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ENHANCING PUBLIC HEALTH PREPAREDNESS: TOWARDS AN INTEGRATED PROCESS

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Summary: Investments in public health preparedness can mitigate the human and economic costs of disease outbreaks. Preparedness is an iterative process of quality improvement through which public health seeks to optimise the anticipation of, response to, and recovery from health threats. Integrating preparedness processes into routine public health activities is essential to ensure the sustainability of preparedness measures. Developing means to efficiently prepare for a wide range of health threats and to coordinate across sectors and national borders will be important priorities in the coming years.

Keywords: *Emergency Preparedness, Public Health, Infectious Disease, Epidemics, Ebola*

➤ #EHFG2015 Lunch workshop 1: Health threats response

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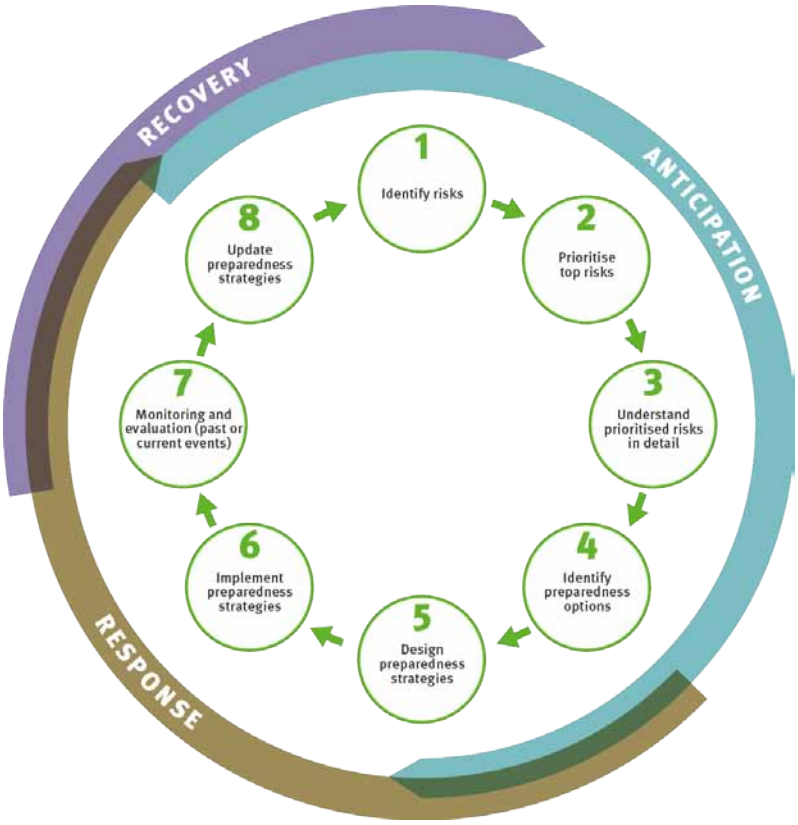
Introduction

It is accepted among global development communities that disaster preparedness not only saves lives but is also a sound investment. The United Nations Development Programme's (UNDP) "Act Now, Save Later" campaign[1] is based on the premise that each dollar spent in preparedness saves seven dollars in emergency response.

In a highly interconnected world in which many key global risks are also drivers of infectious disease (e.g. climate change, terrorism, deforestation, intensified trade and agriculture), it is the case that outbreaks with a cross-border element are increasingly likely.[2] As well as the immediate health impact, such outbreaks can also incur significant costs. Following the SARS outbreak in 2003, it was estimated that the costs to the world economy were a staggering US$40 billion,[3] which led to the conclusion that *"there is a strong economic case for direct intervention in improving public health … where there are inadequate expenditures in public health and insufficient investments in research into disease prevention."*

Ten years later, there have been two major influenza scares (H5N1 avian influenza and the 2009 H1N1 pandemic), countless

Figure 1: The preparedness process



Source: [7]

other outbreaks, and the 2014 outbreak of Ebola in West Africa. The latter in particular has demonstrated that there continue to be significant gaps in the global preparedness for infectious disease risks.[4] There have been nearly 30,000 cases and over 11,000 deaths since the onset of the epidemic. In addition, West Africa regional economic losses for 2014–2017 are estimated at an average of US$3.6 billion per year. Ebola has also led to an increased risk of poverty, heightened food security challenges, the disruption of national childhood vaccination campaigns, and negative impacts on the overall social fabric in Guinea, Liberia and Sierra Leone.[5]

As global attention to the Ebola outbreak gradually waned, in May 2015 a traveller to South Korea from Saudi Arabia triggered an outbreak of Middle East respiratory syndrome (MERS-CoV). This offered further evidence that global interconnectedness can lead to disease outbreaks anywhere and that all countries, rich and poor, are potentially susceptible (although to varying degrees). Public health preparedness has subsequently emerged as an important priority, which means that it is time to move beyond the mantra that better preparedness will lead to better global health security. In order to make the case for further investments in preparedness, it is necessary to clarify what, exactly, is meant by "preparedness", and what activities will be required in coming years to ensure that preparedness is sustainably strengthened.

Public health preparedness: a process of improvement

The United Nations Office for Disaster Risk Reduction (UNISDR) usefully defines preparedness as *"the knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions."* [6]

Implicit in this definition is that knowledge and capacities must exist, and that they must be operationalised and harnessed so as to ensure that activities during the anticipation, response, and recovery phases are conducted as efficiently as possible. In this sense, public health emergency preparedness can be seen as a process of quality improvement (**see Figure 1**). The types of activities relevant to a preparedness process are related to the preparedness phases of anticipation, response, and recovery. In an ideal world, each of the phases of the cycle are iteratively enhanced and effectively integrated into the routine activities of public health institutions. The processes established to ensure that this occurs are arguably as important as the technical activities, for without robust processes the sustainability of preparedness initiatives may be jeopardised. In the following sections, we will focus on the areas for improvement that can be identified at various phases of the preparedness cycle (**see Figure 1**).

Anticipation: Identifying, prioritising, and understanding risks

Early warning is a critical component of preparedness activities. Organisations such as the European Centre for Disease Prevention and Control (ECDC) routinely conduct epidemic intelligence and horizon-scanning activities to identify emerging threats. Innovative new approaches that leverage tools such as Geographic Information Systems (GIS) are being developed that may increase the ability to anticipate the evolution of risks, such as by linking epidemiologic data with data from other sectors. Examples include modelling the impact of environmental changes on certain vector-borne diseases,[8] or using airline transportation data to assess the risks of disease importation.[9] There is great potential for further researching and developing such approaches, and for integrating them into epidemic intelligence activities.

With multiple emerging disease risks often on the horizon, prioritisation efforts may be helpful so as to inform preparedness planning and to ensure that precious resources, both human and financial, are wisely allocated. One approach for doing so is to utilise methodologies such as multi-criteria decision analysis

to solicit multidisciplinary opinion and, it is hoped, enhance strategic decision-making.[10] ECDC is currently in the process of adapting such a methodology and has observed that the process of "risk ranking" may be as useful as the outputs, for it can bring together stakeholders that rarely meet with one another.

Prioritised risks may become the focus of more detailed investigations and studies, as might risks that quickly arise and demand immediate attention. In both cases, detailed threat assessments often become the cornerstone for subsequent preparedness and response measures. Considering threats from the perspective of vulnerabilities, and conducting multidisciplinary threat assessments are preferable, because preparedness strategies are often implemented in complex settings. To give one example, an important impediment to the Ebola response has been the highly varying local ideas of what the virus is, where it comes from, and how it can be stopped. These ideas are in turn affected by varying sociopolitical contexts, and thus a comprehensive understanding of the threat would also consider perspectives from the social sciences in addition to, for example, virology, epidemiology and clinical medicine.

Response: Identifying, designing, and implementing preparedness strategies

Preparedness and response strategies must be designed according to the temporal and geographic scale of the threat, and they must consider the resources available and the context in which they will be implemented. One of the key current challenges is to understand the extent to which preparedness measures can be "generic". In other words, it is increasingly argued that preparedness measures should be "all-hazard", which could lead to efficiency gains, but it is unclear to what extent "generic" preparedness measures can actually account for a wide range of threats. A commonly cited rule of thumb is that 80% of preparedness measures are common across threats. While it is indeed likely that many preparedness processes and capacities are generic, this assumption is worthy of further research. Technically speaking, it is perhaps more likely that classes of infectious diseases can be prepared for similarly, such as mosquito-borne diseases or respiratory diseases, but even then it would not be prudent to assume that the measures in place for one disease would necessarily be relevant for another.

One thing that is clear is that preparedness strategies need to consider the activities of multiple sectors, which means that the health sector will increasingly need to reach out to other relevant partners when developing, testing, and implementing plans. Examples of sectors can include transport and aviation, energy, water treatment, environment, and civil protection.

Similarly, an increasingly important consideration is the cross-border dimension of infectious disease risks. Preparedness measures in one country could affect or need to be conducted in another country (e.g. road closures, trade embargoes, airport screening measures, contact-tracing). Thus, there is a need for coordination of preparedness measures across jurisdictions, and for the exchange of information about risks and the efficacy of specific preparedness measures. In the European Union, Decision 1082/2013/EU on serious cross-border threats came into effect in November 2013. It provides an integrated European framework for the different preparedness phases described in this article and aims to ensure a consistent European response across multiple types of hazards (biological, chemical, environmental).

Recovery: monitoring, evaluating, and updating preparedness strategies

The recovery phase demands many important types of measures, such as transitioning attention and resources back towards routine public health activities. It is also an opportunity to reflect upon the extent to which preparedness measures had achieved their goals. Reviews of past incidents such as H1N1 have tended to focus on concrete "lessons learned" or on specific pharmaceutical interventions (such as stockpiling of countermeasures), but they do not typically address issues such as health system capacities.[11] A similar issue exists with the ways in which tools or simulation exercises seek to evaluate the status of preparedness.[12] They tend to focus on structure- or process-indicators, but do not often capture the degree to which preparedness actually contributes to an efficient response to public health emergencies. In addition, ensuring that lessons learned from exercises and real emergencies are transferable and translated into actual improvements in daily practice remains a challenge.[13]

Ensuring that formal knowledge and capacities are in place is surely important, but is that enough? Other pertinent questions could include: what capacities and knowledge is essential, and what is not? How will personnel and protocols function in practice during highly stressful emergencies? How can health systems be made more resilient? How do we really know when we are prepared for a given threat – or for an unknown one?

The road ahead: strengthening preparedness in Europe and abroad

It has been posited here that preparedness is usefully viewed as a strategic process; one which seeks to optimise the anticipation of, response to, and recovery from major risks. Although knowledge and capacities are crucial components, preparedness activities and processes need to be embedded in the routine activities of public health organisations in order to ensure that future responses to infectious disease outbreaks will be optimised. This should also help to strengthen the resilience of "routine" public health activities, because the most effective health services and system during an emergency are the ones used during peacetime.

In the coming years, ECDC, in collaboration with the European Commission and partners such as the World Health Organization (WHO), will pursue a programme of work that includes: research into threat anticipation and prioritisation; approaches for optimising multi-sector and cross-border collaboration; the essentials for monitoring and evaluation; and, more generally, the integration of preparedness processes into core public health business. Investments in such work, it is hoped, will help to mitigate the human and economic costs of future disease outbreaks.

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