63rd EIS CONFERENCE

EPIDEMIC INTELLIGENCE SERVICE

APRIL 28–MAY 1, 2014

Antimicrobial Use and Resistance

Environmental Health

Vaccine Preventable Diseases in the United States

Chronic Disease Prevention

Zoonoses

Tuberculosis

Injury Prevention

STDs/HIV

Foodborne Diseases

Occupational Safety and Health

Vectorborne and Parasitic Diseases

Child and Adolescent Health

Vaccine Preventable Diseases Wordwide

Maternal and Child Health

Global Health

Health Care

Respiratory Diseases

Hepatitis

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

2014 EIS Conference Schedule At-a-Glance

Monday

Welcome and Call to Order
8:15–8:30

A
Steven B. Thacker
Opening Session
8:30–10:15

Break (30 Minutes)

B1
Antimicrobial Use and Resistance
10:45–12:10

B2
Environmental Health
10:45–12:10

Lunch/Special Session
12:10–1:30

NEW
Poster Symposium I
1:30–2:45

Break (15 Minutes)

C1
Vaccine Preventable Diseases in the U.S.
3:00–4:25

C2
Chronic Disease Prevention
3:00–4:25

EIS Conference Social
4:30–5:30

Tuesday

D1
Zoonoses
8:30–10:15

D2
Tuberculosis
8:30–10:15

Break (30 Minutes)

E1
Injury Prevention
10:45–12:10

E2
STDs/HIV
10:45–12:10

Lunch/Special Session
12:10–1:30

NEW
Poster Symposium II
1:30–2:45

Break (15 Minutes)

F1
Foodborne Diseases
3:00–5:05

F2
Occupational Safety and Health
3:00–5:05

Prediction Run
6:00

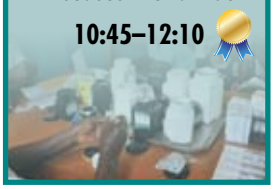
Wednesday

G1
Vectorborne and Parasitic Diseases
8:30–10:15

G2
Child and Adolescent Health
8:30–10:15

Break (30 Minutes)

H1
Vaccine Preventable Diseases Worldwide
10:45–12:10

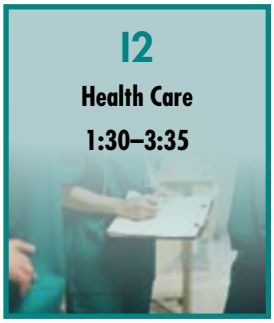


H2
Maternal and Child Health
10:45–12:10

Lunch/Special Session
12:10–1:30

I1
Global Health
1:30–3:35

I2
Health Care
1:30–3:35



Break (15 Minutes)

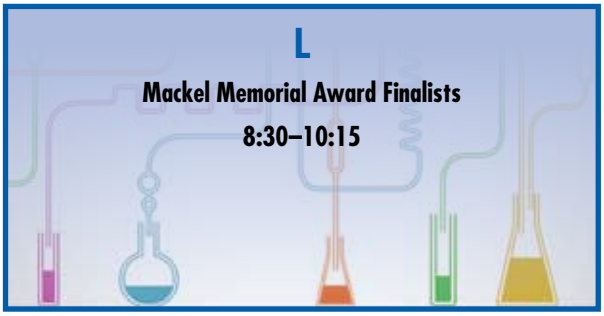
J
Langmuir Memorial Lecture
3:50–5:20

EIS Alumni Association Meeting
5:30–7:30

K
International Night
5:30–10:00

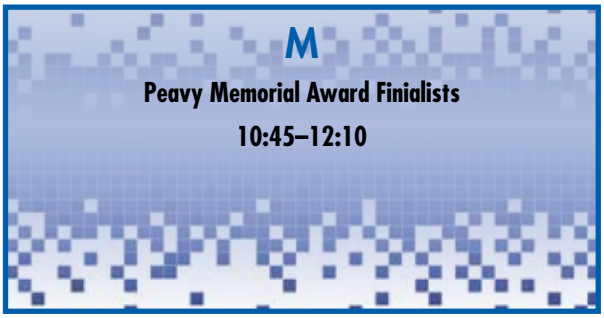
Thursday

L
Mackel Memorial Award Finalists
8:30–10:15



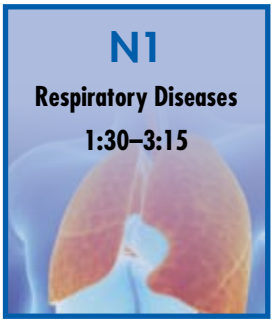
Break (30 Minutes)

M
Peavy Memorial Award Finialists
10:45–12:10

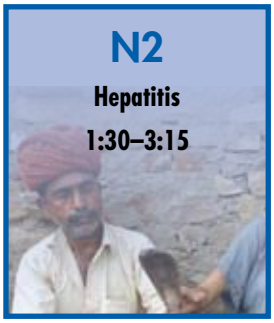


Lunch/Special Session
12:10–1:30

N1
Respiratory Diseases
1:30–3:15



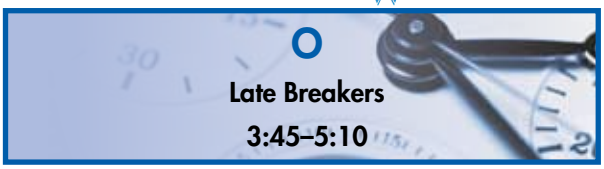
N2
Hepatitis
1:30–3:15



Break (15 Minutes)

Presentation of Awards
3:30–3:45

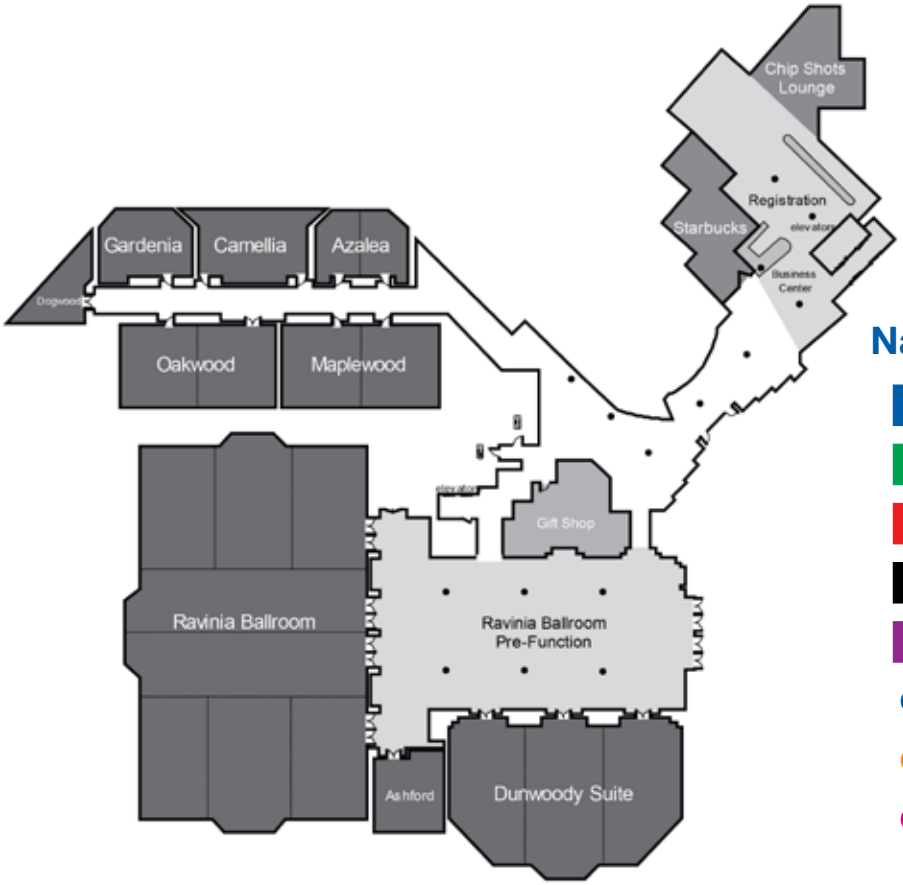
O
Late Breakers
3:45–5:10



Closing Remarks
5:10–5:20

Post Conference EIS Satirical Review
7:30–9:30

Crowne Plaza Atlanta Perimeter at Ravinia Ballroom Floor Plan



Name Tags Color Key

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

SAVE THE DATE

64th EIS CONFERENCE

EPIDEMIC INTELLIGENCE SERVICE

APRIL 20–24, 2015

Centers for Disease Control and Prevention
Atlanta, Georgia

Contents

EIS Alumni Association

The Epidemic Intelligence Service Alumni Association (EISAA) represents more than 3,000 alumni worldwide, and all EIS officers who have graduated from the program are eligible to join. EISAA promotes and supports the EIS Program and also provides opportunities for alumni to remain connected through a variety of networking and support activities throughout the year.

While it's true that EISAA supports the food and beverages between scientific sessions — that is not the only, or even most important, thing that we do at the EIS Conference! EISAA also supports several awards and events throughout the week, including the ***Alexander D. Langmuir Prize*** named in honor of the illustrious founder of the EIS Program, and awarded to the outstanding manuscript completed during EIS; the ***Distinguished Friend of EIS Award*** honoring an individual 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 scientists; the ***J. Virgil Peavy Memorial Award*** named in honor of a wonderful CDC statistician and beloved EIS mentor and recognizing the investigation that most effectively uses innovative statistics and epidemiologic methods; and the new ***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 Scholarships.*** These scholarships, named in honor of a public health giant who was the longest serving director of CDC and devoted to the EIS Program, help support public health students interested in applying to EIS in the future. This year EISAA received 74 applications and awarded 8 travel scholarships. Finally, EISAA provides funding to help support some of our most treasured EIS Conference traditions, such as the ***Prediction Run*** and the ***Skit Night*** done by the graduating class.

Learn More! All EIS alumni and second-year EIS officers are invited to attend the **EISAA Annual Meeting on Wednesday in the Dunwoody Suites at 5:30–7:30 pm**. EISAA is not just about the EIS Conference! The organization provides important support to the EIS Program and our members throughout the year. You can learn more about EISAA and its goals by attending the Annual Meeting and talking to members over yummy food and beverages. We hope to see you there!

Enthusiastic and engaged alumni are crucial to our continued strength as an organization and our ability to support the EIS Program. We have much to gain from staying connected, both personally and professionally. Your membership strengthens a network of EIS alumni in diverse career paths, geographic locations, and interests. It also ensures a continued cadre of support for development of future EIS officers.

If you are not already a member, consider joining TODAY!

- Membership is easy and inexpensive. Annual dues are $25; a lifetime membership is $350. If you are a past member and have lapsed in paying your dues, please consider coming back!
- **Join Now!** You can join at the EISAA table during the conference, during the EISAA Annual meeting, or online at http://www.cdcfoundation.org/eisaa/eisabout.htm (select Pay Membership Dues).
- **Stay Connected!** Join the LinkedIn® (http://www.linkedin.com) Epidemic Intelligence Service (EIS)—Alumni and Current group (more than 700 members and growing)!

We hope you will join EISAA and stay engaged to better support the EIS Program and stay connected with colleagues and friends. While enjoying the Conference this week, please stop by the EISAA table or the Wednesday meeting to say hello. We can't wait to meet you!

Sincerely,

Mary Kamb, MD, MPH
President, EIS Alumni Association, EIS 1989

Aimee Ahmed
Director of Stewardship, EIS Alumni Association Liaison, CDC Foundation

PREFACE

Dear Friends of EIS,

Welcome to the 2014 EIS Conference! We appreciate your participation and ongoing support of the EIS Program. The contributions of our alumni, stakeholders, and friends have always been the heart of the EIS Program and have made it the excellent program that is at the core of CDC's work.

Although this year's conference has changed in length and structure, the ultimate goal remains unchanged — providing opportunities for scientific exchange regarding the most current epidemiologic topics, highlighting the breadth of epidemiologic activities at CDC, and providing a setting for strengthening the EIS professional network among new, current, and former EIS officers and others. We trust you share our enthusiasm about this venue for current officers to meet and learn from epidemiologic leaders and for us all to learn about the responsive and emergent work of EIS officers.

Let me provide some information about the 2014 EIS class. Our selection process used the same key tenets as prior years for selecting excellent and well-qualified EIS officers who are eager to advance their epidemiologic skills through training and service. This year, we reviewed 531 completed applications, and of those, we invited 209 applicants to be interviewed. Seventy-eight new officers were selected, of whom 44 are physicians, 26 are PhD-level scientists, 6 are veterinarians, and 2 are nurses. In keeping with recent trends, 75% are female, and 10 are citizens of other countries (2 from Nigeria, 2 from the United Kingdom, and 1 each from India, Japan, Uganda, Sweden, and Canada). We prematched 10 officers to state and local assignments and 1 to the Centers for Medicare and Medicaid Services. That leaves 67 EIS officers still looking for the perfect assignment while at the conference this week.

The conference format has structural changes and is 1 day shorter this year. Thus, to keep the number of accepted abstracts the same as prior years, we are offering more concurrent sessions. We are also featuring a new pilot poster symposium that gives poster presenters the same visibility as oral presenters. Of the 125 EIS officer presentations, 101 will be oral and 24 will be posters. During the first 30 minutes of each poster session, each EIS officer will give a 2-minute oral presentation about his or her study from the podium before a seated audience. The remaining time allows viewing of posters and individual Q&A.

We also are featuring cross-cutting special sessions from different centers each day during the lunch break. On Monday, NCIRD will present Novel Viruses/Pandemic Threats: Influenza and MERS Coronavirus. On Tuesday, NCEZID will be discussing Creative Solutions for Outbreak Data Management and Contact Tracing with Epi Info™: Viral Hemorrhagic Fever Outbreaks and Beyond. We especially hope you will join us for Wednesday's lunch-time session offered by CSELS and the EIS Program when we will be seeking your input regarding the challenges and opportunities in epidemiology training. Finally, on Thursday, CGH will present Syria Crisis: Epidemiology of Civil War and Refugee Crisis.

The EIS matching interviews will be held on Friday this year. The EIS Program staff will then work tirelessly to complete the matches over the weekend, and the results will be sent by e-mail no later than 11 AM EDT on Monday. As a result, the government will save resources, and travelers will be able to return home to friends and family sooner.

We hope you will be invigorated by the 2014 EIS Conference and depart feeling better connected, with new ideas and new knowledge. We look forward to reconnecting with many of you and to meeting new friends and colleagues for the first time!

Diana M. Bensyl, PhD, MA
Acting Chief, Epidemic Intelligence Service
Division of Scientific Education and Professional Development
Center for Surveillance, Epidemiology, and Laboratory Services

Scientific Program Committee

Chair, Tracie Gardner, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Chair Elect, Marie de Perio, National Institute for Occupational Safety and Health

Center for Global Health ..... Fred Angulo

National Center on Birth Defects and Developmental Disabilities ..... Daisy Christensen, Late-Breaker Committee

National Center for Chronic Disease Prevention and Health Promotion ..... Henraya Davis McGruder

National Center for Emerging and Zoonotic Infectious Disease ..... Dianna Blau and Matthew Wise

National Center for Environmental Health/Agency for Toxic Substances and Disease Registry ..... Kanta Sircar

National Center for Health Statistics ..... Brian Kit

National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention ..... Elizabeth Torrone, Late-Breaker Committee

National Center for Immunization and Respiratory Diseases ..... Jennifer Verani

National Center for Injury Prevention and Control ..... Kevin Vagi, Late-Breaker Committee Chair

National Institute for Occupational Safety and Health ..... Cammie Menendez, Late-Breaker Committee

Center for Surveillance, Epidemiology, and Laboratory Services ..... Rachel Avchen and Julie Magri

Front row, left to right: Henraya Davis McGruder, Daisy Christensen, Rachel Avchen, Marie de Perio, Tracie Gardner, Julie Magri, Matthew Wise

Back row, left to right: Brian Kit, Jennifer Verani, Kevin Vagi, Kanta Sircar, Dianna Blau, Elizabeth Torrone, Cammie Menendez, Fred Angulo

Program Production

Rachel Avchen, Anthony Jordan, Kristen Nichols, Kate Mollenkamp, C. Kay Smith

Acknowledgments/Disclaimer

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 this year's 2014 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 2014 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 this report are those of the author(s) 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 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.

Speaker Ready-Area

Speakers must drop off their presentations (U.S.B transfer preferred) by 3:00 pm the day before their scheduled talk. Designated computers inside the Camellia Room are available for presenters who need to review or make changes to their presentations. Computers will have PowerPoint® and printer access. Dedicated computers will be available 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 2014 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, 2014, 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 and login**.

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

- E-mail at: ce@cdc.gov
- Fax at 404-498-6045
- Phone: 1-800-41-TRAIN or 404-639-1292, during business hours (Monday–Friday) 8 am–4:00 pm ET. After hours, you may leave a voice message, and your call will be returned the next business day.
- After logging in 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 **EISCONF14.** 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
E-mail 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

2014 EIS Conference Schedule

Monday, April 28, 2014

7:00 **Registration Desk Opens**

8:15 **Welcome and Call to Order ..... Ravinia Ballroom**
Moderator: Michael Iademarco, Director, Center for Surveillance, Epidemiology, and Laboratory Services
Presentation of the Stephen B. Thacker EIS Champion Award

8:30 **SESSION A: Stephen B. Thacker Opening Session ..... Ravinia Ballroom**
Moderators: Michael Iademarco and Diana Bensyl

- **8:35** Febrile Illness at a State Correctional Facility—Illinois, 2013. *M. Allison Arwady*
- **8:55** Workplace Secondhand Smoke Exposure Among Nonsmoking Women of Reproductive Age—United States, 2010. *Candice Johnson*
- **9:15** The First U.S. Cryptosporidiosis Outbreak Associated with a Surface Water-Supplied Municipal Water System in 20 Years—Baker City, Oregon 2013. *Malini DeSilva*
- **9:35** Heroin-Related Overdoses and Deaths—Wisconsin, 2003–2012. *Jon Meiman*
- **9:55** Risk Factors for Influenza A(H7N9) Disease—China, 2013. *Fiona Havers*

10:15 **BREAK** — *Sponsored by the EIS Alumni Association*

10:45 **CONCURRENT SESSION B1: Antimicrobial Use and Resistance ..... Ravinia Ballroom**
Moderator: Lauri Hicks

- **10:50** Evaluation of Antibiotics Administered for Acute Upper Respiratory Tract Infections—Oregon, 2011. *Kara Levri*
- **11:10** Outpatient Antibiotic Prescribing for Children—United States, 2011. *Alicia Demirjian*
- **11:30** Vaccines for a "Pièce de Résistance": Prevention of Antimicrobial Resistance Among Children Aged <5 Years with the 13-valent Pneumococcal Conjugate Vaccine—Selected U.S. Areas, 2004–2012. *Sara Tomczyk*
- **11:50** Vancomycin-Resistant *Enterococcus faecium* in a Neonatal Intensive Care Unit—Utah, 2013. *Joanna Watson*

10:45 **CONCURRENT SESSION B2: Environmental Health ..... Dunwoody Suite**
Moderator: Judith R. Qualters

- **10:50** Trouble on the Tracks: Chemical Exposure, Health Effects, and Communication After a Train Derailment—New Jersey, 2012. *Alice Shumate*
- **11:10** Formaldehyde Levels and Respiratory Allergies Among Urban, Low-Income Children—United States, 2011–2012. *Joy Hsu*
- **11:30** Illness Associated with Dietary Supplements—New York, 2013. *Nina Ahmad*
- **11:50** Acute Hepatitis and Liver Failure of Unknown Etiology—United States, 2013. *Kevin Chatham-Stephens*

12:10–1:30 **LUNCH**

12:10–1:30 **SPECIAL SESSION: Novel Viruses/Pandemic Threats: Influenza and MERS Coronavirus ..... Dunwoody Suite**
Moderator: Stephen Redd
Speakers: Dan Jernigan, Sue Gerber, and David L. Swerdlow

1:30–2:45 **POSTER SYMPOSIUM I ..... Ravinia Ballroom**
Moderator: Pattie Simone
During the first 30 minutes of the Poster Symposium, the authors will each give a 2-minute oral presentation at the podium in front of a seated audience. During the remaining time, the audience is encouraged to view the individual posters and engage in direct discussion with the authors.

P1.1 Vaccine-Preventable Diseases Among Fatal Cases of Hospitalized Acute Respiratory Infection—Guatemala, 2000–2013. *Sara Tomczyk*

P1.2 Mexican-Born Legal Immigrants with Tuberculosis Classifications Using Electronic Disease Notification Database, 2009–2012. *Jessica Adam*

P1.3 Strategies for Maximizing Preventive Treatment of Latent Tuberculosis Infection—Mississippi, 2008–2012. *Erik Reaves*

P1.4 Using Electronically Archived Medical Information for Public Health: Analysis of American Indian/Alaska Native Communicable Disease Diagnoses from the Indian Health Service National Data Warehouse—Oregon 2007–2011. *Jessica Marcinkevage*

P1.5 Tales from the Crypto: Trends in Cryptosporidiosis Surveillance—United States, 1995–2012. *Julia Painter*

P1.6 Epidemiology of Reported Malaria Cases—Maryland, 2007–2012. *David Schnabel*

P1.7 Investigating the Sensitivity and Specificity of an Alternative Surveillance Case Definition for Monkeypox—The Democratic Republic of Congo (DRC), 2010–2013. *Lynda Osadebe*

P1.8 Human *Salmonella* Typhimurium Infections Linked with Exposure to Live Poultry from Agricultural Feed Stores and Mail-Order Hatcheries—United States, 2013. *Tara Anderson*

P1.9 Evaluation of a Stillbirth Surveillance Program—Iowa, 2010. *Samir Koirala*

P1.10 Two Fish, One Fish: Decreasing Number of Outbreaks Attributed to Fish—United States, 1998–2011. *Jolene Nakao*

P1.11 Using Media Reports to Track Deaths, Hurricane Sandy, 2012. *Olaniyi Olayinka*

P1.12 Detection of Infectious Disease Outbreaks at an Outdoor Mass Gathering—West Virginia, 2013. *Erica Thomasson*

2:45 **BREAK —** *Sponsored by the EIS Alumni Association*

3:00 **CONURRENT SESSION C1: Vaccine Preventable Diseases in the United States ..... Ravinia Ballroom**
Moderator: Jane Seward

3:05 First Use of a Novel Serogroup B Meningococcal Vaccine in the U.S. in Response to a Large Outbreak at a University—New Jersey, 2013. *Lucy McNamara*

3:25 Meningococcal Disease Among Men Who Have Sex With Men—United States, 2012–2013. *Hajime Kamiya*

3:45 Cost of Measles Case Containment in an Ambulatory Pediatric Clinic—King County, Washington, 2013. *Kristen Wendorf*

4:05 Effect of Rotavirus Vaccines on Diarrhea-Associated Hospitalizations in U.S. Children <5 Years of Age, 2007– 2011. *Eyal Leshem*

3:00 **CONCURRENT SESSION C2: Chronic Disease Prevention ..... Dunwoody Suite**
Moderator: Peter Briss

3:05 Do Individual-Level and Area-Based Poverty Measure the Same Thing? Association of Poverty Measures with Self-Reported Health Outcomes—New York City, 2012. *Kari Yacisin*

3:25 Smoking Cessation Among Users of Telephone and Web-Based Interventions. *Mary Puckett*

3:45 Trends in Exposure to Pro-Tobacco Advertisements via the Internet, Newspapers or Magazines, and Retail Stores Among U.S. Middle and High School Students, 2000–2012. *Israel Agaku*

4:05 Active Transportation Surveillance Across Three Systems—United States, 1999–2012. *Geoffrey Whitfield*

4:30 **EIS CONFERENCE SOCIAL (CASH BAR)**
Sponsored by the EIS Alumni Association **..... Ravinia Ballroom Pre-Function Area**

Tuesday, April 29, 2014

8:30 **CONCURRENT SESSION D1: Zoonoses ..... Ravinia Ballroom**
Moderators: Jennifer McQuiston and David Wong

- **8:35** Variation in Tularemia Clinical Presentation—Arkansas, 2009–2012. *Laura Lester*
- **8:55** Contact Investigation of Melioidosis Cases Reveals Regional Endemicity—Puerto Rico, 2010 and 2012. *Thomas Doker*
- **9:15** Impact of the New National Surveillance Case Definition on Babesiosis Reporting—Connecticut, 2001–2013. *Jocelyn Mullins*
- **9:35** Changing Trends in Backyard Flocks: Review of Outbreaks of Human Salmonellosis Linked to Contact with Live Poultry—United States, 1990–2013. *Colin Basler*
- **9:55** Raccoon Rabies Virus Variant Transmission Through Solid Organ Transplantation—United States, 2013. *Neil Vora*

8:30 **CONCURRENT SESSION D2: Tuberculosis ..... Dunwoody Suite**
Moderator: Philip LoBue

- **8:35** Tuberculosis and Excess Alcohol Use in the United States, 1997–2012. *Tyson Volkmann*
- **8:55** Characterization of Tuberculosis due to *Mycobacterium africanum*—United States, 2004–2012. *Aditya Sharma*
- **9:15** Opportunities for Improved Detection and Treatment of Latent Tuberculosis Infection Among Veterans—Western United States, January 2010–July 2013. *Tara Perti*
- **9:35** Contact Investigation of Health Care Personnel Exposed to Maternal and Neonatal Tuberculosis—Clark County, Nevada, 2013. *Kaci Hickox*
- **9:55** Childhood Tuberculosis—Botswana, 2008–2011. *Negar N. Alami*

10:15 **BREAK —** *Sponsored by the EIS Alumni Association*

10:45 **CONCURRENT SESSION EI: Injury Prevention ..... Ravinia Ballroom**
Moderator: Ileana Arias

- **10:50** Unintentional Injury Child Deaths and the National Child Death Review Case Reporting System—13 U.S. States, 2006 and 2009. *Melissa Mercado–Crespo*
- **11:10** Global Differences in Burden of Childhood Sexual Violence Against Boys—Haiti, Kenya, and Cambodia, 2010–2013. *Steven Sumner*
- **11:30** Injuries Among High School Football Players—Nebraska, Fall 2013. *Deborah Hastings*
- **11:50** Do Children in Domestic Servitude Experience More Violence?—Results from the Violence Against Children Survey, Haiti, 2012. *Leah Gilbert*

10:45 **CONCURRENT SESSION E2: STDs/HIV ..... Dunwoody Suite**
Moderators: Gail Bolan and Ken Castro

- **10:50** Is Vaccine Type Seropositivity a Marker for Human Papillomavirus Vaccination?—Results from the National Health and Nutrition Examination Survey, 2003–2010. *Emiko Petrosky*
- **11:10** Erectile Dysfunction Medication Use Associated with Sex without a Condom in HIV-Infected Men Who Have Sex with Men—Medical Monitoring Project, United States, 2009. *Xia Lin*
- **11:30** Syphilis Time-to-Treatment in STD Clinics versus Private Clinics—Arizona, 2009–2012. *Candice Williams*
- **11:50** Overseas Screening for Syphilis among U.S.-Bound Refugees, 2008–2013. *Edith Nyangoma*

12:10 **LUNCH**

12:10–1:30 **SPECIAL SESSION: Creative Solutions for Outbreak Data Management and Contact Tracing with Epi Info™: Viral Hemorrhagic Fever Outbreaks and Beyond ..... Ravinia Ballroom**
Moderator: Barbara Knust
Speakers: Ilana Schafer, Erik Knudsen, and Asad Islam

1:30–2:45 **POSTER SYMPOSIUM II ..... Dunwoody Suite**
Moderator: Fred Angulo

During the first 30 minutes of the Poster Symposium, the authors will each give a 2-minute oral presentation at the podium in front of a seated audience. During the remaining time, the audience is encouraged to view the individual posters and engage in direct discussion with the authors.

P2.1 Fungemia Outbreak Among Injection-Drug Users—Lane County, Oregon, 2012–2013. *Kara Levri*

P2.2 A Cluster of *Cryptococcus neoformans* Infections at a Community Hospital—Arkansas, 2013. *Snigdha Vallabhaneni*

P2.3 University-Based Gastrointestinal Illness Outbreak Caused by Dual Pathogens—Tennessee, 2013. *Joshua Clayton*

P2.4 Rapid Identification of Prepackaged, Ready-to-Eat Salads Associated with an Outbreak of *Escherichia coli* O157:H7 Infections—Multiple States, 2013. *Patrick Ayscue*

P2.5 Acute Gastroenteritis Among Seminar Attendees After a Catered Lunch—Washington, DC, 2013. *Sasha McGee*

P2.6 Gastroenteritis Associated with Rafting the Middle Fork of the Salmon River—Idaho, 2013. *Mariana Rosenthal*

P2.7 Reported Reasons for Testing Among Hepatitis B Virus-Infected Patients—Chronic Hepatitis Cohort Study, United States, 2006–2010. *Gemechu Gerbi*

P2.8 Mortality Risk After Opportunistic Illness Diagnoses Among HIV-infected Persons—San Francisco, 1980–2012. *Kpandja Djawe*

P2.9 Delayed Diagnosis of Multidrug-Resistant Tuberculosis and the Resulting Outbreak—Sheboygan, Wisconsin, 2012–2013. *Abbey Canon*

P2.10 Micronutrient Powder Use and Infant and Young Child Feeding Practices—Nepal, 2011. *Kelsey Mirkovic*

P2.11 Adverse Drug Events Associated with an Electronic Music Festival—New York City, 2013. *Alison Ridpath*

P2.12 Sudden Cardiac Death in Patients with Unrecognized Lyme Carditis—United States, 2012–2013. *Joseph Forrester*

2:45 **BREAK —** *Sponsored by the EIS Alumni Association*

3:00 **CONCURRENT SESSION F1: Foodborne Diseases ..... Ravinia Ballroom**
Moderators: Ian Williams and Barbara Mahon

3:05 Multistate Outbreak of Listeriosis Linked to Company A Artisanal Cheeses—United States, 2013. *Mary Choi*

3:25 *Escherichia coli* O157:H7 Outbreak Associated with a Mexican Food Restaurant—Arizona, 2013. *Laura Adams*

3:45 Distinct Epidemiologic Patterns of Foodborne versus Person-to-Person Norovirus Outbreaks in the United States, 2009–2012. *Kimberly Pringle*

4:05 Multistate Outbreak of Multidrug-Resistant *Salmonella* Heidelberg Infections Linked to Foster Farms Brand Chicken—United States, 2013. *Jolene Nakao*

4:25 Outbreaks of Cyclosporiasis—United States, June–August 2013. *R. Reid Harvey*

4:45 Human *Escherichia coli* O121 Infections Linked to Multiple Frozen Snack Foods—United States, 2013. *Tara Anderson*

3:00 **CONCURRENT SESSION F2: Occupational Safety and Health ..... Dunwoody Suite**
Moderator: RADM Boris Lushniak, Acting Surgeon General of the United States

3:05 Analysis of Injuries and Illnesses Among American Red Cross® Responders—United States, 2008–2012. *Kimberly Brinker*

3:25 Occupational Hazardous Substance Exposure Surveillance Using Poison Center Data—Wisconsin, 2004–2012. *Jon Meiman*

3:45 Knowledge, Attitudes, and Practices Regarding Antimalarial Chemoprophylaxis in Peace Corps Volunteers—Africa, 2013. *Keren Landman*

4:05 Bigger Is Better: Abnormal Lung Function and Coal Workers' Pneumoconiosis by Mine Size Among Active Underground Coal Miners—United States, 2005–2012. *David Blackley*

4:25 Blowing in the Wind: Coccidioidomycosis Among Solar Power Farm Construction Workers—California, 2011–2013. *Jason Wilken*

4:45 Is Green Energy Good for Workers? An Evaluation of Exposure and Health at a Windblade Manufacturing Facility—North Dakota, 2013. *Anna-Binney McCague*

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

Wednesday, April 30, 2014

8:30 **CONCURRENT SESSION G1: Vectorborne and Parasitic Diseases ..... Ravinia Ballroom**
Moderators: Mark Eberhard and Kay Tomashek

8:35 First Chikungunya Outbreak in Micronesia—Yap State, Federated States of Micronesia, 2013. *Daniel Pastula*

8:55 Dengue Outbreak—Mombasa, Kenya, 2013. *Esther Ellis*

9:15 Factors Associated with Dengue Mortality—Puerto Rico, 2010. *Dana Thomas*

9:35 Atovaquone-Proguanil-Resistant Malaria in Two Travelers Returning from the Same Site—Nigeria, 2012–2013. *Mateusz Plucinkski*

9:55 Prevalence of *Strongyloides stercoralis* Antibodies Among a Rural Appalachian Population—Kentucky, 2013. *Elizabeth Russell*

8:30 **CONCURRENT SESSION G2: Child and Adolescent Health ..... Dunwoody Suite**
Moderator: Marshalyn Yeargin-Allsopp

8:35 Scabies and Bacterial Superinfection Among Children—American Samoa, 2011. *Laura Edison*

8:55 Fungal Sensitization Not Associated with Poor Outcomes in Children with Asthma: Data from the 2005–2006 National Health and Nutrition Examination Survey. *Kenneth Quinto*

9:15 Prevalence and Correlates of Overweight and Obesity Among 5th Graders—Maine Integrated Youth Health Survey, 2009. *Leigh Ann Miller*

9:35 Willingness to Pay for Micronutrient Powder Supplements for Children—Nepal, 2011. *Rajni Gunnala*

9:55 Adolescent Substance Use and the Association with a School-Based Socioeconomic Measure—Washington State, 2012. *Mandy Stahre*

10:15 **BREAK —** *Sponsored by the EIS Alumni Association*

10:45 **CONCURRENT SESSION H1: Vaccine Preventable Diseases Worldwide ..... Ravinia Ballroom**
Moderator: Rebecca Martin
Presentation of the Iain C. Hardy Award

10:50 Measles Post-Campaign Vaccination Coverage—Equateur and Province Orientale, Democratic Republic of the Congo, 2013. *Jennifer Harris*

11:10 Reasons for Low Influenza Vaccination Coverage Among Adults in Puerto Rico, Influenza Season 2013–14. *Carmen Arriola*

11:30 Detecting the Reemergence of Wild Poliovirus Type 1 in Syria Through an Early Warning Alert and Response Network, July–October 2013. *Miriam Shiferaw*

11:50 Diphtheria Outbreak in Lao Peoples Democratic Republic (PDR) 2012–2013: A Failure of Routine Immunization. *Carolyn Sein*

10:45 **CONCURRENT SESSION H2: Maternal and Child Health ..... Dunwoody Suite**

Moderator: Wanda Barfield

10:50 Mother's Return to Work and Meeting Her 6-Month Breastfeeding Intention—United States, 2005–2007. *Kelsey Mirkovic*

11:10 Trends in Gestational Weight Gain: Results from the Pregnancy Risk Assessment Monitoring System—2000–2009. *Jonetta Johnson*

11:30 Vitamin K Deficiency Bleeding in Infants Not Receiving Vitamin K Prophylaxis—Tennessee, 2013. *Lauren Marcewicz*

11:50 Vitamin K Refusal Rates and Parental Attitudes—Tennessee, 2013. *Joshua Clayton*

12:10 **LUNCH**

12:10–1:30 **SPECIAL SESSION: EIS—Challenges and Opportunities in Epidemiology Training ... Dunwoody Suite**
Moderator: Mary Kamb
Speakers: David L. Swerdlow, Tim Jones, Laurene Mascola, and Diana Bensyl

1:30 **CONCURRENT SESSION I1: Global Health ..... Ravinia Ballroom**
Moderators: Jordan Tappero and Rob Tauxe

1:35 Where's the TB? Understanding Low TB Case Notification Rates—Haiti, 2013. *Stephanie Salyer*

1:55 Challenges in Detecting Malaria Outbreaks in an Epidemic-Prone Region—Kuando Kubango Province, Angola, 2013. *Magdalena Paczkowski*

2:15 Pathogen-Specific Mortality Among Infants and Young Children with Moderate-to-Severe Diarrhea—Western Kenya, 2008–2011. *Allison Walker*

2:35 Ceramic Water Filters and Reducing the Burden of Diarrheal Disease in Infants—Western Kenya, 2013. *Jamae Morris*

2:55 Integrating Water Treatment into Antenatal Care: Impact on Use of Reproductive Health Services and Household Water Treatment by Pregnant Women—Uganda, 2013. *Almea Matanock*

3:15 Use of Capture–Recapture Methodology To Characterize Neonatal Mortality Rates in Farchana Refugee Camp—Chad, 2013. *Rachel Idowu*

1:30 **CONCURRENT SESSION I2: Health Care ..... Dunwoody Suite**
Moderators: Joseph Perz and Marion Kainer

1:35 Risk Factors for Invasive Methicillin-Resistant *Staphylococcus aureus* Infection After Discharge from Acute-Care Hospitals—United States, 2011–2013. *Lauren Epstein*

1:55 Peripheral Joint Infections Associated with Contaminated Preservative-Free Methylprednisolone Acetate Injections—Michigan, October 2012–October 2013. *Mawuli Nyaku*

2:15 National Estimates of Insulin-related Hypoglycemia and Errors (IHEs) Leading to Emergency Department (ED) Visits and Hospitalizations—United States, 2007–2011. *Andrew Geller*

2:35 Cluster of *Staphylococcus aureus* Septic Arthritis Cases After Intra-Articular Injection of Autologous Platelet-Rich Plasma—North Carolina, October 2013. *Sarah Rhea*

2:55 The Effect of Having a Medical Home and Reported Family Financial Burden Among Children with Special Health Care Needs—Kansas, 2009–2010. *Suparna Bagchi*

3:15 Infection Control Practices and Multidrug-Resistant *Acinetobacter baumannii* Outbreak in a Hospital—Puerto Rico, 2013. *Nora Chea*

3:35 **BREAK —** *Sponsored by the EIS Alumni Association*

3:50 **SESSION J: Alexander D. Langmuir Memorial Lecture and Reception ..... Ravinia Ballroom**
Moderators: Pattie Simone and Denise Koo
Speaker: Martin-J. Sepúlveda, MD, FACP: EIS in an Era of Data, Technology and Urban Transformations
Presentation of Awards

- Alexander D. Langmuir Prize Manuscript Award
- Distinguished Friend of EIS Award

This event is cosponsored by the EIS Alumni Association and the Center for Surveillance, Epidemiology, and Laboratory Services.

5:30 **EIS ALUMNI ASSOCIATION MEETING ..... Dunwoody Suite**

5:30–10:00 **SESSION K: International Night ..... Ravinia Ballroom**

5:30 Poster Presentations

6:45 Photo Contest

7:30–10:00 Oral Presentations and Awards
See supplement for complete list of presenters and abstracts.

7:45 Reemergence of Rabies on an Island Nation: A Once in a Lifetime Event, or an Indication of more to come? *Ryan Wallace*

International Night is cosponsored by the Center for Global Health (CGH)/Division of Global Health Protection (DGHP) and the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). The posters and presentations featured during International Night are from participants in international programs in applied field epidemiology similar to that of EIS. Some of the programs are sponsored by or partnered with CDC and some are independent. All conference attendees are invited to these sessions.

Thursday, May 1, 2014

8:30 **SESSION L: Donald C. Mackel Memorial Award Finalists ..... Ravinia Ballroom**
Moderators: Steve Monroe and Rachel Kaufmann

8:35 Outbreak of New Delhi Metallo-ß-Lactamase–Producing Carbapenem-Resistant Enterobacteriaceae at a Hospital—Illinois, 2013. *Jennifer Hunter*

8:55 Hospital-Associated Outbreak of Middle East Respiratory Syndrome Coronavirus (MERS-CoV)—Jordan, 2012. *Brian Rha*

9:15 *Pantoea* Bloodstream Infection Outbreak at an Oncology Clinic—Illinois, 2012–2013. *Brian Yablon*

9:35 Novel, Illicit Fentanyl-Analog Causes 14 Overdose Deaths—Rhode Island, 2013. *Matthew Lozier*

9:55 Two Cattle Herdsmen Infected with a Novel Species of Orthopoxvirus—Georgia (Country), 2013. *Neil Vora*

10:15 **BREAK —** *Sponsored by the EIS Alumni Association*

10:45 **SESSION M: J. Virgil Peavy Memorial Award Finalists ..... Ravinia Ballroom**
Moderator: Drew Baughman

10:50 Metabolic Score and Cardiovascular Disease Mortality Among U.S. Adults Aged 18 Years or Older: A Structural Equation Modeling Approach—National Health and Nutrition Examination Survey III Linked Mortality File, United States, 1988–2006. *Carla Mercado*

11:10 Stevens-Johnson Syndrome Associated with *Mycoplasma pneumoniae* Infection—Colorado, 2013. *Louise Francois Watkins*

11:30 Prevalence Assessment of Nodding Syndrome—Uganda, 2013. *Preetha Iyengar*

11:50 An Automated Classification Algorithm for the Surveillance of Autism Spectrum Disorder. *Matthew Maenner*

12:10 **LUNCH**

12:10–1:30 **SPECIAL SESSION: Syria Crisis: Epidemiology of Civil War and Refugee Crisis..... Dunwoody Suite**
Moderator: Jordan Tappero
Speakers: Mike Gerber, Muireann Brennan, Alison Ridpath, and Allison Walker

1:30 **CONCURRENT SESSION N1: Respiratory Diseases..... Ravinia Ballroom**
Moderators: Cyndy Whitney and Seema Jain

1:35 Legionnaire's Disease Outbreak Associated with a Cooling Tower at a Long-Term-Care Facility—Ohio, 2013. *Celia Quinn*

1:55 Timing of Highly Pathogenic Avian Influenza A (H5N1) Poultry Outbreaks, Human Influenza A (H5N1) Cases, and Seasonal Influenza Epidemics—Worldwide, 2004–2013. *Lizette Durand*

2:15 Impact of Changes in Diagnostic Testing on Estimated Influenza-Associated Hospitalization Rates in the Influenza Hospitalization Surveillance Network (FluSurv-NET): United States, 2003–2013. *Alexander Millman*

2:35 Rapid Urine Antigen Testing for *Streptococcus pneumoniae* in Adults with Community-Acquired Pneumonia: Clinical Use and Barriers. *Aaron Harris*

2:55 Assessing the Burden of Pediatric Acute Rheumatic Fever and Rheumatic Heart Disease—American Samoa, 2011–2012. *Amanda Beaudoin*

1:30 **CONCURRENT SESSION N2: Hepatitis..... Dunwoody Suite**
Moderator: Deborah Holtzman

1:35 Hepatitis A Outbreak Associated with Consumption of Imported Pomegranate Arils—Multiple Western U.S. States, 2013. *Erin Epson*

1:55 Hepatitis B Vaccine Response Among Infants Born to Hepatitis B Surface Antigen-Positive Women—United States, 2008–2013. *Stephen Ko*

2:15 Reactivation and Transmission of Hepatitis B Virus from an HIV-Positive Hemodialysis Patient—North Carolina, 2013. *Sarah Rhea*

2:35 Health Care-Associated Hepatitis C Virus Outbreak in a Skilled Care Facility—North Dakota, 2013. *Dinorah Calles*

2:55 Susceptibility to, and Risk Factors for, Hepatitis E Virus Infection Among a Refugee Population—South Sudan, 2012. *Miriam Shiferaw*

3:15 **BREAK** — *Sponsored by the EIS Alumni Association*

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

- Donald C. Mackel Memorial Award
- J. Virgil Peavy Memorial Award
- Paul C. Schnitker International Health Award
- James H. Steele Veterinary Public Health Award
- Outstanding Poster Presentation Award

3:45 **Session O: Late-Breaking Reports..... Ravinia Ballroom**

3:45–5:10 *See supplement for presenters and abstracts.*
Moderators: Kevin Vagi and Tracie Gardner

5:10 **Closing Remarks and Adjournment ..... Ravinia Ballroom**
Thomas R. Frieden, Director, Centers for Disease Control and Prevention
Tracie Gardner, Scientific Program Committee Chair

POSTCONFERENCE ACTIVITY

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

Awards Descriptions and Committee Members

Stephen B. Thacker EIS Champion Award

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

2014 Committee Members: Carol Ciesielski (Co-Chair), Peter Kerndt (Co-Chair), Diana Bensyl, Alexandre Macedo De Oliveira, Alexa Oster, Maria Thacker

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.

2014 Committee Members: David Swerdlow (Chair), Melinda Wharton, Cynthia Whitney, John Modlin, William Schaffner

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 epidemiological investigation or study.

2014 Committee Members: Mary Kamb (Chair), Carol Ciesielski, Neil Gupta, Peter Kerndt, Alexa Oster, Sarah Patrick

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.

2014 Committee Members: Peter Kerndt (Chair), Rachel Avchen, Carol Ciesielski, Neil Gupta, Alexa Oster

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.

2014 Committee Members: Dianna Blau (Chair), Henraya Davis McGruder, Fred Angulo, Vitaliano Cama, Elizabeth Hall, Julu Bhatnagar

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.

2014 Committee Members: Kanta Sircar (Chair), Brian Kit, Matt Wise, Drew Baughman, Dana Flanders

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 (1 year) who has made a significant contribution to international public health.

2014 Committee Members: Douglas Hamilton (Chair), Tom Handzel, J. Lyle Conrad, Ezra Barzilay, Asim Jani, Donna Jones

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.

2014 Committee Members: Casey Barton Behravesh (Chair), Frederick J. Angulo, Barbara Knust, Jennifer McQuiston, Kirk Smith

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.

2014 Committee Members: Jennifer Verani (Chair), Julie Magri, Rachel Avchen, Katherine Mollenkamp

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.

2014 Committee Members: 2012 EIS Class

Mitch Singal Excellence in Occupational and Environmental Health Award

The Mitch Singal Excellence in Occupational Safety 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 Registries, established in 2010 recognizes a current EIS officer for excellence in an oral or poster presentation that best exemplifies the effective application of public health in the area of occupational or environmental health to an investigation.

2014 Committee Members: Sally Brown, (Chair) Diana Bensyl, David Callahan, Renee Funk, Yulia Iossifova, Josephine Malilay, Barbara Materna, Cammie Menendez, Kanta Sircar

Awards Presented at the 2013 EIS Conference

Stephen B. Thacker EIS Champion Award
Stephen B. Thacker

Iain C. Hardy Award
Jim L. Goodson

Alexander D. Langmuir Prize Manuscript Award
Robyn N. Fanfair

Distinguished Friend of the EIS Award
Douglas H. Hamilton

Donald C. Mackel Memorial Award
Mary J. Choi

J. Virgil Peavy Memorial Award
Alison Laufer

Paul C. Schnitker International Health Award
Kevin R. Clarke

James H. Steele Veterinary Public Health Award
Maho Imanishi and Megin Nichols

Outstanding Poster Presentation
W. Thane Hancock

Philip S. Brachman Award
Stephen B. Thacker

Mitch Singal Excellence in Occupational and Environmental Health Award
Duke. J. Ruktanonchai

Stephen B. Thacker EIS Champion Award, 2013

2013 Stephen B. Thacker

Iain C. Hardy Awards, 1996–2013

1996 Peter Strebel
1997 D. Rebeca Prevots
1998 Beth P. Bell
1999 Chares 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 A. Park Fiebelkorn
2011 Jacqueline E. Tate
2012 Preeta Kutty
2013 Jim L. Goodson

Alexander D. Langmuir Prize Manuscripts, 1966–2013

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Alexander D. Langmuir Lectures, 1972–2013

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 Health 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

Distinguished Friend of EIS Awards, 1984–2013

1984	J. Virgil Peavy
1985	Bill 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

Donald C. Mackel Memorial Awards, 1987–2013

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

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

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

1990 Legionnaire's 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

1996 *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.
M. Kathleen 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 Furnculosis 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

J. Virgil Peavy Memorial Awards, 2003–2013

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

Paul C. Schnitker International Health Award, 1995–2013

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 Tracey Creek
2005 Oleg Bilukha
2006 Kevin Cain
2007 Avid Reza
2008 Sapna Bamrah and David Lowrence
2009 Rinn Song
2010 Andrew Auld
2011 W. Roodly Archer
2012 Sudhir Bunga and Janell A. Routh
2013 Kevin R. Clarke

James H. Steele Veterinary Public Health Award, 1999–2013

1999 Frederick J. Angulo and Jordan W. Tappero
2000 David Ashford
2001 Mary-Kathleen Glynn
2002 Kirk Smith
2003 Michael Bunnin
2004 Jennifer McQuiston
2005 John Crump
2006 Katherine Heldman and James Kile
2007 Jennifer Wright
2008 John R. Dunn
2009 Casey Barton Behravesh and Stacy Holzbauer
2010 Kendra Stauffer
2011 Matthew Willis
2012 Barbara Knust
2013 Maho Imanishi and Megin Nichols

Outstanding Poster Presentation Award, 1986–2013

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, Cote 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.
S. 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

Philip S. Brachman Awards, 1983–2013

1983	Philip S. 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

Mitch Singal Excellence in Occupational and Environmental Health Award, 2010–2013

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*

Monday, April 28, 2014

SESSION A: Stephen B. Thacker Opening Session

8:30–10:15AM

Ravinia Ballroom

Moderators: Michael Iademarco and Diana Bensyl

8:35 Febrile Illness at a State Correctional Facility — Illinois, 2013

Authors: M. Allison Arwady, S. Vallabhaneni, V. Tsai, R. Smith, B. Park, C. Conover

Background: On August 29, health authorities were notified that 42 state prison inmates had become ill during the preceding 48 hours, with fever, headache, cough, and dyspnea. A respiratory virus was suspected, and the prison was placed on lockdown. During the following week, 50 additional inmates became ill. We aimed to identify a source and prevent further infections.

Methods: We recommended laboratory testing for viruses, bacteria, and fungi; abstracted medical charts; interviewed inmates and staff; and conducted an environmental assessment. Cases were defined as illness in an inmate, including >2 of the following: temperature >100°F, chills, headache, chest pain, shortness of breath, cough, myalgia, or fatigue with onset after August 12.

Results: Eighty-five inmates met the case definition, 3 of whom required hospitalization. Testing for 21 viral and bacterial respiratory pathogens was negative. Of the 82 symptomatic inmates who submitted blood or urine, 78 (95%) tested positive for acute histoplasmosis (64 had positive antigen; 69 had positive antibody). Seventy-one of the 78 (91%) were housed in Cellblock X. Two weeks prior to the outbreak, 2 trees and their root systems directly outside Cellblock X had been removed for security reasons. These trees were roosting sites for some of the thousands of European starlings found nightly within prison grounds.

Conclusions: Acute histoplasmosis can mimic a respiratory virus outbreak and should be considered in endemic areas. Disturbance of soil contaminated with the fungus *Histoplasma capsulatum*, which thrives in soil contaminated with bird droppings, likely aerosolized fungal spores and caused this large outbreak. To decrease the risk for future histoplasmosis cases, the prison should limit starling roosting sites by removing other facility trees without disturbing their roots.

8:55 Workplace Secondhand Smoke Exposure Among Nonsmoking Women of Reproductive Age — United States, 2010

Authors: Candice Y. Johnson, S. Luckhaupt, C. Lawson

Background: One in 10 nonsmoking American workers is exposed to secondhand smoke (SHS) at work. SHS exposure during pregnancy is associated with adverse pregnancy outcomes, notably low birth weight. Our aim was to characterize workplace SHS exposure among nonsmoking women of reproductive age as a proxy for workplace SHS exposure during the periconceptional period and early pregnancy.

Methods: We used data from the 2010 National Health Interview Survey Occupational Health Supplement, reweighting the data to be representative of the age distribution of pregnant women instead of the general population. We included employed nonsmoking women aged 18–44 years (unweighted N = 3,278), and used logistic regression (SAS v9.3) to estimate odds ratios (OR) and 95% confidence intervals (CI) for associations between sociodemographic and workplace characteristics and self-reported workplace SHS exposure.

Results: Eight percent of the study population reported workplace SHS exposure. Prevalence of exposure decreased with increasing age, education, and earnings. Workplace SHS exposure was associated with working non-day shifts (OR: 4.0, CI: 2.0–8.1 for evening vs. day); food preparation and serving occupations (OR: 3.4, CI: 1.9–6.0 vs. all other occupations); worrying about unemployment (OR: 3.4, CI: 1.8–6.4 for most vs. least worry); exposure to chemicals (OR: 3.3, 95% CI: 2.2–5.1) or vapors, gas, dust, or fumes (OR: 2.9, CI: 2.0–4.2) at work; and being threatened, bullied, or harassed at work (OR: 2.9, CI: 1.8–4.7).

Conclusions: Disparities exist in workplace SHS exposure among nonsmoking women of reproductive age, with strong associations between sociodemographic and work characteristics and SHS. Comprehensive smoke-free laws covering all workers could help to eliminate workplace SHS disparities in the periconceptional period and during pregnancy.

9:15 The First U.S. Cryptosporidiosis Outbreak Associated with a Surface Water-Supplied Municipal Water System in 20 Years — Baker City, Oregon 2013

Authors: Malini B. DeSilva, S. Schafer, B. Robinson, G. Buser, M. Kendall, E. DeBess, A. Hills, L. Xiao, V. Hill, D. Roellig, M. Gronostaj, K. Hedberg

Background: Cryptosporidium, a chlorine-tolerant parasite, causes gastrointestinal illness affecting approximately 748,000 U.S. residents annually and has caused massive, communitywide waterborne outbreaks. Laboratory-based surveillance detected a cryptosporidiosis outbreak in Baker City, Oregon in July 2013, anecdotally linked to municipal drinking water. We investigated to confirm the outbreak source, assess attack rate, and evaluate detection timeliness.

Methods: We tested raw and treated city water and assessed potential environmental sources of contamination. Trained interviewers administered a standardized survey to 380 randomly sampled households. To determine attack rate, survey cases were defined as Baker City residents with onset after July 1 of acute diarrhea lasting ≥3 days. Data were weighted to reflect the sampling design. We compared survey case symptom onset with report dates of laboratory-confirmed cases detected by passive surveillance to determine outbreak detection timeliness.

Results: Cattle grazing encircles the watershed; cattle feces were observed within watershed barriers. City water tested positive for Cryptosporidium; one watershed sample had 913 oocysts. The attack rate was 28.3% (95% confidence interval: 22.1%–33.6%), indicating 2,780 residents became ill. The first survey case onset was July 1; first laboratory-confirmed case was reported July 29. A 3-week boil water advisory began July 31; the implicated reservoir was taken offline and no subsequent cases occurred. *Cryptosporidium parvum* subtype IIaA15G2R1, a common parasite of U.S. dairy calves, was found in stool specimens from nine patients.

Conclusions: This community-wide outbreak highlights the importance of regulations requiring source water protection and treatment to control Cryptosporidium. Watershed contamination by cattle likely caused this outbreak, which was undetected by traditional surveillance for four weeks. Prevention and control of cryptosporidiosis outbreaks requires improvements in drinking water treatment and enhanced surveillance.

9:35 Heroin-Related Overdoses and Deaths — Wisconsin, 2003–2012

Authors: Jon G. Meiman, K. Bisgard, C. Tomasallo

Background: In the United States during 2003–2012, heroin use increased >2-fold to ~669,000 persons; during 2011, ~258,000 heroin-related emergency department (ED) visits occurred. We examined Wisconsin data to characterize trends in heroin overdose and fatalities as a surrogate for heroin use to support intervention strategies.

Methods: A nonfatal case was defined as an ED visit or hospitalization with a principal diagnosis of heroin overdose; two statewide discharge databases included data for 2003–2012. A heroin-related fatality included drug overdose as the underlying cause and heroin poisoning as any contributing cause; death certificate data were available for 2003–2011. Rural areas were defined using the Rural-Urban Commuting Area Codes and accounted for 1.7 million (30%) of Wisconsin's population (5.7 million). We computed annual age-adjusted rates; we used chi-square tests to assess demographic characteristics.

Results: During 2003–2012, a total of 1,429 ED patients were treated and released (patients' median age: 25 years) (74% male) and 809 were hospitalized (patients' median age: 28 years) (71% male) due to heroin overdose. Age-adjusted ED visit rates increased from 0.9/100,000 persons in 2003 to 7.2/100,000 in 2012; overdose hospitalizations increased during the same period (0.7/100,000 to 3.2/100,000). Non-Hispanic whites accounted for a higher proportion of hospitalizations during 2008–2012 (87%), compared with 2003–2007 (76%; $P \leq 0.01$). Five hundred five heroin-related fatalities (patients' median age: 33 years) (84% male) occurred during 2003–2011. Statewide, fatalities increased from 0.5/100,000 in 2003 to 2.4/100,000 in 2011; in rural areas, fatalities increased from 0 in 2003 to 22 in 2011.

Conclusions: Since 2003, Wisconsin has had a substantial increase in heroin overdoses; strengthened prevention and treatment initiatives are needed throughout the state.

9:55 Risk Factors for Influenza A(H7N9) Disease — China, 2013

Authors: Fiona P. Havers, B. Liu, E. Chen, Z. Yuan, H. Yuan, J. Ou, M. Shang, K. Kang, K. Liao, F. Liu, D. Li, H. Ding, L. Zhou, W. Zhu, F. Ding, P. Zhang, X. Wang, J. Yao, N. Xiang, S. Zhou, X. Liu, Y. Song, H. Su, R. Wang, J. Cai, Y. Cao, X. Wang, T. Bai, J. Wang, Z. Feng, Y. Zhang, Q. Li, M.A. Widdowson

Background: A novel avian influenza A(H7N9) caused 147 human infections, including 48 deaths, in China between March and December 2013. The majority of case-patients reported poultry exposure. Specific host and exposure risk factors for disease are unknown, yet critical to design prevention measures.

Methods: In March–April 2013, we conducted a case-control study in eight Chinese provinces. Laboratory-confirmed A(H7N9) case-patients were matched 1:4 for age, sex, and neighborhood to controls. Subjects completed a questionnaire on medical history and potential exposures, including poultry markets and other types of poultry exposure. We used conditional logistic regression to calculate matched odds ratios (mORs) for the association of A(H7N9) virus disease with potential risk factors.

Results: We studied 89 A(H7N9) cases with 340 matched controls. Obesity (mOR: 4.7; confidence interval [CI]: 1.8–12.5), chronic obstructive pulmonary disease (mOR: 2.71; CI: 1.1–6.9), and use of immunosuppressive medications (mOR: 9.0; CI: 1.7–47.2) were associated with A(H7N9) disease. 55% of cases compared with 31% of controls reported any contact with poultry (mOR: 8.0; CI: 3.3–19.2). 67% of case-patients compared with 34% of controls visited a live poultry market (mOR: 2.4; CI: 1.1–5.6); visiting live poultry markets increased risk of infection even after adjusting for poultry contact and other confounders (adjusted OR: 3.5; CI: 1.8–6.8). Domestically raised poultry were not associated with increased risk; 12 (14%) of case-patients did not report any poultry exposure or market visit.

Conclusions: Exposure to poultry in markets was associated with A(H7N9) virus infection, even without direct or indirect poultry contact. China should consider permanently closing live poultry markets and aggressively pursuing control measures to prevent spread of this emerging pathogen.

CONCURRENT SESSION B1: Antimicrobial Use and Resistance

10:45AM–12:10PM

Ravinia Ballroom

Moderator: Lauri Hicks

10:50 Evaluation of Antibiotics Administered for Acute Upper Respiratory Tract Infections — Oregon, 2011

Authors: Kara M. Levri, A. Thomas, B. Robinson

Background: Incorrect antibiotic use increases the risk for antibiotic-resistant bacteria emergence, and infections caused by antibiotic-resistant bacteria are associated with morbidity, mortality, and substantial economic burden. We report a statewide evaluation of antibiotic administration for acute upper respiratory infections (URTIs) among outpatients.

Methods: All-payer claims data were reviewed for outpatient visits for acute URTIs (otitis media, sinusitis, pharyngitis, bronchitis, and upper respiratory infections [URIs] having International Classification of Diseases, Ninth Revision codes) and excluded visits for patients with other provider-diagnosed infectious diseases or underlying pulmonary conditions. As a proxy for prescribing practices, we assessed whether antibiotics had been obtained within 3 days of the outpatient visit by using pharmacy claims. Outpatient visit claims were linked with pharmacy claims for antibiotic prescriptions, then duplicates removed to represent each patient at first diagnosis. We calculated the proportion of patients with an obtained antibiotic by URTI, antibiotic category (narrow or broad-spectrum), and selected antibiotics.

Results: Among all URTI outpatients (n = 621,764), 40% received antibiotics (n = 246,026) during 2011. Children were more likely to obtain antibiotics than adults for all URTI visits except URIs; the proportion receiving broad-spectrum antibiotics increased with age. For bronchitis and URI, diagnoses rarely requiring antibiotics, 50% and 12% obtained antibiotics, respectively. Of those, 90% and 66%, respectively, were broad-spectrum antibiotics. Azithromycin, a broad-spectrum antibiotic, was obtained for 36% of bronchitis and 6% of URI diagnoses.

Conclusions: In Oregon, broad-spectrum antibiotics, particularly azithromycin, are being overly prescribed for bronchitis and URIs, diagnoses that rarely require antibiotics. Use of payer and claims data is a helpful tool for program evaluation and the development of targeted messages to improve antibiotic prescribing.

11:10 Outpatient Antibiotic Prescribing for Children — United States, 2011

Authors: Alicia Demirjian, R. Roberts, M. Bartoces, T. Taylor, L. Hicks

Background: In the United States, at least two million people develop severe infections caused by antimicrobial-resistant pathogens every year, and more than 23,000 die as a direct result. The inappropriate use of antibiotics is the largest modifiable contributor to antibiotic resistance. We sought to describe the use of antibiotics in children according to provider specialty and geography.

Methods: The number of oral antibiotic prescriptions dispensed to persons < 20 years of age was extracted from 2011 IMS Health© Xponent® data, which represent all outpatient antibiotics prescribed in the U.S. Prescribing rates were calculated using census data for denominators.

Results: In 2011, 73.7 million courses of antibiotics, or 885 prescriptions per 1,000 persons < 20 years of age, were dispensed; the prescribing rate was highest for patients 0–2 years (1,267 per 1,000 persons). The most common categories prescribed were penicillins and macrolides; amoxicillin was the most common individual antibiotic (33.7% of total), followed by azithromycin (20.6%). Azithromycin accounted for 28.3% of prescriptions written by family practitioners, compared to only 20.0% of prescriptions written by pediatricians. Pediatricians prescribed 362 courses per 1,000 persons and family practitioners prescribed 154 per 1,000 persons, accounting for 58.3% of pediatric antibiotic prescriptions. Prescription rates varied by census region (lowest, 638 vs. highest, 1,027 per 1,000 persons in the West and South, respectively) and state (lowest, 339 vs. highest, 1,482 per 1,000 persons in Alaska and Kentucky, respectively).

Conclusions: Antibiotic prescribing practices vary markedly according to provider specialty and geography, suggesting an opportunity for targeted interventions to reduce use. The common use of azithromycin among family practitioners and overall high prescription rates in the South are potential areas for improvement.

11:30 Vaccines for a "Pièce de Résistance": Prevention of Antimicrobial Resistance Among Children Aged <5 Years with the 13-valent Pneumococcal Conjugate Vaccine — Selected U.S. Areas, 2004–2012

Authors: Sara Tomczyk, J. Jorgensen, R. Lynfield, W. Schaffner, D. Aragon, L. Harrison, M. Nicholas, S. Petit, A. Thomas, A. Reingold, M. Farley, S. Zansky, B. Beall, L. McGee, L. Kim

Background: Antimicrobial resistant *Streptococcus pneumoniae* (pneumococcus) causes 1.2 million U.S. infections annually among all ages. Antimicrobial resistant invasive pneumococcal disease (IPD) decreased after 7-valent pneumococcal conjugate vaccine introduction in 2000. A Healthy People 2020 (HP2020) goal is to reduce IPD not susceptible (NS) to >1 antimicrobials among children aged <5 years old from 8.3 (2008) to 6 cases per 100,000 children. We evaluated progress towards this goal following the 2010 introduction of 13-valent pneumococcal conjugate vaccine (PCV13).

Methods: We defined IPD as isolation of pneumococcus from normally sterile sites among residents aged <5 years from ten Active Bacterial Core surveillance areas during 2004–2012. Isolates were serotyped and tested for antimicrobial susceptibility (using Clinical Laboratory Standards Institute breakpoints). NS-IPD cases were NS to >1 of the following antimicrobials: penicillin, amoxicillin, erythromycin, cefotaxime, ceftriaxone, cefuroxime, tetracycline, vancomycin, and levofloxacin. We compared rates of NS-IPD observed in 2012 (after PCV13 introduction) to rates expected in the absence of PCV13, using chi-squared analyses.

Results: We identified 3,194 pediatric IPD cases during 2004–2012. In 2012, the observed rate (cases per 100,000 children) of NS-IPD was 3.5 (below HP2020 goal) compared to the expected rate of 12 in the absence of PCV13 (69% decline; P<.0001). Observed antimicrobial-specific NS-IPD rates were significantly lower in 2012 for penicillin (0.5; 93% decline; P<.0001), amoxicillin (0.8; 89% decline; P<.0001), erythromycin (3.2; 72% decline; P<.0001), cefotaxime (0.4; 94% decline; P<.0001), ceftriaxone (0.4; 93% decline; P<.0001), cefuroxime (1.5; 81% decline; P<.0001), and tetracycline (1.1; 86% decline; P<.0001).

Conclusions: PCV13 use among children has allowed the U.S. to achieve a key HP2020 objective 8 years in advance. Continued surveillance is needed to ensure that reductions persist.

11:50 Vancomycin-Resistant *Enterococcus faecium* in a Neonatal Intensive Care Unit — Utah, 2013

Authors: Joanna R. Watson, R. Abouzelof, J. Cline, A. Oswald, K. Friddle, Y. Kohring, R. Bierer, C. Davis, A. Nuibe, S. Patel, E. Thorell, M. Dickey, A. Phillips, R. Daley, B. Robinson, S. Varley, A. Nakashima, A. Pavia

Background: Colonization and subsequent infection with vancomycin-resistant *Enterococcus faecium* (VRE) is associated with increased morbidity, mortality, and health care costs. In January 2013, Hospital A was notified that a patient transferred from their neonatal intensive care unit (NICU) had tested positive for VRE colonization. Hospital A implemented multiple rounds of active surveillance of NICU patients, the first of which identified 4 additional VRE-colonized infants. Control measures, including active surveillance, contact precautions, and enhanced environmental cleaning, were progressively implemented. We investigated to characterize the outbreak and assess control measure effectiveness.

Methods: A case was defined as ≥1 clinical or surveillance culture-positive result for VRE in a NICU patient during January–November 2013. Environmental samples were tested in February, March, April, and July. Case-patients' medical records were reviewed, and VRE isolates were evaluated by pulsed-field gel electrophoresis (PFGE).

Results: We identified 47 cases (45 colonizations, 2 infections). Median patient age was 48 (range: 13–400) days. Peak incidence occurred in March (11 cases). No cases were identified after August. Median time from NICU admission to positive VRE culture was 30 (range 0–263) days. Only 1/15 case-patients cultured at admission to the unit was positive for VRE. Of 29 patient isolates typed by PFGE, 7 belonged to pattern one and 21 to pattern two. During February–April, 21/125 (17%) environmental cultures were VRE-positive, compared with 2/44 (5%) in July. All environmental isolates typed by PFGE matched patient isolate patterns one (3 isolates) or two (5 isolates).

Conclusions: An outbreak with 2 VRE clones occurred in a NICU. Implementation of control measures was able to reduce environmental contamination, halt transmission, and eventually, eliminate VRE from the unit.

CONCURRENT SESSION B2: Environmental Health

10:45AM–12:10PM

Dunwoody Suite

Moderator: Judith R. Qualters

10:50 Trouble on the Tracks: Chemical Exposure, Health Effects, and Communication After a Train Derailment — New Jersey, 2012

Authors: Alice M. Shumate, M. Duncan, J. Taylor, L. Graziano, C. Hunter, E. Vaouli, J. Devlin, J. Wilken, K. Brinker, P. Ruckart, J. Eldridge, C. Tan, M. Orr, J. Fagliano

Background: On November 30, 2012, a train derailment released vinyl chloride (VC) into a town with ~6,100 residents. Because acute, high-level VC exposure can cause serious health effects, including death, the adjacent area was evacuated. Shelter-in-place orders were issued and lifted repeatedly for 4 days as airborne VC levels fluctuated and the evacuation area was expanded. We used in-person surveys to describe exposure and health effects experienced by the community and the effectiveness of risk communication to the public.

Methods: A 2-stage sampling plan selected census blocks and households for interview in the initial evacuation zone (Area A), expanded evacuation zone (B), adjacent area to evacuation zone (C), and the rest of town (D). Associations between risk factors and symptoms and symptom prevalence across areas were evaluated by using chi-square tests.

Results: During December 14–20, 2012, a total of 459 persons were interviewed; 256 (56%) reported health effects, typically headache, upper-respiratory symptoms, coughing, and dizziness. Symptom prevalence was lower among residents of Area D (43.9%) than A (53.6%), B (61.4%), and C (62.7%; P = 0.02). Persons smelling unusual odors were more likely to experience symptoms (odds ratio [OR]: 7.34; 95% confidence interval [CI]: 4.43–12.16), as were smokers (OR: 2.03; 95% CI: 1.22–3.38) and persons with asthma (OR: 2.2; 95% CI: 1.30–3.72). Sixty-five percent of respondents (213/328) reported being told to shelter-in-place, but only 42% (103/246) reported receiving instructions.

Conclusions: Community impact of the VC release was widespread, with symptoms prevalent in all areas and higher among populations with risk factors for respiratory symptoms. Effective risk communication messaging is a crucial public health priority during chemical releases and might decrease morbidity.

11:10 Formaldehyde Levels and Respiratory Allergies Among Urban, Low-Income Children — United States, 2011–2012

Authors: Joy Hsu, M. Colton, F. Yip, K. Sircar, K. Alwis, B. Blount, T. Reponen, G. Adamkiewicz, P. Ryan, G. Chew

Background: Low-income children have disproportionately high morbidity from respiratory allergies, including asthma and cockroach allergy. Health-related hazards are disproportionately found in low-income housing. Despite epidemiologic and in vitro research linking formaldehyde (an indoor air pollutant) to allergic diseases, no home standards for formaldehyde exist. We examined associations between home formaldehyde and respiratory allergies among U.S. low-income children with asthma.

Methods: Ninety-four urban, low-income children with asthma (aged 7–12 years) were recruited from two U.S. metropolises during 2011–2012. We performed home formaldehyde sampling, allergy testing, and questionnaire (demographics, environment, and health) assessments. We defined high formaldehyde levels as those above the National Institute for Occupational Safety and Health 8-hour time-weighted average recommended exposure limit (0.016 parts per million). We analyzed baseline data using chi-square tests ($\alpha = .05$).

Results: Two-thirds of children (56% male; 51% Black, 29% Asian, 16% Latino, 4% White; 75% with ≥1 positive allergy test) had high-formaldehyde homes. High formaldehyde was positively associated with allergy to dust mites ($P = .01$), dogs ($P = .001$), cats, ragweed, and cockroaches (all $P = .04$). High formaldehyde was not associated with age, sex, season, or furniture changes (all $P > .20$), nor study site, secondhand smoke, or particulate matter <2.5μm ($P > .10$), but was associated with Latino ethnicity. Among non-Latino children, high formaldehyde levels remained significantly associated with allergy to dust mites and dogs.

Conclusions: Formaldehyde levels above recommendations for adult workers were found in many homes of urban, low-income children with asthma, especially Latinos. High formaldehyde levels were associated with respiratory allergies; Latino ethnicity modified some associations. Reducing formaldehyde exposure in low-income homes might reduce morbidity disparities in respiratory allergies among low-income children.

11:30 Illness Associated with Dietary Supplements — New York, 2013

Authors: Nina Ahmad, E. Taylor, C. Martin, B. Robinson, K. Aldous, E. Yard, K. Chatham-Stephens, M. Boyd, D. Spink, B. Tran, P. Parsons, D. Flanders, A. Chang, M. Palo, K. Spaeth, G. Birkhead, D. Blog, K. Gelberg, N. Graber, A.K. Gleason, A. Newman, L. Lewis

Background: Dietary supplements represented 51% of Food and Drug Administration (FDA) Class 1 recalls during 2004–2012. In March 2013, physicians notified New York State Department of Health (NYSDOH) of 18 patients experiencing adverse health effects (liver injury, impotence, virilization) consistent with anabolic androgenic steroid (AAS) exposure after taking supplements recommended by a single nutritionist. NYSDOH collaborated with FDA and CDC to investigate.

Methods: NYSDOH tested patient supplements by liquid and gas chromatography with mass spectrometry. In a retrospective cohort study of NY residents counseled by the nutritionist during September 1, 2012–July 31, 2013, we abstracted medical records and interviewed patients. Exposed persons had taken Purity First (PF) "Vitamin B50" or "Multiminerals" (MM), and unexposed persons had taken non-PF supplement(s), for ≥3 days during the study period; persons fitting neither category were excluded. Cases represented any of 27 otherwise unexplainable, AAS-consistent adverse outcomes after taking supplements. We used chi-square and Fisher's exact tests to calculate risk ratios (RRs) and 95% confidence intervals (CIs).

Results: Laboratory analysis identified AAS in PF B50 (methasterone, dimethazine) and MM (methylstenbolone). Of 716 cohort members, 237 (33%) participated; 199 (28%) were included. We identified 137 cases (median patient age 50 [range: 11–79] years, 72% female). Exposure was significantly associated with 16 outcomes (RR: 1.4–undefined), including liver injury (RR: 7.7; CI: 1.1–55.7), hair loss (RR: 12.2; CI: 1.7–87.0), and hot flashes (RR: 4.2; CI: 1.4–13.1).

Conclusions: Collaborative epidemiologic and laboratory investigation determined that adulterated B50 and MM caused this outbreak. Consequently, PF recalled these supplements nationally on July 31, 2013 and ceased operation. These findings could help inform future evaluation of regulatory oversight of supplements.

11:50 Acute Hepatitis and Liver Failure of Unknown Etiology — United States, 2013

Authors: Kevin M. Chatham-Stephens, D. Johnston, E. Taylor, M. Viray, A. Chang, S.Y. Park, J. Daniel, R. Noe, J. Schier, D. Flanders, C. Martin, L. Lewis

Background: Approximately 38 million U.S. adults use herbs or dietary supplements, some of which have been associated with liver injury. On September 9, 2013, the Hawaii Department of Health (HDOH) was notified of seven patients who had developed acute hepatitis and liver failure of unknown etiology. All had used OxyELITE ProTM (OEP), a dietary supplement marketed for weight-loss and muscle gain that was recently reformulated. HDOH, CDC, Food and Drug Administration (FDA), and Department of Defense (DoD) collaborated to identify and describe illnesses among cases nationwide.

Methods: We defined cases as acute hepatitis of unknown etiology that occurred on or after April 1, 2013, following exposure to a weight-loss or muscle-building dietary supplement. We conducted case-finding through active screening of DoD records and passive reporting from clinicians, poison control centers, and FDA MedWatch. For reported cases we performed medical chart abstractions and patient interviews. We then performed descriptive analyses.

Results: We identified 62 patients in 15 states with acute hepatitis of unknown etiology. The median age was 35 years (range: 16–67), and 28 (45%) were male. Fifty-one (82%) patients reported consuming OEP. Commonly reported symptoms included dark urine, jaundice, and light-colored stools. Twenty-five (40%) patients were hospitalized, 2 (3%) received liver transplants, and 1 (2%) died. Product trace back did not implicate a single OEP lot, and initial testing identified no contaminants.

Conclusions: At least 62 patients developed acute hepatitis after consuming a dietary supplement; most patients consumed OEP. We did not identify any common exposure among the patients except for OEP. This investigation led to a national recall of OEP on November 9, 2013 and international case-finding efforts by international health authorities.

SPECIAL SESSION: Novel Viruses/Pandemic Threats: Influenza and MERS Coronavirus

12:10–1:30PM

Dunwoody Suite

Moderator: Stephen Redd

SPONSORS: National Center for Immunization and Respiratory Diseases (NCIRD)

The focus of this session will be to provide an overview for EIS officers, state participants, and other attendees about some of the most important pandemic threats facing the world today. Understanding these threats is important since many EIS officers and others will participate in epidemiologic investigations and emergency responses if a pandemic emerged. The session will also demonstrate how CDC emergency responses are structured and how EIS officers can participate.

The session will provide an update for EIS officers and other attendees, including an overview of the epidemiology, a review of the applicable surveillance guidance, including who should be tested and laboratory protocols, and what guidance is available for travelers and health care providers.

Speakers:

- Novel Influenza A Viruses with Pandemic Potential: H3N3v, H7N9 and H5N1. *Dan Jernigan*
- Of Camels and Men—MERS Coronavirus: The Second Year. *Sue Gerber*
- CDC Emergency Responses and How EIS Officers Can Participate: The MERS Example. *David L. Swerdlow*

POSTER SYMPOSIUM I

1:30–2:45PM

Ravinia Ballroom

Moderator: Pattie Simone

During the first 30 minutes of the Poster Symposium, the authors will each give a 2-minute oral presentation at the podium in front of a seated audience. During the remaining time, the audience is encouraged to view the individual posters and engage in direct discussion with the authors.

P1.1 Vaccine-Preventable Diseases Among Fatal Cases of Hospitalized Acute Respiratory Infection — Guatemala, 2000–2013

Authors: Sara Tomczyk, J. McCracken, C.L. Contreras, MR. Lopez, C. Bernart, J. Moir, K. Escobar, L. Reyes, W. Arvelo, K. Lindblade, J. Bryan, L. Peruski, J.R. Verani

Background: Acute respiratory infection (ARI) is a leading cause of illness and death worldwide, and several ARI etiologies are vaccine-preventable. In Guatemala, influenza vaccination is recommended for adults aged ≥60 years but coverage is low. Pneumococcal conjugate vaccine was recently introduced for infants. We examined characteristics of fatal ARI cases in Guatemala to inform efforts to reduce ARI-associated mortality.

Methods: We analyzed data from the Guatemala International Emerging Infections Program. Patients admitted to surveillance hospitals in Santa Rosa or Quetzaltenango with ARI (≥1 sign of acute infection and ≥1 sign/symptom of respiratory illness) were enrolled. Nasopharyngeal/oropharyngeal swabs from case-patients were tested by polymerase chain reaction for respiratory syncytial virus (RSV), human metapneumovirus, influenza A/B, parainfluenza virus 1/2/3, and adenovirus. Urine was tested for pneumococcal antigen among those aged ≥11 years. We described in-hospital deaths among ARI case-patients and results of diagnostic testing.

Results: From September 2007 to December 2013, 350 of 7911 ARI case-patients died in-hospital, including 166/5323 (3.1%) aged <5 years, 106/1654 (6.4%) aged 5–59 years, and 78/934 (8.4%) aged ≥60 years. Among 338 fatal cases with viral testing, the most commonly detected were RSV (n=57; 16.3%), adenovirus (n=37; 10.6%), and influenza A (n=29; 8.3%); 42 (73.7%) RSV-associated deaths and 15 (51.7%) influenza A-associated deaths were in children <5 years. Among 119 fatal cases among adults with urine tested for pneumococcus, 11 (9.2%) were positive.

Conclusions: Vaccine-preventable respiratory diseases contribute to ARI deaths in Guatemala, although pneumococcal burden was underestimated due to lack of testing in young children. Maximizing coverage with currently used vaccines and vaccinating children against influenza could reduce ARI deaths. RSV vaccines currently in-development could have substantial public health impact.

P1.2 Mexican-Born Legal Immigrants with Tuberculosis Classifications Using Electronic Disease Notification Database, 2009–2012

Authors: Jessica Adam, Z. Wang, R. Philen, S. Benoit, J. Painter, S. Waterman

Background: Foreign-born persons contribute an increasing proportion of U.S. tuberculosis (TB) cases (63% in 2012); therefore, focusing on this population is key to TB elimination. Mexicans accounted for 21% of foreign-born persons with TB in 2012. We described results of TB screening in Mexico for Mexicans applying for U.S. legal permanent resident status.

Methods: CDC's Electronic Disease Notification database (EDN) alerts receiving health departments (HD) of arriving immigrants with notifiable conditions. We analyzed EDN data for Mexican immigrants who arrived in the United States during 2009–2012 by TB classification. Immigrants with medical evaluations suggestive of TB and negative diagnostic tests, or who have recently completed TB treatment are designated Class B1. Persons with latent TB infection (LTBI) are Class B2.

Results: During 2009–2012, approximately 286,762 Mexicans immigrated to the United States. Of those, physicians designated 10,732 (4%) TB Class B1 or B2. Active TB was diagnosed among 214 (<1%); 17% were smear-negative/culture-positive, which would have gone undetected before 2007 CDC guidelines mandating cultures for all suspected TB cases. Upon arrival, California was the most common destination state (44%) followed by Texas (21%) and Illinois (5%). Postarrival evaluation by receiving HD was complete in 60% and 49% of B1 and B2 cases respectively; 23% lacked follow-up data. B1-classified arrivals had a median time to follow-up of 48.5 days; only 23 (0.2%) had active TB.

Conclusions: Screening among legal Mexican immigrants identifies a substantial burden of active and latent TB requiring follow-up by state TB programs; however, follow-up data are incomplete. Increased coordination between CDC and state TB programs could better monitor progress in TB elimination efforts among this immigrant population.

P1.3 Strategies for Maximizing Preventive Treatment of Latent Tuberculosis Infection — Mississippi, 2008–2012

Authors: Erik J. Reaves, A. France, M. Holcombe, S. Quilter, J. Ellis, T. Navin, S. Morris

Background: An estimated 10–15 million persons in the United States have latent tuberculosis infection (LTBI). Strategies to eliminate tuberculosis (TB) include preventive treatment of LTBI, which lowers the likelihood of progression to TB disease. Completion of preventive treatment (average: 40%–60%) is lower among groups at high risk for TB. To monitor the management of LTBI, the Mississippi State Department of Health implemented mandatory reporting of LTBI and an electronic reporting system (ERS).

Methods: Using data from the ERS, we assessed preventive treatment among persons with LTBI. A case of LTBI was defined as infection with *Mycobacterium tuberculosis* diagnosed by Mantoux tuberculin skin test or interferon-gamma release assay without evidence of TB disease and residence in Mississippi at diagnosis. Groups at high-risk were defined as persons with HIV infection, contacts of infectious persons, residents of correctional facilities, homeless persons, and foreign-born persons.

Results: During 2008–2012, LTBI cases totaled 13,287. Preventive treatment was started for 9,256 (70%) persons; of those, 6,936 (75%) completed treatment. The proportions of groups at high risk that completed preventive treatment were: persons with HIV infection: 82% (287/348); contacts of infectious persons: 80% (679/854); residents of correctional facilities: 79% (1795/2280); homeless persons: 74% (265/358); and foreign-born persons: 72% (592/825). Monthly preventive treatment completion reports from the ERS guided follow-up on persons that initiated treatment.

Conclusions: During 2008–2012, a high proportion of persons with LTBI started and completed preventive treatment in Mississippi, especially among populations at highest risk of progressing to TB disease. The statutory reporting requirement and ERS components of the LTBI surveillance system in Mississippi serve as a model to document the burden of LTBI and facilitate treatment.

P1.4 Using Electronically Archived Medical Information for Public Health: Analysis of American Indian/Alaska Native Communicable Disease Diagnoses from the Indian Health Service National Data Warehouse — Oregon 2007–2011

Authors: Jessica A. Marcinkevage, R. Leman, V. Warren-Mears, T. Weiser

Background: American Indian/Alaska Native (AI/AN) communities experience disproportionate disease burdens. No system provides aggregate health or disease surveillance data of Oregon AI/AN communities to tribal public health authorities; state health department data are inaccessible to these organizations, and national surveys are not representative of AI/AN populations. We evaluated performance of the Indian Health Service (IHS) National Data Warehouse (NDW), an electronic repository of clinical data from IHS, tribal, and urban Indian (I/T/U) clinics, for surveillance of 6 communicable diseases: hepatitis A, B, and C; gonorrhea; chlamydia; and pertussis.

Methods: We determined the number of Oregon AI/AN persons in the NDW having a diagnosis of each condition during 2007–2011, according to International Classification of Diseases, 9th Rev., (ICD-9) codes. To validate results, we compared these diagnoses with laboratory-confirmed cases identified through medical records review of the 2 largest IHS/Tribal clinics in Oregon, calculating NDW sensitivity and predictive value positive (PVP). We also compared NDW case counts with counts of AI/AN persons in the Oregon notifiable diseases system (NDS) for each condition.

Results: Eleven Oregon I/T/U clinics reported to the NDW at least once during 2007–2011. Of 621 diagnoses identified at the 2 clinics, 3 (0.5%) were absent from the NDW. Sensitivity was higher for sexually transmitted infections than other conditions (e.g., chlamydia: 67%; hepatitis B: 12%); the opposite was observed for PVP (hepatitis B: 50%; chlamydia: 17%). Compared with Oregon NDS, diagnoses missed by the NDW were among younger AI/AN persons and those living in urban counties.

Conclusions: The NDW can be useful for AI/AN-specific public health surveillance for detecting trends in reportable communicable diseases, guiding development of future AI/AN-specific public health surveillance systems.

P1.5 Tales from the Crypto: Trends in Cryptosporidiosis Surveillance — United States, 1995–2012

Authors: Julia E. Painter, M. Hlavsa, J. Yoder, J. Gargano

Background: Cryptosporidiosis is a gastrointestinal illness caused by the parasite *Cryptosporidium*, the leading etiology of waterborne disease outbreaks in the United States (2001–2010). Historically, cryptosporidiosis disproportionately affected children aged 1–4 years. We evaluated recent trends in cryptosporidiosis reporting.

Methods: We analyzed data on all cryptosporidiosis cases reported to CDC (N=102,835) from 1995–2012. We assessed trends in case type (confirmed versus non-confirmed) using the Cochrane-Armitage test. We used negative binomial regression to estimate incidence rate ratios (IRR) and 95% confidence intervals (CI), and test interactions across three time periods (1995–2004, 2005–2008, and 2009–2012) and four age groups (0–14, 15–44, 45–64, 65+ years).

Results: Annual incidence rates per 100,000 person-years ranged from 0.9 (1997) to 3.9 (2007). Confirmed cases decreased from 88% (1995) to 66% (2012) (P-trend <0.0001). Compared with 1994–2004, overall rates were higher in 2005–2008 (IRR: 2.69; CI: 2.65–2.73) and 2009-2012 (IRR: 2.39 CI: 2.36–2.45). Rate changes from 2005–2008 to 2009–2012 varied by age group (P-interaction <0.0001): 0–14 years (IRR: 0.55; CI: 0.54–0.56), 14–44 years (IRR: 0.99; CI: 0.97–1.01), 45–64 years (IRR: 1.47; CI: 1.41–1.52) and 65+ years (IRR: 2.17; CI: 2.06–2.29). Analyses restricted to confirmed and non-outbreak cases revealed similar patterns.

Conclusions: Increasing cryptosporidiosis reporting has been accompanied by an evolving epidemiology, particularly in confirmed cases and older adults. Potential reasons for these changes include FDA's 2005 approval of a treatment for cryptosporidiosis in adults, decreasing magnitude of recreational water–associated cryptosporidiosis outbreaks, and recent case definition revisions. Findings can be used to develop interventions to reduce *Cryptosporidium* transmission.

P1.6 Epidemiology of Reported Malaria Cases — Maryland, 2007–2012

Authors: David C. Schnabel, K. Feldman, D. Rohn, S. Stanley, S. Wee, J. Braggio, D. Blythe

Background: Malaria, although eliminated from the United States, can be acquired during travel to malaria-endemic countries and prevented by mosquito avoidance and taking chemoprophylaxis. During 2011, Maryland had the highest state incidence rate for malaria. We characterized Maryland malaria cases to help shape prevention strategies.

Methods: Malaria cases reported through Maryland's notifiable disease surveillance system during 2007–2012 were described. We compared imported, confirmed, 2009–2011 Maryland cases with the remainder of imported, confirmed 2009–2011 U.S. cases reported to CDC to assess chemoprophylaxis use and reason for travel (U.S. civilians only) and travel destination (all cases).

Results: Of 575 Maryland malaria cases during 2007–2012, one was laboratory-acquired; 574 were imported. Median patient age was 33 (range: 1–83) years; 63% were male and 81% were black. Of 508 patients with reported country of acquisition, 93% had acquired malaria in Africa. Of 422 patients with known reason for travel, 75% had visited friends and relatives (VFR). Of 430 patients with chemoprophylaxis information, 107 (25%) reported its use. During 2009–2011, compared with malaria patients from all other states, Maryland patients were more likely to be VFR (risk ratio [RR]: 1.18; 95% confidence interval [CI]: 1.09–1.28) and to have acquired malaria in Africa (RR: 1.40; 95% CI: 1.35–1.46) and less likely to have used chemoprophylaxis (RR: 0.80; 95% CI: 0.61–1.06).

Conclusions: Maryland malaria cases differed from other states' cases, with a greater proportion traveling to Africa, being VFR, and chemoprophylaxis nonuse. A survey to understand barriers to recommended use of chemoprophylaxis and other preventive measures is planned to shape efforts to decrease incidence of malaria among Maryland's VFR travelers to Africa.

P1.7 Investigating the Sensitivity and Specificity of an Alternative Surveillance Case Definition for Monkeypox — The Democratic Republic of Congo (DRC), 2010–2013

Authors: Lynda U. Osadebe, A. McCollum, R. Lushima, E. Pukuta, S. Karhemere, M. Balilo, J. Kabamba, J. Malekani, B. Nguete, E. Okitolonda, I. Damon, J. Muyembe, M. Reynolds.

Background: Monkeypox is a zoonosis endemic in DRC with an annual incidence of 5.53/10,000 and case-fatality of 3.7%. Monkeypox is often confused with varicella and in the absence of laboratory testing, which requires extensive resources, it is difficult to know the true burden of monkeypox, signaling the need for a more specific monkeypox surveillance case definition. The national surveillance case definition defines suspect cases as persons having a febrile prodome with a rash, while an alternative definition specifies a 'characteristic rash', plus febrile prodrome, and either pustules on palms and soles, or lymphadenopathy. This study examines the accuracy of the both definitions.

Methods: To determine conformity to either or both surveillance definitions we reviewed case-report forms and recorded the clinical characteristics of 817 suspected monkeypox cases that were investigated from September 2010–June 2013. Of these, 293 (35.8%) had been confirmed by laboratory testing.

Results: Among the 817 suspected cases, 558 (68.3%) met the national definition, 219 (39.2%) of these were confirmed, while 627 (76.7%) suspected cases met the alternative definition, 248 (39.6%) of which were confirmed. Of the 293 confirmed cases, 206 (70.3%) met both definitions and 32 (10.9%) were excluded (false negatives). Only 3 (9.4%) false negatives had febrile prodome and none had the 'characteristic rash'. Of the non-cases, 276 (52.7%) met both definitions (false positives); all had fever prodome and 'characteristic rash'. Notably, 215 (77.9%) of these were confirmed varicella cases.

Conclusions: These finding suggest that an alternative surveillance definition for monkeypox has greater sensitivity but equivalent specificity to the current case definition. This finding highlights the difficulty in clinical identification of monkeypox disease and supports the continuing need for laboratory testing.

P1.8 Human *Salmonella* Typhimurium Infections Linked with Exposure to Live Poultry from Agricultural Feed Stores and Mail-Order Hatcheries — United States, 2013

Authors: Tara C. Anderson, T. Nguyen, J. Kincaid Adams, N. Garrett, C. Bopp, J. Baker, C. McNeil, P. Torres, P. Ettestad, M. Erdman, D. Brinson, T. Gomez, C. Barton Behravesh

Background: From 1990–2012, 45 outbreaks of human salmonellosis linked to live poultry contact have been reported resulting in 1,581 illnesses, 221 hospitalizations, and five deaths. In March 2013, PulseNet, the national bacterial subtyping network for foodborne disease surveillance, identified a cluster of human *Salmonella* serotype Typhimurium infections, which we investigated.

Methods: A case was defined as illness in a person infected with the outbreak strain of *Salmonella* Typhimurium with illness onset between 03/01/13–10/22/13. Human and animal health officials collaborated to conduct epidemiologic, traceback, and environmental investigations.

Results: We identified 356 cases in 39 states. Illness onset dates ranged from 3/4/13–10/12/13. The median patient age was seven years (range: <1–87 years); 57% of ill persons were children ≤10 years; 51% were female. Twenty-six percent (62/240) of case-patients were hospitalized. Seventy-six percent (189/250) of case-patients reported contact with live poultry (83% chicks/chickens; 44% ducklings/ducks) in the week before illness. Ninety-five percent (149/157) reported purchasing live poultry from 116 locations of 33 agricultural feed store companies. Traceback investigations identified 18 mail-order hatcheries that supplied poultry to these stores. The outbreak strain was isolated from poultry and environmental samples collected from patients' homes in three states. Environmental investigations were conducted at two mail-order hatcheries; One of 40 (2.5%) duplicate drag swab samples collected at one hatchery yielded the outbreak strain.

Conclusions: Live poultry remain an important source of human salmonellosis, particularly among children, highlighting the need for educational campaigns and comprehensive interventions at the mail-order hatchery and feed store levels. Prevention and control efforts depend on a One Health approach, involving cooperation between public and animal health officials, industry, consumers, and human/animal health professionals.

P1.9 Evaluation of a Stillbirth Surveillance Program — Iowa, 2010

Authors: Samir Koirala, D.J. Kane

Background: Stillbirth is a major public health issue contributing to over half of all perinatal mortality. It is understudied compared with other adverse outcomes such as prematurity and infant death. The Iowa Stillbirth Surveillance Program (ISSP) was established in 2005 to enhance Iowa's capacity to ascertain reportable stillbirths.

Methods: ISSP defines stillbirth as the delivery of a fetus weighing >350g or ≥20 weeks gestation. We compared 2010 Iowa fetal death certificate (I-FDC) and ISSP data to assess ISSP's ability to enhance reportable stillbirths and identify discrepancies. ISSP staff reviewed Iowa hospitals' medical records of all fetal deaths regardless of gestational age or fetal weight. They used relevant ICD-9 codes for stillbirth case finding. Subject-matter experts reviewed and validated the data based on the ISSP stillbirth case definition.

Results: During 2010, 182 stillbirths were reported per I-FDC. Of these, 132 (72%) I-FDC stillbirths met the ISSP case definition. Out of the 33 (18%) stillbirths that did not meet the case definition, 17 were elective terminations of pregnancy, 14 were spontaneous abortions and 2 live births. ISSP identified 28 stillbirths that had not been reported on I-FDC. Of these, 10 were delivered out-of-state and 18 were delivered at Iowa hospitals but could not be linked to I-FDC.

Conclusions: The discrepancies between I-FDC and ISSP data were primarily due to I-FDC misclassification of elective terminations as stillbirths. ISSP also identified stillbirths that did not link to I-FDC or were delivered out-of-state. Training of hospital staff on proper completion of vital records and which forms to use may reduce stillbirth reporting discrepancies. IDPH may also review its interstate data agreements to improve fetal death reporting.

1.10 Two Fish, One Fish: Decreasing Number of Outbreaks Attributed to Fish — United States, 1998–2011

Authors: Jolene H. Nakao, K. Walsh, L. Gould

Background: Foodborne diseases cause 48 million illnesses in the U.S. each year. Fish is the second most commonly implicated commodity after poultry. We present the epidemiology of fish-attributed outbreaks in the U.S. during 1998–2011.

Methods: We reviewed CDC's Foodborne Disease Outbreak Surveillance System for outbreaks (≥2 cases of a similar illness) attributed to fish; outbreaks caused by shellfish were not included. Analyses examined the number of outbreaks, illnesses, hospitalizations, state, etiologic agent, implicated fish type, and preparation setting and method.

Results: From 1998–2011, 679 outbreaks were reported, resulting in 3,660 illnesses, 229 hospitalizations, and 2 deaths. The number of fish-associated outbreaks declined from an average of 66 per year in 1998–2003 to 35 in 2004–2011. Hawaii (213 outbreaks; 31%) and Florida (158; 23%) reported the most. Fish types implicated most often were tuna (35%), mahi mahi (12%), and grouper (10%). Among 611 outbreaks with a known single etiology, scombroid toxin (338; 55%) and ciguatoxin (199; 33%) were most common. The etiology-fish pairs responsible for the most outbreaks were scombroid toxin in tuna (200 outbreaks), scombroid toxin in mahi mahi (73), and ciguatoxin in grouper (60). Of the 618 outbreaks with a single preparation setting, 57% were attributed to fish prepared in a restaurant and 35% to fish prepared in a private home. Raw or lightly cooked fish was implicated in only 42 (9%) of 458 outbreaks with a known preparation method.

Conclusions: The number of outbreaks attributed to fish declined; reasons are unknown. Control measures targeted to the most common etiologies implicated in outbreaks, including proper fish storage and selection of appropriate harvest locations, could further reduce outbreaks caused by fish.

P1.11 Using Media Reports to Track Deaths, Hurricane Sandy, 2012

Authors: Olaniyi O. Olayinka, T. Bayleyegn, S. Burrer, A. Wolkin, R. Noe, L. Lewis, A. Madsen, V. Arrisi, K. Jones-Vessey, J. Purtill, J. Rainey

Background: Accurate and timely reporting of mortality during disasters is useful and critical; however, timely national mortality surveillance does not exist. During Hurricane Sandy, CDC/Health Studies Branch (HSB) piloted an approach for tracking disaster-related deaths reported by the media for situational awareness. Our objective was to determine the accuracy and timeliness of this data.

Methods: From October 29–November 5, 2012, HSB tracked hurricane-related, media-reported deaths on the internet using a keyword search to capture demographics and circumstance of death. From May–October, 2013, we requested death records from states affected by Sandy to evaluate the media data. Frequencies, sensitivity, and positive predictive value (PPV) were calculated.

Results: We found 76 hurricane-related, media-reported deaths from New Jersey, Connecticut, North Carolina, Virginia, and New York City (NYC). Of these deaths, 67 (88 %) were found in vital statistics records. NYC identified hurricane-related deaths from vital statistics using keyword search; sensitivity and PPV of the media to detect deaths in NYC were 77% and 83%, respectively. The other four states provided vital statistics records based on our media-based list. Percent agreement varied: demographics (86%), location (86%), circumstance (74%), date (62%), and cause of death (56%). CDC/HSB and NYC reported deaths for situational awareness within 24 hours while none of the other four states conducted active disaster-mortality surveillance during this event.

Conclusions: Media-reported deaths captured by HSB during Hurricane Sandy were moderately sensitive and more timely compared to vital statistics. Tracking media-reported, disaster-related deaths can provide situational awareness and support immediate public health decision-making during the initial stage following disasters.

P1.12 Detection of Infectious Disease Outbreaks at an Outdoor Mass Gathering — West Virginia, 2013

Authors: Erica D. Thomasson, S. McBee, S. File, D. Bixler

Background: Mass gatherings can be associated with infectious disease health risks; therefore, surveillance might help early detection and prevention of outbreaks. In 2013, West Virginia hosted for the first time a 10-day camping event that is held by a national youth organization every 4 years. A new mass gathering surveillance system was implemented to detect and prevent outbreaks among the 41,806 attendees. Active surveillance was conducted by a team who performed attendee health screening upon arrival at the site, daily interviews of medical personnel by using standardized questionnaires, and follow-up of disease and outbreak reports. In this study, we assessed the usefulness of the active surveillance system for rapidly detecting outbreaks.

Methods: We reviewed surveillance data for completeness and timeliness. We assessed the number of outbreaks detected and calculated attack rates within camper groups, which comprised 40 campers each. We administered an Internet-based survey to all medical staff to evaluate their perceptions of active surveillance.

Results: Active surveillance data from medical staff interviews were 100% complete and available for review daily. An outbreak of influenza A was detected among 8 campers in a single group (20% attack rate) and 3 campers from 4 other groups. Gastrointestinal illness was detected among 15 campers in a single group (38% attack rate) and 12 campers from 7 other groups. Of 562 medical staff surveyed, 252 (42%) responded. The majority of respondents reporting interaction with the surveillance team (n = 108) considered information or assistance provided by the team useful (73.1%) and timely (80.8%).

Conclusions: Active surveillance was useful, enabling detection of 2 outbreaks. Active surveillance should be considered at future outdoor mass gatherings to detect infectious disease outbreaks.

CONCURRENT SESSION C1: Vaccine Preventable Diseases in the United States

3:00–4:25PM

Ravinia Ballroom

Moderator: Jane Seward

3:05 First Use of a Novel Serogroup B Meningococcal Vaccine in the U.S. in Response to a Large Outbreak at a University — New Jersey, 2013

Authors: Lucy A. McNamara, A. Shumate, P. Johnsen, J. MacNeil, T. Bhavsar, A. Cohn, J. Dinitz-Sklar, J. Duffy, J. Finnie, D. Garon, R. Hary, F. Hu, S. Ingraffia, H. Kamiya, N. Kratz, S. Meyer, J. Neglia, J. Wagner, K. Wagner, X. Wang, Y. Yu, B. Montana, T. Clark, R. Izzo, C. Tan, M. Patel

Background: Meningococcal disease is a severe, outbreak-prone infection with a 10–15% case-fatality ratio. Although a novel meningococcal serogroup B (MenB) vaccine is approved elsewhere, it is not licensed in the U.S.. To control a MenB outbreak at a New Jersey university, the Food and Drug Administration authorized the use of investigational MenB vaccine in this setting.

Methods: We conducted case investigations and performed molecular typing of MenB isolates to characterize the outbreak, define the population at risk, and calculate the attack rate. The first dose of MenB vaccine was administered December 9–12, 2013; the second dose will be administered February 17–20, 2014. Vaccination coverage was calculated; surveillance for adverse events and new MenB cases is ongoing.

Results: Between March 22nd and November 20th, 2013, 7 cases of MenB occurred in undergraduate students at the university. Molecular typing confirmed circulation of one strain and predicted effectiveness of the MenB vaccine. The population at risk included 5,222 undergraduate students with an attack rate of 134 per 100,000 persons (>1400 times higher than the national incidence in 17–22 year-olds). The first-dose vaccination campaign achieved 93% coverage among undergraduates. Eighteen syncopal or presyncopal episodes (3.4/1000 vaccinees), but no anaphylactic reactions, occurred following dose 1. Through January 3, 2014, two hospitalizations occurred in vaccinees but were not considered causally related to the vaccine. Through January 3, 2014, no additional MenB cases occurred at the university.

Conclusions: A high attack rate and sustained transmission of MenB prompted vaccination with an unlicensed product to control the outbreak. Multi-agency coordination resulted in a vaccination campaign that achieved high vaccination coverage. To date, no vaccine safety concerns have been identified.

3:25 Meningococcal Disease Among Men Who Have Sex With Men — United States, 2012–2013

Authors: Hajime Kamiya, J. MacNeil, A. Blain, A. Cohn, M. Whaley, F. Hu, X. Wang, L. Mayer, D. Weiss, S. Ngai, I. Ezeoke, K. Harriman, K. Winter, L. Mascola, R. Civen, L. Misegades

Background: In 2012–2013, New York City (NYC) reported an outbreak of meningococcal disease (MD) among men who have sex with men (MSM). Additionally, Los Angeles County (LAC) reported 4 cases among MSM within a 5 month time period during 2012–2013. MSM have not previously been considered at increased risk for MD.

Methods: Health departments reviewed MD cases among males aged 18–64 years occurring from January 2012–May 2013. Demographic, clinical, and risk factor information were abstracted for known MSM case-patients. Rates of MD among MSM were calculated using national surveillance data, 2012 census data, and estimates of the proportion of MSM in the U.S.

Results: Thirty-two (13.6%) of 235 male cases were reported as MSM, including 17 NYC, 4 LAC, and 11 sporadic MD cases. HIV prevalence was higher among NYC MSM and MSM-sporadic cases compared to cases among other men (50.0%, 42.9%, and 6.3% among those with known HIV status, respectively); no LAC case-patients were HIV-positive. The MD rate for MSM in NYC was 11.6/100,000 person-years (rate ratio [RR]: 59.8, 95% confidence interval [CI]: 52.8–67.0, compared to other men) and in LAC was 2.3/100,000 person-years (RR: 14.1, CI: 12.4–15.8, compared to other men). The rate for MSM-sporadic cases was 0.22/100,000 person-years (RR: 1.4, CI: 1.3–1.6, compared to other men). Serogroup C accounted for all NYC and LAC MSM cases and 72.7% of MSM-sporadic cases.

Conclusions: The NYC MSM rate surpasses the MD outbreak threshold (≥10/100,000 population). The LAC MSM and MSM-sporadic rates, while elevated, are lower than rates observed among high-risk groups routinely recommended for meningococcal vaccination. Epidemiologic data should continue to be used to identify high-risk groups recommended for vaccination routinely or during outbreaks.

3:45 Cost of Measles Case Containment in an Ambulatory Pediatric Clinic — King County, Washington, 2013

Authors: Kristen A. Wendorf, M. Kay, I. Ortega-Sanchez, J. Duchin

Background: Measles is highly infectious. Prompt containment of measles cases, including management of exposed persons, is necessary to prevent spread in health care settings. Containment costs to ambulatory care providers are unknown. In August 2013, a 13-year-old male with undiagnosed measles presented to a pediatric clinic, exposing patients and employees. We studied the containment costs to the clinic to identify future avoidable costs.

Methods: Measles exposure was defined as in-person contact with, or presence in the same room within two hours of, the measles patient. Costs were calculated retrospectively using published costs of measles-mumps-rubella (MMR) vaccine, cost-to-charge ratios for inpatient care in urban Washington State, and information provided by an emergency department where immunoglobulin (IG) was administered. Personnel costs were calculated by multiplying gross wages by time for the 6 employees who worked on the response; overhead was excluded.

Results: Fifty-two patients and 10 employees were exposed at the clinic. Personnel time for the response cost approximately $1,960.80. Exposed patients had a mean age of 9.6 years (range: 2 months–19 years); 34 (65%) were fully vaccinated, 18 (35%) were aged <12 months and too young to be vaccinated. Five patients (1%) were aged <6 months and required IG; 13 infants (25%) aged 6–12 months required MMR vaccination. One employee had documented immunity; nine required measles antibody testing or vaccination. Management of exposed persons cost $3,694.40; therefore, total costs were $5655.20.

Conclusions: Responding to one measles case cost the pediatric clinic >$5,000, despite isolating the patient after examination. Minimizing measles exposures through prompt identification and triage with immediate isolation and improved documentation of health care worker immunity can reduce measles response measure costs.

4:05 Effect of Rotavirus Vaccines on Diarrhea-Associated Hospitalizations in U.S. Children <5 Years of Age, 2007–2011

Authors: Eyal Leshem, R.E. Moritz, A. Curns, F. Zhou, J.E. Tate, B.A. Lopman, U.D. Parashar

Background: Prior to vaccine introduction in 2006, rotavirus accounted for ~40% of diarrhea-associated hospitalizations in children in the United States (U.S.). Our objectives were to examine reductions in diarrhea-associated hospitalizations following rotavirus vaccine introduction and to assess the direct effectiveness of vaccination.

Methods: We conducted a retrospective cohort analysis of claims data of commercially insured U.S. children aged <5. Annual pentavalent (RV5) and monovalent (RV1) rotavirus vaccine coverage were examined. We compared rates of diarrhea-associated hospitalizations in pre-vaccine (2001–2006) versus post-vaccine introduction (2007–2011) years, and compared rates of diarrhea-associated hospitalizations in vaccinated versus unvaccinated children during 2010–2011.

Results: Among children <5 years of age, RV5 and RV1 coverage rates reached 58% and 5%, respectively, by December 31, 2010. Compared with the average rate of rotavirus-coded hospitalizations in 2001–2006, rates were reduced by 75% (95% confidence interval [CI], 72–77) in 2007–2008, 60% (95% CI, 58–63) in 2008–2009, 94% (95% CI, 93–95) in 2009–2010, and 80% (95% CI, 78–81) in 2010–2011. Compared with the average rate of all-cause diarrhea-associated hospitalization in 2001–2006, rates were reduced by 33% (95% CI, 31–35) in 2007–2008, 25% (95% CI, 23–27) in 2008–2009, 54% (95% CI, 52–55) in 2009–2010, and 47% (95% CI, 46–49) in 2010–2011. Compared with unvaccinated children, in 2010–2011, the rate of rotavirus-coded hospitalizations was reduced by 92% (95% CI, 87–96) among RV5 recipients and 96% (95% CI, 74–100) among RV1 recipients.

Conclusions: Implementation of rotavirus vaccines has substantially reduced diarrhea hospitalization rates among U.S. children. Both rotavirus vaccines conferred high protection against rotavirus hospitalizations.

CONCURRENT SESSION C2: Chronic Disease Prevention

3:00–4:25pm

Dunwoody Suite

Moderator: Peter Briss

3:05 Do Individual-Level and Area-Based Poverty Measure the Same Thing? Association of Poverty Measures with Self-Reported Health Outcomes — New York City, 2012

Authors: Kari A. Yacisin, K. Konty, L. Gupta, T.G. Harris, J. Hadler

Background: Poverty is associated with adverse health outcomes, but individual-level poverty (ILP) is often difficult to measure because data are unavailable or inaccurate. Consequently, the New York City (NYC) Health Department adopted area-based poverty (ABP) measures for routine analysis. Whether these measures are interchangeable is unknown. To determine if ILP and ABP have similar associations with health outcomes, we analyzed NYC's 2012 Community Health Survey (CHS) (a random-digit-dial survey of 8,797 adults), which contains both measures.

Methods: ILP was categorized into 4 groups (household income ≥400% [lowest poverty], 200%–<400%, 100%–<200%, <100%, of federal poverty level [FPL]). ABP was categorized into 4 groups (<10% [lowest], 10%–19%, 20%–29%, ≥30% residents with household income below FPL in respondent's zip code). Respondents with missing ILP or ABP were excluded (19.6%). Using SAS®-callable SUDAAN®, we calculated weighted prevalences of self-reported asthma, obesity, and hypertension by poverty level and tested associations of these outcomes with increasing ILP, controlling for ABP, and vice-versa with logistic regression.

Results: Among persons with lowest versus highest ILP, asthma prevalence was 13.2% versus 16.6%, obesity 24.8% versus 38.1%, and hypertension 21.6% versus 31.2%. Among persons with lowest versus highest ABP, asthma prevalence was 9.9% versus 15.5%, obesity 20.1% versus 29.8%, and hypertension 25.5% versus 30.7%. ABP was independently associated with asthma (P=.03) and obesity (P=.002) but not hypertension (P=.82). ILP was independently associated with obesity (P=.005) and hypertension (P <.001) but not asthma (P=.42).

Conclusions: ILP and ABP might measure different health effects of poverty. For certain health outcomes, one measure might be more important than the other. In NYC, CHS data should be routinely analyzed by both.

3:25 Smoking Cessation Among Users of Telephone and Web-Based Interventions

Authors: Mary C. Puckett, A. Neri, J. Underwood, B. Momin, L. Zhang, J. Kahende, S.L. Stewart

Background: Smoking causes 443,000 deaths a year in the United States. Among smokers who attempt quitting, successful cessation rates are 3%–5% per year. Quitlines serve as effective interventions, but state quitlines only reach approximately 1% of smokers due to limited funding. Studies report mixed results whether combined telephone and Web-based interventions improve long-term cessation over quitlines alone. We report the findings of one of the largest studies to date comparing users of Web and phone-based cessation interventions to users of single interventions.

Methods: 16,332 participants were enrolled from four states: Alaska, Arizona, Florida, and Vermont. Follow-up surveys were administered 7 months after enrollment. Univariate, bivariate, and multivariate analyses were performed assessing differences in reported phone and web cessation modalities, demographics, and behavioral and smoking characteristics by using 30-day point prevalence abstinence as the outcome of interest.

Results: For users of dual versus single interventions, demographic and baseline smoking characteristics were similar for male gender (38% vs 39%), white race (75% vs 79%), mean age (44 years vs 43 years), and mean cigarettes/day (18.6 vs 18.5), respectively. Statistically significant differences were seen for past 30-days smoking abstinence measurements, which were taken at 7-month follow-up. Telephone-only users reported 32.3% cessation, whereas telephone users also reporting Web-based intervention use reported 37.5% (P <.05). Similarly, Web-only users reported a 27.2% cessation rate, whereas Web-users also reporting telephone intervention use had a rate of 33.5% (P <.05).

Conclusions: Promoting tobacco cessation remains a high public health priority. Users of both telephone and Web-based interventions had higher cessation rates than users of either intervention alone. Providing access to multiple modalities may improve 30-day quit rates among cessation program users.

3:45 Trends in Exposure to Pro-Tobacco Advertisements via the Internet, Newspapers or Magazines, and Retail Stores Among U.S. Middle and High School Students, 2000–2012

Authors: Israel T. Agaku, B. King, S. Dube

Background: Pro-tobacco advertising is associated with tobacco use initiation among youth. We assessed trends and correlates of pro-tobacco advertising exposure among U.S. students in grades 6–12 during 2000–2012.

Methods: Data came from the National Youth Tobacco Survey, a school-based survey of U.S. middle and high school students conducted during 2000, 2002, 2004, 2006, 2009, 2011, and 2012. Samples ranged from 18,866 (2011) to 35,828 (2000). Self-reported exposure to pro-tobacco advertisements was assessed for the Internet, newspapers or magazines, and retail stores. Logistic regression was used to assess trends and correlates in exposure overall and by current cigarette smoking, sex, school level, and race/ethnicity (P <.05).

Results: Overall prevalence of exposure to pro-tobacco advertisements via the Internet increased from 28.0% to 44.7% during 2000–2012 (P trend <.001), whereas exposure in newspapers or magazines (74.0% to 46.4%) and retail stores (90.3% to 80.0%) declined (P trend <.001). Current smokers were more likely than nonsmokers to report exposure in newspapers or magazines (adjusted odds ratio [aOR] = 1.18; 95% confidence interval [CI]: 1.05–1.31). For all three advertisement media, exposure was lower among high school students and boys than middle school students and girls, respectively. Exposure at retail stores was higher among Non-Hispanic black students than non-Hispanic whites (aOR = 0.62; 95%CI: 0.53–0.73).

Conclusions: Pro-tobacco advertising exposure via the Internet increased by >50% during 2000–2012 among U.S. middle and high students, whereas declines in exposure in newspapers or magazines and retail stores occurred during the same period. However, four out of five students still reported exposure in retail stores in 2012. Enhanced efforts are needed to limit youth exposure to all pro-tobacco advertising.

4:05 Active Transportation Surveillance Across Three Systems — United States, 1999–2012

Authors: Geoffrey P. Whitfield, A. Wendel

Background: Built environment interventions such as sidewalks and trails increase active transportation (AT), defined as utilitarian walking and bicycling. Such interventions may be a broad-reaching strategy to increase population participation in physical activity (PA). In the United States, <50% of adults meet recommendations for aerobic activity. Assessment of AT is therefore important, yet optimal assessment methods remain elusive. Our purpose was to quantify and compare national AT prevalence across three surveillance systems.

Methods: From the 1999–2010 National Health and Nutrition Examination Survey (NHANES), we calculated the proportion of respondents reporting any past-week AT and the proportion meeting aerobic PA guidelines (≥150 minutes/week) through AT. From the 2001 and 2009 National Household Travel Survey (NHTS), we calculated the proportion reporting any AT in a one-day trip log. From the 2005–2012 American Community Survey (ACS), we obtained the proportion of workers reporting AT as their primary past-week commute mode.

Results: The presence of any past week AT in NHANES ranged from 23.9% (2001–2002) to 26.6% (2005–2007), while in the NHTS, one day estimates were 15.6% (2001) and 18.5% (2009). In the ACS, 2.9% (2005) to 3.5% (2009) of workers reported primarily active commuting. From 1999–2006, the proportion of NHANES respondents meeting PA guidelines through AT varied from 6.4% to 8.6%, then increased two-fold in 2007–2010 after an assessment change. Only ACS provided estimates for small geographies.

Conclusions: Definitions and estimates of AT vary widely across surveillance systems. Within individual systems, AT prevalence is stable across time. As more AT infrastructure is built, AT surveillance may be used to measure effectiveness, but the choice of assessment strategy will clearly impact estimates.

CONCURRENT SESSION D1: Zoonoses

8:30–10:45AM

Ravinia Ballroom

Moderators: Jennifer McQuiston and David Wong

8:35 Variation in Tularemia Clinical Presentation — Arkansas, 2009–2012

Authors: Laura K. Lester, D.T. Haselow, J.G. Wheeler, S. Weinstein, W.R. Daley, C. Nelson

Background: Arkansas has the second highest number of tularemia cases reported annually in the United States. Tularemia can manifest as 7 major forms, depending on exposure. The ulceroglandular/glandular forms, which feature regional lymphadenopathy, have historically been reported most commonly and typically result from tick exposure or handling sick or dead animals. The typhoidal form (fever without early localizing symptoms) has been less commonly reported. We describe initial clinical presentation and exposure history associated with Arkansas tularemia cases to guide diagnostic recommendations.

Methods: We reviewed clinical records for positive Francisella tularensis laboratory reports from Arkansas for 2009–2012, and applied the standard case definition. A probable case was compatible symptoms with 1 elevated antibody titer or positive fluorescent assay; a confirmed case was compatible symptoms plus a ≥4-fold change in titer on a second sample or isolation of F. tularensis from a clinical specimen. Frequencies of disease manifestations on initial presentation and reported exposures were computed.

Results: We identified 99 cases: 67 (67.7%) probable and 32 (32.3%) confirmed. Among 92 cases with initial presentation data, 48 (52.2%) presented as typhoidal and 34 (37.0%) as ulceroglandular/glandular. If limited to the 26 confirmed cases with presentation data, 13 (50.0%) presented as typhoidal and 9 (34.6%) as ulceroglandular/glandular. Tick exposure was reported in 72/99 (72.7%) cases; 39/72 (54.2%) initially presented as typhoidal and 26/72 (36.1%) as ulceroglandular/glandular.

Conclusions: The predominant initial presentation of tularemia reported recently in Arkansas was typhoidal, even among patients reporting tick exposure. Using lymphadenopathy as a primary feature to initiate tularemia testing can delay recognition of individual cases or an outbreak. Recommendations regarding diagnostic practices in endemic areas should incorporate up-to-date surveillance data.

8:55 Contact investigation of melioidosis cases reveals regional endemicity — Puerto Rico, 2010 and 2012

Authors: Thomas J. Doker, T. Sharp, B. Rivera Garcia, B.J. Perez-Padilla, D. Haberling, S. Shadomy, M. Glass Elrod, J. Gee, T. Benoit, A. Hoffmaster, W. Bower, H. Walke, D. Blaney

Background: Melioidosis results from infection by percutaneous inoculation, ingestion, or inhalation of the saprophyte *Burkholderia pseudomallei*, and is associated with case-fatality rates up to 40%. Improved survival rates are attributed to early diagnosis and treatment with appropriate antimicrobials. Sporadic cases have been identified in Puerto Rico, where the incidence and epidemiology is unclear. Following identification of one fatal and one non-fatal melioidosis case in 2010 and 2012, respectively, contact investigations were conducted to identify risk factors for infection.

Methods: Questionnaires were administered and serum specimens were collected from co-workers and persons living within 250 meters of cases' residences (neighborhood contacts) and from injection drug use (IDU) contacts of the 2012 case. Serum specimens were tested for evidence of prior exposure to *B. pseudomallei* by indirect hemagglutination assay (titer ≥ 1:40).

Results: Serum specimens were collected from 51 and 60 individuals associated with the 2010 and 2012 cases, respectively. None of the co-workers were seropositive for anti-*B. pseudomallei* antibody, whereas 2 (5%) of 40 and 12 (23%) of 52 of 2010 and 2012 neighborhood contacts were seropositive, respectively, and 67% (2 of 3) of IDU contacts. Of all seropositive persons, 39% reported no travel outside of Puerto Rico. Characteristics significantly associated with seropositivity were reporting skin wounds, sores, or ulcers (adjusted odds ratio [aOR] = 4.6; 95% confidence interval [CI]: 1.2–17.8) and IDU (aOR=18.0; 95% CI: 1.6–194.0).

Conclusions: Sporadic reports of melioidosis and high seropositivity in case contacts suggest at least regional endemicity in Puerto Rico. Increased awareness of melioidosis among clinicians, laboratories, and public health professionals is needed to improve case identification, initiate appropriate antimicrobial therapy, and facilitate case reporting in Puerto Rico.

9:15 Impact of the New National Surveillance Case Definition on Babesiosis Reporting — Connecticut, 2001–2013

Authors: Jocelyn C. Mullins, M. Cartter, R. Nelson, P. Gacek

Background: Babesiosis is a potentially life-threatening tickborne and transfusion-associated parasitic disease. Connecticut Department of Public Health (CDPH) has conducted babesiosis surveillance since 1989. In 2011, CDPH adopted the Council for State and Territorial Epidemiologists' new national surveillance case definition that includes laboratory and clinical criteria. Previously, cases were defined solely by laboratory testing. Since 2011, CDPH contacts health care providers to obtain clinical information for each report meeting laboratory criteria; reports from nonresponding providers are excluded from case counts. We evaluated the impact of the new case definition on babesiosis reporting.

Methods: We compared reports received by CDPH during 2001–2010 and 2011–August 31, 2013. We assessed demographics, predictive value positive (PVP), and staff time to process reports. We used chi-square to compare proportions and Wilcoxon rank sum to compare continuous variables.

Results: During 2001–2010, 1,786 reports met laboratory criteria; PVP was 97.3%. During 2011–2013, 1,280 reports met laboratory criteria, of which 772 were excluded because of provider nonresponse; PVP was 21.5%. Median patient age increased from 58.0 (range: 0–98) to 61.0 (range: 0–100) years ($P < 0.001$); proportion of males increased from 54.7% to 66.3% ($P < 0.01$). Median staff time increased from 12.7 (range: 6.6–28.0) to 200.0 (range: 184.5–255.5) hours/year ($P < 0.01$). Median annual cases decreased from 152 (range: 79–334) to 82 (range: 69–124) ($P > 0.05$); continuing the previous case definition would have resulted in 170 cases/year (range: 146–335) during 2011–2013.

Conclusions: Adoption of the new national surveillance case definition corresponded to changes to the reported epidemiology of babesiosis and increased the surveillance burden. The change limits understanding of babesiosis trends in Connecticut.

9:35 Changing Trends in Backyard Flocks: Review of Outbreaks of Human Salmonellosis Linked to Contact with Live Poultry — United States, 1990–2013

Authors: Colin A. Basler, T. Nguyen, T. Anderson, T. Hancock, C. Barton Behravesh

Background: Ownership of backyard poultry flocks has increased in popularity concurrent with the increase in live poultry-associated salmonellosis (LPAS) in humans. These increases highlight the need to better understand practices that contribute to this emerging public health issue. We reviewed outbreak reports to describe the epidemiology of LPAS in the U.S.A, examine changes in trends, and inform prevention campaigns.

Methods: LPAS outbreaks were defined by having ≥2 culture-confirmed human *Salmonella* infections with a combination of epidemiologic, laboratory, or traceback evidence linking illnesses to live poultry contact. Outbreak data was obtained through CDC's outbreak database, CDC's National Outbreak Reporting System, and literature review. Additionally, standardized poultry exposure questionnaires administered during 21 multi-state outbreak investigations during 2008–2013 were analyzed to identify high-risk practices.

Results: During 1990–2013, 51 LPAS outbreaks were documented, involving 2,188 illnesses, 306 hospitalizations, and 5 deaths. The median outbreak size was 25 case-patients (range: 4–356). Outbreak onsets ranged from January–July; duration averaged 4.2 months; 79% of outbreaks began during February–April. The median patient age was 9 years (range <1 to 92). Sixty percent (374/619) of case-patients reported exposure to chicks and 27% (170/619) to ducklings. The median time between obtaining poultry and illness onset was 17 days. Since 2007, outbreaks increased in size, occurred year-round, and were more frequently linked to backyard flock ownership. High-risk practices included keeping poultry inside households [51% (194/381)] and kissing birds [14% (52/373)].

Conclusions: Live baby poultry remain an important source of human salmonellosis in the U.S.A, particularly among children. Recurring LPAS outbreaks highlight the need for strategies to prevent human illnesses associated with live poultry contact through a comprehensive One Health approach involving human, animal, and environmental health.

9:55 Raccoon Rabies Virus Variant Transmission Through Solid Organ Transplantation — United States, 2013

Authors: Neil M. Vora, S. Basavaraju, K. Feldman, C. Paddock, L. Orciari, S. Griese, R. Wallace, M. Said, D. Blau, A. Velasco-Villa, J. Ritter, J. Blanton, S. Recuenco, S. Zaki, I. Damon, R. Franka, and M. Kuehnert for the Transplant-Associated Rabies Virus Transmission Investigation Team

Background: The rabies virus causes a fatal encephalitis and is typically acquired through the bite of a rabid animal, although transmission has occurred after transplantation of solid organs from infected donors. In 2013, a man without reported exposure to rabid animals died of rabies. Because he had received a kidney transplant 18 months previously, transplantation was investigated as the route of transmission.

Methods: Donor and recipient medical records were reviewed. Tissue specimens from both patients were tested for rabies virus antigens using immunohistochemical staining. Nucleic acid was extracted, amplified using reverse transcriptase–polymerase chain reaction targeting the rabies virus nucleoprotein gene, and sequenced.

Results: Chart review revealed that the donor's illness was consistent with rabies. Rabies virus antigens were detected in autopsy donor brain tissues that had been archived for 18 months. Nucleoprotein gene sequences of the viruses infecting the donor and recipient were >99.9% identical and were consistent with the raccoon rabies virus lineage circulating in the donor's home state. Three additional recipients of organs from the donor were identified. All were asymptomatic and did not have evidence of infection serologically or in biopsied tissues. Postexposure prophylaxis was administered and all seroconverted; to date, they have no evidence of rabies.

Conclusions: Our investigation confirmed transplantation as the route of rabies virus transmission. Unlike previous rabies cases associated with solid organ transplantation, the incubation period in the deceased recipient was long and the three other recipients survived despite not having received pre-transplant rabies vaccination. Prior to this, there was only one report of human infection with the raccoon rabies virus variant. Rabies should be considered in patients with unexplained acute encephalitis, including potential organ donors.

CONCURRENT SESSION D2: Tuberculosis

8:30–10:15AM

Dunwoody Suite

Moderator: Philip LoBue

8:35 Tuberculosis and Excess Alcohol Use in the United States, 1997–2012

Authors: Tyson A. Volkmann, J. Oeltmann, P. Moonan, R. Miramontes

Background: Excess alcohol use (EAU) among tuberculosis (TB) patients complicates TB control strategies. No published nationwide study has addressed the convergence of EAU and TB in the United States. We determined the prevalence of EAU and assessed associations between EAU and TB transmission and treatment outcomes in TB patients aged 15 years and older.

Methods: We used data from the National Tuberculosis Surveillance System, a registry of cases meeting the national definition, which includes EAU (self-reported or medically documented). For 1997–2012, using univariate and then multivariate logistic regression, we examined associations between EAU and treatment outcomes and markers for increased transmission (involvement in an epidemiologic transmission cluster; laboratory-confirmed sputum-smear microscopy results). We used Cox regression analysis to examine the relationship between EAU and the rate of conversion from positive to negative sputum-culture results.

Results: EAU was reported by 31,207 (15.1%) of 207,307 TB patients aged 15 years and older. Prevalence of EAU was greater among male (20.6%) and U.S.-born patients (24.6%). EAU was independently associated with cluster involvement (adjusted odds ratio (aOR): 1.37; 95% confidence interval (CI): 1.25–1.52), a positive sputum-smear result (aOR: 1.23; CI: 1.18–1.28), and death during treatment (aOR: 1.16; CI: 1.10–1.22). In adjusted Cox regression, the rate of conversion from positive to negative sputum-culture results was higher among patients without EAU than among patients with EAU (adjusted hazard ratio: 1.22; CI: 1.19–1.25).

Conclusions: EAU was common among TB patients and was associated with TB transmission, lower rates of sputum-culture conversion, and higher mortality. TB control and alcohol treatment programs should work together to treat the diseases of addiction and TB.

8:55 Characterization of Tuberculosis due to *Mycobacterium africanum* — United States, 2004–2012

Authors: Aditya Sharma, E. Bloss, R. Yelk Woodruff, J. Posey, C. Heilig, E. Click.

Background: Tuberculosis (TB) is caused by a group of 8 closely related bacteria, including *Mycobacterium africanum*. In contrast to *Mycobacterium tuberculosis*, the epidemiology and clinical manifestations of *M. africanum* in the United States have not been systematically characterized. To address this knowledge gap, we compared reports of TB caused by *M. africanum* and TB caused by *M. tuberculosis* using data in the National Tuberculosis Surveillance System (NTSS).

Methods: We analyzed NTSS reports of culture-confirmed TB caused by *M. africanum* or *M. tuberculosis*, as identified by genotype, during 2004–2012. Genotype clusters were defined as 2 or more cases with identical genotype in the same county. We used multivariable logistic regression to examine patient attributes, genotype clustering, clinical characteristics (e.g., disease site), and social risk factors (e.g., homelessness) associated with *M. africanum* versus *M. tuberculosis*.

Results: Of 64,923 cases of TB, only 299 (0.5%) were caused by *M. africanum*. Compared to U.S.-born whites, TB caused by *M. africanum* was associated with West African origin (adjusted odds ratio [aOR]: 2.26; 95% confidence interval [CI]: 1.23–4.78) and U.S.-born black race (aOR: 2.39; CI: 1.12–5.53). The odds of genotype clustering were lower for *M. africanum* than for *M. tuberculosis* (aOR: 0.22; CI: 0.14–0.32). No significant differences in clinical characteristics or social risk factors were found between TB caused by *M. africanum* versus *M. tuberculosis*.

Conclusions: TB disease caused by *M. africanum* is uncommon in the United States and is significantly associated with West Africans and U.S.-born blacks. Clinical characteristics and social risk factors are similar for *M. africanum* and *M. tuberculosis*. Minimal genotype clustering suggests that *M. africanum* is rarely transmitted in the United States.

9:15 Opportunities for Improved Detection and Treatment of Latent Tuberculosis Infection Among Veterans — Western United States, January 2010–July 2013

Authors: Tara Perti, P. Schirmer, C. Winston, E. Weiss, J. Cavanaugh, C. Lucero-Obusan, M. Holodniy

Background: The Veterans Health Administration (VHA) previously estimated that tuberculosis (TB) incidence among Veterans was over twice that for the U.S. population overall. Treatment of latent tuberculosis infection (LTBI) decreases progression to TB by approximately 90% among adherent persons. We describe characteristics of Veterans with TB and their previous screening and treatment for LTBI.

Methods: We queried VHA infection control practitioners and QC PathFinder, VHA's infection surveillance application, to identify Veterans with TB (confirmed by laboratory or clinical criteria), diagnosed or treated during January 1, 2010–July 31, 2013 and evaluated for symptoms or signs of TB at VHA facilities in the western United States. We reviewed VHA medical records for TB risk factors and prior LTBI screening by tuberculin skin test or interferon-gamma release assay.

Results: We identified 69 Veterans with TB in Washington, Oregon, California, and Arizona. Sixty-seven (97%) were men; median age was 60 years (range: 30–92 years). Among 65 with known race or ethnicity and national origin, 19 (29%) were foreign-born: 18 from the Philippines and 1 from Vietnam. Twenty-eight (43%) were non-Hispanic white; 11 (17%) were black; 6 (9%) were Hispanic; and 1 (2%) was American Indian or Alaska Native. Among 63 not previously treated for TB, 47 (75%) had risk factors, 31 (66%) of whom reported or had VHA-documented screening. Of 24 diagnosed with LTBI, only 9 (38%) had initiated and 8 (33%) completed LTBI treatment.

Conclusions: TB could have been prevented in some Veterans by targeted testing and treatment of LTBI per current guidelines. Investigating reasons certain Veterans with TB risk factors are not screened and others with LTBI are not treated may help tailor prevention efforts.

9:35 Contact Investigation of Health Care Personnel Exposed to Maternal and Neonatal Tuberculosis — Clark County, Nevada, 2013

Authors: Kaci L. Hickox, N. Williams, J. Wortham, T. Coleman

Background: Despite declining tuberculosis (TB) rates in the United States, missed TB diagnoses threaten the health of patients, contacts, and progress toward TB elimination. In July 2013, TB was diagnosed during autopsy of a postpartum woman after a prolonged nonspecific illness. She frequently had visited her newborn in the neonatal intensive care unit (NICU); after the mother's death, the newborn was identified as having TB and placed under respiratory precautions. To help interrupt transmission, we performed a contact investigation of health care personnel (HCP).

Methods: We reviewed medical records and work schedules and interviewed staff to identify HCP contacts. Contacts were evaluated with tuberculin skins tests (TSTs) or Quantiferon®-TB tests (QFTs); persons with induration of ≥5 mm or QFT-positive results were considered TB infected. Those with an increase of ≥10 mm, compared with previous TST or positive QFT after a previous negative within 2 years, were considered recently infected (conversion). HCP with clinical, radiographic, or microbiologic evidence of TB disease were considered to have active TB disease. We compared conversion rates of HCP contacts with noncontacts' rates.

Results: Of 195 HCP contacts, 24 had previous TB infections, 7 were unavailable, and 164 were tested. Of those tested, 20 (12%) were infected, including 15 with test conversions. One NICU staff member had active TB disease. Conversions were observed among 15/164 (9%) HCP contacts, compared with 11/646 (1.7%) among other staff ($P < 0.01$).

Conclusions: TB transmission to HCP occurred, and recently acquired infections (conversions) were associated with being an HCP contact to the woman or newborns. Our findings highlight the importance of prompt TB diagnosis and initiation of infection control procedures for preventing health care–associated transmission.

9:55 Childhood Tuberculosis — Botswana, 2008–2011

Authors: Negar N. Alami, T. Arscott-Mills, L. Masole, G. Machao, J. Cavanaugh, H. Menzies, A. Steenhoff, R. Ncube

Background: Childhood tuberculosis (TB) has been a low public health priority because TB in children is difficult to diagnose and generally less infectious than in adults. Consequently, data are sparse for childhood TB. We assessed the epidemiology of childhood TB and associations with treatment outcomes in 9 districts in Botswana, a high TB-burden country.

Methods: We collected data from clinic TB registers on children aged <15 years whose treatment began during January 2008–September 2011. We abstracted demographics, TB treatment history, and HIV-status (infected, negative, or unknown). We performed log-binomial regression to determine factors associated with poor outcome: death, incomplete treatment, or treatment failure.

Results: TB treatment was initiated for 903 children; 661 (73%) had pulmonary TB, 120 (18%) of whom were bacteriologically confirmed cases. Median age was 4 years; 442 (49%) were female; and 42 (5%) had been previously treated. Of 558 (62%) children with documented HIV results, 207 (37%) were HIV-positive, and 102 (49%) received antiretroviral therapy. Of 732 children with a recorded outcome, 657 (90%) were cured or completed treatment, 48 (6.5%) defaulted from treatment, treatment failed in 4 (0.5%), and 23 (3%) died. In multivariate analysis, poor outcomes were associated with previous treatment (relative risk [RR]: 2.8; confidence interval [CI]: 1.5–5.1), HIV infection (RR: 2.8; CI: 1.6–5.3), and unknown HIV status (RR: 2.5; CI: 1.4–4.5).

Conclusions: HIV coinfection is high among children with TB, but HIV status was not recorded for >1/3 of children. HIV infection and unknown HIV status were associated with poor outcomes. Because HIV treatment can improve TB treatment outcomes in coinfected children, HIV testing and treatment should be expanded for children with TB.

CONCURRENT SESSION EI: Injury Prevention

10:45am–12:10pm

Ravinia Ballroom

Moderator: Ileana Arias

10:50 Unintentional Injury Child Deaths and the National Child Death Review Case Reporting System — 13 U.S. States, 2006 and 2009

Authors: Melissa C. Mercado-Crespo, E. Shaw, R. Lee

Background: The National Child Death Review Case Reporting System (NCDR-CRS) is a voluntary surveillance platform to systematically and comprehensively review the circumstances surrounding child deaths. Although preventable, unintentional injuries are the leading cause of death among U.S. children. This study assessed changes in NCDR-CRS' sensitivity, representativeness and data quality in monitoring unintentional child injury deaths (i.e., motor vehicle (MV), drowning, fire/burns, falls), within 13 NCDR-CRS reporting States between 2006 and 2009.

Methods: Proportions and standardized mortality ratios (SMR) of aggregated data were used to test the sensitivity and representativeness of NCDR-CRS data, using National Vital Statistics System (NVSS) data as the gold standard. Statistical significance was determined by comparing 95% confidence intervals (CI). To assess data quality, we calculated the proportion of missing data (data asked but not recorded) by cause of death. Analyses were conducted in SAS version 9.3.

Results: In 2006 and 2009 respectively, NCDR-CRS had a sensitivity of 66% and 67% for MV, 60% and 72% for drowning, and 87% and 80% for fire/burns deaths. NCDR-CRS 2006 data were representative of fire/burns deaths (SMR: 0.4; 95% CI: 0.4–0.5) when compared with NVSS reports (SMR: 0.5; 95% CI: 0.4–0.6). Similarly, NCDR-CRS falls death data (SMR: 0.2; 95% CI: 0.2–0.3) were representative of NVSS reports (SMR: 0.2; 95% CI: 0.1–0.2). MV death reports had the highest proportion of records with missing data (96%); fire/burns and falls deaths had the lowest proportion.

Conclusions: Circumstance data from NCDR-CRS could inform child health and safety policies and practices. Further analyses are needed by State to assess the needs and strengths of each State's NCDR-CRS.

11:10 Global Differences in Burden of Childhood Sexual Violence Against Boys — Haiti, Kenya, and Cambodia, 2010–2013

Authors: Steven A. Sumner, J. Mercy, R. Buluma, K. Brookmeyer, L. Marcelin, S. Al Hebshi, V. Lea, H. Kress, S. Hillis

Background: Globally, little evidence exists on sexual violence against boys. We sought to produce the first internationally comparable estimates of the magnitude, characteristics, and consequences of sexual violence against boys in three diverse countries.

Methods: We conducted nationally-representative, multistage cluster, Violence Against Children Surveys in Haiti, Kenya, and Cambodia among males age 13–24. Differences between countries in experiencing sexual violence (including sexual touching, attempted sex, and forced/coerced sex) before age 18 were examined using chi-square and logistic regression analyses.

Results: In Haiti, Kenya, and Cambodia, respectively, 1,459, 1,456, and 1,255 males completed surveys (response rates all ≥80.4%). The prevalence of experiencing any form of sexual violence ranged from 23.1% (95% confidence Interval [CI]: 20.0–26.2) in Haiti, to 14.8% (95% CI: 12.0–17.7) in Kenya, and 5.6% (95% CI: 4.0–7.2) in Cambodia. The largest share of perpetrators in Haiti, Kenya, and Cambodia, respectively, were friends/neighbors (64.7%), romantic partners (37.2%), and relatives (37.0%). Most episodes occurred inside perpetrators' or victims' homes in Haiti (60.4%), contrasted with outside the home in Kenya (65.3%) and Cambodia (52.1%). The most common time-period for violence in Haiti, Kenya, and Cambodia was the afternoon (55.0%), evening (41.3%), and morning (38.2%), respectively. All differences between nations were statistically significant (chi-square P<.001). Health risks associated with violence were common, including up to a three-fold increased odds of transactional sex in Haiti (Odds ratio: 3.3; 95% CI: 1.5–7.6), as well as elevated rates of alcohol abuse, sexually transmitted infections, anxiety/depression, suicidal ideation/attempts, and violent gender attitudes across nations.

Conclusions: Marked differences were noted between countries in the characteristics of sexual violence yet associations with health risks were pervasive. Prevention strategies tailored to individual locales are needed.

11:30 Injuries Among High School Football Players — Nebraska, Fall 2013

Authors: Deborah L. Hastings, B. Buss

Background: An estimated 25% of Nebraska male high school (HS) students play football and are at risk for injury, long-term disability, or death. In 2011, Nebraska passed the "Concussion Awareness Act," to decrease concussions and limit morbidity among HS athletes. However, Nebraska Department of Health and Human Services (NEDHHS) has no system for collecting data on concussions or other HS football-related injuries. We piloted a method of estimating injury rates among Nebraska HS football players.

Methods: During September–November 2013, NEDHHS requested representatives (athletic trainers, coaches, school nurses, or administrators) of all 284 HSs with football teams complete a weekly Internet-based survey to report athletes who suffered a concussion or fracture, had an injury requiring medical attention and resulting in the loss of ≥1 day's participation, or if no reportable injuries had occurred. Data were collected regarding number of participants, injury setting (game or practice), injury type, and severity. Injury rates were calculated for these elements.

Results: Forty-nine (17.3%) team representatives completed surveys during the study period. Among 2,220 players, 309 (13.9%) injuries were reported. The majority of injuries (206; 66.7%) occurred during games. The most commonly reported injuries were concussions (108; 35%), sprains (59; 19.1%), knee injuries (43; 13.9%), fractures (29; 9.4%), and contusions (15; 4.9%). Of the 309 injuries, 190 (61.5%) athletes required a physician's care; 10 (3.2%) were hospitalized; 16 (5.2%) required surgery; and 35 (11.3%) might need surgery.

Conclusions: Concussions affected 4.9% of Nebraska HS football players, comprising 35% of all reported injuries. Our survey proved effective for estimating HS football injury rates; its ongoing use and expansion can provide valuable data not available elsewhere for guiding prevention strategies.

11:50 Do Children in Domestic Servitude Experience More Violence? — Results from the Violence Against Children Survey, Haiti, 2012

Authors: Leah K. Gilbert, A. Reza, J. Mercy, V. Lea, J. Lee, M. Hast, J. Vertefeuille, L. Marcelin

Background: Child domestic servants (CDS) are considered property of the household for which they perform excessive, unpaid labor. Although servitude violates human rights law, the United Nations Children's Fund estimates there are over 250,000 CDS in Haiti. Of public health concern, CDS face documented risk factors for child maltreatment including discrimination, isolation from family, and denial of education. In the absence of national data on CDS in Haiti, the study objective was to determine if domestic servitude increased the odds of experiencing childhood violence.

Methods: The Violence Against Children Survey was a nationally representative, cross-sectional household survey of 13–24 year olds (n = 2,916) conducted May–June 2012 in Haiti. A stratified three-stage cluster design was used to sample households and camps containing persons displaced by the 2010 earthquake. Respondents were interviewed to assess lifetime prevalence of sexual, physical, and emotional violence occurring before age 18. The association between domestic servitude and violence was assessed using odds ratios.

Results: In this study 21.1% of females and 13.1% of males reported having been CDS. Female CDS had higher odds of reporting childhood sexual (odds ratio [OR]: 1.83; 95% confidence interval [CI]: 1.30–2.57); physical (OR: 2.05; CI: 1.43–2.93), and emotional violence (OR: 2.42; CI: 1.84–3.19) compared to female non-CDS. Male CDS did not have significantly increased odds of sexual violence (OR: 1.50; CI: 0.94–2.39), but did have higher odds of physical (OR: 1.51; CI: 1.01–2.25) and emotional violence (OR: 2.85; CI: 1.88–4.32) compared to male non-CDS.

Conclusions: This study demonstrates that domestic servitude increases a child's risk of maltreatment, further highlighting the importance of human rights law enforcement in Haiti.

CONCURRENT SESSION E2: STDs/HIV

10:45AM–12:10PM

Dunwoody Suite

Moderators: Gail Bolan and Ken Castro

10:50 Is Vaccine Type Seropositivity a Marker for Human Papillomavirus Vaccination? — Results from the National Health and Nutrition Examination Survey, 2003–2010

Authors: Emiko Y. Petrosky, E. Dunne, S. Hariri, G. Panicker, E. Unger, L. Markowitz

Background: Since 2006, a 3-dose human papillomavirus (HPV) vaccine has been routinely recommended for adolescent females in the United States to prevent cervical cancer. Monitoring HPV vaccine coverage is essential in guiding vaccination programs. Because vaccination induces long-term seropositivity to at least 3 of 4 vaccine types (HPV 6, 11, 16, 18), seropositivity could be used as a marker of vaccination coverage.

Methods: We evaluated vaccine type seropositivity (defined as seropositivity to at least 3 HPV vaccine types) among females aged 14–26 years, using data from the National Health and Nutrition Examination Survey (cross-sectional, nationally representative surveys). Antibodies to HPV vaccine types were assessed. Adjusting for the complex survey design, we compared seropositivity in the prevaccine era (2003–2006) with the vaccine era (2007–2010). In the vaccine era, we assessed agreement between seropositivity and reported vaccination by kappa statistic.

Results: Overall, seropositivity was 23.5% among 1,420 females in the vaccine era compared with 1.8% among 2,151 females in the prevaccine era (P <0.001). In the vaccine era, of the 1,382 females who reported vaccine status, 14.6% reported receipt of 3 doses; kappa for seropositivity and report of 3 vaccine doses was 0.80 (95% confidence interval: 0.74–0.86). Among seropositive females, 18.4% reported no vaccination; among those seronegative to all vaccine types, 3.2% reported receipt of at least one vaccine dose.

Conclusions: The increase in seropositivity in the vaccine era likely reflects vaccination uptake. The high agreement between seropositivity and self-reported vaccination suggests seropositivity is useful to estimate vaccination coverage. Discordance between seropositivity and self-reported vaccination may be explained by inaccurate reporting of vaccination or natural exposure to vaccine type HPV.

11:10 Erectile Dysfunction Medication Use Associated with Sex Without a Condom in HIV-Infected Men Who Have Sex with Men — Medical Monitoring Project, United States, 2009

Authors: Xia Lin, C. Mattson, M. Freedman, J. Skarbinski

Background: In 2010, an estimated 77% (29,194) of all newly diagnosed HIV infections among U.S. adult and adolescent males were attributed to male-to-male sexual contact. Limited data suggest an association between erectile dysfunction medication (EDM) use and increased sexual-risk behavior. We assessed the association between prescribed EDM and sex without a condom among a national sample of HIV-infected men who have sex with men (MSM) receiving medical care and whether MSM prescribed EDM received risk-reduction counseling, a recommended preventive service.

Methods: We analyzed 2009 data from the Medical Monitoring Project, a nationally representative, cross-sectional survey of HIV-infected adults receiving medical care. Using the 12 months before the interview as the period, we defined EDM prescription as medical record documentation of sildenafil, vardenafil, or tadalafil and defined sex without a condom as any self-reported anal or vaginal sex without a condom. Using multivariable logistic regression, we determined the association between EDM prescription and sex without a condom.

Results: Among 136,320 sexually active HIV-infected MSM, 56% (95% confidence interval [CI]: 50–61) reported sex without a condom and 13% (CI: 10–15) received an EDM prescription. Sex without a condom was significantly more prevalent among MSM prescribed EDM (prevalence ratio: 1.2; CI: 1.1–1.4; adjusted for confounding by drug use and other risk factors). Of MSM prescribed EDM, 40% reported that they received risk-reduction counseling from their providers.

Conclusions: Sex without a condom is common among HIV-infected, sexually active MSM, especially those prescribed EDM. Only 40% of HIV-infected MSM prescribed EDM received counseling despite CDC's recommendation that such counseling should be provided at least twice a year. HIV care providers should be aware of the potential for HIV transmission risk among MSM prescribed EDM and should provide counseling accordingly.

11:30 Syphilis Time-to-Treatment in STD Clinics versus Private Clinics — Arizona, 2009–2012

Authors: Candice L. Williams, L. Young, K. Bisgard, M. Taylor

Background: During 2011, in the United States, ~46,000 syphilis cases were reported. In a 2007 Arizona syphilis study, the time-to-treatment was longer for private, compared with public-funded, clinics, yet health care reform might provide more access to private clinics and less need for public-funded clinics. We sought to compare time-to-treatment by syphilis screening site (public-funded versus private clinics).

Methods: We reviewed reported incident syphilis cases from 2 Arizona counties during 2009–2012 and formed 3 categories: (1) screened and treated at public-funded STD clinics; (2) screened at private clinics but treated at public-funded STD clinics; and (3) screened and treated at private clinics. The median time-to-treatment (days) was calculated for each category and assessed with the Kruskal-Wallis test.

Results: Of 884 reported syphilis cases, 818 (93%) were among males; 813 (92%) had documented treatment. Untreated patients were more likely to have been screened at a private clinic (54 [76%]), compared with at a public-funded clinic (17 [24%]; P <.001). Category 1 patients (290 [36%]) received the timeliest treatment (median: 0 days; interquartile range [IQR]: 0–6.5 days); Category 2 patients (151 [19%]) received the least timely treatment (median: 8 days; IQR 2–25 days; P <.01); and Category 3 patients (372 [46%]) received less timely treatment, compared with Category 1 patients (median: 5 days; IQR: 0–18 days; P <.001). Patients seeking care at public-funded clinics, compared with private clinics, were younger (mean age: 32.4, compared with 36.2 years; P <.001), and more likely Hispanic (66% versus 47%; P <.001).

Conclusions: Fewer patients were evaluated and treated at public-funded STD clinics but received the timeliest treatment; these clinics remain crucial to syphilis disease control.

11:50 Overseas Screening for Syphilis Among U.S.-Bound Refugees, 2008–2013

Authors: Edith Nyangoma, R.S. Benoit, K.C. Olson, J. Painter

Background: Despite elimination efforts, syphilis remains an endemic disease in the United States, with approximately 15 cases per 100,000 reported yearly from 2008 through 2011. Infected refugees can contribute to the overall disease burden and may be a potential source of further transmission in the U.S.. CDC requires syphilis screening, with treatment of confirmed positives, for all U.S.-bound refugees ≥15 years of age and those ≤14 years who have syphilis risk factors.

Methods: We reviewed overseas screening results for syphilis among all U.S.-bound refugees from October 1, 2008, through September 30, 2013. Syphilis results were considered positive when serologic non-treponemal tests (e.g., Venereal Disease Research Laboratory) were qualitatively positive and confirmed by positive treponemal tests (e.g. *T. pallidum* microhemagglutination assays). Data were analyzed according to age group, sex, pregnancy status, tuberculosis classification, and country of origin. Multivariable logistic regression was conducted to examine factors associated with syphilis.

Results: Of 289,229 refugees aged ≥15 years examined over 5 years, 467 (<1%) were classified as having syphilis. Ten countries contributed 85% of the cases, with Vietnam, Burundi, and Democratic Republic of Congo having the highest rates: 271, 237 and 147 per 100,000 examined, respectively. Of those with syphilis, 43 (9%) had evidence of tuberculosis infection and five (1%) were pregnant. Of 115,399 children who were screened for syphilis, 3 were diagnosed as positive. In multivariable analysis, increasing age (≥65 vs.15–24 years) (OR=6.5), self-reported history of sexually transmitted diseases (OR=11.9.) and male sex (OR=1.8) were associated with syphilis ($p<0.0001$).

Conclusions: Overseas screening for syphilis provides an opportunity to identify and treat syphilis among U.S.-bound refugees and is critical to elimination efforts. Older men were most commonly affected.

SPECIAL SESSION: Creative Solutions for Outbreak Data Management and Contact Tracing with Epi Info™: Viral Hemorrhagic Fever Outbreaks and Beyond

12:10–1:30pm

Ravinia Ballroom

Moderator: Barbara Knust

SPONSORS: National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

We will begin the session by outlining the elements of viral hemorrhagic fever (VHF) outbreak response, focusing on data management needs and how efficient data management can improve overall outbreak management. Problems with data management and communication encountered in the four Ebola and Marburg hemorrhagic fever outbreaks of 2012 will be addressed. Then the development of an Epi Info™ application for VHF outbreaks will be discussed — a project which was undertaken to solve existing data management obstacles in VHF outbreaks. This will include the reasons for and goals of the project, the development process, a brief demonstration of the application, and the generation of support and feedback from multiple international organizations involved in VHF outbreak response. We will conclude with plans for the future of this project, as well as a broader discussion on Epi Info and the many ways that it can be used to support epidemiologic investigations of any disease.

The Epi Info VHF project was initiated and led by a current EIS officer (Ilana Schafer, EIS class of 2012). It was the result of challenges encountered with data management during Epi-Aids responding to four VHF outbreaks in 2012. Additionally, it is an example of how informatics, a current focus of the EIS Program, can be utilized to improve both the EIS experience, as well as the epidemiologic process in general. This session will also highlight how Epi Info, a unique CDC program, can be of use to EIS officers and epidemiologists.

SPEAKERS:

- The Ebola and Marburg Hemorrhagic Fever Outbreaks of 2012: Outbreak Response Components and How We Can Improve the Process. *Ilana Schafer*
- Developing and Promoting a Viral Hemorrhagic Fever Epi Info Application. *Erik Knudsen*
- The Way Forward and the Versatility of Epi Info. *Asad Islam*

POSTER SYMPOSIUM II

1:30–2:45PM

Dunwoody Suite

Moderator: Fred Angulo

During the first 30 minutes of the Poster Symposium, the authors will each give a 2-minute oral presentation at the podium in front of a seated audience. During the remaining time, the audience is encouraged to view the individual posters and engage in direct discussion with the authors.

P2.1 Fungemia Outbreak Among Injection-Drug Users — Lane County, Oregon, 2012–2013

Authors: Kara M. Levri, J. Leahy, D. Appelgate, P. Cieslak

Background: Fungemia are usually healthcare–acquired infections. The most common fungemia, candidemia, has a case fatality rate of 40%–70%. Community-acquired fungemia are rare. In May 2013, a Lane County hospital reported 3 community-acquired fungemia among injection-drug users (IDUs). We investigated to determine the source and recommend control measures.

Methods: We determined baseline (2009–2012) and recent (January–June 2013) community-acquired fungemia hospitalization rates as well as prevalence among IDUs. Cases were community-acquired fungemia among Lane County IDUs after September 2012. We queried laboratories, distributed health alerts, and contacted clinicians and infection preventionists to identify cases. Medical records were abstracted to ascertain patient demographics and clinical courses. Patients were interviewed to assess drug practices.

Results: In 2013, IDU admissions for fungemia increased from a baseline of 0.5 to 8.6/10,000 admissions in Lane County hospitals (prevalence: 8.2/10,000); 7 cases were identified. All patients were HIV-negative men, aged 23–56 (median: 32) years. All reported intravenous heroin use. Six of 7 cases grew Candida species: albicans (4), pelliculosa (1), and krusei (1); 2 cases grew additional fungal organisms, Rhodotorula and Penicillium; 1 case grew only Rhodotorula. Patients were hospitalized for 2–27 (median: 6) days; 1 required cardiac surgery; 4 received long-term outpatient intravenous antifungals; none died. All interviewed patients admitted to unsafe injection practices, including lack of boiling heroin or preinjection site cleaning. One patient reported that the practice of not heating heroin was increasing among local IDUs.

Conclusions: Changing heroin preparation and injection practices may have contributed to this outbreak. Prevention efforts should focus on safer injection practice education. We recommend continuing active case finding and surveying heroin users to determine practices.

P2.2 A Cluster of *Cryptococcus neoformans* Infections at a Community Hospital — Arkansas, 2013

Authors: Snigdha Vallabhaneni, S. Lloyd, D. Haselow, G. Wheeler, L. Gladden, K. Garner, H. Moulton-Meissner, S. Lockhart, B. Park, J. Harris

Background: Clusters of infections caused by *Cryptococcus neoformans* (Cn), an environmental fungus causing pneumonia and meningitis, are rare; active disease usually results from immunosuppression-related reactivation of latent infection. We investigated a Cn cluster at a 330-bed hospital (Hospital X) to determine the source of infections.

Methods: Cases, defined as culture-confirmed Cn infections at Hospital X, were identified using laboratory records. We abstracted data from medical records, assessed clinical specimen handling, interviewed hospital personnel, case-patients, and family members, and queried surrounding hospitals for Cn cases. Epidemiological data prompted culturing of the Hospital X intensive care unit (ICU) surfaces, and the external air intake filter.

Results: During 1992–2012, Hospital X averaged two Cn cases annually. During April–June 2013, Cn was isolated from respiratory (n=2) and blood (n=3) cultures from five case-patients. No case-patients were HIV-infected; one was post-kidney transplant. Four died of respiratory failure or sepsis ≤5 days after their Cn cultures were obtained. Case-patients resided in four distant towns; interviews revealed no common community exposures. Surrounding hospitals reported no increases in patients with Cn infections. Laboratory procedure review did not demonstrate evidence of contamination. During April 6–14, 2013, three case-patients were the only occupants in two adjacent ICU rooms; another case-patient occupied a nearby ICU room during June 2013. The surviving case-patient did not have ICU exposure; he was post-kidney transplant and likely had reactivation disease. Environmental sampling of the ICU did not yield Cn.

Conclusions: Temporospatial commonalities suggested nosocomial acquisition of Cn in the ICU for at least three case-patients; the source remains undetermined. Clinicians should consider the possibility of nosocomial cryptococcosis.

P2.3 University-Based Gastrointestinal Illness Outbreak Caused by Dual Pathogens — Tennessee, 2013

Authors: Joshua L. Clayton, M. Zylstra, D. Walker, K. Garman, J. Dunn, W. Schaffner, T. Jones

Background: School-related foodborne disease outbreaks accounted for 17,266 illnesses in 286 outbreaks, the third most illnesses reported among all U.S. settings during 1998–2008. We investigated gastrointestinal illness among persons dining in a university cafeteria during August–September 2013 to determine the etiology and vehicle.

Methods: We defined a case as diarrhea (≥3 stools in 24 hours) in a student or staff member after eating at the cafeteria August 17–August 24. We conducted hypothesis-generating interviews and reviewed meal-plan data to identify exposures and performed a case-control study. Control subjects were selected from nonill diners at an implicated meal. We performed an environmental assessment of the cafeteria. Isolates from case-patients and food were subtyped by using pulsed-field gel electrophoresis (PFGE) and tested for antimicrobial susceptibility.

Results: We identified 23 cases (median age: 18 years; range: 18–44); 18 (78%) were male. Dinner in the university cafeteria on August 20 was the common exposure. The case-control study included 19 cases and 91 control subjects. Italian-stuffed peppers containing ground chicken were associated with illness (odds ratio: 7.0; 95% confidence interval: 2.1–23.5). Of 10 stool specimens tested, 2 were positive for *Campylobacter jejuni* only, 3 for *Salmonella* Enteritidis only, and 4 for both. All 4 lots of raw ground chicken tested yielded both pathogens, with PFGE patterns indistinguishable from those of case-patients. *C. jejuni* isolates were fluoroquinolone resistant. The environmental assessment identified unsafe food handling practices, including inadequate cooking and lack of temperature monitoring of ground chicken.

Conclusions: Contaminated raw chicken and multiple unsafe food handling practices contributed to this dual-pathogen outbreak. Education of food handlers can minimize illnesses associated with such high-risk foods as ground chicken.

P2.4 Rapid Identification of Prepackaged, Ready-to-Eat Salads Associated with an Outbreak of *Escherichia coli* O157:H7 Infections — Multiple States, 2013

Authors: Patrick R. Ayscue, V. Peralta, T. Libby, W. Probert, A. Barnes, J. Lidgard, M. Needham, B. Melius, D. Gillis, D. Vugia, J. Watt, A. Kimura

Background: On October 29, 2013, the California Department of Public Health (CDPH) identified a cluster of 4 *Escherichia coli* O157:H7 (O157) isolates with a novel pulsed-field gel electrophoresis (PFGE) pattern. We investigated to identify the source and prevent further illness.

Methods: We queried PulseNet for O157 isolates matching the outbreak strain outside California. CDPH also screened O157 isolates by using multilocus variable-number tandem-repeat analysis (MLVA), a more rapid subtyping technique. We interviewed patients with hypothesis-generating questionnaires updated during the investigation, reviewed October 2013 purchases from the implicated grocery Chain A, and conducted a traceback investigation.

Results: We identified 33 O157 isolates matching the outbreak strain among patients in California, Washington, Arizona, and Texas, with sample collection dates during 10/15/13–11/08/13. Ten were initially identified by MLVA and were interviewed an average of 2.6 days earlier (95% confidence interval: 0.18–5.0) than patients identified by PFGE. Patients' median age was 28 years (range: 2–78); 64% were female. The majority (28/31; 90%) shopped at Chain A; 24/30 (80%) reported consumption/likely consumption of a prepackaged salad from Chain A during the week before illness onset, compared with an expected 18% of Chain A customers on the basis of purchase history ($p < .0001$). Among 24 who reported prepackaged salad consumption, 22 (92%) reported 1 of 2 specific salad varieties, which traced back to a single producer. Chain A promptly discontinued stocking the implicated salads, followed by a recall by the salad producer.

Conclusions: This outbreak highlights the need for increased food safety efforts targeting ready-to-eat foods, including prepackaged salads. Conducting PFGE and MLVA testing in parallel contributed to timely interventions to prevent further illness.

P2.5 Acute Gastroenteritis Among Seminar Attendees After a Catered Lunch — Washington, DC, 2013

Authors: Sasha A. McGee, G. Ray, H. Kebede, A. Gibson, I. Cooper, T. Jemaneh, M. Blaylock, A. Diallo, F. Johnson-Clarke, J. Davies-Cole

Background: Foodborne diseases cause approximately 48 million illnesses annually in the United States. In August, the District of Columbia Department of Health was notified of gastroenteritis among seminar attendees who had eaten a catered lunch. We investigated to determine the outbreak source and etiology.

Methods: Cases were defined as any gastrointestinal illness among attendees ≤48 hours after eating the catered lunch. A retrospective cohort study was conducted by using food history questionnaire data to calculate the relative risk (RR) for illness. We also interviewed restaurant staff and conducted a restaurant inspection, during which food samples were collected.

Results: Twenty-eight of 52 attendees (53.8%) completed the survey. Of these, 15 (53.6%) met the case definition. The attack rate among respondents who had eaten the lunch was 57.7%. Neither of the 2 respondents who had not eaten the lunch reported illness. The median time until illness onset was 30.3 (range: 6–38) hours. Illness duration was <24 (range: 6–72) hours for 46.7% of ill respondents, and none sought medical attention; therefore, clinical samples were unavailable. The 2 most common symptoms were diarrhea (80.0%) and vomiting (73.3%). All 4 respondents who had eaten the falafel-stuffed pita became ill, compared to 8/17 (47.1%) of the respondents who had not (RR: 2.13; 95% confidence interval: 1.28–3.52). None of the other food items were associated with becoming ill. Food samples tested negative for common foodborne bacterial pathogens. None of the restaurant employees reported illness.

Conclusions: Epidemiologic evidence indicated the falafel-stuffed pita was associated with illness. Norovirus was the likely etiologic agent as the incubation period, attack rate, and illness duration are consistent with national norovirus outbreak surveillance data.

P2.6 Gastroenteritis Associated with Rafting the Middle Fork of the Salmon River — Idaho, 2013

Authors: Mariana Rosenthal, M. Taylor, K. Anderson, K. Carter

Background: Annually, ~10,000 persons from the United States and abroad raft Idaho's 104-mile Middle Fork of the Salmon River on 4–10-day trips without road access. During July–August 2013, rafters experienced a gastroenteritis outbreak, requiring air evacuations. We investigated to identify the agent, source, and risk factors for illness, and provided prevention recommendations.

Methods: We solicited participants for a case-control study through the media, in person, and by e-mailing rafting permit holders. We provided an online questionnaire regarding symptoms, meals, drinking water, and environmental exposures. A case was defined as nausea, vomiting, or diarrhea within 25 days of rafting, in a person who had rafted during July 1–September 23. Control subjects were well rafters from the same period. Ill persons provided stool specimens and we collected environmental samples at locations along the river for laboratory-testing.

Results: We identified 102 case-patients and 293 control subjects. Illness was associated with drinking filtered river water (odds ratio [OR]: 3.9; 95% confidence interval [CI]: 2.4–6.4). This association was stronger among case-patients ill <4 days (norovirus gastroenteritis-like), (n = 63; OR: 6.6; 95% CI: 3.3–12.9) than those ill ≥4 days (n = 38; OR: 2.2; 95% CI: 1.1–4.3). Norovirus (n = 3) and giardia (n = 8) were detected in stool specimens from 11 ill rafters. Norovirus was detected on water spigots and outhouses; Escherichia coli was detected in an unregulated water source.

Conclusions: This multiple-etiology outbreak apparently was associated with drinking filtered river water; examination of filtering methods used is warranted. Strict adherence among river rafters to disseminated guidelines for gastrointestinal illness prevention, including sanitation, food handling, and water treatment, is advised.

P2.7 Reported Reasons for Testing Among Hepatitis B Virus-Infected Patients — Chronic Hepatitis Cohort Study, United States, 2006–2010

Authors: Gemechu B. Gerbi, L.B. Rupp, S.C. Ko, A. Moorman, S.D. Holmberg, F. Xu

Background: Chronic infection with hepatitis B virus (HBV) is a common cause of death associated with liver failure, cirrhosis, and liver cancer. Of the estimated 800,000–2 million persons in the United States with HBV infection, only about two-thirds have been diagnosed. Identifying reasons why persons diagnosed with HBV infection were tested may help identify opportunities to facilitate diagnosis and treatment of persons who are infected but have not been diagnosed.

Methods: We surveyed participants enrolled in the Chronic Hepatitis Cohort Study, an observational study of persons with chronic viral hepatitis in the United States. Of 3,358 patients aged ≥18 years who had HBV infection, 2,725 (81.2%) were randomly sampled for survey during 2010–2011. After the exclusion of 450 patients who died or otherwise could not be contacted, the remaining 2,275 (67.7%) patients were surveyed by U.S. mail or telephone. Participants selected 1 or more reasons for initial HBV testing from a list of seventeen reasons.

Results: Of the 2,275 patients sampled, 1,044 (46%) completed the survey: mean age: 50 years; men: 53.4%; Asian: 57.8%. Most participants gave one reason for testing. Of 1,386 reasons for testing (reported by 1,044 respondents), 41.1% of respondents indicated symptoms and signs of liver disease or doctor recommendation; 26.4% indicated birth in endemic country or high-risk sexual behaviors; and 14% indicated blood donation or insurance. Seven percent of participants sought testing only after experiencing liver-related symptoms.

Conclusions: Clinical indications, including doctor recommendation, were the most common reason for HBV testing. Promoting awareness among health care providers and persons at high risk for HBV infection may help facilitate identification of infection and reduce HBV-related morbidity and mortality.

P2.8 Mortality Risk After Opportunistic Illness Diagnoses Among HIV-infected Persons — San Francisco, 1980–2012

Authors: Kpandja Djawe, K. Buchacz, L. Hsu, M.J. Chen, C. Rose, T. Williams, J.T. Brooks, S. Schwarcz

Background: Despite substantial decreases in incidence of opportunistic illness (OIs) since the introduction of combination antiretroviral therapy (cART), OIs remain a common cause of HIV-related mortality. We examined whether improved HIV treatment was associated with better survival after OI diagnosis and how survival differed by OIs.

Methods: We analyzed HIV surveillance data and estimated Kaplan-Meier survival probabilities after first OI diagnosis among AIDS patients aged ≥13 years in San Francisco during 3 periods: 1980–1986 (pre-ART); 1987–1996 (mono-/dual ART); and 1997–2012 (cART). We used Cox proportional hazards models to determine adjusted mortality risk by OI in the cART period (referent group: patients with Pneumocystis pneumonia [PCP]).

Results: Of 20,860 persons with AIDS, 3,004 were first diagnosed with an OI (deaths: 2,957) in 1980–1986; 14,097 (deaths: 12,569) in 1987–1996; and 3,759 (deaths: 1,573) in 1997–2012. The most frequent OI diagnoses were PCP (39.1%) and Kaposi's sarcoma (20.1%). Overall 5-year survival probability increased from 7% in 1980-1986 to 65% in 1997-2012. Increases in survival by OI ranged from a 1.8-fold increase (33% to 59%) for patients with HIV wasting to a 69-fold increase (1% to 69%) for patients with PCP. In 1997–2012, after adjustment for clinical and demographic factors, survival after first OI was poorest for brain lymphoma (hazard ratio [HR]: 5.14; 95% confidence interval [CI]: 2.98–8.87) and progressive multifocal leukoencephalopathy (HR: 4.22; CI: 2.49–7.17).

Conclusions: Survival after first OI diagnosis has improved markedly since 1980. Some OIs remain associated with substantial mortality risk even after adjustment for clinical factors (e.g., CD4 cell count). Better prevention and treatment strategies are still needed for OIs occurring in the cART period.

P2.9 Delayed Diagnosis of Multidrug-Resistant Tuberculosis and the Resulting Outbreak — Sheboygan, Wisconsin, 2012–2013

Authors: Abbey J. Canon, C. Yuen, J. Beinemann, P. Vang, P. Wegner, L. Will, J.P. Davis

Background: Prompt diagnosis and treatment of tuberculosis (TB), caused by *Mycobacterium tuberculosis*, can prevent transmission and death. On April 12, 2013, an adult foreign-born Sheboygan resident (index patient) from a high-incidence country and with a history of being exposed to TB received a diagnosis of pulmonary TB disease (later identified as isoniazid and rifampin resistant, or multidrug-resistant) 8 months after cough onset. Concerned about a prolonged infectious period, we investigated to find and prevent additional cases.

Methods: We defined a case as TB disease caused by *M. tuberculosis* with the index case strain genotype in a Wisconsin resident that was diagnosed during May 2012–August 2013; persons with latent TB infection (LTBI) had a positive TB test and an epidemiologic link to a TB patient. To determine factors contributing to transmission and to find contacts, we reviewed medical records and interviewed patients.

Results: Beginning October 2012, the index patient sought medical care for TB symptoms during 9 visits to 7 different providers. Chest radiographs obtained during 3 separate visits were consistent with but not interpreted as TB; TB was first considered during April 2013, approximately 6 months after the first medical visit. Among >700 evaluated contacts, the investigation detected 31 persons with LTBI and 11 secondary TB cases. Among the 12 TB patients, median age was 19 (range: 11–39) years. The index patient had resided in the United States for 19 years.

Conclusions: Because of delayed diagnosis, the index patient's prolonged infectious period resulted in extensive transmission. To prevent outbreaks and promptly interrupt TB transmission, clinicians, even in low-incidence settings, should have a high index of suspicion for TB among populations at high risk.

P2.10 Micronutrient Powder Use and Infant and Young Child Feeding Practices — Nepal, 2011

Authors: Kelsey R. Mirkovic, C. Perrine, G. Subedi, S. Mebrahtu, P. Dahal, M. Jefferds

Background: The World Health Organization (WHO) recommends home-fortification of foods using micronutrient powders (MNP) for children 6–23 months at risk for micronutrient deficiencies. However, the influence of MNP use on infant and young child feeding (IYCF) practices is not well understood. We assessed the association of MNP use and IYCF practices.

Methods: Representative cross-sectional surveys on MNP use and IYCF practices were conducted with mothers of eligible children in 2 rural pilot districts, 3 months after implementation of an integrated MNP/IYCF program made free MNPs available to children 6–23 months (n = 696). Standard WHO definitions of 5 key IYCF practices, chi-square tests, and logistic regression were used to assess whether practices varied by MNP use (yes/no).

Results: MNPs were used by 62% of children 6–23 months. Continued breastfeeding among children 12–15 months (n = 225) was high and did not differ by MNP use (93.7% vs 96.6%; P = .40). Timely introduction of complementary foods among children 6–8 months (n = 98) was more frequent among MNP users; however, the association was not significant (91.4% vs 74.6%; P = .10). Children 6–23 months who used MNPs were more likely to receive a diet that met the criteria for minimum dietary diversity (39.7% vs 21.4%, P <.001), minimum meal frequency (68.7% vs 55.3%, P = .005), and minimum acceptable diet (29.4% vs 14.7%, P <.001). Significant relationships remained after adjusting for maternal education and household economic status.

Conclusions: MNP use is associated with better IYCF practices in 2 districts of Nepal. These findings contribute to ongoing project evaluation, which will guide future policy decisions on program implementation and scale-up.

P2.11 Adverse Drug Events Associated with an Electronic Music Festival — New York City, 2013

Authors: Alison D. Ridpath, C. Driver, H. Kunins, D. Paone, D. Kass, RS. Hoffman, N. Lundy De La Cruz, A. Jakubowski, A. Karpati

Background: Synthetic club drugs (SCDs), including molly and ecstasy, are often used at electronic music festivals (EMFs) and thought to be 3,4-methylenedioxy-N-methylamphetamine (MDMA), known to cause adverse events. In September 2012, New York City Department of Health and Mental Hygiene (DOHMH) investigated adverse events among attendees of an annual EMF, Festival A, resulting in initiation of surveillance of emergency department transports during subsequent EMFs. In September 2013, surveillance at Festival A identified 2 deaths from suspected drug overdose. DOHMH investigated to characterize adverse drug events.

Methods: Cases were drug-related deaths or emergency-department transports among attendees of 2013 Festival A ≤12 hours after the event. Severe cases were seizure, intubation, intensive care unit (ICU) admission, or death. We reviewed medical records and medical examiner case reports. Drug use (including alcohol) was considered present by laboratory test or medical record report. Available biologic samples underwent additional toxicologic testing.

Results: We identified 21 cases, including 9 severe cases [5 ICU admissions, 2 deaths], during the 2-day EMF (daily attendance, 40,000 persons). Median age was 21 years (range: 16–29). Drug use included alcohol only (6), SCDs (12), marijuana (3), and cocaine (1). Eight of 9 severe cases used SCDs compared to 1/9 who did not (prevalence ratio: 6.7; 95% confidence interval: 1.0–44.7). Among 17 patients with additional toxicology, 11 had evidence of SCDs (MDMA or methylone, a synthetic cathinone stimulant often sold as "bath salts.")

Conclusions: The majority of severe adverse drug events at Festival A involved SCDs. Methylone is newly identified as a cause of adverse drug events at EMFs. Public health messages about SCDs should be developed to reduce adverse drug events at EMFs.

P2.12 Sudden Cardiac Death in Patients with Unrecognized Lyme Carditis — United States, 2012–2013

Authors: Joseph D. Forrester, G. Ray, T. Schulz, W. Daniels, E. Daly, T. Andrew, C. Brown, P. Cummings, R. Nelson, S. Ertel, J. Mullins, M. Cartter, P. Backenson, J. White, P. Kurpiel, R. Rockwell, A. Rotans, C. Hertzog, L. Squires, J. Linden, M. Prial, J. House, P. Pontones, K. Waller, E. Schiffman, D. Neitzel, B. Batten, D. Blau, M. DeLeon-Carnes, A. Muehlenbachs, J. Ritter, J. Sanders, S. Zaki, C. Molins, M. Schriefer, A. Perea, K. Kugeler, C. Nelson, A. Hinckley, P. Mead

Background: Each year an estimated 300,000 Americans are diagnosed with Lyme disease (LD), a multisystem tickborne illness caused by Borrelia burgdorferi. Infection of the heart, Lyme carditis (LC), is an uncommon complication and rarely fatal, with four deaths reported worldwide over 35 years. From November 2012 through July 2013, pathologists at a tissue bank and CDC detected evidence of LC in three cases of sudden cardiac death (SCD). We conducted an investigation to confirm the diagnosis, identify risk factors, and define populations at risk of LC.

Methods: Medical records of index cases were reviewed; specimens were tested for evidence of B. burdorferi. Frequency and demographic features of LC were determined from national LD surveillance data using Epi Info™. Vital records in 4 states were searched to identify deaths among reported LC cases.

Results: The decedents, two males and one female aged 26–38 years, were residents of Connecticut, Massachusetts, and New York. Two patients did not seek care. All had serologic evidence of early disseminated LD, and spirochetes were detected in cardiac tissues by microscopy, immunohistochemistry, and polymerase chain reaction assays. Among 154,405 LD cases with clinical information reported to CDC from 2001–2010, 1,710 (1.1%) had LC. Relative to other LD cases, patients with carditis were more likely to be male (odds ratio [OR]:1.55; 95% confidence interval [CI]:1.40–1.71) and aged 15–44 (OR:1.52; CI:1.37–1.68). Review of vital records for 608 patients diagnosed with LC did not identify any deaths attributed to LC.

Conclusions: Carditis occurs in ~1% of reported LD cases and is disproportionately common in young adults and males. Mortality is rare among recognized cases, but LD may be under appreciated as cause of SCD.

CONCURRENT SESSION F1: Foodborne Diseases

3:00–5:05PM

Ravinia Ballroom

Moderators: Ian Williams and Barbara Mahon

3:05 Multistate Outbreak of Listeriosis Linked to Company A Artisanal Cheeses — United States, 2013

Authors: Mary J. Choi, C. Medus, K. Smith, C. Rigdon, M. Forstner, W. Ishow, S. Slette, L. Bottichio, J. Ball, S. Bosch, K. Jackson, B. Mahon, C. Tarr, M. Wise, J. Beal, D. Melka, B. Silk

Background: Invasive listeriosis, a foodborne disease, causes ~260 deaths annually in the United States. Older adults, pregnant women, and persons with immunocompromising conditions are at increased risk. In June 2013, the Minnesota Department of Health notified CDC of 2 patients with isolates that had indistinguishable pulsed-field gel electrophoresis (PFGE) patterns. We investigated to identify the source and prevent additional infections.

Methods: We queried PulseNet for indistinguishable environmental and clinical isolates. Outbreak-related cases were defined by *Listeria monocytogenes* isolation with the outbreak PFGE pattern, and a pattern upload date of May 20–June 28, 2013. Patients were interviewed about food exposures and case-case analyses compared outbreak-related cases with sporadic cases reported during 2004–2013. Microbiologic and traceback investigations were conducted.

Results: Twenty-nine environmental isolates with a PFGE pattern indistinguishable from the outbreak pattern were identified at Company A's production facility during 2010–2011. Five cases from 4 states were identified. All patients were hospitalized. One death and a miscarriage were reported. Soft-cheese consumption was associated with outbreak-related illness (odds ratio: 10.8; 95% confidence interval: 1.8–∞). All patients definitely or probably had eaten Company A's pasteurized soft cheeses. The outbreak strain was isolated from 2 Company A cheeses collected at 2 Minnesota grocery stores. Implicated restaurants and grocery stores received these cheeses as intact wheels from multiple distributors. Inspection of the cheese-making facility revealed sanitation deficiencies. The cheeses were recalled and production was halted.

Conclusions: Environmental contamination of cheese at Company A's production facility likely caused this outbreak. Persons at increased risk should be aware that soft cheeses made under insanitary conditions, whether or not the milk is pasteurized, have been shown to cause illness.

3:25 *Escherichia coli* O157:H7 Outbreak Associated with a Mexican Food Restaurant — Arizona, 2013

Authors: Laura E. Adams, M. Eguchi, A. Mitchell, C. Arbalaez Piedrahita, J. Stewart, R. Klein, T. Sylvester, J. Weiss, K. Bisgard, B. Robinson, K. Komatsu, R. Sunenshine

Background: *Escherichia coli* O157:H7 is a leading cause of foodborne-related hospitalization in the United States, with ~63,000 illnesses and 20 deaths annually. In July, Maricopa County Public Health was notified of bloody diarrhea in 3 hospitalized patients who reported having eaten at Restaurant A. We sought to identify cases and sources to prevent additional illnesses.

Methods: Probable cases were defined as diarrhea (≥3 loose stools in 24 hours) or hemolytic uremic syndrome (HU.S.) ≤10 days after Restaurant A patronage during July 18–30; confirmed cases had E. coli O157:H7 isolates indistinguishable by pulsed-field gel electrophoresis. We conducted a case-control study; case-patients and control subjects were identified through Restaurant A receipts, fellow diners, and press releases encouraging Restaurant A patrons to contact public health. Control subjects had eaten at Restaurant A and had no subsequent illness. We conducted logistic regression analysis of ingredients with statistically significant bivariate associations. Environmental investigation included restaurant inspection, food ingredient traceback, and laboratory analysis.

Results: We identified 94 (including 11 confirmed) cases among patients aged 2–88 (median 32) years; 53 (56.4%) were female. Thirty-three (35.1%) persons sought medical care, including 2 (2%) with HU.S.; none died. In the model, only lettuce remained significant (odds ratio: 3.2; 95% confidence interval: 1.5–6.8). Lettuce had been consumed by 72.8% (59/81) of case-patients and 42.4% (42/99) of control subjects. No pathogenic *E. coli* were identified in environmental samples, but total coliforms >1,400 were isolated from lettuce. Traceback revealed the lettuce distributer supplied other restaurants without reported illnesses. Restaurant A reported no employee illnesses.

Conclusions: An *E. coli* O157:H7 outbreak was traced to one restaurant; data indicate that contaminated lettuce was associated with illness.

3:45 Distinct Epidemiologic Patterns of Foodborne versus Person-to-Person Norovirus Outbreaks in the United States, 2009–2012

Authors: Kimberly D. Pringle, M. Wikswo, L. Gould, U. Parashar, A. Hall

Background: Norovirus is the leading cause of epidemic acute gastroenteritis (AGE) worldwide. Previously, U.S. surveillance for norovirus only included foodborne and waterborne disease outbreaks, highlighting its leading role in foodborne disease. Since 2009, states may also report person-to-person norovirus outbreaks to the passive National Outbreak Reporting System (NORS), providing opportunity to better understand the epidemiology of norovirus outbreaks and the public health importance of person-to-person transmission.

Methods: We included all suspected or confirmed single-etiology norovirus outbreaks reported to NORS from 2009–2012. An outbreak was defined as ≥2 ill persons with a common exposure. We performed descriptive analyses by transmission mode and used chi-square tests to compare proportions.

Results: A total of 4,098 norovirus outbreaks were reported affecting 152,068 people (median=25 people per outbreak; IQR=12–47) from 2009–2012. The primary transmission mode in most outbreaks reported was person-to-person (n=2816, 69%); 1001 (24%) were foodborne. More pronounced winter seasonality (October–March) was observed among person-to-person outbreaks (2407 [63%]) compared with foodborne outbreaks (641 [17%]; p<0.001). Most (53%) foodborne norovirus outbreaks occurred in restaurants while 79% of person-to-person norovirus outbreaks occurred in nursing homes. Compared with foodborne norovirus outbreaks, person-to-person norovirus outbreaks had a higher case-hospitalization rate (2.3% versus 1.2%, p<0.001) and affected a greater proportion of patients ≥50 years-old (70% versus 38%, p<0.001).

Conclusions: Expanded surveillance through NORS illustrates that person-to-person and foodborne transmission account for most norovirus outbreaks. Compared with foodborne norovirus outbreaks, those spread via person-to-person were reported to occur more frequently in vulnerable, elderly populations with elevated rates of severe outcomes. Prevention and control efforts should target such outbreaks through early recognition and aggressive infection control, recognizing the potential for severe disease.

4:05 Multistate Outbreak of Multidrug-Resistant *Salmonella* Heidelberg Infections Linked to Foster Farms Brand Chicken — United States, 2013

Authors: Jolene H. Nakao, J. Higa, V. Peralta, H. Rosen, T. Libby, N. Marsden-Haug, A. Kimura, C. Schwensohn, J. Pringle, A. Green, B. Kissler, K. Robertson, J. Grass, A. Bicknese, B. Tolar, S. Defibaugh-Chávez, M. Wise, C. Barton Behravesh, I. Williams, L. Gieraltowski

Background: *Salmonella* causes ~1.2 million infections and 400 deaths annually in the United States. On 6/13/2013, PulseNet, a national subtyping network, identified a cluster of human infections of *Salmonella* Heidelberg (SHg) with indistinguishable genetic fingerprints. States and CDC initiated an investigation to identify the source and prevent additional illnesses.

Methods: We defined a case as illness with an outbreak strain with onset 3/1/2013–present. Our investigation included collection of patient exposures and comparison to a population survey, isolate testing for antimicrobial resistance, and traceback and culture of retail chicken. U.S.DA-FSIS conducted intensified *Salmonella* testing at four production facilities.

Results: We identified 403 case-patients in 23 states and PR; 40% (128/318) were hospitalized. A higher percentage (82% [51/61]) consumed chicken prepared at home than reported in the FoodNet Population Survey, (65%, p-value <0.002); 80% (16/20) reported eating Foster Farms (FF) brand. One sub-cluster was linked to FF-sourced rotisserie chicken from a single store location which subsequently recalled >23,000 units of rotisserie chicken products. Chicken products collected from FF facilities, FF retail chicken samples, and leftover case-patient food yielded the outbreak strains. Case-patient and poultry isolates were resistant to combinations of seven different antimicrobials, with 50 exhibiting multidrug resistance. On 10/7/13, U.S.DA-FSIS issued an alert about chicken from three FF facilities, reminding consumers to properly handle raw poultry. On 10/11/13, FF began implementing process enhancements.

Conclusions: This outbreak, in which epidemiologic, traceback, and laboratory evidence identified FF chicken as the source, highlights the need for more rigorous *Salmonella* control in raw chicken products. In response, FF implemented measures to decrease *Salmonella* burden in chicken parts, which may stimulate nationwide adoption of more stringent standards by other producers.

4:25 Outbreaks of Cyclosporiasis — United States, June–August 2013

Authors: R. Reid Harvey, F. Abanyie, J. Harris, R. Wiegand, M. Parise, I. Williams, M. desVignes-Kendrick, K. Reynolds, T. Lee, K. Klein, L. Gaul

Background: Cyclosporiasis is a nationally notifiable gastrointestinal illness caused by the parasite *Cyclospora cayetanensis*. During summer 2013, 631 infections from 25 states, primarily Iowa, Nebraska, and Texas, were reported to CDC (compared to 123 reported infections in 2012). In Iowa and Nebraska, most infections occurred in June, and were associated with consumption of bagged salad mix containing lettuce, cabbage, and carrots. In Texas, most infections occurred during July–August; no subtyping methods to link illness clusters currently exist for cyclosporiasis. We investigated a cluster of illnesses at a Texas Mexican-style restaurant (Restaurant A) to identify possible additional contaminated food vehicles.

Methods: Cases were persons with gastrointestinal illness who ate at Restaurant A after June 1; controls were matched by Restaurant A meal dates and reported no diarrhea ≤14 days afterwards. We administered a menu-specific questionnaire, and performed a case-control study including ingredient-level analyses.

Results: We interviewed 21 case-patients and 65 controls. Four fresh produce items were significantly associated with illness: fresh cilantro (matched odds ratio [mOR]:19.8; 95% confidence interval [CI]:4.0–∞), onions (mOR:15.3; CI:2.1–697.7), garlic (mOR:10.7; CI:1.5–475.4), and tomatoes (mOR:5.5; CI:1.1–54.1). Of these, only cilantro was consumed by all case-patients. Among the four salsas prepared at Restaurant A, three containing uncooked cilantro were significantly associated with illness (hot salsa mOR:8.0; CI:2.3–31.4; side salsa mOR:5.7; CI:1.6–23.7; fire salsa mOR:3.5; CI:1.1–12.7); salsa containing cooked cilantro was not (salsa ranchera mOR:6.0; CI:0.7–75.2).

Conclusions: Cilantro was the likely source of illnesses in this Texas restaurant cluster. Although these illnesses overlapped with a multistate outbreak linked to bagged salad mix, epidemiologic studies suggest that the large increase in cyclosporiasis during summer 2013 was caused by at least two different food vehicles.

4:45 Human *Escherichia coli* O121 Infections Linked to Multiple Frozen Snack Foods — United States, 2013

Authors: Tara C. Anderson, J. Pringle, S. Im, M. Anand, T. Root, V. Cantu, S. Viazis, J. K. Beal, A. M. Hardin, A. Clendenin, S. Lance, A. Green, B. Kissler, M. Wise, S. Bosch

Background: Shiga toxin-producing *Escherichia coli* (STEC) infections cause ~175,000 illnesses, 2,400 hospitalizations, and 20 deaths annually in the United States. In February 2013, PulseNet, the national bacterial subtyping network for foodborne disease surveillance, identified a cluster of human infections with a previously unreported strain of STEC O121.

Methods: A case was defined as illness in a person infected with the STEC O121 outbreak strain determined by pulsed field-gel electrophoresis with illness onsets between 12/1/12–5/13/13. We collected information on patients' exposures using questionnaires and open-ended iterative interviews. Public health and regulatory agencies collaborated to culture leftover foods and conduct traceback investigations.

Results: We identified 35 cases in 19 states. Illness onsets ranged from 12/30/12–4/15/13. The median patient age was 17 years (range: 1–75 years); 60% were female. Among 29 patients with available information, 9 (31%) were hospitalized. Twenty-four (100%) of 24 patients reported eating multiple frozen foods in the week before illness; 13/19 (68%) ate Brand A frozen snack foods produced at a single facility. The outbreak strain was isolated from two leftover Brand A heat-treated, not-fully-cooked frozen foods collected from patients' homes in New York and Texas, leading to recalls totaling >10.5 million pounds of frozen snack foods. FDA investigated common ingredients, including flour, but did not identify the outbreak strain at the snack food or flour production facilities.

Conclusions: A novel vehicle for STEC O121, frozen snack foods, was identified using an open-ended iterative interviewing approach combined with targeted product testing. Public health and regulatory collaborations were key to identifying the outbreak vehicle, resulting in multiple recalls, and preventing further illness. Food manufacturers should consider flour as a potential STEC source.

CONCURRENT SESSION F2: Occupational Safety and Health

3:00–5:05PM

Dunwoody Suite

Moderator: RADM Boris Lushniak, Acting Surgeon General of the United States

3:05 Analysis of Injuries and Illnesses Among American Red Cross® Responders — United States, 2008–2012

Authors: Kimberly Brinker, C.A. Head, C.Y. Johnson, R. Funk

Background: Occupational injury and illness rates for responders are not well documented and are difficult to compare with rates for full-time workers; rates for volunteers are unknown. Such injuries and illnesses, however, are preventable and should be a focus of responder organizations. In recent years, the American Red Cross (ARC) noted health concerns among responders and developed a staff wellness program to collect health data. We sought to identify risk factors for occupational injuries and illnesses during disasters and to make recommendations.

Methods: We analyzed data collected by ARC during 2008–2012 to estimate injury and illness rates by several variables, including disaster relief operation (DRO) level, which indicates operational costs (ranging from 3 [lower] to 5+ [higher]). We also calculated rates by disaster type, region, and year. We estimated injury and illness rate ratios (RRs) with 95% confidence intervals (CIs), using negative binomial regression.

Results: We analyzed 113 disasters. Hurricanes had the highest rates of injuries (14 per thousand responders) and illnesses (18 per thousand responders). In the adjusted model for injuries, RRs were higher for DRO levels 4 (3.6 [CI, 2.0–6.7]) and 5+ (4.9 [CI, 2.2–11.0]) than for level 3. In the adjusted model for illnesses, RRs also were higher for DRO levels 4 (4.4 [CI, 2.6–7.3]) and 5+ (8.6 [CI, 4.1–17.7]) than for level 3.

Conclusions: Higher DRO levels were a significant predictor of greater rates of occupational injuries and illnesses. DRO level may be a proxy for other factors such as multiple or longer deployments, larger numbers of responders, and austerity of conditions. Careful selection of responders, including volunteers, is warranted for deployments to such disasters.

3:25 Occupational Hazardous Substance Exposure Surveillance Using Poison Center Data — Wisconsin, 2004–2012

Authors: Jon Meiman, C. Tomasallo, H. Anderson

Background: Occupational hazardous substance exposures (HSEs) cause worker injury and lost productivity; in 2011, in the United States, 12,640 exposures to chemicals resulted in >80,000 lost workdays. The Wisconsin Division of Public Health has no system for tracking worker HSEs. We evaluated Wisconsin Poison Center (WPC) data as a potential occupational HSE surveillance system.

Methods: A total of 482,286 HSEs were reported to WPC during 2004–2012. We abstracted case summaries from the Wisconsin Public Health Information Network coded as occupation-related by WPC. We defined a case as an unintentional hazardous substance(s) exposure occurring in the workplace, excluding food or drugs. Data were examined for timeliness and completeness.

Results: During 2004–2012, a total of 8,039 occupational HSEs met the case definition; 5,210 (65%) were among men; median age was 33 (range: 16–88) years. HSE information was available ≤24 hours after exposure. Chemical type and outcome information were missing in 7.2% and 10.6% of cases, respectively. Of cases missing the chemical type, 0.8% had unknown outcomes. Specific industry and occupation data were unavailable. The most frequent HSEs were carbon monoxide (327 cases; 4.1%), alkali (315 cases; 3.9%), and chlorine gas (294 cases; 3.7%). A total of 3,626 cases (45%) among 3,283 persons required medical evaluation; 104 (1.3%) and 77 (1.0%) cases resulted in hospital and critical care unit admission, respectively. Nine deaths (median age: 43 years) (100% male) resulted from HSEs: hydrogen sulfide (6), carbon monoxide (1), toluene (1), and alkali (1).

Conclusions: Poison center data is a novel and timely data source for occupational HSE surveillance. Although data are incomplete, they can be used to guide workplace safety education and improve regulatory oversight.

3:45 Knowledge, Attitudes, and Practices Regarding Antimalarial Chemoprophylaxis in Peace Corps Volunteers — Africa, 2013

Authors: Keren Z. Landman, K. Tan, P. Arguin

Background: Falciparum malaria is a fatal disease for which long-term travelers to endemic areas are at high risk. However, infection can be prevented with malaria chemoprophylaxis. In 2013, a Peace Corps Volunteer (PCV) who stopped chemoprophylaxis died of malaria. Concurrently, the Peace Corps noted an increase in severe malaria among PCVs. We investigated PCVs' and Peace Corps medical officers' knowledge, attitudes, and practices regarding chemoprophylaxis to develop recommendations to improve adherence.

Methods: We administered internet-based surveys assessing knowledge about, experience with, and perceptions of malaria and chemoprophylaxis to PCVs and medical officers August 19–September 30, 2013. Adherence was defined as missing no doses of prescribed malaria chemoprophylaxis (mefloquine, doxycycline, or atovaquone-proguanil). Survey data were analyzed to identify programmatic deficiencies amenable to interventions for improvement.

Results: Of 1,184 PCVs responding, 545 (55%) reported adherence. Adherence was highest among those taking atovaquone-proguanil (n=108, 86%). The most common reasons for non-adherence were forgetting to take chemoprophylaxis (n=706, 60%), usually during in-country travel (n=368, 52%); fear of long-term side effects (n=469, 40%); and current side effects (n=524, 49%), most commonly associated with mefloquine. Two hundred seventy-nine (24%) PCVs were not worried about malaria, mostly because they believed malaria was a minor illness easily cured without consequence (n=239, 86%). Of 47 medical officers responding, 44 (94%) appropriately indicated that known side effects were important reasons for changing chemoprophylaxis.

Conclusions: Our survey found low adherence and high perception of long-term side effect risk among PCVs. Adherence might be improved by implementing reminder strategies, increasing education about chemoprophylaxis safety and malaria risk, and promoting prompt management of chemoprophylaxis side effects.

4:05 Bigger is Better: Abnormal Lung Function and Coal Workers' Pneumoconiosis by Mine Size Among Active Underground Coal Miners — United States, 2005–2012

Authors: David J. Blackley, C. Halldin, M-L. Wang, A. Laney

Background: Inhalation of coal mine dust (CMD) causes coal workers' pneumoconiosis (CWP) and other diseases affecting lung function. The prevalence of CWP among coal miners has increased two-fold since the late-1990s. Previously, small mine size (<50 employees) was associated with increased risk of CWP. It is unclear how mine size affects lung function. We characterized the prevalence of lung function impairment and CWP by mine size among underground coal miners.

Methods: During 2005–2012, miners received lung function tests (spirometry) and chest radiography at a NIOSH mobile unit. Spirometry and radiography were interpreted using U.S. and international standards, respectively. We used log-binomial regression to estimate risk of abnormal spirometry and CWP among those from small mines, compared to large mines.

Results: We analyzed data from 6690 miners. Those from small mines were more likely to have abnormal spirometry (16.3% vs. 11.8%, P<.01), CWP (9.3% vs. 3.3%, P<.01), and the severe form of CWP, progressive massive fibrosis (2.0% vs. 0.6%, P<.01). Working in small mines was associated with 1.4 times higher risk of abnormal spirometry (CI: 1.22–1.65, job tenure, BMI, and smoking adjusted), and 2.9 times higher risk of CWP (CI: 2.29–3.58, tenure and smoking adjusted).

Conclusions: Most of these miners worked exclusively under dust regulations implemented in 1970 to protect health, yet 15.7% had abnormal spirometry, CWP or both. A higher burden of disease was observed among small mine workers. Environmental and/or work-practice differences between small and large mines could influence exposure characteristics. Workers in small mines may engage in more job tasks at risk for exposure to CMD. Factors influencing the higher prevalence of respiratory disease in small mines should be identified.

4:25 Blowing in the Wind: Coccidioidomycosis Among Solar Power Farm Construction Workers — California, 2011–2013

Authors: Jason A. Wilken, G. Sondermeyer, D. Shusterman, J. McNary, A. McDowell, P. Borenstein, D. Vugia, D. Gilliss, B. Ancock, J. Prudhomme, D. Gold, G. Windham, L. Lee, B. Robinson, B. Materna

Background: Coccidioidomycosis, endemic in California, is associated with soil disturbances. Physician occupational illness reports identified coccidioidomycosis among employees constructing 2 solar power-generating facilities in San Luis Obispo County (SLO). We investigated confirmed cases to recommend preventive measures.

Methods: A case was defined as clinical- and laboratory-confirmed coccidioidomycosis in an employee of either solar farm after August 2011 and before symptom onset. Patients were interviewed for demographics, missed work days, daily work activities, and protective practices. Hazard ratios for time from employment to symptom onset, adjusted for smoking (aHR), were calculated by Cox proportional hazards regression. Incidence rate (IR)/100,000 population/year was calculated for 1 employer and compared with the SLO IR.

Results: Of 43 patients, 40 were male and 10 Hispanic; ages ranged from 21 to 63 (median: 47) years. Nine (21%) were hospitalized. Of 42 interviewed, 34 (81%) had missed work (1–547 days; median: 22). The most common occupations were electrician (13), heavy equipment operator (10), and laborer (6). Twenty-one performed soil-disruptive work daily; of these, 6 always used respiratory protection. Fourteen never performed soil-disruptive work. Thirty reported dusty conditions all or the majority of days. Shorter time to symptom onset was associated with performing soil-disruptive work daily (aHR: 4.15; 95% confidence interval [CI]: 1.61–10.67). For 1 employer with 29 patients, IR was 5,342/100,000/year, 139 (95% CI: 86–226) times the SLO IR of 38/100,000/year.

Conclusions: Risk for coccidioidomycosis was not limited to employees performing soil-disruptive work at the solar farms; however, daily soil-disruptive work was associated with earlier illness onset. We recommended further limiting dust generation and ensuring access to respiratory protection for all employees, practices the solar farm has reported implementing.

4:45 Is Green Energy Good for Workers? An Evaluation of Exposure and Health at a Windblade Manufacturing Facility — North Dakota, 2013

Authors: Anna-Binney McCague, U. Alwis, B. Blount

Background: Ninety thousand workers in the United States are potentially exposed to styrene, which may lead to visual changes and respiratory disease. The manufacture of power-generating windlblades utilizes multiple styrene-containing products, but the risk to these workers is unknown. Our aim was to assess the relationship between styrene exposures and health among workers in a windblade manufacturing facility.

Methods: We interviewed 355 workers about their health history, symptoms, and jobs. We tested spirometry, color vision, and visual contrast. We collected end-of-shift urine samples and assayed for the styrene metabolites mandelic acid (MA), phenylglyoxylic acid (PGA), and N-acetyl-S-(1-phenyl-2-hydroxyethyl-L-cysteine + N-acetyl-S-(2-phenyl-2-hydroxyethyl)-L-cysteine (PHEMA), using ultra-high-performance liquid chromatography coupled with electrospray ionization triple-quadrupole mass spectrometry.

Results: Preliminary results indicate that mean biomarker levels (mg/g creatinine) of 37.2 MA, 29.6 PGA, and 0.29 PHEMA were above the averages seen in the general population (0.36, 0.27, 0.001 respectively). The mean biomarker level (MA + PGA) among all workers was 66.8 mg/g creatinine, below the biologic exposure index (BEI) of 400 mg/g creatinine. Though there was an excess of color blindness (n = 56; expected 22), there was no correlation with biomarkers. Spirometry outcomes and respiratory symptoms also did not correlate. Decreased visual contrast significantly correlated with log-transformed biomarkers at medium spatial frequencies ($p < .05$).

Conclusions: Using a biological index of acute exposure, only visual contrast was associated with styrene exposure. Yet the high prevalence of color vision abnormalities remains unexplained. The healthy worker effect or cumulative exposures may be obscuring styrene's impact on color vision and respiratory outcomes. Alternatively, the BEI may protect workers from respiratory disease but not from decreased contrast. Further exploration may clarify exposure risks in this population.

CONCURRENT SESSION G1: Vectorborne and Parasitic Diseases

8:30–10:15AM

Ravinia Ballroom

Moderators: Mark Eberhard and Kay Tomashek

8:35 First Chikungunya Outbreak in Micronesia — Yap State, Federated States of Micronesia, 2013

Authors: Daniel M. Pastula, H. Biggs, W. Hancock, M. Bel, M. Marfel, R. Lanciotti, A. Panella, T. Chen, J. Staples, M. Fischer, S. Hills.

Background: Chikungunya virus is a mosquito-borne alphavirus that can cause large outbreaks with fever and, often severe, polyarthralgia. In October 2013, laboratory-confirmed chikungunya cases were identified among Yap residents, the first local transmission of chikungunya virus in Micronesia. We describe the preliminary epidemiological findings of this ongoing outbreak.

Methods: We defined a case as a Yap resident who presented to a health care facility with acute onset of fever and arthralgia or arthritis on or after August 11 (onset date of first laboratory-confirmed case). Demographic and clinical data were collected at initial presentation using standard forms. We described continuous variables using median and range, and categorical variables using frequencies and proportions. We used Chi-squared tests to examine risk factors for severe disease.

Results: As of November 26th, 991 cases were reported from Yap (population 11,376) for an attack rate of 87 per 1000. The outbreak initially was focused in the northeast but spread throughout the main islands and to three outer islands. Nine hundred nineteen (93%) cases had onset in 6 weeks from October 15–November 26. Median age was 31 years (range: <1–92) and 487 (49%) patients were male. Thirty-two of 846 (4%) patients were hospitalized; no deaths were reported. Patients aged ≥50 years were more likely to have arthritis (15/156; 10% vs. 24/558; 4%, P <.01) and be hospitalized (14/182; 8% vs. 18/661; 3%, P <.01).

Conclusions: The chikungunya outbreak in Yap has resulted in a high attack rate and rapid geographical spread. Active surveillance, public education on protection from mosquitoes, and vector control are needed to limit the impact of the ongoing outbreak and prevent spread to other islands in the region.

8:55 Dengue Outbreak — Mombasa, Kenya, 2013

Authors: Esther M. Ellis, J. Neatherlin, A. Mohamed, B. Fields, O. Mogeni, S. Patta, M. Delorey, B. Torres-Velasquez, H. Margolis, K. Tomashek, J. Montgomery

Background: Dengue is endemic in Africa where an estimated 64 million dengue virus (DENV) infections occurred in 2010. Few outbreaks have been reported from East Africa since dengue was first detected in the late 1800s. Following detection of an outbreak in Mombasa, Kenya in mid-2013, an investigation was conducted to determine the incidence of DENV infection.

Methods: A stratified multistage sample of households was selected from the Tudor community in Mombasa where recent dengue was reported. Household residents were asked to provide blood specimens and medical and travel histories. Blood was tested for anti-DENV IgM antibodies and DENV by RT-PCR. Sample-based estimates incorporated probabilities for selection of households and standard errors used a finite population correction.

Results: Of 1,489 persons interviewed from 720 households, 194 (13%) had evidence of current (n = 93) or recent (n = 101) DENV infection, with a sample-based estimate of 12% (95% CI: 9–14). Of 194 DENV positive participants, 83 (43%) reported an acute febrile illness in the past month; three (4%) were hospitalized and two (2%) had bleeding manifestations. DENV-1 (n = 46), DENV-2 (n = 45) and DENV-1/2 co-infections (n = 2) were detected. Risk factors for infection included travel out of Kenya in the last six months (P = .02), having mosquito breeding containers in the yard (P = .04), and having a febrile household member in the last month (P<.001).

Conclusions: Our investigation documented the only dengue outbreak in Mombasa since 1982 and the first of four reported outbreaks in sub-Saharan Africa in 2013. Initiatives to enhance dengue surveillance and clinical and public awareness are ongoing to reduce risk of infection and improve medical outcomes.

9:15 Factors Associated with Dengue Mortality — Puerto Rico, 2010

Authors: Dana L. Thomas, J. Pérez-Padilla, B. Torres-Velasquez, A. Rivera, B.J. Biggerstaff, T. Sharp, D. Arguello, H.S. Margolis, K.M. Tomashek

Background: Dengue, a potentially fatal acute febrile illness, is endemic in Puerto Rico. In 2010 an epidemic occurred in which >26,000 suspected cases and 39 laboratory positive fatal cases (1 death per 100,000 residents) were reported. Most studies compare fatal dengue cases to non-severe cases, potentially biasing results. To improve specificity of factors associated with mortality, we compared fatal dengue cases to survivors of severe dengue.

Methods: All hospitalized, laboratory-positive dengue case-patients reported to the passive surveillance system in 2010 were included in a two-stage, stratified random sample. Fatal cases (cases) were matched 1:1–4 by final admitting hospital and age to available non-fatal severe dengue cases (controls). Severe dengue was defined using current WHO classification including severe plasma leakage, hemorrhage or organ failure. Conditional logistic regression, parametric and non-parametric analyses were performed using STATA and R to evaluate differences in effect sizes.

Results: Among 31 cases and 72 controls, all age groups were represented and no gender differences were seen. Cases were more likely than controls to have comorbidities (odds ratio [OR] 4.6; 95% confidence interval [CI] 1.4–14.4) with diabetes, pulmonary, rheumatologic, and mental health diseases being most prevalent. Controls were more likely than cases to be admitted at initial presentation (OR 2.5; 95% CI 1.0–7.0); median duration of their hospitalization was twice as long as cases (4 vs 2 days; p<0.01). Nonetheless, nosocomial infections were more frequent among cases (OR 10.2; 95% CI 2.0–52.5).

Conclusions: Delayed hospital admission of severe dengue patients, especially those with pre-existing comorbidities, was associated with mortality during the 2010 epidemic in Puerto Rico. Aligning clinician dengue management practices with current practice guidelines may be the most effective countermeasure.

9:35 Atovaquone-Proguanil-Resistant Malaria in Two Travelers Returning from the Same Site — Nigeria, 2012–2013

Authors: Mateusz M. Plucinski, C.S. Huber, S. Akinyi, W. Dalton, M. Eschete, K. Grady, L. Flannery, B.A. Mathison, V. Udhayakumar, P. Arguin, J.W. Barnwell

Background: Atovaquone-proguanil (AP) is the most common treatment for uncomplicated malaria in the U.S.. Although generally highly effective, there have been sporadic reports of AP treatment failures in Plasmodium falciparum malaria infections, generally associated with mutations in the cytb gene. Atovaquone-proguanil treatment failures in two returning travelers were reported at a Louisiana hospital 7 months apart; they had stayed in the same compound in Rivers State, Nigeria, suggesting the possibility of transmission of AP-resistant strains.

Methods: The two travelers were interviewed and medical records were reviewed. We genotyped parasites using microsatellite genotyping and sequenced the entire mitochondrial genome from pretreatment (day 0) and day of failure (day 34) samples from both patients. We analyzed day 0 and day of failure samples for the presence of mutations in the genes encoding the molecular targets for atovaquone and proguanil.

Results: Case interviews confirmed that both travelers, non-compliant on their doxycycline prophylaxis, likely contracted the infections in the same compound in Nigeria. Review of medical records confirmed adequate treatment dosing of AP. Molecular analysis showed that the travelers had unrelated parasite genotypes and had different day 0 mitochondrial genomes. On day 0, both travelers had proguanil-resistant genotypes but wild-type, atovaquone-sensitive, cytb sequences. Day of failure samples exhibited mutations in cytb for both travelers, including a previously unreported mutation in one traveler.

Conclusions: Despite the two infections likely having been contracted in the same site in Nigeria, genetic analysis showed that the infections were unrelated. The mutations may have arisen independently during treatment. Our results highlight the importance of investigating unusual instances of imported malaria, including genotyping parasites and sequencing genes associated with antimalarial resistance to guide CDC recommendations.

9:55 Prevalence of *Strongyloides stercoralis* Antibodies Among a Rural Appalachian Population — Kentucky, 2013

Authors: Elizabeth S. Russell, E. Bosserman, R. Marshall, S. Davis, A. Beaudoin, S. Handali, I. Mcauliffe, D. Woodhall

Background: Studies from the early 1980's indicated that Rural Appalachia had a high prevalence of *Strongyloides stercoralis* infection. Infection is often asymptomatic but can last for decades, causing serious systemic disease in immunosuppressed patients, or stunted growth and delayed cognitive development in children. Infection occurs when larvae penetrates skin exposed to stool-contaminated soil. We investigated *S. stercoralis* antibody prevalence and risk factors among Remote Area Medical (RAM) clinic patients in Appalachian Kentucky.

Methods: We conducted a cross-sectional study; all persons presenting to 2 eastern Kentucky RAM clinics, which provide free dental, vision, and medical services, during 2 weekend clinics were asked to provide demographics, international travel, and their home plumbing system information collected on a paper-based survey. Serum was collected for *S. stercoralis* antibody testing. Fisher's exact and t-tests were used to analyze dichotomous and continuous risk factors, respectively.

Results: Among 1,584 RAM clinic patients, 384 (24%) participated. Seven of 379 (1.8%) with adequate laboratory samples were antibody-positive (patients aged: 21–69 years). We found no statistically significant difference in reported travel to a suspected S. stercoralis-endemic country (12% among antibody-negative patients, 14% among antibody-positive patients; P = 0.58), reported outdoor toilet use (2.2%, 14%; P = 0.16), or age (P = 0.46).

Conclusions: The lack of a significant association between antibody-positivity and travel and the wide positive-participant age range indicate these infections might have originated from within Kentucky. Studies including stool sample testing for current infection should be conducted, as should educational campaigns to diagnose and treat infection and prevent further transmission in this region.

CONCURRENT SESSION G2: Child and Adolescent Health

8:30–10:15AM

Dunwoody Suite

Moderator: Marshalyn Yeargin-Allsopp

8:35 Scabies and Bacterial Superinfection Among Children — American Samoa, 2011

Authors: Laura S. Edison, A. Beaudoin, C.E. Introcaso, L. Goh, C. Van Beneden

Background: Scabies, a highly pruritic and contagious mite infestation of the skin, is endemic in tropical regions. Delayed treatment can lead to bacterial superinfection, and treatment of close contacts is necessary to prevent reinfestation. We described scabies incidence and superinfection among children in American Samoa (AS) to support scabies control recommendations.

Methods: We reviewed 2011 pharmacy records from the only AS pharmacy to identify children aged ≤14 years with filled prescriptions for permethrin, the only scabicide available. Identified children's medical records were reviewed for physician-diagnosed scabies during January 1–December 31, 2011. We calculated scabies incidence, bacterial superinfection prevalence, and reinfestation prevalence during 14 days–12 months after first diagnosis. We used log binomial regression to calculate incidence ratios (IRs) for scabies by age.

Results: Medical record review identified 613 children with scabies (incidence: 31.6/1,000 children ≤14 years); 358 (58.4%) were male; 353 (57.6%) had a bacterial superinfection, and 94 (15.3%) had ≥1 reinfestation. Scabies incidence varied significantly among the 9 main island counties (range: 14.8–48.9/1,000). Children aged <1 year had the highest incidence (100.2/1,000). Children aged 0–4 years (incidence: 54.5/1,000; IR: 5.1; CI: 4.0–6.5) and 5–9 years (incidence: 27.7/1,000; IR: 2.4; CI: 1.9–3.2) had a significantly higher scabies incidence than children aged 10–14 years (incidence: 11.5/1,000).

Conclusions: Investigating why certain AS counties have a lower scabies incidence can help support recommendations for improving scabies control in counties with a higher incidence. The high prevalence of bacterial superinfection and frequent reinfestations highlight the importance of diagnosing and treating patients and their close contacts at the first signs of infection. Interventions targeting infants and young children who have frequent close family contact should be considered.

8:55 Fungal Sensitization Not Associated with Poor Outcomes in Children with Asthma: Data from the 2005–2006 National Health and Nutrition Examination Survey

Authors: Kenneth B. Quinto, K. Schoendorf, S. Lukacs, L. Akinbami

Background: Sensitization to fungal allergens is associated with severe asthma. Poor asthma outcomes impair quality of life for children and their families. We examined the association between poor asthma outcomes and sensitization to fungal allergens versus other aeroallergens in a nationally representative sample of children with asthma.

Methods: Using 2005–2006 National Health and Nutrition Examination Survey data for 349 children ages 6–19 years with asthma, we defined sensitization as immunoglobulin E antibody ≥0.35 kU/L for 15 aeroallergens including two fungi Aspergillus and Alternaria. Children were characterized into three mutually exclusive groups: sensitization to fungi, regardless of other aeroallergen sensitization; sensitization to common aeroallergens with no fungal sensitization; no sensitization. Outcomes from wheezing included reported sleep disturbance, limited activity, missed school days, ≥1 asthma attack, and emergency department or urgent care (ED/UC) visit within 12 months. For each outcome, multivariate logistic regression models (SUDAAN software) adjusted for gender, age, race, and income.

Results: 30.2% of children with asthma were sensitized to fungi, 26.5% to non fungal aeroallergens, and 43.4% to no allergens. Children with fungal sensitization did not have worse asthma outcomes than those without aeroallergen sensitization (e.g., asthma attacks adjusted odds ratio [aOR]: 1.1; 95% confidence interval [CI]: 0.4–2.8). However, sensitization to non fungal aeroallergens increased odds of ED/UC asthma visit (aOR: 2.62; 95% CI: 1.0–6.6) and disturbed sleep (aOR: 2.59; 95% CI: 1.6–6.5).

Conclusions: Past studies suggest that severe asthma is associated with fungal sensitization. We found fungal sensitization was not associated with poor asthma outcomes. Sensitization to other aeroallergens was associated with worse outcome, however. Fungal sensitization may not universally identify children at risk for poor asthma outcomes.

9:15 Prevalence and Correlates of Overweight and Obesity Among 5th Graders — Maine Integrated Youth Health Survey, 2009

Authors: Leigh Ann Miller, S.L. Huston, S. Park, T.A. Garrett

Background: Childhood obesity is associated with adverse health outcomes. However, data are limited regarding associations between health behaviors and childhood obesity among Maine children. We analyzed data from the 2009 Maine Integrated Youth Health Survey (MIYHS) to characterize prevalence and correlates of childhood overweight and obesity.

Methods: MIYHS collects data from public school 5th graders on self-reported behaviors and calculates body mass index (BMI) from measured height and weight. Data were weighted and analyzed for complex survey design. We determined prevalence of each BMI category per CDC age- and sex-specific growth charts: underweight (<5th percentile), normal weight (5th–<85th), overweight (85th–<95th), and obese (≥95th). We determined prevalence of 4 health-related behaviors: fruit and vegetable intake, sugar-sweetened beverage (SSB) intake, physical activity, and television viewing. We used multivariate logistic regression to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CIs), controlling for sex, race, and bullying status (as a proxy for mental health status).

Results: Among 2,986 students with complete data, 7% were underweight, 53% normal weight, 17% overweight, and 23% obese. On a per-day basis, 28% reported consuming fruits/vegetables ≥5 times, 23% consuming no SSBs, 72% watching television ≤2 hours, and 25% reporting ≥1 hour physical activity; only 2% reported all 4 optimal behaviors. In multivariate analysis, watching television >2 hours/day was the only variable associated with overweight (aOR: 1.5; CI: 1.1–1.9) or obesity (aOR: 1.6; CI: 1.3–2.0).

Conclusions: Overweight and obesity are common among Maine 5th graders. Targeted interventions, including school-based interventions, might be helpful ways to improve dietary and physical activity behaviors. Our findings can shape intervention efforts for preventing and controlling childhood obesity in Maine.

9:35 Willingness to Pay for Micronutrient Powder Supplements for Children — Nepal, 2011

Authors: Rajni Gunnala, C. Perrine, G. Subedi, S. Mebrahtu, P. Dahal, M. Jefferds

Background: Home fortification with micronutrient powders (MNP) has been implemented in several Nepali districts to combat the high burden of childhood micronutrient deficiencies. A 2011 pilot project gave free MNP to children aged 6–23 months. We describe willingness to pay (WTP) for MNP and pricing attitudes to explore potential for parental purchase of MNP for older vulnerable children aged 2–5 years.

Methods: Surveys representative of children aged 6–23 months were conducted in 2 Nepali districts 3 months after pilot implementation. Caretakers were asked about their WTP for MNP for children aged 2–5 years and attitude about a suggested price (150 Nepali Rupees/6 month supply, ~U.S.$2.10). Chi-square testing assessed WTP and price attitudes by demographics and WTP by MNP intervention exposure and MNP knowledge.

Results: Of caretakers surveyed (n = 731), 78% expressed WTP for MNP, and 66% had positive attitudes toward the suggested price. WTP and positive price attitude were associated with higher wealth quintiles and higher maternal education. Urban residence was associated with positive pricing attitude. Those with exposure to educational or printed materials about MNP during intervention were more likely to show WTP than those who had not (83.3% vs. 73.5% and 85.2% vs. 75.6% respectively; both P =.02). Those who reported awareness of barriers to MNP use were less likely to report WTP than those with none (66.3% vs. 92.4%; P <.01).

Conclusions: WTP and positive price attitude indicate potential for parental purchase of MNP for children aged 2–5 years in Nepal. Studies have demonstrated MNP can improve deficiencies and decrease morbidity in this age group. Further studies can determine if stated WTP translates into actual purchase.

9:55 Adolescent Substance Use and the Association with a School-Based Socioeconomic Measure — Washington State, 2012

Authors: Mandy Stahre, L. Bensley, J. VanEenwyk, N. Kuiper

Background: National data indicate approximately half of all high school students report current addictive substance use. Results are mixed on whether neighborhood socioeconomic status influences adolescent substance use. Certain characteristics of schools might be associated with increases in substance use. Better understanding of this association might help communities and schools prioritize substance abuse prevention programs.

Methods: Using data from the 2012 Washington State Healthy Youth Survey (a biennial school-based survey of health behaviors of 6th, 8th, 10th, and 12th graders), we compared rates of alcohol, cigarette, and nonmedical prescription opioid use with the proportions of students eligible at each school for free or reduced price lunches (FRPL). For 10th graders, we assessed accessibility of each substance and associations of FRPL eligibility proportions by using logistic regression adjusted for sex and race/ethnicity. All analyses used SUDAAN® to account for clustering of students by school.

Results: Substance use prevalence increased with grade across substances, the largest for alcohol increasing from 3% among 6th graders to 37% among 12th graders. As FRPL eligibility proportions increased, so did substance use prevalence within grades. The most common ways 10th graders obtained each substance were cigarettes, borrowed (33%) or gave someone money to buy (28%); alcohol, received from an older friend or sibling (36%) or drank at a family celebration with parent's permission (21%); and prescription opioids, obtained from a friend (31%) or used own prescription (26%). Accessibility to substances was not associated with school-based FRPL proportions.

Conclusions: Substance use, but not how they obtained substances, increased with higher proportions of students being FRPL-eligible, which highlights the need for increased focus of evidence-based strategies to prevent youth initiation in low-income communities.

CONCURRENT SESSION H1: Vaccine Preventable Diseases Worldwide

10:45AM–12:10PM

Ravinia Ballroom

Moderator: Rebecca Martin

Presentation of the Iain C. Hardy Award

10:50 Measles Post-Campaign Vaccination Coverage — Equateur and Province Orientale, Democratic Republic of the Congo, 2013

Authors: Jennifer B. Harris, R. Obama, T. Coulibaly, A. Diaha, J. Ngo Ndjan, M. Alleman, K. Kretsinger

Background: Measles remains a leading cause of child mortality despite declining global incidence. In the Democratic Republic of the Congo, all 9-month old children should receive measles-containing vaccine (MCV). Suboptimal vaccination resulted in an outbreak of >300,000 suspected cases during 2010–2013. The Ministry of Health conducted localized outbreak response immunization and is implementing phased vaccination campaigns nationwide, targeting all children 6 months–9 years old. The campaigns started in October 2013 in the provinces with the largest outbreaks, Equateur and Province Orientale. We conducted a post-campaign vaccination coverage survey.

Methods: We selected 30 clusters per district in these provinces' 12 districts using probability proportional to size sampling and 10 households per cluster following World Health Organization cluster survey recommendations. We interviewed parents of all campaign-eligible children to ascertain receipt of MCV before and during the campaign. One child per age group (<1 year, 1–4 years, 5–9 years) per household was randomly selected for analysis. We estimated vaccination coverage and 95% confidence intervals (CI), accounting for clustering and age-stratum weights.

Results: We surveyed 11,650 children from 3613 households. Province-level campaign MCV coverage was 96% (CI: 95%–97%) in Equateur and 96% (CI: 94%–97%) in Province Orientale. District-level estimates ranged from 89% (CI: 82%–93%) to 98% (CI: 95%–99%). Among one year-olds, 12% (CI: 9%–16%) in Equateur and 6% (CI: 4%–9%) in Province Orientale first received MCV through the campaign.

Conclusions: High campaign MCV coverage should reduce measles transmission in these provinces. However, the proportion of one year-olds that first received MCV during the campaign highlights the need to strengthen routine immunization services and the importance of aggressive outbreak response.

11:10 Reasons for Low Influenza Vaccination Coverage Among Adults in Puerto Rico, Influenza Season, 2013–14

Authors: Carmen S. Arriola, M. Mercado-Crespo, B. Rivera, R. Serrano, N. Macklin, A. Rivera, C. Bish, S. Graitcer, M. Lacen, C. Bridges, E. Kennedy

Background: Vaccination prevents influenza and its complications. Influenza vaccination coverage among adults in Puerto Rico (PR) is low compared to the 50 U.S. states (17.2% vs. 36.2%). Little is known about Puerto Ricans' attitudes and practices regarding influenza vaccination. Identifying influenza vaccination attitudes and practices is necessary to identify interventions to increase vaccination coverage.

Methods: A random-digit-dialing telephone survey (50%/50% landline/cellphone) was conducted November 19-25, 2013. Questions were asked about vaccine receipt and attitudes and practices regarding influenza vaccination. Data were weighted to reflect sampling design and adjustments for non-response.

Results: The response rate was 53%; 232 surveys were completed. The respondents' median age was 55.5 years; 51 (22%) reported having received the 2013-14 influenza vaccine. Among 177 adults who received medical care since July 2013, 40% (95% CI: 33-48%) were recommended and 18% (95% CI: 13-25%) offered influenza vaccination. Among 180 unvaccinated respondents, 52% (95% CI: 44-59%) believed they had "somewhat low or very low" chances of influenza illness; 52% (95% CI: 44-59%) responded that they "will probably or will definitely not get the vaccine", with the most frequent reason cited as "safety/side effects concerns" (39%; 95% CI: 29-49%) followed by "not wanting or needing the vaccine" (32%; 95% CI: 23-43%).

Conclusions: Physician practices (failure of providers to recommend and/or offer vaccine) and patient attitudes (low perceived risk of influenza virus infection) may have contributed to low vaccination rates during the 2013-14 season. Providers and public health groups should strongly recommend influenza vaccination, provide these vaccinations or refer patients for vaccination, and educate patients on the risk of influenza illness.

11:30 Detecting the Reemergence of Wild Poliovirus Type 1 in Syria Through an Early Warning Alert and Response Network, July – October 2013

Authors: Miriam L. Shiferaw, M. Al Saad, F. Husain, A. Ridpath, T. Handzel, M. Brennan, D. Ehrhardt

Background: Wild poliovirus (WPV) was last identified in Syria in 1999. Since the start of the conflict in March 2011, routine polio vaccination coverage dropped from 99% in 2011 to 65% in 2012. Communicable disease surveillance has also largely been disrupted. In response to gaps in surveillance coverage in opposition controlled areas of northern Syria (NS), the Assistance Coordination Unit established an Early Warning Alert and Response Network (EWARN) in July 2013 to detect 10 epidemic-prone diseases, including polio.

Methods: EWARN had two components: immediate reporting of alerts signaling potential outbreaks from communities and weekly reporting and epidemiological trend analysis of EWARN priority syndromes, including acute flaccid paralysis (AFP), from selected health facilities. District level surveillance officers in seven NS governorates investigated alerts and implemented initial response activities. Investigations of AFP cases included collection of two stool specimens, 24 hours apart, and transportation by reverse cold chain to a World Health Organization-accredited laboratory for poliovirus testing.

Results: On October 5, the EWARN detected a cluster of 22 AFP cases in Deir-ez-Zor governorate with onset of paralysis from August 23 to October 8; 21 (95.5%) had paralysis in one limb. Stool specimens were collected from three (13.6%) case-patients. Active conflict and population movement impeded investigation of other cases. WPV type 1 was isolated from all three case-patients. The mean age of case-patients with polio was 29 months (range: 22-36 months); all had incomplete polio vaccination (<3 doses).

Conclusions: The detection of WPV in Syria signifies a public health emergency and underscores the importance of EWARN implementation and strengthening in conflict settings. Enhanced AFP surveillance is needed in neighboring countries to detect and control further WPV spread.

11:50 Diphtheria Outbreak in Lao Peoples Democratic Republic (PDR) 2012–2013: A Failure of Routine Immunization

Authors: Carolyn Sein, A. MacNeil, C. Soulaphy, P. Souliphone, R. Reyburn, A. Ramirez-Gonzalez, J.L. Goodson, M. Watkins, K. Wannemuehler, T.S.P. Tiwari

Background: As a result of increased coverage with diphtheria-tetanus-pertussis vaccine (DTP), global reported diphtheria cases decreased from 98,000 to 4,489 during 1980–2012. Where population immunity is low, outbreaks can occur. We investigated a diphtheria outbreak in Lao PDR that began in April 2012.

Methods: We reviewed diphtheria surveillance data reported from January 1, 2012–May 31, 2013. A diphtheria case was defined as a respiratory illness consisting of pharyngitis, tonsillitis, or laryngitis, and an adherent tonsillar, or nasopharyngeal pseudomembrane. To identify risk factors for diphtheria, we conducted a case-control study with two aged-matched neighborhood controls per case in Houaphan province, using bivariate analysis to calculate matched odds ratio (mOR) with 95% confidence intervals (CI). Reasons for non-vaccination among unvaccinated persons were assessed.

Results: During the study period, 62 cases and 12 deaths were reported in 7 of 17 provinces. Among case-patients, 37 (60%) were 5–14 years old, 5(8%) had received 3 DTP doses (DTP3), and 21 (34%) had received no DTP doses. Fifty-two (84%) cases were reported in Houaphan province. Among case-control enrollees, 5/42 (12%) cases and 20/79 (25%) controls had received DTP3 (mOR = 0.4, CI = 0.1-1.7). Among 20 cases and 38 controls with no DTP dose, 43% of cases and 40% of controls had lack of access to routine immunization services, and 57% of cases and 60% of controls had a missed opportunity for vaccination at a clinic visit.

Conclusions: Suboptimal DTP3 coverage likely contributed to the outbreak. Strengthening access to routine immunization services and reducing missed opportunities are needed to prevent future outbreaks. We also recommended a 3-round interim DTP campaign to raise population immunity.

CONCURRENT SESSION H2: Maternal and Child Health

10:45AM–12:10PM

Dunwoody Suite

Moderator: Wanda Barfield

10:50 Mother's Return to Work and Meeting Her 6-Month Breastfeeding Intention — United States, 2005–2007

Authors: Kelsey R. Mirkovic, C. Perrine, K. Scanlon, L. Grummer-Strawn

Background: Breastfeeding provides numerous health benefits for infants and mothers; however, many infants are not breastfed as long as recommended or desired by mother. Maternal employment has been cited as a barrier to breastfeeding. We assessed whether maternity leave duration and return-status (full-time [FT], part-time [PT]) were associated with not meeting intentions to breastfeed ≥6 months.

Methods: We used data from the Infant Feeding Practices Survey II, a cohort study. Analyses were limited to women employed prenatally who intended to breastfeed ≥6 months (n = 963). We used multivariable logistic regression to assess the relationship between maternity leave duration and return-status (<6 weeks/FT, <6 weeks/PT, 6–¬<12 weeks/FT, 6–<12 weeks/PT, ≥12 weeks–<6 months/FT, ≥12 weeks–<6 months/PT, not working by 6 months) and meeting 6-month breastfeeding intention.

Results: Forty-one percent of mothers did not meet their 6-month breastfeeding intention. Compared with mothers not working by 6 months, mothers who returned to work <6 weeks/FT had 5.44 times the odds (95% confidence interval [CI]: 2.64–11.20) of not meeting their intention. Odds of not meeting intentions were higher among mothers who returned anytime <6 months at FT or PT status (<6 weeks/PT adjusted odds ratio [aOR]: 1.98, CI: 1.14–3.43; 6–<12 weeks/FT aOR: 2.64, CI: 1.73–4.02; 6–<12 weeks/PT aOR: 1.56, CI: 1.00–2.44; 12 weeks–<6 months/FT aOR: 3.45, CI: 2.10–5.64; ≥12 weeks–<6 months/PT aOR: 1.80, CI: 1.02–3.18).

Conclusions: Returning to work before 6 months may reduce a mother's ability to meet her intention to breastfeed for at least 6 months. Longer maternity leave and part-time return schedules may help more women achieve their breastfeeding goals.

11:10 Trends in Gestational Weight Gain: Results from the Pregnancy Risk Assessment Monitoring System — 2000–2009

Authors: Jonetta L. Johnson, S. Farr, P. Dietz, A. Sharma, W. Barfield, C. Robbins

Background: Excessive and inadequate gestational weight gains (GWG) are associated with adverse maternal and infant outcomes. Although prevalence of prepregnancy obesity has increased, current trends in GWG are unknown. We estimate current population-based trends of GWG.

Methods: We analyzed data from the Pregnancy Risk Assessment Monitoring System for 95,025 women who delivered live births in 14 states during 2000–2009. We modeled GWG in pounds, as a continuous and 3-level categorical variable: inadequate, appropriate and excessive gain, according to 1990 Institute of Medicine (IOM) recommendations. We examined adjusted trends in mean GWG by using multivariable linear regression, and we examined inadequate or excessive GWG compared with appropriate GWG by using multivariable multinomial logistic regression.

Results: There was a 0.9 biennial percentage point increase in the percentage of women with excessive gain during 2000–2001 (43%) to 2008–2009 (46%) (P trend <.01). The percentage of women with appropriate gain decreased 1.1 percentage points biennially (2000–2001: 38%; 2008–2009: 34%; P trend <.01). From 2000-2001 to 2008-2009, the adjusted odds of excessive (odds ratio [OR]: 1.1; 95% confidence interval [CI]: 1.0–1.2) and inadequate gain (OR: 1.1; CI: 1.0–1.2) increased significantly. Mean GWG did not change during 2000–2009.

Conclusions: Appropriate GWG decreased while mean GWG remained unchanged. This may be due to more women entering pregnancy overweight and obese, yet gaining outside their GWG guidelines. Compared with 1990 guidelines, 2009 guidelines recommend less GWG for obese women. Thus, a higher percentage of women may have excessive GWG if current trends continue. Efforts are needed to develop and implement strategies to ensure that women enter pregnancy at a healthy weight and achieve recommended GWG.

11:30 Vitamin K Deficiency Bleeding in Infants Not Receiving Vitamin K Prophylaxis — Tennessee, 2013

Authors: Lauren H. Marcewicz, J. Clayton, M. Maenner, E. Odom, E. Okoroh, A. Grant, A. Goodman, D. Christensen, J. Traylor, A. Miller, M. Warren

Background: Infants not receiving intramuscular vitamin K prophylaxis at birth are 81 times more likely than prophylaxed infants to develop vitamin K deficiency bleeding (VKDB), a severe coagulopathy. In 2013, five infants with VKDB presented to Hospital X in Tennessee; by parental choice, none had received vitamin K. A case-control study investigated additional risk factors for VKDB; structured interviews with parents assessed reasons for opting out of vitamin K.

Methods: Our case definition included infants born in Tennessee in 2013 who presented at age 2-24 weeks with symptomatic hemorrhage and had laboratory confirmation of and no medical conditions predisposing to VKDB. Healthy control infants (n=12) were born in 2013 at a Nashville-area tertiary care center, did not receive vitamin K, and were exclusively breastfed. Infant and maternal medical histories and reasons for opting out of vitamin K were obtained through medical record review and parental interviews; Fisher's exact tests assessed associations between potential risk factors and VKDB.

Results: Four infants met case criteria. All case but no control mothers reported a history of easy bruising, heavy periods, or both (p <0.01). No other factors were significantly associated with VKDB. All parents (n=16) expressed concerns about vitamin K that centered on additional ingredients (44%), dosage (28%), and possible cancer risk (28%).

Conclusions: Undiagnosed bleeding disorders may have contributed to VKDB among infants not receiving vitamin K, but small sample size and potential recall bias limit the interpretation of this finding. Parents of cases and controls commonly endorsed non-evidence based concerns about vitamin K; public health efforts to provide information about vitamin K should address these concerns while conveying the severe consequences of opting out of prophylaxis.

11:50 Vitamin K Refusal Rates and Parental Attitudes — Tennessee, 2013

Authors: Joshua L. Clayton, L. Marcewicz, J. Traylor, A. Grant, J. Dunn, T. Jones, W. Schaffner, M. Warren

Background: Late vitamin K deficiency bleeding (VKDB) manifests at 2 weeks–6 months of age, primarily as intracranial hemorrhage; risk increases without vitamin K prophylaxis. Reported incidence is 4.4–7.2 cases/100,000 births among infants without prophylaxis. During 2013, four VKDB cases were reported in Nashville (25/100,000 births). We investigated to determine the rates and predictors of vitamin K refusal.

Methods: We examined the 2013 birth cohort at a Nashville children's hospital (Hospital A) and 5 freestanding birthing centers (over-representing birthing centers) to identify vitamin K refusers, determine refusal rates, and perform a vitamin K knowledge survey. We randomly sampled births from Nashville's largest obstetrics hospital (Hospital B) for vitamin K nonreceipt rates during 2011–2013.

Results: We identified 104 vitamin K refusers at Hospital A (rate: 2.7%) and 83 at 5 birthing centers (rate: 28%; range: 15%–83%). Vitamin K nonreceipt rates at Hospital B were 3.2% (95% confidence interval [CI]: 1.3–6.5) in 2013, 3.7% (95% CI: 1.4–8.0) in 2012, and 2.3% (95% CI: 0.6–6.1) in 2011. Of 102 vitamin K refusers surveyed, 47 (46%) responded; 31/47 (66%) identified bleeding as a risk of refusing prophylaxis. The leading reasons for refusal were desire for a natural birthing process (43%) and believing prophylaxis was unnecessary (43%). Hepatitis B vaccine and erythromycin eye ointment were also refused by 65% of respondents.

Conclusions: Vitamin K refusal rates varied appreciably between Hospital A and birthing centers; a consistent proportion of newborns at Hospital B did not receive vitamin K. The majority of vitamin K refusers surveyed also refused several other preventive care measures. Health care providers should discuss risk of VKDB with parents early in pregnancy.

SPECIAL SESSION: EIS — Challenges and Opportunities in Epidemiology Training

12:10–1:30pm

Dunwoody Suite

Moderator: Mary Kamb

The goal of this session is for the EIS Program to gain feedback on the challenges and opportunities facing EIS officers as they enter the epidemiology workforce. Some areas that will be addressed are the skill sets that EIS officers currently gain going to be the right ones in the future? What skills make an EIS officer the best hire? Do EISOs currently have those skills when they complete EIS?

Representatives for the CDC CIOs and for the state and local perspective will briefly describe their needs for an EIS officer and the challenges and opportunities for public health work including surveillance and electronic data. Following this there will be opportunities for questions and open discussion with the audience. The EIS Alumni Association will help moderate the session and provide the alumni perspective.

This session will allow the EIS Program to give timely program updates, receive stakeholder input, learn of concerns and challenges, and is complementary to other special sessions sponsored during the conference by centers.

Speakers:

- CIO representative: *David L. Swerdlow*
- State/local Health Departments: *Tim Jones and Laurene Mascola*
- Acting EIS Chief: *Diana Bensyl*
- EISAA President: *Mary Kamb*

CONCURRENT SESSION 11: Global Health

1:30–3:35pm

Ravinia Ballroom

Moderators: Jordan Tappero and Rob Tauxe

1:35 Where's the TB? Understanding Low TB Case Notification Rates — Haiti, 2013.

Authors: Stephanie J. Salyer, D. Fitter, R. Milo, C. Blanton, J.L. Ho, H. Geffrard, W. Morose, B.J. Marston

Background: While an estimated 30,000 TB cases occur annually in Haiti, only about 14,000 were registered nationally each year from 2009 to 2011. To assess quality of surveillance including whether underreporting from sites to the national level contributes to low national case registration, we conducted a nationally representative evaluation of TB surveillance.

Methods: We collected 2010 and 2012 case totals, reviewed lab registries, and abstracted individual case TB reports from 32/363 treatment sites randomly selected after stratification/weighting toward higher-volume sites. We compared site results to national databases maintained by an NGO partner (International Child Care [ICC]) for 2010 and 2012, and the National TB Program (PNLT) for 2012 only.

Results: Case registries were available at 30/32 (2010) and all 32 sites (2012). Totals of 3711 (2010) and 4143 (2012) cases were reported at the sites. Case totals per site were higher in site registries than in the national databases by 361 (9.7%) (ICC 2010), 28 (0.8%) (ICC 2012), and 31 (0.8%) cases (PNLT 2012). Of abstracted individual cases, 6.8%–11.8% per site/year were not recorded in national databases. For abstracted cases, final treatment determination was missing from the ICC database in 55.4% (2010) and 33.9% (2012) of cases, and not available from the PNLT database. Based on laboratory registers, 10.0% of TB suspects initiated, but did not complete TB testing; 6.7% of these had initial positive AFB smears.

Conclusions: Currently, registered TB cases are being effectively reported to the national level in Haiti. Improvement in case notification will require improved case detection and diagnosis.

1:55 Challenges in Detecting Malaria Outbreaks in an Epidemic-Prone Region — Kuando Kubango Province, Angola, 2013

Authors: Magdalena M. Paczkowski, S. Nasr, Y. Ricardo, R. Kiniffo, A. Macedo de Oliveira

Background: Malaria outbreak detection is difficult in epidemic-prone regions of malaria-endemic countries because routine surveillance is tailored to areas with stable transmission. Outbreak detection delays can lead to increased morbidity and mortality, while erroneous alerts waste already limited resources. Angola recently implemented an epidemic prevention and response system (EPRS) to detect outbreaks using national malaria surveillance system data. EPRS determines if monthly reported laboratory-confirmed cases exceed an outbreak threshold created from 5-year historical data. We assessed EPRS's attributes, including its outbreak detection usefulness.

Methods: We reviewed patient registries in a convenience sample of 4 health facilities in Kuando Kubango, an epidemic-prone province. We evaluated EPRS's analytic methods, compared the number of reported malaria cases with those in registries, and reviewed EPRS-detected outbreaks during January–June 2013.

Results: Contrary to expectation, historical data used to generate outbreak threshold and monthly reported data were based mainly on clinical diagnoses, not laboratory results. We could not estimate the proportion of laboratory-confirmed cases reported because laboratory testing was inconsistent and registries were incomplete. Using clinical cases instead, we found the number of reported cases in June 2013 to be 30% to 446% of cases documented in registries. During January–June 2013, EPRS detected 5 suspected malaria outbreaks, only 1 of which was confirmed.

Conclusions: The outbreak detection capability of EPRS is limited. EPRS data are hampered by inconsistent laboratory testing, and the outbreak threshold is based on clinical information. Weekly, rather than monthly, data reporting and analysis would facilitate timely outbreak detection and response. Laboratory testing and its documentation in registries should be improved, and alternative outbreak detection methods, such as the proportion of laboratory-positive tests, should be considered.

2:15 Pathogen-Specific Mortality Among Infants and Young Children with Moderate-to-Severe Diarrhea — Western Kenya, 2008–2011

Authors: Allison T. Walker, R. Omore, F. Moke, J. Ochieng, T. Farag, D. Nasrin, S. Panchalingam, J. Nataro, K. Kotloff, M. Levine, X. Lu, J. Oundo, M. Parsons, C. Bopp, K. Laserson, E. Mintz, R. Breiman, C. O'Reilly

Background: Diarrhea is a leading cause of childhood morbidity and mortality in sub-Saharan Africa; one in ten child deaths in the first 5 years of life is due to diarrheal disease. We assessed pathogen-specific mortality following an episode of moderate-to-severe diarrhea (MSD) in children enrolled in the Global Enteric Multicenter Study in western Kenya.

Methods: We recruited children <5 years old presenting to sentinel health facilities with MSD. Stool specimens collected at enrollment were tested for bacterial, parasitic and viral enteric pathogens. Survival status was determined at 60 days. We calculated unadjusted exact odds ratios (OR) and 95% confidence intervals (CI) using simple logistic regression models.

Results: From 2008 to 2011, 1,476 children with MSD were enrolled; 52 (3.5%) died. Nineteen (37%) children died at health facilities (7 at enrollment) and 33 (63%) died at home. Case-fatality rates by age stratum were 4.5% (<12 months), 3.1% (12–23 months), and 2.3% (24–59 months). Pathogens associated with increased risk of case-fatality were Shigella dysenteriae (OR: 7.2; CI: 1.3–27.8), non-typhoidal *Salmonella* (OR: 2.8; CI: 1.0–6.6), typical enteropathogenic Escherichia coli (OR: 2.6; CI: 1.1-5.5), and enterotoxigenic E. coli producing heat-stable toxin (OR: 2.5; CI: 1.1–5.2). Children who died were more likely (at enrollment) to have bipedal edema (OR 22.5; CI: 8.0–60.6), clinical under-nutrition (OR 11.9; CI: 6.4–22.2), thin, sparse and straight hair (OR 11.2; CI: 5.5–21.9), and flaky skin (OR 16.5; CI: 7.5–35.0).

Conclusions: Malnutrition and four bacterial pathogens for which no vaccines are available were associated with increased risk of mortality from MSD. In the near-term, optimizing nutritional status and water, sanitation, and hygiene interventions are urgent priorities for childhood diarrheal mortality reduction in Kenya.

2:35 Ceramic Water Filters and Reducing the Burden of Diarrheal Disease in Infants — Western Kenya, 2013

Authors: Jamae F. Morris, C. Schneeberger, P. Jaron, F. Moke, J. Juma, J.B. Ochieng, R. Omore, T. Ayers, J. Murphy, J. Priest, L. Xiao, B. Fields, J. Montgomery, J. Vulule, E. Mintz, V. Hill, C.E. O'Reilly

Background: Unsafe drinking water consumption is a risk factor for diarrhea, the leading cause of death in sub-Saharan African children. Ceramic water filters (CWFs) remove or inactivate waterborne diarrheal pathogens in drinking water through size exclusion and silver exposure. We examined the effectiveness of CWFs to improve drinking water quality and prevent infantile diarrhea in rural western Kenya.

Methods: A randomized, controlled intervention trial was conducted among 240 households with infants 4-10 months old. Each household was randomized into an intervention or control group with or without CWFs, respectively. Trained interviewers performed a baseline survey and visited households weekly for 26 weeks to document recent onset of diarrhea, respiratory infection, and febrile illness in infants. Source and filtered water samples were tested to monitor *Escherichia coli* concentrations, measured as most probable number (MPN). Person-time incidence rates were calculated per person-weeks of observation.

Results: Households reported using surface water (36.3%), public taps (29.2%), or rainwater (17.1%) as their primary drinking water sources. Self-reported filter use among intervention households was 99.7% across weeks observed. Compared with the control group, intervention households reported fewer diarrheal episodes (8.9 vs. 10.9, p=0.22) and fewer health facility visits for diarrhea (1.1 vs. 2.5, p<0.01). The incidence of respiratory infection (0.34 vs. 0.30, p=0.45) and febrile illness (1.02 vs. 0.93, p=0.56) remained similar. *E. coli* were detected in 100% of source water samples (median concentration 426 MPN/100mL; range <10 – 1.4x104 MPN/100mL) and in only 29% of filtered water samples (median concentration 7.4 MPN/100mL; range <1.0 – >2420 MPN/100mL).

Conclusions: Households using CFWs had improved water quality and reported lower incidence and significantly fewer health facility visits for diarrhea in infants.

2:55 Integrating Water Treatment into Antenatal Care: Impact on Use of Reproductive Health Services and Household Water Treatment by Pregnant Women — Uganda, 2013

Authors: Almea M. Matanock, T. Anderson, M. Mutabazi, L. Likicho, C. Kakande, T. Emeetai, X. Lu, T. Ayers, R. Quick

Background: In Uganda, high maternal and neonatal mortality rates reflect underutilization of reproductive health services; high diarrhea risk among children results from poor access to safe water. To incentivize household water treatment and reproductive health service use, water treatment kits (buckets and packets of flocculant-disinfectant powder) were provided at first antenatal visits. Packet refills were distributed at follow-up antenatal visits, health facility deliveries, and postnatal check-ups.

Methods: We evaluated this intervention with a cross-sectional survey and maternal passbook review of a random sample of women from participating health facilities who received reproductive health care in 2013 after project launch (intervention group) and in 2012 before project launch (comparison group). We used Chi-Square test statistic to compare groups.

Results: We surveyed 226 intervention group women and 207 comparison group women. A higher percentage of intervention than comparison group women reported treating drinking water on the day of the survey (41.1% vs 24.3%, P=.007), and had detectable chlorine residual, an objective measure of treatment, in their stored water (13.5% vs 3.8%, P=.002). Of 226 intervention group women, 222 (98.2%) received hygiene kits but only 101 (45.5%) received refill packets. Among 282 women with maternal passbooks, similar percentages of intervention and comparison group women had 4+ antenatal visits (43.4% vs 38.7%, P=.43), health facility deliveries (38.6 vs 40%, P=.82), and postnatal visits (9% vs 4.7%, P=.26) recorded.

Conclusions: Intervention group women were more likely than comparison group women to treat their drinking water, but had similar low use of reproductive health services. Although hygiene kit coverage at first antenatal visit was high, inadequate distribution of, or low demand for, refill packets may have contributed to limited program impact.

3:15 Use of Capture-Recapture Methodology To Characterize Neonatal Mortality Rates in Farchana Refugee Camp — Chad, 2013

Authors: Rachel T. Idowu, D. Morof, G. Affana, B. Tomczyk, C. Blanton, N. Cornier

Background: Reliable estimates of neonatal mortality rates (NMR) are lacking in refugee camps. We used capture-recapture (CRC) to estimate NMR in Farchana refugee camp from February 2012–January 2013.

Methods: We identified live births, stillbirths, and neonatal deaths (NND) occurring between 24 February 2012–4 January 2013. Capture involved review of the camp health facility's Health Information System (HIS). Recapture consisted of an exhaustive household survey of women of reproductive age (WRA) and review of non-facility health registers (community health worker and Hebrew Immigrant Aid Society). "Total NND" was NND counted during CRC plus unidentified NND not detected during CRC (estimated using contingency table proportions). NMR was calculated using live births identified in the WRA survey.

Results: The survey of 4,995 WRA identified 817 live births. HIS had 1 NND (capture). Thirteen unique NND were identified through recapture: 8 from survey plus 7 from the health registers minus 2 deaths that were found in multiple sources. Using the NND found in the HIS alone, the NMR would be 1.22 NND/1000 live births. Using unidentified NND estimated from CRC contingency tables, we calculated that 40 "Total NND" occurred in Farchana during the study period, yielding an estimated NMR of 49 deaths/1000 live births.

Conclusions: Health registers differentially captured NND. A WRA survey partially improved NND identification. Over half of "Total NND" may have been unidentified by any data source. HIS captured only 1 NND, indicating the Farchana health facility has poor sensitivity to detect NND. Further reliance on the HIS registry alone will severely underestimate Farchana NMR and perhaps other camps where HIS is used. Unreliable NMR estimates may negatively impact mortality reduction programs.

CONCURRENT SESSION I2: Health Care

1:30–3:35PM

Dunwoody Suite

Moderators: Joseph Perz and Marion Kainer

1:35 Risk Factors for Invasive *Methicillin-Resistant Staphylococcus aureus* Infection After Discharge from Acute-Care Hospitals — United States, 2011–2013

Authors: Lauren Epstein, A.J. Kallen, R. Belflower, Y. Mu, J. Scott, G. Dumyati, C. Felsen, S. Petit, K. Yousey-Hindes, J. Nadle, L. Pasutti, R. Lynfield, L. Warnke, W. Schaffner, K. Leib, S.K. Fridkin, F.C. Lessa

Background: Great strides have been made in reducing methicillin-resistant *Staphylococcus aureus* (MRSA) infections in U.S. hospitals. However, the decreases in MRSA infections among recently discharged patients have been less substantial. In 2011, an estimated 38,000 invasive MRSA infections occurred among persons discharged from U.S. hospitals in the prior 12 weeks. We assessed risk factors for developing invasive MRSA infections after an acute care hospitalization to inform new prevention strategies.

Methods: We conducted a matched case-control study. A case was defined as MRSA cultured from a normally sterile body site in a patient discharged from an acute care hospital within the prior 12 weeks. Eligible cases were identified from 15 hospitals across 6 U.S. states. For each case, two controls matched on hospital, month of discharge and age were selected. Medical record review and telephone interviews were conducted to assess exposures during the hospitalization and post-discharge periods. Conditional logistic regression was performed to identify independent risk factors for post-discharge invasive MRSA infections.

Results: From February 1, 2011 through March 31, 2013, 194 cases and 388 matched controls were enrolled. Among the cases, 152 (78%) developed blood stream infections. After controlling for gender, comorbidities and recent history of MRSA colonization, the independent predictors of invasive MRSA infections were post-discharge surgical procedures (mOR=4.7, P=.04), insertion of central venous catheters (CVC) during the post-discharge period (mOR=3.4, P=.03), discharge to a long term care facility (LTCF) (mOR=3.3, P=<.001), and discharge with an invasive device other than CVC (mOR 2.5, P=.007).

Conclusions: Additional efforts to prevent post-discharge invasive MRSA infections should include improving infection prevention practices in LTCFs and improving the insertion and maintenance of invasive devices in recently discharged patients.

1:55 Peripheral Joint Infections Associated with Contaminated Preservative-Free Methylprednisolone Acetate Injections — Michigan, October 2012–October 2013

Authors: Mawuli K. Nyaku, J. McFadden, J. Collins, C. Miller, J. Fiedler, S. Johnson, B. Brennan, J. Coyle, R. Heyding, A. Malani, C. Ledtke, J. Finks

Background: Fungal infection from a contaminated injection is rare (~4/10,000 injections) and can result in permanent joint damage if untreated. Infection associated with the 2012 nationwide fungal meningitis outbreak caused by contaminated methylprednisolone acetate (CMPA) injections continue to be reported. Michigan has reported 25/33 of U.S.-reported peripheral joint infections (PJIs). We describe the epidemiologic and clinical characteristics of affected Michigan patients.

Methods: A probable case was defined as osteomyelitis or worsening inflammatory arthritis of a peripheral joint after CMPA injection after May 21, 2012. Confirmed cases also had a fungal pathogen detected through direct microscopy, culture, or polymerase chain reaction of synovial fluid, or histopathology of joint tissue. Cases were identified through active surveillance or patients self-reporting symptoms; clinical information was obtained through medical record review. All patients had magnetic resonance imaging (MRI).

Results: Among the 22 probable and 3 confirmed cases, all presented with joint pain; however, 15 (60%) were among patients with symptoms unchanged from before their infection. Twenty-three patients had ≥1 underlying chronic condition, including renal insufficiency, diabetes, cardiovascular disease, and immunosuppression. Twenty-four had surgical treatment for infection, including incision and drainage, arthroscopic debridement, clavicle resection, and hip arthroplasty. Median joint aspirate white blood cell count at diagnosis was 717 cells/μL (range: 9–24,000). Median days from last injection to first MRI joint infection evidence was 70 (range: 22–171). Patients had received a median of 1 (range: 1–3) CMPA injection.

Conclusions: Approximately half of Michigan PJIs occurred among patients without new symptoms who later required surgical treatment. A higher index of suspicion should be maintained for patients who received PJIs in the absence of a gold standard for case identification.

2:15 National Estimates of Insulin-Related Hypoglycemia and Errors (IHEs) Leading to Emergency Department (ED) Visits and Hospitalizations — United States, 2007–2011

Authors: Andrew Geller, N. Shehab, M. Lovegrove, S. Kegler, K. Weidenbach, G. Ryan, L. Hampton, D. Budnitz

Background: National prevalence of diabetes mellitus (DM) is increasing, and the number of insulin-treated DM patients has risen 50% over the last decade; one-third of DM patients currently use insulin. Insulin therapy and associated hypoglycemia risks are challenging aspects of DM therapy. Data describing high-risk populations and circumstances involved in IHEs can inform approaches to glycemic targets.

Methods: We estimated ED visits for IHEs from National Electronic Injury Surveillance System — Cooperative Adverse Drug Event Surveillance data (2007–2011) and insulin use from National Health Interview Survey data (2007–2011).

Results: Based on 8,100 cases, an estimated 97,648 (95% confidence interval [CI]: 64,410–130,887) ED visits for IHEs occurred annually. Severe neurologic sequelae (hypoglycemia-associated shock, loss of consciousness, or seizure; hypoglycemia-associated injury or fall; or hypoglycemia-associated altered mental status) were documented in an estimated 60.6% (CI: 51.3%–69.9%) of ED visits for IHEs. Almost one-third of ED visits (29.3% [CI: 21.8%–36.8%]) resulted in hospitalization. Blood glucose levels ≤50 mg/dL were recorded in over one-half (53.4%) of cases. Insulin-treated DM patients aged ≥80 years were more than twice as likely to visit the ED (rate ratio: 2.5; CI: 1.5–4.3) and nearly five times as likely to be hospitalized (rate ratio: 4.9; CI: 2.6–9.1) for IHEs than those aged 45–64 years. The most commonly-identified IHE precipitants were reduced food intake and administration of the wrong insulin product.

Conclusions: Rates of ED visits and hospitalizations for IHEs were highest in patients aged ≥80 years; risks of hypoglycemic sequelae in this age group should be considered in decisions to prescribe and intensify insulin. Meal-planning and insulin product mix-up misadventures are important potential targets for hypoglycemia prevention efforts.

2:35 Cluster of *Staphylococcus aureus* Septic Arthritis Cases After Intra-Articular Injection of Autologous Platelet-Rich Plasma — North Carolina, October 2013

Authors: Sarah K. Rhea, S.E. Morrison, L. Weaver, V. Albrecht, K. Anderson, D. Nguyen, Z. Moore

Background: On October 18, the North Carolina Division of Public Health was notified of 2 patients requiring surgical debridement for *Staphylococcus aureus* (SA) septic arthritis after receiving intra-articular injections at the same outpatient facility. Both patients received injections containing autologous platelet-rich plasma and a human placental tissue-derived allograft product, an unproven alternative therapy for osteoarthritis. We investigated to determine a source and prevent further infections.

Methods: We visited the facility, reviewed information about patients who had received similar injections, interviewed the physician, and assessed infection control practices. We performed bacterial cultures on nasal and throat swabs collected from medical personnel involved in the procedure and compared these isolates with patient synovial fluid isolates by using pulsed-field gel electrophoresis (PFGE).

Results: Preparation of injection materials was a multistep process involving extensive manipulations in the procedure room. We observed opportunities for contamination of injection materials and supplies. Face masks were used inconsistently. SA carriage was identified among 3 of 4 medical personnel involved in the procedure. SA from the physician's throat was indistinguishable from both patients' synovial fluid isolates by PFGE; SA from 2 other personnel did not match patient isolates. No additional infections were identified among 7 other patients who had received similar injections since the facility opened in July.

Conclusions: Although we were unable to discern respiratory droplet versus contact transmission in this cluster, the preparation of injection materials for this unproven therapy offered ample opportunity for SA transmission. This investigation highlights the importance of using accepted safe practices for sterile compounding when performing extensive manipulations of injection materials.

2:55 The Effect of Having a Medical Home and Reported Family Financial Burden Among Children with Special Health Care Needs — Kansas, 2009–2010

Authors: Suparna Bagchi, J. Kim, K. Bisgard, B. Robinson, I. Trevino-Garrison, D.C. Hunt

Background: One in 5 households in the United States include ≥1 children with special healthcare needs (CSHCN); 21% of CSHCN live in families who reported financial burden (FB) meeting the child's healthcare needs. Prior studies demonstrated reduced FB association with receiving care within a MH. The relationship between these factors among CSHCN in Kansas has not been explored; therefore, we assessed the association between having a MH and reported FB.

Methods: Kansas data (n = 787 CSHCN; parent-reported telephone survey) from the 2009–2010 National Survey of CSHCN were analyzed. Factors associated with reported FB (dichotomous variable Yes/No) included: healthcare through a MH (19-item composite measure) and covariates [e.g. child's age, sex, functional limitations, family structure, household education level, federal poverty level (FPL), insurance type, and access to healthcare] were assessed using weighted logistic regression.

Results: Overall, 49.4% CSHCN had received healthcare through a MH; 26.3% CSHCN lived in families that reported FB. Lack of a MH was associated with increased FB (adjusted odds ratio [aOR]: 1.84; 95% confidence interval [CI]: 1.08–3.17). Higher FB was reported among CSHCN living in families ≤200% FPL versus >400% FPL (aOR: 2.64: 95% CI: 1.21–5.75) and those having barriers accessing healthcare (aOR: 2.82: 95% CI: 1.64–4.84). CSHCN with no versus ≥3 functional difficulties (aOR: 0.06: 95% CI: 0.02–0.21), daily activities unaffected versus moderately/consistently affected (aOR: 0.49: 95% CI: 0.27–0.91), and with either public or private insurance versus uninsured (aOR: 0.28: 95% CI: 0.10–0.76) lived in families reporting less FB.

Conclusions: MH absence was associated with increased family FB among Kansas CSHCN. Our findings provide information to policymakers about provision of healthcare via MH.

3:15 Infection Control Practices and Multidrug-Resistant *Acinetobacter baumannii* Outbreak in a Hospital — Puerto Rico, 2013

Authors: Nora Chea, K. Pringle, S. Irving, A. Kerk, A. Kallen, A. Laufer, L. Pollack, H. Moulton-Meissner, A. Shams, A. Ferreira, B. Rivera, J. Rullan

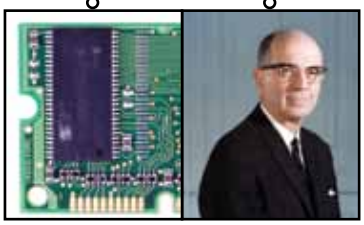
Background: Multidrug-resistant *Acinetobacter baumannii* (MDR-Ab) infections are associated with high mortality rates (≥50%), and organisms are able to survive on environmental surfaces, facilitating transmission. In August 2013, the Puerto Rico Department of Health (DOH) requested assistance from CDC to assist investigating and controlling an outbreak of MDR-Ab infections in a hospital.

Methods: Case-patients were defined as individuals with a clinical or surveillance culture positive for MDR-Ab at the hospital during July 1, 2012 to August 24, 2013. A subset of case-patient records were reviewed to identify common exposures and in-hospital transmissions (first positive MDR-Ab culture >3 days after admission). Admission prevalence was the percent of MDR-Ab culture-positive patients within three days of admission. Infection control practices were observed. Environmental cultures were collected and compared to case-patient isolates using pulsed-field gel electrophoresis (PFGE).

Results: Of 129 case-patients, 68 (all case-patients from January to August 2013) underwent record review, of which 57 (84%) were intubated, 42 (62%) had portable x-rays, and 31 (45.5%) had positive sputum cultures. In-hospital transmissions averaged one per week (range: 0–4); monthly admission prevalence was <1%. Adherence to hand hygiene and Contact Precautions was 39% and 74%, respectively. High-touch surfaces were often missed during room cleaning. MDR-Ab were recovered from cultures of portable x-ray, patient room, and faucet used to rinse laryngoscope blades. PFGE indicated four clusters, of which one contained indistinguishable case-patient and environmental isolates. No further MDR-Ab transmission was identified after a DOH Task Force oversaw the hospital implementation of CDC-recommended interventions.

Conclusions: A large, polyclonal outbreak of hospital-acquired MDR-Ab occurred at the hospital with suboptimal adherence to infection control. The outbreak was stopped after rigorous improvement of infection control.

SESSION J:
Alexander D. Langmuir Memorial Lecture and Reception



3:50–5:20pm

Ravinia Ballroom

Moderators: Pattie Simone and Denise Koo

Presentation of the Alexander D. Langmuir Prize Manuscript Award and the Distinguished Friend of EIS Award

EIS in an Era of Data, Technology, and Urban Transformations
SPEAKER: Martín-J. Sepúlveda, MD, FACP

Martín-J. Sepúlveda, MD, FACP, is an IBM Fellow and Vice President of Health Systems and Policy Research in the Research Division of the IBM Corporation. He collaborates in research with a diverse global team of computational, informatics and other IBM scientists for population health improvement through health systems and health care innovation. The targets for our work are high impact opportunities in complex systems such as cities to improve health and health value (cost, quality, and equity) using data and advanced analytics to improve planning, resource use, and allocation. A second major research area is human performance optimization in enterprises through novel analytics combining human capital, health, and community data sets.

Before this, he served as IBM VP for Integrated Health Services and led health policy and strategy, health benefits and clinical care program design and delivery, occupational and behavioral health, wellness and productivity for IBM globally. He has extensive global experience and competency in population and public health, noncommunicable diseases prevention, health policy/strategy and funding, primary care and care program redesign, process and quality improvement, health systems, and workforce health and productivity.

He is a Fellow of the American College of Physicians, the American College of Preventive Medicine, and the American College of Occupational and Environmental Medicine. He was elected an honorary member of the American Academy of Family Medicine and serves on the Institute of Medicine's Population Health and Public Health Practice Board, the American Board of Internal Medicine Foundation, the Commonwealth Fund Commission for a High Performance Health System and the Council on Health Research for Economic Development. He is chair of the Global Business Group on Health and chair of the Institute for Health Benefits Innovation Research at the Employee Benefits Research Institute.

He received his MD and MPH degrees from Harvard University. He completed residencies in internal medicine at the University of California San Francisco Hospitals, Occupational/Environmental Medicine at the National Institute for Occupational Safety and Health, trained in the Epidemic Intelligence Service of the U.S. Centers for Disease Control, and completed a fellowship in internal medicine at the University of Iowa Hospitals and Clinics. He has authored over 20 peer reviewed scientific publications, worked on numerous Institute of Medicine and other committees and commissions producing national strategies on public health, chronic liver disease, and other subjects.

SESSION K: International Night

5:30–10:00pm

5:30	Poster Presentations
6:45	Photo Contest
7:30–10:00	Oral Presentations and Awards

Ravinia Ballroom

See supplement for complete list of presenters and abstracts.

7:45 Reemergence of Rabies on an Island Nation: A Once in a Lifetime Event, or an Indication of More to Come?

Authors: Ryan M. Wallace, J. Doty, N. Vora, S. Recuenco, A. Velasco-Villa, R. Franka, J.D. Blanton, D. Carroll, I. Damon, K. Christian, H. Wu, S. Chang, F.Y. Chang

Background: Rabies virus variants evolved to circulate primarily in specific reservoir species; these mammalian species are found on all continents except Antarctica. The canine variant is responsible for most human deaths worldwide. Canine rabies was eliminated from Taiwan in 1961 and the island was assumed to be free of rabies virus. In 2012 Taiwan discovered rabies viruses in Formosan Ferret Badgers. Taiwan CDC requested U.S. CDC assistance: identifying the source of rabies, implementing rabies surveillance systems, and developing disease prevention strategies.

Methods: Wildlife surveillance data were analyzed for spatial, temporal, and phylogenetic trends. Site visits were conducted to identify potential animal reservoirs and high risk human populations. Rabies surveillance methods were reviewed and protocols discussed with local and national health authorities.

Results: Historical wildlife surveillance data suggest a fatal disease epizootic in ferret badgers began as early as 2006. Phylogenetic analysis of rabies virus from ferret badgers in 2012 suggests that this variant is a descendent of the canine rabies virus variant eliminated from Taiwan in 1961. Spatial analysis of rabid ferret badgers suggests a natural barrier may be preventing spread into northern Taiwan.

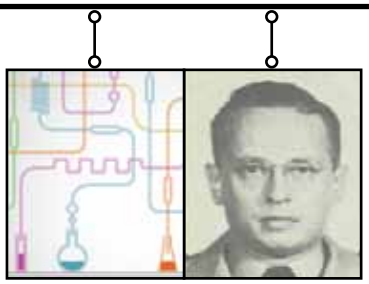
Conclusions: In the 51 years during which Taiwan was considered rabies-free, no terrestrial wildlife rabies testing was conducted. Limited wildlife rabies surveillance is likely true for many other countries and island territories, which currently are considered rabies-free. Vaccination of dogs should be prioritized, as they may be a vector to human exposure after interaction with ferret badgers. Additional surveillance studies are needed to determine the true extent of disease spread. Primary disease prevention among potentially exposed humans and domestic animals is crucial and wildlife management options should be investigated.

Session L: Donald C. Mackel Memorial Award Finalists

8:30–10:15am

Ravinia Ballroom

Moderators: Steve Monroe and Rachel Kaufmann



8:35 Outbreak of New Delhi Metallo-ß-Lactamase-Producing Carbapenem-Resistant Enterobacteriaceae at a Hospital — Illinois, 2013

Authors: Jennifer C. Hunter, L. Epstein, M.A. Arwady, V. Tsai, M.M. Frias, L. Stein, M. Gribogiannis, H. Moulton-Meissner, J.K. Rasheed, B. Kitchel, J.J. Avillan, A. Laufer, A.Y. Guh, J. Conway, B.M. Limbago, M.O. Vernon, A. Kallen

Background: Carbapenem-resistant Enterobacteriaceae (CRE) are an emerging threat; these bacteria inactivate "last resort" carbapenem antimicrobials and can cause infection with high mortality (40%). During March–July 2013, an Illinois hospital identified 8 patients with CRE caused by an antibiotic resistance mechanism rarely found in the United States, New Delhi metallo-β-lactamase (NDM). An investigation was conducted to understand and prevent further transmission.

Methods: A case was an NDM-producing CRE isolated from a patient in Illinois after January 1, 2013. To identify CRE risk factors, hospital cases were compared to controls selected from patients at the same hospital with negative surveillance cultures. Infection control practices were assessed; environmental sampling was performed. Case and environmental isolate relatedness was determined by pulsed-field gel electrophoresis (PFGE). Subsequent case-finding, using surveillance cultures, was initiated based on preliminary findings.

Results: Initially, 9 case-patients were identified; 8 were treated at the hospital. History of endoscopy with a duodenoscope was strongly associated with case-status (6/8 [75%] versus 1/27 [4%]; odds ratio: 78.0; 95% CI: 6.0–>999). No lapses in duodenoscope reprocessing were identified; however, NDM-producing Escherichia coli was recovered from the reprocessed duodenoscope and was highly related (>95%) to all case isolates by PFGE. Forty-nine of 96 patients with exposure to this duodenoscope underwent surveillance cultures; NDM-producing *E. coli* matching the outbreak strain was recovered from 22 (45%), resulting in 31 total cases. The duodendoscope was removed from service.

Conclusions: Surveillance and environmental cultures were essential in characterizing transmission of NDM-producing *E. coli* through endoscopy. While improperly reprocessed endoscopes can transmit bacteria, no reprocessing breaches were identified. A better understanding of duodenoscope design and reprocessing is critical for preventing future transmission of highly-resistant bacteria.

8:55 Hospital-Associated Outbreak of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) — Jordan, 2012

Authors: Brian S. Rha, M. Al-Abdallat, D. Payne, S. Alqasrawi, R. Tohme, G. Abedi, M. Al Nsour, I. Iblan, N. Jaarour, N. Farag, A. Haddadin, T. Al-Sanouri, A. Tamin, J. Harcourt, D. Kuhar, D. Swerdlow, X. Lu, M. Pallansch, S. Gerber, L. Haynes, and the Jordan MERS-CoV Investigation Team

Background: In April 2012, the Jordan Ministry of Health (JMoH) investigated a hospital outbreak of 13 cases of pneumonia of unknown etiology. Two cases were fatal and later confirmed by real-time polymerase chain reaction (PCR) as the first detected cases of Middle East Respiratory Syndrome coronavirus (MERS-CoV), an emerging virus with high mortality. We sought to determine if additional cases of MERS-CoV had occurred in this outbreak, and to describe their characteristics.

Methods: In May 2013, we collected serum specimens and standardized information from available members of the JMoH-investigated outbreak, household contacts, and healthcare personnel through interviews and medical chart reviews. Using newly developed CDC serologic tests for anti-MERS-CoV antibodies, we screened for past infection with an enzyme-linked immunosorbent assay, and confirmed diagnosis with an immunofluorescence or microneutralization assay.

Results: Of the 124 subjects investigated, seven individuals tested positive for MERS-CoV by at least two serologic assays, all who had respiratory illness during the outbreak; six were members of the JMoH-investigated outbreak, one was a household contact. Including the two fatal cases, the nine positive case-subjects (by PCR and/or serology) were relatively healthy prior to illness without serious comorbidities; the overall case fatality rate was 22%. Six case-subjects were healthcare workers at the outbreak hospital, yielding an attack rate of 10% among potentially exposed outbreak hospital personnel.

Conclusions: New serologic assays identified previously undetected cases of MERS-CoV in the first described outbreak in the world, one year after it occurred. Assay results were consistent with clinical findings among previously relatively healthy subjects and documented a lower case fatality rate than reported elsewhere. Serologic assays are essential tools for diagnosing MERS-CoV infections and understanding its epidemiology.

9:15 *Pantoea* Bloodstream Infection Outbreak at an Oncology Clinic — Illinois, 2012–2013

Authors: Brian R. Yablon, R. Dantes, V. Tsai, R. Lim, H. Moulton-Meissner, M. Arduino, M. Patel, M. Vernon, Y. Grant-Greene, D. Christiansen, C. Conover, A. Kallen, A. Guh

Background: *Pantoea* species are gram-negative bacteria inhabiting plants, soil, and water that uncommonly cause human infections. During August 2012–February 2013, an outpatient oncology clinic (Clinic A) identified 8 patients with *Pantoea* species bloodstream infections, prompting an investigation to control the outbreak.

Methods: Cases were defined as *Pantoea* species isolation from blood or catheter tip cultures of Clinic A patients during July 2012–May 2013. We reviewed Clinic A's medical charts and laboratory records and examined infection prevention practices and the water system. Environmental samples were collected for culture. Clinical and environmental *Pantoea* isolates were compared by using pulsed-field gel electrophoresis (PFGE).

Results: Twelve *Pantoea agglomerans* cases were identified; median age was 65 (range: 41–78) years. All patients had malignancies; 11/12 had indwelling vascular access. The only common exposure was receipt of intravenous infusions at Clinic A. Deficiencies in parenteral medication preparation and handling were identified (e.g., suboptimal hand hygiene, placing infusates near sinks with potential for splash-back contamination). Inspection revealed substantial dead space piping in building plumbing and inadequate chlorine residual in sink tap water. *P. agglomerans* were isolated from composite surface swabs of 6 separate sinks and an ice machine; the isolate from the clinic pharmacy sink (in the medication preparation area) was indistinguishable by PFGE from 7/9 available patient isolates.

Conclusions: Water system irregularities contributing to tap water contamination during parenteral medication preparation or handling likely caused these *Pantoea* bloodstream infections. Products compounded in this outpatient clinic propagated a health care–associated outbreak, underscoring the importance of adhering to recommended practices for medication preparation and handling. Further efforts are needed to understand the role of water system maintenance in infection prevention.

9:35 Novel, Illicit Fentanyl-Analog Causes 14 Overdose Deaths — Rhode Island, 2013

Authors: Matthew J. Lozier, L. Ogilvie, C. Martin, L. Lewis

Background: The United States is experiencing an opioid abuse epidemic, with opioid overdose deaths quadrupling between 1999 and 2010. The introduction of more potent illicit opioids increases overdose risk. We characterized a cluster of overdose deaths involving acetyl fentanyl, a novel illicitly-produced opioid about four times more potent than heroin.

Methods: We abstracted data from the Rhode Island (RI) Medical Examiner Database for illicit drug overdose deaths (IDOD) during March 2012–March 2013, and from post-mortem toxicology reports for acetyl fentanyl overdose deaths (AFODs). AFODs, a subset of IDODs, were defined by identification of acetyl fentanyl or 4-Anilino-n-phenethylpiperidine by gas chromatography/mass spectrometry (GC/MS). We performed a case-case risk factor analysis comparing AFODs to other IDODs.

Results: In March 2013, 10 AFODs contributed to a significant increase in total IDODs (n = 20) compared to the previous year monthly average (mean = 8.9; P<.001). Fourteen AFODs occurred during March–May 2013; decedents were 19–57 years old and 71% male. AFODs were more likely than other IDODs to occur in a northern RI city (43% vs. 8%; P<.001). No other risk factor differences were identified. GC/MS toxicology results for 12 AFODs showed various mixtures of other drugs, including cocaine (64%), other opioids (36%), and ethanol (36%); all AFODs tested negative for fentanyl. No AFODs have occurred in RI since May 2013.

Conclusions: This is the first time acetyl fentanyl has been identified in illicit drug use and overdose deaths. Without RI's extensive toxicology testing, the cause of the outbreak might have gone unidentified. This investigation increased awareness of and laboratory capacity to identify acetyl fentanyl nationally, leading to confirmation of six AFODs in two other states.

9:55 Two Cattle Herdsmen Infected with a Novel Species of Orthopoxvirus — Georgia (Country), 2013

Authors: Neil M. Vora, Y. Li, M. Geleishvili, G. Emerson, G. Maghlakelidze, A. Navdarashvili, S. Panayampalli, N. Gallardo-Romero, I. Damon, E. Maes, M. Reynolds, J. Morgan, D. Carroll

Background: Cessation of routine smallpox vaccination has created opportunities for the emergence of orthopoxviruses previously suppressed by vaccine-derived immunity. With the exception of variola (agent of smallpox), Orthopoxvirus infections such as cowpox are often associated with animals. In July 2013, CDC tested diagnostic specimens from two herdsmen in Georgia (country) suspected of having cowpox after contact with ill cattle.

Methods: Sera were tested for Orthopoxvirus IgM and IgG antibodies. Nucleic acid was extracted from swabs of cutaneous lesions and screened for non-variola orthopoxviruses using quantitative real-time polymerase chain reaction (qPCR). Positive samples underwent additional qPCR reactions for identification of known Orthopoxvirus species.

Results: Orthopoxvirus IgM and IgG antibodies were detected. Nucleic acid screening of lesion samples for non-variola orthopoxviruses was positive, but subsequent reactions failed to assign the virus to a known Orthopoxvirus species. Phylogenetic analysis of a 500-base pair DNA sequence representing the Orthopoxvirus DNA-dependent RNA polymerase gene confirmed a novel virus. To determine disease transmissibility and identify additional human cases, an epidemiologic investigation was conducted in the region where the herdsmen lived. Both herdsmen denied history of smallpox vaccination. Fifty-five persons who had contact with the herdsmen or with cattle were interviewed. Five of nine (56%) interviewees born after cessation of routine smallpox vaccination in Georgia in 1980 had Orthopoxvirus IgG antibodies. An additional human case from a different region in Georgia was identified through testing of specimens originally submitted for anthrax diagnostics in 2010.

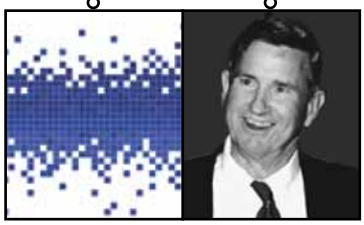
Conclusions: Orthopoxviruses are anticipated to emerge in the absence of routine smallpox vaccination and should be considered in persons who experience cutaneous lesions after animal contact. As highlighted here, global laboratory and epidemiologic capacity for orthopoxviruses are necessary.

SESSION M: J. Virgil Peavy Memorial Award Finalists

10:45–12:10PM

Ravinia Ballroom

Moderator: Drew Baughman



10:50 Metabolic Score and Cardiovascular Disease Mortality Among U.S. Adults Aged 18 Years or Older: A Structural Equation Modeling Approach — National Health and Nutrition Examination Survey III Linked Mortality File, United States, 1988–2006

Authors: Carla I. Mercado, Q. Yang, E. Ford, E. Gregg, A. Valderrama

Background: Metabolic syndrome (MetS) is defined as having abnormal values for ≥3 metabolic components (blood pressure [BP], waist circumference [WC], HDL cholesterol, triglycerides [TG], and fasting glucose [FG]). Cardiovascular disease (CVD) risk may vary based on cut-points or which components are present. We used a novel analytic approach to calculate a metabolic score and tested its association with CVD mortality risk.

Methods: Using structural equation modeling, a continuous metabolic score was estimated from measured BP (systolic [SBP] and diastolic [DBP]), WC, HDL, TG, and FG for 7,791 participants in the National Health and Nutrition Examination Survey III, 1988–1994. Data were linked with the National Death Index to determine mortality status and cause of death through December 31, 2006. Associations between each continuous component, metabolic score, and MetS with CVD mortality were tested using Cox proportional hazard ratios adjusted for sociodemographic characteristics and health behaviors.

Results: Among men, continuous components associated with CVD mortality were SBP (adjusted hazard ratio, 1.24 [95% confidence interval: 1.11–1.38]), DBP (1.36 [1.15–1.61]), and TG (1.01 [1.01–1.02]). Among women, SBP (1.21 [1.11–1.32]) and DBP (1.28 [1.06–1.54]) were associated with CVD mortality. MetS was not associated with CVD mortality. Significant associations between metabolic score and CVD mortality were found among men (1.43 [1.07–1.90]) and women (1.34 [1.07–1.69]). In subgroup analysis among women, associations were greater among Mexican-American (2.84 [1.46–5.53]) and non-Hispanic blacks [2.14 (1.48–3.08)] compared with non-Hispanic whites (1.26 [1.001–1.59]).

Conclusions: The metabolic score was a better CVD mortality predictor and risk assessment tool than MetS. Using novel statistical methods with continuous components may clarify the CVD mortality risk associated with MetS.

11:10 Stevens-Johnson Syndrome Associated with *Mycoplasma pneumoniae* Infection — Colorado, 2013

Authors: Louise K. Francois Watkins, A. Demirjian, X. Lin, D. Olsen, T. Foo, L. Miller, A. Benitez, M. Diaz, J. Winchell, N. Shang, P. Kutty

Background: On November 21, 2013, CDC was notified of a cluster of Colorado children with Stevens-Johnson syndrome (SJS) and concurrent *Mycoplasma pneumoniae* (Mp) infection. SJS is rare (annual incidence 1–2 per million) and characterized by severe mucocutaneous blistering, potentially resulting in blindness or death. Mp, a common bacterial etiology of pneumonia, is the most frequent infectious trigger of SJS in children; however, an outbreak of Mp-associated SJS has never been documented. We evaluated the epidemiology of this unique occurrence.

Methods: A case was defined as an inpatient aged 5–21 years with clinician-diagnosed SJS, and considered "confirmed" when laboratory testing was Mp-positive by quantitative polymerase chain reaction, and "possible" if the patient had antecedent pneumonia without confirmatory Mp testing. We reviewed discharge records from five Colorado referral hospitals and examined hospital and statewide case counts of SJS and bacterial (either etiology unknown or Mp-specific) pneumonia by ICD-9 code over five years. We used cumulative sum (CU.S.UM) analysis to detect existence of an outbreak, assuming an outbreak rate three times baseline and an average detection time of five months.

Results: Eight Mp-associated SJS cases were identified August–November, 2013 (five confirmed, three possible). Case-patient median age was 14 years (range: 8–16), five were male, two required ICU care, and four required ophthalmologic surgery. Bacterial pneumonia reached a five-year peak in October 2013, and the CU.S.UM crossed the detection limit in November 2013, indicating a statistically-significant rise above baseline.

Conclusions: This is the first documented Mp-associated SJS outbreak. Initial analysis suggests that a large community burden of Mp was a contributing factor. CU.S.UM analysis is useful in the detection of outbreaks of rare, intermittent disease.

11:30 Prevalence Assessment of Nodding Syndrome — Uganda, 2013

Authors: Preetha J. Iyengar, J. Wamala, J. Ratto, C. Blanton, M. Muggaga, S. Becknell, R. Downing, S. Bunga, J. Sejvar, I. Makumbi

Background: Nodding syndrome (NS) is a seizure disorder of unknown etiology resulting in neurological deterioration. It is reported in defined regions of three sub-Saharan African countries, and predominantly affects children aged 3–18 years. In Uganda, cases and deaths are reported in large numbers; however no prevalence assessment has been performed.

Methods: We performed single stage cluster sampling to select case-caregiver pairs from self-identified reported head nodding cases. A cluster was defined as a parish, which contains multiple villages. Probability proportional to size sampling was used to select clusters. Cases were selected using simple random sampling without replacement. Trained healthcare workers administered standardized questionnaires including questions on demographics and NS symptoms. Prevalence was calculated by age at time of interview and weighted to account for unequal probabilities of selection, non-response, and calibration to the known age-sex distribution. An international consensus case definition was implemented and modified to classify cases; probable cases were a subset of suspected cases.

Results: The response rate was 75% (547/725); 3 cases were excluded. Median age of cases at time of interview was 13.9 years (range 1.2–45.2 years); 53% (286/544) were male. Most cases (90% [489/544]) were 5–18 years old. In this group (projected population 248,243), there were an estimated 1,782 (95% CI 1,552–2,011) suspected cases, yielding a prevalence of 7.2 per 1000 population (95% CI 6.3–8.1). The number of probable cases was estimated to be 1,687 (CI 1,463–1,912), yielding a prevalence of 6.8 per 1000 population (95% CI 5.9–7.7).

Conclusions: These results provide the most comprehensive and evidence-driven assessment of NS burden in the region. This information offers a critical basis for future studies and can guide allocation of healthcare resources.

11:50 An Automated Classification Algorithm for the Surveillance of Autism Spectrum Disorder

Authors: Matthew J. Maenner, L. Schieve, D. Christensen, M. Yeargin-Allsopp

Background: The Autism and Developmental Disabilities Monitoring (ADDM) Network conducts population-based surveillance of Autism Spectrum Disorder (ASD) among 8-year old children in multiple U.S. sites. Each ADDM site collects special education records and medical records from providers who conduct developmental evaluations. Information is abstracted from developmental evaluations that contain descriptions of behaviors consistent with ASD. Trained clinicians then review all abstracted evaluations to determine whether the child meets the ASD surveillance case criteria.

The number of abstracted evaluations has dramatically increased since the year 2000, affecting the resources and timeliness of the surveillance system. In this study, we developed and evaluated a computer algorithm to classify whether a child meets ADDM ASD case criteria using words and phrases contained in developmental evaluations.

Methods: We assessed 1,165 children with a total of 5,396 evaluations from the Georgia ADDM site. We concatenated each child's abstracted evaluations, processed the text (stemming), and counted the occurrence of all words and 2-3-word phrases (tokenization). A random forest algorithm constructed 10,000 classification trees using these words and phrases to predict ASD case status. We validated its performance using subsets of data that were not used to construct a given tree (out-of-bag sample).

Results: The algorithm predicted ASD case statuses that were 85% concordant with the clinician-determined case statuses (82.4% sensitivity, 87.9% predictive value positive). The area under the resulting receiver-operator characteristic curve was 0.925.

Conclusions: This algorithm could be incorporated into the ADDM surveillance methodology to efficiently "filter out" records that are unlikely to meet ASD case criteria. This methodology also has broader public health utility for epidemiological studies of ASD or other conditions ascertained through extensive manual chart review.

SPECIAL SESSION: Syria Crisis: Epidemiology of Civil War and Refugee Crisis

12:10–1:30pm

Dunwoody Suite

Moderator: Jordan Tappero

This special session will provide an overview of CDC's response to the humanitarian crisis in Syria and neighboring countries. The challenges as well as lessons learned will also be described.

The Syrian conflict is an ongoing armed crisis. Peaceful protests in spring 2011 triggered a violent response by the Assad government; conflict has since escalated to a national civil war. Since the start of the conflict more than 2.3 million people have fled Syria to Lebanon, Jordan, Iraq, Egypt, and Turkey. Current estimates suggest that over 9.3 million people, nearly half of the Syrian population, are in need of humanitarian assistance. The humanitarian situation continues to deteriorate. The conflict has resulted in significant destruction of the Syrian health system. An outbreak of polio was confirmed in Syria in 2013, the first in the country in 14 years. In addition, outbreaks of measles, hepatitis, and tuberculosis threaten the displaced population and host populations.

The Syria crisis and associated public health threats triggered CDC-wide response. Through deployment of EIS officers and subject matter experts from multiple CDC centers and offices, and in collaboration with international partners, CDC provided technical assistance in disease surveillance, mass immunization campaigns, and outbreak investigation and response. This special session is an opportunity to discuss how epidemiology, as well as collaboration with international partners, was used to improve the public health response in these situations and what this means for similar situations in the future.

Speakers:

- Introductions and Overview of Refugee Crisis in Syria. *Mike Gerber*
- Overview of CDC Activities in Response to Syria Crisis. *Muireann Brennan*
- Implementing an Early Warning Disease Surveillance System in Northern Syria. *Alison Ridpath*
- Polio, Partners, and Politics in Syria. *Allison Walker*

CONCURRENT SESSION N1: Respiratory Diseases

1:30–3:15pm

Ravinia Ballroom

Moderators: Cyndy Whitney and Seema Jain

1:35 Legionnaire's Disease Outbreak Associated with a Cooling Tower at a Long-Term-Care Facility — Ohio, 2013

Authors: Celia L. Quinn, C. Lucas, A. Demirjian, L. Francois Watkins, S. Tomczyk, S. Eitneiar, S. Brewer, M. DiOrio, L. Hicks, L. Garrison

Background: On July 9, the Ohio Department of Health was notified of 2 long-term–care facility residents with Legionnaires' disease (LD, a pneumonia resulting from inhalation of *Legionella*-contaminated water). We investigated to identify the outbreak source and prevent further cases.

Methods: On July 10, we requested all facility residents with respiratory symptoms be tested for *Legionella*. Local health departments assessed facility exposure among community LD cases. Outbreak cases were defined as pneumonia since May 1 with positive *Legionella* urine antigen test (UAT) or respiratory culture among persons who lived at, worked in, or visited the facility 2–10 days before symptom onset. We interviewed patients, assessed the environment, and cultured environmental samples. Positive cultures underwent serotyping, monoclonal antibody (MAb) testing, and sequence-based typing (SBT).

Results: We identified 39 LD cases; 6 patients died. Residents lived in 4 buildings; no common potable water source was identified. All patients were positive for *Legionella pneumophila* serogroup 1 (Lp1) by UAT. Among 15 patients with respiratory cultures, 14 were negative, and 1 was positive for Lp1. Water samples and swabs from a cooling tower serving 1 building and from another building's potable water were positive for Lp1, both with matching MAb and SBT to the patient isolate; the patient had not been exposed to the potable water source. Six cases were identified among residents of a third building where no environmental *Legionella* was isolated. An electronic control system turned off cooling tower pumps during periods of low demand, preventing delivery of disinfectant by a timed-release system.

Conclusions: A cooling tower relying on timed-release disinfection was the principal outbreak source. Tower maintenance should ensure adequate disinfection when using automated systems.

1:55 Timing of Highly Pathogenic Avian Influenza A (H5N1) Poultry Outbreaks, Human Influenza A (H5N1) Cases, and Seasonal Influenza Epidemics — Worldwide, 2004–2013

Authors: Lizette O. Durand, P. Glew, D. Gross, M. Kasper, S. Trock, I.K. Kim, J.S. Bresee, R. Donis, T.M. Uyeki, M.A. Widdowson, E. Azziz-Baumgartner

Background: During January 2004–June 2013, highly pathogenic avian influenza (HPAI) A (H5N1) caused >6,000 outbreaks among poultry and 629 H5N1 cases among humans. We analyzed public data to determine the month and season of HPAI H5N1 poultry outbreaks and H5N1 human cases and assessed correlation with ambient temperatures.

Methods: We quantified HPAI H5N1 poultry outbreaks reported to the World Organization for Animal Health and laboratory-confirmed H5N1 human and seasonal influenza cases reported to the World Health Organization. We examined the association between HPAI H5N1 poultry outbreaks and H5N1 human cases by month. We determined whether H5N1 human cases overlapped with seasonal influenza epidemics. Using national temperature data, we performed linear regression to explore seasonality of HPAI H5N1 poultry outbreaks or H5N1 human cases.

Results: Bangladesh, Cambodia, China, Egypt, Indonesia, Thailand, Turkey, and Vietnam reported >95% of H5N1 human cases and 83% of HPAI H5N1 poultry outbreaks. Among 708 country-months, ≥1 H5N1 human cases were reported in 72/233 (31%) country-months when ≥1 HPAI H5N1 poultry outbreak occurred versus 30/475 (6%) country-months when no poultry outbreaks occurred (P<.001). Human H5N1 cases occurred during 53/254 (21%) months when seasonal influenza was epidemic. Two hundred nineteen/264 (83%) H5N1 human cases and 4,645/5,682 (82%) HPAI H5N1 poultry outbreaks occurred during November–March. For each 2.2°C temperature decrease, one additional HPAI H5N1 poultry outbreak was reported; for each 0.4°C temperature decrease, one additional H5N1 human case was reported (P<.04).

Conclusions: Public health and agricultural programs should anticipate and prepare for controlling HPAI H5N1 among poultry and humans during November–March (cooler months) when these outbreaks typically occur and frequently overlap with seasonal influenza epidemics.

2:15 Impact of Changes in Diagnostic Testing on Estimated Influenza-Associated Hospitalization Rates in the Influenza Hospitalization Surveillance Network (FluSurv-NET): United States, 2003–2013

Authors: Alexander J. Millman, C. Reed, P. Kirby, D. Aragon, J. Meek, M. Farley, P. Ryan, J. Collins, R. Lynfield, J. Baumbach, S. Zansky, N. Bennett, B. Fowler, A. Thomas, M. Lindegren, M. Spencer, L. Finelli, S. Chaves

Background: In the U.S., influenza-associated hospitalization rates are used to evaluate annual disease burden and the impact of influenza vaccination. Accurate estimation requires laboratory confirmation and may have changed with increasing use of highly sensitive molecular assays since the 2009 pandemic. We examined the effect of changing test sensitivity on estimations of influenza-associated hospitalization rates.

Methods: We used data from FluSurv-NET, a national, population-based surveillance system, and captured diagnostic test type by age and season. We obtained sensitivity ranges for each diagnostic test type from literature review. Crude rates by age group were calculated and adjusted based on test sensitivity using bootstrap techniques.

Results: Crude influenza-associated hospitalization rates per 100,000 persons varied by season from 7.3–50.1 in children <18 years, 3.4–28.2 in adults 18–49 years, and 8.9–94.7 in adults ≥ 50 years. Test sensitivity varied by age group; the lowest being in adults ≥50 years. Midpoint sensitivity estimates by age group ranged from 88.9–94% for reverse transcription polymerase chain reaction (RT-PCR); 34.2–81.3% for culture, 64.7–65.2% for direct fluorescence antibody, and 26.1–66.7% for rapid tests. The mix of testing methods changed over time, with RT-PCR use increasing from <10% during 2003–2009 to ~70% during 2009–2013. After accounting for test sensitivity, we found hospitalization rates were underestimated by ~35% during 2003–2008 vs. ~20% during 2009–2013 among children <18 and adults 18–49 years; and by ~70% during 2003–2008 vs ~50% during 2009–2013 in adults ≥50 years.

Conclusions: Crude rates underestimate influenza-associated hospitalizations, especially in adults ≥50 years. Rate adjustments may improve the accuracy of disease burden estimates, which may affect assessments of the impact of influenza vaccination.

2:35 Rapid Urine Antigen Testing for *Streptococcus pneumoniae* in Adults with Community-Acquired Pneumonia: Clinical Use and Barriers

Authors: Aaron M. Harris, S. Beekmann, P. Polgreen, M. Moore

Background: *Streptococcus pneumoniae* (pneumococcus) is the most common bacterial etiology of community acquired pneumonia (CAP) in adults, a leading cause of death. However, the majority of pneumococcal CAP is diagnosed by blood culture, which likely underestimates the burden of disease. FDA-approved rapid urine antigen (UAg) tests can also diagnose pneumococcal pneumonia but the frequency of their use in routine clinical care is unknown.

Methods: We performed a web-based survey of practicing infectious disease physician members of the Infectious Disease Society of America's Emerging Infections Network (EIN), regarding their use of UAg. We queried 1,287 EIN members regarding the frequency and clinical setting of UAg use and how results influence clinical decision-making. Descriptive analysis was performed using SAS.

Results: Of 493 (38%) eligible responses, 319 (65%) routinely use the pneumococcal UAg test; 485 (98%) use blood cultures. For UAg users, 71% had access to UAg in their lab, the remainder use outside laboratories. Reasons listed for non-use [174 (35%)] included: lack of availability (46%), timeliness (33%), reliability (12%), antibiotic susceptibility results (7%), and high cost (9%). The UAg test was used more frequently in severe CAP patients: 94% intensive care unit (ICU), 85% in hospitalized non-ICU, and 15% in ambulatory settings. Over 80% reported that UAg results influenced clinical decision-making, including ordering fewer diagnostic tests and shortening or narrowing antibiotic therapy.

Conclusions: Physicians with ready access to the UAg test use it more frequently, and subsequently tailor antibiotic therapy. UAg use may improve the accuracy of non-bacteremic pneumococcal CAP incidence estimates.

2:55 Assessing the Burden of Pediatric Acute Rheumatic Fever and Rheumatic Heart Disease — American Samoa, 2011–2012

Authors: Amanda L. Beaudoin, L. Edison, C.E. Introcaso, L.M.L. Goh, C. Van Beneden

Background: In August 2013, LBJ Tropical Medical Center and the American Samoa (AS) health department notified CDC of a perceived high burden of pediatric acute rheumatic fever (ARF) and rheumatic heart disease (RHD). ARF is an immunologically mediated sequela of inadequately treated group A *Streptococcus* pharyngitis and, potentially, pyoderma. Recurrent or severe ARF can cause permanent cardiac damage and RHD. Long-term prophylactic penicillin injections post-ARF diagnosis can prevent RHD. We aimed to describe pediatric ARF and RHD and prophylaxis in AS and the pyoderma-ARF association.

Methods: We used ICD-9 codes and hospital prophylaxis registries from AS's only medical system to identify all patients aged ≤18 years with a physician-recorded ARF or RHD diagnosis during 2011–2012. We recorded penicillin compliance and pre-ARF pharyngitis and pyoderma diagnoses (<6weeks preceding) for cases. Two age- and sex-matched control subjects per case-patient were selected from non-ARF/RHD patients examined during 2011–2012. We calculated ARF 2011–2012 incidence and RHD prevalence by using 2010 U.S. Census data. We used univariate statistical tests and conditional logistic regression for case-control comparisons.

Results: During 2013, RHD prevalence was 3.2 cases/1,000 children. ARF incidence was 1.1 (2011) and 1.5 (2012) cases/1,000. Of 65 children with ARF, a total of 32 (49%) subsequently received RHD diagnoses. Median ARF diagnosis age was 11 (range: 2–18) years. Pharyngitis history was more common among case-patients (18%) than control subjects (0%; P <0.01), but preceding pyoderma was not. Post-ARF penicillin prophylaxis compliance (65%) was suboptimal.

Conclusions: RHD causes considerable childhood morbidity in AS. Although the pyoderma-ARF association remains unclear, attempts to curb AS's RHD burden should address improved pharyngitis diagnosis and treatment and increased ARF prophylaxis compliance.

CONCURRENT SESSION N2: Hepatitis

1:30–3:15pm

Dunwoody Suite

Moderator: Deborah Holtzman

1:35 Hepatitis A Outbreak Associated with Consumption of Imported Pomegranate Arils — Multiple Western U.S. States, 2013

Authors: Erin Epson, A. Cronquist, M. Cameron-Adams, D. Selvage, Y. Khudyakov, K. Lamba, A. Kimura, R. Sowadsky, R. Hassan, C. McNeil, K. Bisgard, M. Collier

Background: Before 2013, the most recent large common-source hepatitis A virus (HAV) outbreak in the United States occurred in 2003 in association with genotype 1A1 HAV-contaminated Mexican-grown produce (601 cases, 25.6% [124/485] hospitalized, and 3 deaths). During May 2013, HAV illnesses among persons who had consumed Retailer A food were investigated to determine the magnitude of the outbreak, identify the vehicle, and prevent further illness.

Methods: A confirmed outbreak-related case was acute hepatitis symptoms and positive anti-HAV IgM during March 31–August 12 in a person who had either consumed the suspect product or had the outbreak HAV genotype. Serum or stool specimens were submitted to CDC for HAV sequencing. Patients were interviewed regarding demographic, clinical, and food exposure information; food was collected from patients' homes. Retailer A purchase histories were reviewed; traceback and trace-forward investigations were initiated.

Results: We identified 165 confirmed cases in 10 states; 91 (55%) patients were female, median age was 46 (range: <1–84) with 112 (68%) aged ≥40 years; 72 (44%) were hospitalized; none died, but one required liver transplantation. Genotype IB HAV was identified from 117 patients; a frozen berry and pomegranate aril product from Retailer A was reportedly consumed by 153 patients and found in 40 patient homes. Traceback investigations identified pomegranate arils imported from Turkey as the common component in all product lots from patient homes; the product was voluntarily recalled.

Conclusions: This outbreak was the largest common-source foodborne HAV outbreak in the United States in 10 years and had a higher hospitalization rate than previous outbreaks. Genotype IB, uncommon in the United States, is endemic in Turkey; safety of imported food is an on-going concern.

1:55 Hepatitis B Vaccine Response Among Infants Born to Hepatitis B Surface Antigen-Positive Women — United States, 2008–2013

Authors: Stephen C. Ko, S. Schillie, N. Nelson, S. Veselsky, T. Murphy

Background: Annually, an estimated 25,000 infants are at risk for perinatal hepatitis B virus (HBV) infection in the United States. Perinatal HBV infection results in chronic disease in 90% of infected infants. To prevent perinatal infection, postexposure prophylaxis consists of hepatitis B vaccination (HepB) and hepatitis B immune globulin. Postvaccination serologic testing (PVST) is recommended at ≥9 months, infants not responding to initial vaccination are revaccinated. We evaluated factors influencing initial vaccine nonresponse in a cohort of infants born to hepatitis B surface antigen (HBsAg)-positive women.

Methods: Infants were enrolled in the Enhanced Perinatal Hepatitis B Prevention Program from 2008 to 2013, a 5-state project assessing programmatic outcomes among infants. Initial vaccine nonresponse was defined as antibody to HBsAg <10 mIU/mL at PVST. Variables associated with nonresponse were identified using multivariable analyses.

Results: Of the 16,704 infants born to HBsAg-positive mothers, 8,654 infants with at least 3 doses of vaccine received PVST, and 8,199 (94.7%) responded to initial vaccination series. An additional 199 infants responded to revaccination (cumulative response rate: 94.8%). Controlled for maternal and infant demographics, PVST >6 months from last vaccination dose was associated with nonresponse (odds ratio [OR]: 2.7; confidence interval [CI]: 2.0–3.6); receipt of a 4th dose improved response (OR: 0.5; CI: 0.3–0.8). The proportion of infants not responding increased from 2% at 1–2 months PVST to 21.6% at 15–16 months PVST.

Conclusions: Of infants born to HBsAg–positive mothers, 95% responded to HepB, but rates declined with longer interval between the final HepB dose and PVST. To avoid unnecessary revaccination, the optimal timing of PVST is within 1–2 months after final HepB dose.

2:15 Reactivation and Transmission of Hepatitis B Virus from an HIV-Positive Hemodialysis Patient — North Carolina, 2013

Authors: Sarah K. Rhea, R. Pace, V. Mobley, J. MacFarquhar, E. Robinson, T. Hayden, H. Thai, P.R. Patel, A. Moorman, J.T. Brooks, Z. Moore

Background: Hepatitis B virus (HBV) transmission in U.S. hemodialysis (HD) facilities has not been reported in >10 years. In March 2013, the North Carolina Division of Public Health was notified of a new HBV infection in an HD patient with no other identified risk factors. We investigated this event to identify other exposed patients and prevent additional infections.

Methods: We reviewed medical records, interviewed the index patient (Patient 1) regarding hepatitis B risk factors, performed HBV molecular analysis, and observed infection control practices at the HD facility.

Results: Patient 1, a nonresponder to HBV vaccination, was consistently surface antigen (HBsAg)-negative until a positive result in March 2013. Patient 1's only identified hepatitis B risk factor was HD. The HD facility had no other patients with known active HBV infection. One patient (Patient 2) had evidence of resolved HBV infection. Patient 2, who was HIV-positive and on antiretroviral therapy, tested newly HBsAg-positive in April 2013, indicating HBV reactivation. In July 2013, both patients had HBV viral loads >1.1 × 108 IU/mL. HBV whole genome sequences indicated 99.9% genetic homology. No obvious infection control breaches were observed. However, Patient 1 followed Patient 2 at the same HD station 3 times weekly during May 2012–March 2013. Patient 1 remained HIV-negative. Additional testing revealed no new HBV infections among 108 other patients receiving HD at the facility.

Conclusions: As the first reported HD-related HBV transmission from a patient with reactivation, this case underscores challenges in identifying HD patients who reactivate; it also might have policy implications for expanded HBV testing among HD patients with resolved infection. HIV transmission did not occur in this circumstance.

2:35 Health Care-Associated Hepatitis C Virus Outbreak in a Skilled Care Facility — North Dakota, 2013

Authors: Dinorah L. Calles, M. Collier, A. Suryaprasad, F. Xu, A. Moorman, Y. Khudyakov, L. Ganova-Raeva, J. Forbi, G. Xia, S. Lee-Kwan, L. Cooley, R. Allison, S. Ko, A. Kolwaite, C. Ross, T. Miller, T. Brosz, L. VanderBusch, F. Salzer, S. Weninger

Background: Hepatitis C virus (HCV) infection is the most common bloodborne infection in the United States, with 16,500 new infections estimated in 2011. Health care–associated exposure attributable to infection control lapses is a recognized transmission route. In March 2013, the North Dakota Department of Health was notified of 3 HCV cases among residents in a skilled care facility (Facility A). We initiated an investigation to identify additional cases and the exposure source to prevent further transmission.

Methods: A confirmed case was HCV infection in any resident of Facility A during January 2011–September 2013, matching the outbreak strain by quasispecies (QS) analysis. Additional case-finding occurred through serologic screening. We abstracted patient charts and performed a case-control study to identify risk factors associated with infection.

Results: By December 10, 2013, a total of 44 confirmed cases had been identified. QS analyses revealed that all case-patients were related by transmission (97.4%–100% nucleotide identity). Preliminary analyses indicated 32 /44 (73%) case-patients were exposed to a podiatrist who provided care at Facility A. Additionally, 38/44 (86%) case-patients had received care by a phlebotomist under laboratory contract. In preliminary multivariate logistic regression, receipt of podiatry (adjusted odds ratio [aOR]: 11.1; 95% confidence interval [CI]: 2.9–42.5) and phlebotomy (aOR: 7.5; 95% CI: 1.4–39.3) remained independently associated with HCV.

Conclusions: Preliminarily, HCV transmission was associated with receipt of podiatry and phlebotomy at Facility A. Infection control breaches sufficient to account for the outbreak were not identified. Recommendations for strict adherence to Standard Precautions and consultation with a certified infection preventionist have been provided to the facility administration. Case-finding continues among additional populations potentially exposed to identified risk factors.

2:55 Susceptibility to, and Risk Factors for, Hepatitis E Virus Infection Among a Refugee Population — South Sudan, 2012

Authors: Miriam L. Shiferaw, M. Patrick, G. Gerbi, C. Blanton , B. Dineen, N. Marano, K. Thomson, F. Rigamonti, S. Gikunju, L.W. Waiboci, E. Teshale, T. Handzel

Background: Hepatitis E Virus (HEV) infection causes outbreaks in areas with poor water, sanitation and hygiene (WASH) conditions. In September 2012, an HEV outbreak was confirmed in a refugee camp in South Sudan. At the time, 668 suspected/confirmed cases and 22 deaths were reported among 15,000 refugees. CDC was asked to assess the prevalence of infection and risk factors for HEV.

Methods: A cross-sectional serosurvey was conducted in November 2012. Two individuals ≥3 years were randomly selected from a simple random sample of households. Serum for anti-HEV antibody testing along with information on hygiene practices and exposures was collected from each participant. Risk factors for HEV infection were identified through a nested case-control; cases were IgM positive while unmatched controls were negative for both IgM and IgG.

Results: A total of 443 individuals participated in the serosurvey; 21.7% had recent HEV infection (IgM positive), 24.1% had past infection (IgG positive), and 54.3% had no evidence of infection (IgM and IgG negative). A total of 106 cases and 215 controls were included in the nested case-control analysis. Individuals reporting close contact with a person with jaundice and those taking care of animals had 1.8 (95% CI: 1.1, 3.1) and 2.3 (95% CI: 1.03, 4.9) times the odds, respectively, of recent HEV infection compared to those unexposed.

Conclusions: Over 50% of refugees in the camp were susceptible to HEV infection four months after the start of the outbreak, highlighting the risk for continued transmission. Personal contact may play a role in HEV transmission in this setting. The role of animal caretaking needs further investigation. Hygiene interventions should be scaled up in the face of an HEV outbreak.

Presentations of Awards

Donald C. Mackel Memorial Award

J. Virgil Peavy Memorial Award

Paul C. Schnitker International Health Award

James H. Steele Veterinary Public Health Award

Outstanding Poster Presentation Award

Session O: Late-Breaking Reports

3:45–5:10pm

Ravinia Ballroom

Moderators: Kevin Vagi and Tracie Gardner

See supplement for presenters and abstracts.

Closing Remarks and Adjournment

5:10pm–5:20pm

Ravinia Ballroom

Speakers: Thomas R. Frieden, Director, Centers for Disease Control and Prevention
Tracie Gardner, Scientific Program Committee Chair

Notes

EIS Officers, Class of 2012

Abanyie, Francisca – CGH
Adams, Laura* – DSEPD/EWB
Agaku, Israel* – NCCDPHP
Ahmad, Nina* – DSEPD/EWB
Alami, Negar (Nikki)* – NCHHSTP
Anderson, Tara* – NCEZID

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Beaudoin, Amanda* – DSEPD/EWB
Brinker, Kimberly* – NIOSH
Canon, Abbey* – DSEPD/EWB
Choi, Mary* – DSEPD/EWB
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Gilbert, Leah* – NCIPC
Gunnala, Rajni* – NCCDPHP
Harris, Aaron* – NCIRD

Havers, Fiona* – NCIRD
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Idowu, Rachel* – CGH
Irving, Shalon – NCCDPHP
Iyengar, Preetha* – CGH
Johnson, Candice* – NIOSH

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Lebo, Emmaculate – NCIRD

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Leshem, Eyal* – NCIRD
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Mercado, Carla* – NCCDPHP
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Nguyen, Von – NCEZID
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Schwitters, Amee – CGH
Sein, Carolyn* – CGH
Shiferaw, Miriam* – CGH

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Stahre, Mandy* – DSEPD/EWB
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Thompson-Paul, Angela – NCHHSTP
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Vora, Neil* – NCEZID

Wallace, Ryan* – NCEZID
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Wilken, Jason* – DSEPD/EWB
Woodring, Joseph – NCHS
Yablon, Brian* – DSEPD/EWB
Yuen, Courtney – NCHHSTP

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Ayscue, Patrick* – DSEPD/EWB
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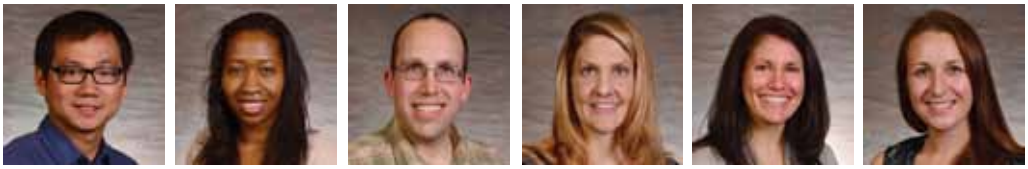
Biggs, Holly – NCEZID
Blackley, David* – NIOSH
Bowen, Ginny – NCHHSTP
Breakwell, Lucy – NCIRD
Calles, Dinorah* – DSEPD/EWB
Chatham-Stephens, Kevin* – NCEH



Chea, Nora* – NCEZID
Chevalier, Michelle – NCCDPHP
Clayton, Joshua* – DSEPD/EWB
Dahl-Thomasson, Erica* – DSEPD/EWB
DeSilva, Malini* – DSEPD/EWB
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Dynes, Michelle – CGH
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Fechter-Leggett, Ethan – NCEH
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Harris, Jennifer* – CGH

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Levy, Benjamin – NCIPC
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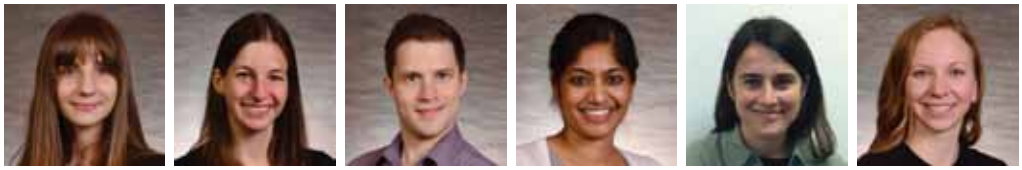
Nyangoma, Edith* – NCEZID
Oboho, Ikwo – NCIRD
Ogunmoyero, Oluwatosin – NCCDPHP
Olayinka, Olaniyi* – NCEH



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Perkins, Kiran – NCCDPHP
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Puckett, Mary* – NCCDPHP
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Rosenthal, Mariana* – DSEPD/EWB
Schnabel, David* – DSEPD/EWB
Sharma, Aditya* – NCHHSTP
Socias, Christina – NIOSH
Sumner, Steven* – NCIPC
Tomczyk, Sara* – NCIRD

Vallabhaneni, Snigdha* – NCEZID
Volkmann, Tyson* – NCHHSTP
Walker, Alison* – NCEZID
Wendorf, Kristen* – DSEPD/EWB
Whitfield, Geoffrey* – NCEH
Williams, Candice* – DSEPD/EWB

Wilson, Nana – CGH
Wu, Hsiu – NCHHSTP
Yacisin, Kari* – DSEPD/EWB

** Presenting EIS Officers*

Incoming EIS Officers, Class of 2014

Adams, Monica PhD, MPH
Aliabadi, Negar MD, MS
Angelo, Kristina DO, MPHTM
Appiah, Grace MD, MHS
Attfield, Kathleen ScD
Beer, Karlyn PhD, MS
Benowitz, Isaac MD
Bicking Kinsey, Cara PhD, MS, MPH
Browne, Lauren MD, MS
Casey, Megan BSN, MPH
Cherry, Cara DVM, MPH
Crowe, Samuel PhD, MA, MPH
Curran, Kathryn PhD, MHS
Dunn, Angela C MD, MPH
Edens, William PhD
Elbadawi, Lina MD, MSPH
Fisher, Emily MD
Folaranmi, Temitope MBChB, MPH, MPP
Foster, Monique MD, MPH
Galang, Romeo MD. MPH
Gleason, Brigette MD, MPH
Gokhale, Runa MD
Greiner, Ashley MD, MPH
Grigg, Cheri DVM, MPH
Hagan, Jose MD, MS
Hancock-Allen, Jessica MSN, SM
Harrist, Alexia MD, PhD
Hennessey, Morgan DVM, MPH
Hsu, Christopher MD, PhD, MPH
Jackson, Sandra PhD, MPH
Jones, Jefferson MD, MPH
Jordan, John MD, MPH
Kamali, Amanda MD
Karwowski, Mateusz MD, MPH
Kasper, Amelia MD, MHS
Kirking, Hannah MD
Kobayashi, Miwako MD, MPH
Kulkarni, Prathit MD
Levine, Rebecca PhD, MPH
Lullo, Carolyn PhD, MS
Lyman, Meghan MD
Martin, Iman PhD, MSc, MPH
Midgley, Claire PhD, MSc, MSc
Mindra, Godwin MBChB, MPH
Namuyinga, Ruth MBChB, MPH
Narra, Rupa MD
Nelson, Jennifer MD, MPH
Nerlander, Maximilian MBBS
Ng'eno, Bernadette, MD, MBChB
Nguyen, Duong (Tony) DO
Oduyebo, Titilope MD, MPH
Omura, John MD, MPH
Parham, Mary DVM, MSVPH
Patel, Monita PhD, MPH
Pathmanathan, Ishani MD, MPH
Paulin, Heather MD, MPH
Pearce, Meghan PhD, MPH
Pieracci, Emily DVM, MPH
Plumb, Ian MBBS, MSc, MA
Qin, Jin ScD, MS
Robyn, Misha DVM, MPH
Rolfes, Melissa PhD, MPH
Scott, Colleen DPH, MPH
Singh, Tushar MD, PhD, MSc
Smith, Charnetta MD, MPH
Soeters, Heidi PhD, MPH
Spies, Erica PhD, MS
Stehling-Ariza, Tasha PhD, MPH
Summers, Aimee PhD, MHS
Talley, Pamela MD, MPH
Twentyman, Evelyn MD, MPH
Vanderende, Kristin PhD, MSN
Vanfrank, Brenna MD, MSPH
Victory, Kerton PhD, MSc
Walker, Tiffany MD
Westercamp, Matthew PhD, MS
Westercamp, Nelli PhD, MBA, MPH
Wong, Jacklyn PhD, MS

Index of EIS Officer Presenters

Notes

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Steven B. Thacker
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EIS —
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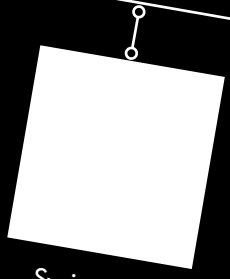
Opportunities

Alexander D. Langmuir
Memorial Lecture

International
Night

Donald C. Mackel
Memorial Award Finalists

J. Virgil Peavy
Memorial Award Finalists



Syria Crisis

Late Breakers

Prediction Run

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EIS Satirical
Review

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