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Preparing for Pandemics through Surveillance

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Theme: The international surveillance of infectious diseases is being addressed through international, national and non-state networks.

Summary: Within the next century there will be a rise in the number of new infectious pathogens, while the drug-resistance of existing pathogens such as dengue, meningitis and tuberculosis will also increase. The need to prepare for the pandemics we can predict, let alone the ones that we can't, has led to calls for investment in preventive efforts. One area of particular growth is infectious disease surveillance networks, set up by both state and non-state actors. International disease surveillance networks exist in a variety of formats: email alert networks, sophisticated laboratory diagnostic networks, cell phone alerts and web scan systems. Generally, the global response to the proliferation of these networks has been positive. Having surveillance in place for situations when either states do not have the capacity to respond to an outbreak or may be tempted to cover up an outbreak, makes the rest of the world safer. But what are the potential political obstacles to the proliferation of infectious disease surveillance networks, and will more 'disease watchers' create secure foundations for protecting the global community from 'public health emergencies of international concern' (PHEIC)?

While states do seem to have responded positively to the proliferation of global surveillance networks and have accepted the need to strengthen their own health systems, as evidenced by universal acceptance of the revised International Health Regulations, which includes the World Health Organization (WHO) headquarters-based Global Outbreak Alert and Response Network (GOARN) in 2005. We are far from being able to confidently believe that official (government) or unofficial (non-state) managed infectious disease surveillance networks will enhance security from infectious disease outbreaks. This ARI outlines three reasons for caution: (1) state capacity is still weak in areas where the greatest numbers of new pathogens have been diagnosed; (2) the ability to identify where a disease outbreak has occurred does not alleviate the political obstacles to international efforts to contain such an outbreak; and (3) we are yet to establish a correlation between the multiplication of surveillance networks and better responses to disease outbreaks.

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Analysis: It is important to remember that just three decades ago there was some confidence amongst public health officials that the risk of infectious disease had decreased. It was widely believed that new treatments, vaccines and knowledge of microbes would lead to the eradication of infectious disease as a major cause of death.[1] This optimism was short lived. In the 1980s, the outbreak and spread of HIV/AIDS followed by the resurgence of stronger microbe-resistant pathogens, such as malaria, TB, meningitis and dengue fever, were compounded by the fear that bioterrorists might use deadly pathogens as a weapon of war. New infectious pathogens have been discovered at the rate of one per year over the last two decades.[2] In the last 15 years, serious infectious disease discoveries have included Lassa and Marburg hemorrhagic fevers in Africa, variants of Creutzfeldt-Jakob disease in Europe, meningococcal meningitis W135, Nipah virus in Malaysia and the West Nile virus in the Americas. In addition, the recent Severe Acute Respiratory Syndrome (SARS) outbreak (2002-03) and the threat of a pandemic arising from the H5N1 Avian Influenza strain that originated amongst poultry in East Asia in 2003, prompted some to argue that the world cannot escape a potential epidemic influenza that could kill anywhere between 2 and 12 million people.[3] These developments have all served to increase calls for infectious diseases to be targeted as a threat to national security.[4]

WHO came to the forefront of these calls after the 1994 outbreak of plague in India revealed its own institutional limitations in providing timely advice and response measures to states under the 1969 International Health Regulations. By 1995, the US was receiving domestic reports on the threat of new emerging diseases, leading to calls for a revision to the International Health Regulations (IHR) at the 1995 World Health Assembly. The new Regulations, it was argued, should alert states to a broader category of public health emergencies. The negative economic impact of a plague outbreak in India and neighbouring states indicated the need for a mediator, such as WHO, to advise the affected state and manage the information flow to the rest of the world. This voice needed to be trusted by states and WHO fitted this role. Various WHO reports argued that a revised IHR would allow WHO to end the flow of misinformation and ensure that all actors were cognisant of their roles and responsibility, whether at seaports, airports, executive level of government or WHO headquarters itself.[5] With a new appreciation of how a disease outbreak in one state could have a ricochet effect across the world, states agreed and the global response to SARS demonstrated how ready they were for WHO to take on this significant new role in health governance. When individuals reported via ProMED[6] mail news of an epidemic in Guangzhou, China, the Chinese government at first denied that the respiratory disease was different to atypical pneumonia. WHO headquarters directly managed the information flow and with its regional counterpart, the Western Pacific Regional Office, took a leading role in advising states, media and the medical community on how to proceed in the months that followed as the disease travelled from China to Hong Kong to Singapore and eventually to Canada. The key reason why WHO was able to assume this role was the creation of the Global Public Health Information

[1] WHO (2000), *A Framework for Global Outbreak Alert and Response*, WHO/CDS/CSR/2000.2, Department of Communicable Disease Surveillance and Response, WHO, Geneva, p. 1.
[2] Angela Merianos & Malik Peiris (2005), 'International Health Regulations 2005', *The Lancet*, nr 366, p. 1250.
[3] WHO, 'Ten things you need to know about pandemic influenza', http://www.who.int/csr/disease/influenza/pandemic10things/en/index.html, accessed 2/XII/2006.
[4] Jennifer Brower & Peter Chalk (2003), *The Global Threat of New and Reemerging Infectious Diseases: Reconciling US National Security and Public Health Policy*, Rand Corporation, Arlington.
[5] Max Hardiman (2003), 'The Revised International Health Regulations: A Framework for Global Health Security', *International Journal of Antimicrobial Agents*, nr 21, p. 207-211.
[6] The Program for Monitoring Emerging Diseases (ProMED) was established in 1993.

Network (GPHIN) in 1997 and the Global Outbreak Alert and Response Network (GOARN) in 2000.

Since its establishment in 1948, WHO has been entitled by states to conduct surveillance of disease outbreaks across the world.[7] In tandem with its call for the revision of the IHR, WHO argued from 1995 that there was also a need for a global surveillance network which could gather outbreak reports from across the world on a 24-hour, 7-day-a-week basis in order to manage outbreak verification and response.[8] This led to the creation of the first global infectious-disease surveillance system, the Global Public Health Information Network (GPHIN), developed in 1997. The GPHIN, funded entirely by the Canadian government, is a web-based electronic system that scans the World Wide Web to identify suspected outbreaks.[9] The WHO had in place other 'outbreak alert' systems, such as FluNet for influenza, RabNet for rabies and DengueNet for Dengue. However, this new outbreak verification system was not just about disease-outbreak surveillance, but a 'global safety net that protects other countries when one nation's surveillance and response systems fail'.[10] GOARN, created in 2000, is a communication network that shares diagnoses and outbreak information (from GPHIN) and is also a back-up for when states themselves do not have the response capacity or require laboratory diagnosis expertise. GOARN, embedded within the Communicable Disease Unit, enables WHO to be the first actor on the scene to manage the verification and reporting of disease outbreaks, to negotiate with the affected state and surrounding states (if need be) to prevent the spread of infection and situate itself as the key authority in infectious-disease control or containing the 'threat'. Previous to SARS, WHO had utilised GOARN to assist with outbreaks of Rift Valley fever in Kenya and Somalia, monkey pox and Marburg virus infection in the Democratic Republic of Congo, Ebola haemorrhagic fever in Gabon, relapsing fever in southern Sudan, influenza in Afghanistan and epidemic dysentery in Sierra Leone.[11]

Just after the SARS outbreak, Dr David Heymann, then WHO Representative of the Director General on the Polio Eradication Initiative, and Dr Guénaël Rodier, then Director of the Department of Communicable Disease Surveillance and Response, argued that many states were not quick enough in diagnosing outbreaks of the disease and containing it quickly enough to prevent international spread. In 2003, member states passed a resolution calling for 'increasing national capacity development for surveillance and response and endorsed the ways in which GOARN obtained information about SARS and supported containment efforts'.[12] A second resolution was then passed encouraging GOARN to strengthen its surveillance capacity. The revised IHRs now require states to develop an internal surveillance and outbreak response capacity by 2012 at the latest.[13]

[7] Julius Weinberg (2001), 'Responding to the Global Challenge of Infectious Disease' in Martin McKee, Paul Garner & Robin Stott (Eds.), *International Co-operation in Health*, Oxford University Press, Oxford, p. 51.
[8] WHO, *Global Outbreak Alert and Response*, p. 23.
[9] William Burns (2006), 'Openness is Key in Fight Against Disease Outbreaks', *Bulletin of the World Health Organization*, nr 84, October, p. 769.
[10] David L. Heymann & Guénaël Rodier (2004), 'Global Surveillance, National Surveillance, and SARS', *Emerging Infectious Diseases*, nr 10, February, p. 173.
[11] WHO, *A Framework for Global Outbreak Alert and Response*, p. 4.
[12] Heymann & Rodier (2004), 'Global Surveillance, National Surveillance, and SARS', p. 174.
[13] World Health Organization (2007), *International Health Regulations (2005) Areas of work for implementation*, Epidemic and Pandemic Alert and Response, WHO/CDS/EPR/IHR/2007.1, Lyon, June, p. 15-16.

Another key feature of GOARN, which marks it out from the non-state-led surveillance networks that have proliferated under the funding of Google.Org and IBM (both of which have the support of WHO headquarters), is that WHO can respond to an outbreak through coordinating diagnostic and containment field teams. However, WHO's entry is dependent on the affected state's verification of an outbreak –WHO cannot send a fieldwork response team without state acquiescence–.[14] The updated GPHIN system has the capability to locate over 20 reports a day of suspected outbreaks. On request by the affected state, the GOARN's Strategic Health Operations Centre (SHOC) can respond to outbreaks with field teams, specialised protective equipment and medical supplies, as well as robust communications to keep in contact with the state officials and WHO headquarters.[15] The key phrase here is 'on request'. Even though WHO is allowed to receive outbreak reports from non-state actors, the state is required to verify the outbreak. Since the passing of the revised IHR, the question of consent remains pivotal.[16]

WHO Headquarters argues that its international partnerships under GOARN makes it able to maximise its use in a situation where 'financial, political and institutional' restraints may inhibit cooperation in more specialised, regional surveillance mechanisms. WHO representatives argue that not only can WHO's 'coordinated response mechanism mobilize the appropriate resources that are necessary to contain the outbreak… WHO has an international mandate [and this] provides an element of neutrality'.[17] In addition, under the new IHR, WHO Headquarters can request the country to verify the event and acknowledge receipt of this request within 24 hours. One of the incentives for countries to report such events is that these will already have been reported via the electronic highway: 'we will be in a much better position to help if we have been involved early on by the affected country. The fear of being named and shamed by the media and other countries concerned by the situation is in itself an incentive'.[18]

There are two key questions to ask in relation to the rise of WHO's role in disease alert and response through GPHIN and GOARN. First, can WHO be 'neutral' in promoting unofficial source gathering for disease outbreak reports, and will the ultimate goal –securing better state cooperation– be accomplished if it is envisioned that in the early stages, naming and shaming may be the only way to get reluctant states to cooperate? Such tactics fail to acknowledge the genuine and deeply-felt political reasons for failure to verify that could outweigh the perceived risk of being named and shamed. Moreover, if naming and shaming fails to deliver in a particular case, the on-going cooperation of the government would be very difficult to secure. Secondly, will the threats of naming and shaming inhibit international support for the whole surveillance endeavour? The idea that GOARN is primarily targeted at developing states could indicate that some officials in the Global North believe that the best response to disease outbreaks is to shame states into compliance with WHO and GOARN partners (of which the majority are from developed states). The danger is that this could come at the expense of international support for capacity building in the area of pandemic preparedness. The expectation that developed states can handle an outbreak, while it is thought inevitable that developing states cannot, may hold some truth but it may not be conducive for establishing cooperation and change in state behaviour. In addition, calling upon states to reorganise their health priorities in

[14] WHO, *A Framework for Global Outbreak Alert and Response*, p. 6 and 14.
[15] Burns (2006), 'Openness is Key in Fight Against Disease Outbreaks'.
[16] Philippe Calain (2007), 'Exploring the International Arena of Global Public Health Surveillance', *Health Policy and Planning* 22 2007, p. 2-12.
[17] WHO, *Global Outbreak Alert and Response*, p. 7 and 27.
[18] Quote from Guénaël Rodier, in WHO News, 'New Rules on International Public Health Security', p. 428.

order to satisfy international demands for improved surveillance and verification overlooks the fact that some states have other competing health priorities that pose a more serious and immediate threat to their populations. It also omits the fact that expenditure on public health is not always at the sole discretion of the developing state. While many states do not adequately invest in public health, the World Bank and International Monetary Fund have long been criticised for their strict conditions limiting government investment in public health services.[19] This brings us to the three concerns identified earlier.

Three Reasons for Caution

First, state capacity is still weak in regions where the greatest number of new pathogens has been diagnosed in the last 20 years. In 2000, professionals within the Communicable Disease Unit from WHO headquarters noted that countries subject to complex emergencies accounted for 49% of outbreaks, compared with 2% in industrialised countries. Not surprisingly, those doing initial reporting of outbreaks were from unofficial sources (71%).[20] Little has changed in terms of the countries experiencing the majority of outbreaks, and the extent of reporting by unofficial sources has actually increased. Generally it took 18 days to confirm an outbreak. Of most concern was that it took over 50 days on average for confirmation of acute respiratory syndrome and meningococcal disease –both highly virulent in crowded settings–. While WHO is aware of the response weaknesses within such countries –as demonstrated by its introduction of a programme of specialised training for epidemiologists and laboratory personnel from developing countries–, it is still unclear how international surveillance will benefit individuals suffering manifest causes of ill health within such countries. Between June 2007 (when the Site was created) and February 2008, the restricted-access Event Information Site received information on 231 public health events, with only 10% communicated to WHO through National IHR Focal Points.[21]

We currently lack precise data on where the burden of disease falls for a quarter of the world's population. WHO's 2007 statistical report includes complete death-cause reports for the years 2004 and 2005 from only 64 countries out of 192. More often than not this means that the countries without complete registration records also have populations with no access to health professionals.[22] The concern here is that surveillance will not be of much use in situations where the absence of health professionals leads to chronic under-reporting –yet these countries are the ones where there appears to be an increased risk of a Public Health Emergency of International Concern (PHEIC) developing–. Not only is there limited laboratory capacity in the countries most at risk, there is rarely a local medical team available to identify an outbreak in the first place. This creates a heavy reliance on unofficial sources for reporting outbreaks –such as non-government agencies in the field–, creating tensions for agencies that base their work on political neutrality and independence. WHO acknowledges this concern and maintains that GOARN depends on 'strong, capable and transparent national systems'.[23] WHO has increased its calls for investment in health systems strengthening so that states with insufficient public health infrastructure can create the means to prevent diseases in the first place, and in turn,

[19] Sara E. Davies, *Global Health Issues: The Politics of Health*, Polity Press, Cambridge, forthcoming, see Chapter 3.
[20] T.W. Grein *et al*. (2000), 'Rumours of Disease in the Global Village – Outbreak Verification', *Emerging Infectious Diseases*, vol. 6, nr 2, March-April, p. 100.
[21] The revised IHR requires that each state nominate a National IHR Focal Point –an office that can be contacted at any time to verify a PHEIC (see note 1)–.
[22] WHO (2007), *World Health Statistics 2007*, World Health Organization, Geneva, p. 16.
[23] Chairman Soley, in the House of Lords, *Intergovernmental Organizations Select Committee*, 'Memorandum submitted by the World Health Organization', Examination of Witnesses, 21/IV/2008, p. 30 and 36-39.

identify and report outbreaks. What remains uncertain is whether there is sufficient international will to do what it takes to strengthen health systems.

The second obstacle is more political in nature. Being able to identify where a disease outbreak has occurred does not alleviate the political obstacles that might exist in gaining state cooperation to contain an outbreak. As WHO acknowledges, GOARN is the safety net in case an outbreak cannot be contained within a state's borders. So the question then is how do we know if a state has not adequately fulfilled its responsibilities in outbreak verification if it lacks either or both the capacity and political will to respond? We cannot assume that a state will either (a) know of the outbreak before it has spread beyond its national boundaries or (b) not believe that a cover-up is the best means of protecting its economy and preventing panic. However, cooperation with the state is absolutely vital for effective disease control. For example, increased funding within China's public health system to develop a national based infectious-disease surveillance system has been warmly received by many as an indication of China's acknowledgement of the need to improve its public health capacity.[24] However, what has received less attention is whether it will be possible for disease alerts to be openly discussed and disseminated within a very hierarchical and heavily politicised public health system. Private discussions by the author with health department officials engaged in shared technology discussions with their counterparts in China have revealed concerns that the move towards surveillance might not be intended to disclose disease outbreaks, but to improve the capacity to cover them up.

Another example of political interference with WHO's objectives to improve state responses to verification requests is the effort to introduce bilateral surveillance systems that manage not only outbreak response, but also virus-strain sharing and vaccine development. In particular, the US Centre for Disease Control (CDC) has established Global Disease Detection Centers (GDDC) in six locations, which are China, Egypt, Guatemala, Kazakhstan, Kenya and Thailand. China's relationship with GDDC since 2006 has increased doubts that the country is likely to cooperate with a global surveillance alert system because while GOARN requires multilateral cooperation in verification and response, the GDDC does not. Although the GDDC is meant to coordinate and share outbreak verification information with GOARN, the GDDC primarily uses US government departments overseas to respond and collaborate with the local party. In addition, GOARN shares all specimens, viruses and bacteria gathered on site through the laboratory network; the GDDC does not.[25]

We see here two types of overt political interference affecting the potential for surveillance to work effectively, even if local capacity is permitting. First, a political interest in resisting the reporting of an outbreak or verifying a PHEIC due to fear of economic paralysis or local reaction to an outbreak triggering a political crises; secondly, an interest in monopolising the field response to an outbreak in order to gain access to biological samples and exclude WHO from its traditional role of sharing such data through its laboratory networks. Against previous analysis that suggested that the willingness of Western states to place primary surveillance responsibility in the hands of WHO due to their trust in WHO's authority in the area of global health security, the assumption that those states have relinquished their attempt to control the infectious disease agenda

[24] Qide Han, Lincoln Chen, Tim Evans & Richard Horton (2008), 'China and Global Health', *The Lancet,* nr 372, 25 October, p. 1439-1441.
[25] Pat Drury, Dr David Heymann & Dr Paul Gully, *Intergovernmental Organizations Select Committee*, p. 36-39.

requires further investigation. In fact, it could be argued that the only reason why WHO has been able to expand its authority under GOARN to the extent that it has is because it suited the immediate interests of Western states at the time. What remains untested is WHO's new authority to secure the verification of a disease outbreak within the 24-hour period, as stipulated by the revised IHR, and the likelihood of host state compliance with disease containment measures.

The third note for caution is that we are yet to establish that more surveillance networks create better response to outbreaks by states. What we do know is that the number of states notifying WHO of an outbreak is lower than the number of non-state actors notifying through the GPHIN system.[26] It is uncertain how this system will place pressure on states to realise the need to invest in their public health systems if someone else is responding to their health crises; nor how it will address the political reluctance of states to notify and cooperate with WHO –other than through the name and shame dynamic-, which may be too late to take effect in the event of a pandemic outbreak.

The link between increased surveillance and improved response could be misleading. As WHO acknowledges, states need to verify an outbreak before any further action can be taken to contain the outbreak. The travel advisory warning placed on China during the SARS crisis galvanised the state into cooperation with WHO, but China's moves since then to develop its own early warning surveillance mechanism raises questions about whether its aim is to improve capacity or to get to the hotspot to cover up the crises before anyone starts e-mailing ProMED or CNN. WHO has no authority over states in the event of a breach of the IHR verification requirement, unless states within the World Health Assembly wish to call a special meeting to consider such actions.

Conclusion: Ultimately we need to figure out how surveillance can contribute to building state capacity: not strengthening particular laboratories through special access to virus samples or forcing states to do what they would not otherwise wish to do. However, real success comes when states cooperate because they know it is the right thing to do and believe that the benefits outweigh the consequences. If saving individuals from the unheralded spread of an unknown pathogen is the real intention, the best start is to deal with political instabilities, the chronically low investment in public health infrastructure in much of the developing world due, in part, to constricting international monetary and trade policies, and to create incentives for cooperation that overcome the instinctive attempt to hide outbreaks. Surveillance is important but it cannot and should not be a substitute for building the capacity and willingness of states to act.

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[26] Dr David Heymann, *Intergovernmental Organizations Select Committee*, p. 40.