Conversation with Tom Inglesby on October 2, 2013

Participants

- Tom Inglesby, M.D., Chief Executive Officer and Director, University of Pittsburgh Medical Center (UPMC) Center for Health Security
- Alexander Berger, Senior Research Analyst, GiveWell

Note: This set of notes was compiled by GiveWell and gives an overview of the major points made by Dr. Tom Inglesby.

Summary

Dr. Tom Inglesby leads the UPMC Center for Health Security in its research on biosecurity, including prevention and preparedness for natural epidemics and biological attacks.

GiveWell spoke to Dr. Inglesby as part of its investigation of biosecurity as a philanthropic cause. Conversation topics included the work of the UPMC Center for Health Security, the field of biosecurity, and possible biological threats.

The UPMC Center for Health Security

History

D.A. Henderson founded the Center in 1998 at Johns Hopkins to work to protect the public from biological threats. While serving in the Federal government in the 1990s, Henderson observed that little work was being done on biological threats. He judged that there was a need for academic work to catalyze the government's efforts in the area. He also believed that research was needed to improve biosecurity practice within the healthcare and public health communities.

The Center has continued to focus on strengthening response capacity to bioweapons and preventing their development and use. The Center also works on the highly related issues of possible epidemics or pandemics from diseases such as pandemic flu, Middle East Respiratory Syndrome (MERS), and SARS.

Structure

For the past several years, the Center has had an annual budget of about $6 million. It has a staff of 28 people, including physicians, public health professionals, scientists, lawyers, an economist, an anthropologist, and a psychiatrist.

The work of the Center is primarily funded by UPMC, the Department of Defense, the Centers for Disease Control and Prevention, the Department of Homeland Security, the

Sloan Foundation (through a project on governance of synthetic biology), and the Gates Foundation (through a joint project on a cholera vaccine with Johns Hopkins University).

Programs

The Center's programs include:

- Global Health Security, which works with governments to increase national preparedness and enhance global cooperation around these threats
- Domestic preparedness and response to biological threats, particularly among hospitals and health agencies.
- Science and technology issues related to biodefense. For example, the Center just completed a project on what drives the development of diagnostic technology for infectious diseases. It examined the tools available for diagnosing various diseases, tried to determine the barriers to developing more diagnostic tools, and suggested ways for the government to change its investment strategy to promote their development. (Often, government only funds the early stages of basic science development of new diagnostic tools, but not scale-up and manufacturing.) The Center collected the ideas of major thinkers in the field and industry leaders for how to encourage the development of diagnostic tools and investigated ways to bring them together with policy makers to discuss the issue. After working on this report for four months, the Center brought together representatives from the White House, the Department of Health and Human Services, the Centers for Disease Control and Prevention, and major foundations investing in developing diagnostic tests for the developing world to discuss these issues. Finally, the Center issued a public report on the meeting.

The field of biosecurity

Before 2001

In the 1990s and prior, there was longstanding work in the government on the Biological Weapons Convention to prevent the use of bioweapons. However, there was no coherent biosecurity field beyond that since the termination of the US biodefense programs in the 1960s. In the 1990s it was almost taboo to talk about biological attacks, because the moral opprobrium around them was so intense. It was hoped that if no one talked about it, no one would undertake such an attack. In addition, biosecurity fell through the cracks because it was seen as a public health issue by funders interested in security and as a security issue by funders interested in public health.

Increased interest and progress after 9/11 attacks and anthrax letters

After the 9/11 attacks, the anthrax letters in September and October 2001, and elevated concern about possible future terrorist biological attacks, interest in biosecurity increased. Soon after, H5N1 (avian flu) emerged as a threat to human health, further elevating interest.

The U.S. Departments of Defense, Homeland Security, and Health and Human Services all started programs in biosecurity. All have had successes, but probably none would declare they are even halfway to achieving its goals. Other countries also started programs.

A few foundations supported NGO work on biosecurity. In the U.S., the Sloan Foundation stood out for its funding of work on dual-use science (science that can be used either for beneficent or maleficent purposes), civilian and community preparedness, and government decision-making exercises on pandemics (both in the U.S. and internationally). Other organizations worked on preventing bioattacks as well, either by trying to persuade scientists not to do research that could lead to bioweapons or by working to strengthen the bioweapons convention.

In addition to receiving funds from these foundations, NGOs also received funding from the government. Government agencies put out requests for proposals for NGOs to do work that the government needed.

In the past ten years, public health systems and hospitals have gotten better at responding to relatively contained disasters, for example the Boston marathon bombing (in which everyone who got to the hospital alive lived). Hospitals have hired specialists to help them prepare for disasters. However, hospitals are generally still unprepared for larger disasters.

Declining interest in recent years

Causes of declining interest

Over the past decade or so, interest in biosecurity has waned. There have been no high-profile bioattacks since 2001, which has made the issue seem less urgent. It is hard for governments and foundations to manage biosecurity threats, because they tend to focus on currently pressing problems. The goal of biosecurity work is to build a robust safety system and sustain it over time, but most people do not want to focus on safety systems until something goes wrong. In addition, biosecurity can be a dark and frightening topic, which makes some want to avoid addressing it. Few legislators today are very involved in biosecurity; many more were five years ago.

The private sector alone can't be expected to deal with biosecurity threats – these threats are a problem of the commons wherein we are all at risk, but no particular private sector entity has responsibility or incentive to fully address these issues. There is insufficient incentive for vaccine and medicine producers to work on these challenges. This is a problem that requires substantial resources and direction from government.

Decline in funding and impact on the field

Federal funding to prepare public health agencies and hospitals for disasters has declined since 2003, and this has affected the preparedness of the public health system. Positions at hospitals for disaster management specialists are mostly funded through federal grants.

The amount granted is decreasing, and if the trend continues, hospitals will have to cut these positions.

The budgets of federal agencies that work on biosecurity have been shrinking and are currently about half of what they were five years ago. None are immune to further budget cuts. The instability of budgets contributes to a flow of talented people out of these organizations.

With the loss of foundation funding in biosecurity, researchers are losing the ability to work on independent research that might inform government work in this area.

Due to the cuts in funding, many people who previously worked on biosecurity have moved out of the field.

Current state of preparation

Many current disaster-response mechanisms are designed for relatively small events rather than for a large biological attack or global pandemic. The most notable exception is preparations for a flu pandemic. The government has worked extensively in the past eight years to develop flu vaccines and antivirals for flu, so the U.S. is better prepared against the threat of flu pandemic than other countries. Also, the U.S. has assembled a stockpile of smallpox vaccine that could be used in the event of a smallpox outbreak.

On the other hand, there are many threats for which there is no medicine or vaccine available at this time. Hospitals and public health systems would be greatly challenged by a large-scale event.

Future work needed

The goal of biosecurity is to have available all the vaccines and medicines needed for any possible contingency, and to have a public health and healthcare systems in place that can respond to a serious and acute crisis.

To move towards those goals, needed improvements include:

- Stronger international disease surveillance systems with better interconnection and more updated technologies.
- Public health systems that can use electronic medical records to detect patterns in disease and to manage outbreaks.
- Stronger response to outbreaks of foodborne illness. (Currently it can take months to find the source of a multi-state foodborne outbreak, and sometimes the source is never found even if thousands of people are infected.)
- A medicine and vaccine development and production process that could quickly scale up if needed. (Currently the U.S. relies on stockpiles for some specific illnesses, but it will ultimately need to be able to make medicines and vaccines for a whole range of illnesses and to be able to quickly scale up production in a crisis.)

- Development of medicines and vaccines for a wider range of illnesses.
- A healthcare system that can respond to mass catastrophes. Specifically, hospitals need to develop plans for transferring patients, sharing medical expertise, and learning from each other.
- Responding to the health consequences of a nuclear attack is also important. There is no other organization working on this issue. It has the potential to save hundreds of thousands of lives in the event of an attack.

Possible threats

The risk of biological attack and flu pandemic should be considered to be of indeterminate rather than a specific low probability, because we have little idea how likely these events are. Both have occurred in the past and should be expected to occur again in the future.

Noncontagious biological attacks

The anthrax letter attacks of 2001 are an example of a noncontagious bioweapons attack on a very small scale. As may have occurred in the case of the anthrax letters, the same actor might be able to make multiple small-scale attacks. The threat of a recurring attack would be very frightening to the public.

In the 1950s–1970s, nations developed noncontagious bioweapons designed to kill on first exposure that would have had much larger effects than the anthrax letters.

The materials required for bioweapons are widely available, and assembling a bioweapon requires much less expertise than assembling a nuclear weapon. Similar techniques as were used to create the bioweapons of that era are now routinely used in the vaccine and agriculture industries, and many biomedical scientists would be capable of making bioweapons.

Contagious engineered pathogens

It is now possible to engineer noncontagious natural viruses to make them transmissible. In fact, in several recent experiments, researchers have engineered flu viruses that were previously not transmissible between animals similar to humans to be transmissible between those animals. Such work could lead to catastrophe in two ways:

1. Further such work done to further scientific understanding could accidentally produce a dangerous virus that might escape the lab.

2. As details of such work are published, it becomes possible for a scientist to maliciously use that public knowledge to create a devastating pathogen. Currently, there are few obstacles in place to prevent this possibility.

Reintroduction of a dangerous natural pathogen

A pathogen such as smallpox could intentionally be released. Since vaccination against smallpox is now very rare, people would have little immunity against the disease.

H5N1

The H5N1 flu virus, often called avian flu, has already killed hundreds of people and is still present in birds around the world. With relatively few genetic changes, the virus could likely become more transmissible between humans (currently transmission between humans is very rare). If avian flu became as transmissible as seasonal flu, it could circulate the world, just as other flu strains do during flu season. The difference is that while typical flu viruses have low case fatality rates, H5N1 has a 50% case fatality rate in healthy people. An H5N1 pandemic could be many times worse than the infamous Spanish flu pandemic of 1918, since that flu had a case fatality rate of only 1-2%. Besides killing many people, the virus would disrupt gatherings of people for school and commerce.

People for GiveWell to talk to

- Luciana Borio, M.D., Assistant Commissioner for Counterterrorism Policy, U.S. Food and Drug Administration.
- Ari Schuler, Deputy Chief of Staff of Science and Technology, U.S. Department of Homeland Security.
- Richard Hatchett, Chief Medical Officer and Deputy Director for Strategic Sciences, Biomedical Advanced Research and Development Authority (BARDA), Office of the Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services. (BARDA was recently founded to further develop research after the early stages are completed with NIH funding.)
- Phil Russell, led Department of Health and Human Services countermeasures against biological attack before BARDA.
- Ali Khan, Director, Office of Public Health Preparedness and Response (PHPR), Centers for Disease Control and Prevention. (PHPR controls vaccine and medicine stockpiles, lab monitoring, and public health agency funding across the country.)
- George Korch, Senior Science Advisor at HHS, ASPR
- Jason Matheny, program manager, Intelligence Advanced Research Projects Agency (IARPA).

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