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Corresponding author:
Michael S. Baker,
E-mail: bakersurgeon@gmail.com

Improving Pandemic Response With Military Tools: Using Enhanced Intelligence, Surveillance, and Reconnaissance

Michael S. Baker MD, FACS, Rear Admiral, USN (ret)[1], Deon V. Canyon[2], Sebastian Kevany[2] and Jacob Baker MA[3]

[1]Independent Scholar, Lafayette, CA USA; [2]Daniel K. Inouye Asia-Pacific Center for Security Studies, Honolulu, HI, USA and [3]Georgetown University of Applied Studies, School of Continuing Studies, Washington, DC, USA

Abstract

The coronavirus disease 2019 (COVID-19) pandemic rocked the world, spurring the collapse of national commerce, international trade, education, air travel, and tourism. The global economy has been brought to its knees by the rapid spread of infection, resulting in widespread illness and many deaths. The rise in nationalism and isolationism, ethnic strife, disingenuous governmental reporting, lockdowns, travel restrictions, and vaccination misinformation have caused further problems. This has brought into stark relief the need for improved disease surveillance and health protection measures. National and international agencies that should have provided earlier warning in fact failed to do so. A robust global health network that includes enhanced cooperation with Military Intelligence, Surveillance, and Reconnaissance (ISR) assets in conjunction with the existing international, governmental, and nongovernment medical intelligence networks and allies and partners would provide exceptional forward-looking and early-warning and is a proactive step toward making our future safe. This will be achieved both by surveilling populations for new biothreats, fusing and disseminating data, and then reaching out to target assistance to reduce disease spread in unprotected populations.

The coronavirus disease 2019 (COVID-19) pandemic illustrates the need for enhanced disease surveillance, better global health surveillance and warning measures, and the ability to provide a robust and coordinated response.[1] The rapid spread of COVID-19 infection affected all aspects of travel, education, commerce, and strained international relations. The pandemic has resulted in restrictions on socializing, shuttered local commercial venues, and upended education in many locations. Many countries struggle to contain the virus effects and still deal with the push-back resulting from intermittent lockdowns, travel restrictions, vaccine misinformation, and disingenuous governmental reporting. These issues have acted as a catalyst for social problems such as civil disobedience, rising nationalism, isolationism, and ethnic strife. To bring this pandemic and its disruption to an end, a large share of the world needs to be immune to the virus.[2] This is best accomplished through unified messaging with aggressive and rapid vaccination of all population groups.

Several research teams stepped up and rapidly developed vaccines within the first 12 mo of the pandemic that protect from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19.[3] The next challenge is to deliver and inoculate people around the world quickly. The longer it takes to vaccinate the world's population, the greater the chance that the virus will continue to mutate in ways that put the whole of humanity at risk. If the pandemic continues unchecked in poor countries with less access to vaccinations, poor health-care infrastructure, or because of vaccine denial, the problem will continue to fester, mutate, surge, and spread. If large segments of the global population remain without immunity, they provide a petri dish for mutation. This may be the case with the recent emergence of more virulent or more transmissible viruses we have seen with Delta and Omicron variants launching new waves of illness.[4]

Experts fear that there will not be enough vaccines for true global coverage until 2023 at the current pace of production.[5] Vaccine supplies remain limited, planning is in its infancy, distribution has at times been erratic, and unknowns are plentiful.[6] The current rollout plans across Africa are expected to vaccinate 20 to 35% of the population at best this year if events progress on track. Delay in vaccinating poorer countries will slow their development and have devastating consequences for the global economy, costing wealthy nations upward of around $120 billion due to loss of commerce.[5]

Vaccine procurement and distribution has always been an issue for less wealthy countries.[6] Almost 2 decades after the hepatitis B vaccine was rolled out, the population covered was estimated at around 90% in the Americas.[7] However, the vaccinated population was only 28% in

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Southeast Asia and 6% in Africa, where the disease is a far larger problem. Several Asian countries have led the way in reigning in the COVID-19 pandemic through aggressive public health measures, yet there are few signs that sufficient vaccine production, adequate supply, details for distribution, and that inoculation plans are ready to be implemented.[8] Governments need to accelerate the process to get shots into arms, but often their capacity to distribute the vaccine is hampered by financial constraints or the medical distribution infrastructure is nonexistent.[6] Barriers may arise due to obstructive political policies or bureaucratic inefficiency and may also hamper efforts.[9]

International Health Regulations (IHR) provide an overarching legal framework that defines countries' rights and obligations in handling public health events and emergencies that have the potential to cross borders. The IHR is an instrument of international law that is legally binding on 196 countries, including the 194 World Health Organization (WHO) member states.[10] The IHR grew out of the response to deadly epidemics that once overran Europe. They create rights and obligations for countries, including the requirement to report public health events. The Regulations also outline the criteria to determine whether a particular event constitutes a "public health emergency of international concern."

The COVID-19 outbreak was a somewhat predictable disease event but surveillance assets in place lacked timely reporting and sharing of information. WHO in its early efforts did not appear to get good cooperation from the nation of origin, and there is evidence suggesting that information was withheld by Chinese government officials.[11]

Additional tools and coordinated systems of sharing and reporting are needed for early detection and warning to avoid delays and deceptions from nontransparent or poorly capable countries. Global health policy decisions are driven by data and its analysis. Data acquisition in this and future pandemics would be enhanced by using military health assets and their intelligence units which can use Intelligence, Surveillance, and Reconnaissance (ISR) to drive decision-making and tactics. Data are a critical strategic, operational, and tactical assets that are the foundational element to generating intelligence. It needs to be gathered, analyzed, fused from a variety of sources into a coherent message, and rapidly disseminated to stakeholders.

The United States is well-positioned with its military and intelligence assets and through its network of allies and partners, to contribute to improving an unprecedented international public health effort. The United States can use resources like the National Center for Medical Intelligence (NCMI), forward surveillance labs, bases around the globe, and international allies and partners to create a strong network of health intelligence gathering and analysis. The ability to harness the power of data is fundamental to building and deploying the most effective forces to accomplish the mission.

A strategy involving military resources in the global pandemic vaccine program is a powerful soft power approach with significant health diplomacy benefits. Such an effort is well-aligned with the concept of "strategic competition" as outlined in the US National Security Strategy, and in the current climate stands to contribute in a fundamental manner to upholding the ideals of a rules based domestic and international order that cooperates to improve health around the globe.

ISR

ISR involves integrated operations that support a leader's decision-making process. This is defined as coordinated acquisition, processing, and provision of accurate, relevant, timely information and intelligence data. ISR functions are an essential component of US defense capabilities; ISR systems can provide tactical forces with targeting data needed to perform their mission within a highly contested environment, in a short time frame, or difficult geographic location.[12] These systems could be used in response to the pandemic, helping medical/disease control personnel identify areas in immediate need of vaccination or treatments and quickly mobilize resources to help them.

ISR tools include a wide variety of platforms for acquiring and processing information needed by national security decision-makers and military commanders.[1] Systems range in size from handheld devices and mobile sensors to orbiting satellites. Some ISR systems collect basic information for a wide range of analytical products; others are designed to acquire data for specific weapons systems or problems. There are "national" systems intended primarily to collect information of interest to government agencies as well as "tactical" systems intended to provide information to support military commanders on the battlefield. Integrated alliance based ISR systems could locate unvaccinated populations and provide faster inoculation services, supporting/encouraging/fostering efficient pandemic control and eradication.

Classical data sources for health intelligence include clinical reports, notifiable disease reporting, lab reports, pathology results, registries, and death records. Health intelligence originates at the local level, usually as clinical information. Clinical cases are identified and samples from patients or vectors are tested in the laboratory to identify the hazard or pathogen. Once a red flag is triggered, an epidemiologic investigation is launched to determine the source of infection and additional exposures.[13]

Surveillance is the systematic observation of places, persons, or things by visual, aural, electronic, photographic, or other means.[10] Classic intelligence tools for acquisition and analysis include human intelligence (HUMINT), signals intelligence (SIGINT), imagery intelligence (IMINT), measurement and signatures intelligence (MASINT), social media intelligence (SOCMINT), and open-source intelligence (OSINT). Social Media Intelligence is a subsector of OSINT that uses social media and Web forums to provide contemporaneous information on a specified topic or theme. The availability of this intelligence expands as the world goes online, and this approach has provided early warning of several outbreaks. A prime example is the Global Public Health Intelligence Network (GPHIN), which was established to increase situational awareness and capacity for the early detection of emerging public health events using big data. GPHIN developed algorithms to comb through news reports from around the world, while analysts scrutinized clues on social media, Internet blogs, hospital data, financial reports, and by talking to medical sources on the ground.[14]

Reconnaissance is a mission undertaken to obtain, by visual observation or other detection methods, direct information about the activities and resources of an enemy or adversary, or to secure data concerning the characteristics of a particular area. In this context, it could be through advanced teams, satellite photography, or the deployment of robotic sensors. Reconnaissance data could identify high-risk populations and determine the most efficient means to reach them.

Traditionally intelligence services have played a key role in fighting emergent outbreaks by detecting trends early, uncovering state secrets particularly in opaque nations, learning of scientific developments, or finding non-government trends. US intelligence provides policy-makers in Washington with unique information,

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potentially unavailable from any other source. These info bytes can vary from foreign state secrets concerning the virus, including whether official government infection rates are accurate, to where vaccinations have been provided. Given that diseases are transboundary in nature, these secrets are particularly important to discover in nontransparent, closed regimes like China, Russia, Iran, and North Korea.[1]

Various intelligence assessments suggest that China mishandled information and possibly concealed the extent of its initial viral outbreak.[11,15,16] Chinese officials now push the narrative that the United States is responsible for the virus in their nation.[16] North Korea claims to not have any cases.[17] A more accurate depiction of events can be gained by using intelligence resources to identify the range and scope of disease and accurately defining risk. If military ISR tools and assets are integrated better into and with national surveillance assets, it provides another improvement in national security.

Bringing Military ISR Might to Bear

A crucial role in disease mitigation is played by international organizations such as WHO, a specialized agency of the United Nations responsible for international public health, whose Constitution states its main objective as "the attainment by all peoples of the highest possible level of health."[10] WHO's remit is detecting, identifying, and mitigating disease outbreaks, and can act as a knowledge broker to facilitate exchange between countries—which requires cooperation from the countries with the outbreak. This was apparently a significant challenge during the COVID-19 outbreak as information may have been withheld or even covered up.

The Indo-Pacific region contains most of the world's population and many frail health systems that are not prepared to vaccinate their large populations against COVID-19.[1,18] For decades, US military medicine has pioneered vaccination programs in the Indo-Pacific because of the ability deal with time and distance to provide goods and services to broadly dispersed and under-resourced populations.[18] The US military could reduce delays in the deployment of vaccine to nations with limited capacity and determine the best areas to target through ISR. The prestige and importance of a large-scale vaccination mission in the Indo-Pacific region will require participation of various international and public health representatives/groups, but the US military could provide strong support to agencies directing relief and aid.

By participating in both intelligence gathering and logistical support, rather than direct vaccine distribution, the US Military is acting in line with international doctrine on Planning for Military Involvement in an Indo-Pacific Vaccination program humanitarian assistance and disaster response (HADR).[12,18,19] Humanitarian assistance can be divided into 3 categories according to the WHO. These distinctions define which types of actions are considered (in)appropriate for military actors and resources.

Direct Assistance

Activities involving the face-to-face distribution of goods and services to the affected population, such as direct medical care.

Indirect Assistance

Activities that are at least 1 step removed from the affected population—designed to include, for example, the transportation of relief goods or relief personnel.

Infrastructure Support

Activities providing general services such as road repair, airspace management, enhanced communications, and power generation that facilitate relief—but are not necessarily visible to or solely for the benefit of the affected population.

A "new" fourth action category should focus on ISR that would provide information to support the mission's logistical planning and delivery strategy. Areas that need enhanced vaccination for both international security and public health reasons can use ISR assets to identify areas in dire need of support and direct resources to those locations. This is the point where medicine, military, intelligence, and national security interests intersect.[1]

Intelligence in the pandemic context is the product resulting from the collection, processing, integration, evaluation, analysis, and interpretation of available information concerning hostile forces or, in this case, disease elements, or to assess and accurately deliver vaccine shots to areas of actual or potential operations. The US military is positioned with vast ISR assets to provide the pillars on which to enhance disease surveillance. It could contribute to a better early warning system through participation in other working groups and multinational alliances that can form a protective shield against future disease outbreaks that have adverse consequences for the rest of the world.

The US Centers for Disease Control and Prevention (CDC) is responsible for tracking cases and providing guidance nationally on the outbreaks. CDC conducts biosurveillance that would normally be shared to better understand the scope and potential spread of disease, as well as to better pin down the source and timing of the infections. However, the initial meetings regarding a national-level coronavirus response conducted under the auspices of the Department of Health and Human Services, where intelligence gathered as a result of any such biosurveillance activity would logically be discussed, were all treated as classified events, under orders from the National Security Council.[20] Failure to share information with other agencies and the public may have significantly hampered coordinated response by keeping state and local officials, as well as the public, uninformed.[21]

This is in direct contradistinction to guidelines in the Implementation Plan for the National Health Security Strategy, which promoted national and international cooperation in disease mitigation, along with public, private, and government agency collaboration.[22] Furthermore, Department of Homeland Security (DHS) has created the National Biosurveillance Integration Center (NBIC). The NBIC serves as the designated government entity to synthesize and analyze information collected from across the spectrum of various stakeholders that are responsible for surveillance, analysis, and mitigation/remediation responses and typically report to national level authorities. NBIC collaborates with and serves as a bridge between federal, state, local, territorial, and tribal partners to integrate information from thousands of sources about biological threats, hence improving early warning, preparedness, and situational awareness.[23]

Given the emergence of the COVID-19 threat, the rapidity of its spread, the profound disaster that has occurred, and the possibility that some information may have been concealed from domestic customers as well as international partners, it is time for greater collaboration in disease mitigation through information collection, analysis, and dissemination. Public, private, government, military medical assets, military ISR, and intelligence agencies need to share information in real time to the extent that national security is not compromised but rather strengthened to deal with the threat. We

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need fusion of medical threat information from all sources to provide for rapid dissemination when a new threat is detected.

DHS Fusion Centers serve as primary focal points for the receipt, analysis, gathering, and sharing of threat-related information. They effectively and efficiently use multiple internal and external information sources to conduct analysis for situational awareness, provide rapid decision support, and remain on the forefront of indicators and warnings of public health emergencies.[24] The Centers' work provides decision-makers with the information necessary to be better prepared for public health emergencies, thereby leading to better rapid response and ultimately saving lives.

Role of the National Center for Medical Intelligence

The National Center for Medical Intelligence (NCMI) serves as the lead US Department of Defense (DOD) agency to produce medical intelligence. It is a part of the Defense Intelligence Agency (DIA), and NCMI is responsible for coordinating and preparing "integrated, all-source intelligence" for the DOD and other government and international organizations on "foreign health threats and other medical issues to protect US interests worldwide."[19] In this context, NCMI provides: (a) timely warning and projection of significant infectious disease and environmental health risks to US personnel abroad and within the United States; (b) analysis of foreign developments in life science technology and countermeasure development; (c) analysis on health trends, foreign health diplomacy, and military and civilian health system capabilities; (d) biosafety and biosecurity policies; and (e) biomedical and environmental related assessments "that are critical to military force and homeland health security protection."

Infectious diseases are not constrained by international borders, which was demonstrated during the 2003 severe acute respiratory syndrome (SARS) outbreak, the 2009 influenza pandemic, the outbreaks of multidrug resistant tuberculosis, and now COVID-19.[25] Lab accidents, bioterrorism, or zoonotic shift or drift can create rapidly spreading global outbreaks with significant adverse impact on economic and social stability. The value of NCMI in this context has been demonstrated repeatedly. In April 2009, 2 mo before the WHO and CDC officially declared the global outbreak of influenza A (H1N1)Pdm09 virus (H1N1) influenza to be a pandemic, the NMCI published an intelligence product for senior US policymakers that predicted H1N1 would be a transboundary global issue.[26]

China experienced an outbreak of SARS caused by a coronavirus in November 2002 (if not earlier), but did not begin reporting it until February 2003, by which time their government listed 305 cases. Even as the virus spread, Chinese officials continued to undercount cases and delay reporting to WHO.[27] Their attempt to conceal and downplay the outbreak highlighted the importance of having our own medical intelligence surveillance and analysis. Several global surveillance entities such as GPHIN had early warning of these crises. These agencies should be linked to and cooperating with NMCI, which has and will continue to provide early warning of disease threats using its forward deployed laboratories and surveillance tools; history suggests these should be expanded and linked to those of our allies.

More recently, the US Intelligence community and NMCI began to warn about a global epidemic in November 2019, saying that the coronavirus outbreak in China could develop into a "cataclysmic event".[28] Policy-makers, decision-makers, and the National Security Council at the White House were repeatedly briefed on the issue. Reports of the novel coronavirus outbreak first appeared in the President's Daily Brief (PDB) of intelligence matters that is placed on the president's desk every morning starting in early January 2020.[28]

NCMI with its DOD assets, research capability, overseas labs, medical intelligence tools, and forward deployed presence must be collaborating with other national medical intelligence agencies and to the extent possible, integrated and cooperating with international early warning surveillance organizations. A global health pandemic outbreak requires an "all hands-on deck" approach through coordination of public, private, government, military, allied partners, and non-governmental organizations (NGOs). Disease information should be shared with all agencies and groups to provide an informed and coordinated response.

Forward Surveillance Bases

The United States maintains forward military bases around the world, and the DOD has developed a network of overseas laboratories that perform research on infectious diseases of public health and military importance. When it comes to providing early warning of disease threats emerging from Asia and China in particular, the Armed Forces Research Institute of Medical Sciences (AFRIM) in Bangkok, Thailand, and the Naval Medical Research Unit No. 2 (NAMRU-2) in Phnom Penh, Cambodia, provide exceptional value due to location.[29,30]

NAMRU-2 has operated in multiple countries in Southeast Asia, including Vietnam, Laos, Singapore, Philippines, Thailand, and Indonesia. These labs conduct regional infectious disease outbreak research in and diagnostic laboratory support within the Office of Defense Cooperation by means of the US Embassy in Singapore. The combination of laboratories in the United States —Walter Reed Army Institute for Research (WRAIR), and the Naval Medical Research Institute (NMRI) and their overseas forward deployed assets—collectively form the basis for an effective international infectious diseases research and reporting effort as well as representing a potent pillar of the proposed ISR alliance.

Biodefense Shield Allies

The COVID-19 pandemic has created the incentive that should stimulate progress in collaboration between the United States and its allies in forming a defensive, health-security, front line for disease surveillance and control. Existing foreign policy engagement, joint defense arrangements, and international agreements are in place to support the establishment of a multinational alliance that creates a protective shield against future disease outbreaks. The COVID-19 pandemic has shown the need for the United States and its partners to establish a stronger and more integrated system of disease surveillance, data fusion, and early warning.

Many Asia-Pacific countries already have a major stake in disease surveillance. Many nations are already significantly aligned with the United States through organizations such as the Daniel K. Inouye Asia-Pacific Center for Security Studies (DKI APCSS) to enhance collaboration.[31] Current events have demonstrated that such alliances are proactive and often successful at mitigating pandemic problems.

Japan, Republic of Korea, and Australia are strong security allies of the United States. By enhancing agreements with other countries such as Taiwan and Vietnam, perhaps tying in all Association of Southeast Asian Nations (ASEAN) countries – the United States can partner in a system to enhance medical intelligence gathering, information evaluation, and rapid dissemination in conjunction

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with other aspects of mutual support and defense. ASEAN nations are already invested in and leading in health-related affairs coordinated by the Center for Disaster Relief and Humanitarian Assistance located in Hawaii that coordinates training, information sharing, and response while promoting civil-military interaction. Prominent partners with the US military and the Center include Malaysia, which chairs the ASEAN Militaries Ready Group on Humanitarian Assistance and Disaster Relief, and Thailand, which hosts the ASEAN Center of Military Medicine.[32]

Security arrangements already in place can be strengthened by better collaboration and communication. The United States has a "Five Eyes" (FVEY) intelligence alliance with Australia, Canada, New Zealand, and the United Kingdom.[33] The Quadrilateral Security Dialogue (QSD, also known as the Quad or QUAD) is a strategic dialogue between the United States, India, Japan, and Australia, focusing on trans-regional security and economic ties between the Indian and Pacific Ocean areas.[34]

The institution of a robust Biodefense Shield Alliance would enable current United States and Asian partner countries to expand their defense repertoire by enhancing the strong mutual defense relationships for disease surveillance. Further benefit accrues with the inclusion of US military laboratories and medical intelligence assets along with medical facilities and scientific relationships in other nearby countries that further strengthen the combined regional ISR and biodefense shield paradigm. This provides a further pillar in a potentially mutually beneficial relationship for a Biodefense Shield Alliance. The addition of Japan, Australia, and New Zealand (already US security partners), and perhaps Taiwan, Vietnam, India, Taiwan, and Thailand would greatly increase the proposed alliance's ISR capabilities due to their geographic position, resources, and demonstrated proficiency in the management of infectious disease outbreaks.[25]

The United States is poised to return to global leadership and proactive action in medical intelligence gathering and surveillance under its new administration, which can promote a coordinated early warning system to create a protective shield against outbreak events. This potential alliance of governments from countries forming a partnership in the Indo Pacific, along with the use of military assets such as forward bases, medical facilities, biologic laboratories, and ISR assets could form the basis for: (1) identifying new threats, (2) locating and targeting unvaccinated groups quickly, (3) early detection and defense against mutations and variants that could have adverse effect on the rest of the world, (4) targeting vaccination delivery. The establishment of a multinational biodefense shield using aggressive and coordinated ISR and devotion of resources and expertise to the concepts of infectious disease control, collaborative surveillance, fusion centers, and information dissemination, will make critical contributions to both the preservation of humankind.

When ISR assets that currently exist in the military and intelligence agencies of the United States and its close allies are tied more closely to our nonmedical intelligence agencies and placed into a strong cooperative effort with international players and organizations, early detection and reporting will be enhanced. Then inclusion in a robust alliance of partner nations and helping to improve their public health capability will further improve cooperation and resultant reporting. These relationships also need to be coordinated with our premier non-military public health groups, such as the WHO, the United States CDC, and others such as the GPHIN and other nonstate actors, so they can rapidly detect, identify, assess, prevent, and mitigate threats to human health.[1]

Conclusion

A robust global health network that includes enhanced US Military ISR assets coordinating more closely with the existing government health agencies, intelligence agencies, civilian medical intelligence network assets, and those of our allies and partners would provide exceptional proactive, early-warning surveillance that would help mitigate risk of future global outbreaks. This will be achieved both by surveilling populations for new biothreats and by assisting in searching out and targeting vaccination assistance to eliminate unvaccinated populations that allow vulnerability to mutations of the virus.

The United States is well-positioned with its military and intelligence assets and through its network of allies and partners to contribute to an unprecedented international public health effort. If these groups can collaborate with a fusion effort that does not threaten national defense or military security issues this will be a big step forward.

More research and funding, along with visionary leadership will help advance our goals to contain future pandemics, promote peace, deter aggression, and improve global health. A strategy involving military resources in the global pandemic mitigation and vaccine program is a powerful soft power approach with significant health diplomacy benefits. Such an effort is well-aligned with the concept of "strategic competition" as outlined in the US National Security Strategy, and in the current climate stands to contribute in a fundamental manner to upholding the ideals of a rules based domestic and international order that ensures peace, promotes health, and improves prosperity for all people around the world.[35]

Time to prepare by promoting cooperation efforts and collaboration of military, national, partner nations, and international agencies for the next crisis.

Conflict of interest. None.

References

1. **Canyon D, Kevany S, Baker MS, *et al.*** The intersection of global health, military medical intelligence, and national security in the management of transboundary hazards and outbreaks. Accessed August 24, 2022. https://apcss.org/nexus_articles/the-intersection-of-global-health-military-medical-intelligence-and-national-security-in-the-management-of-transboundary-hazards-and-outbreaks/
2. **World Health Organization**. Coronavirus disease (COVID-19): herd immunity, lockdowns and COVID-19, World Health Organization, 31 December 2020. Accessed August 24, 2022. https://www.who.int/news-room/questions-and-answers/item/herd-immunity-lockdowns-and-covid-19
3. **Our World in Data**. Coronavirus (COVID-19) Vaccinations. Vaccinations - Statistics and Research. Accessed August 24, 2022. https://ourworldindata.org/covid-vaccinations
4. **CDC**. Science brief: emerging SARS-CoV-2 variants, January 28, 2021. Accessed August 24, 2022. https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-emerging-variants.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fmore%2Fscience-and-research%2Fscientific-brief-emerging-variants.html
5. **CBS News**. Poor countries could be left behind in COVID-19 vaccine distribution: "An unacceptable scenario" - December 31, 2021. Accessed August 24, 2022. https://www.cbsnews.com/news/covid-19-vaccine-distribution-poor-countries/
6. **Duke Global Health**. Will low-income countries be left behind when COVID-19 vaccines arrive? November 9, 2020. Accessed August 24, 2022. https://globalhealth.duke.edu/news/will-low-income-countries-be-left-behind-when-covid-19-vaccines-arrive
7. **Crager SE.** Improving global access to new vaccines: intellectual property, technology transfer, and regulatory pathways. *Am J Public Health.*

2018;108(Suppl 6):S414-S420. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6291766/#bib1
8. **Summers J, Cheng H-Y, Lin H-H, *et al.*** Potential lessons from the Taiwan and New Zealand health responses to the COVID-19 pandemic. *Lancet Reg Health West Pac.* 2020;4:100044. https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065(20)30044-4/fulltext
9. **Griffin R, Wingrove J**. Pfizer, U.S. wrangle over vaccine pace while working toward pact. December 17, 2020. Pfizer Says No Covi-19 Vaccine Shipments Have Been Delayed – Bloomberg. Accessed August 24, 2022. https://www.bloomberg.com/news/articles/2020-12-17/pfizer-says-no-vaccine-shipments-have-been-delayed
10. **World Health Organization**. International health regulations. Accessed January 5, 2022. https://www.who.int/health-topics/international-health-regulations#tab=tab_1
11. **Rogin J.** "In 2018, diplomats warned of risky coronavirus experiments in a Wuhan lab. No one listened." Politico. 3/8/2021. Accessed January 5, 2022. https://www.politico.com/news/magazine/2021/03/08/josh-rogin-chaos-under-heaven-wuhan-lab-book-excerpt-474322
12. **Congressional Research Service**. Intelligence, surveillance, and reconnaissance design for great power competition; June 4, 2020. Accessed January 5, 2022. https://crsreports.congress.gov/product/pdf/R/R46389
13. **Hedberg K, Maher J.** The CDC field epidemiology manual. Epidemic Intelligence Service. Collecting data. Accessed August 24, 2022. https://www.cdc.gov/eis/field-epi-manual/chapters/collecting-data.html
14. **Dion M, AbdelMalik P, Mawudeku A.** Big data and the Global Public Health Intelligence Network (GPHIN). *Can Commun Dis Rep.* 2015;41(9): 209-214.
15. **Shangguan Z, Wang MY, Sun W.** What caused the outbreak of COVID-19 in China: from the perspective of crisis management. *Int J Environ Res Public Health.* 2020;17(9): 3279. Published online May 8, 2020. doi: 10.3390/ijerph17093279
16. **Myers SL.** China spins tale that the U.S. Army started the coronavirus epidemic. March 13, 2020. Accessed August 24, 2022. https://www.nytimes.com/2020/03/13/world/asia/coronavirus-china-conspiracy-theory.html
17. **Bennett BW, Myers DY.** North Korea: denying COVID-19. Accessed August 24, 2022. https://www.rand.org/blog/2020/04/north-korea-denying-covid-19.html
18. **Kevany S, Canyon D, Ostergard R, *et al.*** Planning for military involvement in an Indo-Pacific Pandemic vaccination program. Accessed August 24, 2022. https://apcss.org/wp-content/uploads/2020/11/N2543-Canyon-Military-Involvement-in-South-Pacific-Vaccinations.pdf
19. **Department of Defense**. Instruction. Number 6420.01, March 20, 2009. DoDI 6420.01, "National Center for Medical Intelligence (NCMI)," March 30, 2009. Incorporating Change 3 on September 8, 2020 (whs.mil). Accessed August 24, 2022. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/642001p.pdf?ver=2020-09-08-125038-990
20. **Ritter S.** The staggering collapse of U.S. intelligence on the coronavirus. The American Conservative. March 24, 2020. Accessed August 24, 2022. https://www.theamericanconservative.com/articles/the-staggering-collapse-of-u-s-intelligence-on-the-coronavirus/
21. **Roston A, Taylor M.** Exclusive: White House told federal health agency to classify coronavirus deliberations – sources. Reuters. March 11, 2020. Accessed August 24, 2022. https://www.reuters.com/article/us-health-coronavirus-secrecy-exclusive-idUSKBN20Y2LM
22. **Administration for Strategic Preparedness and Response**. National Health Security Strategy, 2019-2022. Accessed August 24, 2022. https://www.phe.gov/Preparedness/planning/authority/nhss/Documents/NHSS-Strategy-508.pdf
23. **Homeland Security**. National Biosurveillance Integration Center. Accessed August 24, 2022. https://www.dhs.gov/national-biosurveillance-integration-center
24. **National Network of Fusion Centers Fact Sheet**. N.D. https://www.dhs.gov/national-network-fusion-centers-fact-sheet
25. **Canyon D, Kevany S, Baker MS, *et al.*** An international biodefense shield alliance against pathogens from China. August 2020. Accessed August 24, 2022. https://apcss.org/nexus_articles/an-international-biodefense-shield-alliance-against-pathogens-from-china/
26. **US Department of Homeland Security**. Written testimony of the OHA, FEMA, and ICE before House Homeland Security Subcommittee on Emerging Threats, Cybersecurity, and Science & Technology hearing entitled "Real-Time Assessment of The Federal Response To Pandemic"; October 27, 2009. Accessed August 24, 2022. https://www.dhs.gov/news/2009/10/27/written-testimony-oha-fema-and-ice-house-homeland-security-subcommittee-emerging
27. **Bouey J.** From SARS to 2019-Coronavirus (nCoV). U.S.-China collaborations on pandemic response, February 5, 2020. Accessed August 24, 2022. https://www.rand.org/pubs/testimonies/CT523.html
28. **Coleman J.** US intelligence warned in November that coronavirus spreading in China could be 'cataclysmic event': report. The Hill. April 8, 2020. Accessed August 24, 2022. US intelligence warned in November that coronavirus spreading in China could be 'cataclysmic event': report | TheHill
29. **AFRIMS**. AFRIMS Celebrates 60 Years of Partnership with Royal Thai Army, Armed Forces Research Institute of Medical Sciences – September 10, 2021. Accessed August 24, 2022. https://afrims.health.mil/News-and-Resources/News-Articles/Article-Display/Article/2771419/afrims-celebrates-60-years-of-partnership-with-royal-thai-army/
30. **Wikipedia**. Naval medical research unit two. Accessed August 24, 2022. https://en.wikipedia.org/wiki/Naval_Medical_Research_Unit_Two
31. **APCSS.** Daniel K. Inouye Asia-Pacific Center for Security Studies, Honolulu. Accessed August 24, 2022. https://apcss.org/
32. **ASEAN**. ASEAN disaster management reference handbooks, 2015. Center for Excellence in Disaster Management and Humanitarian Assistance. https://reliefweb.int/sites/reliefweb.int/files/resources/ASEAN%20Disaster%20Management%20Reference%20Handbooks.pdf
33. **Tossini VJ.** The five eyes – the intelligence alliance of the anglosphere, U.K. Defence Journal, April 14, 2020. Accessed January 9, 2022. https://ukdefencejournal.org.uk/the-five-eyes-the-intelligence-alliance-of-the-anglosphere/
34. **Smith SA.** The Quad in the Indo-Pacific: What to Know. Council on Foreign Relations. May 27, 2021. Accessed January 9, 2022. https://www.cfr.org/in-brief/quad-indo-pacific-what-know
35. **Kevany S, Baker MS**. Military global health diplomacy: applying smart power via global health engagement. Armed Forces Journal, JFQ 83, 4th Quarter October 1, 2016, p. 83-90. Accessed August 24, 2022. https://ndupress.ndu.edu/Media/News/News-Article-View/Article/969672/applying-smart-power-via-global-health-engagement/

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