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What's Next?

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Featured in This Issue

Editorial Remarks
By Catherine Feinman5

See Something . . . Do Something
By Martin D. Masiuk6

Climate Change Presents an Emerging, Dynamic Set of Hazards
By Jeffrey N. Rubin8

Bioterrorism in a Technologically Advanced World
By Christina M. Flowers10

Preparing for the Unknown
By Jerome H. Kahan13

Forging New Partnerships for Healthcare Preparedness
By Jessica Wambach Brown17

Training Programs & National Preparedness
By Brandon J. Pugh21

Reimagining Epidemic Communications
By ELISS Fellows24

Predictive Policing: Renewed Promise Through New Approaches
By James R. (Chip) Coldren Jr. & Zoë Thorkildsen27

The Art of Awareness for Emergency Medical Calls
By Seth J. Komansky & Raphael M. Barishansky29

Overcoming Notification Systems Challenges
By William (Bill) Betcher32

Food for Thought: Emergency Shelters & Food Allergies
By Andrew Roszak34

About the Cover: The future of a nation's security is uncertain, especially in light of recent terrorist attacks in various parts of the world. As threats increase, technology advances, and the environment changes, subject matter experts must answer the tough question, "What's Next?" (Source: iStock.com/chrisfarrugla)

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Editorial Remarks

By Catherine Feinman



As terrorist tactics change, biological agents adapt, technology advances, and the climate changes, communities are left asking, “What’s Next?” as they try to reimagine their future preparedness needs. DomPrep’s publisher Martin Masiuk leads this issue with a reflection on the brave actions of several citizens on 9/11, and the model they set for others to not just say something, but to do something about such threats. Identifying emerging threats and finding new solutions are the focus of this month’s issue of the DomPrep Journal.

Jeffrey Rubin describes the growing support for scientific research on weather conditions that are exhibiting new extremes, especially considering the potential consequences on communities’ public health and critical resources. James Coldren Jr. and Zoë Thorkildsen also discuss the need for more research with regard to predictive policing. Such research provides decision makers with the right tools to prepare for the unknown by leveraging knowledge to build effective preparedness programs, as described by Jerome Kahan.

Of course, any disaster has the potential to inflict significant health consequences. To address this concern, healthcare partnerships should be forged among various stakeholder groups as discussed by Jessica Wambach Brown. Practices must be followed to limit exposure to health risks in confined spaces where allergens and contaminants can easily spread, such as emergency shelters mentioned by Andrew Roszak. When health threats are used deliberately against a population, Christina Flowers emphasizes the need to understand the threat, the technology being used to create the threat, and other determining factors.

Maintaining an effective task force to address whatever threats emerge, ongoing training is essential. Brandon Pugh’s research shows the correlations between federally funded training programs and preparedness across the nation. Investing in training for personnel is a cost that is returned in full, plus some. However, sometimes the return on investment is the spared life of a responder. Seth Komansky and Raphael Barishansky identify a critical need for emergency medical services to stay in the “loop” by acquiring better situational awareness skills.

Rounding out the issue is the need for two-way communication – through information sharing and technological capabilities. A group of fellows from the Emerging Leaders in Science and Society recently addressed the topic of epidemic preparedness and concluded that building trust among stakeholders is the foundation for building powerful communication efforts. Once the trust exists, crowdsourcing technologies such as the notification systems described by Bill Betcher provide the avenues to overcome information sharing challenges during an emergency response. Being prepared for whatever is next requires having the right combination of knowledge, skills, and tools.

See Something . . . Do Something

By Martin D. Masiuk

On 11 September 2001, United Airlines Flight 93 passengers Todd Beamer, Mark Bingham, Thomas Burnett, and Jeremy Glick took heroic action rushing the cockpit of a hijacked plane. Although the plane crashed near Shanksville, Pennsylvania, this selfless act prevented an even larger catastrophe and likely saved many lives. "Let's roll" was then and is today a fitting cry for citizens to take individual action.



DomPrep's professional readers have repeatedly itemized their frustrations of agencies being understaffed, undertrained, and overwhelmed. The recent acts witnessed in Paris, France, and San Bernardino, California, reinforce what preparedness professionals have known for a long time, western nations are entering the next stage in the fight as the terrorists bring the battle to the homeland . . . with more to come. This warning of a threat-level escalation has been clearly stated by two respected leaders.

Federal Bureau of Investigation Director James Comey stated, at the Aspen Security Forum in July 2015, "ISIL [Islamic State of Iraq and the Levant] has adopted a model that takes advantage of social media to crowdsource terrorism. They are pushing a message of poison, primarily through Twitter but [also in] other parts of social media; that is a siren song with two dimensions. They are preaching through social media to troubled souls, urging them to join their so-called 'caliphate' in Syria and Iraq. Or, if you can't join – kill where you are!"

Chief Cathy Lanier, Metropolitan Police Department of the District of Columbia framed the discussion in another way. On 23 November 2015, she appeared on CBS's "60 Minutes" and stated that, in an active shooter situation, "most victims are killed within the first 10 minutes. At the Navy Yard shootings in 2013, 10 of the 12 victims were dead in fewer than six minutes." She said most law enforcement agencies could not arrive on scene until after the damage had been done. In a situation when a civilian cannot flee, she recommends they fight.

This change from "see something, say something" to "see something, do something" is a new preparedness message, indeed. It is reminiscent of the Flight 93 call to action on 9/11. Because, the energy and commitment to preparedness that started in 2001 has been mostly wiped away, citizens are being told to become resilient, to do something. The enemy is in the homeland and can attack at will.

If a non-weapon of mass destruction like the 7.62x39 mm (AK-47 rifle) or the 5.56 mm NATO (AR-15 rifle) cartridge in the hands of "troubled souls" can cause nationwide – even international – disruption and terror, imagine the short- and long-term complications of biological, nuclear, or chemical nerve agent attacks that could kill hundreds of thousands or millions of innocents. The threat is real, and it is in the house.

As DomPrep's publisher for 18 years, I sincerely wish I could deliver a more uplifting end-of-year holiday message. Despite my dire forecast, I do wish DomPrep's readers, advisors, sponsors, and their families peace, love, and safety throughout the holiday season and into the new year. As Timothy Cratchit, "Tiny Tim," advised in Charles Dickens' A Christmas Carol, "God bless us, every one!" Now let's roll.

Martin Masiuk is the president and founder of the IMR Group Inc. It was established in 1986. In 1998, Marty created DomesticPreparedness.com (DomPrep), which changed the publishing model by using the internet to reach more disciplines in more jurisdictions than was previously possible. His success with DomPrep gave rise to the Preparedness Leadership Council International, where he serves as the Executive Director.

The poster features a dark orange header with the text "Asia Emergency Management Expo & Conference". Below this, the AEME logo is displayed, consisting of a stylized geometric design and the text "AEME Asia Emergency Management Expo 亞洲應急管理博覽". The AEMC logo follows, with a similar geometric design and the text "AEMC Asia Emergency Management Conference 亞洲應急管理會議". The event dates "10 - 12 May 2016" and location "The Venetian® Macao" are prominently displayed. A contact bar at the bottom provides the phone number "+852 2528 0062", website "www.AEMExpo.com", and email "info@AEMExpo.com". The bottom section of the poster is a collage of three images: an airport tarmac with a plane, a crowd of people with their hands raised, and a modern city skyline with a highway interchange.

Climate Change Presents an Emerging, Dynamic Set of Hazards

By Jeffrey N. Rubin

Despite ongoing political controversy about climate change, one leading organization released a position statement that supports scientific research on weather extremes, which are some of the visible indicators of a changing climate. Changes in weather and habitats need to be addressed to mitigate the potential negative consequences to health and critical resources.



Most of the nonpolitical discussion of climate change has been carried on by those doing research on its causes, including scientists across numerous disciplines, or those investigating one or more potential impacts, such as practitioners in public health, ecology and environmental science, land-use planning, and economics. In general, emergency managers have joined the discussion fairly recently. The political controversy surrounding the topic can itself be an obstacle for allocating resources toward hazard assessment and related tasks, particularly for government emergency managers. For much of the public and many policymakers, hazards related to climate change begin and end with weather – not just because the two are commonly equated with each other, but because extreme weather produces discrete, readily observable events.

Changes in Weather & Sea Level – Position Statements & Policies

In order to consider this broad range of climate-change-related hazards, highlight the role of emergency management in planning for and addressing those hazards, and steer past the political controversy, the USA Council of the International Association of Emergency Managers (IAEM-USA) released a position statement in July 2015, [*The Critical Role of Emergency Management in Climate Change Planning*](#). The position recognizes that “ongoing climate change affects all regions, generating not only direct public-safety hazards, but also long-term economic, sociological, and public-health impacts,” and recommends that “all emergency managers incorporate the short- and long-term effects of climate change in hazard vulnerability analyses, mitigation plans, and comprehensive planning.”

This approach follows that of several U.S. departments and agencies – including Defense, Energy, Health and Human Services, Homeland Security, and the Environmental Protection Agency – as well as individual states, local governments, and private entities. A [2015 Federal Emergency Management Agency policy](#) (effective in March 2016) requires states to “include new hazard data, such as ... changing environmental or climate conditions that may affect and influence the long-term vulnerability” in their mitigation planning. This policy indicates that a new approach to climate-change planning extends beyond the federal level and that emergency managers on all levels are likely to see growing expectations in this area.

Although it is difficult to link specific incidents to climate change, near-term effects likely are occurring already, including not only changes in storm incidence and intensity, but also in average temperatures and “seasonal” weather. Longer-term projections have greater uncertainty as well as different impacts depending on where they occur. Warmer temperatures and altered precipitation patterns may mean drought and longer and more

intense wildfire seasons in some areas, and longer growing seasons or better crop habitats in others. New, more, and/or longer occurrences of extreme heat may be a greater weather hazard than storms: heat waves kill more people in the United States than any other weather-related hazard, and require awareness and management practices that may not exist in newly affected areas.

Changes in total precipitation, its distribution throughout a year, or the amount of rainfall versus snowfall affect electric power generation from hydropower dams (lower or more seasonally variable water levels) and thermal power plants (reduced cooling capacity of local surface water due to lower/warmer water), less water for irrigation, and changes in fish and other aquatic populations. The range of projected sea-level changes – via a combination of glacial melt and expansion of warmer water – over the next 20 to 100 years varies by orders of magnitude, but even small changes can have disproportionate effects. Higher mean sea levels can accelerate beach erosion and lead to: increased infiltration of drinking-water sources and inundation of nonmarine habitats; greater impact of storm surges, flood tides, and tsunamis; and damage to port facilities and other coastal development.

Changes in Habitats – Health & Other Effects

Climate largely defines habitat. Higher average and extreme temperatures can render environments untenable for some species, stress others, and open the door for those that could not establish more than a toehold in the past. Related hydrological changes can have at least as much effect via ground and surface water availability. Extreme regions, such as deserts, can become intolerable, temperate regions can become extreme, and colder regions can become more temperate. Habitat includes native plant species that may be weakened and even replaced, which can affect incidence of wildfires, landslides, and floods, as well as agricultural productivity.

Habitat also includes microorganisms, viruses, and their vectors (insects and other animals that help many of them spread) that affect humans, livestock, and other animals (and plants). Warmer climates can facilitate spread of otherwise tropical diseases to previously temperate regions with dense populations and little inherent immunity. The same changes can also reduce disease occurrence in regions in which they were endemic. It is difficult to project a global net change, but it is likely that some diseases with longstanding geographic confinement will find new populations, and that diseases with limited human exposure will see greater incidence. These and other U.S. regional health effects are summarized in [Figure 1](#) of an October 2015 U.S. Government Accountability Office report.

The IAEM-USA position statement “specifies that emergency managers have a critical role in this process and should be considered essential participants at all levels of government,” but emphasizes a collaborative, interdisciplinary approach. Climate change is a complex process with extensive, intertwined effects that no single discipline can address. It will not be the only dynamic set of hazards that emergency managers face in the next few decades, but it may be the broadest, most interconnected, and least obvious one.

Jeffrey Rubin has served as emergency manager for Tualatin Valley Fire & Rescue, Oregon’s largest fire district, since 2001, and has been involved in hospital and health-system preparedness since the mid-1990s. He holds a BS in geology and geophysics from Yale University, and an MA and Ph.D. in geological sciences from the University of Texas at Austin, where he was a research scientist and assistant dean. He served with City of Austin (Texas) Emergency Medical Services for five years, has been on numerous boards and committees, and has published in geological, medical, safety, and emergency management journals.

Bioterrorism in a Technologically Advanced World

By Christina M. Flowers

Recent advances in genetics, genomics, and biotechnology could have devastating implications for bioweapons and genetically engineered diseases. As such, these developments raise the question of whether it makes sense to pull attention away from “classic” biothreat targets, in favor of more technologically advanced options. Immediacy and ease of use may be determining factors.



Terrorism over the past few decades has accelerated into a major strategy of contemporary conflict, and those who utilize its tactics will continue to exploit developments in emerging technologies. It is imperative then to advance preparedness practices as well as to meet this increased sophistication.

However, with constrained budgets, limited time, and so many other threats to plan for, it can be difficult to determine where to best localize efforts. Bioterrorism especially raises concerns because biological pathogens can be difficult to understand even in their most basic, natural state. Still, it can be argued that advances in genetics, genomics, and biotechnology could have disturbingly equal impacts on things like prion-based bioweapons, agroterrorism, and genetically engineered diseases, just to name a few. This raises the question, “Does it make sense to pull attention away from ‘classic’ biothreat targets in favor of the more technologically advanced options?”

Prion-Based Bioweapons

Transmissible spongiform encephalopathies (TSEs) are diseases caused by prions, which are misfolded proteins devoid of nucleic acids (DNA or RNA), yet still highly infectious. Prions are known to cause fatal neurodegenerative disease and are highly resistant to heat, harsh chemical treatments, and irradiation. [Recombinant prions](#) can be bound to other substances in order to be spread through the air, or persist for years in the soil.

[Symptoms of infection](#) are a byproduct of brain degeneration, where “spongy” holes in brain matter cause sudden personality changes, impaired thinking, difficulty in performing normal functions such as speaking or swallowing, and sudden movements such as twitching or tremors. There are no treatments to halt the progression of TSEs, only to alleviate symptoms as the disease progresses. Fatality rates are described as 100 percent. The most notable TSEs in humans are Creutzfeldt-Jakob disease, kuru, and fatal familial insomnia.

With such a destructive resume, prions appear initially to be a relatively ideal terrorist weapon, except that their incubation periods prior to manifestation of clinical symptoms can take up to [40 years or more](#). With such an extended latency, the risks associated with handling the infectious particles relative to the immediate effects associated with their dissemination do not add up. In addition, because terrorists traditionally prefer to announce their involvement within a timely manner after an attack, it would be theoretically just as

psychologically impactful to institute a hoax event, or to defer to something immediate or broadly recognized by the general population.

Agroterrorism

Diseases in agriculture have far-reaching economic impacts on any country affected. For example, the 2001 British outbreaks of hoof-and-mouth disease ([HFM](#)) – a highly infectious aphthovirus spread through cloven-hoofed animals – resulted in the slaughter of over 6 million livestock and the loss of an estimated \$5.4 billion in tourism revenue. In the United States, farmers are currently battling highly pathogenic avian influenza ([HPAI](#)) H5 infections in poultry – shedding light on the biosecurity issues surrounding mass poultry production facilities, which could serve as entry points and transmission routes for previously unknown diseases.

As devastating as these losses are, it is not highly likely that responses to such incidents would change if terrorists as opposed to natural causes perpetrated these events. The HFM outbreak in Britain had a net economic effect of less than [0.2 percent](#) of the country's gross domestic product, and the HPAI outbreak in the Midwestern United States has gone relatively underreported, except in relation to the increased price of eggs and Thanksgiving turkeys. This is not to say that the effects are not damaging, or that the media would not have a field day with alternate reporting strategies, or that formal retaliation of some kind (as a direct result of the terrorist action) would not be pursued. It is just not “ideal” in the scope of a terrorist weapon deployed in search of policy change, or to illicit massive amounts of fear.

There would be a higher likelihood of destruction and coercion possible in certain foreign nations where specific cash crops contribute heavily to the overall gross domestic product (GDP). In these scenarios, it would be feasible that an invasive species bioweapon could cause significant loss, and thereby make more sense as a potential weapon. The problem (for terrorists) then is that no nation that relies on the same product would likely release such a weapon unless they had the safeguards themselves to counteract it. In traditional bioterrorism, this is typically seen as vaccines, antivirals, or antibiotics. In the scope of agroterrorism, it would have to take on the form of resistance mechanisms – innate or applied to the plants or livestock affected – or through some other medicinal cure. The amount of time, money, and effort required for such safeguards leaves the use of such tactics questionable.

Genetically Engineered Diseases

Of course, the above scenarios assume that an unscrupulous geneticist has not already dedicated his or her life's work to addressing these caveats. Therein lies the real concern, which is probably the hardest one to plan around in regards to preparedness efforts: genetically engineered diseases.

There are multiple ways biothreat pathogens could be potentially manipulated using modern technology. These range from inserting a small piece of plasmid DNA into bacteria with the intention of changing the bacteria's virulence or pathogenic properties, to replacing a single gene (otherwise known as gene therapy) with the intention of possibly eluding existing vaccines. There is even the theoretical possibility of cutting and pasting gene sequences together to create brand new [synthetic organisms](#).

However, swapping genes is also not as easy as it sounds. Molecular pathways influence many different components of the bacteria or viruses' life cycles, and in many unpredictable ways. What might make the virus more virulent might also hinder its ability to evade the immune system. What might make the bacteria more environmentally hearty might also prevent them from replicating so quickly. The possibilities are endless, and not likely to yield mutations that "Mother Nature" herself has not already taken into consideration. For example, [RNA viruses](#) – such as Ebola – circumvent deleterious mutations by replicating with mutations in such high numbers that problematic mutations are able to "revert" to their original states. Influenza virus is also highly genetically variant (hence why flu shots are needed every year, as opposed to only once or twice as a child), and has found many opportunities to jump from one type of organism to another – such as from a bird or pig to a human.

The Next Step

Still, these topics vastly underrepresent the broad scope of what communities could potentially face in the future. It is difficult to determine what needs to be done next and, frankly, it depends on one's job profile. At the highest levels of the military and government, scientists will continue to conduct investigative research. It is imperative for the brightest minds to use their knowledge for good and to preserve humanity. In the private sector, security-based companies will continue to innovate, provide recommendations, and work with the highest echelons of preparedness leadership across the country and the world. All efforts must stay "one step ahead" of whatever warfighters, responders, and citizens are faced with in the future.

At the routine surveillance and response levels, though, little can be accomplished by worrying about the specifics of such threats until they have been deemed credible by higher authorities. After all, many agencies and organizations have difficulty executing effective detection and response mechanisms for the existing "traditional" bioterrorism threats – for example, Ebola, anthrax, botulism, ricin, smallpox, plague, tularemia, Q-fever, and Marburg. These threats are the ones that are current, viable, and persistent. As such, continued training and exercises in handling biohazardous substances and other infectious agents – such as sample collection methods, specimen handling, isolation and quarantine procedures, field-forward detection and identification of biothreat agents, and interagency coordination plans for large-scale biohazard attacks – will be the most essential tactics for combating all future incidents as they occur.

Christina M. Flowers has a Master of Public Health and a Bachelor of Science in Biology. She is currently responsible for U.S. sales management and business development for BioFire Defense: A technology innovation and product development company that has been supplying solutions to field forces and laboratories for biothreat detection and disease surveillance since 1990. She was recently instrumental in BioFire Defense's clinical rollout of the first commercial test for Ebola Zaire virus in the United States. Before BioFire, she was an emergency planner for the Virginia Department of Health, and provided technical laboratory assistance during the 2001 anthrax attacks. Other professional certifications have included tropical and emerging vector-borne infectious diseases and Level-1 Hazmat Instructor. She has organized and participated in a number of emergency preparedness and response efforts across the United States.

Preparing for the Unknown

By Jerome H. Kahan

Stakeholders must be prepared for the critical implications of major natural, terrorist, and unintentional human-caused disasters. By identifying threats, dangers, and risks, then recognizing their relationships and consequences, stakeholders can build more-effective preparedness programs that leverage this knowledge of similarities and differences for various types of disaster scenarios.

“By failing to prepare, you are preparing to fail.”
—Benjamin Franklin, n.d.

“There’s no harm in hoping for the best as long as you’re prepared for the worst.”
—Stephen King, 1982, in “Different Seasons”



Much attention has been paid to preparedness, especially since the tragic terrorist attacks of 9/11, but this concept applies to all types of disasters, not just terrorist attacks. Indeed, a disaster is considered to be an event with consequences far beyond the severity and scope of a manageable emergency, the cause of which could be high-impact attacks by terrorists, large-scale acts of nature, or significant human-caused or technologically precipitated incidents. Each of these causal agents has unique characteristics that affect preparedness needs. As defined by the Red

Cross and [Red Crescent Societies](#), “Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters ... to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences.”

Threat of Terrorism

Whether located abroad or in the growing group of violent domestic extremists, terrorist actions are not predictable, but can on occasion be prevented through the difficult tasks of identifying suspects, disrupting their plans, and arresting potential perpetrators. Terrorists are relatively free to select their targets, tactics, and timing to exploit vulnerabilities, create fear, injure and kill people, destroy property, damage critical infrastructure, and contaminate food and water supplies.

As evil yet smart adversaries, terrorists can use many different types of damage-inflicting methods – including shootings, bombings, release of chemical or biological agents, hijackings, skyjackings, and cyberattacks. It is possible that a terrorist group could build a nuclear weapon by stealing such weapons if not well guarded, purchasing existing nuclear weapons on the black market, or creating relatively unsophisticated but nonetheless highly dangerous, improvised nuclear devices. Perhaps more likely than a nuclear weapon is the risk that terrorists would develop and employ a so-called “dirty bomb” that disperses nonexplosive radiological materials – causing some injuries, requiring areas to be cordoned off, and promoting fear among citizens.

Dangers of Natural Disasters

“Mother Nature” is responsible for many natural disasters occurring in the United States – notably floods, wildfires, earthquakes, tornados, and hurricanes. However, based on historical data from past incidents, some factors can be anticipated – for example, impact areas, frequency of occurrence, type and power of destructive potential, and duration of these natural disasters. Although natural disasters are largely unpreventable, the public can be given warnings and/or precautions can be taken before some of these incidents occur.

The potential consequences of these forces of nature are significant regarding lives lost, injuries, property damage, impact on agriculture, and economic costs; all of which differ widely as a function of population density, property values, and other factors. Businesses exposed to these disasters may be temporarily shut down or permanently closed. Rural areas may have their crops destroyed. Entire communities may be leveled, driving residents to either rebuild or move elsewhere.

Risks of Unintentional Human-Caused Incidents

Major industrial incidents are often caused by human error or technological failure, which may result in deaths and injuries, as well as adverse economic effects. Although steps have been taken to preclude such incidents – ranging from tips to avoid household dangers to safety standards for transporting hazardous materials to codes of practice for the prevention of major industrial accidents – such events still occur. Examples include: rupture

of hazardous materials in storage tanks during land or sea transport; oil pipeline breaks and drilling incidents; industrial fires; collapse of large buildings and bridges; inadvertent release of dangerous toxic and explosive chemical substances from laboratories; reactor meltdowns due to cooling system failures; and widespread water contamination from industrial runoff.

“The consequences of many types of terrorist attacks may or may not require some of the same preparedness measures as those of certain natural disasters and large-scale unintentional incidents.”

Relationships & Consequences

Interestingly, hazards are not fully independent. Natural disasters, such as hurricanes and earthquakes, can trigger damaging technological incidents. Damage and disruption from natural disasters can also open opportunities for terrorist actions as law enforcement personnel are dealing with recovery. In addition, terrorists can deliberately destroy a storage site to spread hazardous materials into populated areas.

Along these same lines, the consequences of many types of terrorist attacks may require some of the same preparedness measures as those of certain natural disasters and large-scale unintentional incidents. For example, explosive attacks by terrorists require first responder care for the injured as in the case of an unintentional industrial blast or the occurrence of an earthquake. Certain actions by terrorists, notably chemical-biological attacks, call for special preparedness measures, such as personal protective equipment for responders and also for affected citizens in the case of an inadvertent release from a hazardous material storage

site. On the other hand, natural disasters such as floods and wildfires, each creates largely unique readiness requirements that are not usually relevant either to terrorist attacks or other human-caused incidents.

FEMA at Work

The Federal Emergency Management Agency sees preparedness as the responsibility of all stakeholders in the form of a [pyramid](#), with households, neighborhoods, and communities on the lower levels and local, county, state, and federal governments at the higher levels. In this connection, FEMA has developed a five-step “[Preparedness Cycle](#)” depicting the continuous process of “planning, organizing and equipping, training, exercising, evaluating and improving,” and starting all over again. In other words, any user can reach an appropriate preparedness posture by assessing threats, finding shortfalls and gaps in security measures, establishing requirements for new policies and programs, implementing these measures with associated training and exercising, reassessing the situation, and then repeating the cycle until the desired outcome is attained.

Not to ignore the need for companies to become prepared, the Department of Homeland Security (DHS), sponsors a resource called “[Ready Business](#)” to “assist businesses in developing a preparedness program by providing tools to create a plan that addresses the impact of many hazards.” Although useful, this approach often leads to hundreds of different plans, since each emergency is unique and each user has different concerns.



Preparedness Guidelines

Over the years, as stated by President Barack Obama in Presidential Policy Directive 8 ([PPD-8](#)), preparedness has broadened to encompass the full range of “capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation.” The capabilities needed to translate these five objectives into operational programs vary as a function of whether the hazard in question is terrorism, natural disasters, or unintentional human-caused incidents and also the particular stakeholder involved. How all the parts of this complex puzzle come together is explained by FEMA in the [National Preparedness System](#) – a challenging and complicated guide that has unfortunately been criticized by homeland security experts as not being useful to all stakeholders, as in the 2014 *Homeland Security Affairs* article, entitled “[Preparedness Revisited: W\(h\)ither PPD-8?](#)”

Simpler preparedness guidelines should be developed for every possible user – from individuals and households to all levels of government and businesses – and for all the types of disasters these stakeholders might face. Recognizing this need, FEMA has developed a set of preparedness recommendations about basic necessities required – for example, the availability of food, water, hygiene, clothing, radios – when facing disasters that share common features. Such an “all-hazard” preparedness plan can be adapted for specific anticipated disasters and adjusted to the needs of the locality and scale of the event, while providing at least the foundation for dealing with unexpected incidents.

This plan also needs to include psychological as well as logistical measures. The prospect of terrorist attacks, natural disasters, and unintentional human-caused incidents bring about psychological reactions to adults and children. These reactions include depression and anxiety, with more-extreme effects tending to result from the uncertainties associated with terrorism, when other humans seek to harm innocent people at unpredictable times and places.

Preparing for Preparedness

President Obama reminded the nation in [PPD-8](#) that, “Our national preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens.” Yet, many agencies and organizations still have not developed emergency preparedness plans for many reasons – too busy, it will not happen here, others will take care of this, and similar excuses. Citizens have also tended to ignore the need to prepare for disasters that could impact their families and homes. This brief discussion reminds stakeholders of the need to prepare for disasters and highlights some of the important implications of terrorist attacks, natural disasters, and major human-caused incidents for their preparedness programs.

Jerome H. Kahan is an independent analyst with over 40 years of experience in national and homeland security, having held senior positions in the State Department, including the Policy Planning Staff and Counselor at the U.S. Embassy in Turkey. He has also worked with various research organizations, including senior fellow with the Brookings Institution. He has written or contributed to books and articles, taught as an adjunct professor at Georgetown University, and been a member of the Council on Foreign Relations, and the International Institute of Strategic Studies. He has a master’s degree from Columbia University in electrical engineering.

Forging New Partnerships for Healthcare Preparedness

By Jessica Wambach Brown

In the first week of December 2015, more than 1,000 professionals in healthcare-related organizations, emergency management agencies, public health departments, emergency medical services (EMS), nongovernmental organizations, and academia met in San Diego, California, to discuss ways to bolster partnerships within and between these disparate groups.



In the 10 years since Hurricane Katrina prompted the U.S. Department of Health and Human Services (HHS) to promote the development of healthcare coalitions to enhance regional healthcare readiness for disasters, they have proven their worth in responses to events like the 2013 Boston Marathon bombing and the October 2015 South Carolina floods. However, given the evolving nature of threats, coalitions dedicated to resilience must build relationships beyond their traditional partners, said experts at the fourth annual National Healthcare Coalition Preparedness Conference (NHCPC), held 1-4 December 2015 in San Diego, California.

“We do our organizations a disservice if we only look within our walls because of the unique role that healthcare now more than ever plays in our communities,” said Skip Skivington, vice president of healthcare continuity management and support services for Kaiser Permanente.

Coalitions & Behavioral Health

The NHCPC is a program of the National Healthcare Coalition Resource Center, which was founded in 2012 by the MESH Coalition of Indianapolis, the Northern Virginia Hospital Alliance, and the Northwest Healthcare Response Network, which serves the greater Seattle area. “The founders wanted to promote the development of evidence to support this great healthcare coalition movement,” said Virginia Cane, director of Indiana’s Marion County Public Health Department and chair of MESH, which organized this year’s conference with support from an advisory committee of national healthcare preparedness experts.

Many healthcare coalitions started as groups of hospitals working with their local health departments to discuss mutual aid and pool resources from the HHS [Hospital Preparedness Program](#) and similar federal initiatives. As a testament to the growing scope of coalitions, the more than 1,000 attendees in San Diego included representatives of emergency management agencies, public health departments, emergency medical services (EMS), nongovernmental organizations, academia, and a wide range of healthcare service providers.

Nicole Lurie, HHS assistant secretary for preparedness and response (ASPR), shared that about half of the nearly 500 healthcare coalitions nationwide feel they are capable of responding to a disaster. ASPR hopes to grow that number with the provision of new tools

like emPOWER, an initiative that uses federal health data to map populations with special medical needs to a zip-code level, and the promotion of new partnerships. As an example, Lurie pointed to ASPR's own evolution since 2009, "When I first came to ASPR, although people recognized that behavioral health consequences of disasters were common, we didn't really have a plan for how we were going to respond in a behavioral health sense to events. I think what we've learned is that every single event has behavioral health consequences."

Her point was underscored by the tragic mass shooting at a San Bernardino County Department of Public Health holiday party on the second day of the NHCPC conference. Susan Fanelli, assistant director of the California Department of Public Health, told attendees that the breadth of agencies involved in the initial response raised her hopes for post-disaster mental health in San Bernardino. "We're going to have a lot of issues that are really going to test that community," she said. "But when I saw them jump into action, it was about the relationships. It's not just about better integration of public health and medical, it's about all of that community."

Public Safety, Long-Term Care & Other Partners

In addition to the expanded emphasis on behavioral health, this year's conference focused on the inclusion of long-term care and U.S. Department of Veterans Affairs facilities in healthcare preparedness planning. Representatives of Voluntary Organizations Active in Disaster and the National Oceanic and Atmospheric Administration spoke to their organizations' respective abilities to support coalitions with response resources and hazard predictions.



Several anecdotes stressed the growing relationship between public safety and public health in response. Mark Fletcher, deputy chief of EMS for the Baltimore City Fire Department, shared his city's experience with civil unrest in April 2015 following the controversial death of an arrestee in police custody. Baltimore's law enforcement officers and first responders became the target of attacks by angry protesters. With its resources overstretched, the Fire Department called on its public health and hospital partners to assist EMS with delivery of care and coordinate the provision of dialysis and medications to those who needed them during several days of curfews and gridlock.

Federal initiatives are also driving integration of healthcare partners. The Centers for Medicare and Medicaid Services' emergency preparedness rule, which

is expected to be finalized in early 2016, will require more comprehensive disaster planning for many types of healthcare facilities. Lurie encouraged coalitions to seize the opportunity to rally these critical partners for collective planning, training, and exercises. She also advised coalitions to leverage the resources of large healthcare systems with geographically distributed supply and personnel networks.

To attract new partners, Jeannette David, disaster mental health coordinator at the Georgia Department of Behavioral Health and Developmental Disabilities, suggested that coalitions make the case for how a few hours of staff time a month can save an organization from closure.

According to the [Insurance Institute for Business and Home Safety](#), 25 percent of disaster-affected businesses do not reopen after a major disaster. Scott Cormier, vice president of emergency management, environment of care and safety at Medxcel Facilities Management, encouraged a similar approach for those struggling to make the preparedness case to leadership within an organization. In the aftermath of Hurricane Ike, his previous company, the Hospital Corporation of America, saved \$3.5 million by investing in preparedness measures that enabled them to keep 36 patient rooms and four operating rooms open that would otherwise have closed.

“In the aftermath of Hurricane Ike, the Hospital Corporation of America saved \$3.5 million by investing in preparedness measures that enabled them to keep 36 patient rooms and four operating rooms open that would otherwise have closed.”

“I think resilience and preparedness is a financial equation that most healthcare executives don’t understand. They see it as a line item on a spreadsheet when we have to cut costs,” Cormier said. “If you’re not prepared and you have damage where you can’t accept patients, that’s an even bigger number.”

Healthcare coalitions also have to scrape for funding. Richard Reed, senior vice president, disaster cycle services, for the American Red Cross, advised leaders to look beyond ever-shrinking federal funding for financial sustainability. “I don’t think the government is the answer,” he said. “I think it’s the private sector. I think it’s corporations. I think it’s community organizations that fund people like me every day. Coalitions add value in a way that government can’t.”

The fifth annual NHCPC is slated for 12-15 December 2016 in Alexandria, Virginia. For more information, visit www.healthcarecoalitions.org.

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Training Programs & National Preparedness

By Brandon J. Pugh

There is a positive relationship between first responder training and national preparedness. A comprehensive examination of three different models shows that training is an invaluable component of homeland security. These key findings summarize detailed analysis conducted on the links between training, response capabilities, and funding.



In a time when the United States faces record high security threats and incidents domestically and abroad – in addition to the ever-existent potential for large-scale natural disasters – it is essential to be prepared as a nation. Regardless of the incident type, the nation looks to the government for a solution. At the forefront of any response are first responders at the local, county, and state levels. Training provided to these responders has increased significantly, reaching an all-time high at the federal level in terms of budget allocation and number of students trained. However, due to the ongoing budget difficulties, it is essential to question whether the financial expenditure on training, which has exceeded \$1.5 billion during the past decade, is beneficial to the nation.

Concepts & Frameworks

This article focuses on the federal training facilities that provide specialized training for first responders – on topics ranging from weapons of mass destruction to incident command. This is training beyond fundamental courses that a first responder would receive, such as an emergency medical technician certification. Although specialized first responder training provides essential skills required in times of crisis, budgeting for such training raises several questions:

- Why should the United States continue to allocate millions of dollars to training first responders?
- What will be gained in federally training first responders?
- Is this training being continued simply because this is how it has been done for years?

This research analyzed training through a comprehensive approach, taking into consideration three broad positions that exist surrounding training. The first position asserts that training first responders may not be the best use of limited preparedness resources, and question current training processes. For instance, since the probability of an attack is relatively low, the gains in security may be weighed in light of funds expended, or used to procure tangible items. The second main position advocates for first responder training and for more money to be allocated to it. Finally, the third position entails looking at the structural elements of training to increase efficiency, including looking at how it is offered, and potentially putting the costs of training on the responder and/or their sending agency.

If a change in funding or availability of training were to occur without carefully considering the outcomes, there could be negative consequences. These questions and the

overall relationship between preparedness and training are explored through the three models summarized below, each of which looks at the question from a different perspective and uses different evidence.

Model I: “Structural”

This model looks at the way first responder training is organized and funded in the United States, including the financial breakdown and costs of training, and funding and usage of training over time. After the 1995 Oklahoma City Bombing, gaps within and weaknesses of response capabilities were identified. Consequently, in 1998, Congress established the National Domestic Preparedness Consortium (NDPC) – a federal training network – as a way to improve outcomes. NDPC was placed under the National Training and Education section of the Federal Emergency Management Agency (FEMA), which combined existing training facilities and created new ones under one umbrella. Today, NDPC encompasses seven members, and each focuses on a specific threat area, including the [Center for Domestic Preparedness](#) in Alabama and the Counter Terrorism Operations Support Center in Nevada. Various costs exist for the federal government in running this network including participant expenses, instructor expenses, and course delivery expenses, among others. Through this network, first responders can attend training at no cost to themselves or their agencies, including all meals, lodging, and transportation.

“There were increases in the training budget each year under the main data set, including increasing the budget from \$28 million in 2000 to \$164.5 million in 2009.”

The costs are funded through a congressional budget allocation to NDPC through FEMA, and then divided among each member center as needed. After developing a table of NDPC budgets, number of courses, number of students, and average costs per student by year, several noteworthy trends were identified. First, there were increases in the training budget each year under the

main data set, including increasing the budget from \$28 million in 2000 to \$164.5 million in 2009. There is also a positive trend between the amount allocated to training and training capabilities, such as more training being available, and more students being taught with higher budgets, which could be anticipated. In addition, for the most part the cost per course declines as more money is allocated. These findings help convey that increasing financial allocation increases returns as well, including more students being trained, more contact hours being used, and more classes being offered. This leads to a more capable force to respond to incidents when needed, not to mention a more financially efficient system.

Model II: “Knowledge, Skills, and Abilities”

In Model I, the nation receives noticeable gain with additional money spent on training. However, this would not be advantageous if the first responder is not also benefiting with greater return. This model explores the knowledge and skill increase of a responder through course and personal evaluation data submitted after taking NDPC courses. In brief, evaluations data completed directly after the training displays a significant increase in student knowledge because of the training. This includes an increase of about 50 percent in those feeling their knowledge was extensive after training compared to before. Similarly,

in an evaluation sent six months after training, 96 percent of students indicated that they are better performing and capable in their job because of the training. This model conveys responders are positively impacted, and there is a benefit in having more highly trained and knowledgeable first responders.

Model III: “Application”

The final model includes two parts. The first part examines responses to incidents before NDPC formation, compared to incidents after NDPC formation, where training occurred, including two acts of terrorism and two natural disasters. Specifically, the California Wild Fires of 1970, the Joplin Tornado of 2011, the Oklahoma City Bombing of 1995, and the Boston Marathon Bombing of 2013 are explored. The impacts of training before and after are analyzed, and for the incidents where training occurred there was a more efficient response. Obviously, this cannot all be attributed to training, but it is supported as a contributing factor. The second party of Model III examines individual case studies of responders to see the potential impact of training, which almost unanimously was reported highly beneficial.

Ensuring a Greater Level of Preparedness

National preparedness for any natural disaster or act of terrorism is paramount, as an incident may occur at any time without notice. Since first responders are the foundation for an effective response, it is necessary to have capable, experienced, and knowledgeable personnel. A strong positive relationship exists between the benefit the nation receives from training, compared to the relatively small financial input as conveyed by each model. Although there are certainly other factors, training is a critical component of successful national security.

This analysis should not be a onetime inquiry, but rather an ongoing analysis, including expanding the availability of data to ensure the limited preparedness money is well allocated. What separates first responder training from other types of professional training is that, if it is not superior, property – and lives – could be lost. Training will not solve the problem fully “since our enemies will try to go around our efforts in responding and preventing an attack,” as Steven Bucci noted in a personal interview on 30 October 2013. However, although natural disasters are unavoidable, training does help to ensure the nation is as prepared as possible to prevent and respond to an attack or disaster.

This article provides a brief summary of the analysis adapted from the full research manuscript, which can be accessed [here](#).

Brandon J. Pugh is the president/chief executive officer of American Consulting and Training (ACT), a public safety training and consulting firm in New Jersey. Previously, he was a coordinator in the NJ Governor’s Office of Volunteerism for large events, nongovernmental organizations/volunteers, and emergency preparedness, and he continues to serve as a paid emergency medical technician. Brandon maintains instructor affiliations with the Federal Emergency Management Agency and two New Jersey state agencies on an adjunct basis. He serves in elected office, including on his local school board, and as County School Board Association president. He is also a gubernatorial appointee on the NJ Governor’s Advisory Council on Volunteerism. He has received numerous distinctions, including being acknowledged by President Barack Obama and Governor Chris Christie for his volunteer service and emergency response work. He is a graduate of The College of New Jersey (TCNJ), completed the U.S. Department of Homeland Security’s Master Continuity Practitioner Program (MCP), and is pursuing a Juris Doctor degree at Rutgers Law. He can be reached at brandon@brandonjpugh.com.

Reimagining Epidemic Communications

By *ELISS Fellows*

In the first week of December 2015, professionals involved in epidemic preparedness at the national level participated in a forum convened by graduate students from Emerging Leaders in Science and Society (ELISS), a leadership development program hosted by the American Association for the Advancement of Science (AAAS), in Washington, D.C.

In the wake of the 2014 Ebola crisis in West Africa, and the uncertainty over whether the disease could spread to the United States, epidemic preparedness emerged as a pressing challenge for many communities. Moreover, the Ebola crisis highlighted a specific need for more coordinated communication that balances trust, fear, and accuracy.

To address this need, ELISS fellows convened local stakeholders at four locations – Seattle, Washington, Palo Alto, California, West Lafayette, Indiana, and Philadelphia, Pennsylvania – to discuss challenges faced and communication strategies implemented by their communities in the event of an epidemic crisis. Then, fellows presented insights from these local forums in Washington, D.C., at ELISS’s “Re-imagining Epidemic Communication Strategies” forum to share information and ideas between the local and national levels and to create new channels and strategies for communicating health information during an epidemic crisis.

ELISS’s forum convened stakeholders from government agencies such as the U.S. Department of Health and Human Services, and nonprofits such as the National Association of County and City Health Officials (NACCHO). The goals were to learn how different communication strategies have been used in epidemic response and preparedness at the national stage, and how they can be implemented to maximize collaboration across cities and government organizations. Together, stakeholders identified and discussed four overarching issues, summarized here.

Challenges While Collaborating With Local Stakeholders

The fact that epidemics start as, and often remain, local events creates barriers to collaboration and potential conflicts between different levels of government – namely city, county, state, and federal agencies. In some parts of the country, the idea of adopting federal guidelines is highly problematic at the local level, even for epidemic events, whereas other areas demand more federal intervention than is present currently. Jurisdictional politics can aggravate these issues. For “new” diseases like Ebola – where fears are high and knowledge limited – the temptation exists for local elected officials to act fast, without waiting for guidelines backed by the Centers for Disease Control and Prevention that currently require significant time to be issued.

Juggling between these various levels of government and different types of expectations appears to be a challenge at the federal level. In addition, not all federal agencies have direct relationships with county and municipal health departments, even though collaborating with associations like NACCHO helps. One possible step forward would be to build a working

group across government levels to provide guidance on social media use for epidemics, which might tackle the main issues, mitigating public fears while building medical expertise on the disease.

Bidirectional Flow of Information Between Federal & Local Stakeholders

Since epidemics begin locally, hospitals and other healthcare facilities are often the first to observe evidence of a growing health crisis. However, preparedness does not need to be exclusively local. Higher-level organizations, like federal agencies, can push information to communities before an epidemic emerges to help generate a better outcome. Simultaneously, local organizations can ensure they are looking for information in the right places. During the AAAS forum, fellows reported that many local stakeholders in their communities need more information and materials from federal agencies to help them communicate. In practice, it seems that some of the resources local stakeholders want already exist and are underutilized. The following practices might help bridge this gap:

“Since epidemics begin locally, hospitals and other healthcare facilities are often the first to observe evidence of a growing health crisis. However, preparedness does not need to be exclusively local.”

- Ensuring that federal materials are well advertised and easily accessible from a local stakeholder’s perspective (while officials in D.C. might understand how all the agencies fit together, many local organizations do not); and
- Choosing relationships strategically to promote better information penetration – for example, frequently interacting with hospital liaisons would be strategic since they are a major point of contact.

Community Compliance With Issued Recommendations

All forum attendees agreed that it is not enough for messages and information to be available. In order to be effective, they must also inspire action. Decision-making cannot be treated as a purely logic-based or information-based activity. Rather, communication strategies employed by organizations should factor in emotional decision-making. Importantly, people have to both understand *and* trust a message in order to comply with it. To understand patterns of compliance, agencies need to learn which individuals and institutions people trust for health information.

In addition to trust, considering barriers to action like motivation, time, money, and accessibility allows for programs and messages to be designed around these constraints. One key challenge faced by both local and national stakeholders is how to identify and recruit trusted individuals to disseminate information, particularly to reach those who mistrust governments. An important solution would be to use research from anthropology and other social sciences to inform messaging strategies and to identify gaps.

Additionally, strengthening the ability of local institutions – for example, banks and libraries – to serve their communities as information sources can help. Furthermore, using celebrities as a funnel for disseminating government-approved messages more widely can

help reach a variety of populations. However, agencies should be wary of reinforcing the idea that celebrities are a good source of accurate information. Therefore, strategies must be devised to ensure that celebrity partnerships encourage trust in expert information.

Strategies for Building Trust Among Different Stakeholders

A common theme that emerged is that trust is essential to communication during epidemics. However, it is crucial to acknowledge and engage in systemic trust building *before* a crisis. Lack of early engagement and relationship building can lead to misinformation and heightened fears, which in turn can have disastrous outcomes during epidemics. Moreover, trust is something that is gained over time. Local and national stakeholders agreed that trust should be built at individual and community levels as well as within and across government and public health organizations.

One key practice is developing a culture that allows relationships across organizations to remain strong even when individuals leave their roles. Trust grows as one proves value, and establishing information-sharing protocols ahead of time fosters dissemination of accurate information while minimizing misinformation. Working with trusted messengers can also help build long-term trust – for example, working with cultural brokers within hard-to-reach communities, and educating children through the school system so the messages reach their families.

A more in-depth summary report from the local and national ELISS forums will be available online at www.elissfellows.org in January 2016.

ELISS is a leadership development program that prepares graduate students to collaborate across boundaries for the benefit of society. Each ELISS class focuses on a timely challenge that affects multiple communities. Through the Idea Lab, fellows assess practitioner needs; identify useful practices, research, and technologies; and organize a national forum series to generate innovative approaches to the challenge. The following ELISS fellows contributed equally to this article:

Renske Erion is the Communications and Partnerships Manager for ELISS. She has a Ph.D. in Cell and Molecular Biology from the University of Pennsylvania.

Emily Grubert is a Ph.D. candidate in Environment and Resources at Stanford University. She studies how communities prioritize different social and environmental outcomes related to energy development using life-cycle assessment, surveys, interviews, and text-mining methods.

Simon Mosbah is a Ph.D. candidate in City and Regional Planning at the University of Pennsylvania. His research explores the links between airport expansions and economic development at local and regional scale. He also works on defining sustainability indicators for the built environment with the Penn Institute for Urban Research.

Michelle Munyikwa is a candidate in the M.D./Ph.D. program in anthropology at the University of Pennsylvania. She explores the experiences of refugees and asylum seekers in Philadelphia and the institutions and programs designed to care for them.

Biswajit Paul, a doctoral candidate in the Molecular Cell Biology program at Fred Hutch and University of Washington, works on gene editing CD4 T cells to make them resistant to HIV infection. He is a science communication fellow at Pacific Science Center and a teaching fellow at the Research Innovation Service and Experiential Learning Institute, Bellevue College.

Christine Tran is a Ph.D. student in Educational Organizations, Leadership, & Policy Studies at the University of Washington's College of Education. Her research interests include school nutrition equity, school culture, and policy implementation.

Predictive Policing: Renewed Promise Through New Approaches

By James R. (Chip) Coldren Jr. & Zoë Thorkildsen

Policy makers and the legal system must often make tough decisions that affect the future. In the case of violent criminals, the decision to release or retain in incarceration could determine life or death for future potential victims. As such, decision makers need the right tools to ensure more statistically accurate predictions of future outcomes.



The use of predictive modeling in policing is relatively new, yet it has been lauded as a revolutionary technique for reducing crime. The National Institute of Justice (NIJ) [hosted two symposiums](#) dedicated to the topic of predictive policing in 2009 and 2010. TIME Magazine designated predictive policing one of the [best inventions of 2011](#). A 2012 [survey](#) conducted by the Office of Community Oriented Policing Services and the Police Executive Research Forum found that 70 percent of police agencies surveyed planned to incorporate predictive policing methods in their departments within the next five years. However, hard evidence about the effectiveness of predictive policing techniques is currently scant, though a number of NIJ [studies](#) aim to fill this gap in the next several years.

This article introduces “machine learning” approaches to prediction. “Machine learning” refers to the ability of a computer program to learn from its computations and improve its own performance. In contrast to other prediction models, in which the predictor variables are predetermined and used to predict outcomes (like parole failures) in a static way, machine-learning models build their rules from raw data and have the ability to improve their accuracy as new data are fed into the model. Machine learning is a key concept underpinning some predictive policing techniques. Just as a crime analyst would learn over time from receiving additional reports and data, so too do the computerized machine-learning models.

Machine-Learning Models & Criminal Recidivism

Richard Berk, professor of criminology and statistics at the University of Pennsylvania, recently applied predictive modeling to the prediction of criminal recidivism. His work steps away from the more traditional predictive policing models used to target crime, typically on a geographic basis. In a recent [report](#), Berk and his colleague Justin Bleich explore predictive models’ accuracy in predicting re-offending behavior among parolees, comparing two machine-learning models with a different (regression) model without machine-learning characteristics.

Berk and Bleich use real-world parolee data to show that using predictive methods (specifically, a random forest method) results in more accurate predictions than traditional regression-based prediction models. There are two main reasons this is the case. First,

machine-learning models can easily capture data about numerous types of outcomes – for example, not re-offending, re-offending for a minor crime, and re-offending for a serious crime. Although some regression models can forecast more than two outcomes, logistic regression models cannot. Regression models require a priori specification of predictive variables, whereas machine-learning models do not; they build models inductively through exhaustive searches of large data sets for associations between variables.

Second, machine-learning techniques allow the analyst to apply different weights to model outcomes, and thus can be more responsive to the needs of policy makers. For example, predicting a parole failure that does not occur in reality (a false positive) is different from predicting success when a parole failure occurs in reality (a false negative). Most people

Although 70 percent of police agencies report planning to incorporate predictive policing methods over the next few years, hard evidence about its effectiveness is limited.

would agree that a false negative (releasing a person on parole who commits a serious crime) is more costly and more serious than a false positive (keeping a person incarcerated to the end of their sentence even if they would not have committed another serious crime). Berk's point

is that traditional modeling methods treat both outcomes as equals, when in reality they are not equal regarding costs and public harm. With the information produced by machine-learning models, policy makers are in better positions to make evidence-based decisions about incarceration and parole policies.

Predicting the Future of Prediction

As interest in predictive policing grows, researchers and analysts should look carefully at machine-learning modeling. Based on the work of Berk and others, these predictive models perform well and, in some cases, outperform other more traditional approaches to predictive modeling. Although conducting the programming required to build machine-learning models can be a bit sophisticated and perhaps intimidating, as this field moves forward, such models will become more accessible and understandable.

Note: The authors express their thanks to Richard Berk for his consultation on this article.

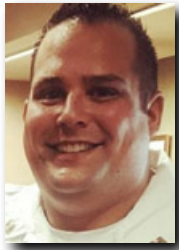
James R. (Chip) Coldren Jr. (pictured) is the managing director of Justice Programs in CNA's Institute for Public Research. He directs several law enforcement related reform and technical assistance projects, and serves as principle investigator for several national research projects concerning utilization of technology in law enforcement and corrections.

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The Art of Awareness for Emergency Medical Calls

By Seth J. Komansky & Raphael M. Barishansky

Civilian responders have successfully acquired many skills that were originally developed by military services. Situational awareness is one such skill that would be beneficial to adapt to the civilian members of the emergency medical services. Maintaining a heightened sense of awareness would help responders stay “in the loop.”



While the term “situational awareness” has entered mainstream vocabulary fairly recently, the theory and concept have been known to the military for a long time. Originally developed by Col. John Boyd and coined by the United States Air Force, the situational awareness phase involved the “observe” and “orient” portion of the observe-orient-decide-act ([OODA](#)) loop. Losing situational awareness means being “out of the loop.”

A definition specific to emergency medical services (EMS) comes from a [2011 article](#) that stated, “Situational awareness is usually defined as the need or ability to have a high level of attentiveness to the environment in a dynamic situation, or making the proper decision and acting on it in the most appropriate fashion.”

Understanding the Concept

Col. Jeff Cooper from the United States Marine Corps further solidified the overall concept with what is known as “[Cooper’s Color Code of Awareness](#).” Cooper’s Color Code breaks down the amount of mental attention given into a perspective of different levels. The five stages explained by this model include:

- “White,” which is compared to a sleeping state, unprepared and unready to take action;
- “Yellow,” which is prepared and alert, but relaxed;
- “Orange,” which is a state of readiness to take action as a result of a specific alert, threat, or danger;
- “Red,” which is the fight or emergent reactionary phase (action mode); and
- “Black,” which was added in recent years to represent the stage where one is unable to react, essentially frozen or in shock – a phase of system overload.

This model is applicable not only to the patient care aspects of EMS, but also to personal situational awareness when EMS providers are evaluating a scene for risks and threats. While on emergency scenes, EMS personnel are most often in an orange condition, ready to take action.

Frequent evaluation of the scenario, heightened awareness of the environment and the people in that environment, and possibly the early recognition of a threat toward responders or an adverse change in a patient condition allow for development of a plan for action while

maintaining an orange condition. Of course, many EMS providers maintain a yellow condition while secure in their stations, but it is safest to maintain an orange level of awareness on the street to stay ahead of potential conflict or adverse situations. However, outside factors and distractions – phones, conversations, or other pressing matters – affect the ability to maintain an orange state, which could be a critical error when it comes to safety.

Situational Awareness at the Provider Level

One of the more palpable areas where the aforementioned definitions become more operationally critical is when examining situational awareness at the EMS provider level. As EMS providers – whether responding to an emergency or having actually arrived on scene – the most valuable commodity in any situation is information. Likewise, the only way to manage the scene is to gather as much information as possible.

The development of incident situational awareness continues beyond the initial “Is the scene safe?” question that EMS providers are taught to ask in their initial training course. Similar to the patient assessment the EMS provider performs on each patient to develop a differential diagnosis and a treatment plan, providers utilize assessment processes on each scene to evaluate environments and incidents long before arriving at the location and throughout the work shifts. The goal is to develop situational awareness for responders by adding to the input of information. Examples of information input include:

- Utilization of dispatch information to determine the need for more, or different types of, resources;
- Evaluation and understanding of potential hazards that may have caused the injuries requiring treatment, or information sharing for other responders of hazardous conditions prior to their arrival, such as electrical wires down or a hazardous odor resulting in multiple unconscious patients;
- Recognition of a particular safety issue, such as an item on scene that could be used as a weapon, resulting in further evaluation, moving the item to a safe distance, or even backing out of the scene; and
- Early recognition of behavioral indicators such as body language from a patient, patient’s family member, or other bystander before an attack against responders occurs.

Incorporating the aforementioned into patient and scene assessments can spell the difference between safety and danger. Understanding issues such as checking patients for weapons, understanding which patients could potentially be disoriented and/or dangerous, and reading the body language of the patient/patient’s family should be on the EMS providers’ minds on scene and especially before relocating patients, or others, into the ambulance.

Relevant Examples

[One example](#) of this type of situation occurred with an EMS crew in 2009 in Alexandria Bay, New York, when a patient became agitated toward an EMS crew providing care. The patient grabbed a rifle from a nearby bedroom, firing at the EMS crew, striking and killing one of the emergency medical technicians (EMTs).

[Another example](#) happened in Omaha, Nebraska, in 2013 and involved a patient who was in custody of law enforcement and searched by an Omaha police officer before having seizure-like activity. Once in the ambulance, the patient stood up, turned around with a gun, fired it twice, and injured the attending paramedic and herself. The patient made [terroristic threats](#), including statements regarding the possession of an improvised explosive device and how she was willing to detonate it, as well as communicating threats of having additional ammunition intended for responders to avoid jail time as she reached into her waistband.

Barriers & Challenges to Situational Awareness

Certain factors, or barriers, can challenge the success of achieving strong situational awareness. Perception, or the idea of reality, is easily affected through experiences and current expectations. By reacting to a current incident in a similar fashion as a previous experience – using outdated information or interpreting an incident based on what is expected to occur versus what is actually occurring – could result in altered awareness.

“Outside factors and distractions – phones, conversations, or other pressing matters – affect the ability to maintain an orange state, which could be a critical error when it comes to safety.”

Complacency and overload are contrasting challenges for responders. Complacency is one of the greatest compromising factors on the EMS providers’ state of situational awareness. No matter how many times an EMT sees a specific patient or a similar scene, it is imperative to stay ahead of the situation. Assuming everything is under control and allowing complacency to take over could eventually affect vigilance.

By contrast, information overload could cause analysis paralysis for responders. Both of these scenarios may result in experiencing the black level of awareness discussed earlier. Fatigue affects many facets of the EMS profession, including situational awareness. In order to be aware, EMTs must be sharp, keeping their heads on a swivel to recognize the changing environment. This requires proper rest to avoid easy distraction.

The foundational elements that comprise situational awareness have applicability to EMS. Forward-thinking EMS providers must endeavor to incorporate these elements in the same manner as in the military and law enforcement realms.

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Overcoming Notification Systems Challenges

By William (Bill) Betcher

Emergency response, information technology, and healthcare communications are three scenarios in which notification systems play a critical role. Recent disasters have demonstrated the benefits of crowdsourcing during response efforts, so notification systems are leveraging this responsiveness through two-way communication technology that can both disseminate and receive information.



The critical communications world continues to evolve, resulting in users taking a closer look at their existing notification systems to determine whether they remain effective tools for communicating crucial information. However, before these systems can be assessed, it is important to first understand a few of the ways these tools are being utilized, the challenges faced within each use case, and how these hurdles can be overcome.

Emergency Response

When responding to an emergency, communicating mission critical information to the affected public is of the utmost importance. Emergencies, incidents, and disasters—from terrorist attacks to major storms—can significantly affect citizens and put their safety at risk, especially if they remain in the dark regarding the crisis management plans put in place by emergency responders.

Traditional emergency notification systems such as reverse 911 and warning sirens (used to alert for tornadoes or a tsunami) deliver an audible alert, but they only provide for one-way communication. The public has no way of responding to the notification or to ask questions around evacuation plans and emergency protocols. Furthermore, those dispersing the alert have no way of verifying its receipt. Targeted, individualized information is also difficult to communicate, especially in the case of warning sirens.

In order to protect and inform the public and emergency responders, two-way communication is required as it allows for response collaboration and the true dissemination of information. Utilizing mobile mass notification and two-way communication tools allow users to increase connectivity to key audiences and ensure that messages are received and acknowledged by the intended recipients. The affected public can also share information with officials from their mobile devices, helping provide real-time intelligence during a crisis.

Information Technology (IT) Alerting

Communications systems are also used as means of providing internal and external communication around business interruptions, such as software and network failures, or cybersecurity breaches. When an IT incident causes system downtime and service disruptions, organizations feel the impact; even more so when the issue is not solved in a timely manner.

The challenge becomes how to deliver quick and accurate information to customers affected by the disruption, while managing system downtime. Up to [80 percent of system downtime](#) is caused by either human error or a failure to follow set processes. It is imperative that internal experts are located and informed of the issue instantly so the situation can

be assessed by the right contacts – and immediate action can be taken. IT customers also expect quick and accurate response information, which is why IT alerting and escalation after periods of nonresponse is critical for organizations.

A fully integrated communications system can be configured to deliver automatic escalation of alerts, as well as on-call scheduling and mobile alerting. This allows for the automation of manual tasks and ensures quick collaboration by the IT operations team to solve the problem. Automation helps improve IT alerting, team collaboration, and incident management by discovering information upfront that helps employees make better decisions and provide a more meaningful response while in crisis mode. This also ensures that the organization can inform key executives, stakeholders, and customers quickly and accurately during an IT incident.

Healthcare Communications

As healthcare costs increase and hospitals manage staffing shortages, many providers are turning to unified communication solutions to automate and simplify clinical, operational, and emergency information. This is particularly important as providers streamline communications not only with internal staff, but also with remote employees, third-party providers, insurers, and patients in an effort to create a “connected hospital.”

Under the connected hospital model, communications are fully integrated. Electronic communications, including wireless technologies, allow caregivers and patients to remain connected no matter where they are in a facility, providing timely and accurate monitoring. This is particularly important during serious clinical and emergency events. During these events, hospitals rely on their critical communication and notification systems to activate code alerts, to initiate staffing call outs to on-call nurses, and to deliver mass notifications to staff and patients.

Again, mobility and collaboration are key themes in this model. Clinicians can leverage these systems for two-way conversations between their patients and colleagues that are compliant with the Health Insurance Portability and Accountability Act. Mobile device solutions can also be used to facilitate other clinical workflows, including the delivery of telemedicine services and care team collaboration. A care team can also be unified within a group chat session to save time and improve patient care.

An Ever-Changing Technology Need

As technology continues to evolve, so too does the way it is used. In an ever-connected society, users expect to have the ability to engage with those dispatching critical updates, especially when relaying sensitive information. The world is unpredictable, and unified critical communications need to be easily adaptable to effectively manage any crisis. As fast as technology is changing, it is important for users to determine not only how they will use the critical communication technology in the present, but also how they plan to use and integrate it in the future.

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Food for Thought: Emergency Shelters & Food Allergies

By Andrew Roszak

When one peanut has the ability to kill, it is necessary to examine the practices and procedures used in public yet confined spaces such as emergency shelters. By following simple steps, emergency managers are able to perform shelter operations while limiting exposure to allergens and contaminants that could turn a safe haven into an exposure risk.



As many as 15 million people in the United States have a food allergy, including nearly 1 out of 13 children under the age of 18. This represents approximately [2 percent of adults and 5 percent of children](#) in the United States. According to a study released in 2013 by the Centers for Disease Control and Prevention, food allergies in children [increased](#) approximately 18 percent between 1997 and 2007. Odds are that, during a large-scale emergency, people with food allergies will show up at shelters. In 2006, about [88 percent of schools](#) had one or more students with a food allergy, which can range in severity, from mild to downright deadly. The U.S. Food and Drug Administration ([FDA](#)) estimates that anaphylactic food reactions cause approximately 30,000 emergency room visits, 2,000 hospitalizations, and 150 deaths per year.

Given the severity of some food allergy reactions, it is certainly important to develop and implement strategies designed to limit exposures to allergens and contaminants. When examining the food allergy spectrum, more than 160 foods can cause food allergies. However, eight major food allergens – milk, eggs, peanuts, tree nuts, soy, wheat, fish, and shellfish – account for 90 percent of all food-related reactions. These [eight food allergens](#) are the focus of the Food Allergen Labeling and Consumer Protection Act of 2004, which requires food manufacturers to list the ingredients of prepared foods and disclose whether their products contain any of these top allergens.

Simple Steps to Reduce Food Allergy Emergencies in Shelters

No cure for food allergies currently exists, so treatments can only ease the symptoms of a [food-induced allergic reaction](#). As a result, prevention is the best strategy. When preparing food at a shelter, good hygiene and cleanliness practices are essential. Food preparation, handling, and serving techniques are important, as even trace amounts of an allergen can cause a reaction. Ensuring hands are washed and surfaces are routinely cleaned can remove most allergens from the environment.

Likewise, shelters planning to serve meals ready to eat (MREs) should be prepared to answer questions about ingredients and allergies. This is especially true in shelters where MREs are the only meal option. Since MREs were first introduced for U.S. military use in 1981, they have undergone a [series of changes](#), including adding ingredient and nutritional information to the packaging. MREs are a common choice to feed large groups during emergencies, since they have a long shelf life and are relatively easy to store.



According to the popular World Grocer website, there are currently about [24 MRE meal menus](#) available, of which 20 contain meat products, 2 are vegetarian, and 2 are vegan. Different manufacturers can produce these meal menus, which means the actual ingredients may vary depending on the manufacturer. Therefore, it is highly recommended that people with food allergies read the [ingredient and allergen statements](#) for each ration component before consumption. The labels on all rations meet the requirements put forth by the Food Allergen Labeling and Consumer Protection Act of 2004.

Food Allergy Accommodations Under the Americans With Disability Act

People with food allergies may require special preparations for their meals. However, these special preparations are different than accommodations required under the Americans with Disabilities Act (ADA). Although lawsuits seeking protection for food allergies under the ADA have been filed, courts have thus far been reluctant to extend ADA provisions to persons with food allergies. A disability under the ADA requires a person to have a physical or mental impairment that substantially limits one or more major life activities.

Since a food allergy only manifests itself during specific times and the exposure can be managed by limiting access to the allergens, courts have found that it does not substantially limit major life activities ([Land v. Baptist Medical Center](#), 164 F.3d 423 [1999]). Similar findings have been made for people suffering from asthma and panic attacks ([Zirpel v. Toshiba America Information Systems Inc.](#), 111 F3d 80 [1997]; [Robinson v. Global Marine Drilling Co.](#), 101 F3d 35 [1996]). However, shelter operators must [adjust their kitchen policies](#) in order to meet the food and beverage needs of residents and volunteers who have disability-related concerns, such as diabetics.

Putting It All Together – What It Means for Emergency Management

Emergency management officials are faced with an enormous task and tremendous responsibility. In addition to responding to the situation that created the need for sheltering operations, they are also charged with ensuring shelter operations are safe, accessible, and accommodating. Prolonged shelter operations necessitate the need for providing food service to those who have been displaced. Shelter plans should include guidelines for safety and sanitation procedures, especially for food preparation, service, and storage.

“The U.S. Food and Drug Administration (FDA) estimates that anaphylactic food reactions cause approximately 30,000 emergency room visits, 2,000 hospitalizations, and 150 deaths per year.”

Appreciating that emergency shelters may be accommodating many people within a confined space, and possibly for a prolonged time adds complexity to food service issues. Staff should be trained to recognize the signs and symptoms of a food allergy incident: tingling, burning, swelling, and itching of the tongue and/or throat can be signs that a person is experiencing an allergic reaction.

Emergency planners and shelter workers are encouraged to familiarize themselves with the [Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Education Centers](#), which were developed by a multidisciplinary group of stakeholders and federal agencies, including the U.S. Department of Education and the Centers for Disease Control and Prevention. These guidelines cover a wide variety of topics that can be applied to emergency shelters, such as strategies for reducing allergic reactions and responding to life-threatening reactions.

Given the myriad of responsibilities, it is easy to surmise that many jurisdictions have not recently examined their shelter policies and procedures with a specific eye toward preventing food allergy incidents. Local environmental or health departments likely have food inspectors that can serve as a resource. The emergency necessitating the need for sheltering operations is enough to deal with, without worrying about someone having a severe allergic reaction onsite.

Andrew Roszak, JD, MPA, EMT-P, serves as the senior director for emergency preparedness at Child Care Aware of America. He is a recognized expert in emergency preparedness, public health, and environmental health. His professional service includes work: as the senior preparedness director of environmental health, pandemic preparedness, and catastrophic response at the National Association of County and City Health Officials; at the MESH Coalition and the Health and Hospital Corporation of Marion County, Indiana, as the senior preparedness advisor supporting Super Bowl 46 and the Indianapolis 500; as a senior advisor for the U.S. Department of Health and Human Services; on the Budget and HELP Committees of the United States Senate; and at the Illinois Department of Public Health. Before becoming an attorney, he spent eight years as a firefighter, paramedic, and hazardous materials technician in the Chicago-land area. He has an AS in Paramedic Supervision, a BS in Fire Science Management, a Master of Public Administration, and a Juris Doctorate degree. He is admitted to the Illinois and District of Columbia Bars and is admitted to the Bar of the U.S. Supreme Court. Twitter: @AndyRoszak

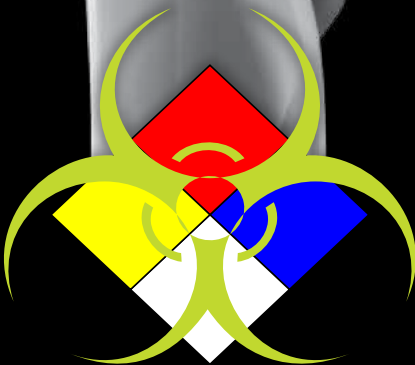
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