Unheeded Warnings: The WHO Bell Tolled, But Not Everyone Listened

By Randolph Fillmore

A study completed in September 2019 and compiled by the Johns Hopkins Bloomberg School of Public Health's Center for Health Security titled "Preparedness for a High-Impact Respiratory Pathogen," warns of the risks we would face in the event of a viral respiratory disease pandemic. Yes, like the one we now have. The 75 page, 2019 document predictively outlined exactly what has now transpired since the COVID-19 pandemic emerged early in 2020.

Commissioned by and prepared for the World Health Organization's (WHO) Global Preparedness Monitoring Board (GPMB) as a collaborative effort between WHO and the World Bank, the study outlines exactly – and in stunning detail – how we should respond if something like today's SARS-Cov-2/COVID-19 disease emerged. It also highlights what might happen if we don't get prepared as recommended. Most, if not all, of their dire predictions about our lack of preparedness have come true.

The GPMB, an independent monitoring and advocacy body, urges political action to prepare for and mitigate the effects of global health emergencies. Co-convened by the World Bank Group and the WHO, the GPMB works independently to provide assessments and recommendations for global preparedness.

The September 2019 document was meant to be a window into proper and expedient readiness but, reading it now, it becomes a mirror for inept behaviors, lack of preparation on the part of industry as well as medical and political institutions, and reflects greed, prejudice, xenophobia, and failed leadership on almost every front and in every category – and most seriously in the United States, the world's current leader in COVID-19 deaths.

The report accurately predicts a weak international response and subsequent damage, both to human health and national economies. The report defines, predicts and warns about what has transpired and continues to transpire in 2020, right down to shortages of medical equipment, the reckless promotion of unproven drugs, the economic disaster, and the irresponsible blaming of victims. It even looks in detail into the possibilities that something like a COVID-19 pandemic could be perpetrated as a weapon.

The findings of the report were summarized in the September 2019 WHO Annual Report.

On September 17, 2019, the GPMB issued a media release widely to inform the world's media about the report.

CNN ran the story on September 18. In the UK, *The Guardian* also ran the story on the same day.

Many news outlets that received the release did not run the story. I found the report by accident on Friday, April 10, 2020.

A quick Google search reveals some who passed the bad news along. The Kaiser Family Foundation covered the report in September 2019, as did the Homeland Preparedness News and the Australian Journal of Pharmacy.

The British medical journal *The Lancet* gave us a heads up on the report, but not until March 28, 2020.

"While WHO is under attack, their commissioning of this report in collaboration with The World Bank and through the GPMB, publishing it, and providing a more than adequate "heads up" to the international media, should help exonerate a distinguished and necessary body."

Making it clear that a serious respiratory outbreak is waiting to happen and is, perhaps, even overdue, the report specifically discusses the possibility of a *novel coronavirus* outbreak. The examples of the SARS 2003 outbreak and the 2009 H1N1 influenza are used throughout to point out the good and the bad of what was done and not done in 2003 and 2009, and make clear recommendations based on these recent serious outbreaks and the lessons learned in terms of what to look for, what to do, and what not to do.

Below are my edited and condensed summaries of report specifics, followed by more in-depth edited and condensed summaries of specifics should anyone care to continue reading.

What to do in preparation, even if no threat is imminent

National public health laboratories and large commercial laboratories should develop a concept-of-operations for how to distribute test kits rapidly to relevant clinical sites and laboratories in areas affected by the outbreak.

Technological advances are needed to modernize our diagnostic capabilities to become faster and nimbler at the onset of outbreaks, particularly around novel pathogens.

Victims of a large-scale outbreak in settings with weak health systems would likely die at a higher rate than would be otherwise expected, due to lack of available modern medical care. Individuals who need to use the overburdened healthcare system for routine care during an outbreak would also likely suffer elevated morbidity and mortality, as available health resources are shifted to the emerging outbreak. (AUTHOR'S NOTE: Looking at this through the lens of today's reality makes the US health system look "weak.")

Isolation of the sick will be critically important to limiting further spread, but most hospitals around the world have very limited isolation capacity, particularly for airborne pathogens, and likely only a fraction of what would be needed in a large outbreak.

Stockpiles would ideally include not only basic supplies, such as IV tubing and fluid, but also disease-specific supplies, such as PPE (eg; gloves, surgical masks, N95 respirators, powered air-purifying respirators, or PAPRs), and medical countermeasures (eg; antivirals, antibiotics, vaccines).

Personal Protective Equipment (PPE), including masks and respirators, would also play a critical role in infection prevention and control, particularly if no vaccine or therapeutics are immediately available.

Mask suppliers would be besieged by countries and healthcare facilities around the world. If there were limited availability of masks and respirators in a given country equipment would need to be prioritized for health facilities to provide protection for healthcare workers and increase infection prevention and control measures. There is very little available information that

studies the effectiveness of masks outside of health facilities. Additional research into the development of easy-to-use, effective, and reusable masks for wider use should be considered.

What to do to help limit and/or control the pandemic

(AUTHOR'S NOTE: Clearly the many distinguished and experienced experts who produced the report would want the World Health Organization (WHO) to take the lead on a respiratory, viral disease pandemic. It's what the organization was designed to do and what it has done, successfully for decades.)

Locally, the response should be centralized to a national government, not decentralized to states or counties. Quarantine's work. Social distancing works. Wearing masks and gloves works. All three work best when they are implanted at the "get go," not weeks into a recognized pandemic. If people are quarantined by governments, those people have to be economically and nutritionally supported by those governments. There should be wide-spread testing. The health care industries should be at least a half step ahead in stockpiling PPE and at least have vaccine research in mind, given the SARs experience of 17 years ago.

Preparedness for high-impact respiratory pathogens will also require involvement from non-health actors, including other government, private, and nongovernment organizations. A response to a severe outbreak will increasingly need to incorporate actors from all sectors, including the private and business sectors. A review by the National Academy of Sciences specifically references the expertise of private and business sectors that can be utilized in response mechanisms, including operations, logistics, and supply chains.

Authorities may also need to provide frequent updates on any investigation into the outbreak's origins and advise against lashing out against others who "look like" they may have spread the disease.

If the pathogen is completely novel and there is no existing research base there is no alternative but to *start with fundamental science*and then advance through the development pipeline as quickly as possible.

Best to avoid these mistakes during a pandemic

Avert the uptake of fraudulent, life-threatening alternatives when access to the *real* beneficial countermeasure is impossible.

Conducting trials during an outbreak will be logistically and ethically challenging.

Manufacturers may face political pressure to produce vaccine for their home country before exporting to the rest of the world.

Quarantine measures will be least effective for pathogens that are highly transmissible, have short incubation periods, and spread through true airborne mechanisms, as opposed to droplets. As with travel restrictions, quarantine appears to delay the introduction of highly transmissible diseases but not prevent their spread entirely. Quarantine requires strict adherence to be effective.

In the "Twilight Zone" of disease where predictions come true

Below are bullet point highlights slightly edited and condensed from the report's lengthier statements, findings, and conclusions.

RISKS POSED BY HIGH-IMPACT RESPIRATORY PATHOGENS

- Novel pathogens continue to emerge, often first in animals with subsequent spillover into human populations living in close contact with animals. Global conditions enable pathogens to spread widely and quickly in people. International travel, mass displacement, migration, and urbanization enable pathogens to spread in new, susceptible populations. The rising incidence of chronic illnesses and drug-resistant infections place individuals at greater risk of infection and complications from respiratory viruses

- Novel high-impact respiratory pathogens have a combination of qualities that contribute to their potential to initiate a pandemic. If an infection is contagious in its incubation period prior to symptom onset spread will likely have taken place before awareness of the risk of the infection.
- Scientific developments have greatly advanced medical and public health tools to fight epidemic disease, but scientific developments have also created the ability for pathogens to be engineered or recreated in laboratories. Should countries, terrorist groups, cults, or scientifically advanced individuals create or obtain and then use biological weapons that have characteristics of a novel, high-impact respiratory pathogen, the consequences could be as severe as or greater than the consequences that would follow a naturally occurring pandemic with such pathogens.

Anticipating Challenges During the Deliberate Release of a High-Impact Respiratory Pathogen

- With advances in biology, a high-impact respiratory pathogen could be engineered to create transmissibility and lethality. The deliberate release of such a pathogen could substantially add to the already extraordinary consequences that would follow a naturally occurring pandemic event.
- A key difference between deliberate release scenarios and those in which a high-impact respiratory pathogen emerges and spreads via natural mechanisms would be the possibility for there to be multiple attacks, or "reload," in a deliberate event.
- Severe epidemics and pandemics have demonstrated how contagious disease emergencies can exacerbate societal divisions by fomenting social and political tensions and generating stigma against vulnerable groups who may be blamed. The potential for such negative societal consequences could be even worse in a deliberate event. Groups who are perceived as aligned with the perpetrator of an attack may experience backlash. Public fear and uncertainty could be high in the aftermath of a deliberate event, requiring highly effective risk communication and public outreach.

WHAT PREVIOUS REVIEWS TELL US ABOUT PREPAREDNESS FOR HIGH-IMPACT RESPIRATORY PATHOGENS

- The lack of global attention to – and consideration of – this threat illustrates the vital need to address preparedness for epidemics and pandemics that might be caused by high-impact respiratory pathogens.

- The implementation of border closures and travel bans may give governments more credibility among their own citizens for attempting to stop the outbreak, but historical evidence and modeling and public health experts would argue such measures would be unlikely to substantially add to disease control efforts.

- The leadership role and operational capabilities of WHO, which would be expected to lead in the event of a high-impact respiratory disease outbreak, have been widely examined and documented, specifically through the UN Panel on Protecting Humanity from Future Health Crises and the subsequent UN Global Health Crises Task Force.47,48 While most high-level reviews have reaffirmed the central role of WHO in outbreak response, they have also called for wide-ranging reforms, which culminated in the establishment of the WHO Health Emergencies Program.

- Multiple reports have recognized that a response to a severe outbreak will increasingly need to incorporate actors from all sectors, including the private and business sectors.

- A review by the National Academy of Sciences specifically references the expertise the private and business sectors contain that can be utilized in response mechanisms, including operations, logistics, and supply chains. Reports have noted that the support the private sector could provide would aid national governments in their preparedness planning and benefit responding agencies in streamlining activities such as procurement processes.

HOW CAN THE WORLD BETTER PREPARE FOR OUTBREAKS CAUSED BY HIGH-IMPACT RESPIRATORY PATHOGENS?

- The World Health Organization (WHO) leads the international response to major internationally important outbreaks, and it would be the lead agency for the health response to any high-impact respiratory pathogen event.
- International frameworks that have been conceived only within the past 20 years remain untested during a high-impact respiratory pathogen event that causes serious illness or death in tens or hundreds of millions of people or more.

- During a pandemic scenario, regional, national, and local needs could severely outpace existing international capacities and resources, and countries could not expect emergency medical response teams to assist them.
- In a large disease outbreak scenario, there may also be decreased international interest in supporting other countries' responses as nations deal with the health crisis in their own borders
- It remains to be seen the extent to which the global preparedness system will be prepared to respond to an epidemic or pandemic event caused by a high-impact respiratory pathogen. Individual country needs might quickly outstrip international resources and capacities, and national interests might overtake the imperative to adhere to international agreements on sample sharing, vaccine access, and emergency medical assistance. During a high-impact scenario, the limitations of current international frameworks would come into immediate focus.
- The Pandemic Influenza Preparedness (PIP) Framework provides a global approach to encourage influenza virus sample sharing and to commit manufacturers to equitably providing vaccines, treatments, and diagnostics during influenza pandemics and annually contributing funds to WHO for influenza pandemic preparedness.
- The capacity of organizations would likely be exhausted quickly, with little chance of replenishment due to high demand and scarcity of resources. Similarly, other countries would be focused on either combating the disease outbreak within their own borders or ramping up preparedness efforts to prevent the introduction of the disease into their territory. This may include decisions not to share vaccines with other countries until all domestic needs are met.

Multi-Sector Coordination and Involvement

- Preparedness for high-impact respiratory pathogens will also require involvement from non-health actors, including other government, private, and nongovernment organizations.
- A severe respiratory pandemic is likely to devastate economic growth, either directly via trade and travel restrictions or indirectly via high morbidity and mortality and the loss to jobs and industry, such as tourism. Therefore, both out of self-preservation and for reasons of corporate social responsibility, the private sector will need to play a greater role in planning for and responding to such events.
- The unique expertise and services of several industries deserve special attention. The first is the pharmaceutical industry, which plays a key role in the research, development, and manufacture of medical countermeasures. The second is the airlines, transportation, and logistics/ shipping industries, which can ensure the transfer of medical personnel and equipment for scaling up operations. The third is the medical supply industry, which would also be of high global importance in a pandemic and contribute to R&D and manufacturing of MCMs. And fourth is the global communications sector—both those who provide the hardware and software around communications, as well as those who are global leaders in delivering content and helping to serve public information needs. Despite its potential, private sector involvement to date has been haphazard and mostly limited to the response phase of a disease outbreak. A key challenge is the lack of advance communication and coordination between public and private actors.

Surveillance, Monitoring, and Assessment Systems

- In addition to assessing the availability of laboratories that can perform diagnostic testing, countries must also consider the capacity of laboratories to handle testing in the event that there is a large surge in demand, efforts should be made to further strengthen these mechanisms and improve laboratory testing.
- In an event involving a novel pathogen, national public health laboratories and large commercial laboratories should develop a concept-of-operations for how to distribute test kits rapidly to relevant clinical sites and laboratories in areas affected by the outbreak.
- Technological advances are needed to modernize our diagnostic capabilities to become faster and nimbler at the onset of outbreaks, particularly around novel pathogens.
- Diagnostics become an important tool in event characterization (determining who is affected, who is at risk of severe outcomes) and in clinical management of patients to optimize treatment and to reduce transmission through proper isolation.

Health Systems and Infrastructure, Health Services, and Clinical Management

- Victims of a large-scale outbreak in settings with weak health systems would likely die at a higher rate than would be otherwise expected, due to lack of available modern medical care. Individuals who need to use the overburdened healthcare system for routine care during an outbreak would also likely suffer elevated morbidity and mortality, as available health resources are shifted to the emerging outbreak
- Early in a pandemic, isolation of the sick will be critically important to limiting further spread, but most hospitals around the world have very limited isolation capacity, particularly for airborne pathogens, and likely only a fraction of what would be needed in a large outbreak. To adequately prepare for and respond to outbreaks of respiratory pathogens, health facilities would need to increase their capacity for large-scale isolation of patients with highly transmissible respiratory diseases.
- There is a severe maldistribution of medical supplies between countries and health systems around the world, and a dedicated effort is needed to determine how low- and middle-income countries would maintain access to critical supplies (eg; masks, respirators, gloves, gowns, IV fluid bags, medical gases) during a large-scale respiratory disease outbreak

Community Engagement

- Community engagement includes creating bridges, open dialogue, and mutual understanding among clinical trial participants, communities, and investigators, thus furthering research will help in achieving collective behavior change, such as alterations in burial practices, social gatherings

Risk Communication

- Apart from having to employ effective public education to dampen people's impulses to shun affected individuals or groups during the outbreak for fear of disease, for example, authorities may also need to provide frequent updates on any investigation into the outbreak's origins and advise against lashing out against others who "look like" they may have spread the disease (in the event of a naturally occurring pandemic) or those who might be presumed perpetrators (in the case of a biological attack.
- Risk communication dilemmas may include how to inform peoples' choices about uptake when they fear a seemingly "rushed" drug or vaccine, how to elicit public confidence in decisions about the allocation of a very scarce life-saving countermeasure, and how to avert the uptake of fraudulent, life-threatening alternatives when access to the real beneficial countermeasure is impossible

Communication With the Public

- Risk communication also includes communication with and through intermediaries such as trusted on-the-ground partners and the news media in order to leverage their capacity as amplifiers of appropriate risk and protective action messages. Although there are many fundamental differences between these different groups, they both act as message mediators and require dedicated time and effort to build relationships and partnerships over time. Trusted partners may also act as advocates during times when public trust in public health is low and misinformation is rampant.

Medical Countermeasures and Pharmaceutical Interventions

- Personal Protective Equipment (PPE), including masks and respirators, would also play a critical role in infection prevention and control, particularly if no vaccine or therapeutics are immediately available.
- National and local governments, academic institutions, the pharmaceutical industry, and the private sector would need to move products through early and advanced development and the regulatory process, the manufacturing and finishing processes, and the distribution and dispensing systems needed to administer countermeasures to people who need them.
- Perhaps a coronavirus vaccine for an existing coronavirus could be used with some value for a novel coronavirus that causes high-impact respiratory outbreak), there is likely to be no surge manufacturing plan or capacity. If the pathogen is completely novel and there is no existing research base—what WHO refers to as a Disease X scenario—there is no alternative but to start with fundamental science and then advance MCMs through the development pipeline as quickly as possible.

- Attempts at developing vaccines against respiratory pathogens such as SARS coronavirus have been slow. Technical barriers at the discovery and R&D phases of development or market failures can be rate limiting. Once a candidate drug or vaccine has been developed, it must then go through clinical trials to test for safety and efficacy. However, trials during an outbreak will be logistically and ethically challenging. Moreover, many countries maintain their own paradigm for pharmaceutical regulation and have not put in place policies for emergency use of medical countermeasures that may not have full regulatory approval. These complexities could slow international MCM deployment, which could impede efforts to control a severe disease outbreak.
- What is needed, but is not currently possible, is the capability to get MCMs from discovery to mass administration within a few months. Because there is very little surge capacity in the system, companies would be faced with taking commercial vaccine production offline in order to accommodate vaccine for the new pathogen. Also, manufacturers may face political pressure to produce vaccine for their home country before exporting to the rest of the world.
- Widespread use of masks and respirators by the public would be complicated by the challenges of proper fit, the costs, and the inability of the supply chain to provide masks at that scale. The same mask suppliers would be besieged by countries and healthcare facilities around the world. If there were limited availability of masks and respirators in a given country (which would be highly probable), they would need to be prioritized for health facilities to provide protection for healthcare workers and increase infection prevention and control measures. Beyond this, in the public setting, there is very little available information that studies the effectiveness of masks outside of health facilities. Additional research into the development of easy-to-use, effective, and reusable masks for wider use should be considered.

The Economics of Medical Countermeasure Development

- In the United States, which has the largest pharmaceutical market in the world, only 13% of new drugs approved between 2005 and 2016 were novel drug products.
- It is necessary to consider different avenues for promoting research and development of medical countermeasures for respiratory transmissible diseases with pandemic potential. Regulatory, policy, tax, and direct financial incentives have all been used at various times and could be pursued further to encourage R&D investment by industry.

Nonpharmaceutical Interventions (NPIs)

- **Travel restrictions** refer to enforceable limitations on travel but should not be confused with travel alerts or notices, which provide information for travelers on ongoing health events. Studies have found that travel restrictions would be less effective once a disease has spread to multiple geographic areas or been introduced to large cities.
- **Movement restrictions** are measures implemented to prevent or limit contact between infectious individuals and susceptible populations, ranging from limits on how or where an individual can travel to full quarantine.
- **Quarantine** is a separation of potentially infectious individuals from susceptible populations. It is often confused with isolation, which refers to separating individuals known to be transmissible (typically implemented in a health facility). Though isolation is routinely used in healthcare and public health practice, the use of quarantine is rare and has been controversial. For a high-impact respiratory pathogen, quarantine may be the least likely NPI to be effective in controlling the spread due to high transmissibility. Quarantine measures will be least effective for pathogens that are highly transmissible, have short incubation periods, and spread through true airborne mechanisms, as opposed to droplets. As with travel restrictions, quarantine appears to delay the introduction of highly transmissible diseases but not prevent their spread entirely. Quarantine requires strict adherence to be effective, **so it works best when government has a trusting relationship with the public.** Quarantine and other movement restrictions also involve legal and ethical considerations and should be supported by available evidence to prevent undue burden on affected individuals. The government must have both the legal authority to quarantine individuals and the operational ability to enforce quarantine orders. Quarantine is being considered include the responsibility for ensuring the safety of affected individuals that are quarantined and providing medical, communication, and legal services as well as food, shelter, and other necessary supplies.
- **Social distancing** covers an array of measures aimed at reducing contact between members of the community that could potentially result in disease transmission, including closing schools, canceling mass gatherings, facilitating remote- or tele-

working, and suspending mass transit operations. Monitoring and enforcing some of these NPI measures would be quite difficult if not impossible, due to the inability to fully monitor large communities and address noncompliance issues. The disruption of normal activities such as schools closing may result in children congregating elsewhere, thus making social distancing efforts irrelevant.
- It is important to communicate to political leaders the absence of evidence surrounding many NPI interventions and the adverse consequences that may follow them.

Deliberate Use and Biosecurity

- When considering the possibility of a deliberate release of a novel high-impact respiratory pathogen, the exact properties of the pathogen and its transmission dynamics would be uncertain, ranging from synthesis of a known virus to the creation of an engineered strain with highly unexpected properties. Deliberate release scenarios are more complex than natural epidemics because they would be initiated by an attacker who chose where and how to attack for a purpose.
- Some RNA viruses may particularly lend themselves to natural pandemic spread, but they are currently hard to engineer, particularly with trans genes. It is reasonable to predict that the barriers to such engineering will decrease in the future. Rapid advances in synthetic biology capabilities, such as nucleic acid synthesis, increase the possibility that pathogens could be engineered to meet specific objectives of a sophisticated attacker.
- Advances in synthetic biology capabilities have driven innovation in the life sciences and created novel capabilities and novel risks. One such capability is nucleic acid synthesis, which has enabled the creation of new therapeutics

CONCLUSIONS: STRENGTHENING PREPAREDNESS FOR A HIGHIMPACT RESPIRATORY PATHOGEN PANDEMIC

- Countries should continue to build and improve core public health capacities across the globe and ensure that WHO has the resources it needs to continue to play a coordinating role. WHO should continue to work to ensure that core capacity strengthening is viewed as a matter of priority by leaders.
- Even the most robust public health surveillance systems are unlikely on their own to provide enough information to inform the wide range of decisions that would need to occur during an epidemic or pandemic response.
- Countries should assess the readiness of health facilities to effectively treat patients with a transmissible disease with high case fatalities. WHO should work with member countries to develop a corresponding assessment tool for health systems and facilities, so that countries have a means of assessing the readiness.
- Countries should plan for the possibility of there being interruptions in the availability of essential basic supplies and equipment. Health facilities would need plans for continuing operations in the event that supplies are no longer available from their primary sources.
- Stockpiles would ideally include not only basic supplies, such as IV tubing and fluid, but also disease-specific supplies, such as PPE (eg; gloves, surgical masks, N95 respirators, powered air-purifying respirators, or PAPRs), and medical countermeasures (eg; antivirals, antibiotics, vaccines).
- There are a range of promising approaches to accelerate rapid vaccine development that should be concomitantly pursued and funded, given the uncertainty in knowing which might bring the most important leaps forward. Traditional vaccine development through big pharma and biotech companies will continue for now to be the backbone of the field. Nucleic acid (RNA and DNA)–based vaccines are widely seen as highly promising and potentially rapid vaccine development pathways, although they have not yet broken through with licensed products.
- Many countries maintain their own paradigm for pharmaceutical regulation, and significant regulatory challenges are associated with deconflicting the regulatory processes across countries, but many countries lack tools to limit manufacturer liability during a crisis. These complexities will slow international MCM deployment and impede efforts to control an outbreak as it begins to spread around the world.
- Many NPIs, particularly those falling under social distancing, require support and acceptance by the public. As these measures inherently limit civil liberties by restricting individuals' movements, assembly, and social interaction, they can be a source of substantial opposition from affected individuals and populations. Providing strong evidence-backed reasoning for the necessity of NPIs, including the predicted impact they will have in containing the outbreak will be crucial.

- Any attacker that successfully deploys a bioweapon (as opposed to conventional weapons) should be presumed to have substantial biological scientific abilities, particularly if it is discovered that the pathogen has been engineered. If a bioweapon is used that causes a high-impact respiratory epidemic or pandemic, that would suggest a great degree of capability and sophistication in the attacker. Such an attacker might try to improve the chance of success by deploying the bioweapon simultaneously in multiple locations. It may be that such an attack is done without claiming responsibility, or without public notification that a release has occurred. Widespread dissemination of a bioweapon could overwhelm traditional outbreak surveillance and control efforts.
- Synthesis of coronaviruses and novel influenza strains should also require special review of the proposed work and the proposed buyer before approval. The US government provides guidance on synthesis screening. It is not a perfect approach for preventing the illicit synthesis of high-impact respiratory pathogens, because it focuses on the US select agent list, which does not necessarily include the viral components of greatest concern for this problem.
- Finally, a deliberate release event that results in a pandemic spread of a respiratory pathogen would require a high level of sophisticated coordination to bring the outbreak under control. One or two governments could not accomplish this effort without working in close concert with other governments and international organizations.

PHOTO: American Red Cross volunteers from Detroit, Michigan during the 1918 Spanish Flu epidemic. Image courtesy Centers for Disease Control and Prevention, USA.