Pandemics, Pills, and Politics

Elbe, Stefan

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Tamiflu is approaching the end of its patent at the time of writing, and the sun is slowly beginning to set on the life of this prominent antiviral. What lessons does its checkered history yield for the wider quest to develop new pharmaceutical defenses in the twenty-first century? Three lessons stand out above all. First, the experiences with Tamiflu reveal just how complicated the process of securing populations pharmaceutically is in practice. Retracing the many unexpected twists and turns in the life of Tamiflu unearths a complex array of policy tensions and competing stakeholder interests present at every stage of a medical countermeasure’s life. Securing populations pharmaceutically thus entails a lot more than just designing a few new pharmaceutical products. Governments also need to put into place the many wider systems necessary for ensuring that they can use such products effectively during future emergencies.

Second, the Tamiflu story shows that the introduction of security logics into commercial processes of pharmaceutical production generates a lot of added tensions. The extraordinary security context within which medical countermeasures would be deployed gives rise to new problems at pretty much every stage in the life course of a medial countermeasure—from its initial development, via its acquisition by governments, all the way through to its eventual use during an emergency. The many challenges surrounding the development of new medical countermeasures thus also differ in crucial respects from the ones associated with more routine pharmaceutical products. If developing safe and effective new medicines is complicated at the best of times, it is even more so when it comes to medical countermeasures intended to address an array of much more unpredictable biological threats.
Finally, the Tamiflu story also reveals that there is no “magic bullet” that will suddenly stimulate companies to develop such new pharmaceutical defenses. There are just too many steps, costs, risks, and uncertainties involved in the process. Governments are only likely to improve outcomes by designing much broader policy initiatives that concurrently address the many overlapping financial, legal, regulatory, developmental, production, and distribution challenges that arise over the life course of a medical countermeasure. That is why some governments are already taking the seemingly quite drastic step of designing new and specialized pharmaceutical regimes for the explicit purpose of developing such new medical countermeasures.

This chapter reviews some of the broader lessons about medical countermeasures that governments and companies are taking away from their formative experiences with Tamiflu over the past decade. It then goes on to map the extensive new medical countermeasure enterprise that has begun to take shape in the United States in response to those challenges. Finally, it moves on to the bigger question of whether that US enterprise could also form the basis for a geographically much wider initiative to strengthen global health security in the twenty-first century. What, in other words, would it actually take for governments to arrive at a point at which in the future they could make lifesaving medical countermeasures rapidly available to the world in response to deadly outbreaks occurring around the world?

**Governments Take Stock: To Stockpile . . . or Not to Stockpile?**

With the dust beginning to settle on Tamiflu, what lessons do the major stakeholders take away from their experience with the antiviral over the past decade? Many governments, for one, are now stuck with all those sizable and costly Tamiflu stocks they acquired from Roche as part of their pandemic preparedness planning. The major problem they face is that those stocks will eventually expire. When governments first began stockpiling Tamiflu, no one knew for certain how long the antiviral’s shelf life would be. Pharmaceutical products are not really designed to be stockpiled for long periods of time. The shelf life for Tamiflu capsules was initially set at five years. With governments starting to stockpile in 2004, decisions about replenishing would have had to be made as early as 2009 (Reddy 2010: ii38).
As longer-term stability data for Tamiflu subsequently became available, however, Tamiflu’s shelf life was extended from five to seven years in the United States and Europe (Reddy 2010: ii38). That bought governments valuable time to figure out the best way forward. Yet sooner or later governments will have to make some difficult decisions.

Are governments still likely to replenish those stockpiles following all the controversies that have engulfed Tamiflu over the intervening years? We have seen that some of the initial rationales for government stockpiling have since become subject to more extensive debate—especially around the issue of complications. New concerns about the possibility of rare but potentially more harmful side effects have also surfaced since many of those initial stockpiling decisions were taken. Overall, the wider debate about the wisdom of stockpiling Tamiflu has thus become much more contested with the passing of time. One of the coauthors of the 2014 Cochrane Review, Carl Heneghan, even argues that, after all the clinical trial data are reviewed, there is “no credible way these drugs could prevent a pandemic” and that stockpiles were “money thrown down the drain” (quoted in Butler 2014). All of this means that government decisions about stockpiling will become more difficult moving forward.

Yet governments will likely also consider a range of other factors when making their final decisions about stockpiling. Governments may conclude that in the event of a pandemic even a small or modest effect would still be beneficial when aggregated to the level of the population. “Even small individual effects,” Jonathan Nguyen-Van-Tam argues with regard to neuraminidase inhibitors, “can have a large impact when applied across whole populations” (Van-Tam 2010: ii3). Irrespective of the issue of other outcomes—such as complications, hospitalizations, and mortality—a modest reduction in symptom duration could be seen to be significant in a pandemic context. If Tamiflu could also achieve such a reduction during a pandemic (which nobody can know for certain in advance), governments might conclude that this would have desirable effects at the aggregate population level and tip the balance in favor of stockpiling. Of course, officials would then still need to weigh any such potential benefits against the possible harms.

Beyond that, antivirals also remain one of the few measures that governments would have available at their disposal during the early phases of a pandemic, when a virus-specific vaccine would not yet be widely available.
One influenza scientist, Wendy Barclay, argues that “they should replenish the stockpile. What else can you do if a pandemic strikes? We won’t have a vaccine for the first six months. . . . If it works a little bit in seasonal flu, the chances are they’ll work quite a lot better in a pandemic situation and get more people back to school and work” (quoted in Gallagher 2014). Even today, Tamiflu is still one of the few pharmaceutical interventions that governments could utilize while they wait for a strain-specific pandemic influenza vaccine to eventually become available. This point was also echoed by the UK’s chief medical officer, Dame Sally Davis, who explained before Parliament that “we have to protect our public in that first six to 12 months. The only known protection is the antivirals, and we knew that if we waited for a pandemic, everyone would be panicking and demanding them” (PAC 2013). That remains the case today, much as it was when the stockpiles were created.

During the onset of a new pandemic, governments will likely also be under considerable political pressure simply “to do something” (Jack 2009). Some have therefore come close to portraying such antiviral stockpiles as being akin to an expedient mass placebo—but one that could nevertheless help with stemming social anxiety and panic during a pandemic. Pandemics, a famous saying goes, always arrive as twins. There is the “biological,” or “epidemiological,” pandemic, but it is usually accompanied by an equally debilitating social pandemic of fear and panic (Strong 1990). Even if the drug turns out not to be that effective clinically during a future flu pandemic, governments also need to manage the social fear and anxiety that such events provoke. In her capacity as editor in chief of BMJ, Fiona Godlee made a very similar point when addressing a UK parliamentary committee about the Tamiflu stockpile: “I think it was politically expedient. There was an outbreak of potentially serious influenza. . . . The UK was confronted with a situation in which it wanted something. There isn’t anything else for pandemic flu. To cut a long answer short, I would say it was bread and circuses to keep the populace happy, and I think it was misleading and wrong, especially as the alternative, paracetamol, is well understood, and Tamiflu has adverse effects, apart from its cost” (PAC 2013). Even she acknowledged, though, that this was ultimately a difficult call for politicians (and medical officers) to make—as they were facing a serious problem (PAC 2013).

Finally, governments will probably also contemplate the political risks involved with deciding not to stockpile. What would happen if a deadly in-
fluenza pandemic subsequently materializes and it then transpired that the government had decided against stockpiling—meaning that citizens were now unable to access potentially lifesaving antivirals? “Pandemic planners,” some influenza experts argue, “must consider all evidence and weigh this against the risks of inaction and the likely public outcry if potentially life-saving drugs are not available in the face of unpredictable, but potentially severe, future influenza outbreaks” (Van-Tam et al. 2014). In the event of a pandemic, the decision not to stockpile could conceivably have career-limiting effects for any officials involved and could be electorally extremely damaging for any government as a whole. After all, people will likely look to their government in the first instance to protect them during a pandemic.

Perhaps such thinking also helps to explain why some experts were not at all surprised that so many governments decided to stockpile Tamiflu in the end. When asked about those stockpiles during an interview, one expert even immediately turned the question around and asked: “Who would have dared not to stockpile a medicine that clearly has efficacy against influenza? It would have been very courageous not to stockpile” (Kurki 2015). Given that in some countries the protection of the individual is even considered the paramount duty of government, such a decision would have been very difficult to justify politically. Confronted with this choice, many politicians and public health planners would prefer to err on the side of caution. As Patrick Mathys of the Swiss Federal Agency for Health (Bundesamt fuer Gesundheit) put it with exemplary candor, “Perhaps some will later say we were exceedingly cautious and went too far. But I can live very well with this accusation” (quoted in Vetterli 2009; my translation).

The entire question of whether or not to stockpile Tamiflu thus continues to pose a profound political dilemma for government officials. If they replenish the stockpiles and there is no pandemic, they are open to accusations of wasting scarce public resources. If they do not stockpile, a pandemic arrives, and the antiviral proves effective against the virus, they could then be open to accusations of negligence. Angus Nicoll and Marc Sprenger explain this wider predicament with reference to their experiences with pandemic preparedness efforts in Europe: “In all this unpredictability it seems one certainty was that when a pandemic happened the policy makers would be criticized. If it was a bad pandemic they would be criticized for not doing enough. If it was not so bad (and European Centre for Disease Prevention
and Control and others have argued that the 2009 was about the best pandemic Europe could have hoped for) they would be criticized for over-preparation, wastefulness and *shroud-waving*” (Nicoll and Sprenger 2011: 191). Decisions about whether or not to stockpile remain shrouded in an irreducible degree of scientific uncertainty, and political factors will also have to be taken into consideration in the end. That was also the conclusion that a high-profile parliamentary inquiry in the United Kingdom arrived at: “the case for stockpiling antiviral medicines at the current levels is based on judgement rather than evidence of their effectiveness during an influenza pandemic” (PAC 2013).

In either case, government decisions about future stockpiling have undoubtedly become more complex since those early days and on the back of all of the public controversies that have engulfed Tamiflu over the intervening years. During this time, citizens have also been confronted with at least two major pandemic flu scares. The first threat—H5N1 (or bird flu) in 2003–2006—did not become a pandemic. The second one—H1N1 (or swine flu) in 2009–2010—did become a pandemic according to the World Health Organization but did not match the more apocalyptic scenarios that many had feared. Yet many members of the public were still asked by their governments to take the antiviral drug and have also seen substantial public funds used to create and maintain large Tamiflu stockpiles—from which pharmaceutical companies profited considerably. Overall, these experiences are likely to have weakened public confidence in such stockpiles, a problem that even the industry acknowledges. Richard Bergstrom of the European Federation of Pharmaceutical Industries and Associations thus argues:

> We also need to reflect on why is it that in the eyes of the public this was so strange that you would buy products for tens of millions of euros or hundreds of millions of euros and stockpile it in case of [an] emergency situation, and you buy this from a private company. This time it was an outcry in many countries, but we do stockpiling all the time for other things. We have emergency supplies for natural disasters. . . . [During] the Cold War we used to have all this stockpiling of everything—clothes, food, oil, everything—and of course this is something that came from the private sector. So there is something wrong here in our explanation about the role of the private sector in developing and providing security. So to me when I look back [on] all of this, it was technically a success story, [but] public-wise it was not. Let’s learn from this, we need to ap-
ply this going forward on areas like antibiotics and other viral threats and even threats of bioterrorism. That we need to explain this all in a much better way to the general public. (Bergstrom 2013)

The publics, in other words, are still likely to be quite confused as to whether or not their governments should continue to stockpile the antiviral. With time, government decisions about stockpiling have only become more complicated, not less so.

**Roche and the Lessons from Tamiflu**

What about Roche? What lessons does the company, in turn, take away from its experiences with Tamiflu? Roche has managed to dramatically reverse the commercial fortunes of Tamiflu on the back of such health security considerations. In fact, the company ended up achieving quite handsome revenues from the antiviral’s second life as a highly lucrative medical countermeasure against pandemic flu. Yet—and highly significantly—this does not mean that Roche will also develop other new medical countermeasures in the future. Roche does believe that pharmaceutical companies have an important role to play in this area, but the company also makes it quite clear that it would take on a new medical countermeasure project only if it aligns with Roche’s wider business strategy. Generally speaking, two Roche spokespeople point out, the company will prioritize those diseases and conditions where they have a good understanding of the biology, as well as an ability to target some relevant part of it with either a small or large molecule intervention (Rollerhagen and Braxton 2016: 9).

If a new medical countermeasure were to fit with these principles, and with Roche’s broader business strategy, the company would likely pursue it. That was certainly true for Tamiflu, where the company was mostly pursuing the lucrative market for seasonal flu. Roche has since had some discussions with BARDA in the United States regarding the potential development of an intravenous formulation of oseltamivir. Yet if those wider conditions are not met, the company is unlikely to prioritize such products, and—rather tellingly—there are no active agreements for medical countermeasures at the time of writing (Rollerhagen and Braxton 2016: 8).

Nor are medical countermeasures likely to be much of a priority for the company in the foreseeable future. The process of developing them remains too risky and too uncertain commercially. As the company further explains,
“The pharma business model already involves a significant level of investment risk. While the risks associated with the development of a medicine to treat a known disease is one thing, developing a medical countermeasure to mitigate a pandemic or attack which may or may not happen increases the investment risk still further. While such developments are crucial, the funding model of the industry makes such research investments very challenging” (Rollerhagen and Braxton 2016: 9). As one looks across the company as a whole, Tamiflu will probably go down very much as a commercial exception for Roche and not at all as the rule. Roche, in short, is still not particularly interested in the whole field of medical countermeasures—even after all of the money it has made from Tamiflu.

More generally Roche’s experiences with Tamiflu thus suggest that governments will continue to face an uphill struggle in trying to engage large pharmaceutical companies in the quest to develop new medical countermeasures. That lack of engagement by large pharmaceutical companies continues to be a defining feature, and also major obstacle, to the development of new medical countermeasures moving forward. After all, those large pharmaceutical companies possess immense—even unparalleled—expertise in terms of their technical and production know-how about pharmaceutical products. They also have considerable funding at their disposal as well as many decades of experience designing new medicines. The prospects for developing new medical countermeasures could thus be greatly improved in the future by the closer involvement of large pharmaceutical companies in those efforts.

With only a few notable exceptions, however, “Big Pharma” continues to eschew the area of medical countermeasures. Not much has changed in that regard, even after the lucrative Tamiflu experience, exposing real limits to the power of governments to shape the priorities of large commercial pharmaceutical companies. Indeed, it remains uncertain whether any government today even has the power to persuade a large pharmaceutical company like Roche to develop a medical countermeasure that the company would not already want to develop for other reasons.

Nor is there really any easy way for governments to get around this challenge—especially without generating new tensions in so doing. One option, of course, would be for governments to simply constitute such a medical countermeasure market artificially. They could conceivably use significant public funds in order to make advance commitments that
they will purchase a set number of medical countermeasures at a prede-
termined price. Doing so would certainly help reduce uncertainty and
increase commercial rewards for a company developing a new medical
countermeasure. This was broadly the approach taken by the George W.
Bush administration through its BioShield program. Much ink has already
been spilled over the billions of dollars pledged for new medical countermea-
sure development under Project BioShield in the United States. Yet in a
commercial context where it can, according to some industry estimates,
cost on average in the range of $800 million to $1.5 billion to develop a new
drug or vaccine (Cole 2013: 24), Project BioShield’s funding of a $5.6 billion
dollar special reserve fund over 10 years of procurement seems fairly
modest—given the broad range of potential health security threats that
have to be considered.

What is more, even this level of funding has already attracted significant
political controversy—indicating that there are economic and political lim-
its to pursuing such a strategy. The financial sums that would be required to
constitute such markets artificially across a whole range of biological
threats would rapidly attain dimensions likely to exceed what citizens would
tolerate in terms of “shifting” public funds to pharmaceutical companies.
Politically, it could start to look as though pharmaceutical companies were
trying to enrich themselves from the security concerns of the taxpayer. The
attempt of many governments to control public expenditure after a finan-
cial crisis also makes such an approach increasingly unrealistic. So there are
very real political, and increasingly also financial, limits to pursing such a
strategy of trying to artificially constitute a medical countermeasure mar-
ket through the use of public funds.

Short of utilizing the public purse to artificially create such a market,
governments wishing to encourage the development of new medical
countermeasures are essentially left with two other options. First, they
could try to prioritize the development of medical countermeasures for
those threats where such parallel commercial markets do exist—much as
they do in the case of flu. For diseases where such a dual commercial and
medical countermeasure market exists, a new drug could have both “nor-
mal” and health security applications. The experience with neuraminidase
inhibitors suggests that for diseases with such a dual market, it is possible
for governments to acquire new medical countermeasures even without
having to actively incentivize companies to do so—because the commercial
market will do so on its own. The one rather obvious drawback with this strategy, however, is that there are only a very limited number of health security threats that possess such a parallel commercial market—and most do not. It would simply leave many other health security threats unaddressed.

A second option would be for governments to encourage pharmaceutical companies to develop more broad-spectrum medical countermeasures. These would consist of new drugs that may simultaneously work across a range of different diseases, conditions, and threats. We have already seen how one of the key attractions of neuraminidase inhibitors is that they showed activity across a range of different influenza viruses, thus increasing the potential size of the market. Stretching that principal further, if new medical countermeasures could be developed that work against a number of different diseases, this could again be a commercially much more attractive proposition and would make the market both more predictable and more sizable. It would effectively represent a different way of doubling up and building a bigger market. Such a strategy might work, for example, in cases where a potential biothreat generates symptoms or biological reactions similar to those for which commercial drugs are already available (Wizemann et al. 2010: 133–134).

Again, however, there are obvious issues with such an approach—not least whether it is actually scientifically possible to develop such treatments. Even where such a strategy could work scientifically, there would still be a need for a supplementary strategy to deal with the large number of threats where this is not the case. There are just no easy options for governments wishing to procure new pharmaceutical defenses for their populations. Even after all the formative experiences with Tamiflu, developing new medical countermeasures will likely remain an uphill struggle for governments moving forward.

Yet new international outbreaks alerts have continued to come in fast and thick since the H1N1 pandemic. The year 2012 witnessed the emergence of human fatalities caused by a new coronavirus leading to MERS. The disease was first reported in Saudi Arabia and kills around 3 to 4 out of every 10 people who are reported to be infected. Since then cases have also been reported in Europe, the Middle East, and Asia. In 2013 instances of lethal human infections with a new avian H7N9 influenza virus arose in China, again generating considerable international alarm and causing
more than 200 deaths in China already. The world then also experienced its largest outbreak of Ebola to date, causing high-level international concern and prompting another meeting of the United Nations Security Council. In 2015, the world was caught off guard once more—this time by the unexpected spread of Zika virus in South America and beyond. Protective medical countermeasures were not available at the height of any of those outbreaks because many of the underlying problems associated with their development and use remain unresolved. Even as they close the books on Tamiflu, therefore, governments need to think hard about how they could do better for their populations against an array of biological dangers in future.

Looking Ahead to the Next One: Building a Medical Countermeasures Enterprise

Will governments ever get to a point where they could rapidly make lifesaving new medical countermeasures available to populations in response to such deadly outbreaks? One key benefit of revisiting the whole Tamiflu story is that it reveals what major challenges would first need to be overcome. Ten such challenges have been identified in total—spread across three different groups: development challenges, acquisition challenges, and deployment challenges. If governments want to rapidly make new medical countermeasures available to their populations during future outbreaks, they need to be able to address all of these challenges first. The ten key challenges can be succinctly recounted now.

First, there are the initial development challenges associated with designing a new medical countermeasure. Those early challenges are scientific, as we have seen just how demanding the scientific development of new medical countermeasures can be. Going through this process takes a considerable amount of time, and success often involves a mixture of rational drug design and serendipity. These early challenges are also economic because developing new medical countermeasures is very risky and expensive, and yet there is no commercial market for most of these products. Unless a way of sharing the commercial risks can be found, financing their development will remain difficult for commercially operating companies. Finally, these early challenges also include navigating the late-stage development processes for pharmaceutical products, such as clinical trials, manufacturing, and so forth. With large pharmaceutical companies unlikely to prioritize medical
countermeasures, many promising drug candidates will be overlooked and never be properly developed into full-fledged medical countermeasures.

If all those initial hurdles can be overcome and a new medical countermeasure is successfully developed, a second set of challenges comes into play about how governments would then transform such products into a functioning medical countermeasure capability. Here there are additional regulatory challenges that arise in actually getting the new product officially approved, so that governments can then proceed to acquire them for their stockpiles. Governments also face further challenges here in properly gauging their levels of demand for such products, given that it can oscillate wildly with fluctuating events on the ground, and it may simply be too late to leave their procurement until an emergency occurs. Even when governments manage this problem through advance stockpiling of medical countermeasures, they still have to consider the complex logistical challenges around how they would rapidly get the right number of medical countermeasures to the right people at the right time—and when normal distribution channels may well have become severely disrupted.

Should an emergency then occur, and a new medical countermeasure actually has to be deployed to the population at large, there is yet a third set of challenges that quickly comes into play. Depending on the scale of the outbreak, there will likely be a scaling up challenge in terms of manufacturing and production. Global demand for any medical countermeasures can increase dramatically during an outbreak or crisis, introducing new challenges around how to rapidly scale up production capacity to meet such a surge in international demand. If it is not possible to meet that demand, the resulting inequality in terms of international access can quickly generate new international diplomatic tensions and lead to calls for allowing generic production—also raising tensions around intellectual property and the protection of patents. During such a crisis, there is also a further challenge in terms of dealing with the liabilities for possible injuries that might arise, because rapidly rolling out a new medical countermeasure to a large number of people during a health emergency could lead to the emergence of harmful side effects. Especially for products destined for use in such health emergencies, there will likely also be strong calls for all the clinical trial data to be made publicly accessible so as to enable independent scrutiny about their effectiveness and safety, making data access a final challenge that can emerge at that point. Any government wishing to secure their populations
pharmaceutically in the future will thus need to successfully manage a large number of different challenges simultaneously. That is one key lesson to emerge from the whole Tamiflu story.

Just as important, however, is that many of these challenges also differ in crucial respects from those usually associated with more routine pharmaceutical development. At almost every stage in the life course of a new medical countermeasure, the introduction of security logics into commercial processes of pharmaceutical development generates new issues and problems. Economically, the unpredictability of health-based security threats makes it much more difficult for companies to build viable business models around the costly development of new medical countermeasures. From the regulatory perspective, the comparative rarity or dangerousness of the pathogens involved also makes it much more difficult to conduct the clinical trials that would normally be required for gaining regulatory approval. On the production and manufacturing side, governments trying to manage a crisis may urgently require access to a volume of medical countermeasures far exceeding what routine production systems can supply in a short period of time. Logistically, governments may also be unable to rely on existing pharmaceutical distribution systems to get medical countermeasures to their citizens during an emergency. The legal picture similarly becomes more complicated in a security context because governments may have to act in extraordinary ways during an emergency (e.g., using drugs that are not yet approved) and because the large volume of people suddenly taking a medical countermeasure could provoke overwhelming lawsuits if harmful side effects subsequently surface. From virtually every angle, then, the complex entanglement of pharmaceutical and security logics generates new tensions that differ in key respects from those associated with more routine pharmaceuticals. Existing systems for developing and handling pharmaceutical products may therefore not work very well for medical countermeasures. That too is an important lesson to emerge from the whole Tamiflu story.

All of these challenges coalesce to form a vexing Gordian knot of policy issues around medical countermeasures in the twenty-first century. There is not just the large number of different challenges that have to be considered. There are also all the intricate interconnections between various stages in the life course of a medical countermeasure that have to be factored in. On top of that, there is the sheer breadth of different issues,
actors, and professional fields involved in the effort. Medical countermeasures evidently live very complex social lives and any government wishing to protect its populations pharmaceutically will therefore need to do so much more than just ensure pharmaceutical companies develop a few new products; they will also have to put into place effective governance mechanisms across all of the many policy challenges we have encountered along the way.

How could all of this ever be done in practice? A final lesson to emerge here from the Tamiflu story is that there can be no quick fix or “magic bullet” policy solution that will suddenly spur pharmaceutical companies into developing more medical countermeasures in the future. As should be evident by now, there are simply too many competing challenges, actors, interests, and tensions involved. Governments wishing to encourage the commercial development of new medical countermeasures will instead have to design a much broader and more comprehensive policy framework that simultaneously deploys a multiplicity of measures. Governments will effectively have to mobilize, adapt, and redistribute the various levers of the state in such a way that it has the overall effect of more strongly incentivizing pharmaceutical companies to develop such new medical countermeasures in the future. That would require nothing short of a bold, new, and wide-ranging political initiative that is willing to do many things differently in relation to pharmaceuticals, that can galvanize the many different stakeholders involved in such an effort, and that can also continuously orchestrate all of these many moving parts toward the common purpose.

Can any government feasibly introduce such a bold initiative capable of untying the Gordian knot around medical countermeasures? So far the US government has tried harder than most by launching what it calls the medical countermeasures enterprise—precisely in order to reflect the fundamentally risky but also bold and wide-ranging nature of the political undertaking required to realize the medical countermeasure vision. The stakeholders involved in that enterprise today include a diverse range of federal government departments (Health and Human Services, Defense, Homeland Security, Agriculture, Veterans Affairs, etc.), state and local governments, industry, academia, professional societies, regulators (e.g., the FDA), public health institutions (e.g., the CDC) and so forth.

The design of that US medical countermeasures enterprise consists of at least five interrelated elements. First, it entails the new pharmaceutical
**stockpiles** created by the US government—like the National Pharmaceutical Stockpile, which subsequently evolved into the Strategic National Stockpile. Second, it consists of **new funds** that the government has made available to purchase new medical countermeasures for the stockpile through the BioShield program and subsequent federal appropriations—thereby adding a financial incentive for their development. Third, it includes **new regulatory mechanisms** introduced by the government for granting approval for new medical countermeasures like the “animal rule,” which allows their effectiveness to be demonstrated in animal models. Fourth, it encompasses **new legal protections** for medical countermeasures developers (and others) against lawsuits for injuries that might be sustained through the widespread use of such medical countermeasures. Finally, it also includes a whole **new institution**—the Biomedical Advanced Research and Development Authority—tasked by the government (and funded with around $500 million per year) to work more closely with companies and help them overcome the “valley of death” associated with late-stage development (Baker-Hostetler 2016). Largely via a piecemeal and protracted process of trial and error, the US government has ended up spawning a bold new—and in many ways quite exceptional—medical countermeasure regime operating outside of the more conventional boundaries of pharmaceutical development and regulation (Elbe et al. 2014).

That medical countermeasure enterprise is certainly not perfect and continues to evolve. Yet mostly by working with small and medium-sized pharmaceutical companies, that enterprise has already helped to produce a number of new medical countermeasures, including 24 products cleared, approved, or licensed since 2007, as well as 14 products already procured for the Strategic National Stockpile (Hatchett 2016b: 5). It remains difficult, of course, to know exactly how successful these new products would be in practice, because many of them have never had to be used so far. Yet there can be no doubt that progress has been made in broadening the array of medical countermeasures now available to the US population.

Overall, then, the US experience with building this new medical countermeasures enterprise clearly confirms that there are no quick fixes or policy interventions to encourage the commercial development of new medical countermeasures. There are just too many steps, costs, risks, and uncertainties involved in the process and too many complex interdependencies that also exist between those various life-cycle stages. Securing populations
pharmaceutically would no doubt be a tall order for any government—and even the US government has experienced a number of significant setbacks along the way. At the same time, the US experience does also show that it can be done. Progress can be made when governments design wider pharmaceutical regimes that remain sensitive to the many different challenges involved. In many ways, the key lesson thus to emerge from the US experience is that the Gordian knot around medical countermeasures can only be untied through the creation of a bold new pharmaceutical regime designed specifically for that purpose.

**Governing Global Health Security: Preparing for the Next Pandemic**

Could a similar pharmaceutical enterprise also be built at the international level so as to strengthen global health security more broadly in the twenty-first century? From a more global perspective, it is important to bear in mind that the US medical countermeasures enterprise is geared mostly toward the needs of the United States. While the US government has certainly been at the international forefront of medical countermeasure efforts over the past decade, its principal mission has always been to protect the domestic US population (although it does also participate in some international partnerships).

With significant financial pressures bearing down on its own government budgets, the US medical countermeasures enterprise can at most begin to address some of the threats facing the American population. Its financial and production scale is not nearly large enough to meet the immense international demand that can quickly arise when a new outbreak occurs. During future international health emergencies, it is therefore unlikely that the US system can produce enough quantities of medical countermeasures to help all of the people in need around the world. For that same reason, it is also not sustainable for the rest of the world to simply rely upon the pioneering efforts of one country like the United States to do most of this work on medical countermeasures. From the perspective of global health security, one of the bigger political questions for the future is therefore whether the kind of pharmaceutical enterprise spearheaded in the United States could also be internationalized in an effort to share the development costs more equitably and to increase the number of such med-
Such a greater degree of internationalization could conceivably help with addressing some of the underlying market challenges that are involved. It is evidently very difficult to create new medical countermeasures through underlying market mechanisms alone. Yet the experience with Tamiflu suggests that a financially more viable business case for medical countermeasures could be constructed when multiple governments are willing to simultaneously commit to stockpiling them in significant numbers. In Europe, for example, there could be scope to build upon the EU decision on cross-border health threats to think about EU-wide systems to address the need for medical countermeasures (European Court of Auditors 2016: 6). Recent experiences with the international Ebola response have also shown that greater levels of international cooperation can be achieved on an ad hoc basis (Roemer-Mahler and Elbe 2016) and that further opportunities also exist to extend some of these lessons from the US medical countermeasures enterprises to other pressing global health challenges such as neglected tropical diseases and antimicrobial resistance (Long et al. 2017; Roemer-Mahler et al. 2017). Realizing all these opportunities in the future, however, would first require achieving a far greater degree of international political cooperation between governments in the area of health security, especially in relation to three pivotal areas.

First, there would need to be a reasonable degree of international consensus on what the major health-security threats facing the world are. The World Health Organization’s recent “R&D Blueprint” is a significant step in that direction, and its list of priority diseases is something that could be built upon in that respect. Second, there would also have to be mechanisms for like-minded governments to pool their resources to create a bigger financial incentive for the pharmaceutical industry to engage with medical countermeasures. Finally, it would also require a significant reduction in the legal and regulatory obstacles to the international sharing of pharmaceutical products (and data). Many of these legal and regulatory aspects pivotal to the functioning of the new medical countermeasure enterprise too remain calibrated to the legal jurisdiction of the United States. Significant barriers thus have to be overcome before such medical countermeasures could be shared with other countries, including low-income countries where
medical need might be greatest (Marinissen et al. 2014). Across all three areas, a geographically broader system for strengthening global health security in the twenty-first century would first require a greater degree of international cooperation.

Those increased levels of international cooperation around medical countermeasures, in turn, could only be achieved by garnering greater political leadership in this area. In the domestic political context of the United States, the experiences of the Anthrax letters in 2001 and subsequently with highly pathogenic avian flu (H5N1) proved transformative in terms of generating political attention and funding for these issues. More than a decade later, however, there are greater difficulties with sustaining the political momentum behind such efforts at the scale required, even in the United States. Generating equivalent collective action at the international level would be even more challenging still. Governance arrangements for emergencies at the international level still appear very much trapped in such a “boom and bust” cycle, as the international community rapidly moves from grappling with one new outbreak to the next. Comparatively, the international system is also politically much more decentralized and fragmented, consisting of many different countries simultaneously pursuing their competing national interests. Generating international leadership and collective action on medical countermeasures in that context is a qualitatively different—and also much bigger—challenge.

Yet not providing such leadership—and simply maintaining the status quo—would also entail considerable costs. Those costs again fall broadly into three areas. First, there have already been a large number of unexpected lethal outbreaks in the twenty-first century, and the expectation is that there will be more in the future. Not having an equivalent medical countermeasures regime at the international level will likely mean that many countries around the world will not have such pharmaceutical defenses at their disposal during later emergencies and that lives could be lost as a result. This is something that may well come to be looked back upon in the future as a valuable—but also missed—opportunity to become better prepared. During any such future outbreak there will likely be immense political interest in scrutinizing what advance measures were taken by governments to develop such medical countermeasures.

A second cost that needs to be considered here is that the current international inequality around access to such new medical countermeasures be-
between high- and low-income countries is already provoking—at times even quite bitter—international political tensions threatening to undermine existing forms of international health cooperation. Amid the height of fears of an imminent H5N1 pandemic in 2006, for example, the Indonesian government ceased sharing its lethal H5N1 virus samples with the rest of the international community over concerns that the government would not have affordable access to new medical countermeasures developed with the help of such biological samples (Elbe and Buckland-Merrett 2017). It marked a particularly stark and intense international political confrontation sparked by unequal access to medical countermeasures. Yet it also showed how the inability to provide other countries with such medical countermeasures can undermine existing forms of international cooperation that high-income countries too depend upon for their health security. In the case of H5N1, it meant that Indonesia started withholding crucial virus samples from the rest of international community, jeopardizing the pandemic preparations of many high-income countries as well. This too represents a significant cost associated with simply maintaining the status quo.

Finally, such international discrepancies in access to medical countermeasures can also create subtler kinds of diplomatic difficulties for countries like the United States. That is because the US government now also has to deal with an increasing number of international requests for access to its medical countermeasures from other countries—requests that need to be handled sensitively and that have the potential to generate new diplomatic tensions if they are turned down. Added together, there is thus quite a considerable cost involved in simply relying on one country to do most of the heavy lifting in developing new medical countermeasures—both for other countries around the world and for the United States. Although generating leadership and political will for internationalizing the medical countermeasure enterprise is a substantial international political challenge, not doing so will also incur considerable costs over time. Here the Coalition for Epidemic Preparedness Innovations has recently emerged as an ambitious new attempt to build greater political momentum around such a wider international capability in the area of vaccines.

All of that said, even if such a medical countermeasure enterprise could be built at international level there is also one final—and seemingly more intractable—dilemma residing at the heart of the entire quest to secure
populations pharmaceutically: the issue of trust. The desire to protect their populations against health-based security threats is ultimately compelling governments to work much more closely with the pharmaceutical industry and even to accommodate some of the industry concerns about medical countermeasures so as to encourage their greater involvement. Given the central role that industry plays in developing new pharmaceutical products, it is actually very difficult for governments to ignore those industry concerns altogether—especially if they wish to strengthen the pharmaceutical protection of their populations.

Yet the more closely and intensively governments try to partner with pharmaceutical companies to develop new medical countermeasures, the more difficult it becomes for governments to persuade their publics that their independence remains intact. Governments, after all, also need to keep a critical distance from the pharmaceutical industry, to avoid the perception of conflicts of interest, to objectively discharge their regulatory functions, and to ensure that taxpayers receive good value for the money. This problem is only exacerbated by the low reputation that the pharmaceutical industry has in many countries around the world.

In the case of Tamiflu, governments and pharmaceutical companies are still having to contend with the political fallout from the 2009–2010 H1N1 pandemic flu. Especially in Europe, widespread public distrust about pharmaceutical stockpiling has emerged in the aftermath of the Tamiflu “fiasco.” More generally, there also remains strong political concern about maintaining scientific independence, and some government institutions even have rules prohibiting them from forming partnerships with industry. Governments thus have to tread a fine political line between cooperating with pharmaceutical companies to ensure that their populations can be protected with appropriate medical countermeasures and not appearing wasteful with public resources to the direct benefit of an industry with a highly uneven political reputation.

The pharmaceutical industry is certainly aware of this problem. Reflecting on the successes and failures of the Tamiflu experience, one prominent industry representative observes: “What of course did not work was the whole public perception around this. And of course in hindsight now that the [H1N1] pandemic was weak we have of course all of us been accused of crying wolf and even some critics of the industry say that we invented this we engineered this, which to me is ridiculous” (Bergstrom 2013). Publics do
rely on their governments to make sure that medicines are safe and effective. However, once governments begin to partner more closely with pharmaceutical companies to develop new medical countermeasures and are seen to be politically invested in those products, it becomes much more difficult to convince publics that the requisite independence is preserved. Even when successful, the conflation of public and private interests in the name of strengthening health security generates new issues around public trust.

Yet that same public trust will be absolutely crucial for governments in responding to any future outbreaks, especially when asking citizens to use medical countermeasures. The whole question of how to build and maintain public trust in any international medical countermeasure enterprise is thus a final area that would need to receive greater attention when trying to strengthen global health security more broadly in the twenty-first century. It marks the one key area where resistance to such medical countermeasure efforts tends to crystallize most clearly. In fact, the ultimate viability of any such international medical countermeasure enterprise may well end up standing, or indeed falling, with this whole issue of trust.

Despite some of the successes of the US medical countermeasures enterprise, then, several key obstacles also remain to using its experiences as the basis for a geographically broader strategy to govern global health security in the twenty-first century—especially in terms of greater internationalization, generating political leadership, and the issue of trust. On a deeper level, moreover, all of these obstacles in moving forward again also seem linked to the closer play of security logics in the area of medical countermeasures. For is it not precisely because the provision of security is widely seen to be the preserve of national governments and states that the security framing has ended up encouraging a medical countermeasure response shaped very much along the lines of individual countries—rather than mirroring the more global aspirations of the lethal pathogens themselves? Is it not also the security framing—with its oscillating cycle of threat and apathy—that makes it so much more challenging politically to forge a sustainable and longer-term approach in this area? Is it, finally, not the imperatives of security that are compelling governments to work more closely with the pharmaceutical industry—albeit in ways that then also make it much more difficult for governments to maintain public trust in
terms of properly carrying out its regulatory functions of the industry and its products? In either case, there is certainly much unfinished business in the quest to secure populations pharmaceutically, and the whole effort also faces a number of countervailing pressures in moving forward in the twenty-first century. Much work therefore still remains to be done before governments can arrive at a point where they could rapidly make lifesaving new medicines available to their populations in response to future outbreaks.