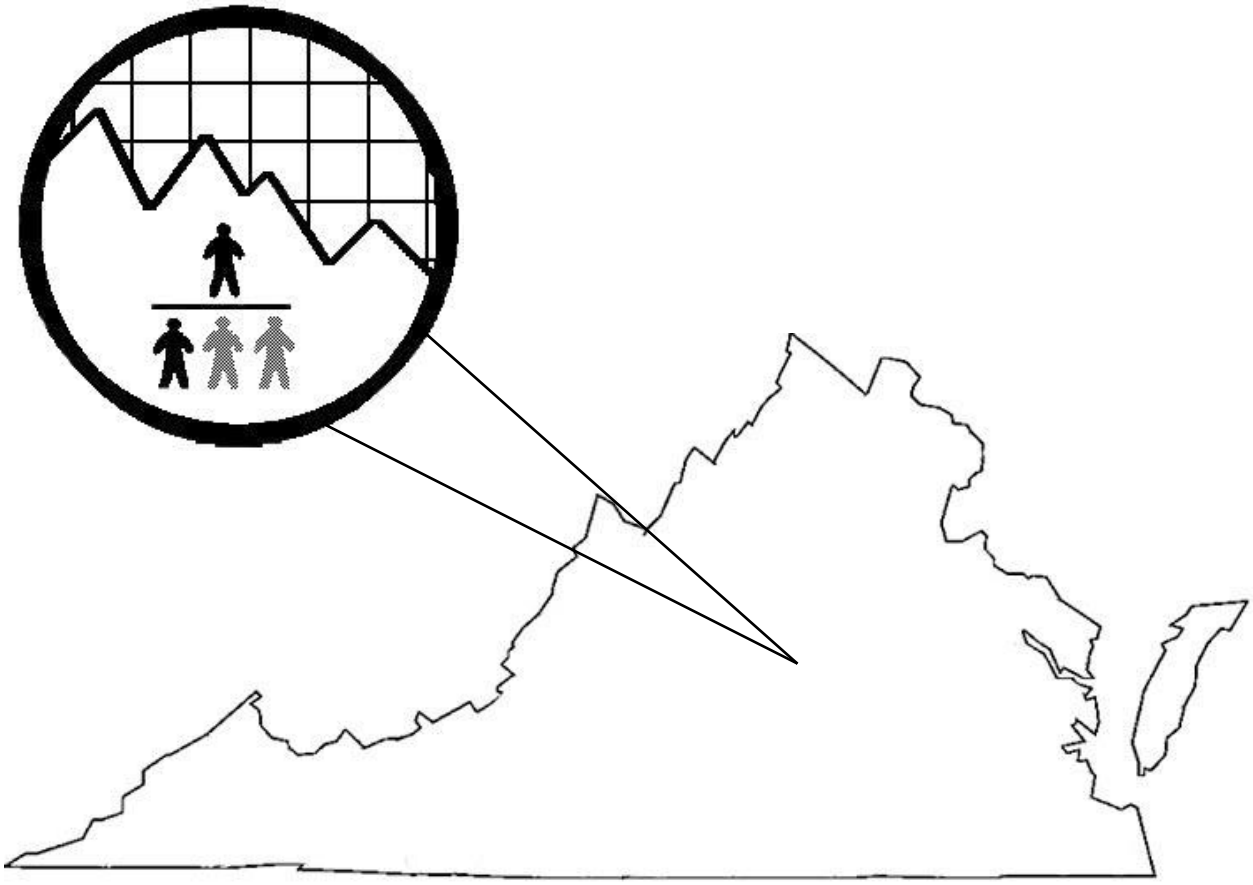
Virginia Department of Health
Field Epidemiology Seminar



June 2, 2017

VDH VIRGINIA DEPARTMENT OF HEALTH
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Emergency Preparedness & Response Programs

Field Epidemiology Seminar Agenda
Friday, June 2, 2017
Fredericksburg, Virginia
Fredericksburg Expo and Conference Center

8:30 a.m. **Registration**

9:00 a.m. **Welcome**
Diane Woolard, PhD, MPH
Division Director, Division of Surveillance and Investigation

SESSION 1
Moderator – Stephanie Dela Cruz, Manager, Epidemiologic Support Group,
Division of Consolidated Laboratory Services

9:10 a.m. **Cup O' Clostridium: A Laboratory Investigation of a Ramen Night *C. perfringens* Outbreak**
Jessica Maitland, Ph.D.
Senior Scientist, Division of Consolidated Laboratory Services
By the end of this session, the participant will be able to:
- *Describe food and clinical sample testing algorithms and limitations in a laboratory investigation of a suspected* C. perfringens *toxin-mediated outbreak.*
- *Recognize the importance of the relationship between environmental and clinical laboratories during the investigation of an outbreak.*
- *Identify critical control points necessary to prevent* C. perfringens *growth in a food service environment.*

9:30 a.m. **Breakfast of Champions - An Udderly Horrific Outbreak of *E. coli* Associated with Raw Milk Consumption**
Daniel Ferrell, MPH
District Epidemiologist, Rappahannock-Rapidan Health District
By the end of the session, the participant will be able to:
- *Identify key characteristics of a STEC outbreak.*
- *Observe/identify the differences between licensed/inspected facilities and herd-share programs.*
- *Recognize the importance of inter and intra-agency collaboration during outbreak investigations.*

9:50 a.m. ***Staphylococcus aureus*: The Uninvited Wedding Guest**
Melissa Hamilton, MPH
District Epidemiologist, Lenowisco Health District
By the end of the session, the participant will be able to:
- *Describe the importance of Environmental Health and Epidemiology partnerships during outbreak investigations.*
- *Identify the importance of proper food handling for the prevention of foodborne illness.*
- *Describe the common sources and symptoms of* Staphylococcus aureus *gastrointestinal illness.*

10:10 a.m. **Same Caterer, Different Names: A Multi-District Foodborne Norovirus Outbreak**
Okey Utah, MBBS, MPH
District Epidemiologist, Richmond City Health District
By the end of the session, the participant will be able to:

- *Describe best practices in specimen collection and coordination.*
- *Explain the synchrony of action between local and state epidemiologists during multi-jurisdictional outbreaks.*

10:30 – 10:45 a.m. **Break**

SESSION 2
Moderator - Caroline Holsinger, DrPH, CPH, Division Director
Virginia Department of Health, Division of Environmental Epidemiology

10:45 a.m. **Do We Have Enough Staph? A Look at Recreation Center Cleaning Policies and an On-Campus MRSA Cluster**
Laura R. Young, MPH, CIC
District Epidemiologist, Henrico Health District
By the end of the session, the participant will be able to:

- *Identify scenarios in which a bio-burden detector can be used as a teaching tool.*
- *Discuss the importance of cleaning schedules in a high-use, non-medical setting.*
- *Appreciate the importance of resources, such as PFGE testing, made available by DCLS during outbreak investigations.*

11:05 a.m. **Fighting the Resistance: The War Against *Acinetobacter baumannii***
Melissa M. Arons, MPH, RN
District Epidemiologist, Alexandria Health District
By the end of the session, the participant will be able to:

- *Determine the important steps in an investigation and site visit for an MDR* Acinetobacter *cluster in a long term care facility.*
- *Develop an understanding of Antibiotic Stewardship and its role in preventing Multi-Drug Resistant, Hospital Acquired Infections in long term care facilities.*
- *Describe facility appropriate responses to increased cases of MDR* Acinetobacter *that are effective measures to control an outbreak.*

11:25 a.m. ***mcr-1* in my Gene Pool? Two Epidemiologic Investigations into Resistance to an Antibiotic of Last Resort**

Ana Colon, MPH

Eastern Regional Epidemiologist, VDH Division of Surveillance and Investigation

By the end of the session, the participant will be able to:

- *Describe why the emergence of this mobile colistin resistance gene (*mcr-1*) is a reason for concern in the battle against antimicrobial resistant bacteria.*
- *Describe aspects of a comprehensive epidemiological case investigation of an antimicrobial resistant bacterium.*
- *Explain the role of VDH, DCLS, CDC and healthcare partners in the identification, control and prevention of antimicrobial resistance relevant to this* mcr-1 *case investigation.*

11:45 a.m. **Tuberculosis Bridges Madison County**

Angela Armstrong, RN, MSN

Public Health Nurse Senior, Rappahannock-Rapidan Health District

By the end of the session, the participant will be able to:

- *Recognize the value of early communication with community leaders.*
- *Appreciate the unique challenges associated with a contact investigation in a transient, multi-cultural population*
- *Describe the importance of a well-planned contact investigation*

12:05 – 1:15 p.m. **Lunch**

SESSION 3

Moderator - B. Keith Skiles, MPH

Director, Division of Shellfish Sanitation

1:15 p.m. **The Fellowship of the Wellspring: A District's Epic Tale of Multiple Norovirus Outbreaks**

Jonathan Falk, MPH

District Epidemiologist, Central Shenandoah Health District

By the end of the session, the participant will be able to:

- *Explain when you might use a case-control study during an outbreak response.*
- *Describe the types of laboratory tests typically used to determine if drinking water is safe.*
- *List three public health concerns associated with renovated barns and rustic facilities used as event venues.*

1:35 p.m. **Hey U, get out of my Water!**
Louise Lockett, MPH, CIC
District Epidemiologist, Crater Health District

By the end of the session, the participant will be able to:

- *Describe standards of uranium in drinking water and expected levels in humans.*
- *Identify regulatory differences between different well categories.*
- *Describe the health impacts of exposure to uranium in drinking water.*
- *Describe public health interventions following identification of elevated uranium levels in well water.*

1:55 p.m. **A Species to Recall from Late Summer to Fall, *Alexandrium monilatum*, a Harmful Algal Bloom Coming to a Coastal Waterbody Near You**
Margaret Smigo, MS
Waterborne Pathogens Control Program Coordinator, VDH Division of Environmental Epidemiology

By the end of the session, the participant will be able to:

- *Recognize harmful algal blooms (HABs) and the potential health effects they can cause in humans/pets/wildlife.*
- *Report blooms to the Virginia HAB Task force.*
- *Distinguish the species* Alexandrium monilatum*, a bioluminescent HAB of Virginia's coast each summer/fall capable of producing potent ichthyotoxins which may have human health implications.*
- *Recall resources that can facilitate epi-investigations for exposures to HABs and that they can be found at www.HarmfulAlgaeVA.com.*

2:15 – 2:30 p.m. **Break**

SESSION 4
Moderator: Wade Kartchner, MD, MPH
Health Director: Rappahannock-Rapidan Health District

2:30 p.m. **Syphilis Strikes Back: The Changing Epidemiology of Congenital Syphilis and Early Syphilis in Virginia**
Nan Haugan, MPH
STD Epidemiologist, VDH Division of Disease Prevention

By the end of the session, the participant will be able to:

- *Describe recent trends of early and congenital syphilis diagnoses in Virginia.*
- *Describe transmission, disease progression, and symptoms of syphilis infection in adults and infants.*
- *Identify intervention opportunities for preventing congenital syphilis.*

2:50 p.m. **A Tale of Two Outbreaks: Hepatitis A in the Central Shenandoah Health District, 2016**

Laura Kornegay, MD, MPH
Health Director, Central Shenandoah Health District

By the end of the session, the participant will be able to:

- *Identify the symptoms, modes of transmission and infective period of Hepatitis A.*
- *Understand the basic elements of an epidemiologic investigation.*
- *Understand the role of Hepatitis A vaccine in responding to a community Hepatitis A outbreak.*
- *Understand the limitations of messaging when dealing with protected health information.*

3:10 p.m. **The Headache You do Not Want in Schoolchildren: Meningococcal Disease in Minors is a Major Problem**

Karen Shelton, MD, FACOG
Health Director, Mount Rogers Health District

By the end of the session, the participant will be able to:

- *Identify skills necessary to accomplish contact investigation using multiple resources.*
- *Identify the key characteristics of collaboration among community partners, which include local health care providers, emergency responders, school system, health department and out- of- state health departments, along with the local and out of state hospitals.*
- *Describe the utilization of management guidance provided by subject matter experts among the regional, state health department and CDC.*

3:30 p.m. **Strawberries Wreak HAVoc on Summer: A Multistate Outbreak of Hepatitis A Associated with Imported Frozen Strawberries**

Seth Levine, MPH
Epidemiology Program Manager, VDH Division of Surveillance and Investigation

By the end of the session, the participant will be able to:

- *Describe a multistate outbreak of Hepatitis A significantly affecting Virginia, associated with imported frozen strawberries.*
- *Illustrate the importance of collaborative work during foodborne outbreak investigations among epidemiologists, environmental health service inspectors and laboratorians on the local, state and federal levels.*
- *Demonstrate the benefit of genetic typing during outbreak investigations to identify cases of illness that may or may not be associated with a potential common source of infection.*

3:50 p.m. **Closing Remarks**

Laurie Forlano, DO, MPH
State Epidemiologist & Director, Office of Epidemiology

4:05 p.m. **Adjourn**

ABSTRACT
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Cup O' Clostridium: A Laboratory Investigation of a Ramen Night *C. perfringens* Outbreak

Presenter: Jessica Maitland, PhD, Senior Scientist, Division of Consolidated Laboratory Services

Background: On February 19, 2016, the Division of Consolidated Laboratory Services (DCLS) received patient specimens and leftover food from the Thomas Jefferson Health District for a suspected toxin-mediated outbreak at a restaurant. A collaborative laboratory investigation was initiated that involved clinical and food microbiology disciplines.

Methods: Stool samples were initially screened for norovirus, followed by culture for the toxin-producing bacteria *C. perfringens* and *B. cereus* based on epidemiologic data. To stabilize potential bacterial contaminants in the leftover food while awaiting the norovirus results, all samples were frozen in a 1:1 dilution of buffered glycerin-salt solution. After only 1 of 4 stools tested positive for Norovirus GI RNA, culture for the enumeration and isolation of both *B. cereus* and *C. perfringens* was initiated.

Results: Among 30 restaurant patrons with diarrheal illness, 24 (80%) reported consuming tonkotsu ramen at a special "Ramen Night" at Restaurant X. Clinical testing of the stools revealed elevated levels of *Clostridium spp.,* but only low levels of *Bacillus* spp. were observed. *C. perfringens* isolated from four stool samples and the leftover tonkotsu ramen composite were compared by pulsed-field gel electrophoresis (PFGE) and found to have indistinguishable DNA fingerprint patterns. Environmental Health Specialists learned that the ramen had not been properly cooled after preparation and observed limited accessibility to a hand sink and improper hand washing technique.

Conclusion: Collaborative efforts within DCLS and between DCLS and the health department were essential for stopping this outbreak. The enumeration and isolation of *C. perfringens* isolates and the PFGE evidence from the food and stool samples supported the hypothesis that consumption of a common source food from the restaurant caused the outbreak. The quick response by epidemiologists and environmental investigators resulted in a voluntary cancellation of a second "Ramen Night" by the restaurant owner, potentially preventing additional illnesses.

Breakfast of Champions! An Udderly Horrific Outbreak of *E.coli* Associated with Raw Milk Consumption

Presenter: Daniel Ferrell, MPH, District Epidemiologist, Rappahannock-Rapidan Health District

Background: In March 2016, a physician notified the Virginia Department of Health (VDH) of four hospitalized patients with Shiga toxin-producing *Escherichia coli* (STEC) infection, including two with hemolytic uremic syndrome (HUS). All had recently consumed raw milk from a farm in the Rappahannock-Rapidan Health District (RRHD), as part of a herd-share program. For several weeks, RRHD staff received additional reports of patients with STEC or HUS who had also consumed raw milk from the farm.

Methods: Communicable disease staff from RRHD and other affected health districts interviewed ill patients using standardized forms. RRHD, VDH and the Virginia Department of Agriculture and Consumer Services (VDACS) staff visited the farm for inspections and sampling. VDACS assessed milking and bottling operations and collected milk and environmental specimens. One ill shareholder submitted leftover raw milk for testing at the Division of Consolidated Laboratory Services (DCLS). Milk specimens were tested by Enzyme Linked Fluorescent Assay for STEC O157 at VDACS and by culture and pulsed-field gel electrophoresis (PFGE) at DCLS. DCLS tested patient specimens by culture and PFGE.

Results: The exposure in common among interviewed patients was consuming raw milk from the farm. Education was provided to facility owners on preventing equipment contamination, proper sanitation techniques, and the dangers associated with producing unpasteurized milk. The facility voluntarily suspended operations while equipment was cleaned. STEC was not isolated from any environmental or milk specimens collected at the farm. Non-O157 STEC from a private household's raw milk was indistinguishable, by PFGE, from another ill shareholder's isolate.

Conclusion: Based on epidemiological and laboratory evidence, an outbreak of STEC associated with raw milk consumption was identified. Education on potentials points of contamination and a thorough cleaning of the facility were critical to stopping the outbreak. STEC outbreaks related to the consumption of raw milk can be prevented through the pasteurization of milk and milk products.

Staphylococcus aureus: **The Uninvited Wedding Guest**

Presenter: Melissa Hamilton, MPH, District Epidemiologist, Lenowisco Health District

Background: A Wise County emergency department reported several cases of gastrointestinal illness among attendees of a wedding reception held on March 19, 2016. The Lenowisco Health District (LHD) investigated to identify the cause and risk factors associated with illness and to prevent additional illness.

Methods: The LHD conducted a retrospective cohort study, performed environmental health inspections, and collected specimens for testing at the Division of Consolidated Laboratory Services (DCLS). A case was defined as acute gastrointestinal illness (nausea, vomiting abdominal cramps, or diarrhea >= 3 times) in someone who either attended the reception or consumed reception food. Relative risk ratios (RRs) and 95% confidence intervals (CIs) were calculated. DCLS compared patient and food isolates using pulsed-field gel electrophoresis (PFGE).

Results: Nineteen (66%) survey respondents reported becoming ill after the reception and 18 (95%) had onset within seven hours after consuming reception food. Eating barbeque pork (RR = 2.0, 95% CI = undefined) and wedding cake (RR = 2.4, 95% CI = 1.2-4.8), were most strongly associated with illness. *Staphylococcus aureus* isolated from leftover barbecue pork and six patient specimens were indistinguishable by PFGE; food purchased from the grocery store was not tested. The LHD identified several food safety issues with the smoker from a local grocery chain and the storage methods of an individual who prepared food for the reception.

Conclusions: Findings strongly suggested that this outbreak was caused by *S. aureus* toxin in barbeque pork. Contamination most likely occurred because of improper at-home food handling. The LHD made recommendations for food safety, including a review of guidelines for food handling and storage to the grocery store chain employees and the individual who prepared the final food product at home.

Same Caterer, Different Names: A Multi-District Foodborne Norovirus Outbreak

Presenter: Okey Utah, MBBS, MPH, District Epidemiologist, Richmond City Health District

Background: On February 3, 2017, Richmond City Health District (RCHD) received notification that several persons developed gastrointestinal illness (GI) after consuming boxed lunches catered by a Richmond City facility. RCHD initiated a public health investigation to identify the cause and risk factors associated with illness and to prevent additional illness.

Methods: RCHD staff conducted an onsite visit, interviewed foodhandlers and collected specimens from five workers. The Division of Consolidated Laboratory Services (DCLS) tested the specimens for norovirus by PCR. Central region epidemiologists supported the laboratory and epidemiologic investigation. RCHD collected information from the facility regarding all orders placed in a four- day period, including the date of the initial complaint.

Results: Between January 31 and February 3, the facility filled 28 orders, for approximately 600 patrons, across multiple districts and under different company names. Of the 28 orders, no illness was reported from 9 of the groups. Nineteen (68%) orders resulted in GI outbreaks. Of these 19 orders, attack rates ranged from 17% to 100%, with at least 37% (7/19) resulting in attack rates greater than 65%. Among a subset of 502 patrons, 145 (29%) reported norovirus-like GI approximately 24 hours following consumption. RCHD Environmental Health team identified several violations upon inspection, although foodhandlers did not respond to the survey about food consumption while at work. Priority violations included lack of employee health policy, improper food holding temperatures, lack of supplies at handwashing sink, overall poor hygiene at worksite, and non-sanitizing dishwasher. The facility voluntarily closed for one week. DCLS detected norovirus GII RNA in stool specimens from 5/8 (three symptomatic and two asymptomatic) employees and two patrons.

Conclusion: The investigation findings suggest food was probably contaminated with norovirus by a foodhandler who returned to work while still shedding the virus. The different dates of onset of illness amongst the employees and the close proximity in which they worked suggest secondary transmission may have occurred at the workplace. Food as a vehicle for transmission within the work environment cannot be ruled out. The investigation underscores how widespread norovirus can be transmitted from a single facility.

Do We Have Enough Staph? A Look at Recreation Center Cleaning Policies and an On-Campus MRSA Cluster

Presenter: Laura R. Young, MPH, CIC, District Epidemiologist, Henrico Health District

Background: In December 2016, Henrico Health Department (HHD) was notified by a local university student health center (SHC) of a cluster of six female undergraduate students who had developed cellulitis of the axillary area within approximately one week of each other.

Methods: Initial investigative steps were to interview the identified students about possible exposures and to forward isolates for PFGE testing through the Division of Consolidated Laboratory Services (DCLS). The SHC, university, and HHD worked together to identify possible exposures. Increased surveillance was put in place at the SHC. Strong existing relationships with the SHC facilitated meetings with the recreation center facility that the case-patients identified as a specific common exposure. Observations and bioburden testing were performed to provide the facility with environmental cleaning guidance.

Results: Nine cases over four weeks were identified with cellulitis of the axillary region. Of the four ill persons who agreed to testing, all four cultured positive for MRSA. Three isolates were forwarded to DCLS for PFGE testing and all three isolates were indistinguishable. Observations and bioburden testing at the recreation center revealed many areas for improvement. Meetings with administrators for the recreation center highlighted a need for a revised cleaning schedule and an assessment of staff training and cleaning duty assignments.

Conclusions: The identification of cases of MRSA and cellulitis are not unusual for a campus or community setting. Strong relationships with the SHC allowed for further investigation and for guidance and recommendations to be shared with the recreation center, where there is significant potential for bacterial exposure. Although the recreation center was not implicated as the cause of the cluster, the investigation led to a thorough evaluation of staffing, cleaning schedules, cleaning product selection and placement, as well as staff training. The university reacted responsibly and proactively to the recommendations.

Fighting the Resistance: The War Against *Acinetobacter baumannii*

Presenter: Melissa M. Arons, MPH, RN, District Epidemiologist, Alexandria Health District

Background: In November 2016, the Alexandria Health Department (AHD) conducted an investigation of an outbreak of infections with Multi-Drug Resistant (MDR) *Acinetobacter baumannii* at a Long-Term Care Facility (LTCF). The affected facility is a 300+ bed community, comprised of multiple units, including a ventilator unit, skilled rehabilitation, and memory care unit.

Methods: Two site visits were conducted, which included touring the facility, observing wound care, respiratory care, and environmental cleaning, as well as reviewing environmental services and hygiene practices. Medical records were abstracted using a standardized form, and a line list, epidemic curve, and map of case locations within the facility were created.

Results: A total of five cases of MDR *Acinetobacter baumannii* infections were identified during the outbreak investigation, including three in females and two in males, with ill persons ranging in age from 61 to 95 years. Positive specimen sources included three wound and two respiratory specimens. Although admissions overlapped for the case-patients, no association was found between shared patient care staff or proximity of patient rooms. A specific source of transmission was not identified, but case-patients had multiple risk factors for infection, including: wounds, frequent hospital admissions, and treatment with multiple antibiotics. Inadequacies in implementing enhanced environmental cleaning were also identified.

Conclusions: Though a specific route of transmission was not identified, recommendations for proper methods of environmental cleaning that help prevent further pathogen transmission were made. Good inter- and intra-facility communication regarding the occurrence of unusual illnesses can help provide early awareness and response. Furthermore, this outbreak highlights the importance of Antibiotic Stewardship Programs to prevent drug-resistant organisms in LTCFs.

***mcr-1* in my Gene Pool? Two Epidemiologic Investigations into Resistance to an Antibiotic of Last Resort**

Presenter: Ana Colón, MPH, Eastern Regional Epidemiologist, VDH Division of Surveillance and Investigation (DSI**)**

Background: In May 2016, the presence of *mcr-1* was reported in the United States. *mcr* -1 is a gene that can make bacteria resistant to colistin, an antibiotic that is the last resort drug for some multidrug-resistant infections. The Centers for Disease Control and Prevention (CDC) identified isolates with this gene from two residents of the Eastern Region in Virginia through the National Antimicrobial Resistance Monitoring System (NARMS).

Methods: Two epidemiologic case investigations were conducted: one required identifying and screening a close contact to determine whether the bacteria with the *mcr* -1 gene had spread; the other involved assessing the risk of a potential healthcare-associated infection (HAI).

Results: One case was an *E. coli* positive culture from a surveillance swab while the second case was a *S.* Typhimurium positive culture from a person with clinical symptoms of infection. The latter was only the second *Salmonella* isolate ever to be identified in the U.S. with the *mcr-1* gene. No risk of transmission was identified within the healthcare facilities. The close contact tested negative and follow up testing conducted for both case-patients confirmed conversion to negative *mcr* -1.

Conclusions: These two investigations highlight the importance of a ring approach to containment when investigating a new public health threat. Both investigations required active involvement of staff from two Virginia health districts, CDC, the Division of Consolidated Laboratory Services (DCLS), and healthcare providers. The interaction between these agencies helped cut across areas of antimicrobial resistance, healthcare-associated infections, enteric infections, and travel-associated infections.

Tuberculosis Bridges Madison County

Presenter: Angela Armstrong, RN, MSN, Public Health Nurse Senior, Rappahannock-Rapidan Health District

Background: In January 2014, the Madison County Health Department (MCHD) in the Rappahannock-Rapidan Health District received a report of a suspect case of *Mycobacterium tuberculosis*. The suspect case-patient was a student at a religious mission institute that was attended by individuals from more than 30 different countries. A contact investigation was initiated by the district with the assistance of the Virginia Department of Health (VDH) Division of Tuberculosis and Newcomer Health (DTBNH) to identify individuals exposed to the suspect case-patient and to provide adequate treatment to those with latent TB infection (LTBI) or TB disease.

Methods: Tuberculin skin tests (TST) and face to face interviews were conducted on all 97 contacts of the suspect case-patient who had also attended the religious mission institute. Social media was employed as a tool to obtain medical records from attendees with suspected TB disease and who were no longer in the United States.

Results: Thirty-three (34%) of the 97 contacts had positive TST results and were sent for chest x-rays. Six had abnormal chest x-rays and were further evaluated. Among the six, four were placed on treatment for active disease. LTBI treatment was recommended for 27 of the contacts, however, only two accepted treatment.

Conclusion: The close collaboration that the MCHD was able to build with institute staff was instrumental in conducting an effective contact investigation. In retrospect, increased consent to LTBI treatment might be achieved by offering treatment immediately after testing. Overall, for the small county of Madison, many bridges were crossed to effectively manage this most challenging investigation.

The Fellowship of the Wellspring: A District's Epic Tale of Multiple Norovirus Outbreaks

Presenter: Jonathan Falk, MPH, District Epidemiologist, Central Shenandoah Health District

Background: On October 14, 2016, the Central Shenandoah Health District (CSHD) received a call regarding cases of nausea, vomiting, and diarrhea associated with an event held at a local venue that previous weekend. By December 7, 2016, five outbreaks were reported from this local venue with the last outbreak occurring on December 3, 2016. The venue is a rustic site that has become a popular destination for celebrating special events.

Methods: CSHD conducted an epidemiologic, environmental health, and laboratory investigation to assess hypotheses of potential foodborne, waterborne, environmental, and person-to-person transmission. A proportion of attendees from only three of the five events could be interviewed. A case-control study was performed for each of these three outbreaks and data were analyzed using Epi Info 7™. RT-PCR testing was performed on raw stool specimen submissions by the Division of Consolidated Laboratory Services (DCLS) in Richmond, Virginia. Environmental health staff performed a site visit, and reviewed each caterer's menu and temperature logs to identify potential food safety risks. Water samples were collected at the well head and inside the venue to determine water quality of the private well serving the venue.

Results: The case-control study revealed water as a common risk factor between all three outbreaks in which a study was conducted. For the October 8 event, water had an odds ratio of 2.7 (confidence interval (CI)=1.02-30.33, p=.08). For the November 12 event, water had an odds ratio of 21.8 (CI=4.4-108.6, p<.001). For the December 3 event, water had an odds ratio of 35.6 (CI=8.2-119.9, p<.001). One specimen from each of the events held November 5, November 12, and December 3 was positive by RT-PCR for norovirus G1. Whole genome sequencing was performed on the specimens collected November 12 and December 3. Both specimens were identified to be norovirus G1.3B and were genetically indistinguishable. Initial results shared with the health department on December 5 indicated the presence of total coliform and E. coli in the well water. Additional testing through the DCLS confirmed the presence of total coliform and E. coli in the well water samples collected December 8 from the well head.

Conclusions: The venue installed ultraviolet light and chlorine disinfection systems on December 7 and December 9, respectively. The venue was also brought under the regulation of the VDH Office of Drinking Water and routine testing of their water supply will be performed annually. No further outbreaks have been reported following the installation of the disinfection system. In recent years, there has been a growing trend of repurposing rustic buildings into sites for wedding receptions and other events. These venues may not directly fall under regulatory authority depending on the size and frequency of the events they host. The outbreaks described above highlight the important role of adequate septic systems, safe water, and safe food preparation at venues that may serve hundreds or thousands of people a year. A critical review should be given to policies to determine if these types of venues should be included under state or local regulations.

Hey U, get out of my Water!

Presenter: Louise Lockett, MPH, CIC, District Epidemiologist, Crater Health District

Background: In October 2016, the environmental health manager and epidemiologist from the Crater Health District and the Virginia Department of Health (VDH) Offices of Drinking Water and Epidemiology began investigating an increase in well-water uranium levels observed during water sampling of a well servicing an adult home facility in Dinwiddie, Virginia. This well was classified as a non-community water supply since the population was not at the facility longer than six months; thus, uranium testing was not required.

Methods: Water samples were collected from the well. Urine specimens were collected from facility residents and employees to assess uranium exposure; the facility subsequently switched to using bottled water for all drinking and cooking needs. A second round of urine specimen collection was conducted two months after the switch to bottled water to assess for any change in urine uranium levels. Client records were reviewed to determine length of stay at the facility. Radon assessment of the facility was conducted to determine if radon was leaching up into the facility as a result of uranium decay in the surrounding bedrock.

Results: The first well water sample showed elevated levels of uranium at 35.76µg/L (EPA standard is 30µg/L). The second well water sample collected showed higher levels of uranium than the first, at 43.0µg/L. Of the 34 residents and staff initially tested, 30 showed urine uranium concentrations above the reference level. Of the 28 paired pre- and post-bottled water intervention urine samples, 25 showed a decrease in urine uranium concentrations. Record review showed that twenty-nine of 34 residents had been at the facility for more than 6 months at the time of data collection (range 1 to 73 months), and all attended other day-support facilities. No associations between initial elevated urine uranium level or positive percent change and day-support facility were observed. Radon assessment detected 15 of 19 rooms with radon levels above the EPA action level of 4 picocuries/liter (pCi/L), with the range from 2.3 – 6.3 picocuries/liter. Post mitigation radon testing conducted at facility showed all rooms tested below EPA action level of 4 picocuries/liter (pCi/L), ranging from 1.1-2.3 pCi/L.

Conclusions: A decrease in urine uranium concentrations was observed following the facility's switch to bottled water, indicating that the well water was a source of uranium exposure. The three residents with increases in urine uranium levels following the bottled water intervention refused re-testing, and an explanation for this increase could not be determined. Although the facility was initially designated as a non-community water supply, the investigation revealed that residents were remaining at the facility for longer than six months. The facility's well designation was updated, making the facility responsible for routine testing of uranium and other radionuclides. The facility remains on bottled water and continues to work with Office of Drinking Water to obtain a grant to mitigate the well.

A Species to Recall from Late Summer to Fall, *Alexandrium monilatum*, a Harmful Algal Bloom Coming to a Coastal Waterbody Near You

Presenter: Margaret Smigo, Waterborne Hazards Program Coordinator, Division of Environmental Epidemiology, Virginia Department of Health

Background: In August 2016, the Virginia Department of Health (VDH) investigated three reports of skin irritation by Virginia Harmful Algal Bloom Task Force staff. Effects were experienced while collecting *Alexandrium monilatum* algal samples in the York and James Rivers. Beginning in the late 2000's, the organism was identified in Virginia's lower-tidal rivers and Chesapeake Bay. *A. monilatum* is a bioluminescent marine alga causing annual red-tides from summer through fall. *A. monilatum's* toxin, goniodomin-A (GDA), can be lethal to fish and shellfish, however, its human health effects are not well-known.

Methods: Interviews of the three 2016 complainants were conducted utilizing the newly-released CDC One Health Harmful Algal Bloom System (OHHABS) form. Shellfish specimens were collected from dense bloom areas and analyzed using enzyme-linked immunosorbent assay (ELISA) and liquid chromatography- mass spectrometry (LC/MS) for saxitoxin, which is produced by most *Alexandrium* species.

Results: Interviews indicated bare-hand sample collection resulted in onset of skin irritation within a minute of exposure; symptoms subsided after rinsing exposed skin with fresh water. All exposures occurred in areas with dense bloom conditions. Staff revealed similar exposures occurred in 2012, in both field and laboratory settings. One 2012 exposure may have potentially resulted in the complainant's respiratory and neurological effects lasting several months. All shellfish specimens analyzed for saxitoxins were negative.

Conclusions: Cases of human health effects have not been documented outside of Virginia. Staff was encouraged to implement the use of personal protective equipment during HAB collections, to immediately rinse exposed areas with fresh water, and to seek medical care if symptoms persist. Exposures and related symptoms should be documented and reported to public health. Messages targeting coastal beach users and watermen will be developed to raise awareness, reduce exposures, and gather information for the CDC OHHABS database.

Syphilis Strikes Back: The Changing Epidemiology of Congenital Syphilis and Early Syphilis in Virginia

Presenter: Nan Haugan, MPH, Epidemiologist, Division of Disease Prevention, Virginia Department of Health

Background: Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum*. Early syphilis (ES) refers to the symptomatic primary and secondary stages of syphilis, as well as asymptomatic early latent syphilis, and represents the most critical period for public health intervention. Serious complications may occur if syphilis goes untreated, including vertical transmission of congenital syphilis (CS) from mother to infant.

Methods: Statewide ES and CS data were assessed weekly to identify trends and inform intervention activities.

Results: ES diagnoses in Virginia increased 55.8% from 2014 (n=566) to 2015 (n=882) and continued to increase through 2016 (n=970, preliminary). ES diagnoses in women increased 43.7% from 2015 (n=87) to 2016 (n=125, preliminary), and the proportion of ES cases that were diagnosed in women increased from 9.9% in 2015 to 13.0% in 2016, and, to date, 16.9% in 2017. From May 2016 – April 2017, eight infants were born or stillborn with CS, a ten-year high in Virginia (2006-2015: average=2 cases per year, range=0-4 cases per year).

Conclusions: Because CS is preventable with regular prenatal care, each case is considered a sentinel event. Missed opportunities for intervention may occur at any point throughout the pregnancy. Although men continue to comprise the largest proportion of ES cases, there has been a concerning recent increase among women of reproductive age. Partner services for men who have sex with women are an opportunity to provide testing and preventive treatment to women of reproductive age who have been exposed to syphilis. Communities in which syphilis morbidity among women is high, or where early and sufficient prenatal care is less common, may be at high risk for CS.

A Tale of Two Outbreaks: Hepatitis A in the Central Shenandoah Health District, 2016

Presenter: Laura Kornegay, MD, MPH, Health Director, Central Shenandoah Health District

Background: By mid-summer 2016, the Central Shenandoah Health District (CSHD) had identified 15 cases of Hepatitis A virus (HAV) infection in and around Augusta County. This represented a five-fold increase compared to 2015. CSHD initiated an outbreak investigation to identify risk factors for transmission and implement control measures to stop the spread of illness.

Methods: CSHD developed a supplemental HAV questionnaire to use when interviewing cases, in order to capture additional risk factors not included on the standard Virginia Department of Health (VDH) case report form. A line list was created to track case information. Data were analyzed spatially by mapping case locations as well as temporally using an epidemic curve. Contact tracing was done to identify links between cases as well as identify any contacts in need of prophylaxis. Hepatitis A vaccine clinics were held in the affected community to decrease ongoing transmission. Available clinical samples were forwarded from clinical laboratories to the Division of Consolidated Laboratory Services and then to CDC's Division of Viral Hepatitis laboratory for genotypic testing.

Results: CSHD identified 26 cases of HAV infection in 2016. Fifteen of the cases were linked to a small town (population 925), and at least four cases reported methamphetamine and other (illicit) drug use. Molecular subtyping and epidemiologic investigation revealed that one case in the CSHD was not part of the local outbreak but was associated with a concurrent HAV outbreak associated with imported frozen strawberries served at a national smoothie restaurant chain. A total of six outreach clinics were conducted between August 3 and August 31, and 145 doses of Hepatitis A vaccine were administered.

Conclusion: CSHD experienced an outbreak of Hepatitis A that was limited to a small geographic region and associated with illicit drug use which occurred during the same time period as a statewide outbreak of Hepatitis A related to smoothies. Public messaging was complicated by concern for patient privacy due to the small number of cases, as well as the stigma of illicit drug use. These factors likely impacted the ability to reach the key target population for vaccination efforts. However, the education and vaccination efforts may have impacted the reduction of ongoing transmission of HAV in the community

The Headache You do Not Want in Schoolchildren: Meningococcal Disease in Minors is a Major Problem

Presenter: Karen Shelton MD, FACOG, Health Director, Mount Rogers Health District

Background: Within two days in March 2017, Mount Rogers Health District (MRHD) received reports of three possible cases of bacterial meningitis among children attending the same elementary school. MRHD initiated an outbreak investigation to identify the scope of the outbreak and prevent further spread of illness.

Methods: MRHD investigated the patients and their close contacts for the ten days before illness onset. MRHD staff coordinated with in-state and out-of-state hospitals, laboratorians, physicians and health departments to confirm diagnoses and ensure appropriate chemoprophylaxis administration, and coordinated with school administration throughout the investigation. MRHD staff also consulted with the Office of Epidemiology and CDC to ensure appropriate specimen testing. MRHD staff utilized contacts in the healthcare community, schools, and media to keep the public informed. School personnel, medical providers and MRHD staff conducted enhanced surveillance for two weeks after the last case was identified.

Results: Three students who attended the same school and rode the same bus were diagnosed with meningococcal disease. Two were siblings, one in kindergarten and one in third grade, and the third was a third grade classmate. Isolates from both siblings were confirmed as *Neisseria meningitidis*, serogroup B. The classmate was classified as a suspected case based on clinically compatible symptoms but no confirmatory lab evidence. All three children received antibiotics before specimen collection, which might have affected organism recovery for the third case. Chemoprophylaxis was recommended for 141 contacts and enhanced surveillance did not identify additional cases.

Conclusion: Rapid identification of meningococcal disease cases and administration of prophylaxis might have reduced the number of additional cases. This investigation highlights the importance of timely coordination and collaboration among local, state and national partners including public health, medical and education communities, and the media.

Strawberries Wreak HAVoc on Summer: A Multistate Outbreak of Hepatitis A Associated with Imported Frozen Strawberries

Presenter: Seth Levine, MPH, Epidemiology Program Manager, Division of Surveillance and Investigation, Virginia Department of Health

Background: In July 2016, three hepatitis A virus (HAV) cases were reported to the Virginia Department of Health (VDH); all were residents of the central region of Virginia. One of the HAV case-patients voluntarily provided credit card statements to assist in gathering exposure history; upon review, a VDH epidemiologist identified multiple visits to a national restaurant chain (NRC) serving smoothies. The other two patients were re-interviewed, and one reported smoothie consumption at the same NRC. This information prompted further epidemiologic and environmental investigation.

Methods: HAV cases reported to VDH since May 1, 2016 that did not have a known source of infection were re-interviewed with a supplemental questionnaire assessing exposure to the NRC. New HAV cases that were reported to VDH were also specifically probed on exposure to the NRC. Environmental Health Specialists (EHS) visited selected locations of the NRC reported by HAV cases to conduct inspections and to collect available product for testing by the U.S. Food and Drug Administration (FDA). All available HAV positive patient specimens were forwarded from clinical laboratories to the Division of Consolidated Laboratory Services and then to CDC's Division of Viral Hepatitis laboratory for genotypic testing. The Virginia Rapid Response Team (RRT) was activated to provide for a coordinated response between multiple state and federal offices and agencies.

Results: A total of 110 Virginia residents were identified as part of the outbreak, including two cases resulting from secondary transmission. Seventy-seven of 87 clinical samples that were available were identified as HAV genotype 1B. Ninety-six patients recalled specific smoothies consumed, and 100% of these individuals reported consuming smoothies containing frozen strawberries. Product labeling of strawberries was inconsistent, and product distribution information reported by the manufacturer changed several times, slowing traceback efforts. VDH issued a press release warning of increased HAV risk on August 19, 2016 and recommended HAV post-exposure prophylaxis for those exposed. FDA traceback revealed frozen strawberries were imported by a single company. Product collected by FDA and VDH was tested at an FDA laboratory, and HAV was detected in six frozen strawberry samples. On October 25, 2016, the importer recalled all frozen strawberries imported from an Egyptian producer since January 1, 2016.

Conclusion: An outbreak of HAV related to imported, frozen strawberries was identified in Virginia. Rapid investigation of HAV cases by local health departments and identification of a strong hypothesis jump-started the investigation and likely prevented many additional HAV cases in Virginia. Virginia's RRT facilitated rapid communication among partner agencies.

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Each year, one speaker who presented at the Field Epidemiology Seminar is selected to receive the Grayson B. Miller award. The award is named in honor of a fellow epidemiologist, mentor, and friend.

Grayson B. Miller, Jr., M.D.

Dr. Miller received his undergraduate degree from Duke University in North Carolina and his medical degree from the Medical College of Virginia. He completed a residency in internal medicine and a fellowship in infectious diseases at MCV, becoming certified in both. He was an officer with CDC's Epidemic Intelligence Service from 1974-1976, stationed at the Pennsylvania Health Department.

He served as the State Epidemiologist for Virginia from 1977-1997. He was the director of the Crater Health District from 1997-2002. After his retirement in 2002, he came back into the VDH central office as a part-time medical consultant with Emergency Preparedness and Response, the Office of Epidemiology and Community Health Services until he decided to fully retire in 2006.

Dr. Miller set an example for the epidemiologists who followed him, teaching us how to focus on using the proper scientific methods while also understanding the practical realities of the context of the situations. He taught by example, demonstrating the importance of working collaboratively and with a sense of humor. He still lives in Richmond and, along with his wife, Nancy, has enjoyed many travel adventures during his retirement.