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Global Health Security:

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GOARN

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Global Health Security: The Global Outbreak Alert and Response Network

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Introduction

In the mid-1990s two infectious disease outbreaks – Pneumonic Plague in Surat, India and Ebola in Kikwit, Democratic Republic of Congo (then Zaire) - caused great concern globally. At that time the standard communication system of the World Health Organisation (WHO) - telephone, telex and facsimile – was unable to handle requests and information dissemination in a timely manner, resulting in uncertainty and misunderstanding that increased concern among its member countries

(http://bvs.sld.cu/uats/articulos_files/Ebola/SE10_283.pdf).

With a vision of using up-to-date communication technologies to avoid such problems in the future, the Global Outbreak Alert and Response Network (GOARN) was created

(https://www.researchgate.net/publication/265342095_The_Global_Outbreak_Alert_and_Response_Network). Its roots

were in the World Health Organization's (WHO's) emerging infections programme established in 1966, and the goal of GOARN was to increase the sensitivity of global disease detection and the rapidity of global risk assessment, risk communication and outbreak response.

By using the most up-to-date

communications technologies, GOARN changed the way in which the WHO received, assessed, and responded to information about infectious disease outbreaks.

(https://www.researchgate.net/publication/12560554_Rumors_of_disease_in_the_global_village_Outbreak_verification).

GOARN is a partnership of national public health institutions, and institutions with public health capacity, from around the world. GOARN conducts rapid risk assessment every weekday morning on information collected from both formal and informal sources. Formal sources include country reports and reports from established public health institutes and laboratories.

(https://www.researchgate.net/publication/265342095_The_Global_Outbreak_Alert_and_Response_Network). Informal

reports are obtained from NGO networks such as the International federation of Red Cross and Red Crescent Societies (IFRC), electronic discussion sites such as ProMed Mail (PMM), and web-crawling search engines such as the Canadian Global Public Health Intelligence Network (GPHIN) (Ref).

When risk assessment indicates that an outbreak response is required, and if countries indicate that they require

technical support for that response, GOARN mobilizes technical experts from the various institutions in the GOARN network who travel to the country to support the outbreak response. In order to rapidly mobilise technical experts, the GOARN secretariat provides terms of reference that describe the needs to all GOARN partners electronically and, at the same time, begins the process of resource mobilization. Using a revolving fund that was set up in support of GOARN in the early 2000s, the GOARN secretariat immediately sends a team of WHO staff members to the country to provide the following: 1) a logistics platform for technical partners, 2) guidance and training to national public health surveillance and response staff, 3) support to the government in coordinating the GOARN partners as they arrive, and 4) work with national counterparts to support the outbreak response.

During its first year of operation, GOARN responded to requests for support in more than 55 infectious disease outbreaks, mainly in sub-Saharan Africa. In 2000, the GOARN partnership was formalized and an external advisory committee established (WHO Program Data). Since its inception, GOARN has been the primary means through which the WHO responds to requests from member countries for support to outbreak control, with the intent of preventing them from becoming Public Health Emergencies of International Concern (PHEICs), and avoiding the need to call together the Emergency Committee of the International Health Regulations (IHR)

(<http://www.who.int/ihr/publications/9789241596664/en/>).

GOARN responds to outbreaks of many aetiologies, and has successfully responded to and helped manage all outbreaks of Ebola and Marburg since 1996. GOARN also contributed significantly to the global response that contained the outbreaks of Severe Acute Respiratory Syndrome (SARS) in 2003. It was during the SARS outbreak that GOARN showed its true capacity, and signalled a change in the way the world could respond to outbreaks that cross international borders.

During the SARS outbreak GOARN established three virtual networks of technical experts: one of field epidemiologists working at outbreak sites; one of virologists working in laboratories around the world to identify the cause; and one of clinicians who were managing patients. Standardised information from these three networks was provided daily to the GOARN secretariat on secure websites, with frequent telephone and video conferences. By using this information it was, for the first time ever, possible for WHO to make real-time outbreak control guidelines based on real time evidence, and to provide them to countries through the WHO website.

Severe Acute Respiratory Syndrome (SARS): A case study in global alert and response

Three global surveillance networks – the Global Influenza Surveillance and Response System (GISRS), ProMed Mail (PMM) and the

Global Public Health Intelligence Network (GPHIN) - provided information to GOARN in 2002 and 2003 that led to the identification of, and response to, the outbreak of Severe Acute Respiratory Syndrome (SARS) (Ref). PMM and GPHIN first identified and reported an outbreak of highly fatal respiratory disease from information in the news media in the Guangdong Province of China in November 2002. GISRS was alerted because of the concern that that this could be the beginning of an influenza pandemic, as it had been known that poultry in the Guangdong Province harboured Influenza A (H5N1) since 1997 - when avian influenza A(H5N1) emerged as a highly fatal respiratory infection in a small cluster of humans in Hong Kong (Ref).

The Chinese government responded to requests for more information, assuring WHO that the disease was not pandemic influenza, but seasonal influenza caused by the influenza B virus. But reports of high mortality respiratory illness in the Guangdong Province continued to be detected by PMM and GPHIN throughout December 2002 and January 2003. In February 2003, GSIRS, on continued heightened alert, identified avian influenza - influenza A(H5N1) - in a father and his child who had recently returned from southern China with symptoms of influenza. This added to the concern that an influenza pandemic was possibly beginning in southern China.. Shortly afterwards, a medical doctor who had been treating patients with highly lethal respiratory illness in the Guangdong Province entered Hong Kong to attend a wedding. He was ill with a respiratory

infection at the time he travelled to Hong Kong, and stayed one-night in a Hong Kong hotel.

One of the persons who stayed on the same floor of the hotel, a businessman, travelled from Hong Kong to Viet Nam where he became seriously ill with respiratory symptoms requiring ventilator support. GISRS was unable to identify the influenza virus in specimens taken from this patient, and his illness, of unknown aetiology, was reported to the WHO. This businessman became the first reported human outside of China with the severe respiratory infection that we now know as SARS. Other hotel guests who stayed on the same hotel floor in Hong Kong as the infected doctor, travelled by air to neighbouring Asian countries, North America, and Europe while still in the incubation period of illness. When they arrived home, they - like the businessman in Viet Nam - became sick with severe respiratory illness and, in turn, spread the infection to hospital workers and other close contacts. In addition to inadvertently spreading the infection to travellers from other continents, the medical doctor from Guangdong also spread infection to health workers in Hong Kong Hospital where he had been admitted, setting up a major outbreak of severe respiratory illness in Hong Kong. Once the geographic extent of spread was understood, technical experts were mobilised by GOARN from among its partner institutions and agencies from North America, Europe and Asia, as well as from NGOs such as Médecins Sans Frontières. They responded to the outbreaks following the GOARN request, provided technical support to countries where outbreaks

were occurring, and to WHO headquarters and regional offices. SARS had never before been seen in human populations, and thus there were no vaccines, medicines or established measures that could be used for its control. Because the virus was able to spread from human to human, there was concern that, like HIV, it would become an endemic infection. Precautionary measures to prevent international spread of the infection were therefore immediately recommended by the WHO. It was first recommended that persons who were ill with similar symptoms and who had contact with geographic areas where there were ongoing, defer travel until they were well. These precautionary measures caused a decrease in international air travel from geographic areas where outbreaks were occurring. In addition, however, many well passengers also perceived the risk of travel as being great and also postponed or cancelled their travel.

When SARS spread throughout a major housing complex in Hong Kong, among persons who had not been in contact with each other, it was hypothesized that SARS might be spreading through indirect transmission, an environmental factor such as an insect or water, in addition to spreading by direct transmission, or face-to-face contact (ref). This led to stronger precautionary recommendations from the WHO. When the WHO made this stronger precautionary recommendation for travel to Hong Kong in April, a sustained decrease in passenger movement occurred throughout the remainder of the month of April and through most of May, when the WHO removed the

precautionary travel advisory. Similar decreases in airport passenger movement occurred when WHO recommended postponement of travel to other sites including Singapore, Taiwan, China, and Canada – sites of major SARS outbreaks where all new cases could likewise not be immediately traced to direct contact with persons with known SARS.

The SARS outbreak ended in July 2003, with 8096 reported cases from 37 countries of which 774 (9.6%) were fatal (http://www.who.int/csr/sars/country/table2004_04_21/en/). The Asian Development Bank estimated the economic impact of SARS at approximately US\$18 billion in East Asia - around 0.6% of gross domestic product (<http://seekingalpha.com/article/133813-swine-flu-s-economic-impact>). But economic recovery was fortunately rapid once international spread had been stopped.

Based on retrospective analysis, hospital workers in China became infected with the SARS coronavirus early in the outbreak, and served to amplify transmission within hospitals, and through close contacts and family members to the community. It was at this time that PMM and GPHIN began to detect the outbreak, and notified the international community. Had the outbreak been detected and responded to in China, when and where it was occurring, it might not have spread to Hong Kong and internationally. And the human suffering and death, and severe economic disruption might have been avoided or decreased in its impact.

Conclusion

Since the SARS outbreak, China and other countries around the world have begun to strengthen national alert, preparedness and response for emerging infections and other naturally occurring public health events. Several new national institutes of public health have been developed as a direct result of concern caused by the SARS outbreaks—the Public Health Agency of Canada, the China CDC, the Health Protection Agency in the United Kingdom (recently transformed into Public Health England), and the Hong Kong Centre for Health Protection to name a few. Many more countries have strengthened their preparedness and capacity to detect and respond to public health events that threaten national populations, and a majority of countries in the world have developed pandemic plans for influenza and other pandemic disease. During this same time the International Health Regulations were revised and now place great emphasis on the legally binding requirement of countries to develop eight core capacities in public health. Among these core capacities are preparedness, surveillance, laboratory, response mechanisms and risk communication so that public health events can better be detected and managed nationally, decreasing their potential for international spread. Though all countries agreed to complete the development of these core capacities before the end of 2014, this goal has not been accomplished as witnessed by the inability of several countries in West Africa to detect and effectively respond to the Ebola outbreak after Ebola had emerged in December 2013.

Though the emphasis that the revised IHR place on national core capacity in public health moves actions for public health security from a global to a national perspective, there is still a need for global surveillance systems to ensure public health security and preparedness; and for global alert and response systems such as GOARN in order to provide a safety net when national capacity fails to detect and/or report a public health event of international importance.

And though there was great optimism of a more collaborative way of working globally after the successful GOARN response to the SARS outbreak, this has not been duplicated during the MERS Coronavirus outbreak that emerged in 2012, nor early in the Ebola outbreak in Guinea when Ebola was first reported in 2014. There are now many recommendations as to how to strengthen the global capacity to detect and respond to outbreaks such as Ebola, and how to strengthen the IHR in order that countries undertake the necessary actions to strengthen their public health capacities (Ref). How these recommendations will eventually relate to GOARN has not yet been defined, but core public health capacity-building is being accelerated, in part by the US-led Global Health Security Agenda which supports 44 countries to achieve full implementation of the IHR. At the same time the actions of new, and non-traditional partners that joined the response to the Ebola outbreak - the private sector and armed forces - are being assessed, and their involvement in future health crises remains to be defined.

There is an urgent need to define a new way of working before the emergence of the next global health crisis – as well as to consider the place of GOARN, and how its past success during previous outbreaks, can be duplicated in the future.

The views expressed in this report are those of the author, and do not necessarily reflect the positions of any of the institutions to which he is affiliated, the Scowcroft Institute of International Affairs, the Bush School of Government and Public Service, or Texas A&M University.

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Previously he was the World Health Organization's assistant director-general for Health Security and Environment, and representative of the director-general for polio eradication.

From 1998 to 2003 he was Executive Director of the WHO Communicable Diseases Cluster, during which he headed the global response to SARS, and prior to that was director for the WHO programme on Emerging and other Communicable Diseases.

Earlier experiences at WHO include chief of research activities in the WHO global programme on AIDS. Before joining WHO he worked for 13 years as a medical epidemiologist in sub-Saharan Africa, on assignment from the US Centers for Disease Control and Prevention (CDC), where he participated in the first and second outbreaks of Ebola hemorrhagic fever, and supported ministries of health in research aimed at better control of malaria, measles, tuberculosis and other infectious diseases.

Prior to joining CDC he worked in India for two years as a medical epidemiologist in the WHO smallpox eradication programme. He is an elected fellow of the Institute of Medicine of the National Academies (US) and the Academy of Medical Sciences (UK), and has been awarded several public health awards that have provided funding for the establishment of an on-going mentorship programme at the International Association of Public Health Institutes (IANPHI).

In 2009 he was appointed an honorary Commander of the Most Excellent Order of the British Empire (CBE) for service to global public health.

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Mark Welsh, Dean and Holder of the Edward & Howard Kruse Endowed Chair

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— Lt. Gen. Brent Scowcroft, USAF (Ret.)