# Offs

### 1AR Theory Hedge

#### 1] No 1ar theory: [a] I only have one speech to respond which outweighs on infinite abuse because they can read any number of shells [b] aff frames the round means they pick neg ground and if the 1ar is hard, they should just write a better aff [c] 1ar restart, 4-6-3 time skew, infinite abuse. [d] No 3NR to address 2AR contextualization makes judge intervention inevitable as it comes down to whether the 2N coverage was “good enough”

#### 2] Use reasonability on 1ar theory – [a] Competing interps moots 7 mins of NC offense which outweighs minimal neg abuse. [b] Offense-defense disincentivizes substantive education by shifting the round from substance to a norm so their model prioritizes diminishing marginal skews over substance. That o/ws – the end goal of theory is better substantive debates.

### China-Biotech DA v2 (1:45)

#### The US leads and will continue to dominate biotech unless we do something truly stupid, like give China our cutting-edge, dual-use mRNA research

Moore 21

(Scott Moore, Director of the Penn Global China Program@UPenn, Young Professional and Water Resources Management Specialist at the World Bank Group, Environment, Science, Technology, Health Officer for China at the U.S. Dept of State, Giorgio Ruffolo Post-Doctoral Research Fellow with the Belfer Center for Science and International Affairs@Harvard [BIODEFENSE](https://www.lawfareblog.com/tagged/biodefense) In Biotech, the Industry of the Future, the U.S. Is Way Ahead of China By [Scott Moore](https://www.lawfareblog.com/contributors/smoore) Wednesday, February 17, 2021, 8:01 AM LAWfare <https://www.lawfareblog.com/biotech-industry-future-us-way-ahead-china> -CAT

It was supposed to be China’s moment of technological triumph—one that would show the world Beijing had not only conquered the coronavirus but also emerged as a biotechnology superpower. But when clinical data on China’s flagship CoronaVac vaccine finally flowed in, they showed it was barely more than 50 percent effective—just clearing the minimum standard set by the World Health Organization. In contrast, not one but two vaccines developed by U.S. firms have been found to be upward of 95 percent effective, a standard no other country’s vaccines have yet met in rigorous clinical trials. The United States’s overall track record in responding to the pandemic has been awful. Yet the success of its vaccine development efforts shows that when it comes to biotechnology, the industry of the future, the U.S. is way ahead of China and most of its other rivals. A continuing refrain from Washington in recent years has been that the United States is falling behind China in the development of critical emerging technologies. In some fields, this may be true. But not in biotechnology. To be sure, China’s biotech sector is growing at a torrid pace, and some of its firms are becoming leaders in certain areas, such as cancer treatment. Yet the U.S. retains a dominant position in research, development and commercialization, accounting for almost half of all biotech patents filed from 1999 to 2013. The triumph of its biotechnology industry during the coronavirus pandemic, producing two highly effective vaccines using an entirely new approach based on messenger RNA, and in record time, shows that the U.S.’s competitive edge in biotechnology remains largely intact. And that has important implications as Washington gears up for a sustained period of geopolitical competition with Beijing. Biotech is such a critical area for technological competition between the U.S. and China because it is transforming fields from medicine to military power. The great advances of the 19th century, like chemical fertilizers, resulted from mastering chemistry. In the 20th century, mastery of physics led to nuclear energy—and, more ominously, nuclear weapons. In the 21st century, biology offers a similar mix of peril and promise. This was illustrated dramatically by the award of the 2020 Nobel Prize for the discovery of an enzyme system known as CRISPR-Cas9, which allows an organism’s genomes to be edited with high precision. It is a transformational breakthrough. But while CRISPR shows great promise in the development of new cures for long-untreatable diseases, it could also lead to a whole new generation of deadly bioweapons. That’s a prospect that increasingly alarms U.S. intelligence officials. In 2016, then-Director of National Intelligence James Clapper warned Congress that “[r]esearch in genome editing conducted by countries with different regulatory or ethical standards than those of western countries probably increases the risk of the creation of potentially harmful biological agents or products.” Although Clapper didn’t name specific countries, it soon became clear that he was referring mainly to China. Four years later, his successor, John Ratcliffe, issued a far more pointed warning that “China has even conducted human testing on members of the People’s Liberation Army in hope of developing soldiers with biologically enhanced capabilities. There are no ethical boundaries to Beijing’s pursuit of power.” Such capabilities are almost certainly only speculative—but they underscore why biotech leadership is so important for national security as well as economic competitiveness. Beijing has long envied the United States’s dominant position in biotechnology and spent heavily to overtake it. Biotech has been a priority sector for state investment since the 1980s, and by one estimate Beijing had poured some $100 billion into the sector by 2018. Nowhere did it lavish more attention or invest more of its propaganda power than in developing a coronavirus vaccine. State media have spent months crowing that “China is working around the clock for breakthroughs in COVID-19 vaccines.” Yet despite this push, China’s vaccine program quickly took on a Potemkin air. In February 2020, barely two months after the onset of the pandemic and after a supposedly crash vaccine effort, a military doctor stood in front of a Chinese flag to receive what was billed as an experimental vaccine dose but was widely suspected to be a staged photo op. Now, having spent months talking up its two primary vaccine candidates to developing countries like Brazil and Indonesia, both of which have entered into purchase agreements with Chinese biotech firms, Chinese officials face severe mistrust among their nation’s overseas partners. For China’s leaders, the disappointing returns on their big bet on biotechnology look likely to cause them more headaches at home as well as abroad—there are already signs that affluent Chinese place more trust in foreign-developed coronavirus vaccines than the homegrown ones produced at such great expense. For U.S. officials, though, China’s relative underperformance in vaccine development presents an opportunity to reassert the United States’s leadership in biotechnology and public health and bolster the nation’s depleted soft power in the process. The Biden administration has already signaled it will reengage in multilateral bodies such as the World Health Organization. Yet the U.S. shouldn’t stop there. Washington should begin thinking now about how to emulate the success of the President’s Emergency Plan for AIDS Relief (PEPFAR)—which, though imperfect, is widely regarded as one of the most successful single public health interventions in history—to address growing disparities in access to coronavirus vaccines between countries. At the moment, vaccine supplies are controlled largely by rich countries, creating the risk of moral and public health failure if the gap persists. While COVID-19, the respiratory disease caused by the novel coronavirus, differs in many respects from AIDS, PEPFAR combined research, prevention, and access to therapeutics. Developing a comparable institutional structure to close the coronavirus vaccine access gap is the right thing to do—but it would also go a long way to restoring America’s battered global reputation. At the same time, the United States can’t afford to rest on its laurels in biotechnology, or any other field. Aside from China, other nations like Singapore and Israel have also invested heavily to develop their biotechnology sectors, with Israel in particular giving rise to a thriving biotech industry. U.S. public investment in basic scientific research and development has meanwhile been on the decline for decades, and there are worrying signs that America’s once world-beating innovation ecosystem is less productive, and less entrepreneurial, than it once was. Despite strengths in translational research, moreover, the frontiers of biology increasingly sit at the intersection with other disciplines like computer science, meaning that funding agencies, universities and other organizations need to break down disciplinary silos. Boosting support for biotechnology research, while reforming how that money is used, will go a long way toward shoring up the United States’s leading position in the global biotech sector. The U.S. biotechnology sector also faces other threats, not least growing espionage and intellectual property theft by foreign actors, especially those linked to China. Several high-profile cases brought by the U.S. Department of Justice’s China Initiative have involved biotechnology researchers, and American biotech firms have been top targets for cyber theft and intrusion. Sustained outreach to researchers and research institutions is critical to preventing such theft. But efforts to clamp down on the threats posed by espionage and intellectual property theft can easily go too far and must preserve the researcher mobility and data-sharing that is essential to doing cutting-edge science. Beyond its shores, the United States should work with its partners and allies to enhance export controls on dual-use biotechnology—used for both peaceful and military gain—especially DNA templates. Many forms of genetic material and synthetic biology products are already subject to U.S. export controls, but gaps remain, and screening for genetic sequence orders relies primarily on voluntary regulation by biotech firms. Better coordinating export controls among major economies and U.S. allies can dramatically reduce the risk of sophisticated bioweapons development in the decades to come. When it comes to biotechnology, the industry of the future, the U.S. remains well ahead of its rivals, including China. That’s something Americans can, and should, take pride in. But the U.S. must make proactive investments and undertake significant reforms now to ensure that things stay that way.

#### WTO weakening IPR would give China our cutting-edge, dual-use mRNA research

Lawder et al. 21

David Lawder, Andrea Shalal, Carl O’Donnell, Reuters, U.S. wants COVID vaccine patent waiver to benefit world, not boost China biotech. May 8, 2021. <https://www.reuters.com/world/china/us-wants-covid-vaccine-patent-waiver-benefit-world-not-boost-china-biotech-2021-05-08/> -CAT

The Biden administration is examining ways to ensure that a waiver of COVID-19 vaccine patents to aid poor countries will not hand sensitive U.S. biopharmaceutical technology to China and Russia, responding to a chorus of concerns, U.S. and industry officials say. President Joe Biden on Wednesday backed the U.S. entering negotiations at the World Trade Organization for the waiver of intellectual property rights as a means to boost vaccine supplies by allowing poorer countries to make their own. So far, vaccines have gone overwhelmingly to richer nations, which scooped up contracts for them earlier this year. COVID-19 infection rates in wealthy countries have dropped as vaccination rates increased this year, but infections are still rising in 36 countries, with India’s daily cases skyrocketing to nearly 400,000 a day. Western pharmaceutical companies, many of which have received government support to develop vaccines, strongly oppose the transfer of intellectual property to make them. They say poorer countries will be slow to set up manufacturing capacity and compete for scarce supplies, hitting production. Albert Bourla, CEO of Pfizer Inc, said on Friday that the proposed waiver would disrupt progress made so far in boosting vaccine supplies. “It will unleash a scramble for the critical inputs we require in order to make a safe and effective vaccine. Entities with little or no experience in manufacturing vaccines are likely to chase the very raw materials we require to scale our production, putting the safety and security of all at risk.” Many companies and now some U.S. officials fear the move would allow China to leapfrog years of research and erode the U.S. advantage in biopharmaceuticals. A senior Biden administration official said that while the priority is saving lives, the United States "would want to examine the effect of a waiver on China and Russia before it went into effect to ensure that it's fit for purpose." A question and answer document produced by the administration and shared with industry representatives also acknowledges concerns that intellectual property sharing could damage the United States's competitive advantage over China, an industry source familiar with the discussions told Reuters. The contents of the document read to a Reuters reporter by an industry representative said the Biden administration believes it can address those concerns through the WTO negotiations, but did not specify how. The source added that some agencies in the Biden administration have conflicting views of how to address the concerns in negotiations that are expected to take months. Spokespersons at the White House and U.S. Trade Representative's office had no immediate comment on the matter. Pfizer and Moderna spokespersons did not respond to requests for comment on technology transfer concerns, while a Novavax spokesperson referred Reuters to the company's statement opposing the waiver on Friday, which said proposals to "weaken intellectual property protections would not achieve equitable vaccine access." Enforcing limits on use of the technology could be very difficult, once handed over, some analysts say. Messenger RNA, used in COVID-19 vaccines by leaders Pfizer/BioNTech and Moderna, is a newly developed biotechnology that holds promise for treatments far beyond vaccines. China and Russia have their own vaccines that do not use this biotechnology. "It took Pfizer and Moderna years and years of research to develop these vaccines," said Gary Locke a former U.S. ambassador to China and U.S. Commerce Secretary. "China, Russia, India, South Africa and others want to gain access. Their intention is to get the underlying know-how so they can use it to develop further vaccines," Locke said. China's Fosun Pharma has struck a deal with BioNTech on COVID-19 vaccine product development, which would potentially give it access to some of the technology. China has high ambitions for its pharma industry and already is developing its own mRNA vaccine. Patents themselves are publicly accessible, noted James Pooley, intellectual property attorney and former deputy director general of the United Nations' World Intellectual Property Organization. But trade secrets developed by Pfizer/BioNTech, Moderna and others, "cook books" of manufacturing processes such as temperature and growing conditions, have not been made public. That may ultimately be a dual problem for negotiators. Before they protect the knowledge, U.S. officials would have to ensure access to it. Those companies would need to be persuaded to come to the bargaining table to give up such trade secrets. “What happens when it turns out that the U.S. can’t actually deliver the information that is critically important to implementing the inventions?” Pooley asked. “This will be seen as another failure by the U.S. and other rich countries to keep their promises.”

#### Their OWN evidence proves – it’s a double bind on solvency, either they can’t solve any of their harms, or the AFF plan depends on giving away locked-up know-how which concedes 100% strength of link to the DA.

1AC Zaitchik – RECUT; Catonsville in GREEN

Zaitchik 1 (Alexander, Alexander Zaitchik is an American freelance journalist who writes on politics, media, and the environment. He has written for The Nation, The New Republic, the Intercept, Rolling Stone, the Guardian, Foreign Policy, the Baffler, the International Herald Tribune, Wired, the San Francisco Chronicle, and The Believer, Jacobin Magazine, among others) “Moderna’s Pledge Not to Enforce the Patents on Their COVID-19 Vaccine Is Worthless.” Jacobinmag.com, 4.22.2021, [www.jacobinmag.com/2021/04/moderna-patents-covid-19-vaccine](http://www.jacobinmag.com/2021/04/moderna-patents-covid-19-vaccine). Accessed 9 Aug. 2021. ‌//AA ////Recut CAT

Suspending enforcement around valuable intellectual property in the midst of a public health crisis appeared, at first glance, like a credible display of noblesse oblige, to be welcomed even if it carried a whiff of incense meant to displace the stink of recent corporate scandals. The media dutifully covered Moderna’s patent pledge as evidence of corporate social commitment in a time of crisis. The patent pledge was widely reported on the assumption that it would, as Reuters put, “allow other drugmakers to develop shots using the company’s technology.” The company was safe in its assumption that scrutiny would stop there, and the public impression would remain that of a sacrifice to help end the pandemic. But this impression is false, and not just because Moderna’s legal claims on technologies developed with government money is provisional in the first place. Moderna’s patent pledge was an empty gesture for another reason quite apart from its long-standing junior partnership with the National Institutes of Health (NIH). Their entire ploy was premised on outdated public perceptions about how intellectual property works in the twenty-first century. Modern Patents on Biomedicines Almost Never Contain the Information Needed to Mass Produce Them. The patent is a form of intellectual property, not a synonym. As inherited shorthand for knowledge monopolies, “patent” is a throwback, a progressively old-fashioned catchall reference that obscures more than it explains, like calling the supercomputer in your pocket a telephone. Understanding why requires revisiting the patent’s origins as a social contract. Emerging in Renaissance Italy, the first patents functioned as royal permission slips; having one meant you could benefit exclusively from a technology, process, or trade. This privilege was half of a limited-term bargain with the sovereign: in exchange for the monopoly, the recipient of the patent agreed to introduce a new and productive form of knowledge into the realm, to be diffused when the patent expired. As technological invention grew more complex, patents required more detailed information to serve as effective notes of collateral: to get the monopoly privilege, inventors had to reveal and submit all of their knowledge — sometimes called “trade secrets” — to the state. Until 1880, the US Patent and Trademark Office required applicants to submit miniature, three-dimensional models, along **with blueprints, instructions, and diagrams** containing everything that someone “skilled in the art” would need to reproduce the invention. When the monopoly term expired, the secrets were spilled into the public domain and, it was hoped, made productive at lower, newly competitive prices. In 2021, that social contract is as quaint as the miniature riverboat buoyancy device a young Abraham Lincoln submitted for patent consideration in 1849. In high technology fields like biomedicine, modern patent applications rarely contain the knowledge required to manufacture the invention. This is by political design, the result of an industry push to change the rules under an obliging Reagan administration and that era’s Democratic Congress. Four decades later, the patent game is one of deterring reproduction, even and especially by those most “skilled in the art.” Key aspects of an invention and its practice are systematically shielded, often indefinitely, by a layered intellectual property barricade involving patents, copyright, and “undisclosed information,” a broad, opaque and relatively new category of intellectual property (**IP**) that contains three subcategories vital to making things like vaccines: know-how, trade secrets, and data. It is within these categories, not in the publicly filed patent, that the most valuable secrets are kept. Industry-oriented legal theorists and intellectual property law professionals sometimes call undisclosed information “the padlock on the patent.” Rare is the new technology without these padlocks to secure a corporation’s crown jewels beyond reach — before, during, and after the term of the legal monopoly. According to the US Defend Trade Secrets Act of 2016 (DTSA), which together with the Uniform Trade Secrets Act of 1985 (UTSA) has been integrated into the global intellectual property regime enforced by the World Trade Organization (WTO), **anything a company deems valuable can be shielded by an undisclosed information claim, including all forms and types of financial, business, scientific, technical, economic, or engineering information, including patterns, plans, compilations, program devices, formulas, designs, prototypes, methods, techniques, processes, procedures, programs, or codes, whether tangible or intangible, and whether or how stored, compiled, or memorialized physically, electronically, graphically, photographically or in writing.** This list begins to explain why Moderna was happy to exchange its patents for a good news cycle. The most important information safely lay elsewhere. Pharma and biotechs trying to establish and protect monopolies can hide just about anything under “undisclosed information,” including technical designs and specs, process and quality control procedures, best production. Unlike patents, claims on “undisclosed information” have no legal term limit. By enjoying infinite life, the category voids the original patent bargain not once, but twice: it allows companies to withhold necessary information from the public domain, which then serves to block competition and extend the granted monopoly beyond the agreed terms. In the age of undisclosed information, applicants are no longer required to provide governments with meaningful collateral in exchange for the benefits of government-protected monopolies. Instead, they can provide partial maps to technologies they have no intention of revealing in full — fragments designed to frustrate, obfuscate, and occlude, providing knowledge that’s necessary but not sufficient to actually make the thing.methods, instruction manuals, and trial data.The New **I**ntellectual **P**roperty Regime Has Other Ways of Protecting Their Valuable Secrets. The IP professionals employed by today’s drug companies descend from the cigar-chomping patent lawyers of last century, who, as much as anyone, are responsible for the growth and power of the modern pharmaceutical and biotech industries. But their twenty-first-century descendants don’t really identify as lawyers. They see themselves as white hats in a double-game of industrial espionage, practitioners in the art of “competitive intelligence.” In the years after the passage of the UTSA in 1985, a unified theory of post-patent IP management began to take shape at corporate-sponsored law school clinics devoted to the art of defending and extending monopolies. One of the most influential was the Center for the Law of Innovation and Entrepreneurship at Franklin Pierce University, directed by Karl F. Jorda, a former head of IP for the Swiss pharma company Ciba, which merged with Sandoz to form Novartis in 1996. In Jorda’s description of the new paradigm, trade secrets had become “the crown jewels of corporations” and patents merely “the tips of icebergs in an ocean of trade secrets.” The task of the modern IP professional is not to file successful patent applications and, as the US Constitution’s progress clause puts it, “promote the progress of science and the useful arts.” Quite the opposite — the point is to oversee, in Jorda’s words, the “synergistic integration of patents and trade secrets to secure invulnerable exclusivity.” This “invulnerable exclusivity” is harmless enough when it protects secret soda formulas and hamburger mystery sauces. It’s less cute when **it blocks countries from using their** legal **right to manufacture and import lifesaving medicines**. But that is exactly the kind of activity the new IP regime was designed to frustrate. During a media call held in May 2020, the director of the pharmaceutical industry’s global trade association, Thomas Cueni, was asked about the possibility that developing countries might issue compulsory licenses to break patents on COVID-19 vaccines. He shrugged off the question by saying out loud what Moderna’s executives intentionally left unsaid. “The focus on IP in vaccines shows a lack of understanding, because with vaccines, it’s all about know-how,” said Cueni. “In the history of IP, there’s never been a compulsory license for vaccines. Not for nothing. It really doesn’t solve the problem.”

#### China already has a terrifying biosurveillance infrastructure that could supply the raw data for novel bioweapons

Moore 20

(Scott Moore, Director of the Penn Global China Program@UPenn, Young Professional and Water Resources Management Specialist at the World Bank Group, Environment, Science, Technology, Health Officer for China at the U.S. Dept of State, Giorgio Ruffolo Post-Doctoral Research Fellow with the Belfer Center for Science and International Affairs@Harvard; “China’s Role In The Global Biotechnology Sector And Implications For U.S. Policy”, April 2020, <https://www.brookings.edu/wp-content/uploads/2020/04/FP_20200427_china_biotechnology_moore.pdf)//HW-CC> -recut CAT

The certainty that China will play an increasingly important role in the global biotechnology sector poses several issues for U.S. policymakers. The gravest of these pertain to national security. Though there is presently no sign that China’s capabilities exceed those of the United States, some researchers have noted that biotechnology is a focus of increasing attention GLOBAL CHINA CHINA’S ROLE IN THE GLOBAL BIOTECHNOLOGY SECTOR AND IMPLICATIONS FOR U.S. POLICY TECHNOLOGY 5 by the People’s Liberation Army.42 U.S. policymakers and security analysts have also raised concerns that the dominant market position of Chinese firms in producing active pharmaceutical ingredients might allow Beijing to disrupt U.S. access to lifesaving drugs in the event of a conflict.43 On the other hand, the use of tools like CRISPR, which is increasingly inexpensive and easy to use, by terrorists and non-state actors to potentially create novel bioweapons poses severe security threats to both the United States and China. It would seem to be in the interest of all states, including China, to strengthen efforts, currently led mostly by the private sector, to prevent dangerous actors from gaining access to DNA templates and other relevant materials.44 Though these prospects are alarming, the theft and use of biomedical data presents more immediate policy concerns. American life sciences research institutions have been subject to what U.S. officials characterize as prolific intellectual property theft and non-traditional intelligence collection by Chinese actors.45 At home, Beijing has already incorporated biometric data on certain populations, such as the Uighur minority group, into its already-formidable social control and surveillance apparatus.46 Chinese actors also appear to have targeted foreign citizens for covert biomedical data collection.47 Last year, the U.S. government forced a Chinese firm to sell its majority stake in an American social network that aggregates health care data from users, primarily over worries this information could be used to persuade Americans with access to sensitive information to spy for China.48 Such added U.S. government scrutiny has contributed to a sharp decline in Chinese investment in the U.S. biotechnology sector. Though small overall, such investment had been growing rapidly, and in 2018 the biotechnology sector constituted the single largest source of Chinese investment in the U.S. overall, surpassing real estate.49 As this impact suggests, access to and control over biomedical data also has profound implications for the economic competitiveness of the U.S. biotechnology sector. Many frontier areas of biotechnology, including the use of artificial intelligence for biomedical applications, depend on access to large quantities of individual patient data. Chinese biotechnology firms are likely to have access to larger quantities of such data than their competitors elsewhere thanks to the size of China’s population and relatively weak rules governing data collection and sharing. An existing biomedical database of patients from China’s national health care system, for example, allegedly covers some 600 million patients.50 The Chinese government is moreover increasingly aggressive about preventing foreign firms and organizations from accessing such data. In 2016, biomedical data was proclaimed a “national strategic resource,”51 and the export of such data is strictly controlled. Rules specifically bar any foreign use of Chinese biomedical data that “may jeopardize national security, national interests, or public security,” and in 2018 these were used to shut down several high-profile scientific collaborations including one involving Peking University and the University of Oxford.52 It should be noted, however, that while data quantity is important, so is data quality, and a combination of poor and inconsistent record-keeping and limited population diversity may diminish the utility of biomedical data produced in China for key applications like therapeutics development.53 In any case, the availability of biomedical datasets will be a key determinant of the relative competitiveness of the U.S. and Chinese biotechnology industries going forward. A final, and more hopeful, policy implication of China’s growing role in biotechnology is its potential to help address shared global challenges like infectious disease prevention and biodiversity protection. In the near term, the COVID-19 crisis has highlighted the need for expanded international cooperation on epidemiological data collection and analysis, vaccine development, and other areas related to biotechnology. While China’s openness to such cooperation at the moment is unclear, there are likely to be future opportunities to engage China in COVID-19 tracing, vaccine development, and deployment initiatives in third countries, especially in the less-developed world. In the longer term, synthetic biology, especially the use of gene drives to rapidly spread genetic modifications throughout a population, offers great promise to eliminate insect-borne diseases like malaria, and could also help endangered species adapt to climate change effects. As the 21st century advances, advanced biotechnology will both demand new forms GLOBAL CHINA CHINA’S ROLE IN THE GLOBAL BIOTECHNOLOGY SECTOR AND IMPLICATIONS FOR U.S. POLICY TECHNOLOGY 6 of global governance and present new arenas for both competition and cooperation between researchers, business leaders, and policymakers.

#### State-created bioweapons uniquely risk extinction in the hands of bioterrorists.

Millett & Snyder-Beattie ‘17. Millett, Ph.D., Senior Research Fellow, Future of Humanity Institute, University of Oxford; and Snyder-Beattie, M.S., Director of Research, Future of Humanity Institute, University of Oxford. 08-01-2017. “Existential Risk and Cost-Effective Biosecurity,” Health Security, 15(4), PubMed -CAT

In the decades to come, advanced bioweapons could threaten human existence. Although the probability of human extinction from bioweapons may be low, the expected value of reducing the risk could still be large, since such risks jeopardize the existence of all future generations. We provide an overview of biotechnological extinction risk, make some rough initial estimates for how severe the risks might be, and compare the cost-effectiveness of reducing these extinction-level risks with existing biosecurity work. We find that reducing human extinction risk can be more cost-effective than reducing smaller-scale risks, even when using conservative estimates. This suggests that the risks are not low enough to ignore and that more ought to be done to prevent the worst-case scenarios. How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all futu­­r­e human lives. Historically, disease events have been responsible for the greatest death tolls on humanity. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world's population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization. A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity's favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6 While these arguments point to a very small risk of human extinction, they do not rule the possibility out entirely. Although rare, there are recorded instances of species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and the Western Abenaki (which suffered a staggering 98% loss of population).9 In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as **rabies** or **septicemic plague**. Other diseases have a track record of spreading to virtually every human community worldwide, such as **the 1918 flu**,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-21 Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record of state-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.22 Delivery capabilities have also been subject to the cutting edge of technical development, with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology.23,24 While there is no evidence of state-run bioweapons programs directly **attempting** to develop or deploy bioweapons that would pose an existential risk, the logic of deterrence and mutually assured destruction could create such incentives in more unstable political environments or following a breakdown of the Biological Weapons Convention.25 The possibility of a war between great powers could also increase the pressure to use such weapons—during the World Wars, bioweapons were used across multiple continents, with Germany targeting animals in WWI,26 and Japan using plague to cause an epidemic in China during WWII.27 Non-state actors may also pose a risk, especially those with explicitly omnicidal aims. While rare, there are examples. The Aum Shinrikyo cult in Japan sought biological weapons for the express purpose of causing extinction.28 Environmental groups, such as the Gaia Liberation Front, have argued that “we can ensure Gaia's survival only through the extinction of the Humans as a species … we now have the specific technology for doing the job … several different [genetically engineered] viruses could be released”(quoted in ref. 29). Groups such as R.I.S.E. also sought to protect nature by destroying most of humanity with bioweapons.30 Fortunately, to date, non-state actors have lacked the capabilities needed to pose a catastrophic bioweapons threat, but this could change in future decades as biotechnology becomes more accessible and the pool of experienced users grows.31,32 What is the appropriate response to these speculative extinction threats? A balanced biosecurity portfolio might include investments that reduce a mix of proven and speculative risks, but striking this balance is still difficult given the massive uncertainties around the low-probability, high-consequence risks. In this article, we examine the traditional spectrum of biosecurity risks (ie, biocrimes, bioterrorism, and biowarfare) to categorize biothreats by likelihood and impact, expanding the historical analysis to consider even lower-probability, higher-consequence events (catastrophic risks and existential risks). In order to produce reasoned estimates of the likelihood of different categories of biothreats, we bring together relevant data and theory and produce some first-guess estimates of the likelihood of different categories of biothreat, and we use these initial estimates to compare the cost-effectiveness of reducing existential risks with more traditional biosecurity measures. We emphasize that these models are highly uncertain, and their utility lies more in enabling order-of-magnitude comparisons rather than as a precise measure of the true risk. However, even with the most conservative models, we find that reduction of low-probability, high-consequence risks can be more cost-effective, as measured by quality-adjusted life year per dollar, especially when we account for the lives of future generations. This suggests that despite the low probability of such events, society still ought to invest more in preventing the most extreme possible biosecurity catastrophes.

### Clinical Trials CP/DA – vs Bioterror AFF (1:50)

#### Text: WTO member nations should (1) recognize a six-year period of exclusivity for data collected from clinical research trials and (2) use that data to train health care workers in bioterror and emergency response

#### That strengthens IPR – it competes

Bing 21

Dr. Han Bing (senior research fellow at the Institute of World Economics and Politics of Chinese Academy of Social Sciences). “TRIPS-plus Rules in International Trade Agreements and Access to Medicines: Chinese Perspectives and Practices.” Global Development Policy Center, Global Economic Governance Iniative. GEGI Working Paper 049, April 2021. JDN. https://www.bu.edu/gdp/files/2021/04/GEGI\_WP\_\_Bing\_FIN.pdf

Undisclosed test or other data refer to the data obtained in the entire medicine development process to demonstrate the medicine’s safety, efficacy and quality. The medicines and healthcare products regulatory agencies in various countries analyze and evaluate whether to approve the marketing of a new medicine based on such data. Since it is obtained from scientific studies, undisclosed test or other data are unable to satisfy the requirements of patent grant and cannot be protected by patent rights. However, the cost of obtaining marketing approval is expensive and the first registrant needs to be significant to overcome the negative price effects of competition from pharmaceutical manufacturers that free ride on the initial registrant’s marketing approval. Therefore, it is argued that, without a period of monopoly, the new drug developers will have no incentive to “conduct the costly clinical research and trials necessary to obtain marketing approval” (Chow and Lee 2018). Given its importance to the pharmaceutical industry, the United States is a strong proponent of adding such a provision in the TRIPS Agreement (Chow and Lee 2018). However, since the TRIPS Agreement was formally implemented 25 years ago, WTO members had not yet unified their opinions on the application of this provision. The United States, the European Union, and some members argue that, taking into account the considerable amount of efforts and costs for generating the necessary data, unless permitted by the originator, undisclosed test or other data should be granted exclusive rights against disclosure for a specific period of time (UNCTAD & ICTSD 2013, 613-615). During the period, government agencies shall not only protect such data against disclosure, but also prevent generic drug manufacturers from relying upon the data to obtain marketing approval. Developing countries such as Argentina, Brazil, India, and Thailand provide a non-exclusive protection on undisclosed test or other data, that is, such data are protected against unfair commercial use, but not granted exclusive rights, which allows government agencies to rely on such data to approve the marketing of generic medicines (UNCTAD & ICTSD 2013, 615-616). Developing countries believe that if the US and European practices were adopted, the marketing of generic medicines would be delayed, thereby unreasonably restricting the public access to medicines (UNCTAD & ICTSD 2013, 621). Prior to accession to the WTO in 2001, there were no data exclusivity provisions in China. After joining the WTO, China has assumed the obligation to protect such data in compliance with the TRIPS Agreement. Unlike most WTO members, as a condition for accession to the WTO, China agreed to provide data exclusivity protection for a period of six years (Feng 2010). Included in the Part V “Trade-Related Intellectual Property System” of the Report of the Working Party on the Accession of China (World Trade Organization 2001), China reiterated the content of and added what is not stipulated in Article 39(3) of the TRIPS Agreement. That is, during the period of six years, China does not allow approval of marketing for generic medicines, in order to provide exclusive protection for undisclosed test or other data of new chemical entities (World Trade Organization 2001, 284). Moreover, such protection is **independent of patent protection**, which means such data are protected whether a medicine is granted patent or not. The period of six years exclusive protection for undisclosed test or other data is longer than the period of 5 years of protection in the US and a number of bilateral free trade agreements.

#### That means you require perms to specifically compare the 1AC to the increased protection for IPR in the CP.

#### Net benefit is the solvency deficit to bioterror or other health emergencies

#### IPR and Clinical Trials are K2 Developing Safe and Effective Strategies; COVID antigen test proves

McDole and Ezell 21

(Jaci Mcdole and Stephen Ezell; McDole is a senior policy analyst covering intellectual property (IP) and innovation policy at the Information Technology and Innovation Foundation (ITIF). Ezell is vice president, global innovation policy, at the Information Technology and Innovation Foundation (ITIF). He focuses on science and technology policy, international competitiveness, trade, manufacturing, and services issues.; 4-29-2021; "Ten Ways IP Has Enabled Innovations That Have Helped Sustain the World Through the Pandemic"; https://itif.org/publications/2021/04/29/ten-ways-ip-has-enabled-innovations-have-helped-sustain-world-through, ITIF, accessed 7-29-2021; JPark) -recut CAT

In the fight against COVID-19, there are two main types of diagnostic tests: molecular and antigen.94 According to the U.S. FDA, molecular tests detect an active virus’s genetic material and provide more accurate results, while antigen tests provide faster results and detect specific proteins from an active virus.95 As of December 21, 2020, there were 469 COVID-19 diagnostic innovations in various stages of development around the world, two of which were fully-approved for general use and 203 were authorized for emergency use.96 One such innovation was developed by LumiraDx, a point-of-care diagnostic and health care information technology company based in the United Kingdom. The LumiraDx SARS-CoV-2 Ag Test is an antigen diagnostic test used in conjunction with the LumiraDx Instrument and Platform to quickly provide highly accurate results.97 Like most COVID-19 diagnostic tests, the LumiraDX SARS-CoV-2 Ag Test starts with collecting a specimen using a nasal swab. In prepping the specimen, the test uses microfluidic immunofluorescence to determine whether a COVID-19 nucleocapsid protein antigen is present in the specimen. A test strip with the prepped specimen is inserted into the LumiraDx Instrument, and results are reported to the LumiraDx Platform within 12 minutes.98 In clinical trials, within the first 12 days of symptom onset, the tests produced the same results as molecular tests 97.6 percent of the time for positive results and 96.6 percent of the time for negative results.99 For tests conducted within the first three days of symptom onset, the results were 100 percent aligned.100 Subsequent independent tests have shown similar results.101 In August 2020, the FDA granted the company EUA for the LumiraDx SARS-CoV-2 Ag Test, and as of January 21, 2021, the test is available in more than 30 countries including Japan, Brazil, and Switzerland.102 In November 2020, LumiraDx partnered with numerous organizations—including the Africa Centres for Disease Control and Prevention, the Bill and Melinda Gates Foundation, and the COVID-19 Therapeutics Accelerator—to provide 55 African Union member states with portable diagnostic instruments and related COVID-19 antigen tests. For innovative companies such as LumiraDx, the importance of IP cannot be understated. As Sir John Bell and his colleagues stated, the life-sciences sector fundamentally survives on IP.103 LumiraDx holds 22 patents associated with the company’s platform, diagnostic assays, and smart connectivity, covering nine different jurisdictions. According to the 2020 U.S. Chamber International IP Index, the United Kingdom ranks second out of 53 countries in terms of IP system effectiveness.104 Key factors weakening the country’s IP, as noted in the U.S. Chamber’s report, include uncertainties surrounding Brexit and the United Kingdom’s adherence to European Commission policies concerning patent term restoration for biopharmaceuticals. The GII 2020 ranks the United Kingdom third in Europe and fourth overall worldwide in innovation policies. Also, the GII 2020 ranks the United Kingdom sixth out of 49 high-income economies for quality of innovation. Given the country’s sustained success in innovation, and for the sake of patients and innovators alike, the United Kingdom must ensure that robust IP systems remain and improve throughout the future.105 Due to government restrictions and market access barriers, UK patients often lack access to the latest medical innovations.106 These policies and restrictions must be reviewed and addressed in a more market-friendly manner moving forward. As the country settles into this new era, policymakers should also ensure strong IP provisions are included in all trade agreements.107 Continued consistency between the UK and European Union systems will ensure certainty and continuity for innovative businesses such as LumiraDx. UK policymakers should also adopt and implement the proposed policy changes set forth in Sir John Bell’s 2017 Life Sciences Industrial Strategy report.108 If policymakers in the United Kingdom maintain providing robust IP systems for their innovators, they will continue to be among the world’s innovation leaders. When these provisions are in place and implemented properly, citizens of the United Kingdom—and the world—will continue to benefit from innovations such as the LumiraDx SARS-CoV-2 Ag Test.

#### Even if they answer innovation, health care workers won’t respond on the ground unless they have access to the underlying data so that they feel the preparedness protocols are safe – willingness is linearly correlated with knowledge.

Murray et al. 21

Eleanor J. Murray, ScD;1 Matt Mason, MAdvPrac(Inf Cont);2,3 Vanessa Sparke, MPH&TM;3,4 Peta-Anne P. Zimmerman, DPH3,5,6 Factors Influencing Health Care Workers’ Willingness to Respond to Duty during Infectious Disease Outbreaks and Bioterrorist Events: An Integrative Review doi:10.1017/S1049023X21000248 © The Author(s), 2021. Published by Cambridge University Press on behalf of World Association for Disaster and Emergency Medicine 1Department of Epidemiology, Boston University School of Public Health, Boston, Massachusetts USA 2. School of Nursing, Midwifery, and Paramedicine, University of the Sunshine Coast, Maroochydore DC, Queensland, Australia 3. Collaborative for the Advancement of Infection Prevention and Control, Queensland, Australia 4. Discipline of Nursing and Midwifery, James Cook University, Cairns, Queensland, Australia 5. School of Nursing and Midwifery, Griffith University, Gold Coast, Queensland, Australia 6. Gold Coast Hospital and Health Service, Southport, Queensland, Australia <https://www.cambridge.org/core/services/aop-cambridge-core/content/view/5A04E842D638C9C0246F7268AA922A5A/S1049023X21000248a.pdf/factors-influencing-health-care-workers-willingness-to-respond-to-duty-during-infectious-disease-outbreaks-and-bioterrorist-events-an-integrative-review.pdf> -CAT

* Prefer our research post-COVID (June 2021)

In general, HCWs appeared to be most willing to respond to infectious disease outbreaks when: (1) the pathogen was non-transmissible; (2) they were provided adequate PPE; or (3) an effective prophylaxis, vaccine, or treatment was provided to both workers and their families (Table 1). The primary factors affecting WTR to naturally occurring outbreaks were individual-level characteristics, such as clinical or non-clinical work, occupation, and prior commitment to provide emergency care. Factors affecting WTR to bioterrorist incidents were typically structural or organizational in nature, such as availability of vaccine or PPE, safety of family members, and provision of information on the pathogen involved. Barriers to Willingness Of the 40 studies identified, 33 (n = 33; 82.5%) identified specific barriers to willingness (Table 2).2,4,8-11,13-18,20-38 The barriers to willingness could be categorized into the following four groups: concern and perceived risk, interpersonal factors, job-level factors, and outbreak characteristics. Concern and Perceived Risk—Concern for personal safety or the safety of family members was identified as a barrier to willingness in 12 (n = 12; 30.0%) studies with fear of being infected by a patient and/or fear of transmitting infection to their families primary concerns for HCWs.3,4,8,16,17,26,37,38 Three studies (n = 3; 7.5%), all conducted in Singapore, found that HCWs were concerned that either they or their family members would be ostracized or face stigma from community members who might perceive the workers or their families as disease carriers.26,37,38 In addition, lack of PPE was cited as a specific barrier in two studies (n = 2; 5.0%).10,34 In two other studies (n = 2; 5.0%), the required performance of perceived high-risk tasks, such as patient resuscitation, was an important barrier.13,25 Records idenfied through database searching (n = 149) Screening Included Eligibility noit acifit nedI Addional records idenfied through other sources (n = 34) Records aer duplicates removed (n = 95) Records screened (n = 95) Records excluded (n = 45) Full-text arcles assessed for eligibility (n = 50) Full-text arcles excluded, with reasons (n = 10) Willingness not measured = 3 Infecous disease/bioterrorism not measured = 5 Quality poor MMAT = 2 Studies included in integrave synthesis (n = 40) Murray © 2021 Prehospital and Disaster Medicine Figure 1. PRISMA Flow Diagram of Search. Murray, Mason, Sparke, et al 323 June 2021 Prehospital and Disaster Medicine https://doi.org/10.1017/S1049023X21000248 Downloaded from https://www.cambridge.org/core. IP address: 76.114.170.56, on 11 Aug 2021 at 23:57:31, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. Interpersonal Factors—Interpersonal factors were common barriers toWTR among HCWs. Personal responsibilities, such as caring for family members who may fall ill, coupled with a lack of available resources to support these responsibilities, such as child care, elder care, and pet care services, were listed as barriers in seven studies (n = 7; 17.5%).4,14,16,17 Another two studies (n = 2; 5.0%) found that staffing shortages were a potential barrier, primarily due to a perception that shortages would lead to conflict among coworkers or being overworked.10,26 Similarly, concern about potential conflicts arising from working with untrained volunteers was a significant barrier to willingness among some HCWs.14 In addition, HCWs whose spouse or partner also worked in health care, or whose spouse was also an emergency responder, reported different levels of willingness from other HCWs, although the evidence was conflicting: one study found workers were less willing to respond if their spouse was also a HCW,3 while a second found that having a spouse who was a first responder increased willingness.4 Job-Level Factors—Requirements to work longer hours during an outbreak and part-time status among a general group of HCWs were associated with lower WTR, as was volunteer status among emergency medical technicians (EMTs).2,3,14 A lack of inclusion of training and education in health curriculum for disaster medicine and public health preparedness was found to also be a barrier for students entering the workforce.18,20,33 Health care workers were typically more willing to respond to an outbreak if they were likely to provide care to their own patients rather than to unfamiliar patients.10,28 Outbreak Characteristics—Although concern, perceived risk, and level of knowledge regarding the pathogen involved in the outbreak were clear barriers to willingness, only limited information was available on other outbreak characteristics. One study found that WTR may decrease as an outbreak continues due to a reduction in perceived duty to treat.11 This may suggest that WTR will vary over the duration of outbreaks of long duration, with HCWs becoming less willing to respond as the outbreak progresses. In addition, outbreak location may be important: HCWs in one study were less willing to respond to outbreak situations outside their home town or state.28 Willingness was also influenced by the availability of a vaccine34 or the unknown nature of the pathogen,36 creating a barrier to responding in some reported studies. Facilitators of Willingness Only four of the 40 (n = 4; 10.0%) studies did not identify at least one facilitator of willingness among HCWs (Table 2).25,26,37,38 The facilitators of willingness could be categorized into the following five groups: availability of PPE and/or vaccine, level of training, professional ethics, family and personal health and safety, and worker support systems. Availability of PPE and/or Vaccine—Overall, nine (n = 9; 22.5%) studies mentioned infection control, vaccination, or PPE as an important facilitator of HCW WTR.4,14-16,19,28,30,39 Lack of adequate provisions to prevent infection among HCWs significantly impacted WTR: the lowest level of WTR noted was the 8.3% (n = 5/60) of general practitioners in Tasmania, Australia willing to provide care to patients during an influenza pandemic if they were not provided with PPE; however, when assured that they would be provided with appropriate PPE, 100.0% (n = 60/60) were willing to provide care to their own patients.10 Comparisons between studies further support the importance of providing adequate PPE and vaccination, as HCWs were generally willing to respond to smallpox outbreaks with vaccine (65.0% [535/823] of EMTs3 and 61.1% [n = 3,447/5,645] of clinical and non-clinical HCWs4 ); however, only approximately thirty percent of both physicians (n = 174/526; 33.1%) and school nurses (n = 31/111; 27.9%) were willing to respond to a smallpox outbreak when informed that they would not have access to vaccine (Table 1).8,11 Level of Training—Nine of the 40 (n = 9; 22.5%) studies included in this review specifically identified the amount of training received as a facilitator of willingness.3,4,8,11,14,16,17,28,30 Health care workers who felt adequately prepared to respond in an infectious disease emergency were also willing to respond.11 Training on bioterrorism, weapons of mass destruction, or other terrorism scenarios,3 especially following the events of 9/11, were particularly important for increasing WTR.8,11 In addition, the HCWs’ existing level of knowledge about emergency response for infectious diseases, coupled with a belief in the importance of bioterrorism or preparedness training, were associated with WTR.28 Finally, confidence in one’s ability to diagnose and treat bioterrorism-related diseases was also important;40 and training opportunities in preparedness, response, and use of PPE were identified in several studies as a factor that could improve willingness.30,41,42 Professional Ethics—Eleven (n = 11; 27.5%) studies identified HCWs’ feelings of moral or ethical responsibility to provide care during an infectious disease outbreak as an important factor in willingness.3,8,10,11,15,17 Health care workers who believed they had a duty to treat patients with serious communicable diseases, such as HIV/AIDS, or a duty to treat patients during an epidemic were more willing to respond during infectious disease emergencies than HCWs who did not perceive these duties.11 Overall, a sense of duty,3,17 a perceived moral obligation10 to treat patients regardless of personal risk,8 a belief that coworkers would respond3 and need help,10 or that their patients really needed help15 were all important facilitators. A perception of one’s importance to the organization further facilitated willingness.12 Family and Personal Health and Safety—Four (n = 4; 10.0%) studies identified availability of vaccines and prophylaxis for HCWs’ families as a critical facilitator of willingness.4,14,15,19 In addition, having a personal preparedness plan4 or an institutional preparedness plan4,14 which included provisions for child care, elder care, and pet care were identified as important facilitators.2,14 Worker Support Systems—Six (n = 6; 15.0%) studies identified worker support systems to help facilitate willingness.2,14,16,28,35,39 Valued supports included telephone and email access,2 transportation support,2,14,39 provision of food2 and accommodation,2,14 and guaranteed financial supports, such as life and/or disability insurance or hazard pay.14,39 A study of WTR among nursing students further supported the value of providing food, opportunities for rest and personal hygiene (eg, showers), and organizational programs to support mental and spiritual health, such as available chaplains.20 Another aspect that facilitated WTR was having clear roles within the response and/or their respective organizations and associated expectations of input towards control of the infectious disease emergency.11,12,21-23 324 Health Care Worker Willingness to Respond Prehospital and Disaster Medicine Vol. 36, No. 3 https://doi.org/10.1017/S1049023X21000248 Downloaded from https://www.cambridge.org/core. IP address: 76.114.170.56, on 11 Aug 2021 at 23:57:31, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. Beyond Acute HCW Although available evidence suggested many HCWs may not be willing to respond during an infectious disease emergency, there was some indication that staffing shortfalls or surge capacity could be provided for using workers or volunteers from other occupational groups. Identification of surge capacity workforces was not a focus of the current review; nevertheless, the search strategy returned a number of papers on WTR among non-hospital HCWs, which appeared valuable. Groups which may be highly willing to respond to infectious disease emergencies included veterinarians, pharmacists, health department employees, and medical or health science students or faculty. For example, 90.1% (n = 471/523) of US medical students in one study reported WTR to pandemic influenza,33 and 79.0% (n = 384/486) of pharmacists in Florida (USA) reported WTR to a bioterrorist incident.28 In another study of medical students in the Netherlands, only 65.9% (n = 659/999) were willing to respond to a bioterrorist event and 43.0% (n = 430/999) to an Ebola type outbreak.18 However, the ability for planners to rely on students as surge capacity may be highly dependent on outbreak characteristics and perceived risk, and students’ concerns appeared to be similar to those of HCWs. In one study for instance, only 56.9% (n = 128/225) of nursing students in Taiwan were willing to respond to an avian influenza outbreak.20 Finally, seven (n = 7, 17.5%) studies suggested that health department employees were willing to respond to biological emergencies.12,13,22,24,35,36,43 A series of studies conducted by a research group at Johns Hopkins University (Baltimore, Maryland USA) found that fifty-four percent to ninety-four percent of local health department employees in the US were willing to respond to pandemic influenza.12,22,24 A study of county health department employees in Florida found that 92.3% (n = 2,228/2,414) were willing to respond to pandemic influenza, although when asked about performing high-risk tasks, willingness dropped to 56.2% (n = 1,357/2,414).13 It should be noted that the prospect of working with untrained volunteers had been demonstrated to reduce WTR among HCWs.14 Therefore, care should be taken to ensure that adequate training is provided to all volunteers and surge capacity workers.