in terms of port health, cautioning, somewhat surprisingly, that their organisation only served one '*small*' airport. These divergences in opinion over the effectiveness of (and even the need for) localised port health interventions - with some organisations even questioning their own capabilities in this domain - is indicative of some of the nuances that exist in recent distributed preparedness initiatives.

We now examine the distinctions that existed within these spatial networks with respect to the 2009-2010 H1N1 influenza pandemic.

Managing the H1N1 pandemic

The presence of the H1N1 influenza virus was confirmed in both case study regions by the second week of May 2009. By this stage, human-to-human transmission was occurring in many parts of the UK. The geographical spread of the virus was later described by Dame Hine in her officially sanctioned, but independent, review of the UK response to the H1N1 pandemic as '*unexpected*' and '*far from uniform*' (Hine, 2010: 48). Some localities within the UK were disease '*hot-spots*' whilst others were '*largely unaffected*' (Hine, 2010: 48). As the pandemic was believed to have entered the UK via Birmingham International Airport, considerable media attention was focused in the early weeks of the outbreak at regional airports (Warren et al, 2010). Interviewees at both airports reported that the multi-agency

meetings - with local authorities, HPU's, Ambulance Services, UK Border Agency, PCTs and Acute Trusts - during this critical period were, in words of one Senior Manager, '*very useful*'. Within case study A, the relationship between airport and HPU appeared to be particularly close, with the same Senior Manager stating '*the liaison was very good, we've got contacts if we need them*'. The HPU's role with regard to this airport was education (for example, delivering a presentation on the pandemic '*in layman's terms, and answering airport queries*') and informative (providing leaflets to be given to passengers). Yet, by July 2009 this activity had, according to a Senior Manager at Airport A, '*faded a lot*':

'The concentration wasn't on the airports anymore, it was on a much more national scale. So, we stepped back a bit from it.' (Emergency Planning Manager, Airport A)

The initial work at the scale of the locality was led by the HPU, in collaboration with PCTs and, to a lesser extent, local authorities. Within case study A, the Port Health Lead for the HPU had stressed their role in developing local networks of collaboration. Nevertheless, it was stated that the '*burden*' of the initial response '*fell on the resources of the HPU*', who were involved in making up swabbing packs (to take samples from patients), advising on and following up treatments and '*doing databases and surveillance*'. In the Port Health Lead's view, the PCT and the SHA (responsible for regional oversight of PCTs), in particular, '*weren't ready*' during the early phase of the pandemic: '*Basically, if we hadn't done it [led the initial response], the NHS would have fell on its face*'. Therefore, although the HPU did '*borrow*' staff from the PCT for routine work such as '*swabbing*', the interviewee was clear about the HPU and, more widely, the HPA's leading role:

'The HPA [...] were working all hours for six to eight weeks until the primary care trust and everyone else got their systems sorted out.' (Port Health Lead, HPU, case study A)

The HPU response encapsulated the multiple geographical scales at play – a true indicator of distributed preparedness – that extended far beyond the locality. This is evidenced by this HPU's involvement in supplying data to the 'Flight Control Hub' established by the HPA at a national scale as means of monitoring the UK's porous border with its many sites of intervention, by coordinating flights, giving advice and coordinating any follow-up of incoming travellers. This input was supported by the HPU Port Health Lead negotiating with the HPA at a national level to ensure that '*small ports*' are represented in their revised national pandemic plan. Preparedness for the pandemic had been based on one scenario ('big bang, high mortality') which did not happen. This caused the HPA (nationally) and HPU (locally) to:

'...work, from an operational delivery point of view, off plan, right from the very beginning. It was different to what people had envisaged...' (Port Health Lead, HPU, case study A)

This view was supported by the PCTs and local authorities contacted. A Senior Manager (PCT1, case study A) stated that the main lesson from the 2009-2010 outbreak was that '*the plans had to be flexible*'. A Risk Coordinator based at LA1 in the same geographical area made a similar point, stating that a pandemic '*won't necessarily result in mass deaths*' and that the one of the biggest issues was surrounding human resources and potential staff absences during the outbreak. Our fieldwork suggests that the PCTs, possibly due their management structure and accountability to the DH, believed they were given little autonomy in reacting to the unexpected nature of the pandemic and its consequences for the populations within their localities. PCTs in both case study areas complained about the DH's '*interference*' in their work. An interviewee in case study B stated:

'...we have had a pandemic preparedness plan which we spent two years developing and then the DH binned it out in one day [...] Instead of allowing the PCT to manage it locally, they took complete control of the management of the pandemic.' (Risk Manager, PCT, case study B)

The interviewee believed this was the experience of PCTs throughout the country. Indeed this point was made by a Senior Manager at PCT1 in case study area A, who drew attention to the DH *'changing the rules'*, for example, by announcing that responsibility for managing cases to go to general practice (something that was not in any plans) and for the *'shambolic'* lead-up to the National Pandemic Flu Service, the national telephone and online influenza service. Moreover, at the start of the outbreak, the DH purportedly redefined the stages of the pandemic:

'They [the DH] straight away brought in these two phases, the containment phase and then the treatment phase, which had not been included in any of the guidance, or anything like that, that had been sent out over the two years that all PCTs and health trusts had followed religiously in drawing up their plans.' (Risk Manager, PCT, case study B)

Viewed from this perspective, distributed preparedness, whilst informing planning within localities, was barely enacted when the pandemic became a reality. It appeared to have been replaced by more prescriptive interventions from central government. This style of management was criticised by a senior public health official:

'The central leadership could be quite damaging locally because it was so detailed [...] it was 'you need to do this, you need to do it like this' and it meant that there was an

awful lot of time spent trying to clarify exactly what it was they wanted...' (Senior Manager, PCT, case study B)

In addition, confusion was caused by the algorithms issued by the DH and intended to be applied when, for example, issuing antiviral drugs. The resultant requests for clarification - from the PCT and GPs - took up considerable time, diverting resources away from serving the community at large. At the same time, PCTs in both case studies acknowledged intrinsic weaknesses in their preparedness planning. One key lesson, according the Senior Manager at PCT1, case study A, was that plans had to be '*flexible*'. The PCT interviewees in case study B concurred, stating that existing plans contained a lot of detail, such as '*how to set up a mortuary*', that has not proved to be as useful. With hindsight, it would have been better:

'...keeping things fairly generic, so that you can develop something more detailed if you need it but keeping it as flexible as possible [...]. The plans were not hugely useful, certainly not the original ones.' (Senior Manager, PCT, case study B)

Moreover, preparedness interventions were, to a lesser degree, hampered by tensions between organisations within the locality. Whilst it should be stressed that participants did, generally, view their working relationships with other agencies positively, some disputes did exist. For example, the HPU in case study B, apparently stretched by having to act in a reactive capacity across a large geographical area comprising several PCTs, asked the PCT participating in this study to free up its GPs to assist in swabbing of patients. The Senior Manager interviewed stated that whilst the PCT was happy to assist the HPU during the containment phase, which aimed to restrict the spread of the virus, it was less prepared to continue to do so during the treatment phase, where laboratory confirmation of the virus was no longer required in order for patients to receive any necessary NHS

treatment. This resulted in '*a bit of conflict*' with the HPU, with the Senior PCT Manager adamant that, in such circumstances, swabbing would have been '*a waste of [the PCT's] time*'.

Finally, the changing roles of the organisations interviewed and, in particular, the healthcare reforms announced by the incoming Conservative-Liberal Democrat coalition government, informed the views of some participants on preparedness planning for future pandemics or other emergency planning processes. A Senior Manager (PCT1, case study A) was concerned that healthcare provisions currently enacted by PCTs may be devolved to organisations such as social enterprises and NHS Mental Health Trusts not subject to provisions set out under the existing *Civil Contingencies Act*. The diffusion of primary health care provision suggested in the White Paper could, therefore, result in a more '*fragmented*' response to future public emergencies. The Port Health Lead at the HPU in the same case study area expressed concerns that the reforms were '*really going to change the organisational landscape*':

'How do we reconfigure what we've developed over the last three years locally to make sure that we can provide this port health service to the port? [...] And that's going to be a major challenge. Because we've only just got to where we've got within the existing organisations.' (Port Health Lead, HPU, case study A)

These concerns reflected, to some degree, the contested geographical landscape in which the various agencies operate, working to different remits across multiple scales, and the social relationships within those organisations. Moreover, they reflected uncertainty about their future existence. The above interviewee, contacted prior to the announcement of the abolition of the HPA, was '*waiting to see where [their employer] was going to go*'. Another participant, a Senior Manager of a HPU outside of the two case study areas but also

servicing a regional airport, suggested the perceived independence of the HPA had helped it gain the trust of other agencies, making it easier to '*forge the right links with partners*':

'...there are some concerns that if we go into the DH that that element of independence might be compromised in some way and I think there is anecdotal evidence that a number of bodies have found it helpful to have the HPA as an arm's length body and giving independent advice.' (Senior Manager, HPU)

Discussion and conclusion

In this paper, we have employed the concept of distributed preparedness to examine port health interventions enacted at the UK border. We built on previous work that reconceptualises this border as a series of potentially vulnerable nodes located inside the UK's state boundary. We refer to this reconceptualisation as the border 'within'. These nodes have emerged following air travel liberalisation, as regional airports - across the globe - increasingly host international flights (Maertens 2010). We argue that these transformations in international passenger air travel have significant implications for the geographies of public health preparedness. Moreover, these changing patterns of aeromobility have been complicated by UK government reforms, including the proposed devolution of many of the PCT functions to multiple GP-led consortia and the absorption of the work of the HPA into the DH. We draw attention to three ways in which our empirical research has clarified the complex notion of the border 'within'.

First, our analysis uncovered tensions between organisational conceptualisations, and practices, of preparedness within localities. These tensions found expression in a degree of territoriality between agencies over their preparedness remits, where good practice required greater joint working and regular interactions between key players during 'normal' times. Among some agencies, there was uncertainty over port health responsibilities,

whilst specific actors were unwilling to compromise on what they interpreted as their professional roles. For example, the PCT in case study B appeared unsure about the actions it should take in the event of an infectious disease entering its locality via the airport. During the H1N1 pandemic, this perceived lack of effective formalised organisational port health procedures resulted in localised disputes over the extent to which the PCT should provide nursing assistance to allow the HPU to conduct patient swabbing. In case study A, the tensions were less overt. Nevertheless, the HPU Port Health Lead for this locality, stated that their organisation felt the need to shoulder the burden during the early weeks of the H1N1 outbreak: '*when this hit, [the PCT] weren't ready to mobilise their resources, and we stepped in...*'.

Second, the border 'within' was the focal point of preparedness planning, and interventions, across a number of geographical scales. There was evidence, nevertheless, of territorial competition between central and local control. Preparedness plans made at the local scale, for example by a PCT, frequently fed into multi-agency plans covering a larger geographical area, often a county or group of counties. This work directly linked to central government guidance, for example, the DH's *National Framework*. Conceptually, these proposed interventions, involving a number of agencies, were 'distributed' across various scales, from the town hall to government department. However, when the H1N1 influenza pandemic occurred, this approach was not put into practice. Instead, there appeared to be a lack of coordinated risk communication across agencies. In spite of the local and regional plans, central government – most notably the DH – took charge at a very early stage. Agencies operating at a local level variously described the '*tearing up*' of local plans and the '*changing [of] rules*' (Risk Manager, PCT, case study B). It was an approach that appeared to be antithetical to the changing nature of the UK border and the uneven geographical spread of the virus across the UK, identified in the Hine Report

(Hine, 2010). Whilst tensions between health policy formulations across geographical scales has been discussed elsewhere (McLafferty, 2010), our empirical study captured the temporal changes, as a national government sought to exercise control from the 'centre' during a period of 'crisis' (Anderson, 2009). Moreover, central government plans to administer directly the HPA's health protection role suggested that much work is required if distributed preparedness interventions are to be *enacted* during the next pandemic.

Third, we found that representations of the regional airport as a significant international border through which tens of thousands of non-EEA travellers enter the UK each year (CAA, 2011) did not register with the majority of participants operating within the communities surrounding this bounded geographical area. The Director of the HPU in case study B referred to the airport within its boundaries, which handled in excess of 500,000 non-EEA passengers a year, as 'small' ('it's not Heathrow'). Participants from other organisations also appeared to downplay the significance of the airport as a point of entry for disease, referring to the low number of port health cases identified each year and the general ineffectiveness of mass, pre-emptive screening processes. Whilst reaction to the latter is understandable, in view of contentious screening interventions aimed at identifying diseases in the UK (tuberculosis) and in Canada and parts of Asia (SARS) (Ali and Keil, 2006; HPA, 2006), it is nevertheless surprising, given the means by which H1N1 Influenza was deemed to have entered the UK. Following our investigation, and building on international studies on this topic (St Michael's Hospital, 2009), therefore, we call for a renewed focus on the regional airport (and on the origin of journey of international passengers), with a view to improving port health provision, both at the airport and within the surrounding community. This would help inform debates in other countries where international airports located outside of global cities have proved to be nodes for virus transfer. It was notable, for example, that the global spread of H1N1 during 2009-2010

was facilitated as much through 'resort' and regional airports (Cancun, Mexico and Birmingham, UK, respectively) as via major international sites (Chang et al, 2010). In order to be effective, any future preparedness interventions need to, in our view, pay greater attention to the bounded, and contested, geographies in which agencies serving these localities operate. Moreover, they need to take greater account of the specific requirements of aviation and note the industry relevant guidance from international agencies such as the WHO, ICAO and ACI. A more nuanced understanding of the tensions between local and national policy formulations in practice may result in more coordinated national – and transnational - approaches to 'distributed preparedness'.

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Figures

1: Organisations with significant port health responsibilities, across national, regional and local scales. Information correct at time of empirical research (April - August 2010).

ACCEPTED MANUSCRIPT

ACI	Airports Council International
APHA	Association of Port Health Authorities
DH	Department of Health
EEA	European Economic Area
GP	General Practitioner
HPA	Health Protection Agency
HPA RO	HPA Regional Office
HPU	Health Protection Unit
ICAO	International Civil Aviation Organization
IHR	International Health Regulations
LA	Local Authority
LRF	Local Resilience Forum
PCT	Primary Care Trust
PMO	Port Medical Officer
RRF	Regional Resilience Forum
SARS	Severe Acute Respiratory Syndrome
SHA	Strategic Health Authority
UKBA	UK Border Agency

Table 1: List of abbreviations. Organisations located in UK unless otherwise stated.

Case Study	Organisation	Participant(s)
A	Airport A	1. Senior Manager - Emergency Planning. Responsible for strategic level with particular focus on major emergencies i.e. that result in, or threaten to result in, a serious disruption of life. 2. Coordinator - Emergency Planning. Responsible for interventions on ground. Reports to Senior Manager.
	HPU	Port Health Lead and Senior Health Protection Nurse. Works closely with Airport A.
	SHA	Senior Manager - Emergency Planning. Oversaw performance management of all PCTs at regional level. Assumes regional command and control over major incidents.
	PCT1	Senior Manager, Public Health. Remit includes prevention of disease, protecting public from infections and assessing effectiveness of healthcare interventions.
	PCT1, PCT2	Emergency Planning Coordinator. Employed by a neighbouring PCT (PCT2), with responsibility for emergency planning and resilience in both organisations.
	LA1	1. Senior Manager - Risk. The APHA contact for Airport A, situated within the LA boundary. 2. Risk Coordinator. Responsible for risk management and resilience within LA, including at Airport A.
	LA2	Resilience Coordinator. Employed at neighbouring LA. Regular involvement in port health and other emergency planning at Airport A.
B	Airport B	1. Senior Manager - Emergency Planning. Responsible for strategic level. Focus on major emergencies and environmental hazards. 2. Manager - Emergency Planning. Responsible for interventions on ground. Reports to Senior Manager.
	HPU	Port Health Lead and CCDC. A senior medical practitioner with port health responsibility.
	PCT	1. Senior Manager, Public Health. Oversaw health interventions in the community, including prevention of disease. 2. Risk Manager. Emergency planning lead for PCT. Regularly liaises with Airport B.
	LA	Senior Manager - Risk. The APHA contact for Airport B, situated within LA boundary.
External	Organisation	Participant(s)
	HPU	1. Senior Manager and CCDC. Strategic responsibility for health protection at an English regional airport other than Airports A and B. 2. Administrator. Responsible for collating statistical data to ensure the HPU fulfils its remit.
	Regional Public Health Observatory	Senior Analyst. Remit includes statistical and epidemiological analysis of public health data.

Table 2: Description of participant roles. Specific job titles have been disguised to preserve anonymity of participants.

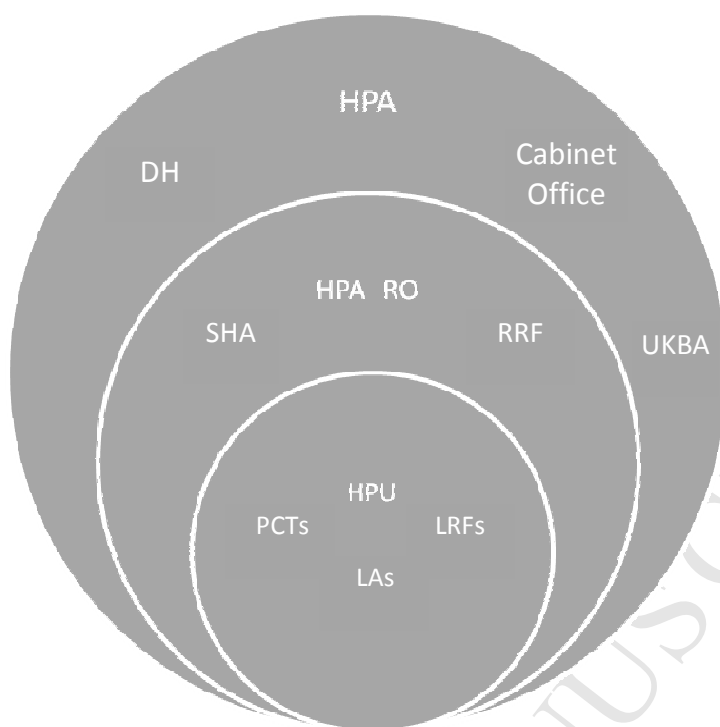


Figure 1: Organisations with significant port health responsibilities, across national, regional and local scales. Information correct at time of empirical research (April - August 2010).