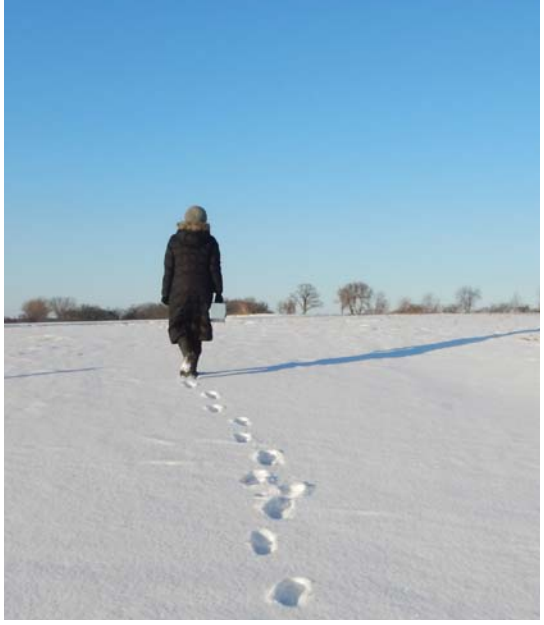


65TH EIS Conference

MAY 2-5, 2016

Data for Action

Centers for Disease Control and Prevention

CS262316

65th Annual Epidemic Intelligence Service (EIS) Conference

May 2–5, 2016

Agenda-at-a-Glance

Monday

- **WELCOME AND CALL TO ORDER** 8:15–8:30
- **SESSION A:** Stephen B. Thacker Opening Session 8:30–10:15
- **SESSION B:** J. Virgil Peavy Memorial Award Finalists 10:45–12:10
- **LUNCH/SPECIAL SESSION 1:** Zika Virus Infection 12:15–1:15
- **POSTER SYMPOSIUM I** 1:30–2:45
- **CONCURRENT SESSION C1:** Foodborne Outbreaks 3:00–4:45
- **CONCURRENT SESSION C2:** Influenza 3:00–4:45
- **EIS CONFERENCE SOCIAL** 4:45
- **EIS Alumni Association Meeting** 5:15–7:00

Tuesday

- **CONCURRENT SESSION D1:** Tuberculosis 8:30–9:55
- **CONCURRENT SESSION D2:** Environmental Health 8:30–9:55
- **SESSION E:** Donald C. Mackel Award Finalists 10:15–12:00
- **LUNCH/SPECIAL SESSION 2:** Using Advanced Molecular Tools to Direct Public Health Action 12:05–1:05
- **LUNCH/SPECIAL SESSION 3:** Data for Community Action: Nation's Noninfectious Disease Epidemic 12:05–1:05
- **CONCURRENT SESSION F1:** Vectorborne Diseases 1:25–3:30
- **CONCURRENT SESSION F2:** HIV and STD 1:25–3:30
- **POSTER SYMPOSIUM II** 3:45–5:00
- **PREDICTION RUN** 6:00
- **SESSION G:** FETP International Night (Poster Presentations) 6:00–10:00

Wednesday

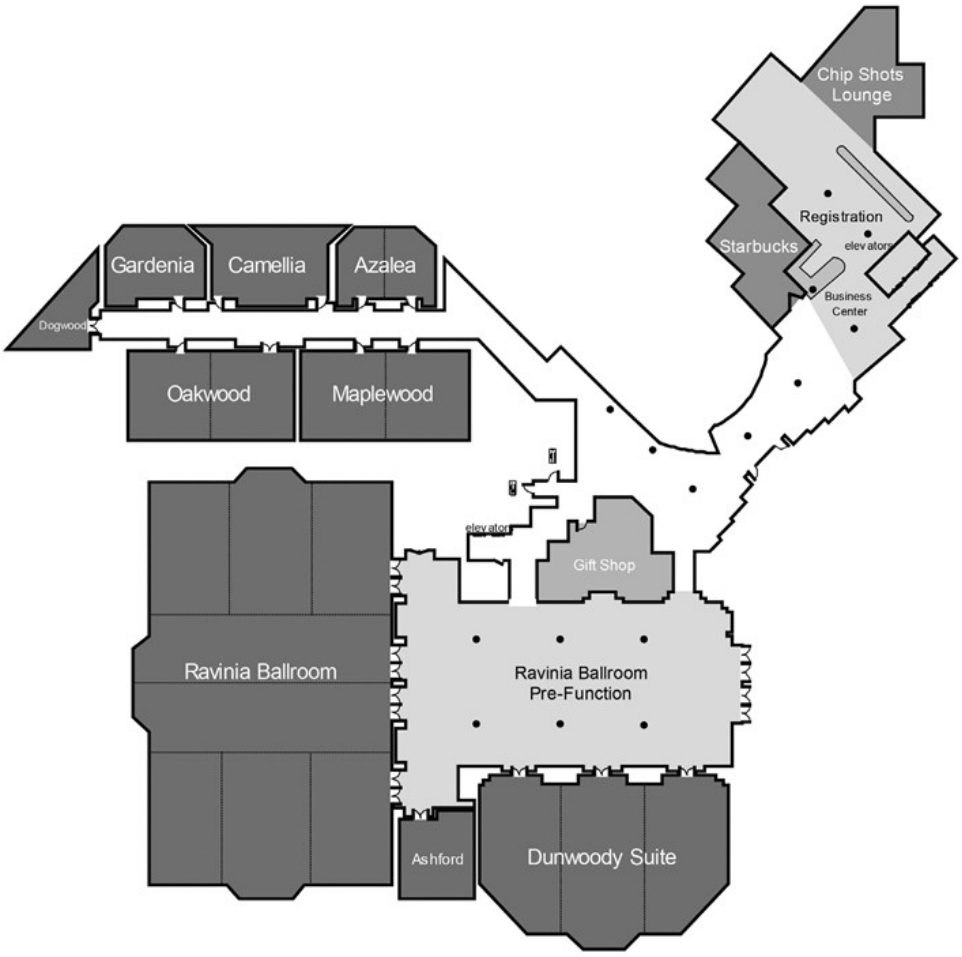
- **CONCURRENT SESSION H1:** Zoonotic Diseases 8:30–10:15
- **CONCURRENT SESSION H2:** Occupational Health and Safety 8:30–10:15
- **CONCURRENT SESSION I1:** Injury 10:35–12:00
- **CONCURRENT SESSION I2:** Malaria 10:35–12:00
- **LUNCH/SPECIAL SESSION 4:** E-Cigarette Advertising: Enticing Another Generation of Youth into Nicotine Addiction 12:05–1:20
- **LUNCH/SPECIAL SESSION 5:** Frontline Field Epidemiology Training Program 12:05–1:20
- **CONCURRENT SESSION J1:** Emerging Infections 1:20–3:05
- **CONCURRENT SESSION J2:** Child Health 1:20–3:05
- **CONCURRENT SESSION K1:** Global Health 3:20–5:05
- **CONCURRENT SESSION K2:** Healthcare-Associated Outbreaks 3:20–5:05
- **SESSION L:** FETP International Night (Oral Presentations) 6:30–10:00

Thursday

- **CONCURRENT SESSION M1:** Drug-Related Illness 8:30–9:55
- **CONCURRENT SESSION M2:** Enteric Diseases 8:30–9:55
- **SESSION N:** Alexander D. Langmuir Lecture 10:15–11:45
- **LUNCH/SPECIAL SESSION 6:** Global Rapid Response Team – An Agency-Wide Approach 12:00–1:30
- **LUNCH/SPECIAL SESSION 7:** Laboratory Leadership Service (LLS) – A Partner Program of EIS 12:00–1:30
- **CONCURRENT SESSION O1:** Vaccine-Preventable Diseases 1:30–3:15
- **CONCURRENT SESSION O2:** Chronic Diseases 1:30–3:15
- **SESSION P:** Awards and Late-Breaking Reports 3:30–5:10
- **CLOSING REMARKS** 5:10–5:20
- **POSTCONFERENCE EIS SATIRICAL REVIEW** 7:30

Awards presented during session.

Crown Plaza Atlanta Perimeter at Ravinia
Ballroom Floor Plan



Name Tags Color Key

- EIS Alumni
- Current EIS Officers
- Incoming EIS Officers
- Current LLS Fellows
- Incoming LLS Fellows
- Conference Participants
- Prospective EIS Officers
- Conference Staff
- Field EIS Alumni
- Recruiters
- Media

SAVE THE DATE

66th ANNUAL EIS CONFERENCE

EPIDEMIC INTELLIGENCE SERVICE

April 24–27, 2017

Centers for Disease Control and Prevention
Atlanta, Georgia

Contents

Awards presented during session.

Awards presented during session.

Preface

Dear Colleagues,

Welcome to the 2016 Annual Epidemic Intelligence Service (EIS) Conference. This is the 65th annual conference, and its agenda is as impressive as ever. EIS officers contributed to controlling the international Ebola outbreak while implementing a simultaneous response to a new emerging challenge of Zika virus transmission. Although these topics continue to be highly visible in the public's eye, this year's conference presentations also highlight the steady work of CDC's EIS officers on a day-to-day basis. Notable presentations in the area of communicable diseases include HIV and hepatitis C outbreaks among injection drug users in Indiana, a large botulism outbreak in Ohio, tuberculosis among refugees in California, mucormycosis among organ transplant recipients in Pennsylvania, pneumococcal colonization among unaccompanied children entering Texas, and the EIS and Laboratory Leadership Service (LLS) collaboration regarding the Legionnaires' disease outbreak in New York City. This has also been a landmark year for EIS work in the area of noncommunicable threats, including: methamphetamine overdose deaths in New Mexico, severe illness associated with novel synthetic cannabinoid use in Mississippi, methyl bromide exposures in the U.S. Virgin Islands, geographic and racial disparities in access to park space in the United States, and investigations of violent death among homeless persons in 17 states. Taken together these presentations highlight what I am most proud of — that CDC's EIS officers continue to apply "tried and true" epidemiologic methods to protect our national, and indeed global, populations on a routine basis while simultaneously surging to meet emerging threats in this evolving modern context.

As in prior years, we are featuring special sessions during lunch breaks each day. Of note, the special session of CDC's LLS will showcase the work of the inaugural LLS class. This session will highlight the benefits of laboratory-epidemiology integration in our response activities and LLS evidence-based approaches to further strengthen laboratory safety. The session will also include opening remarks by Dr. Frieden and short, 10-minute moderator presentations by Dr. Stephan Monroe, CDC Associate Director for Laboratory Science and Safety and Dr. Rob Tauxe, Director of the Division of Foodborne, Waterborne, and Environmental Diseases. Other special sessions to attend this week include those concerning the CDC Global Rapid Response Teams — an Agency-Wide Approach, E-Cigarette Advertising: Enticing Another Generation of Youth into Nicotine Addiction, the Frontline Field Epidemiology Training Program, Using Advanced Molecular Tools to Direct Public Health Action, and Data for Community Action: Nation's Chronic Disease Epidemic. The choices are difficult as all of the sessions will be wonderful.

Please also do attend our Thursday Alexander D. Langmuir Lecture by Dr. Peggy Hamburg, the former Commissioner of the U.S. Food and Drug Administration, titled From Antibiotic Resistance to Zika: Reflections on Working at the Intersection of Science and Public Health Politics.

I indicated to you at this time last year that we would work to preserve the core components that have made the EIS program the premier field epidemiology training program in the world and to simultaneously gather additional input from our officers and *you* — our supervisors, stakeholders, and esteemed alumni — to further strengthen an already great program. This is indeed what we are doing. Critical to this process was the guidance of the EIS Action Council (EAC), our regularly assembled group of advisors representing all parts of CDC, and the state and local field sites.

In coordination with the EAC this year the EIS program

- reviewed EIS eligibility criteria and class selection procedures, with feedback from our Centers, Institutes, and Offices (CIOs) and field representatives for each selection step;
- strengthened the bond between CDC- and field-based EIS officers and states by reinstituting annual regional trainings, and the in-person second year fall course;
- established field and CIO coordinator positions to support and further standardize training and supervision of our CDC- and field-based officers, respectively;

- adapted our training curricula to meet emerging public health priorities such as integrating new Global Rapid Response Training into our first year fall course;
- integrated our EIS rapid response rostering into broader CDC response initiatives, and integrating critical predeployment trainings into EIS summer course;
- implemented new recruitment activities at multiple locations in the United States with support from the EIS Alumni Association; and
- continued to weave data for decision making into the internal fabric of our calendar of annual activities to keep our program well matched to current public health workforce needs.

The EIS program also joined the first group of global Field Epidemiology Training Programs to be accredited by the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) this year. This places us in the position to share best practices with our global partners, whose work will be on display during the International Night sessions this week. Much more about accomplishments of EIS officers during the past year can be found in the Annual EIS Update, which is included with your conference materials.

The 2016 EIS class is as skilled and well adapted to the current needs of CDC and our state, local, and global partners, as any in the past. The new class includes 37 physicians, 2 nurses, 10 veterinarians, and 30 doctoral scientists. A total of 7 non-U.S. citizens (from Germany, Japan, Kenya, Rwanda, Taiwan, and 2 from the United Kingdom) are included. Acceptance into the class was highly selective as always (79 officers selected from 564 applicants). The 8 incoming LLS officers join the program from different backgrounds ranging from academia to governmental agencies, including 1 from NIH and 4 from CDC. These fellows were successfully matched to CDC host laboratories, including 7 in CDC Atlanta and 1 in CDC Ft. Collins.

Our operational and scientific staff in the Epidemiology Workforce Branch were responsible for the strategic direction and implementation of the activities described above, and in your EIS Program Update. None of this would happen without them. Please seek us out with any comments or questions that you might have — they are most welcomed! Together we will continue to train our future epidemiologists and leaders while protecting our population, and the Global Community, for years to come.

CAPT Joshua A. Mott, EIS '98
Chief, EIS Program
DSEPD, CSELS, CDC
United States Public Health Service
"Supposing is good, but finding out is better."
— Mark Twain

EIS Alumni Association

The EIS Alumni Association (EISAA) represents more than 3,000 alumni working on the front lines of public health at local, state, federal, and global levels. The association was established in the 1960s by a group of alumni interested in fostering a sense of loyalty to the EIS program through various activities, including sponsoring multiple prestigious awards, hosting alumni networking events, and carrying-on treasured EIS traditions throughout conference week.

EISAA supports the ***Alexander D. Langmuir Prize,*** named in honor of the beloved founder of the EIS Program and awarded to an outstanding manuscript completed during EIS; the ***Distinguished Friend of EIS Award*** honoring a person who has provided exceptional mentoring and support to EIS Officers; the ***Donald C. Mackel Memorial Award*** recognizing the EIS investigation that best exemplifies collaborative work between epidemiology and laboratory science; the ***J. Virgil Peavy Memorial Award*** named in honor of a distinguished CDC statistician and EIS mentor and recognizing the investigation that most effectively uses innovative statistics and epidemiologic methods; and the ***EIS Champion Award*** initiated in 2013 in honor of ***Dr. Steven B. Thacker***, an inspirational leader who championed the EIS Program and its officers throughout his career. Each year, EISAA also provides competitive travel scholarships for prospective applicants to attend the EIS Conference through the ***David J. Sencer Scholarship Award.*** This year, EISAA had the pleasure of receiving 34 applications and awarding 8 travel scholarships. EISAA also supports EIS Conference events such as the ***Prediction Run*** and ***Skit Night***.

This year, we are grateful to the de Beaumont Foundation for a grant received to help strengthen EISAA and mobilize our alumni base. Their support is allowing us to launch a **new, user-friendly website** (www.eisalumni.org) and alumni portal that will allow EIS alumni, officers, and potential recruits to find each other and connect on the basis of geographic location or interest. The interactive database and improved communication infrastructure will provide a platform for alumni to network and advocate for important public health problems and events. The grant will also allow EISAA to **mobilize broader recruitment support** for the EIS program by assisting with the development of new recruitment materials, sponsoring regional recruitment events, and utilizing our diverse alumni pool to speak at local residencies, academic institutions, and national conferences.

If you haven't already made a contribution to EISAA this year, please consider doing so TODAY! Your support can help your EIS class achieve victory in our competitive class competition. Here's how you can get involved:

- **Join Now!** Renew your membership or make a contribution online (www.eisalumni.org) or at the EISAA table.
- **Stay Connected!** Log-on to our new website (www.eisalumni.org) and update your contact information and alumni profile.
- **Learn More!** Join us at our Annual meeting on Monday, May 2 at 5:15 p.m. in Dunwoody Suite and stop by the EISAA table in the reception area just outside the main Ravinia ballroom.

EISAA is driven by an important purpose — to bring alumni and friends together to connect professionally and personally. We hope you will join us in building our alumni community and supporting the premier public health training program in the world!

Sincerely,

Neil Gupta, MD, MPH
President, EIS Alumni Association, EIS '10

Diana Robelotto
Director of Alumni Affairs/EISAA Liaison, CDC Foundation

Scientific Program Committee

Co-Chair, Tracie Gardner, Center for Surveillance, Epidemiology and Laboratory Services
Co-Chair, Matthew Wise, National Center for Emerging and Zoonotic Infectious Disease

Center for Global Health ..... Fred Angulo
National Center on Birth Defects and Developmental Disabilities ..... Cheryl Broussard
National Center for Chronic Disease Prevention and Health Promotion ..... Italia Rolle
National Center for Emerging and Zoonotic Infectious Disease ..... Brett Petersen and Isaac See
National Center for Environmental Health/Agency for Toxic Substances and Disease Registry ..... Suzanne Beavers
National Center for Health Statistics ..... Lara Akinbami
National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention ..... Anne Marie France
National Center for Immunization and Respiratory Diseases ..... Michael Jhung
National Center for Injury Prevention and Control ..... Katherine Fowler
National Institute for Occupational Safety and Health ..... Cammie Chaumont Menendez
Center for Surveillance, Epidemiology and Laboratory Services ..... Michael King and Jennifer Wright

Front row, left to right:
Anne Marie France, Suzanne Beavers, Katherine Fowler, Isaac See, Italia Rolle

Back row, left to right:
Michael King, Fred Angulo, Brett Petersen, Michael Jhung, Cammie Chaumont Menendez, Matthew Wise, Jennifer Wright, Cheryl Broussard, Lara Akinbami, Tracie Gardner

General Information

Program Production

Twanda Broughton, Anthony Jordan, Ina Jee, Tracy Whang, M. Paul Reid, On Par Productions.

Acknowledgments/Disclaimers

The EIS Program extends a special thank you to the EIS Alumni Association and the Council of State and Territorial Epidemiologists for their generous support of the 65th Annual EIS Conference. The EIS Program gratefully acknowledges the valuable assistance and cooperation of the editorial and support staff of all CDC administrative units participating in the EIS Conference.

Abstracts in this publication were edited and officially cleared by the respective national centers. Therefore, the EIS Program is not responsible for the content, internal consistency, or editorial quality of this material. Use of trade names throughout this publication is for identification only and does not imply endorsement by the U.S. Public Health Service or the U.S. Department of Health and Human Services.

The findings and conclusions in these reports are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Purpose Statement

The primary purpose of the EIS Conference is to provide a forum for EIS officers to give scientific presentations (oral or poster), increase their knowledge of recent investigations and the significance to public health, and maintain and increase their skills in determining the appropriateness of epidemiologic methods, presenting and interpreting results clearly, and developing appropriate conclusions and recommendations.

Overall Conference Goals

- To provide a forum for EIS officers, alumni, and other public health professionals to engage in the scientific exchange of current epidemiologic topics.
- To highlight the breadth of epidemiologic investigations at CDC.
- To provide a venue for recruitment of EIS graduates into leadership positions at CDC and state and local departments of health.

Registration and Information

Staff are available at the conference registration desk. Check-in and onsite registration are available Monday–Wednesday, 7:30 am–5:00 pm. Please wear your conference badge at all times during the conference. Conference staff are wearing purple badges and are available to assist if you need additional information or misplace your badge.

Cyber Café/Message Center

To facilitate conference networking, computers with Internet access are located in the Camellia Room. Preregistered attendees have immediate access to find, communicate, and network with other conference participants, speakers and staff. You can also upload a picture of yourself to facilitate easy identification. Please see conference staff for assistance if you have any questions about the system. Please limit computer time to 10 minutes per session to allow other conference attendees an opportunity to use the system as well. The Cyber Café will be open Monday–Wednesday, 8:00 am–5:30 pm and Thursday from 8:00 am–3:00 pm.

Environmental Considerations

Smoking is not permitted in any of the conference sessions, hallways, or meeting rooms. As a courtesy to presenters and all meeting attendees, please mute cellular phones during conference sessions. Please limit use of cellular phones to public areas outside the meeting rooms.

Lactation Room

Please visit the EIS information table near the registration area to sign up for lactation room access. A schedule and key will be available at the table Monday–Thursday, 8:00 am–5:00 pm.

Instructions for Completing Online Conference Evaluations

April 2016 Course Evaluation

Continuing education credit for this conference is available through the CDC Training and Continuing Education Online system only. Please follow the instructions provided on this page. You must complete the online evaluation by May 31, 2016, to receive your continuing education credits or your certificate of completion.

To complete online evaluation

Go to the CDC Training and Continuing Education Online site at http://www.cdc.gov/tceonline/. If you have not registered as a participant, select **New Participant** to create a user ID and password; otherwise select **Participant Login**.

If you do not remember your login name or need further assistance,

- send an email to ce@cdc.gov;
- send a fax to 404-498-6045; or
- telephone 1-800-41-TRAIN or 404-639-1292 during business hours (Monday–Friday) 8 am–4:00 pm EDT. After hours you may leave a voice message and your call will be returned the next business day.
- After logging on to the CDC/ATSDR Training and Continuing Education Online website, you will be on the Participant Services page. Select **Search and Register**. Select **CDC Courses** at the bottom right side of the page.
- You will be prompted to enter the CDC Center/Course Code. The code for this training is **(EISCONF16).** Enter the course code and then select **View**. Select the course. The course information page will appear. Scroll down to **Register Here**. Select the type of CE credit that you would like to receive and then select **Submit**. Three demographic questions will display. Complete the questions and then select **Submit**.
- A message thanking you for registering for the conference will display. You will then be prompted to select the sessions that you wish to attend.
- After attending your selected conference sessions, return to the CDC Training and Continuing Education Online site. Select **Participant Login** and log onto the site. Select **Evaluations and Tests**, and then select **Conferences**. The conference will be listed with the sessions you selected. You may **Add/Edit Sessions** until you have completed the evaluation for a particular session. After completing all of the session evaluations, you will be prompted to complete the overall conference evaluation. A record of your conference completion will be located in the **Transcript and Certificate** section of your record.

If you have any questions or problems, contact

CDC/ATSDR Training and Continuing Education Online
1-800-41TRAIN or 404-639-1292
Email at: ce@cdc.gov

The printed evaluation form is for tracking purposes only. CE credits will not be issued for completing the printed form.

PLEASE DO NOT HAND IN THE PRINTED VERSION.

65th Annual EIS Conference Schedule

Monday, May 2, 2016

7:00 **Registration Desk Opens**

8:15 **Welcome and Call to Order ..... Ravinia Ballroom**
Moderator: Thomas R. Frieden, Director, Centers for Disease Control and Prevention

8:30 **SESSION A: Stephen B. Thacker Opening Session ..... Ravinia Ballroom**
Moderators: Joshua Mott and Matthew Wise

- **8:35** Phylogenetic Analysis of HIV and Hepatitis C Virus Co-Infection in an HIV Outbreak Among Persons Who Inject Drugs. *Romeo R. Galang*
- **8:55** Investigation of Undetermined Risk Factors for Fentanyl-Related Overdose Deaths — Ohio, 2015. *Erica Spies*
- **9:15** Evaluation of Silica Exposures at a Granite Countertop Fabricator — Texas, 2015. *Kerton Victory*
- **9:35** Pneumococcal Serotype 5 Colonization Prevalence Among Unaccompanied Children One Year After an Outbreak — Texas, 2015. *Miwako Kobayashi*
- **9:55** Men's Health Screening Program: Ebola Survivor Counseling and Behavioral Outcomes — Liberia, 2015. *Lawrence Purpura*

10:15 **BREAK**

10:45 **SESSION B: J. Virgil Peavy Memorial Award Finalists ..... Ravinia Ballroom**
Moderators: Charles Rothwell and Andrea Winquist

- **10:50** Risk Factors for Infection During a Measles Outbreak Among Young Adults After Measles Elimination — Ulaanbaatar, Mongolia, 2015. *José E. Hagan*
- **11:10** Risk for New HIV Diagnosis Among a Cohort of Persons Receiving a Supportive Housing Intervention — New York City, 2006–2012. *Christopher T. Lee*
- **11:30** Giardiasis Diagnosis and Treatment Pattern Analysis Using Insurance Claims Data and a Novel Data Visualization Tool — United States, 2006–2010. *Karlyn D. Beer*
- **11:50** Association Between Surgical Antimicrobial Prophylaxis Regimen and Risk of Mediastinitis Following Coronary Artery Bypass Graft and Valve Surgery. *Cheri Grigg*

12:15–1:15 **LUNCH**

12:15–1:15 **SPECIAL SESSION 1: Zika Virus Infection ..... Ravinia Ballroom**
Sponsors: NCEZID and NCBDDD
Speakers: *Marc Fischer, Erin Staples, Margaret Honein, Denise Jamieson, Harry Savage, John-Paul Mutebi*

1:30–2:45 **POSTER SYMPOSIUM I**
Moderators: Tina Tan and Michael Gronostaj
During the first 30 minutes of the Poster Symposium, the following authors will each give a 2-minute oral presentation at the podium in front of a seated audience in the Ravinia Ballroom. Afterward, the authors will stand with their posters for the remaining session time in the Dunwoody Suite. The audience is encouraged to view the individual posters and engage in direct discussion with the author.

Awards presented during session.

P1.1 Firearm Mortality — Clark County, Nevada, 2009–2013. *Monica Adams*

P1.2 Increased Antiviral Treatment Among Hospitalized Children and Adults with Laboratory-Confirmed Influenza — United States, 2010–2014. *Grace D. Appiah*

P1.3 Increased Cases of Syphilis Among Pregnant Women and Infants — United States, 2012–2014. *Charnetta L. Williams*

P1.4 Cryptosporidiosis Outbreak Associated With a Single Hotel — Tennessee, 2015. *Mary-Margaret A. Fill*

P1.5 Implications of Culture-Independent Testing for Local Enteric Disease Surveillance — San Diego County, 2004–2014. *Jessica M. Healy*

P1.6 Nontuberculous *Mycobacterium* Respiratory Infections — Florida, 2014. *John G. Jordan*

P1.7 Gastroenteritis Outbreak After a Church Potluck — West Virginia, 2015. *Joel Massey*

P1.8 Prevalence of Failure to Floss Among Adults — United States, 2009–2012. *Duong T. Nguyen*

P1.9 *Clostridium perfringens* Illness Associated with a Community Dinner — Nebraska, 2015. *Caitlin Pedati*

P1.10 Reported Cluster of Neuralgic Amyotrophy — North Carolina, May–September 2015. *Jessica Rinsky*

P1.11 Prevalence of Early Diagnosis of Autism Spectrum Disorder and Co-Occurring Conditions Among Children in Five Sites in the United States, 2010. *Gnakub N. Soke*

P1.12 Attitudes Toward Banning the Sale of Tobacco Products in Pharmacy Stores — United States, 2014. *Teresa W. Wang*

2:45 **BREAK**

3:00 **CONCURRENT SESSION C1: Foodborne Outbreaks ..... Ravinia Ballroom**
Moderators: Kirk Smith and Kris Bisgard

3:05 Multidrug-Resistant *Salmonella* Serotype I 4,[5],12:i:- Infections Associated with Pork — Washington State, 2015. *Vance Kawakami*

3:25 *Salmonella* serovar I ,4,{5},12:i:- Outbreak at Restaurant A — Minnesota, 2015. *Pamela Talley*

3:45 Large Outbreak of Botulism Associated with a Church Potluck Meal — Ohio, 2015. *Carolyn L. McCarty*

4:05 *Salmonella* Outbreak Among Patrons of an Upscale Restaurant — Washington, D.C., 2015. *S. Janet Kuramoto-Crawford*

4:25 *Salmonella* Poona Infections Linked to Imported Cucumbers — United States, 2015. *Mark E. Laughlin*

3:00 **CONCURRENT SESSION C2: Influenza ..... Dunwoody Suite**
Moderators: Daniel Jernigan and Michael Jhung

3:05 Influence of Chief Complaint Field Length Concerning Syndromic Surveillance of Influenza-Like Illness — Nebraska, 2015. *Caitlin Pedati*

3:25 Influenza Antiviral Use Among High-Risk Outpatients During Three Recent Influenza Seasons — United States, 2012–2015. *Rebekah S. Schicker*

3:45 Risk Factors for Hospital Admission Following Outpatient Medical Care Among Adults with Influenza — United States, 2011–2015. *Grace D. Appiah*

4:05 Viral and Bacterial Co-Detections in Influenza-Positive Patients Hospitalized with Severe Acute Respiratory Illness — Minnesota, 2013–2015. *Kate E. R. Russell*

4:25 Trivalent Inactivated Influenza Vaccine Efficacy Among Young Children in an Urban Bangladesh. *Melissa A. Rolfes*

4:45 **EIS CONFERENCE SOCIAL (CASH BAR) ..... Ravinia Ballroom Prefunction Area**
Sponsored by the EIS Alumni Association

5:15–7:00 **EIS ALUMNI ASSOCIATION MEETING ..... Dunwoody Suite**

All EIS alumni and second-year EIS officers are invited to attend the EIS Alumni Association (EISAA) Annual Meeting. Talk with other alumni and learn more about EISAA and its activities over food and beverages.

Tuesday, May 3, 2016

8:30 **CONCURRENT SESSION D1: Tuberculosis ..... Ravinia Ballroom**
Moderators: Philip Lobue and Anne Marie France

8:35 Tuberculosis Hotspots: Cluster of Cases with Matching *Mycobacterium tuberculosis* Genotype — Gaborone, Botswana, 2012–2015. *Diya Surie*

8:55 A Comparison of Treatment Response Time Between *Mycobacterium bovis* and *Mycobacterium tuberculosis* Disease. *Colleen Scott*

9:15 Progression to Active Tuberculosis Among Immigrants and Refugees with Abnormal Chest Radiographs Conducted Overseas — California, 1999–2012. *Jacklyn Wong*

9:35 Factors Associated with Poor Outcomes Among Patients with Multidrug-Resistant Tuberculosis — Four U.S. Sites, 2000–2007. *Jorge L. Salinas*

8:30 **CONCURRENT SESSION D2: Environmental Health ..... Dunwoody Suite**
Moderators: Patrick Breysse and Suzanne Beavers

8:35 Relationship Between the Social Vulnerability Index and Hurricane Sandy-Related Mortality — United States, 2012. *Alice Wang*

8:55 Geographic and Racial Disparities in Residential Proximity to Parks — United States, 2010. *Emily N. Ussery*

9:15 Prenatal Exposure to Polychlorinated Biphenyls and Cognitive Development in 15-Month–Old Girls — Bristol, United Kingdom, 1990–present. *Gamola Z. Fortenberry*

9:35 Methyl Bromide Release at a Condominium Resort — United States Virgin Islands, March 2015. *Prathit A. Kulkarni*

9:55 **BREAK**

10:15 **SESSION E: Donald C. Mackel Memorial Award Finalists ..... Ravinia Ballroom**
Moderators: Michael Iademarco and Diana Bensyl

10:20 Influenza-Associated Parotitis — Outbreak During the 2014–15 U.S. Influenza Season. *Melissa A. Rolfes*

10:40 Multidrug-Resistant *Salmonella* serovar I 4,[5],12:i:- Infections Associated with Pork Consumption — Wisconsin, 2015. *Lina I. Elbadawi*

11:00 Meningococcal Carriage Evaluation in Response to a Serogroup B Meningococcal Disease Outbreak and Mass Vaccination Campaign at a College — Rhode Island, 2015. *Heidi M. Soeters*

11:20 Mass Poisoning Associated with a Homebrewed Alcoholic Beverage — Chitima, Tete Province, Mozambique, January 9–12, 2015. *Amelia M. Kasper*

11:40 Legionnaires' Disease Caused by a Cooling Tower — New York City, 2015. *Isaac Benowitz*

12:05–1:25 **LUNCH**

12:05–1:05 **SPECIAL SESSION 2: Using Advanced Molecular Tools to Direct Public Health Action ..... Ravinia Ballroom**
Sponsor: NCHHSTP and NCEZID
Speakers: ***Greg Armstrong, Alexa Oster, Benjamin Silk, Matthew Wise, Scott D. Holmberg***

SPECIAL SESSION 3: Data for Community Action: Nontraditional Epi-Aids in Noninfectious Diseases, Environmental Health, Injury, and Violence ..... Dunwoody Suite
Sponsor: NCCDPHP, NCEH, NCIPC
Speakers: ***Aly Goodman, Seung Hee Lee-Kwan, Yulia Caroll, Arlene Greenspan***

1:25 **CONCURRENT SESSION F1: Vectorborne Diseases ..... Ravinia Ballroom**
Moderators: Steve Waterman and Jennifer Wright

1:30 Knowledge and Use of Prevention Practices for Chikungunya Virus Among Visitors — Virgin Islands National Park, 2015. *Cara C. Cherry*

1:50 Binational Dengue Outbreak Along the United States-Mexico Border — Yuma County, Arizona and Sonora, Mexico, 2014. *Jefferson M. Jones*

2:10 Endocarditis from *Bartonella quintana* in Anchorage, 2012–2014. *Ian D. Plumb*

2:30 Evaluation of a Query for Identifying West Nile Virus Symptoms Using Arizona's BioSense Platform Data — 2015. *Heather Venkat*

2:50 Spotted Fever Group *Rickettsia*, Potential Benefits of One Health Surveillance — Kansas, 2012–2015. *Jessica A. Nadeau*

3:10 Risk Factors for Disseminated Lyme Disease — United States, 2005–2013. *Natalie A. Kwit*

1:25 **CONCURRENT SESSION F2: HIV and STD ..... Dunwoody Suite**
Moderators: Jonathan Mermin and Lawrence Cohen

1:30 Concordance of Sexual Orientation and Sexual Behavior in Sentinel Surveillance of Gonococcal Antimicrobial Resistance — Atlanta, Georgia, 2014. *Alex de Voux*

1:50 Maternal Risk Factors Associated with Delivery of an Infant with Congenital Syphilis — California, 2013–2015. *Hope H. Biswas*

2:10 Human Papillomavirus Vaccine Coverage Among Men Who Have Sex With Men — National HIV Behavioral Surveillance, United States, 2014. *Sara Oliver*

2:30 Assessing Retention in HIV Care Using Laboratory Surveillance Data — Georgia, August 2011–April 2014. *Mary R. Tanner*

2:50 Receipt and Timing of HIV Drug Resistance Testing — 8 U.S. Jurisdictions, 2013. *Sharoda Dasgupta*

3:10 Using HIV Genetic Sequences to Identify Outbreaks and Transmission Patterns: Completeness of HIV Sequence Ascertainment — Maryland, 2011–2013. *Richard B. Brooks*

3:30 **BREAK**

3:45–5:00 **POSTER SYMPOSIUM II**
Moderators: Stephen Redd and Danice Eaton

During the first 30 minutes of the Poster Symposium, the following authors will each give a 2-minute oral presentation at the podium in front of a seated audience in the Ravinia Ballroom. Afterward, the authors will stand with their posters for the remaining session time in the Dunwoody Suite. The audience is encouraged to view the individual posters and engage in direct discussion with the author.

P2.1 Prognostic Indicators for Ebola Virus Disease Survival — Bo District, Sierra Leone, 2014–2015. *Samuel J. Crowe*

P2.2 Differences in Consistent Retention in HIV Care by Race/Ethnicity — 11 U.S. States and the District of Columbia. *Sharoda Dasgupta*

P2.3 Hospital-Associated Mucormycosis Outbreak Among Allogeneic Bone Marrow Transplant Recipients — Colorado, 2015. *Jessica Hancock-Allen*

P2.4 Emergency Department Visits for Cannabis-Related Adverse Events — Oregon, March–October, 2015. *Jonas Z. Hines*

P2.5 Availability and Pricing of Healthier Food and Beverage Options in Restaurants — Guam, 2015. *Elizabeth Lundeen*

P2.6 Community Surveillance of Malaria — Malawi, 2015. *Anna A. Minta*

P2.7 Group A *Streptococcus* Among Residents of a Long-Term–Care Facility — Georgia, 2015. *M. Angela Parham*

P2.8 Survey of Obstetrician-Gynecologists in the United States about Toxocariasis. *Heather N. Paulin*

P2.9 Fatal Flea-Borne Typhus — Texas, 1985–2015. *Emily G. Pieracci*

P2.10 Severe Underreporting of Maternal Death — Cameroon, 2014. *Evelyn R. F. Twentyman*

P2.11 Socioeconomic Determinants of Racial Disparities in Candidemia Incidence Using Geocoded Data from the Emerging Infections Program (EIP), 2008–2014. *Tiffany A. Walker*

P2.12 Evaluation of an Integrated Community-Based Mortality Surveillance System — Kambia District, Sierra Leone, 2015. *Anna Q. Yaffee*

6:00 **PREDICTION RUN ..... Murphey Candler Park**
Sponsored by the EIS Alumni Association
Self-transport to venue; carpooling is encouraged

6:00 **SESSION G: 2016 FETP International Night Poster Presentations ..... Dunwoody Suite**

Wednesday, May 4, 2016

8:30 **CONCURRENT SESSION H1: Zoonotic Diseases ..... Ravinia Ballroom**
Moderators: Casey Barton Behrevesh and Douglas Hamilton

8:35 *Escherichia coli* O157 Infections Linked to Dairy Education Event Attendance — Whatcom County, Washington, 2015. *Kathryn G. Curran*

8:55 *Francisella tularensis* Exposure Among National Park Service Employees — Devils Tower National Monument, Wyoming, 2015. *Alexia Harrist*

9:15 Multistate Outbreaks of *Salmonella* Sandiego and *Salmonella* Poona Infections Linked to Small Turtles — United States, 2015. *Kelly J. Gambino-Shirley*

9:35 Investigation of an Emerging Zoonotic Vaccinia Virus — Colombia, 2015. *Ashley R. Styczynski*

9:55 Q Fever Outbreak Among Travelers to Germany Who Received Live Cell Therapy — United States and Canada, 2014. *Misha P. Robyn*

8:30 **CONCURRENT SESSION H2: Occupational Health and Safety ..... Dunwoody Suite**
Moderators: Margaret Kitt and Cammie Chaumont Menendez

8:35 Health Care Personnel Working While Having Influenza-Like Illness — United States, 2014–15 Influenza Season. *Sophia K. Chiu*

8:55 Cleanliness is Next to Breathlessness: Asthma and Other Health Problems Related to a New Cleaning Product Among Hospital Staff — Pennsylvania, 2015. *Megan L. Casey*

9:15 Occupational Risk Factors Among Cryptosporidiosis Cases — Nebraska, 2010–2014. *Chia-Ping Su*

9:35 Mortality from Amyotrophic Lateral Sclerosis or Parkinson's Disease by Usual Occupation — National Occupational Mortality Surveillance, United States, 1985–2010. *John D. Beard*

9:55 Severe and Highly Fatal Outbreak of Histoplasmosis Among Tunnel Workers — Dominican Republic, 2015. *Paige A. Armstrong*

10:15 **BREAK**

10:35 **CONCURRENT SESSION I1: Injury ..... Ravinia Ballroom**
Moderators: James Mercy and Katherine Fowler

10:40 Adverse Childhood Experiences and HIV Sexual Risk-Taking Behaviors Among Young Adults in Malawi. *Kristin Vanderende*

11:00 Risk Factors of Unsafe Behaviors Among Populations Exposed to Explosive Devices: Results of a Household Assessment of Knowledge, Attitudes and Practices — Colombia, 2012. *Andrew T. Boyd*

11:20 Getting too Close to Wildlife: Risk Factors Associated with Injury from Bison Encounters — Yellowstone National Park, 2000–2015. *Cara C. Cherry*

11:40 Violent Death Among the Homeless — National Violent Death Reporting System, 17 states, 2005–2013. *Amanda G. Garcia-Williams*

10:35 **CONCURRENT SESSION I2: Malaria ..... Dunwoody Suite**
Moderators: Patrick Kachur and Wences Arvelo

10:40 The Impact of Revised Health Management Information System (HMIS) Reporting Forms on the Quality of Malaria Surveillance Data in Uganda: an Interrupted Time Series Analysis. *Nelli Westercamp*

11:00 The Effect of Holes in Long-Lasting Insecticidal Nets on Malaria — Malawi, 2013. *Anna A. Minta*

11:20 Health Worker Adherence to National Malaria Treatment Guidelines at Publicly Funded Outpatient Health Facilities — Southern Malawi, 2015. *Ruth J. Namuyinga*

11:40 Imported Cases of Malaria — Puerto Rico, July–October 2015. *Emilio Dirlikov*

12:00–1:20 **LUNCH**

12:05–1:20 **SPECIAL SESSION 4: E-Cigarette Advertising: Enticing Another Generation of Youth into Nicotine Addiction ..... Ravinia Ballroom**
Sponsor: NCCDPHP
Moderator: Ralph Caraballo
Speakers: *Carla J. Berg, Paul Melstrom, Israel Agaku, Gabbi Promoff*

SPECIAL SESSION 5: Frontline Field Epidemiology Training Program: the Launch ..... Dunwoody Suite
Sponsor: CGH
Speakers: *Jordan Tappero, Augusto Lopez, Senga Sembuche, Maame Amo-Addae, Mei Castor*

1:20 **CONCURRENT SESSION J1: Emerging Infections ..... Ravinia Ballroom**
Moderators: Chris Braden and Brett Petersen

1:25 Alaska Resident Infected with a Novel Species of Orthopoxvirus — Alaska, 2015. *Yuri P. Springer*

1:45 Comparison of Sensitivity of a National Call Center with a Local Alerts System for Detection of New Cases of Ebola — Guinea, 2014–2015. *Christopher T. Lee*

2:05 Acceptability of a Chikungunya Virus Vaccine — United States Virgin Islands, 2015. *Morgan J. Hennessey*

2:25 Enterovirus-D68 and Acute Flaccid Myelitis Among Children: A Case-Control Study in Colorado, 2014. *Negar Aliabadi*

2:45 Zika Virus in Returning U.S. Travelers — United States, 2010–2014. *Morgan J. Hennessey*

1:20 **CONCURRENT SESSION J2: Child Health ..... Dunwoody Suite**
Moderators: Coleen Boyle and Jennifer Lind

1:25 Burden and Etiology of Sepsis in the First Three Days of Life in a Large Public Hospital: Preliminary Results from the Sepsis Aetiology in Neonates in South Africa Study — Soweto, South Africa, 2013–2014. *Matthew D. Westercamp*

1:45 Infant and Young Child Feeding Practices Among Internally Displaced Persons in Three Oblasts in Eastern Ukraine — June 2015. *Aimee Summers*

2:05 Applying a Composite Neonatal Morbidity Measure to Describe Statewide Neonatal Morbidity — Wyoming, 2009–2014. *Alexia Harrist*

2:25 High Prevalence of Vitamin B12 Deficiency and Normal Folate Status Among Young Children in Nepal. *Bernadette N. Ng'Eno*

2:45 *Mycobacterium abscessus* Lymphadenopathy Among Patients of a Pediatric Dentistry Practice — Georgia, 2015. *M. Angela Parham*

3:05 **BREAK**

3:20 **CONCURRENT SESSION K1: Global Health ..... Ravinia Ballroom**
Moderators: Rebecca Martin and Fred Angulo

3:25 Quality of Case Management of Pneumonia and Diarrhea in Children Aged <5 Years — Southern Malawi, 2015. *Miwako Kobayashi*

3:45 Botulism in a Rural Village — Ethiopia, 2015. *Rupa Narra*

4:05 Surveillance Preparedness in the Time of Ebola: Assessing What Is on the Ground — Guinea-Bissau, 2015. *Megumi Itoh*

4:25 *Rickettsia typhi* as an Underrecognized Cause of Acute Undifferentiated Febrile Illness — Damanhour, Egypt, 2010–2014. *Chul Woo Rhee*

4:45 Village-Based Rat Fall Surveillance as an Early Warning System for Human Plague — Uganda, 2013–2015. *Natalie A. Kwit*

3:20 **CONCURRENT SESSION K2: Healthcare-Associated Outbreaks ..... Dunwoody Suite**
Moderators: Denise Cardo and Isaac See

3:25 *Mycobacterium chelonae* Eye Infections Associated with Humidifier Use in an Outpatient Laser-Assisted *in situ* Keratomileusis (LASIK) Clinic — Ohio, 2015. *William C. Edens*

3:45 Mucormycosis Among Solid Organ Transplant Recipients at an Acute Care Hospital — Pennsylvania, 2014–2015. *Amber M. Vasquez*

4:05 Assessing Infection Control Practices Following Hepatitis C Virus Transmission in Outpatient Dialysis Centers — New Jersey, 2015. *Jason Lake*

4:25 Prolonged Outbreak of Invasive Group A *Streptococcus* Among Nursing Home Residents — Illinois, 2015. *Srinivas R. Nanduri*

4:45 Invasive Nontuberculous Mycobacteria Infections Among Cardiothoracic Surgery Patients — Hospital A, Pennsylvania, 2010–2015. *Meghan Lyman*

6:30 **SESSION L: 2016 FETP International Night Oral Presentations ..... Ravinia Ballroom**

Thursday, May 5, 2016

8:30 **CONCURRENT SESSION M1: Drug-Related Illness ..... Ravinia Ballroom**
Moderators: Debra Houry and Michael King

- **8:35** Collaborative Public Health Investigation of Clenbuterol-Adulterated Heroin Outbreak — Richmond, Virginia, March–April 2015. *Brigette L. Gleason*
- **8:55** Severe Illness Associated with a Novel Synthetic Cannabinoid — Mississippi, April 2015. *Amelia M. Kasper*
- **9:15** Calls to Poison Control Centers for Conventional Cigarettes and Electronic Cigarettes — Wisconsin, 2010–2015. *Debora Weiss*
- **9:35** Breaking Bad: Methamphetamine Overdose Deaths — New Mexico, 2014. *Nicole A. Middaugh*

8:30 **CONCURRENT SESSION M2: Enteric Diseases ..... Dunwoody Suite**
Moderators: Robert Tauxe and Stacey Bosch

- **8:35** Assessment of the Incubation Period for *Listeria monocytogenes* Infections. *Kristina M. Angelo*
- **8:55** Outbreak of *Escherichia coli* O26 Infections: Case Finding with a Syndromic Surveillance System — Oregon, 2015. *Jonas Z. Hines*
- **9:15** Disparities in Severe Shigellosis — Foodborne Diseases Active Surveillance Network (FoodNet), 10 U.S. sites, 1996–2013. *Lindsey McCrickard*
- **9:35** Foodborne Outbreaks in Prisons — United States, 1998–2014. *Mariel A. Marlow*

9:55 **BREAK**

10:15–11:45 **SESSION N: Alexander D. Langmuir Memorial Lecture ..... Ravinia Ballroom**
From Antibiotic Resistance to Zika: Reflections on Working at the Intersection of Science and Public Health Politics
Speaker: *Margaret Hamburg, MD*

11:45–1:30 **LUNCH**

12:00–1:30 **SPECIAL SESSION 6: Global Rapid Response Team — An Agency-Wide Approach to Supporting CDC's Response to Global Outbreaks and Humanitarian Emergencies ..... Ravinia Ballroom**
Sponsor: CGH
Moderator: Jordan Tappero
Speakers: *Michael Gerber, Carlos Navarro Colorado, Ashley Greiner, Tasha Stehling-Ariza, Cyrus Shahpar*

SPECIAL SESSION 7: Laboratory Leadership Service (LLS) — A Partner Program of EIS ..... Dunwoody Suite
Sponsor: CSELS
Moderators: Steve Monroe and Robert Tauxe
Speakers: *Xin Liu, M. Shannon Keckler, Peter Minchella, Zachary P. Weiner*

1:30 **CONCURRENT SESSION O1: Vaccine-Preventable Diseases ..... Ravinia Ballroom**
Moderators: Sam Posner and Lara Akinbami

- **1:35** Meningococcal Disease Among Men Who Have Sex with Men — United States, 2012–2015. *Temitope A. Folaranmi*
- **1:55** Trends in Group B Streptococcal Infections Among Young Infants and the Potential Impact of a Maternal Vaccine in the United States, 2006–2014. *Srinivas A. Nanduri*
- **2:15** Pneumonia with Pleural Effusion Among Children Two Years After 13-Valent Pneumococcal Conjugate Vaccine Introduction — Santo Domingo, Dominican Republic, June 2014–July 2015. *Sana S. Ahmed*
- **2:35** Hepatitis B Virus Elimination: Evaluating Disease Reduction After Implementation of Infant Vaccination — U.S.-Affiliated Pacific Islands, 1985–2015. *Winston E. Abara*

Awards presented during session.

2:55 Evaluation of Risk Factors and Effectiveness of Mass Vaccination Campaign in Response to Serogroup B Meningococcal Disease Outbreak — University of Oregon, 2015. *Emily A. Fisher*

1:30 **CONCURRENT SESSION O2: Chronic Diseases ..... Dunwoody Suite**
Moderators: Peter Briss and Italia Rolle

1:35 Obesity, Total Water Intake, and Dehydration in U.S. Adults, 2009–2012. *Asher Rosinger*

1:55 Fruit and Vegetable Availability in a Nutrition Environment Assessment — Guam, 2015. *Brenna K. VanFrank*

2:15 Using Medicare Fee-For-Service Claims Data for Surveillance of Million Hearts® Initiative Inpatient Event Rates, 2007–2014. *Iman K. Martin*

2:35 Objectively Measured Physical Activity and Risk of Knee Osteoarthritis: The Osteoarthritis Initiative. *Jin Qin*

2:55 Five-Year Relative Survival with Human Papillomavirus-Associated Cancers. *Hilda Razzaghi*

3:20 **BREAK**

3:30–5:10 **SESSION P: Awards and Late-Breaking Reports ..... Ravinia Ballroom**

3:30 **Presentation of Awards ..... Ravinia Ballroom**
Moderator: Diana Bensyl

- Outstanding Poster Presentation Award
- Donald C. Mackel Memorial Award
- J. Virgil Peavy Memorial Award
- Paul C. Schnitker International Health Award
- Iain C. Hardy Award
- James H. Steele Veterinary Public Health Award
- Mitch Singal Excellence in Occupational and Environmental Health Award
- Distinguished Friend of EIS Award

3:45 **Late-Breaking Reports**
Moderators: Anne Schuchat and Tracie Gardner

3:50 Restaurant-Associated Typhoid Fever Outbreak Traced to a Chronic Carrier — Colorado, 2015. *Jessica Hancock-Allen*

4:00 Possible Transmission of St. Louis Encephalitis Virus Through Blood Transfusion — Arizona, 2015. *Heather Venkat*

4:10 Using Social Networks to Target Prophylaxis in a Hepatitis A Outbreak — New York State, 2015. *Misha P. Robyn*

4:20 *Mycoplasma Hominis* Surgical Site Infections Following Receipt of Amniotic Tissue Product — Ohio, 2015. *Shannon A. Novosad*

4:30 *Listeria Monocytogenes* Infections Linked to Packaged Salad — United States, 2015–2016. *Julie L. Self*

4:40 An Assessment of Household Knowledge, Attitudes, and Practices During a Cholera Epidemic — Dar Es Salaam, Tanzania, January–February 2016. *Sae-Rom Chae*

4:50 Guillain-Barré Syndrome Outbreak — Bahia State, Brazil, 2016. *Ashley R. Styczynski*

5:00 Ongoing Zika Virus Transmission — Puerto Rico, November 23, 2015–February 15, 2016. *Emilio Dirlikov*

5:10 **CLOSING REMARKS AND ADJOURNMENT ..... Ravinia Ballroom**

POSTCONFERENCE ACTIVITY

7:30 **EIS Satiric Revue ..... Ravinia Ballroom**
Presentation of Philip S. Brachman Award

Awards presented during session.

Awards Descriptions and Committee Members

Alexander D. Langmuir Prize Manuscript Award

The Alexander D. Langmuir Prize, established in 1966 by the EIS Alumni Association, recognizes a current EIS officer or recent alumnus (1 year) for excellence in a written report or an epidemiologic investigation or study.

2016 Committee Members: Neil Gupta (Chair), Art Liang, Laurene Mascola, Christina Mikosz, Alexa Oster, Sarah Patrick, Steve Waterman

Philip S. Brachman Award

The Philip S. Brachman Award, sponsored by the graduating class of EIS officers, recognizes excellence in teaching epidemiology to EIS officers.

2016 Committee Members: 2014 EIS Class

Distinguished Friend of EIS Award

The Distinguished Friend of EIS Award, sponsored by the EIS Alumni Association, recognizes an individual for contributions to the health, welfare, and happiness of EIS officers and the EIS Program.

2016 Committee Members: Laurene Mascola (Chair), Kris Bisgard, Tergan Boehmer, Art Liang, Pam Mahoney, Alexa Oster

Iain C. Hardy Award

The Iain C. Hardy Award, sponsored by the National Center for Immunization and Respiratory Diseases, recognizes a current EIS officer or alumnus (within 5 years) who has made an outstanding contribution to the control of vaccine-preventable diseases.

2016 Committee Members: Sam Posner (Chair), Melinda Wharton, Cynthia Whitney, Eric Mast, John Modlin, William Schaffner

J. Virgil Peavy Memorial Award

The J. Virgil Peavy Memorial Award, established in 2003 by the EIS Alumni Association, recognizes a current EIS officer for the oral presentation that best exemplifies the effective and innovative application of statistics and epidemiologic methods in an investigation or study.

2016 Committee Members: Cheryl Broussard (Chair), Lara Akinbami, Anindya De, Katie Fowler, Glen Satten

Donald C. Mackel Memorial Award

The Donald C. Mackel Memorial Award, sponsored by the EIS Alumni Association, recognizes a current EIS officer for the oral presentation that best exemplifies the effective application of a combined epidemiology and laboratory approach to an investigation or study.

2016 Committee Members: Michael Jhung (Chair), Frederick Angulo, Julu Bhatnagar, Vitaliano Cama, Anne Marie France, Jennifer Wright

Outstanding Poster Presentation Award

The Outstanding Poster Presentation Award is presented by the EIS Scientific Program Committee to a current EIS officer for the poster that best exemplifies scientific content, including originality, study design and analysis; public health impact; and presentation effectiveness.

2016 Committee Members: Suzanne Beavers (Chair), Michael King, Italia Rolle, Kate Mollenkamp, Tracy Whang

Paul C. Schnitker International Health Award

Paul C. Schnitker, MD, died in a plane crash in Nigeria in 1969. He was en route to serve as a public health officer in the response to famine and other public health problems resulting from the Biafra Civil War in Nigeria. He is the only person who has died while serving as an EIS officer. The Paul C. Schnitker International Health Award, sponsored by the Schnitker family, recognizes a current EIS officer or alumnus (one year) who has made a significant contribution to international public health.

2016 Committee Members: Ezra J. Barzilay (Chair), W. Roodly Archer, J. Lyle Conrad, Tom Handzel, Asim Jani, Nancy Messonnier

James H. Steele Veterinary Public Health Award

The James H. Steele Veterinary Public Health Award, sponsored by CDC veterinarians, recognizes a current EIS officer or alumnus (within 5 years) who has made outstanding contributions in the field of veterinary public health through outstanding contributions in the investigation, control, or prevention of zoonotic diseases or other animal-related human health problems.

2016 Committee Members: Casey Barton Behravesh (Chair), Fred J. Angulo, Barbara Knust, Kendra Stauffer, Kirk Smith

Mitch Singal Excellence in Occupational and Environmental Health Award

The Mitch Singal Excellence in Occupational and Environmental Health Award, co-sponsored by the National Institute for Occupational Safety and Health and the National Center for Environmental Health/Agency for Toxic Substances and Disease Registry, was established in 2010. The Mitch Singal Award recognizes a current EIS officer for excellence in an oral presentation that best exemplifies the effective application of public health epidemiology to an investigation in the area of occupational or environmental health.

2016 Committee Members: Cammie Chaumont Menéndez (Chair), Kanta Sircar (Co-Chair), Josephine Malilay, Marie de Perio, Barbara Materna, Alexandre Macedo de Oliveira

Stephen B. Thacker Champion Award

The Stephen B. Thacker EIS Champion Award, established in 2013 by the EIS Alumni Association, recognizes an individual who inspires the EIS community through deep and unwavering commitment to the EIS Program, officers, and alumni.

2016 Committee Members: Alexa Oster (Chair), Lawrence Cohen, Greg Heath, Laurene Mascola, Priti Patel, Maria Thacker

Awards Presented at the 2015 EIS Conference

Alexander D. Langmuir Prize Manuscript Award
Lauren Epstein and Jennifer C. Hunter

Philip S. Brachman Award
Julie Magri

Distinguished Friend of the EIS Award
David B. Callahan

Iain C. Hardy Award
Minal K. Patel

Donald C. Mackel Memorial Award
Louise Francois Watkins

J. Virgil Peavy Memorial Award
Jin Qin

Outstanding Poster Presentation
Angela Dunn

Paul C. Schnitker International Health Award
Edna Moturi and Raina Phillips

Mitch Singal Excellence in Occupational and Environmental Health Award
Geoffrey Whitfield

James H. Steele Veterinary Public Health Award
Ryan Wallace

Stephen B. Thacker EIS Champion Award
Douglas Hamilton

Alexander D. Langmuir Lectures, 1972–2015

The Langmuir Lecture is the preeminent public health lecture in the United States. The first lecture was given in 1972, and it has been a highlight of the annual EIS Conference each year since then. The lecture is named for Alexander D. Langmuir, MD, MPH (1910–1993), a public health visionary and leader who established the Epidemiology Program at what was then called the Communicable Disease Center in 1949; he remained as CDC's chief epidemiologist until his retirement in 1970.

Notably, Dr. Langmuir founded the EIS, established national disease surveillance for the United States, and brought the *Morbidity and Mortality Weekly Report* to CDC. Langmuir Lecture speakers have included Abraham Lilienfeld, Sir Richard Doll, Geoffrey Rose, Jonas Salk, and many other prominent public health thinkers and researchers.

1972 Prevention of Rheumatic Heart Disease — Fact or Fancy.
Charles H. Rammelkamp

1973 Cytomegaloviral Disease in Man: An Ever Developing Problem.
Thomas H. Weller

1974 Hepatitis B Revisited (By the Non-Parenteral Route).
Robert W. McCollum

1975 Origin, Spread, and Disappearance of Kuru: Implications of the Epidemic Behavior of a Disease in New Guineans for the Epidemiologic Study of Transmissible Virus Dementias.
D. Carleton Gajdusek

1976 The Future of Epidemiology in the Hospital.
Paul F. Wehrle

1977 The Historical Evolution of Epidemiology.
Abraham Lilienfeld

1978 The Biology of Cancer: An Epidemiological Perspective.
Sir Richard Doll

1979 The Epidemiology of Antibiotic Resistance.
Theodore C. Eickoff

1980 Health and Population Growth.
Thomas McKeown

1981 The Pathogenesis of Dengue: Molecular Epidemiology in Infectious Disease.
Scott B. Halstead

1982 The Epidemiology of Coronary Heart Disease: Public Health Implications.
Henry W. Blackburn, Jr.

1983 Sexually Transmitted Diseases — Past, Present, and Future.
King K. Holmes

1984 Poliomyelitis Immunization — Past and Future.
Jonas E. Salk

1985 An Epidemiologist's View of Postmenopausal Estrogen Use, or What to Tell Your Mother.
Elizabeth Barrett-Connor

1986 Hepatitis B Virus and Hepatocellular Carcinoma: Epidemiologic Considerations.
Robert Palmer Beasley

1987 Environmental Hazards and the Public Health.
Geoffrey Rose

1988 Lymphotropic Retroviruses in Immunosuppression.
Myron E. (Max) Essex

1989 Aspirin in the Secondary and Primary Prevention of Cardiovascular Disease.
Charles H. Hennekens

1990 Epidemiology and Global Health.
William H. Foege

1991 Public Health Action in a New Domain: The Epidemiology and Prevention of Violence.
Garen J. Wintemute

1992 *Helicobacter pylori*, Gastritis, Peptic Ulcer Disease, and Gastric Cancer.
Martin J. Blasér

1993 Diet and Health: How Firm Is Our Footing?
Walter C. Willett

1994 Alexander D. Langmuir: A Tribute to the Man.
Philip S. Brachman and William H. Foege

1995 Epidemiology and the Elucidation of Lyme Disease.
Allen C. Steere

1996 50 Years of Epidemiology at CDC.
Jeffrey P. Koplan

1997 Public Health, Population-Based Medicine, and Managed Care.
Diana B. Petitti

1998 Pandemic Influenza: Again?
Robert Couch

1999 The Evolution of Chemical Epidemiology.
Philip J. Landrigan

2000 Does *Chlamydia pneumoniae* Cause Atherosclerotic Cardiovascular Disease? Evaluating the Role of Infectious Agents in Chronic Diseases.
Walter E. Stamm

2001 Halfway Through a Century of Excellence.
J. Donald Millar

2002 Public Health Response to Terrorism: Rising to the Challenge.
Marcelle Layton

2003 Alex Langmuir's Somewhat Quiet Legacy: Epidemiology, Sexual Health, and Personal Choices.
Willard (Ward) Cates, Jr.

2004 HIV, Epidemiology, and the CDC.
James W. Curran

2005 Killin' Time: Alcohol and Injury.
Alexander C. Wagenaar

2006 Measuring Malaria.
Brian Greenwood

2007 Implications of Tuberculosis Control on Evidence-Based Public Health Practice.
Thomas R. Frieden

2008 Physical Activity and Public Health: Does the Environment Matter?
Ross C. Brownson

2009 Epidemiology, Public Health, and Public Policy.
Jim Marks

2010 Community Heal*th Rankings*—Epidemiology in Action.
Pat Remington

2011 Skirmishes, Battles, and Wars: Tracking Infection Control Success in the Age of Social Networks.
Robert A. Weinstein

2012 Prevention of Teen Pregnancy: What Do We Know? Where Do We Go?
Robert Blum

2013 The Role of EIS in Communities of Solution: Using GIS and Epidemiology to Activate Health Partnerships.
Robert Phillips

2014 EIS in an Era of Data, Technology, and Urban Transformations.
Martin-J. Sepulveda

2015 Large-Scale Machine Learning and Its Application to Public Health.
Jeff Dean

Alexander D. Langmuir Prize Manuscripts, 1966–2015

1966 Complications of Smallpox Vaccination: I. National Survey in the United States, 1963. N Engl J Med 1967;276:125–32.
J.M. Neff, J.M. Lane, J.H. Pert, R. Moore, J.D. Millar, D.A. Henderson

1967 An Outbreak of Neuromyasthenia in a Kentucky Factory—The Possible Role of a Brief Exposure to Organic Mercury. Am J Epidemiol 1967;86:756–64.
G. Miller, R. Chamberlin, W.M. McCormack

1968 Salmonellosis from Chicken Prepared in Commercial Rotisseries: Report of an Outbreak. Am J Epidemiol 1969;90:429–37.
S.B. Werner, J. Allard, E.A. Ager

1969 Outbreak of Tick-Borne Relapsing Fever in Spokane County, Washington. JAMA 1969;210:1045–50.
R.S. Thompson, W. Burgdorfer, R. Russell, B.J. Francis

1970 Tularemia Epidemic: Vermont, 1968—Forty-Seven Cases Linked to Contact with Muskrats. N Engl J Med 1969;280:1253–60.
L.S. Young, D.S. Bicknell, B.G. Archer, et al.

1971 Tomato Juice-Associated Gastroenteritis, Washington and Oregon, 1969. Am J Epidemiol 1972;96:219–26.
W.H. Barker Jr., V. Runte

1972 *Salmonella* Septicemia from Platelet Transfusions: Study of an Outbreak Traced to a Hematogenous Carrier of *Salmonella cholerae-suis*. Ann Intern Med 1973;78: 633–41.
F.S. Rhame, R.K. Root, J.D. MacLowry, T.A. Dadisman, J.V. Bennett

1973 Outbreak of Typhoid Fever in Trinidad in 1971 Traced to a Commercial Ice Cream Product. Am J Epidemiol 1974;100:150–7.
A. Taylor Jr., A. Santiago, A.Gonzales-Cortes, E.J. Gangarosa

1974 Oyster-Associated Hepatitis: Failure of Shellfish Certification Programs To Prevent Outbreaks. JAMA 1975;233:1065–8.
B.L. Portnoy, P.A. Mackowiak, C.T. Caraway, J.A. Walker, T.W. McKinley, C.A. Klein Jr.

1975 Staphylococcal Food Poisoning Aboard a Commercial Aircraft. Lancet 1975;2:595–9.
M.S. Eisenberg, K. Gaarslev, W. Brown, M. Horwitz, D. Hill

1976 Nursery Outbreak of Peritonitis with Pneumoperitoneum Probably Caused by Thermometer-Induced Rectal Perforation. Am J Epidemiol 1976;104:632–44.
M.A. Horwitz, J.V. Bennett

1977 Epidemic *Yersinia entercolitica* Infection due to Contaminated Chocolate Milk. N Engl J Med 1978;298:76–9.
R.E. Black, R.J. Jackson, T. Tsai, et al.

1978 Measles Vaccine Efficacy in Children Previously Vaccinated at 12 Months of Age. Pediatrics 1978;62: 955–60.
J.S. Marks, T.J. Halpin, W.A. Orenstein

1979 An Outbreak of Legionnaires' Disease Associated with a Contaminated Air-Conditioning Cooling Tower. N Engl J Med 1980;302:365–70.
T.J. Dondero Jr., R.C. Rendtorff, G.F. Mallison, et al.
and
Risk of Vascular Disease in Women: Smoking, Oral Contraceptives, Noncontraceptive Estrogens, and Other Factors. JAMA 1979;242:1150–4.
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J. McCollum, N. Williams, S. W. Beam, et al.

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L. Epstein, J. Hunter

Philip S. Brachman Awards, 1983–2015

1983 Philip Brachman

1984 Michael Gregg

1985 Howard Ory

1986 J. Lyle Conrad

1987 Andrew G. Dean

1988 Richard C. Dicker

1989 Carl W. Tyler, Jr.

1990 Richard C. Dicker

1991 Richard C. Dicker

1992 Jeffrey J. Sacks

1993 J. Lyle Conrad and Michael Toole

1994 Willard (Ward) Cates and Robert Breiman

1995 John Horan

1996 Polly Marchbanks

1997 William Mac Kenzie

1998 Laura A. Coker

1999 Christine Zahniser

2000 Jeffrey J. Sacks

2001 Douglas H. Hamilton

2002 Marcelle Layton, Steve Weirsma, James L. Hadler, Eddy Bresnitz, Elizabeth Barrett, Robert B. Stroube, Ross J. Brechner, David S.B. Blythe, Larry Siegel, Karyn Berry, Sherri Adams, John Eisold, and Greg Martin

2003 Deborah W. Gould

2004 Jim Alexander

2005 Julie Magri

2006 Ralph Henderson

2007 Joshua Mott and Peter Cegielski

2008 Lisa Pealer

2009 C. Kay Smith and Julie Magri

2010 Betsy Gunnels

2011 William Schaffner

2012 Rachel N. Avchen

2013 Stephen B. Thacker

2014 Douglas H. Hamilton

2015 Julie Magri

Distinguished Friend of EIS Awards, 1984–2015

1984 Virgil Peavy

1985 William Schaffner

1986 Mary Moreman

1987 James Chin

1988 Frances H. Porcher

1989 Not Awarded

1990 J. Lyle Conrad

1991 Alexander D. Langmuir

1992 Laurence R. Foster

1993 Kenneth L. Herrmann and William Roper

1994 Louise McFarland

1995 Mike Osterholm

1996 Jim Curran and Larry Schonberger

1997 Patsy Bellamy

1998 John Horan

1999 Not Awarded

2000 James Hadler

2001 Barbara R. Holloway and William R. Jarvis

2002 Patricia Fleming and Stephen B. Thacker

2003 Paul Blake
2004 David Sencer
2005 Not Awarded
2006 Robert Tauxe and Kashef Ijaz
2007 Dixie Snider
2008 Denise Koo
2009 Arjun Srinivasan
2010 Robert Quick
2011 Thomas Peterman
2012 Jeffrey P. Davis
2013 Douglas H. Hamilton
2014 William Keene
2015 David B. Callahan

Iain C. Hardy Awards, 1996–2015

1996 Peter Strebel
1997 D. Rebecca Prevots
1998 Beth P. Bell
1999 Charles R. Vitek
2000 Linda Quick and Nancy Rosenstein
2001 Orin S. Levine
2002 Umesh D. Parashar
2003 Karen A. Hennessey
2004 Tim Uyeki and Montse Soriano-Gabarro
2005 Julie Jacobson-Bell
2006 Gustavo Dayan
2007 Brendan Flannery
2008 Mona Marin
2009 Amanda Cohn and Rosalyn O'Laughlin
2010 Amy Parker Fiebelkorn
2011 Jacqueline E. Tate
2012 Preeta Kutty
2013 James L. Goodson
2014 Catherine Yen
2015 Minal K. Patel

J. Virgil Peavy Memorial Awards, 2003–2015

2003 Danice Eaton
2004 Lori A. Pollack
2005 Andrea Sharma
2006 Andrea Sharma
2007 Abhijeet Anand and David Lowrance
2008 Katherine Ellingson
2009 Michael L. Jackson
2010 Erin Murray
2011 Matthew Willis
2012 Noha H. Farag
2013 Alison Laufer
2014 Matthew Maenner
2015 Jin Qin

Donald C. Mackel Memorial Awards, 1987–2015

1987 Fatal Parathion Poisoning—Sierra Leone.
Ruth A. Etzel

1988 Multistate Outbreak of Legionnaires' Disease Involving Tours to Vermont.
Margaret Mamolen

1989 Nosocomial Outbreak of Legionnaires' Disease Associated with Shower Use: Possible Role of Amoebae.
Robert F. Breiman

1990 Legionnaires' Disease Outbreak Associated with a Grocery Store Mist Machine.
Frank J. Mahoney

1991 Nosocomial Outbreak of Isoniazid- and Streptomycin-Resistant Tuberculosis Among AIDS Patients, New York City.
Brian R. Edlin

1992 Bacillary Angiomatosis, New Infectious Disease: Epidemiology, Clinical Spectrum, and Diagnostics.
Janet C. Mohle-Boetani

1993 Hepatitis B Virus Transmission Associated with Thoracic Surgery, Los Angeles.
Rafael Harpaz

1994 Schistosomiasis and Lake Malawi: A New Site of Transmission Posing a Serious Risk to Expatriates and Tourists.
Martin S. Cetron

1995 Use of Urinary Antigen Testing To Detect an Outbreak of Nosocomial Legionnaires' Disease in Connecticut, 1994.
Lisa A. Lepine

1996 International Outbreak of *Salmonella* Infections Caused by Alfalfa Sprouts Grown from Contaminated Seed
Barbara E. Mahon
and
Malassezia pachydermatis Fungemia in Neonatal Intensive Care Unit Patients: There's a [New] Fungus Among Us!
Huan Justina Chang

1997 Epidemic of Deaths from Acute Renal Failure Among Children in Haiti.
Katherine L. O'Brien

1998 And Weighing in at 25 Million Pounds—A Multistate Outbreak of *Escherichia coli* 0157:H7 Infections and the Largest Ground Beef Recall in United States History.
Kate Glynn

1999 Clinical Mismanagement of Community Outbreak? The Contribution of DNA Finger-Printing to the Analysis of Chronic, Drug-Resistant Tuberculosis in Buenaventura, Colombia, 1998.
Kayla F. Laserson

2000 *Serratia liquefaciens* Bloodstream Infections and Pyrogenic Reactions Associated with Extrinsically Contaminated Erythropoietin—Colorado.
Lisa Grohskoph

2001 When Beauty Is More Than Skin Deep: An Outbreak of Rapidly Growing Mycobacterial Furunculosis Associated with a Nail Salon—California, 2000.
Kevin L. Winthrop

2002 Dances with Cows? A Large Outbreak of *E. coli* O157 Infections at Multi-Use Community Facility—Lorain County, Ohio, September 2001.
Jay K. Varma

2003 Hepatitis C Virus Transmission from an Antibody-Negative Organ and Tissue Donor.
Barna D. Tugwell

2004 Multiple Hepatitis A Outbreaks Associated with Green Onions Among Restaurant Patrons—Tennessee, Georgia, and North Carolina, 2003.
Joseph J. Amon

2005 Case-Control Study of an Acute Aflatoxicosis Outbreak.
E. Azziz-Baumgatner

2006 Delayed Onset of *Pseudomonas fluorescens* Group Bloodstream Infections After Exposure to Contaminated Heparin Flush—Michigan and South Dakota.
Mark Gershman

2007 Epidemiologic and Molecular Investigation of an Outbreak of Hepatitis C Viral Infection at Hemodialysis Unit—Richmond Virginia, 2006.
Nicola Thompson

2008 Multistate Measles Outbreak Associated with an International Youth Sporting Event—Pennsylvania, Michigan, and Texas, August–September 2007.
Tai-Ho Chen

2009 Cardiac Events and Deaths in a Dialysis Facility Associated with Healthcare Provider—Texas, 2008.
Melissa K. Schaefer

2010 Fatal Case of Laboratory-Acquired Infection with an Attenuated *Yersinia pestis* Strain of Plague—Illinois, 2009.
Andrew Medina-Marino

2011 Outbreak of Nosocomial Listeriosis—Texas, 2010.
Noha H. Farag

2012 Pyrrolizidine Alkaloid Toxicity as the Cause of Unknown Liver Disease—Tigray, Ethiopia, 2007–2011.
Danielle E. Buttke

2013 Active Surveillance for Variant Influenza Among Swine, the Environment, and Employees at Live Animal Markets—Minnesota, 2012.
Mary J. Choi

2014 Raccoon Rabies Virus Variant Transmission Through Solid Organ Transplantation—United States, 2013.
Neil Vora

2015 Molecular Epidemiology of Mycoplasma Pneumoniae (Mp) During an Outbreak of Mp-Associated Stevens-Johnson Syndrome.
Louise Francois Watkins

Outstanding Poster Presentation Awards, 1986–2015

1986 Gender Gap in the Diaper Set: A Closer Look at Differences in Sex-Specific Mortality.
Ray Yip

1987 Socioeconomic Differences in Smoking Behavior in Selected States.
Thomas E. Novotny

1988 Late-Stage Diagnosis of Breast Cancer Among Women in Low Socioeconomic Groups, Connecticut, 1984–1985.
Thomas A. Farley

1989 Malaria Infection in Early Infancy, Malawi.
Laurence Slutsker

1990 Seroprevalence of Human Immunodeficiency Virus Type I Among College Students, United States.
Brian R. Edlin

1991 Diarrheal Outbreak Associated with a Cyanobacteria (Blue-Green Algae)-Like Body, Chicago.
Philip P. Huang

1992 Response to One Dose of Inactivated Poliovirus Vaccine after Three Doses of Oral Poliovirus Vaccine, Abidjan, Côte d'Ivoire.
Bernard J. Moriniere

1993 Cholera Outbreak in Rumonge, Burundi.
Maureen E. Birmingham

1994 Salivary Testing as an Epidemiologic Tool During an Outbreak of Hepatitis A in an Amish Community in Indiana.
Edmundo Muniz

1995 Longitudinal Predictors of Initiation of Smokeless Tobacco Use.
Scott L. Tomar

1996 Nonvenomous Animal-Related Fatalities in the U.S. Workplace, 1992–1994.
Constance C. Austin

1997 Multidrug-Resistant Pneumococcal Meningitis in a Day Care Center—Tennessee.
Allen Craig

1998 Beliefs About the Tobacco Industry and Opinions About Anti-Tobacco Policies: How Tight is the Link?
Arthur E. Chin

1999 Cold Breakfast Cereal: A New Vehicle Implicated in a Multistate Outbreak of *Salmonella* Agona Infections.
Thomas Breuer

2000 Hurricane—Puerto Rico, 1998.
Dan O'Leary

2001 Counting Crows: Crow Mortality as a Sentinel for West Nile Virus Disease in Humans—Northeastern United States, 2000.
Kathleen G. Julian

2002 Outbreak of Echovirus 18 Meningitis at a Summer Camp—Alaska, 2001.
Joseph B. Mclaughlin

2003 Surveillance for Chlamydia in Women—South Carolina, 1998–2001.
Wayne A. Duffus

2004 Hospitalizations Associated with Rotavirus Diarrhea—United States, 1996–2000.
Myrna Charles

2005 Risk of Secondary Transmission from Imported Lassa Fever—New Jersey, 2004.
Ester Tan

2006 Risk Factors for *Helicobacter pylori* in a Rural Community—Montana, 2005.
Elizabeth Melius

2007 Outbreak of *Escherichia coli* 0157 Associated with Packaged Spinach—Wisconsin, 2006.
Authur M. Wendel

2008 The Power of Combining Routine Molecular Subtyping and Specific Food Exposure Interviews During *Escherichia coli* O157:H7 Outbreak—Minnesota, 2007.
Stacy M. Holzbauer

2009 Seroprevalence of Herpes Simplex 2—National Health and Nutritional Examination Surveys, United State, 2005–2006.
Sara E. Forhan

2010 Travelers' Impressions of 2009 H1N1 Influenza National Health Messaging Campaign.
Emily Jentes

2011 *Vibrio mimicus* Infection After Consumption of Crayfish—Spokane, Washington, 2010.
Meagan K. Kay

2012 Associations Between *Salmonella* Serotypes and Particular Food Commodities—United States, 1998–2008.
Brendan R. Jackson

2013 A Spicy Catch: *Salmonella* Bareilly and Nchanga Infections Associated with Raw Scraped Tuna Product—United States, 2012.
W. Thane Hancock

2014 Two Fish, One Fish: Decreasing Number of Outbreaks Attributed to Fish—United States, 1998–2011.
Jolene Nakao

2015 Ebola Infection in a Maternity Ward —Tonkolili, Sierra Leone, 2014
Angela Dunn

Paul C. Schnitker International Health Awards, 1995–2015

1995 Leslie F. Roberts

1996 Peter Kilmarx

1997 Alexander K. Rowe and Eric L. Mouzin

1998 Etienne G. Krug

1999 Kayla F. Laserson

2000 John MacArthur and Peter Salama

2001 Valerie D. Garrett

2002 Robert D. Newman and Lorna E. Thorpe

2003 Puneet Dewan, Lisa Nelson, and Pratima Raghunathan

2004 Tracy Creek

2005 Oleg Bilukha

2006 Kevin Cain

2007 Avid Reza

2008 Sapna Bamrah and David Lowrance

2009 Rinn Song

2010 Andrew Auld

2011 W. Roodly Archer

2012 Sudhir Bunga and Janell A. Routh

2013 Kevin R. Clarke

2014 Eugene Lam and Miriam Shiferaw

2015 Edna Moturi and Raina Phillips

James H. Steele Veterinary Public Health Awards, 1999–2015

1999 Fred Angulo and Jordan Tappero

2000 David Ashford

2001 Kate Glynn

2002 Kirk Smith

2003 Mike Bunning

2004 Jennifer McQuiston

2005 John Crump

2006 Katherine Feldman and James Kile

2007 Jennifer Wright

2008 John Dunn

2009 Casey Barton Behravesh and Stacy Holzbauer

2010 Kendra Stauffer

2011 Jennifer Adjemian and Adam Langer

2012 Barbara Knust

2013 Maho Imanishi and Megin Nichols

2014 Danielle Buttke

2015 Ryan Wallace

Mitch Singal Excellence in Occupational and Environmental Health Awards, 2010–2015

2010 Surveillance and Prevention of Occupational Injury Deaths—Wyoming, 2003–2007.
Paul Anderson

2011 Unprecedented Outbreak of Acute Childhood Lead Poisoning—Zamfara State, Nigeria, 2010.
Carrie A. Dooyema

2012 Pyrrolizidine Alkaloid Toxicity as the Cause of Unknown Liver Disease—Tigray, Ethiopia (2007–2011).
Danielle E. Buttke

2013 Impact of Aerial Insecticide Spraying on West Nile Virus Disease—North Texas, 2012.
Duke J. Ruktanonchai

2014 Workplace Secondhand Smoke Exposure Among Nonsmoking Women of Reproductive Age—United States, 2010.
Candice Johnson

2015 Parking Prices and Walking and Bicycling to Work in U.S. Cities
Geoffrey Whitfield

Stephen B. Thacker EIS Champion Awards, 2013–2015

2013 Stephen B. Thacker

2014 Lyle Conrad

2015 Douglas H. Hamilton

Monday, May 2, 2016

SESSION A: Stephen B. Thacker Opening Session

8:30–10:15 AM

Ravinia Ballroom

Moderators: Joshua Mott and Matthew Wise

8:35 Phylogenetic Analysis of HIV and Hepatitis C Virus Co-Infection in an HIV Outbreak Among Persons Who Inject Drugs

Authors: Romeo R. Galang, J. Gentry, C. Conrad, E. Campbell, H. Jia, A. Shankar, S. Ramachandran, S. Blosser, S. Masciotra, Y. Khudyakov, P. Pontones, W. Switzer, P. Peters

Background: In 2015, the largest U.S. outbreak of HIV since 1996 was detected in a rural Indiana county. To inform infection control strategies, we combined traditional outbreak investigation methods with phylogenetic analysis to describe the HIV outbreak and hepatitis C virus (HCV) co-infection.

Methods: We defined a case-patient as either a resident of the outbreak county, with HIV infection diagnosed after October 1, 2014, or an HIV-positive contact (i.e., needle-sharing and sex partners) of a resident. Case-patients were interviewed about risk behaviors and contacts. Serum specimens from case-patients were tested for recent HIV infection (<8 months) and HCV co-infection. We conducted phylogenetic analysis of the HIV *pol* gene and the HCV NS5b gene from case-patients to identify clusters of closely related viral strains.

Results: Among 181 case-patients, 163 (90%) resided in the outbreak county, 171 (94%) reported injecting drugs, and 167 (92%) were co-infected with HCV. Among 130 specimens tested for recent HIV infection, 114 (88%) HIV infections were identified as recent. Case-patients named 527 contacts, of whom 395 (75%) were needle-sharing partners and 157 (30%) were other case-patients. Phylogenetic analysis of 159 HIV *pol* sequences revealed a single large cluster (n = 157); analysis of 67 HCV NS5b sequences revealed 3 genotypes and 2 HCV clusters (n = 14, n = 28).

Conclusions: In this outbreak, a single HIV strain spread rapidly through a needle-sharing network of persons co-infected with multiple circulating strains of HCV. These findings suggested that transmission occurred through risky drug injection practices and demonstrated the urgent need for strategies that prevent HIV and HCV transmission through sharing of contaminated injection equipment.

Awards presented during session.

8:55 Investigation of Undetermined Risk Factors for Fentanyl-Related Overdose Deaths — Ohio, 2015

Authors: Erica Spies, A. Garcia-Williams, A. Peterson, J. Halpin, M. Gladden, J. Zibbell, C.L. McCarty, J. DeFiore-Hyrmer, M. DiOrio, L. Werhan, K. Redd, K. Yoder, R. Thomas, B. Fowler

Background: In 2015, the U.S. Drug Enforcement Administration issued a nationwide alert on fentanyl as a health threat and CDC issued a Health Alert Network Advisory to alert public health and medical practitioners of increases in fentanyl-related overdose fatalities. In Ohio, fentanyl-related overdose fatalities increased by almost 500% from 2013 to 2014 and the supply of illicit fentanyl substantially increased. The Ohio DOH requested CDC's assistance in October 2015 to investigate the 2014 increase in fentanyl-related overdose fatalities and associated risk factors.

Methods: Fentanyl-related overdose deaths from 2014 were identified using death certificates. Ohio Automated Rx Reporting System (OARRS) data was linked with fatalities to understand decedent prescription history. Standardized abstraction of coroner/medical examiner (C/ME) overdose reports were conducted among high burden counties. Toxicology, scene, and background information were abstracted into the National Violent Death Reporting System and its optional drug overdose module.

Results: We identified 551 fentanyl-related overdose deaths among Ohioans in 2014. Decedents were mostly white males (69%), never married (55%), with some college education or less (94%). OARRS data indicate the majority of decedents (72.8%) had not recently been prescribed opioids; however, more than 80% were opioid exposed and had received an opioid prescription ≥ 50 morphine milligram equivalent within the past 7 years. Records suggest over 80% of decedents had a history of substance use; nearly 25% had history of mental illness; and 10% were recently released from jail, a rehabilitation facility, or hospital.

Conclusions: The high prevalence of prescription opioid use, substance use, and mental illness among fentanyl-related overdose decedents suggest healthcare providers have opportunities to intervene (e.g., limiting new opioid prescriptions, referring patients abusing opioids to treatment). This investigation will help Ohio develop prevention strategies based on identified risk factors.

9:15 Evaluation of Silica Exposures at a Granite Countertop Fabricator — Texas, 2015

Authors: Kerton Victory, L. Zwack, S. Brueck, M. de Perio

Background: Silicosis is an irreversible but preventable lung disease from exposure to silica dust. In May 2014, Texas had the first reported case in North America of silicosis associated with granite countertop fabrication. In response, the company implemented changes to reduce dust exposure including wet cutting methods and respirator use. NIOSH assistance was requested to evaluate employee exposures to crystalline silica and their health effects.

Methods: We visited the facility and interviewed 58 employees, reviewed spirometry results on 55 employees, and assessed occupational health policies. We conducted full-shift personal air sampling for crystalline silica on 25 employees in the office and production areas and compared them to occupational exposure limits.

Results: Most interviewed employees were <45 years old (84%), male (81%), and had worked for the company <10 years (67%). Two production employees reported shortness of breath and cough. Although all 55 spirometry tests were deemed normal by the provider, we noted technical methodologic inconsistencies which impacted interpretability. The company's medical surveillance program did not include medical exams or chest radiographs. We measured respirable crystalline silica at concentrations above the Occupational Safety and Health Administration Permissible Exposure Limit in two employees using pneumatic hand grinders and above the American Conference of Governmental Industrial Hygienists' Threshold Limit Value in three employees working in material handling, automated polishing, and laminating.

Conclusions: Despite instituting control measures, employees are still exposed to crystalline silica above occupational exposure limits. We found gaps in the company's medical surveillance program that could impede early diagnosis of silicosis. Local exhaust ventilation is needed to capture crystalline silica particles at the source. Enhanced medical surveillance is needed to improve workers' health long-term.

9:35 Pneumococcal Serotype 5 Colonization Prevalence Among Unaccompanied Children One Year After an Outbreak — Texas, 2015

Authors: Miwako Kobayashi, S. Ahmed, R. Gierke, S. Nanduri, J. Healy, D. Nguyen, M. Carvalho, F. Pimenta, K. Fleming-Dutra, S. Waterman, L. Misegades, M. Moore, C. Kim, C. Whitney

Background: *Streptococcus pneumoniae* (pneumococcus) serotype 5 commonly causes severe disease in developing countries but is rare in the US. In mid-2014, an outbreak of severe pneumonia caused by serotype 5 occurred among unaccompanied children (UC) aged 13–17 years crossing the US–Mexico border. Colonization survey results indicated a high amount of serotype 5 transmission. Therefore, 13-valent pneumococcal conjugate vaccine (PCV13) was recommended for all UC, extending the routine recommendation for children <5 years. In 2015, a repeat pneumococcal colonization survey was conducted to reevaluate the need for ongoing PCV13 use.

Methods: During August 2015 a cross-sectional survey with nasopharyngeal swab collection and interviews of UC took place at six Office of Refugee Resettlement (ORR)-funded programs in Texas. Isolated pneumococci were serotyped by Quellung reaction and results were compared with the 2014 survey. Chi-square test or Fisher's exact test were used for categorical variables.

Results: Of 495 samples collected from UC aged 7–17 years, >99% of whom from El Salvador, Guatemala, or Honduras, 475 (96%) had adequate bacterial growth. Overall pneumococcal colonization prevalence (26% [125/475]) was comparable to that of 2014 (24% [185/774]; *P*=.30); however, prevalence of PCV13-serotype colonization decreased significantly (13% [103/774 in 2014] versus 6% [28/475] in 2015; *P* <.0001). In particular, serotype 5, the most frequently isolated serotype in 2014 (9% [70/774]), was not isolated in 2015 (*P* <.0001).

Conclusions: Results suggest interrupted transmission of serotype 5 among UC, whether due to natural waning of the outbreak, PCV13 use, or decreased crowding at the border. Thus, the extraordinary recommendation to administer PCV13 to all UC in ORR-funded care programs was discontinued, with a return to the standard PCV13 recommended schedule.

9:55 Men's Health Screening Program: Ebola Survivor Counseling and Behavioral Outcomes — Liberia, 2015

Authors: Lawrence Purpura, E. Rogers, T. Nyenswah, M. Massaquoi, P. Bemah, N. Mahmoud, A. Baller, S. Moses, V. Ladele, J. Kollie, N. Abad, S. Kowalewski, E. German, M. Mugisha, M. Weefur, S. White, C. Wasunna, A. Christie, S. Pillai, M. Choi, B. Knust, P. Rollin, A. Gasasira, D. Williams

Background: After recovery from Ebola Virus Disease (EVD), Ebola virus (EBOV) RNA can persist in semen of male survivors for more than nine months. Liberia's Men's Health Screening Program (MHSP), created to prevent sexual transmission of EBOV, offers survivors semen testing for EBOV and provides counseling on safe sexual practices. We examined behavioral data to assess our program's impact on sexual practices.

Methods: From July to October 2015, the MHSP enrolled 234 male EVD survivors for risk-reduction counseling, including abstinence or condom use, and semen testing for EBOV RNA by RT-PCR; follow-up was conducted monthly and participants graduated after two consecutive negative laboratory results. Questions regarding sexual practices were asked at enrollment and follow-up visits. Behavioral differences before and after baseline counseling were assessed using the McNemar test.

Results: At enrollment, 212/233 (91%) reported being sexually active, with 90/212 (43%) reporting condom use at their last sexual encounter. At follow-up, 57/66 (86%) that did not use condoms at enrollment reported use at their last sexual encounter (P<.0001) and 65/174 (37%) of those sexually active at enrollment reported abstinence (P<.0001). Overall, 224/229 (98%) reported receiving counseling concerning resumption of sexual activity following recovery from EVD; 189/212 (89%) waited ≥90 days after recovering from EVD before resuming sexual activity, as previously recommended.

Conclusions: At enrollment, the majority of EVD survivors reported being sexually active. However, less than half reported using a condom at their last sexual encounter, posing a threat of EBOV sexual transmission. Positive behavioral changes after counseling highlights the impact of our program. Therefore, it is important for survivor services in the Ebola-affected countries to include counseling male survivors on abstinence and safe sexual practices.

SESSION B: J. Virgil Peavy Memorial Award Finalists

10:45 AM–12:10 PM

Ravinia Ballroom

Moderators: Charles Rothwell and Andrea Winquist

10:50 Risk Factors for Infection During a Measles Outbreak Among Young Adults After Measles Elimination — Ulaanbaatar, Mongolia, 2015

Authors: José E. Hagan, D. Narangerel, Y. Takashima, R. Pastore, S. Amarzaya, O. Dashpagma, G. Nyamaa, B. Altanzul, D. Sodbayar, D. Nyamkhuu, Y. Buyanjargal, P. Nymadawa, M. Mulders, G. Grant, K. Wannemuehler, W. Schluter, J. Goodson

Background: In 2014, Mongolia was verified as free of endemic measles virus transmission. During March 1–September 30, 2015, however, a nationwide measles outbreak occurred, with 13,638 confirmed cases, predominantly among young adults. We conducted a case-control study to assess risk factors for measles.

Methods: Persons with laboratory-confirmed measles aged 15–28 years, the ages most heavily affected by the outbreak, living in the capital city of Ulaanbaatar, the area of the country with highest incidence, were matched with 2-3 young adult neighborhood controls. Conditional logistic regression was used to calculate univariable p-values and estimate adjusted matched odds ratios (aMOR) for risk factors, with 95% confidence intervals (95%CI). State sequence analysis with TraMineR (R v3.2) was performed to characterize the geographic patterns of early childhood residence, and identify the association with case status.

Results: Overall, 29/124 cases (23%) and 111/302 controls (37%) reported at least one measles vaccine dose ($p<0.01$). Risk factors for measles included recent outpatient or inpatient healthcare exposure (aMOR: 2.30 [95%CI: 1.18–4.49] and 2.26 [1.44–3.54], respectively), and birth outside of Ulaanbaatar (1.76 [1.09–2.98]). Reported measles vaccination (0.47 [0.28–0.80]), any recent travel outside of Ulaanbaatar (0.38 [0.19–0.76]), and college education (0.50 [0.34–0.73]) were protective. State sequence analysis indicated that cases ($P<0.01$) and unvaccinated persons ($P=0.02$) lived in provincial capitals or more remotely during early childhood.

Conclusions: Susceptibility of individuals who spent childhood years in remote regions and nosocomial transmission were associated with measles. Targeted vaccination campaigns to ensure high population immunity in all age groups and geographic settings and improved hospital infection control are needed to prevent re-establishment of transmission after measles virus importations in Mongolia.

11:10 Risk for New HIV Diagnosis Among a Cohort of Persons Receiving a Supportive Housing Intervention — New York City, 2006–2012

Authors: Christopher T. Lee, E. Wiewel, S. Braunstein, S. Lim

Background: Unstable housing is a risk factor for HIV infection, but unknown is whether providing housing decreases HIV incidence. Using a quasi-experimental design, we assessed whether HIV diagnosis rate was lower among persons placed into a supportive housing program than among unplaced applicants.

Methods: We studied 18,004 HIV-negative adults who applied for New York/New York III Supportive Housing between November 2006–September 2012. Subjects were followed until they received a diagnosis in the HIV registry or censored when they died or on September 30, 2012. Treatment was defined as having received housing placement. We used propensity score weighting to balance the sample regarding baseline demographic, behavioral, and housing characteristics. We calculated incidence rate ratios (IRRs) for HIV diagnosis by using Poisson regression.

Results: Compared with control subjects (n = 12,757), treated persons (n = 5,247) were more likely to be older, male, abuse substances, and to have spent more days in homeless shelters at baseline. Crude HIV diagnosis incidence was similar between groups (control incidence rate [IR]: 12.2/10,000 person-years; treatment IR: 12.0/10,000 person-years). Propensity score weighting successfully eliminated observed differences in baseline characteristics. In the intention-to-treat analysis, HIV diagnosis incidence was similar between groups (IRR: 1.0; P = .99). Persons who received ≥2 years of placement (n = 1,894) had lower rates of HIV diagnosis (IRR: 0.4, P = .11), although this difference was statistically insignificant.

Conclusions: Propensity score weighting reduced bias between treatment and control groups. Those who received ≥2 years of housing placement had a substantial but nonsignificant reduction of risk for HIV diagnosis. Analysis using a longer follow-up period with more events might clarify association between housing intervention and HIV infection.

11:30 Giardiasis Diagnosis and Treatment Pattern Analysis Using Insurance Claims Data and a Novel Data Visualization Tool — United States, 2006–2010

Authors: Karlyn D. Beer, S.A. Collier, J.W. Gargano

Background: Giardiasis, the most common enteric parasitic infection in the United States, causes an estimated 1.2 million cases annually. Despite this burden, clinical index of suspicion remains low and case series data suggest delayed diagnosis and absent or ineffective treatment are common. We investigated diagnosis and treatment patterns using a "big data" approach and EventFlow, novel data visualization software for longitudinal data.

Methods: We linked testing, diagnosis and prescription claims ("events") to create a longitudinal cohort of giardiasis patients (ICD-9-CM 007.1), using the MarketScan insurance database (80 million persons). We used EventFlow to view and query event sequences occurring 90 days before and after diagnosis, and identify temporal patterns. We defined the "expected" sequence as: a diagnostic test followed by antiparasitic prescription (drugs effective against *Giardia*), but no antibiotic prescription (ineffective drugs). We identified attributes of outpatients with "unexpected" sequences, and analyzed associations between sequence and age group, sex, and census region using chi-square tests.

Results: Among 2,995 outpatients with 212,433 claims, 19% followed the "expected" event sequence. Among the 2,454 (81%) outpatients with an "unexpected" event sequence, almost half (47%) did not receive a diagnostic test; 33% received an antibiotic ineffective against *Giardia* before their diagnosis, and 44% never received an antiparasitic. Outpatients living in the southern US were less likely to receive the "expected" care sequence than those in other regions (P<.001).

Conclusions: Few outpatients received the "expected" giardiasis care sequence, and sequences differed by region. Ineffective antibiotics and absent testing suggest opportunities for provider education. Using an iterative analytic process coupling visualization software with traditional statistics can quickly identify clinically relevant patterns in complex longitudinal data to prioritize scarce public health resources.

11:50 Association Between Surgical Antimicrobial Prophylaxis Regimen and Risk of Mediastinitis Following Coronary Artery Bypass Graft and Valve Surgery

Authors: Cheri Grigg, J. Bagg, J. Jernigan

Background: Annually in the US, >400,000 Coronary Artery Bypass Grafts (CABG) and >100,000 valve surgeries are performed. Mediastinitis, a severe surgical site infection, can complicate CABGs or valve surgeries, substantially increasing morbidity, mortality, and cost. We examined risk of mediastinitis following CABG and valve surgery according to antimicrobial prophylaxis (AMP) regimen used.

Methods: We identified patients in the Truven Health Analytics MarketScan® Hospital Drug Database with CABG or valve surgery performed between 2007–2010. Patients with ICD-9-CM codes indicating mediastinitis or sternectomy ≤90 days post-surgery were considered to have mediastinitis. Four AMP regimens were examined: $1^{st}/2^{nd}$ generation cephalosporin alone (standard AMP); vancomycin alone; vancomycin plus cephalosporin (expanded AMP1); vancomycin plus an aminoglycoside, $3^{rd}/4^{th}$ generation cephalosporin, quinolone, or beta lactam/beta lactamase-inhibitor combination (expanded AMP2). A logistic regression model, controlling for demographics and clinical characteristics, estimated relative risk of mediastinitis post-discharge for each AMP regimen and topical mupirocin administered preoperatively. K-means cluster analysis was conducted using patient characteristics to identify patients with elevated risk.

Results: Among 250 hospitals, 1,652 mediastinitis cases (0.9%) occurred following 177,171 eligible procedures. The adjusted risk of mediastinitis post-discharge was higher for those receiving vancomycin alone (aRR=1.25, 95% CI 1.01-1.54) but lower for expanded AMP1 (aRR=0.81, 95% CI 0.69-0.97) compared to standard AMP. The adjusted risk of mediastinitis post-discharge was lower among the 48% who received mupirocin compared to those without (aRR=0.80, 95% CI 0.69-0.96). A high-risk patient cluster was identified (RR= 1.79, $p<0.0001$).

Conclusions: Risk of mediastinitis post-CABG may differ by AMP regimen or use of peri-operative mupirocin. Public health authorities and clinicians must weigh potential benefits of broader spectrum regimens against the risk of antibiotic resistance. Additional studies are needed to optimize standard regimens.

SPECIAL SESSION 1: Zika Virus Infection

12:15–1:15 PM

Ravinia Ballroom

Sponsor: National Center for Emerging and Zoonotic Infectious Diseases (NCEZID) and National Center on Birth Defects and Developmental Disabilities (NCBDDD)

This session will cover epidemiology of the ongoing Zika virus epidemic, relationship between Zika and both adverse pregnancy outcomes and Guillain-Barré syndrome, control and prevention of Zika, and the current response to Zika.

Relevance and Appropriateness for the EIS Conference

Zika is a virus spread by mosquitoes that typically causes a mild illness characterized by fever, rash, joint pain, and conjunctivitis. Symptoms begin from 2 to 7 days after being bitten by an infected mosquito, and can last from several days to weeks. Zika was first identified in Uganda in 1947, but had not appeared in the Americas until recently. In spring 2015, the first confirmed Zika case in the Americas was reported from Brazil, which has subsequently documented associated cases of Guillain-Barré syndrome and pregnant women who have had poor pregnancy outcomes, including babies with microcephaly. The virus rapidly spread through Central and South America, leading the World Health Organization to declare a global health emergency in February 2016. As spread continues, U.S. travelers to affected countries, including pregnant women and their unborn children, are likely to be affected by Zika virus infection.

Speakers

- Introduction and Epidemiology of the Ongoing Zika Virus Epidemic. *Marc Fischer, Arbovirus Disease Branch*
- Ongoing and Future Epidemiologic Studies in the Outbreak. *Erin Staples, Arbovirus Disease Branch*
- Zika and Pregnant Women: Adverse Pregnancy Outcomes, *Margaret Honein, Birth Defects Branch and Denise Jamieson, Women's Health and Fertility Branch*
- Vector Control in the Current Response to Zika. *Harry Savage, Arboviral Disease Branch and John-Paul Mutebi, Arboviral Disease Branch*

POSTER SYMPOSIUM I

1:30–2:45 PM

Moderators: Tina Tan and Michael Gronostaj

During the first 30 minutes of the Poster Symposium, the following authors will each give a 2-minute oral presentation at the podium in front of a seated audience in the Ravinia Ballroom. Afterward, the authors will stand with their posters for the remaining session time in the Dunwoody Suite. The audience is encouraged to view the individual posters and engage in direct discussion with the authors.

P1.1 Firearm Mortality — Clark County, Nevada, 2009–2013

Authors: Monica Adams, L. Zhang, Y. Zhang

Background: More people died in Clark County during 2013 from firearms than motor vehicle crashes; however, firearm mortality is infrequently investigated from a public health perspective. The Southern Nevada Health District examined firearm-related mortality in Clark County during 2009–2013 and sought to describe prevalence and disparities among demographic groups.

Methods: A case was defined as a Clark County resident death during 2009–2013 with an ICD-10 code indicating mortality attributable to firearm injury. CDC's Wide-ranging Online Data for Epidemiologic Research database was queried to provide aggregated firearm-related mortality prevalence information; state vital records were used to gather data concerning decedent residence zip codes. Statistical methods are descriptive; ArcGIS® 10.3 was utilized to map cases and the Agency for Toxic Substances and Disease Registry's Social Vulnerability Index (SVI) was utilized to identify socioeconomic patterns across the county.

Results: During 2009–2013, 1,301 cases were reported in Clark County, the largest percentage occurred among males (84%). Non-Hispanic blacks, non-Hispanic whites, and persons aged >85 years had the highest age-adjusted rates (16.7/100,000 persons, 16.2/100,000 persons, and 25.2/100,000 persons, respectively). Among cases, 906 (70%) were suicide, 347 (27%) were homicide. Clark County's firearm suicide rate was 9.1/100,000 persons, higher than the 10 largest U.S. counties by population. The rate of firearm homicide among non-Hispanic blacks was ~5 times that of non-Hispanic whites. ArcGIS® maps showed firearm suicides were distributed across the county; however, firearm homicide hotspots were located in the areas with the highest SVI.

Conclusions: Firearm mortality is a prominent public health problem in Clark County, influenced by substantial suicide rates. Additionally, disparities among demographic characteristics are present in firearm suicide and homicide rates.

P1.2 Increased Antiviral Treatment Among Hospitalized Children and Adults with Laboratory-Confirmed Influenza — United States, 2010–2014

Authors: Grace D. Appiah, S.S. Chaves, P. Kirley, L. Miller, J. Meek, E. Anderson, P. Ryan, S. Eckel, R. Lynfield, M. Bargsten, S. Zansky, N. Bennett, K. Lung, A. Thomas, M. Lindegren, G. Reed, S. Garg, A. Fry, A. Campbell

Background: Prompt antiviral therapy is recommended for all hospitalized patients with suspected or confirmed influenza. Although use of antivirals during the 2009 influenza A (H1N1) pandemic was common, significant declines in antiviral use occurred in the 2010–11 influenza season. Data regarding antiviral use since the pandemic are limited.

Methods: The Influenza Hospitalization Surveillance Network (FluSurv-NET) conducts population-based surveillance of patients hospitalized with laboratory-confirmed influenza. We evaluated patterns of antiviral treatment by age group (<1, 1, 2-4, 5-17, 18-64, and ≥65 years) and influenza season (October 1 through April 30), from 2010-14 using the Cochrane-Armitage test for trend.

Results: Of 28,855 patients with laboratory-confirmed influenza, 23,437 (81%) received antiviral treatment over the four seasons: 72% in 2010-11, 75% in 2011-12, 83% in 2012-13, and 87% in 2013-14 (p-value for trend <0.0001). The proportion of patients treated with antivirals increased steadily across all age groups (p-value for trend <0.0001), except for age group 2-4 years, where treatment initially declined in the 2011-12 season. From the 2010-11 to 2013-14 season, children <1 year had the greatest increase in antiviral treatment, from 51% to 83%. Treatment among adults remained above 75% across all four seasons. Of 26,906 patients with timing data, 14,274 (53%) presented to care within 2 days of illness onset. Among this group of patients who presented early, 12,109 (85%) received antivirals and 9,321 (65%) of 14,274 were treated within 2 days of illness onset.

Conclusions: Antiviral use increased during 2010-14 among all hospitalized persons with influenza and especially among infants. Additional strategies are needed to understand barriers to influenza antiviral treatment and increase prompt antiviral therapy among hospitalized patients, especially young children, with influenza.

P1.3 Increased Cases of Syphilis Among Pregnant Women and Infants — United States, 2012–2014

Authors: Charnetta L. Williams, S. Kidd, E. Torrone

Background: Syphilis is a preventable sexually transmitted infection that causes adverse outcomes of pregnancy, including syphilitic stillbirths and congenital syphilis (CS) in live-born infants. Given recent increases in syphilis among women and potential severe complications of infection during pregnancy, we sought to describe recent syphilis trends among pregnant women and infants during 2012–2014.

Methods: We reviewed national case report data on syphilis among pregnant women and CS (including stillbirths), during 2012–2014. We calculated percentage change in number of syphilis cases, by year, among pregnant women and infants. For pregnant women, trends were stratified by demographic group and geographic area.

Results: Case reports indicated that 5,149 (16.7%) of the 30,911 women infected with syphilis during 2012–2014, were pregnant. During 2012–2014, the number of syphilis cases among pregnant women increased 25% (1,561 to 1,955) and in 2014, 24% of women with syphilis were pregnant. CS cases increased 37% (334 to 458) and stillbirths increased 67% (15 to 25). By U.S. region, syphilis cases increased (17%–104%) except in the Midwest, where cases decreased (0.4%). However, in 2014, the majority of cases among pregnant women occurred in the South (58%). By race/ethnicity, the largest increases occurred among American Indians/Alaska Natives (200%) and non-Hispanic whites (47%), although non-Hispanic black women accounted for 47% of cases.

Conclusions: Syphilis cases among pregnant women and infants increased substantially during 2012–2014. For pregnant women, cases increased in all demographic groups and most U.S. regions. To prevent CS, health care providers should screen all women for syphilis at their first prenatal visit and consider rescreening, on the basis of local syphilis prevalence, in the third trimester and at delivery.

P1.4 Cryptosporidiosis Outbreak Associated With a Single Hotel — Tennessee, 2015

Authors: Mary-Margaret A. Fill, J. Lloyd, T. Chakraverty, D. Sweat, J. Manners, K. Garman, M. Hlavsa, D. Roellig, J. Dunn, W. Schaffner, T. Jones

Background: The chlorine-tolerant parasite *Cryptosporidium* accounts for ~8,000 reported cases of diarrheal disease and >70% of U.S. recreational water-associated outbreaks annually. We investigated a cluster of gastrointestinal illness among persons who traveled to Tennessee in July 2015 to participate in a baseball tournament (>200 teams) to determine illness scope and source, and implement control measures.

Methods: Standardized interviews were conducted with a convenience sample of 19 teams to establish illness scope, followed by a case-control study among team and non-team guests of Hotel A using team rosters and hotel records. We defined a probable case as vomiting or diarrhea (≥3 stools/24 hours) in a person who stayed at Hotel A during July 15–August 4, 2015; confirmed cases had *Cryptosporidium* detected in stool specimens. We molecularly typed *Cryptosporidium* specimens and conducted an environmental assessment of Hotel A's pool.

Results: Of teams interviewed, illness was reported only among 9 teams that stayed at Hotel A (P <.01). We identified 63 cases (8 confirmed) and 190 control subjects. Case-patients were aged 3–65 years (median 13 years; 70% male). Pool exposure was significantly associated with illness (odds ratio: 7.0; 95% confidence intervals: 3.5–14.2). *Cryptosporidium hominis* subtype IfA12G1 was identified in 2 specimens. Hotel guests reported cloudy water and overcrowded conditions; three guests swam ill with diarrhea. *Escherichia coli* and total coliforms were detected in pool water during environmental assessment, which had low chlorine levels, indicating poor maintenance, prompting pool closure.

Conclusions: A diarrheal contamination event and high utilization of the hotel pool likely contributed to this outbreak and its magnitude. Aquatic facilities should practice correct maintenance following available prevention tools (e.g., CDC's Model Aquatic Health Code).

P1.5 Implications of Culture-Independent Testing for Local Enteric Disease Surveillance — San Diego County, 2004–2014

Authors: Jessica M. Healy, A. Kao, L. Negado, E. McDonald

Background: Hospital laboratories increasingly use culture-independent diagnostic testing (CIDT) for pathogen identification because of low cost and rapid results without the need to grow cultures. Laboratories report diagnostic test results to local public health departments for enteric surveillance, but subtyping-based outbreak detection and drug susceptibility testing are limited without cultures. During 2004–2014, approximately 13% of the 256 identified enteric disease outbreaks in San Diego County were caused by bacterial pathogens; all required cultured samples for detection. To determine the impact of CIDTs on enteric disease surveillance, we assessed community laboratory diagnostic practices and evaluated the San Diego County enteric disease surveillance system.

Methods: We evaluated bacterial enteric disease case data reported during January 2004–December 2014 by using descriptive statistics, and interviewed stakeholders to determine how changes in diagnostic practices might affect their work. We administered a 10 question survey to 18 local laboratories to assess bacterial diagnostic practices.

Results: Ninety-seven percent of enteric disease case reports were culture-confirmed as cases, indicating high accuracy. Although laboratories are able to provide antimicrobial susceptibility testing data, these data were not utilized in county public health department surveillance. Of the respondent laboratories, 5 reported using CIDTs for Shiga toxin-producing *Escherichia coli*; ≤ 3 reported using CIDTs for more common enteric pathogens (*Campylobacter*, *Shigella,* and *Salmonella)*. Although 6 of 7 respondents routinely performed culture on cases yielding a CIDT-positive result, 5 of 11 planned to exclusively use CIDT in the future.

Conclusions: Local diagnostic practices are shifting toward CIDT, but still favor culture-based tests as the gold standard. Routine culturing of CIDT-positive samples would maintain surveillance system quality. Incorporating antimicrobial susceptibility surveillance would enhance local resistance monitoring efforts.

P1.6 Nontuberculous *Mycobacterium* Respiratory Infections — Florida, 2014

Authors: John G. Jordan, M.C. Rowlinson, S. Crowe, C. Blackmore, A. Likos

Background: Nontuberculous mycobacteria (NTM) are environmentally ubiquitous, but can cause clinical disease with respiratory disease being commonly described. Previous studies indicate that Florida has high NTM rates, but evidence is limited because these infections are difficult to diagnose and nonreportable. We sought to describe NTM respiratory infection burden in Florida.

Methods: We identified all samples tested for mycobacteria by the Florida Bureau of Public Health Laboratories during 2014. Patients who tested positive for tuberculosis (TB) were excluded. Remaining patients were considered to have an NTM respiratory infection if ≥1 invasively collected respiratory sample (e.g., bronchial alveolar lavage or pleural fluid) was positive for NTM, or if ≥2 sputum samples were positive for the same NTM species. Patient characteristics were described. Complete demographic data was available for 284 samples.

Results: Of 23,385 samples tested, mycobacteria were recovered from 4,101 (17.5%). TB was identified in 388 patients. Of remaining patients, 602 met criteria for NTM respiratory infection. Female sex was reported by 251 (48.0%) of 523 patients. Black and Asian race were reported for 64 (21.1%) and 32 (10.5%) of 304 patients, respectively. Approximately 80% of infections were reported among persons aged ≥50 years, with the highest number for those aged 70–79 years (153/598 = 25.6%). Miami-Dade County had the highest number of patients among Florida residents (69/369 = 18.7%), followed by Pinellas County (27/369 = 7.3%). The most common species identified were *Mycobacterium intracellulare* (279/602 = 46.3%), *Mycobacterium abscessus* (109/602 = 18.1%), and *Mycobacterium avium* complex (83/602 = 13.8%).

Conclusions: NTM respiratory infections cause substantial disease burden in Florida. Further study is needed to understand risk factors and outcomes associated with NTM respiratory infections.

P1.7 Gastroenteritis Outbreak After a Church Potluck — West Virginia, 2015

Authors: Joel Massey, S. Wilson, B. Adkins, P. Spurlock, G. Gomez, D. Bixler

Background: Foodborne illness affects 1 in 6 persons annually in the United States. On August 18, 2015, the West Virginia Bureau for Public Health was notified of gastroenteritis among Church A potluck attendees. We investigated to identify the outbreak source and provide recommendations to prevent future illness.

Methods: We defined a case as having ≥1 episodes of vomiting or diarrhea in a church potluck food service attendee on August 16, 2015. We conducted a retrospective cohort study using data from a 24-item food history questionnaire; we calculated the attack rate of gastroenteritis associated with each food item. We tested 2 ham samples at CDC's National Enteric Laboratory for enterotoxin. We investigated Church A food preparation and serving procedures.

Results: Of 85 attendees, 52 (61%) completed questionnaires; 26 (50%) respondents met the case definition. Median illness incubation period was 4.3 hours (range 2.5–14.0 hours); median illness duration was 11 hours (range 0–110 hours). Ham was consumed by 35 (67%) respondents; all ill persons ate ham. The attack rate among ham consumers was 74% (26/35); among non-consumers it was 0% (0/17), $P < .001$. Staphylococcal enterotoxins were detected in both ham samples; *Staphylococcus aureus* isolates contained corresponding toxin genes. The ham had been baked and cooled, then cut and refrigerated at home the day before serving, and then reheated prior to serving; no refrigeration or serving temperatures were recorded.

Conclusions: Epidemiologic and laboratory evidence indicate the outbreak was attributable to staphylococcal toxin contaminated ham prepared in a home kitchen. Temperature abuse can contribute to toxin production. We reviewed food safety guidelines with church staff and provided a food handling class to prevent future illness.

P1.8 Prevalence of Failure to Floss Among Adults — United States, 2009–2012

Authors: Duong T. Nguyen, E. Fleming, B. Kit

Background: Periodontal (gum) disease affects nearly half of U.S. adults and is associated with adverse health outcomes, including tooth loss. Twice daily tooth brushing and daily flossing prevent periodontal disease. Our objective was to describe, for the first time, prevalence of failure to floss among US adults using nationally representative data from the National Health and Nutrition Examination Survey (NHANES).

Methods: Data from 9,056 US adults ages 30 years and older who participated in the 2009-2012 NHANES were examined. Number of days of reported flossing in the last week was examined by age, sex, race/Hispanic origin, and family income to poverty ratio (FIPR). Analyses used sample examination weights to obtain nationally representative estimates, and design variables to account for the complex survey design.

Results: Overall, 32.4% of adults reported no flossing, 37.3% reported less than daily flossing, and 30.3% reported daily flossing in the last week. Prevalence of no flossing was higher in males (39.1%) than females (26.7%, P <.0001); higher for those aged 75 years or older (45.2%) than those aged 30-44 years (31%, P <.0001); and higher among non-Hispanic black (39.6%, P <.001) and Hispanic (38.4%, P <.001) adults than non-Hispanic white (29.9%) adults. Low-income participants (FIPR of <1.3) had a higher prevalence of not flossing than those with FIPR of 1.3 or higher (49.4% versus 27.6%, P <.0001).

Conclusions: Approximately one in three US adults report not flossing and another one-third reporting not flossing daily. Public health and clinical interventions addressing oral health behaviors in the prevention of periodontal disease may be informed by the significant disparities observed in this study.

P1.9 *Clostridium perfringens* Illness Associated with a Community Dinner — Nebraska, 2015

Authors: Caitlin Pedati, B. Corman, B. Buss, T. Safranek

Background: In October 2015, a community organization reported a gastrointestinal illness cluster among community dinner attendees. An investigation was initiated to identify cases, establish etiology, and prevent further illnesses.

Methods: We conducted a cohort study of all meal attendees using standardized telephone interview questionnaires to collect food and illness histories. A case was defined as abdominal pain or diarrhea (≥3 stools/24 hours) in an attendee with symptom onset 6–24 hours after dining on October 15; well attendees served as a comparison. Food handlers were interviewed, environmental assessment was conducted, and leftover food was cultured for *Clostridium perfringens* and *Bacillus cereus*.

Results: Of 40 reported attendees, 31 were interviewed. Twenty-two (71%) case-patients were identified (median onset time, 10 hours [range: 6–14 hours]), 11 (50%) were men, and median age was 69 years (range: 25–80 years). Twenty-one (95%) persons reported watery diarrhea, 17 (77%) abdominal cramps, and 16 (73%) both; none sought medical care. A chicken noodle dish was consumed by all attendees and was the only item available for testing. *C. perfringens* was isolated from this dish. No food item was statistically associated with illness. Cooks reported boiling chicken >24 hours before the meal, removing it from water and refrigerating, and separately refrigerating leftover water in deep containers. Noodles were later boiled in this water and combined with chicken for serving.

Conclusions: This outbreak was likely caused by inadequate cooling of water resulting in *C. perfringens* growth persisting after final meal preparation, leading to sporulation and production of enterotoxin upon ingestion. Following this outbreak, cooks attended a food education course, with emphasis on correct cooling techniques and use of shallow liquid volumes (<3 inches) in storage containers.

P1.10 Reported Cluster of Neuralgic Amyotrophy — North Carolina, May–September 2015

Authors: Jessica Rinsky, J. Norbury, J. Sejvar, Z. Moore

Background: In August 2015, a physician contacted the North Carolina Division of Public Health concerning an increase in neuralgic amyotrophy (NA) diagnoses at University A since May 2015. NA, a rare, idiopathic syndrome characterized by unilateral pain, weakness, and numbness in the neck, shoulder, or arm, is diagnosed by clinical history and physical exam and has been associated with preceding viral illness, vaccination, surgery, or trauma. We investigated to verify the potential cluster and identify common exposures.

Methods: We defined a case as sudden onset of severe and continuous pain in the neck, shoulder or arm followed by weakness, numbness, and wasting of muscles in the same area in a North Carolina resident. We reviewed medical records and conducted standardized interviews with patients who received an NA diagnosis at University A during May–September 2015. We solicited reports of increased NA diagnoses from 6 North Carolina hospital systems.

Results: Twelve University A patients received an NA diagnosis. Among 8 patients available for interview, 4 did not meet the case definition because they described gradual pain onset or weakness preceding pain. Four patients met the case definition; 3 reported symptom onsets during January–June 2015 and 1 reported onset in 2000. All 4 patients reported ≥1 exposure associated with NA, but no common exposures were observed. No other hospital systems reported NA diagnoses increases.

Conclusions: We were unable to verify an NA cluster or identify common exposures among cases. This investigation highlights challenges of investigating a syndrome that lacks definitive diagnostic criteria. Better clinical and epidemiologic information is needed to characterize illness affects and facilitate identification of clusters and relevant exposures.

P1.11 Prevalence of Early Diagnosis of Autism Spectrum Disorder and Co-Occurring Conditions Among Children in Five Sites in the United States, 2010

Authors: Gnakub N. Soke, M. Maenner, D. Christensen, M. Kurzius-Spencer, L. Schieve

Background: Autism spectrum disorder (ASD) commonly co-occurs with other developmental and health problems, requiring costly lifelong services. Early diagnosis of ASD is important because receipt of early intervention leads to improved outcomes. Since 2000, CDC has monitored 8-year-olds with ASD through the Autism and Developmental Disabilities Monitoring Network, and in 2010 also began monitoring 4-year-olds. We compared the prevalence of ASD and co-occurring conditions between the two age groups.

Methods: Using 2010 surveillance-year data from five sites for 4-year-olds (born in 2006) and 8-year olds (born in 2002) with ASD, we used log-binomial regression to compare (1) prevalence of early-diagnosed ASD (i.e., having ASD diagnosis by age 4) and (2) adjusted prevalence of co-occurring conditions between children born in 2002 when they were ages 4 and 8, and children born in 2006 when they were age 4.

Results: Prevalences (per 1000) of early-diagnosed ASD for children born in 2002 and 2006 were 7.2 (95% CI: 6.5, 7.9) and 8.0 (7.2, 8.7), respectively (prevalence ratio [PR] = 0.9 [0.7, 1.1]). For children born in 2002, prevalence at age 8 (14.7 [13.7, 15.7]) was twice the prevalence at age 4 ($P<.001$). Adjusted prevalences of adaptive functioning delays (aPR=1.6), sleep problems (aPR=1.5), aggression (aPR=1.6), temper tantrums (aPR=1.2), and psychiatric conditions (aPR=2.1) were significantly higher among 8-year-olds than 4-year-olds.

Conclusions: Prevalence of early-diagnosed ASD was similar for children born in 2002 and 2006, but represented half the prevalence among 8-year-olds born in 2002. While it is encouraging that children are frequently diagnosed in time to utilize early intervention services, continued monitoring for ASD beyond age 4 is needed because many co-occurring conditions/symptoms may not be apparent at younger ages.

P1.12 Attitudes Toward Banning the Sale of Tobacco Products in Pharmacy Stores — United States, 2014

Authors: Teresa W. Wang, I. Agaku, K. Marynak, B. King

Background: A growing number of communities are applying policies that prohibit the sale of tobacco products in pharmacy stores. We examined attitudes among adults toward banning tobacco product sales in pharmacy stores.

Methods: Data were from 2014 Summer Styles, an Internet panel survey of adults aged ≥18 years in the United States (N = 4,198). Respondents were classified as favoring a ban if they responded "strongly favor" or "somewhat favor" (versus "somewhat oppose" or "strongly oppose") to the question, "Do you favor or oppose banning the sale of all tobacco products in retail pharmacy stores?" Poisson regression was used to calculate adjusted prevalence ratios (aPR) of the association between favorability and sex, age, race/ethnicity, education, income, region, cigarette smoking, and noncigarette tobacco use.

Results: Overall, 66.1% of adults favored banning tobacco product sales in pharmacy stores. Favorability was 46.5%, 66.3%, and 71.8% among current, former, and never cigarette smokers, respectively. Favorability was more likely among females than males (aPR: 1.03; $P<.05$). Compared with persons with annual household incomes <$15,000, favorability was more likely among persons earning $15,000-$24,999 (aPR: 1.08), $25,000-$39,999 (aPR: 1.07), $40,000-$59,999 (aPR: 1.08), or ≥$60,000 (aPR: 1.08) ($P<.05$). Favorability was less likely among current cigarette smokers than never smokers (aPR: 0.89; $P<.05$). Similarly, adults who reported ever (aPR: 0.97) or past 30 day use (aPR: 0.92) of noncigarette tobacco products had lower likelihood of favorability than never users ($P<.05$).

Conclusions: Two-thirds of adults, including nearly half of cigarette smokers, favored banning the sale of tobacco products in pharmacy stores. Prohibiting tobacco product sales in these settings may reinforce pharmacy stores' efforts to promote wellness, and reduce the desirability, acceptability, and accessibility of tobacco.

CONCURRENT SESSION C1: Foodborne Outbreaks

3:00–4:45 PM

Ravinia Ballroom

Moderators: Kirk Smith and Kris Bisgard

3:05 Multidrug-Resistant *Salmonella* Serotype I 4,[5],12:i:- Infections Associated with Pork — Washington State, 2015

Authors: Vance Kawakami, L. Bottichio, K. Angelo, N. Linton, C. Basler, J. Lloyd, W. Inouye, E. Gonzales, H. Oltean, J. Sinatra, M. Kay, M. Wise, B. Melius, E. Trees, H. Carleton, J. Duchin, S. Lindquist

Background: *Salmonella enterica* serotype I 4,[5],12:i:- infections are increasingly multidrug resistant, a characteristic associated with increased hospitalization rates, bloodstream infections, and treatment failure. During June 2015, Public Health–Seattle & King County and Washington State (WS) Department of Health detected an outbreak of this serotype. We investigated to determine infection source and prevent further illness.

Methods: A case was defined as illness with the outbreak strain with onset April 25, 2015–October 25, 2015 in a WS resident or a highly related isolate by whole genome sequencing (WGS) in a non-WS resident. We compared food histories of outbreak-associated patients with FoodNet Population Survey by binomial test. Antimicrobial resistance testing and WGS were performed on selected clinical, food, and environmental isolates.

Results: We identified 192 patients from 5 states; 17% (30/180) were hospitalized. More patients (74% [57/77]) consumed pork than reported in FoodNet (43%; P <0.001); 61% (35/57) of pork consumers ate product traced to 1 pork-slaughter facility in WS (Establishment A). Environmental samples from Establishment A, distributors and restaurants serving Establishment A products, and leftover food yielded outbreak strains. All 10 clinical isolates tested displayed multidrug resistance. WGS revealed 2 distinct groups of highly related isolates. Establishment A recalled 639,642 pounds of pork and voluntarily ceased operations August 27, 2015.

Conclusions: This is the first outbreak of *Salmonella* I 4,[5],12:i:- infections where epidemiologic, laboratory, and traceback evidence implicated pork as an outbreak source, and highlights need for ongoing *Salmonella* control measures from processing to consumption. The drug susceptibility should be monitored in order to understand multidrug resistance in this serotype and design a strategy to mitigate it.

3:25 *Salmonella* serovar I ,4,{5},12:i:- Outbreak at Restaurant A — Minnesota, 2015

Authors: Pamela Talley, C. Medus, P. Spadafore, N. Hedeen, W. Spanier, E. Tibbetts, J. Hennes, K. Smith

Background: Nontyphoidal *Salmonella* is the leading bacterial cause of foodborne disease in the United States, causing ~1 million illnesses annually. During March 2015, the Minnesota Department of Health identified multiple *Salmonella* serovar I ,4,{5},12:i:- isolates from ill Minnesota residents with indistinguishable pulsed-field gel electrophoresis patterns. We investigated to identify the source and prevent additional infections.

Methods: Cases were defined as infection with the *Salmonella* outbreak strain from ill Minnesota residents with stool collection during March 16, 2015–April 1, 2015. Case-patients were interviewed by using a hypothesis-generating questionnaire and reinterviewed regarding Restaurant A menu items. Restaurant A could not provide credit card receipts; however, de-identified transaction records from consecutive implicated meal dates provided nontraditional data for a case-control study. An environmental assessment of Restaurant A was performed.

Results: Nine cases were identified; 8/9 case-patients had fever; 6/9 had bloody diarrhea; and 5/9 were ill ≥11 days. No hospitalizations or deaths were reported. Median age was 42 years (range: 25–71 years); 5 (56%) were female. All patients ate at Restaurant A during the 9 days before illness onset. Only coleslaw consumption (7/9 patients versus 101/395 control subjects; odds ratio, 10.2; 95% confidence interval, 2.1–49.8; Fisher's exact $P = .002$) was associated with illness. A well employee who made coleslaw daily also performed cleaning, including spraying cooler racks holding raw chicken, and discarding raw chicken fluid into a floor drain.

Conclusions: Restaurant transaction records can provide valuable control data when traditional methods fail. Combined epidemiologic and environmental findings indicated this salmonellosis outbreak likely resulted from cross-contamination of coleslaw from raw chicken by a restaurant food worker. After correcting food preparation practices, no additional illnesses were identified.

3:45 Large Outbreak of Botulism Associated with a Church Potluck Meal — Ohio, 2015

Authors: Carolyn L. McCarty, K. Angelo, K.D. Beer, K. Cibulskas-White, K. Quinn, S. de Fijter, R. Bokanyi, E. St. Germain, K. Baransi, G. Shafer, L. Hanna, M. DiOrio, C. Luquez, J. Dykes, B.E. Mahon, C. Basler, K. Curran, A. Matanock, K. Walsh, K.J. Slifka, P.M. Griffin, A.K. Rao

Background: On April 21, 2015, Hospital A in Lancaster, Ohio, reported a suspect botulism case. Within two hours, four more patients with similar clinical features arrived at the emergency department. All had eaten at a widely attended church potluck meal on April 19. Botulism is a rare but severe neuroparalytic illness, with a mortality rate of ~60% if untreated. In anticipation of more patients, CDC sent an unprecedented 50 doses of botulinum antitoxin to Ohio. We investigated to confirm the diagnosis, identify additional patients, and determine the source of exposure.

Methods: A case was defined as illness in a person who ate potluck food and developed ≥1 symptom of botulism during April 1929. We identified all persons who consumed potluck food, administered a food exposure questionnaire, interviewed a food preparer, and collected leftover food. Laboratory testing of clinical and food specimens was performed for botulinum neurotoxin and *Clostridium botulinum*.

Results: Among 77 persons who consumed potluck food, 29 (38%) met the case definition. Median patient age was 64 (range: 9–87) years. Twenty-five (86%) patients received botulinum antitoxin. Eleven (38%) patients were intubated. One patient died. Twenty-one (91%) of 23 persons who reported consuming homemade potato salad and five (10%) of 50 who reported not consuming it became ill (risk ratio: 9.1; 95% confidence interval: 3.9–21.2). Interviews with the preparer revealed improper home canning of potatoes. Patient and potato salad specimens yielded botulinum neurotoxin and *C. botulinum* type A.

Conclusions: This was the largest United States botulism outbreak in 37 years. The epidemiologic and laboratory investigations implicated potato salad prepared with improperly home-canned potatoes. Early recognition and rapid response likely reduced mortality.

4:05 *Salmonella* Outbreak Among Patrons of an Upscale Restaurant — Washington, DC, 2015

Authors: S. Janet Kuramoto-Crawford, S. McGee, K. Li, K. Dassie, A. Hennenfent, F. Johnson-Clarke, J. Davies-Cole

Background: *Salmonella* causes approximately 1.2 million infections and 450 deaths annually in the United States. On September 8, 2015, a local emergency department reported 4 possible cases of *Salmonella* to the District of Columbia Department of Health (DC DOH). All patients had eaten at Restaurant A. We sought to identify cases and exposures sources to prevent additional illness.

Methods: A case-control study was conducted with Restaurant A patrons. A case was defined as gastrointestinal illness ≤7 days after eating at Restaurant A during July–September 2015. Control subjects had eaten at Restaurant A and reported no subsequent illness. Chi-square tests were performed to examine food items associated with illness. DC DOH inspected the restaurant; DC Public Health Laboratory tested food and environmental samples collected during September 9–11.

Results: Among 214 patrons interviewed, 68% (n = 146) were case-patients. Among case-patients, 10 (7%) were hospitalized and 35 (24%) were confirmed to have *Salmonella* enteritidis. Meal dates were during August 26, 2015–September 9, 2015, for 97% of case-patients. Approximately 67% of case-patients were female; 74% were non-Hispanic white; and mean age was 37 years (range: 9–72 years). Case-patients were more likely to have eaten truffle mushroom croquette (60% versus 29%; p <0.001) and truffle risotto (25% versus 10%; p = 0.02); both dishes contained truffle oils. Multiple food safety violations were noted; none of the food or environmental samples, including truffle oils, grew *Salmonella*. Restaurant was closed during investigation from September 10–16.

Conclusions: Epidemiologic evidence indicates foods containing truffle oil were possible illness sources. These foods were removed from the menu, and no new cases have been reported since the restaurant reopening.

4:25 *Salmonella* Poona Infections Linked to Imported Cucumbers — United States, 2015

Authors: Mark E. Laughlin, L. Bottichio, L. Gieraltowski, I. Williams, L. Burnworth, E. Trees, A. Sabol, D. Wagner, S. Seelman, S. Viazis, A. Crosby, A. Tesfai, S. Lance, J. Concepcion Acevedo, J. Weiss, J. Narang, J. Higa, M. Needham, A. Barnes, E. McDonald, A. Maroufi, H. Buonomo, C. Neiss, L. Negado, J. Healy, F. Ni, K. Trinh, R. Sowadsky, L. McCullough, D. Fejes, A. Saupe, C. Rigdon, G. Provo, J. Ayers

Background: *Salmonella* causes approximately 1.2 million illnesses and 400 deaths annually. On 8/18/2015, PulseNet, the national molecular subtyping network detected a multistate cluster of 32 *Salmonella* serovar Poona (SPa) infections with an indistinguishable genetic fingerprint. Our objectives included identifying the source and preventing additional illnesses.

Methods: A case was defined as an ill-person infected with the outbreak strains reported to PulseNet with illness onset on or after 7/22/2015. Information was collected using focused questionnaires regarding food consumption seven days before illness onset. Product samples were collected and cultured for enteric pathogens. Whole genome sequencing (WGS) was conducted to further characterize the relatedness of isolates.

Results: As of 11/5/2015, a total of 829 cases from 38 states were identified. Median age of case-patients was 18 years; 27% (165/601) were hospitalized; four deaths were reported. A significantly higher percentage of case-patients than FoodNet survey respondents consumed cucumbers within seven days before illness onset (68% vs. 55%, p<0.0001). Eleven sub-clusters were identified in seven states. A common distributor was identified for all sub-clusters. The distributor received cucumbers imported from a single Mexican farm. Cucumbers distributed by the firm yielded an outbreak strain which led to a voluntary recall of cucumbers sold from 8/1–9/3/2015. WGS data demonstrated phylogenetic links between clinical and cucumber isolates.

Conclusions: Epidemiologic, traceback, and laboratory evidence suggests imported cucumbers were a source of the infections. A recall was issued only 17 days after the outbreak was identified, notably short for a produce item sold at multiple points-of-service. This investigation is the third since 2013 to identify either domestic or imported cucumbers as the source of a large multistate outbreak.

CONCURRENT SESSION C2: Influenza

3:00–4:45 PM

Dunwoody Suite

Moderators: Dan Jernigan and Michael Jhung

3:05 Influence of Chief Complaint Field Length Concerning Syndromic Surveillance of Influenza-Like Illness — Nebraska, 2015

Authors: Caitlin Pedati, S. Dietz, S. Gonzalez, B. Buss, T. Safranek

Background: Accurate influenza-like illness (ILI) surveillance is critical for prevention and response. Nebraska conducts ILI surveillance by using Electronic Surveillance System for Early Notification of Community-Based Epidemics (ESSENCE), which applies a text-processing algorithm to chief complaints from emergency department (ED) electronic health records (EHR). Available data vary by EHR vendor allowances and what gets entered. We assessed whether word count of chief complaint fields influences ILI detection.

Methods: Using word count in EHR chief complaint fields from 160 ED visits during January 1–March 31, 2015, from 2 hospitals, we created a binary field length variable on the basis of median word number (short [≤6 words] or long [>6 words]). An ILI gold standard was established if patients' EHR documented fever (>100°F) and either cough or sore throat with no alternative diagnosis. We applied the ESSENCE algorithm to the same records and calculated sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).

Results: Chief complaint median length was 6 words (range: 1–45); short and long chief complaint medians were 2 (range: 1–6, n=80) and 19 (range: 7–45, n=80), respectively. ESSENCE ILI detection analysis demonstrated 33% sensitivity, 96% specificity, 62% PPV, and 89% NPV. For chief complaints with ≤6 words we found 25% sensitivity, 97% specificity, 67% PPV and 84% NPV. For >6 words we found 50% sensitivity, 96% specificity, 57% PPV, and 95% NPV. Sensitivity differed significantly between short and long chief complaints (McNemar's test, $P < .0001$).

Conclusions: Chief complaint fields of >6 words improved ESSENCE's ILI sensitivity. EHR vendors can provide data-entry fields to capture long chief complaints. Additionally, providers are encouraged to enter more data to enhance ILI detection accuracy from EHRs.

3:25 Influenza Antiviral Use Among High-Risk Outpatients During Three Recent Influenza Seasons — United States, 2012–2015

Authors: Rebekah S. Schicker, B. Flannery, J. Chung, M. Gaglani, R. Zimmerman, L. Jackson, J. Petrie, H. McLean, M. Nowalk, M. Jackson, A. Monto, E. Belongia, H. Eng, S. Garg, A. Fry, F. Havers

Background: Influenza results in >200,000 US hospitalizations annually. Early antiviral treatment can reduce the risk of complications, including hospitalization and death, and is recommended by CDC for all outpatients at increased risk of severe influenza-associated disease due to age or comorbidities. However, previous studies suggest that antiviral prescribing is low. We examined three recent influenza seasons to determine whether influenza antiviral prescribing has increased among high-risk outpatients.

Methods: We analyzed antiviral prescription data for outpatients aged ≥6 months who presented with respiratory illness of ≤7 days duration and were enrolled in the US Influenza Vaccine Effectiveness Network in five states during the 2012–13 to 2014–15 influenza seasons. We obtained clinical information from interviews and medical record extraction. All patients had respiratory specimens that were tested for influenza by RT-PCR. We used the Cochran-Armitage test for trend to compare proportions of patients receiving antivirals across seasons.

Results: During three seasons, 865 (8%) of 10,521 outpatients in high-risk groups were prescribed antiviral medications, including 4% of patients aged <2 years, 10% aged ≥65 years, 9% with ≥1 underlying medical condition, and 23% of pregnant women. Among 3,624 high-risk patients enrolled ≤2 days from illness onset, 577 (18%) were prescribed antivirals. Among 2,434 high-risk patients with PCR-confirmed influenza infection, 535 (22%) were prescribed antiviral treatment, including 391 (40%) of 1,009 presenting ≤2 days from illness onset; the proportion of these patients prescribed antivirals was similar across seasons (2012/13–2014/15: 36%, 43%, 39%, *P*=.34).

Conclusions: In this multi-state study, influenza antiviral medications were consistently under-prescribed for high-risk outpatients. Efforts are needed to understand barriers to antiviral prescribing and to improve use in order to reduce influenza-associated complications.

3:45 Risk Factors for Hospital Admission Following Outpatient Medical Care Among Adults with Influenza — United States, 2011–2015

Authors: Grace D. Appiah, C. Chung, F. Havers, E. Belongia, M. Gaglani, L. Jackson, M. Jackson, H. McLean, A. Monto, P. Nowalk, S. Ohmit, R. Zimmerman, A. Fry, B. Flannery

Background: Influenza virus infection causes >200,000 hospitalizations in the United States annually. Early antiviral treatment of outpatients with influenza may reduce risk of subsequent hospitalization. To identify persons at risk for hospitalization after an influenza-related clinic visit, we evaluated data from outpatients during four influenza seasons.

Methods: We analyzed medical record data from outpatients aged ≥18 years, with respiratory illness onset ≤7 days and laboratory confirmed influenza, enrolled at five U.S. Influenza Vaccine Effectiveness Network sites during 2011-2012 through 2014-2015. We identified hospitalizations occurring within 14 days of outpatient encounters for RT-PCR-confirmed influenza. High-risk conditions were defined according to Advisory Committee for Immunization Practices recommendations for influenza vaccination. We used multivariable logistic regression to calculate adjusted odds ratios (aOR) and 95% confidence intervals (CI) for predictors of influenza-associated hospitalization adjusted for age, site and high-risk condition.

Results: Overall 73 (2%) of 4,024 adult outpatients with influenza were hospitalized ≤14 days (median, 2 days; interquartile range: 0-7 days) after outpatient visit, including 5% of persons aged ≥65 years and 3% of persons with high-risk conditions. Independent predictors of influenza-associated hospitalization after outpatient visit included age ≥65 years (aOR 2.2, 95% CI 1.4, 3.7) and presence of ≥1 high-risk conditions (aOR 4.8, 95% CI 2.6, 8.8). Outpatients with influenza A(H1N1)pdm09 virus infection had a higher risk of hospitalization (aOR 1.6, 95% CI 1.0, 2.9) compared to those with influenza A(H3N2) virus infection but the difference was not statistically significant.

Conclusions: In this study, older adults and adults with high-risk conditions were more likely to be hospitalized after outpatient visits for influenza virus infection. These results support current recommendations for use of influenza antiviral treatment in these adults.

4:05 Viral and Bacterial Co-detections in Influenza-Positive Patients Hospitalized with Severe Acute Respiratory Illness — Minnesota, 2013–2015

Authors: Kate E. R. Russell, A. Fowlkes, R. Lynfield, H. Friedlander, K. Como-Sabetti, D. Boxrud, A. Strain, S. Bistdeau, A. Steffens, C. Reed

Background: Influenza is a common cause of severe acute respiratory illness (SARI), leading to >200,000 U.S. hospitalizations annually. The impact of other respiratory pathogens on the severity of influenza-associated SARI is unclear. Previous studies suffer from biases inherent in clinician-ordered testing or focus on patient subgroups. Using an active surveillance platform with systematic multi-pathogen testing, we describe co-detections in influenza-positive SARI patients.

Methods: Minnesota conducted SARI surveillance in three hospitals from September 2013–June 2015. We tested respiratory specimens from all hospitalized patients with fever, cough, and difficulty breathing for 16 viral and 6 bacterial pathogens using individual and multiplex RT-PCR. We collected patient information, including bacterial culture results, from medical records. We compared age-adjusted risk factors and outcomes among patients with influenza alone to those with co-detections using logistic regression.

Results: Of 320 influenza virus-positive SARI patients, 70 (22%) had at least one co-detection (17% viral, 5% bacterial). RSV and rhinovirus were most frequent overall and Staphylococcus aureus was the most common bacterial co-detection. Patients with viral co-detections were younger compared with patients with influenza alone (median age 2 vs. 50 years respectively, p<0.01). Patients with bacterial co-detections had higher mortality (18% vs. 1%, p<0.01) and frequency of ICU admission (35% vs. 12%, p<0.05). Patients with co-detections were less likely to have had a clinician-ordered influenza test (odds ratio [OR] 0.40, p<0.01) and to have received influenza antiviral treatment (OR 0.58, p=0.05).

Conclusions: Co-detections were common among patients with influenza-associated SARI, and more severe among those with bacterial co-detections. Clinicians should be aware of the risk of multiple pathogens in SARI and consider influenza testing in addition to empiric antiviral treatment during influenza season.

4:25 Trivalent Inactivated Influenza Vaccine Efficacy Among Young Children in an Urban Bangladesh

Authors: Melissa A. Rolfes, D. Goswami, A.T. Sharmeen, S. Yeasmin, N. Parvin, K. Nahar, M. Rahman, M. Barends, D. Ahmed, M.Z. Rahman, E. Azziz-Baumgartner, J. Bresee, S. Luby, L. Moulton, M. Santosham, A.M. Fry, W.A. Brooks

Background: Pneumonia is a primary cause of child mortality worldwide, and influenza is a major cause of childhood pneumonia. We sought to determine the impact of influenza vaccination on incident influenza and pneumonia in young children.

Methods: Children aged 6–23 months were enrolled in a double-blind, randomized controlled trial of trivalent inactivated influenza vaccine (IIV3) versus inactivated polio vaccine (IPV) conducted August 2010–April 2014 in Kamalapur, Bangladesh. Clinical illness was captured through weekly home-based surveillance, with ill children taken to a study clinic. Respiratory specimens were collected from ill children and tested for influenza viruses using real time RT-PCR. We estimated yearly incidence rates of clinical pneumonia and laboratory-confirmed influenza. Intention-to-treat vaccine efficacy (VE) was estimated as 1-(rate ratio) x 100% using unadjusted Poisson regression.

Results: 4,081 children were randomized, with 2,576 and 2,593 child-years observed in the IIV3 and IPV arms, respectively. Thirty-eight (IIV3 arm) and 36 (IPV arm) children were lost-to-follow-up over the study period. Overall, pneumonia incidence was 46 episodes per 100 child-years in both the IIV3 and IPV arms (VE against clinical pneumonia=-1%, 95% confidence interval [CI] -15%, 12%). Overall, influenza incidence was 9 and 14 episodes per 100 child-years in the IIV3 and IPV arms, respectively (VE against influenza=32%; 95% CI 19%, 43%). Of pneumonia episodes, 4% were influenza-positive (VE against influenza-positive pneumonia=32%; 95% CI -5%, 55%).

Conclusions: IIV3 vaccination of young children in Bangladesh provided a modest reduction in laboratory-confirmed influenza incidence, but did not significantly impact pneumonia. Exploration of other vaccine strategies, including adjuvanted and live influenza vaccines, and non-vaccine interventions may be warranted to inform influenza and pneumonia prevention for young children in low-income countries.

CONCURRENT SESSION D1: Tuberculosis

8:30–9:55 AM

Ravinia Ballroom

Moderators: Phil Lobue and Anne Marie France

8:35 Tuberculosis Hotspots: Cluster of Cases with Matching *Mycobacterium tuberculosis* Genotype — Gaborone, Botswana, 2012–2015

Authors: Diya Surie, O. Fane, M. Ogopotse, E. Click, P. Moonan, A. Finlay, N. Zetola, C. Modongo, J. Oeltmann

Background: Between August 2012 and July 2015, 25 tuberculosis (TB) patients with matching TB genotype and drug susceptibility pattern were detected in Gaborone, Botswana, suggesting recent transmission of this TB strain. Eleven had received care at the same hospital raising concern for nosocomial transmission. We investigated epidemiologic links between patients to determine the extent of nosocomial transmission and to identify potential hotspots of community transmission to inform targeted TB control measures.

Methods: We interviewed patients to determine common contacts, workplaces, and sites of social gathering. We also reviewed dates of their visits at the hospital and mapped their primary residence by global positioning system coordinates. We defined an epidemiologic link suggesting recent transmission as having at least one of the following associations: overlapping visits at the hospital; living within 1 kilometer of another patient; frequenting the same locations as another patient; or naming another patient as a contact.

Results: Based on epidemiologic links, transmission at the hospital might have occurred between two patients. However, recent community transmission was possible among 20 (95%) of 21 interviewed patients. Sixteen (76%) were linked to another patient sharing the same minibus route; 12 (57%) lived within 1 kilometer of another patient; 11 (52%) frequented the same bar as at least one other patient; 8 (38%) attended the same church as at least one other patient; and 6 (29%) named each other as a contact.

Conclusions: The hospital was not a major site of transmission for this cluster, but we identified several plausible sites of community transmission. Active case-finding at these sites could complement traditional contact tracing to identify additional TB patients and stop active transmission.

8:55 A Comparison of Treatment Response Time between *Mycobacterium bovis* and *Mycobacterium tuberculosis* Disease

Authors: Colleen Scott, J. Ershova, J.S. Cavanaugh, G.M. Mazurek, P. Lobue, P.K. Moonan

Background: Because pyrazinamide shortens standard tuberculosis treatment, current guidelines recommend longer treatment for tuberculosis due to pyrazinamide-resistant organisms, such as *Mycobacterium bovis.* We compare treatment response times of *M. bovis* and *M. tuberculosis* cases reported to the National Tuberculosis Surveillance System during 2006–2013.

Methods: We included patients with culture-positive, pulmonary tuberculosis with genotyping results who received standard four-drug treatment at the time of diagnosis. Time to sputum culture conversion (treatment response) was defined as the time between treatment start date and date of first consistently culture-negative sputum. Patients with incomplete culture conversion data, tuberculosis resistant to rifampin or isoniazid, or *M. tuberculosis* cases resistant to pyrazinamide were excluded. Patients who died during treatment were censored at the date recorded for death. We used Cox proportional hazard modeling to calculate adjusted hazard ratios (aHR) and 95% confidence intervals (95%CI).

Results: A total of 30,862 cases, 290 (0.9%) *M. bovis* and 30,572 (99.1%) *M. tuberculosis,* were eligible. After two months of treatment, 72% of *M. bovis* and 65% of *M. tuberculosis* patients converted sputum culture to negative (*P*=.0025). Relative to *M. tuberculosis* patients, *M. bovis* patients were more likely to convert to negative culture (aHR: 1.2; 95%CI: 1.1–1.4), after controlling for gender, age, HIV status, directly observed versus self-administered therapy, and a composite variable of sputum smear result and radiographic findings indicating pulmonary bacillary burden.

Conclusions: Inherent resistance to pyrazinamide in *M. bovis* TB cases did not lengthen time to culture conversion among those receiving standard treatment. Specific studies are needed to investigate intrinsic differences in response to treatment between *M. bovis* and *M. tuberculosis*.

9:15 Progression to Active Tuberculosis Among Immigrants and Refugees with Abnormal Chest Radiographs Conducted Overseas — California, 1999–2012

Authors: Jacklyn Wong, P. Lowenthal, J. Flood, J. Watt, S. Dietz, P.M. Barry

Background: California reported 6.6 tuberculosis cases/100,000 persons aged ≥15 years during 2014, and is striving to eliminate tuberculosis. Persons with radiographic evidence of previous tuberculosis disease have historically had increased risk for active tuberculosis. We estimated tuberculosis progression rates among these persons to guide elimination strategies.

Methods: To identify persons with previous tuberculosis, we retrospectively examined a cohort of immigrants and refugees aged ≥15 years with chest radiographs conducted overseas indicative of tuberculosis. Cohort members arrived in California during 1999–2012 and completed domestic evaluation to be classified into 1 of 3 groups (previous tuberculosis, latent tuberculosis infection [LTBI], or no documented infection). Arrivers progressing to active tuberculosis through 2014 were identified in California's Tuberculosis Registry. We calculated progression rates within 10 years after arrival. Using Cox models, we estimated hazard ratios (HRs) adjusted for age, sex, overseas treatment, and treatment upon arrival.

Results: Of 35,613 arrivers, 20,187 (56.7%) had previous tuberculosis; 7,124 (20.0%) had LTBI; and 8,302 (23.3%) had no documented infection. Overall, 102 arrivers progressed to active tuberculosis. Progression rates were 52.7 (95% confidence interval [CI]: 40.9–64.5), 28.8 (95% CI: 13.2–44.5), and 22.0 (95% CI: 9.6–34.5) cases/100,000 person-years among arrivers with previous tuberculosis, LTBI, and no documented infection, respectively. Previous tuberculosis significantly increased progression risk relative to no documented infection (adjusted HR = 2.68; 95% CI: 1.37–5.26), but LTBI did not (HR = 1.40; 95% CI: 0.60–3.24, data insufficient for adjusting).

Conclusions: Despite likely underestimation of tuberculosis progression because of unknown outmigration and deaths among this cohort, persons with previous tuberculosis had 8-fold higher incidence than the general California population and should be prioritized for evaluation and treatment.

9:35 Factors Associated with Poor Outcomes Among Patients with Multidrug-Resistant Tuberculosis — Four U.S. Sites, 2000–2007

Authors: Jorge L. Salinas, B. Silk, R. Pratt, J. Westenhouse, J. Flood, F. Dworkin, S. Ahuja, M. Rodriguez, J. Keller, Y. Luster-Harvey, P. Cegielski, L. Armstrong

Background: Multidrug-resistant tuberculosis (MDR TB) is diagnosed when the patient's *Mycobacterium tuberculosis* isolate is resistant to at least isoniazid and rifampin. Completing treatment reduces mortality and prevents TB recurrence and transmission to others. Although directly observed therapy (DOT) is standard care for ensuring treatment completion, some patients' therapy is self-administered. We examined the association of patient characteristics and treatment administration mode with poor outcomes among MDR TB patients.

Methods: Using surveillance data for MDR TB patients treated in California, Florida, Texas, and New York City during 2000–2007, we defined a poor outcome as all-cause mortality or treatment noncompletion because of loss to follow-up or refusal to continue therapy. We used Cox proportional hazards models to identify patient and treatment administration characteristics associated with time from MDR TB treatment start to poor outcome.

Results: Among 526 MDR TB patients, the median age was 38 years (interquartile range: 28–51 years). One hundred patients (19%) had previous TB, and 60 patients (11%) reported excessive alcohol use. Of 493 (94%) patients with available data, 462 (94%) received DOT. Ninety-six (18%) of 526 patients had poor outcomes, including 35 deaths and 61 treatment noncompletions. Older age (per 5-year increments) (adjusted hazard ratios [aHR]: 1.11; 95% confidence intervals [CI]: 1.03–1.19), previous TB disease (aHR: 1.96; 95% CI: 1.16–3.32), and excessive alcohol use (aHR: 1.92; 95% CI: 1.04–3.54) were risk factors for poor outcomes. Receiving DOT was protective (aHR: 0.28; 95% CI: 0.14–0.54).

Conclusions: Among this MDR TB cohort, older age, previous TB disease, and using alcohol excessively were risk factors for poor outcomes. Maximizing DOT coverage can help reduce poor outcomes from MDR TB.

CONCURRENT SESSION D2: Environmental Health

8:30–9:55 AM

Dunwoody Suite

Moderators: Patrick Breysse and Suzanne Beavers

8:35 Relationship Between the Social Vulnerability Index and Hurricane Sandy-Related Mortality — United States, 2012

Authors: Alice Wang, K. Conlon, J. Kolling, O. Olayinka, T. Bayleyegn, R. Noe, A. Wolkin

Background: The CDC/ATSDR Social Vulnerability Index (SVI) spatially identifies communities, at the census tract level, vulnerable to adverse effects of disasters to target local public health response. The overall SVI ranking (i.e., ranging 0–1, where 1 represents highest vulnerability) of all tracts is determined by variables (e.g., income, age, education, minority status) from the US Census. CDC previously reported 117 Hurricane Sandy-related deaths using American Red Cross (ARC) mortality reports. We examined the relationship between SVI and these deaths.

Methods: We obtained decedents' residential address and location of fatality from ARC records, death certificates, or media reports. SVI was assigned using the residential address. Tract mortality counts were aggregated into three groups (i.e., 1, 2, and 3+). Kruskal-Wallis test assessed differences in SVI by tract mortality group. Bi-variate Moran's I assessed spatial autocorrelation (i.e., clustering) of the location of fatalities.

Results: The residential address was obtained for 95% (n=111) of ARC mortality reports (N=117). For 77% of deaths (n=85), location of fatality was the same as residential address. The SVI did not differ by tract mortality group (*P=.335*). Bivariate Moran's I was significant for spatial clustering of the location of fatalities (*P<.0001*).

Conclusions: This is the first study exploring overall SVI rank as a predictor of disaster-related mortality. Preliminary results demonstrate that Hurricane Sandy-related deaths are spatially clustered; however, there was no significant association between SVI and tract mortality group. Additional analyses will include tracts without deaths, focus on evacuation zones, and examine SVI variables as risk factors. Understanding SVI for indication of greater risk regarding disaster-related mortality could improve SVI utility for public health professionals and emergency managers in disaster preparedness and response.

8:55 Geographic and Racial Disparities in Residential Proximity to Parks — United States, 2010

Authors: Emily N. Ussery, L. Yngve, D. Merriam, G. Whitfield, S. Foster, A. Wendel, T. Boehmer

Background: Parks are associated with environmental, physical, social, and mental health benefits. Identifying disparities in park access can help urban planners locate gaps in park systems and geographically prioritize park development. The objective of this study was to quantify residential proximity to parks by geography, race/ethnicity, and urbanicity using CDC's National Environmental Public Health Tracking Network access to parks indicator (API). This was the first national-scale investigation of its kind.

Methods: The API represents the percentage of individuals who live within a half-mile of a park boundary ("park proximity") and is calculated using a commercial parks database and 2010 US Census data. Differences in park proximity were examined by state, county, race/ethnicity, and degree of urbanization defined by 2013 Rural-Urban Continuum Codes. Because park proximity is derived from census data and lacks sampling error, statistical testing was not performed.

Results: In 2010, 39% of the US population lived within a half-mile of a park. Park proximity ranged from 9% in West Virginia to 88% in the District of Columbia, and from 0% in 350 counties (11.1% of total) to 100% in 3 counties (0.1% of total). Park proximity varied by race/ethnicity (range: 34.2% among non-Hispanic whites to 52.0% among non-Hispanic other races) and urbanicity (range: 16.2% in non-metropolitan counties to 43.3% in metropolitan counties).

Conclusions: Most US residents do not live within close proximity to a park, and geographic and racial disparities in park proximity exist. The API identified areas where residents lack basic park access, like non-metropolitan counties. Planning professionals can use this standardized measure to compare park proximity between states or counties and inform decisions about equitable park distribution to improve public health.

9:15 Prenatal Exposure to Polychlorinated Biphenyls and Cognitive Development in 15-month-old Girls — Bristol, United Kingdom, 1990–Present

Authors: Gamola Z. Fortenberry, E. Taylor, Z. Jeddy, T. Hartman, K. Kordas, A. Sjordin

Background: Polychlorinated biphenyls (PCBs) are synthetic, organochlorine compounds previously used in industrial processes. Although banned, these chemicals continue to persist in the environment and are associated with adverse health outcomes in children. Using data from the Avon Longitudinal Study of Parents and Children, we investigated the association between prenatal exposure to PCBs and cognitive development in 15-month-old girls.

Methods: The concentration of PCB-118 was measured in maternal serum samples collected during pregnancy. Using a variation of the MacArthur-Bates Communicative Development Inventories, cognitive development was measured based on total communication score and 4 sub–scores (social development, non-verbal communication, vocabulary, and understanding). Using multivariable linear regression, we explored associations between log–transformed PCB-118 exposure and each cognitive outcome with adjustment for maternal education, maternal smoking, alcohol consumption, maternal age, breastfeeding, marital status, head circumference, and Home Observation Measurement of Environment score—assessment of caregiver–child interaction and home life.

Results: Among 418 mother-daughter dyads, the geometric mean (25^{th}, 75^{th} percentile) for PCB-118 was 87 (64, 121) pg/g of serum. The mean (standard deviation) for vocabulary and total communication scores were 95.3 (45.5) and 138.3 (51.8), respectively. Preliminary results indicated a one percent increase in PCB-118 was associated with a 0.23 (95% Confidence Interval [CI]: -0.35– -0.11) and 0.25 (95% CI: -0.38– -0.11) unit decrease in vocabulary and total communication scores, respectively. We also observed effect modification based on maternal age suggesting decreased vocabulary and total communication scores among daughters of younger mothers.

Conclusions: Prenatal exposure to PCB-118 is associated with minor decreases in communication scores among young girls. This confirms the limited previous research regarding prenatal PCB-118 exposure–related impairments to early language development.

9:35 Methyl Bromide Release at a Condominium Resort — United States Virgin Islands, March 2015

Authors: Prathit A. Kulkarni, M. Duncan, M. Watters, L. Graziano, E. Vaouli, L. Cseh, J. Risher, M. Orr, T. Hunte-Ceasar, E. Ellis

Background: On March 22, 2015, the Agency for Toxic Substances and Disease Registry was notified of a 4-case cluster of suspected acute methyl bromide poisoning among family members vacationing in the U.S. Virgin Islands; symptoms included tremors, myoclonus, and altered sensorium. Methyl bromide, a pesticide banned for residential use, had been used to fumigate the building where the family was residing; methyl bromide had also been used at the condominium resort during October 2014. We assessed the extent of exposures to methyl bromide, adverse health effects, and public health impact from improper use of this chemical.

Methods: On the basis of the air concentration of methyl bromide in the fumigated building and expected decrease in the concentration over time, anyone who had entered a fumigated building <2 weeks from fumigation was considered potentially exposed. A standardized health questionnaire was used to assess adverse health effects.

Results: In addition to the family, 37 persons who had potentially been exposed to methyl bromide were identified. Among these 37 persons, 16 of 20 (80%) persons whose contact information was available were surveyed. Six of 16 (38%) respondents reported postexposure headache, and 4 of these 6 persons experienced fatigue. Four emergency medical personnel developed postexposure symptoms; certain responders noted that prompt notification about their exposure had not occurred.

Conclusions: Incorrect use of methyl bromide resulted in unsuspecting persons being exposed to this chemical. The most common postexposure symptoms were headache and fatigue. These exposures can be avoided if regulations regarding restricted-use chemicals are followed. Pest-control companies can also consider using integrated pest management, which emphasizes environmental sensitivity. Additionally, prompt notification of responders who experience a chemical exposure is recommended.

SESSION E: Donald C. Mackel Memorial Award Finalists

10:15 AM–12:00 PM

Ravinia Ballroom

Moderators: Michael Iademarco and Diana Bensyl

10:20 Influenza-Associated Parotitis — Outbreak During the 2014–15 U.S. Influenza Season

Authors: Melissa A. Rolfes, A.J. Millman, P. Talley, L.I. Elbadawi, N.A. Kramer, J.R. Barnes, L. Blanton, J.P. Davis, S. DeVita, J.J. Dreisig, R.J. Garten, T. Haupt, M.A. Jackson, A. Kocharian, D. Leifer, S. Lindstrom, K. Martin, L. McHugh, S. Robinson, G. Turabelidze, L.A. Webber, M.P. Weinberg, D.E. Wentworth, L. Finelli, M.A. Jhung

Background: Common in mumps, parotitis is rarely seen with influenza, yet >200 cases of influenza-associated parotitis were reported during the 2014–15 US influenza season, when a new influenza A(H3N2) virus emerged. We conducted a multi-state case-control study aimed at describing the epidemiology of and risk factors for influenza-associated parotitis.

Methods: Eleven states participated in the study from February–April, 2015. Using a standard questionnaire, we interviewed 50 cases (with parotitis) and 124 controls (without parotitis) with laboratory-confirmed influenza and a respiratory specimen available. Controls were matched to each case by age, state, hospital admission, and specimen collection date. Influenza viruses were characterized using RT-PCR and next-generation genetic sequencing. We compared epidemiologic and virologic characteristics of cases and controls using conditional logistic regression.

Results: Cases experienced painful (86%), unilateral (67%) swelling a median of 4 days (range 0–16 days) after onset of respiratory symptoms. Cases were significantly more likely to be male (76 vs. 51%; p-value=0.005) and report history of mumps infection (11 vs. 2%; p-value=0.047), but were less likely to have influenza-like illness (51 vs. 89%; p-value<0.001) than controls. We identified influenza A(H3N2) viruses, genetic group 3C.2a, in 100% of case (29/29) and 92% of control (105/114) specimens sequenced (p-value=0.22). Parotitis was not associated with underlying medical conditions, taking over-the-counter medications, or history of influenza vaccination.

Conclusions: History of mumps infection and male sex were associated with influenza-associated parotitis. Newly-emerged influenza A(H3N2) 3C.2a viruses, which were antigenically drifted from the 2014–15 influenza vaccine virus, were detected in all case specimens. Clinicians should consider influenza in patients with acute parotitis during influenza season to inform public health actions and influenza treatment decisions.

10:40 Multidrug-Resistant *Salmonella* serovar I 4,[5],12:i:- Infections Associated with Pork Consumption — Wisconsin, 2015

Authors: Lina I. Elbadawi, T. DeSalvo, R. Klos, T. Monson, D. Warshauer, J.P. Folster, A.C. Brown, E. Trees, J.P. Davis

Background: *Salmonella* is a leading cause of foodborne gastrointestinal illness in the United States; invasive infections require antimicrobial treatment with third-generation cephalosporins (e.g., ceftriaxone) and quinolones (e.g., ciprofloxacin) as first-line drugs. Presence of both extended-spectrum beta-lactamase (ESBL) phenotype and quinolone resistance is reported in <.2% of nontyphoidal *Salmonella* to CDC-National Antimicrobial Resistance Monitoring System. During May 2015, we investigated an outbreak of multidrug-resistant *Salmonella* serovar I 4,[5],12:i:- infections associated with consumption of Store A food in Wisconsin to stop transmission and understand multidrug-resistance mechanisms.

Methods: A confirmed case was defined as a *Salmonella* serovar I 4,[5],12:i:-infection with isolate pulsed-field gel electrophoresis patterns JPXX01.4356, JPXX01.4045, or JPXX01.0338; a probable case was a diarrheal illness in a person with exposure to Store A prepared foods during May 8–11. Laboratory investigation was enhanced by antimicrobial susceptibility testing, whole genome sequencing (WGS), and plasmid analysis of patient and food isolates.

Results: Seventy-six cases (37 confirmed and 39 probable) were identified; 7 (9%) hospitalizations and no deaths occurred. Seventy-three (96%) of 76 patients consumed Store A prepared pork carnitas. All 37 patient isolates and 2 leftover prepared pork isolates were resistant to 9 antibiotics from 6 different antibiotic classes. All isolates were resistant to ceftriaxone; 36 isolates had intermediate ciprofloxacin resistance. WGS of a subset of isolates identified 13 resistance genes including $bla_{\text{shv-12}}$, a gene conferring ESBL phenotype, and *aac(6')-lb-cr*, a plasmid-mediated quinolone resistance (PMQR) gene. Isolates with intermediate ciprofloxacin resistance also had PMQR *qnrB49*. Nine antibiotic resistance genes including $bla_{\text{shv-12}}$ were plasmid encoded.

Conclusions: Because plasmids permit horizontal gene transfer among different bacterial species, the potential for emerging multidrug-resistant *Salmonella* through plasmids warrants enhanced surveillance, investigation, and prevention.

11:00 Meningococcal Carriage Evaluation in Response to a Serogroup B Meningococcal Disease Outbreak and Mass Vaccination Campaign at a College — Rhode Island, 2015

Authors: Heidi M. Soeters, M. Whaley, X. Wang, N. Alexander-Scott, K. Goodwin, K. Kanadanian, C. Kelleher, J. MacNeil, S. Martin, L. McNamara, S. Sears, C. Vanner, J. Vuong, U. Bandy, K. Sicard, M. Patel,

Background: Meningococcal disease, caused by *Neisseria meningitidis*, is a rare but severe infection primarily transmitted via asymptomatic nasopharyngeal carriage. MenB-FHbp, a recently-licensed, 3-dose serogroup B meningococcal vaccine, was used to control a 2015 Rhode Island college outbreak. MenB-FHbp impact on carriage, and potential effect on herd immunity, is unknown and has important vaccine policy implications. We assessed MenB-FHbp vaccination impact on carriage.

Methods: Cross-sectional carriage surveys were conducted in conjunction with 3-dose vaccination campaigns. Questionnaires and oropharyngeal swabs were collected from undergraduates and graduate students living on-campus. Specimens were evaluated using culture, slide agglutination, real-time PCR, and whole genome sequencing. Prevalence ratios (PR) were calculated using Poisson regression with general estimating equations for repeat measures.

Results: During the three carriage surveys, 1,587 students participated 2,212 times. During the first, second, and third surveys, 25%, 24%, and 20% of participants, respectively, carried any meningococcal bacteria. During each survey, 4% carried serogroup B by PCR. The outbreak strain (serogroup B ST-9069) was not detected at baseline; one student carried a non-groupable ST-9069 variant in the second and third surveys. 508 students participated in multiple surveys: 370 (73%) remained non-carriers, 36 (7%) cleared carriage, 72 (14%) remained carriers, and 28 (6%) acquired carriage. Smoking (PR 1.8, 95%CI: 1.5–2.1) and male sex (PR 1.3, 95%CI: 1.1–1.6) were associated with increased meningococcal carriage.

Conclusions: Carriage prevalence on campus remained stable despite MenB-FHbp vaccination, suggesting two vaccine doses do not rapidly reduce carriage. Molecular testing is ongoing; a final survey is planned for February 2016. This study will improve our understanding of carriage dynamics over time and provide important data for policymakers considering routine serogroup B meningococcal vaccination programs.

11:20 Mass Poisoning Associated with a Homebrewed Alcoholic Beverage — Chitima, Tete Province, Mozambique, January 9–12, 2015

Authors: Amelia M. Kasper, S. Kern, C. Salomão, M. Anwar, C. Baltazar, B. Boyd, J. Brzezinski, A. Chang, K. Cook, T. Doyle, T. Falconer, Q. Fernandes, H. Ismael, J. Litzau, C. Mosse, F. Oliveira, A. Ridpath, C. Saeze, J. Schier, A. Steck, J. Thomas, J. Turner, A. Vergara, S. Viegas, E. Yard, E. Samo Gudo, I. Jani

Background: Over 200 people in Chitima, Mozambique became ill after drinking homebrewed *pombe* (a maize-based, alcoholic beverage) on January 9, 2015. CDC supported the Mozambican Ministry of Health's (MMOH) investigation to determine the causative toxic agent.

Methods: MMOH reviewed medical records and conducted community interviews to find cases, defined as any Chitima resident with unexplained death or onset of neurological, gastrointestinal, or cardiovascular symptoms during January 9–12, 2015. We obtained detailed clinical data from medical records and clinician interviews. Using a battery of forensic tests for toxic and infectious agents, the Food and Drug Administration (USFDA) tested the suspect *pombe*, suspect maize flour, and control *pombe* from a neighboring village.

Results: Of the 232 cases, 103 (43%) people were hospitalized; 75 (32%) died. Of the 118 (51%) people with clinical data, common symptoms were weakness (n = 60; 51%), vomiting (n = 68; 58%), and palpitations (n = 41; 35%); three physicians reported that gravely ill patients developed psychomotor agitation, followed by coma and death. The median interval from *pombe* consumption to symptom onset was 17 (range: 0–46) hours. Testing at USFDA's Forensic Chemistry Center detected bongkrekic acid (BA) in the suspect *pombe*. The flour used to make the *pombe* tested positive for BA and *Burkholderia gladioli* pathovar *cocovenenans*, a bacteria that produces BA. No BA was detected in the control sample.

Conclusions: The mass poisoning was likely caused by *pombe* brewed with BA-contaminated flour. Only Indonesia and China had previously reported BA poisonings; symptoms among Mozambican patients were similar to prior outbreaks. No further cases have been reported in Mozambique, but BA-related illness may be an unrecognized cause of toxic outbreaks globally.

11:40 Legionnaires' Disease Caused by a Cooling Tower — New York City, 2015

Authors: Isaac Benowitz, J. Rakeman, K. Musser, N. Kozak-Muiznieks, D. Baker, A. Fine, S. Hughes, J. Kornblum, J. Kunz, P. Lapierre, M. Moore, E. Nazarian, A. Tran, J.K. Varma

Background: Community outbreaks of Legionnaires' disease (LD), a common cause of severe pneumonia, have been associated with aerosolized *Legionella* bacteria from cooling towers. *Legionella* bacteria grow slowly in culture, which can delay environmental source identification. In July 2015, we investigated an outbreak of LD to find the source and interrupt transmission.

Methods: We defined a case as laboratory-confirmed LD with illness onset after July 1, 2015, in a person who lived in or visited a 7-ZIP-code area ≤10 days before illness onset. We assessed patient exposures through structured interviews. We located cooling towers in the area and measured residential space-time clustering ≤1 km from towers. Specimens from all towers were screened for *Legionella pneumophila* serogroup 1 (LP1) DNA by real-time polymerase chain reaction (PCR) and confirmed with culture. Patient isolates and tower isolates were compared using molecular methods.

Results: In total, 138 cases occurred during July 2–August 3; 16 (12%) persons died. No individual buildings were implicated: the investigation subsequently focused on cooling towers. Of 42 towers sampled, PCR detected LP1 DNA in 18 (43%); all 18 were immediately disinfected. LP1 grew in culture in 6 (14%). All 26 patient isolates matched isolates from Towers A and B by pulsed-field gel electrophoresis and sequence-based typing, but matched only isolates from Tower A by whole genome sequencing (WGS). By residential cluster analysis, Tower A was associated with 56 cases and Tower B with 33 cases.

Conclusions: We associated the largest U.S. community LD outbreak since 1976 with a cooling tower through epidemiology and molecular methods. PCR results prompted rapid disinfection of cooling towers, potentially preventing further infections. PCR and WGS might aid future LD investigations.

SPECIAL SESSION 2: Using Advanced Molecular Tools to Direct Public Health Action

12:05–1:05 PM

Ravinia Ballroom

Sponsor: The National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) and National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

This session will focus on the application of advanced molecular tools to detect and investigate outbreaks of infectious diseases and guide public health response. An overview of the use of advanced molecular tools in applied epidemiology at CDC will be provided, as well as examples of the application of these tools to detect and respond to outbreaks caused by HIV, TB, viral hepatitis, and enteric bacteria.

Relevance and Appropriateness for the EIS conference

Advanced molecular tools are an increasingly important public health tool for detecting and responding to outbreaks of infectious diseases. Integrating these approaches into surveillance and epidemiologic investigations offers the potential to detect transmission and outbreaks that would not be recognized through traditional surveillance and to gain a detailed understanding of transmission relationships that can guide more focused and effective public health responses. This topic should be of interest to many EIS officers and public health practitioners, whose work is increasingly influenced by these tools.

Speakers

- Advanced Molecular Detection at CDC and the Impact on Public Health. *Greg Armstrong, NCEZID*
- Using Molecular Sequence Data to Identify and Respond to HIV Transmission Clusters. *Alexa Oster, DHAP/NCHHSTP*
- Molecular Surveillance for Recent TB Transmission. *Benjamin Silk, DTBE/NCHHSTP*
- The Practical Impact of Whole-Genome Sequencing on Multistate Enteric Disease Outbreak Investigations. *Matthew Wise, DFWED/NCEZID*
- Global Health, Outbreak, and Surveillance Technology (GHOST): Advanced Molecular Detection in Viral Hepatitis. *Scott D. Holmberg, NCHHSTP*

SPECIAL SESSION 3: Data for Community Action: Nontraditional Epi-Aids in Noninfectious Diseases, Environmental Health, Injury, and Violence

12:05–1:05 PM

Dunwoody Suite

Sponsor: National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), National Center for Environmental Health (NCEH), and National Center for Injury Prevention and Control (NCIPC)

Success stories of timely public health responses focusing on nontraditional Epi-Aids in chronic diseases, environmental health, and injury.

- Nutrition, physical activity, and obesity using rapid assessments of the food and physical environments and how the findings informed intervention strategies, policies, and grant work. Examples provided will include Epi-Aids conducted in national parks, Navajo nation, Guam, and American Samoa.
- Overview of Epi-Aids in environmental health for the previous 10 years, including examples from the health studies, air pollution and respiratory health, and ATSDR.
- Overview of Epi-Aids in injury and violence epidemic focusing on recent prescription drug overdose and suicide-related Epi-Aids.

Relevance and Appropriateness for the EIS Conference

This session features success stories of timely public health responses focusing on nontraditional Epi-Aids in Chronic Diseases, Environmental Health, and Injury. The Epi-Aids were responses to urgent requests from local and federal agencies. State public health practitioners and CDC staffs can learn about noninfectious disease Epi-Aids. Incoming and current EIS officers interested in prevention of chronic diseases, environmental health, injury and violence can visualize the stepwise process from data collection to policy changes. The Division of Nutrition, Physical Activity, and Obesity conducted rapid assessments of selected food and physical environments and will describe how the findings informed intervention strategies, policies, and grant work. The National Center for Environmental Health provides an overview of Epi-Aids in environmental health for the previous 10 years, including Epi-Aids from health studies, air pollution and respiratory health, and the Agency for Toxic Substances and Disease Registry. The National Center for Injury Prevention and Control presents an overview of Epi-Aids in injury and violence focusing on recent prescription drug overdose and suicide-related Epi-Aids. The findings from these nontraditional Epi-Aids led to data for community actions including intervention strategies and policy changes.

Speakers

- Introduction. *Aly Goodman*
- Rapid Assessments of the Food and Physical Environments. *Seung Hee Lee-Kwan*
- Nontraditional Epi-Aids in Environmental Health. *Yulia Caroll*
- Epi-Aids: A Strategy for Rapidly Responding to our Nation's Growing Injury and Violence Epidemic. *Arlene Greenspan*

CONCURRENT SESSION F1: Vectorborne Diseases

1:25–3:30 PM

Ravinia Ballroom

Moderators: Steve Waterman and Jennifer Wright

1:30 Knowledge and Use of Prevention Practices for Chikungunya Virus Among Visitors — Virgin Islands National Park, 2015

Authors: Cara C. Cherry, K. Beer, C. Fulton, D. Wong, D. Buttke, J.E. Staples, E. Ellis

Background: The mosquito-borne chikungunya virus (CHIKV) emerged in the United States Virgin Islands (USVI) in June 2014, with 380 locally transmitted and 19 travel-associated cases reported during 2014. Efforts have focused on educating USVI residents regarding CHIKV symptoms (e.g., fever and arthralgia) and prevention measures, but limited knowledge is available concerning visitors' CHIKV awareness and prevention measures. We surveyed Virgin Islands National Park (VINP) visitors to assess CHIKV knowledge and prevention practices.

Methods: During February 2–8, 2015, we used an intercept, convenience-sample design to survey VINP visitors aged ≥18 years at 10 park locations. Respondents completed a standardized questionnaire assessing CHIKV knowledge, attitudes, and practices; health information-seeking practices; travel details; and demographics. Tests of comparisons were conducted using chi-square.

Results: Of 783 approached persons, 443 (57%) completed the survey. Fewer than half (208/441; 47%) were aware of CHIKV. During trip preparation, 28% of respondents (126/443) investigated USVI-specific health concerns, of whom 81% (102/126) were aware of CHIKV. Compared with persons unaware of CHIKV, CHIKV-aware persons were more likely to apply insect repellent ([134/207; 65%] versus [111/231; 48%]; P <.001), wear long-sleeved shirts and long pants ([84/203; 41%] versus [57/227; 25%]; P <.001), and wear clothing treated with insect repellent ([36/204; 18%] versus [22/227; 10%]; P =.02).

Conclusions: The majority of visitors surveyed did not research destination-related health concerns and were unaware of CHIKV; however, the majority of persons who conducted destination-related research were aware of CHIKV. CHIKV awareness was markedly associated with using multiple prevention measures to reduce disease risk. These findings underscore the importance of providing tourists with education regarding potential disease risks during transit or upon destination arrival.

1:50 Binational Dengue Outbreak Along the United States-Mexico Border — Yuma County, Arizona and Sonora, Mexico, 2014

Authors: Jefferson M. Jones, B. Lopez, L. Adams, F.J. Navarro Gálvez, A. Sánchez Núñez, N.A. Hernández Santillán, L. Plante, R.R. Hemme, M. Casal, E.A. Hunsperger, J. Muñoz-Jordan, V. Acevedo; K. Ernst, M. Hayden, S. Waterman, D. Gomez, T.M. Sharp, K.K. Komatsu

Background: Dengue, an acute febrile illness caused by any of 4 dengue viruses (DENV) transmitted by *Aedes* species mosquitos, is endemic throughout the tropics and subtropics with 390 million infections worldwide in 2010. During 1997–2013, 0–10 annual dengue cases were reported to Arizona. During September–December 2014, while a dengue epidemic was ongoing in Sonora, 95 travel-associated dengue cases were reported to Arizona. Because 71/95 (75%) cases were among Yuma County (bordering Sonora) residents, we conducted a risk assessment in Yuma County to evaluate potential local DENV transmission.

Methods: Household (HH)-based cluster investigations were conducted December 2014–January 2015, within a 50-meter radius of dengue patients' Yuma County residences with reported illness onset within ≤90 days. All persons residing within the radius were offered participation which included a questionnaire and dengue diagnostic testing by RT-PCR and anti-DENV IgM ELISA. Entomologic assessments included examining the house and yard for mosquito breeding sites.

Results: Thirty-nine HH-based cluster investigations were conducted, including 194 participants in 113 HHs. Four persons were identified with detectable anti-DENV IgM antibody, but none reported a recent febrile illness; all had travelled to Mexico within the past 3 months. Among 194 participants, 152 (78%) reported travelling to Mexico at least monthly; 42 (37%) of 113 HHs reported mosquitoes in their home. Entomologic assessments in 105 HHs revealed 23.8 *Ae. aegypti* colonized containers/100 houses and 11.4% of houses had ≥1 colonized container.

Conclusions: Although no locally acquired dengue cases were detected, frequent travel to Mexico during dengue outbreaks and entomologic findings demonstrate potential for DENV importation and transmission in Yuma County. To reduce transmission risk, residents should employ mosquito elimination and avoidance strategies.

TUESDAY

2:10 Endocarditis from *Bartonella quintana* in Anchorage, 2012–2014

Authors: Ian D. Plumb, B. Westley, J. Gray, C. Wenger, C. Nelson, L. Osikowicz, M. Kosoy, K.M. Rudolph, M.G. Bruce, T.W. Hennessy, M. Cooper, L.Castrodale, J. McLaughlin

Background: *Bartonella quintana* is a fastidious bacillus transmitted to humans by body lice. Infections are prevalent in homeless populations; manifestations include asymptomatic bacteremia, 'trench fever', and endocarditis. In Anchorage, Alaska, physicians identified an unusual cluster of endocarditis cases associated with *B. quintana* in recent years. We examined cases and local lice samples to determine clinical severity and ongoing risk.

Method: A case was defined as *B. quintana* infection with confirmed endocarditis. We requested lists of patients diagnosed with *Bartonella* infection (ICD-9 0.99.0 or 083.1) in Anchorage hospitals during 2009–2014, and performed standardized chart abstraction. Since August 2015 we collected lice from clothing of patients presenting to one emergency department, and performed PCR for *Bartonella* using 2 molecular targets (gltA and ITS).

Results: We identified 7 cases between 2012 and 2014–5 confirmed by PCR, 2 with positive serology only. All occurred in men aged >40 years, of whom 6 were Anchorage residents, 4 reported homelessness, 3 used the same shelter, and 3 reported louse infestation. Six presented with valvular cardiac failure and 2 died. All surviving patients required valve replacement plus antimicrobial therapy. Of 55 lice collected from 21 patients thus far, 4 lice from 2 patients tested positive for *B. quintana*.

Conclusions: A cluster of *Bartonella* endocarditis cases was identified in Anchorage from 2012–2014 in men aged >40 years, leading to substantial morbidity and two deaths. *Bartonella* testing should be considered in men with potential lice exposure and unexplained valvular insufficiency. Additional investigations are needed to understand the prevalence of *B. quintana* infection in the Alaskan homeless population; feasibility and risks of preventing sequelae; and options for reducing lice in the community.

2:30 Evaluation of a Query for Identifying West Nile Virus Symptoms Using Arizona's BioSense Platform Data —2015

Authors: Heather Venkat, J. White, S. Imholte, A. Mohamed, K. Komatsu, L. Adams

Background: West Nile virus (WNV), the leading cause of domestically acquired arboviral disease in the United States, can lead to neuroinvasive disease and death. Using the BioSense Platform, Arizona Department of Health Services (ADHS) monitors chief complaint data from 23 participating hospitals, which encompass ~38% of emergency department (ED) visits statewide. We created and evaluated a query for identifying WNV symptom trends using Arizona's BioSense data. WNV-like syndrome trends were compared with laboratory-confirmed WNV disease cases reported to ADHS.

Methods: We defined WNV BioSense syndromic cases as hospital visitors with ≥2 of the following symptoms in the chief complaint or diagnosis fields: fever, chills, headache, rash, vertigo, muscle pain, joint pain, nausea, vomiting, stiff neck, altered mental status, seizures, limb or muscle weakness, encephalitis, or loss of consciousness; we subsequently used thresholds of ≥3 and ≥4 symptoms. We queried hospital ED and inpatient visits from the period 01/01/15–10/26/15. We compared WNV BioSense cases with reported laboratory-confirmed WNV cases by week and ran a vector autoregressive (VAR) model and Granger causality test to identify correlations between WNV BioSense and reported WNV cases.

Results: The query resulted in 141,920 WNV BioSense cases with ≥2 symptoms; numbers decreased to 38,093 and 5,790 with thresholds of ≥3 and ≥4 symptoms, respectively. In contrast, 91 laboratory-confirmed WNV cases were reported. The correlation between trends of WNV BioSense cases with ≥2 WNV symptoms and laboratory-confirmed WNV cases was not significant (F-test = 0.92; $P = .43$).

Conclusions: The WNV BioSense syndrome-based query was too broad to accurately reflect disease trends; creation of a more nuanced definition with weighted criteria, and increasing hospital participation, might be needed to predict WNV outbreaks.

2:50 Spotted Fever Group *Rickettsia*, Potential Benefits of One Health Surveillance — Kansas, 2012–2015

Authors: Jessica A. Nadeau, D. Neises, K. Almes, I. Trevino-Garrison

Background: Spotted fever group *Rickettsia* (SFGR) infect humans and animals through the bite of an infected tick. In Kansas, human SFGR incidence during 2012–2014 was 4.8 cases/100,000 persons; 27% of cases involved hospitalization. SFGR in canines is not reportable and the Kansas incidence is unknown. We evaluated human and veterinary data to determine if a statewide One Health surveillance system can indicate SFGR risk in counties without historic cases.

Methods: We evaluated human SFGR cases reported to the Kansas Department of Health and Environment with onset during January 1, 2012–October 17, 2015, and canine specimens submitted to the Kansas State Veterinary Diagnostic Laboratory during the same period. Human case reports and veterinary laboratory submission information were reviewed to determine county of exposure. Laboratory tests dates for positive human SFGR serologic tests and positive canine SFGR serologic or polymerase chain reaction tests were compared to determine the first reported case for each county.

Results: Exposure for 514 reported human cases occurred in 58 of 105 Kansas counties, and in 17 counties for 90 canine cases. Exposure for human and canine cases was identified in 14 counties; in 4 counties, canine cases preceded human cases (average of 4 months earlier). Canine cases were identified in 3 counties with no reported human cases.

Conclusions: In certain counties, SFGR was identified in canines before or in the absence of reported human cases. Because of shared vector and host environments, incorporation of veterinary SFGR laboratory data into a One Health surveillance system, monitoring and animal health might identify certain counties with SFGR exposure risk and help to target tickborne disease prevention messages.

3:10 Risk Factors for Disseminated Lyme Disease — United States, 2005–2013

Authors: Natalie A. Kwit, C. Nelson, P. Mead

Background: Each year >300,000 Americans are diagnosed with Lyme disease (LD), a tickborne illness caused by *Borrelia burgdorferi*. Clinical features range from localized rash to more serious disseminated disease: carditis, meningitis, facial palsy, or arthritis. To promote early recognition, we analyzed insurance claims data to identify populations at increased risk of disseminated LD.

Methods: The MarketScan insurance claims databases contain diagnosis and treatment information for ~40 million insured Americans <65 years old, coded according to the International Classification of Diseases, Ninth Revision. Patients treated for LD during 2005–2013 were identified using codes for LD (088.81) coupled with antibiotic treatment. Patients with disseminated disease were defined as those with clinically compatible codiagnoses. Age was grouped into 16-year categories.

Results: A total of 93,981 unique patients diagnosed with LD were identified; average annual incidence was 51 per 100,000 persons. Median patient age was 41 years; 51% were female. A total of 3,406 (3.6%) patients had codiagnoses consistent with disseminated LD: 348 (0.3%) carditis, 451 (0.5%) meningitis, 447 (0.5%) facial palsy, and 2,160 (2.0%) arthritis. Overall, 35% of patients with disseminated disease were hospitalized. Males aged 17–33 years were at significantly greater risk of both carditis (odds ratio [OR]: 2.09; 95% confidence interval [CI]: 1.87–2.30) and facial palsy (OR: 1.26; 95% CI: 1.04–1.48), whereas risk of meningitis was highest among children aged 0–16 years of either sex (OR: 1.90; 95% CI: 1.73–2.06). Arthritis disproportionately affected females aged 34–50 (OR: 1.18; 95% CI: 1.09–1.27).

Conclusions: The risk and manifestations of disseminated LD vary by demographic group. Provider education regarding these findings should enhance early case recognition and improve patient management.

CONCURRENT SESSION F2: HIV and STD

1:25–3:30 PM

Dunwoody Suite

Moderators: Jonathan Mermin and Lawrence Cohen

1:30 Concordance of Sexual Orientation and Sexual Behavior in Sentinel Surveillance of Gonococcal Antimicrobial Resistance — Atlanta, Georgia, 2014

Authors: Alex de Voux, R. Hedenquist, T.D. Bright, R. Kirkcaldy, E. Torrone, J. Lewis

Background: Antimicrobial-resistant gonorrhea undermines treatment success, threatening to impede gonorrhea control efforts. The prevalence of gonococcal antimicrobial resistance may be highest among men who have sex with men (MSM). Sexual identity (gay, bisexual, or heterosexual) is often used as a proxy for sex of sex partner in sentinel surveillance but may not accurately reflect sexual behavior. We sought to quantify possible misclassification of sexual behavior in a US-based sentinel surveillance system of gonococcal antimicrobial resistance.

Methods: The Gonococcal Isolate Surveillance Project (GISP) collects data on self-reported sexual identity from men with gonococcal urethritis in sexually transmitted diseases (STD) clinics. We compared sexual identity with sexual behaviors (sex of partner, anal sex) documented in the medical record of men enrolled in GISP at the participating clinic in Atlanta during January–June 2014. We calculated sensitivity and positive predictive value (PPV) of sexual identity, using any indication of same-sex behavior as the gold standard.

Results: Among 149 men enrolled in GISP in Atlanta, the median age was 26 years, 100% were black, 19% were HIV-positive, 71% self-identified as heterosexual, 23% as homosexual, and 9% as bisexual. All men who self-identified as heterosexual reported sex exclusively with women. All homosexual or bisexual men described at least one same-sex behavior. The sensitivity and PPV of sexual identity were 100%.

Conclusions: Although research has documented discordance between sexual identity and sexual behavior, particularly among MSM of color, we found high concordance of identity and behavior in this sample of patients with gonorrhea from one STD clinic. Results suggest that at this STD clinic, self-reported sexual identity may be a good proxy for sexual behaviors documented in the medical record.

1:50 Maternal Risk Factors Associated with Delivery of an Infant with Congenital Syphilis — California, 2013–2015

Authors: Hope H. Biswas, R. Ng, E. Murray, J. Stoltey, J. Watt, H. Bauer

Background: Congenital syphilis (CS), the transmission of *Treponema pallidum* from mother to infant during pregnancy, can cause stillbirth or severe illness. During 2012–2014, the national CS rate increased 38%; in California, the CS rate increased >200% from 6.0 to 20.0/100,000 live births. We assessed CS risk factors to guide prevention strategies.

Methods: We identified pregnant women with all stages of syphilis reported to the California Department of Public Health during January 2013–June 2015. We described demographics and clinical care of women who delivered an infant with CS (CS mothers). Among interviewed pregnant women with early syphilis, we compared behavioral risk factors between CS mothers and women who did not deliver an infant with CS (non-CS mothers) by using chi-square tests.

Results: Among 158 CS mothers, 92 (58%) received prenatal care; of these, 15 (16%) had adequate, 45 (49%) inadequate, and 32 (35%) unknown treatment. Compared with non-CS mothers (n = 90), CS mothers (n = 28) more frequently reported methamphetamine use (13 [46%] versus 21 [23%]; P <.01), sex while intoxicated or high (12 [43%] versus 22 [24%]; P <.05), anonymous sex partner(s) (9 [32%] versus 10 [11%]; P <.01), and sex partner(s) who had been incarcerated during the past 12 months (13 [46%] versus 26 [29%]; P <.01).

Conclusions: Lack of prenatal care and inadequate treatment were common among CS mothers. Substance abuse and risky sexual behavior were associated with delivering an infant with CS. Early identification of syphilis through prenatal screening, including repeat screening of women at high risk, and adequate treatment are critical for preventing CS. Additional strategies are needed to ensure women at high risk receive comprehensive prenatal care.

2:10 Human Papillomavirus Vaccine Coverage Among Men Who Have Sex With Men — National HIV Behavioral Surveillance, United States, 2014

Authors: Sara Oliver, G. Paz-Bailey, B. Hoots, L. Markowitz, E. Meites

Background: Human papillomavirus (HPV) can cause oropharyngeal and anogenital cancers among men who have sex with men (MSM). Vaccination is effective in preventing HPV infection and associated diseases. In 2011, the Advisory Committee on Immunization Practices extended HPV vaccine recommendations to men through age 21 and MSM through age 26. Because of this distinction, vaccination for some MSM might rely on sexual behavior disclosure to healthcare providers. HPV vaccine coverage among MSM aged 18–26 years was 4.9% in 2011. We evaluated HPV vaccine coverage and associated factors among MSM in 2014 to assess implementation of these recommendations.

Methods: We evaluated National HIV Behavioral Surveillance data from 2014 regarding MSM aged 18–26 years. Coverage was calculated as percentage of MSM self-reporting ≥1 HPV vaccination. Factors associated with vaccination were identified using Poisson regression to calculate adjusted prevalence ratios.

Results: Among 2,892 MSM, vaccine coverage was 17.2%. Overall, 2,326 (80.4%) reported a healthcare visit within 12 months, and 2,095 (72.4%) disclosed MSM activity to a healthcare provider. Factors associated with vaccination included self-reported HIV infection (adjusted prevalence ratio [aPR]: 2.4; 95% confidence interval [CI]: 2.0–2.8), healthcare visit within 12 months (aPR: 2.3; CI:1.6–3.2), having health insurance (aPR: 1.5; CI:1.2–1.9), at least some college (aPR: 1.4; CI:1.2–1.7), and disclosing MSM activity (aPR: 1.3; CI:1.1–1.6).

Conclusions: After a national recommendation for vaccination of males, HPV vaccine coverage among MSM increased from 2011 through 2014, but remained low. Most MSM reported a recent healthcare visit and disclosed sexual behavior, indicating opportunities for vaccination. Improving access to recommended care and education for providers and patients are potential strategies for increasing coverage among this population.

2:30 Assessing Retention in HIV Care Using Laboratory Surveillance Data — Georgia, August 2011–April 2014

Authors: Mary R. Tanner, N. Camp, Y. Pan, E. Pennisi, D. Maggio, R. Lambert, K. Byrd, P. Wortley

Background: Retention in care (RiC) is an important component of HIV treatment because it is associated with improved outcomes and reduced transmission risk. Measuring RiC is critical to monitoring the US response to the HIV epidemic. Clinic visit records are the gold-standard for defining RiC. Although clinic visit data are not routinely collected, HIV-monitoring laboratory tests are reported to states' HIV surveillance systems. We assessed the agreement between RiC measured using HIV-monitoring laboratory tests and the RiC gold-standard.

Methods: We used data collected through medical record abstraction from Georgia residents in the 2013 cycle of the Medical Monitoring Project (MMP), a national survey of HIV-infected adults receiving care. MMP records included 24 months of laboratory tests and clinic visits per participant. RiC was defined as ≥1 encounter per 6 months, ≥60 days apart, for 24 months. We determined the RiC proportion according to laboratory tests compared to clinic visits. We used the kappa statistic to assess agreement. We also used data from Georgia's HIV surveillance system to determine the RiC proportion according to surveillance laboratory records from the same timeframe.

Results: Of 229 participants, 143 (62.4%) were retained according to laboratory tests, versus 137 (59.8%) according to clinic visits. The observed agreement proportion was 81.7% (kappa 0.61; 95% confidence interval: 0.51–0.72), indicating good agreement between laboratory-based and clinic-based measures using MMP data. In contrast, 119 participants (51.9%) were retained according to surveillance laboratory records.

Conclusions: Our findings support the concept of using laboratory data to measure RiC. However, incomplete laboratory reporting to HIV surveillance systems could lead to underestimating RiC. Accurately assessing RiC is critical to monitoring our ongoing response to the HIV epidemic.

2:50 Receipt and Timing of HIV Drug Resistance Testing — 8 U.S. jurisdictions, 2013

Authors: Sharoda Dasgupta, H. Hall, A. Hernandez, M. Ocfemia, N. Saduvala, A. Oster

Background: Antiretroviral therapy can reduce morbidity and mortality among people living with HIV; however, particular treatments may be less effective for drug-resistant strains. The Department of Health and Human Services recommends drug resistance testing upon linkage to HIV care (i.e., an initial clinical assessment with HIV laboratory testing). Because receipt and timing of resistance testing is not well characterized, we examined resistance testing among HIV-diagnosed persons linked to care.

Methods: We analyzed National HIV Surveillance System data for persons aged ≥13 years with HIV infection diagnosed in 2013; data were restricted to those linked to care within 3 months after diagnosis who resided in 1 of 8 jurisdictions that reported complete resistance-testing data for ≥50% of persons. We assessed the proportion with resistance testing during the same calendar month as linkage to care (i.e., at linkage); among those with resistance testing, we used chi-square tests to identify factors associated with testing at linkage.

Results: Of 11,351 persons with HIV diagnosed in 2013, 9,435 (83%) were linked to care within 3 months after diagnosis. Of those linked, 6,106 (65%) received resistance testing, 4,195 (69%) of whom received resistance testing at linkage. The proportion receiving resistance testing at linkage was significantly lower among blacks (66%), compared with whites (71%) or Hispanics/Latinos (70%) ($P = .01$), and among those aged <35 years (67%), compared with older persons (70%–71%) ($P = .03$).

Conclusions: Almost two-thirds of HIV-infected persons who entered HIV care received resistance testing, and most received testing at linkage to care as recommended. Increasing resistance testing among blacks and younger persons may increase the number of persons who receive appropriate treatment, thus improving HIV care outcomes.

3:10 Using HIV Genetic Sequences to Identify Outbreaks and Transmission Patterns: Completeness of HIV Sequence Ascertainment — Maryland, 2011–2013

Authors: Richard B. Brooks, K. Feldman, D. Blythe, H. Boykin, C. Flynn

Background: HIV genetic sequence analyses, which are generated through routine HIV drug-resistance testing and reported by laboratories to Maryland's Molecular HIV Surveillance system, can elucidate transmission patterns and identify outbreaks, but only if sequences are ordered promptly and results are reported completely. Guidelines recommend ordering sequences when patients enter care, rather than waiting for advanced disease with lower CD4 counts. We assessed HIV sequence ascertainment completeness among HIV-infected Maryland residents.

Methods: Among Maryland residents with new HIV diagnoses during 2011–2013, we calculated percentage with sequences ascertained by February 2015. We calculated chi-square *P*-values and risk ratios (RRs) to compare percentages by demographic, risk, and clinical characteristics.

Results: During 2011–2013, a total of 4,436 Maryland residents received new HIV infection diagnoses; sequences were available for 1,285 (29.0%). Median time from diagnosis to sequence report was 28.5 days (interquartile range: 8–175). Among 926 persons aged ≥50 years, 25.1% had a sequence, compared with 30.0% of 3,510 persons aged <50 years (RR: 0.8; $P = .003$). Among 1,925 residents of counties comprising Maryland's National Capital Region (NCR), 23.8% had a sequence, compared with 32.9% of 2,511 residents of other regions (RR: 0.7; $P < .0001$). Among 2,543 persons with an initial CD4 count <500, approximately 35.5% had a sequence, compared with 20.2% of 1,893 persons with higher CD4 counts (RR: 1.8; $P < .0001$). Sequence reporting did not vary substantially by race/ethnicity or transmission risk category.

Conclusions: Sequence ascertainment in Maryland is low. Ensuring complete reporting from testing laboratories and educating providers concerning genotype testing importance at entry to care, with particular attention to NCR, older patients, and those with higher CD4 counts, might improve reporting completeness.

POSTER SYMPOSIUM II

3:45–5:00 PM

Moderators: Stephen Redd and Danice Eaton

During the first 30 minutes of the Poster Symposium, the following authors will each give a 2-minute oral presentation at the podium in front of a seated audience in the Ravinia Ballroom. Afterward, the authors will stand with their posters for the remaining session time in the Dunwoody Suite. The audience is encouraged to view the individual posters and engage in direct discussion with the authors.

P2.1 Prognostic Indicators for Ebola Virus Disease Survival — Bo District, Sierra Leone, 2014–2015

Authors: Samuel J. Crowe, M. Maenner, S. Kuah, B. Erickson, M. Coffee, B. Knust, J. Klena, J. Foday, D. Hertz, V. Hermans, J. Achar, G. Caleo, M. Van Herp, C. Albariño, B. Amman, A. Basile, S. Bearden, J. Belser, E. Bergeron, D. Blau, A. Brault, S. Campbell, M. Flint, A. Gibbons, C. Goodman, L. McMullan, C. Paddock, B. Russell, J. Salzer, A. Sanchez, T. Sealy, D. Wang, G. Saffa, A. Turay, S. Nichol, J. Towner

Background: During the 2014–2015 Ebola virus disease (EVD) epidemic, healthcare facilities in West Africa were overwhelmed and staff lacked reliable prognostic indicators. These indicators can inform patient triage, treatment, and counseling service needs. We assessed the reliability of 2 potential indicators — time from symptom onset to healthcare facility admission and cycle threshold value (Ct) at first positive test.

Methods: We collected and analyzed data for all EVD patients in Bo District during September 2014–January 2015. Ct was determined using quantitative real-time reverse transcription polymerase chain reaction. We used unadjusted and adjusted logistic regressions to assess if time to admission, Ct, age, and sex were associated with survival. We used a locally weighted scatterplot smoothing curve to identify the Ct threshold that most accurately predicted survival.

Results: Seventy percent of patients (151/216) had admission date and Ct data available. Median time to admission was 3 days for both survivors and deceased, while median Ct was 26 for survivors and 20 for deceased. In both unadjusted and adjusted models, Ct was associated with survival (decreasing, continuous adjusted odds ratio: .70; confidence interval: .62–.78), but time to admission was not. A Ct of 24 was the most accurate predictor for survival: 87% (52/60) of patients with a Ct ≥24 survived, whereas only 22% (20/91) with a Ct <24 survived.

Conclusions: These patients, on average, might have sought care too late for time to admission to be predictive. Alternatively, patients with high viral loads also might need more advanced care than available in Sierra Leone. If testing were standardized, clinicians could use Ct to determine probable patient outcome, which could inform care decisions and patient expectations.

P2.2 Differences in Consistent Retention in HIV Care, by Race/Ethnicity — 11 U.S. States and the District of Columbia

Authors: Sharoda Dasgupta, A. Oster, J. Li, H. Hall

Background: Retention in HIV care and antiretroviral treatment can lead to viral suppression, which improves clinical outcomes and reduces transmission of HIV to others. Racial/ethnic disparities in HIV care retention may limit antiretroviral therapy and resultant viral suppression, perpetuating disparities in HIV incidence and clinical outcomes. We examined racial/ethnic differences in retention in HIV care over a 3-year period.

Methods: We used National HIV Surveillance System data from 12 jurisdictions with complete laboratory reporting for persons aged ≥13 years with HIV infection diagnosed in 2010 and alive through December 2013. Using reported laboratory tests performed during HIV care, we calculated retention in HIV care, measured by ≥2 laboratory tests ≥3 months apart during a calendar year, and estimated the percentage of persons not retained in care (0 of 3 years), retained 1 year, retained 2 years, or retained 3 years (i.e., consistently retained) during 2011–2013, overall and by race/ethnicity.

Results: Of 9,824 persons with HIV infection, 25% were not retained in care, 14% were retained 1 year, 19% were retained 2 years, and 43% were retained 3 years (consistently retained). The proportion of blacks consistently retained in care (38%) was lower than the proportion of Hispanics/Latinos (50%) or whites (49%). Lower consistent retention in care among blacks was attributable to the larger proportion of blacks (28%), compared with Hispanics/Latinos (23%) or whites (19%), who were not retained in any year.

Conclusions: Fewer blacks were consistently retained in care because higher proportions were not in care. These data highlight the need to focus efforts on consistent retention in HIV care among blacks to mitigate disparities in HIV incidence and clinical outcomes over time.

P2.3 Hospital-Associated Mucormycosis Outbreak Among Allogeneic Bone Marrow Transplant Recipients — Colorado, 2015

Authors: Jessica Hancock-Allen, A Vasquez, C. Edens, T. Walker, N. Marzec, S. Vallabhaneni, M. Walters, C. Gould, R. Mody, W. Bamberg

Background: Mucormycosis is an opportunistic infection that can occur in bone marrow transplant (BMT) recipients after environmental mold inhalation; mortality rates are 50%–90%. Infection prevention guidelines recommend use of protective environment (PE) rooms with air filtration and flow guidelines for immunocompromised BMT recipients. We investigated a cluster of hospital-associated mucormycosis cases among allogeneic BMT recipients at Hospital A during March 5–June 20, 2015 to determine risk factors and implement control measures.

Methods: A case of hospital-associated mucormycosis was defined as mucormycosis diagnosed by histopathology or culture during March 5–June 20 in a BMT recipient who had been hospitalized ≥10 days at Hospital A before initial clinical suspicion of mucormycosis. We conducted an unmatched case-control study to evaluate mucormycosis risk factors; 3 control subjects per case were randomly selected from all allogeneic BMT patients hospitalized during March 5–June 20 without evidence of mucormycosis. We performed a facility assessment and interviewed staff regarding patient placement practices.

Results: Of 6 case-patients identified, 5 (83.3%) died. Compared with control subjects, case-patients were more likely to have grade III or grade IV graft-versus-host-disease (GVHD) (odds ratio [OR]: 37; 95% confidence interval [CI]:1.5–886.0), have received ≥1000 mg of prednisone-equivalent corticosteroids (OR: 34; CI: 2.4–474.6), and have received nebulized pentamidine (OR: 25; CI: 2.1–298.3). Construction was ongoing in an adjacent unit; construction-related infection control breaches were observed. Multiple case-patients were placed in rooms not PE-designated because of closure of certain BMT rooms during construction.

Conclusions: BMT recipients with GVHD or receiving high-dose corticosteroids should be prioritized for PE room placement, especially during construction periods when possibility of environmental mold contamination increases.

P2.4 Emergency Department Visits for Cannabis-Related Adverse Events — Oregon, March–October, 2015

Authors: Jonas Z. Hines, K. Hedberg

Background: In July 2015, Oregonians voted to allow recreational – in addition to medical – cannabis use for adults. To assess public health effects, we analyzed emergency department (ED) data to describe patient characteristics and trends in visits for cannabis-related adverse events (CRAEs).

Methods: We analyzed syndromic surveillance data reported by all 60 Oregon EDs during March–October 2015. To identify CRAEs, chief complaint and clinical impression fields were queried for cannabis terms. We categorized records as physical symptoms (e.g. palpitations, vomiting), psychogenic symptoms (e.g. anxiety, paranoia), or injury (e.g. fall), and excluded those mentioning cannabis incidentally (e.g. "denies marijuana use") or with insufficient information.

Results: "Marijuana," "THC," "cannabis," "smoke pot," "brownie," "smoke weed," and "hash" retrieved 168 records from >1 million visits; 130 (77%) were for CRAEs and 38 (23%) were excluded, for 11.9 CRAEs per 100,000 visits. Patients' median age was 29 years (range: 0–80 years); 33 (25%) were <21 years. More visits were for psychogenic symptoms (53; 41%), physical symptoms (43; 33%) or both (12; 9%) than for injuries (8; 6%). None were hospitalized. Cannabis was the only substance in 88 CRAEs (68%); alcohol was the most common concomitant substance (19; 15%). Cannabis-only users were more likely than multiple substance users (50% vs 29%) to report physical symptoms (RR 1.75, p=0.02). Visits did not increase after July 1st (p=0.25).

Conclusions: Cannabis-related adverse events are infrequently reported. Most CRAEs are for toxicity (physical and psychogenic symptoms) rather than injury. Although no increase was observed yet, evolving cannabis use patterns warrant ongoing surveillance with more widespread cannabis availability in Oregon.

P2.5 Availability and Pricing of Healthier Food and Beverage Options in Restaurants — Guam, 2015

Authors: Elizabeth Lundeen, B. VanFrank, B. Harmon, S. Jackson, A. Uncangco, C. Dooyema, S. Park

Background: In Guam, one in four adults and one in six children has obesity. To guide chronic disease prevention strategies, the Guam Department of Public Health and Social Services assessed the availability and pricing of healthier foods and beverages in restaurants. The presence of menu labels and nutrition information, tools to help consumers make informed choices, was also assessed.

Methods: Sixty-three restaurants (sit-down and fast-casual/fast-food) were selected through random sampling within the three regions. Surveyors assessed menus using an adapted Nutrition Environment Measures Survey (NEMS). Healthier beverages included diet soda, water, 100% fruit juice, unsweetened tea or coffee, and unflavored low-fat milk. Entrées and main salads were characterized as healthy if they met NEMS calorie and fat criteria, or had *healthy* menu icons; entrées were also classified by preparation method, with grilled or baked considered healthier-preparation. Within restaurants, difference in price was calculated between the least expensive healthy or healthier-preparation entrée and the least expensive less-healthy entrée.

Results: All sampled restaurants had ≥1 healthier beverages, but only 12.7% offered unflavored low-fat milk. Most (93.7%) restaurants had ≥1 healthier-preparation entrées. Only 19.0% provided calorie and fat information or *healthy* icons on menus. Calorie and fat information was available in 10.0% of fast-causal/fast-food and no sit-down restaurants. Only 15.9% of restaurants offered ≥1 healthy entrées. Thirty-eight percent of restaurants had ≥1 healthy main salads. When entrées and salads were combined, 44.4% offered ≥1 healthy options. On average, healthy and healthier-preparation entrées were $1.82 more than less-healthy entrées.

Conclusions: This assessment identified potential opportunities in Guam to help restaurant consumers make healthier choices. These include increasing healthy options, menu labeling, and pricing incentives that encourage healthier choices.

P2.6 Community Surveillance of Malaria — Malawi, 2015

Authors: Anna A. Minta, S. Yosefe, R. Mchenga, J. Bergeson-Lockwood, P. Troell

Background: Malaria is a leading cause of mortality in Malawi. Community health workers (CHWs) diagnose malaria as fever because rapid diagnostic tests (RDTs) are not widely available for confirmatory testing. In 2014, CHWs reported diagnosing 1.2 million malaria cases and dispensing 1.5 million courses of the antimalarial artemether-lumefantrine (AL), to the community malaria surveillance system (CMSS). This discrepancy raised concern among the government and donors about the system's quality. We investigated the role of data quality in CMSS as a cause of this discrepancy.

Methods: We abstracted two months of CHW patient register data and corresponding monthly aggregate data from January–May, 2015 at 8 health facilities in 2 districts. We evaluated completeness of key information fields (e.g., age and sex) in registers. Using registers as the gold standard, we assessed over- and under-reporting in corresponding monthly aggregate data. We abstracted the percentage of facilities reporting by region from national CMSS data. We assessed data quality challenges using semi-structured stakeholder interviews.

Results: Registers were available for 6 of 8 facilities. Of 428 patient register records examined, 86% were complete. Cases were under-reported by 6% in one district and over-reported by 18% in the other. Both districts over-reported AL consumption, by 16% and 31% respectively. Regional facility reporting varied from 65–95%. Stakeholders noted that CWHs lacked supervisory support and access to RDTs.

Conclusions: Poor data quality, particularly over-reporting of AL consumption, likely contributes to the discrepancy between reported malaria cases and AL consumed. Incomplete regional reporting further limits the usefulness of CMSS data to determine community AL needs. Regular supervision of CHWs, data quality monitoring, and diagnostic testing using RDTs could strengthen the system.

P2.7 Group A *Streptococcus* Among Residents of a Long-Term–Care Facility — Georgia, 2015

Authors: M. Angela Parham, M. Tobin-D'Angelo, J. Tuttle, L. Lorentzson, J. Grippo, T. Parrott, M. Hodel, L. Edison, C. Drenzek

Background: Group A *Streptococcus* (GAS) bacteria can colonize the nose and throat and cause illness ranging from pharyngitis to invasive disease, particularly among long-term–care facility (LTCF) residents. In May 2015, the Georgia Department of Public Health was notified of 2 fatal invasive GAS cases among LTCF (Facility A) residents. We investigated to determine the extent of and halt the outbreak.

Methods: We defined a case as infection in a Facility A resident during February–June 2015 from whom GAS was isolated from a sterile site (invasive) or nonsterile site (noninvasive). We conducted active case finding, cultured oropharyngeal and wound swabs from Facility A residents and staff, assessed Facility A's infection control practices (ICP), and conducted a case-control study to determine infection risk factors. Control subjects were randomly-selected culture-negative residents of the same hallways as case patients. The Georgia Public Health Laboratory performed isolation and identification of GAS; isolates were *emm*-typed at CDC.

Results: We identified GAS infection among 7/106 (7%) residents (4 invasive, 3 noninvasive). Six of 158 (4%) staff also cultured positive. Isolates from all 7 residents and 5 staff had the same *emm* type. Five of 7 (71%) infected residents were bedbound. The case-control study reported no differences in demographics, comorbidities, caregiver, devices, and ambulatory status between patients and control subjects. ICP deficiencies included inadequate hand-hygiene facilities, equipment disinfection, and sick-leave and sick-visitor policies.

Conclusions: The common *emm* type and bedbound status among the majority of patients and ICP deficiencies indicate caregiver practices might be most responsible for the outbreak. Adequate hand-hygiene facilities, staff policies that discourage working while ill, and proper equipment disinfection can decrease likelihood of GAS outbreaks in LTCFs.

P2.8 Survey of Obstetrician-Gynecologists in the United States About Toxocariasis, 2013

Authors: Heather N. Paulin, F. Abanyie, J. Schulkin, J.L. Jones

Background: Toxocariasis is a neglected parasitic infection (NPI) caused by *Toxocara,* an intestinal parasite of dogs and cats. It is among the most common parasitic infections in the United States and disproportionately effects non-Hispanic Blacks. Approximately 70 people are blinded by toxocariasis annually. Many physicians are unfamiliar with toxocariasis, leading to missed diagnosis and progression of disease. To assess physician knowledge of *Toxocara* we surveyed members of the American College of Obstetricians and Gynecologists (ACOG) via an established partnership.

Methods: A 23-question survey was mailed during November 2013–July 2014 to ACOG members to assess member knowledge about toxocariasis epidemiology, diagnosis, and treatment. Members were selected by stratified random sampling. Weighted response proportions were calculated for each question. Logistic regression was employed to identify associations between physician characteristics and responding correctly.

Results: Of 1,000 members surveyed, 427 (42.7%) responded. Approximately half of physicians (55.9%, 95% confidence interval [CI] = 47.8%-64.1%) recognized appropriate prevention methods for toxocariasis, and 47.0% (95% CI = 38.9%-55.1%) correctly reported that transmission occurs via ingestion of soil containing infectious eggs. A smaller fraction, 32.1% (95% CI = 24.6%-39.6%) identified the correct therapy for toxocariasis. Fewer, 8.3% (95% CI = 3.9%-12.7%), identified characteristic clinical manifestations in people. In multivariable analysis, physicians with a majority White/Caucasian patient population were less likely than those with a majority Black/African population to correctly identify the organs affected in human toxocariasis (aOR 0.4, 95% CI = 0.1%-1.0%, p=0.04).

Conclusions: Generally, physicians were more knowledgeable about *Toxocara* prevention and transmission than treatment and clinical manifestations. Overall, knowledge of toxocariasis is limited and educational efforts to increase clinician awareness are needed to prevent the debilitating effects of this NPI.

P2.9 Fatal Flea-Borne Typhus — Texas, 1985–2015

Authors: Emily G. Pieracci, N. Evert, N. Drexler, B. Mayes, I. Vilcins, P. Huang, J. Campbell, C. Barton Behravesh, C. Paddock

Background: Flea-borne (murine) typhus (FBT) is a global rickettsial zoonosis caused by *Rickettsia typhi.* FBT has not been nationally notifiable in the United States since 1995, but remains a reportable disease in 14 states, including Texas. FBT is often described as a relatively mild, self-limiting disease; however life-threatening manifestations have been described with increasing frequency. To better understand the increasing frequency, we set out to characterize FBT fatalities in Texas.

Methods: A retrospective case series was conducted using case report forms and hospital charts provided by the Texas Department of State Health Services. Epidemiologic and clinical information were abstracted and described.

Results: During 1985–2015, 13 cases of fatal FBT were reported in Texas. The median patient age was 67 years (range: 36–84 years); 69% (9/13) were male. Cases presented with fever (85%), anorexia (46%), nausea and vomiting (46%) and rash (46%). Fifty-four percent reported respiratory manifestations. Thirty-eight percent had encephalopathy. Laboratory abnormalities included thrombocytopenia (62%) and elevated liver function tests (54%). Fifty-four percent reported animal exposure, and 31% reported known contact with arthropods prior to illness onset. The median time from hospitalization to doxycycline administration was four days (range: 0–5 days). The median time from symptom onset to death was 12 days (range: 1–34 days).

Conclusions: FBT is a potentially severe disease. FBT should be considered in febrile patients with respiratory or neurologic symptoms and animal or arthropod exposure. Lack of reported arthropod exposure does not exclude FBT, as flea bites may go unrecognized. Increased clinician and community awareness of FBT is needed to reduce time to treatment and potential disease severity.

P2.10 Severe Underreporting of Maternal Death — Cameroon, 2014

Authors: Evelyn R. F. Twentyman, F. Serbanescu, E. Bernstein, D. Morof, G. Bita, M. Tuyisenge-Onyegbula, H. Perry, M. Ngamby, M. Baye, O. Bolu, O. Pasi

Background: Maternal mortality in Cameroon remains among the highest worldwide at an estimated 596 deaths per 100,000 live births. Cameroon introduced Maternal Death Surveillance and Response (MDSR) with reporting through two passive systems: a reproductive health reporting system (RHRS), and the Integrated Disease Surveillance and Response (IDSR) system. The sensitivity of these systems to detect maternal deaths (MDs) and identify causes of death (CODs) have not been evaluated.

Methods: We used qualitative and quantitative methods to evaluate MD reporting in Cameroon, including interviews with system stakeholders and comparison of 2014 MDs reported in each system. We assessed system sensitivity by comparison to the predicted number of maternal deaths (PMDs) derived through the 2015 WHO estimates of maternal mortality in Cameroon. In six Yaoundé health facilities, we further assessed identification and reporting through Rapid Ascertainment Process for Institutional Deaths (RAPID) methodology—active case finding of deaths of women of reproductive age, and ascertainment and characterization of pregnancy-related deaths.

Results: In 2014, 401 and 288 MDs were reported through RHRS and IDSR respectively, representing only 8.0% and 5.8% of 4992 calculated PMDs. Lack of unique patient identifiers makes redundancy in reporting indeterminable. COD data was available only within RHRS. All reporting originates in facilities; none in communities. RAPID investigation has preliminarily revealed that 40 of 247 confirmed deaths (16.2%) in facilities were reported.

Conclusions: In 2014, reporting systems in Cameroon identified only 8.0% of PMDs. CDC and stakeholders are enhancing surveillance through strategies to increase case-detection in facilities, introduce routine reporting by community health workers, and improve ascertainment and characterization of pregnancy-related deaths. Improved MDSR implementation is essential to guide policies and programs to reduce maternal mortality.

P2.11 Socioeconomic Determinants of Racial Disparities in Candidemia Incidence Using Geocoded Data from the Emerging Infections Program (EIP), 2008–2014

Authors: Tiffany A. Walker, B.R. Jackson, G. Derado, A.A. Cleveland, Z.G. Beldavs, M.M. Farley, L.H. Harrison, W. Schaffner, R.K. Mody

Background: Candidemia, a fungal bloodstream infection, has an attributable mortality as high as 49%. Surveillance in California, Georgia, and Maryland found that blacks have higher candidemia incidence than whites. We used active, population-based surveillance data from the Emerging Infections Program (EIP) to examine whether differences in socioeconomic status (SES) partially explain this racial disparity.

Methods: We included census tract-mapped candidemia cases from EIP sites in Atlanta, Georgia, Baltimore, Maryland, and surrounding counties (2008–2014) and Knoxville, Tennessee, Portland, Oregon, and surrounding counties (2011–2014) and calculated race-specific incidence using 2010 U.S. census data. We estimated the SES of cases by assigning a poverty quartile to each census tract based on percentage of population below poverty level. We calculated the Cochran-Mantel-Haenszel estimate for the risk (rate) ratio for black vs. white residents, stratified by poverty quartile.

Results: Over half (57%) of the 4,743 cases were among blacks. Incidence was higher for blacks than whites in all locations, ranging from 4.3–24/10,000 for blacks and 1.5–13/10,000 for whites. Rate ratios were higher for blacks vs. whites in all sites, ranging from 1.4–2.7, and the overall rate ratio was 2.3 (95% CI 2.1-2.4). After adjusting for poverty quartile, the rate ratio declined to 2.0 (95% CI 1.9-2.1).

Conclusions: Adjustment for census tract poverty quartile of candidemia cases attenuated the elevated rate ratio for black versus white race, suggesting that SES confounds the relationship between candidemia and race. Further research is needed to understand the effect of SES markers on this relationship. SES may be associated with modifiable drivers of candidemia, including variations in hospital infection control and underlying medical conditions.

P2.12 Evaluation of an Integrated Community-Based Mortality Surveillance System — Kambia District, Sierra Leone, 2015

Authors: Anna Q. Yaffee, A. Varan, A. Tran, B. Osman, F. Sesay, J. Redd

Background: In response to 2014-2015's Ebola Virus Disease (EVD) outbreak, Sierra Leone (SL) mandated reporting of all deaths to health authorities. To improve reporting in high risk areas and identify suspect EVD cases, an integrated surveillance and social mobilization (ISSM) system was implemented in SL's Kambia District (KD). Teams of surveillance officers and social mobilizers worked with village-level leadership to encourage community-based EVD surveillance and reporting, including mortality. We assessed the effect of ISSM on KD death reporting rates.

Methods: ISSM was implemented on a rolling basis August-September 2015 in 18 out of 62 KD sections ("intervention sections") reporting <25% of expected deaths per capita for seven months pre-intervention (calculated using population and age-adjusted mortality estimates); ISSM was not implemented in the remaining sections ("control sections"). Pre- and post-intervention per-capita weekly death reporting rates were calculated for each intervention section using ten weeks pre- and five weeks post-implementation period; control section rates were calculated using the neighboring section's implementation date. The section-level reporting rate difference pre- versus post-implementation was averaged to compare intervention and control sections.

Results: Following ISSM implementation, the death reporting rate increased across intervention and control sections; the rate difference pre- and post-intervention was not statistically significant between intervention and control sections. Two EVD deaths occurred in KD during the implementation period in sections pre-intervention, and generated 1 death alert. As of November 2015, no EVD cases or deaths occurred post-intervention.

Conclusions: ISSM did not significantly affect death reporting rates in KD. Unmeasurable benefits include increased community ownership of health. Limitations of the evaluation include small sample size and short sampling timeframe. Additional studies are recommended to further understand mortality surveillance needs.

SESSION G: FETP International Night Poster Presentations

6:00 PM

Dunwoody Suite

CONCURRENT SESSION H1: Zoonotic Diseases

8:30–10:15 AM

Ravinia Ballroom

Moderators: Casey Barton Behrevesh and Douglas Hamilton

8:35 *Escherichia coli* O157 Infections Linked to Dairy Education Event Attendance — Whatcom County, Washington, 2015

Authors: Kathryn G. Curran, K. Heiman, T. Singh, Z. Doobovsky, J. Hensley, J. Leinbach, B. Melius, L. Stevenson, L. Burnworth, I. Williams, M. Nichols

Background: *Escherichia coli* O157 infections cause approximately 95,000 illnesses and 60 deaths annually in the United States. On April 27, 2015, Washington health authorities identified *E. coli* O157 infections associated with a dairy education event for students held in a barn April 20–24. We investigated to identify the source and evaluate compliance with the Compendium to Prevent Animal-Associated Disease in Public Settings.

Methods: We conducted a case-control study. Cases were defined as laboratory-confirmed *E. coli* O157 infection, physician-diagnosed hemolytic uremic syndrome (HUS), or diarrhea (bloody or ≥3 loose stools/day) onset ≤10 days following event attendance. Controls were without gastrointestinal symptoms ≤10 days following event attendance; they were frequency-matched 3:1 by category: first grade student, high school student, or adult. We interviewed parents and children regarding event activities. We computed odds ratios (OR) and 95% confidence intervals (CI). Environmental testing was conducted in the barn; isolates were compared to patient isolates using pulsed-field gel electrophoresis (PFGE).

Results: Sixty people were ill, 11 (18%) were hospitalized, and six (10%) developed HUS. Twenty-seven case-patients and 88 controls were enrolled. Handwashing (i.e. soap and water, hand sanitizer) before lunch was protective (OR: 0.29; 95% CI: 0.09–0.91). Among first graders, 26% of case-patients reported "always biting nails" compared to 5% of controls (OR: 6.26; 95% CI: 1.29–32.90). Barn samples yielded *E. coli* O157 with PFGE patterns indistinguishable from outbreak strains. Gaps in implementation of guidance to prevent animal-associated disease were identified.

Conclusions: The barn was likely contaminated from previous animal exhibitions; facility layout and improper cleaning might have increased infection risk among attendees. Increased education and enforcement of infection prevention measures, such as handwashing, can prevent illness.

8:55 *Francisella tularensis* Exposure Among National Park Service Employees — Devils Tower National Monument, Wyoming, 2015

Authors: Alexia Harrist, C. Cherry, N. Kwit, R. Pappert, K. Bryan, D. Wong, J. Petersen, C. Nelson

Background: Tularemia is a bacterial zoonosis caused by *Francisella tularensis*. Persons working outdoors are at increased exposure risk during an epizootic. During July 2015, *F. tularensis*-infected rodents were identified within Devils Tower National Monument (DETO), and a DETO employee developed tularemia. We investigated to assess frequency of *F. tularensis* exposure, risk factors for exposure, and protective measure use among DETO employees and develop control recommendations.

Methods: We administered a written questionnaire to DETO employees assessing tick contact, job activities, and protective measure use during the prior 3 months, and conducted a serosurvey; seropositivity was defined as a single antibody titer ≥1:128. We examined differences between seropositive and seronegative employees in frequencies of tick contact (Mann-Whitney U test), job-related activities, and protective measure use (Fisher's exact test).

Results: Among 44 total DETO employees, 23 (52%) participated in both the questionnaire and serosurvey. Three of 23 employees (13%) were seropositive, indicating prior *F. tularensis* exposure. Seropositive employees reported contact with a median of 30 ticks (range: 25–35), compared with 6 ticks (range: 0–25) among seronegative employees (P = .008). More seropositive employees used powered blowers (67% versus 5%, P = .034) and collected animal carcasses (100% versus 30%, P = .047) than seronegative employees. Among both seropositive and seronegative employees, 0% always wore insect/tick repellent or always wore a mask during landscaping activities.

Conclusions: Tick contact and landscaping activities were associated with *F. tularensis* exposure among DETO employees. There was no association between protective measure use and seropositivity, likely because use was inconsistent among all employees. Persons working outdoors should consistently take measures to prevent exposure during a *F. tularensis* epizootic.

9:15 Multistate Outbreaks of *Salmonella* Sandiego and *Salmonella* Poona Infections Linked to Small Turtles — United States, 2015

Authors: Kelly J. Gambino-Shirley, L. Stevenson, K. Wargo, L. Burnworth, J. Roberts, N. Garrett, S. Van Duyne, G. McAllister, M. Nichols

Background: Zoonotic transmission of *Salmonella* causes an estimated 11% of salmonellosis in the United States. In August 2015, the U.S. Food and Drug Administration notified CDC of a consumer complaint involving transmission of *Salmonella* Sandiego (*SS*) to a child from a small turtle. PulseNet, the national molecular subtyping network for foodborne disease surveillance subsequently detected three additional multistate *Salmonella* clusters: one *SS* and two *Salmonella* Poona (*SP*). We aimed to characterize the extent of the outbreaks and prevent additional infections.

Methods: Cases were defined as infection with one of the outbreak strains of *SS* or *SP* from January 1, 2015 to December 28, 2015. Interviews were conducted using a standard questionnaire regarding turtle exposure. Environmental samples were taken from cases' pet turtle habitats. Traceback was initiated for cases with purchase information. Water samples were collected from one turtle farm.

Results: One hundred twenty-five cases from 22 states were identified; of these, 34 (27%) were ≤1 year old. Forty (75%) of 53 patients with ethnicity information were Hispanic. Of 74 patients interviewed, 41 (55%) had turtle exposure. Turtles were purchased from stores, street vendors, flea markets, or as carnival prizes or gifts. Seven environmental samples matched the outbreak strains of *SP* and *SS*. Traceback for one patient's turtle identified a farm where water testing yielded *Salmonella;* however, the outbreak strains were not identified.

Conclusions: Epidemiologic, microbiologic and traceback evidence linked the outbreaks to contact with small turtles and their environment; however, transient turtle vendors hindered traceback to farms. Small turtles remain a source for human *Salmonella* infections, especially among young children. This outbreak highlights the need to translate prevention messages into languages targeting at risk populations.

9:35 Investigation of an Emerging Zoonotic Vaccinia Virus — Colombia, 2015

Author: Ashley R. Styczynski

Background: Beginning in early 2014, Colombian health authorities contacted CDC about suspected poxvirus infections in farmworkers and dairy cattle, including a severe infection in a patient with HIV. In collaboration with CDC laboratories, Colombia confirmed vaccinia virus (VACV) as the etiology. Vaccinia had not been known to circulate in Colombia but has caused sporadic outbreaks in countries such as Brazil and India. VACV infections can have adverse effects on human health and agriculture. Colombia requested CDC's assistance in investigating this emerging infectious disease.

Methods: Personnel from CDC traveled to Colombia to interview farmworkers in the affected areas and conduct environmental assessments. Seventeen serum samples and six lesion samples were obtained from individuals with vaccinia-like lesions. Serum samples underwent screening for anti-orthopoxvirus IgM and IgG by ELISA, and lesion samples were tested for VACV using PCR.

Results: Interviews conducted at eight farms revealed 5 workers and 15 cows with a history of vaccinia-like lesions. Six rodents and 100 domestic animal samples were collected from the farms (laboratory results pending). Of the 17 human serum samples, 10 were found to have anti-orthopoxvirus IgM, and 15 had anti-orthopoxvirus IgG. Among 6 skin lesion specimens tested by PCR, 3 were positive, 1 was inconclusive, and 2 were negative. Phylogenetic analysis identified a VACV strain closely related to a phylo-group of VACV strains in Brazil.

Conclusions: Results of this investigation provide the first confirmation of this emerging zoonosis in South America outside Brazil. Because of the risk of inter-human spread in communities and health care settings and impact on agriculture, heightened surveillance, risk factor assessments, and identification of potential animal reservoirs are needed to further inform prevention and control efforts.

9:55 Q Fever Outbreak Among Travelers to Germany Who Received Live Cell Therapy — United States and Canada, 2014

Authors: Misha P. Robyn, A.P. Newman, M. Amato, M. Walawander, C. Kothe, J.D. Nerone, C. Pomerantz, C. Barton Behravesh, H.M. Biggs, F. S. Dahlgren, E.G. Pieracci, Y. Whitfield, D. Sider, O. Ozaldin, L. Berger, P.A. Buck, M. Downing, D. Blog

Background: During September–November 2014, the New York State Department of Health (NYSDOH) was notified of five residents who had tested seropositive for *Coxiella burnetii*, the bacterium that causes Q fever. All had symptoms compatible with Q fever and traveled to Germany during May 2014 for live cell therapy, an alternative medicine practice, unavailable in the United States, of injecting animal cells into humans. Testing was prompted after a Canadian resident with a similar history received a Q fever diagnosis; German authorities identified a Q fever-positive sheep flock as the cells source. We investigated to characterize the outbreak.

Methods: A case was defined as a person who received live cell therapy in Germany during May, experienced signs and symptoms compatible with Q fever, and a single IgG titer ≥1:128 to *C. burnetii* phase II antigen. Patients were interviewed and NYSDOH notified the Centers for Disease Control and Prevention. Clinical and exposure information was reported to Germany.

Results: Patients received sheep cell injections by the same physician. Median age was 61 years; three (60%) were female. Signs and symptoms began ~1–7 days after exposure and lasted ~10–90 days; 80% reported fever, sweats, and fatigue, and 60% reported headache, chills, and malaise. None were hospitalized. No additional cases were identified.

Conclusions: Epidemiologic evidence indicates live cell therapy was the likely source of this outbreak. This is the first Q fever outbreak associated with live cell therapy, although other serious adverse events have been reported. Clinicians should be aware of this practice and consider zoonotic disease potential among patients receiving live cell therapy.

CONCURRENT SESSION H2: Occupational Health and Safety

8:30–10:15 AM

Dunwoody Suite

Moderators: Margaret Kitt and Cammie Chaumont Menendez

8:35 Health Care Personnel Working While Having Influenza-Like Illness — United States, 2014–15 Influenza Season

Authors: Sophia K. Chiu, C. Black, X. Yue, M. de Perio, A. Laney, S. Greby

Background: Health care settings, where an estimated 14.6 million influenza cases received medical attention in 2013–14, are known sites for influenza transmission. Health care personnel (HCP) with influenza-like illness (ILI) who continue working despite CDC's recommendation not to work until being afebrile for ≥24 hours, contribute to influenza transmission. We describe the magnitude of this issue and characterize the reasons why HCP work with ILI.

Methods: Using a national nonprobability Internet panel survey of 1,914 HCP during the 2014–15 influenza season, we calculated frequency of working with self-reported ILI (defined as "fever and cough or sore throat" from October 1, 2014–April 15, 2015) and examined reasons for working with ILI by occupation and work setting. Responses were weighted to the U.S. HCP population by Bureau of Labor Statistics data on age, sex, race/ethnicity, work setting, and census region.

Results: Of 414 (21.6% overall) HCP reporting ILI during the 2014–15 season, 183 (41.4%) reported working with ILI (median: 3 days, range: 0–30). Pharmacists (67.2%) and physicians (63.2%) had the highest frequency of working with ILI. By setting, hospital-based HCP had the highest frequency of working with ILI (49.3%). The most common reasons for working while ill included still being able to perform job duties, not feeling bad enough to miss work, and having a professional obligation to co-workers. Among HCP at long-term care facilities, the most common reason was not being able to afford lost pay.

Conclusions: Over 40% of HCP with ILI work while ill. To reduce HCP-associated influenza transmission, potential interventions could target paid sick leave policies and HCP misconceptions about working while ill, especially among pharmacists and physicians.

8:55 Cleanliness is Next to Breathlessness: Asthma and Other Health Problems Related to a New Cleaning Product Among Hospital Staff — Pennsylvania, 2015

Authors: Megan L. Casey, B. Hawley, N. Edwards, K.B. Fedan, J.M. Cox-Ganser, K.J. Cummings

Background: In March 2014, a surface cleaning product containing hydrogen peroxide, peroxyacetic acid and acetic acid was introduced at a hospital to control healthcare-associated infections. CDC was notified of respiratory, skin and eye problems among hospital environmental services (EVS) staff in January 2015. Nationally, over 500 hospitals use this product along with daycares and other facilities. We sought to determine if this cleaner posed a health hazard to EVS and other hospital staff.

Methods: A questionnaire on health status, work history and work practices was completed by 163 staff members, including 77% of available EVS staff, in August 2015. Standardized morbidity ratios (SMRs) were derived from national data. Symptoms that improved away from work were considered work-related. We defined asthma-like symptoms using a set of validated questions. Air sampling for product chemicals included 41 personal and 9 area samples. Exposures were assigned using department averages; odds ratios were calculated.

Results: Among questionnaire participants, 48% used the cleaning product. Cleaning product user SMRs were elevated for current asthma (2.5;CI=1.4–4.6) and lifetime asthma diagnosis (2.1;CI=1.2–3.7). Product users reported higher prevalence of work-related wheeze and watery eyes compared to non-product users (p <0.05). Highest hydrogen peroxide and peroxyacetic acid exposures were significantly associated with watery eyes (OR=3.62, CI= 1.39-9.44), skin problems (OR= 3.97, CI= 1.31-12.0) and asthma-like symptoms (OR= 2.66, CI= 1.02-6.93).

Conclusions: These findings suggest a risk of mucous membrane irritation and asthma and demonstrate need for exposure reduction. The hospital has since limited product spraying and provided eye protection to EVS staff. Aggressive infection control efforts may compromise the health of workers; healthcare facilities need to balance patient and worker safety.

9:15 Occupational Risk Factors Among Cryptosporidiosis Cases — Nebraska, 2010–2014

Authors: Chia-Ping Su, D. Stover, S. Luckhaupt

Background: Cryptosporidiosis is a highly transmissible parasitic diarrheal disease spread through exposure to water, food, or surfaces contaminated with feces of infected humans or animals. It has a high incidence in Nebraska (10 cases /100,000 population in 2011); one possible explanation is a high rate of occupational exposure to livestock. We reviewed cryptosporidiosis case reports for estimates of potential occupational transmission.

Methods: Reports for all laboratory-confirmed cases of cryptosporidiosis among Nebraska residents ≥15 years old that occurred from 2010–2014 were obtained from the Nebraska Electronic Disease Surveillance System. Occupational information was abstracted from specific fields and free text investigation comments. For cases identified as having potential occupational exposure to high risk animals, potentially infected persons, or contaminated water, we coded occupation and exposure type then calculated frequencies.

Results: Occupational information was available for 118 (20.5%) of 576 cases. Potential occupational risk was identified in 71 (12.3%) cases. Of these cases, 62% had occupational contact with animals, 33.8% with potentially infected persons and 3.0% with water. Among cases with occupational animal contact, farmworkers (79.5%) were the most common occupation, followed by veterinarians (11.4%); cattle were the most common animal mentioned. Among cases with exposure to potentially infected persons, the most common occupations were child care workers (41.7%), hospital workers (25.0%) and workers in other healthcare facilities (20.8%).

Conclusions: At least one in every 8 cryptosporidiosis cases aged ≥15 years in Nebraska has occupational risk factors. Clinicians should have a high index of suspicion for cryptosporidiosis among high risk workers with diarrheal diseases. Workers with occupational risk factors should be educated about disease awareness, appropriate use of personal protective equipment and proper hygiene techniques at work.

9:35 Mortality from Amyotrophic Lateral Sclerosis or Parkinson's Disease by Usual Occupation — National Occupational Mortality Surveillance, United States, 1985–2010

Authors: John D. Beard, A. Steege, J. Ju, J. Lu, S. Luckhaupt, M. Schubauer-Berigan

Background: Amyotrophic lateral sclerosis (ALS) and Parkinson's disease (PD), both progressive neurodegenerative diseases, affect >1 million Americans. The etiologies of these diseases, and the role of occupation, however, remain unknown. Therefore, we evaluated associations between usual occupation and ALS or PD.

Methods: We used data for 1985–2010 from National Occupational Mortality Surveillance (NOMS), a population-based surveillance system of >13 million deaths from 32 U.S. states. We identified mortality from ALS or PD via underlying cause of death codes and coded usual occupation with U.S. Census occupation codes. We grouped occupations into 26 categories and calculated proportionate mortality ratios (PMRs) and 95% confidence intervals (CIs) for associations between occupation categories and ALS or PD mortality. We indirectly standardized PMRs by age, sex, race, and calendar year to the population of all NOMS deaths.

Results: There were 26,008 ALS and 67,378 PD deaths. For ALS, five occupation categories had PMRs ≥1.50: legal (PMR: 1.79; 95% CI: 1.52, 2.10); computer and mathematical (PMR: 1.73; 95% CI: 1.44, 2.06); education, training, and library (PMR: 1.70; 95% CI: 1.60, 1.80); architecture and engineering (PMR: 1.62; 95% CI: 1.50, 1.74); and life, physical, and social science (PMR: 1.57; 95% CI: 1.35, 1.82). For PD, three occupation categories had PMRs ≥1.50: community and social services (PMR: 1.70; 95% CI: .59, 1.82); education, training, and library (PMR: 1.62; 95% CI: 1.56, 1.67); and computer and mathematical (PMR: 1.54; 95% CI: 1.31, 1.79).

Conclusions: The shifts in the U.S. workforce toward older ages and white-collar occupations highlight the urgency of understanding why we observed positive associations between white-collar occupations and ALS or PD mortality; this understanding will help target workplace interventions.

9:55 Severe and Highly Fatal Outbreak of Histoplasmosis Among Tunnel Workers — Dominican Republic, 2015

Authors: Paige A. Armstrong, J. Beard, S. Chae, L. Bonilla, M. Lindsley, D. Castillo, R. Nuñez, T. Chiller, N. Arboleda, R. Pimentel, S. Vallabhaneni

Background: Histoplasmosis, typically a self-limited infection in immunocompetent persons, is acquired by inhalation of fungal spores from disturbed bat excrement (guano). It had never been reported in the Dominican Republic. In September 2015, local health authorities received reports that workers removing guano from tunnels were hospitalized with a febrile illness suggestive of histoplasmosis. We conducted a cohort study to confirm the etiology and determine risk factors for severe infection.

Methods: A case was defined as fever and ≥2 symptoms in a person who worked in the tunnels during July 30–September 2. We obtained a list of all tunnel workers, conducted interviews, and reviewed medical charts. Analysis of factors associated with severe disease (intensive care unit [ICU] admission) was performed by calculating risk ratios (RRs) and 95% confidence intervals (CIs). Blood and urine samples were tested at CDC.

Results: Thirty of 35 workers had illnesses meeting the case definition, 28 were hospitalized, 9 required intensive care, and 3 died. None had recognized immunocompromising conditions. Work consisted of the removal of large amounts of bat guano from tunnels without respiratory protection. The median time from symptom onset to antifungal treatment was 6.5 days. All 6 intubated patients had a concomitant ventilator-associated pneumonias. Twelve of 31 (39%) patients' urine specimens tested positive for *Histoplasma* antigen; urine antigen positivity was associated with ICU admission (RR 3.5; 95% CI 1.1-11).

Conclusions: Lack of awareness, inadequate protection and unfamiliarity with occupational safety standards likely increased exposure burden. Delay in treatment and high rates of nosocomial infection contributed to a case fatality rate 10 times higher than similar outbreaks. Recommendations for further work, including training and safe work practices, were provided.

CONCURRENT SESSION 11: Injury

10:35 AM–12:00 PM

Ravinia Ballroom

Moderators: James Mercy and Katie Fowler

10:40 Adverse Childhood Experiences and HIV Sexual Risk-Taking Behaviors Among Young Adults in Malawi

Authors: Kristin Vanderende, L. Chiang, J. Mercy, M. Shawa, J. Hamela, N. Maksud, S. Gupta, N. Wadonda-Kabondo, J. Saul, J. Gleckel, H. Kress, S. Hillis

Background: Adverse childhood experiences (ACEs), which include exposure to physical, sexual, emotional violence and/or witnessing violence as a child, exhibit a dose-response association with numerous poor health outcomes in adulthood, including HIV. In this analysis, we explored the relationship between ACEs and HIV sexual risk-taking behaviors among young adults in Malawi.

Methods: The Malawi Violence Against Children Survey, conducted in 2013, is a nationally representative cross-sectional household survey containing ACE items. We analyzed responses from sexually active 19–24 year old males and females (n=610) and tested the association between respondents' exposure to ACEs (0, 1–2, 3+) and early sexual debut (<15 years), infrequent condom use in the past year (yes/no), and multiple sexual partners in the past year (yes/no). We used logistic regression to test the association between ACEs and these sexual risk-taking behaviors, adjusted for demographic characteristics and potential confounders.

Results: A majority (82%) of respondents reported at least 1 ACE, and 29% reported 3+ ACEs. We found positive unadjusted associations between the number of ACEs (1–2 and 3+ vs. none) and all three outcomes. In adjusted models, we found positive associations between the number of ACEs and early sexual debut (adjusted odds ratio [aOR]: 3.0, 95% CI [CI]: 1.2–8.0; aOR: 3.6, CI: 1.6–8.4) and infrequent condom use (aOR: 2.7, CI: 1.0–7.8; aOR: 3.7, CI: 1.3–11.1).

Conclusions: Among young adults in Malawi exposure to ACEs is positively associated, in a dose-response fashion, with engaging in several HIV sexual-risk taking behaviors. Considering the high prevalence of HIV in Malawi (11%), HIV prevention efforts may benefit from prioritizing programs and policies aimed at the prevention of violence against children.

11:00 Risk Factors of Unsafe Behaviors Among Populations Exposed to Explosive Devices: Results of a Household Assessment of Knowledge, Attitudes, and Practices — Colombia, 2012

Authors: Andrew T. Boyd, K. Becknell, S. Russell, C. Blanton, S.T. Cookson, M. Anderson

Background: Following decades of armed conflict, Colombia remains highly affected by explosive device (ED) contamination, especially in rural areas. Many victims are injured by EDs despite knowing their dangers. Determining risk factors of unsafe ED-related behaviors is critical for preventing ED injuries.

Methods: In 2012, CDC assisted Colombian partners in conducting a multi-stage knowledge, attitudes, and practices survey in "ED-affected" areas. Within 40 clusters, 28 households were selected, and one adult and all children aged ≥10 years in each household were asked about behaviors toward EDs encountered. Reported behaviors were classified as "unsafe" or "safe." Complex survey analysis was performed using SAS version 9.4.

Results: Of the 1,490 total participants, 740 (49.7%) had encountered ≥1 ED, and 281 (18.9%) had encountered ≥2 EDs. Among the 611 (41.0%) participants who had encountered grenades, 154 (25.2%) reported an unsafe behavior with a grenade; unsafe behaviors were associated with being male (adjusted odds ratio [aOR]: 1.65, 95% confidence interval [CI]: 1.12-2.44), working outdoors (aOR: 1.63, 95% CI: 1.12-2.38), seeing ≥4 EDs (aOR: 1.94, 95% CI: 1.02-3.68), and demonstrating lower ED knowledge assessed by eight true/false questions (aOR: 0.88, 95% CI: 0.71-0.99). Multivariable regression modeling found that unsafe reported behaviors among persons who encountered grenades were associated with being male (aOR: 1.57, 95% CI: 1.05-2.37) and demonstrating lower ED knowledge (aOR: 0.87, 95% CI: 0.77-0.98). Only 18% (269/1490) of participants had received mine risk education (MRE).

Conclusions: Participants reported frequent ED exposure but low receipt of MRE. Survey findings should guide expansion and improvement of MRE in ED-affected areas, especially among males. Content should link knowledge of the dangers of EDs to avoidance of unsafe ED-related behaviors.

11:20 Getting Too Close to Wildlife: Risk Factors Associated with Injury from Bison Encounters — Yellowstone National Park, 2000–2015

Authors: Cara C. Cherry, K. Leong, R. Wallen, D. Buttke

Background: Bison are wild, unpredictable, and dangerous; Yellowstone National Park (YNP) requires visitors to stay at least 75 feet from bison. Since 1980, bison have injured more visitors to YNP than any other animal. During 2010–2014, an average of 0.8 persons were injured per year (range = 0–2/year). In 2015, five bison-related injuries occurred. Because of this increase, we evaluated injury reports to characterize risk factors associated with bison-human encounters.

Methods: We analyzed law enforcement case incident records and press releases concerning bison-human encounters in YNP during 2000–2015. Narrative reports were coded for demographics, pre-encounter activities, number of persons involved, injury, and appropriate viewing distance acknowledgement; responses were not provided for all fields and missing data are not reported.

Results: Bison encounters resulted in injury to 25 persons (4 employees and 21 visitors). Age range for injured persons was 7–68 years (median: 49 years); 13 were female. All injuries occurred in areas of high visitor concentration. Median distance from bison prior to injury was ~8.5 feet (range: 1– 20 feet). Twenty persons (80%) actively approached bison before their injury; 5 (20%) failed to retreat when bison approached. Thirteen persons (52%) were injured when groups of ≥3 persons surrounded bison. Twelve persons (48%) sustained injuries while photographing bison. Six persons (24%) acknowledged they were too close to bison.

Conclusions: All bison encounters occurred when people were considerably closer than the required 75 feet viewing distance. In the majority of cases, visitors actively disregarded this regulation by approaching bison. Photographing bison was a common injury-associated activity. By incorporating known factors associated with wildlife-related injuries, public land managers can develop targeted intervention strategies to reduce public health risks.

11:40 Violent Death Among the Homeless — National Violent Death Reporting System, 17 states, 2005–2013

Authors: Amanda G. Garcia-Williams, K. Vagi, K. Fowler

Background: An estimated 500,000 people experience homelessness each day in the United States. Violent death in this population is not well understood, and this limits the development of violence prevention activities. The purpose of this study is to characterize violent death among the homeless.

Methods: Data from 17 states participating in the National Violent Death Reporting System from 2005–2013 were used. The population of interest was homeless persons, defined as individuals living in a place not designed for humans, or in temporary accommodations. Suicide and homicide deaths were examined. Adjusted odds ratios (aOR) and 95% confidence intervals (CI) were calculated to compare homeless and non-homeless violent death decedents using multivariable logistic regression with adjustments for age and gender.

Results: During study years, there were 800 suicide and 535 homicide decedents identified as homeless, and 90,328 suicide, and 36,935 homicide decedents identified as non-homeless. Most homeless (suicide: 83.3%, homicide: 85.5%) and non-homeless decedents (suicide: 78.0%, homicide: 76.8%) were male. Compared to non-homeless, homeless decedents were more likely to have alcohol dependence (suicide aOR: 2.1; CI: 1.8–2.5, homicide aOR: 8.3; CI: 6.2–10.9), and to die in a natural area (suicide aOR: 3.7; CI: 3.0–4.5, homicide aOR: 8.8; CI: 6.9–11.4). Homeless decedents were more likely victims of homicide by a blunt or sharp instrument (aOR: 2.9; CI: 2.4–3.4) and to use hanging as means of suicide (aOR: 1.6; CI: 1.4–1.9) than non-homeless.

Conclusions: Characteristics of suicide and homicide deaths among the homeless differ from non-homeless populations. Preliminary results point to the need for housing assistance and substance abuse treatment as ways to mitigate violence in this at risk and marginalized group.

CONCURRENT SESSION I2: Malaria

10:35 AM–12:00 PM

Dunwoody Suite

Moderators: Patrick Kachur and Wences Arvelo

10:40 The Impact of Revised Health Management Information System (HMIS) Reporting Forms on the Quality of Malaria Surveillance Data in Uganda: An Interrupted Time Series Analysis

Authors: Nelli Westercamp, S. Staedke, G. Dorsey, S. Kigozi, A. Ndyabakira, B.K. Kapella, S. Yoon, M. Hamel, A. Rowe

Background: Malaria control programs need accurate data to implement and evaluate malaria interventions. In July 2015, Uganda introduced revised HMIS reporting forms to health facilities (HFs) to improve data quality. To evaluate this intervention, we assessed data completeness and accuracy in five HFs in Kayunga district.

Methods: We abstracted data from 7,523 records in outpatient (OPD) registers and surveillance summary reports for 12 months before and four months after the intervention. Monthly completeness was measured as the proportion of malaria patient records with: 1) all data fields completed, and 2) clinically-relevant fields completed. Accuracy was the relative difference between numbers reported in the OPD register and surveillance reports for total patients, malaria patients, malaria tests performed, and positive malaria tests. Data were analyzed as interrupted time series with segmented linear regression. The current analysis is limited to one HF with complete time series available; data collection for other HFs is ongoing.

Results: Completeness for all data fields ranged from 0–14% over time, with no effect of the intervention (*P*-value of instantaneous change [*P*(i)]=.94, *P*-value of slope change [*P*(s)]=.66). Completeness of clinically-relevant fields, which averaged 30% at baseline, showed an improvement of 38 percentage-points immediately following the intervention (95% CI: 0.28–0.49; *P*(i)<.0001). This increase was driven by improvement in recording patients' weight. Discrepancies between surveillance reports and registers ranged from 0–15% for all patients, 1–9% for malaria patients, 24–71% for tests performed, and 0–20% for positive tests, with no significant intervention effect.

Conclusions: Revised reporting forms improved completeness for clinically-relevant data but had no effect on data accuracy. Analysis of additional HFs will assess intervention effectiveness in a broader setting.

11:00 The Effect of Holes in Long-Lasting Insecticidal Nets on Malaria — Malawi, 2013

Authors: Anna A. Minta, K. Landman, D. Mwandama, M. Shah, J.V. Eng, J. Sutcliffe, K. Lindblade, D. Mathanga, L. Steinhardt

Background: Long-lasting insecticidal nets (LLINs) are a cornerstone of malaria prevention, but their ability to prevent malaria might be compromised as holes develop. LLINs were distributed in southern Malawi in 2012, covering >95% of children. We conducted one of the first in-depth studies to assess the relationship between holes in LLINs and malaria.

Methods: From March–September 2013, we enrolled febrile children ages 6–59 months who slept under LLINs ≥14 nights before illness onset in a case-control study at a clinic in Malawi. Case-patients were positive for *Plasmodium* parasites by microscopy, and control-patients were negative for parasites. Digital photographs of participants' LLINs were analyzed using image software to count and measure holes. World Health Organization guidelines were used to categorize hole sizes. We compared hole characteristics between case-patient and control-patient LLINs using descriptive and logistic regression analyses.

Results: Of 248 LLINs analyzed, 97 (39%) were from case-patients. Overall, 214 (86%) LLINs had at least one hole, and 13 (13%) case-patient LLINs and 30 (20%) control-patient LLINs had at least one hole ≥ medium-size (9–15-cm radius) (*P*=.19). Unadjusted models showed no differences in odds of malaria by various measures of hole number, size, or location. Adjusting for caregiver education, housing eaves, and child's age, we found no difference in malaria based on at least one LLIN hole ≥ medium-size (adjusted odds ratio: 0.56; *P*=.13).

Conclusions: The lack of association between malaria and LLIN holes could be due to high LLIN coverage and the relatively good condition of LLINs in this initial study. Future studies should examine LLIN holes and malaria risk in other populations and with more damaged nets.

11:20 Health Worker Adherence to National Malaria Treatment Guidelines at Publicly Funded Outpatient Health Facilities — Southern Malawi, 2015

Authors: Ruth J. Namuyinga, D. Mwandama, D. Moyo, A. Gumbo, P. Troell, M. Kobayashi, M. Shah, A. Bauleni, H. Nsona, J. Vanden Eng, A. Rowe, D. Mathanga, L. Steinhardt

Background: Six million episodes of malaria occur in Malawi annually. Gaps in quality malaria treatment persist. We conducted a health facility (HF) survey to identify opportunities for promoting adherence to national malaria treatment guidelines.

Methods: A cross-sectional cluster survey of outpatient HFs in southern Malawi was conducted in January–February 2015. Weighted descriptive and regression analyses of patient, health worker (HW) and HF characteristics were performed. Suspect malaria patients were classified as severe if they presented with a life threatening symptom or uncomplicated in the absence of one. Malaria case-definition and characterization of correct treatment were based on 2013 Malawi treatment guidelines.

Results: We assessed 105 HFs and interviewed 150 HWs and 2342 patients. There were 1732 (74.9%) total suspect malaria patients including 903 (53.9%) laboratory confirmed plus presumptively treated patients (when testing was unavailable). Overall, 785 (88.9%) patients had uncomplicated malaria whereas 118 (11.1%) had severe symptoms. Altogether, 634 (81.7%) uncomplicated malaria patients and 5 (1.9%) severe malaria patients were correctly treated. Preliminary univariate regression analysis showed increased odds of correct malaria treatment for patients <5 years of age (odds ratio [OR] = 2.0; 95% confidence interval [CI]: 1.3–3.1; *P*<.002), patients who spontaneously reported fever to HWs (OR = 8.3; 95% CI: 5.9–11.4; *P*<.0001) and patients treated by physicians (OR = 2.4; 95% CI: 1.6–3.7; *P*<.0001). Patients with severe symptoms had lower odds of receiving correct treatment (OR = 0.04; 95% CI: 0.0–0.1; *P*<.0001).

Conclusions: Patient clinical presentation plays a key role in influencing the quality of malaria treatment in Malawi. Opportunities for improvement lie in identifying patient symptoms and emphasizing administration of lifesaving treatment to patients with severe symptoms.

11:40 Imported Cases of Malaria — Puerto Rico, July–October 2015

Authors: Emilio Dirlikov, C. Rodríguez, S. Morales, L.C. Martínez, J. Mendez, A.C. Sanchez, J.H. Burgos, K. Ryff, R. Cuevas-Ruis, S.A.Camacho, E.R. Mercado, J.F. Guzmán, P. Arguin, J.C. Velázquez, D. Thomas, B.R. Garcia

Background: Malaria is a mosquito-borne parasitic infection. Although Puerto Rico eliminated locally acquired malaria, cases have been reported after travel, including to Hispaniola, the only endemic island in the Caribbean. During 2000–2014, Puerto Rico reported 35 cases (annual range = 0–7/year). On July 16, the Puerto Rico Department of Health (PRDH) was notified of a student who had received a malaria diagnosis after travel to Punta Cana, Dominican Republic on a school-organized trip. PRDH conducted an epidemiologic investigation and released a health alert on July 17 to identify additional cases.

Methods: A suspected case was defined as clinical symptoms onset ≥9 days after travel to the Dominican Republic. Interviews were conducted among school trip participants. PRDH Public Health Laboratory evaluated patient samples sent by health providers. CDC Malaria Branch confirmed cases through molecular evaluation.

Results: Seven suspected cases were identified among school trip participants, and during July 16–August 21, health providers sent 102 patient samples to PRDH for evaluation. Of the 109 total patient samples, 27 met the suspected case definition and were sent to CDC. Suspected cases were predominately male (59%), with median age 25 years (range = 1–79 years). *Plasmodium falciparum* was confirmed in 5 of the 27 suspected cases. During September–October, two additional *P. falciparum* cases among Puerto Rican travelers to Punta Cana were identified.

Conclusions: In 2015, collaborative epidemiologic and laboratory investigation confirmed 7 malaria cases among Puerto Rican travelers to Punta Cana. Compared to 2000–2014 reported cases, this matched the annual maximum (reported during 2001). Surveillance in nonendemic settings should be maintained. Health providers should recommend precautions to travelers visiting endemic areas, including chemoprophylaxis.

SPECIAL SESSION 4: E-Cigarette Advertising: Enticing Another Generation of Youth into Nicotine Addiction

12:05–1:20 PM

Ravinia Ballroom

Moderator: Ralph Caraballo

Sponsor: National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)

This session will focus on four different perspectives in relationship to e-cigarette advertising:

- Social Marketing: The tactics used by e-cigarette companies to target youth.
- Epidemiology: prevalence of e-cigarette advertising exposure among U.S. middle and high school students; as well as the relationship between exposure to e-cigarette advertising and e-cigarette use.
- Toxicology: Assessing the discordance between claims made by e-cigarette advertising (e.g., safety or zero nicotine claims) against laboratory evidence from assays of e-cigarette liquids and aerosols.
- Policy: What can we do to reduce e-cigarette advertising exposure among youth?

Relevance and appropriateness for the EIS conference

E-cigarettes are a class of battery-powered devices that heat a chemical mixture (e-liquid) that typically contains nicotine and flavorings to generate a vapor, which is inhaled by the user. Since 2011, e-cigarette use has increased by over three-fold among U.S. youth. Approximately 2.4 million middle and high school students were current (past 30-day) users of e-cigarettes in 2014. The majority of e-cigarettes contain nicotine, which causes addiction, can harm brain development, and could lead to continued tobacco product use among youth. Tobacco product advertising can entice youth to use tobacco, and spending to advertise e-cigarettes has increased rapidly since 2011. Exposure to e-cigarette advertisements might be contributing to increases in e-cigarette use among youth. Efforts by states, communities, and others could reduce this exposure. This discussion is relevant and appropriate for the EIS conference because this is an emerging public health threat, which EIS officers should be aware of, and prepared for. More so, the session is an opportunity to offer new EIS officers a glimpse into how population-level surveillance and laboratory science (toxicology) can be used together in chronic disease settings to provide the evidence base for regulatory policy. One of the inherent novelties about this proposed topic is the fact that it is one of a few chronic disease examples of a rapidly emerging public health threat that aligns with something that can be seen in an infectious disease context. Just like the mutation of an infectious agent (e.g., a virus) might influence its pathogenicity and transmissibility in a host, so the evolution ('mutation') of tobacco products ('infectious agent') as induced by the tobacco industry ('vector') has influenced the initiation and abuse potential of emerging tobacco products such as e-cigarettes among adolescents and young adults ('host').

Speakers

- Different Era, Same Tatics: How E-Cigarette Advertising Targets Youths. *Carla J. Berg, Department of Behavioral Sciences and Health Education, Rollins School of Public Health, Emory University*
- Do the Ads Add Up? Holding Claims of E-Cigarette Advertisements Against the Scientific Evidence. *Paul Melstrom, Office on Smoking and Health, NCCDPHP*
- By the Numbers: Prevalence and Impact of E-Cigarette Advertising Exposure Among U.S. Youth. *Israel Agaku, Office on Smoking and Health, NCCDPHP*
- What Can We Do To Protect US Youth From E-Cigarette Advertising. *Gabbi Promoff, Office on Smoking and Health, NCCDPHP*

Questions to the Panel

SPECIAL SESSION 5: Frontline Field Epidemiology Training Program: the Launch

12:05–1:20 PM

Dunwoody Suite

Sponsor: Center for Global Health (CGH)

Experiences and lessons learned after beginning a new focus on surveillance and epidemiologic training for the largest number of health care workers at the base of the Field Epidemiology Training Program (FETP) pyramid.

Relevance and Appropriateness for the EIS conference

The launch in 2016 of the Field Epidemiology Training Program (FETP) Frontline programs in 26 different countries (17 Global Health Security Agenda [GHSA]/ 8 High-risk Unaffected Countries [HRNA]/1 US President's Emergency Plan For AIDS Relief [PEPFAR]) should strengthen support of surveillance systems and Integrated Disease Surveillance and Response (IDSR) indicators at the district level. It will also link to other Global Health Security (GHS) surveillance systems being rolled out at national level. Stronger district level reporting should improve early warning systems for outbreak response and link laboratory and epidemiologic investigations. Two countries, Tanzania and Liberia, launched cohorts in 2015 with plans for 4 more countries in spring 2016 (Senegal and Cameroon, February 22; Guinea-Bissau, March 7; and Malawi, April 16). The remaining countries are at different phases in planning and implementation. They are scheduled to commence later in 2016. Fifteen Resident Advisor (RA) FETP graduates, primarily from West Africa, completed a 2 week training for FETP in Atlanta.

Speakers

Introduction. *Jordan Tappero, Director, Division of Global Health Protection*

Overview of the New Frontline FETP. *Augusto Lopez*

Experience From the Field.

Tanzania. *Dr. Senga Sembuche*

Liberia. *Dr. Maame Amo-Addae*

Cambodia. *Dr. Mei Castor*

Summary and Q&A Panel

CONCURRENT SESSION J1: Emerging Infections

1:20–3:05 PM

Ravinia Ballroom

Moderators: Chris Braden and Brett Petersen

1:25 Alaska Resident Infected with a Novel Species of Orthopoxvirus — Alaska, 2015

Authors: Yuri P. Springer, C. Hsu, M. Cooper, Y. Li, Z. Werle, L. Olson, L. Castrodale, K. Wilkins, J. Gao, N. Patel, V. Olson, A. McCollum, J. McLaughlin

Background: Waning vaccine-derived immunity after discontinuation of routine smallpox vaccination has resulted in emergence of other Orthopoxvirus-associated human infections. During September 2015, the Alaska Division of Public Health investigated a report of a patient living in a woodland setting in interior Alaska who developed an illness consistent with Orthopoxvirus infection. Investigation objectives were to determine etiology and source and to prevent additional cases.

Methods: The patient was interviewed to ascertain potential exposures and identify contacts. Swabs of a papulovesicular lesion on the patient's back were cultured; DNA fragments amplified from the resulting isolate by quantitative real-time polymerase chain reaction (qPCR) were sequenced and compared with those from described Orthopoxviruses. Sera collected from the patient and contacts were tested for Orthopoxvirus antibodies. Household environmental samples including swabs of surfaces, clothing, personal effects and small mammal feces were tested by using qPCR.

Results: Phylogenetic analysis of sequences from the cultured isolate confirmed a novel Orthopoxvirus species. Patient's serum was positive for IgM and IgG antibodies, consistent with recent Orthopoxvirus infection. Sera from all 4 contacts were IgM-negative; sera from 2 contacts were IgG-positive, consistent with their prior history of smallpox vaccination. The patient had not recently travelled outside Alaska. Wild rodents were reportedly abundant around, and occasionally found inside, the patient's home. None of the 23 environmental samples tested positive. No additional human cases were identified.

Conclusions: This investigation identified a novel species of Orthopoxvirus in an Alaska resident whose travel history was inconsistent with importation of the virus into the state. Given Orthopoxviruses emergence in the absence of routine smallpox vaccination, Orthopoxvirus testing should be performed on persons with an illness consistent with poxvirus infection.

1:45 Comparison of Sensitivity of a National Call Center with a Local Alerts System for Detection of New Cases of Ebola — Guinea, 2014–2015

Authors: Christopher T. Lee, M. Bulterys, L. Martel, B.A. Dahl

Background: Passive surveillance for Ebola in Guinea is conducted by 2 telephone reporting systems. Community members and health facilities report all deaths and suspected Ebola cases to either a local alerts system at local prefecture health offices or to a national toll-free call center established in November 2014. We compared sensitivity of the 2 passive reporting systems for detecting confirmed Ebola cases.

Methods: We used probabilistic record linkage to link alerts (n = 8,667) from the passive surveillance databases of prefectures with Ebola cases (Conakry, Coyah, Dubréka, and Forécariah) during April 1, 2015–August 31, 2015, with records (n = 9,454) from the viral hemorrhagic fever (VHF) database. We calculated proportion of confirmed cases in the VHF database with a match found in each passive surveillance database to determine sensitivity.

Results: During the study period, 221 confirmed cases of Ebola in the VHF database were reported. Linkage between surveillance databases and VHF database identified 5,006 matches, of which 120 were confirmed cases. Of these, 113 originated locally (sensitivity 51.1%; positive predictive value [PPV] 1.6%) and 7 originated from the national call center (sensitivity 3.2%; PPV 0.4%). The remainder of cases were identified by contact tracing or Ebola treatment units. National call center sensitivity was lower than local alerts in all 4 prefectures.

Conclusions: The 2 passive reporting systems detected approximately half of confirmed Ebola cases during the study period. The local alerts system had a higher sensitivity for the identification of confirmed cases than the national call center did. These findings underscore the limited sensitivity of the national call center and the importance of local public health infrastructure for surveillance in an epidemic setting.

2:05 Acceptability of a Chikungunya Virus Vaccine — United States Virgin Islands, 2015

Authors: Morgan J. Hennessey, E. Ellis, M. Fischer, E. Staples

Background: Chikungunya virus (CHIKV) is an emerging virus capable of causing large outbreaks of fever and severe polyarthralgia. There are several CHIKV vaccines currently under development. We assessed the acceptability of a CHIKV vaccine in an area that recently experienced an outbreak of CHIKV disease.

Methods: We randomly selected households on the United States Virgin Islands using a stratified, one-stage cluster sampling design. We administered a standardized questionnaire to all residents in selected households to collect information on demographics, clinical history, repellent use, and interest in CHIKV vaccine. We compared those who were interested in the vaccine to those who were not using Fisher's exact and t-tests.

Results: Of 509 enrolled participants, 323 (63%) were interested in receiving a CHIKV vaccine. Median age of those interested (50 years; range 0-87) was similar to those not interested (55 years; range 0-91) (P =.06). Sex was similar, with females representing 56% (181/323 versus 104/186) of both groups. Having symptoms of CHIKV disease in the last year did not impact vaccine interest with 38% (123/323) of those interested in a vaccine and 35% (66/186) of those not interested in a vaccine reporting symptoms (P =.5). Vaccine acceptance did not vary based on mosquito prevention practices with 31% (101/323) of vaccine-interested participants and 38% (52/186) of non-interested participants wearing repellent (P =.4). The majority (52%; 94/186) of those not interested in the vaccine cited safety concerns; only 1 (<1%) cited cost concerns.

Conclusions: The majority of our study population would accept a CHIKV vaccine. Educational efforts targeted at addressing vaccine safety concerns would likely improve vaccine acceptability. Additional studies should address the potential cost effectiveness of a CHIKV vaccine.

2:25 Enterovirus-D68 and Acute Flaccid Myelitis Among Children: A Case-Control Study in Colorado, 2014

Authors: Negar Aliabadi, K. Messacar, D.M. Pastula, C.C. Robinson, E. Leshem, J.J. Sejvar, W.A. Nix, M.S. Oberste, D.R. Feikin, S.R. Dominguez

Background: From August-October 2014, an increase in cases of acute flaccid myelitis (AFM) was recognized in U.S. children, temporally associated with a nationwide outbreak of enterovirus-D68 (EV-D68) respiratory disease. Cerebrospinal fluid results from AFM cases did not reveal an etiology. Colorado, having the most AFM cases in the country, offered a unique opportunity to assess a possible association between AFM and EV-D68.

Methods: Using a case-control design, we defined AFM cases as children <18 years old, hospitalized in the Denver area with acute focal limb weakness and gray matter spinal cord lesions on MRI of unknown etiology. Controls were children with nasopharyngeal (NP) specimens collected during the same time period at outpatient visits for respiratory viruses (RV) or *Bordetella pertussis* (BP) in the same setting. Cases/controls were classified as 'EV-D68' if EV-D68 was detected in NP specimens by real-time RT PCR; or 'EV' if pan-EV PCR positive and EV-D68 PCR-negative. We evaluated associations of EV-D68 and EV with AFM case status using multivariable logistic regression, controlling for significant covariates.

Results: 10/11 (91%) cases had respiratory symptoms, compared to 96/123 (80%, p=0.69) of RV and 263/274 (98%, p=0.25) of BP controls. Cases were older than RV controls (8 vs 5 years, median, p=0.04). EV-D68 was detected in 4/11 (36%) AFM cases compared to 6/123 (5%) RV (p<0.01) and 31/274 (11%) BP controls (p<0.01). AFM cases had elevated risk of EV-D68 detection compared to RV controls (odds ratio 10.6, 95%CI 1.9, 66.7) and BP controls (odds ratio 5.5, 95%CI 1.2, 25.7). Non-EV-D68 enterovirus was not associated with AFM.

Conclusions: EV-D68 detection in AFM cases significantly exceeded that in controls, supporting a possible association between EV-D68 and AFM.

2:45 Zika Virus in Returning U.S. Travelers — United States 2010–2014

Authors: Morgan J. Hennessey, M. Fischer, A. Panella, O. Kosoy, J. Laven, R. Lanciotti, E. Staples

Background: Zika virus (ZIKV) is an emerging mosquito-borne flavivirus that causes an acute illness characterized by fever, rash, arthralgia, and conjunctivitis. ZIKV has recently caused large outbreaks of disease in Southeast Asia, Pacific Ocean islands, and Central and South America. The virus will likely continue to spread to other unaffected areas, including the United States. We reviewed the epidemiology and clinical features of travel-associated ZIKV disease cases in the United States from 2010–2014.

Methods: We identified all positive ZIKV test results performed at CDC from 2010–2014. We defined a ZIKV disease case as a patient with the following laboratory findings in serum: 1) ZIKV RNA detected by RT-PCR; or 2) anti-ZIKV IgM antibodies detected by ELISA with ≥4-fold higher neutralizing antibody titer against ZIKV compared to dengue virus. We collected information on demographics, clinical features, and travel history.

Results: Eleven travel-associated ZIKV disease cases were identified in the United States. The median age of cases was 50 years (range: 29–74 years) and 6 (55%) were male. Illness onset occurred predominantly from January–April 2014 (n=9, 82%). The majority of cases reported rash (91% [10/11]), fever (90% [9/10]), myalgia (80% [8/10]), arthralgia (64% [7/11]), and conjunctivitis (56% [5/9]). All cases reported travel to islands in the Pacific Ocean in the days preceding illness onset and all cases were potentially viremic after returning to the United States.

Conclusions: Travelers to areas with ZIKV activity should be informed about disease risks and ways to reduce mosquito exposure. Healthcare providers and public health officials should be educated about the recognition and diagnosis of ZIKV disease in returning travelers, and the risk and prevention of local transmission.

CONCURRENT SESSION J2: Child Health

1:20–3:05 PM

Dunwoody Suite

Moderators: Coleen Boyle and Jennifer Lind

1:25 Burden and Etiology of Sepsis in the First Three Days of Life in a Large Public Hospital: Preliminary Results from the Sepsis Aetiology in Neonates in South Africa Study — Soweto, South Africa, 2013–2014

Authors: Matthew D. Westercamp, S. Velaphi, T. Pondo, N. Shang, A. von Gottberg, N. Wolter, M. Moleleki, M. Diaz, J. Winchell, S. Madhi, S. Schrag

Background: Globally, over 400,000 neonatal deaths in 2013 were attributed to sepsis. However, etiologies of these infections are largely unknown, particularly in sub-Saharan Africa where mortality rates are highest.

Methods: We investigated the etiology of sepsis in the first 3-days of life among infants admitted with pre-defined clinical sepsis (cases) to the largest hospital serving Soweto, an urban township of >1.6 million persons (2012), from August 2013–September 2014. We collected blood, nasopharyngeal (NP), and oropharyngeal (OP) swabs from case infants and healthy infant controls. Blood underwent culture; all specimens were tested for leading pathogens (15 bacteria, 13 viruses) by real-time polymerase chain reaction (PCR). We used variant latent class methods to estimate pathogen-specific prevalence.

Results: We identified 1,231 sepsis cases (39/1,000 live births). Blood cultures were available for all; PCR results were obtained for 1,204 NP/OP specimens (98%) and 933 blood specimens (76%). Blood cultures from 8% (99/1,231) of cases (3/1,000 live births) yielded bacterial pathogens. Using PCR, the most common pathogen detected from respiratory samples was *Ureaplasma* spp. (19.9% cases, 14.5% controls) and from blood was *Streptococcus pneumoniae* (14.1% cases, 9.9% controls). Using etiologic modeling, the organisms most often linked to disease were group B *Streptococcus* (5.5%; 95% CI: 4.9–6.5), *Ureaplasma* spp. (3.2%; 95% CI: 2.5–4.3), and *E. coli/Shigella* (1.3%; 95% CI: 0.8–1.9). For 84.8% of cases, etiology was not identified.

Conclusions: We documented high rates of clinical sepsis in the first 3 days of life, with group B *Streptococcus* the leading cause. Despite extensive testing for infectious causes, however, an etiology remained elusive for most sepsis cases, perhaps because of insensitive diagnostics or a noninfectious cause of illness.

1:45 Infant and Young Child Feeding Practices Among Internally Displaced Persons in Three Oblasts in Eastern Ukraine — June 2015

Authors: Aimee Summers, O. Bilukha

Background: In April 2014, fighting began between pro-Russian separatists and government forces in the Donbass region in eastern Ukraine, resulting in internal displacement of about 1.5 million people. Most internally displaced persons (IDPs) live in the Donbass region and bordering oblasts of Kharkiv, Dnipropetrovsk, and Zaporizhia. Effects of displacement (e.g. stress, loss of income) can jeopardize breastfeeding practices and result in less nutritious complementary feeding. We aimed to determine changes in infant and young child feeding (IYCF) practices among people displaced by conflict in Ukraine to inform humanitarian action.

Methods: We conducted a cross-sectional household survey in Kharkiv, Dnipropetrovsk, and Zaporizhia oblasts using standardized questions based on the World Health Organization IYCF assessment questionnaire. IDP households with children <2 years were randomly selected and surveyed in three oblasts.

Results: A total of 458 households, with 477 children <2 years were surveyed. Prevalence of exclusive breastfeeding for children <6 months was low (26%). The percentage of mothers breastfeeding non-exclusively at one and two years was 54% and 21% respectively. Bottle feeding was common in children <2 years (68%). Almost all children 6-8 months were receiving solid or semi-solid foods (99%). Over 63% of children <6 months were given water. Mothers who stopped breastfeeding before six months more often listed stress related to conflict as the main reason for stopping (46%) compared with mothers who stopped between 6-23 months (14%) (P<.0001).

Conclusions: To mitigate effects of conflict, humanitarian action should provide psychosocial support to help mothers deal with stress and support breastfeeding. In addition, promoting exclusive breastfeeding, discouraging bottle feeding, and prohibiting the provision of infant formula to breastfed children <6 months are key interventions to promote.

2:05 Applying a Composite Neonatal Morbidity Measure to Describe Statewide Neonatal Morbidity — Wyoming, 2009–2014

Authors: Alexia Harrist, A. Busacker

Background: Nearly one in ten hospital-born neonates experience neonatal morbidity (birth-associated complications). Improving perinatal health care quality, a national initiative, requires monitoring neonatal morbidity at statewide and hospital levels, yet traditional measures do not provide comprehensive neonatal morbidity surveillance. We applied a published claims-based composite measure to describe neonatal morbidity rates in Wyoming and assess its usefulness for surveillance.

Methods: We used discharge data from all 26 Wyoming hospitals during fiscal years 2009–2014. We used *International Classification of Diseases*, Ninth Revision codes to identify neonates with birth-associated complications among hospital-born neonates; complications included respiratory and neurologic conditions, birth trauma, shock, and death. We calculated statewide and facility-specific morbidity rates (percentage of neonates with ≥1 complication among total hospital-born neonates) and determined how high-risk deliveries (Cesarean sections and twin deliveries) and hospital charges were related to morbidity rates. Statistical differences were assessed using chi-square and Mann-Whitney U tests.

Results: The statewide neonatal morbidity rate was 10.4% (3,880 neonates with ≥1 complication among 37,434 hospital-born neonates). Facility-specific morbidity rates varied (range: 0%–17.6%). The most frequent complications were respiratory (55% of morbidities). Morbidity rates were higher among high-risk deliveries; neonates delivered by Cesarean section had a higher morbidity rate than neonates delivered vaginally (16.4% versus 7.9%, P <.001), and twins had a higher morbidity rate than singletons (36.4% versus 9.8%, P <.001). Hospitals charged a mean of $8,501 (range: $0–$115,662) per morbidity-associated neonatal hospitalization, compared with $2,605 (range: $21–$9,992) per hospitalization without morbidity (P <.001).

Conclusions: This composite measure provides statewide and hospital-specific neonatal morbidity rates and demonstrates expected differences in morbidity rates and hospital charges, making it a useful surveillance tool in Wyoming.

2:25 High Prevalence of Vitamin B12 Deficiency and Normal Folate Status Among Young Children in Nepal

Authors: Bernadette N. Ng'Eno, C. Perrine, R. Whitehead, G. Subedi, S. Mebrahtu, P. Dahal, M. Jefferds

Background: Vitamin B12 and folate deficiencies during early childhood contribute to anemia and poor growth and development. Many children in low and middle-income countries might get inadequate nutrition; however, biochemical data confirming these inadequacies are limited.

Methods: A cross-sectional survey representative of children aged 6-23 months was conducted among 2,549 children in 2 districts of Nepal. The survey assessed demographic and behavioral characteristics, as well as anthropometry and biochemical indicators of nutritional status. Vitamin B12 deficiency was defined as serum B12 <150pmol/l, and folate deficiency as red blood cell (RBC) folate <226.5 nmol/L. We used logistic regression and adjusted for sociodemographic and nutritional characteristics to identify predictors of vitamin B12 deficiency.

Results: Mean vitamin B12 concentration was 212.8 pmol/l (95% confidence interval [CI]: 204.1, 221.5), and 30.2% of children were deficient. Mean RBC folate concentration was 1,361.5 nmol/L (95% CI: 1,317.1, 1,405.9), and there was no deficiency. The following were independently associated with increased odds of vitamin B12 deficiency among children: (a) age 6-11 months (adjusted odds ratio [aOR] 1.50; 95% CI: 1.18, 1.90) or aged 12-18 months (aOR 1.38; 95% CI 1.10, 1.71) compared to those aged 18-23 months; (b) being stunted (aOR 1.24; 95% CI: 1.02, 1.50) compared to not being stunted; (c) and not eating animal source foods (aOR 1.81; 95% CI: 1.39, 2.36) compared to eating animal source foods.

Conclusions: Among young children in Nepal, there was a high prevalence of vitamin B12 deficiency, but no folate deficiency. Improving early feeding practices that include the consumption of animal source foods may help decrease vitamin B12 deficiency.

2:45 *Mycobacterium abscessus* Lymphadenopathy Among Patients of a Pediatric Dentistry Practice — Georgia, 2015

Authors: M. Angela Parham, M. Tobin-D'Angelo, G. Peralta, L. Edison, C. Smith, L. Lorentzson, C. Drenzek

Background: *Mycobacterium abscessu*s, a bacterium found in water, soil, and dust, can cause severe infection and contaminate water lines leading to contaminated medical devices. Healthcare-associated *M. abscessus* outbreaks have been reported, though not in dental clinics. In September 2015, Hospital A notified the Georgia Department of Public Health of 9 children diagnosed with *M. abscessus* lymphadenopathy after dental procedures at Practice B who presented during the previous 13 months. We investigated to identify additional cases, determine infection source, and provide control recommendations.

Methods: We defined a case as facial or cervical swelling and granulomatous inflammation among children who had dental procedure(s) at Practice B during January 1, 2014–November 18, 2015. Confirmed cases were *M. abscessus* culture-positive. We conducted active case finding among area pediatric patients, assessed Practice B's infection control practices, collected water samples, and sent patient and water isolates to CDC for molecular characterization by pulsed-field gel electrophoresis (PFGE).

Results: We identified 16 cases, 44% confirmed. All patients had pulpotomies at Practice B <6 months of symptom onset. Median onset age was 7 years (range: 3–10); 63% were male. All patients were hospitalized ≥1 time for 1–17 days (median: 8 days). All underwent surgical intervention, 69% had osteomyelitis, 56% required outpatient intravenous antibiotics, and 44% had pulmonary nodules. Tap water was used for pulpotomies without recommended water-quality monitoring. All 7 Practice B dental stations exceeded the <500 CFU/mL American Dental Association-recommended bacterial counts (median: 73,000 CFU/mL). All water samples cultured *M. abscessus*. Water and patient isolates had indistinguishable PFGE patterns.

Conclusions: Contaminated water used during pulpotomies likely caused this outbreak. Dental practices should follow equipment-maintenance and water-quality monitoring recommendations to prevent contamination.

CONCURRENT SESSION K1: Global Health

3:20–5:05 PM

Ravinia Ballroom

Moderators: Rebecca Martin and Fred Angulo

3:25 Quality of Case Management of Pneumonia and Diarrhea in Children Aged <5 Years — Southern Malawi, 2015

Authors: Miwako Kobayashi, D. Mwandama, H. Nsona, R. Namuyinga, M. Shah, A. Bauleni, J. Vanden Eng, A. Rowe, D. Mathanga, L. Steinhardt

Background: Globally, pneumonia and diarrhea are leading causes of child deaths. Integrated Management of Childhood Illness (IMCI) is a widely adopted approach to manage these and other childhood illnesses in resource-poor settings, but studies show that many children are inappropriately treated. The objectives of this analysis were to describe pneumonia and diarrhea case management in children aged 2–59 months in Malawi and determine factors associated with case management quality.

Methods: During January–March 2015, a cross-sectional health facility survey, using patient exit interviews, healthcare worker (HCW) interviews, and facility assessments, was conducted at 95 health facilities in southern Malawi. Weighted logistic regression models examined patient, HCW, and facility factors associated with pneumonia and diarrhea case management quality, using local IMCI guidelines as the gold standard.

Results: Of 694 children surveyed, 132 (19.4%) met survey-assessed IMCI criteria for pneumonia. Of those, HCWs diagnosed pneumonia in 24 (15.1%) and gave correct treatment to 38 (17.4%). Of 201 (26.4%) children with uncomplicated diarrhea, HCWs diagnosed 118 (58.7%) and correctly treated 87 (37.0%). Preliminary univariable models showed that HCW ascertainment of cough or difficult breathing was significantly associated with correct pneumonia treatment (odds ratio [OR]: 4.0; 95% confidence interval [CI]: 1.1–15.0) and ascertainment of diarrhea was significantly associated with correct diarrhea treatment (OR: 13.3; 95% CI: 1.9–93.3). Female patients, HCW with less training, and IMCI guideline availability at the facility were also significantly positively associated with correct treatment for diarrhea, but not for pneumonia.

Conclusions: Many children in southern Malawi with pneumonia or diarrhea were inadequately managed. A key initial step to improve case management quality would entail facilitating systematic HCW solicitation of patient symptoms.

3:45 Botulism in a Rural Village — Ethiopia, 2015

Authors: Rupa Narra, U. Luvsansharav, L. Boulanger, A. Matanock, J. Sejvar, D. Jima, J. Dykes, M. Mengesha, A. Tamiru, O. Ejerso, D. Mamo, I. Shemesedin, A. Dori, S. Maslanka, S. Kalb, J. Halpin, C. Luquez, A. Rao

Background: Botulism is a life-threatening neuroparalytic illness. Outbreak control depends on timely clinical recognition and rapid identification of contaminated foods. In March 2015, a cluster of unexplained deaths occurred in Jarso, Ethiopia. We conducted an investigation to determine the cause of death, and the source and extent of the outbreak.

Methods: A case was defined as descending paralysis in a Jarso resident with illness onset during March 2015. Cases were identified through extensive family interviews, medical record review, and clinical examinations. We investigated epidemiologic links and food preparation practices. Serum, stool, and food samples were tested by mouse bioassay and mass spectrometry for botulinum neurotoxin (BoNT); stool and food samples were cultured for *Clostridium botulinum*. Isolates were characterized by whole genome sequencing (WGS).

Results: Ten of 13 (77%) persons from one family met the case definition; five (50%) patients died. Median age was 17 years (range: 4-45); six (60%) were female. All three hospitalized patients demonstrated features atypical for botulism including 1) confused mental status 2) profound neck/truncal weakness and hyporeflexia while preserving limb strength, and 3) unexpected autonomic findings including diarrhea and reactive pupils without mydriasis. Clinical specimens and food samples (dried milk, clarified butter, and a chili condiment) contained BoNT type A or *C. botulinum* type A. Milk was used to make butter which was used to make chili condiment; cross contamination between foods was possible. Isolates were indistinguishable by WGS.

Conclusions: These were the first confirmed botulism cases in Ethiopia. Atypical clinical features made epidemiologic and laboratory findings essential to diagnosis and outbreak investigation. Increased awareness of botulism and education on safe food preparation may prevent future illnesses in Ethiopia.

4:05 Surveillance Preparedness in the Time of Ebola: Assessing What Is on the Ground — Guinea-Bissau, 2015

Authors: Megumi Itoh, P. Cardoso, D. Mane, A. Macedo de Oliveira

Background: Integrated Disease Surveillance and Response (IDSR) is a weekly surveillance system designed for epidemic detection. In 2004, Guinea-Bissau (GB), a country with frequent measles and cholera epidemics, adopted IDSR to monitor 14 epidemic-prone diseases, including hemorrhagic fever. Due to the 2014–2015 Ebola virus disease (EVD) outbreak in neighboring Guinea-Conakry, epidemic surveillance became a priority for GB. We evaluated IDSR attributes to bolster its capacity for epidemic detection and response.

Methods: We focused our evaluation in Tombali region, which borders Guinea-Conakry. We interviewed stakeholders using semi-structured questionnaires, conducted site visits, and reviewed patient registers. We assessed the use of laboratory confirmation by comparing the number of blood specimens for measles testing at the national reference laboratory with the number of IDSR measles case reports.

Results: Seven in-depth interviews and 3 site visits were conducted; we learned IDSR is well-accepted, with adequate flexibility, reflected by increased reporting frequency in response to the EVD epidemic. System shortcomings include large number of diseases under surveillance, inconsistent application of case definitions, limited health facility participation, and lack of systematic data analysis to support timely epidemic response. In the first 26 epidemiological weeks of 2015, 170 suspected measles cases were reported and 104 blood specimens were received at the national laboratory for confirmation, thus only up to 61% of suspected cases were tested.

Conclusions: Using standardized case definitions and streamlining the number of reportable diseases would further strengthen this well-established surveillance system. IDSR could then meet its goal of detecting epidemics, including newly introduced public health threats, such as EVD. Furthermore, enhancements in laboratory capacity and usage would reinforce IDSR's role in epidemic detection and response in GB.

4:25 *Rickettsia typhi* as an Underrecognized Cause of Acute Undifferentiated Febrile Illness — Damanhour, Egypt, 2010–2014

Authors: Chul Woo Rhee, E. Reaves, A. Mansour, H. Mansour, K. Clarke, S. Salyer, T. Lo, J. Montgomery, M. Wooster, S. El Shorbagy

Background: *Rickettsia typhi* is a vector-borne intracellular bacteria with a wide geographic distribution seldom previously described in Egypt. Infected patients typically present with a nonspecific febrile illness. Tetracycline is the drug of choice. We sought to describe the seroprevalence of *Rickettsia typhi* and clinical characteristics of recent infection among acute undifferentiated febrile illness (AUFI) cases in Damanhour, Egypt.

Methods: We analyzed surveillance data of hospitalized AUFI patients with temperatures ≥ 38°C presenting at Damanhour Fever Hospital from September 2010–December 2014. Seropositivity was defined as the detection of IgG antibody against *Rickettsia typhi* by indirect enzyme immunoassay (EIA) in serum from AUFI patient. Recent *Rickettsia typhi* infection was defined as seroconversion from negative to positive, or 4-fold increase of EIA IgG antibody, between the initial (acute) and 3-week follow-up (convalescent) serum specimen. Student *t*-test and chi-square test were used to describe the seroprevalence and clinical characteristics.

Results: Among 2,262 AUFI cases, 410 (18.1%) were seropositive on acute phase serology; Seropositivity increased with increasing age (P <.05). Of the 2,262 AUFI cases, 720 (31.8%) had convalescent serum specimen; among those, 8 (1.1%) were recent *Rickettsia typhi* infections. Among recent infections, the median age was 45 years (range: 33–55), 7 (87.5%) were male, all were rural residents, and none were prescribed tetracycline. Compared to all other AUFI cases, recent *Rickettsia typhi* infections had a longer mean hospital duration (7.5 vs 4.2 days, P <.05).

Conclusions: *Rickettsia typhi* infection is an underrecognized cause of AUFI in Damanhour. Increasing *Rickettsia typhi* seroprevalence with increasing age suggests ongoing new infections. Failure to prescribe the drug of choice for recent infections indicates need for physician education.

4:45 Village-based Rat Fall Surveillance as an Early Warning System for Human Plague — Uganda, 2013–2015

Authors: Natalie A. Kwit, K. Boegler, L. Atiku, J. Mpanga, J. Kaggwa, L. Ojosia, K. Ojwang, T. Apangu, M. Schriefer, B. Yockey, R. Enscore, P. Mead, K. Gage, R. Eisen

Background: Plague is a life-threatening, flea-borne zoonosis caused by *Yersinia pestis*. During 1999–2011, over 2,400 suspect and confirmed human plague cases were reported in northwestern Uganda. "Rat falls" (RF) – rodent mortality resulting in large numbers of carcasses – may be caused by plague, and plague-associated RFs often precede human infections. In 2013, we implemented a pilot RF surveillance system, coupled with vector control, in previously affected villages. The goal of this program was to prevent human infection through early risk recognition and timely intervention.

Methods: 83 villages were selected to participate based on history of human plague cases. One person in each village was identified as Plague Monitor and provided a cell phone, solar charger, GPS unit, bicycle, carcass collection materials, and appropriate training. Plague Monitors reported RF events to a central office by calling a toll-free number. Carcasses were collected, identified, and tested for plague using standard laboratory methods. Following confirmation of a plague-infected carcass, indoor residual spraying (IRS) was performed inside huts of the affected village to decrease flea loads and presumably likelihood of transmission to humans.

Results: During July 2013–October 2015, RFs were reported in 65 (78%) of 83 participating villages, yielding 386 rat carcasses, of which 15 (4%) tested positive for plague. IRS was implemented with a median delay of 8 days (range: 4–112) following confirmation of infected carcasses. Despite enhanced surveillance for human plague, no confirmed cases were identified in enrolled villages, compared with 4 confirmed cases in 583 non-enrolled villages.

Conclusions: Community-level phone-based notification facilitates timely response to RF events. RF surveillance may help reduce human plague risk by increasing community awareness and targeting vector control efforts.

CONCURRENT SESSION K2: Healthcare-Associated Outbreaks

3:20–5:05 PM

Ravinia Ballroom

Moderators: Denise Cardo and Isaac See

3:25 *Mycobacterium chelonae* Eye Infections Associated with Humidifier Use in an Outpatient Laser-Assisted *in situ* Keratomileusis (LASIK) Clinic — Ohio, 2015

Authors: William C. Edens, L. Liebich, A. L. Halpin, H. Moulton-Meissner, S. Eitniear, J. Perz, M. Mohr

Background: Approximately 600,000 LASIK eye surgery procedures are performed annually in the United States. On February 5, 2015, the Toledo-Lucas County Health Department (TLCHD) was notified of 2 patients who experienced eye pain following a LASIK procedure at clinic A. Both patients were diagnosed with an infection of *Mycobacterium chelonae,* a nontuberculous mycobacterium (NTM) common in the environment. After 2 additional infections, clinic A suspended all LASIK procedures. Our objective was to identify the source and prevent further infections.

Methods: TLCHD staff visited clinic A to review LASIK procedures and identify possible routes of transmission. CDC tested clinical samples from infected patients as well as environmental samples collected by TLCHD. These samples included water from 2 reservoir-style, consumer-grade humidifiers used during the procedures, one of which used an ultrasonic nebulizer to produce a mist.

Results: Four (17%) of 24 patients who underwent LASIK surgery in January or February 2015 developed *M. chelonae* eye infections. *M. chelonae* was isolated from the misting humidifier water reservoir. Pulsed-field gel electrophoresis results indicated that 3 patient isolates and the humidifier isolate were indistinguishable. The isolate from the fourth patient was closely related. Clinic A removed the humidifiers and upgraded its centralized air handling system to control humidity in the procedure room.

Conclusions: This outbreak was likely caused by use of a consumer-grade humidifier that had been contaminated with *M. chelonae*. Current guidance from CDC and professional standards groups states that use of reservoir-style humidifiers is not permitted in any healthcare facility. This outbreak highlights the need for greater awareness and attention to water-containing devices as a source of opportunistic NTM infections and diligent adherence to published patient care recommendations.

3:45 Mucormycosis Among Solid Organ Transplant Recipients at an Acute Care Hospital — Pennsylvania, 2014–2015

Authors: Amber M. Vasquez, S. Novosad, E. Christensen, H. Moulton-Meissner, M.S. Keckler, M. Arduino, C.V. Gould, T. Chiller, J. Perz, A. Nambiar, J.T. Weber, M.E. Brandt, A.L. Halpin, R.K. Mody

Background: Mucormycosis is a rare, often fatal, infection caused by a group of angioinvasive molds and typically occurs among persons with marked immunosuppression. In September 2015, the Pennsylvania Department of Health reported a mucormycosis cluster among solid organ transplant recipients (SOTR) at an acute care hospital. Our objective was to identify possible sources and prevent additional infections.

Methods: Healthcare-associated cases were defined as mucormycosis among SOTR, diagnosed ≥7 days after admission during June 2014–September 2015. We reviewed microbiology and histopathology records, abstracted medical charts, interviewed staff, and performed an environmental assessment and cohort and nested case-control studies.

Results: Four cases (3 probable, 1 suspect) caused by three *Mucorales* species were identified. The 3 probable case-patients had undergone heart or lung transplantation and received care in the cardiothoracic intensive care unit (CTICU), which was closed for deconstruction prior to our investigation. While the probable case-patients had no documented indication for negative-pressure isolation, all 3 had prolonged stays in the CTICU's only negative-pressure room. In a cohort of 124 heart or lung SOTR cared for throughout the hospital, 3 (43%) of 7 patients exposed to this negative pressure room developed mucormycosis, compared with none of those unexposed ($P<.001$). A nested case-control study of CTICU patients showed only exposure to the negative-pressure room to be associated with mucormycosis (odds ratio: 51.3; 95% confidence interval: 5.9–infinity).

Conclusions: Our investigation of mucormycosis infections identified negative-pressure isolation as a contributing factor. Negative-pressure isolation may increase the risk of mucormycosis in immunocompromised patients by concentrating dust and mold spores. Although not addressed in current guidelines, healthcare facilities should avoid housing immunosuppressed SOTR in negative-pressure rooms unless medically indicated.

4:05 Assessing Infection Control Practices Following Hepatitis C Virus Transmission in Outpatient Dialysis Centers — New Jersey, 2015

Authors: Jason Lake, P. Kulkarni, J. Mehr, D. Nguyen, E. Rudowski, N. Gualandi, L. Hamilton, P. Barrett, J. Felix, C. Genese, R. Greeley, G. Vaughan, G. Xia, J. Forbi, A. Moorman, T. Tan, P. Patel

Background: Half of healthcare-related hepatitis C virus (HCV) outbreaks occur in hemodialysis centers; such outbreaks have been attributed to inadequate infection control (IC) practices. From 2013–2015, 16 new HCV infections in 9 hemodialysis centers were reported to New Jersey (NJ) Department of Health, who visited centers and required corrective plans. We evaluated transmission and IC practices in affected centers.

Methods: A case was defined as new HCV antibody positivity between September 2013–May 2015 in a NJ hemodialysis center patient. HCV-infected patients underwent viral genetic testing to identify potential source-patients. We assessed patients' HCV risk factors, and performed direct observations of IC practices. We calculated percent adherence to CDC-recommended practices across different IC domains and compared adherence among centers that reported cases early vs. late.

Results: Infection with highly-related virus indicated a dialysis source-patient for 9/16 (56%) case-patients (4 centers). For 3 of the 7 remaining case-patients, dialysis was the only HCV risk factor (3 centers). Adherence to best practices was observed in 25 (38%) of 66 catheter handling procedures, 97 (39%) of 248 dialysis station disinfection procedures, 58 (59%) of 98 injectable medication administration and 72 (75%) of 96 injectable medication preparation procedures. Proper station disinfection was more common in centers reporting cases in 2013–2014 versus 2015 (54% vs. 33%, p=0.002).

Conclusions: Dialysis-related HCV transmission was demonstrated for most cases. All centers had IC lapses that can increase transmission risk. Centers with earlier cases may have had more public health interaction and time to improve. Follow-up is planned with all 9 centers. Enhanced collaboration between public health departments and hemodialysis facilities might help to prevent pathogen transmission in hemodialysis centers.

4:25 Prolonged Outbreak of Invasive Group A *Streptococcus* Among Nursing Home Residents — Illinois, 2015

Authors: Srinivas A. Nanduri, M.A. Arwady, C. Edens, M.A. Lavin, J. Morgan, W. Clegg, A. Beron, J.P. Albertson, R. Link-Gelles, A. Ogundimu, J. Gold, D. Jackson, B. Beall, N. Stone, C. Van Beneden, K. Fleming-Dutra

Background: Group A *Streptococcus* (GAS) can cause life-threatening illnesses in the elderly. In February 2015, the Illinois Department of Public Health (IDPH) identified a cluster of GAS infections at a nursing home. After multiple interventions, mass antibiotic prophylaxis was implemented from April 28–May 2, 2015. Infections reemerged in late June. In November, IDPH requested assistance to assess risk factors for infection and recommend control measures.

Methods: We defined cases as GAS infection among residents or employees, confirmed by culture or antigen detection. We surveyed employees and observed infection control practices. To identify disease risk factors, we conducted a case-control study comparing resident cases occurring from May 3–November 10 to time-matched resident controls; p-values were calculated using conditional logistic regression. To identify asymptomatic colonization, we collected throat and wound cultures from residents receiving wound care and throat cultures from employees linked to cases. Available GAS isolates were *emm* typed.

Results: During 2015, 57 cases and 4 deaths occurred, including 17 cases (10 residents and 7 employees) since mass prophylaxis. The employee survey identified 7 self-reported, previously unrecorded employee GAS illnesses since May 2015. Multiple lapses in hand hygiene and wound care practices were observed. All (8/8) case-patients included in the case-control study received wound care versus 8/24 (33%) controls (P<0.001). One employee and 4 residents were colonized with GAS. Of typed isolates, 27/28 (96%) were *emm89*.

Conclusions: Continued GAS transmission likely resulted from poor infection control, employees and resident colonization, and inadequate surveillance for GAS infections among employees. Strong infection control practices — particularly during wound care — and active surveillance for new infections are critical to preventing and controlling GAS outbreaks in nursing homes.

4:45 Invasive Nontuberculous Mycobacteria Infections among Cardiothoracic Surgery Patients — Hospital A, Pennsylvania, 2010–2015

Authors: Meghan Lyman, C. Grigg, C.B. Kinsey, M.S. Keckler, H. Moulton-Meissner, J. Noble-Wang, J.R. Miller, J.F. Perz, K. Perkins

Background: Nontuberculous mycobacteria (NTM) are a cause of healthcare-associated infections, often related to water sources. In July 2015, Pennsylvania Department of Health notified CDC regarding a cluster of NTM infections among cardiothoracic surgery (CTS) patients at Hospital A. We aimed to identify exposures associated with infection.

Methods: We conducted a case-control study to identify risk factors and exposures associated with NTM infection. Case-patients had a NTM-positive culture during 2010–2015 obtained from a sterile body site 30 days–3.5 years following CTS. Controls underwent CTS and had no NTM-positive cultures. We evaluated infection control practices and analyzed clinical and environmental samples.

Results: We identified 10 cases and 48 controls. Cases had higher odds of undergoing major cardiac surgery involving cardiopulmonary bypass (CPB) where body temperature is regulated by a heater-cooler unit (HCU) (odds ratio [OR]=5.6; 95% confidence interval [CI]: 1.1-29.2). Among patients on CPB, exposure to bypass >2 hours was associated with higher odds of NTM infection (OR=16.5; 95% CI: 3.2-84). All three available case-patient isolates were positive for *Mycobacterium chimaera* with indistinguishable pulsed-field gel electrophoresis patterns. The facility removed HCUs from service prior to onsite investigation, but environmental cultures, including water and air samples taken while these HCUs functioned in a simulated environment, were also positive for *M. chimaera*. Recommendations to the facility included enhanced NTM surveillance and notification of ~1300 potentially exposed patients.

Conclusions: Our findings are the first in the U.S. suggesting NTM aerosolization by HCUs may cause invasive infections in CTS patients. With HCUs used in all life-saving CPB procedures, CDC continues nationwide efforts to mitigate infection risk, issuing public health guidance and working with FDA to address device design issues.

SESSION L: 2016 FETP International Night Oral Presentations

6:00 PM

Ravinia Ballroom

CONCURRENT SESSION M1: Drug-Related Illness

8:30–9:55 AM

Ravinia Ballroom

Moderators: Debra Houry and Michael King

8:35 Collaborative Public Health Investigation of Clenbuterol-Adulterated Heroin Outbreak — Richmond, Virginia, March–April 2015

Authors: Brigette L. Gleason, L. Forlano, K. Cumpston, M. Kelly, A. West, S. Wyatt, D. Avula, M. Vogt, O. Utah, P. Brasler.

Background: In March 2015, the Virginia Department of Health (VDH) was alerted by the Virginia Poison Center (VPC) of a 6-patient cluster treated for severe clinical presentations after using heroin. Patients' symptoms were atypical for heroin use, and concern existed that patients were exposed to heroin that had been adulterated with another substance. A public health investigation was initiated to implement response measures and prevent further cases.

Methods: Collaboration between VDH, VPC, clinicians, and community partners facilitated retrospective case-finding and active surveillance via medical record data abstraction at health care facilities to identify patients with symptoms consistent with those of the initial cluster of patients. The state laboratory processed patient specimens to detect a substance that could explain the clinical presentations.

Results: Case investigation relied on patients' willingness to report details of heroin use. Ten clinical samples tested positive for clenbuterol, implicating it as a heroin adulterant. Based on clinical and epidemiological criteria, we identified 13 patients exposed to clenbuterol-adulterated heroin. Of those 13, at least 8 (62%) experienced the following clinical manifestations consistent with clenbuterol exposure: tachycardia, palpitations, chest pain, shortness of breath, nausea or vomiting, hypokalemia, elevated anion gap, leukocytosis, electrocardiogram with QT prolongation, or electrocardiogram with ST or T wave abnormalities. No deaths occurred. Patient interviews elucidated heroin-supplier information. VDH's coordination with local law enforcement agents led to the heroin supplier's arrest and no cases were identified thereafter.

Conclusions: This outbreak required obtaining sensitive information regarding illicit substance use for a public health investigation. Outbreak control relied on collaboration with community stakeholders and multiple divisions within VDH. Public health responders should maximize collaborative opportunities to optimize outbreak control efforts.

8:55 Severe Illness Associated with a Novel Synthetic Cannabinoid — Mississippi, April 2015

Authors: Amelia M. Kasper, R. Gerona, A. Ridpath, J. Arnold, K. Chatham-Stephens, M. Morrison, O. Olayinka, C. Parker, R. Galli, R. Cox, N. Preacely, J. Anderson, P. Kyle, C. Martin, J. Schier, A. Wolkin, T. Dobbs

Background: Synthetic cannabinoids (SCs), an evolving class of illicit drugs, cause nonspecific clinical effects and are not detected by routine drug screens. On April 5, 2015, a clinician at the University of Mississippi Medical Center (UMMC) in Jackson, Mississippi (MS) notified the Mississippi State Department of Health (MSDH) of an unusual number of patients seeking emergency care after using SCs. We sought to identify causative SCs and describe associated illnesses.

Methods: Using MS Poison Center surveillance data, we identified and reviewed medical charts of UMMC patients who met case criteria, defined as any person with at least two of the following symptoms during April 2–May 1, 2015 after reported SC use: sweating, severe agitation, or psychosis. Blood samples were analyzed by liquid chromatography–quadrupole time-of-flight mass spectrometry, a method capable of identifying unknown toxins (University of California, San Francisco).

Results: Of 721 statewide cases, including 9 deaths, we abstracted records from 119 UMMC patients, including 3 deaths. Patients were predominately male (85%); median age was 29 (range: 14–62) years. Common clinical effects were aggression (32%) and agitation (30%). Intensive care unit admission and death were associated with histories of mental illness (odds ratio [OR]: 4.4; 95% confidence interval [CI]: 1.4–14.9) and substance abuse (OR: 4.9; CI: 1.5–17.3). Laboratory analysis identified SCs in 39/55 (71%) UMMC patients, with 30/39 (77%) testing positive for MAB-CHMINACA or one of its metabolites.

Conclusions: Accelerating emergence of novel SCs poses a public health threat; the outbreak associated with MAB-CHMINACA was unprecedented in magnitude and severity. Strengthened epidemiologic surveillance and laboratory capacity are needed to quickly detect clusters of illness and identify new SCs as they emerge.

9:15 Calls to Poison Control Centers for Conventional Cigarettes and Electronic Cigarettes — Wisconsin, 2010–2015

Authors: Debora Weiss, C. Tomasallo, P. Melstrom, D. Gummin, J. Meiman, H. Anderson

Background: E-cigarettes, battery-powered devices that aerosolize an "e-liquid" typically containing nicotine and other additives, have been marketed in the United States since 2007. At the national level, monthly e-cigarette exposure calls to poison control centers (PCCs) increased during 2010–2014. We characterized conventional cigarette and e-cigarette calls to PCCs in Wisconsin during January 2010–October 2015.

Methods: We defined an e-cigarette call as a Wisconsin PCC call regarding an e-cigarette cartridge or e-liquid exposure; a conventional cigarette call was a call regarding conventional cigarettes or butts exposure. Only single-substance calls were included. Demographic characteristics, exposure routes, medical outcome, and care level were compared.

Results: During January 2010–October 2015, a total of 98 single-substance e-cigarette calls were reported, and annual calls increased from 2 to 35; during the same period, 671 single-substance conventional cigarette calls were reported with stable annual call volumes. E-cigarette calls were highest for children aged ≤5 years (57/98, 58.2%) and adults aged ≥20 years (23/98, 23.5%). Almost all conventional cigarette contacts were among children aged ≤5 years (645/671, 96.1%). The primary exposure route was ingestion for both e-cigarettes (66/98, 67.3%) and conventional cigarettes and butts (667/671, 99.4%). Vomiting was the predominant adverse effect for e-cigarettes (19/47, 40.4%) and conventional cigarettes (144/202, 71.3%), followed by ocular irritation for e-cigarettes (5/47, 10.6%) and choking for conventional cigarettes (24/202, 11.9%). Health care facility referral occurred for 14 (14.3%) e-cigarette and 22 (3.3%) conventional cigarette contacts.

Conclusions: The frequency of calls to PCCs for e-cigarette exposure has increased in Wisconsin, and is highest among young children. Strategies are warranted to prevent future poisonings from these devices, such as nicotine warning labels or child resistant packaging.

9:35 Breaking Bad: Methamphetamine Overdose Deaths — New Mexico, 2014

Authors: Nicole A. Middaugh, D. Thompson, J. Wright, M. Landen

Background: The New Mexico (NM) methamphetamine overdose death (MOD) rate approximately tripled from 2.1 to 6.2/100,000 during 2011–2014. In 2013, NM ranked second nationally for amphetamine-related deaths. To characterize the population in need of prevention and treatment efforts, a descriptive analysis of 2014 MODs was performed.

Methods: Drug overdose death and toxicology data were abstracted from NM Office of the Medical Investigator reports and from CDC's Wide-ranging Online Data for Epidemiologic Research. We identified MODs by using manner of death coding and text recognition; drug classes were identified from autopsy and toxicology reports. Decedent characteristics of MODs were compared with other classes of drug overdoses and with MODs co-occurring with other classes.

Results: During 2014, NM reported 463 drug overdose deaths; methamphetamine was a cause in 104 (22.5%). Multiple substances were involved in 58.7% (61/104) of MODs; of these, 37/61 (60.7%) involved heroin, 27/61 (44.3%) involved prescription opioids, 11/61 (18.0%) involved cocaine, and 10/61 (16.4%) involved benzodiazepines. Among 104 MODs, 71 (68.7%) were men (mean age: 43.1 years; range: 20.1–74.3 years); 96 (92.3%) were white, 49 (47.1%) were Hispanic, and the majority were central NM residents. Although Hispanic and non-Hispanic white men were similar in age (mean: 40.8 and 46.2 years, respectively), Hispanic and non-Hispanic white women differed significantly by age (mean: 32.0 and 50.3 years, respectively; $P < 0.05$).

Conclusions: The majority of MODs in New Mexico co-occurred with other substances. Deaths occurred primarily among non-Hispanic white middle-aged men in central NM. Because MOD demographic characteristics vary by age, gender, and ethnicity, methamphetamine addiction treatment and prevention efforts should target these specific subgroups.

CONCURRENT SESSION M2: Enteric Diseases

8:30–9:55 AM

Dunwoody Suite

Moderators: Robert Tauxe and Stacey Bosch

8:35 Assessment of the Incubation Period for *Listeria Monocytogenes* Infections

Authors: Kristina M. Angelo, K. Jackson, K. Wong, B. Jackson

Background: Listeriosis is a rare but deadly foodborne illness (case-fatality ratio ~20%). The incubation period (IP) for listeriosis, traditionally reported as 3–70 days, is based on data from few cases. Improved listeriosis IP data can improve outbreak investigations (e.g., focus food histories) and clinical guidance. We examined available data to further characterize listeriosis IPs.

Methods: We reviewed invasive (isolated from a source other than stool) listeriosis cases reported to the Centers for Disease Control and Prevention during 1985–2015 with a known food source. For patients with multiple possible dates of exposure, we used a model to generate simulated probability distributions of IPs. We used quantile regression to examine IPs for U.S. and European cases by clinical manifestation category [central nervous system (CNS), bacteremia, pregnancy-associated, and other illness], and implicated food (dairy, produce, and meat and seafood).

Results: Among 48 U.S. cases, the median IP was 11 days (range 0–70); 50% of cases occurred within 10 days of exposure and 90% of cases occurred within 28 days of exposure. The 21 day median incubation period for pregnancy-associated cases was estimated to be 16 days longer than for bacteremia cases (95% confidence interval [CI]: 9.1–22.9) and 11 days longer than for CNS cases (95% CI: 2.9–19.2). The median IP did not vary by food.

Conclusions: Epidemiologists should focus food histories on the four weeks before illness onset to adequately obtain listeriosis exposure information; our data suggest that the traditional 3–70 day range inadequately describes the IP distribution, particularly for non-pregnancy-associated cases. These findings will help epidemiologists investigate listeriosis outbreaks and aid clinical decision-making.

8:55 Outbreak of *Escherichia coli* O26 Infections: Case Finding with a Syndromic Surveillance System — Oregon, 2015

Authors: Jonas Z. Hines, K. Hedberg

Background: Oregon conducts syndromic surveillance in 60 hospital emergency departments (EDs) by using the Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE). During a 2015 restaurant chain–associated Shiga toxin-producing *Escherichia coli* (STEC) O26 outbreak, we analyzed Oregon ESSENCE to identify additional cases and evaluate effect on case detection timeliness.

Methods: We queried ESSENCE for persons presenting to a metropolitan Portland ED during October 7–30, 2015, reporting bloody diarrhea or bloody stool in chief complaint or clinical impression fields. We defined suspected infectious diarrhea as acute onset of ≥3 loose stools daily, and interviewed patients to determine if they had dined at the implicated chain. We compared ESSENCE-identified case reporting dates with 13 confirmed laboratory reported outbreak cases (positive STEC O26 culture).

Results: Of 157 ESSENCE records concerning patients reporting bloody diarrhea or stool, 113 (72%) medical charts were reviewed; 52 (46%) contained infectious diarrhea symptoms. Of 37 who had no laboratory stool testing performed, we contacted 26 (70%), of which 6 (23%) reported eating at the chain. Eleven of 13 confirmed outbreak patients sought care at facilities reporting to ESSENCE; 4 were detected by the query (sensitivity 37%), 2 earlier than by traditional methods (by 1 and 2 days). Adding abdominal pain would have detected 5 more confirmed cases, but added 10,093 ESSENCE records to review.

Conclusions: Using ESSENCE enhanced case ascertainment during an outbreak – we identified 6 additional suspect cases. A more sensitive query would have substantially increased work burden. ESSENCE can also improve timeliness of case detection. During outbreaks where case finding is challenging, health departments can consider using ED syndromic data to improve traditional case finding methods.

9:15 Disparities in Severe Shigellosis — Foodborne Diseases Active Surveillance Network (FoodNet), 10 U.S. sites, 1996–2013

Authors: Lindsey McCrickard, S. Crim, A. Bowen

Background: *Shigella* causes about 500,000 diarrheal illnesses, 6,000 hospitalizations, and 40 deaths in the United States annually. Shigellosis mortality is highest among children <5 years old; additional risk factors for shigellosis-related hospitalization or death are unknown. To guide interventions, we describe severe shigellosis using data from FoodNet, an active, population-based surveillance system in 10 U.S. sites.

Methods: We analyzed FoodNet shigellosis data from 1996–2013. Criteria for severe cases included hospitalization, bacteremia or death. We calculated annual incidence per 100,000 population using U.S. census data and compared groups using odds ratios (OR), stratified by *Shigella* species.

Results: Of 39,371 shigellosis cases, 6,600 (16.8%) were severe (6,493 hospitalizations, 247 bacteremic cases, and 36 deaths). Median annual incidence of severe shigellosis was 0.91 overall, 0.62 among whites, and 1.9 among blacks. Highest median rates of severe shigellosis occurred among blacks <10 years old (4.3), and among black males between 20–29 (3.1) and 30–39 (2.5) years old. Among shigellosis patients, severe infection was more common among blacks than whites ([OR]: 1.2; 95% confidence interval [CI]: 1.1 – 1.2), particularly among persons >20 years old (males, OR: 1.9; 95% CI: 1.7 – 2.2; females, OR: 1.6; 95% CI: 1.4 – 1.8). Odds of severe infection did not differ by race among children <20 years old. Insufficient ethnicity data were available for analysis.

Conclusions: Blacks are more likely to develop severe illness when infected with *Shigella* and to experience markedly greater incidence of severe shigellosis than are whites in the United States. Additional sensitivity analyses may help determine incidence among Hispanics. The role of drug-resistant infections, comorbidities, care-seeking behaviors, treatment, and socioeconomic factors should be examined to guide interventions to reduce these disparities.

9:35 Foodborne Outbreaks in Prisons — United States, 1998–2014

Authors: Mariel A. Marlow, R. Gierke, A. Vieira

Background: Foodborne diseases cause an estimated 48 million illnesses in the United States annually. Outbreaks in prison settings present unique challenges. We present the epidemiology of US prison-related foodborne outbreaks during 1998–2014.

Methods: We reviewed CDC's Foodborne Disease Outbreak Surveillance System for outbreaks (≥2 cases of similar illness resulting from the ingestion of a common food) in prisons. Number of outbreaks, hospitalizations, deaths, state, etiologic agent, implicated food, and food preparation were analyzed.

Results: From 1998–2014, 200 foodborne outbreaks in prison settings were reported, resulting in 20,616 illnesses, 204 hospitalizations, and 5 deaths. Median number of ill cases per outbreak was 44 (range: 2–1644). These outbreaks accounted for 1% (200 of 18,206) of all reported foodborne outbreaks. Thirty-seven states reported at least one outbreak in a prison; Florida (12%, 23) and California (11%, 22) reported the most. Among 128 outbreaks with a single etiology, *Clostridium perfringens* (28%, 36), *Salmonella* (27%, 35), and norovirus (16%, 21) were most frequently reported. Poultry (19), vegetables (10), and meat (7) were the most commonly implicated foods. Food was prepared at the prison in 89% (178) of outbreaks and food handler(s) were implicated as the source of contamination in 14% (28). Stolen or hidden food storage and preparation was reported in 13 outbreaks.

Conclusions: These data on implication of food handlers and on illicit food storage and preparation indicate a need to improve training of prison food handlers and to educate inmates on the risks of improperly storing and preparing food. The large numbers of illnesses and hospitalization indicate that reducing the occurrence of outbreaks would improve inmates' health and decrease costs to prisons.

SESSION N: Alexander D. Langmuir Memorial Lecture

10:15–11:45 AM

Ravinia Ballroom

Moderator: Patricia Simone

Presentation of the Alexander D. Langmuir Prize Manuscript Award and the Distinguished Friend of EIS Award

From Antibiotic Resistance to Zika: Reflections on Working at the Intersection of Science and Public Health Politics

Speaker: Margaret Hamburg, MD

Biography

Margaret Hamburg is an internationally recognized leader in public health and medicine. She is the former Commissioner of the U.S. Food and Drug Administration, having stepped down last year after almost six years of service.

In 1991, Dr. Hamburg was named Commissioner of the New York City Department of Health. During her six-year tenure there, she implemented rigorous public health initiatives that tackled the city's most pressing crises head-on — including improved services for women and children, a widely acclaimed Tuberculosis control program, a needle-exchange program to combat HIV transmission, and the nation's first public health bio-terrorism/public health preparedness program.

In 1997, President Clinton named Dr. Hamburg Assistant Secretary for Planning and Evaluation in the U.S. Department of Health and Human Services, the chief policy position in the Department. She later became founding Vice President for Biological Programs at the Nuclear Threat Initiative, a foundation dedicated to reducing the threat to public safety from nuclear, chemical, and biological weapons. In that role, Dr. Hamburg spearheaded efforts to prevent, detect and respond to both naturally occurring and deliberately caused biological threats.

In March 2009, President Obama nominated Dr. Hamburg for the post of FDA Commissioner. In that role, Dr. Hamburg emphasized the critical need for innovation in meeting medical care and public health needs. As Commissioner, she provided leadership on many groundbreaking activities, including implementation of new authorities to regulate tobacco products, new legislation designed to transform our nation's food safety system to one based on prevention rather than simply responding when outbreaks occur, and modernization of the system for the evaluation and approval of medical products.

Dr. Hamburg is a Fellow of the American Association for the Advancement of Science and the American College of Physicians, as well as a member of the Council on Foreign Relations and the Institute of Medicine, National Academy of Sciences, where she serves as Foreign Secretary. Dr. Hamburg currently sits on the board of the Commonwealth Fund, the Simons Foundation, the Urban Institute and the American Museum of Natural History. She is also a member of the Harvard University Global Advisory Council and the Scientific Advisory Committee for the Gates Foundation. She is the recipient of numerous awards and several honorary degrees.

Dr. Hamburg earned her B.A. from Harvard College, her M.D. from Harvard Medical School and completed her medical residency at Weill Cornell Medical Center. She is married and the mother of two children.

Awards presented during session.

SPECIAL SESSION 6: Global Rapid Response Team — An Agency-Wide Approach to Supporting CDC's Response to Global Outbreaks and Humanitarian Emergencies

12:00–1:30 PM

Ravinia Ballroom

Moderator: Jordan Tappero

Sponsor: Center for Global Health (CGH)

This special session will provide an overview of CDC's initiative to develop a global rapid response team to enhance the agency's ability to respond effectively to humanitarian crises throughout the world. The session will describe the team's organizational structure, how it supports subject matter expert (SME) groups and other sectors within CDC, and how EISOs can participate.

Speakers

- Introductions. *Michael Gerber, Emergency Response and Recovery Branch*
- Enhancing CDC's Response to Global Outbreaks and Humanitarian Emergencies: An Overview of the Global Rapid Response Team. *Carlos Navarro Colorado, Global Rapid Response Team*
- Building Local Capacity for Emergency Response: The Role of the Global Rapid Response Team during the Cholera Outbreak in Tanzania. *Ashley Greiner, Global Rapid Response Team*
- Supporting Regional Capacity for Emergency Response: The Role of the Global Rapid Response Team during the Zika Outbreak in the Latin America and Caribbean Region. *Tasha Stehling-Ariza, Global Rapid Response Team*
- Working with the Global Rapid Response Team. *Cyrus Shahpar, Global Rapid Response Team*

SPECIAL SESSION 7: Laboratory Leadership Service (LLS) — A Partner Program of EIS

12:00–1:30 PM

Dunwoody Suite

Moderators: Steve Monroe and Robert Tauxe

Sponsor: Center for Surveillance, Epidemiology, and Laboratory Services (CSELS)

This session will showcase the public health contributions of LLS fellows achieved through work in their assignments, highlighting the collaboration between laboratory and epidemiology disciplines, the public health influence of laboratory science, and the scientific approach to laboratory safety and quality.

Speakers

Xin Liu, LLS Program Lead, Epidemiology Workforce Branch, Division of Scientific Education and Professional Development, Center for Surveillance, Epidemiology, and Laboratory Services, will introduce CDC Leadership, who will give the introductory comments regarding LLS.

Laboratory Leadership Service Fellows

Environmental Sampling of Contaminated Heater-Cooler Units Associated with Nontuberculous Mycobacteria Infections at Hospital A — Pennsylvania, 2010–2015. *M. Shannon Keckler*.

Using Laboratory Data for Public Health Action: Turnaround Time During HIV Viral Load Testing Scale-Up in Malawi, 2013–2015. *Peter Minchella*.

Determination of Inactivation Kinetics of Orthopoxviruses using Heat and Micro-Chem Plus™. *Zachary P. Weiner.*

Panel Discussion

Steve Monroe, Associate Director for Laboratory Science and Safety (ADLSS) at CDC, will present the mission and priorities of the newly established Office of the ADLSS and its role in improving quality and safety in the agency's laboratory science.

Robert Tauxe, Director of Division of Foodborne, Waterborne, and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, will discuss the importance of lab-epi collaboration to address public health problems.

CONCURRENT SESSION O1: Vaccine-Preventable Diseases

1:30–3:15 PM

Ravinia Ballroom

Moderators: Sam Posner and Lara Akinbami

1:35 Meningococcal Disease Among Men Who Have Sex with Men — United States, 2012–2015

Authors: Temitope A. Folaranmi, M. Whaley, H. Kamiya, J. MacNeil, C. Kretz, A. Blain, S. Ngai, K. Winter, M. Pacilli, X. Wang, G. Bowen, M. Patel, S. Martin, L. Misegades, S. Meyer

Background: Meningococcal disease is a rare but serious bacterial infection. Three clusters among men who have sex with men (MSM) have been reported in the U.S. since 2012. We characterized risk of disease among MSM to inform the Advisory Committee on Immunization Practices' discussions regarding the use of meningococcal vaccines in this population.

Methods: All cases among males aged 18-64 years reported to the National Notifiable Disease Surveillance System between January 2012 and June 2015 were reviewed. MSM status and potential risk factors for disease were collected from state health departments. We compared annualized incidence rates among MSM and men not known to be MSM (non-MSM). Denominators were estimated using 2012 census data and published estimates of the proportion of MSM in the U.S. Isolates were characterized using standard microbiological methods and PCR; genetic similarity of these isolates were assessed using pulsed-field gel electrophoresis (PFGE) and whole genome sequencing (WGS).

Results: Seventy-four cases were reported among MSM and 453 among non-MSM. The risk in MSM was 4.0 times (95% CI: 3.55-4.50) the risk in non-MSM. HIV-infected MSM had 9.8 times (95% CI: 5.94-16.21) the risk in HIV-uninfected MSM. Among MSM with known information, 48.1% (N=52) reported recreational drug use, 31.7% (N=63) tobacco use, and 45.2% (N=31) multiple or anonymous sexual partners. PFGE and WGS revealed distinct phylogenetic groups associated with the MSM clusters.

Conclusions: MSM, particularly HIV-infected MSM, are at higher risk for meningococcal disease than non-MSM. While vaccination of MSM may reduce their risk, policymakers should consider other factors, including suboptimal vaccine immune response in HIV-infected persons, low absolute risk of disease, and likely need for booster doses in all MSM when making recommendations.

1:55 Trends in Group B Streptococcal Infections Among Young Infants and the Potential Impact of a Maternal Vaccine in the United States, 2006–2014

Authors: Srinivas A. Nanduri, S. Petit, J. Baumbach, A. Reingold, L. Miller, L. Harrison, R. Lynfield, S. Zansky, W. Schaffner, A. Thomas, M. Farley, S. Schrag, G. Langley

Background: Intrapartum antibiotic prophylaxis recommendations for prevention of early-onset neonatal group B streptococcal (GBS) disease were first implemented in 1996. Despite declines in newborn disease following these and subsequent recommendations, GBS remains the leading cause of neonatal sepsis and meningitis in the United States. We analyzed GBS disease trends among young infants from 2006 through 2014 and estimated potential impact of a trivalent vaccine (serotypes Ia, Ib and III) under development.

Methods: We defined early-onset disease (EOD) cases as GBS infections in infants aged 0-6 days and late-onset disease (LOD) as infections among infants aged 7-90 days. To calculate incidence, we used cases identified by Active Bacterial Core surveillance (ABCs) for numerators and live births from state vital records for denominators. We analyzed serotype data from 7 of 10 ABCs sites that collect GBS isolates.

Results: During 2006-2014, ABCs identified 1,188 EOD and 1,255 LOD cases. Overall EOD incidence initially declined, from 0.38 (2006) to 0.27 (2010) cases per 1000 live births (*P=.014*), but stabilized at 0.26/1000 live births since 2011. LOD incidence has largely remained unchanged at 0.29/1000 live births in 2009 and 0.30/1000 live births in 2014. Serotyping data were available for 1548 (73.5%) of 2,105 EOD and LOD cases. A maternal trivalent vaccine targeting serotypes Ia, Ib and III could potentially cover 63% of EOD and 82% of LOD.

Conclusions: Despite use of intrapartum antibiotic prophylaxis, perinatal GBS remains a concern; EOD rates have plateaued in recent years and LOD rates are not affected by intrapartum prophylaxis. The tri-valent vaccine, if effective, offers an opportunity to significantly reduce both LOD, for which there is no public health intervention, and EOD.

2:15 Pneumonia with Pleural Effusion Among Children Two Years After 13-Valent Pneumococcal Conjugate Vaccine Introduction — Santo Domingo, Dominican Republic, June 2014–July 2015

Authors: Sana S. Ahmed, F.C. Lessa, J. Sanchez, M. Carvalho, D. Cedano, H. Coradin, C. Peña, J. Fernández, Z.G. Arbaje, C. Whitney, J. Feris-Iglesias

Background: Nearly one million children die of pneumonia annually in resource-limited countries. In the Dominican Republic's (DR) main pediatric hospital, 45% of pneumonia admissions are complicated by effusion. In 2013, the DR introduced 13-valent pneumococcal conjugate vaccine (PCV13) to reduce pneumonia burden. We described clinical characteristics and outcomes of pediatric pneumonia with effusion after PCV13 introduction and evaluated early vaccine impact.

Methods: Enhanced hospital surveillance data from June 2014–July 2015 (post-PCV13) were analyzed and compared to results of pre-PCV13 surveillance (121 cases from June 2009–July 2011). A case was radiologic evidence of pneumonia with effusion in a child aged <15 years with fever (≥38.5˚C). Pneumococcus was detected by culture and polymerase chain reaction on pleural fluid and underwent serotyping. National PCV13 coverage data for 2014–2015 was obtained from the health ministry. Case characteristics were compared using chi-square.

Results: Of 155 post-PCV13 cases, 105 had data abstracted. Of these, 64% were male, median age was 2 years, 18% developed sepsis, 46% required supplemental oxygen, 8.6% were admitted to an intensive care unit, and 11% died. PCV13 coverage for first, second and third doses was 84%, 73%, and 28%, respectively. The proportion of cases with pneumococcus detected was similar in the two surveillance periods (51.2% pre-PCV13, and 56.2% post-PCV13, *P*=.54). The proportion of pneumococcal pneumonia caused by PCV13-serotypes remained stable among children age-eligible to have received PCV13 (92% vs. 96%, *P*=1.0).

Conclusions: Poor outcomes following pediatric pneumonia were common. In addition, surveillance has not yet detected significant benefit from PCV13 introduction, perhaps because of low vaccination coverage or improved surveillance methods. Increasing vaccination coverage may impact disease rates and outcomes.

2:35 Hepatitis B Virus Elimination: Evaluating Disease Reduction After Implementation of Infant Vaccination — U.S.-Affiliated Pacific Islands, 1985–2015

Authors: Winston E. Abara, M.G. Collier, E. Teshale

Background: The US-affiliated Pacific Island countries (USAPI) are disproportionately burdened by hepatitis B virus (HBV) infection. To address this, the USAPI introduced universal infant hepatitis B vaccination in the mid-1980s. To evaluate progress toward eliminating HBV infection, we assessed the prevalence of current HBV infection and vaccination coverage among children aged <10 years in the USAPI born in the 1980s, 1990s, and 2000s.

Methods: We obtained demographic and serologic data from serial cross-sectional seroprevalence surveys from convenience samples of children aged 2–10 years recruited in 6 USAPI countries in 1985, 1986, 1991, 1995, 2000, 2005, 2010, 2011, and 2015. Positive hepatitis B surface antigen serologic results were classified as current HBV infections. Vaccination status was determined by vaccination record. Descriptive statistics and a one-way analysis of variance were performed to estimate prevalence of current HBV infection and vaccination coverage for children on the basis of birth year and significant differences in these estimates.

Results: Data were obtained from 4,462 children; 1,283 children (median age: 6.5 years) born in the 1980s; 840 children (median age: 4.5 years) born in the 1990s; and 2,339 children (median age: 7 years) born in the 2000s. Of all children, 57% were female. Prevalence of current HBV infection significantly decreased (10.1% [1980s]; 1.9% [1990s]; 0.3% [2000s]; $P < .0001$) as vaccination rates significantly increased (76.4% [1980s]; 88.7% [1990s]; 97.5% [2000s]; $P < .0001$).

Conclusions: In an endemic region of the United States, high vaccine coverage corresponded with a significant decrease in the prevalence of current HBV infection over time. With continued universal HBV vaccination, HBV elimination in the USAPI is an achievable goal.

2:55 Evaluation of Risk Factors and Effectiveness of Mass Vaccination Campaign in Response to Serogroup B Meningococcal Disease Outbreak — University of Oregon, 2015

Authors: Emily A. Fisher, T. Poissant, P. Luedtke, P. Cieslak

Background: Two vaccines were licensed in October 2014 and January 2015 to prevent invasive serogroup B meningococcal disease (ISBMD), a disease with a 10% fatality rate. During January–May 2015, a total of 7 persons affiliated with the University of Oregon (UO) contracted ISBMD; 1 died. Mass vaccination was recommended to prevent future cases. We evaluated effectiveness of the mass vaccination campaigns.

Methods: A case is defined as isolation of serogroup B *Neisserita meningitidis* since January 2015 from an UO-associated person. We conducted a retrospective cohort study of UO undergraduates to determine groups at highest risk for disease, and surveyed vaccine recipients at the vaccination clinics to measure uptake among populations at risk and evaluate messaging effectiveness.

Results: UO freshmen were more likely than nonfreshmen (risk ratio [RR]: 8.2; 95% confidence interval [CI]: 1.5–44.7) and sorority and fraternity members more likely than nonmembers (RR: 10.2; CI: 1.9–55.6) to contract ISBMD. To date, 6,362 vaccinees (approximately 90% of clinic attendees) have completed surveys. Although only 29% of registered freshmen and 21% of fraternity and sorority members attended a mass vaccination clinic, they were more likely than nonfreshmen (RR: 2.1; CI: t2.0–2.2) and nonmembers (RR: 1.2; CI: 1.2–1.3) to attend. Respondents reported e-mail as preferred communication method (90%). Concern for contracting ISBMD (65%) and parental request (55%) were most commonly cited motivations for getting vaccinated.

Conclusion: As of December 2015, UO continues to experience an ISBMD outbreak. Freshmen and fraternity and sorority members are at higher risk. The vaccination campaign reached populations at risk, but using e-mail and engaging parents might improve uptake among undergraduate populations in ongoing vaccination efforts.

CONCURRENT SESSION O2: Chronic Diseases

1:30–3:15 PM

Dunwoody Suite

Moderators: Peter Briss and Italia Rolle

1:35 Obesity, Total Water Intake, and Dehydration in U.S. Adults, 2009–2012

Authors: Asher Rosinger, L. Akinbami, H. Lawman, C. Ogden.

Background: Adequate water intake is critical to physiological and cognitive functioning. While water requirements increase with body size, it remains unclear if water homeostasis differs by weight status. Given that 36% of U.S. adults are obese, understanding the association between weight status and dehydration may help guide future water intake recommendations.

Methods: National Health and Nutrition Examination Survey data (2009–2012) were analyzed for 9,601 non-pregnant adults aged 20 + years without kidney failure. Body mass index (BMI) was categorized as under/normal weight (BMI<25), overweight (25≤BMI<30), or obese (BMI≥30). Urine osmolality was determined by freezing point depression osmometry and used to determine hydration status with an age-dependent formula. Total water intake was determined using a 24-hour dietary recall. We conducted multiple linear and logistic regressions adjusted for confounders and tested interactions.

Results: Adults with obesity had higher urine osmolality (P <.001) than adults with under/normal weight and higher dehydration prevalence (mean: 45.7% ± 1.2 standard error vs 28.5% ± 1.4, P <.001). Interactions between obesity and water intake were significant (P <.01) and analyses were stratified by recommended adequate intakes (AI) of water (men, 3.7 L; women, 2.7 L). Among those who consumed less than the AI, adults with obesity had 1.97 times (95% confidence interval [CI]: 1.61–2.42) the odds of dehydration than adults with under/normal weight; however, among those consuming more than AI, the odds ratio increased to 2.74 (95% CI: 1.91–3.92).

Conclusions: On a population level, obesity is related to hydration status. Almost half of U.S. adults with obesity were dehydrated and, regardless of water intake, adults with obesity were more likely to be dehydrated than under/normal weight adults.

1:55 Fruit and Vegetable Availability in a Nutrition Environment Assessment — Guam, 2015

Authors: Brenna K. VanFrank, S. Park, S. Jackson, B. Harmon, E. Lundeen, A. Uncangco, D. Harris

Background: Since 2010, Guam has been in a declared state of emergency because of a high prevalence of chronic diseases. Low consumption of fruits and vegetables (FV) increases the risk of chronic diseases; access to FV can influence consumption. We explored availability and variety of FV in Guamanian stores.

Methods: Stores selling staple foods (n=114) were selected by regionally-stratified random sampling. Availability and variety of three FV types (fresh, canned in water or 100% juice, frozen) were measured with a validated survey adapted for Guam. We examined associations between store size (small: 1 register, n=77; large: ≥2 registers, n=37) and FV availability and variety using Chi-square and Fisher's exact tests.

Results: Most stores sold fruits (80%) or vegetables (96%). Fresh fruits were available in 62% of stores, 49% of which had >2 varieties. Canned fruits were available in 62% of stores, 31% of which had >2 varieties. Few stores (14%) sold frozen fruit. Fresh vegetables were available in 61% of stores, 54% of which had >2 varieties. Stores commonly sold canned (96%) or frozen (72%) vegetables. More (P<.01) large stores than small stores sold any fruit type (95% vs 73%) or fresh vegetables (89% vs 48%). Among stores selling each FV type, more (P<.01) large stores had >2 varieties of fresh fruits (76% vs 24%), canned fruits (58% vs 10%), and fresh vegetables (82% vs 30%).

Conclusions: Although most stores sold some type of FV, availability and variety of all fruit types and fresh vegetables were limited, particularly among small stores. These results suggest potential opportunities to improve access to healthy foods in Guam; strategies could include increasing capacity for FV distribution, marketing, and sales.

2:15 Using Medicare Fee-For-Service Claims Data for Surveillance of Million Hearts® Initiative Inpatient Event Rates, 2007–2014

Authors: Iman K. Martin, M.D. Ritchey, K.J. Caines, K.M. Hodges, C.A. Powers

Background: In 2012, the Million Hearts® (MH) initiative was launched in an effort to prevent 1 million heart attack and stroke events by 2017. One component of the MH event surveillance strategy is tracking cardiovascular disease hospitalization events (HE) among adults aged ≥18 by using Healthcare Cost and Utilization Project National Inpatient Sample (NIS) data. Although nationally representative, this data source lacks timeliness (~18 month lag) and can only provide limited regional and race/ethnicity-specific estimates. This study assesses the utility of using Medicare claims data to supplement MH HE surveillance among persons aged ≥65.

Methods: Age-sex-specific HE rates were calculated by using claims data collected among Fee-For-Service (FFS) beneficiaries with Medicare Parts A and B coverage and compared with NIS-based HE rates during 2007–2012. Additional surveillance system attributes were assessed.

Results: Medicare data were complete through 2014 (~3-6 month lag); could support longitudinal, race-ethnicity, and regional monitoring; and, in 2012, were representative of 65% of the US population aged ≥65. Comparing the NIS and FFS rates, the NIS rates were, on average, higher by 7.4% among men aged 65-74, 3.0% among men aged ≥75, 3.3% among women aged 65-74, and 1.6% among women aged ≥75. In addition, they had Pearson product-moment correlation coefficients of .94, .89, .94, and .86, respectively.

Conclusions: During 2007-2012, the NIS and FFS age-sex-specific HE rates were strongly correlated, with small magnitude differences. Supplementing MH HE surveillance with Medicare data may enhance tracking among those aged ≥65 by providing more timely data, longitudinal monitoring, and greater granularity by race/ethnicity and geography. These attributes may allow MH to quickly identify population segments that could benefit from additional public health actions.

2:35 Objectively Measured Physical Activity and Risk of Knee Osteoarthritis: The Osteoarthritis Initiative

Authors: Jin Qin, K. Barbour, D. Dunlop, C. Helmick, J. Hootman, J. Cauley, M. Nevitt, L. Murphy

Background: Regular physical activity (PA) protects against cardiovascular disease, cancer, diabetes, and death. Prior studies about PA and knee osteoarthritis risk used self-reported PA, which is subject to recall and social desirability bias, and activities captured may be limited. We analyzed this association by using measured PA instead.

Methods: We examined the association between objectively measured PA and risk of developing symptomatic knee osteoarthritis (SKOA) using data from the Osteoarthritis Initiative, an ongoing prospective cohort study of adults at high risk of knee osteoarthritis. The study population (n = 1,329; age 64.6 ± 9.2 years; follow-up 3.9 ± 0.5 years) was free of SKOA (i.e., with both symptoms and radiographic evidence) at baseline. PA was measured by a uniaxial accelerometer worn on a waist belt for 7 continuous days at baseline; and minutes-per-week of moderate-equivalent intensity PA were calculated. Incident SKOA was defined by Kellgren-Lawrence radiographic grade ≥2 plus pain, aching, or stiffness in the same knee during follow-up. Weibull parametric survival regression models estimated hazard ratios (HR) for interval-censored data. Multivariable analyses adjusted for age, sex, race, body mass index, education, and history of knee injury.

Results: Forty participants developed SKOA during follow-up. Compared with inactive participants (<10 min/week; 43%), those who were insufficiently active (10–149 min/week; 41%; HR: 1.5; 95% CI: 0.7–3.1) and those meeting recommended PA levels (≥150 min/week; 16%; HR: 2.3; 95% CI: 0.9–6.0) did not have significantly higher risk of SKOA (test-for-trend *P*=.075).

Conclusions: Objectively measured PA levels were not associated with the risk of developing SKOA during 4 years among middle-aged and older adults. Additional studies using longer follow-up time are needed to confirm these findings.

2:55 Five-Year Relative Survival with Human Papillomavirus-Associated Cancers

Authors: Hilda Razzaghi, T. Thompson, R. Joseph, R. Wilson, M. Saraiya

Background: Human papillomavirus (HPV) vaccines can potentially prevent more than 90% of cervical and anal cancers, and a substantial proportion of vulvar, vaginal, penile, and oropharyngeal cancers caused by certain HPV types. Because more than 30,000 HPV-associated cancers are diagnosed annually, current studies are needed to understand how relative survival varies for each of these cancers by certain demographics, including race or ethnicity and age.

Methods: We examined data from 27 population-based cancer registries that met CDC's publication criteria, linked with the National Death Index, completed active patient follow-up from 2001 to 2011, and covered approximately 59% of the US population. We limited our analyses to invasive cancers that met specified histologic criteria for HPV-associated cancers. We calculated 5-year relative survival from diagnosis until death for these cancers by age, race, and sex by using the Ederer II method.

Results: Five-year relative survival was 69.7% for cervical, 67.5% for anal, 72.6% for vulvar, 53.3% for vaginal, 54.5% for penile, and 61.8% for oropharyngeal cancers. Five-year relative survival was consistently higher among white compared to black persons for all HPV-associated cancers and all age groups, and the largest differences were for oropharyngeal cancers among those aged 30-49 years (75.0% white vs. 43.1% black) and for anal cancers among those aged 30 years or younger (67.5% white vs. 36.3% black).

Conclusions: Disparities in relative survival with HPV-associated cancers among young black populations was most notable for anal and oropharyngeal cancers. These groups may benefit most from targeted preventions, including HPV vaccination and improved access to screening and treatment.

SESSION P: Awards and Late-Breaking Reports

3:30–5:10 PM

Ravinia Ballroom

Presentation of Awards

Moderator: Diana Bensyl

- Outstanding Poster Presentation Award
- Donald C. Mackel Memorial Award
- J. Virgil Peavy Memorial Award
- Paul C. Schnitker International Health Award
- Iain C. Hardy Award
- James H. Steele Veterinary Public Health Award
- Mitch Singal Excellence in Occupational and Environmental Health Award
- Distinguished Friend of EIS Award

Late-Breaking Reports

Moderators: Anne Schuchat and Tracie Gardner

3:50 Restaurant-Associated Typhoid Fever Outbreak Traced to a Chronic Carrier — Colorado, 2015

Authors: Jessica Hancock-Allen, A. Cronquist, J. Peden, D. Adamson, N. Corral, K. Brown

Background: Typhoid fever (infection with *Salmonella* typhi) among U.S. residents is usually acquired internationally. Humans are the only reservoir; transm ission is fecal-oral. Asymptomatic carriage occurs in 2%–5% of cases. During October 2015, a total of 2 unrelated, non travel-associated typhoid fever cases from the same county were reported to the Colorado State Health Department. We sought to identify additional cases, determine risk factors, and implement control measures.

Methods: A case was defined as a clinically compatible illness with 1 of 2 *S.* typhi pulsed-field gel electrophoresis (PFGE) patterns isolated during July 1–October 15, 2015. A carrier was a person who had contact with ≥1 patient, was asymptomatic, and had *S.* typhi with a matching PFGE pattern. We searched for additional cases through passive reporting, PulseNet, and 2 broadcasts to clinicians. To determine common exposures, we conducted interviews and investigated credit card statements and supermarket records. We attempted to obtain 2 stool cultures from all workers at Restaurant A present during the patients' exposure period (August 10–20, 2015); both patients had eaten at Restaurant A.

Results: Three cases were identified. Two (67%) patients were hospitalized; all recovered. All patients ate at Restaurant A during August16–August 20. A single food handler who last traveled internationally during 2000 tested positive for *S.* typhi with the outbreak PFGE pattern, denied illness, and was classified as a carrier. He was excluded from work and treated with antibiotics.

Conclusions: This outbreak demonstrates that chronic typhoid carriers can cause illness, even years after infection. When non travel-associated typhoid fever cases are detected, thorough investigating is essential. Open collaboration among public health, laboratories, patients, and industry is imperative for successful investigations.

Awards presented during session.

4:00 Possible Transmission of St. Louis Encephalitis Virus Through Blood Transfusion — Arizona, 2015

Authors: Heather Venkat, R. Sunenshine, C. Levy, T. Kafenbaum, T. Sylvester, L. Adams, K. Smith, J. Townsend, M. Dosmann, H. Kamel, R. Patron, J. Huskey, H. Khamash, E. Krow-Lucal, I. Rabe

Background: St. Louis encephalitis virus (SLEV) causes disease clinically similar to West Nile virus (WNV), a related flavivirus. In the United States, blood donors are screened for WNV; SLEV transmission through blood transfusion has not been reported. In September, SLEV infection was confirmed in an Arizona kidney transplant recipient. We investigated to determine the infection source.

Methods: We interviewed the patient and reviewed medical records for transplant and transfusion history. Retained specimens before and after organ transplantation and blood transfusion were collected and tested by IgM microsphere immunoassay and plaque reduction neutralization testing. To determine the likelihood of mosquito-borne infection, we reviewed mosquito surveillance data (5-mile radius) surrounding the patient's and blood donor's residences 30 days prior to symptom onset.

Results: Patient interview revealed neuroinvasive symptom onset compatible with a flavivirus infection 35 days posttransplant. Four organ recipients from the same donor, and 4 blood donors who provided packed red cells that were transfused to the patient ≤35 days before symptom onset were identified. One asymptomatic blood donor was positive for SLEV; the 3 blood donors, 3 organ recipients, and organ donor had no clinical or laboratory evidence of SLEV infection. One recipient of a blood component from the SLEV-infected blood donor died posttransfusion; no samples remained for testing. No blood components remained from the implicated donation. We identified 1 positive SLEV mosquito pool around the patient's residence and 12 positive SLEV mosquito pools around the asymptomatic blood donor's residence.

Conclusions: This investigation provides evidence for the first reported possible case of SLEV transmission through blood product transfusion. Health care providers should consider SLEV in patients with compatible clinical symptoms who recently received blood products.

4:10 Using Social Networks to Target Prophylaxis in a Hepatitis A Outbreak — New York State, 2015

Authors: Misha P. Robyn, S. Fegley, V. Swinehart, C. Hidalgo, A. Sullivan-Frohm, G. Young, A. Newman, B. Backenson, E. Dufort, Y. Lin, D. Blog

Background: In November 2015, County X reported 2 siblings with hepatitis A virus (HAV) infection. Three weeks later, County X reported 3 more persons with HAV infection who were not known contacts of the siblings. We investigated to identify persons needing prophylaxis and stop transmission.

Methods: We defined a case as HAV compatible illness and detectable IgM antibody to HAV in a County X resident during October–November, 2015. We complemented limited interview information with information from online and in-person social networks to further identify persons to target for prophylaxis or HAV testing. We searched publically-available information on Facebook® to verify information provided during interviews and guide re-interview strategies. Some patients frequented a support and recreation center; staff were interviewed to clarify social links and identify members with high-risk behaviors.

Results: Eight cases were identified; 2 patients reported symptoms directly to public health authorities. Seven patients were epidemiologically linked as household or sexual contacts. All patients were infected with HAV genotype IA, a relatively common genotype. Six patients had public Facebook profiles, and 5 were support center members. We identified 77 contacts of patients at risk for HAV infection; 60/77 (78%) received prophylaxis. Five contacts reported symptoms and tested negative for IgM anti-HAV antibodies. Seventeen support center members were identified as contacts, but all 162 members were offered prophylaxis. Of those, 78/162 (48%) received prophylaxis. No additional cases were identified.

Conclusions: Although the source of infection was not identified, social networks helped identify contacts and persons at high risk to target for prophylaxis. Social networks provide insight into social links and high-risk behaviors. This information can help guide investigation, case identification, and community prevention efforts.

4:20 Mycoplasma Hominis Surgical Site Infections Following Receipt of Amniotic Tissue Product — Ohio, 2015

Authors: Shannon A. Novosad, S. Basavaraju, M. Mohr, P. Annambhotla, A. Halpin, L. Foy, R. Chmielewski, D. Crabb, A. Ratliff, K. Waites, M. Kuehnert

Background: In October 2015, CDC was notified of a cluster of surgical site infections (SSIs) following lumbar surgery at an acute care hospital (Facility A) in Ohio, including 2 from which *Mycoplasma hominis* was isolated. All patients received intraoperative applications of an amniotic tissue product from a common donor at their surgical sites, raising concern for donor-derived infection. *M. hominis* is a bacterium that can colonize the lower urogenital tract. The objective of the investigation was to identify the source and to prevent additional infections.

Methods: Use of this product at Facility A was reviewed. Laboratory tests of tissue product from the common donor, including *M. hominis* culture and polymerase chain reaction (PCR), were performed. A multi-state investigation to identify additional cases is ongoing.

Results: This product is approved by the Food and Drug Administration (FDA) as a tissue product and is used to facilitate wound healing. Twenty-seven vials of tissue product from a common donor were distributed to facilities in 7 states. Fourteen patients who underwent surgery at Facility A during August–September 2015 received an amniotic tissue product, and 9 received product recovered from this donor. Of these, 4/9 (44%) developed SSIs, including 2 *M. hominis* infections. *M. hominis* and *Ureaplasma parvum* were identified by culture and PCR in 2 sealed and unused vials of product from the same donor.

Conclusions: *M. hominis* was most likely transmitted through amniotic tissue. The supplier screens donors for infections and tests product for contamination prior to distribution; however, these methods cannot prevent all tissue-transmitted infections, including genitourinary tract organisms, such as *M. hominis* and *U. parvum*. FDA approved amniotic tissues are not free from contamination by microorganisms.

4:30 *Listeria Monocytogenes* Infections Linked to Packaged Salad — United States, 2015–2016

Authors: Julie L. Self, A. Conrad, S. Stroika, A. Jackson, J. Beal, A. Wellman, L. Burnworth, K. Jackson, S. Bidol, T. Gerhardt, A. Fields, M. Wise, C. Basler

Background: *Listeria monocytogenes* (*Lm*) is estimated to be the third leading US cause of death from foodborne illness. In September 2015, PulseNet, the national molecular subtyping network for foodborne disease surveillance, identified a cluster of *Lm* isolates that were indistinguishable by two-enzyme pulsed-field gel electrophoresis (PFGE) pattern and highly related by whole-genome multi-locus sequence typing (wgMLST) analysis. We investigated to identify the source and prevent further illnesses.

Methods: A case was defined as isolation of *Lm* with the outbreak PFGE pattern and highly related by wgMLST with isolation date on or after July 5, 2015. Exposure information was collected through questionnaires and open-ended interviews. wgMLST was performed on all isolates, and FDA conducted a regulatory investigation.

Results: This investigation is ongoing. To date, 18 cases from nine states have been identified, with isolation dates between 07/05/2015 and 01/31/2016. All patients were hospitalized; one was pregnant; one died. Twelve patients were asked about leafy greens, and all reported consuming them. Ten of 12 patients (83%) recalled consuming packaged salads, and six (50%) reported consuming brands processed by Company A. Patient isolates were highly related by wgMLST (median allele differences, 3) to *Lm* isolates from packaged salad collected at retail by Ohio Department of Agriculture and food samples collected by FDA from Company A's Ohio facility. Company A halted production and voluntarily recalled packaged salads processed at that facility.

Conclusions: This is the first reported US outbreak of listeriosis linked to leafy greens. Distribution of cases over many months and short shelf-life of food suggest persistent contamination rather than a single contamination event. Additional research is needed to understand factors that may have contributed to contamination.

4:40 An Assessment of Household Knowledge, Attitudes, and Practices During a Cholera Epidemic — Dar Es Salaam, Tanzania, January–February 2016

Authors: Sae-Rom Chae, H. Lukupulo, N. Emmanuel, A. Abade, S. Sembuche, L. Urio, J. Mghamba, T. Walker, R. Quick

Background: Epidemic cholera spreads rapidly and is difficult to control. Access to safe water and oral rehydration solution (ORS) is critical to prevention and control efforts. From August 15, 2015–February 23, 2016, Tanzania reported 16,521 cholera cases and 251 deaths, with 4,714 cases and 43 deaths in Dar es Salaam. We assessed how cholera response efforts protected affected communities.

Methods: We surveyed the 5 most affected wards in Dar es Salaam using two-stage cluster sampling, randomly selecting 192 neighborhoods in stage 1, and 4 households per neighborhood cluster in stage 2. We interviewed household caretakers about cholera knowledge, treatment, and prevention practices; tested drinking water; and surveyed pharmacies regarding ORS and water treatment product availability.

Results: We interviewed 645 (84%) of 768 selected households. Among a total of 3,120 residents, 14 (0.5%) cholera cases were reported. Approximately 88% of respondents knew that cholera causes diarrhea and 95% knew to seek care if ill while 38% were aware of the current epidemic, 29% knew how to prevent cholera, and 10% knew to take ORS when ill. Of 645 households, 55% had improved water sources, 89% of household water samples had no chlorine residual, and 45% of water samples were contaminated with *Escherichia coli*. During the previous month, 68% of households reported that their water supply had been unavailable, and 37% were unable to pay for water. ORS was available in 42% of pharmacies, and 25% had water treatment products.

Conclusions: Despite high awareness of cholera symptoms and health-seeking behavior among respondents, poor knowledge of prevention measures, inadequate water treatment and access to water treatment products, and unreliable water supplies placed respondents at risk of disease.

4:50 Guillain-Barré Syndrome Outbreak — Bahia State, Brazil, 2016

Authors: Ashley R. Styczynski, J. Malta, E. Krow-Lucal, J. Percio, M. Nobrega, A. Vargas, T. Lanzieri, P. Leal, J. Sejvar

Background: In mid-2015, reports of Guillain-Barré syndrome (GBS) increased in certain regions of Brazil. These reports coincided with the introduction and rapid spread of Zika virus in Brazil, and geographic areas with the highest reports of Zika-like illness and GBS overlapped. The Brazil Ministry of Health and CDC performed an investigation to identify risk factors and potential infectious pathogens associated with GBS.

Methods: We conducted a case-control investigation in the Salvador metropolitan area, Brazil. We defined GBS cases according to the Brighton Collaboration criteria. Two controls matched by age group were randomly selected from the same neighborhoods as the cases using WHO cluster survey methodology. We conducted in-person interviews to obtain risk factor and exposure (environmental, food/water) histories in the 2-month period prior to GBS-case onset.

Results: Of 77 suspected GBS case-patients, 50 (65%) met Brighton case definition criteria. The incidence of GBS during April-July 2015 was nearly 4-times higher than expected. Among 41 enrolled GBS case-patients and 85 controls, there were no differences in demographic or exposure data. A higher proportion of GBS cases compared to controls reported an antecedent illness (88% versus 21%, P <0.01), with rash and conjunctivitis being reported by 71% and 56% of GBS case-patients, respectively, versus 39% and 22% of the controls (P <.01).

Conclusions: Our investigation identified increased incidence of GBS case-patients occurring in tight geo-temporal clustering in the Salvador area during mid-2015. Many GBS case-patients reported an exanthematous illness during a time of recognized Zika transmission in Salvador, suggesting a possible association between GBS and Zika virus infection. Further surveillance for GBS, additional case control studies, and refined Zika virus laboratory diagnostics are needed to substantiate this possible association.

5:00 Ongoing Zika Virus Transmission — Puerto Rico, November 23, 2015–February 15, 2016

Authors: Emilio Dirlikov, K Ryff, T Sharp, J Salinas, J Munoz, M Garcia, D Thomas, S Waterman, B Rivera

Background: Zika virus (ZIKV) is transmitted primarily by *Aedes* mosquitoes. Studies suggest most infected persons are asymptomatic; symptoms include fever, rash, arthralgia, and/or conjunctivitis. In December 2015, the Puerto Rico Department of Health (PRDH) reported the first U.S. locally acquired ZIKV infection, with symptom onset on November 23, 2015.

Methods: Laboratory-positive cases were defined by detection of ZIKV by reverse transcription-polymerase chain reaction (RT-PCR) or anti-ZIKV immunoglobulin M (IgM) antibody by enzyme-linked immunosorbent assay (ELISA) with dengue virus IgM negative results, depending on time between symptom onset and specimen collection. Data on laboratory-positive cases were abstracted from PRDH Arboviral Surveillance System, and are reported by date of symptom onset.

Results: During November 23, 2015–February 15, 2016, 106 ZIKV laboratory-positive cases were detected out of 846 people tested; 93 (88%) were RT-PCR positive and 13 (12%) were ELISA positive. Median age was 32 years (range = <1–93); 69 (65%) were female. Following the index case in November 2015, 9 (8%) cases were reported in December, 42 (40%) in January, and 54 (51%) up to February 15. Cases were reported from 22 (28%) municipalities. Among cases, 3 (3%) were pregnant women, with no adverse pregnancy outcomes reported to date. Four (4%) cases required hospitalization, including a case of Guillain-Barré syndrome. No deaths or cases of microcephaly were reported.

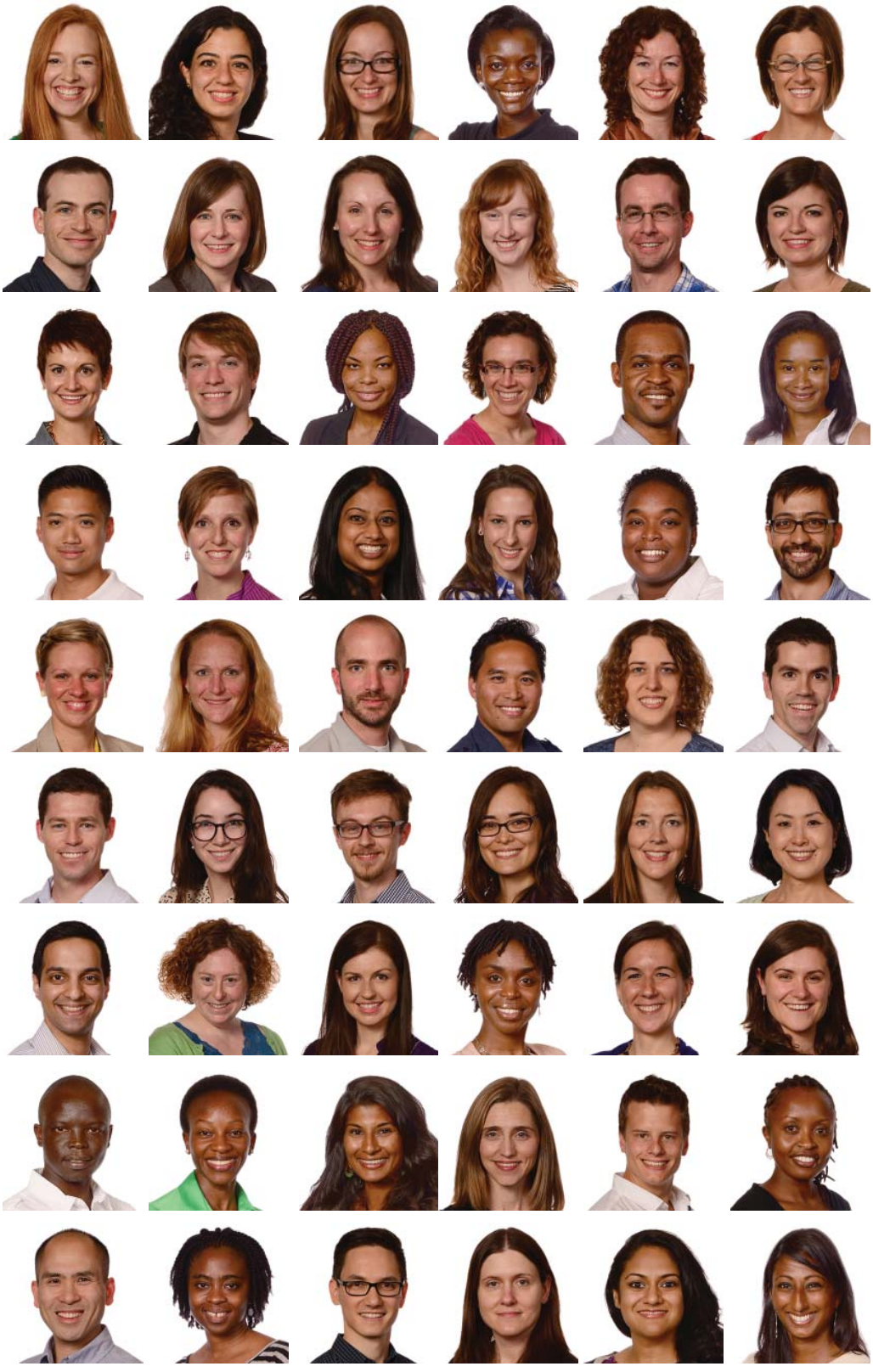
Conclusions: Since November 2015, cases of ZIKV have increased, and ongoing transmission is expected to spread ZIKV throughout Puerto Rico. Residents and visitors to Puerto Rico, especially pregnant women, should avoid mosquito bites, including insect repellent use. Possible sexual transmission of ZIKV may be prevented by consistent and correct use of condoms or abstaining from sexual contact.

Closing Remarks and Adjournment

5:10–5:20 PM

Ravinia Ballroom

EIS Officers, Class of 2014



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Nerlander, Maximilian – CGH
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Oduyebo, Titilope – NCCDPHP
Omura, John – NCCDPHP
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Patel, Monita – NCHHSSTP
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Otshudiema, John – NCIRD

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Springer, Yuri* – DSEPD/EWB-AK

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Styczynski, Ashley* – NCEZID
Su, Chia-Ping* – NIOSH
Subaiya, Saleena – CGH
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Tanner, Mary* – NCHHSTP

Tran, Cuc – NCEZID
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Llewellyn, Anna – NCIRD
Mercante, Alexandra – NCEZID
Minchella, Peter – CGH
Okoth, Sheila – NCHHSTP

Weiner, Zachary – NCEZID

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Agyemang, Elfriede MD, MPH
Akelo, Victor MPH, MBA, MBChB
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Annor, Francis PhD, MPH
Ayers, Tracy PhD, MS
Bonwitt, Jesse MSc
Boundy, Ellen ScD, MS
Bozio Eldridge, Catherine PhD, MPH
Burakoff, Alexis MD, MPH
Burke, Rachel PhD, MPH
Burrage, Amanda MD, MPH
Casey, Rebecca MPH, MBBS
Castillo, Caroline MD
Cha, Susan PhD, MPH
Chen, Meng-Yu MD, MSc
Chi, Gloria PhD, MPH
Cote, Andrea DVM, MPH
Da Silva, Juliana MD
Davis, William DrPH, MA, MPH
Davlantes, Elizabeth MD
Dawson, Erica Lynn PhD, MA, MS
Doshi, Reena PhD, MPH
Evans, Mary MD, MPH
Frawley, Alean DO, MPH
Fukunaga, Rena PhD, MA
Greene-Cramer, Blanche
Grimes, George MD, MPH
Guagliardo, Sarah PhD, MPH
Hall, Noemi PhD
Hall, Victoria DVM, MS
Hatcher, Sarah PhD
Hofmeister, Megan MD, MS, MPH
Issa, Anindita MD
Iverson, Sally DVM, MPH
Jarashow, Claire PhD, MPH
Kerins, Janna VMD, MPH
Killerby, Marie VetMB, MPH
Krishnasamy, Vikram MD, MPH
Lakhani, Naheed MD, MD, MPH
Laws, Rebecca PhD, MPH
Leung, Vivian MD
Link-Gelles, Ruth PhD, MPH
Liu, Eugene MD
Luna, Sarah PhD
Marx, Grace MD, MPH
Mcateer, Jarred MD
Mcclung, Robert MD
Mitchell, Patrick ScD, SM
Montgomery, Martha MD, MHS
Mosites, Emily PhD, MPH
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Rozwadowski, Faye MD
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Seitz, Amy PhD, MPH
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Siegel, David MD, MPH
Siza, Charlene DVM, MPH
Skrobarcek, Kimberly MD
Soda, Elizabeth MD
Stuckey, Matthew PhD, MPH
Tomasi, Suzanne DVM, MPH
Tromble, Erin MD
Tsay, Sharon MD
Va, Puthiery DO, MS
Van Dyne, Elizabeth MD, MPH
Walker, William PhD, DVM
Wansaula, Zimy MD, MPH
Weng, Mark MD, MSc
Wilkinson, Amanda PhD
Zambrano, Laura PhD, MPH
Zwald, Marissa PhD, MPH

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Dietrich, Elizabeth PhD
Kines, Kristine MSPH
Pompey, Justine PhD
Potts, Caelin PhD
Riner, Diana PhD, MS
Tang, Xiaoling PhD, MS
White, Brunilis PhD

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