



URGENT

EPIDEMIC INTELLIGENCE SERVICE



**EPIDEMIC INTELLIGENCE SERVICE PRESENTS THE 61ST ANNUAL EIS CONFERENCE
AT CROWNE PLAZA HOTEL ATLANTA PERIMETER AT RAVINIA**



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

APRIL 16 - 20, 2012

**61st Annual
EPIDEMIC INTELLIGENCE
SERVICE (EIS) CONFERENCE**

April 16–20, 2012

Centers for Disease Control and Prevention
Atlanta, Georgia

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Name Tags Color Key

Blue: EIS Alumni

Green: Current EIS Officers

Red: Incoming EIS Officers

Black: Conference Participants

Purple: Conference Staff

Blue Dot: Field EIS Alumni

Orange Dot: Recruiters

Pink Dot: Media

SAVE THE DATE

62nd Annual Epidemic Intelligence Service (EIS) Conference

April 22–26, 2013

Centers for Disease Control and Prevention
Atlanta, Georgia

Preface

Dear Friends of EIS:

Welcome to the 61st Annual Epidemic Intelligence Service (EIS) Conference. I am delighted that you are able to attend our conference, which highlights the professional activities of EIS officers (EISOs). The scientific program this year includes 95 oral presentations and 30 poster presentations. In addition, your experience this week will be enriched by International Night, the EIS skit, the Prediction Run, special award presentations, and other activities that have long been a tradition at the Conference. This year you might have noticed that CDC and EIS received a little more attention than usual in the popular media with the release of the movie *Contagion* (the conference program book design is a not so subtle acknowledgement of this attention). It was fun to see Kate Winslet describe EISOs as “The Sherlock Holmes of the medical world.” While the fictional world of EIS was being portrayed on the big screen, the real Sherlock Holmes were out in the field conducting a wide variety of investigations, which will be portrayed on the small screen in the conference ballroom.



Looking forward, I predict that one of the themes for next year's conference will be EISOs' involvement in CDC's renewed commitment toward eradicating polio. EIS alumni play critical leadership roles on the CDC teams coordinating and staffing this effort; EISOs will likely play an increased role on teams in the field as we get closer to reaching our goal. The first teams of EISOs began deploying in February and one of the special sessions this week will highlight their experiences.

As always, we extend a special welcome to the incoming EISOs, members of the Class of 2012. This year we again received about 475 applications. Although this continues to mean a lot more work for us in the initial screening process, it also means that we have a much richer pool of candidates from which to choose. I am confident that we have chosen an excellent group of new officers.

This year's 84 red name tags represent a select group of men and women with a broad array of interests and skills. Fifty-nine of the new officers are women (70%), and 13 are citizens of other nations (16%). The other countries represented in this year's class are Australia, Canada (3), Ghana, India, Israel, Japan, Kenya, Nigeria (2), Togo, and United Kingdom. Among the 73 U.S. citizens or permanent residents, 29 represent racial or ethnic minority groups (40%). The class includes 26 PhD-level scientists (33%), 42 physicians (50%), 12 veterinarians (14%), 1 dentist, and 1 PharmD. One of the MDs and 3 of the DVMs also hold PhDs. Ten members of the class have accepted prematch assignments in state health departments.

This year, we again will be running concurrent oral sessions on Tuesday and Wednesday mornings, so please check your program carefully. Several special sessions also will be included in this year's conference. Tuesday's lunchtime session is hosted by CGH and will focus on the Horn of Africa Famine: Applied Public Health in Nutritional Emergencies. On Wednesday, the National Center for Chronic Disease Prevention and Health Promotion will host a lunchtime session, Progress in Prevention and Control of the U.S. Childhood Obesity Epidemic: Creating Environments that Support Healthier Choices. On Thursday, our final special lunchtime session will cover Polio: EIS Response to a Public Health Emergency.

The 2012 Conference provides you with an opportunity to learn about many current applications of epidemiology to public health and prevention by EISOs. I hope you enjoy this exciting series of days and evenings in the EIS experience, and I hope you take this as an opportunity to learn, meet old and new friends, and welcome the incoming officers. I look forward to seeing you during the week.

Douglas H. Hamilton, MD, PhD

Director, Epidemic Intelligence Service

Division of Applied Sciences

Scientific Education and Professional Development Program Office

Scientific Program Committee

Chair, Emad Yanni, National Center for Emerging and Zoonotic Infectious Disease

Chair Elect, Alexandre Macedo De Oliveira, Center for Global Health

Center for Global Health	Katherine Tan
National Center on Birth Defects and Developmental Disabilities	Deborah (Daisy) Christensen
National Center for Chronic Disease Prevention and Health Promotion.	Jacqueline Miller*
National Center for Emerging and Zoonotic Infectious Disease	Dianna Blau and Benjamin Park
National Center for Environmental Health/Agency for Toxic Substances and Disease Registry	Mary Anne Duncan*
National Center for Health Statistics	Kathryn Porter
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention	Tracie Gardner
National Center for Immunization and Respiratory Diseases	Jennifer Verani
National Center for Injury Prevention and Control.	Joseph Logan
National Institute for Occupational Safety and Health	Jacek Mazurek*
Scientific Education and Professional Development Program Office	Kris Bisgard and W. (Randolph) Daley*

* Late-breaking session subcommittee



Left to right: Joseph Logan, Tracie Gardner, Benjamin Park, Katherine Tan, Kathryn Porter, Kris Bisgard, Jacek Mazurek, Jennifer Verani, Randolph Daley, Jacqueline Miller, Dianna Blau, Daisy Christensen, Alexandre Macedo De Oliveira, Mary Anne Duncan, Emad Yanni

Program Production

Rachel N. Avchen	Christa Hale	Sheila Porter
Mary Dott	Korwaski Jeter	Todd Prydybasz
Ronald Edwards	Anthony Jordan	C. Kay Smith
Brad Goodwin	William Knoll	
Kathryn Green	Julie Magri	
Douglas H. Hamilton	Deborah Ornelas	

Acknowledgments/Disclaimer

The EIS Program extends a special thank you to the EIS Alumni Association for sponsoring the breaks at this year’s 61st Annual EIS Conference.

The EIS Program gratefully acknowledges the valuable assistance and cooperation of the editorial, creative service, and support staff throughout CDC who contribute to the officers’ presentations. 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.

General Information

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 located outside the Ravinia Ballroom. Check-in and onsite registration are available Monday–Friday, 7:00 a.m.–5:00 p.m.

Please wear your conference badge at all times during the conference. Conference staff are wearing purple badges and are available to assist if you need additional information or misplace your badge.

Cyber Café/Message Center

To facilitate conference networking, computers with Internet access are located in the Camellia Room. Preregistered attendees have immediate access to find, communicate, and network with other conference participants, speakers, and staff. LinkedIn® profiles can be uploaded easily to the conference messaging system, and you can upload a picture of yourself to facilitate easy identification. If you are not already registered, please see conference staff for assistance. Please limit computer time to 10 minutes per session to allow other conference attendees an opportunity to use the system as well.

Speaker Ready Room

Located in the Dogwood Room, the speaker ready room is available for presenters who need to review or make changes to their presentations. Computers with PowerPoint® software, rewritable CD-ROM drives, and a printer will be available Monday–Thursday, 8:00 a.m.–6:00 p.m.

Exhibit Hall

Open Monday–Thursday, 8:00 a.m.–5:00 p.m., in the Pre-convene Area and the Ravinia Ballroom (E, F, and G).

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 turn off ringers on cellular phones during conference sessions. Please limit use of cellular phones to the meeting room foyers and public areas outside the meeting rooms.

Lactation Room

Please visit the EIS information table, next to the registration area, for access to the lactation room. A sign-up schedule and key will be available at the table Monday–Friday, 7:30 a.m.–5:00 p.m.

**2012 EIS Conference
Schedule At-a-Glance**

Schedule At-a-Glance

MONDAY

SESSION A: Opening Session - Ravinia Ballroom	8:15–10:15 am
SESSION B: Emerging Environmental Infectious Diseases - Ravinia Ballroom	10:45–12:10 pm
POSTER SESSION 1: Meet the Authors: Posters 1–15 - Ravinia Ballroom (E, F, and G)	12:30–1:30 pm
SESSION C: Parasitic Diseases - Ravinia Ballroom	1:30–2:55 pm
SESSION D: Health Care-Associated Infections - Ravinia Ballroom	3:15–5:20 pm
EIS CONFERENCE SOCIAL Conference Preconvene Area.	5:20 pm

TUESDAY

CONCURRENT SESSION E1: Environmental and Occupational Health - Ravinia Ballroom	8:30–10:15 am
CONCURRENT SESSION E2: HIV/STD - Dunwoody Suites	8:30–10:15 am
CONCURRENT SESSION F1: Injury - Ravinia Ballroom	10:45 am–12:10 pm
CONCURRENT SESSION F2: Zoonoses - Dunwoody Suites	10:45 am–12:10 pm
SPECIAL SESSION Page 72	
Horn of Africa Famine: Applied Public Health in Nutritional Emergencies - Dunwoody Suites	12:30 pm
SESSION G: Global Health - Ravinia Ballroom	1:45–3:50 pm
PREDICTION RUN Liane Levetan at Brook Run Park Pavilion, Dunwoody	6:00 pm

WEDNESDAY

CONCURRENT SESSION H1: Chronic Diseases - Ravinia Ballroom	8:30–10:15 am
CONCURRENT SESSION H2: Respiratory Diseases - Dunwoody Suites	8:30–10:15 am
CONCURRENT SESSION I1: Reproductive Health - Ravinia Ballroom	10:30–11:55 am
CONCURRENT SESSION I2: Tuberculosis - Dunwoody Suites	10:30–11:55 am
SPECIAL SESSION Page 88	
Progress in Prevention and Control of the U.S. Childhood Obesity Epidemic - Dunwoody Suites	12:30 pm
POSTER SESSION 2: Meet the Authors: Posters 16–30 - Ravinia Ballroom (E, F, and G)	12:30–1:30 pm
SESSION J: Foodborne and Enterics - Ravinia Ballroom	1:30–3:35 pm
SESSION K: Alexander D. Langmuir Memorial Lecture and Reception - Ravinia Ballroom	4:00–5:30 pm
Awards Presentation - Maplewood Room Alexander D. Langmuir Prize Manuscript Award Distinguished Friend of EIS Award	
EIS ALUMNI ASSOCIATION MEETING Oakwood Room	5:30 pm
SESSION L: International Night Dunwoody Suites	6:00–9:35 pm
Poster Session	6:00–7:30 pm
Oral Presentations	7:30–9:35 pm
Award Presentation , William H. Foege Award - Dunwoody Suites.	9:35 pm

THURSDAY

SESSION M: Donald C. Mackel Award Finalists - Ravinia Ballroom	8:30–10:15 am
SESSION N: J. Virgil Peavy Award Finalists - Ravinia Ballroom	10:30–11:55 am
SPECIAL SESSION Page 119 Polio: EIS Response to a Public Health Emergency - Dunwoody Suites	12:30 pm
SESSION O: Vaccine Preventable Diseases - Ravinia Ballroom	1:30–3:15 pm
Award Presentation Iain C. Hardy Award	
SESSION P: Pediatrics - Ravinia Ballroom	3:30–4:55 pm
EIS SATIRIC REVUE Ravinia Ballroom	8:30 pm
Award Presentation Philip S. Brachman Award	

FRIDAY

SESSION Q: Surveillance - Ravinia Ballroom	8:30–9:55 am
Awards Presentation - Ravinia Ballroom.	10:15 am
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 R: Late-Breaking Reports - Ravinia Ballroom	10:30–11:55 am
SESSION S: Global Immunization - Ravinia Ballroom	1:30–3:15 pm
CLOSING REMARKS AND ADJOURNMENT.	3:15 pm

Monday, April 16, 2012

7:00 REGISTRATION DESK OPENS

8:15 WELCOME AND CALL TO ORDER Ravinia Ballroom
Stephen B. Thacker, Director, Office of Surveillance, Epidemiology, and Laboratory Services, CDC

8:30 SESSION A: Opening Session

Almost Famous Ravinia Ballroom

MODERATORS: Stephen B. Thacker and Denise Koo

8:35 *Legionella* Outbreak Associated with Solar Rooftop Water Heating System — Maryland, 2011. *Maria A. Said*

8:55 Trends in Unintentional Injury Deaths Among Children Aged 0–19 — United States, 1999–2009. *Erin M. Parker*

9:15 Using Routine Clinical Data To Estimate the Incidence of HIV Infection in Female Commercial Sex Workers — Honduras, 2006–2010. *Mahesh Swaminathan*

9:35 Investigation of Respiratory and Dermal Symptoms Associated with Metal Working Fluids at an Aircraft Engine Manufacturing Facility — Ohio, 2010. *Francisco A. Meza*

9:55 Decline in Gastroenteritis and Rotavirus-Coded Hospitalizations Among U.S. Children After Implementation of Rotavirus Vaccine. *Rishi Desai*

10:15 BREAK

10:45 SESSION B: Emerging Environmental Infectious Diseases

An Inconvenient Truth Ravinia Ballroom

MODERATORS: Beth P. Bell and David Warnock

10:50 Necrotizing Cutaneous Mucormycosis Following a Tornado — Joplin, Missouri, 2011. *Robyn Neblett Fanfair*

11:10 Serologic Survey of Exposure Following Fatal *Balamuthia mandrillaris* Infection — Southern Arizona, 2010. *Brendan R. Jackson*

11:30 *Cryptococcus gattii*: An Emerging Fungal Infection in the Pacific Northwest — Oregon and Washington, 2004–2011. *Rachel M. Smith*

11:50 Elevated *Acanthamoeba* Keratitis Incidence Despite a 2007 Outbreak-Associated Product Recall — A Multi-State Investigation, 2008–2011. *Allison C. Brown*

12:10 LUNCH

12:30 POSTER SESSION 1: Meet the Authors

Into the Wild Ravinia Ballroom (E, F, and G)

All posters presented during the conference will be on display Monday 9:00 a.m.–Friday 12:00 p.m.

The following authors will be present to discuss their studies on Monday, 12:30–1:30 p.m.

- P1** Assessment for Possible Healthcare-Associated Transmission of a Novel Swine Influenza — Pennsylvania, August 2011. *Adena H. Greenbaum*
- P2** Survival of Women with Invasive Cervical Cancer by Genotype-Specific Human Papillomavirus Status — United States, 1993–2005. *Keisha A. Houston*
- P3** Birth-Year versus Traditional Risk Indicators Among Confirmed Cases of Chronic Hepatitis C Virus Infection from 6 Funded Hepatitis Surveillance Sites — United States, 2004–2010. *Reena Mahajan*
- P4** Novel Swine-Origin Triple Reassortant Influenza A (H3N2) Among Attendees of an Agricultural Fair — Pennsylvania, August 2011. *Karen K. Wong*
- P5** Associations Between *Salmonella* Serotypes and Particular Food Commodities — United States, 1998–2008. *Brendan R. Jackson*
- P6** Epidemiology of Bacterial Toxin-Mediated Foodborne Disease Outbreaks — United States, 1998–2008. *Sarah D. Bennett*
- P7** Outbreak of Enterohemorrhagic *Escherichia coli* O104:H4 in Europe and North America Associated with Sprout Consumption: Investigation of US Cases — 2011. *Adamma Mba-Jonas*
- P8** Visual Impairment Among Adults Aged ≥ 40 Years — New Mexico, 2008. *Mam Ibraheem*
- P9** *Escherichia coli* O157 Among Arapahoe County Inmates — Colorado, 2011. *Neena Jain*
- P10** Prevalence and Risk Factors for Metabolic Syndrome in Medellin — Colombia, 2008–2010. *Evelyn D. Davila*
- P11** Relationship Between Food Insecurity and Low Fruit and Vegetable Consumption — 12 U.S. States, 2009. *NaTasha H. Hollis*
- P12** Pine-ing for a Vehicle: Using Supermarket Shopper Card Information as a Tool in a Multistate Outbreak of *Salmonella* Enteritidis Infections Linked to Turkish Pine Nuts. *Alison S. Laufer*
- P13** Risk Factors for Methicillin-Resistant *Staphylococcus aureus* Infection Among an Incarcerated Population — King County, Washington, 2008–2010. *Michael H. Kinzer*
- P14** Typhoid Fever Associated with Intestinal Perforations — Bundibugyo District, Uganda, 2011. *Maroya Walters*
- P15** Malaria and Anemia Prevalence After Indoor Residual Spraying in Northern Ugandan Districts with High Levels of Insecticide Resistance. *Laura Steinhardt*

1:30 SESSION C: Parasitic Diseases

Invasion of the Body Snatchers Ravinia Ballroom

MODERATOR: Mark Eberhard

1:35 Bedbug Complaints Among Public Housing Residents — New York City, 2010. *Prabhu P. Gounder*

1:55 Efficacy of Artemether-Lumefantrine and Dihydroartemisinin-Piperaquine in the Treatment of Uncomplicated *Plasmodium falciparum* Malaria Among Children — Western Kenya, 2010–2011. *Aarti Agarwal*

2:15 Morbidity Due to Schistosomiasis Among School-Children — Kenya 2011. *Aaron M. Samuels*

2:35 Fire and Feces: *Cryptosporidium parvum* Outbreak Associated with Fighting a Barn Fire — Indiana and Michigan, June 2011. *Jenna M. Webeck*

2:55 BREAK

3:15 SESSION D: Health Care-Associated Infections

Nurse Betty Ravinia Ballroom

MODERATORS: Scott Fridkin and John Moran

3:20 What Goes Around Comes Around — Investigation of a Group A Streptococcal Outbreak Among Residents of a Skilled Nursing Facility, Georgia, 2009–2011. *Kathleen L. Dooling*

3:40 *Herbaspirillum* Species Infections Among Oncology Patients — Texas, 2011. *Raymund B. Dantes*

4:00 Streptococcal Endophthalmitis Associated with Contaminated Bevacizumab from a Compounding Pharmacy — Florida, 2011. *Valery M. Beau De Rochars*

4:20 Incidence and Pathogen Distribution of Health Care-Associated Infections — Egypt, 2011. *Isaac See*

4:40 Outbreak of Hepatitis C Virus Infections in an Outpatient Hemodialysis Facility — Georgia, 2011. *Chukwuma Mbaeyi*

5:00 Characteristics and Trends of Bloodstream Infections Caused by Methicillin-Resistant *Staphylococcus aureus* Among Chronic Dialysis Patients, Active Bacterial Core Surveillance, 2005–2010. *Duc B. Nguyen*

5:20 **EIS CONFERENCE SOCIAL** Conference Preconvene Area
Cash Bar

Tuesday, April 17, 2012

8:30 CONCURRENT SESSION E1: Environmental and Occupational Health

The Help Ravinia Ballroom

MODERATORS: Bruce Bernard and David Callahan

- 8:35** Histoplasmosis Infection Among Temporary Laborers — Illinois, August–September 2011. *Yoran T. Grant*
- 8:55** Prevalence of Coal Workers' Pneumoconiosis Among Surface Coal Miners — 16 States, 2010–2011. *Cara N. Halldin*
- 9:15** Cohort Mortality Study of Garment Industry Workers Exposed to Formaldehyde — United States, 1955–2008. *Alysha R. Meyers*
- 9:35** Exposure to Radioactive Strontium Following Cardiac Positron Emission Tomography — Alabama, Florida, Pennsylvania, Tennessee, 2011. *Satish K. Pillai*
- 9:55** All That Bugs Is Not in Bed: Bedbug Infestation of an Office Building — Clarksville, Tennessee, 2011. *Jane A. G. Baumblatt*

8:30 CONCURRENT SESSION E2: HIV/STD

Fatal Attraction Dunwoody Suites

MODERATORS: Jonathan Mermin and Gail Bolan

- 8:35** Prevalence of Circumcision in Males Aged 14–59 Years — United States, 2005–2010. *Cammille E. Introcaso*
- 8:55** Prevalence of HIV Testing Among Men at Risk of Acquiring HIV Infection Through Sex — United States, 2002 and 2006–2008. *Candice K. Kwan*
- 9:15** Health Care Providers' Perspectives on Barriers to Prenatal Syphilis Testing and Treatment — Shreveport, Louisiana, 2011. *Eleanor B. Fleming*
- 9:35** Evidence Against Serosorting Among HIV-Infected Persons with Syphilis — New York City, Philadelphia, and Washington, DC, 2009–2010. *Brooke E. Hoots*
- 9:55** Women at Risk for Repeat *Chlamydia trachomatis* Infections — Infertility Prevention Program, Oregon, 2010. *Genevieve L. Buser*

10:15 BREAK

10:45 CONCURRENT SESSION F1: Injury

It's a Mad, Mad, Mad, Mad World Ravinia Ballroom

MODERATOR: Linda Degutis

10:50 Too Many “Cooks” in the RV: Injuries Associated with Illicit Clandestine Methamphetamine Production — United States, 2001–2010. *Bryan E. Christensen*

11:10 The Impact of Father Absence, Parental Monitoring, and Parenting Practices on Suicidal Behavior. *Asha Z. Ivey*

11:30 Mortality in Tornado Outbreak — Alabama, 27 April 2011. *Cindy H. Chiu*

11:50 Preparing for Functional Needs While Sheltering During a Disaster — Kentucky, 2011. *Amy R. Kolwaite*

10:45 CONCURRENT SESSION F2: Zoonoses

The Silence of the Lambs Dunwoody Suites

MODERATORS: Sean Shadomy and Nina Marano

10:50 *Campylobacter jejuni* Infections Associated with Sheep Castration — Wyoming, 2011. *Kerry R. Pride*

11:10 *Escherichia coli* O157:H7 Outbreak Associated with a State Fair — North Carolina, 2011. *Stephanie E. Griese*

11:30 Imported Human Rabies in a U.S. Army Soldier — New York, 2011. *Angela M. Maxted*

11:50 Anthrax Outbreak Associated with Hippopotamus Meat — Chama District, Zambia. *Mark W. Lehman*

12:10 LUNCH

12:30 SPECIAL SESSION

Horn of Africa Famine:

Applied Public Health in Nutritional EmergenciesDunwoody Suites

MODERATOR: Scott Dowell

SPEAKERS: Lara Jacobson, Carlos Navarro, Sharmila Shetty, Cyrus Shahpar, Sudhir Bunga, Leisel Talley, Kevin Clarke, Susan Cookson, Danni Daniels, Muireann Brennan

1:45 SESSION G: Global Health

Around the World in 80 Days Ravinia Ballroom

MODERATORS: Laurence Slutsker and Rita Helfand

- 1:50** The Impact of Targeted Incentives and Enhanced Services on Use of Maternal Health Services in Rural Western Kenya. *Katherine A. O'Connor*
- 2:10** Adherence to Artemether-Lumefantrine in the Treatment of Uncomplicated Malaria — Ethiopia, 2010. *Melissa A. Briggs*
- 2:30** Artisanal Gold Ore Processing and Childhood Lead Poisoning — Nigeria, November 2010. *Behrooz Behbod*
- 2:50** Factors Associated with Undiagnosed HIV Infection Among Persons with HIV in Mozambique, 2009. *Kainne E. Dokubo*
- 3:10** Impact of a Blanket Supplementary Feeding Program in a Nutrition Emergency — Turkana County, Kenya, 2011. *Cyrus G. Shahpar*
- 3:30** Nodding Syndrome, a Novel Neurologic Illness of Unknown Etiology — South Sudan, 2011. *Sudhir Bunga*

3:50 BREAK

6:00 PREDICTION RUN Liane Levetan at Brook Run Park Pavilion, Dunwoody

4:30-4:45 Shuttle transportation is available at the front of the hotel.
Shuttle will depart at 4:45 and arrive at the park by 5:00 pm.



Wednesday, April 18, 2012

8:30 CONCURRENT SESSION H1: Chronic Diseases

Happy Feet Ravinia Ballroom

MODERATORS: Ursula E. Bauer and Kate Brett

- 8:35** Unhealthy Weight Control Behaviors Among High School Students — United States, 1999–2009. *Zewditu Demissie*
- 8:55** Nonadherence to Physical Activity Recommendations Among Preschool- and School-Aged Children — United States, 2009–2010. *Tala H.I. Fakhouri*
- 9:15** Relationship of Self-Reported Neighborhood Characteristics to Overweight and Obesity — Allegheny County, Pennsylvania, 2009–2010. *Michael Gronostaj*
- 9:35** Usual Sodium Intake Among Preschool Children — United States 2001–2008. *Niu Tian*
- 9:55** Why Mothers Introduce Solid Foods to Their Infants Earlier than Recommended — United States, 2005–2007. *Heather B. Clayton*

8:30 CONCURRENT SESSION H2: Respiratory Diseases

Up in the Air Dunwoody Suites

MODERATOR: Thomas Clark

- 8:35** Factors Associated with False-Positive Polymerase Chain Reaction Results During a Pertussis Outbreak — Jefferson County, New York, 2010–2011. *Angela M. Maxted*
- 8:55** Pertussis Transmission in a Neonatal Intensive Care Unit — Arizona, 2011. *Seema Yasmin*
- 9:15** Outbreak of *Streptococcus pneumoniae* Serotype 15A Among Patients and Staff in a Psychiatric Unit — Rhode Island, January–February 2011. *Katherine E. Fleming-Dutra*
- 9:35** *Bordetella holmesii* Epidemiology During an Outbreak of Pertussis-Like Illness — Ohio, 2010–2011. *Loren E. Rodgers*
- 9:55** Diagnosis and Demand — Patient and Provider Drivers of Antibiotic Use — Minya District, Egypt, 2011. *Kathleen Dooling*

10:15 BREAK

10:30 CONCURRENT SESSION I1: Reproductive Health

The Parent Trap Ravinia Ballroom

MODERATOR: Robert J. Berry and Wanda Barfield

- 10:35** Trends in Venous Thromboembolism Among Pregnancy Hospitalizations — United States, 1994–2008. *Nafisa Ghaji*
- 10:55** Patient Characteristics of Repeat Induced Terminations of Pregnancy — New York City, 2010. *Amita Toprani*
- 11:15** Evaluation of CDC’s 2009–2011 Pregnancy Flu Line for Monitoring Pandemic and Seasonal Influenza. *Elizabeth C. Ailes*
- 11:35** Prevalence of Urinary Tract Infections and Pharmacotherapy Use in Pregnancy United States, 1997–2007. *Simerpal Gill*

10:30 CONCURRENT SESSION I2: Tuberculosis

Catch Me If You Can Dunwoody Suites

MODERATORS: Kenneth Castro and Martin Cetron

- 10:35** Tuberculosis Surveillance Data Transmission Errors — United States, 2011. *Robert F. Luo*
- 10:55** Tuberculosis Contact Investigation in a Middle School — Kansas, 2010–2011. *Amy E. Peterson*
- 11:15** Tuberculosis Follow-Up Among Immigrant and Refugee Children Arriving in the United States with Latent Tuberculosis Infection — 2010. *Eboni M. Taylor*
- 11:35** Tuberculosis Among Foreign-Born Temporary Residents — California, 2010–2011. *Jonathan J. Nunez*

11:55 LUNCH

12:30 **SPECIAL SESSION**

**Progress in Prevention and Control of the U.S. Childhood Obesity Epidemic
Creating Environments that Support Healthier Choices** Dunwoody Suites

MODERATOR: Ursula E. Bauer

SPEAKERS: Alyson Goodman, Sohyun Park, MinKyoung Song, Cria Perrine

12:30 POSTER SESSION 2: Meet the Authors

Where the Wild Things Are..... Ravinia Ballroom (E, F, and G)

All posters presented during the conference will be on display Monday 9:00 a.m.–Friday 12:00 p.m.

The following authors will be present to discuss their studies on Monday, 12:30–1:30 p.m.

- P16** Integration of Household Water Treatment, Hand Washing Promotion, and Voluntary Counseling and Testing for HIV with Antenatal Services in Malawi. *Janell A. Routh*
- P17** Hospital Outbreak of Carbapenem-Resistant *Klebsiella pneumoniae* — Panama, 2011. *Raymund B. Dantes*
- P18** Comparison of O157 and Non-O157 Shiga Toxin-Producing *Escherichia coli* — Los Angeles County, 2006–2011. *Christina A. Mikosz*
- P19** Autopsy and Unexplained Death Due to Possibly Infectious Causes in Infants — United States, 2006. *Christopher A. Taylor*
- P20** Knowledge and Practices of Health Care Providers Regarding Early Lyme Disease — US, 2009. *Meghan E. Brett*
- P21** *Escherichia coli* O157 Family Cluster Associated with Orphan Calves — Wyoming, 2011. *Kerry R. Pride*
- P22** Clonal Cluster of *Burkholderia contaminans* Among Ventilated Patients in a Hospital Intensive Care Unit — Kansas, 2011. *Amy E. Peterson*
- P23** Paralytic Shellfish Poisoning — Southeast Alaska, 2011. *Kimberly Porter*
- P24** Vitamin B12 Deficiency in Bhutanese Refugees — Nepal, 2011. *Stacie E. Dunkle*
- P25** Characteristics and Magnitude of Acute Pesticide-Related Illnesses Associated with Pyrethrin and Pyrethroid Exposures — 11 States, 2000–2008. *Naomi L. Hudson*
- P26** Vaccine Effectiveness of Tetanus, Diphtheria, Acellular Pertussis Vaccine in a School-Based Pertussis Outbreak — Maine, 2011. *Andrew Terranella*
- P27** Multistate Outbreak of *Salmonella* Bovismorbificans Infections Associated with Mediterranean-Style Restaurants — United States, 2011. *Tiana A. Garrett*
- P28** Association of Asthma with Seasonal and Pandemic H1N1 Influenza Among Children with Medically Attended Respiratory Illness in a Wisconsin Population Cohort — 2007–2009. *Sarah K. Kemble*
- P29** Injuries Following Historic Tornadoes — Alabama, April 2011. *Thomas Niederkrotenthaler*
- P30** Let Us Raise the Salad Bar: Shiga Toxin-Producing *Escherichia coli* O157:H7 Infections Linked to Romaine Lettuce — Missouri, 2011. *Rachel B. Slayton*

1:30 SESSION J: Foodborne and Enterics

Attack of the Killer Tomatoes! Ravinia Ballroom

MODERATORS: Robert V. Tauxe and Aaron Fleischauer

1:35 Rapid Investigation of a Multistate Outbreak of Listeriosis Associated with Farm A Cantaloupes Using the Listeria Initiative — United States, August–October 2011.
Katherine A. O’Connor

1:55 BOTtoms Up!: Botulism Associated with Illicit Alcoholic Prison Beverage — Utah, 2011.
Mayora S. Walters

2:15 Can Seasonal Food Commodity Consumption Changes Explain Variations in Occurrence of Foodborne Disease Outbreaks? — United States, 1998–2008. *Sarah D. Bennett*

2:35 Outbreak of *Salmonella enterica* Serotype Enteritidis Infections Associated with Pet Guinea Pigs — Multiple States, 2010. *Michael L. Bartholomew*

2:55 The Proof Is in the Poultry: Multistate Outbreak of Multidrug-Resistant *Salmonella* Heidelberg Infections Linked with Ground Turkey, 2011. *Janell A. Routh*

3:15 Norovirus Outbreak at a Rehearsal Dinner — Connecticut, 2011. *Timothy S. Styles*

3:35 BREAK

4:00 SESSION K: Alexander D. Langmuir Memorial Lecture and Reception

The Godfather Ravinia Ballroom

MODERATOR: Stephen B. Thacker

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



Prior to the lecture, the following awards will be presented:

Alexander D. Langmuir Prize Manuscript Award

Distinguished Friend of EIS Award

This event is cosponsored by the EIS Alumni Association and the Scientific Education and Professional Development Program Office.

5:30 EIS ALUMNI ASSOCIATION MEETING Oakwood Room

6:00 SESSION L: International Night

Lost in Translation Dunwoody Suites
Poster Session

The following authors will be present to discuss their studies on Wednesday, 6:00–7:00 p.m.

- IP1.** An Outbreak of *Salmonella* Serotype Dublin Infections Associated with Eating Egg Sandwiches from a Supermarket — Zhejiang Province, China, 2011. *Qin Liu*
- IP2.** Foodborne Outbreak Among Inmates in Six Prison Facilities — Eastern El Salvador, June 2010. *Rhossy Hassell Espinoza*
- IP3.** Rabies in Georgia, 2011 (Georgia, Gardabani Region, Village of Nazarlo) August 2011–December 14. *Marina Nikolaishvili*
- IP4.** Risk Factors for Colonization with Livestock-Associated Methicillin-Resistant *Staphylococcus aureus*, Germany 2011. *Michaela Diercke*
- IP5.** Risk Factors for Severe Pneumonia Among Children Aged 2–59 Months in Western Kenya, 2011. *Dickens O. Onyango*
- IP6.** Measles Outbreak and Vaccination Coverage — Kakuma Refugee Camp, Kenya, 2011. *Joyce N. Wamicwe*
- IP7.** Risk Factors for Human Brucellosis in an Urban Setting — Bishkek, Kyrgyz Republic, 2011. *Kalysbubu Nogobaeva*
- IP8.** Epidemiological and Microbiological Investigation of Cholera Outbreak in a Marsh Slum Area of Lagos, South Western Nigeria, 2011. *A. Aman-Oloniyo*
- IP9.** An Outbreak of Shigellosis Linked to Imported Basil: The Importance of Standardized Genotyping Tools and Traceability Systems, Norway, October 2011. *B. Guzman-Herrador*
- IP10.** Investigation of a Measles Outbreak and Appraisal of Measles Elimination Indicators — Qasseem Region, Saudi Arabia, 2011. *Ibraheem Mohammed Al-Nahellah*
- IP11.** Cluster of Measles Cases Among Malnourished Maasai Children, Monduli District, Arusha, Tanzania, 2011. *Remidius Kakulu*
- IP12.** Epidemiology of Electrocution Death Identified by Flood-Related Surveillance During the Worst Flood Disaster in Thailand, 2011. *Sukhum Piriyaornpipat*
- IP13.** Crab Meat: A New Vehicle for *Escherichia coli* O157 Identified During an Outbreak in the United Kingdom, 2011. *Petra Matulkova*
- IP14.** The Effect of Formal Written Communication on Male Partner Participation in the Prevention of Mother to Child HIV Transmission (PMTCT) Programme in Zvimba District, Zimbabwe, 2010. *Bernard Madzima*
- IP15.** Typhoid Outbreak Investigation in Dzivaresekwa Suburb of Harare City, Zimbabwe, 2011. *Monica Muti*

7:30 ORAL PRESENTATIONS *Dunwoody Suites*

WELCOME: Dr. Peter B. Bloland, Director, Division of Public Health Systems and Workforce Development, Improving Global Health Outcomes through Field Epidemiology Training and Public Health Response

MODERATORS: Kevin DeCock and Paul M. Kelly

- 7:35** Linked Testing Using Rapid HIV Tests for Antenatal Care Sentinel Surveillance in Resource-Limited Settings: Evidence from Angola's Experience in 2009. *James C. Houston*
- 7:55** Risk Factors for Critical Disease and Death from Hand, Foot, and Mouth Disease, Immunosuppressants and Immunostimulants — What Works? — Chongqing Municipality, China, 2011. *Yilin He*
- 8:15** Factors Associated with Interruption of Treatment Among Pulmonary Tuberculosis Patients in Plateau State — Nigeria, 2011. *Luka Ibrahim*
- 8:35** Cholera Outbreak at an Internally Displaced Person's Camp in a Flood-Affected District — Muzaffargarh, Pakistan, 2010. *Shoaib Hassan*
- 8:55** Effect of Educational Intervention to Prevent and Control the Increase of Overweight and Obesity in Schoolchildren from Public Elementary Schools in Marginal-Urban District of Villa El Salvador in Lima, Peru from 2010 to 2011. *Julia Viviana Gago*
- 9:15** Space-Time Clusters Analysis of Cases of Whooping Cough — Barcelona, Spain, 2000–2011. *Rubén Solano*

9:35  **Presentation of William H. Foege Award** *Dunwoody Suites*

Reception to Follow.

International Night is cosponsored by the Center for Global Health (CGH) 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 partners with CDC and some are independent. All conference attendees are invited to these sessions.

Thursday, April 19, 2012

8:30 SESSION M: Donald C. Mackel Memorial Award Finalists

Weird Science Ravinia Ballroom

MODERATORS: Rachel Kaufmann and Sherif Zaki

8:35 *Yersinia enterocolitica* Infections Associated with Pasteurized Milk — Southwestern Pennsylvania, March–August 2011. *Allison H. Longenberger*

8:55 *Serratia marcescens* Bloodstream Infections in Patients Receiving Total Parenteral Nutrition — Alabama, 2011. *Neil Gupta*

9:15 Pyrrolizidine Alkaloid Toxicity as the Cause of Unknown Liver Disease — Tigray, Ethiopia, 2007–2011. *Danielle E. Buttke*

9:35 Characterization of Patients Infected with Influenza B Viruses with a Novel I221V Neuraminidase Mutation — North Carolina and South Carolina, 2010–2011. *Shikha Garg*

9:55 Outbreak of *Escherichia coli* O157:H7 Infections Associated with Consumption of Strawberries Contaminated by Deer — Oregon, July–August 2011. *Mathieu Tourdjman*

10:15 BREAK

10:30 SESSION N: J. Virgil Peavy Memorial Award Finalists

Against All Odds Ravinia Ballroom

MODERATOR: Philip S. Brachman

10:35 Heat-Related Illness Among Migrant Farmworkers — Georgia, 2011. *Nancy L. Fleischer*

10:55 Changes in Adult Participation in Leisure-Time Walking — United States of America, 2005 to 2010. *Prabasaj Paul*

11:15 Using Social Context To Explain Racial/Ethnic Differences in the Risk of Preterm Births — Texas, 2004–2008. *Noha H. Farag*

11:35 Role of Norovirus Gastroenteritis in the Ambulatory Setting — United States, 2000–2009. *Paul A. Gastañaduy*

11:55 LUNCH

12:30 SPECIAL SESSION

Polio: EIS Response to a Public Health Emergency Dunwoody Suites

MODERATORS: Sara Lowther, Diana Bensyl, and Robert Linkins

SPEAKERS: Cristina V. Cardemil, Rennatus Mdodo, Heather M. Scobie, Danielle Tack, Noha H. Farag

1:30 **SESSION O: Vaccine Preventable Diseases**

Hot Shots!..... Ravinia Ballroom

MODERATOR: Melinda Wharton



Presentation of the Iain C. Hardy Award

- 1:35** Racial Disparities in Invasive Pneumococcal Disease — United States, 1998–2009.
Jonathan M. Wortham
- 1:55** Impact of Quadrivalent Meningococcal Conjugate Vaccine (MenACWY) Coverage on Disease Incidence in the United States, 2005–2010. *Sarah A. Meyer*
- 2:15** Rise in Risk of Pertussis in the 6 Years Following Complete Diphtheria-Tetanus-Acellular-Pertussis (DTaP) Vaccination — Minnesota and Oregon, 2010. *Sara Y. Tartof*
- 2:35** An Outbreak of Varicella in the 2-Dose Vaccine Era: A Diagnostic Dilemma?
Abdirahman Mahamud
- 2:55** Measles Outbreak Associated with International Travel — Indiana, 2011. *Melissa G. Collier*

3:15 **BREAK**

3:30 **SESSION P: Pediatrics**

The Descendants..... Ravinia Ballroom

MODERATOR: Lorraine Yeung

- 3:35** Treatment Quality for Children Seen by Health Workers Trained To Use Integrated Management of Childhood Illness Guidelines in Benin. *Laura C. Steinhardt*
- 3:55** Asthma Is Associated with Increased Acute Chest Syndrome Diagnoses During Hospital Admission Among Children with Sickle Cell Disease — United States, 2005.
Ijeoma Azonobi
- 4:15** Are Children in Puerto Rico Lead Free? A Population-Based, Cross-Sectional Assessment of Childhood Lead Poisoning — Puerto Rico, 2010. *Alejandro Azofeifa*
- 4:35** Risk Factors for Abusive Head Trauma in Young Children — United States, 2000–2009.
Thomas Niederkrotenthaler

8:30 **EIS SATIRIC REVUE** Ravinia Ballroom



Presentation of Philip S. Brachman Award

Friday, April 20, 2012

8:30 SESSION Q: Surveillance

Spies Like Us Ravinia Ballroom

MODERATORS: James W. Buehler and Denise Koo

8:35 How Complete Is Automated Reporting for Coronary Heart Disease? Improvement in Data Quality of Pilot Acute Coronary Heart Disease Surveillance System After System Changes — Nebraska, 2011. *Kristin M. Yeoman*

8:55 Completeness and Timeliness of Electronic Versus Conventional Laboratory Reporting for Communicable Disease Surveillance — Oklahoma, 2011. *Matthew G. Johnson*

9:15 Non-O157 Shiga Toxin-Producing *Escherichia coli* (STEC) — California, 2004–2010, *Joyanna M. Wendt*

9:35 Surveillance of Gender-Based Violence — Belize, 2011. *Katherine A. Fowler*

9:55 BREAK

10:15  **PRESENTATION OF AWARDS** Ravinia Ballroom

MODERATOR: Douglas H. Hamilton

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

10:30 SESSION R: Late-Breaking Reports

The Hangover Ravinia Ballroom

MODERATORS: Douglas H. Hamilton and Jacqueline Miller

See supplement for presenters and abstracts.

11:55 LUNCH

1:30 SESSION S: Global Immunization

Great Expectations Ravinia Ballroom

MODERATOR: Anne Schuchat

- 1:35** Effect of Rotavirus Vaccination on Childhood Diarrhea-Related Mortality — Mexico, 2003–2010. *Paul A. Gastañaduy*
- 1:55** Worldwide Spread of Pandemic Influenza A (H1N1) pdm09 During 2009–2010 and Seasonality as a Characteristic of Transmission. *Aaron D. Storms*
- 2:15** Impact Assessment of a Mass Typhoid Fever Vaccination Campaign — Fiji, 2011. *Heather M. Scobie*
- 2:35** Risk Factors for Measles Mortality Among Somali Refugees Displaced by Famine, Kenya, 2011. *Abdirahman Mahamud*
- 2:55** The Added Contribution of the Second Stool Specimen to Wild Poliovirus Detection — India, 2000–2010. *Cristina V. Cardemil*

3:15 CLOSING REMARKS AND ADJOURNMENT

Stephen B. Thacker, Director, Office of Surveillance,
Epidemiology and Laboratory Services, CDC



Awards

Award Descriptions and Committee Members

Alexander D. Langmuir Prize Manuscript Award

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

Committee: *Alexandre Macedo de Oliveira (Chair), Janet Mohle-Boetani, Philip S. Brachman, Mary L. Kamb, Peter R. Kerndt, Priti R. Patel, and Katherine M. Stone*

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.

Committee: *2010 EIS Class*

Distinguished Friend of EIS Award

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

Committee: *Alexandre Macedo de Oliveira (Chair), Janet Mohle-Boetani, Philip S. Brachman, Mary L. Kamb, Peter R. Kerndt, Priti R. Patel, and Katherine M. Stone*

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.

Committee: *David Swerdlow (Chair), John Modlin, William Schaffner, and Melinda Wharton*

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.

Committee: *Benjamin J. Park (Chair), Dianna Blau, Vitaliano A. Cama, Marie C. Earley, Michele Parsons, and Kathrine Tan*

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.

Committee: *Kris Bisgard (Chair), Steven Leadbetter, Joseph Logan, Kathryn Porter, and Maya Sternberg*

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.

Committee: *Tracie Gardner (Chair), Daisy Christensen, and Jennifer Verani*

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.

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

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 presentation that best exemplifies the effective application of public health in the area of occupational or environmental health to an investigation.

Committee: Bruce P. Bernard (Chair), Diana Bensyl, David Callahan, Renee Funk, Barbara Materna, and Kanta Sircar

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.

Committee: Casey Barton Behravesh (Chair), Adam Langer, Hugh M. Mainzer, Nina Marano, Jennifer McQuiston, and Jennifer Wright



Awards Presented at the 2011 EIS Conference

Alexander D. Langmuir Prize Manuscript Award

Rotavirus vaccine and health care utilization for diarrhea in U.S. children. *N Engl J Med* 2011;365:1108–17.

Jennifer Cortes, A. Curns, J. Tate, M. Cortese, M. Patel, F. Zhou, and U. Parashar

Donald C. Mackel Memorial Award

Outbreak of Nosocomial Listeriosis — Texas, 2010.

Noha H. Farag, L. Gaul, B. Silk, E. Trees, M. Kingsley, L. Graves, and T. Ward

Outstanding Poster Presentation

***Vibrio mimicus* Infection After Consumption of Crayfish — Spokane, Washington, 2010**

Meagan K. Kay, E. Cartwright, E. Barzilay, K. MacDonald, J. McCullough, D. MacEachern, J. Duchin, C. Tarr, D. Talkington, A. Marfin

J. Virgil Peavy Memorial Award

Seasonality of Tuberculosis — United States, 1993–2008.

Matthew Willis

Philip S. Brachman Award

William Schaffner

Distinguished Friend of the EIS Award

Tom Peterman

Paul C. Schnitker International Health Award

W. Roodly Archer

Iain C. Hardy Award

Jacqueline E. Tate

James H. Steele Veterinary Public Health Award

Adam Langer and Jennifer Adjemian

Mitch Singal Excellence in Occupational and Environmental Health Award

Carrie Dooyema



Alexander D. Langmuir Lectures, 1972–2011

- 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. Blaser
- 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

Alexander D. Langmuir Prize Manuscripts, 1966–2011

- 1966 Complications of Smallpox Vaccination: I. National Survey in the United States, 1963. *N Engl J Med* 1967;276:125–32.
J.M. Neff, J.M. Lane, J.H. Pert, R. Moore, J.D. Millar, D.A. Henderson
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- 1968 Salmonellosis from Chicken Prepared in Commercial Rotisseries: Report of an Outbreak. *Am J Epidemiol* 1969;90:429–37.
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- 1972 *Salmonella* Septicemia from Platelet Transfusions: Study of an Outbreak Traced to a Hematogenous Carrier of *Salmonella cholerae-suis*. *Ann Intern Med* 1973;78:633–41.
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A. Taylor Jr., A. Santiago, A. Gonzales-Cortes, E.J. Gangarosa
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M.S. Eisenberg, K. Gaarslev, W. Brown, M. Horwitz, D. Hill
- 1976 Nursery Outbreak of Peritonitis with Pneumoperitoneum Probably Caused by Thermometer-Induced Rectal Perforation. *Am J Epidemiol* 1976;104:632–44.
M.A. Horwitz, J.V. Bennett
- 1977 Epidemic *Yersinia enterocolitica* Infection Due to Contaminated Chocolate Milk. *N Engl J Med* 1978;298:76–9.
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- 1978 Measles Vaccine Efficacy in Children Previously Vaccinated at 12 Months of Age. *Pediatrics* 1978;62:955–60.
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- 1979 An Outbreak of Legionnaires' Disease Associated with a Contaminated Air-Conditioning Cooling Tower. *N Engl J Med* 1980;302:365–70.
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- and*
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- 1981 Respiratory Irritation Due to Carpet Shampoo: Two Outbreaks. *Environ Int* 1982;8:337–41.
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- and*
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Philip S. Brachman Awards, 1983–2011

1983	Philip Brachman
1984	Michael Gregg
1985	Howard Ory
1986	J. Lyle Conrad
1987	Andrew G. Dean
1988	Richard C. Dicker
1989	Carl W. Tyler, Jr.
1990	Richard C. Dicker
1991	Richard C. Dicker
1992	Jeffrey J. Sacks
1993	J. Lyle Conrad and Michael Toole
1994	Willard (Ward) Cates and Robert Breiman
1995	John Horan
1996	Polly Marchbanks
1997	William Mac Kenzie
1998	Laura A. Coker
1999	Christine Zahniser
2000	Jeffrey J. Sacks
2001	Douglas H. Hamilton
2002	Marcelle Layton, Steve Weirsma, James L. Hadler, Eddy Bresnitz, Elizabeth Barrett, Robert B. Stroube, Ross J. Brechner, David S.B. Blythe, Larry Siegel, Karyn Berry, Sherri Adams, John Eisold, and Greg Martin
2003	Deborah W. Gould
2004	Jim Alexander
2005	Julie Magri
2006	Ralph Henderson
2007	Joshua Mott and Peter Cegielski
2008	Lisa Pealer
2009	C. Kay Smith and Julie Magri
2010	Betsy Gunnels
2011	William Schaffner

Distinguished Friend of EIS Awards, 1984–2011

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 V. Tauxe and Kashef Ijaz
2007	Dixie Snider
2008	Denise Koo
2009	Arjun Srinivasan
2010	Robert Quick
2011	Thomas Peterman

Iain C. Hardy Awards, 1996–2011

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. Parker Fiebelkorn
2011	Jacqueline E. Tate

J. Virgil Peavy Memorial Awards, 2003–2011

- 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

Donald C. Mackel Memorial Awards, 1987–2011

- 1987 Fatal Parathion Poisoning — Sierra Leone
Ruth A. Etzel
- 1988 Multistate Outbreak of Legionnaires Disease Involving Tours to Vermont
Margaret Mamolen
- 1989 Nosocomial Outbreak of Legionnaires Disease Associated with Shower Use: Possible Role of Amoebae
Robert F. Breiman
- 1990 Legionnaires Disease Outbreak Associated with a Grocery Store Mist Machine
Frank J. Mahoney
- 1991 Nosocomial Outbreak of Isoniazid- and Streptomycin-Resistant Tuberculosis Among AIDS Patients, New York City
Brian R. Edlin
- 1992 Bacillary Angiomatosis, New Infectious Disease: Epidemiology, Clinical Spectrum, and Diagnostics
Janet C. Mohle-Boetani
- 1993 Hepatitis B Virus Transmission Associated with Thoracic Surgery, Los Angeles
Rafael Harpaz
- 1994 Schistosomiasis and Lake Malawi: A New Site of Transmission Posing a Serious Risk to Expatriates and Tourists
Martin S. Cetron

- 1995 Use of Urinary Antigen Testing To Detect an Outbreak of Nosocomial Legionnaires Disease in Connecticut, 1994
Lisa A. Lepine
- 1996 International Outbreak of *Salmonella* Infections Caused by Alfalfa Sprouts Grown from Contaminated Seed
Barbara E. Mahon
and
Malassezia pachydermatis Fungemia in Neonatal Intensive Care Unit Patients: There's a [New] Fungus Among Us!
Huan Justina Chang
- 1997 Epidemic of Deaths from Acute Renal Failure Among Children in Haiti
Katherine L. O'Brien
- 1998 And Weighing in at 25 Million Pounds — A Multistate Outbreak of *Escherichia coli* O157: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 Fingerprinting to the Analysis of Chronic, Drug-Resistant Tuberculosis in Buenaventura, Colombia, 1998
Kayla F. Laserson
- 2000 *Serratia liquefaciens* Bloodstream Infections and Pyrogenic Reactions Associated with Extrinsically Contaminated Erythropoietin — Colorado
Lisa Grohskoph
- 2001 When Beauty Is More Than Skin Deep: An Outbreak of Rapidly Growing Mycobacterial Furunculosis Associated with a Nail Salon — California, 2000
Kevin L. Winthrop
- 2002 Dances with Cows?: A Large Outbreak of *E. coli* O157 Infections at Multi-Use Community Facility — Lorain County, Ohio, September 2001
Jay K. Varma
- 2003 Hepatitis C Virus Transmission from an Antibody-Negative Organ and Tissue Donor
Barna D. Tugwell

- 2004 Multiple Hepatitis A Outbreaks Associated with Green Onions Among Restaurant Patrons — Tennessee, Georgia, and North Carolina, 2003
Joseph J. Amon
- 2005 Case-Control Study of an Acute Aflatoxicosis Outbreak
E Azziz-Baumgatner
- 2006 Delayed Onset of *Pseudomonas fluorescens* Group Bloodstream Infections After Exposure to Contaminated Heparin Flush — Michigan and South Dakota
Mark Gershman
- 2007 Epidemiologic and Molecular Investigation of an Outbreak of Hepatitis C Viral Infection at Hemodialysis Unit — Richmond Virginia, 2006
Nicola Thompson
- 2008 Multistate Measles Outbreak Associated with an International Youth Sporting Event — Pennsylvania, Michigan, and Texas, August — September 2007
Tai-Ho Chen
- 2009 Cardiac Events and Deaths in a Dialysis Facility Associated with Healthcare Provider — Texas, 2008
Melissa K. Schaefer
- 2010 Fatal Case of Laboratory-Acquired Infection with an Attenuated *Yersinia pestis* Strain of Plague — Illinois, 2009
Andrew Medina-Marino
- 2011 Outbreak of Nosocomial Listeriosis — Texas, 2010.
Noha H. Farag
- 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

Outstanding Poster Presentation Award, 1986–2011

- 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

- 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* O157 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

Paul C. Schnitker International Health Award, 1995–2011

- 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 Lawrence
2009 Rinn Song
2010 Andrew Auld
2011 W. Roodly Archer

Mitch Singal Excellence in Occupational and Environmental Health Award, 2010–2011

- 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

James H. Steele Veterinary Public Health Award, 1999–2011

- 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 Behraves and Stacy Holzbauer
2010 Kendra Stauffer
2011 Matthew Willis

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April 16–20, 2012 | Course Evaluation

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**2012 Conference
Abstracts**

MONDAY, APRIL 16, 2012

SESSION A:

Opening Session

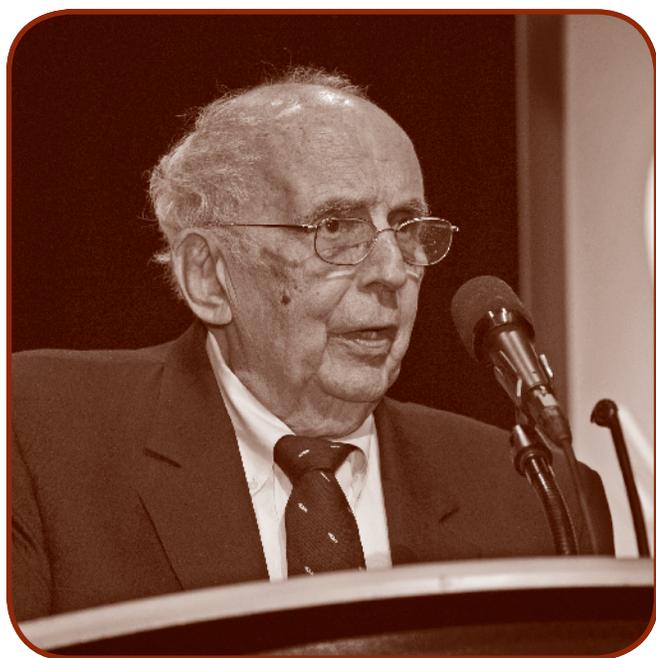
8:30–10:15 am

Almost Famous

Ravinia Ballroom

MODERATORS:

Stephen B. Thacker and Denise Koo



8:35

Legionella Outbreak Associated with Solar Rooftop Water Heating System — Maryland, 2011

AUTHORS: Maria A. Said, A. Chu, L. Wilson, R. Najera, R. Thompson, M. Carlos, L. Trivedi, T. Lawson, A. Mathias, K. Derr, D. Stevens, E. Potetz, B. Dorsch, K. Feldman, D. Blythe

BACKGROUND: During September 2011, the Maryland Department of Health and Mental Hygiene (DHMH) identified a Legionnaires disease (LD) case associated with Ocean City Hotel A. Because exposure to aerosolized *Legionella* can cause severe pneumonia, we investigated to identify additional cases, assess exposure sources, and implement control measures.

METHODS: Cases were defined by radiographic pneumonia with laboratory identification of *Legionella* by culture, urine antigen testing (UAT), or seroconversion. Cases were identified through local case reporting, notification of hotel guests during the previous month, media, and *Epi-X* posting. Patients were interviewed by using a standard questionnaire. Environmental investigation included a walk-through evaluation and potable water testing for *Legionella* by established DHMH protocols.

RESULTS: *Legionella pneumophila* serogroup 1 (Lp1) was identified by UAT in 7 patients from 3 states; no cultures were performed. Six were hospitalized; of these 1 died. All had been Hotel A guests without other common exposures. Hotel A's potable water system was unusual for having an extensive, intermittently used, rooftop piping network using solar energy to preheat municipal water. Subsequent water temperatures were $\leq 44^{\circ}\text{C}$ before distribution to individual rooms; industry guidelines recommend hot water storage at $\geq 60^{\circ}\text{C}$. Residual chlorine levels were as low as 0.01 mg/L (World Health Organization standard ≥ 0.2 mg/L). Lp1 was cultured from multiple sites, including within the rooftop piping. Incoming municipal water was negative for *Legionella*.

CONCLUSION: Multiple LD cases were linked to a complex potable water system whose nontraditional solar heating component was colonized with Lp1. Remediation of the hotel's water system was required. Solar systems might be increasingly used for energy conservation; however, their ability to harbor and amplify *Legionella* merits further study and, possibly, *Legionella* control standards.

KEYWORDS: *Legionella*, Legionnaires' disease, pneumonia, water purification, solar energy

8:55

Trends in Unintentional Injury Deaths Among Children Aged 0–19 — United States, 1999–2009

AUTHORS: Erin M. Parker, M. Ballesteros, J. Gilchrist

BACKGROUND: Unintentional injuries are the leading cause of death among children 1-19 in the United States. While child unintentional injury death rates have improved in recent decades, rates remain high in some subpopulations. This study uses National Vital Statistics System (NVSS) data to assess 10-year trends in child unintentional injury deaths in order to help focus prevention strategies.

METHODS: We used 1999-2008 NVSS annual mortality files for children 0-19 from the 50 states and the District of Columbia. Using the *International Classification of Diseases, 10th Revision* external cause of injury codes, we classified unintentional injury deaths by underlying mechanism—drowning, fall, fire/burn, motor-vehicle traffic, other transportation-related, poisoning, suffocation and other. We calculated yearly death rates per 100,000 children by mechanism, sex, age-group, race/ethnicity, and state. We assessed trend significance using weighted least squares regression.

RESULTS: The child unintentional injury death rate declined from 15.6 per 100,000 in 1999 to 12.2 per 100,000 in 2008 ($P < 0.001$). Rates decreased among all age-groups except for children <1 , where deaths increased from 22.3 to 30.7 per 100,000 ($P < 0.001$) due to a rise in suffocation deaths. Poisoning deaths among 15-19 year olds increased from 1.3 to 3.9 per 100,000 ($P < 0.001$), but were more than offset by declines in other mechanisms. Substantial state differences persist, with 2008 rates >23 per 100,000 in Wyoming, Louisiana, and Alaska and <7 per 100,000 in New York and Massachusetts.

CONCLUSION: While trending downward overall, child unintentional injury death rates remained high in some states and age-groups, and deaths attributed to suffocation and poisoning increased since 1999. Increased prevention efforts through education and policy changes may further reduce this toll.

KEYWORDS: child, wounds and injuries, death, safety

9:15

Using Routine Clinical Data To Estimate the Incidence of HIV Infection in Female Commercial Sex Workers — Honduras, 2006–2010

AUTHORS: Mahesh Swaminathan, R. Shiraishi, J. Sabatier, F. Flores, N. Artiles, F. Tinajeros, A. Miranda

BACKGROUND: Infection with HIV is an important public health problem in Honduras, with an adult prevalence of 0.8% and 2,500 AIDS-related deaths in 2010. Female sex workers (FSW) are at high risk, with a HIV prevalence of 2.3%. However, information on the incidence of HIV in FSW is lacking. Behavioral, HIV, and sexually transmitted infection (STI) data from FSW are collected during routine clinical care at sentinel sites in Honduras. We estimated the incidence of HIV and associated risk factors in FSW using these data.

METHODS: Data were reviewed for 1,340 FSW attending two clinics from 2006–2010. Patients aged 15 years or older with at least two HIV tests during the follow-up period, the first being negative, were included in the analysis ($N=489$); FSW with a subsequent positive test were considered newly infected. Data were analyzed using a Cox proportional hazards model. Demographic/behavioral risk factors and STI infection were selected for inclusion in the model using a backward elimination method with a cutoff P -value of 0.25.

RESULTS: The mean age was 32.4 years [95% confidence interval (CI): 32.1–32.7]. The incidence of HIV was 1.0/100 person-years [95% CI: 0.5–1.9], with 9 FSW acquiring HIV. The adjusted hazard ratios for acquiring HIV was 8.1 (95% CI: 0.95– 68.7) in FSW with gonorrhea and 7.9 (95% CI: 1.6–39.0) in FSW who did not report condom use with their most recent client; only these risk factors met criteria for inclusion in the model.

CONCLUSIONS: Strategies to increase condom use and prevent the spread of STI in FSW should be strengthened. These data, collected during routine clinical care, could complement data from formal incidence studies.

KEYWORDS: Central America, HIV, surveillance, incidence, commercial sex workers

9:35

Investigation of Respiratory and Dermal Symptoms Associated with Metal Working Fluids at an Aircraft Engine Manufacturing Facility — Ohio, 2010

AUTHORS: Francisco A. Meza, N.L. Hudson, L. Chen, E. Page

BACKGROUND: 1.2 million workers are potentially exposed to metal working fluids (MWFs), complex mixtures in numerous formulations, through aerosol inhalation or skin contact. MWFs are associated with serious dermal and respiratory diseases including work-related asthma (WRA). The National Institute for Occupational Safety and Health (NIOSH) has a recommended exposure limit (REL) for MWF of 0.4 mg/m³ for particles deposited in the lower airway which should protect most workers over a working lifetime. The union at an aircraft engine manufacturing facility requested a health hazard evaluation to determine if new MWFs were hazardous.

METHODS: In a cross-sectional evaluation, 406 employees completed questionnaires regarding atopy, smoking, dermatitis, asthma, and WRA. We categorized workers as exposed or unexposed to MWF, and estimated prevalence ratios (PR) using log binomial regression. Airborne concentrations of MWF were measured, and work practices were observed.

RESULTS: We surveyed 182 MWF exposed and 224 unexposed employees. After controlling for atopy, the prevalence of dermatitis on wrists/forearms was greater in exposed than unexposed participants (P.R. 2.59, 95% CI: 1.22-5.46). After controlling for smoking and atopy, MWF exposed participants had a higher prevalence of asthma symptoms (PR 1.49, 95% CI: 1.05-2.13) and WRA symptoms (PR 2.10, 95% CI: 1.22-3.30). All airborne concentrations of MWF particles that could be deposited in the lower airway were below the NIOSH REL.

CONCLUSIONS: Despite exposures below the NIOSH REL, employees exposed to MWF at very low airborne concentrations had a significantly higher prevalence of asthma, WRA, and dermatitis symptoms than unexposed workers. At this facility, the NIOSH REL for MWF did not prevent illness and additional controls were recommended to protect these workers.

KEYWORDS: metalworking fluids (MWF), asthma, dermatitis, work-related asthma, occupational

9:55

Decline in Gastroenteritis and Rotavirus-Coded Hospitalizations Among US Children After Implementation of Rotavirus Vaccine

AUTHORS: Rishi Desai, A. Curns, C. Steiner, J. Tate, M. Patel, U. Parashar

BACKGROUND: Prior to rotavirus vaccine introduction in 2006, rotavirus gastroenteritis annually resulted in 55,000–70,000 hospitalizations and medical costs of \$300 million in US children <5 years of age. We monitored trends in gastroenteritis-coded and rotavirus-coded hospitalizations as well as associated hospital costs among US children pre- and post-vaccine introduction.

METHODS: We analyzed data from the State Inpatient Databases for 29–44 US states over a 10-year period (2000–2009) to calculate gastroenteritis and rotavirus-coded hospitalization rates by age group and region among children <5 years of age. By extrapolating observed pre- and post-vaccine gastroenteritis hospitalization rates to the US population <5 years of age and using the 2008 and 2009 cost of a diarrhea hospitalization, we estimated national reductions in diarrhea hospitalizations and associated treatment costs.

RESULTS: The pre-vaccine (2000–2006) annual average gastroenteritis-coded hospitalization rate among children <5 years of age was 74 per 10,000 (annual range: 71–82 per 10,000), and declined 32% to 51 and 50 per 10,000 in 2008 and 2009, respectively ($p < 0.001$). The pre-vaccine annual average rotavirus-coded hospitalization rate among children <5 years of age was 15 per 10,000 (annual range: 13–18 per 10,000), and declined 63% to 5 and 6 per 10,000 in 2008 and 2009, respectively ($p < 0.001$). Compared with pre-vaccine years, there were decreases in rotavirus-coded hospitalization rates in 2008 and 2009 among all age-groups and regions. Nationally, we estimated average annual reductions of approximately 38,000 diarrhea hospitalizations and approximately \$121 million in hospital costs in 2008 and 2009.

CONCLUSION: Since implementation of the US rotavirus vaccination program, a marked reduction in diarrhea hospitalizations and related hospital costs has occurred among US children through two rotavirus seasons.

KEYWORDS: rotavirus, vaccination, United States, hospitalization

SESSION B: **Emerging Environmental Infectious Diseases**

10:45–12:10 pm

An Inconvenient Truth

Ravinia Ballroom

MODERATORS: Beth P. Bell and David Warnock



10:50

Necrotizing Cutaneous Mucormycosis Following a Tornado — Joplin, Missouri, 2011

AUTHORS: Robyn Neblett Fanfair, K. Benedict, K. Etienne, S.D. Bennett, J. Bos, Y.C. Lo, T. Adebajo, D. Englethaler, S.R. Lockhart, M. Brandt, J. Harris, E. Deak, G. Turabelidze, B. J. Park

BACKGROUND: Mucormycosis is a rare infection caused by Mucormycetes, a class of environmentally-acquired molds. We investigated an outbreak of cutaneous mucormycosis in persons who sustained trauma during the May 22, 2011 Joplin, Missouri tornado.

METHODS: A case was defined as a soft-tissue infection in a tornado-injured person with evidence of a mucormycete by wound culture, immunohistochemistry or DNA sequencing. An unmatched case-control study was performed to identify factors associated with disease; controls (n=35) were persons hospitalized with traumatic injury but without mucormycosis. We extracted data from medical records using a standardized form, and conducted patient interviews. Whole-genome DNA sequencing was performed on clinical isolates for subtype identification.

RESULTS: We identified 13 case-patients; isolates from all 13 yielded *Apophysomyces trapeziformis* (AT). Median case-patient age was 48 years (range: 13–76). Case-patients had a median of five wounds (range: 1–7); five (39%) case-patients had penetrating trauma. Nine (69%) were in a single-family home during the tornado and all case-patients were located in the zone with most severe damage. Ten (77%) required intensive care unit admission, and five (39%) died. On multivariable analysis, AT infection was associated with number of wounds (adjusted odds ratio [aOR]: 2.0 for each additional wound; 95% CI: 1.2–3.2) and penetrating trauma (aOR: 8.8; CI: 1.1–69.2). Whole-genome sequencing identified four AT clusters; isolates from five cases were genotypically indistinguishable from at least one other case isolate, suggesting common sources.

CONCLUSIONS: Post-disaster cutaneous mucormycosis can have considerable morbidity and mortality. Public health officials should be aware of these infections following natural disasters, and should consider mucormycete infection among persons with multiple penetrating trauma.

KEYWORDS: mucormycosis, tornadoes, soft tissue infections, Missouri

11:10**Serologic Survey of Exposure Following Fatal *Balamuthia mandrillaris* Infection — Southern Arizona, 2010****AUTHORS:** Brendan R. Jackson, Z. Kucerova, G. Aguirre, J. Weiss, S. Roy, J. Yoder, R. Foelber, S. Baty, G. Derado, R. Sriram, S. Stramer, V. Winkelman, G. Visvesvara**INTRODUCTION:** Granulomatous Amebic Encephalitis (GAE) from *Balamuthia mandrillaris*, a free-living amoeba, is extremely rare and the case fatality rate from recognized *Balamuthia* infection exceeds 90%. In August 2010, a cluster of GAE occurred following transplantation of infected organs from a 27-year-old previously healthy landscaper in Pima County, Arizona, who died of a suspected stroke. As the amoeba is thought to be transmitted through soil, we performed a serologic survey of landscapers and blood donors to assess *Balamuthia* exposure.**METHODS:** From Sept. 14–27, 2010, we contacted publicly listed landscaping companies in Pima County, Arizona, surveyed consenting workers, and collected serum for *Balamuthia* antibody testing. For a comparison group, we requested anonymized sera from two blood donation organizations in Arizona. Sera were tested for *Balamuthia* antibodies with an enzyme-linked immunosorbent assay (ELISA) followed by immunofluorescent assay (IFA) and western blot. Fisher's exact test was used to analyze proportions.**RESULTS:** Three (3.6%) of 83 samples from Pima County landscapers and 11 (2.5%) of 441 samples from blood donors had reactive ELISA tests and positive IFA titers at 1:64 ($P = 0.5$). Three (1.0%) of 285 blood donors from Pima County had positive tests compared with 7 (4.7%) of 148 blood donors from Yuma County ($P = 0.04$). Landscapers were not significantly more likely to have positive antibody testing than blood donors from the same county ($P = 0.13$). Antibody status did not differ by age, sex, or ethnicity.**CONCLUSIONS:** *Balamuthia* exposure, as measured by antibody testing, was not more common among landscapers than blood donors, though exposure rates differed by county. Exposure to *Balamuthia*, previously unexamined in North America, appears to be far more common than GAE.**KEYWORDS:** *Balamuthia mandrillaris*, fluorescent antibody technique, encephalitis, amoeba, Arizona, blood donors**11:30*****Cryptococcus gattii*: An Emerging Fungal Infection in the Pacific Northwest — Oregon and Washington, 2004–2011****AUTHORS:** Rachel M. Smith, M. Tourdjman, A. Mba-Jonas, T. Schimek, E. DeBess, N. Marsden-Haug, J. Harris**BACKGROUND:** *Cryptococcus gattii* (Cg) causes meningoencephalitis in Oceania, where subtype VGI predominates. Cg infections, caused by novel VGII subtypes, emerged in Oregon and Washington (Pacific Northwest, PNW) beginning in 2004. To describe the epidemiology of PNW Cg infections, and understand their differences from previously-described infections, we conducted an investigation of Cg cases in the PNW.**METHODS:** Cases were defined as culture-confirmed Cg infections in the PNW during 2004–2011 identified through existing laboratory surveillance. Cg isolates were subtyped using genetic sequencing. Demographics, clinical presentation, treatment and outcomes through one year of follow-up were abstracted from medical records.**RESULTS:** Eighty cases were reported; 20 (25%) in Washington and 60 (75%) in Oregon. Case counts increased yearly. Data were complete for 79 (99%) case-patients; of these, 74 (94%) were infected with one of three clonally related Cg subtypes (VGIIa/b/c). Median patient age was 55 years (range: 10 months–96 years), and 42 (53%) were male. Of 78 case-patients, 42 (53%) were immunocompromised; 10 (13%) had other comorbidities. Thirty-six (46%) of 78 case-patients had pulmonary Cg infection and 25 (32%) had central nervous system infection; 47 (59%) had respiratory symptoms at diagnosis. Median time from onset to diagnosis was 33 days (range: 1–351). Seventy-one (90%) case-patients received antifungal therapy; however, initial antifungal treatment was suboptimal in 30 (42%). During follow-up, 24 (36%) of 67 case-patients responded completely to antifungal therapy; 22 (28%) died of or with Cg infection.**CONCLUSION:** Disease caused by the ongoing Cg outbreak in the PNW differs substantially from Cg disease in Oceania. Increased physician awareness of this emerging pathogen and its clinical presentation may help address delays in diagnosis and facilitate appropriate treatment.**KEYWORDS:** *Cryptococcus gattii*, meningoencephalitis, Washington, Oregon, pneumonia, communicable disease, emerging

11:50**Elevated *Acanthamoeba* Keratitis Incidence Despite a 2007 Outbreak-Associated Product Recall — A Multi-State Investigation, 2008–2011****AUTHORS:** Allison C. Brown, J. Ross, J. Yoder, T. Ayers, S. Roy, M. Beach

BACKGROUND: *Acanthamoeba*, a free-living amoeba in the environment, can cause a rare form of keratitis (AK). In the US, AK primarily affects contact lens (CL) wearers. Following a 2007 multi-state AK outbreak investigation, an implicated brand of CL disinfection solution was recalled but reported AK cases did not subsequently decrease as expected. An investigation was initiated to identify risk factors contributing to the persistence of AK that could be modified to prevent further cases.

METHODS: We conducted a case-control investigation, with cases defined as US residents with signs and symptoms of AK and laboratory diagnoses after January 1, 2008. Cases were identified and recruited from 15 ophthalmology centers. Controls were recruited from among CL wearers with no history of AK attending ophthalmology and optometry practices. Controls were matched to the state of residence and CL-wear status of the case. Cases and controls were interviewed using standardized questionnaires.

RESULTS: We enrolled 147 cases and 159 controls from 30 states. Cases were predominantly female and either <26 or >55 years of age. Adjusting for sex and age, multivariate analysis identified four hygiene-related behaviors as significant risk factors: topping off solutions (matched odds ratio [mOR] = 4.54; 95% confidence interval [CI]: 2.27–9.80), recently starting CL use (mOR = 3.22; CI: 1.60–6.81), storing CLs in water (mOR = 5.37; CI: 1.91–18.78), and handling CLs with wet hands (mOR = 2.17; CI: 1.10–4.52).

CONCLUSIONS: Multiple CL hygiene practices were associated with increased risk of AK. The observed persistence of AK might be due to enhanced disease awareness and clinical suspicion following the 2007 investigation. To prevent infection, CL wearers should observe recommended CL care practices.

KEYWORDS: *Acanthamoeba* keratitis, hygiene, contact lenses, case-control studies

POSTER SESSION 1:**Meet the Authors of
Posters 1–15**

12:30–1:30 p.m.

Into the Wild

Ravinia Ballroom (E, F, and G)

**Poster 1****Assessment for Possible Healthcare-Associated Transmission of a Novel Swine Influenza — Pennsylvania, August 2011**

AUTHORS: Adena H. Greenbaum, K. Wong, D.B. Nguyen, E. Smith, L. Torso, G. Chen, M. Wise, J. Lando, R. Voorhees, M. Casey, S. Ostroff, M. Moll, A. Nambiar, K. Nalluswami, J. Miller, J. Lute, A. Klimov, S. Emery, M. Green, P. Giampa, L. Finelli, M. Jhung

BACKGROUND: In August 2011, Patient A, a child infected with a novel swine-origin influenza virus (S-OtrH3N2) was hospitalized in Pennsylvania. This virus shared the M gene with the A(H1N1)pdm09 strain, heightening concerns for efficient human-to-human transmission. We investigated the potential for transmission of S-OtrH3N2 to healthcare personnel (HCP) and patients.

METHODS: We conducted cohort studies of HCP and patients exposed to Patient A during Patient A's 20 day hospitalization and evaluated the association between illness and use of personal protective equipment (PPE), exposure duration, intensity, or hospital floor in HCP; and proximity and common HCP in patients. Illness was new onset of respiratory symptoms plus ≥ 1 : fever, gastrointestinal, or constitutional symptoms. We performed influenza testing if symptom onset was ≤ 10 days. We interviewed HCP and reviewed patients' medical records.

RESULTS: The cohorts contained 83 HCP and 43 patients. We completed 63 (76%) HCP surveys. Among HCP, median contact duration was 3.8 hours (range: 1–26 hours) and 23/53 (43%) reported never wearing a mask with Patient A. We identified 6 ill HCP; one was tested and was negative. Controlling for occupation, illness risk was lower, but not significantly, in HCP with longer contact duration (Relative Risk: 0.1; CI: 0.01-1.2), and illness was not associated with hospital floor or exposure intensity. We identified no illness among 43 patients potentially exposed to Patient A.

CONCLUSIONS: We found no association between illness in HCP and risk factors assessed. Most ill HCP were identified >10 days after illness onset, limiting our ability to test for influenza. PPE use was low despite recommendations. Healthcare facilities should implement appropriate infection control precautions for suspected influenza, even without laboratory confirmation.

KEYWORDS: human influenza, swine-origin influenza, nosocomial infections, influenza A virus

Poster 2

Survival of Women with Invasive Cervical Cancer by Genotype-Specific Human Papillomavirus Status — United States, 1993–2005

AUTHORS: Keisha A. Houston, M. Saraiya, J. Li, C. Hopenhayn, C. Lynch, E. Wilkinson, G. Copeland, W. Cozen, Y. Huang, M. Goodman, E. Peters, E. Unger

BACKGROUND: Women with invasive cervical cancer (ICC) have a good chance of survival if the disease is detected early. Certain human papillomavirus (HPV) genotypes play a causal role in ICC and could influence cancer progression, but there is little information on the relationship between survival of ICC patients and their genotype-specific HPV status.

METHODS: Using seven central cancer registries, HPV genotyping was performed on tissue samples collected from 779 cases of invasive cervical cancer (ICC) diagnosed between 1993 and 2005. Initial HPV genotyping was performed on all samples using the Linear Array HPV Genotyping Test followed by INNO-LiPA HPV Genotyping Assay (Innogenetics) for negative or inadequate results. The Kaplan-Meier method was used to estimate mean time to death after ICC diagnosis and multivariate Cox proportional hazard analysis to estimate 5-year ICC survival rates by patients' age at diagnosis, cancer stage at diagnosis, and genotype-specific HPV status (HPV 16, HPV 18, other oncogenic and non-oncogenic HPV types, and HPV negative).

RESULTS: Of 779 samples of ICC, 51.8% were HPV-16 positive, 15.6% HPV-18 positive, 24.0% positive for other HPV genotypes, and 9.6% HPV negative. The 5-year survival rate among all women was 71.6%. Compared with women with HPV negative ICC unadjusted 5-year survival rates were higher among women with HPV positive ICC, but adjusted 5-year survival did not differ significantly by genotype-specific HPV status.

CONCLUSION: HPV 16 was the most common HPV genotype in ICC, but HPV genotypes were not associated with ICC 5-year survival after adjusting for covariates. Additional studies are needed to evaluate whether method of cervical cancer treatment or HPV genotyping in ICC mitigates the relationship between HPV genotype and 5-year survival.

KEYWORDS: HPV genotyping, HPV 16, HPV 18, invasive cervical cancer, survival, papillomavirus infection

Poster 3

Birth-Year versus Traditional Risk Indicators Among Confirmed Cases of Chronic Hepatitis C Virus Infection from 6 Funded Hepatitis Surveillance Sites — United States, 2004–2010

AUTHORS: Reena Mahajan, S. Liu, R. Klevens, S. Holmberg

BACKGROUND: There are an estimated 3 million cases of chronic hepatitis C virus (HCV) infection in the United States, most of which are in persons aged 45 to 64 years. CDC is developing guidance to recommend screening of persons born during 1945–1965, many of whom are unaware that they are infected. In this study, we ascertained birth-year and traditional risk indicators for testing among laboratory-confirmed cases reported in funded hepatitis surveillance jurisdictions.

METHODS: We analyzed cases reported during 2004–2010 in Colorado, Connecticut, Minnesota, New York City, New York state, and San Francisco. Cases were confirmed by positive laboratory test results (HCV nucleic acid testing, antibodies against HCV, and recombinant immunoblot assays). Demographic and risk factor attributes of cases were collected by physicians and compiled by the health department. We described cases according to current CDC indications for HCV testing (i.e. known risk factors, symptoms, or elevated liver enzymes).

RESULTS: Of the 151,559 cases of chronic HCV infections reported during 2004–2010, 99,644 (66%) were in persons born during 1945–1965. Overall 32,307 (21%) of 151,559 had at least one indication for screening: 18,518 injection drug users, 11,725 persons with elevated liver enzyme(s), 3,826 transfusion recipients, 2,424 blood donors, 996 persons with HCV symptoms, 638 hemodialysis patients, and 150 transplant recipients. Of those with at least one indication, 20,839 (65%) were born during 1945–1965.

CONCLUSIONS: Our findings suggest that testing residents of those 6 surveillance jurisdictions born during 1945–1965 would identify many prevalent HCV infections. Supplementing risk-based screening with birth-year based screening may also improve detection of chronic HCV infections.

KEYWORDS: hepatitis C virus, screening, risk, age

Poster 4**Novel Swine-Origin Triple Reassortant Influenza A (H3N2) Among Attendees of an Agricultural Fair — Pennsylvania, August 2011**

AUTHORS: Karen K. Wong, A.H. Greenbaum, M. Biggerstaff, R. Ganatra, E. Lam, E. Smith, A.D. Storms, G. Chen, V. Dato, J. Miller, M. Moll, A. Nambiar, K. Nalluswami, S. Ostroff, J. Lute, J. Lando, S. Silvestri, K. Hancock, S. Trock, L. Finelli, M. Jhung

BACKGROUND: In August 2011, a child who attended Fair A in Pennsylvania developed infection with a swine-origin influenza A(H3N2)variant [A(H3N2)v] virus. This novel virus resulted from reassortment with influenza A(H1N1)pdm09 and therefore raised concerns of efficient human-to-human transmission. We sought to determine extent of influenza transmission and identify illness risk factors.

METHODS: We traced contacts and identified cases among fairgoers. Suspected cases were defined as having ≥ 2 of fever, respiratory, gastrointestinal, or constitutional symptoms ≤ 7 days after attending Fair A (fever or respiratory symptom required). Probable and confirmed cases had A(H3N2)v infection by serology and genomic sequencing, respectively. We conducted a retrospective cohort study among randomly selected members of an agricultural club to evaluate illness risk factors.

RESULTS: We identified 82 suspected, 4 probable, and 3 confirmed cases; all recovered. The cohort study included 247 members; 127 (51%) completed interviews. Median age was 13 years (range: 4–19); 34 (27%) exhibited swine at Fair A. There were 14 (11%) suspected cases among cohort members. Risk of suspected case status increased as pig exposure increased from no exposure (4%; referent) to attending pig exhibits (11%; relative risk [RR]: 2.8; 95% confidence interval [CI]: 0.3–24.0) to touching pigs (16%; RR: 4.4, 95% CI: 0.6–32.4); risk was also higher among those who cleaned pig corrals (23% versus 10%; RR: 2.4; 95% CI: 0.9–6.0).

CONCLUSIONS: Animal-to-human transmission of A(H3N2)v likely occurred at Fair A. Fairs may be venues for zoonotic transmission of viruses with pandemic potential, and health officials should investigate novel influenza A associated with agricultural events. Clinicians should consider swine-origin influenza in patients with influenza-like illness and recent fair or swine exposure.

KEYWORDS: reassortant viruses, swine, influenza A virus, H3N2 subtype, H1N1 subtype

Poster 5**Associations Between *Salmonella* Serotypes and Particular Food Commodities — United States, 1998–2008**

AUTHORS: Brendan R. Jackson, P.M. Griffin, D. Cole, K. Walsh, S.J. Chai

BACKGROUND: Salmonellosis is responsible for an estimated 1.2 million illnesses in the United States annually, and the incidence has not decreased in the past decade. *Salmonella* serotypes differ in their animal reservoirs, and this affects the foods that transmit them. We examined associations between serotypes and foods to inform *Salmonella* control measures.

METHODS: We reviewed foodborne outbreaks of *Salmonella* infection caused by a single serotype reported to CDC's Foodborne Disease Outbreak Surveillance System from 1998–2008. We analyzed outbreaks with a single implicated food commodity — foods and ingredients were assigned to one of 17 standardized commodities. For each serotype, we calculated percentage of outbreaks attributed to each commodity; standard deviation (SD) of these percentages was used to assess the diversity of implicated commodities. A large standard deviation indicates a large difference in the percentage of outbreaks due to each commodity, indicating a smaller diversity of commodities.

RESULTS: Of 1,193 outbreaks due to a single *Salmonella* serotype, 403 (34%) were attributed to a single commodity. Among serotypes that caused ≥ 5 outbreaks, Typhimurium, Newport, Javiana, and Saintpaul had the greatest diversity of associated commodities (SD <10). Serotypes Enteritidis, Heidelberg, Hadar, and Litchfield had the smallest diversity (SD >15). Of 144 Enteritidis outbreaks, eggs accounted for 65% and poultry for 19%. Of 24 Heidelberg outbreaks, poultry accounted for 50% and eggs for 42%. Of 7 Hadar outbreaks, poultry accounted for 71%. All 5 Litchfield outbreaks were linked to the fruits-nuts commodity.

CONCLUSIONS: Poultry and eggs accounted for the majority of outbreaks caused by *Salmonella* serotypes with the smallest diversity. Knowledge about these differences in predominant food commodities implicated in outbreaks caused by different serotypes can help guide control measures.

KEYWORDS: outbreaks, *Salmonella*, foodborne diseases, poultry, eggs

Poster 6

Can Seasonal Food Commodity Consumption Changes Explain Variations in Occurrence of Foodborne Disease Outbreaks? United States, 1998–2008

AUTHORS: Sarah D. Bennett, D. Cole, K. Swanson, A.L. Nisler, W. Gu, S.J. Chai

BACKGROUND: An estimated 9.4 million foodborne illnesses with a known pathogen occur annually in the United States. Understanding the epidemiology of foodborne illnesses is important for focusing prevention efforts. The number of foodborne outbreaks caused by specific pathogens as well as availability and consumption of foods vary throughout the year. We compared outbreak frequency with estimated consumption to evaluate the possible roles of food availability and consumption in the occurrence of foodborne outbreaks.

METHODS: We reviewed outbreaks reported to the Foodborne Disease Outbreak Surveillance System from 1998–2008 caused by bacterial pathogens and single food commodities. For each commodity, we examined monthly or quarterly per-capita consumption estimated by national USDA Economic Research Service (USDA-ERS) market availability data and the FoodNet sentinel site food consumption survey. For each commodity, outbreak frequency was compared with consumption measures using Spearman rank correlation coefficients (ρ).

RESULTS: Of 733 outbreaks reviewed, 518 (71%) were associated with five commodities: beef (160), poultry (146), pork (95), eggs (60), and dairy (57). For all commodities, frequency of outbreaks varied monthly. USDA-ERS data was positively correlated with quarterly frequency of outbreaks attributed to beef ($\rho = 1.00$) and negatively with pork ($\rho = -0.60$; p -value = 0.49). No correlations were found for dairy, eggs, and poultry outbreaks (all $|\rho| < 0.10$). Monthly FoodNet consumption was negatively correlated with outbreaks caused by eggs ($\rho = -0.52$; p -value = 0.08) and pork ($\rho = -0.60$; p -value = 0.04).

CONCLUSION: The frequency of outbreaks associated with beef might be explained by seasonal variation in consumption; however, the frequency of outbreaks associated with dairy, eggs and pork is more likely due to other factors, such as level of contamination.

KEYWORDS: disease outbreaks, foodborne illnesses, seasonal variation

Poster 7

Outbreak of Enteroaggregative Shiga Toxin-Producing *Escherichia coli* O104:H4 in Europe and North America Associated with Sprout Consumption: Investigation of US Cases — 2011

AUTHORS: Adamma Mba-Jonas, T.A. Nguyen, R. Mody, C. Bailey, C. Bopp, P. Gerner-Smidt, K. Joyce, N. Strockbine, R.V. Tauxe, C. Foley, E. Harvey, S.A. Bidol, T. Henderson, R. Njord, T. DeSalvo, T. Haupt, C. Barton-Behravesh, S. Bosch

BACKGROUND: Enteroaggregative Shiga toxin-producing *Escherichia coli* (STEC) O104:H4 is a novel pathogen for which clinical manifestations and disease transmission dynamics have not been fully characterized. On 05/25/2011, CDC was notified of a rise in STEC O104:H4 infections in Germany. We initiated surveillance for US cases of STEC O104:H4 infections to identify outbreak associated cases, assess travel and food histories, and review patients' clinical courses.

METHODS: Surveillance for US cases began on 05/26/2011. Suspect cases were defined as either hemolytic uremic syndrome (HUS) or Shiga toxin-positive diarrheal illness in persons with travel to or from Germany since 04/01/2011, or illness onset either during travel to, or ≤ 3 weeks after arriving in the US from Germany. Cases were confirmed when STEC O104:H4 was isolated from a clinical specimen. Open-ended interviews were conducted with cases or their travel companions to obtain food and travel histories. Strains from clinical specimens were characterized at CDC.

RESULTS: Between 05/26/2011—06/16/2011, six confirmed cases were identified in 5 states. All strains expressed *stx2a* and *aggR* genes, but not *eae*. The median patient age was 52 years (range: 38–72 years); 33% were female. Five traveled to Germany and one developed diarrhea after close contact with a case-patient who traveled. No patients recalled consumption of sprouts, the food vehicle ultimately implicated in the outbreak. Five patients reported bloody diarrhea, four (66%) developed HUS and required both dialysis and ventilator support; one case-patient died.

CONCLUSIONS: The severity of illness and potential for person-to-person transmission are cause for concern for future outbreaks of similar novel STEC strains. Adherence to established guidelines for STEC testing and characterization is needed to detect such pathogens routinely in the future.

KEYWORDS: Shiga-toxigenic *Escherichia coli*, foodborne outbreaks, hemolytic-uremic syndrome, diarrhea

Poster 8**Visual Impairment Among Adults Aged ≥ 40 Years — New Mexico, 2008****AUTHORS:** Mam I. Ibraheem, M. Landen, W. Honey**BACKGROUND:** During 2000, approximately 3.4 million U.S. residents aged ≥ 40 years were blind or visually impaired; this number is predicted to double by 2030. Early detection and timely treatment of many ocular diseases can reduce visual impairment (VI). VI prevalence and covariates were assessed to guide prevention strategies.**METHODS:** We analyzed 2008 Behavioral Risk Factor Surveillance System data for 4743 New Mexico adults aged ≥ 40 years. VI was defined as any difficulty with near or far vision, while wearing glasses or contact lenses for those using them. Adjusted odds ratios (aORs) from complex-survey logistic regression and weighted percentages were calculated.**RESULTS:** VI prevalence was 44.9% (95% confidence interval [CI]: 43.1–46.8) and was significantly more prevalent among Hispanics (52.3%; 95% CI: 48.9%–55.7%) and American Indians/Alaska Natives (AI/ANs) (51.6%; 95% CI: 43.2%–59.9%) than non-Hispanic whites (40.5%; 95% CI: 38.3%–42.9%). VI was significantly associated with ages 40–64 years (aOR: 1.28; 95% CI: 1.04–1.57), unemployment (aOR: 2.01; 95% CI: 1.24–3.28), no college education (aOR: 1.37; 95% CI: 1.13–1.66), annual household income \leq \$49,999 (aOR: 1.34; 95% CI: 1.10–1.63), “fair” or “poor” health (aOR: 1.58; 95% CI: 1.28–1.95), stroke history (aOR: 1.55; 95% CI: 1.05–2.29), inability to visit doctor because of cost (aOR: 1.61; 95% CI: 1.23–2.11), and no eye-care visit in ≥ 2 years (aOR: 1.42; 95% CI: 1.16–1.74).**CONCLUSIONS:** VI prevalence was highest among Hispanics and AI/ANs and was associated with middle age, stroke history, limited care access, and lower education and income. To reduce VI, disparities should be addressed through a vision health initiative that increases access to eye care services among groups at high risk.**KEYWORDS:** health surveys; Behavioral Risk Factor Surveillance System; vision disorders; blindness; vision, low**Poster 9*****Escherichia coli* O157 Among Arapahoe County Inmates — Colorado, 2011****AUTHORS:** Neena S. Jain, N. Corral, J. Brown, D. Garrison, T. Ghosh, R.L. Vogt**BACKGROUND:** Shiga toxin-producing *Escherichia coli* (STEC) can cause severe illness, including hemolytic uremic syndrome (HUS), and during 2010 was responsible for 71 deaths in the United States. Prison STEC outbreaks have rarely been documented. On October 30, a prison housing $\sim 1,100$ inmates reported 1 inmate with stool isolation of *E. coli* O157:H– (nonmotile), and additional symptomatic inmates. We interviewed ill inmates and inmate food-handlers and launched an investigation to prevent spread within the institution.**METHODS:** Twenty-seven symptomatic inmates were isolated, 12 of whom submitted stool samples, and the kitchen was inspected. We assessed illness risk factors by randomly sampling a cohort of 310 facility inmates. A probable case was defined as an inmate with either >3 diarrheal episodes within 24 hours or 1 bloody diarrheal episode between October 1–31. Cases were confirmed by STEC isolation; isolates underwent pulsed-field gel electrophoresis (PFGE). Relative risk and Fisher’s exact test were used to identify associations.**RESULTS:** Four confirmed cases with matching PFGE patterns were identified; no HUS or deaths occurred. Critical violations were noted on kitchen inspection, including an obstructed hand sink and improper hand washing practices. In the cohort, 266 (86%) questionnaires were completed; 32 (12%) were probable cases. Nonsignificant findings included inmate work assignment, location within prison, incarceration duration, contraband food consumption, and reported sexual partners. Among kitchen foods served, inmates who had consumed turkey à-la-king were more likely to have illnesses than persons who did not, (25/146; 17%) compared with (7/113 [6%]); Relative risk: 2.7; 95% confidence interval: 1.24–6.16).**CONCLUSIONS:** Results indicated prison-served food as the possible illness source. Spread was contained with ill inmate isolation, correction of kitchen violations, and inmate food-handler education.**KEYWORDS:** *Escherichia coli* O157, prisons, Colorado

Poster 10**Prevalence and Risk Factors for Metabolic Syndrome in Medellin, Colombia, 2008–2010**

AUTHORS: Evelyn P. Davila, M.L. Orrego, E. Ford, M. A. Quintero, M. Pratt, H. Walke

BACKGROUND: Research on the prevalence of and risk factors for metabolic syndrome (MetS) in Latin America is sparse. We assessed the prevalence of and risk factors for MetS and its components among adults from Medellin, the second largest city in Colombia, for 2008-2010.

METHODS: Multi-stage complex sample survey data from 845 participants aged 25-64 years were used. MetS was defined as having >3 of the following: abdominal obesity (AO) (men: >90 cm; women: >80 cm); high triglyceride levels (HTG) (≥ 150 mg/dl); low HDL (L-HDL) (men: <40 mg/dl; women: <50 mg/dl); high blood pressure (HBP) ($\geq 130/\geq 85$ mmHg or taking antihypertensive medication); high fasting blood glucose (HFBG) (≥ 100 mg/dl or taking diabetes medication). Descriptive and logistic regression analyses were conducted to assess prevalence of and risk factors for MetS and its components.

RESULTS: Forty-one percent (95% Confidence Interval, CI, 36.4-45.3) had MetS, 19.8% (CI 15.8-24.4) had HFBG, 21.4% (CI 17.9-25.5) had HBP, 43.9% (CI 39.8-48.0) had HTG, 56.6% (CI 51.2-61.8) had L-HDL levels, and 64.0% (CI 59.4-68.4) had AO. Adjusting for socio-demographics and lifestyle behaviors, older age was significantly associated with MetS (OR range 2.02-3.89), being a woman (OR 2.85, CI 2.20-3.70), married (OR 1.40, CI 1.09-1.82), and high PA (OR 0.59, CI 0.39-0.91) with AO, being a smoker with HTG (OR 1.76, CI 1.16-2.67) and L-HDL (OR 1.66, CI 1.10-2.51), and rural residence (OR 3.42, CI 1.82-6.37) and eating >5 fruits/vegetables/day (OR 0.49, CI 0.25-0.94) with HBP.

CONCLUSIONS: The prevalence of MetS and AO in Medellin was high. Risk factors varied for each MetS component. Public health strategies to promote awareness of the risk for MetS and the importance of healthy lifestyles are needed in Medellin.

KEYWORDS: metabolic syndrome X, central obesity, Colombia, Hispanics

Poster 11**Relationship Between Food Insecurity and Low Fruit and Vegetable Consumption — 12 U.S. States, 2009**

AUTHORS: NaTasha D. Hollis, P. Siegel, R. Njai, Y. Liao

BACKGROUND: Food insecurity (defined here as always, usually, or sometimes being worried/stressed about having enough money to buy nutritious meals) is a psychosocial stressor related to socioeconomic status (SES), and associated with low fruit and vegetable (F&V) consumption. Measuring the association between food insecurity and F&V consumption, controlling for SES, may help identify population subgroups at highest risk for low F&V consumption.

METHODS: Among 75,103 adults in 12 states that included a food-insecurity question in their 2009 Behavioral Risk Factor Surveillance System (BRFSS), we estimated the prevalence of low F&V consumption (<5 servings/day) stratified by sex and food security status. We used multivariate logistic regression to measure the adjusted odds ratio (aOR) and 95% confidence interval (CI) for the association between food insecurity and low F&V consumption, controlling for SES (education and income). Interactions between food security status and SES were tested.

RESULTS: Food insecurity was more prevalent among women than men (21.7% versus 16.9%; $P < 0.001$), whereas low F&V consumption was more prevalent among men (80.2% versus 72.0%; $P < 0.001$). Low F&V consumption was reported more often among food-insecure women than food-secure women (78.0% versus 70.7%; $P < 0.001$); there was no difference between food-insecure and food-secure men (81.7% versus 79.7%; $P = 0.38$). Food insecurity was associated with low F&V consumption among women (aOR: 1.26; 95% CI: 1.08–1.46) but not among men (aOR: 1.12; 95% CI: 0.86–1.45).

CONCLUSIONS: Food insecurity is significantly associated with low F&V consumption among women. Concise survey measures, such as the BRFSS single-item food-insecurity question, can help identify high-risk population subgroups to develop tailored interventions to increase F&V consumption and reduce chronic disease risk.

KEYWORDS: health status disparities, food intake, food security, population at risk

Poster 12**Pine-ing for a Vehicle: Using Supermarket Shopper Card Information as a Tool in a Multistate Outbreak of *Salmonella* Enteritidis Infections Linked to Turkish Pine Nuts**

AUTHORS: Alison S. Laufer, D. Reyes, J. Pringle, J. Egan, E. Sawyer, N. Dumas, S. Levine, H. Lee, A. Weltman, A. Palumbo, M. Malavet, K. Irvin, B. McGlinchey, C. Barton Behravesh, K. Neil

BACKGROUND: Nuts, often served as an ingredient, are challenging to detect as outbreak vehicles. Validated, available processes exist to reduce and eliminate *Salmonella* contamination in nuts, which should be used by industry. In October 2011, state and local health departments and CDC investigated a multistate outbreak of *Salmonella enterica* serotype Enteritidis (SE) infections.

METHODS: A case was defined as a person infected with the outbreak strain of SE with illness onset between 8/20/2011–10/21/2011. Information from iterative case-patient interviews and supermarket shopper cards, obtained with consent, helped generate hypotheses and identify common exposures. Product tracebacks were conducted. Foods were collected and cultured for *Salmonella*.

RESULTS: Forty-three cases from five states were identified. Median case-patient age was 43 years old (range: <1-94); 60% were female. Two case-patients were hospitalized; none died. Initial interviews revealed shopping at Supermarket Chain A as a common exposure. Review of shopper card information revealed case-patients purchased bulk bin Turkish pine nuts (TPNs). Twenty-eight (70%) of 40 case-patients consumed TPNs or products containing TPNs. Traceback linked Chain A bulk bin TPNs to Distributor A. The outbreak strain was isolated from 14 retail and patient-home samples of TPNs or homemade pesto containing TPNs; FDA testing isolated the outbreak strain from TPNs from two warehouses: Distributor A and a Distributor A-customer. Over 21,000 pounds of TPNs were voluntarily recalled. In November, FDA placed an Import Alert on two TPN suppliers.

CONCLUSIONS: This is the first reported *Salmonella* outbreak linked to TPN. Shopper card information can provide crucial data to identify contaminated food vehicles and provide detailed information for product traceback investigations. Voluntary product recalls and an FDA Import Alert likely prevented additional illnesses.

KEYWORDS: *Salmonella* food poisoning, Infectious disease outbreak, Pulsed-field gel electrophoresis, food supply

Poster 13**Risk Factors for Methicillin-Resistant *Staphylococcus aureus* Infection Among an Incarcerated Population — King County, Washington, 2008–2010**

AUTHORS: Michael H. Kinzer, T. Kwan-Gett, J. Duchin

BACKGROUND: Rates of methicillin-resistant *Staphylococcus aureus* (MRSA) infection are higher in correctional settings, compared with the general population. Crowding and unsanitary conditions contribute to MRSA transmission, but the association of MRSA infection with risk factors specific to inmates has been studied incompletely. We examined inmate characteristics associated with MRSA infections diagnosed during incarceration.

METHODS: Demographic data, incarceration dates, booking charges, and history of drug abuse, alcohol abuse, and psychiatric disorders were obtained from the county's administrative database regarding inmates released from two King County, Washington, facilities during 2008–2010. MRSA culture results were obtained from the commercial laboratory used by the facilities.

RESULTS: Of 65,535 inmates, passive surveillance detected 594 MRSA skin or soft-tissue infections. Prevalence of MRSA infection differed across racial groups: 2.8% among American Indian/Alaska Natives, 1.6% among blacks, 1.4% among whites, and 0.5% among Asians ($P < .05$). Compared with uninfected inmates, those with MRSA infection were older (38 versus 34 years; $P < .05$). They also averaged 3 times as many incarcerations and 5 times as many days of incarceration during the study period (6.0 versus 2.0 and 189.3 versus 36.9, respectively; all $P < .01$). In bivariate analysis, inmates with MRSA infection were more likely to have been charged with assault, property theft, robbery, or drug-related offenses (all $P < .05$) and more likely to have a history of psychiatric illness or drug abuse (all $P < .05$).

CONCLUSIONS: MRSA infections were associated with repeated incarcerations, history of psychiatric illness or drug abuse, and certain booking charges. A high index of suspicion for MRSA and intensifying infection control efforts among these groups can help decrease MRSA infections in correctional settings.

KEYWORDS: methicillin-resistant *Staphylococcus aureus*

Poster 14

Typhoid Fever Associated with Intestinal Perforations — Bundibugyo District, Uganda, 2011

AUTHORS: Maroya S. Walters, J.A. Routh, M. Mikoleit, E. Ejoku, D. Mubiru, J. Lule, R. Wod-Ongom, F. Mula-bya, S. Kadivane, C. Ouma, V. Hill, E. Mintz

BACKGROUND: *Salmonella enterica* serovar Typhi causes an estimated 22 million cases, 440,000 intestinal perforations, and 220,000 deaths worldwide annually. In August 2011, the Ugandan Ministry of Health (MOH) began investigating an outbreak of febrile illness with intestinal perforations in Bundibugyo District; CDC joined the investigation in October 2011.

METHODS: Ill persons were identified through the district health office (DHO), theater log, hospital medical records, and enhanced surveillance. A suspected case was defined as fever, abdominal pain, and ≥ 1 specified additional sign or symptom; probable cases met this definition and had a positive IgM antibody test for typhoid; confirmed cases had *Salmonella* Typhi isolated from blood. Drinking water supplies were tested for *Escherichia coli*, an indicator of fecal contamination.

RESULTS: In the 7 months from May 1–November 30, 2011, 226 suspected cases were identified, including 11 probable cases. Twelve cases were confirmed. During this period, 41 patients with intestinal perforation (IP) were recorded at Bundibugyo Hospital or reported to the DHO; 12 (75%) of 16 with known symptoms met the suspected case definition, and 4 (33%) of 12 with known outcomes died. In the preceding 29 months, only 43 patients with IP were documented. The two sub-counties with the highest incidence of suspected cases in 2011 were Kirumya and Bundibugyo Town Council, which had 727 and 82 cases per 100,000, respectively. *E. coli* was detected in all three drinking water sources tested in these sub-counties.

CONCLUSIONS: This outbreak of typhoid fever was likely caused by fecally contaminated drinking water. Recommended control measures included emergency point-of-use water treatment interventions, intensive community education about sanitation and hygiene, and long term investments in drinking water and sanitation infrastructure.

KEYWORDS: typhoid fever, *Salmonella*, intestinal perforation, safe water

Poster 15

Malaria and Anemia Prevalence After Indoor Residual Spraying in Northern Ugandan Districts with High Levels of Insecticide Resistance

AUTHORS: Laura C. Steinhardt, A. Yeka, S. Nasr, D. Rubahika, A. Sserwanga, H. Wanzira, G. Lavoy, M. Kamya, G. Dorsey, S. Filler

BACKGROUND: Indoor residual spraying (IRS) with insecticides is a primary intervention to reduce malaria, which causes more than 500,000 deaths annually. In highly malaria-endemic northern Uganda, selected districts were sprayed with dichlorodiphenyltrichloroethane (DDT) and pyrethroids from 2007 to 2010, when documented resistance to both insecticides prompted a shift to carbamates. Changing insecticides for IRS after development of resistance is relatively common, but little evaluation of the impact on malaria epidemiology has been done. This study assessed the effect of northern Uganda's IRS program on malaria and anemia prevalence.

METHODS: Data from a 2010 household survey from three northern Ugandan districts were used to compare one non-sprayed district (Lira) with two IRS districts (Apac, sprayed once each with DDT [2008], pyrethroids [2010], and carbamates [2010]; and Pader, sprayed with four rounds of pyrethroids [2007–2009] and two rounds of carbamates [2010]). District-level anemia and malaria prevalence estimates from 1,763 children <5 years old were calculated.

RESULTS: Parasitemia levels were significantly lower in both IRS districts. In Apac, 37.2% of children had positive malaria blood smears, compared with 49.6% in non-sprayed Lira ($P < 0.01$). Parasitemia prevalence was lowest in Pader (16.8%, $P < 0.001$ compared with both Apac and Lira). Anemia (hemoglobin $< 11\text{g/dL}$) was less common in Apac (38.6%) and Pader (36.8%), compared with Lira (53.2%; $P < 0.001$). Insecticide-treated bednet use was higher in the IRS districts than Lira, but multivariable regression models including this and other potential confounders still showed strong and statistically significant effects of IRS.

CONCLUSION: These results indicate lower malaria burdens in IRS versus non-sprayed districts in northern Uganda. Using resistance monitoring data to guide insecticide selection should help further reduce malaria in endemic settings.

KEYWORDS: malaria, anemia, survey, insecticide resistance, carbamates

SESSION C:**Parasitic Diseases**

1:30–2:55 p.m.

Invasion of the Body Snatchers

Ravinia Ballroom

MODERATOR: Mark Eberhard**1:35****Bedbug Complaints Among Public Housing Residents — New York City, 2010****AUTHORS:** Prabhu P. Gounder, N. Ralph, A. Flatley, A. Maroko, L.E. Thorpe

BACKGROUND: Bedbug (most commonly *Cimex lectularius*) proliferation in urban communities can cause physical, psychological, and economic harm. Descriptive epidemiologic research to determine bedbug prevention and control efforts has been limited. We conducted a retrospective cohort study to describe bedbug complaints among New York City Housing Authority (NYCHA) residents.

METHODS: NYCHA tracks work orders generated in response to residents' complaints; this centralized database provides a representative profile of complaints by all NYCHA residents. We analyzed unique households with a work order referencing bedbugs during January 1–December 31, 2010. We compared self-reported prevalence of bedbugs (i.e., complaints) by household characteristics. Adjusted prevalence ratios (PRs) and 95% confidence intervals (95% CIs) were calculated by using a generalized estimating equation Poisson regression model to account for clustering by NYCHA housing development.

RESULTS: Of 176,273 households among NYCHA's 334 developments, 6,814 (3.9%) registered a bedbug complaint. Household characteristics significantly associated with bedbug complaints included head of household (HOH) aged >84 years compared with 18–29 years (PR: 1.41; 95% CI: 1.19–1.67), disabled HOH (PR: 1.26; 95% CI: 1.19–1.33), income below poverty level (PR: 1.16; 95% CI: 1.09–1.24), receiving public assistance (PR: 1.15; 95% CI: 1.07–1.24), having an employed family member (PR: 0.83; 95% CI: 0.78–0.89), >5 adults versus 1 adult (PR: 1.64; 95% CI: 1.26–2.14), and >6 children versus 0 children (PR: 2.08; 95% CI: 1.51–2.87).

CONCLUSIONS: Our study, among the first to describe the self-reported prevalence of bedbugs within a defined population, indicates that NYCHA can target education and control efforts in households with low income, high occupancy, and residents aged >84 years.

KEYWORDS: bedbugs, public housing, epidemiology, environmental health

1:55

Efficacy of Artemether-Lumefantrine and Dihydroartemisinin-Piperaquine in the Treatment of Uncomplicated *Plasmodium falciparum* Malaria Among Children — Western Kenya, 2010–2011

AUTHORS: Aarti Agarwal, M. McMorrow, P. Onyango, K. Otieno, C. Odero, J. Williamson, S. Kariuki, S.P. Kachur, L. Slutsker, M. Desai

BACKGROUND: Monitoring antimalarial drug efficacy is essential in detecting the emergence of resistance in malaria-endemic countries. Artemether-lumefantrine (AL) has been first-line treatment for uncomplicated malaria in Kenya since 2006, and dihydroartemisinin-piperaquine (DHAPPQ) is currently second-line treatment. Our study aimed to assess if these antimalarials remained efficacious.

METHODS: Between September 2010 and August 2011, we conducted a 42-day in vivo drug efficacy trial of AL and DHAPPQ in 274 children aged 6–59 months with symptomatic malaria in western Kenya. Study participants with microscopy-confirmed, uncomplicated *Plasmodium falciparum* mono-infection were randomly assigned to treatment with AL or DHAPPQ (n=137 per arm) according to the standard World Health Organization protocol.

RESULTS: Follow-up at 42 days was completed for 110 subjects in the AL group and 112 subjects in the DHAPPQ group. At day 28, the polymerase chain reaction (PCR)-uncorrected adequate clinical and parasitological response (ACPR) rate was 62% for AL and higher, 83%, for DHAPPQ ($P=0.0004$). At day 42, the PCR-uncorrected ACPRs were similar for AL and DHAPPQ, 44% and 55% ($P=0.1$), respectively. However, preliminary PCR results indicate that >90% of treatment failures in both groups are due to reinfection rather than recrudescence. There were no early treatment failures in either group, and 99% of subjects cleared parasitemia by day 3 in both groups.

CONCLUSIONS: PCR-uncorrected day 28 and 42 failure rates were high for both regimens; however, preliminary PCR data suggest that the PCR-corrected ACPR rates will exceed the global standard (90%), signifying that both regimens remain efficacious in this population. The longer half-life of piperaquine relative to lumefantrine may provide temporary chemoprophylaxis accounting for the higher uncorrected ACPR at day 28 in the DHAPPQ group.

KEYWORDS: malaria, treatment efficacy, antimalarials, artemisinins

2:15

Morbidity Due to Schistosomiasis Among School-Children — Kenya 2011

AUTHORS: Aaron M. Samuels, P. Mwinzi, E. Matey, G. Muchiri, M. Hyde, S. Montgomery, D. Karanja, W. Secor

BACKGROUND: Schistosomiasis affects >350 million persons worldwide, and is associated with liver abnormalities, stunting, wasting, anemia, exercise intolerance, and decreased quality-of-life. We present baseline data from a multi-year study on the impact of control strategies for *Schistosoma mansoni*-associated morbidity.

METHODS: We randomly selected 822 Kenyans aged 7–8 years from communities with *S. mansoni* infection prevalence $\geq 25\%$. Stools were tested for *S. mansoni* and soil-transmitted helminth (STH) infection; blood was tested for malaria and anemia. Abdominal ultrasound, anthropometric, quality-of-life, and exercise tolerance examinations were performed to assess morbidity. Data were analyzed using chi-squared tests and Poisson regression, accounting for clustering with generalized estimating equations.

RESULTS: A total of 597 children contributed ≥ 2 stools and complete morbidity assessments. *S. mansoni*, STH, and *Plasmodium falciparum* infection prevalence were 69%, 25%, and 8%, respectively. Anemia and hepatomegaly prevalence were 36% and 67%, respectively. In univariate analysis, anemia was more common in children with schistosomiasis (40%) than without (28%; $P=0.01$). Hepatomegaly was more common in children with heavy intensity of schistosomiasis, defined by >399 eggs per gram of stool, (79%) compared to uninfected (62%; $P=0.01$). In multivariate analyses, heavy intensity schistosomiasis (adjusted prevalence ratio [aPR] 1.78; confidence interval [CI]: 1.17–2.69) and malaria (aPR 1.37; CI: 1.06–1.78) were predictors for anemia. Liver abnormalities were more common in children with *S. mansoni* (aPR 0.78; CI: 0.60–0.999) and STH infections (aPR 0.63; CI: 0.42–0.97). Schistosomiasis was not associated with lower quality-of-life, poor exercise tolerance, or abnormal anthropometry.

CONCLUSION: Schistosomiasis-associated morbidity in Kenyan school-children included anemia and liver abnormalities. However, measuring impact of schistosomiasis control might be challenging, and new tools are necessary to better inform programmatic decision-making.

KEYWORDS: schistosomiasis, morbidity, control, child, Kenya

2:35**Fire and Feces: *Cryptosporidium parvum* Outbreak Associated with Fighting a Barn Fire — Indiana and Michigan, June 2011****AUTHORS:** Jenna M. Webeck, S. Peters, T. Henderson, J. House**BACKGROUND:** *Cryptosporidium* species have caused outbreaks of diarrheal illness involving recreational waterparks, municipal water, and exposure to livestock. On June 6, 2011, a total of 34 firefighters from Michigan and Indiana responded to a calf barn fire in Michigan. Shortly after, gastrointestinal illnesses among responding firefighters were reported. The Michigan Department of Community Health investigated to identify the outbreak source and assess risk factors.**METHODS:** A retrospective cohort study of responding firefighters was performed. Potential exposure information was collected through standardized telephone interviews. A clinical case was defined as diarrhea or ≥ 4 other gastrointestinal symptoms in a person within 12 days after responding to the June 6 fire; confirmed cases tested positive by any of multiple diagnostic assays, and probable cases had epidemiologic links to a confirmed case but no laboratory confirmation. Environmental sampling at the farm was performed.**RESULTS:** Of 34 firefighters, 33 were interviewed; 20 (61% cases (3 confirmed, 17 probable) were identified. Median age was 33 (range: 21–58) years. Median time from exposure to illness onset was 5 (range: 2–10) days. Among 17 patients whose illness had resolved by time of interview, median illness duration was 4 (range: 0.5–15) days. One patient was hospitalized; none died. Cases were more likely than noncases to have had direct calf contact (risk ratio: 2.88; 95% confidence interval: 1.04–12.76). *Cryptosporidium parvum* was detected in calf feces and pond water.**CONCLUSIONS:** Calf feces and pond water likely contributed to this first-ever reported cryptosporidiosis outbreak attributable to occupational exposure among firefighters. Firefighting equipment and clothing should be decontaminated at the scene, especially if grossly contaminated with feces, to prevent cryptosporidiosis and other gastrointestinal illnesses.**KEYWORDS:** *Cryptosporidium parvum*, cryptosporidiosis, disease outbreaks, occupational exposure

SESSION D:**Health Care-Associated Infections**

3:15–5:20 p.m.

Nurse Betty

Ravinia Ballroom

MODERATORS: Scott Fridkin and John Moran**3:20****What Goes Around Comes Around — Investigation of a Group A Streptococcal Outbreak Among Residents of a Skilled Nursing Facility, Georgia, 2009–2011****AUTHORS:** Kathleen L. Dooling, D.B. Nguyen, M. Crist, J. Bass, L. Lorentzson, K. Toews, N. Stone, B. Beall, C. Van Beneden**BACKGROUND:** Group A *Streptococcus* (GAS) cause approximately 12,000 invasive infections annually in the U.S, accompanied by high mortality. In October 2011, the Georgia Department of Public Health identified a protracted GAS outbreak in a skilled nursing facility (SNF). We sought to identify risk factors and stop transmission.**METHODS:** We defined a case as a SNF resident with illness onset between June 2009 and October 2011 and GAS isolated from a usually sterile site (invasive) or non-sterile site (noninvasive). Cases were “repeat” infections if >1 month elapsed between episodes. To identify asymptomatic carriers, we swabbed throats and wounds of patients and staff. To identify risk factors, we conducted a case-control study; residents without GAS infections (controls) were matched by time of residence in SNF and analyzed using univariate conditional regression. We evaluated infection control practices.**RESULTS:** We identified 11 invasive (3 repeat) and 7 noninvasive (2 repeat) cases over 28 months. All invasive cases were hospitalized; 4 died. All typeable isolates from cases and resident carriers were type emm11. Risk factors for infection included having a non-surgical wound (OR 9.6, 95% CI 2.8-35.3), being bedbound (OR 13.5, 95% CI 2.9-62.5), presence of indwelling line or catheter (OR 5.9, 95% CI 1.6-22.2) and living in East wing (OR 3.9, 95% CI 1.2-12.4). Multiple hand hygiene lapses and frequent wound care staff turnover on East wing were noted. The treating hospital communicated the GAS diagnosis to the SNF for only 2 (11%) cases.**CONCLUSION:** Prolonged GAS transmission was likely perpetuated by suboptimal infection control practices among vulnerable residents. Improved inter-facility communication regarding GAS infections, staff retention and prevention of skin breakdown may prevent additional transmission and disease.**KEYWORDS:** Group A *Streptococcus*, long-term care facilities, outbreak

3:40

***Herbaspirillum* Species Infections Among Oncology Patients — Texas, 2011**

AUTHORS: Raymund B. Dantes, D.B. Nguyen, F. Modarai, N. Pascoe, C. Perego, R. F. Chemaly, J.J. Lipuma, H. O’Connell, J. Noble-Wang, B. Jensen, T. Forster, A. Guh, T. MacCannell

BACKGROUND: *Herbaspirillum* species are gram-negative soil- and water-based bacteria that rarely cause human infections. From July–September 2011, Hospital A identified several oncology patients with *Burkholderia cepacia* infections, later confirmed as *Herbaspirillum* species. In October 2011, we investigated the first reported cluster of *Herbaspirillum* spp. infections.

METHODS: We reviewed hospital laboratory and clinical records from January 1, 2006–October 24, 2011. Cases were defined as *Herbaspirillum* species isolates, confirmed by genetic sequencing, obtained from Hospital A patients. We examined hospital wards, water systems, and infection prevention practices. Isolates were compared using pulsed-field gel electrophoresis (PFGE). Environmental samples were collected and cultured for *Herbaspirillum* species.

RESULTS: We identified 6 cases; median age was 57 years (range 2–67 years). Five case-patients had positive blood cultures (3 with multiple positive cultures) obtained between July 5–August 8, 2011. All 5 had central lines and received either chemotherapy or high-dose steroids within 30 days prior to culture. A sixth case-patient was identified by a single sputum culture obtained on September 20, 2011. No common hospital wards, healthcare personnel, or intravenous treatments were found. No deaths were attributable to *Herbaspirillum* species infection. Central line care, hand hygiene, personal protective equipment use, and lab processing were acceptable. Four of the 5 blood culture isolates tested were indistinguishable by PFGE, suggesting a common source. No *Herbaspirillum* species were identified in 40 environmental samples.

CONCLUSION: The etiology of the first reported *Herbaspirillum* species cluster remains unknown. *Herbaspirillum* species can be misidentified as *B. cepacia*, and is potentially under-recognized as a pathogen in oncology patients. Diagnosis of *Herbaspirillum* species infections should prompt early interventions, including patient interviews, infection control assessments, and environmental assessments.

KEYWORDS: *Herbaspirillum*, *Burkholderia cepacia*, gram-negative bacterial infections/diagnosis, gram-negative bacterial infections/microbiology, bacteremia/diagnosis, hospital infection

4:00

Streptococcal Endophthalmitis Associated with Contaminated Bevacizumab from a Compounding Pharmacy — Florida, 2011

AUTHORS: Valery M. Beau De Rochars, A. Schmitz, P. Pritchard, B. Beall, J Noble-Wang, H. O’Connell, V. Srinivasan, D. Miller, R. Goldberg, H. Flynn, R. Hopkins, T. Török

BACKGROUND: Off-label use of bevacizumab, an anti-vascular endothelial growth factor (anti-VEGF) drug used to treat retinopathies, is increasing worldwide. Repackaging single-use vials for intravitreal injection (IVI) provides opportunities for contamination. Bacterial endophthalmitis, a rare but serious complication after IVI, can cause permanent vision loss. In July 2011 Florida Department of Health investigated reports of endophthalmitis among patients after IVI using bevacizumab.

METHODS: A retrospective cohort study was conducted for the period June 2–July 8, 2011 among patients who received IVI using anti-VEGF medications at 3 ophthalmology clinics where the majority of cases occurred. A case was defined as ophthalmologist-diagnosed endophthalmitis in a patient after IVI during the study period. Multilocus sequence typing (MLST) was used to compare isolates recovered from clinical specimens and unused bevacizumab syringes.

RESULTS: Eleven (2.1%) cases were identified among 530 anti-VEGF IVI procedures performed by 3 ophthalmologists at 3 locations. Visual outcomes were severe; all had permanent vision loss. Median age was 76 years (range: 68–88). Bevacizumab was used for 457 (86.2%) injections; all cases received bevacizumab prepared by one compounding pharmacy ($P < .001$, compared with other pharmacies). Four batches of bevacizumab were associated with endophthalmitis. Ten patients cultures tested positive for viridans streptococci. MLST identified multiple species of oral streptococci from patient and syringe isolates. One *Streptococcus oralis* strain was recovered from patient and syringe isolates from a bevacizumab batch and from patient isolates associated with 2 additional batches.

CONCLUSIONS: Contaminated syringes prepared by one compounding pharmacy caused this outbreak of endophthalmitis. Laboratory evidence indicates multiple contamination events introduced streptococci during syringe preparation. Endophthalmitis following bevacizumab IVI should trigger immediate investigation for infection control breaches during repackaging and injection.

KEYWORDS: endophthalmitis, *Streptococcus*, intravitreal injections, bevacizumab

4:20**Incidence and Pathogen Distribution of Health Care-Associated Infections — Egypt, 2011****AUTHORS:** Isaac See, F. Lessa, K. Ellingson, M. Talaat

BACKGROUND: Healthcare-associated infections (HAIs) represent a major patient safety concern worldwide, particularly when caused by antimicrobial-resistant organisms such as extended-spectrum beta-lactamase (ESBL)-producing organisms and multidrug-resistant *Acinetobacter* sp. Prevention must be informed by surveillance, which characterizes the magnitude and scope of these infections. In April 2011, Naval Medical Research Unit-3 implemented a pilot surveillance system for HAIs in Egypt. We report HAI rates and associated pathogens from this system.

METHODS: From May–September 2011, 36 intensive-care units (ICUs) across 8 hospitals collected surveillance data. HAI definitions were adapted from the CDC’s National Healthcare Safety Network. A case-patient was defined as an HAI in a patient who had been in the ICU for at least three days. Trained healthcare workers identified case-patients, reporting data on clinical symptoms and up to four pathogens. HAI rates were calculated by pooling data across all participating ICUs and reported per 1000 patient-days. A convenience sample of clinical isolates was tested for antimicrobial resistance.

RESULTS: Of 212 case-patients identified, 111 (52%) were pneumonia, 45 (21%) were bloodstream infections (BSIs), and 16 (8%) were urinary-tract infections (UTIs), with rates/1000 patient-days of 3.1 for pneumonia, 0.5 for BSIs, and 0.5 for UTIs. The mean age of case-patients was 26 years, and 58% were male. The most common pathogens reported were *Acinetobacter* species (20%) and *Klebsiella* species (19%). All *Acinetobacter* species isolates tested (20/20) were multidrug-resistant, and 85% (22/26) of *Klebsiella* species and *Escherichia coli* isolates were ESBL-producing.

CONCLUSIONS: Pneumonia represented over half of the HAIs identified in 36 Egyptian ICUs. Antimicrobial-resistant organisms were commonly identified. Infection control priorities in Egypt should include pneumonia prevention, identification of sources for antimicrobial-resistant organisms, and interruption of transmission.

KEYWORDS: Egypt, developing countries, cross infection, pneumonia, ventilator-associated, infection control, drug resistance, bacterial

4:40**Outbreak of Hepatitis C Virus Infections in an Outpatient Hemodialysis Facility — Georgia, 2011****AUTHORS:** Chukwuma Mbaeyi, A. Agarwal, R. Belflower, L. Mercedes, J. Tuttle, P. Kolhe, G. Xia, S. Ramachandran, Y. Khudyakov, D. Hu, N. Thompson, P. Patel, M. Arduino, C. Nielsen, M. Schaefer, M. Wise

BACKGROUND: Hepatitis C virus (HCV) infection, a leading cause of chronic liver disease, is highly prevalent (>8%) among US hemodialysis patients. Long-standing CDC infection control guidelines for hemodialysis settings include monthly liver enzyme testing and semiannual HCV antibody (anti-HCV) screening to detect possible intra-facility HCV transmission. In May 2011, we investigated a cluster of HCV infections at Facility A to determine the source and recommend control measures.

METHODS: We reviewed annual anti-HCV test results and medical records for all current patients at the facility. Cases were defined as patients who seroconverted to positive anti-HCV test status at any time following facility admission. A previously infected patient was one who was anti-HCV positive upon admission. The hypervariable region 1 (HVR1) of the HCV genome was analyzed to determine relatedness of viruses from all case-patients and previously infected patients. Infection control practices were evaluated.

RESULTS: Among 89 patients at Facility A, 23 (26%) previously infected patients were identified, and six case-patients (7%) seroconverted between 2008–2011. Liver enzyme elevations, occurring six to eight months before positive anti-HCV test results, were identified for all case-patients. Phylogenetic analysis identified three distinct clusters linking five case-patients to three previously infected patients (maximum HVR1 nucleotide identity: 98–100%). Observed infection control lapses included medication preparation (e.g., heparin) in proximity to blood specimen processing and use of single-dose medications (e.g., epoetin alfa) for multiple patients.

CONCLUSIONS: Infection control lapses at Facility A likely resulted in multiple HCV transmission events. A remediation plan was implemented with support from oversight authorities, including guidance to promptly review and act on liver enzyme test results. No new infections have been identified since the investigation concluded.

KEYWORDS: HCV, hemodialysis, outbreak, infection, medication, liver enzyme tests

5:00**Characteristics and Trends of Bloodstream Infections Caused by Methicillin-Resistant *Staphylococcus aureus* among Chronic Dialysis Patients, Active Bacterial Core Surveillance, 2005–2010**

AUTHORS: Duc B. Nguyen, F. Lessa, R. Belflower, Y. Mu, M. Wise, J. Nadle, W. Bamberg, S. Petit, S. Ray, L. Harrison, R. Lynfield, G. Dumyati, J. Townes, W. Schaffner, P. Patel

BACKGROUND: Approximately 90,000 invasive methicillin-resistant *Staphylococcus aureus* (MRSA) infections occurred in the United States in 2008 (0.3 per 1,000 population); the majority (96%) of these infections were bloodstream infections (BSI). Dialysis patients require frequent vascular access and thus are at higher risk for BSI than the general population; central venous catheters (CVCs), used by 22% of hemodialysis patients nationally, increase the risk of infection because they are more prone to colonization than other types of vascular access. We describe the epidemiology and trends in MRSA BSIs among dialysis patients.

METHODS: We analyzed population-based surveillance data from 9 U.S. metropolitan areas participating in Active Bacterial Core surveillance (ABCs) from 2005–2010. A case was defined as a positive MRSA blood culture in a resident of a catchment area who received chronic dialysis. Starting in 2009, vascular access type was collected. Incidence was calculated using dialysis population denominators from the U.S. Renal Data System. Changes in incidence were assessed using a regression model.

RESULTS: During 2005–2010, ABCs recorded 6,051 cases of MRSA BSI among dialysis patients; incidence per 1,000 dialysis patients decreased from 60.6 to 37.7 (modeled annual decrease: 8.1%; $P < 0.0001$). Of 1,827 cases identified during 2009–2010, median age was 59 years (range 3–97), 53.6% were male, 57.9% were black, 6.1% died within 7 days of their MRSA culture, and 36.5% had a recurrent MRSA infection. Most case-patients (62.2%) had a CVC.

CONCLUSIONS: MRSA BSI incidence has decreased significantly among dialysis patients, but remains substantially higher than in the general U.S. population. Improving CVC care and reducing its use should be prevention priorities. Interrupting MRSA transmission may be important for preventing MRSA BSI among all dialysis patients.

KEYWORDS: dialysis, methicillin-resistant *Staphylococcus aureus*, blood stream infection, rate

TUESDAY, APRIL 17

CONCURRENT SESSION E1:

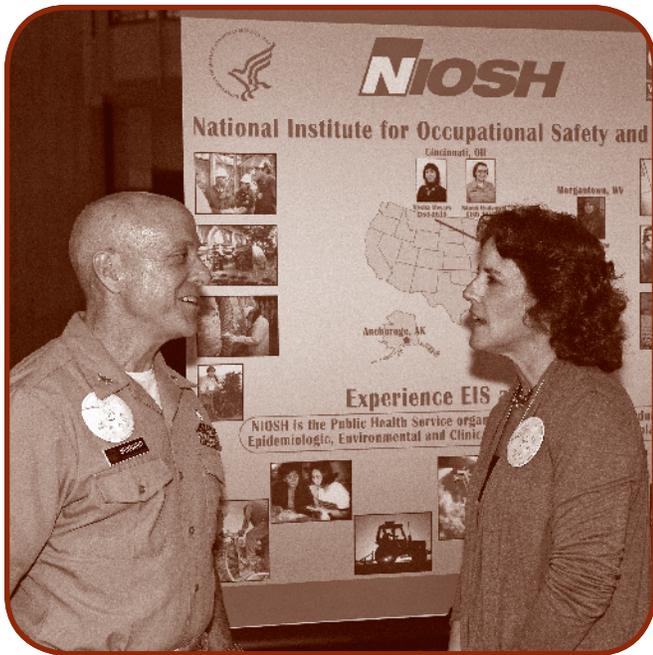
Environmental and Occupational Health

8:30–10:15 a.m.

The Help

Ravinia Ballroom

MODERATORS: Bruce Bernard and David Callahan



8:35

Histoplasmosis Infection Among Temporary Laborers — Illinois, August–September 2011

AUTHORS: Yoran T. Grant, V. Harlacher, C. Austin

BACKGROUND: *Histoplasma capsulatum* is an endemic fungus in the United States that thrives in bat and bird droppings and droppings-contaminated soil. Exposure occurs primarily outdoors through inhalation of aerosolized spores. Infection is often asymptomatic or self-limiting, but can cause severe respiratory disease requiring hospitalization. On September 7, a local health department (LHD) received reports of 2 suspected histoplasmosis cases among laborers for a building restoration. The LHD and Illinois Department of Public Health investigated to identify the source and refer exposed persons to health care for testing and ill persons for treatment.

METHODS: The 2 laborers were interviewed; the only shared work site was inspected. Site owners and contractors confirmed that restoration occurred during August 17–31; they provided contact information for other exposed persons. Among persons onsite 3–18 days before onset of clinically compatible symptoms, histoplasmosis was confirmed by blood or tissue culture; probable cases had positive urine antigen test results.

RESULTS: Fourteen exposed persons were identified; 12 were interviewed. Four reported seeing live bats or animal droppings; 5 reported wearing facial masks; none reported soil disturbance. Of 10 exposed persons tested, 8 (80%) cases were identified (2 confirmed; 6 probable); 6 were hospitalized. All cases recovered without complications. The site inspection revealed abundant animal droppings where an interior wall had been removed. No environmental samples were taken.

CONCLUSIONS: Live bat sightings indicate bat droppings as the outbreak source. When bat droppings are present, histoplasmosis might be transmitted indoors. Prevention recommendations included notifying neighbors and impending future owners of histoplasmosis risks and educating laborers to use personal protective equipment and to wet sites with water to reduce dust.

KEYWORDS: fungus, histoplasmosis, occupational health, epidemiology

8:55**Prevalence of Coal Workers' Pneumoconiosis Among Surface Coal Miners — 16 States, 2010–2011****AUTHORS:** Cara N. Halldin, A. Wolfe, A. Laney

BACKGROUND: Inhalation of coal mine dust causes coal workers' pneumoconiosis (CWP), a chronic, occupational lung disease and progressive massive fibrosis (PMF), a severe form of CWP. In the last decade CWP prevalence and severity have increased among underground coal miners in central Appalachia (Kentucky, Virginia and West Virginia). No studies of CWP prevalence among surface miners have been conducted since 2002, though surface miners comprise 43% of the coal mining workforce. We investigated the prevalence, severity and geographic distribution of CWP in surface coal miners.

METHODS: Surface coal miner chest radiographs were taken by the National Institute for Occupational Safety and Health Coal Workers' Health Surveillance Program and classified according to International Labor Office standards for pneumoconiosis. We compared the prevalence of CWP and PMF in central Appalachia with other U.S. mining regions. Log-binomial regression was used to calculate prevalence ratios (PR) adjusting for miner tenure.

RESULTS: We evaluated 2,325 miners' (7% of U.S. surface coal miners) chest radiographs and identified 49 (2.1%) with CWP and 12 (0.5%) with PMF. The prevalence of CWP was 3.2 fold greater (95% confidence interval [CI]: 1.7–5.8) in central Appalachian miners when adjusting for underground and surface mining tenure. The prevalence of PMF was also elevated in central Appalachian miners (1.2% vs. 0.14%; PR=7.9, 95% CI: 1.7–36.4).

CONCLUSION: The increased prevalence of CWP and PMF observed in Appalachian surface miners was not explained by differences in surface or underground mining tenure. Additional research efforts are required to elucidate the cause of excess CWP and PMF in central Appalachia. In the interim, we recommend surface mining operations diligently utilize effective dust control methods to reduce respiratory hazards.

KEYWORDS: pneumoconiosis, coal mining, Appalachian region, respiratory surveillance

9:15**Cohort Mortality Study of Garment Industry Workers Exposed to Formaldehyde — United States, 1955–2008****AUTHORS:** Alysha R. Meyers, L. Pinkerton, M. Hein

BACKGROUND: Formaldehyde is ubiquitous in the environment, and approximately two million US workers are occupationally exposed to formaldehyde. In 2009, an International Agency for Research on Cancer Working Group concluded that there is sufficient evidence of a causal association between formaldehyde exposure and leukemia, particularly myeloid leukemia; however, the mechanism by which formaldehyde could cause leukemia remains unclear. To further evaluate the association between formaldehyde and leukemia, we extended follow-up through 2008 for a cohort mortality study of 11,043 US garment workers exposed to formaldehyde.

METHODS: We used a person-years analysis program, LTAS.NET, to compute standardized mortality ratios (SMRs) and standardized rate ratios stratified by year of first exposure, exposure duration, and time since first exposure. Associations between exposure duration and rates of leukemia and myeloid leukemia were further examined using Poisson regression models that considered age and time since exposure.

RESULTS: Compared to the US population, mortality from all leukemias was not elevated (36 deaths, SMR: 1.04; 95% confidence interval (CI): 0.73–1.44). Mortality from myeloid leukemia was not significantly elevated (21 deaths, SMR: 1.28; 95% CI: 0.79–1.96) and attenuated compared to the earlier update through 1998 (SMR: 1.44; 95% CI: 0.80–2.37). In internal analyses, leukemia mortality increased with increasing exposure duration but this trend was not statistically significant.

CONCLUSIONS: We continue to see limited evidence of an association between formaldehyde and leukemia. However, the extended follow-up did not strengthen the previously observed associations. In addition to continued epidemiologic research we recommend further research to evaluate the biological plausibility of a causal relationship between formaldehyde and leukemia.

KEYWORDS: formaldehyde, cohort studies, occupational exposure, retrospective studies, leukemia

9:35

Exposure to Radioactive Strontium Following Cardiac Positron Emission Tomography — Alabama, Florida, Pennsylvania, Tennessee, 2011

AUTHORS: Satish K. Pillai, A. Chang, M. Murphy, R. Jones, R. Whitcomb, J. Buzzell, A. Ansari, L. Evans, A. Pomerleau, Z. Kazzi, C. Miller, S. Sullivan, D. Saunders, M. Podgornik, C.H. Chiu, A. Espinosa-Bode, J. Nemhauser, L. Lewis

BACKGROUND: During 2011, routine United States Customs screening identified 3 travelers with elevated radioactivity. All 3 were contaminated with radioactive strontium, a potential carcinogen, from cardiac Positron Emission Tomography using a product (PET-A) that was subsequently recalled. The Food and Drug Administration requested CDC assistance to assess the extent of strontium overexposure among approximately 40,000 at-risk PET-A recipients nationally.

METHODS: Eight clinics in 4 states agreed to participate. Eligible participants received PET-A between February (earliest scan month among travelers) and July (month PET-A recalled) 2011 and were selected by random quota sampling. Availability of whole body counting (WBC), a highly accurate radioactivity detection method, is limited. Therefore, screening was performed using portable isotope identifiers for direct radiation measurements and a novel urine biological assay method (bioassay) to detect radioactive strontium. A subset of participants with above-background direct screening travelled to Oak Ridge National Laboratory for confirmatory WBC.

RESULTS: Three-hundred eight individuals completed direct screening. Median radiation activity was -0.25 net counts per minute (cpm) (range -5.1–55.4 cpm). Of 265 bioassay results, 261 were below minimum detectable activity (MDA); 3 were 2.5–2.7 becquerel/L, close to MDA; 1 was 5.7 becquerel/L. Twenty-three participants with above-background direct screening (0.4–55.4 cpm) underwent WBC and all had low strontium activities (57–4828 becquerel). Twenty-one of 23 WBC referrals had bioassay results; the participant with highest WBC activity had a positive bioassay and 20 were below MDA.

CONCLUSIONS: Overall, participants lacked evidence of excessive strontium contamination, including those with above-background direct screening sent for WBC. Combining direct screening results and urine bioassay may accurately identify high-risk populations for WBC referral in radiologic events.

KEYWORDS: radiation, strontium, diagnostic imaging, biological assay

9:55

All That Bugs Is Not in Bed: Bedbug Infestation of an Office Building — Clarksville, Tennessee, 2011

AUTHORS: Jane A.G. Baumbatt, J.R. Dunn, W. Schaffner, A.C. Moncayo, A. Stull-Lane, T.F. Jones

INTRODUCTION: Since 2000, a resurgence in bedbugs (*Cimex lectularius*) has occurred in the United States. Infestations of homes, hospitals, hotels, and offices have been described; detection and elimination are difficult. On September 1, 2011, the manager of Office A reported unexplained complaints of itching and bug bites among workers to the Tennessee Department of Health. We conducted a retrospective cohort study to determine the cause and recommend interventions.

METHODS: A case was defined as unexplained skin lesions or itching during July 9–September 9, 2011, in a worker in Office A. A standardized questionnaire assessing symptoms and exposures in the work environment was administered. Situational anxiety was assessed on a scale of 1 (low) to 10 (high). Analyses were performed by using Epi-Info™. Dogs certified to detect live bedbugs were used, and arthropod samples were collected. Three workers with skin complaints obtained medical evaluation.

RESULTS: Of 76 workers, 61 (80%) were interviewed; 35 (57%) cases were reported. In bivariate analysis, the following exposures were associated with case status; working in a cubicle adjacent to one in which a dog identified bedbugs (risk ratio [RR]: 4.3; 95% confidence interval [CI]: 1.02–18.38), self-reported allergies (RR: 3.6; CI: 1.24–10.5), and female sex (RR: 7.6; CI: 1.38–41.94). Median situational anxiety score was 4.0. Pruritic maculopapular lesions observed were consistent with arthropod bites. Arthropods were identified morphologically as bedbugs by 2 entomologists.

CONCLUSIONS: Bedbug infestation in this office building caused dermatologic manifestations and anxiety among staff. We recommended use of a pest control professional and provided education about bedbugs not being disease vectors. Bedbugs represent a challenging environmental problem with clinical, psychological, social, and financial impact.

KEYWORDS: bedbugs, parasitic diseases, occupational health

CONCURRENT SESSION E2:

HIV/STD

8:30–10:15 a.m.

Fatal Attraction

Dunwoody Suites

MODERATORS: Jonathan Mermin and Gail Bolan



8:35

Prevalence of Circumcision in Males Aged 14–59 Years — United States, 2005–2010

AUTHORS: Camille E. Introcaso, A. Zaidi, L. Markowitz, F. Xu

BACKGROUND: HIV is a major public health problem in the United States: an estimated 48,100 new infections occurred in 2009, and 3,590 of those were heterosexually acquired infections in men. Three randomized-controlled trials demonstrated that male circumcision decreased a man's risk for HIV infection through heterosexual sex. We sought to describe trends in circumcision prevalence in U.S. men and to determine circumcision prevalence among men potentially at increased risk for heterosexually acquired HIV infection.

METHODS: We used 2005–2010 National Health and Nutrition Examination Surveys (cross-sectional, nationally representative surveys of the civilian, non-institutionalized U.S. population) data to estimate circumcision prevalence by demographics and sexual behavior. Men with ≥ 2 female sex partners in the past year were defined as potentially at increased risk for HIV infection.

RESULTS: Among 6,294 men aged 14–59 years, prevalence of circumcision was 80.5% (95% confidence interval [CI]: 78.4%–82.5%). Prevalence varied by birth cohort, decreasing from 83.3% among men born during 1960–1969 to 76.2% among men born during 1990–1996; prevalence also differed by race/ethnicity: 90.8% among non-Hispanic white men, 75.7% among non-Hispanic black men, and 44.0% among Mexican American men (all: $P < 0.05$). Having ≥ 2 female sex partners in the last year was reported by 19.1% of men. Circumcision prevalence among this group was 80.4% (CI: 77.3%–83.1%), which in 2010 corresponded to an estimated 3.5 million uncircumcised men.

CONCLUSIONS: Circumcision prevalence has decreased in the United States and differs among racial/ethnic groups. In 2010, an estimated 3.5 million U.S. men were uncircumcised and potentially at increased risk for heterosexually acquired HIV. These data could help to inform recommendations concerning male circumcision in the United States.

KEYWORDS: male circumcision, health surveys, minority health, men's health, HIV, risk factors

8:55

Prevalence of HIV Testing Among Men at Risk of Acquiring HIV Infection Through Sex — United States, 2002 and 2006–2008

AUTHORS: Candice K. Kwan, C. Rose, J.T. Brooks, G. Marks, C. Sionean

BACKGROUND: To facilitate earlier diagnosis, CDC, in 2006, recommended annual HIV testing for persons at risk for infection. We assessed the effects of this recommendation on prevalence of self-reported testing among men with sexual risk factors.

METHODS: We combined data from 2002 and 2006–2008 cycles of the household-based National Survey of Family Growth. We defined high-risk heterosexual contact (HRHC) during the past year as sex with multiple, non-monogamous, injection-drug using, or HIV-infected women, or sex in exchange for drugs or money, and no sex with men. We defined men who had sex with men (MSM) as having ≥ 1 male sex partner during the past year. Estimates were weighted to reflect sample design and US household census.

RESULTS: Among an estimated 123,346,447 men aged 15–44 years, from both cycles (11,067 respondents, unweighted), 19.4% reported HRHC (95% confidence interval [CI]: 18.0–20.7) and 2.4% were MSM (95% CI: 2.0–2.8). Compared with men without sexual risk, men with HRHC were 2.3 times (relative risk [RR] CI: 2.0–2.6) and MSM 3.8 times (RR CI: 3.0–4.7) as likely to report being tested during the past year. Comparing data for 2002 with 2006–2008, HIV testing remained stable among men with HRHC (24% vs. 24%, $P = 0.97$) and increased without significance among MSM (37% vs. 42%, $P = 0.56$). During 2006–2008, an estimated 8,772,041 men with HRHC and 750,493 MSM did not report being tested.

CONCLUSIONS: Fewer than half the men with HRHC and MSM received HIV testing during the past year, with little improvement from 2002 to 2006–2008. Programs to increase annual HIV testing for men with sexual risk are needed.

KEYWORDS: HIV, HIV testing, human immunodeficiency virus, AIDS

9:15

Health Care Providers' Perspectives on Barriers to Prenatal Syphilis Testing and Treatment — Shreveport, Louisiana, 2011

AUTHORS: Eleanor B. Fleming, K. Kroeger, R. Schmidt, T. Sangaramoorthy, P. Loosier, P. Harris, D. Gruber

BACKGROUND: Timely testing and adequate treatment can prevent congenital syphilis. In 2010, Louisiana had the highest congenital syphilis rate (49.8 per 100,000) in the United States. Shreveport reported 11 of the state's 32 congenital syphilis cases. Because few mothers had received recommended prenatal care, been tested, or been treated for syphilis according to CDC guidelines, we investigated barriers to prenatal syphilis testing and treatment practices in Shreveport.

METHODS: During September 12–16, 2011, we conducted a rapid ethnographic assessment in Shreveport. Health care providers were selected by chain-referral sampling. We used open-ended interviews to elicit provider perspectives on perceived barriers to prenatal care and syphilis testing and treatment. Interviews were coded until saturation: the point at which no new themes emerged.

RESULTS: We interviewed 36 health care providers. The primary themes that emerged from providers included the following: private prenatal care providers were unaware of the local problem of congenital syphilis and CDC prenatal syphilis testing and treatment guidelines; did not test pregnant women at recommended times; and did not treat them adequately for syphilis. Reported barriers included discomfort in treating pregnant women with syphilis and low Medicaid reimbursement for treatment. Private providers often referred pregnant patients to two public clinics for treatment that they described as underfunded and understaffed.

CONCLUSIONS: Local private providers are perceived by peers as not offering timely syphilis testing and adequate treatment to pregnant women. Interventions for private providers could increase the use of CDC guidelines for prenatal syphilis testing and treatment. Removing provider barriers to treating prenatal syphilis may reduce congenital syphilis in Shreveport.

KEYWORDS: congenital syphilis, prenatal care, Medicaid, health services accessibility

9:35

Evidence Against Serosorting Among HIV-Infected Persons with Syphilis — New York City, Philadelphia, and Washington, DC, 2009–2010

AUTHORS: Brooke E. Hoots, E. Torrone, F. Lewis, B. Furness, J. Schillinger, S. Blank, T. Peterman

BACKGROUND: Syphilis has increased among men who have sex with men (MSM) since 1999. When HIV-infected MSM acquire syphilis it suggests they may have transmitted HIV. However, many do not consider syphilis a sentinel event for HIV transmission; they believe HIV-infected MSM practice serosorting (limiting unprotected sex to partners with the same HIV serostatus as them to prevent HIV transmission). We investigated if HIV-infected persons with syphilis reported HIV-uninfected sex partners and whether those partners also had syphilis, suggesting unprotected sex.

METHODS: We reviewed health department records of syphilis case-patients coinfecting with HIV whose sex partners had been traced via partner services in New York City (January 2009–June 2010) and in Philadelphia and Washington, DC (2010). Eligible case-patients had records with a diagnosis of HIV infection ≥ 1 year before syphilis diagnosis and ≥ 1 sex partners treated for syphilis after the case-patient.

RESULTS: Of 97 case-patients, 92 (95%) were MSM, 63 (65%) were black, and 34 (35%) named only HIV-infected partners (thus may have practiced serosorting). Forty-three (44%) named ≥ 1 HIV-uninfected sex partners. Another 19 (20%) named a partner of unknown HIV serostatus. Of those with at least one HIV-uninfected partner, 21 (49%) had an HIV-uninfected partner infected with syphilis, suggesting unprotected anal or oral sex with a case-patient. Case-patients with only HIV-infected partners did not differ from those with ≥ 1 HIV-uninfected partners with respect to age, race/ethnicity, or facility of syphilis diagnosis ($P > 0.05$).

CONCLUSION: The high percentage of HIV and syphilis-coinfecting persons who reported sex with HIV-uninfected partners indicates a potential increased risk of HIV transmission. HIV prevention interventions should be directed to persons coinfecting with syphilis and HIV.

KEYWORDS: syphilis, HIV, sexual behavior, risk management

9:55

Women at Risk for Repeat *Chlamydia trachomatis* Infections — Infertility Prevention Program, Oregon, 2010

AUTHORS: Genevieve L. Buser, K. Hedberg, S. Schafer

BACKGROUND: *Chlamydia trachomatis* is the most commonly reported infection in Oregon. Repeat chlamydial infections increase the risk for pelvic inflammatory disease and infertility. Clinics participating in the Infertility Prevention Program (IPP) receive public funding to decrease chlamydia prevalence through screening and treatment. We sought to identify risk factors for repeat chlamydial infections.

METHODS: During 2010, approximately one-third of Oregon chlamydial infections were diagnosed through IPP. A chlamydial infection was defined as a positive result of a transcription-mediated amplification assay for chlamydia in a female tested in Oregon during 2010; repeat infections were those diagnosed >28 days after a prior diagnosis. We analyzed IPP programmatic data by using multivariable logistic regression.

RESULTS: During 2010, IPP diagnosed 2,832 chlamydial infections among 2,672 females: 2,536 females with 1 infection (95%) and 136 females with >1 infection (5%). Compared with females with 1 chlamydial infection, females with >1 infection were more likely to be younger (mean age: 19.7 versus 21.1 years; $P = .0001$), be Hispanic, compared with non-Hispanic (29% versus 18.5%; adjusted odds ratio [aOR]: 1.95; confidence interval [CI]: 1.22–3.11), and report multiple sex partners during the previous 60 days (31.4% versus 20%; aOR: 1.57; CI: 1.07–2.30); females with >1 infection were less likely to have been screened in a family planning clinic than in other clinic types (48.5% versus 66.3%; aOR: 0.58; CI: 0.37–0.91).

CONCLUSION: Within IPP, Oregon females receiving multiple diagnoses of chlamydial infections differed from females with 1 infection among demographic and behavioral characteristics. Efforts to diagnose repeat infections and prevent sequelae should ensure these groups are included among rescreening outreach efforts.

KEYWORDS: *Chlamydia trachomatis*, risk factors, infection, sexual partners

CONCURRENT SESSION F1:

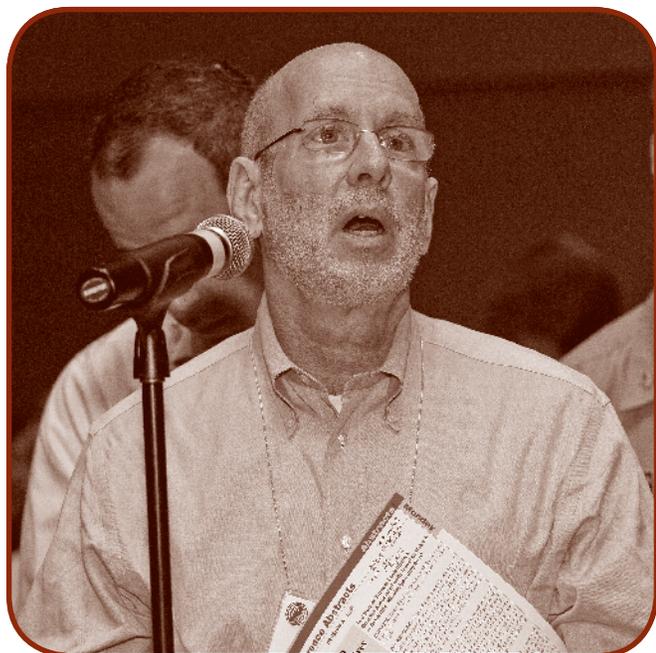
Injury

10:45 a.m.–12:10 p.m.

It's a Mad, Mad, Mad, Mad World

Ravinia Ballroom

MODERATOR: Linda Degutis



10:50

Too Many “Cooks” in the RV: Injuries Associated with Illicit Clandestine Methamphetamine Production — United States, 2001–2010

AUTHORS: Bryan E. Christensen, N. Melnikova, J. Wu, M. Orr

BACKGROUND: More than 12 million Americans have tried methamphetamine (meth). Meth, a highly addictive central nervous system stimulant, can easily be made from household chemicals. Meth labs have been found in fixed facilities (e.g., homes, motels) or vehicles (e.g., recreational vehicles, boats). Meth production can cause harm including physical injury (e.g., from explosions, chemical burns) and environmental hazards. We analyzed surveillance data to characterize meth events, populations affected, and types of injuries associated with these events.

METHODS: We conducted a descriptive analysis of state-based surveillance data from the National Toxic Substance Incidence Program on methamphetamine-events (MEs). A ME was defined as a release (e.g., spill, explosion) of a hazardous substance within 72 hours after lab seizure by law enforcement. Data from 2001–2010 were collected from six states: LA, NC, OR, UT, NY and WI.

RESULTS: From 2001–2010, 1,730 MEs occurred that affected 215 victims who reported a total of 259 injuries. Most MEs (89.8%) occurred at fixed facilities. Fifty-three percent of MEs occurred in residential areas and <20% in commercial or undeveloped areas. Thirty percent of victims were <18-years-old and 81.9% were male for those who reported age or gender. The most common injuries associated with MEs were respiratory irritation (45.9%), eye irritation (12.4%), and burns (10.0%). The subpopulations with the most ME-related injuries were members of the public (e.g., neighbors, 48.8%) and police (36.7%). Of injuries reported, 5.1% were among meth lab operators.

CONCLUSION: Meth production has injured the police and innocent bystanders including children, but has not largely affected meth producers. Public health interventions (e.g., first responder awareness, legislation regulating meth production chemicals) should be improved to further decrease preventable injuries.

KEYWORDS: methamphetamine, meth, clandestine laboratories, pseudoephedrine

11:10**The Impact of Father Absence, Parental Monitoring, and Parenting Practices on Suicidal Behavior****AUTHORS:** Asha Z. Ivey

BACKGROUND: Suicide is the third leading cause of death among youth ages 12 to 18. Father absence from a household is associated with higher levels of suicidal behavior; however, parenting variables such as parental monitoring and parenting practices are often not accounted for. The present study hypotheses include (1) father absence, low parental monitoring, and low positive reinforcement will independently predict higher levels of lifetime attempts; (2) high parental monitoring and high positive reinforcement will independently moderate the relationship between father absence and lifetime attempts.

METHODS: Data from the 2004 Student Health and Safety Survey were analyzed. This survey was designed to identify risk and protective factors for interpersonal and self-directed violence among a high-risk sample of 4,131 middle and high school students. Bivariate and multivariate logistic regression models examined the relationship between predictors and lifetime suicide attempts, controlling for gender, student grade level, and race/ethnicity.

RESULTS: In bivariate models, as expected, father absence (OR=1.30; 95% CI=1.10-1.55), low parental monitoring (OR=1.67; 95% CI=1.39-1.96), and low positive reinforcement (OR=2.00; 95% CI=1.82-2.50) were independently and significantly associated with higher levels of lifetime attempts. In the full multivariate model low positive reinforcement (OR=1.64; CI=1.32-2.00) remained significantly associated with higher levels of lifetime attempts, while high parental monitoring moderated the relationship between father absence and lifetime attempts such that the association was stronger when monitoring was low (OR=1.59; CI=1.05-2.39).

CONCLUSIONS: This study highlights the importance of a father's presence in the household along with positive reinforcement with respect to suicidal behavior. The results suggest that youth suicide prevention efforts might emphasize the importance of increased parental monitoring in buffering the effects of a father's absence from the household.

KEYWORDS: father, suicidal behavior, parental monitoring, parenting practices, positive reinforcement

11:30**Mortality in Tornado Outbreak — Alabama, 27 April 2011****AUTHORS:** Cindy H. Chiu, A. Schnall, S. Vagi, R. Noe, C. Mertzlufft, J. Spears, M. Casey-Lockyer, A. Wolkin

BACKGROUND: On April 27, 2011, 67 tornadoes including powerful EF-4 and -5 tornadoes killed 256 people and injured thousands in Alabama, resulting in one of the deadliest tornado events in US history. We investigated circumstances surrounding these fatalities to identify risk factors to prevent future tornado-related fatalities.

METHODS: We combined interview data collected by American Red Cross during condolence visits with the decedents' families and death certificate data. We conducted a preliminary analysis to describe demographic characteristics, circumstances and cause of death, and behaviors prior to death.

RESULTS: Of the 256 tornado-related deaths in Alabama, 106 (41.4%) had a social or physical vulnerability, with the majority being ≥ 65 years ($n=85$, 33.2%). Of nearly half ($n=108$, 42.2%) known to receive some form of warning, 24.1% ($n=26$) were warned by another person and 16.7% ($n=18$) heard a siren; at least 73 (67.6%) took protective action. Most deaths occurred on site ($n=217$, 84.8%) and were directly associated with impact ($n=237$, 92.6%). The most common mechanisms of directly-related deaths were struck/cut by debris/objects ($n=112$, 47.3%), thrown ($n=80$, 33.8%), and crushed ($n=44$, 18.6%). Fifty-four (21.1%) decedents sustained head injuries which was the leading cause of death in 37 (14.5%) people.

CONCLUSIONS: Preliminary findings suggest that the older populations were vulnerable and head injuries were common. When warned, most took protective action and many received warnings through word-of-mouth. These findings suggested that prevention efforts should target older populations and emphasize current CDC recommendations to prevent head injuries. Current CDC recommendations should expand to address the role of social interactions in alerting the public, such as encouraging individuals to warn others, while improving formal warnings.

KEYWORDS: tornadoes, disasters, fatal outcome, death, Red Cross, Alabama

11:50

Preparing for Functional Needs While Sheltering During a Disaster — Kentucky, 2011

AUTHORS: Amy R. Kolwaite, K. Humbaugh, M. Riggs, D. Thoroughman

BACKGROUND: During 2009–2011, Pike County (eastern Kentucky), experienced multiple severe storms, tornadoes, and flooding, resulting in damage to homes, lack of clean water, and need for temporary shelter of vulnerable populations. To plan for emergency responses for future disasters and to help ensure compliance with Federal Emergency Management Agency’s new functional shelter guidance, we assessed the health status of Pike County by using a Community Assessment for Public Health Emergency Response (CASPER) survey.

METHODS: During June 2011, we used a 2-stage cluster sampling method to select 210 representative households in Pike County. Through in-person surveys, we assessed the proportion of households with children aged ≤ 24 months, adults aged ≥ 65 years, and residents affected by chronic health conditions, visual impairments (ranging from needing glasses for anything more than reading to legal blindness), physical limitations (use of cane/walker, wheelchair, or being bedbound or homebound), and supplemental oxygen requirements. Data were weighted to account for complex sampling.

RESULTS: Among 210 selected households, 207 (99%) were completed. Of these, 8.3% included children aged ≤ 24 months, and 27.1% included an adult aged ≥ 65 years. The most common chronic health condition reported was heart disease, affecting 50.7% of households, followed by diabetes (28%), lung disease (23%), and asthma (20.5%). Visual impairments were reported for 28.9% of households, physical limitations for 23.5%, and supplemental oxygen use for 11.6%.

CONCLUSION: The substantial chronic disease burden among these selected Pike County households highlights the importance of encouraging residents to maintain personal emergency stocks of essential medications. Emergency response plans should include transportation for persons with physical limitations, and shelter modifications to ensure sufficient staff and supplies of infant formula, pharmaceuticals, and supplemental oxygen.

KEYWORDS: needs assessment, disaster planning

CONCURRENT SESSION F2:

Zoonoses

10:45 a.m.–12:10 p.m.

The Silence of the Lambs

Dunwoody Suites

MODERATORS: Sean Shadomy and Nina Marano



10:50

Campylobacter jejuni Infections Associated with Sheep Castration — Wyoming, 2011

AUTHORS: Kerry R. Pride, A. Geissler, K. Weidenbach, K. Musgrave, W. Manley, C. Van Houten, T. Murphy

BACKGROUND: Worldwide, *Campylobacter jejuni* is a leading bacterial cause of gastroenteritis; it is commonly associated with poultry, but has also been associated with multiple other animals and food products. Of the states that submit *Campylobacter* cases to PulseNet, Wyoming is the third highest contributor and has reported 667 campylobacteriosis cases since 2004. In late June, 2 cases of laboratory-confirmed *C. jejuni* infection in an employee and a resident of a sheep ranch were reported to the Wyoming Department of Health. We investigated to determine the source of infection and to prevent further cases.

METHODS: On July 14 and 17, we conducted patient interviews to assess potential exposures; focusing on animals and food products. We visited the ranch and collected fecal samples from 5 re-cently weaned lambs on the ranch. Isolates were subtyped by using pulse-field gel electrophoresis (PFGE) and compared them with other PFGE patterns in the PulseNet database since 2004.

RESULTS: Interviews revealed a common source exposure to sheep: both patients reported having used their teeth to castrate lambs in mid-June. The 2 human isolates and a *C. jejuni* isolate from 1 lamb were indistinguishable by PFGE. This *C. jejuni* PFGE pattern had not been documented previously among Wyoming isolates and was represented in only 8 (0.09%) of 8,817 *C. jejuni* cases in PulseNet; none of these 8 cases was associated with animals.

CONCLUSIONS: Animal fecal sampling in an investigation might help identify the source of *C. jejuni* in recently reported cases. Asking specific questions regarding animal husbandry might reveal novel exposures. Livestock producers should be educated about safe and humane castration methods to reduce exposure to *C. jejuni* and other pathogens.

KEYWORDS: *Campylobacter*, sheep, *Campylobacter jejuni*, castration

11:10

***Escherichia coli* O157:H7 Outbreak Associated with a State Fair — North Carolina, 2011**

AUTHORS: Stephanie E. Griese, A. Fleischauer, J. MacFarquhar, Z. Moore, L. Njord, R. Njord, D. Sweat, N. Lee, J-M. Maillard, D. Griffin, D. Springer, M. Davies

BACKGROUND: A Shiga toxin-producing *Escherichia coli* (STEC) outbreak attributed to a petting zoo at the 2004 North Carolina State Fair resulted in regulation regarding exhibits housing animals intended for physical contact. On October 24, 2011, the North Carolina Division of Public Health was notified of 4 STEC infections among attendees of the October 13–23 State Fair. We investigated to identify the vehicle and prevent further illness.

METHODS: We conducted a case-control study, matching 3 control subjects per case-patient by age and date of fair attendance. Cases were identified through active surveillance and defined as acute bloody diarrhea, hemolytic uremic syndrome (HUS), or culture-confirmed STEC in a person who had attended the fair 1–10 days before illness onset. Pulsed-field gel electrophoresis (PFGE) testing was performed on culture isolates. To recruit control subjects, we contacted 11,000 randomly selected advanced ticket purchasers to request participation. We assessed food, animal, and activity exposures.

RESULTS: We identified 25 case-patients with illness onset during October 16–25. Median age was 26 years (range: 1–77 years). Eight (32%) case-patients were hospitalized; 4 (16%) experienced HUS. Eleven (44%) case-patients had laboratory confirmation of *E. coli* O157:H7 with matching PFGE patterns. Visiting Building A was the only exposure associated with illness (matched odds ratio: 5.6; 95% confidence interval: 1.6–19.2). Building A housed sheep and goats for livestock competitions and was open to the public; signage discouraged physical contact.

CONCLUSIONS: An exhibit housing animals not intended for physical contact was the likely outbreak source. This outbreak illustrates the importance of applying public health prevention measures to ruminant exhibits where physical contact might occur, regardless if intentional, to prevent future STEC outbreaks.

KEYWORDS: *Escherichia coli* O157, hemolytic-uremic syndrome, zoonoses, legislation as topic

11:30

Imported Human Rabies in a U.S. Army Soldier — New York, 2011

AUTHORS: Angela M. Maxted, R. Rudd, B. Cherry, K. Ellis, D. Alves, D. Grant, W. Javaid, T. Johnson, C. Rupprecht, A. Newman, D. Kuhles, S. Cersovsky, D. Blog

BACKGROUND: Although human cases are rare in the United States, >55,000 persons die from rabies annually in canine rabies-endemic regions. Human rabies is preventable with postexposure prophylaxis (PEP). To determine the potential exposure source and prevent secondary cases, we investigated a rabies case in a recently returned U.S. Army soldier.

METHODS: The patient's laboratory specimens, medical records, and travel history were reviewed. The patient and his close family and friends were interviewed regarding his exposure and PEP history. Contacts' exposure risks were assessed and PEP recommendations were provided.

RESULTS: The soldier, aged 24 years, was admitted to a New York hospital on August 19, 2011, with neck and right arm pain, ataxia, vomiting, fever, and hydrophobia. Rabies was laboratory-confirmed on August 21. Despite experimental treatment, the patient's condition rapidly deteriorated and on August 31, life support was withdrawn and he died. At admission, the patient reported that he sustained a dog bite during December 2010–January 2011 while in Afghanistan. Genetic sequencing of the virus indicated an Afghanistan canine variant. The patient's family believed that he had received partial PEP. However, a May 2011 banked serum specimen contained no rabies virus neutralizing antibodies, indicating that he had not received effective PEP. Although the patient stated that the dog tested rabies-negative, no record of such neuropathologic (brain) testing was identified. Eighty-nine contacts in 2 countries were interviewed; 29 contacts received PEP, including 9 health care workers without confirmed exposures.

CONCLUSION: Laboratory findings provided clarity to conflicting information from record review and interviews. This case stresses the need to avoid animal contact while in rabies-endemic regions and to seek prompt medical evaluation after any animal bite.

KEYWORDS: rabies; post-exposure prophylaxis; military personnel; sequence analysis, RNA

11:50**Anthrax Outbreak Associated with Hippopotamus Meat—Chama District, Zambia****AUTHORS:** Mark W. Lehman, M. Marx, A. Craig, C. Malama

BACKGROUND: Between July and September 2011, over 85 hippopotamus deaths were reported in Zambia. Local residents were reported to have handled and consumed the hippopotamus remains. Over 500 suspect human anthrax cases and 5 deaths had been reported by late September 2011. Zambia Ministry of Health requested CDC's assistance in evaluating human cases for suspected anthrax, identifying specific exposure risks, and developing prevention messages.

METHODS: Following an initial assessment of the outbreak, a questionnaire was developed to conduct a community assessment in the Chama district of Northeastern Zambia and administered by three teams in communities where human cases of suspected anthrax were known to have occurred in the prior three months. Each team attempted to interview all persons 15 years of age and over in every 5th household in the communities.

RESULTS: Two-hundred eighty-four surveys were completed. Of the 284 participants, 31 (11%) reported having been diagnosed with anthrax. Respondents reporting skinning or cutting the hippopotamus meat were 13 (95% CI = 4.4-41.5) and nine-times (95% CI = 2.5-47.5) more likely to develop anthrax, respectively compared to respondents who did not report a diagnosis of anthrax. The majority of participants (84%) reported eating hippopotamus meat, and were nine-times (95% CI = 1.3-369.3) more likely of reporting an anthrax diagnosis as those who denied eating the meat. Sixty-five (23%) respondents said they would eat dead hippopotamus meat again because of food shortage (73%), lack of meat (12%), hunger (7%) and lack of protein (5%).

CONCLUSION: Area-wide food insecurity may drive people to eat meat from dead hippopotami. Handling carcasses is a significant risk for contracting anthrax; people should be discouraged from handling carcasses in any form.

KEYWORDS: anthrax, Zambia, hippopotamus, food insecurity

12:30**SPECIAL SESSION:****Horn of Africa Famine: Applied Public Health in Nutritional Emergencies**

Dunwoody Suites

MODERATOR: Scott Dowell**SPONSOR:** CGH

FOCUS OF SESSION: This special session will provide an overview of CDC's response to the humanitarian crisis in the Horn of Africa. The challenges as well as lessons learned will also be described.

The challenges inherent to the use of epidemiologic methods in complex international emergencies have led in the past to substantial under use of these tools in emergencies. In 2011, countries in the Horn of Africa, particularly Somalia, experienced one of the worst nutrition emergencies in last 20 years. Several regions in Somalia were declared famine zones, resulting in massive population displacement throughout the region. Through the deployment of EIS officers, subject matter experts (SMEs), and collaboration with international partners, CDC provided technical assistance in disease surveillance, outbreak investigations, program evaluation, and health systems reconstruction. Given the timeliness of the response to this emergency, 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.

- Measles, Mortality and Malnutrition in Dadaab Refugee Camps, Kenya. *Lara Jacobson, Carlos Navarro Colorado, Sharmila Shetty*
- Monitoring and Evaluation of Preventive Nutrition Programming in Response to the Nutritional Crisis In Northern Kenya, August 2011- February 2012. *Cyrus G. Shahpar, Sudhir Bunga, Leisel Talle*
- War, Germs and Famine: Somalia Early Warning Communicable Disease Surveillance and Response. *Kevin Clarke, Susan Cookson*
- Campaign Monitoring in Conflict Zones: Mogadishu Measles and Polio Campaign, October–November 2011. *Danni Daniels, Muireann Brennan*

SESSION G:
Global Health
1:45–3:50 p.m.

Around the World in 80 Days

Ravinia Ballroom

MODERATORS: Laurence Slutsker and Rita Helfand



1:50

The Impact of Targeted Incentives and Enhanced Services on Use of Maternal Health Services in Rural Western Kenya

AUTHORS: Katherine A. O'Connor, I. Sadumah, S. Kola, J. Oremo, M. Kelley, T. Ye, M. Kamb, R. Quick

BACKGROUND: Maternal and neonatal outcomes can be improved through adequate antenatal care (>4 prenatal visits) and delivery in a health facility. Kenya has high maternal mortality (530/100,000) and neonatal mortality (57 per 1,000 live births), but 94% of women have at least one antenatal visit, which provides an opportunity to integrate interventions into antenatal care as incentives to increase service use.

METHODS: In 2011, we offered all pregnant women at 22 health facilities in western Kenya hygiene kits (household water treatment solution and soap) at their first and third antenatal clinic visits, protein-fortified flour at their second and fourth antenatal visits, and rapid syphilis testing and treatment at first antenatal visits. We also provided clean delivery kits (sterile razor and gloves, baby blanket, and hygiene kit) to women who delivered at the facilities. We collected service utilization data from logbooks at each participating health facility. We compared data from March-July 2010 (before program implementation) with data from March-July 2011 (after program implementation).

RESULTS: From 2010 to 2011 the mean number of first antenatal visits per facility over the 5-month period remained constant (19.0 vs. 18.9, $p=0.96$) but there was an increase in the ratio of fourth to first antenatal visits (27.4% vs 44.7%, $p<0.0001$), health facility deliveries to first antenatal visits (38.7% vs 58.1%, $p<0.0001$), and syphilis tests to first antenatal visits (42.6% vs 94.8%, $p<0.0001$); the percentage of positive syphilis tests also increased (1.2% vs 2.7%, $p<0.01$).

CONCLUSIONS: The increases in fourth antenatal visits, health facility deliveries, and syphilis testing suggest that offering health-enhancing products as incentives helped increase use of maternal health services and diagnosis and presumed treatment of syphilis.

KEYWORDS: antenatal, water, delivery, incentives

2:10

Adherence to Artemether-Lumefantrine in the Treatment of Uncomplicated Malaria — Ethiopia, 2010.

AUTHORS: Melissa A. Briggs, D. Townes, J. Hwang, B. Hailegiorgis, J. Malone, R. Reithinger, S. Filler, M. Menon, S. Girma, T. Abreha, H. Teka, S.P. Kachur

BACKGROUND: Due to widespread resistance to single-dose sulfadoxine-pyrimethamine, six-dose artemether-lumefantrine (AL) became first-line treatment for uncomplicated malaria in Ethiopia in 2004. Determining adherence to AL is critical, as nonadherence can lead to treatment failure and promote the development of artemisinin-resistance. This study assessed factors associated with adherence to AL amongst patients in two health settings.

METHODS: We evaluated adherence to AL for uncomplicated malaria 72 hours after it was prescribed, in patients seen at either a government health facility (n=132) or community health post (n=108). Adherence was defined as taking all required doses at the correct dose for age, measured by patient report and pill count. We compared adherence between patients from the two health settings, and analyzed factors associated with adherence by performing univariate analysis on the entire population.

RESULTS: Of the 240 patients assessed, 131 (55%) were adherent. Adherence at the government health facility and community health post did not differ significantly (49% vs. 61%; $P=0.07$). Factors positively associated with adherence included age >5yrs (OR: 2.2; $P<0.03$), any head-of-household education (OR: 1.9; $P<0.03$), recognition of the drug name (OR: 2.1; $P<0.02$), and receiving instruction on the number of days to take pills (OR: 2.2; $P<0.02$). The most common reasons given for nonadherence were forgetting (1.7%), epigastric pain (1.7%), and not understanding instructions (1.7%).

CONCLUSIONS: In Ethiopia, adherence to AL was poor in both health settings analyzed. Nonadherence was higher in children < 5yrs and households with lower education, two groups already at increased risk for adverse outcomes from malaria. Interventions to improve medication instructions and address difficulties in providing medication to children may increase adherence in this population.

KEYWORDS: malaria, artemisinins, patient compliance, Ethiopia

2:30

Artisanal Gold Ore Processing and Childhood Lead Poisoning — Nigeria, November 2010

AUTHORS: Behrooz Behbod, Y. Lo, T. Jefferies, J. Durant, A. Neri, N. Umar-Tsafe, A. Medina-Marino, L. de Ravello, D. Thoroughman, L. Davis, R. Dankoli, A. Dama, M. Samson, L. Ibrahim, O. Okechukwu, M.J. Brown

BACKGROUND: In spring 2010, artisanal gold-mining in Zamfara State, Nigeria resulted in fatal childhood lead-poisoning. A follow-up CDC village-to-village survey in November identified children with lead-poisoning in two ore-processing villages (Sunke and Kirsa) with high soil-lead levels. In November 2010, we characterized childhood lead-poisoning in these two villages and investigated associated factors.

METHODS: We conducted door-to-door interviews in Sunke and Kirsa, collected blood from children aged ≤5 years, and sampled indoor floor-dust from areas where children ate and played. We measured dust- and blood-lead concentrations using X-ray fluorescence and Lead-Care II® analyzer. We used bivariate analyses, logistic regression and generalized estimating equations (GEE), accounting for the correlation among children living within the same compound (alpha-level = 0.05), to cross-sectionally assess the determinants of childhood lead-poisoning.

RESULTS: Interviews were completed in 122 (90%) of 135 compounds. Blood was collected from 252 children; all (100%) had blood-lead levels (BLL) >10 µg/dL (CDC level-of-concern) and 176 (70%) had BLL >45 µg/dL (level when chelation-therapy is recommended). Dust was collected from 80 compounds, with 41 (51%) exceeding 400 parts-per-million (ppm; Environmental Protection Agency bare soil-standard for children). Adjusting for village, elevated dust-lead levels (>400ppm) were associated with the presence of a child with BLL >45 µg/dL (GEE odds ratio [OR]: 7.21; 95% confidence interval [CI]: 2.92–17.80). Gold-ore processing activity was marginally associated (logistic regression OR: 1.37; 95% CI: 0.98–1.93) with high dust-lead (>400ppm).

CONCLUSION: High prevalence of childhood lead-poisoning in these villages was associated with indoor lead contamination introduced by gold-ore-processing activities. Interventions are ongoing to remediate villages and prevent lead exposures. A representative survey of Zamfara to quantify the extent of the outbreak is needed.

KEYWORDS: lead poisoning, childhood, gold, mining

2:50

Factors Associated with Undiagnosed HIV Infection Among Persons with HIV in Mozambique, 2009

AUTHORS: Kainne E. Dokubo, R. Shiraishi, J. Neal, J. Aberle-Grasse, P. Young

BACKGROUND: HIV/AIDS is the second leading cause of death in Mozambique, accounting for 27% of all deaths in the country. In 2009, HIV prevalence was 11.5% and Mozambique ranked seventh in the number of AIDS deaths worldwide. HIV transmission occurs more commonly from persons unaware they have HIV, as those aware they are HIV-positive are more likely to change their behavior and reduce the risk for HIV transmission. We aimed to characterize persons living with HIV (PLWH) who were never previously tested for HIV or never received their test results and assess factors associated with undiagnosed HIV infection in Mozambique.

METHODS: We analyzed data from the 2009 Mozambique AIDS Indicator Survey, a cross-sectional nationally representative survey, which included HIV testing. Analyses focused on HIV-infected adults aged 15-49 years and were weighted and controlled for the complex survey design. Logistic regression was used to identify socio-demographic and behavioral factors associated with undiagnosed HIV infection.

RESULTS: Among 1,310 persons with positive HIV tests, 762 (58%) had undiagnosed HIV infection. Males were more likely to have undiagnosed infection compared with females (aOR: 2.54; 95% CI: 1.63-3.94). Not using a condom during last sexual intercourse (aOR: 2.50; 95% CI: 1.58-3.94) was associated with undiagnosed infection. Persons with limited knowledge about HIV transmission and prevention were also significantly more likely ($P<0.05$) to have undiagnosed infection.

CONCLUSIONS: In 2009, the majority of PLWH in Mozambique had undiagnosed HIV infection. PLWH with undiagnosed infection were less knowledgeable about how to prevent HIV and less likely to engage in behaviors that decrease risk for HIV transmission. HIV prevention programs should focus on increasing HIV awareness, testing, risk-reduction counseling and linkage to care.

KEYWORDS: HIV/AIDS, Mozambique, HIV testing, undiagnosed HIV infection, sexual behavior

3:10

Impact of a Blanket Supplementary Feeding Program in a Nutrition Emergency — Turkana County, Kenya, 2011

AUTHORS: Cyrus G. Shahpar, S. Bunga, K. Clarke, L. Talley, C. Navarro-Colorado, Y. Forsen

BACKGROUND: In July 2011, over 10 million people in East Africa required emergency assistance during the worst drought in 60 years. Surveys in northern Kenya revealed acute malnutrition prevalence up to 37%, far exceeding the critical level of 15%. This prompted the World Food Programme to implement a blanket supplementary feeding program (BSFP) to prevent incident malnutrition in children. This evaluation assessed the impact of BSFP on the nutritional status of children.

METHODS: During August-December 2011, we followed a cohort of non-malnourished children enrolled in a BSFP in Turkana County, Kenya. At baseline and each subsequent monthly food distribution, we administered questionnaires and recorded anthropometric measures, including weight-for-height z-score (WHZ), an indicator of acute malnutrition. We used a paired two-sample t-test to compare mean WHZ.

RESULTS: At 28 sites, 1528 non-malnourished children were enrolled during the first distribution. Of these, 1420 children (92.9%) were recaptured at the second distribution. After removing records with missing or implausible data, 1288 (90.7%) of these children were included in the analysis. The average interval between distributions was 40.4 days (range 18-68 days). The mean WHZ was -0.93 (-0.97 to -0.89) and -0.86 (-0.90 to -0.81) for distributions one and two respectively. The mean increase in WHZ was 0.08 ($P<0.0001$). By the second distribution, 1208 (93.8%) children remained non-malnourished while 79 (6.1%) became moderately malnourished and 1 (0.1%) became severely malnourished.

CONCLUSIONS: Children enrolled in a BSFP program in Northern Kenya experienced an overall improvement in their nutritional status as measured by WHZ. A small proportion of children developed malnutrition despite receiving food in the program. Risk factors for the deterioration of nutritional status in this population should be examined.

KEYWORDS: anthropometry, child, emergencies, Kenya, malnutrition, nutritional support

3:30

Nodding Syndrome, a Novel Neurologic Illness of Unknown Etiology — South Sudan, 2011

AUTHORS: Sudhir Bunga, J. Foltz, L. Reik, A. Abubakar, J. Sejvar, C. Navarro- Colorado, M. Opoka, G. Mindra, J. Ratto, C. Blanton, S. Dowell

BACKGROUND: Nodding Syndrome (NS) is an unexplained neurologic illness predominantly affecting children aged 5–15 years. Possibly a novel seizure disorder, it is characterized by head-nodding. Published descriptions from Tanzania and South Sudan suggest that nodding is precipitated by exposure to food or cold and includes progressive cognitive dysfunction, neurological deterioration, and stunted growth. Postulated etiologies from past investigations include infectious, nutritional, toxicological, and genetic factors. The cause of NS remains unknown. In 2011, CDC was invited to investigate a cluster of NS in South Sudan.

METHODS: We conducted an age- and village-matched case-control investigation, collecting exposure information and biological specimens. We used conditional multiple logistic regression analysis to assess risk factors.

RESULTS: We enrolled 38 case-control pairs. The mean age-of-onset for head-nodding was 9.2 years (Range: 5.0–14.0). Cases were more likely to have had hunger episodes, sometime from birth to 2 years (matched odds ratio [mOR]: 8.2; 95% confidence interval [CI]: 1.2–∞) and more likely to have consumed food from their own-farm (mOR: 10.0; 95% CI: 1.4–434.0). Studied risk factors among cases, exposure to munitions, consumption of sorghum, crushed roots and small fish, and suspected maternal pre-natal exposures did not show any significant association. Onchocerciasis, confirmed by skin-snip, was more common among cases (mOR: 3.2; 95% CI: 1.2–8.7).

CONCLUSIONS: Our preliminary findings highlight nutrition factors not previously identified (going hungry early-in-life; having consumed food from own-farm) and continue to implicate onchocerciasis. We recommend reinforcing mass ivermectin treatment for onchocerciasis, nutritional supplementation for malnourished children, and anti-epilepsy medication for seizures. Future priorities include improving surveillance to monitor disease burden and geographic distribution, and continued work to determine etiology and guide interventions.

KEYWORDS: neurological illness, nodding, novel, outbreak, seizures, Sudan, unknown etiology

WEDNESDAY, APRIL 18

CONCURRENT SESSION H1:

Chronic Diseases

8:30–10:15 a.m.

Happy Feet

Ravinia Ballroom

MODERATORS: Ursula E. Bauer and Kate Brett



8:35

Unhealthy Weight Control Behaviors Among High School Students — United States, 1999–2009

AUTHORS: Zewditu Demissie, R. Lowry, D. Eaton

BACKGROUND: Since the 1970s, obesity prevalence among U.S. adolescents has more than tripled, making weight management among adolescents an important concern. Using unhealthy weight control methods can have negative psychosocial and physical effects. This study examines trends for three unhealthy weight control behaviors (fasting; taking diet pills, powders, or liquids without a doctor's advice; and vomiting/taking laxatives) among U.S. high school students.

METHODS: Data were analyzed from 6 national Youth Risk Behavior Surveys (YRBS) conducted during 1999–2009. YRBS is conducted biennially among cross-sectional, nationally representative samples of 9th–12th grade students (approximately 14,000 students/survey) using self-administered questionnaires. Sex-stratified, multivariable logistic regression models were used to test for linear and quadratic trends in unhealthy weight control behaviors, adjusted for grade, race/ethnicity, and obesity status, among students trying to lose or maintain weight.

RESULTS: During 1999–2009, 64% of students were trying to lose (45%) or maintain (19%) weight. Among these students, the percentage of female students using fasting (23.3% in 1999 to 17.6% in 2009, linear trend $P<0.001$); diet pills, powders, or liquids (13.7%–7.8%, $P<0.001$); and vomiting/laxatives (9.5%–6.6%, $P<0.001$) for weight control decreased. The percentage of male students using diet pills, powders, or liquids (6.9%–5.1%, $P<0.001$) decreased during 1999–2009, but changes in the prevalence of fasting (11.2%–10.4%) and vomiting/laxatives (3.2%–3.1%) were not significant.

CONCLUSIONS: The prevalence of unhealthy weight control behaviors decreased primarily among female students during 1999–2009. However, these behaviors were still too prevalent in 2009, especially among female students, indicating further efforts are needed to teach adolescents how to manage their weight safely and avoid the risks associated with using unhealthy methods.

KEYWORDS: adolescent, weight control, trend, sex differences

8:55

Nonadherence to Physical Activity Recommendations Among Preschool- and School-Aged Children — United States, 2009–2010

AUTHORS: Tala H.I. Fakhouri, J. Hughes, D. Brody, B. Kit, C. Ogden

BACKGROUND: To prevent childhood obesity, the Let's Move Initiative and the American Academy of Pediatrics recommend that children be physically active for at least 60 minutes/day. To aid clinicians and public health providers in identifying children at risk for physical inactivity, we sought to determine the percentage of preschool- and school aged children who do not meet recommendations and examined demographic differences.

METHODS: Analysis included 2,230 children ages 2-11 years in the 2009-2010 National Health and Nutrition Examination Survey, a representative sample of the US population. A proxy respondent reported the number of days/week a child is physically active for at least 60 minutes. Children were categorized as not meeting recommendations if the response was less than 7 days/week. Age-stratified multivariable logistic regression models were used to assess differences in non-adherence to recommendations by race/ethnicity, gender, income and family structure. SUDAAN was used to adjust for complex sample design and data were analyzed using sample weights to account for differential probabilities of sample selection, non-response, and sample noncoverage.

RESULTS: Overall, 16% of preschoolers versus 30% of school-aged children did not meet physical activity recommendations ($P < 0.001$). For preschool-aged children, the odds of not meeting recommendations were significantly lower for those living in a single- compared to a two-parent household (aOR=0.57; 95%CI [0.36–0.91]). In school-aged children, female sex (aOR=1.40; 95%CI [1.09–1.80]), Hispanic ethnicity (aOR=1.72; 95%CI [1.11–2.67]) and higher-income (aOR=2.17; 95%CI [1.21–3.88]) were associated with not meeting recommendations.

CONCLUSIONS: Non-adherence to physical activity recommendations was associated with family structure, female sex, race/ethnicity and income status. Interventions designed to prevent childhood obesity by promoting physical activity may be informed by these findings.

KEYWORDS: child, preschool obesity, motor activity

9:15

Relationship of Self-Reported Neighborhood Characteristics to Overweight and Obesity — Allegheny County, Pennsylvania, 2009–2010

AUTHORS: Michael Gronostaj, S. Lyss, B. Gunnels, J. Lando, R. Sharma, R. Voorhees

BACKGROUND: Overweight and obesity are risk factors for cardiovascular disease, diabetes, and certain cancers. The Centers for Disease Control and Prevention has recommended community strategies to address obesity in the United States. We investigated the association of overweight and obesity with persons' perceptions of their neighborhoods.

METHODS: During 2009–2010, Allegheny County Health Department conducted a random-digit-dialed landline telephone survey of adult residents about self-reported health risks and conditions and self-assessments of their neighborhoods' physical and social environment. Overweight or obese was defined by a body mass index $\geq 25\text{kg}/\text{m}^2$. Respondents who agreed or strongly agreed with statements about their neighborhood characteristics were considered to perceive those characteristics to be present. Analyses accounted for the complex survey design and oversampling of minorities.

RESULTS: The survey was completed by 5,442 Allegheny County residents; 62.5% (95% confidence interval [CI]: 60.8%–64.3%) of Allegheny County residents were estimated to be overweight or obese. Those who perceived many opportunities for physical activity in their neighborhood were less likely to be overweight or obese than those who did not (60.60% versus 66.93%; prevalence ratio: 0.91; 95% CI: 0.85–0.96). In stratified analyses, this association was significant for females and whites, but not for males or blacks. Proportions of overweight or obese residents did not differ between those who did or did not perceive substantial availability of fresh produce (61.88% versus 63.55%; prevalence ratio: 0.97; 95% CI: 0.92–1.03).

CONCLUSIONS: Perceptions of some neighborhood characteristics in Allegheny County are associated with being overweight and obese among certain population subgroups. To guide intervention development, future research should determine whether these associations are causal and why they might vary by demographic subgroup.

KEYWORDS: obesity, risk factors, residence characteristics, Behavioral Risk Factor Surveillance System

9:35

Usual Sodium Intake Among Preschool Children, United States 2001–2008

AUTHORS: Niu Tian, Z. Zhang, F. Loustalot, Q. Yang, M. Cogswell

BACKGROUND: In adults, excess sodium intake is associated with high blood pressure, a leading risk factor for cardiovascular disease; high blood pressure tends to start in childhood. By race-ethnicity, the prevalence of high blood pressure is highest among non-Hispanic black adults. However, limited information exists on how usual sodium intake in non-Hispanic black preschool children compares with that among preschool children in other racial/ethnic groups. We investigated sodium intake among US children aged 1–5 years.

METHODS: Using 2001–2008 National Health and Nutrition Examination Survey data for 3,067 children aged 1–3 years and 1,454 children aged 4–5 years, we compared mean daily sodium intake and the prevalence of excess sodium intake (>1500 mg/day for children aged 1–3 and >1900 mg/day for those aged 4–5 based on the Institute of Medicine Tolerable Upper Intake Levels) among racial/ethnic groups.

RESULTS: Mean sodium intake was significantly higher among non-Hispanic black than among non-Hispanic white or Mexican-American children ($P < 0.05$ for all comparisons). Among children aged 1–3 years, the prevalence of excess sodium intake was 85% (95% confidence interval [CI]: 82%–90%) among non-Hispanic blacks, 79% (95% CI: 76%–83%) among non-Hispanic whites, and 73% (95% CI: 68%–79%), among Mexican-Americans. Among children aged 4–5 years, the corresponding prevalence rates were 97%, 82%, and 84%, respectively.

CONCLUSIONS: Most U.S. preschool children consume excessive sodium. Mean sodium intake and the prevalence of excess sodium intake are both highest among non-Hispanic black children. These findings suggest enhanced strategies are needed to reduce sodium intake among preschool children, and particularly among non-Hispanic black children.

KEYWORDS: NHANES, sodium, preschool children, high blood pressure

9:55

Why Mothers Introduce Solid Foods to Their Infants Earlier than Recommended — United States, 2005–2007

AUTHORS: Heather B. Clayton, C.G. Perrine, K.S. Scanlon, R. Li

BACKGROUND: Early introduction of solid foods (<4 months) may increase infants' risk for adverse outcomes such as childhood obesity. Determining how mothers' reasons for early solid food introduction vary by feeding method (breast milk, formula, mixed breast milk and formula) may be useful in targeting interventions to improve mothers' adherence to infant feeding recommendations.

METHODS: We analyzed data from 1,117 women who participated in the Infant Feeding Practices Study II, a national non-representative longitudinal study of mothers and infants conducted from 2005 to 2007. Each monthly questionnaire included a 7-day food frequency recall, and in months 5 and 9, a 12-item list of reasons for solid foods introduction. We calculated the percentage of women who introduced solid foods early and who indicated reasons for introducing solid food as "important." Multiple logistic regression examined the six most commonly selected reasons for solid food introduction by feeding method among mothers who introduced solid foods early.

RESULTS: Overall, 36.3% of infants were introduced to solids earlier than recommended, including 22.7% of breastfed, 48.1% of formula-fed, and 44.4% of mixed-fed infants. Compared with mothers who breastfed, those who formula-fed were significantly more likely to cite the reason "a doctor or other health care professional said my baby should begin eating solid foods" as "important" for introducing solid food early (adjusted odds ratio [aOR]: 1.73; 95% confidence interval [CI]: 1.05–2.86), and mothers who mixed-fed were more likely to cite the reason "it would help [their] baby sleep longer at night" (aOR: 1.87; 95% CI: 1.08–3.24).

CONCLUSION: Understanding reasons for solid food introduction by feeding method is useful in improving infant feeding practices and preventing adverse health outcomes.

KEYWORDS: breast feeding, weaning, infant, risk factors

CONCURRENT SESSION H2:

Respiratory Diseases

8:30–10:15 a.m.

Up in the Air

Dunwoody Suites

MODERATOR: Thomas Clark



WEDNESDAY

8:35

Factors Associated with False-Positive Polymerase Chain Reaction Results During a Pertussis Outbreak — Jefferson County, New York, 2010–2011

AUTHORS: Angela M. Maxted, D. Grant, C. Schulte, E. Rausch-Phung, D. Blog, A. Newman, S. Martin

BACKGROUND: Pertussis is a potentially fatal, highly contagious bacterial respiratory disease often requiring resource-intensive outbreak control measures. Pertussis pseudo-outbreaks, commonly characterized by false-positive results from polymerase chain reaction (PCR) tests with variable specificity, have been reported. During a prolonged atypical outbreak, we determined factors associated with false-positive results.

METHODS: We collected demographic, symptom, and health care provider data from laboratory reports and interviews. Illnesses among PCR-positive patients were classified as confirmed cases if they met the clinical case definition (cough duration ≥ 2 weeks plus paroxysmal cough, inspiratory whoop, or posttussive vomiting). Characteristics of confirmed patients were compared against PCR-positive patients not meeting case definition by using chi-square and multivariable analyses.

RESULTS: During November 2010–January 2011, laboratories reported >540 PCR-positive patients; 99% had been tested at Laboratory A. Of 531 patients available for follow-up, 428 (81%) did not meet the case definition. All confirmed patients were coughing before sample collection versus 69% of patients not meeting the case definition. On preliminary analysis, odds of not being confirmed were higher among patients whose coughs lasted <5 days before sample collection (odds ratio [OR]: 7.1; 95% confidence interval [CI]: 4.5–11.4), whose specimens were tested by Laboratory A (OR: 21.8; 95% CI: 2.5–188.7), and whose results were reported >3 weeks after the outbreak started (OR: 1.9; 95% CI: 1.2–3.1). Laboratory A had adopted a new PCR assay 1 month before the outbreak.

CONCLUSION: Pertussis was likely present early in the outbreak, but testing patients without clinically compatible illness and Laboratory A's new PCR assay contributed to the prolonged pseudo-outbreak. This pseudo-outbreak underscores the importance of recognizing clinical signs and symptoms and practicing careful laboratory testing.

KEYWORDS: whooping cough, *Bordetella pertussis*, polymerase chain reaction, epidemics, false positive reactions

8:55

Pertussis Transmission in a Neonatal Intensive Care Unit — Arizona, 2011

AUTHORS: Seema Yasmin, R. Sunenshine, K. Bisgard, C. Wiedeman, A. Carrigan, T. Sylvester, A. D’Souza, S. Anderson, K. Howard, K. Komatsu, R. Klein

BACKGROUND: During 2010 in the United States, 3,350 pertussis cases and 25 deaths among infants aged ≤6 months were reported; adults are often the transmission source of infant pertussis. During September 13–15, 2011, hospital B reported 3 pertussis cases, including 1 confirmed by *Bordetella pertussis* isolation among infants discharged ≤30 days previously from a 71-bed neonatal intensive care unit (NICU A). We investigated NICU A to determine outbreak extent, factors contributing to transmission, and associated costs.

METHODS: Case definition was cough ≥14 days with onset during July 28–September 15 in an NICU-associated person. We observed NICU A practices and interviewed 35 health care workers (HCW) furloughed for cough illness and parents of 35 hospitalized infants. Costs were calculated by using HCW wages, time furloughed, vaccine, chemoprophylaxis, diagnostic testing, and hospital B labor costs.

RESULTS: We identified 16 patients; 5 infants (aged 5–19 weeks; 5 female), 11 HCWs (aged 29–50 years; 6 female). The index patient was an infant aged 11 weeks (gestational age 28 weeks) who experienced apnea on July 28 and cough on August 14 in NICU A. Pertussis was diagnosed after transfer to hospital B on September 9. Spacing of NICU A beds (16 inches apart), 4:1 patient-to-nurse ratio, and absence of personal protective equipment (PPE) use were observed. Outbreak costs (\$97,744) were primarily influenced by HCW furloughs (\$55,349) and hospital B labor costs (\$16,809). Of 365 HCWs, 330 required pertussis booster vaccine.

CONCLUSIONS: This costly health care–associated pertussis outbreak might have been prevented with heightened awareness of apnea as a pertussis sign, compliance with HCW pertussis vaccination recommendations, and enforcement of PPE for HCWs with cough illness.

KEYWORDS: pertussis, infants, health care worker-patient transmission, disease outbreak

9:15

Outbreak of *Streptococcus pneumoniae* Serotype 15A Among Patients and Staff in a Psychiatric Unit — Rhode Island, January–February 2011

AUTHORS: Katherine Fleming-Dutra, C. Mbaeyi, R. Link-Gelles, N. Alexander, A. Guh, E. Forbes, B. Beall, J. Winchell, M.G. Carvalho, F. Pimenta, M. Kodani, C. Vanner, H. Stevens, D. Brady, M. Caulcrick-Grimes, U. Bandy, M. Moore

BACKGROUND: *Streptococcus pneumoniae*, an important cause of pneumonia, meningitis, and bacteremia, periodically causes outbreaks that can sometimes be controlled by pneumococcal vaccines. In January 2011, the Rhode Island Department of Health was notified of a pneumococcal outbreak in a pediatric, inpatient psychiatric unit (Unit 1). We investigated to determine the outbreak extent, assess infection control, and recommend control measures.

METHODS: Outbreak cases, occurring in Unit 1 patients, staff, or visitors with onset from January 1–May 1 were defined as confirmed pneumococcal disease, with pneumococcus isolated from blood or otorrhea; x-ray confirmed pneumonia; or suspected pneumonia. We conducted retrospective case finding via patient medical record review and questionnaires for staff members and prospective surveillance among Unit 1 patients and staff. We assessed pneumococcal nasopharyngeal colonization among symptomatic staff and all Unit 1 patients. We serotyped by polymerase chain reaction (PCR) and genotyped nasopharyngeal and cultured clinical pneumococcal isolates. We directly observed infection control practices.

RESULTS: We identified eleven cases (three confirmed pneumococcal disease, six confirmed pneumonia, and two suspected pneumonia) among Unit 1 patients, staff, and visitors. The three clinical isolates were *S. pneumoniae*, serotype 15A, with identical genotypes. Six (30%) of 20 patients and staff had PCR-based evidence of serotype 15A nasopharyngeal colonization. Infection control assessment revealed suboptimal adherence to hand hygiene (48% compliance) and respiratory precautions. Outbreak control measures, instituted February 4–8, included amoxicillin prophylaxis and training sessions focusing on hand and respiratory hygiene, after which one case occurred on February 23.

CONCLUSION: This was the first reported outbreak of *S. pneumoniae*, serotype 15A, a serotype not included in current pneumococcal vaccines. Infection control and antibiotic prophylaxis appeared to control the outbreak.

KEYWORDS: *Streptococcus pneumoniae*; pneumococcal infections; pneumonia, pneumococcal; disease outbreaks; infection control

9:35

***Bordetella holmesii* Epidemiology During an Outbreak of Pertussis-Like Illness — Ohio, 2010–2011**

AUTHORS: Loren E. Rodgers, A. Cohn, S. Martin, T. Clark, J. Budd, A. Terranella, S. Mandal, L. McGlone, A. Emanuel, L. Tondella, L. Pawloski, K. Tatti, M. Marcon, K. Spicer, A. Leber, R. Iyer, D. Salamon, N. Tucker, C. Hicks, M. DiOrion, E. Koch, M. LeMaile-Williams

BACKGROUND: During May 2010–May 2011, Franklin County, Ohio experienced an outbreak of pertussis with an incidence of 80/100,000 persons. The majority of cases were identified by a highly sensitive single-target polymerase chain reaction (PCR) (IS481) that does not differentiate among *Bordetella* species.

METHODS: We described the outbreak and conducted additional diagnostic testing to confirm etiology. We ascertained cases by using the Council of State and Territorial Epidemiologists case definition, and evaluated demographics, clinical features, and vaccination status. We tested sera for antipertussis toxin antibodies and used multitarget PCR to differentiate among *Bordetella* species.

RESULTS: Reported cases totaled 918; 5/10 samples tested had discordant serology and IS481 PCR results, indicating that *B. holmesii* might be the etiologic agent. Of 298 specimens tested by multitarget PCR, *B. pertussis* and *B. holmesii* were detected among 138 (46%) and 53 (18%), respectively; 5 (2%) registered both. Among 53 patients with *B. holmesii*, 60% were aged 11–18 years, compared with 34% of 138 patients with *B. pertussis* ($P < .001$). Pertussis symptoms were similar among *B. holmesii* and *B. pertussis* cases; paroxysms, 88% versus 81%; posttussive vomiting, 44% versus 38%; and whoop, 23% versus 20%, respectively. Among patients aged 11–18 years with *B. holmesii*, 18/31 (58%) had received an adolescent pertussis booster, compared with 20/45 (44%) patients with *B. pertussis* ($P = .24$).

CONCLUSIONS: We report the first documented mixed outbreak of *B. pertussis* and *B. holmesii*, with *B. holmesii* particularly affecting adolescents. Influence of *B. holmesii* on public health is undetermined; routine use of multitarget PCR for clinical diagnosis might be nonfeasible, but limited use through enhanced surveillance activities might improve understanding of *B. holmesii* burden.

KEYWORDS: respiratory tract infections, *Bordetella* infections, whooping cough, polymerase chain reaction, disease outbreaks, diphtheria-tetanus-acellular pertussis vaccines

9:55

Diagnosis and Demand — Patient and Provider Drivers of Antibiotic Use, Minya District, Egypt, 2011

AUTHORS: Kathleen L. Dooling, W. El-Shoubary, M. Talaat, L. Hicks

BACKGROUND: Overuse of antibiotics has contributed to the emergence of antibiotic-resistant bacteria globally. In Egypt, patients can purchase antibiotics without a prescription. We assessed attitudes and practices related to antibiotic use for acute respiratory infections (ARIs) among physicians and patients in Egypt.

METHODS: We conducted an in-person survey of all ARI patients (150 adults and 248 parents of pediatric patients) regarding antibiotic treatment and attitudes following an ambulatory visit during one day in four clinics. All district physicians ($n=252$) who treat ARIs were administered an in-person survey regarding attitudes and antibiotic prescribing practices. Surveys were conducted in Minya District, Egypt, April - May, 2011. Chi-square was used for tests of association.

RESULTS: Survey response rates exceeded 93% for all groups. For adults and children with ARIs, 315 (83%) reported receiving antibiotic prescriptions. For bronchitis and colds, ARIs which do not require antibiotics, 96 (85%) and 40 (57%) were prescribed antibiotics, respectively. Of the 67 respondents not prescribed an antibiotic, 17 (25%) intended to obtain one from a pharmacist. In fact, 73 (19%) patients had already taken an antibiotic before the physician visit. Fifty (21%) physicians reported having prescribed antibiotics without an indication, citing patient access to over-the-counter (OTC) antibiotics at pharmacies as the most common reason. Physician characteristics associated with not prescribing antibiotics for colds were age > 40 years ($p=0.03$), and pediatric specialty ($p<0.001$).

CONCLUSION: We found a high rate of unwarranted outpatient antibiotics for ARIs. Patient access to OTC antibiotics contributes to over-prescribing. National policy requiring a prescription to dispense an antibiotic might decrease inappropriate use. Similar studies in another district and physician and public education promoting appropriate antibiotic use are planned.

KEYWORDS: respiratory tract infections, Egypt, bacterial drug resistance

CONCURRENT SESSION I1:

Reproductive Health

10:30–11:55 am

The Parent Trap

Ravinia Ballroom

MODERATOR: Robert J. Berry and Wanda Barfield



10:35

Trends in Venous Thromboembolism Among Pregnancy Hospitalizations — United States, 1994–2008

AUTHORS: Nafisa Ghaji, S. Boulet, C. Hooper

BACKGROUND: Venous thromboembolism (VTE) during pregnancy is associated with acute and long-term effects. It is a leading cause of maternal morbidity and mortality in the U.S complicating 0.5–3.0 per 1000 pregnancies. Recent temporal trends in pregnancy-related VTE have not been evaluated in a national sample. This study characterizes trends in pregnancy-related VTE during 1994–2008 and evaluates the prevalence of co-morbid conditions known to increase VTE risk.

METHODS: All pregnancy-related hospitalizations with VTE among women aged 15–44 from the Nationwide Inpatient Sample (1994–2008) were identified using ICD-9 diagnostic, procedure and diagnostic-related group codes. Trends in VTE-associated hospitalizations were evaluated using variance-weighted least squares regression; multi-variable logistic-regression analysis assessed the likelihood of VTE during the study period, after adjusting for co-morbid conditions such as obesity and diabetes. Antenatal, delivery, and postpartum hospitalizations were evaluated separately; estimates were weighted to account for the complex sample design.

RESULTS: From 1994–2008, there was 17% increase in the rate of all pregnancy hospitalizations with VTE (1.89 to 2.21 per 1,000 deliveries). From 1994–1996 through 2006–2008, the prevalence of obesity increased (3.0%–7.4% in antenatal, 1.3%–4.4% during delivery and 3.7%–7.3% at postpartum). Diabetes and chronic heart disease increased among delivery hospitalizations (from 6.6%–8.8% and 5.6–8.6%, respectively). The aOR of VTE increased with each subsequent study period ranging from 1.14 (1.02–1.26) in 1997–1999 to 1.75 (1.58–1.94) in 2006–2008.

CONCLUSIONS: The occurrence of pregnancy associated VTE increased from 1994–2008. The observed trend did not change despite adjustment for co-morbid conditions. These findings are important for design, planning, and implementation of programs which focus on reduction of maternal morbidity and mortality.

KEYWORDS: venous thromboembolism, pregnancy, deep venous thrombosis, pulmonary embolism, risk factors, hospitalizations

10:55

Patient Characteristics of Repeat Induced Terminations of Pregnancy — New York City, 2010

AUTHORS: Amita Toprani, W. Li, C. Greene, E. Begier

BACKGROUND: Unintended pregnancy, linked to prematurity and negative child-development outcomes, is generally preventable with effective contraception. Repeat induced termination of pregnancy (ITOP) is an indicator of repeat unintended pregnancy. We describe repeat ITOP by patient characteristics.

METHODS: ITOP is reportable in New York City (NYC). We analyzed 2010 ITOP data to characterize repeat ITOP, defined as ITOP with the patient reporting ≥ 1 past ITOP, among NYC residents. Proportion of repeat ITOP among all ITOP was calculated by patient characteristics. Multivariate linear regression with total number of ITOP as outcome was used to obtain adjusted estimates of association.

RESULTS: Of 76,614 reported ITOP, 43,567 (57%) were repeat terminations. Among all ITOP patients, 25% reported 1 prior termination, 15% reported 2 prior terminations, 8% reported 3 prior terminations, and 9% reported ≥ 4 prior terminations. Each 1-year increase in patient age and each additional living child were associated with a 6% and 48% increase in likelihood of repeat ITOP, respectively. Repeat ITOP comprised 66% of total ITOP among non-Hispanic blacks, 65% among Puerto Ricans, 55% among other Hispanics, 45% among non-Hispanic whites, and 43% among Asian-Pacific Islanders. Repeat ITOP comprised 52% of self-paid ITOP, 62% of Medicaid-paid ITOP, and 63% of ITOP paid by other insurance. Repeat ITOP comprised 63% and 50% of total ITOP among women living in high- and low-poverty areas, respectively. In multivariate analysis, all of these predictors remained significantly associated with likelihood of repeat ITOP.

CONCLUSIONS: The proportion of ITOP that are repeat procedures is high across all groups. Postabortion care should include comprehensive contraception education and services. A question regarding postabortion contraception provision will be added to NYC's ITOP reporting form in 2012.

KEYWORDS: pregnancy outcome; pregnancy, unplanned; abortion, induced; contraception

11:15

Evaluation of CDC's 2009–2011 Pregnancy Flu Line for Monitoring Pandemic and Seasonal Influenza

AUTHORS: Elizabeth C. Ailes, K. Newsome, S. Gilboa, M. Jhung, D.J. Jamieson, W. Callaghan, L. Finelli, M. Honein

BACKGROUND: Early data from the 2009 H1N1 pandemic indicated that pregnant/postpartum women were four times more likely to be hospitalized than the general population, yet no ongoing national surveillance for influenza in pregnant women existed. The Pregnancy Flu Line (PFL) used existing jurisdiction-specific reporting structures to implement enhanced passive surveillance for severe influenza (intensive care unit-admission or death) in pregnant/postpartum women from August, 2009–September, 2011. PFL also included a 24-hour clinical consultation phone line. Standardized case report forms were submitted via secure email or fax. A surveillance evaluation was conducted to assess the system's operation during the pandemic and subsequent influenza season (2010–11).

METHODS: Influenza coordinators in 52/54 participating jurisdictions and five CDC stakeholders were interviewed to assess PFL flexibility, usefulness, and sensitivity.

RESULTS: The system was determined to be flexible since it accommodated season-specific jurisdictional reporting structures; 21 (40%) jurisdictions required reporting of hospitalizations and deaths during the pandemic compared to 11 (21%) in 2010–11. The system was useful; 41 (79%) influenza coordinators found the 24-hour phone line helpful or added pregnancy status to their jurisdiction's influenza reporting forms because of PFL participation and 21 (40%) were planning to make influenza hospitalizations and/or deaths in pregnant/postpartum women reportable in 2011–12. Stakeholders reported that the system lacked sensitivity, potentially missing some first trimester and postpartum cases, and deaths occurring outside the health care system.

CONCLUSIONS: The PFL was useful and flexible but had limited sensitivity. Future use of the PFL could improve understanding of the prevalence and severity of influenza in pregnant/postpartum women. Alternately, pregnancy status could be collected as part of seasonal influenza surveillance and thereby captured in case reporting in future pandemics.

KEYWORDS: influenza A virus, H1N1 subtype, pregnancy

11:35

Prevalence of Urinary Tract Infections and Pharmacotherapy Use in Pregnancy — United States, 1997–2007

AUTHORS: Simerpal Gill, C. Broussard, K. Crider, R. Berry, T. Carter, C. Hobbs, J. Reefhuis

BACKGROUND: Urinary tract infections (UTIs) are the most common bacterial infection in pregnancy, affecting approximately 20-25% of pregnant women in the United States. Improperly managed UTIs can result in adverse pregnancy outcomes including preterm birth, low birth weight, and even fetal demise; however, early pregnancy use of some antibacterials to treat UTIs has been associated with increased risks for specific birth defects. In order to assess the association between antibacterial use and birth defects, we first sought to determine the prevalence of UTIs and the use of related pharmacotherapy in early pregnancy.

METHODS: Data were obtained from the National Birth Defects Prevention Study, a multi-site, population-based case-control study of risk factors for birth defects. Data on control mothers from 10 sites were collected via standardized telephone interviews, and used to estimate the prevalence of self-reported UTIs from the month prior to conception (B1) through the end of the first trimester (M3). For the same time period, the prevalence of specific medications used for treatment in women who reported having a diagnosed UTI was estimated.

RESULTS: The prevalence of self-reported UTIs was 19.6% (1655/8450), of which 95.0% (1571/1655) were diagnosed by physicians. Of diagnosed infections, 1401 (89.2%) were treated using pharmacotherapy, where amoxicillin was the most commonly reported antibacterial medication (n=513, 36.6%) followed by nitrofurantoin (n=356, 25.4%) and trimethoprim/sulfamethoxazole (n=187, 13.3%). A large proportion of women (n=629, 44.9%) could not specify the antibacterial medication used.

CONCLUSIONS: UTIs are common in early pregnancy. Pharmacotherapy is used to treat the majority of infections; determining the specific medication(s) used for treatment is first required before future studies can accurately elucidate the associations between these medications and birth defects.

KEYWORDS: urinary tract infection, pregnancy, amoxicillin, nitrofurantoin, trimethoprim, sulfamethoxazole

CONCURRENT SESSION 12:

Tuberculosis

10:30–11:55 a.m.

Catch Me If You Can

Dunwoody Suites

MODERATORS: Kenneth Castro and Martin Cetron



WEDNESDAY

10:35

Tuberculosis Surveillance Data Transmission Errors — United States, 2011

AUTHORS: Robert F. Luo, K. Young, C. Wallace, A. Langer

BACKGROUND: Reliable tuberculosis (TB) surveillance data are critical for monitoring U.S. trends toward TB elimination. However, TB program officials report that data presented in CDC's online National Tuberculosis Indicators Project (NTIP) do not always match data collected locally. Since data transmission errors contribute to data mismatch, we sought to describe these errors.

METHODS: In September 2011, the National TB Controllers Association distributed an online survey about NTIP to all TB controllers and NTIP users, representing 50 state and 18 city or territorial TB programs. We described TB program characteristics and conducted stratified bivariate analysis to examine characteristics associated with reports of data transmission errors.

RESULTS: Of 406 invitees, 122 responded from 38 (76%) state and 10 (56%) city or territorial TB programs. Although only 7% of respondents reported that 100% of data in NTIP reports matched program data, an additional 46% stated that 60–80% of data matched. Programs that transmit TB data to CDC through a reporting system not developed by CDC had greater odds of experiencing data transmission errors than did programs using a CDC-developed system (prevalence odds ratio [POR]: 4.5; 95% CI: 1.4–17.6). When stratifying this association by program size, programs with <100 TB cases per year had a POR of 4.4 (95% CI: 0.7–50.0) and programs with >100 TB cases per year had a POR of 2.0 (95% CI: 0.3–15.9); however, this interaction was not significant (Breslow-Day $P=0.51$).

CONCLUSIONS: Programs using systems not developed by CDC can benefit from additional technical support to ensure accurate data transfer. Although there was no significant interaction between system type and TB program size, smaller programs might benefit more from technical assistance.

KEYWORDS: tuberculosis, program evaluation, medical informatics

10:55

Tuberculosis Contact Investigation in a Middle School — Kansas, 2010–2011

AUTHORS: Amy E. Peterson, K. Bisgard, J. Schwartz, T. Elliott, D.C. Hunt, P. Griffin

BACKGROUND: On December 22, 2010, a case of smear-positive tuberculosis (TB) in a 14-year-old student with cough, positive tuberculin skin test (TST), and cavitory lesion on chest radiograph, was reported to public health authorities; the student's TB symptom onset was <1 month after emigration from Peru. Among 46 reported TB cases in 2010 in Kansas, 26 (56%) were in foreign-born persons. Undiagnosed TB infection can lead to active TB disease and, possibly, death. We investigated the case and performed contact tracing to prevent additional cases.

METHODS: Because false-positive TST results might occur among foreign-born persons vaccinated with *Bacillus Calmette-Guérin* (BCG), all patient-contacts considered at risk for transmission (persons with daily contact) had TB infection assessed with an interferon-gamma release assay (IGRA) during baseline (January 14, 2011) and follow-up (March 8, 2011) testing; students' birth country was determined by send-home questionnaire.

RESULTS: All same-grade students and teachers were considered contacts. At baseline assessment, 31 (22%) of 142 same-grade students were foreign-born. Seven (4.9%) had IGRA-positive results; 5 were foreign-born with a diagnosis of treated latent TB infection, and 2 were U.S.-born with other risk factors (e.g., residence in an apartment building or area of county with previously confirmed TB cases) in addition to the recent re-exposure at school. During follow-up assessment, an additional 3 student contacts, all U.S.-born, had positive IGRA results consistent with recent infection. Five students newly identified with TB infection received and completed treatment.

CONCLUSIONS: TB transmission to 3 students was detected by IGRA. Because of prior BCG vaccination, IGRA use might have avoided false-positive TST results among foreign-born contacts; TB contact testing methods should be selected to fit the specific population.

KEYWORDS: schools, tuberculosis, contact tracing, *Mycobacterium tuberculosis*, tuberculin skin test

11:15

Tuberculosis Follow-Up Among Immigrant and Refugee Children Arriving in the United States with Latent Tuberculosis Infection — 2010

AUTHORS: Eboni M. Taylor, J. Painter, S. Shetty, D. Lee, D. Posey, Z. Wang, W. Zhou

BACKGROUND: In 2007, CDC began screening for tuberculosis (TB) among immigrant and refugee children aged 2–14 years entering the United States. Currently, children migrating from a country with an estimated TB incidence rate ≥ 20 per 100,000 population receive a tuberculin skin test (TST) or interferon gamma release assay (IGRA) overseas. Children with TB disease are treated before U.S. arrival; those with latent TB infection (LTBI) are recommended for evaluation after arrival. We estimated rates of TB evaluation and therapy.

METHODS: We used Electronic Disease Notification (EDN) data from immigrant children with medical conditions and all refugee children who arrived in the U.S. during 2010 and had overseas medical and domestic TB follow-up examinations. Children with a positive TST or IGRA but otherwise negative TB evaluation during their overseas immigrant visa application were classified as LTBI. Rates of LTBI therapy post-U.S. arrival were examined by age and visa status.

RESULTS: In 2010, 11,098 (32%) of 34,322 children documented in EDN had LTBI diagnosed overseas; 7699 (69%) were evaluated for TB domestically. Of those evaluated, 56% received TST only, 35% IGRA only, and 9% both; LTBI was confirmed in 62%. Approximately 90% of those confirmed to have LTBI were offered therapy. Adjusted for age, refugees were 2.4 times as likely (95% confidence interval: 1.1, 5.5) to be offered therapy as immigrants. LTBI therapy initiation and completion rates were 84% and 69%, respectively.

CONCLUSIONS: Approximately 1 in 3 children aged 2–14 years documented in EDN in 2010 had LTBI; thus, domestic LTBI treatment could effectively prevent reactivation in this population. All children who enter the U.S. with LTBI should be examined and barriers to treatment completion eliminated.

KEYWORDS: latent tuberculosis infection, immigrants, refugees, children

11:35

Tuberculosis Among Foreign-Born Temporary Residents — California, 2010–2011

AUTHORS: Jonathan J. Nunez, E. Murray, P. Barry, J. Flood, S. Kanowitz, J. Watt

BACKGROUND: Foreign-born persons account for approximately 75% of tuberculosis (TB) disease in California. Unlike legal permanent residents (LPRs) (persons entering the country with an immigrant visa), temporary residents (TRs) (persons entering the country with a student, family, or work visa) have no visa-related TB screening requirement. We compared new arrivers (those who developed TB ≤ 2 years after arrival [when disease risk is highest and screening most beneficial]) in California.

METHODS: We reviewed TB cases reported to the California Department of Public Health during January 1, 2010–October 1, 2011, for demographics, clinical characteristics, and sputum results. Analyses were limited to reported TB cases occurring in TRs or LPRs.

RESULTS: A total of 1,242 TB cases were reported among 154 TRs and 1,088 LPRs. More than 90% of both groups emigrated from countries with a high burden of TB disease. TRs consisted of 55 student, 55 family and 44 work visas. Among TB patients, forty-six (30%) TRs and 191 (18%) LPRs were new arrivers. Thirty-six TRs (78%) had pulmonary disease, of whom 19 (53%) were sputum smear positive for acid-fast *bacillus*. For LPRs 165 (86%) had pulmonary disease, of whom 47 (29%) were sputum smear positive for acid-fast *bacillus*.

CONCLUSION: Although a limited number of TB cases in California are among TRs, TRs were more likely to develop disease ≤ 2 years of arrival and a greater proportion of TRs were smear-positive (a known predictor of infectiousness). Additional data are needed to assess screening strategies for TRs, but our data indicate that more systemic screening before or after arrival might help reduce TB disease associated with TRs in California.

KEYWORDS: tuberculosis, diagnosis, emigrants and immigrants, family health

12:30

SPECIAL SESSION:

Progress in Prevention and Control of the U.S. Childhood Obesity Epidemic: Creating Environments that Support Healthier Choices

Dunwoody Suites

MODERATOR: Ursula E. Bauer

SPONSOR: NCCDPHP

Childhood obesity is a major public health concern, and this epidemic has affected every part of the U.S. Obesity now affects 17% of all children and adolescents in the U.S. — triple the rate from just one generation ago. To prevent and control obesity and other chronic diseases through healthful eating and physical activity, DNPAO has established principal target behaviors such as increasing breastfeeding, the consumption of fruits and vegetables, drinking water and other healthy beverages, and increasing physical activity. This special session will feature four speakers and provide an overview of environmental and systems change efforts in various settings where children and families spend the majority of their time.

This session is timely with the designation of obesity by CDC's director as a "Winnable Battle", targeted investments in funding for obesity prevention initiatives, and the Let's Move! Initiative. The medical care costs of obesity in the U.S. are staggering. In 2008 dollars, these costs totaled about \$147 billion. Because of the substantial economic and societal burdens related to obesity, obesity prevention and control efforts will have significant public health impact. There is no single or simple solution to the childhood obesity epidemic. States, communities, and parents can help make the healthy choice the easy choice for children, adolescents, and their families.

The presentations will describe 1) CDC's role in conducting a baseline assessment of the food environment in 47 national parks across the US, use of a mobile application of Epi-Info7 for data collection, study results and policy implications; 2) nutrition standards for increasing access to healthier beverages and foods in communities, child care facilities, and hospitals; 3) studies that examine the prevalence of youths who meet the 2008 Physical Activity Guidelines for Americans and environmental strategies within and outside of schools to promote youth physical

activity; and 4) the prevalence of U.S. hospitals implementing maternity care practices consistent with the Ten Steps to Successful Breastfeeding.

- The CDC — National Park Service Healthy Foods Evaluation: A First Step Toward Leveraging National Parks to Promote Healthy Foods. *Alyson Goodman*
- Protecting the Public: Healthy Beverages and Food Offerings in Communities, Child Care Facilities, and Hospitals. *Sohyun Park*
- *Ants in their Pants? Let's Hope So!* Environmental Approaches to Help Kids Get the Physical Activity They Need. *MinKyoung Song*
- Hospital Support for Breastfeeding — Preventing Obesity Begins in Hospitals. *Cria Perrine*

POSTER SESSION 2:

Meet the Authors of Posters 16–30

12:30–1:30 p.m.

Where the Wild Things Are

Ravinia Ballroom (E, F, and G)



WEDNESDAY

Poster 16

Integration of Household Water Treatment, Hand Washing Promotion, and Voluntary Counseling and Testing for HIV with Antenatal Services in Malawi

AUTHORS: Janell A. Routh, E. Chemey, A. Msoma, M. Ntambo, R. Mvula, A. Loharikar, M. Msukwa, A. Gunda, K. Sabot, E. Russo, R. Quick

BACKGROUND: Integrating public health interventions with antenatal clinic (ANC) visits can motivate women to attend ANC and improve maternal and neonatal health. In Malawi, 21% attend >4 ANC visits and 72% deliver in health facilities. In 2009, in an ANC program that included HIV testing, we implemented a program to provide free hygiene kits (safe water storage containers, *WaterGuard* water treatment solution, soap, and oral rehydration salts) to women accompanied by their spouse/partner, and refills of *WaterGuard* and soap during subsequent ANC visits and delivery.

METHODS: We surveyed women receiving ANC care at baseline and at follow-up 12 months later to assess household water treatment; test drinking water for residual chlorine; observe hand-washing; and determine ANC service utilization.

RESULTS: We enrolled 106 participants at baseline; 97 (92%) were found at follow-up. From baseline to follow-up, the percentage of women who had ever used *WaterGuard* (38% vs. 100%, $p<0.001$), knew how to use it correctly (23% vs. 81%, $p<0.001$), had a bottle in their home (3% vs. 77%, $p<0.001$), had residual chlorine in stored water (0 vs. 71%, $p<0.001$), and were able to demonstrate proper hand washing technique (21% vs. 65%, $p<0.001$) increased. At follow-up, 56% of respondents had >4 ANC visits, 90% delivered at a health facility, 99% were tested for HIV, 99% of partners were tested for HIV, and 98% had disclosed their status to their partner.

CONCLUSION: Women in this program showed significant increases in water treatment and hygiene practices, and high utilization of ANC and HIV testing services. Integration of hygiene kits, refills, and HIV testing during ANC is feasible, helps increase service use, and may help motivate changes in health behaviors.

KEYWORDS: diarrhea, water treatment, hygiene, antenatal care, integration, Malawi

Poster 17

Hospital Outbreak of Carbapenem-Resistant *Klebsiella pneumoniae* — Panama, 2011

AUTHORS: Raymund B. Dantes, N. Gupta, V. Stemplik, M. Guardo, J. Lombardo, H. Castillo, E. Landires, C. Urena, R. Mitre, M. de Paredes, R. Molino, R. López, D. Santana, M.G. Mallorca, N. Sosa, N. Bolaños, C. Gould, J. Perz, A. Guh

BACKGROUND: Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) is a globally emerging, multidrug-resistant bacterial pathogen that causes healthcare-associated infections with few therapeutic options. CRKP containment is difficult due to easy transmissibility of resistance genes among bacteria; the most common resistance mechanism is *K. pneumoniae* carbapenemase (KPC). Hospital A became aware of CRKP infections among patients in August 2010, with steep increase in May 2011. We investigated the first known CRKP outbreak in Panama.

METHODS: We reviewed hospital laboratory and clinical records. Cases were defined as CRKP isolates from Hospital A patients during January 2009–July 2011. Presence of the KPC gene was confirmed by polymerase chain reaction. We conducted a case-control study to assess predictors for KPC-confirmed CRKP; controls were patients with non-CRKP cultures collected the same date as cases. Infection prevention practices were also assessed.

RESULTS: We identified 108 cases; 17 (16%) occurred before August 2010, and 53 (49%) since May 2011. Of 83 cases tested, 69 (83%) were KPC-confirmed. Record review was completed for 43 KPC-confirmed case-patients identified during May–July, 2011. These case-patients were located throughout the hospital and had a median age of 64 years (range: <1–94 years); 38 (88%) had ≥1 indwelling device, 24 (56%) had prior intensive or step-down care, and 26 (60%) had died. Multivariable analyses did not identify significant predictors for KPC-confirmed CRKP. Hand hygiene and use of Contact Precautions were suboptimal facility-wide.

CONCLUSION: CRKP emerged in Panama earlier than previously recognized, culminating in a large hospital outbreak. High levels of device utilization in the context of inadequate infection control may have facilitated transmission. Adherence to infection control practices and improved surveillance for CRKP are needed to prevent continued transmission.

KEYWORDS: carbapenems/therapeutic use, case-control studies, drug resistance bacterial, *Klebsiella* infections/microbiology, *Klebsiella* infections/mortality, risk factors

Poster 18

Comparison of O157 and Non-O157 Shiga Toxin-Producing *Escherichia coli* — Los Angeles County, 2006–2011

AUTHORS: Christina A. Mikosz, L. Martinez, R. Reporter, L. Mascola

BACKGROUND: Shiga toxin-producing *Escherichia coli* (STEC) causes ~175,000 illnesses annually; severe illness is typically associated with STEC O157:H7, with 5%–10% of illnesses leading to hemolytic uremic syndrome (HUS), usually among children. However, non-O157 STEC is an increasingly-recognized cause of morbidity and mortality. We studied epidemiology of non-O157 and O157 STEC in Los Angeles County (LAC) to characterize differences.

METHODS: An STEC case was defined as either non-O157 stool identified through Shiga toxin enzyme immunoassay (EIA), or O157 STEC identified by stool culture. We reviewed LAC STEC passive surveillance data from January 2006, when a systematic database for non-O157 STEC was initiated, through June 2011. We compared non-O157 and O157 STEC characteristics by using chi-square analysis.

RESULTS: STEC cases totaled 217 in LAC; 128 (59%) were non-O157 and 89 (41%) were O157 STEC. Similar percentages by sex were noted for non-O157 and O157 (48% and 54% female, respectively), with median ages of 3 and 14 years, respectively. Non-O157 illness was less severe than O157 with respect to bloody diarrhea (30% versus 82%; $P < 0.01$), hospitalization (5% versus 36%; $P < 0.01$), and HUS (0% versus 7%; $P < 0.01$). Two patients died, 1 with non-O157 and 1 with O157 STEC. Non-O157 cases increased from 7 during 2006 to 51 during 2010.

CONCLUSIONS: Less severe illness among non-O157 STEC in LAC reflects trends observed nationally. Younger median age among non-O157 illnesses and substantial increase in non-O157 illnesses during 2010 reflects an increase in EIA Shiga toxin testing, particularly among children. Increasing awareness regarding non-O157 STEC illness burden and further assessment of changes in testing practices will shape prevention and response efforts.

KEYWORDS: Shiga toxin-producing *Escherichia coli*, hemolytic-uremic syndrome, population surveillance, infection

Poster 19

Autopsy and Unexplained Death Due to Possibly Infectious Causes in Infants — United States, 2006

AUTHORS: Christopher A. Taylor, R. Holman, L. Sinden, S. Zaki, D. Blau

BACKGROUND: A death in which pre-mortem signs and symptoms suggest an infectious cause but no definitive infection-related cause of death (COD) is reported on the death certificate can be classified as an unexplained death due to possibly infectious causes (UDPIC). One in eight infant deaths can be classified as UDPIC. Autopsies provide public health benefit by helping to identify infectious agents that are suspected but cannot be confirmed by pre-mortem testing. This study seeks to describe the relationship of various clinical and birth-related factors in infants with UDPIC who received an autopsy.

METHODS: Infant deaths meeting the criteria for UDPIC were selected from the 2006 US Linked Birth and Infant Death data set using International Classification of Disease, 10th Revision (ICD-10) codes. Infants with UDPIC who received autopsies were classified to a syndromic category based on ICD-10 COD codes listed on the death certificate. These categories, along with birthweight, were analyzed to obtain standard odds ratios (OR) with 95% confidence intervals [CI].

RESULTS: Infant UDPICs with possible respiratory infections were more likely to undergo autopsies (OR: 3.8; 95% CI: 2.8–5.1) as were infants with UDPIC with other possible infections (OR: 7.9; CI: 6.7–9.3). Autopsies were less likely if death was sepsis-related (OR: 0.09; CI: 0.07–0.10). Compared with infants with UDPIC having birthweight ≤ 2500 g, infant UDPICs with birthweight >2500 g had greater odds of receiving an autopsy (OR: 14.9; CI: 12.3–18.1).

CONCLUSIONS: Birthweight and presentation of symptoms might be characteristics that help to determine which infants with UDPIC receive autopsies. It is important to investigate these factors in order to more fully describe unexplained deaths related to possible infections in infants.

KEYWORDS: infant, mortality, communicable disease, autopsy, United States

Poster 20

Knowledge and Practices of Health Care Providers Regarding Early Lyme Disease — US, 2009

AUTHORS: Meghan E. Brett, A. Hinckley, E. Zielinski-Gutierrez, P. Mead

BACKGROUND: Lyme disease (LD) is the most common vector-borne disease in the United States with $>29,000$ cases reported in 2009. Prompt treatment of erythema migrans (EM), the hallmark of early LD, is necessary to prevent later complications such as arthritis. We assessed healthcare providers' knowledge and practices regarding LD treatment using data from a nationwide practitioner survey.

METHODS: We included five questions regarding LD in the 2009 DocStyles survey, a computer-administered questionnaire of 2,000 U.S. healthcare providers. We obtained information on demographics, practitioner type, and LD-related knowledge and practices. We defined endemic states as those with LD incidence $>5/100,000$ population, which collectively account for $>97\%$ of reported cases.

RESULTS: Respondents included family practitioners (30.5%), internists (19.6%), dermatologists (12.5%), nurse practitioners (12.5%), obstetricians/gynecologists (12.5%), and pediatricians (12.5%). Overall, 493 (73.1%) of 674 providers in endemic states and 443 (33.4%) of 1,326 providers in nonendemic states reported treating at least one patient for LD in the past year. Given a patient with likely EM, 70.6% of providers would prescribe antibiotics and order a blood test for LD, 18.7% would prescribe antibiotics without testing, 4.3% would order a blood test only, and 6.6% would not test or treat. Providers in endemic states were more likely to prescribe antibiotics (odds ratio [OR]=1.4, 95% confidence interval [CI] 1.0–1.9) and to treat without testing (OR=2.1, 95% CI 1.7–2.7).

CONCLUSIONS: In endemic states most providers treat early LD promptly, suggesting adequate knowledge. Providers in nonendemic states also treat patients for LD frequently, despite the low risk of infection. Further characterization of LD-related knowledge among providers in nonendemic states is needed to reduce misdiagnosis and overtreatment.

KEYWORDS: Lyme disease, clinical practice patterns

Poster 21

***Escherichia coli* O157 Family Cluster Associated with Orphan Calves — Wyoming, 2011**

AUTHORS: Kerry R. Pride, K. Weidenbach, T. Murphy, C. Van Houten, W. Manley

BACKGROUND: In the United States, an estimated 95,000 infections of Shiga toxin-producing *Escherichia coli* (STEC) O157 occur annually. Potentially life-threatening hemolytic-uremic syndrome (HUS) occurs in 5%–10% of cases. On September 12, 2011, the Wyoming Department of Health (WDH) received a report of HUS in a female aged 3 years. We investigated to determine the source of infection.

METHODS: On September 14th, we reviewed charts and interviewed the parents by using the WDH STEC questionnaire about their child's illness, foods eaten, animal contact, and illnesses among other close contacts. Stool samples collected on September 21 and 23 from the father, brother, and 3 orphan calves and ground beef samples were screened at the WDH Laboratory by enzyme immuno-assay (EIA); samples with positive EIA results were cultured, and pulse-field gel electrophoresis (PFGE) was performed on isolates.

RESULTS: The HUS patient, the brother aged 6 years, and her parents reside on a cattle and horse ranch. The HUS patient had consumed undercooked ground beef (from home-butchered cattle) during the 14 days before symptom onset and had bottle-fed 3 orphan calves daily. One week after the female's onset of hemorrhagic diarrhea, her father and brother experienced diarrhea; both recovered. *E. coli* O157 isolates from the brother and 1 calf had indistinguishable PFGE patterns; another calf had EIA-positive test results. Samples from the ground beef, the third calf, and the father tested negative by EIA.

CONCLUSIONS: Bottle-feeding the orphan calves might have been the source of the infection; cattle aged 3–18 months appear to shed the organism more often than adults. On-going education about thorough hygiene practices before, during, and after feeding livestock can reduce *E. coli* exposures.

KEYWORDS: hemolytic-uremic syndrome, Shiga-toxicogenic *Escherichia coli*, cattle, *Escherichia coli* O157

Poster 22

Clonal Cluster of *Burkholderia contaminans* Among Ventilated Patients in a Hospital Intensive Care Unit — Kansas, 2011

AUTHORS: Amy E. Peterson, A. Kallen, A. Chitnis, N. Xiang, J. Scaletta, R. Geist, E. Lawlor, J. DeMent, J. Noble-Wang, H. O'Connell, J. Schwartz, I. Garrison, D.C. Hunt

BACKGROUND: *Burkholderia contaminans* within the *Burkholderia cepacia* complex (BCC) often found in water, can cause infections among immunocompromised or critically ill patients. Health care-associated outbreaks have been linked to intrinsic and extrinsic contamination of medical products and to suboptimal infection prevention practices among health care personnel. Hospital A requested assistance on July 5 after an increase in BCC infections in an intensive care unit (ICU); we investigated the source of infections and provided recommendations to prevent additional cases.

METHODS: During November 2011, Hospital A patient microbiology and medical records were reviewed; cases were defined as colonization or infection with an isolate of a related BCC in a patient >48 hours postadmission. Infection prevention practices were observed and environmental swabs obtained from patient-care areas. Patient isolates were identified by conventional biochemical methods and typed by repetitive-element polymerase chain reaction.

RESULTS: During January 2009–October 2011, a total of 19 BCC cases were detected; 10/19 (53%) occurred during 2011 and were typed; 7/10 (70%) were from the surgical ICU (SICU). Among SICU cases, 4 were clonally related *B. contaminans* from respiratory sources among mechanically ventilated patients. Infection prevention observations detected a hand hygiene failure rate of 40% (73/184), improper cleaning and disinfection of shared equipment, and improper care of nebulizer cups. BCC was isolated from sinks in 2 (14%) patient rooms of 14 total environmental swabs.

CONCLUSIONS: Review of BCC isolates from Hospital A indicated an increase beginning January 2011 associated with a BCC clonal cluster in the SICU. Inadequate infection prevention practices might have led to environmental source contamination of patient supplies and subsequent colonization or patient infections. Targeted infection prevention activities could reduce transmission.

KEYWORDS: *Burkholderia cepacia* complex; infection control; ventilation, mechanical

Poster 23

Paralytic Shellfish Poisoning — Southeast Alaska, 2011

AUTHORS: Kimberly A. Porter, D. Fearey, L. Castrodale, D. Bensyl, T. Esposito, J. McLaughlin

BACKGROUND: Paralytic shellfish poisoning (PSP) is a potentially fatal neuroparalytic condition resulting from ingestion of saxitoxins accumulated in bivalve mollusks. On June 6, 2011, the Alaska Section of Epidemiology (SOE) was notified of a case of PSP in Southeast Alaska and informed that other community members had also recently experienced PSP symptoms after consuming noncommercially harvested shellfish. We launched an investigation.

METHODS: Investigators conducted active case finding, interviewed ill persons, posted warnings at local beaches, and collected clinical specimens and shellfish for testing. A probable case of PSP was defined as a compatible illness in a person after consumption of noncommercially harvested shellfish from Alaska during May–June 2011. A confirmed case met the probable case definition and had detectable saxitoxins in urine or had consumed shellfish with ≥ 80 μg saxitoxins/100 g of meat before illness onset.

RESULTS: Four suspected PSP patients were reported to SOE. Case finding identified 13 probable and 8 confirmed PSP cases in 2 neighboring communities. Of these 21 cases, 15 (71%) were associated with consumption of cockles, 4 (19%) with blue mussels, 1 (5%) with butter clams and cockles, and 1 (5%) with unspecified clams. Shellfish from both communities tested positive for high levels of saxitoxins, and urine from 2 ill persons was positive for saxitoxins. All 21 patients reported experiencing paresthesias. Four patients were hospitalized; none died.

CONCLUSIONS: Active case finding enabled epidemiologists to identify previously symptomatic persons who had not sought care and therefore were not reported. The burden of PSP in Alaska is likely substantially underestimated through lack of reporting. An inexpensive test providing rapid identification of saxitoxins can benefit persons who consume noncommercially harvested shellfish.

KEYWORDS: shellfish poisoning, saxitoxin

Poster 24

Vitamin B12 Deficiency in Bhutanese Refugees — Nepal, 2011

AUTHORS: Stacie E. Dunkle, O. Gorbacheva, A. Mishra, Y. Liu, J. Painter, M. Weinberg, N. Wongjindanon, W. Zhou

BACKGROUND: The United States is resettling a majority of the nearly 108,000 Bhutanese refugees living in camps in Nepal since the 1990s. A 30–60% prevalence of vitamin B12 deficiency has been reported in those already resettled. B12 deficiency can lead to megaloblastic anemia, peripheral neuropathy, and other neurologic conditions.

METHODS: To identify risk factors for B12 deficiency, we enrolled randomly selected Bhutanese refugees in Nepal aged ≥ 5 years during routine resettlement exams in April–May 2011. We collected blood specimens to evaluate B12 status and used a structured questionnaire about B12-rich food preferences, consumption frequency, and use of a fortified blended food (Unilito). We defined B12 deficiency as a serum concentration of < 203 pg/mL.

RESULTS: We enrolled 470 refugees aged 5–87 years (median 26 years); 48.3% were female. Participants had a median serum B12 concentration of 225 pg/mL (interquartile range: 163–329); 14 (15.1%) participants aged 5–14 years and 164 (47.4%) participants aged ≥ 15 years were deficient. In a binomial logistic regression model, dietary factors associated with B12 deficiency in those aged ≥ 15 years include: consuming meat < 1 time per week (adjusted relative risk [aRR]: 1.3; 95% confidence interval [CI]: 1.1, 1.6), eating a beef-free diet (aRR: 1.4; CI: 1.1, 1.9), and consuming Unilito > 7 times per week (aRR: 0.7; CI: 0.5, 0.9). An egg-free diet was associated with deficiency in participants aged 5–14 years (crude relative risk: 5.8; CI: 2.6, 13.1).

CONCLUSIONS: Low frequency of meat and egg consumption was associated with vitamin B12 deficiency in Bhutanese refugees while consuming Unilito was protective. We recommend increased access to B12-rich foods, vitamin supplementation and surveillance for B12 and other micronutrient deficiencies.

KEYWORDS: Vitamin B12 deficiency, refugees, Nepal, malnutrition, dietary supplements

Poster 25

Characteristics and Magnitude of Acute Pesticide-Related Illnesses Associated with Pyrethrin and Pyrethroid Exposures — 11 States, 2000–2008

AUTHORS: Naomi L. Hudson, E. Kasner, G. Calvert.

BACKGROUND: Excluding disinfectants, pyrethrins and pyrethroids are the pesticides used most commonly in and around homes. Studies associate pyrethrin/pyrethroid exposures with respiratory effects; however, the association between pyrethrin/pyrethroid exposure and asthma is debated. This study identifies characteristics of persons with acute pyrethrin/pyrethroid-related illness.

METHODS: Acute pesticide-related illness cases were obtained from the Sentinel Event Notification System for Occupational Risks-Pesticides Program and the California Department of Pesticide Regulation from 2000–2008. Case characteristics and incident rates were determined for these illnesses. Logistic regressions were performed to determine odds of respiratory symptoms in persons poisoned by pyrethrins/pyrethroids compared to persons poisoned by pesticides not considered asthmagens.

RESULTS: A total of 4,740 cases of acute pyrethrin/pyrethroid-related illness were identified. Incident rates increased over time and was 7.7 cases/million population in 2008. The majority of cases were low severity (81%) and 35% were work-related. Contributing factors to pyrethrin/pyrethroid-related illness included exposure from spills/splashes, improper storage, and failure to evacuate during application. Respiratory effects were the most common symptoms reported (47%). Ill persons exposed only to pyrethrins (adjusted Odds Ratio [aOR] 1.27; 95% confidence interval [95%CI]: 1.04-1.55), or only to pyrethroids (aOR 1.38; 95%CI: 1.25-1.53) or to a mixture containing both pyrethrins and pyrethroids (aOR 1.77; 95%CI: 1.37-2.30) were more likely to present with respiratory symptoms (e.g. cough, dyspnea, or asthma attack). Ill persons exposed to permethrin, a commonly used pyrethroid, were significantly more likely to present with asthma attack (aOR 2.32; 95%CI: 1.13-4.79).

CONCLUSIONS: The magnitude of acute pyrethrin/pyrethroid-related illnesses is relatively low, and the majority of illnesses are low severity. However, permethrin was associated with an increased asthma attack risk. Additional measures to prevent these illnesses are needed.

KEYWORDS: pesticides, pyrethrins, pyrethroids, respiratory system

Poster 26

Vaccine Effectiveness of Tetanus, Diphtheria, Acellular Pertussis Vaccine in a School-Based Pertussis Outbreak — Maine, 2011

AUTHORS: Andrew Terranella, V. Rea, S. Manning, S. Sears, A. Farmer, M. Griffith, S. Martin, T. Clark, B. Plikaytis, M. Patel

BACKGROUND: Maine experienced an increase in pertussis incidence from 12/100,000 in 2010 to 88/100,000 in 2011. Seventy-seven of 137 cases were associated with 6 school outbreaks in one county from August 15 to December 4, 2011. Despite 63% state-wide coverage with the recommended adolescent tetanus, diphtheria, acellular pertussis (Tdap) vaccine, 38 of 77 school-related cases were in Tdap-eligible adolescents aged 11-19 years.

METHODS: We conducted retrospective cohort studies in two outbreak schools with the highest attack rates (Schools A and B) to evaluate Tdap vaccine effectiveness. All students aged 11-19 years as of August 15, 2011 were enrolled. Cases were defined as cough illness with a positive pertussis polymerase chain reaction test from August 15 to November 26, 2011 in students at schools A and B. Students with provider-verified vaccination history and who were fully vaccinated with the childhood pertussis series were included in the analysis. Vaccine effectiveness was calculated as: $VE=1-(\text{Attack-rate}_{\text{vaccinated}} / \text{Attack-rate}_{\text{unvaccinated}}) \times 100\%$.

RESULTS: Of the 379 students enrolled, 326 were included in the analyses. Thirteen cases among the 120 students occurred at School A; Tdap coverage among eligible students was 65%. Attack rates were 5.1% and 21.4% in vaccinated and unvaccinated students, respectively. At School B, 13 cases occurred among 206 students; Tdap coverage was 39% among eligible students. Attack rates were 2.5% and 8.7% in vaccinated and unvaccinated students, respectively. Vaccine effectiveness was 76% for School A and 71% for School B.

CONCLUSIONS: Tdap was effective in preventing disease among vaccinated students; however, suboptimal coverage of 65% or less may have contributed to these outbreaks. Whether or not increased Tdap coverage can prevent school outbreaks remains to be determined.

KEYWORDS: pertussis, Tdap, vaccine effectiveness, adolescent immunization

Poster 27

Multistate Outbreak of *Salmonella* Bovismorbificans Infections Associated with Mediterranean-Style Restaurants — United States, 2011

AUTHORS: Tiana A. Garrett, D. Herdman, M. Blaylock, A. Gibson, S. Levine, H. Lee, L. Hausman, K. Blickenstaff, J. Davies-Cole

BACKGROUND: Human *Salmonella* Bovismorbificans (SB) infections are rare in the United States. During October 2011, the District of Columbia (DC) Department of Health identified 3 SB isolates with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns. We investigated to identify the outbreak source and prevent additional illnesses.

METHODS: Cases were defined as laboratory-confirmed infection in persons with the outbreak strain PFGE pattern, with illness onset during August–December 2011. PulseNet, a national subtyping network, identified cases. Patients were interviewed to collect information on food and restaurant exposures. Implicated restaurants were inspected, employees interviewed and tested, and food and environmental samples tested.

RESULTS: We identified 23 cases in 7 states and DC, with onsets during August 19–November 21, 2011. Median patient age was 27 (range: 20–87) years. No patients were hospitalized. Twenty patients reported eating at DC metropolitan area restaurants before illness onset. Commonly reported foods included: Mediterranean-style foods (16, including hummus [9]), chicken (11), lettuce (11), tomato (11), and cucumber (9). Restaurants A, B, or C, all DC Mediterranean-style restaurants, were reported by 9 patients from 3 states and DC. An environmental investigation revealed Restaurant A prepared foods for Restaurants B and C. No Restaurant A food preparers reported illness; Restaurant A's self-service food bar and refrigerator were inadequately cooled. Environmental, food, and employee stool samples were negative for *Salmonella*. Three hummus samples obtained from Restaurants A and B yielded the outbreak strain; individual hummus ingredients were negative for *Salmonella*.

CONCLUSION: Hummus was a likely vehicle for SB infections. This outbreak demonstrates the challenges of investigating ingredient-driven outbreaks, and the importance of proper food handling and storage in and transportation to restaurants.

KEYWORDS: *Salmonella*, disease outbreaks, food contamination, employee safety, food industry

Poster 28

Association of Asthma with Seasonal and Pandemic H1N1 Influenza Among Children with Medically Attended Respiratory Illness in a Wisconsin Population Cohort — 2007–2009

AUTHORS: Sarah K. Kemble, S. Irving, A. Bateman, B. Kieke, D. Shay, E. Belongia

BACKGROUND: Influenza has been associated with asthma among hospitalized children; less is known among pediatric outpatients. We examined this association in a primarily outpatient setting to inform prevention and treatment recommendations.

METHODS: We conducted a study among children aged 5–17 years in a defined community cohort seeking care for acute respiratory illness during the 2007–2008 and 2008–2009 influenza seasons and the 2009 H1N1 pandemic. Patients with respiratory illness, including fever or cough <8 days in duration, were prospectively recruited and tested for influenza by real-time reverse transcription polymerase chain reaction. Participants were classified as having confirmed, possible, or no asthma based upon previous diagnoses and prescription records. Associations between asthma and seasonal and pandemic influenza were determined using logistic regression, controlling for age and sex; influenza vaccination status was included for seasonal influenza only because pandemic vaccine was unavailable until after the pandemic wave.

RESULTS: We enrolled 3,416 children (females: 51%; median age: 9 years; asthma: 11%). Before the pandemic, 51/150 (34%) with confirmed asthma and 507/1,173 (43%) without asthma tested positive for influenza. However, 50% of those with asthma and 25% without asthma were vaccinated. No significant association between asthma and seasonal influenza existed after adjusting for covariates (adjusted odds ratio [aOR]: 0.74; 95% confidence interval [CI]: 0.52–1.07). During the 2009 H1N1 pandemic, 53/100 (53%) with confirmed asthma and 225/603 (37%) without asthma tested positive for influenza (aOR: 1.86; CI: 1.21–2.86).

CONCLUSION: Among children seeking care for respiratory illness, asthma was associated with influenza during the 2009 pandemic, but not the previous 2 seasons. Our findings suggest that children with asthma were disproportionately affected by the 2009 H1N1 virus.

KEYWORDS: influenza, human; respiratory tract infections; asthma; influenza A virus, H1N1 subtype

Poster 29

Injuries Following Historic Tornadoes — Alabama, April 2011

AUTHORS: Thomas Niederkrotenthaler, D. Sugerman, E. Parker, F. Ovale, J. Bell

BACKGROUND: On April 27, 2011 multiple devastating tornadoes struck Alabama resulting in 256 deaths. This study examines injured tornado victims treated in Alabama hospitals to characterize injuries and risk factors in order to better prepare for future tornadoes.

METHODS: The Alabama Department of Public Health and CDC performed a retrospective review of emergency department (ED) and inpatient records in 29 hospitals and conducted interviews with hospital staff. Cases were defined as tornado victims >17 years of age seen April 27–30, 2011 with an *International Classification of Diseases, 9th Revision* injury code of 800.0–959.9.

RESULTS: Of the 1,373 injured, the mean age was 47 years and a majority were male (n = 677, 51.2%) and white (n = 834, 70.5%). Most patients (n = 1,028, 74.9%) were discharged from the emergency department, with 325 (24.0%) admitted for ≥1 days. Among hospital admissions, 72 (22.2%) required intensive care unit admission and 5 (1.5%) patients died. The most frequent primary injury diagnosis was head injury (n = 407, 35.0%). Location at time of injury was recorded for 862 (62.8%) patients, and a substantial proportion occurred in high-risk locations (i.e., outdoors [n = 165, 19.1%] or in mobile homes [n = 98, 11.4%]). One minor injury occurred in an underground tornado shelter. Hospitals reported several post-disaster challenges, including loss of power and communication and security concerns due to sheltering community members.

CONCLUSIONS: Most injured tornado patients seen at local hospitals had minor injuries treated in the ED. To ensure preparedness for future tornadoes, hospitals should have disaster plans to alleviate ED surge. The public should be educated to seek underground shelter and protection from head injury.

KEYWORDS: tornadoes, emergency preparedness, head injuries, United States, Alabama

Poster 30

Let Us Raise the Salad Bar: Shiga Toxin-Producing *Escherichia coli* O157:H7 Infections Linked to Romaine Lettuce — Missouri, 2011

AUTHORS: Rachel B. Slayton, G. Turabelidze, S.D. Bennett, C. Schwensohn, A. Yaffee, F. Khan, C. Butler, E. Trees, T. Ayers, M. Davis, S. Gladbach, C. Barton Behravesh, I. Williams, L. Gieraltowski

BACKGROUND: Shiga toxin-producing *Escherichia coli* (STEC) O157:H7 is responsible for ~96,000 infections annually in the United States. Foodborne outbreaks linked to raw produce have become >18 times more common since 1970. During October and November 2011, we investigated a cluster of STEC O157:H7 infections. Hypothesis generation identified several case-patients who shopped at different locations of Grocery Store Chain A in Missouri. An Epi-Aid was requested to identify the source of infections and prevent additional illnesses.

METHODS: We defined a confirmed case as illness in a person with the outbreak strain during 10/07/2011–11/30/2011. A case-control study was conducted using geographically-matched controls. Environmental and traceback investigations were conducted.

RESULTS: We identified 60 cases in 10 states; 67% were hospitalized. We enrolled 22 cases and 82 controls in the case-control study. Grocery Store Chain A salad bar (86% of cases vs. 55% of controls, mOR = 25.9, 95% CI 5.8–263.2) and any romaine lettuce consumption (85% of cases vs. 46% of controls, matched Odds Ratio (mOR) = 12.73, 95% Confidence Interval (CI) 2.4–141.8) were significantly associated with illness. Traceback analysis determined that a single common lot of romaine lettuce harvested from Farm A was used to supply Grocery Store Chain A and a university campus linked to a case with the outbreak strain. Preliminary findings of investigations at Farm A did not identify the source of contamination.

CONCLUSIONS: This multistate outbreak of *E. coli* O157:H7 infections was linked with consumption of romaine lettuce from Farm A and highlights the importance of preventing raw produce contamination. Because lettuce is commonly eaten raw, prevention efforts should include interventions on the farm, during packing, and at food establishments.

KEYWORDS: foodborne diseases, disease outbreaks, *E. coli* O157:H7, lettuce

SESSION J:

Foodborne and Enterics

1:30–3:35 p.m.

Attack of the Killer Tomatoes!

Ravinia Ballroom

MODERATORS: Robert V. Tauxe and Aaron Fleischauer



WEDNESDAY

1:35

Rapid Investigation of a Multistate Outbreak of Listeriosis Associated with Farm A Cantaloupes Using the Listeria Initiative — United States, August–October 2011

AUTHORS: Katherine A. O'Connor, B. Silk, K. Jackson, A. Cronquist, J. McCollum, S. Cosgrove, A. Gelfius, T. Duvernoy, M. Freeman, T. Ghosh, M.I. Ibraheem, M. Imanishi, N.S. Jain, L. Joseph, S. Merriweather, C. Spires, P. Teitell, E. Trees, R. Vogt, G. Wright, K. Neil, C. Tarr, B. Mahon, R.V. Tauxe

BACKGROUND: Listeriosis has a long median incubation period and affects specific higher-risk populations, making outbreak investigations challenging. The Listeria Initiative (LI), an enhanced surveillance system that links routinely-collected epidemiologic data on food histories with molecular subtyping data, was started in 2004 to address these issues. On September 2, 2011, the Colorado Department of Public Health and Environment notified CDC of an apparent outbreak.

METHODS: We identified outbreak strains of *L. monocytogenes* and defined cases as illnesses with these strains isolated August 1–October 31. As case food histories were reported, we compared outbreak-associated cases to sporadic cases in patients ≥ 60 years old with specimens collected August, 2004–2010. Traceback and environmental investigations were initiated simultaneously.

RESULTS: On September 9, a case-case comparison of 11 outbreak-associated cases to 85 sporadic cases reported to the LI showed an association with cantaloupe (odds ratio=8.5; 95% confidence interval [CI]: 1.3, ∞). By September 14, this association strengthened (n=19 cases; OR=14.9; 95% CI: 2.4, ∞), and Farm A issued a voluntary recall of whole cantaloupes. Four outbreak strains of *L. monocytogenes* were identified. These strains were isolated from cantaloupe samples in patients' homes, grocery stores, and environmental samples from Farm A's processing facility. In total, 146 cases and 31 deaths in 28 states were reported. Most patients were ≥ 60 years old (86%) and 94% of patients reported eating cantaloupe.

CONCLUSIONS: Rapid interviewing and subtyping in the LI enabled a case-case analysis early in the investigation, which rapidly confirmed an association between the outbreak-associated cases and whole cantaloupe. This epidemiological evidence supported a voluntary recall of Farm A cantaloupes within 10 days of reporting to CDC, preventing additional cases and deaths.

KEYWORDS: listeriosis, foodborne diseases, infectious disease outbreaks, cantaloupe

1:55

BOTtoms Up! Botulism Associated with Illicit Alcoholic Prison Beverage — Utah, 2011

AUTHORS: Maroya S. Walters, D. Thurston, I. Risk, M. Hill, D. Vitek, L. Bogdanow, J. Robertson, A. Price, L. Smith, C. Campbell, J. Dykes, C. Luquez, P. Afra, K. Jackson, P. Sturdy, R. Rolfs, K. Leniek, M. Dimond, R. Boulton, J. Hall, A. Rao

BACKGROUND: Foodborne botulism is a potentially lethal neuroparalytic illness that affected approximately 18 Americans annually in the last decade. Pruno, an illicit, anaerobically brewed alcoholic beverage, has been associated with botulism among prisoners when made with potatoes. On October 2, 2011, a prisoner at Prison A developed symptoms compatible with botulism shortly after drinking pruno; additional cases were identified within several days. We conducted an investigation to determine the cause and extent of the outbreak.

METHODS: Cases were identified through interviews and medical evaluations assessing pruno consumption and symptoms of botulism. A case was defined as signs or symptoms of botulism in a Prison A prisoner with onset from October 2–October 4, 2011. Laboratory testing of clinical specimens and an environmental sample was performed for *Clostridium botulinum* and botulinum neurotoxin. Pruno production methods were investigated.

RESULTS: Thirteen prisoners reported drinking pruno. Eight cases were identified; these patients drank the same batch of pruno and were the only prisoners who reported drinking this batch (attack rate 100%). Symptoms included blurred vision (n=8), weakness (n=7), double vision (n=5), impaired gag reflex (n=4), and difficulty swallowing (n=3). Patients were hospitalized for an average of 7 days (range 2–23 days); 3 (38%) received mechanical ventilation. Botulinum toxin type A or Type A *C. botulinum* was detected in specimens from 5 patients. Fluid from a sock used to filter pruno consumed by the 8 patients contained *C. botulinum* Type A. The pruno consumed by patients was prepared with a baked potato.

CONCLUSIONS: Pruno made with potato was the vehicle for a botulism outbreak among prisoners. Limiting potato availability in prisons and educating prisoners about pruno-associated botulism may prevent future outbreaks.

KEYWORDS: botulism, botulinum toxin, *Clostridium botulinum*, pruno, prison

2:15

Can Seasonal Food Commodity Consumption Changes Explain Variations in Occurrence of Foodborne Disease Outbreaks? United States, 1998–2008

AUTHORS: Sarah D. Bennett, D. Cole, K. Swanson, A.L. Nisler, W. Gu, S.J. Chai

BACKGROUND: An estimated 9.4 million foodborne illnesses with a known pathogen occur annually in the United States. Understanding the epidemiology of foodborne illnesses is important for focusing prevention efforts. The number of foodborne outbreaks caused by specific pathogens as well as availability and consumption of foods vary throughout the year. We compared outbreak frequency with estimated consumption to evaluate the possible roles of food availability and consumption in the occurrence of foodborne outbreaks.

METHODS: We reviewed outbreaks reported to the Foodborne Disease Outbreak Surveillance System from 1998–2008 caused by bacterial pathogens and single food commodities. For each commodity, we examined monthly or quarterly per-capita consumption estimated by national USDA Economic Research Service (USDA-ERS) market availability data and the FoodNet sentinel site food consumption survey. For each commodity, outbreak frequency was compared with consumption measures using Spearman rank correlation coefficients (ρ).

RESULTS: Of 733 outbreaks reviewed, 518 (71%) were associated with five commodities: beef (160), poultry (146), pork (95), eggs (60), and dairy (57). For all commodities, frequency of outbreaks varied monthly. USDA-ERS data was positively correlated with quarterly frequency of outbreaks attributed to beef ($\rho = 1.00$) and negatively with pork ($\rho = -0.60$; p-value = 0.49). No correlations were found for dairy, eggs, and poultry outbreaks (all $|\rho| < 0.10$). Monthly FoodNet consumption was negatively correlated with outbreaks caused by eggs ($\rho = -0.52$; p-value = 0.08) and pork ($\rho = -0.60$; p-value = 0.04).

CONCLUSION: The frequency of outbreaks associated with beef might be explained by seasonal variation in consumption; however, the frequency of outbreaks associated with dairy, eggs and pork is more likely due to other factors, such as level of contamination.

KEYWORDS: disease outbreaks, foodborne illnesses, seasonal variation

2:35

Outbreak of *Salmonella enterica* Serotype Enteritidis Infections Associated with Pet Guinea Pigs — Multiple States, 2010

AUTHORS: Michael L. Bartholomew, R. Heffernan, J. Wright, S. Khan, R. Klos, T. Monson, J.P. Davis

BACKGROUND: Annually in the United States, *Salmonella* causes ~1 million infections and 400 deaths; infections can be acquired from nontraditional pocket pets. We investigated a *Salmonella* serotype enteritidis (SE) sternal osteomyelitis case in a previously-healthy, 7-year-old who cared for 2 recently-deceased guinea pigs (GPs). The patient's SE pulsed-field gel electrophoresis (PFGE) pattern matched a Michigan GP isolate; the investigation expanded to determine a source.

METHODS: A case was defined as SE PFGE XbaI pattern JEGX01.0021 (outbreak strain) infection during 2010 among persons reporting GP exposure. To locate outbreak strain isolates, PulseNet and USDA National Veterinary Service Laboratories (NVSL) databases were queried. Persons reporting GP exposure were re-interviewed. All SE patient and GP isolates underwent PFGE XbaI and BlnI testing and multilocus variable number tandem repeat analysis (MLVA). Traceback and environmental investigations were conducted.

RESULTS: We identified 10 case-patients from 8 states. Nine illness onsets occurred May–November 2010. One patient was hospitalized; none died. The median age was 9.5 years (range: 1–61). Among 10 patients, 2 purchased GPs from independent stores; 3 purchased from different national retail chain (Chain A) store locations; 3 were Chain A employees; and 2 reported GP exposures of unknown characterization. Four NVSL GP SE isolates matched the outbreak strain. All 14 isolates had PFGE BlnI pattern JEGA26.0002; MLVA revealed 3 related patterns. Tracebacks identified 4 distributors and 92 sources supplying Chain A, including 1 breeder potentially supplying GPs to case associated Chain A stores; all environmental samples tested negative for *Salmonella*.

CONCLUSIONS: A definitive GP source was not identified due to their complex distribution. Because GPs can harbor *Salmonella*, consumers and the pet industry should be educated regarding risks.

KEYWORDS: salmonellosis, zoonotic diseases, *Salmonella* enteritidis, guinea pigs

2:55

The Proof Is in the Poultry: Multistate Outbreak of Multidrug-Resistant *Salmonella* Heidelberg Infections Linked with Ground Turkey, 2011

AUTHORS: Janell A. Routh, J. Pringle, M. Mohr, E. Salehi, S. Bidol, K. Arends, M. Adams-Cameron, W.T. Hancock, B. Kissler, R. Rickert, J. Folster, B. McGlinchey, S. Bosch, C. Barton Behravesh, I. Williams, L. Gieraltowski

BACKGROUND: *Salmonella* causes ~1 million infections and 400 deaths annually in the United States. Multi-drug resistant (MDR) *Salmonella* infections increase the risk of hospitalization and antibiotic treatment failure. On May 23, 2011, CDC PulseNet reported a multistate cluster of *Salmonella* Heidelberg infections and two MDR ground turkey isolates collected by the National Antimicrobial Resistance Monitoring System (NARMS) with an indistinguishable genetic fingerprint. An investigation was initiated to identify the source of infections and prevent additional illnesses.

METHODS: We defined a case as a person infected with the outbreak strain of *Salmonella* Heidelberg with illness onset between 02/27/2011–11/10/2011. Investigators collected hypothesis generating questionnaires and shopper card information to identify foods and brands purchased by case-patients. Food samples from patient homes' and retail outlets were collected and cultured for *Salmonella*; The USDA Food Safety and Inspection Service (FSIS) conducted a traceback investigation.

RESULTS: Between 2/27/2011–11/10/2011, 136 confirmed cases of *Salmonella* Heidelberg infections were identified in 34 states. Of 54 ill persons interviewed, 28 (52%) reported ground turkey consumption, compared to a survey of the general population in which 11% reported consuming ground turkey. Antibiotic resistance profiles of patient and NARMS retail samples matched an identical MDR pattern. Shopper card information identified Company A as the source of ground turkey. On August 3, Company A issued a recall of ~36 million pounds of ground turkey because of possible MDR *Salmonella* contamination, making this the largest USDA-FSIS Class I recall in U.S. history.

CONCLUSIONS: Epidemiological and laboratory evidence, together with shopper card and traceback information, identified contaminated ground turkey as the source. This outbreak highlights the importance of aggressive surveillance for MDR *Salmonella* in the food supply.

KEYWORDS: food poisoning, *Salmonella*, antibiotic resistance, disease outbreaks

3:15

Norovirus Outbreak at a Rehearsal Dinner — Connecticut, 2011

AUTHORS: Timothy S. Styles, Q. Phan, J. Brockmeyer, K. Soto, C. Applewhite, D. Barden, J Vinjé, M. Cartter

BACKGROUND: In the United States, norovirus causes >50% of foodborne disease outbreaks with a known etiology and is the most common cause of epidemic and sporadic acute gastroenteritis. During August 2011, a gastroenteritis outbreak occurred among attendees of a rehearsal dinner at a Connecticut restaurant. We investigated to determine outbreak extent, source, and risk factors.

METHODS: Through a retrospective cohort study, attendees were interviewed by standardized questionnaire regarding illness and food consumption. Case were defined as diarrhea (≥ 2 loose stools/24 hours) or vomiting among attendees ≤ 72 hours after the event. Restaurant practices and illness among foodservice workers (FSWs) were assessed. Stool samples from all 15 FSWs and 5 dinner attendees were tested for enteric pathogens by culture and polymerase chain reaction. Norovirus-positive samples were subtyped by sequencing.

RESULTS: Twenty of 27 attendees were interviewed; of these, 9 (45%) met the case definition. Median incubation period was 35 hours (range: 15–52); median illness duration was 48 hours (range: 24–96). Four secondary cases (onset >72 hours) were reported among attendees' household contacts. None of 17 buffet items was associated with illness. Restaurant evaluation indicated no major violations; no FSWs reported illness. Re-interview of attendees revealed that a toddler with active diarrhea had attended the dinner; her father was the first ill attendee. All FSWs tested negative for enteric pathogens. The toddler, her father, and 2 secondary cases all had identical norovirus sequences typed as GII.4 New Orleans.

CONCLUSION: Although contaminated food was initially suspected, person-to-person transmission from an ill toddler at the dinner likely caused this norovirus outbreak. Persons with active diarrhea should not attend functions where food is served and shared among guests.

KEYWORDS: disease outbreaks, norovirus, gastroenteritis, foodborne diseases

SESSION K:

Alexander D. Langmuir Memorial Lecture and Reception

4:00–5:00 p.m.



Award Presentation

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

The Godfather

Ravinia Ballroom

MODERATOR: Stephen B. Thacker

SPEAKER: Robert Blum, MD, MPH, PhD

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

Dr. Robert Blum is the William H. Gates, Senior Professor and Chair of the Department of Population, Family and Reproductive Health, Johns Hopkins Bloomberg School of Public Health. He has edited two books, and has written nearly 250 journal articles, book chapters and special reports.

In July 2007, Dr. Blum was named the Director of the Johns Hopkins Urban Health Institute. He is a Past-President of the Society for Adolescent Medicine; has served on the American Board of Pediatrics; was a charter member of the Sub-Board of Adolescent Medicine is a past chair of the Alan Guttmacher Institute Board of Directors and served as chair of the National Academy of Sciences Committee on Adolescent Health and Development. In 2006, The National Academy of Sciences' Institute of Medicine elected Dr. Blum into membership. He is a consultant to The World Bank and UNICEF as well as the World Health Organization where he has served on the Technical Advisory Group of the Child and Adolescent Health Department as well as the Scientific and Technical Advisory Group of the Human Reproductive Program. He has been awarded the Society for Adolescent Medicine's Outstanding Achievement Award (1993); and in 1998 was the recipient of the American Public Health Association's Herbert Needleman Award "for scientific achievement and courageous advocacy" on behalf of children and youth.

SESSION L:

International Night

Lost in Translation

Dunwoody Suites

INTERNATIONAL NIGHT

POSTER SESSION: 6:00–7:30 p.m.



WEDNESDAY

International Poster 1

An Outbreak of *Salmonella* Serotype Dublin Infections Associated with Eating Egg Sandwiches from a Supermarket — Zhejiang Province, China, 2011

AUTHORS: Qin Liu, X.X. Qing, H.L. Ming, C. Jian, H. Fan, C. Jiang, J.F. Lin, H.L. Ma

BACKGROUND: *Salmonella* infection is estimated to cause 10% of bacterial gastroenteritis outbreaks in China. In October 2011, a gastroenteritis outbreak occurred in school M in Zhejiang Province. We conducted an investigation to identify the risk factors and source of contamination.

METHODS: We defined a case as acute onset from October 16–20, of diarrhea (at least 3 times/24hr) in a student or teacher of the school. We isolated and/or identified enteric bacteria and norovirus from rectal swabs. We used PFGE to evaluate homology of isolates. We compared food exposure among 91 case-students to 184 healthy control-students randomly selected from the same classrooms as case-student. We checked preparation of the implicated foods.

RESULTS: We found 91 student-cases (attack rate: 3.7%) and one teacher-case. We isolated *Salmonella* Dublin from 10 of 15 rectal swabs and all 10 isolates had the same PFGE pattern. 96% (87) of case-student and 48% (88) of control-students ate food from a supermarket (odds ratio [OR] =24, 95% confidence interval [CI]: 8.3-92). Among the students who ate supermarket food, 93% case-students and 31% of control-students ate egg sandwich (ES) (OR=31, 95% CI: 11-89). Of those who ate ES 88% of 81 case-students ate ES produced on October 18 compared with 41% of 27 control-students (OR=50, 95% CI=18-140). To make ES, 336 raw eggs were mixed together before cooking. Temperature and time of cooking and leftover ES were not available.

CONCLUSIONS: This outbreak was likely caused by ES contaminated by a single strain of S Dublin. Good food handling practices need to be reviewed for this establishment.

KEYWORDS: *Salmonella* Dublin, egg sandwiches, norovirus

International Poster 2

Foodborne Outbreak Among Inmates in Six Prison Facilities — Eastern El Salvador, June 2010

AUTHORS: Rhossy Hassell Espinoza, M. Abarca

BACKGROUND: On June 18, 2010, authorities of six prison facilities in eastern El Salvador sharing a food supplier reported frequent gastrointestinal complaints among 5,817 inmates. The supplier provided the same menu to all facilities in the region. We sought to document the outbreak, identify its cause to develop control measures.

METHODS: We conducted a 1:1 case-control study, collecting demographic, symptomatic and food consumption data through a survey. Cases were inmates reporting abdominal pain or diarrhea on June 17. Facility-matched controls were inmates without gastrointestinal symptoms. Clinical and food samples were cultured. Matched-odds ratios (OR) and 95% confidence intervals (95%CI) were calculated using Epi-info 3.5.2. Food-handling practices at the supplier's were observed.

RESULT: We documented 2,737 cases in six prisons, for a 47% global attack rate (range: 26-93%). Higher rates occurred in facilities farthest from the supplier. Of 612 cases surveyed, abdominal pain occurred in 97%, diarrhea in 96%, nausea and vomiting in 34%. Symptoms began within 12 hours of lunch on June 17, and resolved within 36 hours. 15% of cases required intravenous rehydration. The outbreak lasted 10 hours. Consuming chicken (OR:9.34; 95%CI:3.54-27.13), rice (OR:2.31; 95%CI:1.43-3.73), drink (OR:1.8; 95%CI:1.42-2.31), or tortillas (OR:1.61; 95%CI:1.27-2.03) was associated with illness. 25 rectal swabs yielded *Echerichia coli*; food samples from four facilities, fecal coliforms. The supplier's sanitary practices were poor. No further illness was reported after changing supplier.

CONCLUSIONS: We confirmed a food-borne outbreak associated with a lunch provided by a common supplier in six prisons, likely due to poor food-handling practices. Association between distance from the supplier to the facilities and attack rate suggested a dose-response effect to contaminated food. Trainings in best food-handling practices were recommended.

KEYWORDS: El Salvador, prisoners, *Echerichia coli*, food supplier

International Poster 3

Rabies in Georgia, 2011 (Georgia, Gardabani Region, Village of Nazarlo) August 2011 — December 14

AUTHORS: Marina Nikolaishvili, T.S. Tushishvili, K. Sidamonidze

BACKGROUND: About five Georgians (from 4.5 million population), have died annually from rabies since 2005; similarly, 102 animals had laboratory-confirmed rabies. In August 2011, Georgia National Center for Disease Control (NCDC) and Ministry of Agriculture Laboratory (LMA) learned of human death due to rabies in the village of Nazarlo, Gardabani Region. We investigated to determine the extent of the outbreak and implement control measures.

METHODS: We visited households within 3km radius of residence of human rabies death. We collected data on demographics, animal bites, post-exposure rabies vaccination; NCDC and LMA provided laboratory results for rabies.

RESULTS: A 52 year-old man was bitten by stray dog on September 7, 2011; he was unvaccinated; became symptomatic on December 8; he died six days later; PCR confirmed rabies. We interviewed an adult in 149 nearby households (799 persons). Six additional persons were bitten by dogs (3 strays; 3 domestics) since August. The same dog bit the decedent and wife on one day. She received first dose of rabies vaccine as recommended, but stopped due to vaccination cost; she completed vaccination after her husband's diagnosis. Two more persons were bitten and completed vaccination; three others were bitten and unvaccinated. During August to December, two dogs died; bioassay confirmed rabies. We vaccinated 114 domestic animals against rabies.

CONCLUSION: Four bite-victims were not vaccinated due to cost. Following a correctly started post-rabies vaccination series, delayed completion probably prevented one human death. Diagnosis by bioassay requires 21 days, limiting its value to determine timely control measures. Persons at risk of rabies may refuse vaccination due to cost. We recommend education about the importance of rabies vaccination and development of dog vaccination programs.

KEYWORDS: rabies, vaccination, bioassay, health education, Georgia

International Poster 4

Risk Factors for Colonization with Livestock-Associated Methicillin-Resistant *Staphylococcus aureus*, Germany 2011

AUTHORS: Michaela Diercke, D. Rocker, R. Köck, M. Pulz

BACKGROUND: Northwestern Germany has intensive livestock farming. Screening studies in pigs reported high prevalences of methicillin-resistant *Staphylococcus aureus* (MRSA) of a special lineage (spa types t011, t034, t108). We screened for MRSA in hospitals to estimate MRSA prevalence, characterize spa types and identify risk factors.

METHODS: During 23rd-27th May 2011, we interviewed all patients admitted to acute-care hospitals in 13 districts using a standardized questionnaire on risk factors for MRSA colonization, including exposure to livestock farming. We tested nasopharyngeal swabs and determined spa types. We defined livestock-associated(LA)-MRSA as spa type t011, t034 and t108. We examined the association between pig stock and LA-MRSA prevalence at district level using binomial regression. At individual level, we assessed risk factors in multivariable analysis and calculated Odds Ratios (OR).

RESULTS: In 33 hospitals, 4,939 (85%) patients participated (median age: 60 years, 53% female). MRSA prevalence was 2.6% (Range among districts 0.9-5.2%), of which 21.3% were LA-MRSA (Range 0-50%). Number of pigs per resident was positively associated with prevalence ($p=0.003$) of LA-MRSA per district. Persons working in agriculture (OR=13, 95% confidence interval (95% CI) 4.9-36), in contact with livestock (OR=7.6, 95% CI 3.0-20) or with recent antibiotic use (OR=2.7, 95% CI 1.2-6.0) were at higher risk for LA-MRSA. Non LA-MRSA was associated with catheters (OR=3.3, 95% CI 2.0-5.5) and chronic wounds (OR=3.8, 95% CI 2.0-7.0). History of MRSA infection was associated with both LA-MRSA (OR=5.5, 95% CI 1.5-21) and non LA-MRSA (OR=9.3, 95% CI 5.3-16).

CONCLUSIONS: Districts with intensive livestock farming may have a higher LA-MRSA prevalence suggesting an introduction of LA-MRSA into hospitals. A regular screening of livestock farmers on admission to hospitals should be considered.

KEYWORDS: MRSA, livestock farmers, pig stocks, LA-MRSA

International Poster 5

Risk Factors for Severe Pneumonia Among Children Aged 2–59 Months in Western Kenya 2011

AUTHORS: Dickens O Onyango, A. Abade, S. Amwayi, J. Omolo

BACKGROUND: Globally, pneumonia is the leading cause of death in children <5 years. In Kenya, it is the second leading cause of morbidity and mortality, accounting for >30,000 deaths among children < 5 years annually. We conducted this study to identify risk factors for severe pneumonia in children under the age of five years.

METHODS: We conducted a hospital based case control study. Cases were children aged 2-59 months with severe pneumonia and controls were those with non-severe pneumonia according to the Integrated Management of Childhood Illnesses (IMCI) classification. We administered structured questionnaires to mothers of cases and controls to obtain data on socio-demographic characteristics, nutritional status and potential environmental risk factors. Data was analyzed using Epi Info, significance level was 0.05.

RESULTS: We recruited 103 cases and 103 controls. The median age of cases was 14.0 (Range 3-58) months and controls 14.0 (Range 2-54) months. Those who used herbal medication at home (OR=3.41; 95% CI 1.45-8.05), were hospitalized with diarrhea in the last 6 months (OR=2.18; 95% CI 1.01-4.66), had a co-morbidity (OR=3.10; 95% CI 1.24-7.74), or had had contact with a relative with upper respiratory tract infection (OR=2.82; 95% CI 1.27-6.26) and sought medical treatment after more than three days of illness (OR=2.86; 95% CI 1.62-5.06) were more likely to have severe pneumonia. Those who received antibiotics at home (OR=0.45; 95% CI 0.24-0.90) were less likely to have severe pneumonia.

CONCLUSIONS: Comorbidities and delays in seeking appropriate treatment are the main risk factors for severe pneumonia. We recommend more health education regarding appropriate health seeking and greater interventions at the community level by engaging community health workers in pneumonia prevention, control and treatment.

KEYWORDS: pneumonia, children, antibiotics, health education

International Poster 6

Measles Outbreak and Vaccination Coverage — Kakuma Refugee Camp, Kenya, 2011

AUTHORS: Joyce N. Wamicwe, E. Mbaisi, I. Njeru, S. Amwayi, A. Abade, J. Oundo, J. Omolo

BACKGROUND: Measles, a highly infectious vaccine preventable disease, is widespread and severe among displaced populations due to overcrowding. In January 2011, three patients at the Kakuma refugee camp were reported to have laboratory confirmed measles. We investigated the outbreak to characterize it. We also determined measles vaccination coverage and factors associated with non-vaccination in children aged 12 to 24 months.

METHODS: A suspected case of measles was any person presenting with fever and maculopapular rash and a cough, coryza or conjunctivitis while a confirmed case was IgM positive for measles. We conducted active case searches and collected serum samples from suspected patients. A cluster survey (30 by 7) was used to assess measles vaccination coverage among children aged 12 to 23 months. We interviewed parents or caregivers to collect data on vaccination history and selected socio-demographic characteristics.

RESULTS: We identified 41 patients suspected to have measles. Fifteen of these were laboratory confirmed. Ten (67%) of the confirmed case-patients were aged > 5 years and eight (53%) were unvaccinated. The index patient had a history of travel to Eastleigh, Nairobi where a measles outbreak had earlier been reported. Vaccination coverage among children aged 12 to 23 months was 87%. Only 23% of the vaccinated children had received > one dose of measles vaccine. Children of single mothers (OR=3.0, 95% CI =1.1 -8.0) and those born outside a health facility (OR=4.2, 95% CI =1.7-10.8) were more likely to be unvaccinated.

CONCLUSIONS: We confirmed measles outbreak at Kakuma refugee camp. Primary vaccine failure may have increased susceptibility. We recommended providing a second opportunity for measles vaccination and lowering vaccination age to 6 months.

KEYWORDS: measles, vaccination, outbreak

International Poster 7

Risk Factors for Human Brucellosis in an Urban Setting — Bishkek, Kyrgyz Republic, 2011

AUTHORS: Kalysbubu Nogoibaeva

BACKGROUND: Human brucellosis is a serious disease that can result in disabling complications. Between 2006 and 2010, the annual number of reported cases in Bishkek in Kyrgyzstan increased from 57 to 188 (rate 21/100,000). We conducted a prospective population-based case-control study to identify risk factors for brucellosis.

METHODS: Case-patients were city residents age (10) years who were acutely ill in 2011 with positive Wright and Huddleson tests. Case-patients (n=118) were identified through surveillance. Density sampling was used to select controls (n=145) from population lists of those aged 10 years; controls had no history of brucellosis. Exposures to animals or animal products within a month of case diagnosis and control selection and disease knowledge were ascertained using a structured questionnaire. Assuming no relation between the study exposures and the controls' sampling time, we used logistic regression to study disease-exposure associations.

RESULTS: Of the 118 case-patients, 70 (59%) had home-made dairy products from street vendors and 47 (40%) from bazaars, 69 (58%) had goat meat, only 13 (11%) had direct exposure to farm animals, and 9 (8%) knew possible brucellosis sources. In multivariate analysis, risk factors for brucellosis were: having goat meat (OR=12.7, 95% CI 3.7-43.3), and home-made dairy products from vendors (OR=7.1, 95% CI 2.5-20.1) or bazaars (OR=3.9, 95% CI 1.7-9.1). Subjects' knowledge of infection sources was protective (OR=0.3, 95% CI 0.14-0.63).

CONCLUSIONS: Goat meat and home-made dairy products are likely sources of human brucellosis, a possible indication that brucellosis is spreading among farm animals and that dairy products are insufficiently pasteurized. Adequate veterinary services; health education to thoroughly cook meat; and avoidance of buying home-made dairy products, will lessen the incidence of brucellosis in Bishkek.

KEYWORDS: dairy, brucellosis, Kyrgyzstan, goat meat

International Poster 8

Epidemiological and Microbiological Investigation of Cholera Outbreak in a Marsh Slum Area of Lagos, South Western Nigeria, 2011.

AUTHORS: A. Aman-Oloniyo, O. Fawole, P. Nguku, S. Idris, O. Biya, J. Idris, F. Olugbile, F. Taiwo, O. Bakare, A. Odor, G. Balogun, A. Oduneye, D. Modupe, A. Mbata

BACKGROUND: Cholera epidemics are common in Nigeria and cause high morbidity and mortality. In March, 2011, we investigated an outbreak of suspected cholera in Ajegunle — a marsh slum in Lagos State, Nigeria, to confirm the outbreak and institute control measures.

METHODS: A retrospective review of hospital records of suspected case patients was conducted and hospital patients identified. A suspected case was defined as any person residing in Ajegunle with at least one episode of severe diarrhea between January 1 and April 30, 2011. Food and water samples were collected from different sources in the community (11 tap water, 2 water vendors, 5 well water and 5 food vendor samples). Rectal swabs were collected from three hospital patients. Data was analyzed using Epi-Info.

RESULTS: Forty-one suspected cases were identified: with 1:1 male: female ratio. Ages ranged from 7 months–57 years (median- 12 years). The overall attack rate was 51/100,000 with one death (case fatality rate=2.5%). The attack rate was highest among persons 1 to 4 years. (56/100,000) and lowest among < 1 year age group (20/100,000) (difference not significant; $p=0.485$). Three rectal swabs were positive for *Vibrio cholera* 01(Ogawa). All (100%) well water samples were positive for *Vibrio cholera*, none (0%) of the tap water samples were positive, and one of the two samples (50%) from water vendors yielded *Vibrio cholera*. Three (60%) of the food samples also yielded *Vibrio cholera*.

CONCLUSION: *Vibrio cholera* was found in multiple sources of food and water throughout the community; well water and food sold by vendors were likely sources. Provisions of potable water halted the outbreak. Chlorination of wells and Health Education for food vendor is advocated to prevent future outbreaks.

KEYWORDS: cholera, outbreak, water, food vendors, urban slum

International Poster 9

An Outbreak of Shigellosis Linked to Imported Basil: The Importance of Standardized Genotyping Tools and Traceability Systems, Norway, October 2011

AUTHORS: B. Guzman-Herrador, E. Nilsen, L. Jensvoll, J.M. Kvamme, A. Lindegård Aanstad, B. Lindstedt, K. Nygård, G. Severinsen, A. Wester, M. Wiklund, L. Vold

BACKGROUND: On 9 October 2011, the Norwegian Institute of Public Health was alerted about an increase in *Shigella sonnei* infections in Troms, northern Norway with identical Multiple-Locus Variable number tandem repeat Analysis (MLVA) profile previously unknown in Norway. Most cases had consumed food provided by one local delicatessen. On 14 October, *S. Sonnei* cases with identical MLVA-profile to those in Troms were reported from Østfold, southern-east Norway. We aimed at identifying the source of the outbreak to prevent further cases.

METHODS: We concurrently performed active case finding of all laboratory confirmed *S. sonnei* infections with the identified MLVA-profile from 1st October in Norway and a cohort study among 50 attendees of a banquet in Troms where food from the delicatessen was served. Trace back investigations of suspected food items were conducted.

RESULTS: Overall, 46 cases were confirmed. Ten of 50 participants in the banquet had symptoms compatible with shigellosis; three of them were laboratory confirmed. Those who ate basil pesto sauce were 2.8 (95%CI 1.3-5.8) times more likely to become a case than those who did not. Patients in Troms and Østfold had consumed basil delivered by the same supplier. The basil, imported from Israel, was withdrawn from the Norwegian market. No further cases were reported. No cases with the outbreak MLVA-profile were reported from other European countries.

CONCLUSIONS: Routine MLVA-typing of all *Shigella* isolates in Norway was paramount to link geographically disparate cases, highlighting the importance of standardized genotyping methods. The rapidly launched epidemiological investigation allowed us to identify the implicated product with wider distribution. The effective trace back investigation helped stopping the outbreak in Norway and led to a European Rapid alert message to prevent further cases.

KEYWORDS: shigellosis, outbreak, genotyping, traceability

International Poster 10

Investigation of a Measles Outbreak and Appraisal of Measles Elimination Indicators — Qasseem Region, Saudi Arabia, 2011

AUTHORS: Ibraheem Mohammed Ali Al-Nahellah, S.H.S. Al-Busaidi, F.M.A. Mashragi, A.J. Choudhry, M.N. Abdalla

BACKGROUND: The Saudi Arabia Measles Elimination Program (MEP) is committed to success by the end of 2015. In early 2011, a Measles outbreak was reported from the Buraidah sector of Qasseem region. An FETP team investigated the outbreak to identify risk factors and make recommendations to improve the MEP.

METHODS: After a descriptive analysis of the outbreak, a case-control study was conducted with a case-to-control ratio of 1:2, matching for age-group, gender and place of residence. The team re-viewed records of MEP performance indicators for the year 2010 and the first half of 2011.

RESULTS: From 1st January to 20th May 2011, of 69 confirmed Measles cases in the region, 40(58%) were reported in the Buraidah sector (13/100,000 population). Sixty percent of the confirmed Buraidah cases were females and 40% were older than 18 years. The index and 13(33%) of cases were among a small nomadic group. One case and 55 (75%) controls had received at least one dose of measles vaccine (OR 0.01; 95% CI 0.00 - 0.07), with a vaccine efficacy of 99.1%. Disease was associated with a history of contact with a known Measles case (OR 3.23; 95% CI 1.26 - 8.38). Targets for most MEP outbreak investigation performance indicators were achieved, except timing of serology sampling (16%) and timing of availability of laboratory results (11%). MEP surveillance targets were achieved, except suspected cases discarded after laboratory testing (42%) and timeliness of weekly reporting (75%). MEP outcome targets were achieved, except Measles vaccination at 9 months (91%) and MMR at 12 months (83%).

CONCLUSIONS: MEP performance needed strengthening, especially among underserved nomads. A national house-to-house, school-based and mobile-unit MMR vaccination campaign was implemented, including vaccinations of nomads.

KEYWORDS: measles, elimination indicators, nomads, MEP

International Poster 11

Cluster of Measles Cases Among Malnourished Maasai Children, Monduli District, Arusha, Tanzania, 2011

AUTHORS: Remidius Kakulu, R. Andrew, M. Mohamed, J. Mghamba, A. Simba, Z. Ngware, S. Sembuche, P. Mmbuji

BACKGROUND: On 12 August 2011, the Tanzania Ministry of Health and Social Welfare received a report of a cluster of suspected measles patients from Monduli district. A total of 104 measles cases with 5 deaths (CFR=4.8%) were reported. Case patients presented with fever, body rashes, diarrhoea and cough. An investigation was initiated on 18 August 2011 to confirm the outbreak, determine risk factors, and plan control measures.

METHODS: We conducted case-control study of suspected measles cases. A suspected measles case was defined as any child residing in Monduli presenting with fever and maculopapular rash and cough or conjunctivitis or coryza between 1 June and 1 July 2011. Neighbourhood controls were selected. We used growth cards to assess the nutrition status of children. Seven blood samples from selected cases were collected for laboratory confirmation.

RESULTS: We interviewed 83 patients and 125 controls. Seven blood samples were positive for measles specific IgM antigen. The mean age of cases was 4.5 years (SD of 4.89). Male and female children were equally affected, 47.3% and 52.7% respectively. Being vaccinated with one dose verified on vaccination card and knowledge of how measles is being prevented were found to be protective (OR=0.26, 95% CI [0.14-0.47] and OR=0.35, 95% CI [0.167-0.733] respectively). Contact with measles patients and being malnourished were risk factors. (OR=12.7, 95% CI [5.63-28.7] and OR=13.9, 95% CI [6.9-27.97] respectively).

CONCLUSION: A measles outbreak was confirmed and risk factors included lack of vaccination, contact with measles cases, malnutrition and lack of knowledge on measles prevention. We instituted a mass vaccination campaign and also provided health promotion information in the Maasai language with messages emphasizing nutrition, vaccination and measles prevention.

KEYWORDS: Maasai, measles, malnutrition, maculopapular rash

International Poster 12

Epidemiology of Electrocution Death Identified by Flood-Related Surveillance During the Worst Flood Disaster in Thailand, 2011

AUTHORS: Sukhum Piriyaornpipat, P. Siriarayaporn, H. Kanjanasombat, P. Mawiriya, S. Iamsirithaworn

BACKGROUND: Flood crisis had ravaged Thailand during August-December 2011, affected over 5.1 million populations. Of 919 deaths reported, 128 died from electrocution which was unprecedented before the disaster. This study describes causes of electrocution deaths and risk groups and prevention measures.

METHODS: A special surveillance system was established at the beginning of flood disaster to monitor causes of flood-related deaths. Data were obtained from Ministry of Interior and Forensic Department of hospitals in Bangkok, then asked health officers in flood areas to further investigate the event or we interviewed family members of the fatal cases. Definition of electrocution death was a person who died of an electric shock in Thailand's flooding area during August-December 2011.

RESULTS: Of 919 flood-related deaths, 83.4% were drowning, followed by electrocution (14.6%). De-tailed information was available in 92 electrocution deaths. Median age was 47 years, male was 4 times higher than female. Seventy-seven percent died in household and 14.1% on street. Staying in capital city and neighboring provinces increased risk of electrocution deaths compared to rural provinces (RR=4.1; 95%CI=2.5-6.7). Major cause was intentional touched electric devices while body wet (36.5%), followed by staying within 1.5 meters distance from electric source (14.9%). Almost all (96%) electrocution cases did not shut off circuit breakers in houses.

CONCLUSIONS: The number of electrocution death during the great flood in Thailand 2011 was significantly high in urban cities where residents did not allow electrical authority to cut off the power. Most died in house while touching electric devices. This information was immediately communicated to public and stakeholders to design innovative and proper interventions. The number of deaths had declined followed intensive risk communication through media.

KEYWORDS: electrocution death, flood disaster, circuit breakers

International Poster 13

Crab Meat: A New Vehicle for *Escherichia coli* O157 Identified During an Outbreak in UK, 2011

AUTHORS: Petra Matulkova, M. Gobin, F. Oshin, G. Thould, C. O'Connor, I. Oliver

BACKGROUND: Since 08/05/2011, the Health Protection Unit, South West England, was notified about six cases of infections with Vero cytotoxin-producing *Escherichia coli* (VTEC) O157 phage type (PT) 21/28 verotoxin (VT) 2 linked to Plymouth. From 08/11/2011 onwards we investigated to identify the source of the outbreak and prevent further spread.

METHODS: We defined a case as onset of diarrhea after 07/20/2011 in a person living in or visiting Plymouth 10 days before the onset, and with either laboratory diagnosis of VTEC PT21/28 VT2 or an epidemiological link to a laboratory-confirmed case. We searched for further cases using national surveillance and laboratory data. We compared cases with controls recruited among healthy persons living in Plymouth nominated by case-patients or recruited among Local Authority staff. We interviewed participants using a structured questionnaire. Environmental health officers conducted food and environmental investigations, including microbiological sampling and food supplier tracing.

RESULTS: The nine adult cases identified were laboratory-confirmed (n=8) and epidemiologically-linked (n=1). Six were from Plymouth and three were visitors. Symptom onset ranged between 07/31 and 09/16/2011. Compared with 28 controls (median age: 54.5 years, 61% female), the eight laboratory-confirmed cases (median age: 60.5 years, 75% female) reported eating crab meat away from home more often (88% versus 11%; OR=58; 95% CI 4-2700). The suspect crab meat was identified and linked to a local, unapproved supplier whose unregulated processing site could not be inspected.

CONCLUSIONS: This outbreak points to crab meat as a new possible vehicle of *E. Coli* O157 infection. By 08/19/2011 we removed all suspect crab meat from food establishments and alerted local outlets about the importance of using only approved suppliers. Since then no further associated cases have been reported.

KEYWORDS: *Escherichia coli* O157, crab, outbreak, vehicle

International Poster 14

The Effect of Formal Written Communication on Male Partner Participation in the Prevention of Mother to Child HIV Transmission (PMTCT) Programme in Zvimba District, Zimbabwe, 2010

AUTHORS: Bernard Madzima, W. Nyamayaro, A Chadambuka, M. Tshimanga

BACKGROUND: Data from the Zimbabwe 2001 National Sentinel Surveillance Survey of Antenatal mothers showed HIV seroprevalence of 30%. Men are recognized as key stakeholders in reproductive health issues. In Zvimba District in 2009, only 6.25% of pregnant women had HIV testing together with their partners. Pregnant women are advised to invite their partners for HIV testing through verbal communication.

METHODS: A randomized control trial (RCT) was conducted at three hospitals in Zvimba District to determine if formal written communication will improve male participation in PMTCT. Male partners of pregnant women attending ANC were followed up after having been randomly assigned to either receiving formal written invitation or routine verbal invitation to participate in PMTCT. Males invited by any of the two methods were followed up and interviewed regardless of whether they had participated in PMTCT or not. The follow up period was up to the second ANC visit.

RESULTS: Of the 402 males invited, 303 (73.5%) participated in the study. Of the 303, 183 (60.4%) had been invited by letter. Males were more likely to participate in PMTCT if they resided in urban areas [RR =1.44 95% CI (1.12-1.85)], being knowledgeable about PMTCT [RR=2.64, 95% CI (1.34-5.23)], knowing benefits [RR=2.33, 95% CI = (1.05-5.16)]. Males formally employed [RR=1.67, 95% CI = (1.18-2.37)] and those living within 10 kilometers from a health facility [RR =1.42, 95% CI =1.08-1.85)] were likely to participate. Males invited by formal letter were more likely to participate [RR =2.23, CI (1.59-3.12)].

CONCLUSION: Formal invitation of males using a written letter improved their participation in PMTCT. Writing of a formal letter to invite male partners to attend ANC was recommended to PMTCT program officers.

KEYWORDS: PMTCT, male participation, Zimbabwe

International Poster 15

Typhoid Outbreak Investigation in Dzivaresekwa Suburb of Harare City, Zimbabwe, 2011

AUTHORS: Monica Muti, N. Gombe, S. Mungofa, M. Tshimanga

BACKGROUND: Typhoid fever is a systemic infection caused by a gram negative bacterium, *Salmonella* Typhi. Harare City reported 1078 cases of suspected typhoid fever cases from October 2011 to January 2010. We initiated an investigation to identify possible source of transmission so as to institute control measures.

METHODS: An unmatched 1:1 case-control study was conducted. A questionnaire was administered to study participants to identify risk factors for contracting typhoid. A case was a resident of Dzivaresekwa who presented with signs and symptoms of typhoid between October and December 2011. Water samples were collected for microbiological analysis.

RESULTS: A total of 115 cases and 115 controls were enrolled. Drinking water from a well [OR= 6.2 95% CI (2.01-18.7)], attending a gathering [OR= 11.3 95% CI (4.3-29.95)], boiling drinking water [OR= 0.21 95% CI (0.06-0.76)] and burst sewer pipe at home [OR= 1.19 95% CI (0.67-2.14)] were factors associated with contracting typhoid. Independent risk factors for contracting typhoid were drinking water from a well [AOR=5.8; 95% CI (1.90-17.78)], and burst sewer pipe at home [AOR=1.20; 95% CI (1.10-2.19)]. Faecal coli forms and *E. coli* were isolated from 8/8 well water samples. Stool, urine and blood specimens were cultured and serotyped for *Salmonella* typhi and 26 cases were confirmed positive. Shigella, Giardia and *E. coli* were also isolated. Ciprofloxacin, X-pen and Rocephin were used for case management. No complications were reported.

CONCLUSIONS: Contaminated water from unprotected water sources was the probable source of the outbreak. Health education campaigns were conducted. Water storing containers and aqua tabs were distributed to 3000 households. Water trucking was conducted, 6 boreholes were drilled and burst sewer pipes were repaired.

KEYWORDS: typhoid, risk factors, Dzivaresekwa, Harare

SESSION L:

International Night

7:30–9:35 p.m.



Award Presentation
9:35

William H. Foege Award

ORAL PRESENTATIONS

Dunwoody Suites

WELCOME: Dr. Peter B. Bloland, Director, Division of Public Health Systems and Workforce Development, Improving Global Health Outcomes through Field Epidemiology Training and Public Health Response

MODERATORS: Kevin DeCock and Paul M. Kelly



WEDNESDAY

7:35

Linked Testing Using Rapid HIV Tests for Antenatal Care Sentinel Surveillance in Resource-Limited Settings: Evidence from Angola's Experience in 2009

AUTHORS: James C. Houston, S. Chen, C. Mendoza, M. Rodrigues

BACKGROUND: Antenatal Care Sentinel Surveillance (ANCSS) refers to periodic serologic surveys among women attending antenatal care and is a core activity of global HIV surveillance. ANCSS usually involves unlinked testing of blood samples leftover from routine care. Linked testing (LT) using HIV rapid tests to return results to women is not commonly used for ANCSS due to concerns about quality of on-site HIV rapid testing and need for consent. In 2009, Angola used a novel ANCSS approach using LT where clinicians obtained consent from women, performed rapid HIV tests, returned the result on the same day, and created dried blood spots (DBS) for quality-assurance testing. We assessed the quality of HIV rapid testing and acceptability of this approach to clinicians.

METHODS: We assessed concordance between rapid tests at ANCSS sites and ELISA tests performed at the national laboratory on the DBS samples made from all positive and a random sample of 10% of all negative rapid tests. We conducted one focus group with 18 representatives from stakeholders and interviewed staff at 4 of 36 ANCSS sites.

RESULTS: Overall 2,292 of 17,452 (13.1%) samples were retested with ELISA. Concordance between rapid and ELISA tests was 98.0%. During focus group discussions, national surveillance supervisors reported 100% of women consented to testing. However clinicians at ANCSS sites estimated up to 10 women (2%) per site refused testing; the number and characteristics of non-consenting women were not documented.

CONCLUSIONS: High concordance of test results suggests using LT for ANCSS may be feasible. However, improvements in documenting non-consenting women are needed as uncertainty regarding the number and characteristics of non-consenting women limit the ability to estimate the prevalence of HIV.

KEYWORDS: Angola, HIV, prevalence, pregnancy

7:55

Risk Factors for Critical Disease and Death from Hand, Foot, and Mouth Disease, Immunosuppressants and Immunostimulants — What Works? — Chongqing Municipality, China, 2011

AUTHORS: Yi-lin He, T. Shen, Q. Li, J. Long

BACKGROUND: In China hand, foot and mouth disease (HFMD) killed 1416 children in 2010-2011. Those years Chongqing Province had the 3rd (0.13%) and 1st (0.14%) highest case fatality rates in China. We conducted a study to identify risk factors for critical and fatal HFMD.

METHODS: We selected all fatal HFMD cases from 2010 to 2011 and all critical cases in 2011 as cases and noncritical HFMD inpatients matched by age and neighborhood as controls. Using univariable and multivariable unconditional logistic regression, we compared exposures from onset of HFMD obtained from the medical records and demographic information.

RESULTS: We investigated 90 critical cases (45 fatal) and 60 controls. The univariate analysis identified 7 risk and protective factors. In the multivariable model, before being diagnosed as critical, each additional visit to a doctor (odds ratio [OR] = 17, 95% confidence interval [CI] = 5.7-52), fever onset before rash (OR = 5.7, 95% CI:1.8-18) were associated. Among all drugs, 27% of cases had glucocorticoids compared to 8.3% of controls (OR = 6.5, 95% CI = 1.5-29), and 16% of cases received andrographolide compared to 58% of controls (OR = 0.27, 95% CI:0.08-0.87).

CONCLUSIONS: These findings support other observational studies in China that treatment with glucocorticoids, an immunosuppressant, before the development of critical disease, is a risk factor for development of critical and fatal HFMD. In contrast, andrographolide, a known immunostimulant, appears to have a protective effect. This underscores MOH recommendations that physicians not use glucocorticoids for mild HFMD. Andrographolide should undergo controlled clinical trials for treatment of enterovirus 71 infections.

KEYWORDS: andrographolide; adjuvants, immunologic; Chongqing Municipality, China; immunosuppression

8:15

Factors Associated with Interruption of Treatment Among Pulmonary Tuberculosis Patients in Plateau State — Nigeria, 2011

AUTHORS: Luka Ibrahim, P. Nguku, H. Akpan, S.H. Idris

BACKGROUND: Nigeria has one of the highest tuberculosis (TB) burdens in the world (311/100,000), and the largest in Africa. Multi-drug resistant TB (MDR-TB) is an emerging threat for TB control in Nigeria, caused mainly by incomplete treatment. This study explored factors that affect adherence to treatment among patients undergoing direct observation of TB treatment in Plateau state, Nigeria. **Methods:** Between June and July 2011, we reviewed medical records and interviewed randomly selected pulmonary TB patients in their eighth month of treatment. Study participant's clinical presentations and socio-demographic characteristics were obtained from medical records; Knowledge of treatment duration and reasons for default were obtained using a structured questionnaire. We conducted focus group discussions (FGD) with patients about barriers to treatment adherence. Data were analyzed with EpiInfo™ software.

RESULTS: Of 378 records reviewed, 229 (60.6%) patients were male; overall mean age was 37.6±3.5 years; 71 (18.8%) defaulted from treatment. Defaults were associated with lack of knowledge of treatment duration (OR: 3.72; CI 95%: 2.03–6.85), cigarette smoking (OR: 2.02; CI 95%: 1.11–3.67) and distance >5 kilometers from treatment sites (OR: 9.25; CI 95%: 4.94–17.38). Major reasons for default were lack of transport fare (40%) and feeling well (25.4%). FGD revealed unfriendly attitudes of health care workers as barriers to treatment adherence. Multivariate analysis revealed lack of knowledge of duration of treatment as an independent risk factor (OR: 4.63; 95% CI: 2.25–9.51) associated with interruption of treatment.

CONCLUSIONS: This study revealed patient knowledge of the duration of treatment, distance, and health worker attitude as major determinants for failure to adhere to TB treatment. Training for health care workers on patient education was conducted.

KEYWORDS: tuberculosis, multidrug-resistant, Nigeria

8:35

Cholera Outbreak at an Internally Displaced Person's Camp in a Flood Affected District — Muzaffargarh, Pakistan, 2010

AUTHORS: Shoaib Hassan

INTRODUCTION: Cholera's current (seventh) pandemic with high transmissibility and case fatality rate (CFR) is of high public health importance. It continued in Pakistan during August, 2010 floods with increasing global prevalence and CFR (2.38%). After confirmation of *Vibrio Cholerae* O1, El Tor Ogawa among internally displaced persons (IDPs) of a flood relief camp in Ali Pur, Pakistan this outbreak was investigated to reveal responsible factors, control it and prevent future such events. Methods: Descriptive study followed by the case-control study, introducing identical structured questionnaires to both cases and controls. Case defined as patient aged five years or more with acute watery diarrhea with or without vomiting, from the IDP camp between August 7, 2010 and August 15, 2010. Age and sex matched controls were selected from the same IDP camp with the ratio of 1:2. Risk factor analysis was performed in EpiInfo™ software version 3.5.3°.

RESULTS: Of the 81 IDPs, 54 enrolled as cases and controls had a mean age of 14 years with cholera prevalence of 22% and CFR 4.1%. Case rate was highest among 11-39 years age group with male: female of 1:1.5. Potential risk factors' association for bread consumed at the camp had OR 10.18 (95% CI: 2.08-56.67, $P<0.05$) and poor hygiene practices of those involved in making this bread was implicated for ongoing transmission, OR 31.5 (95% CI 1.7-1363.9, $P<0.05$).

CONCLUSIONS: Identifying bread and poor hygiene practices as outbreak responsible, our recommendations led to start of hygiene-care education campaigns that helped stop the ongoing transmission. This investigation resulted in World Health Organization's response at highest level with a well-equipped diarrhea treatment center in the area and periodic drinking water checked by town's local administration.

KEYWORDS: *Vibrio cholerae*, transmission, internally displaces persons

8:55

Effect of Educational Intervention to Prevent and Control the Increase Overweight and Obesity in Schoolchildren from Public Elementary Schools in Marginal-Urban District of Villa El Salvador in Lima, Peru from 2010 to 2011

AUTHORS: Julia Viviana Gago, A. Oscar, E.R. Zárate

BACKGROUND: Obesity is a worldwide public health problem. In urban Peru, prevalence of overweight in children aged 5 to 9 years is 18.1% and obesity 12%, in Villa El Salvador district (Lima) are 21.7% and 10.1% respectively. Elementary school coverage is almost 100%, an ideal environment to tackle malnutrition. This educational intervention aims to prevent and control the increase in body mass index (BMI), overweight and obesity.

METHODS: 521 schoolchildren of four elementary public schools from Villa El Salvador district participated in a quasi-experimental non-randomized controlled study, 201 were intervention group (I.G.) and 328 control group (C.G.). Multidisciplinary health promotion team, teachers, students and parents participated actively in the intervention which consisted in theoretical and practical sessions using the same standard educational material that promoted seven food and healthy life-styles messages. Anthropometric diagnosis using the WHO classification. Outcomes were BMI Z-score (BMIZ), overweight and obesity prevalence at the beginning and after a year of intervention. Time effects were assessed by changes in BMIZ (CI:95%).

RESULTS: The I.G. decreased overweight and obesity from 57 (28.4%) and 49 (24.4%) to 38 (18.9%) and 42 (20.9%) respectively. C.G. increased in obesity 68 (20.7%) to 88 (26.8%) and decreased in overweight (24.1%) to 75 (22.9%). Furthermore, I.G reduced BMIZ from 1.32 (SD:1.3) to 1.05 (SD:1.5) $p<0.05$ in I.G. In contrast, C.G. increase significantly BMIZ from 1.04 (SD:1.6) to 1.23 (SD:1.6) $p<0.05$.

CONCLUSIONS: The proposed methodology in a multi-sectoral educational intervention could be a community approach alternative to prevent and control overweight and obesity in schoolchildren from urban-marginal districts of major cities.

KEYWORDS: health promotion, elementary schools, overweight, obesity.

9:15

Space-Time Clusters Analysis of Cases of Whooping Cough-Barcelona, Spain, 2000 — 2011

AUTHORS: Rubén Solano, D. Gómez-Barroso, F. Simón, S. Lafuente, J. Caylà

BACKGROUND: Whooping cough is a highly contagious disease of childhood that affects the upper respiratory tract. It is endemic worldwide and appears occasionally in the form of outbreaks in children even after widespread vaccination.

OBJECTIVE: To identify space-time clusters of whooping cough in Barcelona in the period 2000-2011.

METHODS: In this retrospective space-time analysis we included individual cases of whooping cough reported to the Public Health Agency of Barcelona (PHAB) during the period 2000-2011. The population census of 2006 of the National Statistics Institute (NSI) stratified by age and sex and census tracts. We have used the space-time Scan Statistic assuming a Poisson distribution with restriction of 7 days and 500 meters maximum distance in the analysis. Maps have been developed with those clusters that showed statistical significance ($p < 0.005$). Statistical calculations were performed with Stata 11 and SatScant. Mapping was performed with Arcgis 10.0.

RESULTS: 283 cases of whooping cough were included in the analysis. The most likely cluster includes 5 census tracts located in three districts of central Barcelona during 17 to 23 August 2011. This cluster included 5 cases compared with the expected 0.0021 (RR = 2436.17, $p < 0.000026$). Also 12 secondary significant space-time clusters were detected. The secondary clusters occur at different time frames and localizations as shown on the map.

CONCLUSIONS: Spatial statistics methodologies can be complementary tools in epidemiological surveillance systems since it enables us to analyze an excess of cases in space and time and also to identify outbreaks not reported to the surveillance system.

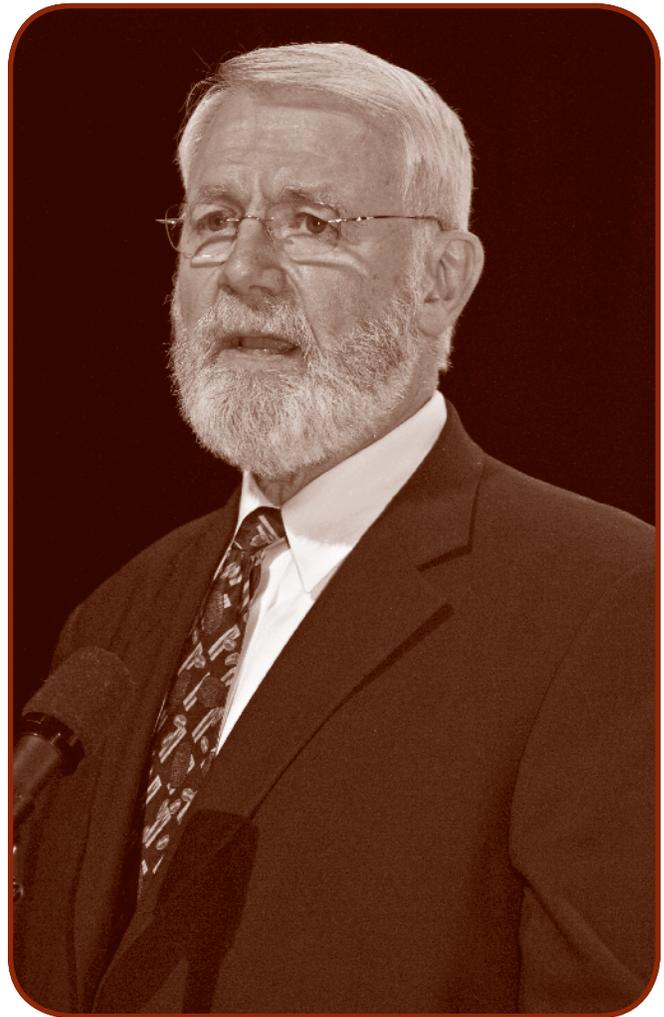
KEYWORDS: whooping cough, Barcelona, space-time analysis, surveillance, outbreak



Award Presentation

9:35

William H. Foege Award



WEDNESDAY

SESSION M:



Donald C. Mackel Award Finalists

8:30–10:15 a.m.

Weird Science

Ravinia Ballroom

MODERATORS: Rachel Kaufmann and Sherif Zaki



8:35

***Yersinia enterocolitica* Infections Associated with Pasteurized Milk — Southwestern Pennsylvania, March–August 2011**

AUTHORS: Allison H. Longenberger, M. Gronostaj, G. Yee, L. Johnson, J. Lando, R. Voorhees, K. Waller, M. Moll, A. Weltman

BACKGROUND: Outbreaks of *Yersinia enterocolitica* (YE), a potentially serious enteric illness, rarely have been associated with pasteurized milk. Routine surveillance detected 3 YE illnesses among persons who reported having drunk milk from a small local dairy (Dairy A). We investigated to identify the outbreak's scope and source.

METHODS: We reviewed surveillance and laboratory records for culture-confirmed YE during 2011 among residents of the 4 Pennsylvania counties served by Dairy A. Patients were interviewed; the dairy was inspected. Food, milk, and environmental samples were cultured by using standard cold (5°C) enrichment; food samples were also cultured by using novel room temperature (25°C) enrichment. Pulsed-field gel electrophoresis (PFGE) was used to subtype YE isolates.

RESULTS: Twenty-one YE illnesses were identified among patients with symptom onsets during March–August, 2011. Seven (33%) patients were hospitalized; 1 died. Sixteen (76%) had consumed Dairy A products, including pasteurized milk (16) and ice cream (3). Multiple environmental, water, and dairy product samples (including pre-pasteurized milk) did not yield YE with 5°C enrichment. An unopened container of ice cream and homemade yogurt (made with Dairy A milk) yielded YE only with novel 25°C enrichment (i.e., not with 5°C enrichment). Available isolates from ice cream, yogurt, and 9 Dairy A consumers were indistinguishable by PFGE. Isolates from 2 non-Dairy A consumers each had different PFGE patterns. Pasteurization temperatures were achieved, but equipment was worn and cleaning pumps underpowered; deficiencies were corrected.

CONCLUSIONS: This first documented use of room temperature enrichment to isolate YE during an outbreak validated the epidemiologic association between Dairy A and YE. Given the difficulty of isolating YE, multiple laboratory methods for food and environmental isolation should be considered.

KEYWORDS: *Yersinia enterocolitica*; dairy products; disease outbreaks; foodborne diseases; electrophoresis, gel, pulsed-field

8:55

***Serratia marcescens* Bloodstream Infections in Patients Receiving Total Parenteral Nutrition — Alabama, 2011**

AUTHORS: Neil Gupta, S. Hocevar, H. O’Connell, K. Stevens, S. Massingale, M. McIntyre, D. Kuhar, J. Noble-Wang, A. Kallen

BACKGROUND: Total parenteral nutrition (TPN) is a commonly-used intravenous formulation of nutrients for severely ill patients. Compounding pharmacies commonly prepare TPN using sterile, manufactured components whenever possible to reduce risk of contamination. In March 2011, five *Serratia marcescens* bloodstream infections (BSIs) were identified from one hospital; TPN from Pharmacy A was a common exposure. An investigation was conducted to identify contamination sources and prevent further infections.

METHODS: Cases were defined as *S. marcescens* BSIs in patients receiving TPN from Pharmacy A between 1/1/2011 and 3/15/2011. Cases were identified via laboratory and pharmacy record review; case-patient medical records were reviewed. Pharmacy A compounding practices were examined and environmental samples obtained. Genetic relatedness of clinical and environmental *S. marcescens* isolates was determined by pulsed-field gel electrophoresis (PFGE). Studies simulating Pharmacy A’s amino acid filter-sterilization conditions were conducted.

RESULTS: Nineteen case-patients from six hospitals receiving Pharmacy A TPN were identified (35% March attack rate); all were aged >18 years. Nine case-patients died. Because of a manufacturer shortage, Pharmacy A began compounding and filter-sterilizing amino acids for adult TPN in October 2010. Review of this process identified breaches in mixing, filtration, and sterility testing practices. *Serratia marcescens* was identified from a mixing container, amino acid powder, and a Pharmacy A water faucet. These isolates were indistinguishable from case-patient isolates by PFGE. Simulation of Pharmacy A’s substandard filter-sterilization procedures demonstrated breakthrough of *S. marcescens* in the post-filtered amino acid solution.

CONCLUSIONS: Higher-risk compounding of amino acids was initiated due to a national shortage. Failure to follow recommended filter-sterilization practices resulted in an outbreak of *S. marcescens* BSIs. To prevent similar outbreaks, pharmacies must understand and adhere to current compounding standards.

KEYWORDS: disease outbreaks, drug compounding, parenteral nutrition, amino acids, *Serratia marcescens*

9:15

Pyrrolizidine Alkaloid Toxicity as the Cause of Unknown Liver Disease — Tigray, Ethiopia, 2007–2011

AUTHORS: Danielle E. Buttke, R. Wang, T. Bayleyegn, E. Yard, K. Sircar, C. Martin

BACKGROUND: Since 2002, more than 1000 persons have been diagnosed with a liver disease of unknown etiology (case fatality rate = 38%) in Tigray, Ethiopia. After multiple investigations, the leading hypothesis was a plant-source pyrrolizidine alkaloid (PA) exposure through contaminated food. However, confirmatory methods did not exist previously. We employed novel laboratory methods to assess community PA exposure and toxicity in both 2008 and 2011 samples.

METHODS: We conducted a case-control study using 2007–2011 community census and surveillance data. Cases had epigastric pain and abdominal distension. We analyzed questionnaire data on consumption, farming, and animal husbandry practices, measured PAs in food using gas chromatography/tandem-mass spectroscopy, and measured PA pyrrole-protein adduct in serum using a novel liquid chromatography/mass spectroscopy. We used Mantel-Haenszel Chi-Square and Mann-Whitney U test for statistical comparisons in SAS 9.2.

RESULTS: We identified 111 cases and 180 controls. PA adduct was detected in 57 (51%) cases and 71 (39%) controls. The median serum PA adduct concentration was significantly higher in cases than in controls (0.20 nM versus 0.10 nM; $P = 0.006$). The food-sample analysis identified PAs produced by local weeds in grain, and demonstrated a significantly higher median PA content in case households than in control households (0.23 ppm versus 0.08 ppm; $P = 0.018$). Cases weeded their fields significantly less often than did controls.

CONCLUSIONS: This investigation confirms widespread PA exposure, and supports PA toxicity as causing the liver disease in Tigray. This community-based study is the first to evaluate serum adducts as a biomarker for PA toxicity and provides a framework for local agricultural interventions and future response to one of the largest foodborne outbreaks of human PA toxicity.

KEYWORDS: pyrrolizidine alkaloids, liver disease, food contamination, toxicology

9:35

Characterization of Patients Infected with Influenza B Viruses with a Novel I221V Neuraminidase Mutation — North Carolina and South Carolina, 2010–2011

AUTHORS: Shikha Garg, J. McKenna, N. Lee, A. Bishop, J. Dailey, A. Fleischauer, S. Kilpatrick, K. Sleeman, T. Sheu, C. Springs, L. Gubareva, Z. Moore, A. Fry

BACKGROUND: During 2010–2011, influenza B viruses with a novel neuraminidase (NA) mutation, denoted I221V, associated with reduced in vitro oseltamivir susceptibility were identified in North Carolina (NC). To determine the clinical significance of I221V, we investigated the extent of circulation of B viruses with I221V (B/I221V), whether I221V arose during oseltamivir use, and characteristics of patients infected with B/I221V.

METHODS: During November 2010–March 2011, we tested all B viruses from the NC and South Carolina (SC) state public health laboratories and B viruses submitted to CDC from other states for I221V by NA inhibition assay and/or pyrosequencing. We conducted medical record reviews and phone interviews of NC and SC patients tested for I221V.

RESULTS: I221V was detected in 45 (22%) of 209 and 6 (12.5%) of 48 B viruses from NC and SC patients, respectively; 56% of NC patients and 83% of SC patients lived in counties near Charlotte, NC. No B viruses tested from 34 other states (n = 324) had I221V. Infection with B/I221V was not associated with differences in age, underlying conditions, clinical illness, hospitalizations or deaths. No patients with B/I221V infection had received oseltamivir prior to specimen collection. Among 73 patients who completed oseltamivir treatment, 12 patients with B/I221V infection [median 5 days (range: 3–12 days)] reported a longer duration until illness resolution compared with 61 patients without B/I221V infection [median 3 days (range: 2–21 days)]; P = 0.02.

CONCLUSIONS: B/I221V co-circulated with wild-type viruses in NC and SC during 2010–2011. The presence of I221V did not affect clinical illness from B virus infection but may have reduced oseltamivir effectiveness. Surveillance for B/I221V is ongoing.

KEYWORDS: influenza B Virus, neuraminidase, mutation, oseltamivir

9:55

Outbreak of *Escherichia coli* O157:H7 Infections Associated with Consumption of Strawberries Contaminated by Deer — Oregon, July–August 2011

AUTHORS: Mathieu Tourdjman, M. Laidler, G.L. Buser, T. Hostetler, K. Repp, M. Samadpour, W. Keene

BACKGROUND: *Escherichia coli* O157 (O157) causes approximately 97,000 illnesses annually in the United States and can cause renal failure and death. In August 2011, laboratory surveillance identified an outbreak of O157 infections with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns. We investigated to identify the source and recommend control measures.

METHODS: We defined confirmed cases as O157 infection with the PFGE outbreak pattern during July–August 2011. We defined presumptive cases as coincident diarrheal illness among household members of confirmed patients. We conducted an age-, sex-, and neighborhood-matched case-control study. Sales tracebacks identified suppliers. The implicated farm was inspected; water, soil, plant, and deer feces were sampled and screened for O157 by polymerase chain reaction and cultured. PFGE was performed on O157 isolates.

RESULTS: Fifteen cases were identified (14 confirmed, 1 presumptive) among Oregon residents with onsets during July 10–28. Median age was 68 (range: 4–85) years; 11 patients were female. Four persons experienced hemolytic uremic syndrome; 2 died. Consumption of strawberries from roadside stands or farmers markets was associated with illness (matched odds ratio: 19.6; P < .001). Tracebacks implicated Oregon Farm A strawberries. Deer feces were visible in all Farm A strawberry fields. O157 was cultured from 14/456 (3%) environmental samples; 10 isolates matched the outbreak pattern by PFGE. Only deer feces samples cultured positive.

CONCLUSIONS: This is the first reported O157 outbreak linked to strawberries. Strawberries were contaminated by deer feces, a previously implicated source of O157. Laboratory testing of a broad environmental sample size confirmed the source of infection. Risk for bacterial contamination from deer might be mitigated by safe agricultural practices, including prevention of deer intrusion into produce fields.

KEYWORDS: *Escherichia coli* O157, disease outbreaks, foodborne diseases, fragaria, deer

SESSION N:



J. Virgil Peavy Award Finalists

10:30–11:55 a.m.

Against All Odds

Ravinia Ballroom

MODERATOR: Philip S. Brachman



10:35

Heat-Related Illness Among Migrant Farmworkers — Georgia, 2011

AUTHORS: Nancy L. Fleischer, H. Tiesman, J. Sumitani, T. Mize, M. Murphy

BACKGROUND: Migrant farmworkers are at risk for heat-related illness (HRI) at work. The purpose of this study was to determine which risk factors, if intervened upon, would most reduce the prevalence of HRI symptoms among migrant farmworkers in southern Georgia.

METHODS: We conducted in-person interviews of adults who attended Emory University Physician Assistant Program's South Georgia Farmworker Health Project clinics from June 11–23, 2011. We used population intervention models (PIMs), a causal inference method, to assess where the greatest potential impact could be made to reduce the prevalence of three or more HRI symptoms. Targeted Maximum Likelihood was used to estimate the parameter of interest, which was the difference between the expected value of experiencing symptoms for those with the optimal level of exposure (counterfactual level) and the actual prevalence in the study sample.

RESULTS: A total of 468 adults participated in the survey. Most participants were currently working in agriculture (86.5%), and 34.4% had experienced three or more HRI symptoms in the past week. Migrant farmworkers faced barriers to preventing HRI at work, including lack of training (78.9%), and no access to regular breaks (33.6%), shade (26.9%), or medical attention (26.3%). Using PIMs, we could potentially reduce the prevalence of HRI symptoms by intervening on taking breaks in the shade (-7.0%), reducing soda intake (-6.4%), or increasing access to medical attention (-5.9%).

CONCLUSION: The largest potential impact for reducing HRI symptoms among migrant farmworkers in south Georgia could be made by intervening on work environments and hydration techniques. Heat standards to protect outdoor workers similar to those in CA and WA should be developed at the national level for states to adopt.

KEYWORDS: heat stress disorders, migrant workers, agricultural workers' diseases, primary prevention

10:55

Changes in Adult Participation in Leisure-Time Walking — United States of America, 2005 to 2010

AUTHORS: Prabasaj Paul, D. Carroll, J. Fulton

BACKGROUND: Physical activity (PA) lowers the risk for many common chronic diseases and premature death. According to HHS's 2008 Physical Activity Guidelines for Americans, adults should engage in ≥ 150 minutes/week of moderate-intensity aerobic activity. Walking is the most commonly reported leisure-time PA among U.S. adults. This study examines changes in self-reported leisure-time walking among U.S. adults between 2005 and 2010.

METHODS: Using data from the National Health Interview Survey of 2005 ($n=31,428$) and 2010 ($n=27,157$), we conducted logistic and log-linear regression analyses (adjusted for sex, age group, race/ethnicity, education and weight-classification) to assess changes between 2005 and 2010 in the prevalence of walking (≥ 1 10-minute bout in the previous week), and in mean weekly walking-time among adults who reported walking. Using combined 2005 and 2010 data, we also assessed the relationship between walking and adherence to the aerobic PA guideline.

RESULTS: Among U.S. adults, prevalence of leisure-time walking increased from 41.5% [95% CI (40.7%–42.4%)] in 2005 to 49.6% (48.7%–50.5%) in 2010 [adjusted odds-ratio 1.37 (1.31–1.44)]. Among walkers, average minutes/week spent walking decreased [2005: 90.0 (88.1–91.9); 2010: 80.2 (78.5–81.8); adjusted decrease by 10.5% (7.9%–13.1%)]. The overall increase in prevalence and decrease in average walking-time also occurred within each demographic and weight-classification category examined. The prevalence of guideline adherence was 60.6% (59.8%–61.5%) among walkers and 29.1% (28.3%–29.8%) among non-walkers [aOR = 3.46 (3.28–3.64)].

CONCLUSION: More U.S. adults reported leisure-time walking in 2010 but their average walking-time decreased. Our finding that the prevalence of guideline adherence was substantially higher among leisure-time walkers suggests that promotion of leisure-time walking may be one approach to increasing aerobic PA in this population.

KEYWORDS: walking, physical activity, guideline, National Health Interview Survey.

11:15

Using Social Context to Explain Racial/Ethnic Differences in the Risk of Preterm Births — Texas, 2004–2008

AUTHORS: Noha H. Farag, B. Gunnels, D.M. Bensyl, R. Kingsley, M. Canfield, R. Martin, I. Ahluwalia

BACKGROUND: Preterm birth (PTB) is the leading cause of neonatal mortality in the United States with substantial race/ethnicity disparities. Individual-level characteristics cannot explain observed disparities; community-level factors lack consistent availability for analysis. We used individual- and community-level characteristics to examine race/ethnicity disparity for PTB.

METHODS: By using 2004–2008 data from the Texas Pregnancy Risk Assessment Monitoring Survey (PRAMS), we calculated population-weighted prevalence estimates for PTB by level of prenatal risk factors (socioeconomic status, maternal age, stress, chronic morbidity). PRAMS and census data were linked to obtain community-level characteristics (neighborhood poverty, racial composition). By using the traditional approach to account for survey design (design-based methods) we fit logistic regression models to examine effect modification by race/ethnicity among risk factors and PTB. We compared results with those obtained using multilevel logistic regression (model-based methods).

RESULTS: Prevalence of PTB was 16% among non-Hispanic blacks, and 11% among Hispanics and non-Hispanic whites. No individual-level factors differentially affected risk for PTB among the 3 race/ethnicity groups. However, effects of community-level factors varied by race/ethnicity ($P=.003$). Hispanic women residing in majority black and predominantly black neighborhoods had higher risks for PTB (odds ratio [OR]=1.4; confidence interval [CI]: 1.1–1.9 and OR=2.2; CI: 1.6–4.0, respectively), while black women residing in majority black, and predominantly black neighborhoods had lower risks for PTB (OR=0.8; CI: 0.5–1.0, and OR=0.4; 95% CI: 0.2–0.9), compared with counterparts residing in predominantly white neighborhoods. Model-based methods severely biased standard errors.

CONCLUSIONS: Findings highlight the importance of examining social conditions and their interactions with individual characteristics to resolve persistent PTB racial/ethnic disparity problems. Consideration of statistical methods is important when analyzing community-level characteristics.

KEYWORDS: premature birth, risk factors, censuses, statistics.

11:35

Role of Norovirus Gastroenteritis in the Ambulatory Setting — United States, 2000–2009

AUTHORS: Paul A. Gastañaduy, A. Hall, A. Curns, U. Parashar, B. Lopman.

BACKGROUND: Gastroenteritis remains an important cause of morbidity in the US, most being of undetermined etiology. Norovirus is the leading cause of epidemic gastroenteritis, but its contribution to ambulatory endemic gastroenteritis is unknown, due to lack of widely available diagnostics.

METHODS: Using MarketScan (insurance claim) databases, cause-specified and cause-unspecified gastroenteritis coded emergency department (ED) and outpatient visits were extracted for July 2000 to June 2009. Using cause-specified proportions, time-series regression models were fitted to predict the number of unspecified gastroenteritis due to specific pathogens other than norovirus. After removing specific pathogens, background, and secular trends, model residuals were used to estimate norovirus visits, by subtracting the minimum monthly residual for each seasonal year from each monthly residual.

RESULTS: From 2000–2009, an annual mean of 938,994 visits (501 visits per 10,000 persons) due to cause-unspecified gastroenteritis occurred, representing 95% of all-cause gastroenteritis. The annual mean rate of norovirus-associated ED and outpatient visits was 13 and 56 cases per 10,000 persons, respectively, across all age-groups. Rates were higher during known norovirus epidemic seasonal years 2002/03 and 2006/07: 22 and 16 ED, and 57 and 77 outpatient visits per 10,000 persons, respectively. Rates for age groups 0–17, 18–64, and ≥65 years, were 16, 12, and 15 ED, and 123, 34, and 54 outpatient visits per 10,000 persons, respectively. Norovirus was estimated to cause 14% of all gastroenteritis and 51% of norovirus visits occurred from November to February.

CONCLUSIONS: Norovirus is a substantial cause of diarrheal disease in the ambulatory setting, particularly affecting children and the elderly, exhibits winter seasonality, and surges with emergence of new strains. These findings support development of rapid diagnostics and vaccines.

KEYWORDS: norovirus, gastroenteritis, ambulatory care, United States

12:30

SPECIAL SESSION:

Polio: EIS Response to a Public Health Emergency

LOCATION: Dunwoody Suites

MODERATORS: Sara Lowther, Diana Bensyl, and Robert Linkins

FOCUS OF SESSION: On December 2, 2011, CDC Director Thomas R. Frieden, MD, MPH, activated CDC's Emergency Operations Center to strengthen the agency's partnership engagement through the Global Polio Eradication Initiative (GPEI), which is committed to eradicating polio. On December 14, Dr. Frieden enlisted the support of the entire CDC community to become active participants in an intensified strategy to eradicate polio worldwide. This session will provide an update on EIS Officer work to meet this agency initiative. This session will also highlight potential future opportunities in polio eradication for all CDC staff and partners who are in attendance at the conference. CAPT Linkins will briefly describe the EOC activation and needs. EIS Officers will describe recent experiences in-country and provide an overview of the types of epidemiologic, surveillance, and programmatic activities they conducted. The second half of the session will be a question and answer session regarding field experiences.

- South Sudan and India: On the Campaign Trail in South Sudan and India. *Cristina V. Cardemil*
- Kenya Response
- Back to My Roots: Going Home to Kenya to Help Eradicate Polio. *Renmatus Mdodo*
- Seeing the Whole Picture: Kenya's Polio Surveillance and Immunization Systems from the Clinic to the National Level. *Heather M. Scobie and Cara N. Halldin*
- Reaching Pastoral Communities for Polio Vaccination: Is Animal Health the Answer? *Danielle Tack*
- Sudan Response: You Can't Choose Your Neighbors: Dealing with Polio Importation When Borders Are Shared with 7 Countries. *Noha H. Farag*

THURSDAY

SESSION 0:

Vaccine-Preventable Diseases

1:30–3:15 p.m.



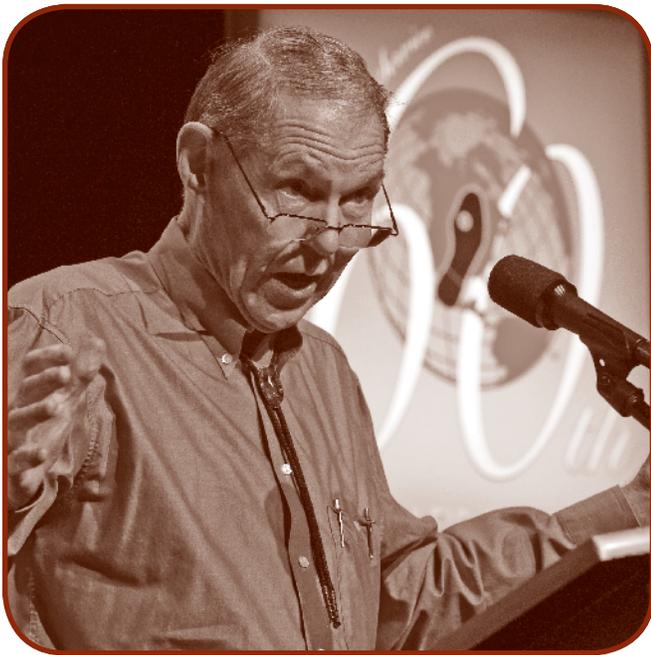
Award Presentation

Iain C. Hardy Award

Hot Shots

Ravinia Ballroom

MODERATOR: Melinda Wharton



1:35

Racial Disparities in Invasive Pneumococcal Disease — United States, 1998–2009

AUTHORS: Jonathan M. Wortham, K. Gershman, J. Baumbach, M. Farley, L. Harrison, R. Lynfield, A. Reingold, W. Schaffner, S. Petit, A. Thomas, S. Zansky, B. Beall, M. Moore.

BACKGROUND: *Streptococcus pneumoniae* (pneumococcus) causes approximately 43,000 invasive pneumococcal disease (IPD) cases annually in the U.S. and disproportionately affects blacks more than whites. PCV7, a vaccine introduced in 2000, protects against disease from seven of >90 pneumococcal serotypes. PCV13, introduced in 2010, protects against 6 additional serotypes. We estimated the potential benefit of PCV13 in reducing racial disparities in IPD.

METHODS: IPD cases were defined as isolation of *S. pneumoniae* from normally sterile sites in hospitalized children <5 years residing in any Active Bacterial Core surveillance area during 1998–2009. Race was imputed for ~15% of cases with unknown race based on relationships between race and other variables, such as state of residence and age. We compared pre-PCV7 IPD rates for black and white children with those in 2009.

RESULTS: We identified 3,395 cases. Rates decreased from a pre-PCV7 average of 23 (cases per 100,000 population) to 11 in 2009 in white children and from 58 to 23 in black children. Rate ratios between black and white children were 2.5 (pre-PCV7) and 2.1 in 2009. The rate caused by PCV7 serotypes decreased from 19 in white children and 48 in black children to <0.5 in both races. Rates caused by PCV13 serotypes not in PCV7 increased from 3 to 8 in white children and from 7 to 14 in black children.

CONCLUSIONS: The racial disparity in PCV7 serotypes was eliminated. Rates of IPD in black children remained more than twice those of white children due to an increase in the PCV13 serotypes not in PCV7. PCV13 has the potential to reduce both rates of IPD and the rate difference between blacks and whites.

KEYWORDS: *Streptococcus pneumoniae*, pneumococcal vaccines, continental population groups, child

1:55

Impact of Quadrivalent Meningococcal Conjugate Vaccine (MenACWY) Coverage on Disease Incidence in the United States, 2005–2010

AUTHORS: Sarah A. Meyer, J.R. MacNeil, S. Stokley, C. Dorell, T. Santibanez, T.A. Clark, N.E. Messonnier, A.C. Cohn

BACKGROUND: In 2005, quadrivalent meningococcal conjugate vaccine (MenACWY) was routinely recommended for 11-18 year-olds. U.S. vaccination coverage in 13-17 year olds reached 62.7% in 2010 but varied substantially by state (26-90%). Measuring impact of vaccination is challenging in the setting of historically low meningococcal disease incidence.

METHODS: To assess direct and population effect of variability in increasing vaccine coverage, we used Pearson's correlation coefficient to compare the slope of vaccine coverage over time with the slope of meningococcal disease incidence by state among 13-17 year olds, <5 year olds, and ≥25 year olds. We used National Immunization Survey-Teen coverage estimates for 13-17 year-olds during 2008-2010. States were grouped into quintiles based on 2010 coverage data. Vaccine coverage was assumed to be 0% in 2005. We included all cases of *Neisseria meningitidis* reported through the National Notifiable Diseases Surveillance System during 2005-2010. US census data were used to calculate state-specific disease incidence.

RESULTS: Meningococcal disease incidence declined from 0.41 to 0.27 cases per 100,000 during 2005-2010. For 13-17 year olds, state-specific analysis revealed a correlation of -0.47 between the positive coverage slope and negative disease incidence slope ($P < 0.01$). In the state-grouped analysis, there was a stronger correlation of -0.89 ($P = 0.04$). There was no correlation between adolescent coverage and disease incidence for < 5 year olds and ≥25 year olds.

CONCLUSION: This ecologic analysis suggests that states with more rapid uptake of MenACWY vaccine have achieved greater declines in meningococcal disease in adolescents. Absence of declines in non-vaccinated age groups suggests lack of herd immunity. Increasing uptake in low coverage states will be important to achieve maximum benefit of the adolescent MenACWY vaccine.

KEYWORDS: meningococcal disease, vaccine effectiveness, adolescent vaccination

2:15

Rise in Risk of Pertussis in the 6 Years Following Complete Diphtheria-Tetanus-Acellular-Pertussis (DTaP) Vaccination — Minnesota and Oregon, 2010

AUTHORS: Sara Y. Tartof, M. Lewis, C. Kenyon, K. White, A. Osborn, J. Liko, E. Zell, T. Clark, T. Skoff

BACKGROUND: Despite high coverage with pertussis childhood vaccines, reported pertussis cases increased in 2010, particularly among children aged 7–10 years. Acellular pertussis vaccines (DTaP) were recommended for all 5 doses in 1997; the first cohorts to receive all DTaP are now 7–10 years old. Rising rates of pertussis in this age group may be due to waning immunity following the DTaP series.

METHODS: These cohort analyses included Minnesota and Oregon children born between 1998–2003 who had 5 DTaP doses recorded in state Immunization Information Systems. Immunization records were merged with state-wide pertussis surveillance data. Incidence rates and rate ratios were calculated for the six years following receipt of 5th DTaP dose.

RESULTS: Our cohorts included 224,378 Minnesota children and 179,011 from Oregon; 521 and 99 pertussis cases developed in Minnesota and Oregon, respectively. Pertussis incidence rates rose each year of follow-up: 21.8/100,000 (95% confidence interval [CI]: 16.4–28.6) at year 1 to 152.0/100,000 (CI: 125.6–181.9) at year 6 (Minnesota); 6.15/100,000 (CI: 3.3–10.6) in year 1 to 25.8/100,000 (CI: 16.0–39.4) in year 6 (Oregon). Rate ratios increased from 1.62 (CI: 1.1–2.3) in year 2 to 7.0 (CI: 5.0–9.7) in year 6 (Minnesota) and from 1.37 (CI: 0.6–3.0) in year 2 to 4.2 (CI: 2.0–8.8) in year 6 (Oregon).

CONCLUSIONS: This study reports steady increase in risk of pertussis in the years following completion of the 5-dose DTaP series in 2 different states. This rise is likely attributable to waning immunity from DTaP vaccines. Continued evaluation of DTaP duration of protection is needed to better understand waning immunity and determine the appropriateness of timing of pertussis vaccinations.

KEYWORDS: pertussis, diphtheria-tetanus-acellular pertussis vaccines, immunity, registries

2:35

An Outbreak of Varicella in the 2-Dose Vaccine Era: A Diagnostic Dilemma?

AUTHORS: Abdirahman Mahamud, R. Wiseman, S. Grytdal, C. Basham, J. Asghar, T. Dang, J. Leung, A. Lopez, D. Schmid, S. Bialek

BACKGROUND: In response to outbreaks among highly vaccinated populations, a routine second dose of varicella vaccine was recommended for all children in 2006. We investigated a suspected varicella outbreak in School District X, Texas, to confirm varicella as the etiology and determine 2-dose varicella vaccine effectiveness (VE).

METHODS: A case of varicella was defined as an illness with maculopapulovesicular rash without other explanation and with onset during April 1–June 10, 2011, in a School District X student. We conducted a retrospective cohort study involving students attending two elementary schools (Schools A and B) with the majority of cases. Lesion, saliva, and environmental specimens were collected for varicella-zoster virus (VZV) PCR testing. VE was calculated using historic attack rate among unvaccinated.

RESULTS: In School District X, 82 varicella cases were reported, including 60 from Schools A and B. All cases were mild, with a median of 14 lesions. All 10 clinical specimens and 58 environmental samples tested negative for VZV. Two-dose varicella vaccination coverage was 66.4% in Schools A and B. Varicella VE was 80.9% (95% CI: 67.2–88.9) among 1-dose vaccinees and 94.7% (95% CI: 89.2–97.4) among 2-dose vaccinees in School A, with a 2nd-dose incremental VE of 72.1% (95% CI: 39.0–87.3). Varicella VE among School B students did not differ significantly by dose (80.1% vs. 84.2% among 1-dose and 2-dose vaccinees, respectively).

CONCLUSION: Laboratory testing could not confirm varicella as the etiology of this outbreak; however, VE suggests varicella as the likely cause. Better diagnostics are needed to ensure accurate diagnosis of varicella in vaccinated individuals so that appropriate outbreak control measures can be implemented and 2-dose VE can be determined.

KEYWORDS: varicella outbreak, varicella vaccination

2:55

Measles Outbreak Associated with International Travel — Indiana, 2011

AUTHORS: Melissa G. Collier, A. Cierzniewski, T. Duszynski, P. Kutty, J. Duwve, P. Pontones

BACKGROUND: Endemic measles was eliminated in the United States during 2000, but outbreaks from imported cases occur. Five epidemiologically linked measles cases were reported on June 20, 2011, to the Indiana State Department of Health. We investigated to identify additional cases and contacts and to prevent spread.

METHODS: We used the Council of State and Territorial Epidemiologists 2010 measles case definition. Contact investigations during the June 20–August 13 outbreak period identified measles-exposed persons who were in the same room with a measles patient or ≤ 2 hours after the patient left. Exposed persons without documented measles-mumps-rubella vaccinations, birth before 1957, physician letter confirming childhood disease, or documented measles immunoglobulin G titers, were offered serologic testing to determine immunity.

RESULTS: Contact investigations identified the index patient, an unvaccinated U.S. resident aged 24 years, who experienced a measles-like rash on June 3 while flying commercially from Indonesia; measles was not considered during hospitalization June 7–9. Among 838 exposed persons identified through contact investigation, 412 (49%) had documented measles immunity; 354 (42%) were lost to follow-up or declined testing; and 72 (9%) lacked evidence of immunity. In total, 14 confirmed measles illnesses were identified (10 [71%] female; median age: 11.5 years [range: 15 months–27 years]). Thirteen patients were unvaccinated members of 1 extended family. One additional hospitalization and no deaths were reported.

CONCLUSIONS: The unvaccinated index patient with recent travel history to a measles-endemic region was identified after secondary cases were reported. Clinicians should consider measles among patients with recent travel and promptly report suspected illnesses. Measles exposures might have been prevented if the index case had been identified earlier.

KEYWORDS: measles, disease outbreaks, measles-mumps-rubella vaccine, epidemiology

SESSION P:

Pediatrics

3:30–4:55 p.m.

The Descendants

Ravinia Ballroom

MODERATOR: Lorraine Yeung



3:35

Treatment Quality for Children Seen by Health Workers Trained To Use Integrated Management of Childhood Illness Guidelines in Benin

AUTHORS: Laura C. Steinhardt, F. Onikpo, A. Rowe

BACKGROUND: The aim of the World Health Organization's Integrated Management of Childhood Illness (IMCI) strategy is to improve treatment of leading causes of child deaths in developing countries. Although studies have found that training health workers (HWs) to use IMCI guidelines increases treatment quality, these studies also identified important deficiencies. To improve performance, clearer understanding of factors influencing HW practices is critical. Our study aimed to investigate associations of patient- and HW-level factors with recommended treatment for children 2–59 months old with potentially life-threatening illnesses in Benin.

METHODS: We analyzed >9000 outpatient consultations performed over 14 months by 32 IMCI-trained HWs in Benin. Detailed assessment, diagnosis, and treatment data were abstracted from IMCI-adapted registers after training in 2001.

RESULTS: We classified 8,277 children with ≥ 1 potentially life-threatening illness (77.2% had malaria, 34.4% anemia, 30.4% pneumonia, and 16.5% diarrhea). On average, 63.7% of children received recommended treatment, although performance varied widely by HW (range: 14.7–87.5%). Multivariate logistic regression modeling revealed that treatment quality was poorer for children >12 months old (odds ratio [OR] = 0.55; $P < 0.0001$); with more symptoms (OR = 0.95 per additional IMCI task required; $P < 0.0001$); with danger signs (OR = 0.33; $P < 0.001$); with anemia (OR = 0.27; $P < 0.0001$); and seen by older HWs (each year of age reduced recommended treatment odds by 4.1%; $P = 0.01$). The number of supervision visits HWs received was not related to performance.

CONCLUSIONS: Our findings illustrate how factors outside managers' control (e.g., HW and patient age) can influence HW performance. Quality improvement strategies, such as redesigned supervision, job aids, or targeted training, which are within managers' control, may overcome these weaknesses.

KEYWORDS: IMCI, child health, health workers, Benin

3:55

Asthma Is Associated with Increased Acute Chest Syndrome Diagnoses During Hospital Admission Among Children with Sickle Cell Disease — United States, 2005

AUTHORS: Ijeoma Azonobi, A. Grant, S. Grosse, S. Guh, T. Nurmagambetov, M. DeBaun

BACKGROUND: Acute chest syndrome (ACS) accounts for approximately 20% of deaths among U.S. children with SCD. ACS and asthma share inflammatory pathways. Asthma may potentiate ACS in children with sickle cell disease (SCD). We examined the relationship between asthma and ACS diagnoses made in children with SCD during pediatric emergency department visits (EDVs) and inpatient admissions (IAs) using population-based data.

METHODS: We identified children ages 3–21 in 2005 with SCD using the 2002–2005 Thomson Reuters MarketScan® Medicaid Multistate Database. Using *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes and National Drug Codes for asthma reliever medications, we determined asthma status; using ICD-9-CM codes we identified ACS diagnoses. We calculated rates of ACS diagnoses per patient-year among SCD-diagnosed children, with and without asthma, during EDVs and IAs and determined the odds of having ACS, controlling for hydroxyurea use. We used standard and Mantel-Haenzel chi-square tests for bivariate comparisons and set statistical significance at ≤ 0.05 and at 95% confidence intervals (CI).

RESULTS: Of 1,726 children with SCD, 28% (n= 484) had asthma. Rate of ACS per patient-year during EDVs was 0.07 for children with asthma compared to 0.05 in the non-asthma group ($P= 0.06$). Rate of ACS during IAs among children with asthma was 0.26 episodes per patient-year compared to 0.17 in the non-asthma group ($P < 0.001$). Odds of having an inpatient diagnosis of ACS was 2.17 times higher among children with asthma compared to those without when controlling for hydroxyurea use (CI: 1.62–2.19).

CONCLUSIONS: This is the first population-based study to demonstrate that children with SCD and asthma are more likely to be diagnosed with ACS during an inpatient hospital admission than those without asthma.

KEYWORDS: sickle cell, asthma, acute chest syndrome

4:15

Are Children in Puerto Rico Lead Free? A Population-Based, Cross-Sectional Assessment of Childhood Lead Poisoning — Puerto Rico, 2010

AUTHORS: Alejandro Azofeifa, T. Dignam, B. Rivera, J. Rullán, M. Rullán, C. Dooyema, A. Creanga, A. Baghal, M.J. Brown

BACKGROUND: Lead poisoning can cause anemia and affect intellectual development, growth, and hearing. Children particularly are susceptible to lead poisoning. In Puerto Rico, blood lead testing is mandatory for children enrolled in Head Start and Medicaid programs; however, no population-based data exist on the prevalence of elevated blood lead levels (BLLs) or potential sources of lead exposure among children. We assessed the prevalence of elevated BLLs among children and potential environmental lead sources in Puerto Rico.

METHODS: We conducted a population-based, cross-sectional two-stage cluster household survey in 363 households with children aged 1–5 years. We interviewed parents using a standardized questionnaire to collect data on socio-demographics and known sources of lead. Blood samples were collected from all children, while environmental samples (soil, water, and dust) were obtained from a random sample (n=259) of surveyed households. CDC defines BLLs ≥ 10 $\mu\text{g}/\text{dL}$ as the level of concern.

RESULTS: Of 440 children tested for lead, 425 (96.6%) had BLLs < 5 $\mu\text{g}/\text{dL}$; 12 (2.7%) had BLLs 5–9 $\mu\text{g}/\text{dL}$; three (0.7%) had BLLs ≥ 10 $\mu\text{g}/\text{dL}$. The weighted estimated national prevalence of elevated BLLs was 1% among children aged 1–5 years. Environmental sampling showed greater than acceptable lead levels in water for three (1.2%) households and in the floor-dust composite in one household.

CONCLUSIONS: The prevalence of an elevated BLL among Puerto Rican children aged 1–5 years was low and comparable to the most recent U.S. national estimate (1.6%). Few environmental lead hazards were identified in households surveyed. Our findings suggested that the policy of mandatory blood lead testing among Medicaid children should be revised with a process for targeted screening of specific communities in Puerto Rico.

KEYWORDS: lead poisoning, prevalence, risk factors, children, Puerto Rico.

4:35

Risk Factors for Abusive Head Trauma in Young Children — United States, 2000–2009

AUTHORS: Thomas Niederkrotenthaler, D. Sugerman, L. Xu, S. Parks

BACKGROUND: Abusive head trauma (AHT) is the leading cause of child maltreatment-related fatalities in the United States. The goal of this study was to characterize young children who had AHT to better inform primary prevention efforts and post-injury response.

METHODS: Using the recent CDC AHT case definition, we performed a retrospective secondary analysis of 2000, 2003, 2006 and 2009 hospitalization data using the Kids Inpatient Database from the Healthcare Cost and Utilization Project. Logistic regression was used to compare AHT to non-abusive head trauma (NAHT) inpatients <2 years of age. Socio-demographic data and known indicators of socioeconomic status (i.e., insurance status and household income), injury severity (i.e., length of hospital stay and vital status), hospital specialization (i.e., teaching status), hospital region, and admission time (i.e., year and season) were used as independent variables.

RESULTS: A weighted sample of 7,108 AHT and 25,339 NAHT patients was identified, including 500 AHT deaths and 449 NAHT deaths. Children with AHT were more often <1 year of age (adjusted odds ratio [aOR] = 2.64; 95% confidence interval [CI]: 2.32–3.00); uninsured (aOR = 1.72; 95% CI: 1.29–2.30), hospitalized longer (aOR = 8.40; 95% CI: 7.39–9.54), died during hospitalization (aOR = 5.16; 95% CI: 4.06–6.56), and seen at teaching hospitals (aOR = 1.46; 95% CI: 1.21–1.76) as compared to NAHT patients.

CONCLUSIONS: Our findings suggest that socioeconomically disadvantaged families with children <1 year of age are an important target population in primary prevention efforts. Hospitals need to continuously refine training to identify and provide rapid treatment for AHT in young children.

KEYWORDS: child abuse, domestic violence, shaken baby syndrome, craniocerebral trauma, traumatic brain injuries, United States

FRIDAY, APRIL 20

SESSION Q: Surveillance

8:30–9:55 a.m.

Spies Like Us

Ravinia Ballroom

MODERATORS: James W. Buehler and Denise Koo



8:35

How Complete Is Automated Reporting for Coronary Heart Disease? Improvement in Data Quality of Pilot Acute Coronary Heart Disease Surveillance System After System Changes — Nebraska, 2011

AUTHORS: Kristin M. Yeoman, B. Buss, T. Safranek, E. Murphy

BACKGROUND: Coronary heart disease (CHD) is Nebraska's leading cause of death and hospitalization. For more timely data, the Nebraska Department of Health and Human Services (NDHHS) initiated pilot surveillance on July 20, 2011 to identify acute CHD through automated data transfer from tertiary-care Hospital A. We evaluated system performance initially and after improvements were implemented.

METHODS: During July 20–September 13 (initial operation), Hospital A transmitted each hospitalization record (N = 1,789) to NDHHS on day 14 postdischarge; during October 1–October 31, to address missing data from coding delays, records (N = 1,676) were transmitted 1 day after International Classification of Diseases (9th rev.) (ICD-9) coding. An NDHHS SAS® program identified presumed acute CHD hospitalizations (i.e., ICD-9 discharge codes matching myocardial infarction [MI], percutaneous transluminal coronary angioplasty [PTCA], or coronary artery bypass grafting [CABG]). Data were compared with Hospital A's internal cardiovascular registry for MI, PTCA, and CABG.

RESULTS: During initial operation, NDHHS identified 39 hospitalizations (34 in registry, 5 others miscoded as acute CHD). Of an additional 63 registry records, 2 were missed by surveillance, and 61 were not transmitted to NDHHS. After system changes, NDHHS identified 37 hospitalizations (33 in registry, 4 miscoded). Of an additional 17 registry records, 2 were missed by surveillance, and 15 (all observation patients) were not transmitted. Records lacking ICD-9 codes decreased from 12% to 6%. Sensitivity improved from 36% to 66% and predictive value positive from 87% to 89%.

CONCLUSIONS: This system is not ready for expansion to additional hospitals. Modifying record transmission timing improved sensitivity, but data-extraction algorithm changes are necessary to capture observation patients. Our findings demonstrate the importance of evaluating pilot surveillance systems.

KEYWORDS: *International Classification of Diseases; coronary disease; coronary artery bypass; angioplasty, balloon, coronary*

8:55

Completeness and Timeliness of Electronic Versus Conventional Laboratory Reporting for Communicable Disease Surveillance — Oklahoma, 2011

AUTHORS: Matthew G. Johnson, K. Bradley, L. Smith-ee, A. Lee, J. Williams, C. McDonald-Hamm

BACKGROUND: The Health Information Technology for Economic and Clinical Health (HITECH) Act encourages meaningful use of certified electronic health record technology; insurance reimbursement can be denied if criteria are unmet. A core component of HITECH compliance is nationwide electronic laboratory reporting (ELR) implementation for communicable disease surveillance. In Oklahoma, laboratories with 400 positive tests annually for reportable diseases are mandated to use ELR. Of 11 such laboratories, 2 have adopted ELR and 9 are in transition. We compared completeness and timeliness of ELR versus conventional reporting in anticipation of statewide ELR expansion.

METHODS: We retrospectively reviewed confirmed reportable disease cases during January 1–June 30, 2011, excluding tuberculosis, hepatitis, sexually transmitted infections, diseases without laboratory diagnoses, and immediately reportable diseases. We compared ELR with conventional reporting (mail, facsimile, telephone, and Internet) assessing data completeness by 8 key demographic and 2 laboratory fields in each disease report and timeliness by percentage of cases reported within the required 1 business day.

RESULTS: Overall, 511 reports met inclusion criteria, representing 14 of 61 reportable diseases; 22% had been submitted by ELR. Data completeness was 99.5% for ELR and 98.2% for conventional reporting. Of 438 cases with laboratory confirmation date, 76% (81/106) of ELR reports and 78% (260/332) of conventional reports were timely. Among ELR reports, 94% (62/66) from Laboratory A and 46% (18/39) from Laboratory B cases were on time; Laboratory A sends reports 7 days/week, whereas Laboratory B sends reports 6 days/week.

CONCLUSIONS: Both reporting methods were complete. ELR did not yield improved timeliness overall, but Laboratory A had improved timeliness versus conventional reporting. To optimize ELR's benefit, reporting frequency should be standardized before statewide ELR expansion.

KEYWORDS: electronic health records, Oklahoma, population surveillance, epidemiology, communicable diseases, disease notification

9:15

Non-O157 Shiga Toxin-Producing *Escherichia coli* (STEC) — California, 2004–2010

AUTHORS: Joyanna M. Wendt, C. Crandall, D. Vugia, E. Weiss, D. Gilliss

BACKGROUND: Shiga toxin-producing *Escherichia coli* (STEC) can cause severe enteric infections and the potentially life-threatening hemolytic uremic syndrome (HUS). Although the epidemiology of serogroup O157 has been well-described, the burden of illness resulting from non-O157 serogroups has been underrecognized as a result of diagnostic limitations and inadequate surveillance. We describe the epidemiology of non-O157 STEC in California during 2004–2010.

METHODS: We used California mandatory surveillance case reports of culture-confirmed STEC illness with symptom onset during January 2004–December 2010. We described non-O157 patient demographics and compared the proportion of non-O157 STEC complicated by HUS with O157 by using Chi-square, and median days from illness onset to laboratory confirmation by using Wilcoxon test.

RESULTS: In California during 2004–2010, of 2,029 STEC cases reported, 359 (17.7%) were non-O157. Among those patients, median age was 9.5 years (range: 0–101); 199 (55.4%) were female; 140 (40.0%) were non-Hispanic white; 3 (0.8%) were non-Hispanic black; 135 (37.6%) were Hispanic; 19 (5.3%) were Asian; and 62 (17.2%) were other or were missing data. A lower proportion of non-O157 STEC cases was complicated by HUS, compared with O157 (3.1% versus 9.0%; $P < .001$). Median days from illness onset to laboratory diagnosis was longer for non-O157 STEC, compared with O157 (9.0 versus 5.0; $P < .001$), but not significantly different when the infection was complicated by HUS (4.0 versus 5.0; $P = .96$).

CONCLUSIONS: Although a lower proportion of non-O157 illness was complicated by HUS, non-O157 remains an important cause of enteric infection and HUS. Efforts to reduce diagnostic delay should be encouraged so that STEC infections can be diagnosed and treated rapidly and outbreak response initiated.

KEYWORDS: *Escherichia coli*, Shiga-toxigenic *Escherichia coli*, hemolytic-uremic syndrome

9:35

Surveillance of Gender-Based Violence — Belize, 2011

AUTHORS: Katherine A. Fowler, V. Espitia, A. Crosby, S. Parks, L. Dahlberg

BACKGROUND: Gender-based violence (GBV) comprises physical, sexual and psychological harm directed toward women and girls. The World Health Organization estimates 30–60% of women worldwide experience one or more forms of GBV in their lifetime. Although Belize has a surveillance system that tracks GBV, the Ministry of Health (MoH) estimates that it captures only 15% of GBV cases. We evaluated the system at the request of the MoH and Pan-American Health Organization to improve its accuracy and inform prevention.

METHODS: We evaluated the system on CDC criteria: sensitivity/predictive value positive; timeliness and completeness of reporting; flexibility; acceptability to stakeholders and data providers; simplicity; stability; and representativeness. We interviewed stakeholders, conducted site visits, and reviewed completed encounter forms (n=114).

RESULTS: The system has strengths: public health importance and high data completeness for reported cases (90%). It also has weaknesses: It lacks clear objectives and case definitions, thus missing true cases (lowered sensitivity) and including inappropriate cases (lowered predictive value positive). Multisectoral reporting increases data collection, but non-standardized reporting procedures across agencies add complexity, and printed forms reduce flexibility. Confidentiality concerns and lack of training and feedback from MoH hinder participation by data providers and staff, causing low acceptability and underreporting (~5% of all cases are captured). Underreporting is highest in rural indigenous districts, further reducing representativeness. Timeliness is moderate; staff turnover compromises stability, reducing timely reporting.

CONCLUSIONS: The system could provide a foundation for the public health response to GBV in Belize, but it is currently underused. To improve its usefulness, we recommend establishing clear objectives and case definitions; regular training; confidentiality protocols; and increasing communication between administrators and stakeholders to increase acceptability of the system.

KEYWORDS: surveillance, violence, domestic violence, partner abuse, child abuse, rape

SESSION R:



Award Presentation

10:15-10:30

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

Late-Breaking Reports

10:30–11:45 a.m.

The Hangover

Ravinia Ballroom

MODERATORS: Douglas H. Hamilton and Jacqueline Miller

See supplement for presenters and abstracts.



SESSION 5:

Global Immunization

1:30–3:15 p.m.

Great Expectations

Ravinia Ballroom

MODERATOR: Anne Schuchat



1:35

Effect of Rotavirus Vaccination on Childhood Diarrhea-Related Mortality — Mexico, 2003–2010

AUTHORS: Paul A. Gastañaduy, R. Desai, E. Sanchez-Uribe, M. Esparza-Aguilar, U. Parashar, M. Patel, V. Richardson.

BACKGROUND: In Mexico, substantial declines in diarrhea deaths have been documented since the introduction of rotavirus vaccine in 2007. Because of concerns about lower vaccine efficacy in poor populations with high mortality, we compared reductions in diarrhea mortality in lesser developed Southern regions compared to more developed Northern and Central regions of Mexico.

METHODS: We obtained data from national vital statistics on diarrhea-related deaths among children <5 years of age from 2003 through 2010. We compared region-specific diarrhea-related mortality before (2003–2006) and after the introduction of vaccine (2009–2010). Vaccine coverage was estimated from administrative data and regional socioeconomic status was estimated using the human development index.

RESULTS: In Northern, Central, and Southern Mexico, the 2005 human development index was 0.85, 0.82, and 0.79, respectively; an estimated 72.2%, 68.1%, and 76.8% of children <12 months of age had received rotavirus vaccine in 2009. Diarrhea-related mortality fell from 8.3, 17.9, and 28.5 deaths per 100,000 children during 2003–2006 to 4.5, 9.0, and 16.8 in 2009–2010 in Northern, Central, and Southern Mexico, respectively, corresponding to rate reductions of 46% (95% confidence interval [CI]: 33%–56%; $P<0.001$), 50% (95% CI: 44%–54%; $P<0.001$), and 41% (95% CI: 31%–48%; $P<0.001$). No significant differences were observed in reductions of diarrhea mortality between regions ($P>0.4$).

CONCLUSIONS: After rotavirus vaccine introduction, a significant decline in diarrhea-related deaths among children was observed across all three regions of Mexico with distinctly different levels of development, including the lowest income region of Southern Mexico with the highest diarrhea mortality. These findings provide evidence of the beneficial effects of rotavirus vaccination against fatal rotavirus disease and support vaccine introduction in high-mortality, resource-limited settings.

KEYWORDS: rotavirus vaccines, diarrhea, mortality, Mexico

1:55

Worldwide Spread of Pandemic Influenza A (H1N1)pdm09 During 2009–2010 and Seasonality as a Characteristic of Transmission

AUTHORS: Aaron D. Storms, M.D. Van Kerkhove, E. Azziz-Baumgartner, M.A. Widdowson, N.M. Ferguson, T.W. Mounts

BACKGROUND: Understanding how influenza A (H1N1)pdm09 (H1N1pdm09) activity varied with geography and time of year may help us understand the behavior of future pandemic viruses.

METHODS: We obtained influenza virology data compiled by the World Health Organization from June, 2009–August, 2010. We selected countries with >70% of weeks with data and >120 H1N1pdm09-positive samples. We assessed influenza activity by calculating the weekly proportion of influenza-positive samples by subtype out of all influenza A-positive samples (proportion positivity), identified the peak of H1N1pdm09 activity, and number of weeks from H1N1pdm09 detection until peak activity. We compared these parameters between countries with different climates. We compared H1N1pdm09 activity between countries where H1N1pdm09 detection coincided with the start of the country's historical influenza season versus countries where detection occurred at other times. We quantified each country's percent H1N1pdm09-positive specimens out of all influenza A-positive specimens and correlated it with the country central latitude.

RESULTS: We analyzed data from 80 countries. The median peak H1N1pdm09 proportion positivity was significantly different between temperate (0.17), subtropical (0.12) and tropical (0.11) regions ($P < 0.001$). Countries where H1N1pdm09 was detected during the start of their influenza season had a median of 8 weeks from H1N1pdm09 detection until peak activity, versus 22 weeks in countries where detection occurred at other times ($P < 0.001$). There was a positive correlation between the percent of H1N1pdm09-positive specimens and country central latitude (Pearson's correlation: 0.59; $P < 0.0001$).

CONCLUSIONS: Pandemic viruses may be more likely to become predominant in temperate countries where they may have higher peak activity. Countries that first identify pandemic strains at the start of their influenza season may have less time before facing peak activity.

KEYWORDS: influenza, human; influenza A virus, H1N1 subtype; seasonal variation; pandemics

2:15

Impact Assessment of a Mass Typhoid Fever Vaccination Campaign — Fiji, 2011

AUTHORS: Heather M. Scobie, E. Nilles, J. Kool, T. Hyde, E. Mintz, A. Dawainavesi, S. Singh, M. Kama, S. Korovou, K. Jenkins, K. Wannemuehler, K. Date

BACKGROUND: Typhoid fever (TF) is a life-threatening disease that is endemic in Fiji (annual incidence >100/100,000 population). During June–December 2010, a mass TF vaccination campaign was conducted in Fiji targeting 65,000 persons >2 years old in cyclone and outbreak-affected areas (8% of Fiji's population). As TF vaccine has primarily been used for travelers and rarely in post-disaster or outbreak settings, we conducted an impact evaluation of the campaign.

METHODS: Clinical TF cases from national notifiable disease surveillance and culture-confirmed TF cases from laboratory surveillance were analyzed. Relative changes in cases nationwide were calculated for the high season period post-campaign (January–June, 2011) versus the 3-year average for the same period pre-campaign (January–June, 2008–2010). In 3 vaccinated and 2 unvaccinated subdivisions with >10 reported cases in each high season period pre-campaign, we used log-binomial regression to estimate risk ratios and 95% confidence intervals (CIs) for the proportion of blood and stool cultures that yielded the TF agent, *Salmonella* Typhi, post- versus pre-campaign.

RESULTS: Nationwide, the decrease in clinical and culture-confirmed cases post-campaign versus pre-campaign was 26% (200 versus 269) and 19% (216 versus 267), respectively. In two unvaccinated subdivisions, risk ratios for the proportion of cultures positive post- versus pre-campaign were 2.0 [CI: 1.3, 3.1] and 1.2 [CI: 0.86, 1.7]. In three vaccinated subdivisions, risk ratios for the proportion of cultures positive post- versus pre-campaign were 0.13 [CI: 0.04, 0.40], 0.46 [CI: 0.24, 0.87], and 0.69 [CI: 0.46, 1.1].

CONCLUSIONS: Post-campaign, confirmed TF cases in Fiji decreased in vaccinated areas, while increasing in unvaccinated areas. Further evaluation is needed to define the role of vaccination for prevention and control of endemic TF and TF outbreaks.

KEYWORDS: typhoid vaccination, Fiji, post-disaster, typhoid outbreak

2:35

Risk Factors for Measles Mortality Among Somali Refugees Displaced by Famine, Kenya, 2011

AUTHORS: Abdirahman Mahamud, A. Burton, M. Hassan, J. Ahmed, M. Abdikadir, H. Omar, G. Mohamed, R. Eidex, S. Shetty, C. Navarro-Colorado, J. Goodson

BACKGROUND: Measles among displaced populations can result in epidemics with high mortality rates. A large laboratory confirmed measles outbreak occurred in the five refugee camps in Dadaab, Kenya after an influx of refugees fleeing famine and conflict in Somalia. We investigated the outbreak to identify predictors of measles mortality and provide recommendations to reduce deaths.

METHODS: A measles case was defined as an illness with fever, maculopapular rash, and either cough, coryza or conjunctivitis with rash onset during June 6–November 11, 2011. Vaccination status was determined by parental or case-patient recall. Age- and camp-specific case fatality rates (CFRs) were calculated. A retrospective cohort analysis of measles patients hospitalized during June 6–September 10, 2011 was done using logistic regression to identify independent predictors of mortality.

RESULTS: Among 1366 reported case-patients, 259 (19%) had previous measles vaccination, 544 (40%) were <15 years-olds, 554 (40%) were 15–29 years-olds, and 268 (20%) were >30 years-olds. Of 32 reported measles-related deaths, 18 occurred among the 388 hospitalized case-patients included in the retrospective analysis. Age-specific CFRs were 2.0% among <15 years-olds, 2.2% among 15–29 year-olds, and 3.4% among >30 year-olds. Camp-specific CFRs ranged from 0.8% to 8.6%. Independent risk factor for measles mortality were neurological complications (RR = 12.7, 95% CI = 3.2–51.4), malnutrition (RR = 9.0, 95% CI = 2.4–34.1), and admission to hospital Z (RR = 4.2, 95% CI = 1.3–13.0).

CONCLUSIONS: The wide range of camp-specific CFRs might have occurred due to differences in quality of medical care and community outreach services. In addition to increasing measles vaccination coverage, these findings suggest that improving nutritional status and hospital care practices might reduce measles mortality among refugees.

KEYWORDS: measles, mortality, refugee camps

2:55

The Added Contribution of the Second Stool Specimen to Wild Poliovirus Detection — India, 2000–2010

AUTHORS: Cristina V. Cardemil, M. Rathee, H. Gary, K. Wannemuehler, A. Anand, O. Mach, S. Bahl, S. Wasilak, H. Jafari, M. Pallansch

BACKGROUND: Testing two stool specimens from patients aged <15 years with acute flaccid paralysis (AFP) is standard of practice for wild poliovirus (WPV) detection. Since 2004, testing of AFP patients in India has increased to improve WPV detection. Collecting a single specimen might decrease collection and testing burden, if surveillance quality is not compromised. We investigated stool specimen sensitivity for WPV detection in India to understand the contribution of the second specimen.

METHODS: We reviewed WPV isolation data for 303,984 children aged <15 years with AFP during 2000–2010. Using maximum likelihood estimation, we determined specimen sensitivity for each stool specimen, combined sensitivity for both specimens, and sensitivity added by the second specimen. Sensitivity estimates were evaluated by the interval from paralysis onset to stool collection, specimen quality, and patient age; the Wald chi-square was used to test for equality of mean specimen sensitivities.

RESULTS: Among 5,184 patients with WPV isolates, 382 (7.4%) were identified only by the second specimen. Sensitivity was 91.4% (95% confidence interval [CI]: 90.5%–92.2%) for the first specimen and 84.5% (95%CI: 83.4%–85.5%) for the second specimen. Combined sensitivity was 98.7% (95%CI: 98.1%–99.2%); the second specimen increased sensitivity by 7.3% (95%CI: 5.9%–8.6%). Specimen and combined sensitivity declined, and added sensitivity increased, as the paralysis onset to stool collection interval increased (P = 0.032), if specimens were inadequate (P = 0.037) and for children aged 60–180 vs 0–59 months (P = 0.069).

CONCLUSIONS: The second stool specimen contributed substantially to WPV detection. Maximum sensitivity is important to detect WPV transmission. To achieve polio eradication, health officials in India should collect two stool specimens from each AFP patient.

KEYWORDS: poliomyelitis, sensitivity, India, surveillance

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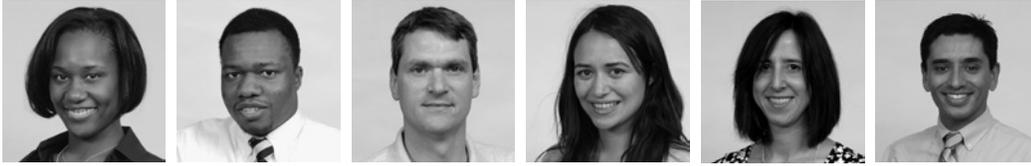
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Storms, Aaron D.* - NCIRD
Swaminathan, Mahesh* - CGH
Tack, Danielle - NCEZID
Tartof, Sara Y.* - NCIRD



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 Baker, Charlotte - NCBDDD



Baughman, Penelope - NIOSH
 Baublatt, Jane A.G.* - SEPDPPO
 Behbod, Behrooz* - NCEH
 Briggs, Melissa A.* - CGH
 Britton, Carla - SEPDPPO
 Buser, Genevieve L.* - SEPDPPO



Chiu, Cindy H.* - NCEH
 Clarke, Kevin - CGH
 Dantes, Raymund B.* - NCEZID
 Davis, Stephanie - CGH
 Dokubo, Kainne E.* - CGH
 Dooling, Kathleen L.* - NCIRD



Espiritu, Jennifer - SEPDPPO
 Fakhouri, Tala H. I.* - NCHS
 Fitter, David - CGH
 Fleming, Eleanor B.* - NCHHSTP
 Fowler, Katherine A.* - NCICPC
 Garrett, Tiana A.* - SEPDPPO



Gastañaduy, Paul A.* - NCIRD
 Ghaji, Nafisa* - NCBDDD
 Grant, Yoran T.* - SEPDPPO
 Greenbaum, Adena H.* - NCIRD
 Griese, Stephanie E.* - SEPDPPO
 Gronostaj, Michael* - SEPDPPO



Halldin, Cara N.* - NIOSH
 Hancock, William - NCEZID
 Hoots, Brooke E.* - NCHHSTP
 Houston, James C.* - CGH
 Houston, Keisha A.* - NCCDPHP
 Imanishi, Maho - NCEZID



Introcaso, Camille E.* - NCHHSTP
 Jain, Neena S.* - SEPDPPO
 Johnson, Matthew G.* - SEPDPPO
 Joseph, Rachael - SEPDPPO
 Kinzer, Michael H.* - SEPDPPO
 Lam, Eugene - NCCDPHP



Lankau, Emily - NCEZID
 Laufer, Alison S.* - NCEZID
 Lo, Terrence - NCHHSTP
 Ludwig, Alison - SEPDPPO
 Luo, Robert F.* - NCHHSTP
 Mahajan, Reena* - NCHHSTP



Mdodo, Rennatus - NCHHSTP
 Meyer, Sarah A.* - NCIRD
 Mikosz, Christina A.* - SEPDPPO
 Musolin, Kristin - NIOSH
 Nerlander, Lina - NCCDPHP
 Nguyen, Duc B.* - NCEZID



Niederkrotenthaler, Thomas* - NCIPC
Nunez, Jonathan J.* - SEPDPO
Parker, Erin M.* - NCIPC
Paul, Prabasaj* - NCCDPHP
Pillai, Satish .K.* - NCEH
Pride, Kerry R.* - SEPDPO



Raczniak, Gregory - NCEZID
Said, Maria A.* - SEPDPO
Scobie, Heather M.* - CGH
See, Isaac* - NCEZID
Slayton, Rachel B.* - NCEZID
Smith, Rachel M.* - NCEZID



Sreenivasan, Nandini - NCEZID
Styles, Timothy S.* - SEPDPO
Taylor, Eboni M.* - NCEZID
Tian, Niu* - NCCDPHP
Toprani, Amita* - SEPDPO
Tsai, Rebecca - NIOSH



Walters, Maroya S.* - NCEZID
Wendt, Joyanna M.* - SEPDPO
Wong, Karen K.* - NCIRD
Wortham, Jonathan M.* - NCIRD
Yasmin, Seema* - SEPDPO
Yendell, Stephanie - NCEZID



Yeoman, Kristin M.* - SEPDPO

** Presenting EIS Officers*

Incoming EIS Officers, Class of 2012

Abanyie, Francisa MD, MPH
Adams, Laura DVM, MPH
Agaku, Israel BDS, MPH
Ahmad, Nina MD, MPH
Alami, Negar MD
Anderson, Tara PhD, MPH
Bagchi, Suparna DrPH, MSPH, MSc
Beaudoin, Amanda DVM, PhD
Brinker, Kimberly MSN, MPH, BSN
Canon, Abbey DVM, MPH
Choi, Mary MD, MPH
Cooley, Laura MD, MPH
David, Patricia MD, MSPH
Demirijian, Alicia MD
Djawe, Kpandja PhD
Doker, Thomas DVM, MPH
Durand, Lizette VMD, PhD
Edison, Laura DVM, MPH
Geller, Andrew MD
Gerbi, Gemechu PhD, MSc
Gilbert, Leah MD, MSPH
Gunnala, Rajni MD, MPH
Harris, Aaron MD, MPH
Havers, Fiona MD, MHS
Hickox, Kaci MSN, MPH, BSN
Idowu, Rachel MD, MPH
Irving, Shalon PhD, MPH, MS
Iyengar, Preetha MD
Johnson, Jonetta PhD(c), MPH
Johnson, Candice PhD(c), MSc
Kamiya, Hajime MD, MPH
Ko, Stephen MD, MPH, MA
Kumar, Gayathri MD
Landman, Keren MD
Lebo, Immaculate MBChB, MPH
Lederer, Philip MD
Leshem, Eyal MD
Levri, Kara MD, MPH
Lind, Jennifer PharmD, MPH
Lloyd, Spencer MD, MPH
Lowe, Michael PhD(c), MSPH
Lozier, Matthew PhD, MPH
McCague, Anna-Binney MD
McNeil, Carrie DVM, MPH
McNelley-Epson, Erin MD
Mercado, Carla PhD(c), MS
Miller, Leigh PhD, MSW
Morris, Jamae PhD(c), MA
Murti, Michelle MD, MPH
Nakao, Jolene MD, MPH
Nguyen, Vuong MD, MPH
Nnadi, Chimeremma MBBS, PhD(c), MPH, MS
Nyaku, Mawuli DrPH(c), MPH
Osadebe (Odofin), Lynda DVM, PhD(c), MSPH
Patton, Monica MD
Plucinski, Mateusz PhD(c), MPhil, MPH
Purfield, Anne PhD
Quinn, Celia MD, MPH
Quinto, Kenneth MD, MPH
Rha, Brian MD, MSPH(c)
Ridpath, Alison MD, MPH
Ross, Christine MD, MPHTM, BSN
Ruktanonchai, Duke MD
Russell, Elizabeth PhD, MSc
Salyer, Stephanie DVM, MPH
Schafer, Ilana DVM, MSPH
Schwitters, Ameer PhD(c), MPH
Sein, Carolyn MBBS
Shiferaw, Miriam MD, MPHc
Shumate, Alice PhD
Stahre, Mandy PhD(c), MPH
Thomas, Dana MD, MPH
Thompson-Paul, Angela PhD(c), MSPH
Todd, Suzanne DVM, MPHc
Volper-Ellis, Esther, PhD
Vora, Neil MD
Wallace, Ryan DVMc, MPH
Warren, Tatiana PhD(c), MS
Watson, Joanna DPhil, MSc
Wernimont, Susan PhD, MS
Wilken, Jason PhD, MPHc
Woodring, Joseph DO, MPH, MTMM, BSN
Yablon, Brian MD
Yuen, Courtney PhD, ScB

