

# CDC Career Epidemiology Field Officer (CEFO) Program

Strengthening CDC's Impact in the Field



**2018**  
Annual Report



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# Background

The Centers for Disease Control and Prevention (CDC) created the Career Epidemiology Field Officer (CEFO) program in 2002 to strengthen state, tribal, local, and territorial epidemiology capacity for public health preparedness and response. Through placement in frontline public health agencies, CEFOs provide communities with a more direct connection to CDC expertise, resources, and technical assistance. CEFOs work in conjunction with their assigned health departments to identify and fill gaps in preparedness capacity, improving their ability to respond to public health threats. The scope of work varies depending on their assigned jurisdictions' needs and capabilities.

Funding for CEFO positions is mainly derived from the CDC Public Health Emergency Preparedness (PHEP) cooperative agreement through the direct assistance (DA) mechanism. Health departments allocate PHEP funding through DA requests to support CEFO positions. Some CEFO assignments are co-funded with other CDC programs and support a broader spectrum of activities.

During 2014–2017, large-scale public health responses to infectious diseases of global importance (Ebola and Zika virus) influenced the work activities of most CEFOs. During 2018, the urgent public health issues for US health departments became more uniquely domestic in nature and CEFOs responded to address those. The nation was faced with a growing crisis of opioid overdoses and deaths. Multifocal outbreaks of hepatitis A were occurring in multiple states. And the paramount requirement to build and maintain public health preparedness continued. This report describes the history and current state of the CEFO program and documents CEFO activities to address the public health challenges of 2018.

## Vision

Sustained epidemiologic capability nationwide for public health preparedness and response.

## Mission

Enhancing the epidemiologic capability of state, tribal, local, and territorial health departments to respond to public health emergencies

# Career Epidemiology Field Officer Program Timeline, 2002–2018

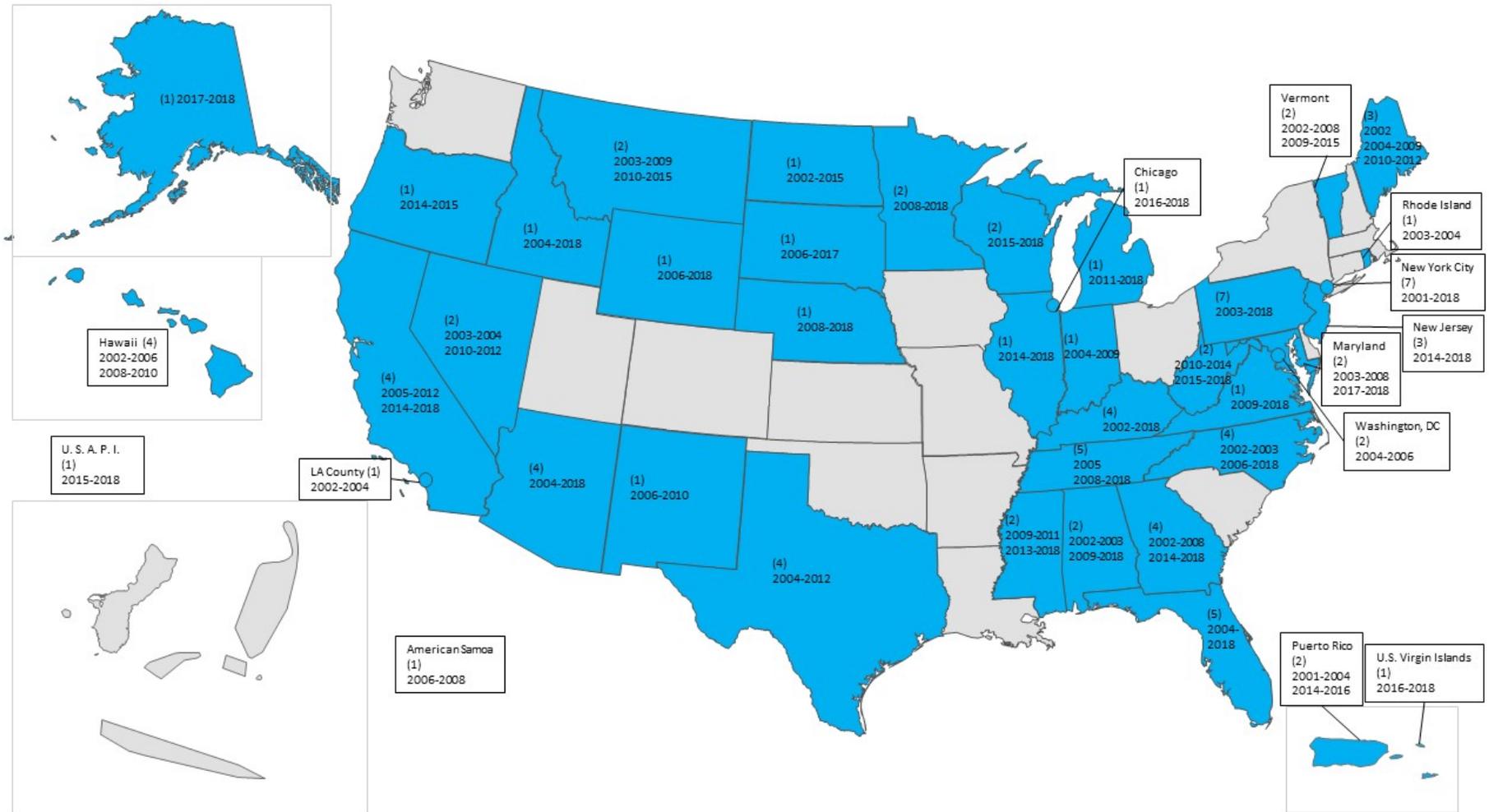
Selected CDC Responses		CEFO Program Milestones
9/11, Anthrax Attacks	<b>2001</b>	Career Field Officer (CFO) program begun by <b>Tom Török and Karen White</b>
Ongoing monitoring for nationwide threats	<b>2002</b>	<b>First 12 CFOs</b> recruited. Program placed in MCHM State Branch
SARS, Monkey Pox CDC Use of Incident Management System for Domestic Responses	<b>2003</b>	Program moved to NCHM Name changed to <b>Career Epidemiology Field Officer (CEFO)</b> program
CAT 5 Hurricanes Katrina and Rita	<b>2004</b> <b>2005</b>	Pat Drehobl named <b>1st Program Director</b>
XDR Tuberculosis	<b>2006</b> <b>2007</b> <b>2008</b>	Program moved to <b>OTPER/DSLRL</b> <b>Valerie Kokor</b> named Program Director <b>Sandy Gambescla</b> named Acting Director
Pandemic Influenza A H1N1	<b>2009</b>	Program moved to <b>COTPER/OSPHP</b> <b>Stephanie Ostrowski</b> , Acting Director <b>John Horan</b> named Program Director
Haiti Earthquake and Cholera Outbreak Deep Water Horizon	<b>2010</b>	
Japan Earthquake and Tsunami	<b>2011</b>	
Multistate Fungal Meningitis Outbreak	<b>2012</b>	<b>Valerie Kokor</b> , Acting Director CEFO program moved to <b>OPHPR/DSLRL/Field Services Branch</b>
Ebola Outbreak in West Africa Unaccompanied Children	<b>2013</b> <b>2014</b> <b>2015</b>	<b>Theresa Smith</b> , Acting Director <b>Randolph Daley</b> named Program Director
Flint, Michigan Water Crisis Zika Virus Outbreak	<b>2016</b> <b>2017</b>	
CAT 5 Hurricanes Harvey, Irma, Maria Opioid Overdose Crisis	<b>2017</b>	
Opioid Overdose Crisis Multistate Hepatitis A Outbreaks	<b>2018</b>	

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U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

# Career Epidemiology Field Officers and Assignment Locations 2002–2018



Number of CEFOs (in parentheses) and Years CEFOs Served in Jurisdictions

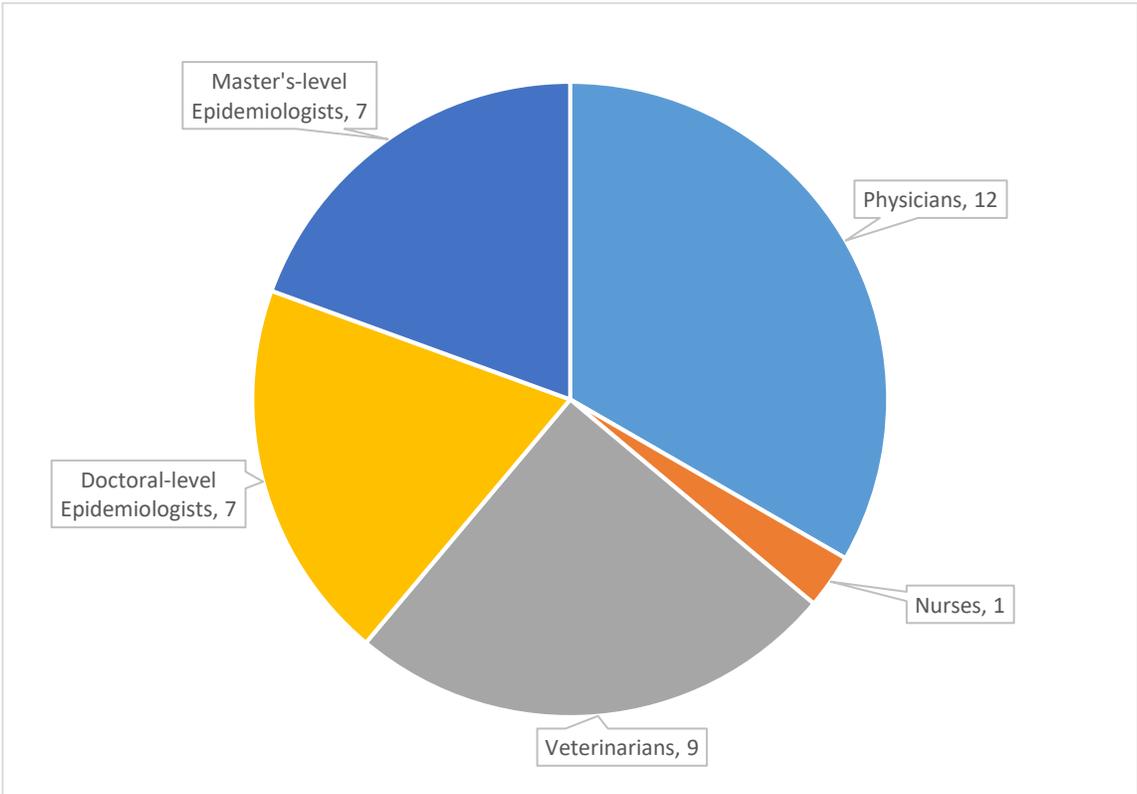
# Career Epidemiology Field Officers — Assignments, 2002–2018

During the years 2002–2018, 87 CEFOs served in 46 unique jurisdictions. A comprehensive list of CEFOs and their jurisdictional assignments can be found in the [Annex](#) at the end of this report.

## CEFO 2018 Data Points

CEFOs are mid-level to senior CDC epidemiologists with experience in surveillance, epidemiology, preparedness, research, training, and policy development. Prior to their assignments, CEFOs have completed the CDC Epidemic Intelligence Service (EIS) fellowship or have comparable experience and training. As of May 2018, 23 CEFOs are U.S. Public Health Service (USPHS) Commissioned Corps Officers, and 13 are civil service employees. CEFOs represent an array of disciplines and professional backgrounds, including physicians, nurses, veterinarians, and masters or doctoral-level health scientists—see Figure 1. Prior to entering the program, CEFOs acquired expertise in various settings, including academia, state, local, territorial health departments, and federal agencies. The diverse backgrounds and public health skills of CEFOs provide health departments with adept leaders who can work on a broad range of issues essential for community resilience and preparedness.

**Figure 1: Professional disciplines**



CEFOs complete quarterly reports that detail the activities they performed during that period and the associated preparedness capabilities. The number of activities a CEFO works on during any given quarter may vary. Figures 2 and 3 represent the combined capabilities and activities CEFOs reported during 2018.

# Career Epidemiology Field Officers Assignment Locations May 2018



## Principle Public Health Preparedness and Response Capabilities Reported in CEFO Quarterly Reports — 2018

One of the nation’s key preparedness challenges has been determining appropriate state and local public health preparedness priorities. To assist state and local public health departments in their strategic planning, CDC developed 15 capabilities to serve as national public health preparedness standards. Figure 2 shows the principle public health preparedness and response capabilities that CEFOs reported in their 2018 quarterly reports. CEFOs focused primarily on supporting and improving their assigned jurisdictions’ public health surveillance & epidemiological investigation, community preparedness, emergency operations coordination, and information sharing capabilities.

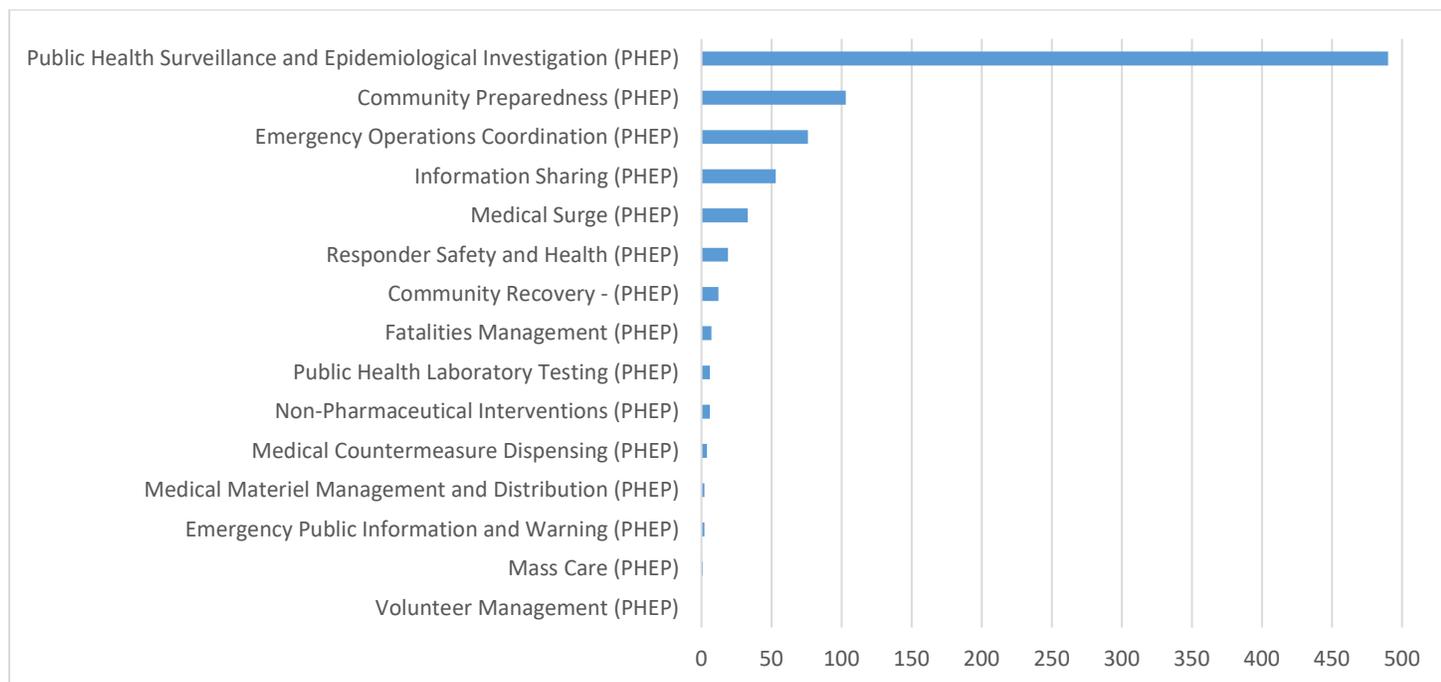
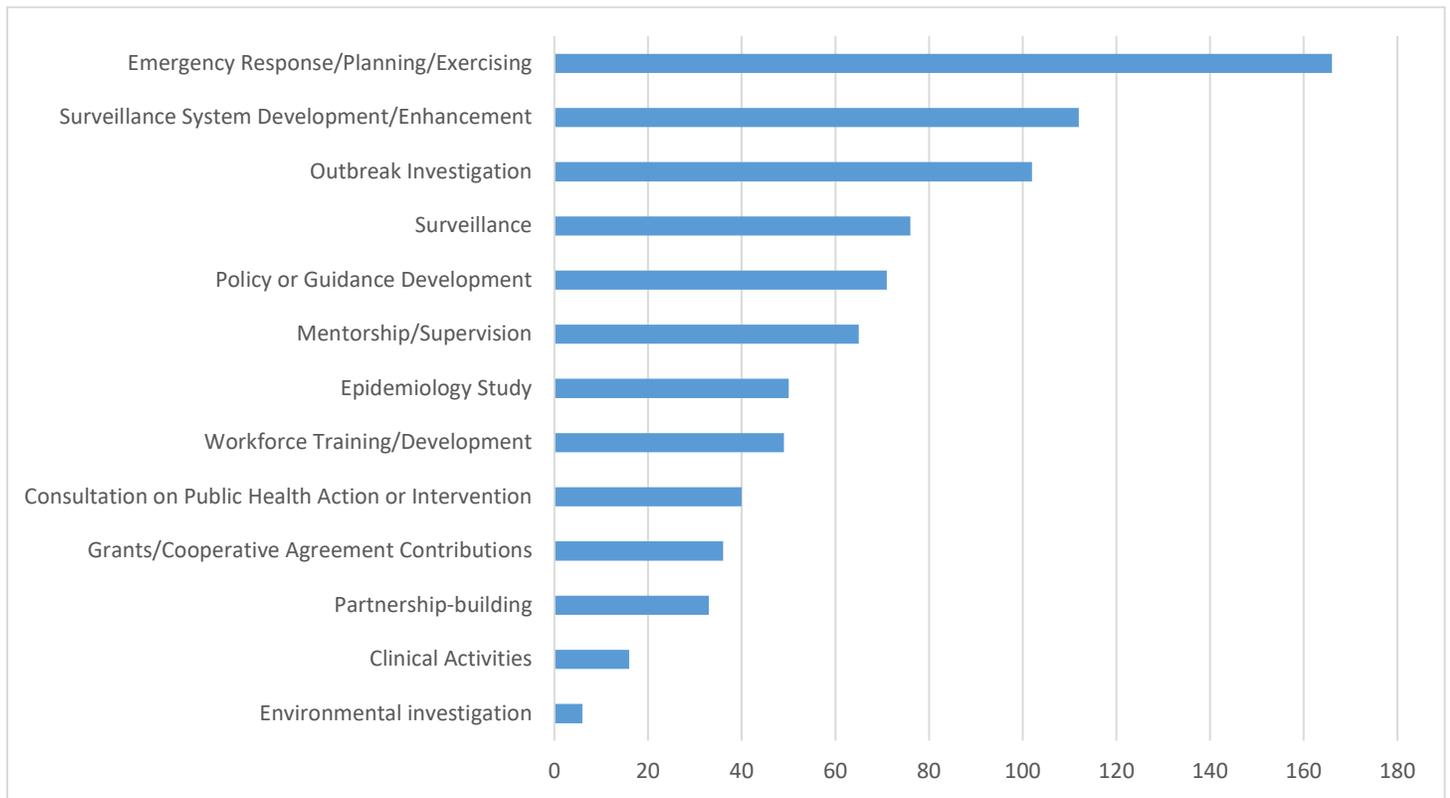


Figure 2

## Principle Activities Reported in CEFO Quarterly Reports — 2018

Figure 3 shows the principle activities CEFOs reported they participated in during 2018. Predictably, CEFOs focused primarily on epidemiological activities, including surveillance, outbreak investigations, and epidemiological studies. CEFOs spent considerable time in emergency responses (including planning and exercising), outbreak investigations, and mentorship. CEFOs also share subject matter expertise with jurisdictional policy makers and assist in preparation of jurisdictional guidance documents.



# Accomplishments

During 2018, most CEFOs were involved with response to the nationwide opioid crisis and unusual multifocal outbreaks of hepatitis A in addition to their more routine development of preparedness and response capabilities in their assigned jurisdictions. As expected, most accomplishments involved development and exercise of investigative epidemiological and surveillance capabilities. Below are selected descriptions from the six major CEFO project areas and two highlighting activities involving the opioid crisis and hepatitis A. Additional examples describing an accomplishment from each CEFO is available in an online appendix.



## Epidemiologic Studies

CEFOs enhance the ability of state and local jurisdictions to detect and track potential threats to public health; epidemiologic studies lay the groundwork for many of these achievements. Epidemiologic studies not only improve the nation's ability to prepare for and respond to public health events, but they support the advancement of public health science overall. During 2018, CEFOs conducted epidemiologic studies of health effects resulting from natural disasters, chemical exposures, and multiple infectious agents.



**Bryan Buss, DVM, MPH, DACVPM, CAPT US Public Health Service**  
Lincoln, Nebraska

### **Rapid Identification of Alfalfa Sprouts as the Source of a *Salmonella* Newport Cluster**

As a CEFO assigned in Nebraska, CAPT Buss serves as a scientific expert in epidemiology and leads outbreak response activities. On April 3, 2018, CAPT Buss and his team were notified of a multistate outbreak of *Salmonella* Newport cases with matching Pulsed-Field Gel Electrophoresis (PFGE) patterns. The majority were from the Omaha, Nebraska metropolitan area (Douglas and surrounding counties). CAPT Buss convened a team including partners in Nebraska local health departments (LHDs) to investigate the locally occurring cases in order to identify the outbreak source and determine appropriate

control measures.

CAPT Buss led the state team to coordinate with LHDs to administer CDC's National Hypothesis Generating Questionnaire (NHGQ) in order to obtain detailed information on illness and exposure histories including multiple foods. LHDs were able to interview/re-interview all Nebraska cases using the NHGQ. CAPT Buss ensured collected data were shared with CDC to be included with the multistate exposure data for comparison against expected background rates of consumption in FoodNet Population Survey data. Of 41 confirmed cases in 10 states, 18 were identified in Nebraska residents. By April 13, 2018, LHD interviewers had completed interviews

with all but one patient; CDC's preliminary results indicated that alfalfa sprouts were the only food statistically associated with illness ( $p < 0.0001$ ). Among Nebraska's 17 patients, seven reported eating sprouts at two local restaurant chains.

CAPT Buss and his team NDHHS worked closely with Environmental Health Officials in the Nebraska Department of Agriculture and Lincoln-Lancaster and Douglas County Health Departments (Omaha) who conducted traceback investigations. Supply records from the implicated restaurants traced back to a single Nebraska producer. A Douglas County inspector visited the growing facility and this firm voluntarily stopped sprout production and distribution that same day (April 13).

Under CAPT Buss's leadership, the investigation team rapidly identified sprouts as a possible common exposure. This prompted rapid traceback investigations by Nebraska Environmental Health Officials and control measures. Given the epidemiologic link between seven Nebraska cases to locally produced sprouts and suspicion that other ill persons might have consumed sprouts unknowingly, his environmental partners were able to convince the firm to voluntarily stop production thus preventing additional cases in Nebraska and elsewhere. The findings of his team's investigation supported CDC and FDA efforts to identify and recall a contaminated lot of sprout seeds from a non-Nebraska supplier which ultimately ended the larger multistate outbreak.



## Surveillance System Development & Enhancement

CDC's surveillance strategy affirms that public health surveillance and its essential health data is the nation's portal for progress in protecting our health. CDC's overarching goal for federally supported surveillance activities is to get the right information into the right hands at the right time. CEFOs directly support state and local efforts to enhance and expand existing surveillance systems to improve health monitoring. They provide leadership, subject matter expertise, and technical assistance to strengthen surveillance by evaluating, improving, and developing data collection, information systems, and surveillance-related policies. During 2018, CEFOs enhanced syndromic surveillance, reportable disease, post-disaster surveillance, and worker monitoring systems. Improvements included both programmatic and technical modifications.



**Melissa Morrison, MPH, CDR US Public Health Service**  
Robertsdale, Alabama

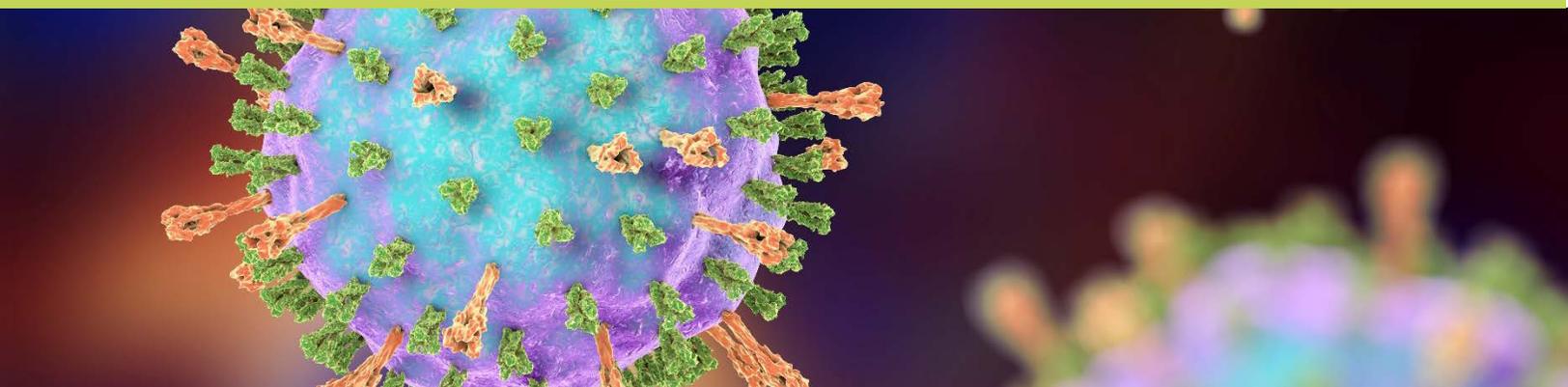
### **Answering the Call: Incorporating Poison Center Data into Syndromic Surveillance**

Collaboration with partners to include useful data sources is a key component to enhancing public health surveillance and investigation. Poison Control Centers are particularly important target groups for information sharing during critical events. CDR Melissa Morrison was aware of a past, event-specific partnership between the Alabama Department of Public Health (ADPH) and the Regional Poison Control Center (RPCC). Leaning forward, she approached the RPCC Medical Director to discuss the potential expansion of the partnership. She learned that the current RPCC system was not

designed with public health utilization of poison center data in mind. For example, there was no ability to request and customize data collection for public health functions. Other limitations were noted including lack of ability to determine if events involved multiple patients, such as participants in mass gatherings. But the RPCC was interested in transitioning to a different data management system, ToxSentry, which was designed for public health collaboration. However, funding for the new data management system was a challenge.

CDR Morrison recognized this barrier as an opportunity to utilize PHEP resources to expand the capabilities of the RPCC to contribute to public health preparedness and response and cultivate a mutually beneficial and sustainable partnership. CDR Morrison worked with the RPCC leadership to develop an action plan and, utilizing PHEP funding, ADPH provided grants in 2017 and 2018 to the RPCC to establish the infrastructure and to implement ToxSentry. ADPH planned to continue supporting development of information sharing between RPCC and ADPH in 2019, specifically to monitor mass gatherings and substance-specific surveillance.

ToxSentry was fully implemented in 2018, and RPCC records from 2006 to 2018 were transferred into ToxSentry and are now available in a single, searchable database to help establish baselines when investigating potential public health threats.



## Outbreak/Environmental Investigations and Emergency Response

CEFOs play a vital emergency response function within their assigned jurisdictions. Emergencies can involve infectious disease outbreaks, natural disasters, unusual chemical exposures, or terrorist attacks. Regardless of the scope, duration, or etiologic agent, CEFOs use the techniques of applied epidemiology and emergency management to improve public health response and better protect communities. During 2018, CEFOs responded to earthquakes, wildfires, hurricanes, a widespread anticoagulant exposure, and multiple infectious disease outbreaks.



**Aaron Fleischauer, PhD, MSPH, CAPT US Public Health Service**  
Raleigh, North Carolina

### Epidemiological Responses to Hurricane Florence

During the 2018 Hurricane Florence response, CAPT Aaron Fleischauer served as chief epidemiologist and liaison between North Carolina Public Health and federal partners. CAPT Fleischauer led a team of epidemiologists and public health professionals to conduct surveillance, epidemiologic investigations and produce critical public health messages.

Starting before the storm made landfall and for weeks afterwards, CAPT Fleischauer produced a daily epidemiology and surveillance situation report and created a dashboard to communicate hazards, risks, morbidity, and mortality events associated with the impacts of the hurricane to a diverse local,

state, and federal stakeholder audience. The dashboard was a critically important communication tool that displayed public health impacts from the hurricane including a single, consensus-based mortality case count.

Additionally, CAPT Fleischauer and his team quickly trained nurses staffing evacuation shelters. Trainees included more than 150 nurses provided through Emergency Management Assistance Compact (EMAC) requests who effectively enhanced shelter surveillance for reportable diseases and outbreaks. Three outbreaks (two norovirus outbreaks in shelters and a salmonellosis outbreak among first responders) were rapidly detected, reported to higher authorities, investigated and controlled before they could spread further. CAPT Fleischauer also served as a liaison between CDC and the state health department. He streamlined communication processes to ensure regular situation updates and also ensured that technical assistance was provided and requests for assistance were routed appropriately.



## Plans, Guidance, and Policy Development

When policy makers need timely, accurate, and effective strategies to address public health concerns, they often rely on CEFOs for guidance. CEFOs provide critical subject matter expertise in areas that jurisdictions may not otherwise have adequate staff or resources to handle. During 2018, CEFOs provided input to plans for large-scale evacuation of healthcare facilities, guidelines for investigation of communicable diseases and potential bioterrorism agents, and policy to prevent toxic chlorine gas exposures.



**Rajal Mody, MD, MPH, CAPT US Public Health Service**  
St. Paul, Minnesota

### Preparing Communities to Safely Respond to High Consequence Infectious Diseases

In a world where people can quickly travel the globe and where pathogens evolve, health care facilities are vulnerable to High Consequence Infectious Diseases (HCID) such as Ebola Virus Disease (EVD), Middle East Respiratory Syndrome (MERS), and others that are easily transmissible, highly fatal, and, thus far, not preventable through vaccination. A patient with a HCID could present at any healthcare facility that provides acute care, including emergency departments, urgent care clinics, and in primary care settings. To prevent disease spread in the community, these facilities must be prepared to quickly identify and isolate patients with a potential HCID and inform others to ensure a coordinated public health and health care system response.

Identification, isolation, and informing others are critical functions for patients with HCIDs, but also challenging because such patients typically present at healthcare facilities with signs and symptoms that are indistinguishable from more common illnesses. Furthermore, HCIDs only occur rarely so it is difficult to prioritize HCID preparedness over other infection control needs. Given these challenges, the Minnesota Department of Health (MDH), the Minnesota Chapter of the Association for Professionals in Infection Control and Epidemiology, and the Minnesota Healthcare Coalitions developed a toolbox to help facilities prepare for HCIDs in a manner that integrated HCID measures into routine infection control practices and trainings. Tools were designed to be simple and adaptable to the unique needs of individual facilities. CAPT Rajal Mody, a CEFO assigned to MDH, played a lead role in the development and rollout of the HCID toolbox, which made an impact not only in Minnesota, but in other parts of the nation as well. The core of the toolbox is a simple HCID screening algorithm that can be integrated into routine clinical workflows. This screening algorithm, designed by CAPT Mody, helps facilities prevent transmission of rare HCIDs as well as common infectious diseases, e.g. influenza and the common cold. This algorithm is combined with simple planning, training, and exercise tools that ensure preparedness and regulatory compliance.

CAPT Mody has presented about the importance of HCID preparedness and demonstrated the toolbox throughout Minnesota and at national conferences. The HCID Frontline Facility Toolbox was posted online in June 2018. By January 2019, several healthcare systems in Minnesota began adopting these tools into their routine practices and exercises. Numerous healthcare facilities in other states as well as other state health departments have contacted CAPT Mody and others at MDH about their plans to implement these tools in other parts of the country. The toolbox website was viewed more than 10,000 times during its first nine months online. CAPT Mody presented the HCID Screening algorithm at the National Ebola Training and Education Center (NETEC) Annual Summit in 2018, and NETEC endorsed this tool as a best practice.





## Education, Training, and Workforce Development Activities

CEFOs serve as educators and mentors to the next generation of public health professionals. Their varied knowledge and experience help ensure the continued excellence of our nation's public health system. During 2018, in addition to organizing training activities for multiple state and local partners, CEFOs supervised approximately 15 CDC Epidemic Intelligence Service Officers and multiple Applied Epidemiology Fellows sponsored by the Council of State and Territorial Epidemiologists.



**W. Thane Hancock, MD, MPH, LCDR US Public Health Service**  
U.S.-affiliated Pacific Islands

### Building Preparedness Capacity in the Pacific through Epidemiology Training

The U.S.-affiliated Pacific Islands are a uniquely vulnerable part of the United States, made up of small, isolated islands spread across thousands of miles in the Pacific Ocean. They face many public health challenges, including natural disasters, outbreaks of emerging infectious diseases, some of the world's highest burden of chronic diseases. The one limitation that most impacts their ability to prepare for and mitigate these public health challenges is human resources. Often the islands do not have enough skilled public health professionals to maintain routine public health work, let alone meet the surge required to respond to an emergency. Currently, the largest human resource gap is public health staff who are well trained in the basic science of public health and epidemiology.

To address the deficit in epidemiology capacity, a pilot training program in basic data management and epidemiology was started in 2013. The program was based on CDC's Data for Decision Making courses and the goal was to train local health staff on the islands to the level of an Epi Technician — a person who can operate well designed data systems, assure quality data inputs, use Excel and Epi Info to produce standard reports, and understand and explain those reports.

LCDR W. Thane Hancock was part of the initial group of facilitators that helped develop the new curriculum for Data for Decision Making in the Pacific. The training included weeklong modules in public health surveillance, outbreak detection and response, basic epidemiology, analytic epidemiology, and a final public health project. The initial pilot program format involved bringing 1–2 students from each jurisdiction (about 15 total) to a training conducted by 6–7 facilitators. LCDR Hancock collaborated with two other colleagues from the Pacific Island Health Officers Association (PIHOA) to develop and refine the training into streamlined workshops that could be delivered in-



country by two facilitators to 30-40 participants. LCDR Hancock then helped deliver the courses across the U.S.-affiliated Pacific, specifically in Yap, Kosrae, Guam, and Majuro.

The new format developed by LCDR Hancock and his two colleagues at PIHOA allowed for the trainings to make a greater impact in the local health departments by training substantially more of their staff on good data management and basic epidemiology. Additionally, the delivery was much less expensive, requiring fewer facilitators and no travel costs for participants.

From May 2015 to January 2018, LCDR Hancock provided epidemiology training to 93 health department staff in the USAPI. In addition, facilitators working in other locations used his training materials to train an additional 92 health staff. Of these staff, 58 were able to complete all five modules, including an individual project. Because of the success of this training in the US-affiliated Pacific, it has been adopted by other partner agencies working in the Pacific and the training materials will be used to deliver the program across the Pacific Islands.



## Program Development and Evaluation

CEFOs build, enhance, and foster program development by maintaining partnerships between public health and healthcare providers, conducting exercises, expanding mass care and medical surge capabilities, and improving health communications and information sharing across jurisdictions. They work with health departments, hospitals, doctors, clinics, long-term care facilities, and other providers to ensure the programs that are developed are comprehensive, maintain integrity across public health settings, and effectively meet their stated goals. During 2018, CEFOs developed collaborative approaches for responding to zoonotic diseases and evaluated the ability of the healthcare system to respond to a mass casualty incident.



**Neil Vora, MD, CDR US Public Health Service**  
New York City, New York

### **Develop public-private partnerships for public health response**

The New York City Department of Health and Mental Hygiene (Health Department) has often activated an agency-wide emergency incident command system in response to large scale public health emergencies. Yet this is resource-intensive and often diverts resources away from other public health priorities. CDR Neil Vora led efforts for the Health Department's Division of Disease Control to develop more efficient mechanisms to respond to public health emergencies. One such mechanism was to partner with the private health sector for administration of medical countermeasures such as vaccines to persons exposed to an infectious threat.

The potential for such public-private partnerships was demonstrated through evaluation of two similar incidents in 2015 and 2017. In 2015, routine Health Department surveillance detected a hepatitis A infection in a food

handler at a restaurant. In response, the Health Department activated its agency-wide incident command system to set up an emergency field operation site to test and provide exposed persons with post-exposure prophylaxis (PEP) when indicated. This emergency field operation site was resourced entirely by the Health Department and required redirection of resources from other public health priorities. In 2017, a similar hepatitis A incident occurred at another restaurant, resulting in a similar number of exposed persons. During response to the 2017 incident, however, the Health Department opted to not activate the agency-wide incident command system and instead referred exposed persons to a private network of urgent care clinics for testing and PEP. This was the first time the Health Department had addressed a mass hepatitis A exposure incident in such a fashion. Anecdotally, Health Department staff involved in both incidents commented that this public-private partnership could be a useful model for similar responses in the future. In 2018, CDR Vora completed supervision of an economic cost evaluation of the responses to the two incidents so that the Health Department could use a data-driven approach to inform future efforts

The evaluation showed that the costs incurred by the Health Department for its agency-wide incident command system activation in 2015 were \$65,831 (\$238 per restaurant employee evaluated) of which Health Department personnel services accounted for 85% (\$55,854). Had the Health Department paid for services rendered by the private network of urgent care clinics, costs incurred in 2017 would have been \$50,914 (\$253 per restaurant employee evaluated) and Health Department personnel services would have accounted for only 6% (\$3,146). Collaborating with the private network of urgent care clinics was slightly more expensive per employee than the agency-wide incident command system activation, but it required far fewer Health Department on-the-ground resources and sustained staffing and support for other public health priorities.

As a next step, the Health Department planned to develop a contract for urgent care clinics around the entire city to aid in response to future public health emergencies including patient management for both known threats (e.g., hepatitis A, meningitis) and novel threats (e.g., Zika). Furthermore, the focus of such a private network selected may also extend to address non-infectious threats if the need arises. An added advantage is that persons affected by public health incidents can receive needed medical care in a familiar and convenient manner. Because efficiency in government is increasingly important and because the private sector has a critical role in the wellbeing of communities in which they operate, CDR helped demonstrate that public-private partnerships can be advantageous for public health agencies.





## 2018 Hepatitis A Response

During 2017 major hepatitis A outbreaks occurred in California, Kentucky, Michigan, and Utah. Unlike previous outbreaks associated with a specific source of contaminated food and water, these large community outbreaks were associated with societal risk factors such as homelessness. CEFOs were involved with investigations of these outbreaks from the beginning. As more outbreaks were recognized in 2018 and CDC responded with an incident management structure, most CEFOs became involved with the hepatitis A response or preparedness activities of their assigned jurisdictions.



**Julie Shaffner, MS, MPH**  
Nashville, Tennessee

### **Tennessee Department of Health Hepatitis A Response**

In the five years prior to 2018, the Tennessee Department of Health reported an average of 13 acute Hepatitis A cases annually. In 2018, as reports of cases in middle Tennessee began to increase, the state declared an outbreak and activated the State Health Operations Center (SHOC) in April. Ultimately, 718 cases were reported in 2018, and the outbreak continued into 2019. Julie Shaffner served as the SHOC's Operations Section Chief. She led epidemiology and investigation branches to coordinate specimen collection, laboratory testing, and outreach to and engagement with community and clinical partners including Tennessee's Immunization Information System.

Early in the outbreak, Ms. Shaffner played a key role in the development of a data collection and visualization system for case and contact investigations. This system provided the critical information necessary to guide response actions. For example, as the outbreak progressed, the proportion of cases who reported being a man who has sex with men decreased while the proportion of cases who reported recreational drug use increased. These trends informed prevention and outreach efforts to focus on medically assisted therapy clinics, behavioral health providers, and addiction specialists.

Ms. Shaffner also supported implementation of nursing strike teams throughout the state to conduct Hepatitis A vaccination campaigns. The placement of these teams throughout the state increased the capacity to identify appropriate venues for and conduct vaccination events for at-risk populations and relieved some burdens on local public health nurses and communicable disease staff.

The early implementation of a public health Incident Command Structure (ICS) in Tennessee has been key to the Hepatitis A response and was noted as a successful model by CDC and by other states experiencing similar outbreaks. Along with her colleagues, Ms. Shaffner provided guidance to staff of other programs on the use of ICS for outbreak response and increasing order and efficiency for this long, complex outbreak.



## 2018 Opioid Crisis Response

Although for many years the nation had been experiencing a growing problem with opioid abuse, including a growing number of overdoses and deaths, health departments had generally not activated the emergency response structures they had traditionally used for infectious disease or environmental crises. Health problems resulting from societal and behavioral risk factors had typically been addressed by programs removed from state and local preparedness systems. As opioid overdose and related death counts climbed in 2018, CEFOs were amongst the first to engage with their state emergency management systems. Working at the front lines of public health, CEFOs recognized the need to employ the principles of emergency management and collaborate with non-traditional partners to respond to this atypical public health emergency.



**Laura Edison, DVM, MPH, LCDR US Public Health Service**  
Atlanta, Georgia

### Developing a Drug Surveillance Program in Georgia

In 2017, the opioid epidemic was declared a national emergency. Prior to 2017, the Georgia Department of Public Health (GDPH) did not perform surveillance for drug overdoses or prescribing practices, and state stakeholders addressing the epidemic were calling for local and statewide data to better understand the problem and direct their resources.

LCDR Laura Edison, the CEFO assigned to GDPH, was tasked with developing an opioid surveillance program to deliver data to a wide range of stakeholders, respond to clusters of overdoses, and develop response plans. LCDR Edison convened and expanded the GDPH Drug Surveillance Unit (DSU). In 2018, the team consisted of epidemiologists, biostatisticians, information technology developers, a program consultant, overdose death data abstractors, and student interns. With LCDR Edison's leadership and guidance, the DSU:

- Obtained and analyzed data from hospital discharges, deaths, syndromic surveillance, and prescription drug monitoring program. They created and shared reports with stakeholders that better described the opioid epidemic in Georgia.
- Developed an electronic interface with the state's Emergency Medical Services (EMS) and Vital Records systems to receive daily EMS trip reports and death data.
- Worked with EMS providers to develop and share best practices for documenting EMS overdose-related encounters. LCDR Edison facilitated training across the state and evaluated how adoption of the best practices improved surveillance.
- Partnered with medical examiners and coroners (ME/Cs) to develop a centralized database to improve data quality and access, added a "suspected overdose" checkbox to the electronic vital records system to improve the timeliness of overdose death report, and support enhanced opioid toxicology testing. LCDR Edison trained ME/Cs to use the checkbox and conducted an evaluation to determine how to further improve use and timeliness of reporting tools.

- Coordinated with law enforcement and other state and national partners to develop an overdose cluster response plan and drug overdose notification system. Thirty-six suspect cluster notifications were made.
- Worked with diverse state partners to create the data and surveillance portion of the Georgia Statewide Opioid Epidemic Strategic Plan.

LCDR Edison developed a robust surveillance program to better understand an epidemic that caused more than 6,200 emergency department visits and more than 1,000 deaths among Georgia residents in 2017 alone. This surveillance program not only provided data to local, state, and federal partners to inform their programs, but utilized novel approaches to improve data quality and timeliness and dissemination. Because of her work, Georgia is better prepared to respond to overdose clusters and the epidemic as a whole.



# Annex

## Career Epidemiology Field Officers — Assignments, 2002–2018

Assignment	Territory	Last	First	From	To
Alabama	State	Hayes	John Mosely	2002	2003
Alabama	State	Morrison	Melissa	2009	2018
Alaska	State	Porter	Kim	2017	2018
American Samoa	Territory	Roth	Jay	2006	2008
Arizona	State	Chuang	Ilin	2004	2006
Arizona	State	Sunenshine	Rebecca	2006	2009
Arizona	State	Adams	Laura	2014	2016
Arizona	State	Venkat	Heather	2017	2018
Arizona (Maricopa County)	City/County	Sunenshine	Rebecca	2009	2018
California	State	Pertowski	Carol	2009	2012
California	State	Wilken	Jason	2014	2018
California	State	Chai	Shua	2016	2018
California (San Francisco)	State	Hlady	Gary	2005	2007
California (San Francisco)	State	Pertowski	Carol	2008	2009
Chicago (Illinois)	City/County	Toews	Karrie-Ann	2016	2018
District of Columbia	City/County	Cote	Tim	2004	2005
District of Columbia	City/County	Sandhu	Sukminder	2006	2006
Florida	State	Schulte	Joanna	2004	2006
Florida	State	Doyle	Tim	2006	2010
Florida	State	Schmitz	Ann	2010	2018
Florida	State	Torok	Tom	2010	2014
Florida	State	Jackson	William	2013	2016
Georgia	State	Hlady	Gary	2002	2004
Georgia	State	Cookson	Susan	2003	2006
Georgia	State	Kim	David	2007	2008
Georgia	State	Edison	Laura	2014	2018
Hawaii	State	Kitsutani	Paul	2002	2003
Hawaii	State	Chow	Cathy	2004	2006
Hawaii	State	Chen	Tai-Ho	2008	2010
Hawaii	State	Goode	Brant	2008	2009
Idaho	State	Carter	Kris	2004	2018
Illinois	State	Navon	Livia	2014	2018
Indiana	State	Chester	Tom	2004	2009
Kentucky	State	Thoroughman	Doug	2002	2018
Kentucky	State	Riggs	Margo	2007	2012
Kentucky	State	Groenewold	Matthew	2012	2014
Kentucky	State	Porter	Kim	2015	2017
Los Angeles County	City/County	Kim-Farley	Robert	2002	2004

Assignment	Territory	Last	First	From	To
Maine	State	Hayes	Ned	2002	2002
Maine	State	Pelletier	Andy	2004	2009
Maine	State	Manning	Susan	2010	2012
Maryland	State	Davenport	Marsha	2003	2008
Maryland	State	Goodell (Acharya)	Jessica	2017	2018
Michigan	State	McFadden	Jevon	2011	2018
Minnesota	State	Holzbauer	Stacy	2008	2018
Minnesota	State	Mody	Rajal	2016	2018
Mississippi	State	Chester	Tom	2009	2011
Mississippi	State	Preacely	Nyki	2013	2018
Montana	State	Johnson	Kammy	2003	2009
Montana	State	Nett	Randy	2010	2015
Nebraska	State	Buss	Bryan	2008	2018
Nevada	State	Khan	Amy	2003	2004
Nevada	State	Sun	Ben	2010	2012
New Jersey	State	Venuto	Margaret	2014	2015
New Jersey	State	Burks	Ma'isah	2015	2018
New Jersey	State	Thomas	Dana	2016	2018
New Mexico	State	Török	Tom	2006	2010
New York City	City/County	Karpati	Adam	2001	2002
New York City	City/County	Marx	Melissa	2004	2007
New York City	City/County	Dentinger	Catherine	2005	2016
New York City	City/County	Harper	Scott	2005	2018
New York City	City/County	Quinn	Celia	2014	2018
New York City	City/County	Vora	Neil	2015	2018
New York City	City/County	Styles	Tim	2016	2018
North Carolina	State	Davies	Megan	2002	2003
North Carolina	State	Goode	Brant	2006	2008
North Carolina	State	Fleischauer	Aaron	2008	2018
North Carolina	State	MacFarquhar	Jennifer	2011	2018
North Dakota	State	Pickard	Steve	2002	2015
Oregon	State	Török	Tom	2014	2015
Pennsylvania	State	Campagnolo	Enzo	2003	2018
Pennsylvania	State	Miller	Jeff	2012	2018
Pennsylvania (Allegheny County)	State	Lando	Jim	2008	2013
Pennsylvania (Philadelphia)	City/County	Agocs	Mary	2005	2005
Pennsylvania (Philadelphia)	City/County	Sinclair	Julie	2006	2007
Pennsylvania (Philadelphia)	City/County	Patel	Ami	2007	2017
Puerto Rico	Territory	Alvarado-Ramy	Francisco	2001	2004
Puerto Rico	Territory	Thomas	Dana	2014	2016
Rhode Island	State	Sanchez	Maria Pia	2003	2004

Assignment	Territory	Last	First	From	To
South Dakota	State	Tarkhashvili	Nato	2006	2017
Tennessee	State	Dunn	John	2005	2005
Tennessee	State	Roth	Jay	2008	2016
Tennessee	State	MacFarquhar	Jennifer	2009	2011
Tennessee	State	Murphree	Rendi	2011	2018
Tennessee	State	Shaffner	Julia	2017	2018
Texas	State	Stonecipher	Shelley	2004	2006
Texas	State	Taylor	Richard	2006	2008
Texas	State	Rey	Araceli	2009	2012
Texas	State	Bosch	Stacey	2009	2010
US Virgin Islands	Territory	Roth	Jay	2016	2018
US-Affiliated Pacific Islands	Territory	Hancock	William (Thane)	2015	2018
Vermont	State	Blevins	Lynn	2002	2008
Vermont	State	Goode	Brant	2009	2015
Virginia	State	Kurkjian	Katie	2009	2018
West Virginia	State	Radcliffe	Rachel	2010	2014
West Virginia	State	Thomasson	Erica	2015	2018
Wisconsin	State	Meiman	Johnathan	2015	2016
Wisconsin	State	Elbadawi	Lina	2016	2018
Wyoming	State	O'Leary	Dan	2006	2018
Wyoming*	Detailed	Geissler	Aimee	2011	2012

\* Assigned to CEFO program but detailed to Division of Vector-Borne Diseases

# Appendix A – 2018 CEFO Success Stories



**Kimberly Porter, PhD, MSPH; 2018 Southcentral Alaska earthquake response**

On November 30, 2018, a 7.0 magnitude earthquake caused considerable infrastructure damage in Southcentral Alaska. Shortly after the earthquake, the Alaska Division of Public Health released to the public an online survey in order to

characterize the health impacts of the earthquake on individuals, to assess emergency communication, and to better understand personal preparedness. Dr. Kimberly Porter helped to create, disseminate, organize, analyze, and communicate results from this public health emergency response and preparedness survey.

Dr. Porter analyzed and communicated results from over 3000 responses to Alaska governmental agency partners and the media. One key finding from the survey was respondents' interest in receiving text messages from a state health agency during emergencies. At the time, the Alaska Division of Public Health did not have a process for sending text messages to the public. Using this finding, Dr. Porter led efforts to recommend several options for developing emergency text message capacity. In addition to improving delivery of emergency communications via text messages, results also highlighted that fewer than half of the respondents had an emergency kit on-hand.

To analyze qualitative data, almost 1,000 comments were individually reviewed. Recurring themes were identified and shared with epidemiology and emergency preparedness leadership at the Alaska Division of Public Health. Comments related to specific topics, such as the tsunami warning, were collated and shared with relevant Alaska governmental agencies. Ways to improve future surveys were also identified, e.g. including a map of affected areas so respondents could report their locations.

Dr. Porter's work improved awareness of important ways to increase Alaskans' capacity and capability to prepare for and remain safe during future emergencies and will assist the State of Alaska with their public health preparedness efforts to protect the health of its citizens.



**Heather Venkat, DVM, MPH; Phoenix, Arizona**

**Creation of One Health toolkit to strengthen preparedness and response and enhance collaborations in Arizona**

One Health recognizes the interconnection between human, animal, and environmental health. Arizona faces many One Health issues, such as vector-borne diseases and zoonoses driven by wildlife diversity, social-economic disparities, and extreme weather events. Although robust partnerships to respond to One Health issues exist with state, local, tribal, and federal public and animal health agencies, documentation outlining partner roles and responsibilities was lacking.

Dr. Heather Venkat led a project to create a One Health toolkit to strengthen existing collaborations, foster communication, and enhance capacity for routine investigations and emergency preparedness. She developed and distributed two surveys — one to local health jurisdictions to assess communication and collaborative efforts with One Health partners and a second to state and federal partners to ascertain their role in One Health activities. Results aided the creation of a toolkit including scope of work, role in zoonoses investigations, points of contact for each agency, and examples of agency collaboration. Dr. Venkat added strategies, resources and best practices for responding to public health issues involving the human-animal-environment interface. She also diagrammed the flow of communication for rabies, Q fever, and plague investigations. This toolkit was distributed to local partners in Arizona to improve effective and timely collaboration surrounding case or outbreak investigations, including algorithms for response to potential bioterrorism events.

Because of Dr. Venkat’s efforts to improve communication and collaboration with internal and external One Health partners, Arizona is better prepared to respond to emerging and unknown threats. The One Health toolkit has clarified the roles of partner agencies, outlined strategies to build capacity, and improved Arizona’s ability to prepare for, identify, and respond to zoonotic disease and other One Health threats.



**Shua Chai, MD, MPH, CDR US Public Health Service; Richmond, California**

**Response to norovirus outbreaks in California wildfire evacuation shelter centers**

On November 8, 2018, California’s largest wildfire to date, the Camp Fire, displaced ~52,000 people with >1,100 evacuated to nine shelters in Butte and surrounding counties. Before the fire, norovirus, a pathogen that causes acute gastrointestinal illness (AGI) and explosive outbreaks, had been reported in the area. Cases of AGI occurred in two evacuation shelters on November 10, and by November 17, norovirus had been confirmed with a surge in cases and additional shelters involved. On November 17, CDR Shua Chai deployed to the Governor’s State Operations Center (SOC) as the California Department of Public Health (CDPH) representative to the Shelter Taskforce.

As CDPH’s Taskforce representative, CDR Chai helped coordinate and support CDPH’s epidemiology and infection control field teams’ efforts to collect key epidemiologic information needed to define the outbreaks and target control efforts. This included rapid development and deployment of surveys needed to systematically collect data about cases. CDR Chai led efforts for real-time examination and analysis of these data that was used to define where and when to target control efforts. He regularly briefed the SOC through the Taskforce, the Director of CDPH, and local health departments about these epidemiological findings. He also provided information to the Secretary of California’s Health and Human Services (HHS) through the CDPH Director and Assistant Director, and to federal DHHS assets deployed to the response. CDR Chai also helped develop and ensure that up-to-date guidance and educational materials about norovirus outbreak control were provided to the local health departments.

Daily AGI case counts from affected shelters were collected in coordination with local health departments during the response. Data were analyzed with findings presented to the CDPH Director and, via the Director, to the Secretary of California's HHS to make critical decisions about response assets. With support from CDPH field teams, evacuation shelters increased their infection control practices. These included rapid evaluation and isolation, when warranted, of ill persons. Finally, educational materials were provided to local health departments and shelters to further strengthen public health emergency response capacity.



**Jason Wilken, PhD, MPH, LCDR US Public Health Service; Richmond, California**

### **Preventing toxic chlorine gas exposures at aquatic venues**

In June 2015, the California Department of Public Health (CDPH) was informed by staff from the Hazardous Materials Division of Contra Costa County of a chemical release at a municipal swimming pool that sickened 34 bathers, mostly children. An investigation by Contra Costa County identified equipment failure and human error as contributing factors when excess pool chemicals were expelled at high concentrations, generating toxic chlorine gas.

LCDR Jason Wilken worked with a team who reviewed records held by the California Department of Pesticide Regulation and identified eight other incidents involving toxic chlorine gas exposures at aquatic venues (e.g. swimming pools, water parks). Of the total 155 persons that were sickened, 121 were transported to an emergency department or were evaluated by their primary medical provider, and five required hospital admission. A review of incident reports identified equipment failure and/or human error as contributing causes. A multidisciplinary team representing epidemiology, clinical practice, hazardous materials, environmental health, and swimming pool inspectors/engineers was convened to develop recommendations to prevent future toxic chlorine gas releases at aquatic venues.

The team's findings and recommendations were presented at multiple venues, including the National Environmental Health Association, Council for the Model Aquatic Health Code (CMAHC), and Council of State and Territorial Epidemiologists annual conferences, and they were published in Morbidity and Mortality Weekly Reports (<https://www.cdc.gov/mmwr/volumes/66/wr/mm6619a3.htm>). The team was invited by the CMAHC to propose updates to the language of CDC's Model Aquatic Health Code (<https://www.cdc.gov/mahc/editions/current.html>), CDC's collection of best practices and regulatory language for aquatic venue and safety. Their recommended changes were the first to address prevention of toxic chlorine gas releases, and they were adopted as a best practice into 16 sections of the 2018 revision of the Model Aquatic Health Code.



**Ann Schmitz, DVM, MA, LCDR US  
Public Health Service; Miami, Florida**

**EpiRiot rash illness training program –  
Florida Department of Health**

Nationally, 372 measles cases and 17 outbreaks were reported nationwide for 2018. Eighty-two cases were imported from other countries, the highest number since measles was eliminated in the U.S in 2000. Imported measles cases are of priority concern in Florida given the more than 126 million visitors to the state in 2018, including international visitors from countries experiencing measles outbreaks. Florida also recorded an increase in measles cases in 2018 with a total of 15 cases in residents, an additional four cases in visitors to the state, and two outbreaks. Based on the increased number of measles cases nationwide and feedback from local health department staff and regional epidemiologists, rash illness training was needed statewide.

CDR Ann Schmitz is a member of the Acute Investigations Team at the Florida Department of Health (FDOH) that was tasked with development of the EpiRiot curriculum in 2018. The final product was a one-day training program consisting of a collection of modules designed to educate health department staff on investigation of rash illnesses and outbreaks. Modules include (1) Clinical Characteristics and Epidemiology of Rash Illnesses of Public Health Importance, (2) Conducting Effective Rash Illness Investigations, (3) Overview of Laboratory Testing for Rash Illnesses, and (4) a Measles Tabletop Exercise. CDR Schmitz led the first of five regional EpiRiot workshops for Florida County Health Departments (CHDs) on December 17, 2018; the remaining four workshops were completed by March 14, 2019.

At least 137 staff members from 47 CHDs attended the regional training workshops and were eligible for continuing education credits, 5.0 contact hours for nursing and 5.75 hours for environmental health. After taking the training, participants were able to identify characteristics of febrile rash illnesses of public health concern and demonstrated ability to conduct effective case, contact, and outbreak investigations, increasing capacity to investigate these events statewide.





**Kris Carter, DVM, MPVM, DACVPM, CAPT US Public Health Service; Boise, Idaho**

### **Implementation of syndromic surveillance in Idaho**

Syndromic surveillance for health trend monitoring and situational awareness is an encouraged component of PHEP Capability 13, "Public Health Surveillance and Epidemiological Investigation." Yet not all states, including Idaho, use PHEP Cooperative Agreement funds for this purpose. In 2015, Idaho applied for competitive funding from CDC's National Syndromic Surveillance Program to implement syndromic surveillance with emergency department visit data using BioSense 2.0. In September 2015, funding was awarded for the first year of a four-year project period.

CAPT Kris Carter serves as the syndromic surveillance coordinator for the Idaho Division of Public Health (IDPH), coordinating the activities of the Idaho Syndromic Surveillance program team (initially 3 state employees (0.8 FTE total), Idaho's Preparedness Field Assignee, and CAPT Carter). The team officially engaged with hospitals, transitioned from BioSense 2.0 to the BioSense Platform, developed data quality scripts and syndrome definitions, developed and managed syndromic surveillance subgrants with Idaho's 7 local Public Health Districts, and trained state and local epidemiologists on syndromic surveillance.

The proportion of eligible Idaho hospitals that registered intent to contribute syndromic surveillance data as part of Meaningful Use Stage 2 and submitted emergency department visit data for syndromic surveillance increased from 2.6% in February 2016, to 13.9% in February 2017, and 57.9% in February 2018. Coverage of time-sensitive emergency certified facilities increased from 0% in February 2017 to 58% in February 2018. The percentage of Idaho Public Health Districts receiving data from hospitals in their jurisdiction increased from 14% in 2016 to 87% in February 2018. Syndromic surveillance emergency department visit data were used for the first time in Idaho. For example, IDPH incorporated information from these data into weekly seasonal influenza reports. One Public Health District began routinely providing suicide-related reports to the local suicide prevention network. And syndromic surveillance during cold weather identified CO poisoning has prompted rapid and relevant public prevention messaging.





**Livia Navon, MS, RD; Chicago, Illinois**

**Severe bleeding associated with exposure to the superwarfarin brodifacoum through use of synthetic cannabinoids — Illinois, 2018**

Synthetic cannabinoids (SCs), also known as K2 and spice, are psychoactive compounds that have emerged as drugs of abuse. SCs are manufactured illegally, and compound producers continuously alter the chemical structures to create compounds that evade routine drug testing. In March 2018, the Illinois Department

of Public Health (IDPH) was notified of 4 patients seen in emergency departments during the preceding 2 weeks with unexplained bleeding. All patients reported using SCs during the previous three days. Based on clinical signs and improvement after treatment with vitamin K and/or fresh frozen plasma, exposure to a long-acting anticoagulant rodenticide (LAAR) through SC use was suspected.

With IDPH colleagues on the investigation team, Ms. Livia Navon rapidly developed an outbreak investigation tool to collect epidemiological data using REDCap. Data were collected from patient interviews, chart abstraction and Illinois Poison Center clinical consultations. As the volume of cases increased, local health departments in jurisdictions with cases (n=16) joined the investigation. Coagulopathy associated with LAAR exposure requires high initial doses of intravenous vitamin K followed by 3-6 months of high-dose, prescription oral vitamin K to manage patients. Given the large number of patients, there were initial concerns about the vitamin K supply chain and the potential for localized treatment shortages. Contingency plans were developed for sharing of vitamin K between hospitals in areas with high numbers of cases. However, the supply chain proved to be robust and there were no significant shortages. The most significant treatment challenge was the high cost of oral vitamin K combined with the long duration of treatment.

Many patients were underinsured or uninsured. Among the insured, high co-payments resulted in several patients foregoing treatment. Without treatment, patients were at risk for fatal hemorrhage. Navon developed and implemented a procedure for telephone follow-up of patients. Conducting these calls (n=326), though labor intensive, led to identification of gaps in treatment access. IDPH staff communicated directly with patients' providers or referred cases to available clinical resources. In May 2018, IDPH secured a donation of oral vitamin K from a pharmaceutical manufacturer that was distributed to pharmacies in affected areas and a free prescription mail service was established. Over 51,000 vitamin K pills were dispensed to 86 patients in Illinois. By July 2018, 174 confirmed/probable cases (and 5 deaths) had been identified in Illinois, with 96 of 97 patients testing positive for brodifacoum, a commercially available LAAR. This is the largest cluster of LAAR poisoning cases reported in the literature.





**Doug Thoroughman, PhD, MS, CAPT US Public Health Service; Frankfort, Kentucky**

### **Hepatitis A response in Kentucky**

In October 2017, the Kentucky Department for Public Health identified an outbreak of acute hepatitis A. The observed increase in cases exceeded the 10-year average of reported hepatitis A cases. Several reported cases were linked to outbreaks in California, Utah and Michigan. The primary risk factors for hepatitis A infection in Kentucky were illicit drug use and homelessness with disease transmission believed to have occurred through person-to-person contact. In June of 2018, Kentucky's hepatitis A outbreak was reported as the largest outbreak in the United States and the largest ever recorded in Kentucky. By summer of 2019, the outbreak had affected 113 of Kentucky's 120 counties with nearly 5,000 reported cases and 61 deaths.

CAPT Douglas Thoroughman was initially assigned to the Kentucky Department of Public Health in 2002. He had been assisting the Commonwealth twice as acting State Epidemiologist from May 2017 thru March 2018, and again since May of 2018. During the hepatitis A outbreak in 2018, CAPT Thoroughman organized and analyzed disease reporting and surveillance system data, served as Incident Commander in the State Health Operations Center, Coordinated hepatitis A outreach and vaccination interventions, and supported health communications activities.

Kentucky's overall response efforts were complicated by logistical challenges of effectively targeting at-risk populations of drug users and the homeless for vaccination, public-funded vaccine limitations early in the event, and trail-blazing strategies for how to address the epidemic in rural areas since Kentucky was the first state to experience this scenario. CAPT Thoroughman helped Kentucky health jurisdictions to develop innovative and sustainable interventions to decrease transmission and reach drug users more effectively. Vaccine campaigns and nurse strike teams were established to reach those at highest risk - including incarcerated populations, hospital emergency department patients, syringe exchanges, drug treatment programs, and homeless support centers.



**Rebecca Sunenshine, MD, CAPT US Public Health Service; Maricopa County, Phoenix, Arizona**

### **Multi-agency collaborative response to a Group A *Streptococcus* outbreak among unaccompanied children in a Maricopa County shelter**

Group A *Streptococcus* (GAS) infection can lead to severe consequences when untreated, including kidney failure, rheumatic fever, permanent damage to heart valves, and death. In January 2018, Maricopa County Department of Public Health (MCDPH) and the Office of Refugee Resettlement were notified of a GAS pharyngitis outbreak at a shelter for unaccompanied children. The majority of the nearly 200 cases occurred among minors who resided at the shelter for >5 days, indicating they were infected after arrival.

From January 2018 to July 2018, CAPT Rebecca Sunenshine led MCDPH collaboration with the Office of Refugee Resettlement, their associated medical providers, and contracted shelter facilities to respond to the GAS outbreak. Progressive response efforts included screening and isolating all sick unaccompanied children, temporarily suspending new admissions and screening all resident minors in March, performing an infection control observational site visit and screening staff in May, and recommending numerous infection control strategies to the facility. Despite implementation of all recommendations, the outbreak continued. In July, all

stakeholders determined that simultaneous mass prophylaxis of all minors and staff was the only way to stop the outbreak.

CAPT Sunenshine oversaw this entire operation: She ensured education for all staff regarding the outbreak in English and Spanish, the prescribing and dispensing of almost 1,000 courses of antibiotics, and the management of side effects and concerns of staff taking antibiotics. She also ensured that staff unable to complete the full course of antibiotics were appropriately excluded until the outbreak ended. After two incubation periods (10 days) from the dispensing of antibiotics, no new outbreak cases among minors were identified and the outbreak was declared over. The leadership of CAPT Sunenshine in overseeing a complex, multi-jurisdictional response at the local level prevented additional infections and serious consequences among this vulnerable population.



**Jessica (Goodell) Acharya, MPH; Baltimore, Maryland**

### **PHEP contributions to the opioid response in Maryland**

Maryland was one of the first states in the United States to declare a state of emergency in response to the opioid crisis. Law enforcement actions taken against inappropriate prescribing of controlled dangerous substances (e.g. opioids) have been an important component of the opioid response, yet such actions can put patients who seek other sources of opioids at increased risk for overdose and other complications. To reduce risks when enforcement actions occur, a multifaceted, collaborative approach is needed to ensure continuity of care for affected patients.

Since January 2018, Maryland has responded to eleven enforcement actions affecting over 6,500 patients and involving over 60,000 prescriptions. Ms. Jessica Goodell, CEFO assigned to Maryland Department of Health (MDH), helped coordinate opioid-related preparedness and response activities with the MDH Office of Preparedness and Response (OP&R). She brought diverse partners together (e.g. the Prescription Drug Monitoring Program, the state's Office of Controlled Substances Administration, clinician licensure boards, Medicaid, and law enforcement partners) to understand their respective roles and to work collaboratively in order to reduce risks when such actions occurred. The group realized that each investigation demanded a tailored approach for potentially displaced patients who have varied healthcare coverage and may be receiving treatment for opioid use disorder or prescribed high doses of opioids. Ms. Goodell worked with partners to develop and implement a toolkit useful in multiple jurisdictions. Toolkit components included a decision support flow-chart, an investigation response checklist, and a call-center triage protocol based on real-life responses.

Within two weeks of enforcement actions, Ms. Goodell's efforts with MDH ensured that partners in nearly half of affected jurisdictions received enforcement investigation alerts. Each of these actions required outreach to an average of ten jurisdictions outside the originating notification area, three neighboring states, and over 600 patients. None of these jurisdictions experienced increased counts of naloxone administrations which may indicate that overdoses were prevented. Maryland is one of few states to provide partners with specific protocols for responding to sudden medical practice closure and/or loss of controlled substance prescription privileges. Ms. Goodell and her colleagues shared their experiences and toolkit resources at national conferences including ASTHO's Opioid Preparedness Meeting, the National Rx Heroin and Opioid Summit, and the National Preparedness Summit.



**Jevon McFadden, MD, MPH, CDR US Public Health Service; Lansing, Michigan**

### **A strategy for targeting vaccinations to highest risk groups during Michigan's 2016-2018 Hepatitis A outbreak**

During August 2016, Southeast Michigan experienced an increase in reported hepatitis A cases occurring among persons reporting intravenous (IV) and non-IV drug abuse, homelessness, and recent incarceration. During August 2017, there was a dramatic surge in reported cases with similar risk profiles accompanied by geographic spread to neighboring counties outside the Southeast Michigan area. Additionally, men who reported having sex with other men began accounting for nearly 20% of newly reported cases. As of the end of May 2018, 840 confirmed or probable cases were reported as part of Michigan's hepatitis A outbreak.

During October 2017, the CEFO assigned to the Michigan Department of Health and Human Services (MDHHS), CDR Jevon McFadden, started a service with a newly formed leadership team to guide outbreak emergency response. CDR McFadden guided all outbreak-related data interpretation which informed MDHHS and local health department outbreak response activities. By providing better data to local health departments based on the locations and characteristics of high-risk groups, vaccine efforts could be targeted to areas of greatest need. CDR McFadden communicated the importance of this targeted approach and provided guidance on strategies for overcoming challenges to reaching some of the highest risk populations. He conducted numerous presentations of descriptive and spatiotemporal data to MDHHS leadership, affected local health departments statewide, and the most heavily impacted jurisdictions.

Through this targeted vaccination strategy, >150,000 doses of adult hepatitis vaccine were administered during October 2017–May 2018. The proportion of vaccine administered within the highest-risk geographic areas increased nearly three-fold during this time. Michigan has experienced a consistent decline in reported cases each month since December 2017. CDR McFadden helped initiate and sustain this targeted hepatitis A vaccination strategy which led to increased vaccine delivery to the highest risk groups in Michigan.





**Stacy Holzbauer, DVM, MPH, DACVPM, CDR  
US Public Health Service; St. Paul, Minnesota**

**Collaborative approach to reducing Salmonella burden due to backyard poultry**

Poultry are potential carriers of Salmonella and the source for thousands of illnesses each year. Since 2000, 70 human Salmonella outbreaks linked to live poultry from mail-order hatcheries have been documented. As raising backyard flocks becomes more popular, more people are having contact with chickens and ducks and may

not understand the risks.

CDR Stacy Holzbauer, the CEFO assigned to the Minnesota Department of Health (MDH), has investigated yearly outbreaks of Salmonella associated with live poultry during her tenure at MDH. She worked with the Minnesota Board of Animal Health (BAH) to develop a system to trace back implicated birds to hatcheries of origin. This information is shared regionally with hatcheries (accounting for 90% of the birds that enter Minnesota) and nationally with CDC. Every year, her outbreak investigations have identified two to three unlicensed poultry dealers. While yearly outbreak investigations are important to understand the burden and risk factors for illness, CDR Holzbauer recognized that most infected birds coming to Minnesota originate from hatcheries where amplification can increase numbers of infected birds. To help ensure hatcheries start with eggs from breeders with minimal levels of Salmonella, many participate in the voluntary National Poultry Improvement Plan (NPIP) program. This program's goal is to use the latest diagnostic technology and biosecurity recommendations to effectively improve poultry and poultry products throughout the United States. CDR Holzbauer convened a group of state and national stakeholders to propose and pass an amendment to the NPIP that required testing of breeder flocks in addition to hatcheries at the 2018 NPIP Biennial Conference.

CDR Holzbauer's work with animal health and industry colleagues helped bridge the divide between animal and human health. Her public-private collaboration successes positioned her to help lead industry-driven improvement. Her work enhanced the ability to trace implicated birds and improved dealer and animal owner education. Several national retail farm stores that sell live poultry now require birds they sell to be raised under the new NPIP standards. Because of her successful work addressing salmonellosis caused by live poultry exposure, CDR Holzbauer worked with a National Association of State Public Health Veterinarians compendium committee and a United States Department of Agriculture committee to address this issue and provide national guidelines to industry and public health. This collaboration between public health and poultry dealers, hatcheries and breeders may potentially dramatically decrease the rates of Salmonella in live poultry and decrease human illnesses.



**Bryan F. Buss, DVM, MPH, DACVPM, CAPT US Public Health Service; Lincoln, Nebraska**

**Using REDCap for biocontainment worker symptom monitoring in Nebraska**

As a CEFO assigned in Nebraska, CAPT Bryan Buss serves as a scientific expert in epidemiology and leads outbreak response activities. During the Ebola epidemic of 2014–15, he led efforts at the state health department for symptom monitoring of returning travelers and healthcare workers (HCW). That event demonstrated that outbreaks

of high-consequence infectious diseases, even in remote parts of the world, can affect communities anywhere in the developed world, and that every healthcare facility must be prepared to identify, isolate, and provide care for infected patients. The Nebraska Biocontainment Unit (NBU), located in Omaha, cared for three American citizens with confirmed Ebola virus disease (EVD). Based on lessons learned from these earlier experiences, CAPT Buss worked to leverage funding from Nebraska's Public Health Emergency Preparedness (PHEP) Supplemental Ebola cooperative agreement to identify and customize a more efficient solution for healthcare worker monitoring.

CAPT Buss coordinated with Nebraska's PHEP program and colleagues at the Douglas County Health Department (Omaha) to develop a contract with the NBU team. They used REDCap, an open-source application used by academic health centers, to develop a symptom monitoring application. They used Perl, a free programming language, to automate reminders and configurable symptom alerts. A REDCap monitoring control panel collected contact information for management staff who would receive alerts of either nonresponse or symptoms of illness. Survey components included four functions: enrolling HCWs, triggering survey invitations, gathering initial contact preferences of the HCW and risk assessment, and issuing invitations for twice-daily symptom reviews each morning and evening sent as emails and text messages. CAPT Buss's team configured the system to resend invitations if a timely response was not provided and to trigger alerts to the NBU management team both for ongoing non-response or if fever or symptoms were reported. After the team completed development, they tested the system with seven NBU HCWs. Testers reported that completing symptom review on a smart phone was manageable and convenient, and that they preferred text message reminders over email.

The team convened by CAPT Buss successfully developed a symptom monitoring system that holds promise to reduce the burden of managing future response activities and save valuable time for public health and NBU officials. His team's pilot activities suggest this novel use of REDCap could minimize costs and resource demands associated with symptom monitoring while offering a more user-friendly experience for monitored persons and officials managing the response.





**Ma'isah (Burke) Larkin, MBA, MPH, CPH, PMP; Trenton, New Jersey**

### **Legionnaire's disease in New Jersey**

Infection with *Legionella* bacteria can cause a serious type of pneumonia known as Legionnaire's disease. The bacteria live in water and can grow in water systems if such systems are not properly maintained. When persons are exposed to contaminated water, they may become infected and ill. CDC notes that outbreaks of Legionnaires' disease are often associated with large or complex water systems, like those found in hospitals, hotels, and cruise ships.

CEFO Ma'isah Larkin led a program team at the New Jersey Department of Health to investigate an outbreak of Legionnaire's disease associated with a large hotel in New Jersey. Larkin conducted surveillance of travel-associated cases linked to stays at the hotel during a 12-month period during 2017–2018. She identified several guests who experienced Legionellosis infections associated with the hotel. Initially, she worked with local health departments to collect additional information on the hotel guests, their rooms, and their activities during their hotel stay. A multi-disciplinary team was assembled to create a response plan. Larkin led the team on an initial site visit and walk through at the facility where the water system was evaluated, and water samples were collected. She worked with the Legionellosis subject matter experts (SMEs) to devise a plan for notification and remediation of the hotel's water system.

As a result of these activities, the hotel successfully remediated their water system and has not had any additional cases of the disease. Aside from successful remediation, Larkin's actions led to the development of standardized procedures for addressing Legionellosis in the hotel setting in the state of New Jersey. The outlined steps of this process have been used in other hotel and casino investigations throughout the state.



**Scott Harper, MD, MSc, MPH DTMH, CAPT US Public Health Service; New York City, New York**

### **Botulism outbreak in New York City**

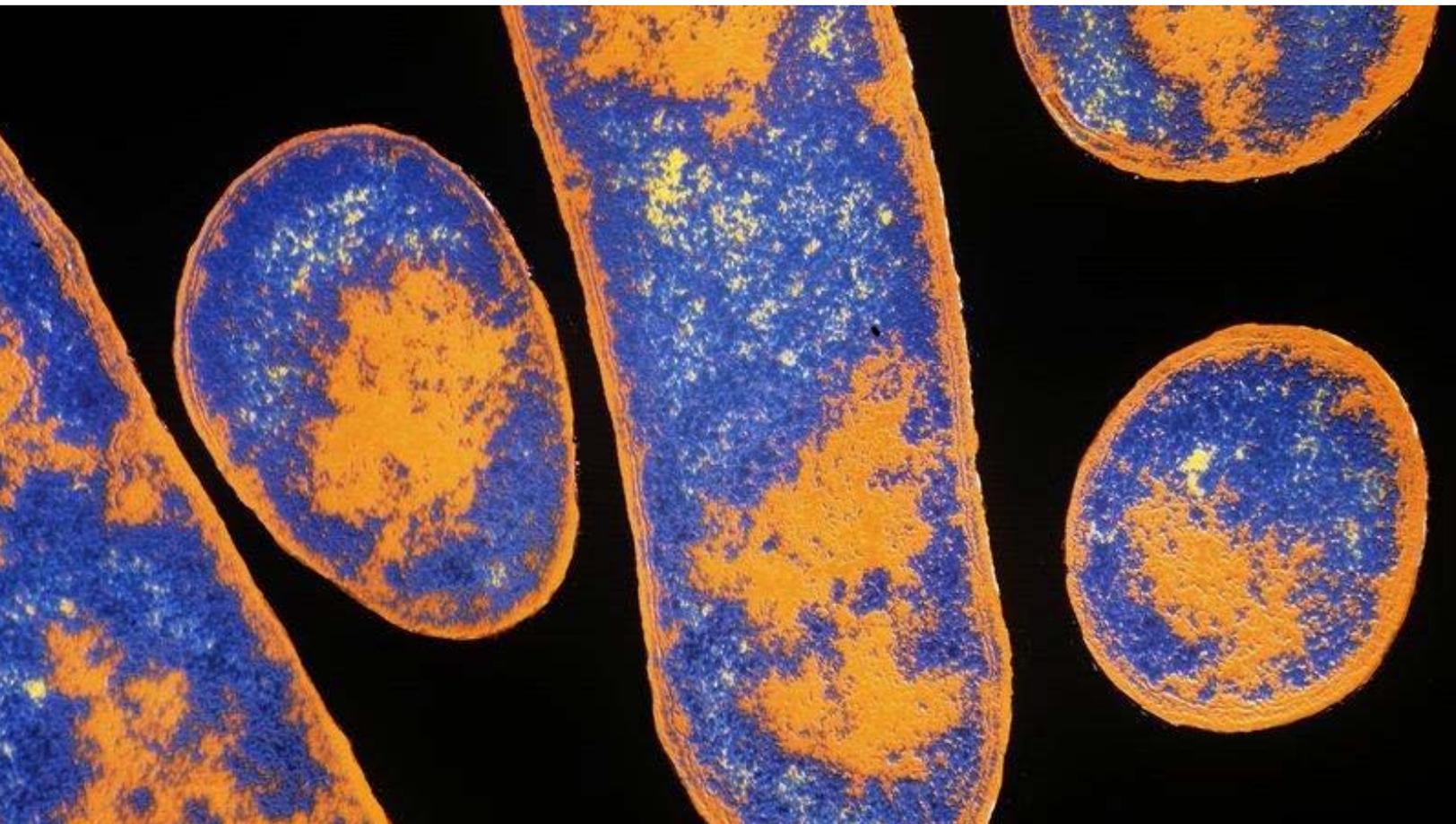
*Clostridium botulinum* produces the most potent known neurotoxin (BoNT) which is categorized as a Tier 1 select agent indicating its potential use to threaten public health. CAPT Scott Harper supervised the response to a botulism outbreak in New York City in 2018. The NYC health department was notified of three women who were evaluated at a hospital with acute nausea, dizziness, blurred vision, slurred speech, ptosis (drooping of eyelids), thick-feeling tongue, and shortness of breath. Two patients developed respiratory failure requiring mechanical ventilation in the emergency department, and the third patient was intubated later that evening. Since

BoNT is a potential bioterrorism agent, local and federal law enforcement officials were brought into the discussion early in the investigation per the NYC Joint Investigation Protocol. After consultation with CDC, botulinum antitoxin was released by CDC and administered to all patients within approximately 12 hours of presentation.

CAPT Harper led the New York City Dept. of Health team that discovered that approximately 14 hours before hospital presentation, the patients had shared a homemade potato salad containing home-canned peas. The family's freezer had malfunctioned, and to preserve some commercially produced frozen peas, one of the patients had home canned the peas 1-2 weeks earlier. CAPT Harper's team interviewed the patient who reported preparing the canned peas using a boiling water technique. They were unaware that low-acid foods (e.g., vegetables like peas) should be canned using a pressure-canner rather than a boiling water canner in order to eliminate *C. botulinum* spores. In the absence of a pressure-canning step, *C. botulinum* spores were not eliminated, and the closed jar created an anaerobic environment allowing spore germination and BoNT production. All three patients survived but required prolonged intensive care (range = 34–54 days) and rehabilitation.

Blood collected from two patients before administration of antitoxin and stool collected from all three after antitoxin administration demonstrated BoNT type A. Also, a wash from an empty jar that had held the peas and residual food from the salad bowl were positive for BoNT type A(B). Isolates from two stool specimens characterized by Whole Genome Sequencing (WGS) were indistinguishable from the salad bowl isolate. Other environmental samples, including different home-canned vegetables from the same batch, were negative for BoNT, confirming the peas as the outbreak source.

This outbreak demonstrated the importance of ongoing surveillance for potential bioterrorism pathogens. It also allowed exercise of the NYC Joint Investigation Protocol by which law enforcement officials are engaged early in any outbreak that might be considered a result of bioterrorism. While potential bioterror was rapidly ruled out, this outbreak also illustrated the ongoing need for educating home canners about safe home-canning practices needed to prevent botulism. Additionally, it reinforced public health officials' advice for clinicians to consider botulism in their differential diagnoses for persons with serious neurological diseases. Home-canned food, even when made with commercially processed ingredients and especially with low acidity foods, can lead to serious morbidity or mortality if canned incorrectly.





**Celia Quinn, MD, MPH, CDR US Public Health Service; New York City, New York**

### **Planning for large-scale evacuation of healthcare facilities**

Healthcare systems must adapt during large-scale emergencies. These include major storms, earthquakes, terrorist attacks, and pandemics. Healthcare systems can boost their resiliency when individual components effectively coordinate and communicate with each other and with overall system leadership. Such coordination and communication may involve reporting data about current resource availability (e.g. ICU beds available) as well as plans for patient management if demand outstrips available resources (e.g. plans for discharges and transfers). New York City (NYC) has one of the largest health care systems in the world. Ensuring its diverse partners effectively coordinate and communicate is critical to protect the health of the city's population during emergencies.

CDR Celia Quinn is a CEFO in a leadership role for the Bureau of Healthcare System Readiness in the NYC Department of Health and Mental Hygiene's Office of Emergency Preparedness and Response. In 2018, she led an interagency team to ensure that >300 hospitals, nursing homes, and adult care facilities in NYC could complete required reporting of critical assets and transfer arrangements for coastal storm evacuations. CDR Quinn led efforts to collaborate with the New York State Department of Health and local stakeholders to communicate the importance of these reports to facilities, and to provide technical assistance for completing them. She also oversaw an analysis of the data included in the reports to inform city and state planning assumptions for coastal storms.

By April 2018, 100% of NYC's more than 300 hospitals, nursing homes, and adult care facilities had completed their required reporting which more than doubled the compliance rate of the previous two years. This also provided city and state agencies with their first complete snapshot of the status of coastal storm evacuation planning for NYC's healthcare system. Analysis of this data revealed the need for improved understanding of transfer arrangements among healthcare facilities, guidelines for identification of non-traditional surge space at the facility level, and additional support for facility surge and evacuation planning both inside NYC and in surrounding counties. Public health agencies will use these findings to guide planning, training, and exercises for the local healthcare system. In addition to accomplishing the goal of 100% reporting compliance for 2018, CDR Quinn's efforts strengthened relationships between the city and state health departments and the diverse group of stakeholders involved in healthcare system evacuation planning, including facility-level emergency managers.





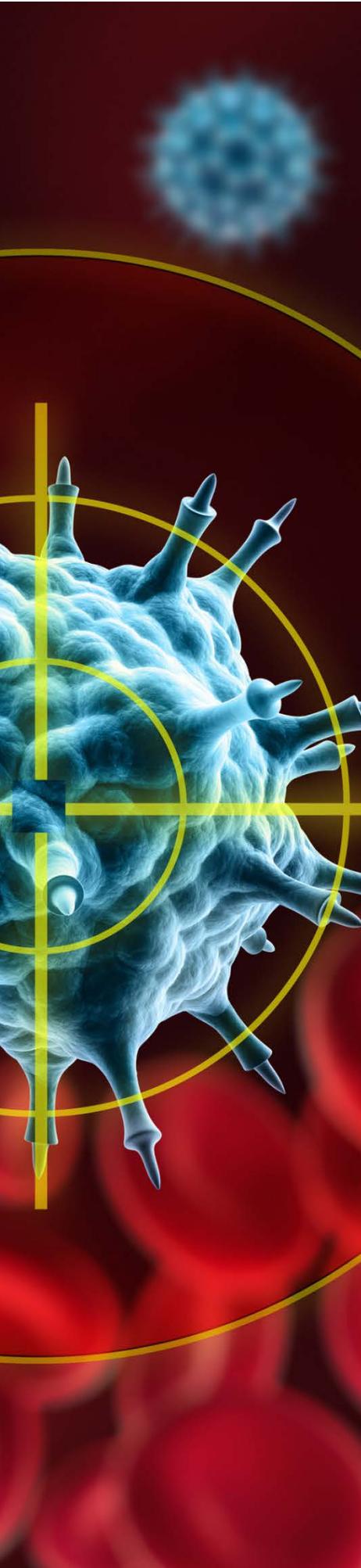
**Timothy Styles, MD, MPH, CDR US Public Health Service; New York City, New York**

### **Mass casualty incident notification mini drills**

In New York City, mass casualty incidents (MCIs) occur nearly every day. MCIs are incidents with the potential to produce five or more patients. While some types of MCIs are common in NYC, such as motor vehicle collisions, these do not frequently produce large numbers of patients. As the most populated city in the United States, with millions of commuters and travelers coming to the city daily, there is ongoing risk for larger MCIs resulting from both natural and manmade (intentional and non-intentional) causes. To mitigate health impacts from larger MCIs, public health, healthcare systems and emergency services need to coordinate efforts efficiently. This requires planning and exercising.

To better prepare NYC to respond to large MCIs, CAPT Timothy Styles, a CEFO assigned to the NYC Department of Health and Mental Hygiene, worked with FDNY, NYC Emergency Management, NYC Health and Hospitals, and the Greater New York Hospitals Association to establish new MCI protocols during late 2016. These protocols included hospital notifications from first responders indicating MCI event severity levels (i.e. level A—moderate, level B—significant, level C—major, and level D—catastrophic). FDNY and 9-1-1-receiving hospitals agreed upon a maximum number of patients that could be transported for each level to specific facility types, e.g. a trauma hospital may expect to receive a maximum of 9 critical patients and 70 non-critical patients for a level C (major) event. In 2017, CAPT Styles continued to collaborate with multiple agencies and hospitals to further improve and align emergency operation plans between the city and its hospitals. As part of this effort, hospitals ensured that emergency department staff responsible for communicating with FDNY during MCIs received training about the notification protocols. In 2018, CAPT Styles took these efforts to the next step and coordinated MCI drills to test emergency departments' capability to recognize an alert for a level C event involving victims from a nearby mass shooting and bombing event. These drills focused on the first 10–15 minutes after a notification to assess department's ability to translate the alert level to the number of potential patients they might receive. It also tested how they initiated the process of preparing the hospital to receive the large influx of critical and non-critical patients including assessing needed staff (need to surge nursing and trauma personnel), space (triage area, trauma bays, etc.), and stuff (trauma supply stockpiles). During January–May 2018, 38 of the 9-1-1-receiving hospitals in NYC participated in these emergency department drills, including 15 trauma centers.

Analysis of evaluation and after-action reports showed that 36 of the 38 hospitals would immediately activate their hospital emergency operations, triggering mass notifications to leadership and other departments in the hospital. More than 50% of hospitals immediately identified the potential number of critical and noncritical patients they might receive for their hospital. The rest of the hospitals either 1) didn't know precisely how many critical and noncritical patients to expect but understood the impact of level C event; or 2) were able to identify the expected patient numbers after some additional questioning by the drill evaluator. Finally, more than 80% of participating hospitals rapidly developed a plan to address the needed space, staff, and stuff to respond to this hypothetical event, given their current emergency department and hospital resources, while the remaining hospitals were able to address these needs with minor prompting by the drill administrators. Throughout these drills, hospitals and partners benefited from CAPT Styles' emphasis on the need and importance for continued planning, practice, communication and response coordination to optimize facility preparation for major MCIs.



**Jennifer MacFarquhar, MPH, RN, CIC; Raleigh, North Carolina**

**Enhancing public health surveillance: addition of diseases to NC reportable conditions list**

Communicable diseases emerge, evolve, and may spread geographically in ways that threaten public health. In order for public health authorities to effectively address microbial threats, standards are needed to classify them and to define investigation goals and reporting methods. Since the early 1950s, members of the Council of State and Territorial Epidemiologists (CSTE) have used their expertise in surveillance and epidemiology to select which diseases and conditions should be reportable (“nationally notifiable”) to public health authorities, and to define their associated “case-definitions.” The list of reportable diseases and conditions and their related case-definitions provides public health authorities with a consistent framework to use in their efforts to control these diseases. The process of drafting additions to the list of reportable diseases is a critical activity that CSTE, CDC and other public health partners engage in to address new threats.

Jennifer MacFarquhar, a CEFO assigned to the North Carolina Department of Health and Human Services (NCDHHS), has led the North Carolina Surveillance for Healthcare Associated and Resistant Pathogens Patient Safety (SHARPPS) Program since 2012. She and her SHARPPS and NCDHHS colleagues extensively collaborated in national workgroups related to the addition of infections to the nationally notifiable diseases list with a specific focus on microbes that are resistant to most current treatments. This effort is a CDC priority activity. Ms. MacFarquhar and her team worked with CSTE to create draft case definitions for Carbapenem-resistant Enterobacteriaceae (CRE) which are resistant to nearly all antibiotics and which contain mobile resistance elements (plasmids) that can transfer resistance to other bacteria. Ms. MacFarquhar and her colleagues worked to add another infection with high potential for drug resistance to the list of reportable diseases, *Candida auris* (*C. auris*). *C. auris* infections can be difficult to identify and treat. CRE and *C. auris* are both associated with high morbidity and mortality (up to 50% and 33% respectively). Both CRE and *C. auris* can also persist in the environment which facilitates spread and new outbreaks. Due to these factors, containment is a high priority for these multi-drug resistant organisms.

Ms. MacFarquhar worked with partners and the NC Public Health Commission during 2017-2018 to add these two diseases to the NC reportable conditions list. Both CRE and *C. auris* became nationally notifiable in 2018. When consistently followed, public health recommendations can stop the spread of these organisms within and between healthcare facilities as well as in community settings. Requiring reporting and subsequent analysis of North Carolina data has led to development and implementation of successful prevention and sustainable control measures to reduce the burden imposed by healthcare associated infections. MacFarquhar and her SHARPPS program team’s efforts have improved reporting and enabled public health authorities to prevent further spread of both *C. auris* and CRE.



**Jeffrey Miller, MD, MPH, CDR US Public Health Service; Harrisburg, Pennsylvania**

### **Secure and Flexible Tools for Rapid Data Collection are Critical in Emergency Response**

Data to support well-informed decisions during emergencies can help limit excess morbidity and mortality, and also help reduce associated disruptions to critical health care and public health systems and therefore protect population health. Systems to support data collection and analysis during emergencies need to be developed and practiced prior to such events and be able to rapidly adapt as circumstances demand. The goal remains the same: useful data collected rapidly to support decision-making to reduce health burdens associated with emergencies.

CDR Jeffrey Miller led a cross-program team at the Pennsylvania Department of Health to improve its ability to deploy flexible, timely, and secure surveys to collect data, including patient protected health information. CDR Miller assisted the department with a programmatic and technical needs assessment, identified and evaluated possible solutions, co-presented a proposal to the department's architectural review board, and collaborated with colleagues from the legal and contracts office through the procurement process. Policies, procedures, and best practices for data security and integrity were prioritized. He shared solutions and demonstrated features to programs interested in adopting the technology, helped design and implement surveys, and served as a technical resource to programs within the Bureau of Epidemiology and elsewhere in the Department. CDR Miller also shared his experience with health departments in other states.

As a result of these activities, the Pennsylvania Department of Health secured access to nPhase REDCap Cloud. This technology promotes enhanced continuity of operations and surge and disaster responses through secure and redundant servers, distributed web-based data collection, and mobile online and offline data collection. By Q4, 2018, the Pennsylvania Department of Health had used this secure web-based survey solution in multiple public health programs including healthcare associated infections (outbreak tracker, program management, drug resistance laboratory capacity surveys), influenza (iliNet), foodborne (outbreak questionnaires), and zoonotic disease (Lyme disease) programs. In addition, it was used to bootstrap a new birth defects surveillance program and has become a critical tool in Zika virus pregnancy registry and opioid response (i.e., neonatal abstinence syndrome). Lessons learned from this experience are informing CDR Miller's subsequent efforts to implement the CDC Community Reception Center e-Toolkit to REDCap Cloud to enhance the state's radiological emergency responses.



**Rendi Murphree, PhD, CAPT US Public Health Service; Nashville, Tennessee**

### **Bringing a Coordinated Incident Response Framework to the Tennessee Opioid Epidemic**

Curbing the epidemic of substance abuse disorder (SUD) has been a top priority for the Tennessee Department of Health (TDH). Despite remarkable gains in reducing the number of morphine milligram equivalents dispensed annually, demand for opioids and resulting morbidity and mortality have continued to rise. In 2017, TDH recognized the need for greater direction and coordination of opioid-related initiatives and requested assistance from the Emergency Preparedness program. CAPT Rendi Murphree, CDC CEFO assigned to TDH, was named Incident Manager for the opioid epidemic response. Fighting the epidemic of substance use disorder and opioid misuse

and will require a prolonged public health and health care system response. Although no formal state of emergency was declared in Tennessee, CAPT Murphree began integrating components of the national incident management system into TDH response activities in July 2017.

CAPT Murphree led the virtual activation of TDH emergency operations to improve cohesion and coordination of response activities. Specific activities she spearheaded included coaching public health incident responders through the process of documenting incident-specific goals, activities and measures. She brought a focus on key

principles needed to improve response capability and capacity: Focus on what is most important, act on lead (process) measures, keep a scorecard, and create a cadence of accountability. She worked to institutionalize implementation of ICS structure and operational tempo including regular situational reports and action plans. She met frequently with >10 TDH Divisions, Offices, and Programs to identify complementary activities and connect staff to improve service delivery and communication and reduce departmental duplication. And she regularly communicated with rural regional and metropolitan health department staff to keep them informed, identify needs, provide technical assistance, and to improve statewide response capacity and capability.

Before widespread national attention to the opioid crisis, CAPT Murphree successfully executed a virtual activation of the enhanced TDH incident management system. The improved response coordination set the stage needed to sustain a lengthy response. Improvements in the TDH system continue to be made as lessons are recognized—a virtuous cycle to help promote improvements needed are made in a systematic fashion.



**Joseph (Jay) Roth, JR., MPH, CAPT US Public Health Service; Christiansted, U.S. Virgin Islands**

### **Hurricane response in U.S. Virgin Islands**

During September 2017, The U.S. Virgin Islands (USVI) were struck by two Category-5 hurricanes within a two-week period which catastrophically damaged this territory's infrastructure. Hurricanes Irma and Maria caused widespread damage to homes and business, leaving many residents without electricity and potable household water for months. Of the three hospitals in USVI, only two remained marginally operable; public health operations were limited as most facilities and staff members were affected by the storms. Teams quickly established general and special needs shelters for residents on each island. The response to a disaster of this magnitude required the application of

nearly every Public Health Preparedness Capability.

CAPT Joseph ("Jay") Roth, CDC CEFO assigned to the USVI, was pre-positioned to provide Emergency Support Function-8 (Public Health and Medical) and Emergency Operations Center (EOC) leadership and support throughout the response period that began in 2017 and continued throughout 2018. Initially, mass care and evacuation of hundreds of patients were his primary foci although he also helped to coordinate the distribution of needed medical supplies, food, and water. CAPT Roth was integral in establishment of disaster surveillance activities, which included shelter surveillance, conducting active surveillance, and conducting community assessments to characterize the disaster's multifaceted impacts and identify and prioritize myriad community needs. Two Community Assessments for Public Health Emergency Response (CASPERs) were conducted during the response phase, followed by subsequent CASPERs to gauge recovery progress and guide recovery efforts.

The information provided by the multiple surveillance and community assessment activities CAPT Roth led enabled USVI leadership and EOC partners to wage a data-driven response and manage recovery efforts across multiple domains including healthcare and public health. This rational approach was critical given the response environment characterized by massive destruction, limited resources and geographic isolation. Ongoing monitoring of community health status, needs, and perceptions have continued to keep public health at the forefront of recovery planning.



**Katie Kurkjian, DVM, MPH;  
Richmond, Virginia**

**Empowering communicable disease investigators in Virginia**

Virginia Department of Health (VDH) maintains a disease control manual comprised of the nearly 80 reportable diseases and other emerging diseases. The manual is designed for communicable disease staff to

use during their public health investigations. Each chapter contains disease investigation guidelines, a fact sheet, surveillance forms, and other investigation tools. The manual requires constant revision as new information is learned and procedures evolve.

Dr. Katie Kurkjian, CDC CEFO assigned to VDH, has served as the editor of Virginia's disease control manual, developing materials and reviewing documents produced by subject matter experts. In 2018, she led the revision of seven chapters in the manual, including infections caused by carbapenem-resistant gram-negative organisms, fungal infections, legionellosis, methicillin-resistant *Staphylococcus aureus* infections, Middle East Respiratory Syndrome, paratyphoid fever, and Zika virus infection. She reviewed numerous materials developed by subject matter experts, including investigation guidelines, case report forms, and other investigation materials. In addition, Dr. Kurkjian revised guidelines for healthcare providers for 10 bioterrorism agents and coordinated a project to update more than 100 disease fact sheets for the public.

Having current and accurate guidelines is critical to the success of health department staff preparing for and responding to a wide array of communicable disease threats both large and small. These updated materials will help to ensure a standardized public health response across Virginia's 35 health districts. Educational materials for healthcare partners and the public also raise important awareness of public health threats and promote disease control and prevention strategies.



**Erica Thomasson, PhD, MPH;**  
**Charleston, West Virginia**

**Legionnaire's disease outbreak  
investigation affecting racetrack workers**

Legionnaires' disease (LD), a serious lung infection (pneumonia), is caused by inhaling aerosolized droplets of water containing the bacterium *Legionella*. While LD is treatable with antibiotics, most people who get sick require hospitalization but make a full recovery.

However, about 1 out of 10 people with Legionnaires' disease die from the infection. *Legionella* can also cause a milder illness called Pontiac fever. In October 2018, the West Virginia Bureau for Public Health (BPH) was notified of a laboratory-confirmed case of LD in a person with occupational exposure to a racetrack facility. Following initial investigation by the BPH and the Hancock County Health Department (HCHD), five additional cases with occupational exposure to the same facility within a one-month period were identified. In response, BPH requested an Epi-Aid from CDC to assist the epidemiologic and environmental investigation needed to determine the extent of the outbreak and to identify, control, and mitigate risks of continued exposure.

Dr. Erica Thomasson serves as a CEFO assigned to the BPH and served as the lead epidemiologist overseeing the coordination of expertise and information across federal, state, and local jurisdictions. The investigative team she led interviewed all confirmed Legionnaires' disease cases and conducted extensive case-finding among racetrack workers. Seventeen cases were identified including six confirmed and four suspected LD cases, and seven suspected Pontiac fever cases. An environmental assessment of the facility's plumbing and ventilation systems and nearby cooling towers was conducted in collaboration with NIOSH to identify potential sources of *Legionella* transmission. The environmental assessment revealed a poorly maintained hot tub in the jockey area on the first floor of the racetrack facility; one confirmed case and nine suspected cases had exposure to this hot tub. The remaining cases were exposed to a second-floor office suite. The environmental assessment identified maintenance deficiencies in the facility's ventilation systems and a crack in the floor between the hot tub and office areas.

The team worked closely with the facility to institute control and prevention measures that prevented further morbidity. While hot tubs are often reservoirs for *Legionella*, the investigation provided evidence that ventilation systems and airflow dynamics should also be considered in LD outbreak investigations and public health prevention strategies. This added to the public health toolkit that can be used in other U.S. jurisdictions to address threats from *Legionella*.





**Lina Elbadawi, MD, MS, LCDR US Public Health Service; Madison, Wisconsin**

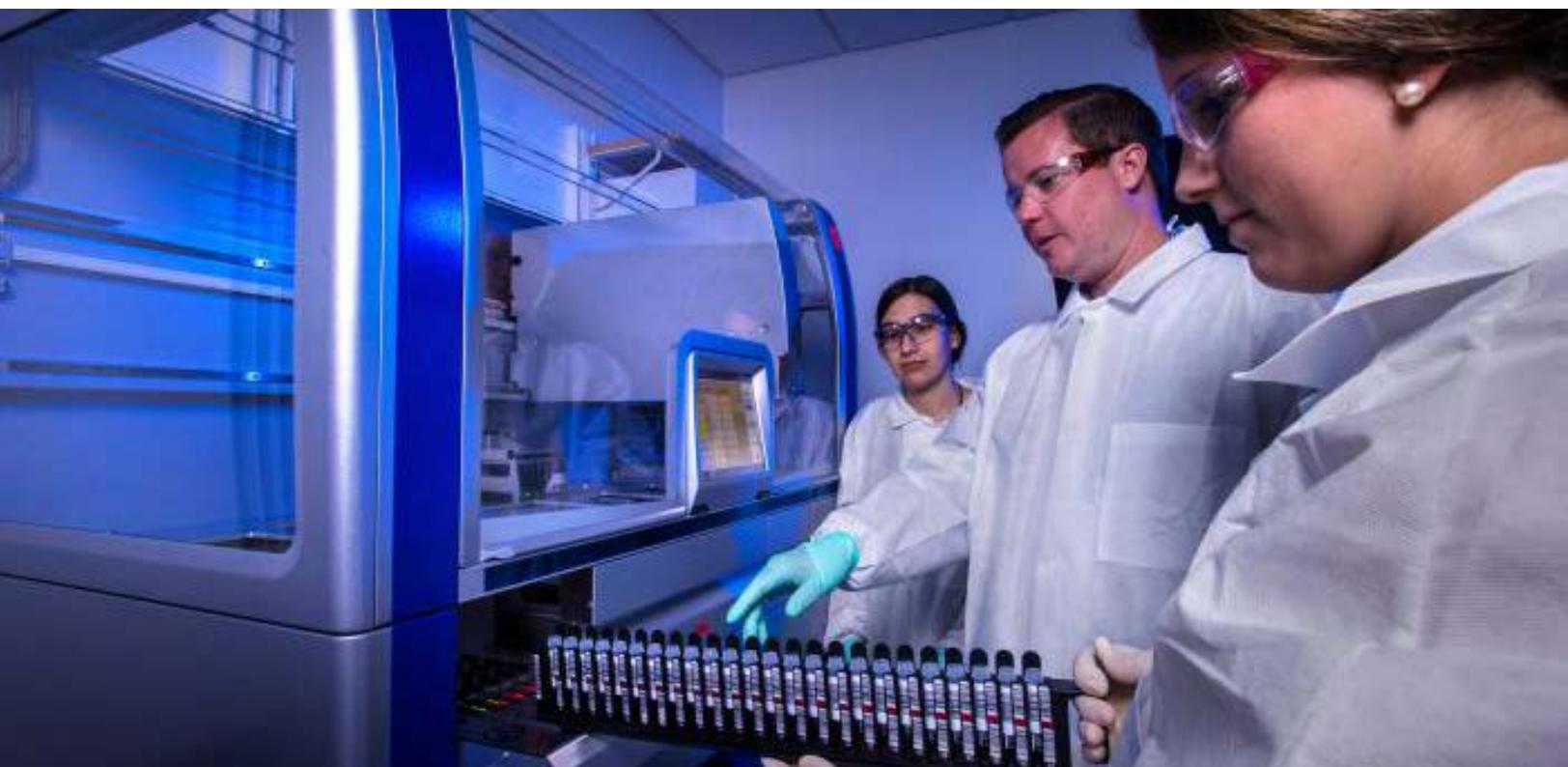
### **Healthcare associated infections in Wisconsin**

Detection and control of antimicrobial resistant organisms are pressing public health and clinical healthcare priorities. Outbreaks of *Acinetobacter* infections are considered to be caused exclusively by contamination and transmission in hospital environments. The infections can extend hospital stays for infected patients or even lead to their demise. Certain *Acinetobacter* resistance profiles are especially concerning because of extremely limited treatment options. During October 2018, the Wisconsin Division of Public Health (WDPH) was notified of a cluster of carbapenem-resistant *Acinetobacter baumannii* (CRAB) with identical resistance patterns on antimicrobial susceptibility testing in three patients admitted to intensive care units in

one facility in southeastern Wisconsin.

LCDR Lina Elbadawi, the CEFO assigned to WDPH, coordinated efforts to investigate the apparent cluster. Working with the Wisconsin State Laboratory of Hygiene (WSLH), the Wisconsin Clinical Laboratory Network and healthcare facilities in the region to obtain line-lists and CRAB isolates, she supervised staff at WDPH to determine patient overlap and exposure at various facilities. In addition, she organized the needed infection control assessment and response (ICAR) efforts at affected facilities to identify and close gaps in infection control to stop transmission. CDC uses ICAR as a standardized approach to address infectious threats in health care settings.

LCDR Elbadawi's efforts included use of whole genome sequencing that identified a cluster of CRAB that would have otherwise only been suspected. She facilitated strong partnerships with acute care facilities that led to case finding and characterization of the scope of the cluster. Furthermore, her coordination and collegial relationships with regional long-term care facilities and long-term acute care providers facilitated a point prevalence survey to detect CRAB transmission. Her ICAR efforts and facilities' responses ensured control of this cluster and interventions that prevented further spread. Facilities and public health partners are better prepared to address future healthcare-associated infectious disease threats.





**Daniel O'Leary, DVM, DACVPM, CAPT US Public Health Service; Cheyenne, Wyoming**

### **Wyoming National Guard medics train as medical shelter providers**

During a disaster or public health emergency, communities are often forced to evacuate their homes and displaced from established medical 'homes'. Hospitals can become overwhelmed, and people may simply find themselves with no place to seek health care during potentially prolonged periods of displacement. To meet this need, the Wyoming Department of Health's (WDH), Public Health Preparedness and Response Program (PHPR) has worked to develop the Wyoming Medical Station (WMS) program. The core of this effort is a federally repurposed medical equipment set with essential equipment for a 250-bed medical shelter. PHPR received the equipment in 2015 and started an inventory, subdividing the equipment into five smaller 50 bed sets, and developing a strike team of county Public Health Response Coordinators to oversee the deployment process in the event that the WMS was needed. But who would provide the critical staff to operate the WMSs?

CAPT Daniel O'Leary, CDC Career Epidemiology Field Officer assigned to WDH thru CDC/CPR/DSLRL, and Andy Gienapp, Unit Manager for Wyoming Office of Emergency Medical Services, discussed the possibility of working with the Wyoming Army National Guard (WYARNG) and developed a staffing solution for the WMS utilizing the healthcare personnel assigned to the WYARNG Medical Detachment (MEDDET). The MEDDET is the WYARNG's unit responsible for the health and readiness of all WYARNG soldiers. It's comprised of a substantial cadre of physicians, Physician Assistants, nurses, Advanced Practice Nurses, medics, healthcare administration specialists, and other healthcare professionals.

With approvals from WDH and the Wyoming Military Department, planning began to conduct a two-and-a-half-day WMS training with the MEDDET and other key partners to familiarize everyone with the equipment, the concept of sheltering persons, agency roles and responsibilities, and to brainstorm ideas for improvements and other needed training. Led by CAPT O'Leary, planning culminated in August 2018 with representatives from the WDH Public Health Division, the WMS Strike Team, the American Red Cross, and others convened at the WYARNG's Regional Training Institute to train the soldiers of the MEDDET to operate the WMS. Wyoming-based soldiers were successfully trained in the concepts of sheltering, the interaction of the National Guard and civilian authorities, and the setup and operation of the equipment set. Red Cross, state and county health and emergency management officials trained on their agency's specific support roles. Finally, with local youth serving as simulated patients, the MEDDET soldiers, trainers, and support agencies worked through hypothetical medical sheltering patient scenarios to test established WMS processes and made operational improvements should the WMS be needed and deployed.

As a result of CAPT O'Leary's leadership, Wyoming National Guard, WDH, and Wyoming Office of Homeland Security has created a Medical Sheltering Support Package for placement in state emergency management resource inventory. This improved state and regional medical surge capacity as Wyoming made the WMS available for other states under the National Emergency Management Agency's Emergency Management Assistance Compact (EMAC).

# Appendix B – CEFO Program Publications

October 1, 2017–December 31, 2018

(66 peer-reviewed and 9 others)

## Peer-Reviewed Publications (49)

**Laura Adams, Career Epidemiology Field Officer, Arizona**

Yaglom HD, Nicholson WL, Casal M, Nieto NC, and **Adams L**. Serologic assessment for exposure to spotted fever group rickettsiae in dogs in the Arizona-Sonora border region. *Zoonoses and Public Health* 2018 August 21. DOI: 10.1111/zph.12517. <https://onlinelibrary.wiley.com/doi/epdf/10.1111/zph.12517>

**Victor Caceres, Career Epidemiology Field Officer Team Lead, Headquarters**

**Cáceres VM**, Sidibe S, Andre M, Traicoff D, Lambert S, King M, et al. Surveillance Training for Ebola Preparedness in Côte d'Ivoire, Guinea-Bissau, Senegal, and Mali. *Emerg Infect Dis*. 2017;23(13). <https://dx.doi.org/10.3201/eid2313.170299>

**Enzo Campagnolo, Career Epidemiology Field Officer, Pennsylvania**

**Campagnolo E**, Tewari D, Farone TS, Livengood JL and Mason KL. Evidence of Powassan/deer tick virus in adult black-legged ticks (*Ixodes scapularis*) recovered from hunter-harvested white-tailed deer (*Odocoileus virginianus*) in Pennsylvania: A public health perspective. *Zoonoses Public Health*. 2018;00:1–6. <https://doi.org/10.1111/zph.12476>

Farone TS, **Campagnolo ER**, Hutzelmann AL, Lind AE, Everett AA, Minch RL, Fort CJ and Braumann RE. Ticks Collected in Late Fall from Hunter-Harvested White-Tailed Deer (*Odocoileus Virginianus*) Heads in Pennsylvania, 2013–2015. *Journal of the Pennsylvania Academy of Science*. 2017; 91(2):65–72. *JSTOR*, *JSTOR*, [www.jstor.org/stable/10.5325/jpennacadscie.91.2.0065](http://www.jstor.org/stable/10.5325/jpennacadscie.91.2.0065).

Farone TS, **Campagnolo ER**, Mason KL and Butler CL. *Borrelia miyamotoi* infection rate in black-legged ticks (*Ixodes scapularis*) recovered from heads of hunter harvested white-tailed deer (*Odocoileus virginianus*) in Pennsylvania: A public health perspective. *Journal of the Pennsylvania Academy of Science*. 2018 Aug 10;92:1-12.

**Kris Carter, Career Epidemiology Field Officer, Utah**

**Carter KK**, Lundgren I, Correll S, Schmalz T, McCarter T, Stroud J, Bruesch A, Hahn C. First United States Outbreak of *Mycobacterium abscessus* Hand and Foot Disease Among Children Associated With a Wading Pool. *J Pediatric Infect Dis Soc* 2018 May <https://doi.org/10.1093/jpids/piy036>.

<https://academic.oup.com/jpids/advance-article/doi/10.1093/jpids/piy036/5022847?guestAccessKey=ce776447-3aaa-4ba7-9867-b800ac6cf370>

**Laura Edison, Career Epidemiology Field Officer, Georgia**

Book Chapter: Applications: Informatics: Using Information Systems to Improve Surveillance During Disasters. **Edison L**, Soetebier K and Dishman H. *Disaster Epidemiology*, 1st Edition, Methods and Applications, Editors: Jennifer Horney

Parham M, Pomerleau A, Peralta G, Drenzek C, **Edison L**. Fentanyl-Associated Illness Among Substance Users – Fulton County, Georgia, 2015. *The American Journal of Emergency Medicine*. 2018 November;36(11);2115-2117.

[Turner AK](#), [Wages RK](#), [Nadeau K](#), [Edison L](#), [Prince PE](#), [Doss ER](#), [Drenzek C](#), [O'Neal P](#): The Infectious Disease Network (IDN): Development and Use for Evaluation of Potential Ebola Cases in Georgia. [Disaster Med Public Health Prep](#). 2018 Feb 2:1-7. [Epub ahead of print]

#### **Aaron Fleischauer, Career Epidemiology Field Officer, North Carolina**

**Fleischauer AT**, Gaines J. Enhancing Surveillance for Mass Gatherings: The Role of Syndromic Surveillance. *Public Health Rep*. 2017;132(1\_suppl):95S-98S.

Cope AB, Mobley VL, Oliver SE, Larson M, Dzialowy N, Maxwell J, Rinsky JL, Peterman TA, **Fleischauer A**, Samoff E. Ocular syphilis and HIV coinfection among syphilis patients in North Carolina, 2014-2016. *Sex Transm Dis*. 2018 Aug 31;46(2):80-85. doi: 10.1097/OLQ.0000000000000910. [Epub ahead of print].

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