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Coronavirus pandemic: applying a whole-of-society model for the whole-of-the world

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Abstract

During a pandemic, a national government is often considered solely responsible for dealing with the outbreak with local-based policies. A whole-of-society approach to a pandemic is evidence-based and used successfully in countries with a history of pandemic infections. This collaborative approach assumes that no single entity has the capacity to successfully manage the dynamic, complex problems that arise in a pandemic environment. Application of the whole-of-society model globally would provide a more harmonious and concerted response with mutual and synergistic benefits to all affected nations. Central entities within the model include; Civil society, business and government. These are addressed at the community, local government and sub-national level. Nine essential services are also identified including Health, Defence, Law & Order, Finance, Transport, Telecommunication, Energy, Food, and Water. A continuing cycle of readiness, response and recovery of services encapsulates this model. Pandemics affect the whole of the world, a global whole-of-society approach is therefore needed to tackle them.

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What is a disaster?

Fritz described “disaster” as being a concentrated event in time and space in which society undergoes disruption such that essential functions are impaired.¹ This disruption occurs on multiple levels; Osterholm describes even in a mild pandemic the catastrophic loss of life and devastating impact on world economy, potentially lasting for several years.² The cost of preparedness, an estimated \$4.5 billion per year, is dwarfed by the estimated \$570 billion annual pandemic costs.³ Such disasters and their inevitable consequences occur as the situation exceeds beyond the protective measures placed to contain it. International

cooperation remains fundamental and despite improved general medical care and institutional plans pandemics continue to overwhelm these public health protocols. As witnessed during this current coronavirus pandemic crisis and past pandemics; although the responsibility of control falls upon the country affected by the outbreak there does not currently exist a foolproof singular response system.

History of pandemics

A review of the history of pandemics demonstrates an increase in frequency since the 1980’s with an average of 5.2 emerging infections every year between 1940 and 2004.⁴ Since the severe acute respiratory syndrome (SARS) virus in 2002 there followed H1N1 in 2009, H5N1 in 2012, H7N9 in

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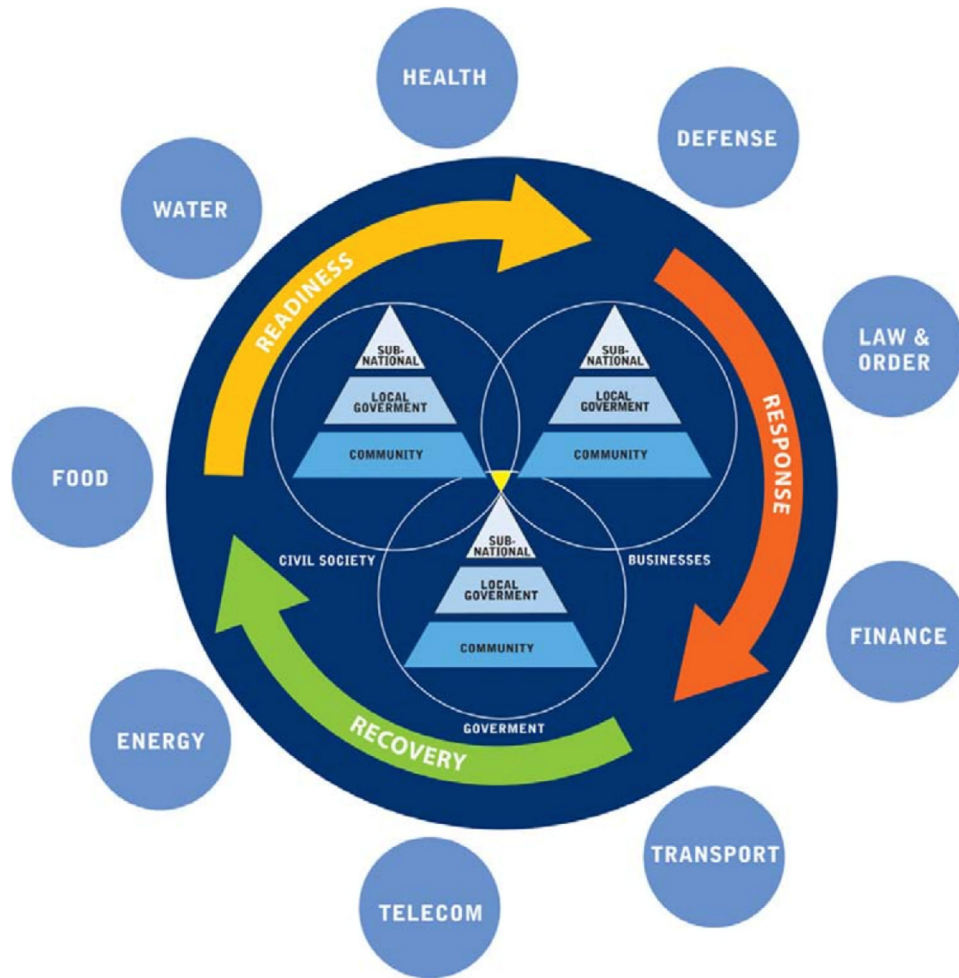


Fig. 1. Whole of society model.

2015 and middle east respiratory syndrome (MERS) in 2015. These emerging infection threats are made more potent by the increasing international transportation modalities upon which we have come to depend. Lessons have been learned from past pandemics and an evidence-based plan now exists. The World Health Organisation (WHO) first proposed a whole-of-society (WoS) preparation plan in 2009 with risk management update in 2017 based upon lessons learned from the 2009 A(H1N1) pandemic.^{1,4,5} In this model they describe three central entities; government, civil society and business with nine surrounding essential services such as Health, Defence, and Food. These are all managed by a continuum of readiness, response, and recovery⁵ (Fig. 1). On declaring the coronavirus pandemic on March 11th Dr. Tedros Adhanom Ghebreyesus, WHO director-general stated: *“This is not just a public health crisis, it is a crisis that will touch every sector, So every sector and every individual must be involved in the fights”*⁶

Is a pandemic too much of a complex problem?

Is this too complex of a problem to tackle from a local systems perspective let alone on a world scale? Complexity within healthcare systems has been described as individual agents able to act independently and unpredictably, their actions are interconnected and become defined by these same interactions.⁷ We are naturally used to working within a well-oiled rigid system with specific targets and outcomes, meeting them allows us to level up in the game of healthcare. Complex systems in reality are more akin to the matrix; some rules can be bent, others can be broken with rigid boundaries being more blurred than clear.¹ The features of a pandemic are not dissimilar to the features of complexity within a health system; the rapid pace and changing narrative of spreading infection; decisions based on inadequate, incomplete or debated data and adaptive solutions to fix local problems. Is a surgical mask superior to an FFP3 mask? The Roth score is widely used one week only to be

discounted the next, does wearing theatre shoe covers have any evidence-based impact on reducing infection? The Medical Research Council (MRC) itself adapted to this challenge evolving from rigid randomised control trials to including non-linear, mixed-method approaches to aid in the answering of these questions.⁸ As with the WoS approach that utilises a multivariate approach this is reflected in the guidance and approach to dealing with complex problems in healthcare itself.

The whole-of-society approach

The WoS approach aims to utilise the principles of complexity within systems and seeks to improve the global effort against pandemic infections, increase information sharing and further institutionalise pandemic responses. Although simple in theory, executing such measures requires national, political and local involvement incorporating the entirety of society, the so-called WoS pandemic collaboration.² This collaborative approach incorporates public agencies including but not limited to businesses, philanthropic organisations, communities, and the entire public as a whole. This collaborative approach assumes that no single entity has the capacity to successfully manage the dynamic, complex problems that arise in a pandemic environment. Pan-collaboration allows for responses to local changes and appropriate allocation of resources to meet national requirements.³ Despite this well-versed plan on paper, lockdowns initiated as per the advice from the WHO protocols initially appeared draconian with many countries still not following recommendations of widespread testing, strict quarantine, contact tracing, and social distancing.⁴ The now ubiquitous and familiar social distancing protocols, restricted transport, and hand-hygiene measures were sluggishly adopted in Italy, Spain, and the USA amongst others, which in hindsight appear poorly judged decisions. The UK itself went through several different strategies starting with “Contain-Delay-Mitigate-Research”, a plan that overlooked the WHO recommendation of testing and “Detect, Protect, and Treat”. The new plan now aims to “Suppress-Shield-Treat-Palliate”. Another phrase that comes to mind is “singing from the same hymn sheet”,⁵ a WoS approach applied on a global scale would aim to mitigate the plethora of policy changes adopted with every country effectively trying to re-invent the wheel unnecessarily.⁶

Italy as a case example went from its discovery of the first official coronavirus case to the biggest crisis it has faced since World War II within the space of four weeks.⁶ Many other countries have unfortunately suffered the same fate demonstrating not a lack of available knowledge but failure to efficiently and systematically execute this knowledge. From a political perspective pandemics, with their tendency to start small but exponentially and dramatically increase, represent a tightrope walk. Strict and systematic measures are best undertaken early before cases are even officially confirmed. In retrospect, these actions would inevitably appear

as overreactions if the interventions are successful. Partial solutions, however, have been shown to fail time and again with confirmation bias a significant confounder when making daily objective assessments of infection progression.^{6,7} From a governing body perspective a unified message of preparedness, not panic, is required with prudence overriding politics.

Clinical human factors in a pandemic

An important aspect of this collaborative approach is trust and situation awareness. During the H1N1 pandemic in Taiwan, despite mass production of a vaccine, a negative media story centred around the death of a physician’s son led to a significant loss of trust.¹¹ Not only were vaccinations refused but this lack of trust then also extended to government recommendations and inhibited protective measures. Situation awareness, so easily lost on a macro-scale again reflects the dynamic, ever-changing environment that is not dissimilar to an operating room.¹² Errors on a local level but magnified on a national and international setting may occur often because of tunnel vision toward achieving a particular action or goal to the exclusion of all other factors. Conversely, relevant information may be present yet ignored due to distraction or hierarchy or a combination of these factors.¹³ Examples of this may include panic-buying items despite no suggestion of shortage in supplies or ability to access, listening to local evidence and policy to the exclusion of globally available information and changing events. A government plea for businesses to help in the manufacture and production of ventilators was met with positive pledges from multiples businesses, related and not, to aid in the production of these vital machines. An important aspect missed in the early rush to produce more physical machines was the awareness of training need, recognising the deployment of healthcare workers from a familiar to an unfamiliar environment and different devices having different operational instructions. This very human and relevant clinical factor applies equally to the rapid production of safe machines that make it easy to use under considerable stress and pressure. To this end, further guidance has been appropriately released for a rapidly manufactured ventilator system specification that is minimally, clinically acceptable.¹⁴ Other successful collaborations include that of telecommunication companies. These have recently committed to combined resources to support the government and NHS with broadband and mobile network services to support the almost overnight conversion of physical GP and outpatient appointments to remote and digital consultations.¹²

The whole-of-society model at work

A real-life example of the WoS model at work can be seen in the 2009 H1N1 influenza pandemic. As the WHO raised the

pandemic alert level the Taiwanese government, using the WoS model utilised many of the measures across multiple entities that we have started to witness in the UK also. This included mass school closure with public education through mass media, enhanced border controls, and a mass vaccination programme. Retired healthcare workers, volunteers and active members of the workforce were also readily mobilised⁸ as part of their preparedness measures. More localised examples of this included containment strategies utilised across cities and the triaging process of patients within the hospital. In the former, the city was segregated into sub-districts and districts led by a mayor-appointed official. Using Six Sigma principles of breaking down a complex process into smaller, simpler steps these districts were given allocations based on infection status. A “hot zone” for infection outbreaks, “intermediate zones” as buffers and lastly “cold zones” for no outbreaks. Checkpoints limited interzonal traffic and isolated outbreaks within a cold zone were transported to isolated hospitals for treatment.⁸ Triage of patients for hospital often took place outside of the hospital environment. Clear zones of contamination with confirmed cases, clean zones, and disinfection stations in between these clearly marked areas.⁹

The starkest example of the effectiveness of these measures when followed and when not is that of Lombardy and Veneto, neighbouring regions within Italy of similar socio-economic profiles. Lombardy has suffered 5,000 deaths in its population of 10 million compared to 287 deaths in Veneto’s population of 5 million. Obvious confounders such as population density have played a part however Lombardy and Veneto adopted opposing public health strategies. Whilst Lombardy adopted a more relaxed approach Veneto undertook many of the WoS measures that included extensive testing, proactive tracing of cases and widespread quarantine. At-risk populations including healthcare workers, pharmacists, supermarket cashiers, and other essential exposure-prone workers were specifically targeted.⁶

The WoS model mobilised on the global canvas has untold potential benefits that we have already started to witness. The WHO-led SOLIDARITY trial is a global, coordinated research effort combining worldwide expertise for the discovery of potential treatments of coronavirus. Similarly, UNICEF, WHO and the Coalition for Epidemic Preparedness Innovations (CEPI) have combined their efforts, raising funds to help across multiple levels including protective equipment for health workers, mitigate the considerable societal impacts; education, health and safety among others.¹⁰ These are true examples of facet of the WoS model applied across the whole of the world and what can be achieved.

Conclusion

The occurrence of any pandemic, by definition, is panic inducing and responsibility is often considered to be solely

of the governing body within that country. Past pandemics have demonstrated that mobilising all aspects of society in a collaborative effort has dramatically improved results. The most effective response requires an orchestrated, systematic approach undertaken simultaneously rather in partial measures. A whole-of-society-approach applied on the global canvas characterises the most effective response to a global pandemic; the combined efforts of society undertaking a multitude of effective actions undertaken harmoniously and simultaneously.

Ethics statement/confirmation of patients’ permission

Not applicable.

Conflict of interest

I have no conflicts of interest.

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