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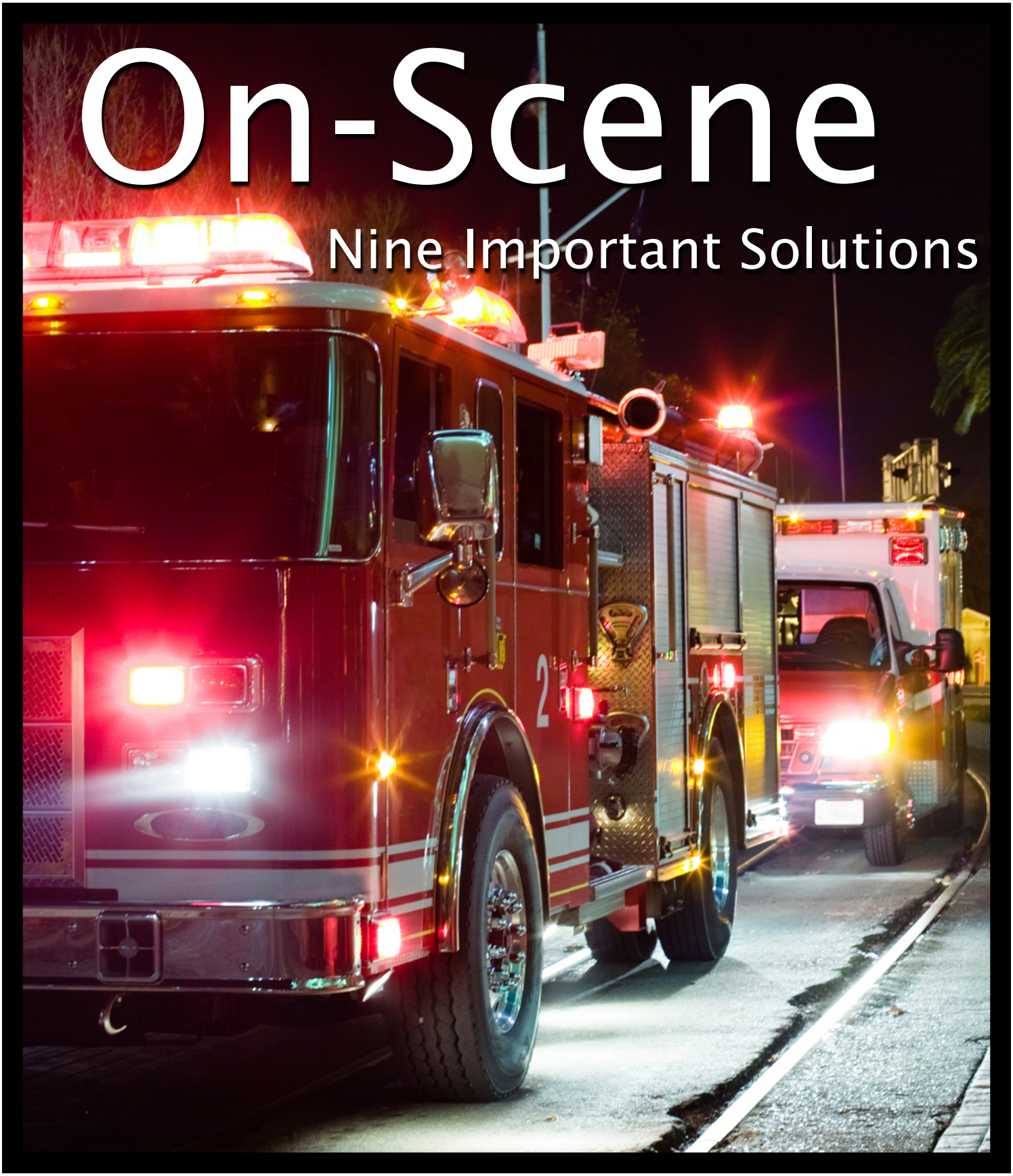

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Featured in This Issue

About the Cover: As emergency responders rush to a scene, they must already have the knowledge, training, and tools to effectively perform any necessary tasks. Being prepared gives responders the confidence and know-how to perform to the best of their abilities. (Photo: ©iStock.com/slobo).

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Editorial Remarks

By Catherine Feinman

Having a plan, educating and training personnel, collaborating and communicating with others, and learning lessons from past incidents are all critical elements of preparedness. However, not every incident is foreseeable or preventable. In such cases, agencies and organizations must use all these elements in order to be prepared and ready to respond before arriving "On-Scene."

Leading this month's edition of the *DomPrep Journal* is Stephen Grainer, with advice on how to get back to the basics when it comes to managing a response. At the height of a crisis, stress levels may rise and inhibit clear thinking. At such times, knowing what to do must be ingrained, so that managers are equipped with the best capabilities for protecting their communities.

Such protection may come in the form of either civilian or military response, with everyone being on alert for a variety of threats both domestically and abroad. Richard Schoeberl expresses his concern for a growing terrorist threat that the United States alone cannot defeat. However, Wayne P. Bergeron describes how the skills and knowledge these military personnel acquire abroad while fighting such threats could be put to other uses as emergent first responders at home.

Examples of other threats that require effective response efforts include public health emergencies, dangerous chemical, biological, radiological, and nuclear sources, or natural hazards. When responding to an incident, the roles of respondents, the types of hazards, and the telltale signs of threats are all critical. Raphael M. Barishansky and Rachel Schulman each share critical elements of the public health role in chemical and other emergencies.

When law enforcement, fire, or other emergency responders encounter public health threats, these responders must know what to do and how to identify such threats. For example, Stuart K. Cameron warns about secondary threats to law enforcement personnel posed by suicide attempts involving dangerous chemicals. Jeffrey D. Williams then explains the differences between radiation sources and quantities of these sources. These "apples" and "oranges" could mean life or death for responders.

Detector technology can help responders identify threats, but it must be reliable. Richard M. Ozanich, Cynthia J. Bruckner-Lea, and Rachel A. Bartholomew highlight the work that Pacific Northwest National Laboratory is doing to help first responders meet their biodetection technology needs and fill information gaps. Real-world testing helps responders know how such technology will perform in the real world.

Rounding out the issue is an article by Craig DeAtley, who describes a functional exercise, "Operation Twister," that addressed an often-overlooked response capability – behavioral health responders. Triaging during an emergency response should go beyond the physical trauma and assess the varying degrees of psychological trauma as well. Any member of a community may become a responder when disaster strikes. Including the whole community in the preparedness process will help each member be that much more ready to respond when needed.

Response Management: Back to Basics

By Stephen Grainer

When a seemingly unrealistic incident occurs, emergency managers must be equipped with the base knowledge necessary to respond to the previously unknown scenario. Acronyms are a good way to remember what to do when stress levels are high and time is short. By getting back to the basics, managers are better equipped to respond and to protect their communities.

Emergency managers and responders across the United States confront a wide array of hazards and emergency situations daily. Whether responding to and managing floods, droughts, tornadoes, hurricanes, terrorist attacks, or any other natural or human-caused threat, effective operations begin with preparedness.

A Worst-Case Scenario

Preparedness efforts typically focus on the principle of planning for the worst, and hoping for the best. As such, planning, training, exercising, and evaluating preparedness frequently begin with the premise of identifying the worst situations imaginable and developing response protocols accordingly. Although this may enable the emergency responder community to broadly take an all-hazards approach to planning and preparedness, it also may create a lengthy menu of procedural guidelines that can overwhelm emergency or incident managers. During times of high stress and urgent need, the emergency or incident manager may become so stressed that identifying the starting point for establishing management functions is the first challenge.

As is often said, managing major incidents is a good news-bad news situation. The relatively infrequent incidence of catastrophic emergencies is the good news. Major incidents with potentially horrific consequences and threat to life are relatively rare. Correspondingly, that same rarity also is a primary cause for concern for emergency managers and incident commanders. The opportunities to apply acquired knowledge, skills, or abilities associated with major incident management for most personnel are very limited. In order to offset the limited experience in actual major incident response management, many preparedness efforts involve conducting exercises with scenarios that are close to unimaginable and incomprehensible – perhaps even unrealistic.

Additionally, in the efforts to support the "all-hazards" concept associated with the National Incident Management System (NIMS), preparedness efforts – specifically exercises – sometimes incorporate an array of different threats and hazards concurrently. This can lead to a descending cycle of efforts to develop and conduct more complex and detailed scenarios for each successive exercise. If this progression continues, emergency preparedness and planning efforts result in more detailed and complex plans and protocols.

The net effect can be that both emergency managers and incident commanders may become overloaded with situational details that can cause "decisional paralysis" or information overload.

Sometimes characterized as "brain drain," such overload causes a person to become unable to think through an orderly sequence of decisions in a timely manner. If this occurs, it may be best to remember another old adage, "Keep it simple, son" (or KISS).

From Priorities to Preservation

One fundamental – or back-to-basics – tenet of the Incident Command System (ICS) is to employ an orderly methodology by which emergency managers and incident commanders organize and focus response efforts to address threats and hazards of any type or magnitude, indeed all hazards. This principle is captured with the acronym P-O-S-T and has been presented in various ICS training programs for many years. Often the "P" is overlooked or minimized because it is a consistently recurring step, but it can help begin the initial thought process regardless of the magnitude or uniqueness of a threatening situation.

The "P" in P-O-S-T represents "priorities." One unchanging element in every incident is the fact that there are three common core priorities. From an "all-hazards" perspective, the priorities are constants and may be the only elements that do not change regardless of threats, hazards, vulnerabilities, or risks. These priorities can be listed by another acronym – L-I-P, which stands for: (a) Life safety; (b) Incident stabilization; and (c) Property conservation (or Preservation). The order in which they are listed also represents the relative order in which these priorities should be addressed when defining the parameters of any emergency. It is from these three core priorities that all further decisions and actions can be programmed.

Priorities also may be stated using different, or more detailed (subordinate), verbiage. For example, an incident commander states that the "*first* priority is to reopen the highway." Although this is a legitimate statement, it may be driven by the recognition that opening the highway is critical to implementing life-saving operations (priority number 1). Alternately, if there are no immediate life-safety threats, reopening the highway would facilitate stabilizing the incident situation sooner (core priority number 2). Or finally, reopening the highway may limit continuing damage to property. In any case, the original statement to "reopen the highway" captures the intent of one of the three core priorities or perhaps all three.

The "O" in P-O-S-T represents "objectives." Once the situational demands of the incident can be defined within any or all of the core priorities, incident managers can identify operational objectives to confront the threat(s) and conform to these priorities. Objectives are broad statements of intent or desired outcomes relative to the priorities and actions anticipated.

The "S" in P-O-S-T represents "strategy" (or strategies). Based on the objectives established, incident managers typically then assess several alternative strategies for action to meet the objectives and select the one or two strategies deemed best under the circumstances. There may be cases in which two (or more) compatible strategies may be adopted. The important decision relative to adopting strategies is to remember that if multiple strategies are considered, they must not be counterproductive and cannot "neutralize" each other.

Finally, the "T" in P-O-S-T represents "tactics" or "tasks." These are the functional actions undertaken to disrupt, deter, or redirect the event(s) to achieve a more favorable outcome. As

with strategies, several alternative tactical options often are assessed. Selection of tactics most commonly are dependent on the immediacy (or urgency) of the threat; readily available resources; time necessary to acquire resources not on hand; and functional constraints to perform the actions under consideration.

Putting P-O-S-T Into Action

One example of using the P-O-S-T process might be as follows:

> *A tornado touches down suddenly in a suburban locality wreaking havoc on an area of residential occupancies 200 yards wide by half a mile long. Fortunately, National Weather Service warnings provide sufficient time for most residents to take protective measures; however, structural damage is extensive.*

All three *priorities* come into play. Life safety for citizens and responders are the preeminent priority. With that, incident stabilization (priority 2) and property conservation (priority 3) also steer initial decision-making.

The *objectives* may be stated as follows:

- Identify and provide emergency medical care for any injured citizens in the impacted area within ___ hours. (Priority 1)
- Ensure all emergency response personnel conduct operations in the safest and most expedient manner possible using appropriate personal protective clothing and equipment. (Priority 1)
- Map and cordon/secure the impact area from unauthorized incursion within ___ hours. (Priority 2)
- Survey for any externally visible structural damage, especially for residential occupancies, within ___ hours. (Priority 3)

Strategies may include:

- Organize search teams of trained/qualified response personnel and conduct surveys and searches for any victims. Remove any readily extricable victims, provide triage and treatment, remove to safety, and report any victims needing technical rescue assistance and/or life support.
- Establish technical rescue crews prepared, equipped, and capable of conducting technical rescue activities.
- Establish emergency medical services (EMS) operations in a safe location to provide care for victims or any injured personnel.
- Establish traffic control points at all roads providing access to the affected area and prohibit entry for all by authorized personnel.
- Contact local power and other utilities and cut off all services within the impacted area pending determination of safety for restoration on a case-by-case basis.
- Obtain local tax maps or other records to support assessment operations.

Tactics may include:

- Conduct aerial (preferably rotary wing) overflight of the impacted area (conditions permitting), noting visible victims and report same to command. If possible provide live-stream video to command or other downlink location.
- Establish 10 three- to five-person teams of fire/EMS personnel who, wearing appropriate personal protective equipment and having appropriate hand tools, conduct house-to-house "walk-around" surveys on a street-by-street basis to locate any victims. Assess victims for injuries, provide preliminary treatment, and direct them to the EMS care location or notify supervisory personnel of need for more extensive victim care and/or removal assistance.
- Establish two- or three-person EMS teams to provide care for victims within the impact zone and to remove any victims as needed.
- Request utility companies to interrupt utility services to the area at main control points for the area.
- Establish squads of heavy equipment to conduct debris removal operations to facilitate access to any debris-blocked streets.
- Establish a branch in the operations section to record all reports of damage to structures and coordinate structural triage activities.

The development and implementation of the objectives, strategies, and tactical operations should follow an orderly progression initiated based on core priorities.

Confidence, Effectiveness, Efficiency & Safety

Emergency managers and incident commanders should develop an intuitive sense of awareness to fall back to the P-O-S-T process in order to organize their thoughts based on core priorities, regardless of the nature or scope of the incident. (It also may help to have a "cue card" simply stating P-O-S-T located with other emergency response field guides or first responder job aids.) Using these three core priorities to formulate objectives as statements of intent, emergency managers then can assess strategies – or means to achieve the objectives.

Once viable strategies have been identified, the tactics or actions to accomplish the strategies can be formulated. Based on an orderly progression, as captured in the acronym P-O-S-T, emergency managers would be more confident that any scenario confronted, no matter how complex, unique, or potentially overwhelming, could be resolved with a greater degree of effectiveness, efficiency, and, above all, SAFETY. Often, the most basic of processes can be the best solution to the biggest challenges.

Stephen Grainer is the chief of IMS programs for the Virginia Department of Fire Programs (VDFP). He has served in Virginia fire and emergency services and emergency management coordination programs since 1972 – in assignments ranging from firefighter to chief officer. He also has been a curriculum developer, content evaluator, and instructor, and currently is developing and managing the VDFP programs needed to enable emergency responders and others to meet the National Incident Management System compliance requirements established by the federal government. From 2010 to 2012, he served as president of the All-Hazards Incident Management Teams Association.

No Defensive Strategy to Address A Growing Terrorist Threat

By Richard Schoeberl

As the Islamic State group increases its threats around the world, the United States is grossly unprepared to track radicalized members and sympathizers, or to even know how many there are in the United States and abroad. At this point, an international coalition effort is the best hope for thwarting this unpredictable, yet ever-growing, "lawless" group.

The United States is not shielded from the threats of the world and has borne witness to fatal terrorist attacks on domestic soil, from the tragedy of 9/11 in 2001, the Boston Marathon bombings in 2013, and most recently the horrific lone wolf attack on 16 July 2015 that left five servicemen dead in Tennessee. Yet, many Americans still perceive terrorism as a problematic international issue as opposed to a domestic one. Americans must stay vigilant and keep in mind an important point: al-Qaida, in its infancy, was comparable to the Islamic State group (IS). However, Americans ignored al-Qaida's existence because they were across the ocean and did not see a threat emerging in the United States until the tragic events of 9/11. The world now bears witness to the violence of IS as it spreads from Syria to Iraq, and most recently infecting embattled Libya.

A Rapidly Expanding & "Lawless" Threat

The international community will see IS continue to develop in Libya, taking full advantage of the ongoing chaos of a country unraveling, destabilizing, and becoming "lawless" since the onset of violence in early 2011. Recently, there have been a number of attacks on foreign embassies in the region and IS is continually gaining popularity. Comparably speaking, IS's reach will widen and become reminiscent of al-Qaida's expansion with loyal offshoots – or franchises – emerging throughout the region from Syria to Yemen, Afghanistan, Iraq, and now Libya. Over the past year, the world has become witness to one of the most well funded terrorist groups as it marches through swaths of land mercilessly killing thousands and continuing to gain popularity each day.

Most concerning, with the expansion into Libya, IS will further weaken a country that clearly is still suffering from a devastating civil war and unrest. Additionally, Libya presents IS with a new base of operations from which to initiate attacks in North Africa and elsewhere in the region. Intelligence estimates as many as 3,000 fighters loyal to IS are currently present in Libya. It is important to remember that IS did not appear in Libya until roughly a year ago in the middle of 2014, and its support is rapidly mounting. Militants originally from Libya, while fighting in Syria, had pledged allegiance to IS and then returned home and organized in this chaotic "lawless" region. In less than one year, IS has moved quickly through Libya and has formed three caliphates in the region, each with its own IS governor.

True to form, the group has swiftly established its supremacy and is enforcing its strict brand of Islamic law. There are dangers, though, of leaving IS alone in Libya. When left alone elsewhere, the results have had greater consequences for Americans – for example, the attacks that killed U.S.

Ambassador Chris Stevens and three other Americans in September 2012. However, what could be most alarming about the occupation and infiltration into Libya is the certainty that IS could use Libya's coastline as a launching pad for European-bound terrorists.

Dr. Aref Nayed, Libyan Ambassador to the United Arab Emirates, warned in a February 2015 Breitbart News interview that IS currently has control over coastal territories in the northern Libya region that can serve as a stage for terrorist attacks on Europe. Nayed stated, "The situation is that they have consolidated their control on Sirte – it's a major city that's about an hour and 15 minutes by plane from Italy." He further stated that, "If they continue to hold on to Sirte, it's extremely dangerous. This is in the middle of the coast of Libya, very close to Europe, and it has logistical capacity to be a real platform of terror on the Mediterranean."

Radical Cells & Sympathizers

In fact, the leader of IS, Abu Bakr al-Baghdadi, has vowed to lead the conquest of Rome as he calls on Muslims to immigrate to this new land to fight under the IS banner. Disturbingly, an estimated 276,000 migrants entered the European Union illegally last year, and "lawless" Libya is the foremost hub for most people aiming to reach southern Europe. Italy, which continues to battle illegal immigration and is in the forefront of this migration wave, is concerned that extremists might be sneaking into the country along with migrants.


Photo: ©iStock.com/slobo

Aside from utilizing Libya as a launching pad for IS militants into Europe, IS's outreach and recruitment has seen thousands of European fighters head to Syria and beyond. The growing number of Europeans being recruited by IS is a fundamental concern, adding fears that they could return home to launch attacks within the region. IS already has directed several attacks in Europe through this scenario and it is likely there will be more – much like the attack at the Jewish Museum in Brussels, Belgium, in May 2014 that killed four people. The attack involved a Frenchman named Mehdi Nemmouche, who was a radicalized IS sympathizer and had recently returned from fighting with Islamist militants in Syria. The investigation confirms that the Brussels shooting was part of a planned strategy by IS. That attack has raised awareness in relation to the risk of Europeans going to fight in Syria and then returning and staging attacks in Europe.

It is still early in the investigation and not yet concluded if Mohammod Youssuf Abdulazeez in Tennessee was inspired by IS. But what authorities have learned is the deeply disturbed man struggled with not only mental illness and drug abuse, but at the same time was alienated from the United States' policies in the Arab world. What will unfold in the upcoming months will be the FBI's focus on Abdulazeez's trips abroad and whether someone he made contact with during his

travels might have inspired the attacks, or somehow set in motion his lethal planning of the attacks. Nevertheless, after Abdulazeez returned from the Middle East, changes were apparent to people close to him – all signs that fall directly in line with the radicalization process. There is still no direct evidence that Abdulazeez was inspired by the IS, but the evaluation of all electronic media is not yet complete.

However, there have been frequent claims of IS cells, as well as IS sympathizers, already entrenched in the United States. It would be naïve to assume anything different. In February 2015, the FBI's Section Chief of the Counterterrorism Division, Michael Steinbach, told CNN that, "There are individuals that have been in communication with groups like IS who have a desire to conduct an attack, and those people are living in the U.S. right now." Steinbach admitted that the FBI finds it extremely difficult to keep track of every American traveling abroad who can join IS or receive training by foreign terrorist organizations, similar to trips to Jordan taken by Abdulazeez.

U.S. Inability to Thwart a Growing Threat

Advances in social media and technology have allowed IS access to the United States and its citizens unlike before the use of social media and encrypted online communications. Ahead of law enforcement surveillance's reach, IS is progressively reaching new sympathizers and encouraging attacks within country borders. Rep. Michael McCaul, R-Texas, chairman of the Homeland Security Committee, said in March 2015 that more than 180 Americans have gone or have attempted to travel to Syria. But it is difficult to approximate the number of sympathizers inside the United States.

A 5 June 2015 CNN report quoted FBI's Michael Steinbach as stating that, "There's hundreds, maybe thousands [of followers in the United States]. … It's a challenge to get a full understanding of just how many of those passive followers are taking action." This statement is concerning due to the fact that the FBI is the lead agency for crisis management response to acts of terrorism, which would include measures to identify, acquire, and plan the use of resources needed to anticipate, prevent, or resolve a threat or act of terrorism. Reminiscent of what happened in Chattanooga, Tennessee, being unable to identify or track "passive followers" and being unable to establish how quickly one of these followers becomes radicalized make threats difficult to thwart.

Stopping attacks on U.S. soil must start with a clear strategy and a thorough plan. The current administration lacks not only a methodical plan or strategy, but a plan in general. President Barack Obama admitted nearly a year ago in August 2014 that the United States still lacked a strategy for defeating the growing extremist threat emanating from Syria. At the G7 Summit in Germany on 7 and 8 June 2015, Obama further reiterated, "When a finalized plan is presented to me by the Pentagon, then I will share it with the American people." Obama added, "We don't yet have a complete strategy."

Due to the lack of efforts to defeat IS abroad, the United States is left to defend itself domestically from this growing international threat. Historically, some of the militants have been trying to return to their countries of origin to carry out terrorist attacks. This should serve as a wake-up call for Washington, D.C., to resolve and make border security a top priority. Whether the United States has a policy for IS abroad or not, response efforts in the United States must be taken in order to be ready for such an attack. Regardless of size or scope, it will take the full efforts and cooperation of an integrated response concept – all responders and their support assets

are coordinated for an effective and efficient response.

Never Isolated & Always a Risk

Terrorism is never an isolated threat that affects certain areas; a single attack can affect everyone. Whether additional threats emanate from an incident or the myriad hoaxes that often follow, every department – federal, state, and local – should be prepared to respond. Law enforcement agencies have taken great strides in preparedness over the years since 9/11, particularly local and state law enforcement agencies, which have taken progressive actions by: (a) increasing the amount of employees involved in the emergency response planning; (b) working more closely with federal agencies and updating their outdated response plans for chemical, biological, or radiological attacks; and (c) reallocating resources to focus on terrorism preparedness within the department.

Far too often, though, agencies use "perceived risk" as a significant predictor for taking actions to develop a level of preparedness. Perceived risk should never be used as a predictor for agencies – regardless of size – making strides to improve their terrorism preparedness, as it will inhibit their ability to function in the integrated response concept. As witnessed in Tennessee, terrorism also should not be considered isolated to New York City or Washington, D.C. As determined in a recent Office of Inspector General (OIG) audit report dated June 2015, 73 airport workers across the United States were "linked to terrorism." The data indicated the individuals were working for major airlines, airport venders, and other employers nationwide. The OIG investigation further indicated that the Transportation Security Administration is responsible for massive security breaches at some of the country's largest airports. Such breaches call the security of all airports across the country into question – all this amid a growing threat by IS militants warning of attacks inside the United States.

Since terrorist acts are typically unexpected and catch many countries off guard, it is imperative to maintain preparation and the best possible response to an attack. When it comes to IS, the challenges faced by the world are enormous and complex. Preparing for a threat from IS is equivocal to forecasting the weather. The difficulty for law enforcement lies in not only having the ability to know where supporters and sympathizers are, but also understanding how quickly they become radicalized. Unfortunately, a lone wolf like Abdulazeez is impossible to predict and almost as impossible to identify. IS is far more than barbarism, far more than just terrorism, far more than simply dropping a few bombs. Drones cannot defeat an ideology. Military action is never an easy option, but whether military intervention is the best answer, it will take an international coalition effort to make the commitment work – anything less will result in failure.

Richard Schoeberl has over 19 years of security and law enforcement experience, including the Federal Bureau of Investigation (FBI) and the Central Intelligence Agency's National Counterterrorism Center (NCTC). He has served at a variety of positions throughout his career ranging from supervisory special agent at the FBI's headquarters in Washington, D.C., to acting unit chief of the International Terrorism Operations Section at the NCTC's headquarters in Langley, Virginia. Prior to his managerial duties at these organizations, he worked as a special agent investigating violent crime, international terrorism, terrorist financing, cyberterrorism, and organized drugs. He also was assigned numerous collateral duties during his FBI tour – for example, as a certified instructor and member of the agency's SWAT program. In addition to the FBI and NCTC, he is an author and has served as a media contributor for Fox News, CNN, PBS, NPR, Al-Jazeera Television, Al Arabiva Television, Al Hurra, and Sky News in Europe. Additionally, he has authored numerous articles on terrorism and security.

Superheroes in Waiting: Emergent First Responders

By Wayne P. Bergeron

Although they may not want to be called "heroes," military members and veterans can fill a critical gap in emergency and disaster response. Their unique qualities of training, discipline, leadership, and teamwork make them the perfect emergent responder either as a member of an organized team, or simply by being in the right place at the right time.

It is not a normal everyday occurrence for U.S. Army Captain Steve Voglezon to rescue people from a burning car and pull multiple people to safety. Even more unlikely, is that he would be wearing a Captain America T-shirt while doing it. However, that is the nature of the military or veteran emergent first responder, someone who is in the right place at the right time with both the will and the courage to act. Simply on his way to the mall, the soldier from Fort Bragg, North Carolina, found himself in May 2015 thrust into the role of first responder as he pulled two people to safety from a vehicle collision with one of the vehicles fully engulfed in flames. When asked about the courage and bravery of his actions, the young captain simply said, "I really didn't have time to think or be scared, just time to react – I saw people who needed help and I guess the Army programming just kicked in." Luckily, for the two victims, it did.

A list of the qualities for the perfect emergent first responder likely would include the following:

- Able to operate in complex, confusing, and quickly changing situations;
- Able to endure hardship;
- Thrives in austere environments;
- Mission focused and able to operate with minimum guidance;
- Comfortable with leadership;
- Confident;
- Physically fit;
- Able to inspire loyalty;
- A team player; and
- Passionate about volunteerism and serving others.

It is no surprise that these qualities also are some of the perfect descriptions for the modern generation of military members and veterans. These qualities and a number of other factors make the military member or veteran the perfect emergent first responder in times of crisis. Many military veterans become formal first responders, with a tendency to gravitate toward professions within the law enforcement, fire, emergency medical services, and emergency management communities when they leave the service. However, many others return to their communities to

open small businesses, or to become managers, foremen, bankers, electricians, etc. Some return to the university to complete their education, and many others settle into the community and start families, join faith communities, coach youth sports, and do all the activities that young adults are expected to do.

However, for many veterans, they sometimes feel that something is missing – a sense of duty or a sense of service. It might just be a fleeting thought at times, but it is present. That might very well be the end of the story, but local emergency managers or newly designated crisis incident commanders should take stock and consider the talents and capabilities of military members and veterans. These valuable resources could serve either as part of a designated reserve manpower pool or simply as an emergent first responder during times of an emergency. In any case, it is a wise choice in terms of the latter and a great strategic investment in terms of the former.

The Unique Qualities of Military Personnel and Veterans

There are key areas of emphasis for emergency management and response that make military personnel and veterans a perfect fit for most emergency management and responder organizations. Three basic categories are: (a) training and discipline; (b) leadership and teamwork; and (c) tested and proven experience.

Training and discipline: From the first day of initial entry training (boot camp), all branches of the military instill a unique sense of self-discipline in each member. This then contributes to an overall sense of teamwork and group identity that allows a bunch of strangers to become a functioning, organizational unit with a group identity and shared sense of purpose in a very short period of time. Military members and veterans never forget that experience and are able to repeat it even many years after leaving the service. The military also teaches practical skills such as physical agility, problem solving, survival skills, navigation, first aid, etc. All of these teachings and many more are the recipe of skills that most first responder organizations need as well. Veterans also value structure and the chain of command, so they intuitively understand the Incident Command System (ICS).

Three key areas that make military personnel and veterans a perfect fit for most emergency management and responder organizations: (a) training and discipline; (b) leadership and teamwork; and (c) tested and proven experience.

Leadership and teamwork: It is no secret that the military operates as a unit or a team at all levels. Even the smallest special operations unit or the fighter pilot has a team of talented and dedicated individuals that they rely on to help them perform their tasks and, in so doing, they all contribute to the overall mission. In addition to teamwork, one of the greatest strengths of the U.S. military is the ability of all of its members – from the most junior private, seaman, or airman to the most senior general or admiral – to step into a leadership role when necessary and appropriate.

For an emergency manager or incident commander, this skill can be critical in knowing that a particular individual is up to the task of leadership at a critical point in a crisis.

Tested and proven experience: One of the biggest unknowns within the emergency response community is exactly how a person – particularly one who is not a formal responder – will respond when faced with his or her first real crisis situation. Regardless of the amount of training or number of exercises, the "real thing" always seems to add an increased level of anxiety and stress. For the most part, military members and veterans in the current generation have served at least one deployment or combat tour with many having served three or more in a normal tour, service, or career. That kind of experience proves invaluable in an emerging crisis situation.

Leveraging Military Members & Veterans

There is no single best method to leverage military members and veterans within the emergency management community, but there are options. One option is to create an emergency response organization fully staffed by veterans, which is exactly what the organization known as Team Rubicon did in the wake of the 7.0 magnitude earthquake that hit the island nation of Haiti in 2010. Two Marines (there are no "former" Marines) together with six other veterans gathered funds and medical supplies from friends and family and flew into the Dominican Republic, where they rented a truck, loaded their gear, headed west to Haiti, and began helping the response efforts. They have not looked back since and have created a dynamic organization of self-deploying veterans, which continues to deploy both domestically and internationally when disaster strikes – most recently in Texas helping with flood relief.

However, not every community can have a Team Rubicon, or even be members of the organization because of day jobs, families, responsibilities, and an inability to pick up and deploy for a few weeks or more at a time. There are several ways that military members and veterans can help their communities, and that local organizations can capitalize on the skills and abilities of these community members.

The first and perhaps most productive way is to become a member of a local Community Emergency Response Team (CERT). Veterans would be instantly familiar and comfortable with the squad-like paramilitary structure of the organization. If a community does not have a CERT, it is relatively easy to start one. Other options to leverage veterans include recruiting them for: volunteer fire departments, rescue squads, search and rescue teams, and similar response teams. *The bottom line:* The possibilities are endless after tapping into this great reservoir of talent (capes are optional)!

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What It Takes to Be a Public Health Emergency Preparedness Professional

By Raphael M. Barishansky

In the relatively young subspecialty of public health emergency preparedness, effective public health preparedness managers must identify the essential elements of their roles and the skills or requirements necessary to be effective in their positions. Although there is no set recipe for success, diverse and field-related skills are a must.

In the October 2014 edition of the *DomPrep Journal*, Daryl Lee Spiewak published an article entitled, "The Professional Emergency Manager." Similar questions can be raised about the essential elements for an effective public health preparedness manager:

- Are there specific training programs, structured educational degrees, or even a blend of traits, training, education, and real-world operational experience that make for the optimal public health preparedness manager?
- Is public health preparedness manager even the correct title? Or is public health emergency manager a better title?

Before answering these questions, a review of some of the background of Public Health Emergency Preparedness (PHEP) programs is in order.

Painting a Realistic Picture

Although there were various emergency situations that could have utilized the services of those with expertise in public health emergency preparedness – such as the Aum Shinrikyo sarin attacks on the Tokyo subway system in 1995 – the subspecialty of public health emergency preparedness is relatively young, truly emerging only after the anthrax attacks in 2001. Before 2001, a lack of operational public health emergency preparedness experience combined with a crumbling health infrastructure (specifically with regard to the number of laboratories and adequately trained public health personnel) painted the picture for a less-than-prepared public health system.

Since the terrorist attacks of 9/11, considerable funding has been provided to local, state, and federal public health agencies and organizations to orient them toward the more comprehensive state of preparedness needed to cope with the changing and increasingly more dangerous realities of today's world. These realities include the possibility of public health entities needing to plan for, and respond to, the full spectrum of threats from weapons of mass destruction (specifically chemical, biological, radiological, nuclear, and high-yield explosive threats) as well as from other threats such as pandemic influenza. Such funding must include the need for personnel with a unique blend of experiences and education in order to manage these programs and the personnel the programs require – for example, planners, trainers, budget analysts, and support staff.

Defining Public Health Emergency Preparedness

There are various definitions for the field of public health emergency preparedness, including the following, which was published in 2007 in the *American Journal of Public Health:*

> "Public health emergency preparedness (PHEP) is the capability of the public health and health care systems, communities, and individuals, to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing or unpredictability threatens to overwhelm routine capabilities."

Additionally, key elements of public health preparedness now include regularly exercised plans, timely access to information, clear knowledge of individual and agency roles and responsibilities, reliable communications systems, and connectivity between and among responding agencies.

Yet, there currently is no definition for the public health emergency preparedness manager or a public health emergency manager. Possibly, the closest to a definition is a portion of the Center for Disease Control and Prevention's (CDC) Preparedness Capabilities requirements (under skills and training for capability 1, function 2). These requirements define an individual's ability to handle specific public health preparedness job requirements as "acquired from three sources: foundational public health competencies, generic health security or emergency core competencies, and position-specific or professional competencies."

Incidents such as the Aum Shinrikyo sarin attacks on the Tokyo subway system in 1995 could have benefitted from the services of those with expertise in public health emergency preparedness, but there is no set recipe for success.

Many occupations defined as professions have their own set of requirements and methods of demonstrating compliance, and will employ various methodologies to ensure that practitioners can demonstrate said compliance. For example, many professions require a Bachelor of Science or Bachelor of Arts degree from an accredited college or university, but some also require: (a) a specific degree; (b) specialized advanced education such as graduate medical or law degrees; (c) a minimum amount of training, with required training subjects based on the specialized knowledge, skills, and abilities of the given profession; and (d) specialized examinations with varying topics and methods.

The PHEP profession is no different. Often, managers of local and state programs have baccalaureate and graduate-level degrees as well as various certifications including, but not limited to: Certified Emergency Manager (CEM®), Certified Healthcare Safety Professional, or Certified Business Continuity Professional. Additionally, relevant coursework such as various Incident Command System (ICS) and Homeland Security Exercise and Evaluation Program (HSEEP) classes may be required. For many, an experiential component to employment as a public health

preparedness manager includes having been employed as registered nurses, emergency medical service providers, or even firefighters.

Diverse Skills Required for Public Health Emergency Professionals

PHEP managers must have a diverse skill set with expertise in at least the following areas in order to be most effective:

- Mass vaccination and prophylaxis planning;
- All-hazards preparedness training;
- Implementation of National Incident Management System (NIMS) and ICS;
- Enhancement of disease surveillance systems;
- Hiring of new staff to work on preparedness planning;
- Stockpiling of various personal protective equipment, vaccines, or antivirals;
- Development of public health specific emergency plans; and
- Administration of workforce training in emergency response.

It is clear that, in order to be an effective public health preparedness manager, there is no set recipe for success. A number of state and local managers have structured degrees in public health or public administration, whereas others have clinical experience as registered nurses, emergency medical service providers, or other degrees and/or additional credentials such as the CEM. However, certain skills are constant, including but not limited to: excellent communications skills, presentation skills, understanding of past events and incidents that have impacted public health, and an ability to research and develop plans in real-time to respond to emerging public health threats.

Time and again, public health agencies and organizations have been planning for, preparing for, and responding to various emergencies including environmental emergencies, foodborne and sanitation issues, and water supply safety. Emerging crises also may have an effect on public health such as SARS, H1N1, and even the recent Ebola outbreak. Other incidents, even if not directly related to public health – such as weather-related events or acts of terrorism – have the ability to significantly affect the public health system. Perhaps the next logical step in the progression of the subspecialty of public health emergency preparedness is the codification of a minimum list of education, experience, certifications, and necessary skills that a public health emergency manager should optimally possess for success.

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Dangerous Suicides

By Stuart K. Cameron

Although most suicides injure only the suicide victims themselves, others may cause injury to anyone within close proximity. With law enforcement officers typically being the first on the scene of such incidents, they should be aware of the hazards and be able to recognize the signs of potential residual threats.

The death of actor Robin Williams in August 2014 focused more attention on deaths caused by suicide. Law enforcement personnel frequently respond to investigate unattended deaths. The cause of death in these cases can span a wide range, from accidental overdoses to homicides. In 2013, more than 41,000 deaths were caused by suicide in the United States making it the tenth leading cause of death for Americans that year. During 2013, that translated statistically into one suicide death occurring every 12.8 minutes. Suicide deaths among middle-aged Americans have been trending upward. According to the Centers for Disease Control and Prevention, more people now die from suicide than from automobile incidents in the United States.

Multiple Ways to Die

Various means are used to commit suicide. The most commonly used method among males in the United States is firearms, whereas American females most frequently opt for the use of poison. Generally, responding to a suicide, such as those where people orally ingest poison, does not pose any extraordinary threat to law enforcement officers. However, those who opt instead to cause their death through some type of inhalation exposure may very well pose an ongoing threat to those who respond.

One method people have opted to use is to commit suicide through the inhalation of carbon monoxide generated by running internal combustion engines in confined spaces. This is frequently accomplished by idling a vehicle in a closed garage. In these cases, responding police personnel need to ventilate the involved area to ensure that they are not affected by this toxic gas. This method often is readily identified for what it is because of the telltale indicators. Therefore, the potential danger is mitigated despite the fact the carbon monoxide is odorless and colorless.

Some more exotic, less frequent, and newly emerging methods to commit suicide via respiratory exposure may be less easily recognized. As a result, these methods may pose a significant threat of harm to responding personnel. Awareness of the threat posed by these methods may be lacking but, once officers are forewarned, they often can be alert for and recognize telltale indicators, which empower them to take actions to avoid injury. All members of law enforcement should be familiar with these trends to ensure their safety should they respond to one of these events.

Oxygen Displacement Hazards

Among the less common methods are asphyxiation through oxygen displacement, the inhalation of hazardous gases and chemical suicides (also known as detergent suicide). Asphyxiation through

oxygen displacement often involves someone placing a bag over his or her head and then pumping in an inert gas, such as helium or nitrogen. Since helium is lighter than air, it fills the bag from the top down forcing all of the air out of the bottom of the bag. Accordingly, the bags used during these acts are sometimes referred to as suicide or exit bags.

Helium may be purchased in a variety of tanks – including disposable ones – from a number of locations, such as party supply stores. This method of asphyxiation reduces the unpleasant sense of suffocation commonly associated with oxygen deprivation in the presence of carbon dioxide, and it is even advocated on various suicide websites. Other gases that have been documented for bag suicides include propane, butane, or methane. Often, tanks of the gas are connected to a hose leading up into the bag, which may have a drawstring, be taped, or otherwise be secured around the neck to prevent the bag from becoming displaced.

Telltale indicators of a chemical or detergent suicide. *Source:* Stuart Cameron (July 2015).

Responders who encounter this method of suicide should be aware that, if it is completed in a confined space with poor ventilation, the gas may continue to displace oxygen in that area, creating an oxygen-deficient environment. Additionally, if a flammable gas such as propane is used, releasing the gas may create an additional risk of explosion or fire.

If a toxic gas, such as Freon or a concentrated pesticide like methyl bromide, is pumped into the bag instead of an inert gas, the victim may die directly from exposure to the concentrated poisonous gas. Once the gas release has been initiated, the toxic gas may continue to flow freely, thereby creating a risk of exposure to those who enter the immediate area. Whenever an apparent suicide involves a tank containing an unknown gas, extreme caution should be exercised and a hazardous materials response team should be requested to assess the situation. Telltale signs include the use of tanked compressed gases, hoses, or bags covering the head.

If the method can effectively kill the victim, it may pose an ongoing hazard to those who respond. Clearly, one of the greatest threats faced by personnel responding to suicides is one of an inhalation hazard – whether carbon monoxide, an oxygen deficient atmosphere, or an intentionally released toxic gas.

Chemical or Detergent Suicide Hazards

A newly emerging threat that has its roots in Japan is being used with increasing frequency in the United States. This trend has been dubbed "chemical or detergent suicide." This method of death involves the intentional mixing of common household chemicals to generate an off-gassing of extremely toxic gases, generally either hydrogen sulfide or, less frequently, hydrogen cyanide. Off-gassing, also called outgassing, is the release of chemicals from various substances under normal temperature and pressure. Chemical suicide deaths usually occur in confined spaces, such as motor vehicles or closets, and generally do not involve the use of bags to further concentrate the gas.

> ***"Attempts to resuscitate victims can expose responders to injury, as the victims are often contaminated with the product. Even the victims' bodies should be considered hazardous, as they may release harmful gases after being removed from the site."***

Chemical suicide is most commonly performed when a person mixes readily available household chemicals containing sulfur together with a product containing hydrochloric or muriatic acid in the proper manner to create an off-gassing of deadly hydrogen sulfide, also called "swamp gas." Products that contain sulfur include various fungicides and dandruff shampoos. Many toilet bowl cleaners and tile or stone cleaning products contain hydrochloric acid. Lists of potential ingredients as well as mixing instructions are readily available on the Internet.

In Japan, where this method began, over 2,000 incidents have occurred. Although this method of suicide is still relatively uncommon in the United States, it is trending upward in frequency. In order to attain the concentration of gas necessary to cause death, those using this method of suicide often do so in a confined space, common spaces used include inside a vehicle, small room, bathroom, or closet.

Generally, the two chemicals are mixed together in an improvised container, such as a pail or bucket. Some victims have mixed the chemicals in glove compartments or vehicle consoles. At high concentrations, one breath of hydrogen sulfide may be sufficient to cause death.

Hydrogen sulfide is a naturally occurring chemical formed by the decomposition of organic matter. It is colorless and has an odor similar to rotten eggs. Continued exposure may rapidly fatigue the sense of smell. The gas is heavier than air and, if it is released in a multistory building, it may sink to lower levels of the structure. Although hydrogen sulfide is flammable at certain concentrations and may create a fire or explosion hazard, flammability occurs at much higher concentrations than is necessary to cause death. Those committing suicide using this method often post signs to warn anyone who may find them of the danger involved from the gas.

In addition, victims frequently use tape to seal doorways and vents to keep the gas from escaping. If the gas is dispersed within a vehicle, it often results in the windows fogging up with a yellowish green tint or cause yellowish green residue deposits on the interior of the car. If there is

loose change in the car, the gas causes pennies to become heavily tarnished to a blue-green color. Victims occasionally remove the interior door handles to prevent themselves from a last-second change of mind and prevent exiting the car. Since the mixture tends to cause chemical burns to skin and eyes, some victims wear gloves and goggles to spare themselves pain. Frequently, the ingredients containers are visible, as well as the improvised container used to mix them.

Additional Concerns for Hydrogen Cyanide

Some opt to commit chemical suicide by mixing products containing cyanide with strong acids to create hydrogen cyanide, which historically has been used to cause death in gas chambers and deployed as a chemical warfare agent. When compared to the use of hydrogen sulfide, this method is far less common due to the increased difficulty in obtaining the precursors. Unlike hydrogen sulfide, hydrogen cyanide is lighter than air, so it rises. It also is readily absorbed through the skin, so skin contact with liquid or vapors must be avoided. Like hydrogen sulfide, hydrogen cyanide has a distinctive odor, which in this case is similar to bitter almonds, and is flammable under certain concentrations.

Many law enforcement agencies have equipped their members with air purifying respirators. Although these units are effective for many hazards, they generally are insufficient for use at chemical suicide scenes. Self-contained breathing apparatus is recommended for these inhalation hazards and, in the case of hydrogen cyanide, fully encapsulating suits are recommended to prevent skin exposure. The safest course of action when these indicators are observed is to request support from a hazardous materials team or the fire service – assets that may not be routinely dispatched to potential suicides. When chemical suicides occur in vehicles, they also are initially dispatched as suspicious vehicle calls, which often result solely in a law enforcement response.

Attempts to resuscitate victims can expose responders to injury, as the victims are often contaminated with the product. Even the victims' bodies should be considered hazardous, as they may release harmful gases after being removed from the site. Therefore, body bags are not recommended because they trap and concentrate toxic gases, thus creating a secondary hazard when they ultimately are opened. Law enforcement personnel have been injured responding to chemical suicides, so extreme caution should be exercised.

Respiratory suicides pose a unique hazard for law enforcement personnel and other responders. Whether compressed gases are released or household chemicals are mixed, awareness is the key to safe response. There usually are several telltale indicators present when these methods are used, but possessing the knowledge to recognize them is crucial for maintaining officer safety.

Stuart K. Cameron is a 30-year veteran of the Suffolk County (New York) Police Department and currently serves as the chief of support services. He spent more than a decade overseeing the operations of the department's Special Operations Commands. He also supervised numerous tactical assignments, barricaded subjects, bomb squad call outs, large crime scene searches, and hazardous material incidents. He has been involved in the development of national level procedures and homeland security training and has been an active instructor on topics related to homeland security and public safety. He is a subject matter expert on the role of law enforcement in the defense against radiological and nuclear terrorism and chaired a committee that developed the concept of operations for the Securing the Cities Program.

Apples & Oranges – Understanding Curies & REM in Radiation Sources

By Jeffrey D. Williams

Hazardous materials personnel are faced with a broad range of chemical, biological, and radiological hazards. However, not all hazards are equal, nor are similar quantities. Responders who encounter radiological materials need to know the relationship of quantity and biological impact of specific materials by first understanding the terminology of measurement units.

The world of the hazardous material responder has changed substantially in the past two decades. Past responses tended to be for accidental releases or misplaced sources, whereas recent events have shown a growing capability for intentional releases with political or terrorist motivations. These events – whether involving a vehicle-borne improvised explosive device, the release of hazardous chemicals, or the dispersal of biological agents – have increased the need for all emergency responders and preparedness professionals to expand their skills and scope of actions. This is particularly true for radiological terrorism, which fortunately has not had a real-world event to date.

With the increasing variety of chemical, biological, radiological, nuclear, and high-yield explosive threats comes the need to understand and become comfortable with the specialized terms of each threat scenario. One of the challenges in discussing radiological sources and their impacts is in understanding the size and threat from a source or an event. Two different ways of looking at hazards are: (a) in the quantity of material involved; and (b) in the biological impact of that material. The first involves understanding the term "curies," whereas the latter involves understanding the term "rem," which is an acronym for roentgen equivalent man. Although both describe an aspect of the scale of an event, the terms relate to different aspects of a source and are not equivalent to each other.

Measuring Quantities of Radiological Material

The unit for measuring the amount, or activity, of radioactive material is the curie (or the becquerel in the International System of Units [SI]). The act of a single atom undergoing decay and changing to another element is one disintegration. Once that particular decay has occurred, an atom that has changed into another isotope or another element will not undergo that same process again, although the new isotope or element may have its own decay process. A curie is defined as 3.7 x 1010 disintegrations per second (dps); the definition of becquerel is 1 dps.

Although curies and becquerels measure the same event, they are obviously significantly different in scale. The practical consequence of this is that small millicurie sources are gigabecquerel sources, whereas curie-sized sources are terabecqueral or petabecquerel sources. This terminology can present problems with the public, and even responders, as these prefixes are not part of traditional experiences in scale. There can even be a psychological impact in these numbers, with a perception that the large prefix represents an inordinate hazard.

A major issue with the measurement of radioactive material is that knowing the quantity does not indicate the level of hazard it represents. Although the term expresses the rate of emissions, it does not factor in the type of radiation (alpha, beta, gamma, or neutron) being emitted – the type of radiation is highly significant in defining the level and scope of hazard of an isotope – nor does it reflect the energetic strength of the radiation. There are critical parameters because a 100-curie (intact) source of alpha-emitting Americium represents a minimal external hazard and can be closely approached with no risk or harm, whereas a 100-curie Cobalt-60 source, which is a high-energy gamma emitter, would require a safe standoff distance of several hundred feet.

Understanding Biological Terms of Radiological Material

Curies describe a source's strength in terms of the rate of decay of a source; describing the strength in terms of the impact of that radiation on a human body is the dose. There are three terms that are frequently, if inaccurately, used interchangeably: (a) the roentgen; (b) the rad; and (c) the rem. The terms are distinct and refer to three noticeably different measurements, a distinction frequently lost in the semantics of the terms.

The roentgen, which is a measure of exposure to radiation, is a measure of the amount of energy deposited in a volume of air that results in the production of a specific rate of ionization. Exposure in this sense is not the same as the common usage of the term ("I've been exposed to chlorine gas"). However, it does convey some of the same sense of having been in contact with the radiation, even if not in contact with the source itself. The term "rad" is used to define a dose, and stands for radiation-absorbed dose. It represents the amount of energy deposited and absorbed by a body (the SI unit is a gray [Gy] and 100 rad =1 Gy). The amount of energy deposited does not depend on either the type of the radiation or the energy of the radiation, just on the energy per mass absorbed.

"In understanding radiation measurement, no single term or aspect gives a full picture of the hazard, so the more information available, the better the opportunity to correctly evaluate the hazard for the scene."

Although rad does not depend on the type of radiation deposited on a body, the impact of that energy on a biological unit is dependent on the type of radiation. The rem is a dose equivalent and accounts for the difference in biological impacts based on particle size (the SI equivalent is sievert [Sv], where 100 rem = 1 Sv). The larger particles of alpha and neutron radiation do greater damage at the point of impact because their energy is deposited in a small space. The lighter beta particle or the energy-only gamma have a more linear energy deposition form, allowing energy to be deposited over a greater volume and, therefore, with less intensity. A quality factor allows the conversion of rad to rem by accounting for the type of radiation and the differing effects. As an example, a 10 rad dose of gamma results in a 10 rem of exposure, and a 10 rad dose of alpha results in 200 rem of exposure.

There is a further complexity in defining the impact of radiation on the human body. Although ad and rem account for the radiation type and the doe equivalent respectively, both assume and

external whole body impact from an intact, external sources. Yet, in both medicine and accidental releases, radiation can enter the body by different pathways and can have significantly different impacts on different tissue systems. This is the effective does and accounts for biological uptake, organ selectivity, etc. Regardless of radiation energy or type, internal exposure is always worse than external exposure due to the sensitivity of the tissues involved.

It is clear that describing source strength in terms of curies or rem provide two very different descriptions looking at very different aspects. It also is clear that, for both terms, that number by itself does not provide a full picture of the hazard presented by the source. The type of radiation and its energy level affect the usefulness of both terms. In understanding radiation measurement, no single term or aspect gives a full picture of the hazard, so the more information available, the better the opportunity to correctly evaluate the hazard for the scene.

Jeffrey Williams has served over the last 20 years as an environmental engineer in the U.S. Department of Defense. He also has served on two different emergency response teams, during which assignments he became an expert on radiological dispersal devices and various related topics. He has been a speaker at a number of public and private forums on topics ranging from environmental regulations to radiological preparedness. Prior to assuming his DoD post, he worked on the design and construction of hazardous-waste disposal sites for industrial facilities. He holds a Bachelor's degree in Nuclear Engineering and a Master's degree in Environmental Engineering from the University of Maryland as well as a Master's degree in Legal Studies from the University of Baltimore. He also has studied at the Massachusetts Institute of Technology's Center for Advanced Engineering Studies.

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Local Public Health's Role in Large-Scale Chemical Incidents

By Rachel Schulman

Public health departments play, or have the ability to play, a key role in large-scale incidents caused by hazardous materials. By clearly defining their roles and collaborating with local partners, health departments have the ability to help emergency planners and responders prevent, mitigate, plan for, and respond to chemical hazards and incidents.

Large-scale chemical incidents – such as the West, Texas, fertilizer plant explosion in 2013, the Graniteville, South Carolina, train crash chlorine release in 2005, and the Tokyo, Japan, sarin gas release in 1995 – pose unique threats to human health that warrant specialized planning by first responders. Chemical incidents often unfold quickly, and serious exposure symptoms develop equally fast. Although these circumstances necessitate quick action by first responders, the information that responders need to make decisions may not be readily available. Chemical agents may take time to identify and, in the case of a surreptitious release, it may not be immediately evident that a chemical event has occurred. Responders may find themselves in the position of making high-consequence decisions that are not fully informed.

Defining the Roles of Local Health Departments

In collaboration with the Department of Homeland Security Office of Health Affairs, the National Association of County and City Health Officials (NACCHO) sought to determine how local health departments (LHDs) could best contribute to a large-scale chemical event response. After a research review, NACCHO conducted a multidisciplinary focus group of 33 local, state, federal, and nonprofit agency representatives in the National Capital Region. Key research objectives were to understand the roles that LHDs currently play in response to a large-scale chemical incident, to pinpoint challenges that limit the LHD role in these responses, and to identify additional roles for LHDs that capitalize on their unique capabilities and resources.

The overwhelming message of the National Capital Region focus group was that the role of LHDs in a chemical response is not well defined. Though LHDs have responsibility for protecting human health in all hazards, the role of LHDs is often perceived to be limited to disease prevention and control. The perception of chemical incidents as hazardous material (hazmat) events, and not public health events, may result in LHDs being left out of the loop, even after the incident transitions to a mass casualty or mass fatality event.

As long as hazmat responders are unaware of LHDs' chemical event response capabilities, LHDs likely will find that they continue to be left out of chemical event planning and response, to the detriment of communities and their response partners. To facilitate conversations on this important topic, NACCHO's research highlighted the many roles that LHDs can play in a chemical incident. Even though all localities operate differently, the roles described below should be considered when planning with public health partners.

Prevention & Mitigation of Chemical Incidents

LHDs offer unique perspectives on chemical threats to the community through their intimate knowledge of community vulnerabilities. LHDs regularly conduct surveillance activities – for example, community health assessments and geographic information system mapping of at-risk populations – that inform them of the locations and needs of different community groups. This knowledge can be used to inform decisions about local-level chemical storage, use, and disposal practices, and to assess risks to nearby populations.

By participating in the inspection and regulation of chemical facilities, LHDs gain a better understanding of the nature of the greatest chemical threat facing jurisdictions. This understanding allows LHDs to better prepare the community for potential health and environmental impacts. Precedents exist for the involvement of LHDs in the inspection and regulation of chemical facilities. For example, the Town of Acton, Massachusetts, enacted local bylaws that provide the health department with the authority to permit and inspect commercial facilities' manufacturing, use, and storage of chemicals in quantities of 25 gallons/pounds or greater. The health department routinely inspects permitted chemical facilities within the community and coordinates monitoring and response with other government agencies.

Thorough knowledge of the chemical threats facing the community also allows LHDs to educate community members. LHDs tailor outreach activities for groups living near chemical facilities, teaching community members critical preparedness information including how to recognize the effects of chemical exposure, how to avoid exposure, and where to obtain information during an emergency.

Planning & Response

In the case of a surreptitious chemical release, public health surveillance activities are crucial to determining that an event has happened, as well as the nature of the event. Routine passive surveillance results can be monitored for unusual symptoms associated with chemical exposures. LHDs also collaborate with poison centers, healthcare systems, and clinical laboratories on protocols for chemical exposure symptom recognition and reporting protocols.

Once it is known that an event has occurred, LHDs' preexisting community relationships position them to be a trusted source of risk communications. While other responders handle the hazardous materials, LHDs have the ability to calm and inform the populace. By synthesizing knowledge of the chemical's properties and the parts of the community affected, LHDs identify at-risk populations and share information on health concerns and protective measures, such as evacuation routes, shelter-in-place guidance, and instructions for decontamination and obtaining medical care. Health messages and templates for the most likely chemical threats can be drafted in advance, along with messaging for events when the chemical released is not immediately known.

Response partners also turn to LHDs for expertise on potential human health and environmental impacts of chemical agents. LHDs provide subject matter expertise to healthcare partners on matters such as the toxicity of chemical agents and sampling and screening approaches. If the agent is unknown, LHDs could use epidemiologic investigation methods to help identify it. LHDs engage in active surveillance of cases through coordination with hospitals, emergency medical services, urgent care, and poison control centers, as well as coordination with sheltering partners to support the assessment, referral, and decontamination of exposed persons presenting at shelters.

Other potential roles based on LHD expertise include: (a) coordinating the provision of mental and behavioral health services to affected communities; and (b) providing guidance to ensure the safety and health of on-the-ground responders.

Public health expertise on the impacts of chemical agents also provides extensive opportunities to support and collaborate with healthcare and environmental health partners. With large numbers of people (both injured and worried well) potentially reporting to hospitals, LHDs could assist with surge management by supporting triage and patient tracking efforts, or by monitoring bed status and other issues across multiple affected facilities and serve as a liaison between hospitals and response partners. Depending on how environmental health is handled in the jurisdictions, LHDs may play a role assessing and monitoring the environment impact of the agent and the pathways by which it travels. With their knowledge of environmental health impacts, LHDs define exclusionary zones and evacuation areas to ensure public safety, as well as to issue advisories related to drinking water and food safety.

LHDs also may be responsible for distribution and dispensing of medical countermeasures. Many LHDs are the lead agencies for CHEMPACK distribution. The rapid onset of chemical exposure symptoms means that medical countermeasures must be deployed quickly, but uncertain diagnoses can make the determination to dispense difficult. Public health understanding of chemical exposure symptoms and experience with medical countermeasure dispensing well positions LHDs to develop CHEMPACK deployment triggers and effective distribution protocols.

Once a response reaches the recovery phase, LHDs may be responsible for long-term monitoring of exposed individuals and environmental health impacts, as well as continued risk communication should environmental contamination linger. Their training and expertise again position them well to take on this role, although many LHDs lack the capacity to carry out these activities long-term without external support.

Challenges to Implementation

The roles described above provide numerous entry points for public health participation in a large-scale chemical event response, but identifying roles is only the first step. NACCHO's research revealed challenges to LHD involvement that also must be addressed. The first few are more easily addressed locally, but some require more systematic efforts at the state and federal levels to eliminate barriers.

- *Written plans.* The process of developing written plans or annexes for chemical incident response helps LHDs more clearly define their response roles. By working with partners to develop written plans, LHDs set up protocols to ensure that the resources and capabilities they offer are available and utilized during a chemical response. Local best practices, such as chemical response annexes and decision trees, must be more widely shared to aid in written plan development.
- *Notification.* The perception that chemical events only require a hazmat response interferes with the rapid involvement of LHD responders. It can be difficult to identify when an average hazmat incident crosses the line into an event with larger community consequences requiring public health involvement. Clear delineation of public health response roles and notification triggers are needed to ensure that LHDs are at the table when they need to be.

- *Information sharing.* Once roles are defined, LHDs need to determine and share their data and communication needs. It may not be clear to partners which information LHDs need in order to make decisions and carry out their assigned responsibilities. For example, LHDs need a certain level of situational awareness to accomplish any public messaging roles and may require the collection of certain data to support long-term monitoring of health outcomes of those exposed.
- *Baseline data.* Many communities do not know the top chemical vulnerabilities and threats to their jurisdictions. Some of these can be determined through direct planning with local facilities (per the Chemical Facilities Anti-Terrorism Act) and participation on Local Emergency Planning Committees. Others are more difficult or potentially impossible to determine – for example, it is hard to assess chemicals passing through a jurisdiction by road or railway. Baseline data on current levels of contamination also is lacking, making it difficult to assess environmental health and safety in the long term for areas affected by chemical events.
- *Training and educational resources.* As other responders look to public health for expertise on chemical health threats, LHDs need regular training and education in this area, but budget limitations and conflicting priorities pose obstacles. Although LHDs may be well versed in the most likely chemical threats to their jurisdictions, it is impossible for them to maintain expertise in the thousands of chemical threats that exist. As such, LHDs must maintain an understanding of which questions to ask and who to contact to source information – for example, poison centers are a critical partner that LHDs help integrate into chemical response planning. LHDs have access to many resources of the Centers for Disease Control and Prevention as well as other federal resources used to support chemical incident response. However, different guidance from different federal agencies may be confusing, and certain resources, like plume modeling, may be unknown or unavailable to LHDs, especially ones that are smaller or underfunded.

LHDs have much to offer their response partners and communities with regard to preventing, responding to, and recovering from large-scale chemical incidents. However, more planning and partnership-building must take place before public health's unique knowledge, skills, and resources can be effectively utilized in these scenarios. Further research may illuminate strategies for better integration of public health into chemical response activities. In the meantime, collaboration and communication to plan for the unique challenges posed by chemical incidents are the best way for communities to prepare.

For additional information:
Florida Department of Health. (2012). Chemical Incident Annex to the Emergency Operations Plan.

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National Laboratory Support for First Responders' Biodetection Needs

By Richard M. Ozanich & Cynthia J. Bruckner-Lea

In an ever-changing biological environment, laboratory support is necessary to help responders identify, categorize, and manage incidents involving biological threats. The Pacific Northwest National Laboratory is one source that provides valuable testing data to help today's first responders collect, screen, identify, and ultimately protect against such threats.

First responders know that white powder scenarios – or suspected biological threats – require quick and decisive action. Having the right field equipment available to identify suspicious substances can be complicated, challenging, and expensive. With support from the Department of Homeland Security (DHS) Science and Technology Directorate (S&T), Pacific Northwest National Laboratory (PNNL) has been working with the first responder community to identify biodetection technology and information needs and gaps, and transition solutions to the first responder community. PNNL's "ground-up approach" involves first responders and stakeholders early in the process and culminates in the transition of information and knowledge to improve biological response capabilities (see Figure 1).

"Biodetection Technologies for First Responders: 2015 Edition"

Since 2012, PNNL has produced an annual product guide that has been downloaded almost 14,000 times. The guide summarizes commercially available technologies that can be used by first

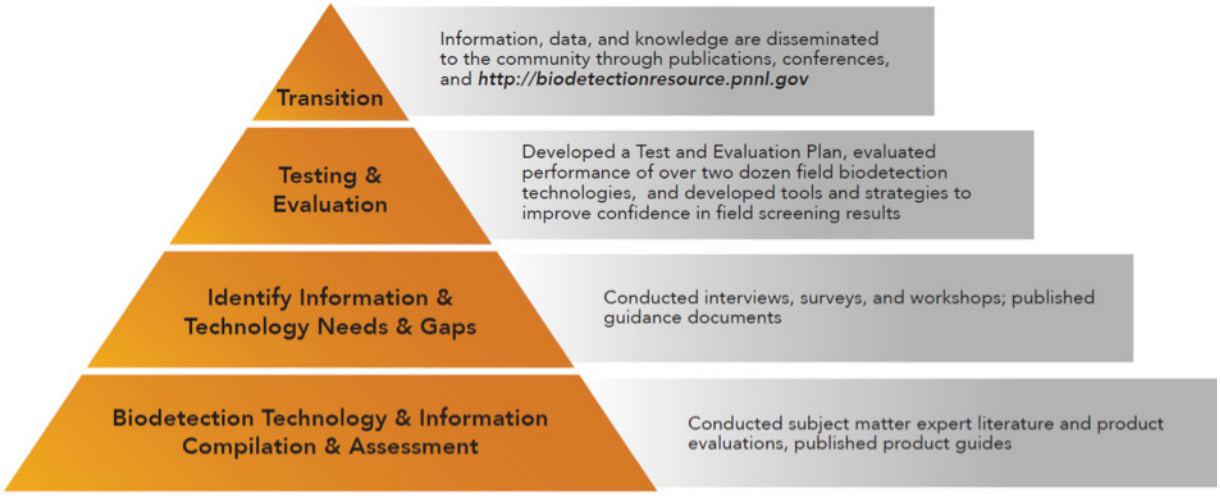

Figure 1. PNNL's "Ground-Up" approach involves first responders and stakeholders early on in the process and culminates in the transition of information and knowledge.

responders in the field for the collection, screening, and identification of suspected biothreat materials. This guide provides information about available technologies to help end users make informed decisions when procuring and using biodetection technology. The third edition, "Biodetection Technologies for First Responders: 2015 Edition" is available for download at: http://biodetectionresource.pnnl.gov (see Figure 2). The product guide is also available on the website in a search-and-compare format and as an iOS app (free from the Apple Store). Technology demonstration videos are also available on the website, as well as a demonstration of the American Society of Testing and Materials (ASTM) E2458-10 suspected biothreat powder collection standard practice.

Figure 2. Pacific Northwest National Laboratory Report.

PNNL tested 35 commercially available hand-portable biodetection products with over 5,000 assays conducted to date against anthrax, multiple levels of purity of ricin, and environmental powders. Product performance was evaluated in the areas of: inclusivity (ability to generate a true positive result for an actual biothreat sample); exclusivity (the ability to not generate a false positive result for a nonthreat sample); environmental interferents/powders (ability to not generate a false positive result or have assay interference); and sensitivity/limit of detection.

The products tested included biological indicator tests, immunoassays, and polymerase chain reaction (PCR) systems. Biological indicator tests simply detect the potential presence of biological material in a sample. Typically, these tests detect proteins, amino acids, deoxyribonucleic acid (DNA), or adenosine triphosphate, which are all indicators of a material of biological origin. These general biological screening tests detect a broad range of biological and organic materials, but do not confirm the presence of a specific biothreat agent. Therefore, although many of the biological indicator tests are relatively rapid and inexpensive, they should be used only as a screening tool in conjunction with tests that are more specific.

Agent-Specific Assays & Protein-Based Immunoassays

PNNL also tested agent-specific assays, which unlike the general biological indicators, can both detect and identify the specific agent or toxin present in a sample. PNNL tested both protein-based immunoassays and DNA-based PCR assays.

Immunoassays use antibodies, which are proteins designed (by nature or in the laboratory) to bind to a specific threat agent such as anthrax or ricin. Most field-based immunoassays use a lateral flow assay format similar to a home pregnancy test (see Figure 3). A lateral flow assay includes an assay strip containing all the assay components encased in a disposable plastic cartridge. The cartridge has a sample window where the sample is applied to the assay strip, and a results window where the results are visually displayed or read by an electronic optical reader. Immunoassays are advantageous because they are relatively inexpensive, require little skill to use, and results can typically be obtained in only 5 to 15 minutes. However, most immunoassays are several orders of magnitude less sensitive than PCR. Typical sensitivity for immunoassays range from 1 million to 10 million spores or microbes per milliliter.

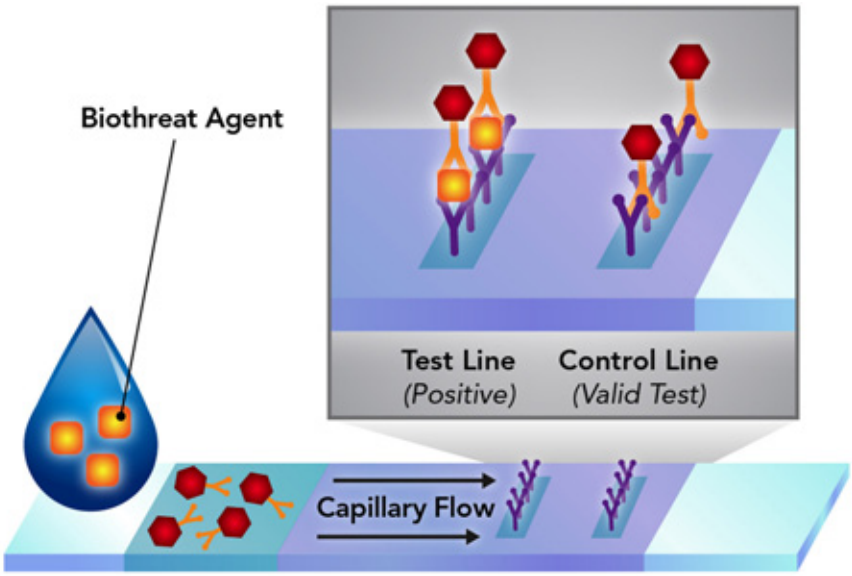

Figure 3. Illustration of typical lateral flow immunoassay.

In contrast to immunoassays, PCR-based assays detect specific organisms based on their DNA sequence. During PCR, short pieces of DNA from the biothreat organism are amplified, creating millions of DNA copies from a small number of starting molecules. PCR assays are designed to recognize regions of DNA that are unique to the biothreat organism. Most field-based PCR systems consist of a disposable assay cartridge containing all of the consumable reagents, an instrument that integrates the thermal components to perform the heating/cooling cycles required for PCR, and the optical components required for quantifying the amplified DNA products.

PCR assays are performed on liquid samples and require a sampling kit (sometimes included) to swab a suspicious powder and solubilize or suspend the powder in a compatible buffer.

Depending on the system, various degrees of sample preparation or cartridge manipulation may be required, such as pipetting, manual mixing, or centrifugation. Results are visually displayed on the instrument following the PCR reaction. PCR-based assays are advantageous because they are very sensitive and specific (although the specificity of a system is dependent on the design of a particular assay).

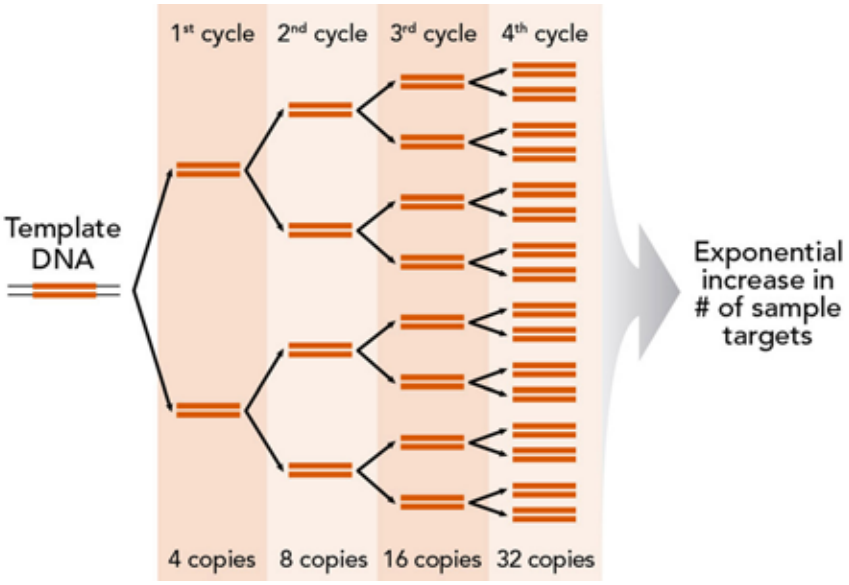

Figure 4. PCR can amplify a single piece of DNA ("target") to make millions of copies in 30-60 minutes.

Very few field-based PCR systems have integrated sample preparation to concentrate DNA and remove PCR inhibitors. However, because PCR is very sensitive, a sample can often be significantly diluted after sampling to reduce the effects of potential inhibitors on the reaction. Few published studies are available that assess the impact of environmental samples and hoax powders on PCR-based assays when little or no sample preparation is conducted. The most significant disadvantages of PCR-based approaches are relatively long assay times (typically 30 to 60 minutes) and, for some systems, relatively high costs (see Figure 4).

A Test Plan, Gaps & New Products

Prior to testing, PNNL developed a statistically based, cost-effective test plan that provides results for the probability of detection and percent confidence to define the performance of a given biodetection product. This test plan has formed the basis for a proposed ASTM standard in the E54.01 Homeland Security subgroup.

However, serious gaps still exist in the first responder biodetection community including a lack of: (a) test and evaluation standards; (b) formal guidance for conducting field biodetection; (c) biodetection product performance data obtained by an independent third party; (d) best practices and knowledge for technology use and limitations; and (e) a consolidated resource for biodetection-related information.

New, untested biodetection products continue to emerge at a rapid pace, numerous other biothreat agents have not been tested on any platforms, and additional testing with more complex types of samples and a broader range of "near-neighbor" agents (nonpathogenic organisms similar to biothreat organisms) remains to be done. While it is critical (and more cost-effective) to demonstrate instrument performance and proficiency in the laboratory, it is equally important for first responders to evaluate instruments in the field, after the instruments have successfully passed the laboratory testing.

In addition, a sustained effort is needed to transition information to the first responder community to keep responders informed of performance testing results, technology use and limitations, and best practices. Conducting and supporting bioresponse field exercises that promote coordination between first responders, the Federal Bureau of Investigation (FBI), public health/Laboratory Response Network labs, and National Guard Bureau Civil Support Teams are also critical to identify gaps and improve response readiness and effectiveness. Although PNNL efforts are bridging these gaps to improve overall first responder effectiveness and public safety, considerable work remains to be done.

Richard M. Ozanich, Ph.D., has worked in the biodetection field for over 20 years. He is a subject matter expert in biodetection and optical spectroscopy and has a broad base of knowledge in the fields of chemistry, biology, and measurement instrumentation. He is currently working on evaluation and testing of biothreat detection instruments and assays to improve the selection and use of field biodetection equipment for first responders. His research includes development of automated fluidics instrumentation and microparticle-based methods for sample preparation and rapid detection of biothreats. He is active in the area of bioresponse and development of standards and best practices and is a member of ASTM International (American Society for Testing and Materials) Committee E54 on Homeland Security Applications. He received a B.S. degree in chemistry from the University of Washington and a Ph.D. in analytical chemistry from the University of Washington.

Cynthia J. Bruckner-Lea, Ph.D., is a senior scientist and program manager at Pacific Northwest National Laboratory. She is a recognized biodetection expert with over 30 years of experience in the development and application of biological detection systems for environmental monitoring, medical, and national security applications. She is an American Association for the Advancement of Science Engineering Section Fellow, and she has served on several National Academy of Science Committees conducting studies related to chemical and biological detection. She has over 50 publications and 10 patents. She received a B.S. degree in chemical engineering from the University of California, Davis, and a Ph.D. in bioengineering from the University of Utah.

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Operation Twister – Exercising Disaster Behavioral Response

By Craig DeAtley

Functional exercises are invaluable for helping participants understand their roles in disasters. This is particularly true for participants who normally are not included in interagency exercises, such as behavioral health personnel. Triaging following a disaster should not stop at the physical level, but should consider psychological concerns as well.

Every disaster to one degree or another involves behavioral health issues affecting the public and the response communities. Disaster behavioral health responders typically work in concert with healthcare providers, public health, emergency management, first responders, and volunteer organizations. Although disaster behavioral health is gaining recognition as an integral part of the overall public health and medical preparedness, response, and recovery systems, disaster preparedness exercises often fail to integrate a behavioral health response. Personnel responsible for providing behavioral health assistance and the healthcare facilities both benefit from opportunities to clarify their roles and rehearse their responses to effectively address the full needs of patient populations in disasters.

Recently, a functional exercise was held in the District of Columbia that provided a focused opportunity for the D.C. Department of Behavioral Health to respond to a severe bad-weather incident and practice its response plan. The plan included the use of Psychological Simple Triage and Rapid Treatment (PsySTART) for victim screening and integration with hospitals requesting their assistance in assessing the immediate and long-term behavioral needs of the injured patients and their families. As a result of the exercise, some valuable lessons were learned.

Operation Twister

The three-hour exercise, named "Operation Twister," was sponsored by the D.C. Emergency Healthcare Coalition. Dr. Kevin O'Brien, director of Disaster Behavioral Health Services for the D.C. Department of Behavioral Health, was part of the exercise planning team. The scenario involved severe bad weather hitting the District of Columbia with torrential rain, damaging winds, and eventually a tornado. Numerous incidents occurred, which caused mass casualties involving adults and pediatric patients. Some patients had critical trauma including burns; whereas others were severely emotionally traumatized from the resulting dangers, utility outages, and general disruption to their normal lifestyles.

Several hospitals requested assistance from the D.C. Department of Behavioral Health to manage the immediate and possible long-term behavioral health problems of their patients. The department deployed three members of the Behavioral Health Emergency Response Team to work

with the Psychiatry Department staff at a large trauma center hospital that received nearly 100 moulaged victims. The request was made by phone as well as on the coalition's intranet-based system for information sharing.

The team arrived at the hospital within an hour after the request was received. Once at the hospital, they reported per instructions to the Hospital Command Center, where they were briefed and redirected to the Emergency Department to support the work of the staff from the hospital's Psychiatry Department. Together, the two teams triaged 29 of the victims with the PsySTART tool. The nonintrusive format took less then 10 minutes to administer and manually record the triage scores.

PsySTART

PsySTART is a strategy for rapid mental health triage during a large-scale incident. This evidence-based concept was originally created by Dr. Merritt Schreiber at the Center for Disaster Medical Services at the University of California Irvine School of Medicine, and is used in numerous communities in the United States including hospitals and the D.C. Department of Behavioral Health. The U.S. Department of Health and Human Services' Hospital Preparedness Program grant money was used in 2012 to provide initial training in the District of Columbia to hospitals, fire, and emergency medical services, and D.C. Department of Behavioral Health staff members.


St. John's Regional Medical Center after the 22 May 2011 EF-5 tornado in Joplin, MO. Source: FEMA/Elissa Jun.

Periodic refreshers and new training have been conducted annually since then. The triage tool can be used for assessing both adult and pediatric patients. Patient answers can be written on the questionnaire or entered into a computer database for analysis. The questionnaire's primary purpose is providing situational awareness of at-risk individuals, and it uses a "floating triage algorithm" that prioritizes those who need to be seen first from those who can be referred for assessment after the initial surge is over.

Exercise Lessons Learned

The exercise was an excellent overall learning experience according to O'Brien, who served as an exercise controller/evaluator. "It gave our department a chance to rigorously exercise our

emergency response plan in coordination with other members of the healthcare community. We don't get a chance to do that very often." The value of having a redundant approach for making a request for assistance was reinforced because, for some of the facilities, their phone lines were not functioning and use of the coalition's intranet-based Healthcare Information System (HIS) was the only way they could make the request for help.

The exercise provided the D.C. Department of Behavioral Health a chance to rehearse deploying their personnel to a hospital, while taking into account the bad weather and potentially dangerous road conditions. O'Brien pointed out in his hot wash remarks that, "Having our staff actually integrate into a hospital operation during a crisis was new for us, and proved invaluable so we could learn how to support and not interfere."

The exercise also brought to light the importance of having multiple personnel – whether in the Department of Behavioral Health or at a hospital – being familiar with and adept at using the PsySTART tool itself. Although both responders and the hospital had trained personnel using PsySTART, just-in-time refresher training was needed for some of the users to quickly become comfortable using it.

Interestingly, the analysis of the answers these "make believe" disaster victims gave indicated that all of the patients evaluated would require follow-up care – something that otherwise might not have been recognized so quickly. Knowing these results allowed both the hospital and O'Brien's colleagues to better devise long-term discharge plans for these patients. Plans also were discussed but not implemented for administering the questionnaire to hospital staff and using the results to determine staff support needs. However, exercise time limitations precluded such plans from actually being implemented.

Operation Twister was an exercise that had the usual focus on emergency medical services and hospital performance of patient triage and treatment. However, this exercise also provided a much-needed opportunity for key members of the city's healthcare system to evaluate their ability to address the behavioral health concerns rather than simply the physical needs of victims and responders to severe weather or any other emergency.

Craig DeAtley, PA-C, is director of the Institute for Public Health Emergency Readiness at the Washington Hospital Center, the National Capital Region's largest hospital; he also is the emergency manager for the National Rehabilitation Hospital, administrator for the District of Columbia Emergency Health Care Coalition, and co-executive director of the Center for HICS (Hospital Incident Command System) Education and Training. He previously served, for 28 years, as an associate professor of emergency medicine at The George Washington University, and now works as an emergency department physician assistant for Best Practices, a large physician group that staffs emergency departments in Northern Virginia. In addition, he has been both a volunteer paramedic with the Fairfax County (Va.) Fire and Rescue Department and a member of the department's Urban Search and Rescue Team. He also has served, since 1991, as the assistant medical director for the Fairfax County Police Department.

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