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2009 : November 2009 - Author Commentaries : UPMC's Thomas V. Inglesby

AUTHOR COMMENTARIES - 2009

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Thomas V. Inglesby

Featured *Science Watch*[®] Newsletter Interview from Thomson Reuters

For those whose job it is to worry about the future, the list of potential threats has always been a long one, although dominated by the usual four apocalyptic suspects—war, famine, pestilence and, of course, death. Until recently, fears of pestilence focused only on naturally occurring epidemics. Now, though, the deliberate spread of infectious disease—biological weapons and bioterrorism—is considered an undeniable strategic threat to the nation and the world, and a new field of research has emerged to deal with it.

In the last decade, few institutions have played as critical a role in this research, in developing an understanding of the bioweapon and bioterrorism threats, as the Center for Biosecurity of the University of Pittsburgh Medical Center. Among the most influential researchers in the field is the center's deputy director and chief operating officer, Thomas V. Inglesby, who ranked at #3 among highly cited authors in *Science Watch's* May/June 2009 survey of bioterrorism research (Inglesby's co-director, Tara O'Toole is currently ranked fourth.) In the last decade, Inglesby has published 45 papers that have been collectively cited more than 2,500 times, and he is a co-author on seven of the hottest papers in the field: consensus statements, all with well over 100 citations each, addressing the medical and public-health management of smallpox, anthrax, tularemia, plague, botulinum toxin, and other agents as biological weapons.

Inglesby, 43, received his bachelor's degree from Georgetown University in 1988, and his M.D. from Columbia University's School of Physicians and Surgeons in 1992. He then relocated to Baltimore and the Johns Hopkins School of Medicine, where he did his internship and a fellowship in infectious disease, and then, in 1999, became an assistant professor. In 2003, Inglesby became deputy director and COO of the Center for Biosecurity of the UPMC (which was originally managed by Johns Hopkins University and is still located in Baltimore). Since then, Inglesby has become an associate professor of medicine at the University of Pittsburgh School of Medicine and the University of Pittsburgh Graduate School of Public Health.

Inglesby spoke to Science Watch from his office in Baltimore.

SW: You've been involved in two exercises to explore the political and public health issues that would arise in the event of a bioterrorist or bioweapons attack. The first, in 2001, was called Dark Winter. Could you tell us what the motivation was for that exercise and what you hoped to achieve from it?

Dark Winter was an exercise that had as its major purpose trying to inform former government leaders—those still quite connected with sitting leadership—about the character and potential consequences of a

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biological attack on the country. It was our view at the time that there was a profound misunderstanding about the consequences that could follow a serious biological weapons attack. Most leaders had in mind the responses that are required after some kind of chemical event: immediate intervention, decontaminating victims, etc.—things that you can do when you can delineate the boundaries of the event. What is actually the case with biological weapons, as with naturally occurring infectious diseases, is that it requires an almost entirely different set of responses and responders. It would precipitate a series of political challenges and choices that are quite different. So we had these leaders go through a relatively brief exercise, where they had to make decisions and think about the consequences of those decisions. We thought that this would make these issues more clear to the leaders than if they had merely read about them in a journal article or got a briefing on this. We decided to use a smallpox scenario because of the concerns at the time regarding the security of the smallpox vaccine in the former Soviet Union, and because we had a very limited national supply of the vaccine for smallpox.

SW: And what lessons came out of the exercise?

It showed that even in a small outbreak, the political choices that would confront leadership would be very serious, and that the time sequence of these scenarios are very different from the kinds of events they were familiar with. The stress on the health-care system would be serious. There would be great differences in different parts of the country as to how they would respond. Some might try quarantining groups of people. Others might attempt to restrict the movement of people across state or national borders. And the leaders had to be aware of these kinds of things so that they could work out in advance how to avoid the most deleterious consequences. The whole point of the exercise was to get people to think as clearly as they could about these types of scenarios in the future and to begin planning methodically and analytically how to deal with them.

"The vision for the future of biological threats, whether natural or deliberate, should be to make the country resilient to such threats," says Thomas Inglesby of the Center for Biosecurity of the University of Pittsburgh Medical Center. "This is what's needed as a strategic goal."

SW: Did you see any significant effects from the exercise afterward?

The exercise took place in June of 2001. It was followed by a number of briefings given by the participants, as well as Congressional hearings. Sam Nunn spoke about what he learned, as did others. Then 9/11 happened, followed by the anthrax events. One of the decisions the government made that fall was to acquire a national reserve of smallpox vaccine and to move with as much alacrity as possible in doing that. So what seemed like an intractable problem only months before—a small and aging smallpox vaccine supply—was actually one that was overcome with the will of government leadership. By 2002, we had large supplies of smallpox vaccine coming online, which could be stored for years and used only in an emergency.

SW: How do you perceive the threat of biological weapons and bioterrorism compared to nuclear weapons and nuclear terrorism?

Both are very serious national security challenges for the U.S., although for different reasons. The consequences of a nuclear detonation in America would be quite extreme and would change history. Everything that can feasibly be done to try to reduce that risk should be done. The intelligence community has said that a biological weapons attack in the U.S. is more likely than a nuclear terrorist attack for a number of reasons. The first is the availability of pathogens around the world. They can't be locked up like fissile material can be. There are no technological choke points in the development of biological weapons that can be controlled, in the way that there are in the development of nuclear weapons. Similarly, the knowledge required to make biological weapons cannot be controlled. We have an area of science—life sciences—that is very highly capitalized in the world, producing phenomenal, beneficent changes worldwide. And all developed countries and many developing countries are actively pursuing the fruits of this explosive growth in the life sciences. So this field is highly capitalized, quite global, and the knowledge is almost immediately available after it's learned. There's no reliable or feasible mechanism to control the knowledge, the technology, the people, or the outcomes in the life sciences. This is why intelligence-community assessments and commission report after commission report generally tend toward biological weapons or bioterrorism attacks being more likely than nuclear. Of course, we can't predict exactly what will happen next. The consequences of a nuclear weapon going off in America are as extreme as can be imagined. The consequences of a biological weapons attack or bioterrorism could be anything from small to extreme.

SW: Are there definitive actions we can take to minimize the chances of a biological weapons

attack or bioterrorism, or to minimize the consequences afterward?

Yes, and that's the good news. There is a great deal we can do to diminish the potential consequences of biological weapons. Over the longer run, it's conceivable that we would become so effective at responding to biological threats that we would no longer need to consider biological weapons to be weapons of mass destruction. If we can get to the point where we can make vaccines and medicines rapidly and in great quantity, and if we can diagnose illnesses more quickly, then the impact of biological weapons and natural epidemics will drop dramatically over time.

SW: Should this be our number-one priority in this field?

The vision for the future of biological threats, whether natural or deliberate, should be to make the country resilient to such threats—to make them into events that can be managed with limited illness and limited disruption. This is what's needed as a strategic goal in this country. The Obama administration

has moved in that direction. One of the policy goals of the administration is to accelerate development and the ability to make vaccines and medications for the world's worst infectious diseases. That is a very important goal.

SW: What do you think we can do to deter the use of biological weapons?

We can do a number of things. And it's good to compare and contrast that with the nuclear model. In nuclear deterrence, we've lived now for quite a while with the deterrence of having enough nuclear weapons to achieve "mutually assured destruction." That, fortunately, is not the strategy for biosecurity. The U.S., as have most countries in the world, has foresworn the development of biological weapons. That's a useful tool in promoting transparency and in setting moral and behavioral norms amongst countries. Another part is the education of the life-sciences community generally about the potential misuse of research. That's a relatively new concept for some working in these fields. Getting people in the life sciences to think about the fact that their work can be used both for good or not-so-good can have a strong deterrent effect at the community level. Improving our approach to microbial forensics to better identify the signatures of pathogens could help us attribute future attacks.

SW: You've spoken publicly about deterring biological-weapons use by limiting the effects. Can you explain that to us?

If we develop the ability to substantially blunt the effect of biological weapons or natural epidemics, this would reduce the effects that such weapons would have. If the U.S. has developed the ability to vaccinate people quickly against a particular threat, it lowers the incentive to use this kind of weapon. The country has become much more capable of dealing with biological threats in just the last five to ten years, but obviously there are limits to what can do. We have a long way to go in terms of developing vaccines and anti-infective medications quickly. But that's the goal.

SW: Has the pharmaceutical industry shown a willingness to pursue this?

The interest has almost exclusively been on the part of smaller biotech companies, trying to develop some of these anti-infective medicines—antibiotics or vaccines or monoclonal antibodies. A few years ago, the government made a very serious commitment to prepare for pandemic influenza. That has created a strong industrial-pharmaceutical commitment to flu medicines and vaccines. In the realm of

Highly Cited Papers by Thomas V. Inglesby and Colleagues, Published Since 1999 (Ranked by total citations)		
Rank	Papers	Cites
1	D.A. Henderson, <i>et al.</i> , "Smallpox as a biological weapon – Medical and public health management," <i>JAMA-J. Am. Med. Assoc.</i> , 281(22): 2127-37, 1999.	404
2	D.T. Dennis, <i>et al.</i> , "Tularemia as a biological weapon – Medical and public health management," <i>JAMA-J. Am. Med. Assoc.</i> , 285(21): 2763-73, 2001.	390
3	T.V. Inglesby, <i>et al.</i> , "Anthrax as a biological weapon – Medical and public health management," <i>JAMA-J. Am. Med. Assoc.</i> , 281(18): 1735-45, 1999.	378
4	T.V. Inglesby, <i>et al.</i> , "Anthrax as a biological weapon, 2002 – Updated recommendations for management," <i>JAMA-J. Am. Med. Assoc.</i> , 287(17): 2236-52, 2002.	336
5	T.V. Inglesby, <i>et al.</i> , "Plague as a biological weapon – Medical and public health management," <i>JAMA-J. Am. Med. Assoc.</i> , 283(17): 2281-90, 2000	315

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emerging infectious disease and biodefense, there has been substantial focus and commitment to basic science. NIH has funded research in many areas related to infectious-disease pathogenesis and immunology. There has only been modest levels of support in the last couple of years to fund advanced development of medications and vaccines for biodefense and ongoing infectious disease. Some companies are working with the government on developing new medicines and vaccines, but compared to other kinds of national-security investment, it's quite small.

SW: What is the government doing other than funding basic research?

The government has set a number of vaccine and medication requirements that it believes must be fulfilled for the security of the country. These include things like broad-spectrum antibiotics and antiviral treatments for ebola and other infectious diseases. It's a list of diseases the government considers to be sufficiently threatening that there needs to be a medication or vaccine developed against them. This is both on the Health and Human Services side and the Department of Defense side. The government is now continuing to flesh out a strategy of how to get those medications and vaccines most efficiently and effectively.

SW: Other than creating medicines and vaccines, what do you see as the most pressing needs?

We have to look at the kinds of hospital responses we'll need in a crisis in a major city. We need to improve surveillance for new infectious diseases. We need a public-health system that is prepared for emergencies. And we should encourage more community-level preparedness for cities. We need a highly competent government effort allied with a committed private effort—by academics and public-health officials and the private sector.

SW: Is it easier or harder to get people to pay attention now that we live in an era when there seems to be so much to worry about—global warming, health care, the economy, etc.?

Both. The average person walking around doesn't like to think about preventing bad events from happening—it's just not human nature to do so. If it's not actively part of your job, you don't keep it in mind for very long. There is "threat fatigue." I think we have to expect that and build around it. It can't be everyone's job to think about all threats all the time. That said, it needs to be the job of some community of people. What we need are competent people in positions to make a difference. What we've seen with the financial crisis and climate change is that it's important to have an effective federal government, as well to have constructive international dialogue about these types of problems. It can't just be the U.S. or any single country alone. We have to recognize that not everything will take care of itself, and that we need talented people in the public sector. It seems to me that there's a new premium on having the right people doing the right jobs, both in and outside of government. Hopefully that will carry over into many of these challenges that confront us, including preparing for biological threats and preparing to respond to epidemics, be they natural or deliberate. ■

KEYWORDS: THOMAS V. INGLESBY, CENTER FOR BIOSECURITY, BIOLOGICAL WEAPONS, BIOWEAPONS, BIOTERROR, SMALLPOX, BIOSECURITY, DARK WINTER.



[back to top](#)

2009 : November 2009 - Author Commentaries : UPMC's Thomas V. Inglesby