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By Robert C. Hutchinson



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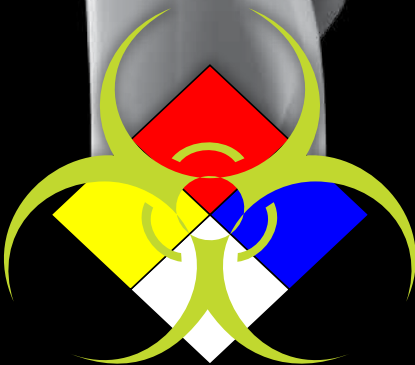
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Building a Healthy & Resilient Community

By Catherine L. Feinman



A healthy community is a resilient community. From pandemic threats to school shootings, crisis events continue to affect the health and wellbeing of the surrounding human population long after the crisis ends. These health effects can then weaken a community's ability to cope with future disasters. As such, physical, psychological, environmental, and technological factors all play key roles in determining how well a community prepares for, mitigates, responds to, and recovers from a disaster.

Hurricanes and other natural disasters have both immediate and long-term consequences, which extend the recovery time. However, when a community is isolated, the consequences can be even greater. For example, the 2017 hurricane season has spurred the U.S. Virgin Islands Emergency Medical Services to address this concern and the islands' specific needs by endeavoring to deploy a [community paramedicine model](#).

When the physical, psychological, or environmental health of a community is in jeopardy, the ability to recover after a disaster becomes much more challenging.

Infectious diseases and pandemics may indicate a crisis, or they may be secondary or tertiary consequences of another crisis. Regardless, the original source of the disease may be unknown or may have travelled a long distance before manifesting. Because of the wide-ranging implications related to disease, planning strategies may require a multijurisdictional or even [global approach](#) in order to prevent, detect, and respond to these threats.

Other key players in mitigating public health emergencies include [environmental health professionals](#), who help bridge the gaps that often exist between the various sectors involved in addressing key public health concerns. Whether naturally occurring or human caused, early and coordinated intervention with all key stakeholders is critical. Recognizing the signs and symptoms of an emerging threat saves lives. This is true regarding those falling ill at the beginning of the influenza season or [terrorists using new tactics](#) to interfere with the food supply.

Building a healthy and resilient community goes beyond the visible and physical effects of a disaster. The [psychological trauma](#), in some cases, can be even more devastating than the physical trauma in the long term. Ignoring this fact could compromise a community's preparedness and response efforts and risk the health and lives of its citizens. This edition of the *DomPrep Journal* addresses these concerns and provides lessons learned from previous disasters.

Trauma Lessons Learned From a School Shooting

By Robert C. Hutchinson

At the end of the school day on 14 February 2018, a former student entered Marjory Stoneman Douglas High School (MSDHS) in Parkland, Florida, and committed a mass murder on the campus that forever changed numerous lives and an entire community. During the attack, 17 students and staff were killed and another 17 were injured. Approximately 3,500 students and staff were not physically injured, but most definitely affected by the active shooter attack.

The tragedy continues to be investigated, analyzed, and studied by a [formal commission](#), [after action task forces](#), law enforcement, prosecutors, victim families, media, and numerous other parties. Upon release of their results and findings, lessons shall be learned and hopefully logically implemented for permanent and lasting changes to address the dozens of interdiction and mitigation opportunities that were missed in this tragedy to interrupt the next attack. Before the release of the formal reports and findings with recommendations, several lessons learned that may not directly appear in the findings are useful for consideration by first responders and others regarding response operations and mitigation of trauma in these complex incidents.

Defining Trauma & Its Triggers

Trauma has been defined in various ways, including but not limited to the following:

- [Merriam Webster](#) defines trauma as “an injury to living tissue caused by an extrinsic agent”; “a disordered psychic or behavioral state resulting from severe mental or emotional stress or physical injury”; or “an emotional upset.”
- The [American Psychological Association](#) defines trauma as “an emotional response to a terrible event like an accident, rape or natural disaster.”
- The [American Psychiatric Association](#) defines post-traumatic stress disorder (PTSD) as “a psychiatric disorder that can occur in people who have experienced or witnessed a traumatic event such as a natural disaster, a serious accident, a terrorist act, war/combat, rape or other violent personal assault.”
- According to [The New Social Worker](#), “retraumatization is a conscious or unconscious reminder of past trauma that results in a re-experiencing of the initial trauma event. It can be triggered by a situation, an attitude or expression, or by certain environments that replicate the dynamics of the original trauma.”

For the discussion in this article, the definition of trauma shall focus on psychological or emotional rather than physical, even though both were evidently present during the MSDHS active shooter attack.

Trauma may leave an imprint on the brain – such as a sight, sound, touch, smell, or taste – which could [trigger](#) a flashback. Flashback experiences may be brief and typically last only a few seconds, but the emotional after-effects may last for hours or longer. A review of the three lessons learned below demonstrates the importance of considering previous trauma and the rolls those actions, triggers, and flashbacks play in retraumatization.

Lesson 1 – Expanding Trauma During Search & Rescue

Through observations and comments made by MSDHS staff and students, it was repeatedly identified that the breaching of scores of classroom doors during the primary and secondary room clearing (searching) of the campus expanded the trauma experienced by the students and staff on that day. The use of breaching tools for the entry into rooms to clear the occupants for the primary search was a necessary task, especially when law enforcement officers could not locate keys and time was of the essence. It was unknown if additional attackers were part of the attack plan and hidden on campus or if others required medical attention.

The continued breaching of doors after the shooter was in custody for the secondary searches of each room created a substantial level of noise and confusion for the occupants of the rooms, especially those concealed within second level sheltering areas inside the rooms. The breaching was often confused with gunshots by some of the occupants or as the killer attempting to make entry, which resulted in further trauma for survivors after the primary event was well over.

A lesson was learned that schools should have additional master keys in a designated secure location for immediate first responder access. First responders should also accept master keys to permit a faster and quieter entry into the rooms to better permit rapid access for the element of surprise and reduce the impact on the room occupants, who do not always know who is making forced entry into the sheltering area during an emergency lockdown.

Lesson 2 – Triggering Flashbacks

The MSDHS campus reopened two weeks after the campus attack. The first day that the students returned to MSDHS was as emotionally charged and solemn as expected after the tremendous incident. To support the students, there was an outpouring of support from the public to include a very [large presence of law enforcement](#), which was coordinated by a local police association, at the MSDHS front entry gates.

Regrettably, there was also a very large media presence with news helicopters and news trucks, which appeared extremely similar to the day of the attack. The presence of hundreds of law enforcement officers at the first day back at school, while handing out flowers, may not have had the positive effect on all of the returning students as intended by those well-intentioned first responders. The last time the students were on campus was during the active shooter attack on Valentine’s Day when flowers were also distributed and an enormous amount of law enforcement and media were present.

According to many students and staff members, the great intentions of the law enforcement supporters with the flowers triggered memories of that horrible day. They were fleeing the campus with flowers and stuffed animals in their hands as a tremendous amount of law enforcement was running in. On the day of the shooting as well as the first day back, the students and law enforcement crossed paths in the same location. Inadvertently, these actions reportedly resulted in flashbacks for some of the students and staff by providing triggers to relive the fateful day. A lesson was learned to better evaluate, consider, and discuss subsequent actions by first responders and others to reduce the likelihood of triggers for traumatic flashbacks.

Lesson 3 – Mitigating Triggers

After the attack, several of the 14 law enforcement agencies that provide school resource officers (sworn law enforcement officers) to the school district chose to openly carry long guns (rifles) on campus to enhance their preparedness. The possession of long guns on campus had never occurred before 14 February 2018 beyond the trunk of a police vehicle. This was a significant change in the law enforcement and educational cultures on the designated campuses with these school resource officers.

The display of the long guns on slings in the schools was received with mixed emotions throughout the county of approximately two million residents and 275,000 students. Many citizens appreciated the enhanced tactical preparedness, but some citizens did not want school resource officers to be armed with any firearms, even after the attack.

Beyond the massive cultural change with the presence of long guns on campuses, there was another serious impact – especially at MSDHS. The long guns carried by the officers were very similar in appearance to the weapon used by the killer. Even when the long guns were not openly carried and were concealed in a long gun case on the back of the officer, the case was similar to the case utilized by the killer on the day of the attack. There was a great concern that the existence of the long gun and case could trigger flashbacks for some at MSDHS and distress persons at other school locations.

To mitigate this unintended consequence, the law enforcement agencies located a long gun case that provided the appearance more of a tennis racket case rather than a classic long gun case. This new style of long gun case, available in several colors, was able to divert much of the attention away from the long gun being carried by the officer on the school campuses. The ease of access to the weapon also appeared to encourage the long guns to be carried in the case and concealed from student, staff, and public observation.

A lesson was learned that, through teamwork and discussions, an option was identified that addressed many of the concerns on both sides of the fence for carrying long guns on campus. The concealment from open view, of a long gun on a sling, may assist those for which it could be a trigger while permitting immediate access if required by the officer. The solution was functional and considerate.

Lessons Learned & Shared

The impact of the shooting shall be analyzed in many ways since the consequences were so vast, deep, and lasting. The lessons learned from this tragedy are numerous and continue to this day. These three lessons learned expand beyond standard tactical and operational concerns to include the perspective and consideration of trauma and retraumatization for future planning and preparedness.

Robert C. Hutchinson has been the chief of police for the Broward County Public Schools, Special Investigative Unit since 2016. He was the former deputy special agent in charge and acting special agent in charge with U.S. Department of Homeland Security (DHS), Homeland Security Investigations in Miami, Florida. He retired in 2016 after more than 28 years as a special agent with DHS and the legacy U.S. Customs Service. He was previously the deputy director and acting director for the agency's national emergency preparedness division and assistant director for its national firearms and tactical training division. His writings, interviews and presentations often address the important need for cooperation, coordination and collaboration between the fields of public health, emergency management and law enforcement. He received his graduate degrees at the University of Delaware in public administration and Naval Postgraduate School in homeland security studies.

Combating Pandemic Threats – Global Health Security Agenda

By Gary A. Flory

On 6-8 November 2018, global health leaders from around the globe met in Bali, Indonesia, for the 5th Global Health Security Agenda (GHSA) Ministerial Meeting. At the meeting, the GHSA launched a five-year plan to address health security issues called GHSA 2024 and U.S. Health and Human Services Deputy Secretary Eric Hargan reaffirmed U.S. support for the GHSA with a pledge of \$150 million. This global efforts and this commitment of resources to strengthen the capacity to prevent, detect, and respond to infectious diseases are clearly needed.



The [1918 Spanish Flu](#) sickened 500 million people and killed nearly 50 million. More recently, the [2014-2016 Ebola crisis](#) killed more than 11,000 people and some reports suggest that the [swine-flu pandemic of 2009](#) may have killed as many as 203,000 people. With global travel and trade increasing and population growth resulting in more interactions between humans, wildlife, and livestock, infectious disease threats are increasing rapidly. Whether naturally occurring or intentionally introduced, communities must prepare for the next infectious disease outbreak.

Fighting Back With the Global Health Security Agenda

To combat these ever-increasing threats, the Global Health Security Agenda ([GHSA](#)) was launched in February 2014 to strengthen both global capacity and each nation's capacity to prevent, detect, and respond to infectious diseases threats. Since then, the GHSA has expanded to include over 60 countries as depicted in Table 1. The initiative brings together nations, international organizations, and nongovernmental stakeholders to make measurable strides to address public health emergencies. It supports collaboration not just among countries but also between public health, agriculture, security, and environmental sectors. The GHSA is one way to operationalize the [One Health concept](#) – the idea that the health of humans, animals, and the environment is inextricably connected.

As described on the GHSA website, the vision of the initiative is a world safe and secure from global health threats posed by infectious diseases whether naturally occurring, deliberate, or accidental. The pathway to this vision is organized around three main objectives: to prevent, detect, and respond to disease threats. Within these three broad objectives are 11 specific targets critical to the goals of the GHSA. These targets are identified as [action packages](#) and were developed by participating countries during two commitment development meetings in 2014. Each action package includes a five-year target, an indicator to measure progress, desired outcomes, country commitments, and long-term actions.

Prevent Avoidable Catastrophes

The worst catastrophes are those that could have been prevented. This is true in business and engineering and many other fields, but is often overlooked in efforts to prevent disease outbreaks. Action packages focusing on preventing avoidable disease threats include

Afghanistan	France	Mali	South Africa
Argentina	Georgia	Mexico	Spain
Australia	Germany	Mongolia	Sweden
Azerbaijan	Ghana	Netherlands	Switzerland
Bangladesh	Guinea	Nigeria	Tanzania
Burkina Faso	Guinea-Bissau	Norway	Thailand
Cameroon	India	Pakistan	Togo
Canada	Indonesia	Peru	Turkey
Chile	Israel	Philippines	Uganda
China	Italy	Portugal	Ukraine
Colombia	Japan	Republic of the Congo	United Arab Emirates
Côte d'Ivoire	Jordan	Republic of Korea	United Kingdom
Democratic Republic of Congo	Kenya	Saudi Arabia	United States
Denmark	Laos	Senegal	Vietnam
Ethiopia	Liberia	Sierra Leone	Yemen
Finland	Malaysia	Singapore	Zimbabwe
<i>* as of February 2018</i>			

efforts to address [antimicrobial resistance](#), [zoonotic diseases](#), [biosafety and biosecurity](#), and [immunization](#).

Of the [1,415 pathogens](#) known to infect humans, 61% of those disease organisms are considered zoonotic. [Zoonotic diseases](#) are those that can be transmitted from animals to humans. Common examples of zoonotic disease include avian influenza, rabies, Ebola, and anthrax. To reduce the emergence and spread of infections of zoonotic diseases, the first step is to identify the diseases not only in humans but also in wildlife and livestock. With enhanced animal disease surveillance, it may be possible to identify and respond to disease outbreaks before they pose a significant risk to human populations.

Once identified in an animal population, responders can implement a series of measures to prevent the spread of the disease within the animal population and minimize human exposure. A comprehensive animal disease



Thousands of turkeys killed by highly pathogenic avian influenza. Source: ©2016 Gary Flory



Decontamination procedures following a zoonotic animal disease. *Source:* ©2016 Gary Flory

response plan may include a variety of strategies including quarantine in infected animals, vaccination, movement control, enhanced surveillance, stamping out, carcass disposal, and facility disinfection.

The biosafety and biosecurity action package focuses on the storage and handling of dangerous pathogens. This is important to avoid not only the theft and intentional misuse of pathogens, but also the accidental release and spread of diseases. Implementing effective biosecurity programs requires extensive training wherever these organisms exist.

In addition to robust biosecurity programs and zoonotic disease response strategies, there are preventative action packages designed to address microbial resistance and to prevent death and illness through the implementation of a robust vaccination program.

Detecting Threats Early

The second broad objective of the GHSA is to detect disease threats early. This objective includes four action packages: [national laboratory systems](#), [real-time surveillance](#), [reporting](#), and [workforce development](#). Together these action packages save lives by improving the ability to quickly identify disease outbreaks, share disease detection information with public health officials, and train staff to detect and investigate disease outbreaks.

Responding to Disease Threats

The third and final objective is to enhance response to confirmed disease threats. During any disaster, the difference between success and failure often lies in the effectiveness of the communication. Emergency operations centers with well-trained staff are able to efficiently monitor and respond to disasters by deploying resources where they can do the most good. The last two action packages – [linking public health with law and multisectoral rapid response](#) and [medical countermeasures and personnel deployment](#) – support the deployment of trained, cross-sector responders from the emergency operations center.

Measuring Capabilities

At the heart of the GHSA is the country assessment conducted by a standardized joint external evaluation (JEE) process. The JEE process measures a country's current capabilities and progress toward building capacity to prevent, detect, and respond to infectious disease threats. The assessment also highlights gaps in capabilities to inform the development of implementation plans.

The JEE is a two-stage process that includes a self-evaluation conducted by in-country representatives from many sectors including ministries of health, agriculture, wildlife, environment, and defense. Together these stakeholders collect the necessary information to evaluate the country's capabilities to prevent, detect, and respond to infectious diseases.

An external evaluation follows the self-evaluation phase. This evaluation is conducted by a JEE team made up of experts from member countries, the World Health Organization, the World Organization for Animal Health, the Food and Agricultural Organization, and a variety of other international organizations. Together the JEE team and experts from the host country assign scores to the country's capabilities in the 19 areas covered in the JEE tool. In addition to the scoring each area, the team identifies strengths, best practices, areas of improvement, challenges, and priority actions. The information collected in the process is published in a Joint External Evaluation Mission Report containing approximately 60 priority actions identified in the external evaluation process.

Filling the Gaps

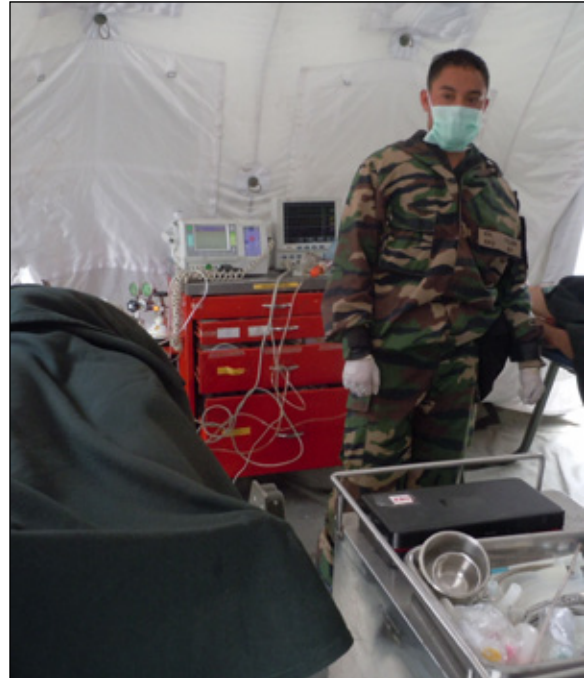
With the gaps and priority actions identified through the JEE process, countries are able to develop a five-year action plan to address gaps in capabilities. These plans, or roadmaps, include annual milestones and provide a way to prioritize and match action items to available resources. They also provide potential funders a way to identify projects that match the mission of their organizations.

Since it was launched in 2014, membership in the Global Health Security Agenda has risen steadily from 40 participating countries to over 60. Each year, more joint external evaluations are conducted, roadmaps are developed, and priority action items are addressed to increase the global capacity to prevent, detect, and respond to infectious diseases threats.

There is no doubt that funding for the Global Health Security Agenda will be cyclical and that significant funding cuts by donor partners will negatively impact the ability to implement priority projects and improve global response capacity. Regardless of funding, a global, focused, and strategic approach will be more effective than the independent efforts of individual countries to prevent, detect, and respond to infectious diseases threats.

This article was modified from one first published in CBNW (Chemical, Biological & Nuclear Warfare) journal, May 2018.

Gary Flory is the agricultural program manager for the Virginia Department of Environmental Quality. He also founded G.A. Flory Consulting, a global consulting firm, to help clients with a range of services including animal disease and natural disaster response, agricultural emergency planning, and emergency response training.



Mobile field hospital in Malaysia for responding to infectious disease threats.
Source: ©2013 Gary Flory

Hurricanes & Islands – One Year Later

During September 2017, two major Category 5 hurricanes impacted the U.S. Virgin Islands. More than one year later, the scope, scale, and magnitude of Hurricanes Irma and Maria are still being felt. The three islands that make up the U.S. Virgin Islands – St. Thomas, St. Croix, and St. John – suffered prolonged critical infrastructure shortages and failures in the aftermath of the storms. A lack of reliable access to electricity and water compounded challenges as the islands sought to recover from a hurricane season that caused an estimated \$282.27 billion in damage and claimed over 3,300 lives.

In the U.S. Virgin Islands, many buildings were damaged, destroyed, or later condemned. This included the hospitals serving St. Thomas and St. Croix and several of the Department of Health's buildings, clinics, and offices. After a year has passed, the residents are adjusting to the new normal and are working with the resources that have been provided.

DomPrep Advisor Andrew Roszak, who has been supporting recovery efforts in the Caribbean through the Institute for Childhood Preparedness, recently sat down to conduct a podcast with Chance Lindner of the U.S. Virgin Islands Emergency Medical Services (EMS) to learn more about the state of recovery and how EMS is seeking to deploy a community paramedicine model to better serve the needs of the Islands.

[Click](#) to listen.

Andrew Roszak, Moderator, Executive Director, Institute for Childhood Preparedness

Chance Lindner, Program Manager, U.S. Virgin Islands Department of Health's Mobile Integrated Healthcare and Community Paramedicine Program



Environmental Health – Profoundly Local & Profoundly Useful

By David Dyjack

Nutrition, community resilience, and poverty are just a few factors that are of great importance to public health professionals, which include representatives for maternal and child health, preparedness, nutrition, epidemiology, and land use planning, among others. However, the second largest segment of the public health workforce – the environmental health (EH) profession – bridges the gaps within the public health discipline as well as between public health and other disciplinary sectors.



Despite being the profession that inspired the launch of the American Public Health Association ([APHA](#)), environmental health as a concept and a vocation is still often poorly understood. Flood conditions created by recent hurricane seasons highlighted the central roles that the EH profession plays in protecting vulnerable populations. For example, local EH specialists are qualified to answer the following questions and many more:

- Is the local emergency room safe to reoccupy?
- Is the day-care center suitable for children?
- What are the implications for individual homeowners whose wells were contaminated by fecal and chemical pollutants?
- Is the food in the restaurant walk-in cooler safe to eat?
- Is the emergency shelter being operated in a manner that limits the risk of highly contagious noroviruses?

Field-Based Qualifications & Resources

Most EH professionals have completed essentially the same foundational college science

and math courses as pre-med students. They apply that education in the field every day as they interpret and enforce health and safety codes and assess environmental conditions, which may result in serious harm or death within their communities.

The critical differentiating feature from other public health professions is that they are field-based. They work directly with the regulated community,



such as retail food facilities. They inspect the hospitality industry. They approve land use plans. They inventory wells and septic systems. In fact, one could apply the old adage and say that environmental health is for “everybody, everywhere, all the time.”

Local EH departments should be considered as access resources. They have access to almost every segment of society – industry, education, and healthcare for starters. They can be particularly helpful during emergencies because they know and work with a broad swath of society. At one statewide meeting in 2017, a Minnesota state health official boasted that her environmental health professionals communicate in 18 different languages. Such linguistic skills are necessary to effectively communicate with their constituents.

Most environmental health professionals have completed essentially the same foundational college science and math courses as pre-med students.

Local EH departments should also be considered as axis resources. In many localities – particularly rural and frontier areas – environmental health is public health. That is, the local health department is largely or entirely comprised of EH professionals. In places where resources are more abundant, EH remains essential in advancing public health goals. For example, considering the opioid epidemic, the EH workforce is a central player in drug take-back programs and needle exchange programs. In some cases, segments of the EH workforce have been reassigned to work on opioids because of their familiarity with local subcultures and immigrant languages.

A Local Solution for Local Concerns

In many instances, environmental health issues are hyper-local. Consider childhood lead exposure due to aging paint or drinking water traveling through lead service lines. Concerns do not get much more local than the water from a kitchen faucet, the paint that covers windowsills, and the food going into children’s mouths.

EH professionals are valuable resources in virtually every community in the country. Emergency preparedness, response, and resilience professionals should establish working relationships with their local EH departments before they are needed. The director should be on speed dial. Much of the progress to be made in public health will occur in spaces between the health professions. It is time to fill that space with possibilities, and begin that journey today.

David T. Dyjack, Dr.PH, CIH, is executive director and CEO of the 7,000-member National Environmental Health Association (NEHA), a position he has held since May 2015. Throughout his career, he has worked in over 50 countries, most recently in the Congo, South Sudan, and post-earthquake Haiti. Under his leadership, NEHA has established a presence in Washington, D.C. in support of efforts to influence national policy. He is Principal Investigator on two recent externally funded awards from the U.S. Centers for Disease Control and Prevention. The first grant serves to increase capacity of the environmental health profession writ-large, while the second is focused on rebuilding essential environmental health services in the U.S. Virgin Islands. He earned a doctorate in public health from the University of Michigan, an MSPH from the University of Utah, and is a board-certified industrial hygienist (CIH). Email: ddyjack@neha.org. Follow him on Twitter: @DTDYJACK

Gene Drives – An Emerging Terrorist Threat

By Richard Schoeberl

Conventional acts of terrorism will likely never fade away, and advancements in technology will continually raise concerns for governments and global security practitioners. The increasing threat and possibility of chemical, biological, radiological, nuclear, and explosive (CBRNE) use is evolving. Terrorist groups are actively seeking materials and the expertise to manufacture and utilize those materials in future operations. One of the frontiers in terrorism today involves a developing technology known as “gene drives.”



For several years, scientists have been able to alter genes inside plant and animal cells with efforts focused on altering the traits of these organisms. [Gene-drive](#) technology uses genetic engineering to “drive” desirable or undesirable traits through a population. Without gene drives, genes have a 50/50 chance of being passed on during the reproduction phase, the gene-drive technology can cheat the reproduction phase to ensure that the desirable pair of chromosomes can or cannot be inherited by all offspring. In addition to altering the genes in an organism, the gene drive also makes the altered trait inheritable, thus passing it down to ensuing generations.

Modifications With Deadly Potential

Gene editing is a prevailing technology and the real danger is whether the gene altering is done to push a desired mutation that could be harmful to a population. This potentially could lead to negative outcomes, such as destroying crops through agroterrorism, creating genetic mutations among insect populations, or reconstructing a variety of hazardous pathogens – all from DNA sequences.

The advancing gene-drive technology has great potential. However, the world is largely unprepared for threats stemming from this rapidly emerging technology. In 2016, the director of national intelligence (DNI) released a [Worldwide Threat Assessment](#) alerting the intelligence community of the potential risks associated with gene-drive technology or gene editing, categorizing it as a potential weapon of mass destruction (WMD) and a threat to national security. The DNI’s concerns were voiced when then Director James Clapper testified before the Senate Armed Service Committee:

Research 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. Given the broad distribution, low cost, and accelerated pace of development of this dual-use technology, its deliberate or unintentional misuse might lead to far-reaching economic and national security implications. Advances in genome editing in 2015 have compelled groups of high-profile U.S. and European biologists to question unregulated editing of the human germline (cells that are relevant for reproduction), which might create inheritable genetic changes. Nevertheless, researchers will probably continue to encounter challenges to achieve the desired outcome of their genome modifications, in part because of the technical limitations that are inherent in available genome editing systems.

Although the reality of would-be terrorists actually utilizing gene-drive technology in a terrorist attack might sound like science fiction, the realism is the technology is available at a low cost and is ineffectively monitored, and the desire by organizations to possess this technology is real. Although gene drives theoretically used by terrorists could work on humans, it is not realistic without the process taking centuries. The technology works best on organisms that reproduce quickly, such as plants, rodents, and insects.

Low Cost & Accessible – A Desirable Combination for Terrorists

A new genome-editing technique, recognized as clustered regularly interspaced short palindromic repeats (CRISPR), has gained the attention of the intelligence community, which has argued that the low cost ([online for roughly \\$60](#)) and wide accessibility of the basic components of the technology makes it of increasing concern. The [CRISPR](#) technique permits scientists to “cut and paste” in DNA easier and more precise than ever before. Because CRISPR technology allows scientists the ability to selectively edit DNA in living cells, would-be terrorists could potentially craft bacteria or viruses that repress and damage human gene cells. The technology could also make it conceivable for an aspiring bioterrorist to recreate known pathogens such as harmful viruses or bacteria.

The misapplication of CRISPR is so concerning among [national security experts](#), the technology is recognized as a security risk – similar to the risk of nuclear capabilities in North Korea and the use of CBRNE by the Syria regime. It is highly likely that, in the near future if not already, unknown groups using inexpensive laboratory equipment purchased online will have the capability to reconstruct a variety of hazardous pathogens – all from DNA sequences.

According to the [American Association for the Advancement of Science](#), there is a significant danger of potential gene-drive abuse. For example, gene-drive technology employed by a terrorist organization or a state sponsor of terrorism against the agricultural sector could be difficult to counter and could cause substantial damage. Although an imminent threat of agroterrorism at this time is unknown, intelligence suggests that terrorist organizations have long had ambitions to target the agriculture sector, thus this threat cannot be ignored.

The economic damage and disruption, coupled with the relative inexpensiveness and unsecured status, vulnerable farming operations make it easily accessible and attractive to terrorist organizations. Hundreds of pages of [documents](#) pertaining to the U.S. agriculture sector were recovered in Afghanistan in 2002, and a Central Intelligence Agency ([CIA](#)) report in 2003 detailed that the 9/11 hijackers had expressed interest in crop dusting aircraft. In March 2017, a [report](#) by the Office of the Inspector General found that “the Office of the United States Department of Agriculture (USDA) Homeland Security and Emergency



Coordination had not adequately overseen and coordinated the efforts to prevent, detect, and respond to agroterrorism.” Furthermore, the USDA was not “in compliance with the [Homeland Security Presidential Directive \(HSPD\) - 9](#) requirements to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies.”

A 2017 law aims to correct the problem of preparedness. Chiefly because coordination between Homeland Security and the Department of Agriculture was absent, the new law [Securing Our Agriculture and Food Act \(HR 1238\)](#) directs the Department of Homeland Security to take the lead in fighting agroterrorism. Although these measures seek to mitigate the risk of agroterrorism, more aggressive and comprehensive policies must be taken to ensure a secure agricultural sector.

Ongoing Security Implications

Although there are cruder methods for instilling terror, the fact that gene-driven technology exists has lasting security implications the world is not prepared for if misused. The theory and application of bioweaponry has a [long history](#) of use. For example, in as early as 600 BC, infectious diseases were recognized for their potential catastrophic impact on armies and citizens. During World War I, the Germans had an ambitious biological warfare program and, in World War II, Japan experimented on over 10,000 prisoners using plague, anthrax, and other diseases. Gene-driven technology, if misused, has the potential for global implications as it transcends borders.

The future of CBRNE security is going to require a far-reaching international response. Internationally, measures are already in place to prohibit and prevent the development of biological weapons through the [Biological Weapons Convention](#). In December of 2016, all 178 state parties [declared](#) continuous determination, “to exclude completely the possibility of the use of (biological) weapons, and their conviction that such use would be repugnant to the conscience of humankind.” However, addressing the threat of thwarting any misuse of gene-driven technology such as CRISPR cannot be completed by any nation alone. Therefore, unilateral security measures, such as practical biological security measures, are imperative.

Because of the infancy in this technology, evaluating the actual national security threats will be problematic with gene-driven technology. At this point, scientists cannot foresee all the directions this technology could lead to at this time. However, its relative ease of use and the scope of applications will make it even more challenging for security practitioners.

Richard Schoeberl (pictured above), has over 23 years of security and law enforcement experience, including the Federal Bureau of Investigation (FBI) and the Central Intelligence Agency's National Counterterrorism Center (NCTC). He has served in a variety of positions throughout his career, ranging from supervisory special agent at the FBI's headquarters in Washington, D.C., to acting unit chief of the International Terrorism Operations Section at the NCTC's headquarters in Langley, Virginia. Before these organizations, he worked as a special agent investigating violent crime, international terrorism, terrorist financing, cyberterrorism, and organized drugs. He was also assigned numerous collateral duties during his FBI tour – including a certified instructor and member of the agency's SWAT program. In addition to the FBI and NCTC, he is an author and has served as a media contributor for Fox News, CNN, PBS, NPR, Al-Jazeera Television, Al Arabiya Television, Al Hurra, and Sky News in Europe. Additionally, he has authored numerous articles on terrorism and security. He is currently a Professor of Criminology and Homeland Security at Martin Methodist College and works with Hope for Justice – a global nonprofit combatting human trafficking.

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